3. Submission Analysis

3.1 Project Rationale

3.1.1 Rationale for Raising of Hinze Dam

The Stage 3 upgrade of Hinze Dam is proposed to be undertaken to meet three key objectives

- reduce flooding in the lower Nerang River catchment by increasing the flood mitigation capability of Hinze Dam. This is addressed in Section 2.1.1 in Volume 1 of the EIS; and
- increasing the storage capacity of the dam and the water supply available from Hinze Dam. This is addressed in Section 2.1.2 in Volume 1 of the EIS; and
- ensuring that the dam complies with current safety standards and guidelines. This is addressed in Section 2.1.3 in Volume 1 of the EIS.

The submissions received in relation to the EIS have questioned the volume of water supply that will be gained from the raising of Hinze Dam, the bringing forward of the plans to undertake the Stage 3 works, and the need for the designed flood immunity.

Water Supply

The Gold Coast Water Futures report prepared by GCCC in 2005 outlined strategies and options for increasing water supply to the Gold Coast identified the raising of Hinze Dam as a key element of the overall strategy. In addition the South East Queensland Regional Water Supply Strategy identified a range of measures that will provide enough water for the short, medium and long term needs for the South East Queensland region. The raising of Hinze Dam was one of the initiatives identified in the strategy.

An emergency regulation under the *Water Act 2000* was made by the State Government in August 2006 which requires that Hinze Dam Stage 3 deliver a target of 16ML/day of additional yield by 31 December 2010.

Therefore under Schedule 10B Measures of the *Regulation*, in relation to Hinze Dam, GCCC is responsible for Measure 11:

Description of Measure	Service Provider	Target (ML/day)	Date
11 Take all necessary steps to prepare for, and construct, Hinze Dam Stage 3 and prepare for associated water harvesting works	Gold Coast City Council	16	31December 2010

The provision of additional water supply from Hinze Dam Stage 3 and the legislative timeframes for this to occur are addressed in Sections 2.1.2, 2.2 and 2.3.1 of Volume 1 of the EIS.

During the construction of Hinze Dam Stage 3 continuity of water supply to the Gold Coast community will be retained. The design and environmental measures that will be in place during the construction works will ensure that there are not impacts on water quality.

Dam Safety

As detailed in Section 2.1.3 of Volume 1 of the EIS, the *Water Act 2000* provides the regulatory framework for dam safety of water dams in Queensland and requires that the owners of referable dams must operate and maintain dams in accordance with the Guidelines on Acceptable Flood Capacity for Dams. In order to comply with these guidelines and standards the raised dam and modified spillway must be capable of passing the Probable Maximum Flood (PMF) determined for the dam without overtopping of the dam crest.

The PMF is the flood resulting from the worst flood-producing catchment conditions that can be realistically expected in the prevailing meteorological conditions. The PMF, by definition, therefore cannot be assigned a probably of occurrence.

3.1.2 Spillway Options

In October 2006 the Alliance commenced an optimisation study that, in part, assessed both gated and non-gated spillway options. A fully quantitative cost benefit analysis was developed for the optimisation study including economic, social and environmental considerations.

Details of the dam configuration alternatives and the optimisation process are addressed in detail in Section 2.3.3 in Volume 1 of the EIS.

3.1.3 Economic Viability of the Project

Submissions received in relation to the EIS raised concerns regarding the economic viability of the Hinze Dam Stage 3 project. The response to these submissions is addressed in this section.

The issue of the economic viability of the project is linked to the three key elements of the project, flood mitigation, the provision of additional water supply, and the dam safety requirements. Each of these elements was addressed in Section 2.3.1, while the project costs and benefits were addressed in Section 2.4.1 of Volume 1 of the EIS.

Flood Mitigation

If the Project does not proceed it is unlikely a significant reduction in flood risk could be achieved via any alternative means. The alternatives to the project were addressed in Section 2.3.2 of Volume 1 of the EIS.

The economic and social consequences of a major flood on the Nerang River floodplain would be significant at local, regional and national levels. An assessment of the economic cost of flooding associated with a 1 in 100 year ARI flood event, undertaken by the Alliance, for the "do nothing" case indicated net economic losses in the region of approximately $120 million. For a 1 in 100 year ARI flood event, the project will result in a reduction in the net economic loss experienced by the region of approximately $76.9 million. This is a 62% reduction in the estimated 1 in 100 year ARI flood damages for the Nerang River flood plain.

In addition, the Project delivers a 40 percent reduction ($3.07M) in the Average Annual Damages caused by flooding over the existing conditions case. This reduction in flood damages will be a significant benefit to the regional, State and national economies.

Water Supply

The GCCC investigated a wide range of options for water supply alternatives as part of the Gold Coast Water Futures Strategy 2006-2056. These options were detailed in Section 2.3.2 of Volume 1 of the EIS.

In addition, if the Project did not proceed then Gold Coast City Council would be in breach of the subordinate legislation made under the *Water Act 2000* titled *Water Amendment Regulation (No.6) 2006*. This legislation specifically requires that the Stage 3 raising of the dam delivers a target of 16 ML/d of additional yield by 31st December 2010. Financial penalties are associated with such a non compliance (Refer to Section 2.3.1 of Volume 1 of the EIS).

Dam Safety

Whilst the dam is intrinsically safe, the current dam configuration is no longer compliant with the recently upgraded Guidelines on Acceptable Flood Capacity for Dams. The Dam Safety Regulator in Queensland has advised that under the requirements of the *Water Act 2000* the dam owner, Gold Coast City Council must make the dam compliant by 2015. Therefore if this Project does not proceed, the Council will still be required in the near future to

undertake substantial works to the dam's embankments and spillways (Refer to Section 2.3.1 of Volume 1 of the EIS).

3.1.4 Impact Assessment Process

Submitters to the EIS have raised concerns regarding the time that was available for thorough investigations to be undertaken for such a major project, and further that the Project disadvantages the residents of Duncan Road.

The Hinze Dam Alliance commenced work on the Project in October 2006 with the Optimisation Phase. The background research for the EIS commenced during this phase with initial work being undertaken from November 2006 and site investigations commencing in January 2007. This period enabled supporting research, modelling and field work to be undertaken prior to the review and completion of the EIS in May 2007, and advertising commencing on 12 June 2007.

The EIS addressed all the elements of the Project as required by the Terms of Reference (Appendix A of Volume 4 of the EIS), and undertook a thorough assessment of the potential impacts of the project on all residents within the impacted environment. Mitigation measures included in the EIS, proponent commitments (Appendix G of Volume 4 of the EIS), and the preparation of EMPs and the Environmentally Relevant Activities (ERAs) which form part of this supplementary report (refer to **Section 3.3**) address the impacts on all impacted residences.

3.1.5 Use of Modelling in the EIS Preparation

Concerns were raised in submissions to the EIS that the modelling in relation to dam water levels, noise, dam safety requirements, and other emissions from the Project are not completely accurate.

All modelling that formed part of the design and assessment process for the dam wall and spillway, and for surface water hydraulics, noise and air quality was undertaken in accordance with industry standards, guidelines, and accepted models. The models that were used in the preparation of the EIS have been accepted by the regulating authorities and all technical review groups.

The models that were used in the preparation of the EIS are detailed in **Table 1**.

Table 1 Hinze Dam EIS Modelling

Topic	Model/Guidelines	EIS Section
Dam Safety Risk Assessment	ANCOLD Guidelines on Selection of Acceptable Flood Capacity for Dams ANCOLD Guidelines on Assessment of the Consequences of Dam Failure DNRW Guidelines for Failure Impact Assessment of Water Dams ANCOLD Guidelines on Dam Safety Management ANCOLD Guidelines on Risk Assessment	Section 14
Hydrologic Modelling – Nerang River Catchment	Integrated Quantity Quality Model (IQQM)	Section 7
Flood Impacts	Urban Runoff and Basin System (URBS) MIKE11 flood modelling MIKE21 hydraulic modelling	Section 7
Generation of meteorological file	TAPM version 3	Section 11
Air Dispersion Modelling	AUSPLUME version 6	Section 11
Emissions Estimation	Emission Estimation Technique Manual for Mining version 2.3	Section 11
Greenhouse Gas Inventory	AGO Factors and methods Workbook 2006	Section 11
Noise	SoundPLAN	Section 12
Airblast Overpressure Levels	AS2187.2	Section 12

3.2 Project Description

3.2.1 Construction Hours

The submissions to the EIS identified that there were inconsistencies in the description of the hours of construction, the incorporation of down time due to wet weather in the construction program.

Construction work will be undertaken between the hours of 6.30am – 6.30 pm five days per week, generally Monday to Friday. One week of every four the five day working week will be from Tuesday to Saturday. Each working day an evening shift will operate from 3pm to 12 midnight. This shift allows for machinery maintenance and repair works to be undertaken during these hours. The evening shift will not include works other than machinery maintenance and repairs. A noise assessment was conducted for the evening shift. **Section 3.11** details the potential impacts and the proposed mitigation measures to mitigate any potential impact associated with the evening workshop activities. The Noise assessment is attached in full in **Appendix B.**

The project construction program (Figure 3-7 in Section 3 of Volume 1 of the EIS) incorporates a contingency for wet weather during the construction life of the project. This contingency is based on rainfall data for the area and the predicted impact of rainfall events on construction activities.

3.2.2 Clay Borrow Area

This section of the supplementary report addresses the submissions that raised the following issues:

- location of the clay borrow area downstream of the dam;
- the amount of clay required and the area of the clay borrow;
- further investigations undertaken upstream to determine if suitable clay source exists and the impacts on:
  - preservation of the natural downstream topography including significant vegetation;
  - filling and re-profiling;
  - control of runoff by the use of sedimentation ponds;
  - other on-going environmental matters such as waterlogging;
- rehabilitation of the clay borrow area;
- proposed buffer zones around the clay borrow area and treatment of runoff;
- the development and implementation of EMPs associated with the clay borrow;
- location of the clay borrow for ease of construction; and
- containment of the area within the site boundaries.

Project Clay Requirements

Section 3.4.3 of Volume 1 of the EIS identified that the project requires 250 000m^3 of clay for the construction of the main embankment and saddle dam.

Site investigations undertaken during the first half of 2007 have identified the clay deposits that are available on site and located within an area that enables the material to be won and transported to the construction area without the need to access the surrounding road network. The distribution of this clay and an estimate of the volumes of clay available are detailed in **Table 2**. The clay conditioning area will be located within the current park area with all the clay extracted being transported to this location for treatment prior to use in the construction. Due to the positioning of this area the clay resources in this area would be the last to the used for the project.

Table 2 Project Site Clay Resources

Location	Clay Quantity Available
Clay Borrow Area located within the CID boundary and identified on figure 6-9 in Section 6 Volume 1 of the EIS	252 000m^3

Location	Clay Quantity Available
Within the **existing lakeside parkland** area	20 000m^3 Potential useable clay

Location and Operation of Clay Borrow Area

The location of the clay borrow area has been determined by the extent of the clay reserves located within the CID boundary area. There has been extensive pit testing undertaken around the site and this part of the site has the only significant clay reserve. With the exception of the clay located within the existing park area (as detailed in **Table 2**) there are no other known clay resources located upstream of the dam that are not inundated.

The area of the clay borrow will be used for clay extraction, with all the associated sedimentation ponds located within the CID boundary. The extraction area will be surrounded by an appropriate buffer in which some clearing may be required to provide for the required batters. No clearing will be undertaken within the buffer area unless it is necessary for the functioning of the clay borrow.

The clay borrow is located to the west of the creek on the eastern side of Gilston Road, and will not extend into this waterway. The water in this creek will be protected by the erosion and sediment control measures proposed for the clay borrow area.

Rehabilitation of the Clay Borrow Area

The clay borrow area will be progressively rehabilitated as the extraction of the clay occurs. Approximately 100,000m^3 of fill will be placed into the clay borrow area to provide some re-contouring of this area on completion. This fill will be used to create a drainage line for runoff leaving the site and entering the existing creek downstream of the site. The re-contouring of this area will result in there being no ponding of water or filling of this area. All runoff from the site will be treated prior to discharge until ground cover is established on this site.

The rehabilitation of the clay borrow area will include hydro-mulching with additional replanting. The detail of the rehabilitation work to be undertaken in this area will be contained within a rehabilitation management, the structure of which was contained within Section 19 of Volume 3 of the EIS.

Environmental and Site Management

The operation of the clay borrow area is regulated through the EIS approval process and the subsequent material Change of Use – ERA 20 – Extracting Rock or Other Material. The project approvals that relate to this ERA, including the proposed stormwater and environmental management are addressed in **Section 3.3** of this report.

3.2.3 Project Management Structure

The organisational structure of the Project was raised with regard to the effectiveness of this framework to ensure that conditions of approval and environmental requirements are being met at all times.

The management of the construction of this project will be similar to that of other major projects undertaken within Queensland. No independent body will sit over the Alliance to oversee the project; however the Alliance is bound by the legislative requirements of the conditions of the approvals applicable to the site works. The relevant lead state and federal agencies regulate compliance with the approval conditions and other requirements

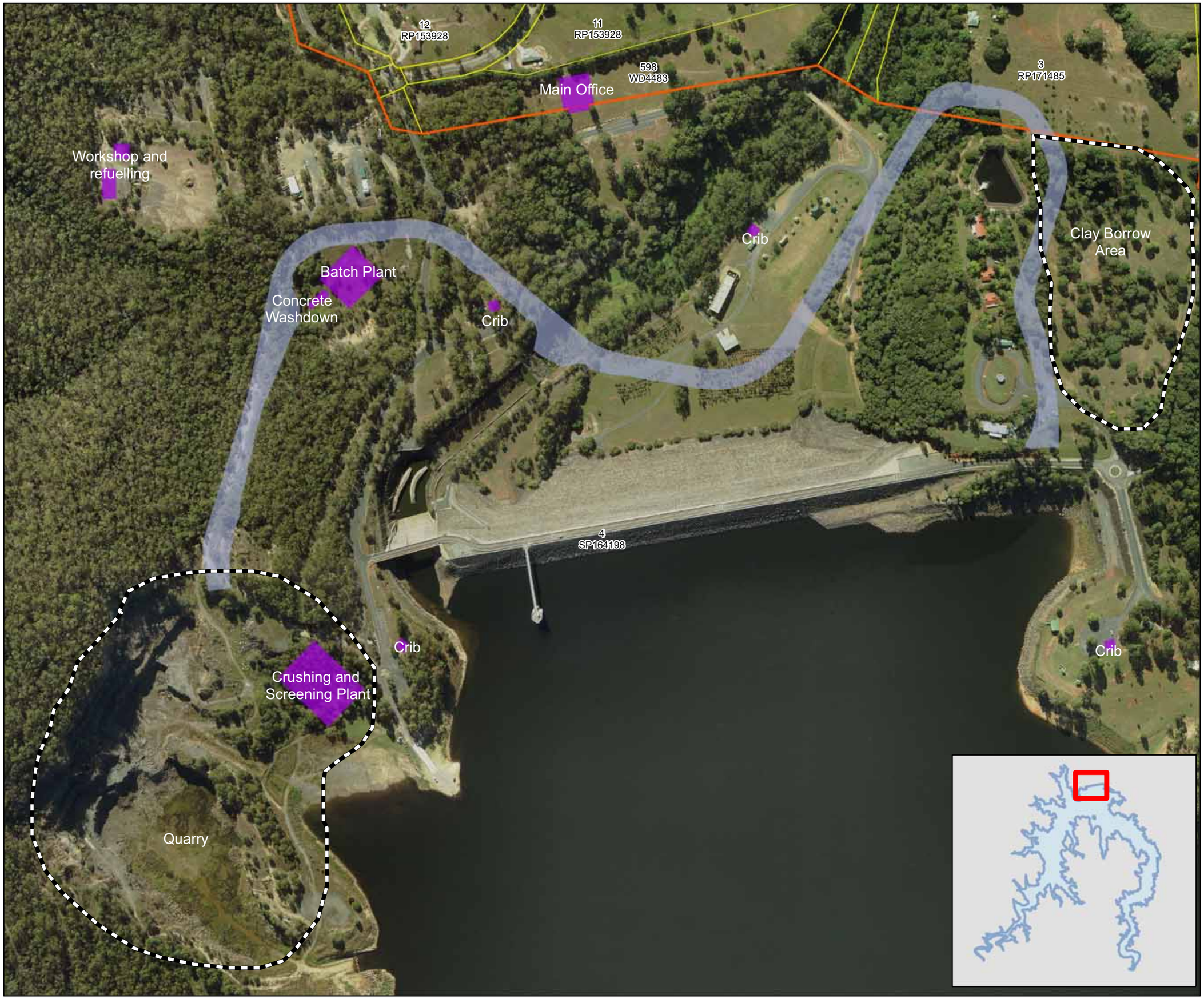
3.3 Project Approvals – ERAs

The EIS (Volume 1, Section 1.9.2) identifies that the Alliance will be required to obtain development approval for a number of Environmentally Relevant Activities (ERAs) prior to the commencement of these activities. The following ERAs are only associated with the construction phase of the project:

- ERA7 – Chemical storage;
- ERA 11 – Petroleum product storage;
- ERA 19 – Dredging;

- ERA 20 – Extracting Rock or other material;
- ERA 22 – Screening materials;
- ERA 62 – Concrete Batching; and
- ERA 84 – Regulated waste storage.

The EIS did not identify that an approval for ERA 28 – motor vehicle workshop would be sought. The Alliance confirms that an application for ERA 28 will be made for the construction phase of the project. All of the ERAs will be establish and operated on Lot 4 SP164198, refer **Figure 1** for the location of each ERA. The following sections provide specific process information for each of the proposed Environmentally Relevant Activities, and the environmental management measures associated with the operation of the ERAs to minimise any potential impact on the environment.



HINZE DAM STAGE 3 EIS SUPPLEMENTARY REPORT

FIGURE 1

Site Layout Plan - ERAs

Legend

- Building/Construction Area Footprints
- Haul Road
- Hinze Dam Community Infrastructure Designation Boundary
- Quarry and Clay Borrow

N

0 55 110 220

Metres

Scale - 1:4,000 (at A3)

Projection: MGA Zone 56

Gold Coast City Council

Hinze Dam Alliance

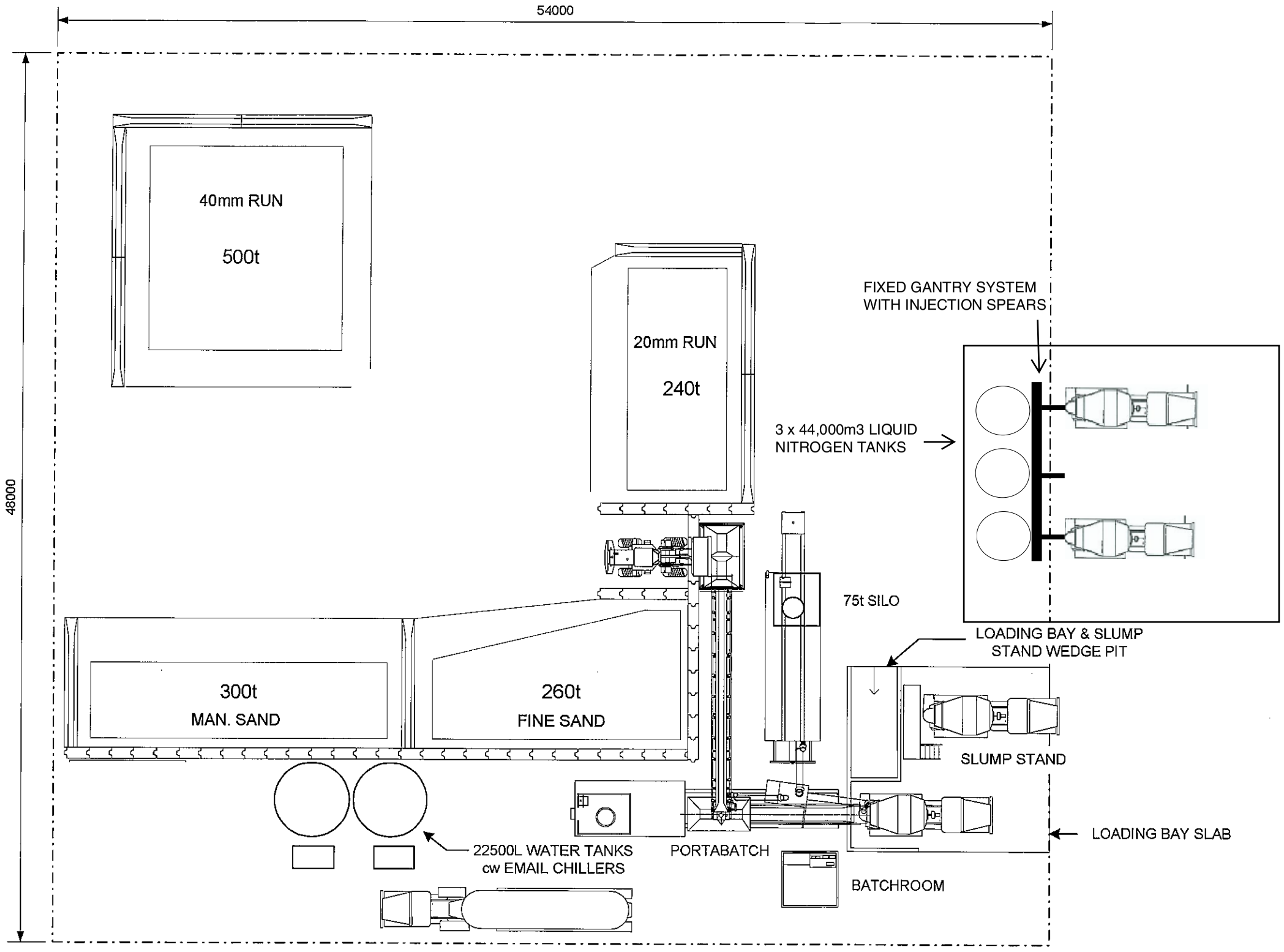
1.7.1 ERA 7 – Chemical Storage

The Hinze Dam Alliance will require an approval for ERA 7 level (b) for the storing of chemicals in containers having a design storage volume of 1000m^3 or more. Liquid nitrogen is the only chemical that the Alliance proposes to store on site that triggers this approval.

The liquid nitrogen will be used to lower the placement temperature of concrete for the construction of the dam spillway. It will be injected into the agitator on the concrete trucks, where it will mix with the concrete. This method is the most efficient in order to lower the temperature of the concrete prior to use in construction.

The total volume of liquid nitrogen to be stored on site at any one time will be a total of 85,500m^3. The liquid nitrogen will be stored in three 44,000m^3 vacuum insulated vertical vessels/ tanks (VID). The tanks will be located on a concrete slab, adjacent to the concrete batching plant. The location of the tanks is presented on **Figure 2**.

As detailed above, the liquid nitrogen will be stored in Vacuum Insulated Tanks (VIT). VITs are designed to store and deliver gases in liquid form. They operate at low pressures only, (up to 600 kPa) and are normally only used to supply liquid nitrogen to applications in which it is required for its refrigeration capacity. **Figure 3** presents a schematic of a VIT filling and storage process.

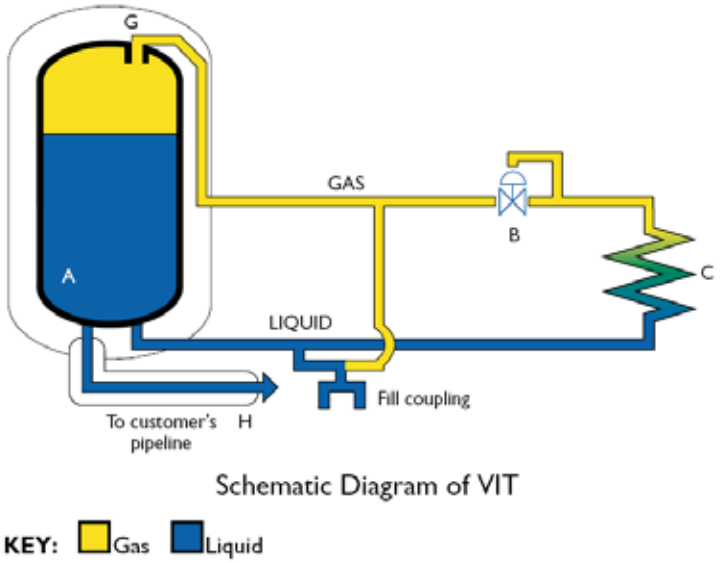


HINZE DAM STAGE 3 EIS SUPPLEMENTARY REPORT

FIGURE 2
Site Layout - Concrete Batching Plant and Liquid Nitrogen Storage

Hanson	HINZE DAM PORTABATCH GA	DWG NO NR-PROJ-HD1	DRAWN EAGLESR		REV.	DESCRIPTION	DATE	BY
			SCALE 1:250	DATE 17/04/2007	0			
	FULL FILENAME D:\MY DOCUMENTS\PLANT DRAWINGS BY SITE\NR - PROJECTS\HINZE DAM\HINZE DAM PBATCH.VSD		0 6 10 20		1			

- **Figure 3 - Schematic Diagram of a Vacuum Insulated Tank**



As is shown in **Section** 3, the inner vessel A contains the liquid with gas in the space above it. The pressure is maintained by an automatic pressure regulator B which is operated by a diaphragm in response to the vessel pressure. If the pressure in the vessel falls below the required level, the pressure regulator opens and the liquid flows by gravity to a pressure raising vaporiser C, where heat is absorbed from the atmosphere and liquid converted to gas. This gas then enters the gas withdrawal system at point G, raising the pressure in the system to the pre-set level, whereupon the regulator B shuts again. The liquid is then vaporised in the super-heater vaporiser where it is converted into gas and heated to ambient temperature, before passing to the customer's pipeline through H. **Figure 4** illustrates an example of a VIT.

- **Figure 4 - Example of Vacuum Insulated Tanks**

Liquid Nitrogen and the Concrete Cooling Process

The liquid nitrogen injection process consists of injecting the loaded agitator truck with a predetermined amount of liquid nitrogen by means of an extendable lance or injector. The injection of the liquid nitrogen cools the concrete which can then be transported to the pour site ready for placement.

The first and most crucial step in adding the liquid nitrogen to the concrete is the positioning of the agitator truck to allow the injector to enter the agitator and deliver the liquid nitrogen to the mix. Accurate positioning of the truck is achieved using a hinged location plate and a lateral driver's side guide.

The location plate is attached to the injector support frame and connected to a micro switch. When the plate is activated by the truck's loading hopper a green light on a stand positioned adjacent to the driver's cab indicates to the driver that the vehicle is in the correct position rearward. If the driver continues to reverse the light will change to red indicating that they have gone too far. If this occurs the injector will not operate. In addition a rear, concrete stop is positioned to ensure that the truck does not overrun excessively.

The lateral driver's side guide is simply used by the driver to visually align the trucks wheels.

Once the truck is in position, the injector extends into the barrel of the truck. Liquid nitrogen is then injected into the mix. The length of injection is controlled by a timer. Once injection is complete the injector is automatically retracted and the agitator truck can leave the liquid nitrogen injection facility and deliver the concrete to the pour site.

Environmental Management

The Alliance is currently preparing Environmental programs (EPs) for each ERA as part of the overall Construction Environmental Management Plan. Each EP will specifically address the environmental management measures to be implemented for each ERA, and will be submitted as supporting documentation with the Material Change of Use Application.

The following information identifies the areas where ERA 7 may have the potential to impact on the environment if appropriate management measures are not implemented. Furthermore, it provides an overview of the management measures that will be implemented as part of the EPs and overall Construction EMP to mitigate potential impacts.

Air

The adverse effects of chemical storage on the air quality surrounding the Hinze Dam site will be limited to the generation of dust on the transport routes surrounding the site and the location of deliveries. In order to reduce the generation of dust on the site the following measures will be taken:

- pave haul routes and where practical and maintain these areas in a clean condition by sweeping away dust or washing dust into collection pits;
- dampen unpaved haul routes to limit dust emission;
- minimise vehicle movements; and
- inspect vehicles and wash down when required.

Land

The storing of chemicals on-site will have limited effect on the land unless damage to storage containers or accidents involving bulk chemical transport occur. However, given the nature of liquid nitrogen, if a spill should occur, environmental harm to land is not likely to result as liquid nitrogen will quickly vaporise to its gaseous state.

The following measures will be taken to reduce the risk of a spill or to procedures for containment:

- liquid nitrogen stored in tanks designed specifically for liquid nitrogen storage;
- an emergency response procedure is to be developed and rehearsed (an outline of the emergency response procedure is provided below); and
- emergency equipment is made readily available in major work areas.

Emergency Response Plan

Safety risks associated with the use of liquid nitrogen include:

- liquid nitrogen will cause "cold" burns if it comes in contact with the skin;
- many materials (eg. carbon steel) will become brittle in liquid nitrogen and will fracture easily; and
- liquid nitrogen may cause the atmosphere to become oxygen deficient and can cause asphyxiation.

The following actions will be undertaken should a liquid nitrogen spill occur:

1) wear appropriate safety clothing:
   - long sleeved shirt;
   - long trousers;
   - safety boots;
   - gloves;
   - full face shield and goggles;
2) if the spill occurs in a confined space do not enter the confined space;
3) attempt to isolate the sources of supply by closing appropriate valves (if possible);
4) use fire hose to contain spillage. Form an ice dam, if possible, with cryogenic liquids by directing the water spray around the perimeter of the spillage;
5) during a liquid nitrogen (or other cryogenic liquid) spillage intense vapour fog will occur. This could cause disorientation. If the fog collects over a roadway, traffic must be halted and rerouted;
6) depending on the severity of the spillage and the intensity of the ensuing fog, it may be necessary to obtain the assistance of the Fire Brigade; and
7) dial: **000,** Ask for "Fire" to isolate the source and to contain the spillage.

Noise

Nuisance noise will be limited to that created by trucks delivering chemicals to site. In order to limit this noise the following measures are to be taken:

- pave haul routes where practical;
- enforce a speed limit on and around the site of 20km/h; and
- ensure trucks do not use air brakes except in emergencies.

Water

As with land, chemical storage may only have significant environmental affect on the water surrounding the site if damage to storage containers or accidents involving bulk chemical transport occurs. However, as discussed in the Land section above, given the nature of liquid nitrogen, if a spill should occur, environmental harm to land is not likely to occur as liquid nitrogen will quickly vaporise to its gaseous state.

Waste

Waste due to the storage of liquid nitrogen will be negligible.

3.3.2 ERA 11 – Petroleum Storage

The Hinze Dam Alliance will require an approval for ERA 11 level (a) storing crude oil or a petroleum product in tanks or containers having a combined total storage capacity of 10,000L or more but less than 500,000L.

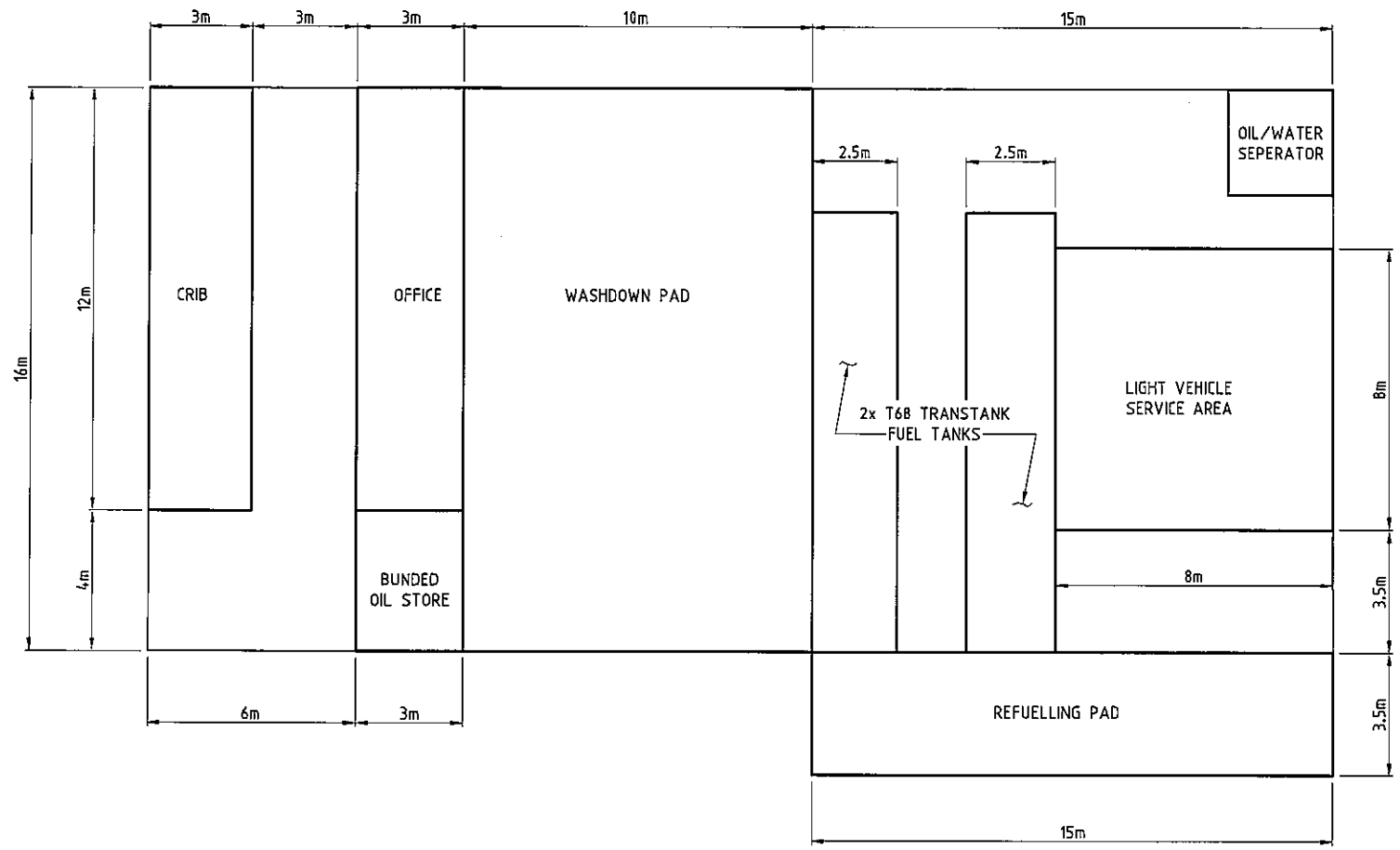
The Alliance is aware that the assessment of ERA 11 (a) is usually devolved to Council for approval. However, an activity is unable to be devolved for management by a local government if:

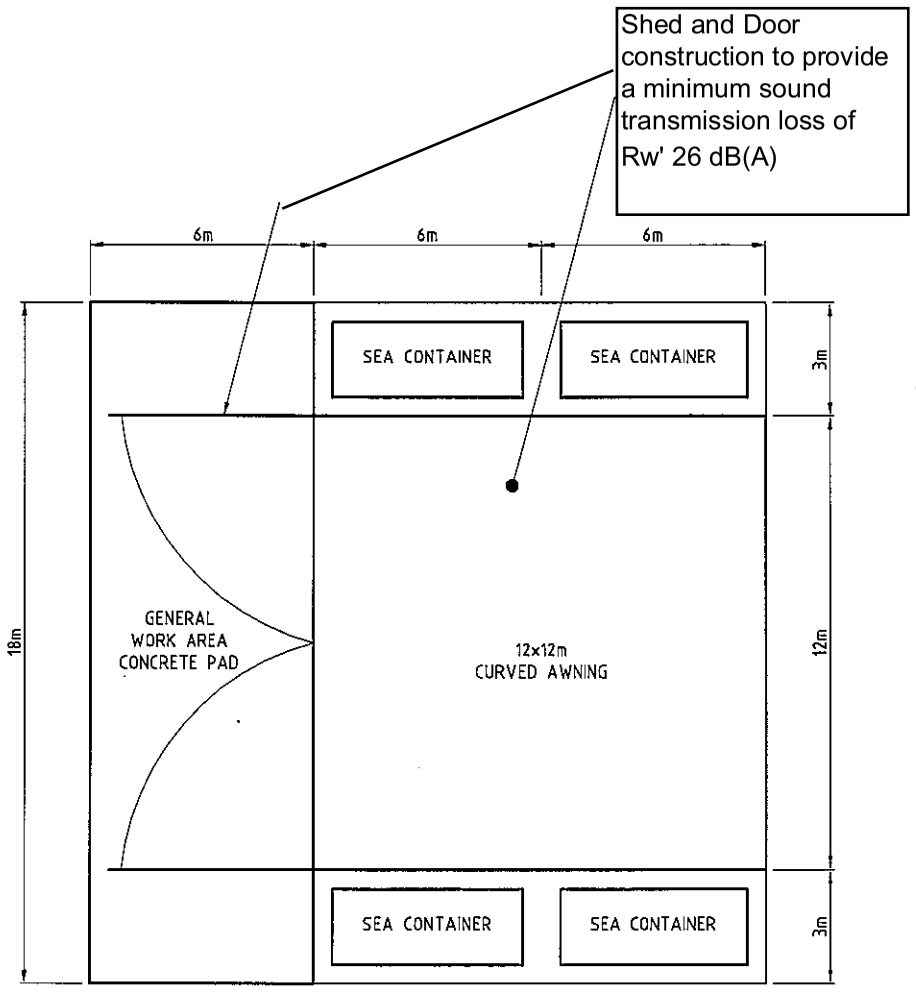
- the activity includes a non-devolved environmentally relevant activity at the same place; or
- the activity is carried out by a local government or the State.

Therefore the EPA will be the assessment manager for this application as the project involves a non-devolved activity on the site, and the activity is being carried out by Gold Coast City Council (as part of the Hinze Dam Alliance).

The Alliance propose two separate self-bunded, double-skinned (*Transtank* or similar) tanks for the site to service the construction vehicle fleet. Each tank will have a safe fill storage capacity of 61,300L and will store diesel. Therefore, the total quantity of diesel stored on site will be 122,600L. The diesel tanks will be located in close proximity to the workshop as shown on **Figure 5**. **Figure 6** shows an example of the Transtank self-bunded storage tanks, and **Figure 7** and **Figure 8** show the various fill point and fill reticulation system.

A1 THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.





PLAN - WORKSHOP AND REFUELLING AREA
SCALE 1:100

HINZE DAM STAGE 3 EIS SUPPLEMENTARY REPORT

FIGURE 5
Site Layout - Fuel Storage Tanks and Workshop

Hinze Dam Alliance | SKM SINCLAIR KNIGHT MERZ | URS | THIESS

Rev	By	Appd	Date	REVISION RECORD

Designed	TLR
Drawn	SCB
Checked	
Approved	
Date	8/7/2007

Gold Coast City Council

Project Title:	HINZE DAM STAGE 3
CAD File Number:	SK-605-A.DWG
Drawing Set:	INFRASTRUCTURE
Drawing Title:	PROPOSED SITE INFRASTRUCTURE WORKSHOP/REFUELLING AREA
Status	PRELIMINARY
Rev	A
Drawing Number:	SK 605

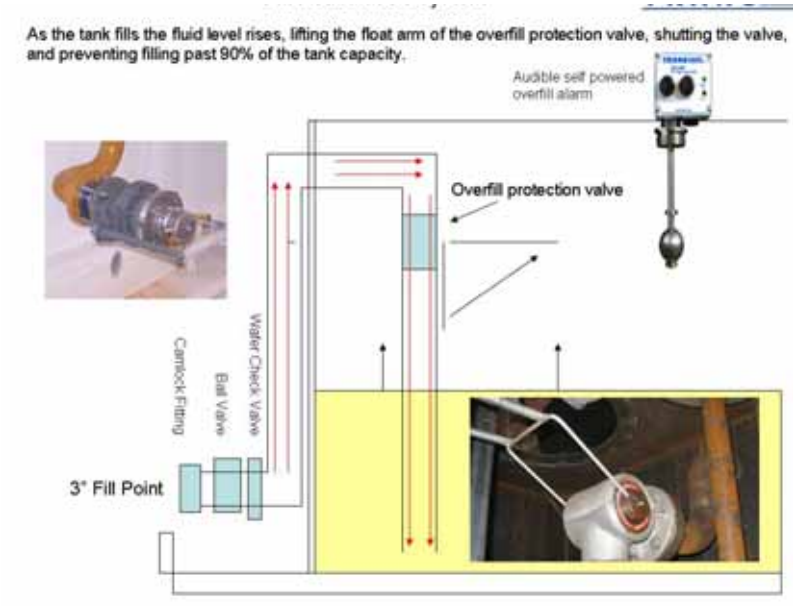
G:\5000 Site Work and Technical\5960 Drafting\1.Detailed Design\2.Sketches\SK605-A.dwg, layout, 8/8/2007 9:46:28 AM, stacey

The design details of the tanks are presented below, and drawings T-068-GA01 sheets 1 – 3(**Appendix F**) show the detailed design of the tanks:

- overall dimension – 12200mmL x 2438mmW x 2900mmH;
- safe fill level 61 300 litres;
- bare Tank Weight 16000kg;
- 80nb Camlock Male Tanker hose filler c/w Dust Cap connection;
- tanker fill point supplied c/w 80nb Full Bore, 2 piece, Fire Safe Flanged Ball Valve, and Wafer Style Non Return Valve;
- 600mm dia manway access to internal tank;
- tanks are made up of an internal fuel storage tank (rectangular design) surrounded by an external tank (or skin) providing the 'self bunding' functionality of the design;
- tanks are designed and manufactured in compliance with AS 1692 Tanks for flammable and combustible liquids and AS 1940 The storage and handling of flammable and combustible liquids;
- permanent ladder and platform for ease of inspection and access. Designed and manufactured in accordance with AS1657;
- tanks are constructed from 1st grade new steel;
- venting is fitted to the inner tank (50mm dia) in accordance with the requirements of AS 1940;
- provision has been made for relief of any pressure in the interstitial space during any possible fire engulfment conditions;
- a visual indication system is provided to monitor the interstitial space between the inner and outer walls for leakage from the inner tank;
- air breather vents and fittings;
- a filter is fitted to the vent pipe to assist with the prevention of ingress of dust into the main containment area, therefore preventing the possible contamination of product stored;
- the tank overfill protection system is supplied with a mechanical shut off valve and visual/audible alarm once the safe fill level is reached;
- antisyphon valve;
- a calibrated fluid level dipstick is supplied; and
- bunded pump bay housing.

- **Figure 6 - Proposed Self-bunded Fuel Tanks**

- **Figure 7 - Fill Reticulation System**



- **Figure 8 - Fill Point**

Environmental Management

The Alliance is currently preparing Environmental programs (EPs) for each ERA as part of the overall Construction Environmental Management Plan. Each EP will specifically address the environmental management measures to be implemented for each ERA, and will be submitted as supporting documentation with the Material Change of Use Application.

The following information identifies the areas where ERA 11 may have the potential to impact on the environment if appropriate management measures are not implemented. Furthermore, it provides an overview of the management measures that will be implemented as part of the EPs and overall Construction EMP to mitigate potential impacts.

As described above, the proposed storage tank is a fully self bunded tank, with the following design features to ensure that no fuel spills occur:

- the tanks are made up of an internal fuel storage tank (see drawing T-C30-GA04), this internal tank is surrounded by an external tank (or skin) providing the 'self bunded' functionality of the design;
- a tank overfill protection system including a mechanical shut off, and audible and visual alarm;
- bunded pump bay housing; and
- oil and water separator.

A bunded concrete pad will also be installed at the bowser to contain any potential spills that may occur during refuelling. However, this is unlikely to occur as the contractor will be required to conduct the re-fuelling activity in accordance with the Alliance re-fuelling procedures.

In the event a spill occurs, spill response kits will be located adjacent to the fuel tanks. The Alliance has prepared an emergency spill response procedure and environmental incident/ emergency management procedures (as attached) that will be implemented if a spill occurs. A copy of these plans will also be located at the facility. These procedures form part of the site induction that all staff are required to undertake prior to entering the work site. A Site Spill Equipment Register will also been prepared by the Alliance, and will form part of the weekly site audit process.

Air

The adverse effects of fuel storage on the air quality surrounding the Hinze Dam site will be limited to the generation of dust on the transport routes surrounding the site and the location of deliveries.

In order to reduce the generation of dust on the site the following measures will be taken:

- pave haul routes and where practical and maintain these areas in a clean condition by sweeping away dust or washing dust into collection pits;
- dampen unpaved haul routes to limit dust emission;
- minimise vehicle movements; and
- inspect vehicles and wash down when required.

Noise

Refuelling activities are relatively quiet. Nuisance noise will be limited to that created by trucks delivering chemicals to site. In order to limit this noise the following measures are to be taken:

- pave haul routes where practical;
- enforce a speed limit on and around the site of 20km/h;
- ensure trucks do not use air brakes except in emergencies; and
- all deliveries will occur between 6:30am and 6:30pm.

Waste

Waste due to the storage of diesel fuel will be negligible.

Land and Water

The environmental risk of storing fuel on site is the potential contamination of both land and water should a fuel spillage occur.

As described above, the proposed storage tank is a fully self bunded tank, with the following design features to ensure that fuel spills are prevented or that the effects of any fuel spills are minimised:

- the tanks are made up of an internal fuel storage tank (see drawing T-C30-GA04), this internal tank is surrounded by an external tank (or skin) providing the 'self bunded' functionality of the design;
- a tank overfill protection system including a mechanical shut off, and audible and visual alarm; and
- bunded pump bay housing.

In addition, a bunded concrete pad will be installed at the bowser to contain any potential, though unlikely, spills that may occur during refuelling. The bunded concrete pad will also incorporate a sump that will drain to an oil-water separator, prior to being discharged from the site.

To prevent accidental vehicle collisions with the tanks by site vehicles, bollards will also be placed around the fuel tanks.

In the event a spill occurs, spill response kits will be located adjacent to the fuel tank. The Alliance has prepared an emergency spill response plan and environmental incident/ emergency management procedures (described below) that will be implemented if a spill occurs. A copy of these plans will also be located at the facility. These procedures form part of the site induction that all staff are required to undertake prior to entering the work site. A Site Spill Equipment Register has also been prepared by the Alliance, and will be part of the weekly site audit process.

Spill Response Procedures

Table 3, Table 4, and **Table 5** outline the emergency response to an incident where a spill has occurred on concrete/bitumen, on soils, and in water respectively.

- **Table 3 Spill Response Procedure for Spills on Concrete/Bitumen**

#	Action	Description
1	Notice spill	
2	Notify Personnel	Person who noticed spill to inform supervisor. Person who noticed spill to advise staff in area and request assistance if necessary. Supervisor to notify Construction Manager and Environmental Adviser.
3	Trace source of spill	Find source of leak or spill. Check if spill is still occurring.
4	Stop discharge	If safe stop leak/spill (by closing valve, plugging leak). If not safe, do not attempt to stop leak. If necessary and available in spill kit, seal non-pressurised leaks with premix putty.
5	Assess risk	If spill contains liquid fuel, Supervisor to: Terminate all equipment and sources of heat or ignition in the area. Assess the risk to personnel and evacuate area if necessary. If workplace personnel cannot safely clean up spill, contact emergency services (000) and follow their instructions. Proceed with remaining actions as safe or as instructed by emergency services. If spill does not contain liquid fuel, Supervisor to: If spill is greater than 500 L, contact State pollution hotline (1300 130 372) or emergency services (000) and proceed with remaining actions as safe or as instructed by authorities. If spill is less than 500 L and can be safely managed by workplace personnel, proceed with remaining actions.
6	Contain spill	Do not spread or dilute spills with degreasers, detergents or water. Put on appropriate personnel protective equipment. If necessary, Construction Manager to request additional spill response equipment. Position absorbent material or other spill control equipment to restrict movement of spilled material.
7	Restore site to original condition	Clean spill site with absorbent material eg. Mop, pads, pillows. Dispose used absorbents to oily waste bins. Wash down non-disposable equipment in vehicle wash down area.

8	Replace used equipment	Supervisor to replace spill kit or other equipment used.
9	Post spill monitoring	Construction Manager to insect spill site and ensure is satisfactory. Supervisor to monitor source or activity that caused leak and equipment or process to prevent future occurrence of leak.

- **Table 4 Spill Response Procedure for Spills on Soils**

#	Action	Description
1	Notice spill	
2	Notify Personnel	Person who noticed spill to inform supervisor Person who noticed spill to advise staff in area and request assistance if necessary. Supervisor to notify Construction Manager, Environmental Adviser, Senior Gold Coast Ranger and Gold Coast Water.
3	Trace source of spill	Find source of leak or spill. Check if spill is still occurring.
4	Stop discharge	If safe stop leak/spill (by closing valve, plugging leak). If not safe, do not attempt to stop leak. If necessary and available in spill kit, seal non-pressurised leaks with premix putty.
5	Assess risk	If spill contains liquid fuel, Supervisor to: Terminate all equipment and sources of heat or ignition in the area. Assess the risk to personnel and evacuate area if necessary. If workplace personnel cannot safely clean up spill, contact emergency services and follow their instructions. Proceed with remaining actions as safe or as instructed by emergency services. If spill does not contain liquid fuel, Supervisor to: If spill is greater than 500 L, contact State pollution hotline (1300 130 372) or emergency services (000) and proceed with remaining actions as safe or as instructed by authorities. If spill is less than 500 L and can be safely managed by workplace personnel, proceed with remaining actions.
6	Contain spill	Do not spread or dilute spills with degreasers, detergents or water. Put on appropriate personnel protective equipment. If necessary, Construction Manager to request additional spill response equipment. Position absorbent material or other spill control equipment to restrict movement of spilled material.
7	Restore site to Original condition	If spill less than 100 L: Clean spill site with absorbent material eg. Mop, pad, pillows. Dispose used absorbents to oily waste bins. Remove contaminated soil together with any oily sludge and dispose to oily waste bin. Wash down non-disposable equipment in vehicle wash down area. If spill greater than 100 L, Construction manager to determine whether workplace personnel can manage spill: If it is deemed workplace personnel can manage spill, follow instructions above for spill less than 100 L. If additional assistance is required, engage the services of a contaminated land specialist following the Construction Manager's approval.
8	Replace used equipment	Supervisor to replace spill kit or other equipment used.
9	Post spill monitoring	Construction Manager to inspect spill site and ensure cleanup is satisfactory. Construction Manager to initiate post cleanup monitoring as directed by contaminated land specialist. Supervisor to monitor source or activity that caused leak to improve equipment or process to prevent future occurrence of leak.

- **Table 5 Spill Response Procedure for Spills in Water**

#	Action	Description
1	Notice spill	
2	Notify Personnel	Person who noticed spill to inform supervisor. Person who noticed spill to advise staff in area and request assistance if necessary. Supervisor to notify Construction Manager, Environmental Adviser, Senior Gold Coast Ranger and Gold Coast Water.
3	Trace source of spill	Find source of leak or spill. Check if spill is still occurring.
4	Stop discharge	If safe stop leak/spill (by closing valve, plugging leak). If not safe, do not attempt to stop leak. If necessary and available in spill kit, seal non-pressurised leaks with premix putty.
5	Assess risk	If spill contains liquid fuel, Supervisor to: Terminate all equipment and sources of heat or ignition in the area. Assess the risk to personnel and evacuate area if necessary. If workplace personnel cannot safely clean up spill, contact emergency services and follow their instructions. Proceed with remaining actions as safe or as instructed by emergency services. If spill does not contain liquid fuel, Supervisor to: If spill is greater than 25 L, contact State pollution hotline (1300 130 372) or emergency services and proceed with remaining actions as safe or as instructed by authorities. If spill is less than 25 L and can be safely managed by workplace personnel, proceed with remaining actions.
6	Contain spill	Do not spread or dilute spills with degreasers, detergents or water. Put on appropriate personnel protective equipment. If necessary, Construction Manager to request additional spill response equipment. Position spill control equipment/absorbent material eg. Roll, boom or as a last resort, soil to contain or divert flow from entering water body.
7	Restore site to Original condition	Use absorbent boom or other apparatus to remove diesel floating on water. Use absorbent material eg. Mop, pillows to clean diesel from banks of water body. Dispose used absorbents to oily waste bins. If contaminated soil involved (eg. Sides of bank), remove and dispose to oily waste bin. Wash down non-disposable equipment in vehicle wash down area.
8	Replace used equipment	Supervisor to replace spill kit or other equipment used.
9	Post spill monitoring	Construction Manager to inspect spill site and ensure cleanup is satisfactory. Construction Manager to initiate post cleanup monitoring as directed by contaminated land specialist. Supervisor to monitor source or activity that caused leak to improve equipment or process to prevent future occurrence of leak.

3.3.3 ERA 19 – Dredging

The Alliance has not confirmed if ERA 19 will be required for the project. Dredging may be associated with the construction and installation of the proposed fish transfer system, however the detailed design of this structure has not been finalised, therefore the associated construction works cannot be confirmed.

It is understood that under Schedule 1 of the *Environmental Protection Regulation 1998*, the definition of Dredging includes:

> *Dredging material - dredging material from the bed of any waters (other than dredging by a port authority of material for which a royalty or similar charge is not payable) using plant or equipment having a design capacity of -*
>
> *(a) not more than 5000t a year;*

(b) 5000t or more, but less than 100000t, a year; or

(c) 100000t or more a year.

The threshold of material to be removed which triggers dredging is 250m^3. Therefore the Alliance will obtain a development approval for dredging if the installation of the fish transfer device requires the removal of 250m^3 or more of material from the bed of the Nerang River, or any other waters if required.

There are no other construction activities that will involve the removal of material from the bed of any waters.

3.3.4 ERA 20 – Extracting Rock or other Material

In order to obtain the materials required to construct the raising works, the extraction of rock and clay is required onsite. The Alliance will therefore require development approval for ERA 20 level 1 (c) extraction of more than 100,000t per year.

The extraction will occur in two locations on the site (Lot 4 SP164198) and the method of extracting the materials will differ at each location (refer **Figure 1**). The extractive works will therefore be described from herein as the Quarry and the Clay Borrow area. The following provides an overview of the extraction processes, and the environmental management measures associated with each activity.

Quarry Operation

The efficient operation of the quarry is critical to the overall success of the project, as the quarry is the major source of raw material for the production of:

- rock-fill for the embankments;
- transition rock-fill;
- armour rock;
- filter material;
- concrete aggregates;
- coarse Sand; and
- road embankment and pavement material.

The Quarry activities will occur entirely within Lot 4 on SP164198, and will be a continuation of the quarry site that was used for the Stage 2 dam raising in the 1980s (refer **Figure 9** below). The location of the quarry and the extent of the quarrying activities are presented on **Figure 1**.

- **Figure 9 - Existing Quarry Site**

Initial, the establishment of the quarry area will require the clearing of vegetation and removal of overburden to allow commencement of the quarry operations. This process will include the use of dozers, scrapers and later in the process, excavators and haul trucks. The depth of overburden material varies over the foot print but is generally in the range of 6 to 8 metres in depth. The overburden material will be used in the construction of the haul road out of the quarry and the construction of a pad for the crushing and screening operation. The cleared vegetation will either be mulched and stockpiled for use in the rehabilitation of the quarry and clay borrow areas or pit burned in accordance with EPA and Council requirements and in consultation with the rural fire brigade.

Following the removal of the overburden and the exposure of the greywacke rock mass, a series of small trial blasts will be carried out to determine the powder factor required to give the level of fragmentation needed for the various rock fill classifications and crusher feed. Details regarding blasting are described further below.

The following tables identify the machinery that will be used for the establishment and operation of the quarry:

- **Table 6 - Machinery used for Quarry Establishment**

Machinery	Number
40t & 100t Excavator	1
50t Truck	1
D9 Dozer	1
16G Grader	1
Vibrating Roller	1
Water Cart	1

- **Table 7 - Machinery used during Quarry Operation**

Machinery	Number
D9 Dozer	1
100t, 150t & 300t Excavator	3
Cat 777 Haul Truck	5
Cat 773 Haul Truck	5
50t Truck	5

Drill and Blast Operation

As the quarry will be the primary supplier of various grades of rock products and raw feed for the construction of the upgrade structures, the drill and blast process will not be uniform throughout the quarry.

The blasting techniques that will be employed have been designed to minimise the impact on the surrounding environment in respect to the following:

- impact from fly rock;
- excessive noise; and
- excessive vibration or dust.

There will generally be four work areas open within the quarry at any one time:

- blasted rock for the Main/ saddle Dam;
- blasted rock to crusher feed;
- drilling of next area for blasting; and
- advance overburden stripping.

As part of the blasting process the following safety management measures will be implemented:

- a safety exclusion zone will be established around the quarry (500m). The 500m safety exclusion zone will also extend to cover sections of the Lake Advancetown. The 500m safety exclusion zone will be contained within the site boundary;
- suilding condition surveys will be carried out on buildings within a 1km radius of the quarry area;
- information will be communicated to all residents within a 1km radius of the site in regard to the blasting schedule;
- noise and vibration monitors will be installed at a number of locations, specifically at the closest sensitive receiver (refer to environmental management plans for specific locations and associated management procedures); and
- security fencing and signage will be erected prior to the commencement of blasting trails.

Operating Times

The construction program incorporates 1 blast per day, with approximately 5,000m^3 of material per blast. Blasting will only occur within daylight hours and within construction hours (i.e. 6:30 am to 6:30 pm). However, it is likely that blasting will occur on site regularly between 5pm and 5:30 pm once the construction day shift has completed. If required, blasting may occur on Saturdays, however the proposed work program has scheduled work activities for only one Saturday per month.

The powder factors for the various blasts would typically vary from 0.9kg/m^3 to 0.4 kg/m^3 depending on the type of product being produced.

Clay Borrow Area

The clay borrow area is located to the east of the dam wall in an area that includes both open parkland and areas of non-remnant vegetation (refer **Figure 1**). The establishment of the clay borrow area will include clearing of vegetation and removal of topsoil. It is anticipated that some of this material will be mulched and stockpiled near the borrow area to be used in the rehabilitation process. The top soil material that covers the clay deposit has been tested and contains sufficient clay content to be used in stormwater management structures for the clay borrow area. Stormwater management for the clay borrow area and the quarry is described in further detail below.

Once the clay borrow area has been established, the clay will be ripped with a dozer and picked up using scrapers, then and transported to the clay conditioning area for treatment. The clay material will be stockpiled for use in the construction of the core of the main embankment and saddle dam.

The clay extraction will be staged to meet the usage demands of the saddle dam and the main dam embankment, and to minimise the area of clay exposed at any one time. The topsoil will be pushed and stockpiled around the perimeter of the deposit. These stockpiles will be partially compacted and seeded to stabilise the batters.

The clay in each section of the deposit will be tested to determine its in-situ moisture content and from this the optimum moisture content can be determined. Once this is determined, the clay will be irrigated and turned using a grader and allowed to cure. The cured clay is then retested to test the moisture content, and if found to be correct the material will then be transported to its final location in the core.

The following table identifies the machinery that will be used during the operation of the clay borrow area.

- **Table 8 Machinery used during Operation of the Clay Borrow Area**

Machinery	Number
633 Scraper	3
50t Truck	5
16G Grader	1

As the clay reserved are depleted from an area the area will be reshaped to provide stable batters and topsoil spread and the area hydro-mulched.

Environmental Management

The Alliance is currently preparing Environmental programs (EPs) for each ERA as part of the overall Construction Environmental Management Plan. Each EP will specifically address the environmental management measures to be implemented for each ERA, and will be submitted as supporting documentation with the Material Change of Use Application.

The following information identifies the areas where ERAs 20 and 22 may have the potential to impact on the environment if appropriate management measures are not implemented. Furthermore, it provides an overview of the management measures that will be implemented as part of the EPs and overall Construction EMP to mitigate potential impacts.

Land

There is potential for the spreading of noxious weeds around the quarry and clay borrow areas. To prevent new noxious weed infestation and minimise risk of weed spreading to other areas:

- all non-local earthmoving plant /equipment must be washed and cleaned thoroughly to remove all external dirt and excess oil/grease;
- large non-local plant will be inspected prior to start;
- clearance certificates kept on records for all future references;
- weed, seed & fire ant fact sheet to be supplied to all suppliers of plant and equipment (Thiess);
- designated parking area for vehicles established to minimise spread of weeds;
- all earthmoving plant/machinery cleaned before demobilising off-site;
- as quarrying and clay borrow activities will initially cause physical changes to the landscape, there is potential to impact on native fauna. To protect native fauna, a qualified fauna spotter will be engaged to work ahead of

the site clearing works at the commencement of the quarrying and clay borrow activities. If native fauna is present, clearing works will be halted until such time as the fauna spotter is able to safely relocate the native fauna; and

- there is potential for damage to native flora and fauna outside the defined work areas. To prevent damage to natural areas outside the defined clay borrow and quarrying areas from vehicle movements, on site vehicles will only be permitted to travel within the defined construction areas and the dedicated haul roads.

Air

The quarry and clay borrow area have the potential to create nuisance on surrounding areas from the creation of dust. This impact is would be in the form of suspended and deposited particles, which will vary according to the amount of dust produced by construction activities, and the prevailing meteorological conditions.

To minimise dust generation and associated impacts, the following management practices will be undertaken:

- haul roads watered regularly using truck water carts to reduce emissions of wheel generated dust with particular focus on haul roads located near residents to the north and northeast of the construction site. Recycled water used preferentially for dust suppression purposes. A dust suppressant additive may also be used to minimise the amount of water required for the haul roads;
- haul trucks speed limited to 20km/h to control wheel-generated dust from haul roads, if visual inspection indicates that significant quantities of dust are being generated and transported off-site;
- the size of cleared areas kept to a minimum to limit exposed areas available for dust emissions by wind erosion;
- surface excavation works and blasting activities incorporate consideration of prevailing meteorological conditions wind speed and direction, with works potentially ceasing if high winds are blowing in the direction towards sensitive receivers. This is particularly important when dust emissions are close to residences;
- regular monitoring of PM_{10} and dust deposition levels at nearest sensitive places to provide a basis for compliance with appropriate criteria;
- newly established stockpiles in the construction site seeded and stabilised as soon as practical. Water sprays will be used on stockpiles and should be activated during dry and windy conditions;
- hydromulch, mulch or hydroseed applied to batters adjacent to haul roads to stabilise these areas and minimise wind-blown dust;
- retention of existing vegetation, where practical, between construction activities and sensitive receivers to reduce particulate concentrations and dust deposition rates at receivers; and
- construction of an enclosure around the crushing area may be considered if dust impacts from crushing operations become problematic.

Noise

Potential noise impacts associated with quarrying and clay borrow activities include noise impacts from mobile construction equipment, materials handling activities, and ground vibration impacts from blasting.

To minimise noise and vibration impacts associated with the quarry and clay borrow areas, the following general noise management measures will be implemented:

- in general, construction works and consideration of quite work practices would be carried out in accordance with Australian Standard 2436-1981, *Guide to noise control on construction, maintenance and demolition sites* (Standards Australia, 1981);
- prior to the commencement of works the community will be informed of the upcoming activities and likely duration;

- the construction programme will continue to be developed in consultation with the local community to schedule noisier activities (such as blasting) during least sensitive times of the day;
- rock breaking, rock hammering, sheet piling, blasting and any other activities which result in impulsive or tonal noise generation would only to be conducted during normal operational hours;
- appropriate selection of construction processes / methodologies and equipment which minimise the generation of noise would be further considered during the development of the project schedule;
- maintain a site activity log, recording the type of activities occurring during various times of the day to assist with the retrospective investigation of community complaints relating to noise (or dust) complaints; and
- regularly train workers and contractors (such as during tool box meetings) to maximise awareness of project noise goals and nuisance noise generating activities and encourage minimisation of these activities, including:
  - unnecessary or overuse of PA devices, horns
  - use of compression air brakes adjacent to sensitive areas;
  - shouting, swearing, laughing at shift start/end; and
  - efficient material handling procedures to reduce unnecessary loud banging sounds.

The following management measures will be implemented to reduce noise impacts associated with plant and equipment used in the quarry and clay borrow activities:

- avoid (where practicable) the coincidence of noisy plant working at the same time close together adjacent to sensitive receivers;
- where possible, all mechanical plant will be silenced by best practical means using current control technology;
- ensure that internal combustion engines (all mobile and stationary equipment) are fitted with a suitable muffler in good repair;
- where reversing alarms are to be used for mobile equipment such as dozers, scrapers, cranes, graders, excavators, trucks, loaders etc, their acoustic range would be limited to the immediate danger area;
- where practicable, metal surfaces subject to impacts from heavy objects (such as rock dropping into empty truck trays) will be lined with rubber impact protection to minimise impact noise;
- ensure that tailgates on trucks are securely fitted to avoid unnecessary “clanging” noise, particularly during movement of empty trucks;
- conduct regular inspections and effective maintenance of both stationary and mobile plant and equipment (including mufflers); and
- equipment not being utilised as part of the work would not be left standing with engines running for extended periods.

In relation to quarrying activities, blasting would be restricted to one blast per day at a single regular time of day during afternoon hours, following consultation with the community.

Blasting would be designed and managed by a blasting contractor, who would control blast overpressure and vibration in accordance with the project limits, through a detailed management plan. The contractor’s plan will address Australian Standard 2187 – 2006 Explosives—Storage and use Part 2: Use of explosives, and would include the following types of measures to minimise impacts:

- reducing maximum instantaneous charge of each blast;
- changing drilling patterns, burden, blasthole diameter, deck loading, location, spacing and orientation of blastholes or using a combination of appropriate delays;
- where possible orienting faces so that they do not face directly towards residences and keeping face heights to a minimum; and

- consider weather forecasts in the ongoing management of blast impacts (allowing for the effects of adverse wind on the propagation of airblast to surrounding areas).

Water

An Environmental Plan has been prepared specifically in response to surface water management in the quarry and clay borrow areas. This plan is attached in **Appendix C**.

Rehabilitation

The Alliance is unable to prepare a detailed rehabilitation plan for these areas, as the exact volume of materials to be extracted and the final landforms are unknown at this stage. **Section 3.17.2** identifies the proponent commitments that were presented in Appendix G of the Draft EIS. General details regarding the rehabilitation of the quarry and clay borrow area are detailed below.

Quarry Rehabilitation

The initial cuts through the overburden in the quarry will have 1:1 batters. These batters will be hydro-mulched with a batter grass mix with the inclusion of native tree seeds. The drill and blast profile will leave behind 5m wide benches every 10 metres. These benches will be cleared of loose rocks and the edge pulled if deemed necessary by a geologist.

As there is a potential for a Stage 4 to occur on the site in the future that may require additional rock products, no other rehabilitation will occur on the benches or the quarry floor.

Clay Borrow Rehabilitation

Following the completion of the clay core in the Main dam there will be additional work carried out in the clay borrow area as part of the recreation plan for the whole site. This will involve additional landscaping, construction of a number of public facilities, reinstating bike tracks and fencing.

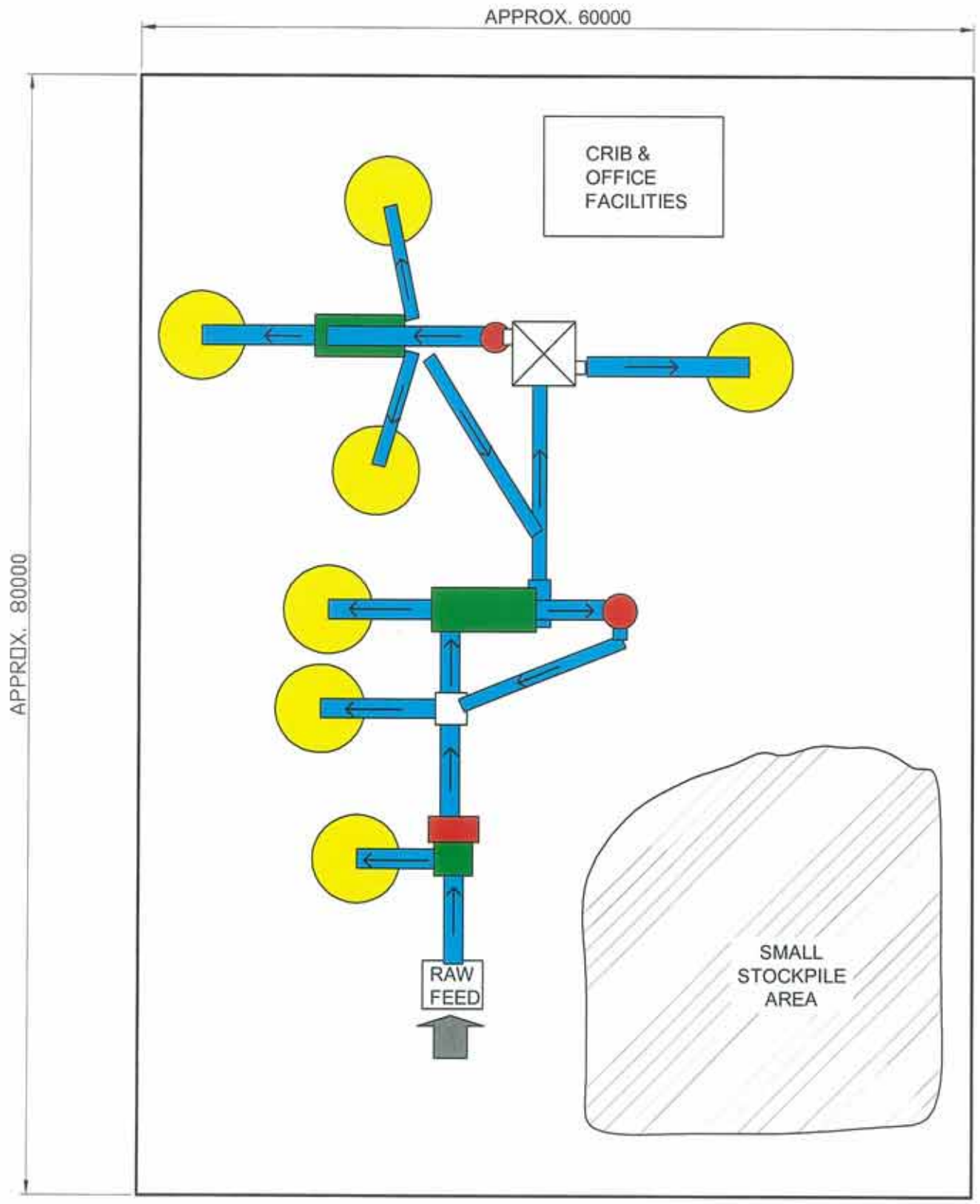
3.3.5 ERA 22 – Screening Materials

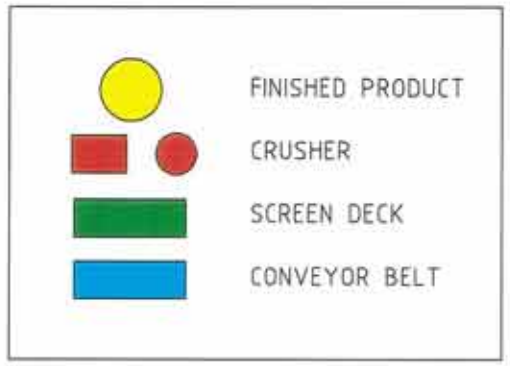
The Alliance will require a development approval for ERA 22 level 1 (c) screening, washing, crushing, grinding, milling, sizing or separating material extracted from the earth by using plant having a production capacity greater than 100,000t per year.

Crushing and Screening

A crushing and screening operation will be established on the upstream side of the main embankment, southwest of the existing spillway (refer **Figure 1**).

A1 THIS DRAWING TO BE READ IN CONJUNCTION WITH THE COMPLETE PROJECT DOCUMENTATION SET INCLUDING THE SPECIFICATIONS.





PROPOSED CRUSHING & SCREENING CONFIGURATION
NOT TO SCALE

HINZE DAM STAGE 3 EIS SUPPLEMENTARY REPORT

FIGURE 10
Site Layout - Crushing and Screening Plant

Hinze Dam Alliance | SKM | URS | THIESS

Rev	By	Appd	Date	REVISION RECORD

Designed: TLR
Drawn: JL
Checked:
Approved:
Date: 8/1/2007

Gold Coast City Council

Project Title: HINZE DAM STAGE 3
CAD File Number: SK-606-A.DWG

Drawing Set: INFRASTRUCTURE
Drawing Title: PROPOSED CRUSHING & SCREENING CONFIGURATION

Status: PRELIMINARY
Rev: A
Drawing Number: SK 606

The rational for selecting this location includes:

- close proximity to the crusher raw feed material from the quarry;
- power and water is available;
- the crusher pad will be constructed using quarry overburden;
- the crusher pad will later be transformed into a major part of the recreation area;
- easy access to the area;
- drainage from the area can be directed back into the quarry containment system (further information regarding stormwater management is discussed above); and
- it allows a closed circuit area to be maintained from the quarry area to the crusher area, which minimises haulage of materials and associated impacts.

The crushing and screening operation will produce the following construction material:

- concrete Aggregates;
- coarse sand;
- embankment filter material; and
- road pavement material.

The crushing and screening operation must be able to produce enough coarse aggregate to keep up with the production of concrete from the batching plant ($80m^3$/hr). As such, the approximate design capacity of the crushing and screening operation will be $78m^3$/hour.

Plant Process Description

The crushing plant will be established on an area covering approximately 10,000 m^2 (refer **Figure 10**). The pad will be at approximately RL 95.0 and will be shaped to direct any stormwater runoff from this area through pipes into the quarry containment system where the suspended solid will be allowed to settle out of the runoff, and the water may be treated further prior to re-use (refer to surface water management plan for further detail).

The area will be used for the feed stockpile, crushing and screen circuit and temporary stockpiles under the belts.

The crushing and screening process commences with the raw feed from the quarry being stockpiled adjacent to the feed bin. The material is then loaded into the bin by an excavator or loader and the rock then passes through the system. Depending on the range of material being produced on the day the system will produce graded material to a stockpile under the end of the conveyor belt. **Figure 11** shows an example of a crushing and screening plant.

The material will then be moved from the temporary under belt stockpile, pass over a weighbridge and weighed using load cells on the loader and taken to the materials stockpile area.

At the completion of the screening operation the crushing and screening plant will be removed from the site and the screening pad will be incorporated in the new recreational park facility near the left abutment.

- **Table 9- Yearly production rates from crushing and screening plant**

Year	Production
2007	220 t
2008	24200 t
2009	14550 t
2010	17450 t

- **Figure 11 - Example of a Crushing and Screening Plant**

Daily Operating Times

The plant will operate during 6:30am – 6:30pm Monday to Friday, and one Saturday (6:30am – 6:30pm) per month during the construction phase (October 2007 to December 2010). These operating times are likely to be reduced or altered during holiday periods (Christmas and Easter), Sundays and public holidays.

Environmental Management

The Alliance is currently preparing Environmental programs (EPs) for each ERA as part of the overall Construction Environmental Management Plan. Each EP will specifically address the environmental management measures to be implemented for each ERA, and will be submitted as supporting documentation with the Material Change of Use Application.

The following information identifies the areas where ERA 22 may have the potential to impact on the environment if appropriate management measures are not implemented. Furthermore, it provides an overview of the management measures that will be implemented as part of the EPs and overall Construction EMP to mitigate potential impacts.

Air

Several activities involved in the crushing and screening operation have the potential to generate dust and release cementious materials into the atmosphere. The following sources have been identified which may generate dust:

- the crushing operations;
- general vehicle movements (deliveries, transport, etc.);
- material storage both before and after crushing; and
- conveying materials to various stages of the process.

The following measure will be implemented to manage the potential for dust generation:

- dust suppression on the system will be achieved through the use of water sprays situated on the discharge to stockpile belts and on feed belts that carry predominately larger crushed material.

Measures to control dust generation that may arise from the transportation of materials:

- pave haul routes where practical and maintain these areas in a clean condition by sweeping or washing away dust into collection pits;
- dampen unpaved haul routes to limit dust emission;
- minimise vehicle movements;
- cover or dampen dry loads; and
- inspect vehicles and wash down when required.

Measures to control dust generation in association with aggregate storage include:

- materials should be stacked within the confines of storage bins to minimise exposed surface area thereby reducing the risk of surface drying and therefore wind blown dust emissions;
- ensure that a 0.5m freeboard is maintained around the storage bins; and
- ensure materials are kept damp to avoid dust emissions.

Land

The establishment of the screening and crushing facility site will require clearing of vegetation to establish the site area. As such, there is potential to impact on native fauna. To protect native fauna, a qualified fauna spotter will be engaged to work ahead of the site clearing works at the commencement of the quarrying and clay borrow activities. If native fauna is present, clearing works will be halted until such time as the fauna spotter is able to safely relocate the native fauna.

There is potential for the spreading of noxious weeds around the screening and crushing site. To prevent new noxious weed infestation and minimise risk of weed spreading to other areas:

- all non-local earthmoving plant /equipment must be washed and cleaned thoroughly to remove all external dirt and excess oil/grease;
- large non-local plant will be inspected prior to start;
- clearance certificates kept on records for all future references;
- weed, seed & fire ant fact sheet to be supplied to all suppliers of plant and equipment;
- designated parking area for vehicles established to minimise spread of weeds; and
- all earthmoving plant/machinery cleaned before demobilising off-site.

At the completion of the screening operation the crushing and screening plant will be removed from the site. The screening pad will be incorporated in the new recreational park facility to be established on the left abutment. The remainder of the screening plant site will be landscaped for recreational purposes.

Noise

Potential sources of noise include:

- motors: front end loader, concrete slumping operations, raw material delivery trucks and concrete delivery trucks.
- scraping loader buckets;
- truck air brakes; and
- the operation of the swing jaw crusher and hydrocone.

The following control measures will be implemented to minimise noise impacts:

- enforce a speed limit on and around the site of 20km/h;
- ensure trucks do not use air brakes except in emergencies;

- ensure the crushing machinery is maintained in order to limit the noise emitted by it;
- enforce operation times (7am – 6pm).
- equipment having directional noise characteristics (emits noise strongly in a particular direction) would be oriented such that noise is directed away from sensitive areas;
- acoustic barriers will be incorporated around the crushing and screening plant.
- all mechanical plant would be silenced by best practical means using current control technology;
- ensure that internal combustion engines (all mobile and stationary equipment) are fitted with a suitable muffler in good repair;
- where reversing alarms are to be used for mobile equipment such as dozers, scrapers, cranes, graders, excavators, trucks, loaders etc, their acoustic range would be limited to the immediate danger area.
- where practicable, metal surfaces subject to impacts from heavy objects (such as rock dropping into empty truck trays, or metal grates on road ramps etc) should be lined with rubber impact protection to minimise impact noise;
- ensure that tailgates on trucks are securely fitted to avoid unnecessary "clanging" noise, particularly during movement of empty trucks;
- conduct regular inspections and effective maintenance of both stationary and mobile plant and equipment (including mufflers, enclosures etc); and
- equipment not being utilised as part of the work would not be left standing with engines running for extended periods.

Water

An Environmental Plan has been prepared specifically in response to surface water management in the quarry and clay borrow areas. This plan details specific measures that will be implemented to mitigate any potential impacts on surface water quality as a result of the proposed crushing and screening plant. The plan is attached in **Appendix C**.

3.3.6 ERA 28 – Motor Vehicle Workshop

The Alliance will require a development approval for ERA 28 level 1 (b) Motor vehicle workshop - operating a workshop or mobile workshop in the course of which motor vehicle mechanical or panel repairs are carried out in the course of a commercial or municipal enterprise (other than on a farm or under a mining tenement) or on a commercial basis.

The proposed workshop will be constructed and operated by the Hinze Dam Alliance within the timeframe for constructing Hinze Dam Stage 3 (expected by the end of 2008) and potentially any handover/commissioning activities under the management of Thiess Pty Ltd until practical completion has occurred (anticipated for approximately twelve months after construction).

Workshop Details

The operational activities to be undertaken at the workshop are similar to standard vehicle workshop activities, including:

- conduct servicing, maintenance and repairs to heavy plant, light vehicles, and other field equipment used in the construction of the Project;
- storage of plant, equipment, spares, and small quantities of chemicals and oils associated with these activities;
- conduct vehicle and equipment washing for cleaning and seed/weed control purposes;
- conduct tyre-changes for all equipment;
- storage of waste oils, glycols and other related chemicals prior to disposal or recycling off-site;

- office and administrative functions associated with workshop activities;
- maintenance of pollution-control equipment; and
- parking of plant and equipment.

The scope of activities does not include spray-painting, sand-blasting or other abrasive cleaning.

Hours of Operation

The workshop will be required to operate during the following periods:

- Monday to Friday 6:30 am – 6:30 pm
- Saturdays (each 4th week) 6:30 am – 6:30 pm
- A maintenance shift between 3.00pm and 12.00pm on each work Monday through Saturday.

Workshop Facilities and Layout

The workshop facilities will comprise:

- 12m x 12m enclosed workshop building on concrete slab;
- vehicle washdown and refuelling area, each on concrete hardstanding;
- oil and waste oil storage tanks (on concrete hardstanding);
- equipment stores (four 7x3m sized shipping containers); and
- first flush water diversion system and oil/water separator.

A layout sketch of the workshop site is shown on **Figure 5**.

A range of hazardous substances, though in small quantities, could be stored and used in the workshop. These substances would be limited to those materials generally found in a motor vehicle workshop, and could include:

- degreasers;
- solvents;
- vehicle wash/detergents;
- lubricants; and
- paints.

Noise Assessment – Night Time Works

A noise assessment was conducted for the proposed night time workshop operations. The following provides an overview of the report and the recommendations.

Existing Noise

The noise environment at residential locations near the Hinze Dam wall and construction areas was measured using both attended and unattended monitoring methods. The measurements were undertaken in general accordance with the EPA Noise Monitoring Manual.

- **Table 10 Noise Monitoring Locations**

ID	Address	Description
H1	Mottee Court	Residential dwelling approx. 560 m north of the dam wall
H2	Toula Court	Residential dwelling approx. 840 m north of the dam wall
H3	Duncan Road	Residential dwelling approx. 450 m north east of new saddle dam

The Rating Background Level (RBL) in **Table 11** is the overall, single-figure, background level representing each of the day, evening or night assessment periods over the whole monitoring period. This is the level used for assessment purposes when referring to background noise.

- **Table 11 Results of Unattended Noise Monitoring**

Location	Monitoring Dates	Rating Background Level (RBL)			L_{Aeq} over the assessment period			
		Day	Evening	Night	Day	Evening	Night	$L_{Aeq\ 24\ Hr}$
H1	20/02/07 to 27/02/07	34 dB(A)	36 dB(A)	32 dB(A)	45 dB(A)	43 dB(A)	39 dB(A)	43 dB(A)
H2	13/03/07 to 21/03/07	33 dB(A)	29 dB(A)	24 dB(A)	47 dB(A)	40 dB(A)	41 dB(A)	44 dB(A)
H3	13/03/07 to 21/03/07	31 dB(A)	28dB(A)	25 dB(A)	43 dB(A)	39 dB(A)	44 dB(A)	44 dB(A)

Sleep Disturbance Criteria

The potential for noise impacts on the acoustic amenity of the residents during the night will be compared to the sleep disturbance criteria to determine an acceptable operational noise level for the works.

The Queensland EPA's Guideline, Planning for Noise Control, recommends that maximum instantaneous internal noise levels in sleeping areas should not exceed approximately 45 dB(A) more than 10 – 15 times per night. Corresponding external maximum noise levels (L_{Amax}), that would represent a probability of less than 1% awakenings, are presented in **Table 12**. These levels are estimated by the applying the attenuation offered by different window types to the maximum internal noise level.

- **Table 12 External Maximum Instantaneous Noise Level (L_{Amax}) (EPA 2004).**

Window type and setting	Typical Noise Reduction	External L_{Amax} (dB(A))
Wide open	5	37
Partially closed	10	42
Single glazed, closed	20	52
Thermal double glazed, closed	25	57

Given the very low noise level at residential locations during the night time, an L_{Amax} night time noise goal of 42 dB(A) was recommended for the nearest dwelling, which represents the maximum external level for partially closed windows.

Predicted Noise Levels

The SoundPLAN V6.4 noise modelling package was used to predict noise levels from the workshop activities. The predicted levels are based on the attenuation achieved by providing an acoustic workshop shed having a minimum sound attenuation of 26 dB(A) through 3 sides and the roof. The doors at the entrance of the shed would also have an attenuation of 26 dB(A) however, when no noisy activities are being undertaken, the doors could remain open to assist with ventilation. The internal lining of the shed should be covered in a foil faced insulation to reduce reverberant noise within the space.

Predicted noise levels at the nearest receiver indicate that the L_{A1} noise level at the nearest receiver will be approximately 36 dB(A) and the corresponding L_{Amax} noise level would be 41 dB(A). When compared to the noise criteria outlined in Section 4, the predicted L_{A1} and L_{Amax} noise levels from the maintenance workshop would comply with the night time noise goals for sleep disturbance.

Noise Management

As a result of the night time noise assessment, the Alliance has changed the location and configuration of the workshop.

The noise also assessment recommended a number on acoustic materials that will be used in the construction of the workshop. The assessment also includes a detailed management plan that will be implemented throughout the construction works (refer Appendix B).

Environmental Management

The Alliance is currently preparing Environmental programs (EPs) for each ERA as part of the overall Construction Environmental Management Plan. Each EP will specifically address the environmental management measures to be implemented for each ERA, and will be submitted as supporting documentation with the Material Change of Use Application.

The following information identifies the areas where ERA 28 may have the potential to impact on the environment if appropriate management measures are not implemented. Furthermore, it provides an overview of the management measures that will be implemented as part of the EPs and overall Construction EMP to mitigate potential impacts.

Air

Activities at the site that have the potential to impact on air quality of the locality include dust and exhaust emissions from plant and equipment testing and servicing.

- Service all vehicles (especially exhaust) and equipment to ensure optimum engine performance that minimises energy use and emissions;
- Install and maintain correct air quality control measures (eg. Exhaust fans).
- Maintain correct service records;
- Maintain an inventory of spare parts (flexible pipe connectors and filter fabric bags) to ensure worn or faulty materials can be readily replaced; and
- Implement routine inspections (at least weekly) of all dust control devices.

Noise

Refer **Appendix B** for night time noise management plan.

Land and Water

Some workshop activities have the potential for impacting soil and land values on and in the vicinity of the workshop if no controls were implemented during construction, operations or decommissioning. Stormwater runoff and process water (eg from vehicle washdown) and accidental spillage of fuels from the workshop site has the potential to mix with waters if inadequately controlled. Potential sources for water pollution include:

- escape of cleanup water; and
- accidental spillage of fuels, lubricants, or chemicals

To minimise the risk of land and water pollution, the workshop activities will be carried out within an enclosed building and over a bunded concrete slab, where any potential spills will be drained to an internal sump. In addition, water runoff from the site will pass through an oil/water separator systems (refer **Figure 12** for process detail).

- First Flush system - The proposed ‘first flush’ unit, will capture the 'first flush' of rain falling on a site after a pollution generating activity has occurred. This volume will be diverted to a holding tank for processing via a

treatment unit such (the oil/water separator). The system is programmed to ensure that the diversion takes place after a polluting activity (such as truck wash or accidental spillage) or rainfall occurs; and

- Oil/water separator - once water has been captured in the first flush system, the polluted run-off from the site will be treated to enable disposal in an environmentally friendly manner.

Correct storage of hazardous substances

To prevent accidental spillage of hazardous substances and thereby reducing potential impacts on surrounding land and water, the following storage management measures will be implemented:

- storing flammable and combustible liquids in accordance with AS1940. (AS1940 provides requirements for the planning, design, construction and safe operation of all installations in which flammable or combustible liquids are stored and/or handled.);
- ensuring refuelling and lubricated activities occur in designated areas, and spill kit equipment for the containment and cleanup of spills is provided;
- containing spillages in plant and working areas;
- storing and handling of corrosive materials in accordance with AS3780;
- recording and reconciling fuel usage;
- ensuring that all Material Safety Data Sheets are kept at the batch office;
- maintaining a hydrocarbon spill clean up kit adjacent to the tank refuelling; and
- ensuring hazardous material storage containers are identified and labelled and appropriate warning signs posted.

Spill Kits

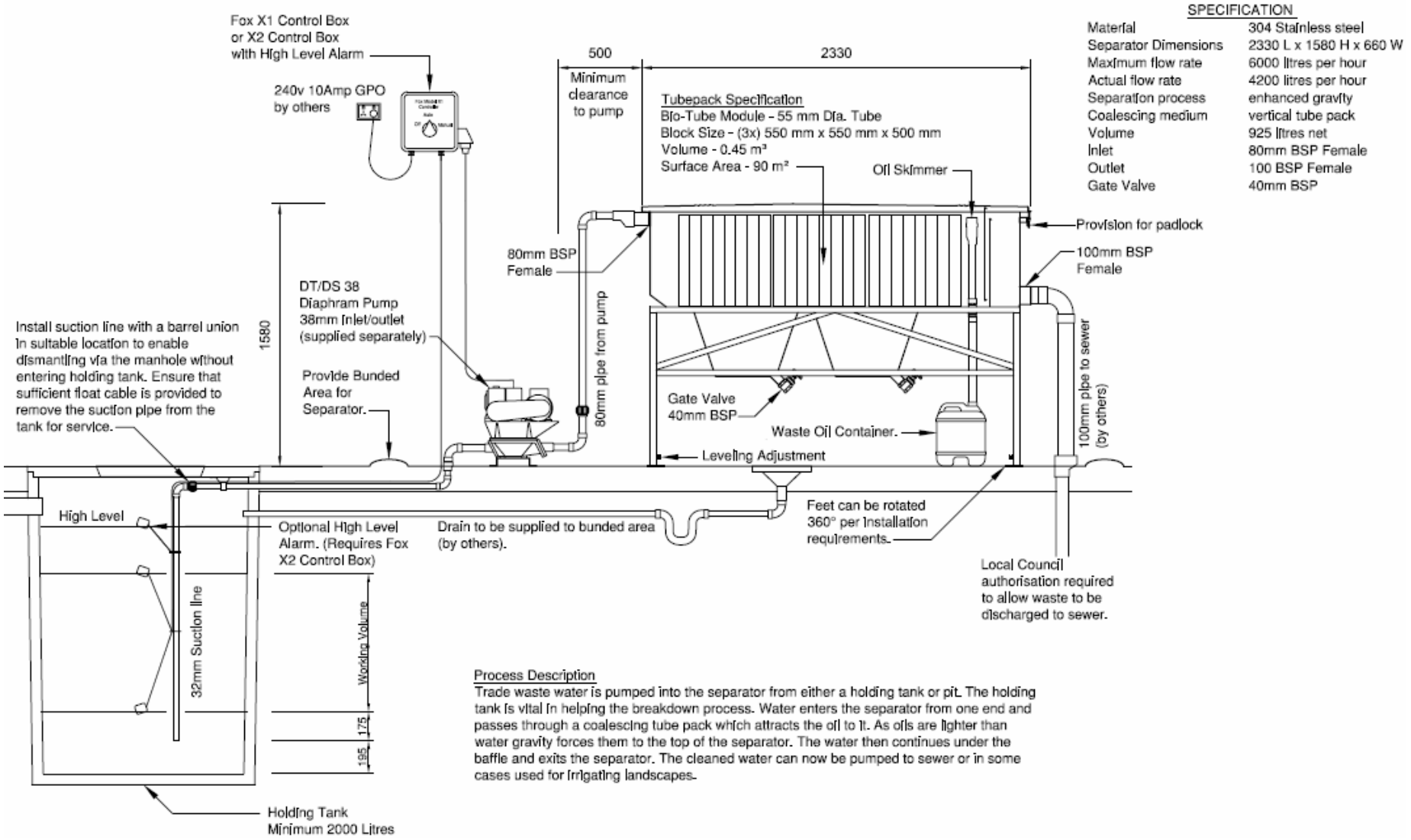
Should an accidental spillage occur, the proposed workshop will have spill kits in place in order to mitigate impacts (health, safety and environment) associated with the storage and usage of hydrocarbons. Spill kits are to be located in areas of the proposed workshop regularly associated with the use of hydrocarbons. The workplace manager shall ensure that relevant staff are trained in the appropriate spill control techniques and correct usage of spill kits.

Mobile Workshop Management

For mobile workshop operations (eg maintenance of plant that is too large to fit into the workshop building), the following management measures will be implemented to ensure land and water contamination does not occur:

- place drip trays under process plant, machinery and equipment containing contaminants such as diesel, oil etc, to collect potential leaks;
- spill kits will be provided at the mobile work site;
- staff trained in the effective use spill response kits;
- manage all spills as incidents; and
- report any spill to the site environmental manager.

- **Figure 12 – Oil Water Separator - Schematic Detail and Process Description**



Waste

Some workshop activities have the potential to create solid and liquid waste and cause harm to the environment and local amenity if no controls were implemented during construction, operations or decommissioning. These wastes could result from:

- discarded materials associated with the construction, installation, maintenance and removal of workshop facilities and equipment;
- maintenance of pollution control devices;
- vehicle and equipment servicing, maintenance and repairs;
- amenity activities; and
- site clearance and establishment.

The following waste management practices will be implemented:

- waste avoidance relates to preventing the generation of waste or reducing the amount of waste generated. Reasonable and practicable measures for achieving waste avoidance may include, but are not necessarily limited to:
  - input substitution (using recyclable materials instead of disposable materials, for example using oil delivered in recyclable steel drums instead of non-recyclable plastic containers);
  - increased efficiency in the use of raw materials, energy, water (purchasing consumables in bulk (viz. large containers) rather than small quantities);
  - improved maintenance and operation of equipment (keeping equipment in good working order to reduce wear and overhauls); and
  - undertaking an assessment of waste minimisation opportunities from time to time.

- waste re-use refers to re-using waste, without first substantially changing its form. Reasonable and practicable measures for reusing waste may include recovering and separating materials;
- waste recycling refers to treating waste that is no longer useable in its present from and using it to produce new products. Reasonable and practicable measures may include, but are not necessarily limited to:
  - Recovering oils, greases and lubricants for collection by a licensed oil recycling contractor;
  - Recovering, separating and recycling packaging (including paper, cardboard, steel and recyclable plastics);
  - Recycling used plant and equipment to the maximum practicable extent;
  - Finding alternatives to disposal of non-recyclable materials (e.g. using conveyor belts for noise attenuation); and
  - Providing suitable receptacles and storage areas for collection of materials for recycling.
- waste disposal refers to disposing of waste which can not otherwise be reused, recycled or used for energy recover. Reasonable and practicable measures may include, but are not necessarily limited to:
  - Suitable containers will be provided on site for the collection and storage of waste;
  - Regulated wastes must be transported and disposed of in accordance with the Environmental Protection (Waste) Policy 2000;
  - Disposal to a licensed waste disposal facility (viz. landfill or transfer station);
  - Removal of wastes, disused plant and rubbish from the vessels in a timely manner;

- Any litter entering the vessels is to be collected and disposed of; and
- Worn parts and packaging will be disposed of in accordance with the requirements of the Gold Coast City Council.

In addition, the following waste management measures will be implemented:

- all containers to be stored in bunds, lids on when not in use, old drums to be disposed or returned to supplier when empty;
- stores to be locked;
- low toxicity chemicals to be sought & investigated during procurement;
- work areas to be kept in clean, uncluttered state at the end of each working day;
- obtain waste tracking docket from waste contractor & link with Thiess Pty Ltd waste register;
- check for litter & maintain high housekeeping standards;
- check status of bins / drum;
- store and dispense all hazardous materials in above ground, bunded tanks or pallets in compliance with Australian standards AS1940;
- cover and seal all fuel, oils & solvents containers to prevent evaporation into the environment and intrusion of water;
- monitor all hazardous materials in such a manner as to prevent overflow and to detect leakage;
- empty containers to be labelled 'empty' to identify container is not in use. If container is refilled it shall be relabelled;
- maintain bund value and ensure closed and locked when not in use;
- transport fuel and other hazardous material to Australian Standards, AS1940;
- use fuel transfer pipes and hoses with properly functioning and approved check valves, spaced to prevent backflow of fuel; and
- fit all dangerous goods containers with decanting taps and spill trays to contain drips.

3.3.7 ERA 62 – Concrete Batching

The Alliance will require a development approval for ERA 62 – level 1 (b) Concrete Batching - producing concrete or a concrete product by mixing cement, sand, rock, aggregate or other similar materials in works (including mobile works) having a design production capacity of more than 100t a year.

Process Description

Concrete Batch Plant

As part of the overall construction of the project, the manufacture and placement of approximately 55,000m^3 of concrete will be required. The concrete used in the project will be either structural concrete or mass concrete. The concrete will need to be produced on the site as it would not be possible for an existing concrete plant on the Gold Coast to meet the specific requirements of the site needs and produce concrete for their normal customers.

The production of concrete will be required over the full duration of the project with demand varying from 5m^3 to 400m^3 per day, depending on the programme. The mass concrete will generally use 75mm aggregate and the structural concrete 20mm aggregate.

Concrete for the construction of the Upper Intake Tower will likely be sourced from an established Gold Coast plant as it will all be structural grade concrete.

The plant for the site will typically be a mobile plant with a production capacity of 50m^3 per hour. The plant will consist of a series of weigh hoppers that are loaded by augers from the cement and a wheel loader for the aggregate.

Rock sourced from the quarry will be delivered by trucks to aggregate receiving bins, after being crushed and screened on-site. Fine aggregate, cement and fly-ash are delivered to site by trucks. This material is then discharged onto a conveyor belt and feed into the back of a transit mixer (agitator truck) along with water to produce concrete. The transit mixer mixes the concrete at the batch plant, the consistency of the concrete is checked visually and the concrete is then transported to where it is requires. This process is repeated until the required amount has been delivered to the site. Transit mixers are typically capable of mixing and transporting 5m^3 per load.

Storage silos for Fly ash and Cement powder will be located adjacent to the weigh hopper, with a typical storage capacity of 50t. These silos are fitted with electrostatic precipitators to control dust associated with the filling process and high level sensors connected to audio visual alarms. The cement and fly ash weigh hopper is fitted with a bag filter as these materials are transported by an auger and not aerated and as such do not have the potential to generate the same amount of dust.

The layout of the concrete batching plant is shown on **Figure 2.**

Truck Washout

During a typical concrete pour there is a need to wash out the bowls on the transit mixers. This usually occurs after every three to four loads and at the end of the pour. The process to do this is simple and only required the addition of around 1000L of water to the bowl of the mixer and the mixer is then spun at ¾ speed. The waste water is then discharged into a settling pond (refer Figure 13).

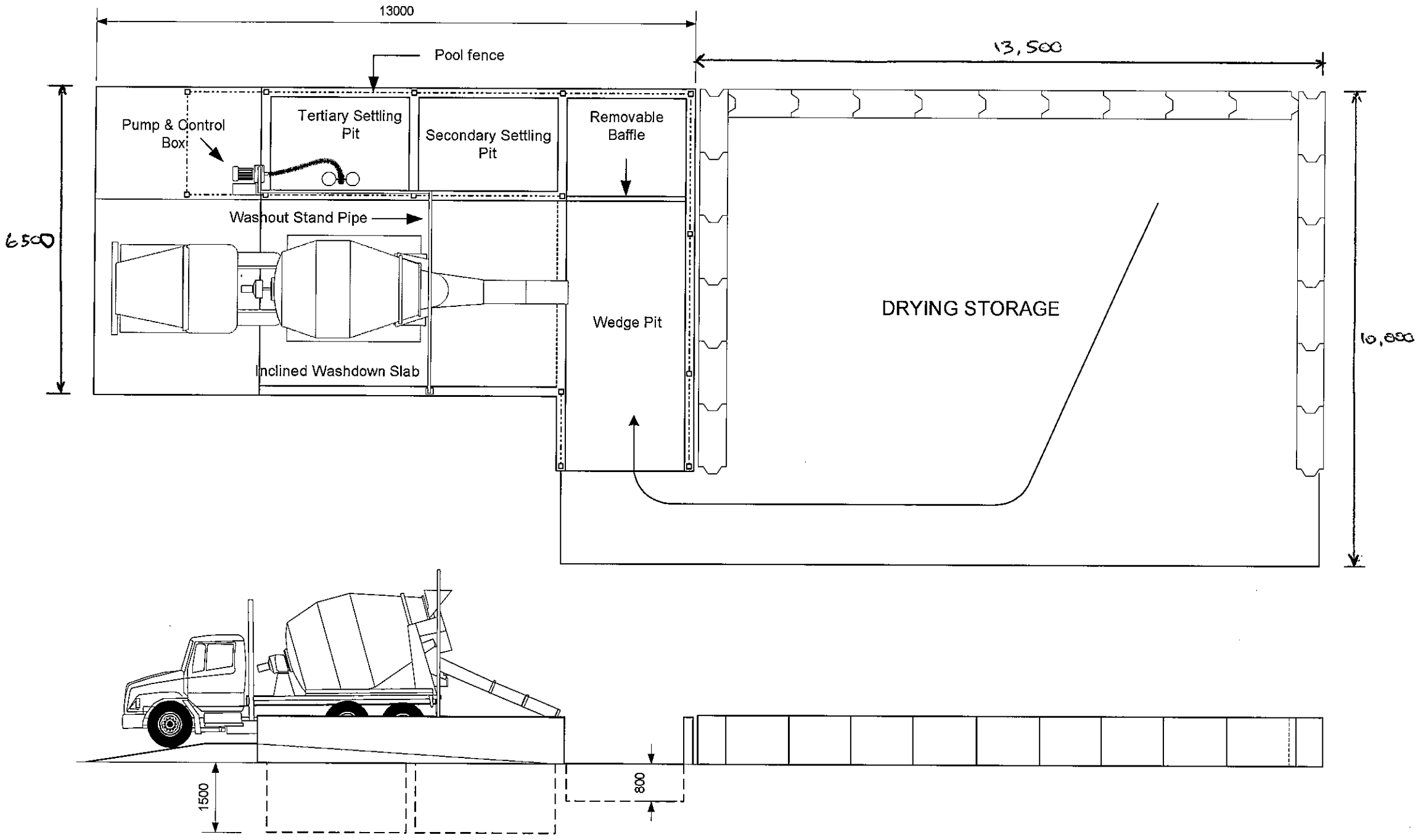
The water from the settling pond is allowed to settle and is then pumped to a holding tank before being reintroduced into the water storage tanks for the batch plant water supply. The water storage tank will have a level indicator that will activate a pump to empty the tank to a predetermined level. This transfers the washout water from the transit mixers into a closed circuit thus eliminating the potential of an uncontrolled release.

The solids from the settling pond are removed and returned to the crusher feed stockpile to be re-processed into concrete aggregate or coarse sand.

If water was required to be released from the storage into the site drainage system then the pH of the water would be tested using a pH meter. The pH of the water would be corrected using typically dry acid and the water retested. Once the pH is at an acceptable level it would be released into a site storage and additional pH testing would be taken in the storage 24hours after the release.

The quantity of dry acid kept on site would be less that 40kg as it is readily available in large quantities within 5 km from the site.

NOTE:
PRECAST CONCRETE SECONDARY & TERTIARY SETTLING PITS COULD BE REPLACED BY A BUNDED, UNLINED EARTH PIT IF SITE CONDITIONS PERMIT.



General Arrangement

HINZE DAM STAGE 3 EIS SUPPLEMENTARY REPORT

FIGURE 14
Concrete Washout

REV.	DESCRIPTION	DATE	BY
0	Preliminary		
1	GS&A Ground Bins 030147/22		

Hanson

TRUCK WASHOUT PIT

DWG NO NR-PROJ-HD3

DRAWN EAGLESR

SCALE 1:100

DATE 17/04/2007

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0 2100 3500 7000

Material Quantities and Production Rate

Table 13 and Table 14 detail the quantity of materials to be processed and the anticipated yearly production rate of the concrete batch plant.

- **Table 13 - Quantity of materials to be processed**

Material	Quantity
Cement	8960 t
Fly-Ash	5880 t
40mm Aggregate	25200 t
20mm Aggregate	18480 t
10mm Aggregate	10640 t
Water	10.1 ML
Coarse Sand	28000 t
Fine Sand	25760 t
Concrete	56000 m^3

- **Table 14 - Yearly production rate**

Year	Production
2007	225 m^3
2008	24950 m^3
2009	15000 m^3
2010	18000 m^3

Daily Operating Times

The plant will operate during 7am – 6pm Monday to Friday, and one Saturday per month during the construction phase (October 2007 to December 2010). These operating times are likely to be reduced or altered during holiday periods (Christmas and Easter), Sundays and public holidays.

Environmental Management

The Alliance is currently preparing Environmental programs (EPs) for each ERA as part of the overall Construction Environmental Management Plan. Each EP will specifically address the environmental management measures to be implemented for each ERA, and will be submitted as supporting documentation with the Material Change of Use Application.

The following information identifies the areas where ERA 62 may have the potential to impact on the environment if appropriate management measures are not implemented. Furthermore, it provides an overview of the management measures that will be implemented as part of the EPs and overall Construction EMP to mitigate potential impacts.

Air

Several activities involved in the operation of a concrete batch plant have the potential to generate dust and release cementious materials into the atmosphere. The purpose of this application is to identify these sources and provide possible solutions for the minimisation of dust and the escape of cementious materials from the site.

Sources of dust include:

- general vehicle movements (deliveries, transport, etc.);
- unloading raw materials into storage bins;

- raw material storage; and
- transfer of raw materials into concrete agitator.

To minimise the potential air quality impacts of the concrete batching plant, the following control measures are proposed:

Transport:

- pave haul routes and batch plant areas where practical and maintain these areas in a clean condition by sweeping away dust or washing cementious materials into collection pits;
- dampen unpaved haul routes to limit dust emission;
- minimise vehicle movements;
- cover or dampen dry loads; and
- inspect vehicles and wash down when required.

Cement and fly-ash silos:

- provide a dust extraction system to collect and contain dust generated in the loading and unloading areas for this project a static precipitator will be utilized;
- fit an overfill warning device to silos;
- install a burst filter bag warning device;
- blow through and cap all pneumatic lines after deliveries;
- ensure hatches are maintained in airtight condition;
- ensure spillages are hosed to collection pits; and
- regular inspections of entire system.

Aggregate storage bins:

- materials should be stacked within the confines of storage bins to minimise exposed surface area thereby reducing the risk of surface drying and therefore wind blown dust emissions.
- ensure that a 0.5m freeboard is maintained around the storage bins;
- ensure materials are kept damp to avoid dust emissions.

Land

The operation of a concrete batching plant may pose a risk to native flora and fauna in the immediate area. The main risks for flora and fauna impacts include clearing of vegetation to establish the site area, storage areas and surrounding roads thereby destructing habitat, increasing the risk of erosion and possible introduction of noxious weeds to the area.

To minimise impacts to land, the following control measures are proposed:

- flora and fauna inspection to be conducted prior to construction of the plant;
- careful planning in order to minimise the amount of land cleared for the concrete batching plant;
- a number of dead trees to be left in the area for habitat purposes;
- injured fauna to be taken for treatment at an approved Fauna Rehabilitation Unit;
- rehabilitation measures taken once construction is complete; and
- use of approved seed mix to avoid the introduction of weeds.

Noise

Uncontrolled or unmitigated noise from batching operations has the potential to be a nuisance at neighbouring residences.

Noise from fixed and mobile equipment sources on the site shall be limited by such practicable means to ensure that the emission of noise or the likelihood of the emission of noise that constitutes an environmental nuisance is prevented.

Potential sources of noise include:

- diesel motors (front end loader, concrete slumping operations, raw material delivery trucks and concrete delivery trucks);
- raw material handling (unloading trucks, loading receiving bins, dispensing materials to the concrete trucks);
- scraping loader buckets;
- conveyors;
- truck air brakes;
- filters;
- compressors;
- alarms/reverse warning signals;
- air valves;
- pumps; and
- fans.

Specific control measures that may be implemented include, but are not necessarily limited to:

- Plant and Equipment;
  - Concrete pave or bitumen seal traffic areas as soon as possible and keep them in good condition to minimise vehicle noise
  - Refill aggregate bins prior to the bins being completely empty
  - Install self-cleaning weigh hoppers with high valley angles
  - Ensure vibrators are not installed
  - Ensure any generators and air compressors are adequately muffled and located within an insulated housing
- Agitator Trucks and other Road Trucks;
  - Limit mobile equipment speed to less than 20 kilometres per hour on the site
  - Enforce regulated speed limits
  - Ensure any reversing sirens are noise attenuated, consistent with performing the intended purpose while minimising shrill and piercing emissions
  - Operate modern, well-maintained roadworthy concrete and aggregate delivery trucks with high efficiency mufflers
  - Ensure trucks comply with the national vehicles standard design rules
  - Ensure delivery or agitator trucks do not use engine brakes in built up areas except in emergencies
  - Ban the use of engine brakes within the site

  - Train truck drivers to conduct operations with minimum noise impact
  - Control of high speed mixing operations to the maximum practical extent
  - Install and maintain the agitator truck loading point and slump stand enclosure
  - Advise all supplier and subcontracted delivery vehicles and operators of company requirements.
- Miscellaneous;
  - Prohibit the use of horns on the site (except in an emergency)
  - Use portable telephones or pagers rather than bells or hooters
  - Enclose any drop chute areas
  - Provide enclosures around exhaust fans or any dust extraction intake/release points
  - Ensure exhaust points for dust extraction system are ducted and released at ground level
  - Fit warning lights on mobile equipment and limit the use of audible sirens or beepers
  - Enclose plant (loading area and slump point)
  - Implement and enforce a site code outlining requirements for operators and drivers
  - Enclose compressors and provide silencers on air valve outlets.

Water

Stormwater runoff and plant process water from the site the potential to mix with downstream waters if inadequately controlled.

The principal water management objectives are:

- to ensure stormwaters are managed to protect downstream water quality;
- to ensure all water management facilities are installed and maintained to manage all site runoff;
- to contain, treat and recycle all process water and contaminated stormwater on the site; and
- to ensure any release of stormwater from the site meets appropriate water quality criteria.

Potential sources of water pollution include:

- escape of truck wash out water;
- runoff containing spilled raw material (sand and gravel);
- runoff containing spilled cementious material;
- accidental spillage of fuels, lubricants, or chemicals; and
- spillage of concrete outside the site entering stormwater drains.

Specific control measures that may be implemented include, but will not be limited to:

- General
  - Implement methods for managing the water. Provide suitable falls and broad dished areas for directing flows and controlling stormwater runoff
  - Ensure any activities that may produce water contaminated with aggregates or cementious materials are to be conducted within the areas defined as ‘dirty’ or ‘contaminated’ respectively.
  - Ensure precipitation falling in the “clean” area outside the perimeter is to be directed away from the dirty area catchment to the clean water collection tank along the southern boundary of the site

  - Ensure precipitation falling within the 'dirty' area is directed to strip field gullies with integral silt traps thence on to the stormwater collection tank. Ensure silt traps are cleaned regularly to maintain catchment capacity below discharge invert
  - Ensure precipitation falling in the "contaminated" area is directed to the collection wedge pit before being pumped to the stirrer tank
  - Use water collected on the site for concrete manufacture to reduce the use of reticulated town water
  - Maintain paved surfaces in a well maintained and clean condition
  - Implement control measures for storage and handling of hazardous materials
  - Keep and maintain a mobile spill cleanup kit on site
- Washout and Contaminated Area Control Measures
  - Implement run-off controls and waste and contaminated water collection via a water collection and recycling system which includes washout bays, wedged pits, a settlement pit, slurry tank (stirrer tank) and a batch water holding tank
  - Wash truck agitator barrels into the wash-out pits where the solids separate from the water
  - Decant wash water into water collection/ settlement pit and thence to the stirrer tank from where it will be pumped to the batch water holding tank for use in the manufacture of concrete
  - Provide adequate free storage to collect the minimum design first flush of 20 millimetres and hydraulic controls to divert clean stormwater runoff to the external stormwater drainage
  - Use water collected in the settlement tank as a priority for the manufacture of concrete, to maintain the live first flush capacity
  - Remove sediment from the settlement tank prior to it comprising 20% of the total pit capacity
  - Ensure trucks discharge any retained concrete, without addition of water, into the concrete waste bin or mould prior to washing out mixer drums
  - Ensure concrete is not discharged into the washout bin

Waste

Unmanaged waste poses an environmental risk by increasing the possibility of fire, land contamination, contamination of downstream water quality and the visual aesthetics of a site. The following identifies sources of waste and describes the management plan which will be implemented to control it.

Sources of waste:

- packaging;
- concrete returns;
- worn parts; and
- maintenance residues.

Control measures:

- uof reusable or recyclable materials;
- recovering and separating materials to be recycled;
- allow waste concrete to harden and then crush and screen for use as aggregate;
- recovering oils, lubricants and greases for collection by a licensed oil recycling contractor;
- reuse/ recycle water from washout bays (dust suppression etc.); and

- controlling waste by providing suitable containers and regular pick up and disposal to a licensed waste disposal facility.

Spill Management

All necessary preventative measures should be implemented to prevent spills, and if a spill does occur, it should be contained, removed and disposed of properly.

Reasonable and practicable management measures include but are not limited to:

- Fuels and Oils
  - Storing flammable and combustible liquids in accordance with AS1940. (AS1940 provides requirements for the planning, design, construction and safe operation of all installations in which flammable or combustible liquids are stored and/or handled.)
  - Ensuring that the diesel fuel tank is situated within a concrete wall containment structure with sufficient capacity to contain the total contents of the fuel tank.
  - Ensuring refuelling and lubricating activities occur in designated areas, and equipment for the containment and cleanup of spills is provided
  - Containing spillages in plant and working areas
  - Storing and handling of corrosive materials in accordance with AS3780
  - Recording and reconciling fuel usage
  - Ensuring that all Material Safety Data Sheets are kept at the batch office
  - Maintaining a hydrocarbon spill clean up kit adjacent to the tank refuelling bay to facilitate rapid mop up of any spillage occurring during refuelling.
  - Ensuring hazardous material storage containers are identified and labelled and appropriate warning signs posted.
- Cementious Materials
  - Maintaining General Purpose Cement and Flyash in separate, 100 tonne storage silos
  - Training all staff in the proper handling procedures of cementious powders
  - Ensuring that all Technical and Material Safety Data Sheets relating to both cement and flyash are kept at the batch office.
- Admixtures
  - Ensuring all admixture tanks are located within a concrete walled containment of sufficient capacity to contain the total tank capacity.
  - Roofing admixture storing area to prevent collection and buildup of precipitation.
  - Ensuring that all Technical and Material Safety Data Sheets relating to the standard admixtures to be used are kept at the batch office.
  - Ensuring all staff are trained in the proper handling and use of admixtures and of procedures to follow in the event of spillage
- Truck wash
  - Ensuring that truck wash is stored in original containers to time of use
  - Using a non-hazardous, biodegradable, organic salt based products for truck washing purposes on site (e.g Barrell Kleen Safe)
  - Storing truck wash within the designated “contaminated” area where all usage of the substance will occur.

- Ensuring that spillage/leakage will be contained within the "contaminated" area and collected by the recycled water system.
- Ensuring that all Technical and Material Safety Data Sheets relating to truck wash are kept at the batch office.
- Ensuring all staff are trained in the proper handling and use of truck wash and of procedures to follow in the event of spillage

3.3.8 ERA 84 – Regulated Waste Storage

The Hinze Dam Alliance will require an approval for ERA 84 level 1 (b) operating a facility for receiving and storing….regulated waste.

Where the following 'regulated wastes' (as per Schedule 7 of the Environmental Protection Regulation 1998)

- adhesives;
- batteries;
- oil interceptor sludges;
- oils;
- organic solvents;
- petroleum tank sludges;
- tyres; and
- vehicle wash down waters.

Activity Description

Regulated wastes will be stored within the workshop building (refer **Figure 5**).

The maximum intended quantity of oils and lubricants to be stored on-site will be approximately 2000L to be stored in 44 gallon (205L) drums. Oils will be stored within the bunded area of hard stand serviced by the oil/water separator and sedimentation basin. A self-bunded storage crate will also be used to carry and store drums when in use outside of the hardstand facility.

The maximum intended quantity of waste oil and glycols to be stored on-site is about 3000L, and will also be stored within the bunded hardstand storage area in specially labelled containers. Waste oil will be removed from site on an as-needs basis and despatched off-site by a licensed waste oil contractor.

Brake fluids and coolants will be stored on an as-needs basis. Brake fluids and coolants will only be stored in 44 gallon drums (205L) or smaller containers. Brake fluids and coolants will be stored on self bunded crates within the hardstand storage area serviced by the oil/water separator and sedimentation basin.

Environmental Management

The Alliance is currently preparing Environmental programs (EPs) for each ERA as part of the overall Construction Environmental Management Plan. Each EP will specifically address the environmental management measures to be implemented for each ERA, and will be submitted as supporting documentation with the Material Change of Use Application.

The following information identifies the areas where ERA 84 may have the potential to impact on the environment if appropriate management measures are not implemented. Furthermore, it provides an overview of the management measures that will be implemented as part of the EPs and overall Construction EMP to mitigate potential impacts.

Air

The adverse effects of chemical storage on the air quality surrounding the Hinze Dam site will be limited to the generation of dust on the transport routes surrounding the site and the location of deliveries.

In order to reduce the generation of dust on the site the following measures will be taken:

- pave haul routes and where practical and maintain these areas in a clean condition by sweeping away dust or washing dust into collection pits;
- dampen unpaved haul routes to limit dust emission;
- minimise vehicle movements;
- inspect vehicles and wash down when required.

Noise

Nuisance noise will be limited to that created by trucks delivering chemicals to site. In order to limit this noise the following measures are to be taken:

- pave haul routes where practical;
- enforce a speed limit on and around the site of 20km/h;
- ensure trucks do not use air brakes except in emergencies.

Land and Water

The most significant of the environmental risks of storing regulated wastes on site is the potential contamination of both land and water should a spill occur.

As described above, the regulated wastes will be stored in specially labelled and suitable containers on hardstand bunded areas, serviced by the oil/water separator and sedimentation basin. The bunded concrete pad will also incorporate a sump that will drain to an oil-water separator, prior to being discharged from the site. This will ensure that any spills are prevented or that the effects of any fuel spills are minimised.

In the event a spill occurs, spill response kits will be located adjacent to the adjacent to the waste storage areas. The Alliance has prepared an emergency spill response plan and environmental incident/ emergency management procedures (as attached) that will be implemented if a spill occurs. A copy of these plans will also be located at the facility. These procedures form part of the site induction that all staff are required to undertake prior to entering the work site. A Site Spill Equipment Register has also been prepared by the Alliance, and will be part of the weekly site audit process.

Spill Response Procedures

Table 3, **Table 4**, and **Table 5** outline the emergency response to an incident where a spill has occurred on concrete/bitumen, on soils, and in water respectively.

3.4 Project Approvals – General

3.4.1 Vegetation Clearing

Section 1.9.2 of the EIS identifies an exemption under the *Vegetation Management Act 1999* for the clearing of regional ecosystems within the CID boundary. The Department of Natural Resources and Water (DNRW) have confirmed that the exemption under Section 74 of the VMA applies to clearing on Lot 4 on SP164198. The Alliance acknowledges that an Operational Works application for the clearing of regional ecosystems will be required for the areas outside of the CID, where the Full will inundate regional ecosystems. This approval will be obtained form DNRW prior to the clearing of any regional ecosystems.

The Alliance also acknowledges that an approval is required for the clearing of native vegetation on State land under the *Land Act 1994*. Approval will be obtained from DNRW prior to the clearing of any native vegetation on State land.

Exemption Under the Vegetation Management Act 1999

As identified in Section 1.9.2 of the EIS, and following further confirmation from DNRW, the clearing of Regional Ecosystems is exempt from assessment under the VMA on Lot 4 on SP164198 only, and hence against the Regional Vegetation Management Code (Southeast Qld).

Given this exemption, the Project is not required to "maintain the current extent" of Essential Habitat, Of Concern or Threshold Regional Ecosystems or Waterway Vegetation. From a statutory viewpoint, there is no requirement to assess the proposed vegetation clearing on Lot 4 on SP164198 against the Policy for Vegetation Offsets (the Offset Policy). Furthermore, the offset area commitments made in the EIS were in strict accordance with the Offset Policy and were calculated using the offset area ratios calculated therein. As the Offset Policy does not apply, these multipliers are no strictly relevant.

However, it is the intention of the Alliance to develop an offset strategy in consultation with DNRW, EPA and GCCC. The Strategy will seek to comply with the intent of the VMA and the Offset Policy, that being to achieve a no net loss scenario for remnant vegetation.

3.4.2 Road works on Main Roads

One submission identified the need for sufficient detail to be provided for a *Section 33* approval which relates to the regulation of parties other than the Department of Main Roads (DMR) who wish to carry out road works, or otherwise interfere with a State-controlled road. This requirement is acknowledged by the Alliance as works are proposed to be completed by the Alliance on Gold Coast - Springbrook Road (Road 104) and Nerang. - Murwillumbah Road (Road 201), which are state controlled roads. The Alliance will further consult with DMR in relation to the information and approvals required in relation to these works. This consultation will be undertaken during the detailed design of these works.

3.4.3 *Water Act 2000* Approvals

Discussions have been held with DNRW in relation to the need to amend the Interim Resource Operations Licence (IROL) prior to submission of water related Development Applications required for the Project. Given that construction activities, as identified in the construction program documented in the EIS, will not alter the operation of the dam as set out in the IROL until June 2010 it has been agreed in principle that an amendment to the IROL will not be required prior to the submission of applications. The time frame of the project will enable the amendment of the Resource Operations Licence to be undertaken as part of the development of the Gold Coast Resource Operations Plan currently being prepared by DNRW. As such the approvals set out in Volume 4 Appendix B of the EIS and the relevant administering Legislation are applicable to the Project as described in the EIS

Gold Coast City Council holds a water entitlement from Hinze Dam which allows them to draw up to 209 ML/d. Current water usage from the dam is approximately 140 ML/d. Water is available from GCCCs existing entitlement for construction purposes. The estimated daily water requirement for the project during construction is 1 ML/d.

It is likely that a pump will be used to extract this water. In the event a new pump structure is required for this extraction, the Alliance will lodge an Operational Works application with the DNRW for the taking or interfering with water prior to the installation of the pump.

3.4.4 Native Title

The Alliance has undertaken discussion with the Department of Natural Resources and Water in regard to the relevant Native Title Notification processes under the *Native Title Act 1993*. DNRW has advised that the following Native Title Notifications will be undertaken for the relevant approvals:

- 24HA Notification –for the additional storage of water; and
- 24MA Notification – for the clearing of native vegetation.

Native Title Notifications will only be required for the area of inundation where native title has not been extinguished, and for the capture and storage of the additional water from the catchment.

3.4.5 Dam Failure Impact Assessment

The Alliance has requested a letter form the DNRW regarding the acceptance of the Failure Impact Assessment. This letter will accompany the following IPA applications:

- Operational Works – Referable dam;
- Operational Works – Interfering with water in a watercourse; and
- Operational Works – Construction of a waterway barrier.

3.4.6 Sewage Treatment Facilities

Additional information has been requested in relation to the sewage treatment facilities to be provided for the Project. A combination of 3 existing septic tank installations, 1 new septic tank facility and 1 pump out facility will be utilized during construction as summarized below.

The site office which will accommodate approximately 80 people will be serviced by a new septic tank system. This system will be installed in accordance with GCCC standards and guidelines.

Four crib huts will be provided around the site to provide lunchroom facilities for approximately 25 workers at each hut. Ablutions for three of the crib huts will be provided by existing amenities blocks in the parkland area around the dam wall. These huts will be located in close proximity to these facilities. GCCC has advised that these facilities can treat up to 2000 litres/day of sewage. The hydraulic loading during construction on each of these facilities was estimated to be 1250 litres/day. A crib hut located in the quarry will be serviced by a portable pump out facility. This will be a fully contained system which will be maintained and emptied by a licensed waste contractor.

3.5 Land Contamination

3.5.1 Methodology of Study

A review was requested of GCCC contaminated records to supplement the EMR/CLR searches. This additional search of council records of environmental notifications and licenses for information on other potentially contaminating activities was conducted. No additional sites were identified within the project-affected area.

A question was raised in the public submissions regarding the appropriateness of the dam buffer area used for the assessments of contamination. The 1 in 100 year ARI flood line was adopted as the appropriate project “buffer zone”, surrounding the new area of inundation. This area was included in the EIS investigation project- affected area.

A rationale was requested for the identification and selection of those properties used in the EMR/CLR searches. As stated in Volume 2 Section 5.1.2 of the EIS, eighteen lots were identified as being at least partially within the project- affected area. All eighteen of these lots were searched on the EMR/CLR. There were no lots contained within the project- affected area that were not searched.

3.5.2 Impacts of Past Land Uses

As stated in the EIS (Section 5.2.1), remnants of pre-dam uses (such as houses, hotel and caravan park) have been removed and the land vacant for at least 30 years. Of the materials potentially disposed in these areas during that time, the organic - based wastes (including general household refuse and oils) will have biodegraded and/or naturally attenuated and therefore, are not considered to pose any significant risk to humans and/or the aquatic environment. At this time it is anticipated that further management/remediation with respect to these sites is not required. However, additional inspection will be undertaken as part of the further investigation activities, and sampling conducted if significant areas of disposal identified.

Concern was raised regarding contamination in areas where herbicides have been used or are currently being used. Use of glyphosate will terminate prior to inundation, with sufficient time for degradation of the herbicide to acceptable levels. Prior to inundation, soils in the glyphosate use areas will be sampled and tested and evaluated regarding potential water quality impacts in the dam. If necessary, additional management of these soils will be conducted to ensure that the remaining concentrations in the soil or water will not cause glyphosate concentrations to be above the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000).

3.5.3 Abandoned Vehicles

A request for further information was made regarding the quantity of abandoned vehicles and scrap metal and the condition of the soil on Lot 234 WD4207. According to the Ranger, this is a fairly recent accumulation by one person who used to live on the property. It is currently fenced and difficult to view completely from the road. It appeared that there were approximately 12 vehicles there at the time of the drive- by viewing. There are also visible slab/ timber piles (see **Figure 14**). This area is just within the 1 in 100 year ARI flood line, across Gold Coast Springbrook Road from the Dam. It is private property and the Alliance has no jurisdiction to conduct remediation or sampling at the site. However, this small amount of potential contaminants at this distance from the dam likely poses a low risk to water quality, and only in an extreme flooding event. The property was searched on the EMR/CLR and was not listed on either register.

- **Figure 14 Abandoned Vehicles on Lot 234 WD4207**

3.5.4 Notifiable Activities

The Alliance will contact EPA in relation to any notifiable activities during construction and/ or operation of the dam, as per the requirements of the EP Act.