



DUST MANAGEMENT PLAN

M-2602 Narngulu Expansion - Construction Activities

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1. Purpose

This management plan defines the requirements associated with the process of minimising the impact of dust emissions during construction activities scheduled for the CBH Narngulu Grain Storage Site as part of the 2019 site expansion project.

2. Objectives

The objectives of this dust management plan are to minimise significant impacts on amenity and the environmental impact of construction works and activities.

CBH is committed to improving the overall environmental impacts of its business, and in achieving the environmental objectives outlined in the CBH Group Health, Safety and Environmental Policy.

3. Scope

All construction activities undertaken by the Contractor and its Sub-Contractors as part of the earth works and construction activities associated with CBH Narngulu site expansion project must comply with this Dust Management Plan.

4. Relevant Legislation

Relevant legislation or guideline	Application
Environmental Protection Act 1986	The principal statute relevant to environmental protection in WA. It provides for the establishment of the EPA, preparation and implementation of EPPs, environmental impact assessment and approvals for new developments, licensing and permitting, and waste management
National Environmental Protection Council (Western Australia) Act 1996	Establishes National Environmental Protection Measures (NEPM)
Ambient Air Quality (NEPM)	Prescription of acceptable air pollutant concentrations
Health Act 1911	Part VII Section 182 deals with nuisance dust



5. Dust Management Commitments

5.1 Risk Assessment

The Contractor shall be responsible to identify and assess all possible civil works or construction that have a risk of generating dust during the construction activities, this may include but is not limited to:

5.2 Top Soil Removal

The Contractor shall be responsible to ensure that they minimise the top soil disturbance in areas not requiring earthworks. The Contractor shall also be responsible to ensure that land clearing be minimised to reduce risk of dust generation.

5.3 Material Transportation (gravel, clay, sand etc.)

The Contractor shall be responsible to ensure sufficient resources are made available to minimise the risk of dust generation from the transportation of construction materials associated with the site works. This includes maintaining the construction area and transportation routes in a dust free state by suitable means. Such methods include:

- a. Application of water via water tanker fitted with sprayer, dribble bars or cannons;
- b. Cleaning affected surfaces with street sweeping equipment; and
- c. Covering high risk material whilst being transported to and from the site.

5.4 Internal Vehicle Movement

The Contractor shall be responsible to ensure that frequently trafficable areas including any unsealed access roads are treated with dust suppression measures such as water.

5.5 External Vehicle Movement

Regular cleaning of machinery and vehicle tyres may be required to prevent track out dust to public roads.

5.6 Onsite Material Stockpiles

Should the Contractor be required to stockpile materials onsite during construction, then this stock pile shall be assessed for its risk of dust generation. Should the stockpile material have a medium to high risk of nuisance dust generation, then the Contractor shall treat the material via:

- a. Application of water;
- b. Use of a Geotextile covering or tarping; and
- c. Application of a soil binding treatment

5.7 Remaining cleared and undeveloped areas

Those areas remaining cleared and undeveloped post the construction phase will require a soil binding treatment to minimise any ongoing dust or erosion issues.



5.8 Operating Conditions

The Contractor shall be to be mindful at all times of undertaking site works or construction activities which have a risk of nuisance dust generation, particularly during adverse weather conditions.

The following activities should be undertaken to reduce the dust emission potential of all medium to high risk dust generating activities:

- a. Visual monitoring of dust on a daily level;
- b. Review of 5 day weather forecast to identify any conditions likely to increase the risk of dust generation;
- c. Ensure dust suppression equipment is located on site and remains operational for a 12 hour period prior to and after any 'extreme' risk weather conditions reports;
- d. Water tanker is to be equipped and ready to use if required to control dust emissions around the work area;
- e. Water tankers are to be full at all times whilst on standby;
- f. Monitor worked areas, frequently trafficked areas and any stock plies;
- g. Apply dust suppression over all affected areas, access roads and frequently trafficked areas; and
- h. Ensure all vehicle movements are controlled and within site speed limits.

6. Contacts and Responsibilities

CBH will assign a 'Site Supervisor' for the entirety of the construction phase who will have overall responsibility for the site works and/or Contractor and Sub Contractors.

A CBH point of contact (*to be confirmed*) will be provided to the City of Greater Geraldton for handling enquiries and complaints regarding the construction phase.

All relevant contact details relating to the site works are to be located on the outside of the site office and/or on the main entry to the site.

7. Internal Reporting

All CBH employees and Contractors will be required to report generation of significant dust plumes, and /or any increase in dust levels to the Site Supervisor and/or Project Manager.

8. Incident Reporting (including complaints process)

Any unplanned event with potential to cause harm to the environment will be investigated thoroughly to prevent a recurrence.

With regards complaints related to dust, in the first instance an investigation into the complaint should take place, site activities and procedures should be altered to reduce nuisance issues and liaison should take place with the administrating authority and/or complainant over remedial action.

Details shall be recorded using the CBH Group online reporting system 'SHARE'.



For any complaint that is determined to be of a CBH environmental incident classification level 3 (moderate) or above then the City of Greater Geraldton is to be informed of the nature of the complaint, any investigation findings, and/or remedial action taken.

9. Training

All employees and Sub-Contractors will be required to undergo a pre work induction, outlining environmental controls to be implemented and monitored during operations. The induction will provide necessary awareness of dust management and the procedures and work practices to minimise and report dust generation.

Regular toolbox meetings will also be held to reinforce a positive attitude to environmental matters and to highlight any issues that arise during the course of site operations.

10. Audit

Audit activities should take place during the construction phase to ensure the objectives of the Dust Management Plan are being met, and to identify any areas for improvement in the management of site activities. To assist with this process;

- a. A copy of the Dust Management Plan will be available on site;
- b. Actions undertaken by the Contractor in accordance with this Dust Management Plan are to be recorded in the daily log;
- c. Water truck operator to detail all dust suppression treatments durations on timesheet;
- d. Site staff and Contractors to review daily dust suppression plan, with any changes/issues to be forwarded to the Project Manager for assessment;
- e. CBH Project Delivery Group and /or CBH Health, Safety and Environment staff to randomly audit site conditions and Contractor's logs entries to ensure compliance.

11. Definitions

Dust is considered to be any particle suspended within the atmosphere. Particles can range in size from as small as a few nanometres to 100 microns (um) and can become airborne through the action of wind turbulence, by mechanic disturbance of fine materials or through the release of particulate rich gaseous emissions.

Dust is measured using a variety of methods, the most common being Total Suspended Particulates (TSP), which normally measure up to 50um, and PM10 or PM2.5 (particulate matter less than 10um or 2.5um in size, respectively). Deposited matter measures the mass of any particulate falling out of suspension expressed in mass per

area per time, and is the least commonly used in determining dust concentrations (Environment Australia, 1998).

Other definitions include:



Nuisance Dust: Describes dust particles ranging in size from 1mm to 50um, which reduce environmental amenity without necessarily resulting in material environmental harm.

Fugitive Dust: Refers to dust derived from a mixture of sources or a source not easily defined and includes dust generated from vehicular traffic on unpaved roads, materials transport and handling and un vegetated soils and surfaces.

PM10: A criteria air pollutant consisting of small particles with an aerodynamic diameter less than or equal to a nominal 10 microns. Their small size allows them to make their way to the air sacs deep within the lungs where they may be deposited and result in adverse health effects.

PM2.5: Includes tiny particles with an aerodynamic diameter less than or equal to a nominal 2.5 microns. This fraction of particulate matter penetrates most deeply into the lungs.

12. Attachment

CBH Group Health, Safety and Environmental Policy [STORE ID: 10193562].

CBH Dust Management Plan Operational Activities

CBH Narngulu Grain Storage Site

DUST MANAGEMENT PLAN

Operational Activities

Store ID: 14056929

CBH Narngulu Dust Management Plan – Operational Activities

1. Purpose

This management plan defines the requirements associated with the process of minimising the impact of dust emissions during operations at the CBH Narngulu Grain Storage Site [Lot 15, Arthur Road, Bootenal].

2. Objectives

The objectives of this dust management plan are to minimise significant impacts on amenity and environmental impact of CBH Group operational activities.

CBH is committed to improving the overall environmental impacts of its business, and in achieving the environmental objectives outlined in the CBH Group Health, Safety and Environmental Policy.

3. Scope

All operational activities undertaken at the CBH Narngulu Grain Storage Site must comply with this Dust Management Plan.

The plan will be subject to on going review and therefore will be subject to change to ensure that it remains relevant and effective in light of site performance, past results and technological advances through out the life of the site.

4. Relevant Legislation

Relevant legislation or guideline	Application
Environmental Protection Act 1986	The principal statute relevant to environmental protection in WA. It provides for the establishment of the EPA, preparation and implementation of EPPs, environmental impact assessment and approvals for new developments, licensing and permitting, and waste management
National Environmental Protection Council (Western Australia) Act 1996	Establishes National Environmental Protection Measures (NEPM)
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Health Act 1911	Part VII Section 182 deals with nuisance dust

CBH Narngulu Dust Management Plan – Operational Activities

5. Dust Management Commitments

Dust Management will comply with *Environmental Protection Act 1986* and the relevant *National Environmental Protection Measures*.

Due to the nature of grain handling and storage, some dust can be produced from a range of activities. CBH make the following commitment to dust management:

- On-going hygiene practices during operations designed to limit the build up of dust and chaff on site;
- Existing operational dust management practices such as the ongoing covering of open grain stacks will be applied across the site;
- An ongoing review of weather conditions is undertaken during operational periods with the appropriate site management activities taken to eliminate, as far as is practicable, any causal factors;
- Internal roads are to be cement stabilised and maintained in good condition;
- Water tankers and water suppression should be used to control dust emissions from heavy trafficked areas on site;
- Hydro mulch or similar treatments are to be applied and maintained to disturbed or cleared areas on site to minimise dust generation;
- All site traffic is required to adhere to the site speed limit to minimise dust lift generated by vehicle movement, and this will be communicated at any Growers Meetings.
- Where practicable, CBH will cover grain handling equipment to reduce fugitive dust generation;
- Loads are to be kept within designated load limits and load covers always used;
- Stockpiling operations will reduce material drop height when loading into and out of storages and/or trucks;
- Environmental issues including dust management are and will continue to be included as part of CBH induction programs for all CBH employees and contractors;
- If required the identification and implementation of containment lines where appropriate for fugitive dust sources will be undertaken;
- A complaints management system, including investigation, action and feedback, will be implemented. Please refer **Incident Reporting (including complaints process)**.

6. Contacts and Responsibilities

Overall responsibility for the management of the site is with the CBH Area 1 Manager [Mr Cory Foot – 0417 726 001].

Overall responsibility for the Geraldton Zone is with the CBH Geraldton Zone Manager [Mr Duncan Gray – (08) 9921 9499].

7. Internal Reporting

All CBH employees and contractors will be required to report generation of significant dust plumes, and /or any increase in dust levels to the Site Manager.

8. Incident Reporting (including complaints process)

This section outlines the responsibilities for all concerned, not only the individual with specified tasks but all employees, contractors and visitors to CBH sites and receival points.

All hazards and/or incidents witnessed **as well as complaints received** relating to the environment must be recorded using 'SHARE' - our online reporting system. The incident and

CBH Narngulu Dust Management Plan – Operational Activities

hazard reporting system is designed to automatically escalate the report to the relevant management and assign action to appropriate parties. We therefore endeavour to act upon and mitigate any issues or complaints in an effective and timely manner.

At CBH, hazards and/or incidents that require reporting and/or investigation may include but is not limited to a diesel fuel spill, chemical spill, fugitive dust emissions, and noticeable increases in the noise profile of the site or its machinery.

In addition, **any complaints received** regarding dust and/or noise is immediately referred to the Site Manager, who would then notify the Area Manager or Zone Manager of the following information.

- Date of complaint
- Time of Complaint
- Location of Complaint
- Nature of Complaint
- Name of Complainant (if given)
- A summary of any action taken

For any complaint that is determined to be of a CBH environmental incident classification level 3 (moderate) or above then the City of Greater Geraldton is to be informed of the nature of the complaint, any investigation findings, and/or remedial action taken.

9. Training

All employees and subcontractors will be required to undergo a pre work induction, outlining environmental controls to be implemented and monitored during operations. The induction will provide necessary awareness of dust management and the procedures and work practices to minimise and report dust generation and dust emissions.

Regular toolbox meetings will also be held to reinforce a positive attitude to environmental matters and to highlight any issues that arise during the course of site operations.

10. Definitions

Dust is considered to be any particle suspended within the atmosphere. Particles can range in size from as small as a few nanometres to 100 microns (um) and can become airborne through the action of wind turbulence, by mechanic disturbance of fine materials or through the release of particulate rich gaseous emissions.

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CBH Narngulu Dust Management Plan – Operational Activities

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11. Attachments

CBH Group Health, Safety and Environmental Policy [STORE ID: 10193562].



Grain Protection Officers Manual

This manual sets out basic procedures for Grain Protection Officers to follow, consistent with normal work practices, safety procedures, codes of practice and regulatory requirements.

The scope of this manual is to give a broad understanding around the Grain Protection procedures and techniques involved in protecting grain from insects, rodents, weeds, damage and contamination.

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1. Grain Protection Duties

1.1 Responsibilities

The Officer-in-Charge of a Grain Protection Unit is responsible for:

-) Execution of Insect Management Plan and MFR
-) Ensure adherence to SWMS and other safety requirements
-) Fumigation related activities
-) Submitting weekly reports
-) Condition of Grain Protection Unit and other equipment
-) Dangerous Goods Storage, transport, handling and usage
-) Insect resistance management
-) Sealed Storage reports and minor maintenance
-) Preventative maintenance
-) Continuous Improvement
-) Staff development and training
-) Pest and weed management
-) Staff and resource planning
-) Communication and advice on Grain Protection
-) Stock control
-) Structural treatments

The Grain Protection Officer is responsible for:

-) Supporting Officer in charge with their responsibilities
-) Maintenance or repairs on truck/vehicle (Includes checking oil, water, battery and re-fuelling)
-) Clean Grain Protection unit
-) Restock unit with chemicals as required for the next weeks work program
 - o Fumigant
 - o Rodent Bait
 - o Herbicides
 - o Any other requirements
-) Clean and check safety masks and equipment and place back on unit. (Includes replacing cartridges if necessary)
-) Clean and sweep-out depot
-) Such other duties as instructed by the Officer in charge

1.2 Routine Grain Inspections

All grain not under fumigation should be routinely inspected. During the grain inspections the following should be looked for:

-) Mould development
 - o crusting

- storage water leaks
-) Insect infestation
 - primary or secondary insects
 - location and extent of infestation
 - collection for resistance monitoring
-) Rodent activity
 - infestation level
 - damage
-) Bird contamination
 - Faecal matter
 - Population and species present (typically feral pigeons, corellas and swallows)

1.3 Insect detections

For any insect infestations the first step is to determine if it is a Primary or Secondary infestation. **Primary infestations** occur in the product (in a storage where grain is being held). **Secondary infestations** occur in or around a flow path (garner bins, conveyors, chutes etc).

Primary Infestations need to be recorded in IBIS to ensure an adequate follow up and action plan is executed. Secondary Infestations need to be recorded in IBIS and a Continuous Improvement (CI) raised. For all insect detections a sample of live insects needs to be taken and sent to the Australian Grain Centre (AGC) for resistance testing.

2. Phosphine

Phosphine is the main fumigant for the control of insects in grain. This is largely the result of the development of methods whereby this potentially flammable and toxic gas can be generated without undue risk of either fire or excessive exposure to fumigators.

This document contains basic principles for the fumigation of grain with phosphine.

2.1 Phosphine Properties

Phosphine, or hydrogen phosphide, is a colourless gas, slightly heavier than air, with a carbide or garlic-like odour and will self ignite at 1.7% volume in air (17,000ppm). This odour is not sufficiently noticeable to give a reliable warning of the presence of the gas in concentrations which exceed the threshold limit of 0.3 parts per million; if the gas can be smelt, the phosphine concentration of the air should be checked. However, smell should not be used as a guide to the presence or absence of phosphine.

Aluminium phosphide preparations formulated for grain fumigation release combustion inhibiting gases and phosphine at a controlled rate to reduce the fire hazard of the phosphine and air mixture.

2.2 Health Hazards

Exposure to phosphine causes depression of the central nervous system and impairment of the respiratory function. Inhalation of phosphine may produce symptoms including but not limited to nausea, vomiting, diarrhoea, headache and chest-pain.

The current exposure standard for phosphine is 0.3 PPM. This is the concentration to which persons may be continuously exposed to, eight hours per day, five days per week without adverse effect on their health.

The Short term exposure limit for phosphine is 1PPM. Persons can be exposed to a maximum of four STEL periods per 8 hour shift, with at least 60 minutes between exposure periods.

2.3 Detection of the Gas

The most convenient direct reading method for the detection and determination of phosphine in air involves the use of gas monitoring devices. Detector tubes which exhibit a coloured stain when air containing phosphine is drawn through them can also be used but take longer to give a reading.

2.4 Respiratory Protection

Before fumigation commences, all fumigators must ensure that the full face respirators and SCBA are checked to see that the valves in the face piece are undamaged and functional. For canister type respirators ensure the correct canister for phosphine is fitted. The mask should then be negative pressure tested, by placing the mask on the head and tightening the straps, place the palm of the hand over the inlet to the canister and inhale deeply; a vacuum should be created causing the mask to adhere to the face. If any leaks are felt (air rushing into mask) tighten mask straps further and test again.

Annual fit testing is required and all fumigators must pass a fit test prior to the use of respiratory protection equipment. The fit test is specific to each model of respirator.

Each fumigator must be clean shaven to ensure an adequate seal.

The respirators are to be used for all fumigation activities and in places where staff may be exposed to phosphine gas. Where concentrations exceed 20PPM SCBA must be used.

Respirators should be kept clean and serviceable at all times and remain on the Grain Protection Unit when not in use. Guidelines for the care and use of canister type respirators are provided with the canister log book.

2.5 Monitoring Work Environment

During any fumigation activity the working environment must be monitored at all times through the use of personal monitoring devices. Do not rely on smell as a means of detecting phosphine.

Phosphine monitoring devices should be checked to ensure they have sufficient battery power and spare batteries are available. Monitoring devices must be calibrated according to manufacturer's recommendation.

3. Storage Integrity

3.1 Tarp Seam Maintenance

For information about correct method for sealing bulkhead tarps please refer to the Tarp Seam Maintenance Manual STORE ID: [4935340](#)

3.2 Pressure Testing

A pressure test shall be carried out if there is no obvious reason for a failed fumigation (refer Minimum Fumigation Requirement and Insect Management Plan). Pressure testing shall be carried out by a competent Person to ensure the integrity of the storage.

Pressure testing is to be carried out when all plant and equipment is shut down and the area is as quiet as possible.

For the recording of pressure test information refer to the [Pressure Test Record Sheet](#).

3.2.1 Pressure Test Procedure

Step 1 Seal storage as you would for fumigation.

Step 2 Set up Manometer on vent stack; seal all vent breathers with plastic bags, or add extra oil to oil bath.

- Step 3 Close fan hatch covers and test ambient pressure for 10 minutes.
- Step 4 Check the manometer that the ambient pressure is 0 or negative.
- Step 5 Open 1 fan hatch and run fan inwards.
- Step 6 Wait till Manometer reading shows positive pressure of no more than 200 Pascal's or until fan equalises/cavitates.
- Step 7 Close fan hatch and turn off fan and note the manometer reading.
- Step 8 Record manometer reading every 30 seconds on Pressure Test Record.
- Step 9 When Half-Life is achieved record and finalise Pressure Test Record. Forward a copy to Grain Protection AGC.
- Step 10 A 10 minute half life must be attained.
- Step 11 Repair leaks if needed and repeat steps 5 to 8.
- Step 12 If pressure test is successful repeat Steps 3 to 4. If ambient 0 or negative remove plastic bags from oil vents or excess oil from baths ensuring that the oil remaining starts bubbling at about 100 Pascal's and close fan. The storage is then available for fumigation.

4. Weed Control

Control of weed burdens in the vicinity of grain storages is an important part of general sanitation to deprive insect pests, rodents and other vermin of harbourages and shelter. Furthermore, it is a necessary fire prevention measure and also facilitates the drainage of water from storage sites.

4.1 Common Herbicides

Below is a list of the 3 main types of herbicides used at CBH.

4.1.1 Glyphosate

Common trade name Roundup or Zero, active ingredient Glyphosate. This herbicide is non-residual and must be applied to the leaves to be effective. It is used to control difficult weeds such as the tussock type grasses (Johnson/Love Grasses). However many receival points are now treated with Glyphosate as part of our standard winter program, because the run-off from residual herbicides may contaminate farm or town water supplies.

4.1.2 Simazine/Triazine

Simazine is an off-white crystalline compound which is sparingly soluble in water. It is a residual non-selective herbicide that acts by inhibiting photosynthesis. It remains active in the soil for 2-7 months after application and is used to control broad-leaved weeds and annual grasses.

4.1.3 Sulfometuron Methyl (Oust)

Sulfometuron methyl (Oust) is a broad spectrum urea herbicide. It is used for the control of annual and perennial grasses and broad-leaved weeds and is also used to control woody tree species. It is applied either post-emergent or pre-emergent. It works by blocking cell division in the active growing regions of stem and root tips.

4.2 Calibrate Boom Spray Equipment

Calibration of boom spray equipment must occur prior to the start of any major application program (typically winter application). This ensures that a specified rate of chemical is applied to the target surface (e.g. plant,

soil, pest). To determine this you need to measure the total spray output of the machine, the travel speed, the swath width (spray application total width) and the desired application rate.

4.2.1 Determine Total Sprayer Output (L/min)

To determine the spray output in L/min first set the pressure at the correct level for spraying (correct pressure is specified by the manufacturer and determined by the nozzles used). To ensure accurate spray outputs only use the same nozzles on any one boom. Once you have determined and set the correct pressure the following procedure must be followed:

1. Fill the spray tank with clean water.
2. Place a measuring jug under one nozzle. If you do not want to get wet, attach a piece of plastic hose to the nozzle and place the other end into the jug.
3. Run the sprayer for one minute at the correct pressure with all nozzles operating.
4. Measure how much water is in the jug. Compare this to the output specified by the manufacturer using the correct pressure.
5. Repeat steps 2–4 for all nozzles.
6. Add all the jug measurements to find the total sprayer output in litres per minute.

Nozzle output should not vary by more than 10%. If it does, the nozzle could be worn or damaged and should be replaced. All nozzles on the boom should have a similar output.

4.2.2 Travel Speed (km/h)

Maintaining a consistent travel speed is critical in ensuring the correct application rate is achieved (a change in ground speed of 10% results in a 10% change in application rate). The normal speed for spraying with small boom sprayers is between 4–10 km/h and should be determined based on ground conditions. To determine an accurate travel speed during application the following procedure must be followed:

1. Measure out a distance of 100 metres on the ground to be sprayed and mark the start and finish positions with pegs.
2. Measure how many seconds it takes to travel 100 metres with the sprayer attached and half full.
3. Calculate your travel speed by inserting the time in seconds into the following formula:

$$\text{Travel speed (km/h)} = \frac{100 \text{ (m)} \times 3.6}{\text{Time (seconds)}}$$

4.2.3 Spray Application Rate (L/ha)

First, measure your swath width (in metres). For general broadcast spraying, the swath width is equal to the number of nozzles multiplied by the nozzle spacing. For band spraying the swath width is equal to the total of all the band widths.

Calculate the application rate using the following formula:

$$\text{Application rate (L/ha)} = 600 \times \frac{\text{total sprayer output (L/min)}}{\text{Swath width (m)} \times \text{travel speed (km/h)}}$$

For example: If your total sprayer output is 5L/min, your speed is 10 km/h, and the swath width is 5m, your application rate is:

$$600 \times 5 = \frac{3000}{5 \times 10} = 60 \text{ L/ha}$$

By following the steps to calibrate boom spray and determine spray application rate the amount of herbicide and mixing rate for your spray unit can be determined.

4.3 Equipment Maintenance and Usage

Clean all equipment after use by thoroughly washing with water. Spray tanks, lines and nozzles should be thoroughly rinsed with clean water following application to prevent corrosion and remove residual chemical.

5. Rodent Control

The control of rodents within the CBH network primarily focuses on baiting and site hygiene programs. The fumigation process is not a method to manage rodents however will aid in the protection of commodities during the exposure period. Baiting programs should be aligned with fumigation practices to maximise effectiveness of control.

5.1 Species Present

In any integrated pest management system it is important to understand the ecology and behaviour of the species subject to control. Due to their long association with man, rodents have become omnivorous and therefore represent a greater menace to health and commerce than their native relatives. As far as is known to date, two species of rat and the common house mouse have been introduced into Western Australia.

5.1.1 The Sewer Rat

Rattus norvegicus

The Sewer or Norway rat is usually found in the environs of cities and coastal ports and waterways. It is a sturdily built animal with large strong feet, short ears and a short thick, coarsely-scaled tail which is shorter than the head and body combined. An adult specimen commonly has a body weight of 500 grams and a body length (exclusive of the tail of about 30 cm). Much larger specimens are frequently encountered. The sewer rat is found living in a variety of temperature conditions varying from warm (such as in brickworks) to low temperatures (such as in cold stores).

5.1.2 The Roof Rat

Rattus rattus

The roof rat or ship rat is identified by a slender tail which is invariably longer than the head and body. The large leafy ears and short, sleeker hair will usually distinguish this species from the sewer rat. Fully grown, this rat seldom weighs more than 350 grams with a body length of from 20 to 30 cm. Unlike the sewer rat this species is well distributed throughout Australia, excepting possibly sub-desert and extremely inhospitable coastal regions, and occurs as a field, foliage and house infesting animal. The roof rat is so-called because of its ability to climb and live in high localities such as grain silos and the top floors of warehouses. Its damage is primarily to food and it is the species most likely to introduce bubonic plague because of its ship-borne habits.

5.1.3 The Common House Mouse

Mus musculus

The house mouse seldom weighs more than 2-3 grams and is 8 cm in head and body length with a tail of from 8 cm long. The ears and eyes are small and the tail is scantily clad. The upper surface of the body is almost uniformly grey-brown and the underparts buff-grey to whitish. Mice live in any structure they can

enter which offers some protection and within range of food, and can pass through a hole 1.5 cm diameter. Where food is plentiful the daily range of mice is quite small.

The house mouse averages some five to six young per litter, the young being able to run about when only 21 days old and can breed at 42 days of age. Individual captive mice have produced 100 young per year. The species is relatively short-lived, most individuals probably not living longer than 12 months, hence the population "turnover" is very rapid.

5.2 Breeding Habits

The average number of young per litter in the rat is ten, from six to 22 being a normal variation. From three to 12 litters can be produced in the one year. The young are blind at birth but rapidly develop and breed when three to four months old. The life-span of the rat is much longer than that of the mouse and varies between three and five years. As many as seven litters in seven months from a single pair have been recorded, the gestation period being only 21 to 25 days. The rat's tremendous reproduction potential - the progeny from one pair could, under the most favourable conditions, exceed 350,000,000 in three years - and its rapid development indicate the ability to recuperate quickly from any unusual depletion in numbers.

5.3 Health Hazards

Because of their close relationships to man and domestic animals and their scavenging habit, living on both filth and edible foods, it is not surprising that rats and mice play an extremely important part in the spread and dissemination of disease. Quite a number of their own diseases are transmissible to man and domestic animals. Mice sometimes carry Salmonella bacteria that can kill man and because of their greater penetration into buildings is probably as big a health hazard as their larger rat relations. Such diseases as bubonic plague, typhus fever, spirochetal jaundice, rat-bite fever, tularemia, trichinosis, rabies and food poisoning can be carried and spread by these pests.

5.4 Hygiene for Rodent Control

Good hygiene in and around premises and storage areas will reduce the available habitat for rodents and discourage their activity. It is not usually a good plan to disturb the hiding places of rats and mice during or just before a treatment, but tidying should be done as soon as the treatment is over. As far as possible it should go hand-in-hand with measures to prevent rats and mice from getting in and out of premises likely to become re-infested. Unfortunately in Australian conditions adequate rodent proofing of buildings is seldom undertaken.

The following hygiene program needs to be maintained as part of the integrated pest management program for the control of rodents:

1. Sweeping, cleaning and removal of all loose grain and dust from inside storages, gutters, drains, grids, boot pits, lockers and electrical rooms should be done as early as possible after harvest, so that an effective baiting programme can begin. Sweeps should be dumped.
2. Removal of all unnecessary paper and bags etc, from lockers.
3. Eliminate harbourage and surface cover for rodents by maintaining a clear area around the perimeters of buildings.
4. Removal of dead rodent bodies should be carried out as soon as they are found.

5.5 Evidence of Rodent Activity

5.5.1 Footprints and Tail Markings

The prints made by rats and mice are easily recognised from each other. Common rats and ship rats may sometimes be distinguished by the fact that the ship rat carries its body higher and its tail touches the floor at the tip.

5.5.2 Runways

Out-of-doors, for example, common rats often wear distinct trails in grass and other vegetation by their constant running backwards and forwards.

5.5.3 Smears

These are the dirty, greasy marks left by the fur of rats and mice on various surfaces along much-used runways. The "loop-smears" left on upright surfaces of beams by ship rats differ from those left by common rats in that, instead of being continuous loops, they often consist of four separate smudges.

5.5.4 Holes and scrapes

Out-of-doors, in river banks, drains and similar places, the number of holes in use gives some indication of the size of rat activity.

5.5.5 Damage and Gnaw Marks

Obviously the more rodents present, the more the damage can be expected. However, in the case of mice in large bulks of grain, experience is necessary to decide how big the infestation is.

5.5.6 Recording

For recording rodent activity the following descriptions should be used:

Light Activity

Mice: when a few tracks are noticed or one or two live mice are seen on grain surface or in the structure of the storage.

Rats: when a few tracks or a few fresh droppings are noticed on runways established on the grain around the wall of the storage.

Medium Activity

Mice: when mice tracks cover most of grain surface and live mice are seen running on grain surface or structure of the storage.

Rats: rats are more difficult to determine they generally establish very distinct runways across the grain surface leaving heaps of droppings usually at the intersection of runways.

Heavy Activity

Mice: many live mice seen on grain surface and/or in the structure of the building, usually on rafters and machinery.

Rats: large quantity of droppings on grain surface, live rats often seen in day light, electrical fittings or conveyor belts chewed.

5.6 Rodent Baiting

CBH typically use anticoagulants as the poison of choice for the control of rodents during a baiting program. They act by damaging internal capillaries and destroying the coagulating or clotting properties of the blood.

5.6.1 Anticoagulants

There are several anticoagulant baits available. The more widely available anticoagulant compounds used by CBH include Warfarin, Bromadiolone, Coumatetralyl, Flocoumafen and Brodifacoum.

5.6.2 Soluble Bait

Soluble anticoagulants are mixed with water and must be placed in water fonts. The water font must then be placed in a spill proof container. Water fonts should be placed close to walls of lockers, tool sheds, engine rooms, etc. where rodent activity is present and they should be positioned where they are readily accessible to rodents. Water fonts must not be placed on the grain surface or in any position where it is possible for the Soluble Bait to be spilt onto the grain.

Soluble Bait is typically used in summer time where there is an increase in rodent activity and rodent control is problematic. Where ever possible isolate other sources of water such as dripping taps or water leaks so that the rodents' only source of water is from the water fonts.

5.6.3 General Safety Precautions

The safety risk to non-target species (other animals) or people (including the operator) must be minimised through adhering to the following requirements:

1. Ensure that all poison bait containers are clearly labelled "poison"
2. When handling dead rats, wear gloves and use a shovel to pick them up (the bacteria of Weil's Disease and other disease can enter the skin through very small cuts)
3. When mixing and/or handling poison baits follow all MSDS and label safety directions including but not limited to: use gloves, dust mask and other protective clothing and wash your hands thoroughly with soap and water, wash gloves and any contaminated clothing before reuse.
4. Only use poison bait containers approved for use and designed to prevent access to non-target species.
5. Collect carcasses as soon as practicable and dispose of them in an approved manner.

5.6.4 Tracking Powders

Rodenticide tracking powders typically contain anticoagulants. These powders are used to treat dry harbourages and, places where it is difficult to position bait. Anticoagulant dust is picked up on the feet and underside of the rodent's body and is ingested during grooming. The potential for grain contamination when using tracking powders is high and therefore rodenticide dusts must not be laid in positions where they might fall on, or be blown or swept onto foodstuffs and cereal grains.

5.6.5 Bait Placement

Rodenticides are safe for humans to handle provided care is taken in placing baits. Identifying where rodent activity is most prevalent and subsequent baiting in such locations will reduce non-target animal poisoning. Because anticoagulant baits are tasteless, bait shyness does not develop - rats do not usually associate the death of others with the poison because of its slowness and type of action.

5.6.6 First Aid

If poisoning occurs, contact a doctor or poisons information centre immediately. In cases of accidental poisoning, **vitamin K** is administered as it restores the ability of the blood to clot.

6. Bird control

The most common pest species found affecting CBH sites include but not limited to pigeons, corellas, galahs and swallows. The control of these may vary depending on the species, location and size of the population.

6.1 Pigeons

Feral pigeons are primarily an issue due to the contamination of the grain and flow path with their droppings, eggs and carcasses. If remained unchecked pigeon populations can rapidly increase. Pigeons are a predominant problem in major centres such as Ports and Major Depots.

6.2 Alphachloralose

Alphachloralose is only to be used for the control of pigeon populations. It is a narcotic compound and must be handled with the appropriate PPE (including pvc gloves). Only Pest Management Technicians with endorsement to use alphachloralose may implement baiting programs.

Refer to relevant MSDS, Label, SWMS and MOR for further information.

6.2.1 Pre-feeding

Pre-feeding birds with untreated bait is essential. Use the same material for pre-feeding as will be used for the bait. Pre-feed on a hard dry surface, 30-60 grams per bird for 1-3 weeks or until all birds are feeding prior to use of the product. During pre-feeding calculate the amount of bait that is expected to be required to allow the theoretical capture of all target birds in the flock.

The pre-feeding is to entice the birds into a predictable feeding pattern. No pre-feeding or baiting is to take place on private properties or on road verges.

6.2.2 Baiting

Baiting should commence at first light (early morning). Baited grain/seed should be exposed for ½ to 1 day only and then withdrawn and free feed substituted. Apply 10 g baited wheat per pigeon or 1 g baited seed per sparrow (before mixing with untreated seed). Lay bait in a dry area and keep bait dry. Only use enough bait to allow the theoretical capture of all birds in the flock. Constant supervision must be maintained at all times during baiting. Monitor any non-target birds or animals taking the bait and follow up on their fate. Repeat if necessary. Remove any surplus grain left from the free feeding and substitute the alpha-chloralose bait. During this time the bait should be kept under observation allowing pigeons to freely feed on the bait, making sure no other animals consume the bait.

At the end of the baiting operation all remaining product must be swept up and removed for disposal or stored for re-use. Moisture can inhibit the effectiveness of the bait and baiting must be dry. Product to be disposed is to be placed into heavy-duty garbage bags, sealed with nylon cable ties and disposed of by burial at a local authorised landfill. Burial should be sufficient to ensure that scavenging birds cannot readily access the bait.

6.2.3 6.1.3 Disposal of birds

All affected birds must be immediately collected and euthanized humanely and then placed in garbage bags for disposal. All deceased birds are to be placed into heavy-duty garbage bags, sealed with nylon cable ties and disposed of through appropriate waste disposal methods. Birds are to be disposed of in a landfill/tip. The bags of dead birds must be buried to prevent access by predatory birds and other animals (e.g. dogs, foxes).

6.3 Shooting – Corellas

Corellas and galahs are common at many CBH storages and are capable of doing extensive damage to storage infrastructure including bulkhead tarps. It is not uncommon for a flock of over 1,000 birds to be seen at a site. Due to their inquisitive nature and habit of constantly chewing, corellas can damage storages and bulkhead tarps.

An application can be made to the Department of Environment and Conservation (DEC) for a damage license to undertake controlled shooting of corellas. Once a damage licence has been granted an approved gun club can be hired to do the shooting.

Refer to relevant SWMS and MOR for further information

6.4 Shooting – Feral Pigeons

CBH staff can control pigeons through the use of firearms providing the following conditions have been met:

-)] CBH Group Corporate Licence requirements are met (Nominated persons only)
-)] A minimum of two people required for a shoot
-)] Non-toxic ammunition to be used on CBH premises (e.g. steel, zinc, tin or alloy)

Refer to relevant SWMS and MOR for further information

6.5 Long Range Acoustic Device (LRAD)

The LRAD was primarily intended for long-range hailing and warning applications but was purchased by CBH due to its ability to effectively deter birds over long distances. The LRAD is a portable, highly directional sound device with integrated electronics.

6.5.1 Safety precautions

The LRAD is capable of noise levels in excess of 150dB so care must be taken when using the device to ensure people in the vicinity are protected from hearing damage. The LRAD manual should be read before use and all safety considerations outlined must be followed. Safety conditions for using the LRAD on CBH sites are as follows:

-)] All employees on site need to be aware that the LRAD will be in use and know at what times.
-)] At no time should the LRAD be left unattended.
-)] The LRAD should be used when minimum employees are on site and none are working in the vicinity.
-)] Ear protection should be worn by all staff onsite regardless of proximity to LRAD.
-)] The employees using the LRAD must be fully aware of its capabilities and the risks involved.
-)] Precautions must be in place to stop truck drivers etc. entering areas where the LRAD is in use.
-)] Neighbouring businesses need to be informed by flyer or similar that the LRAD will be in use.
-)] It is recommended that site specific risk assessments, such as JSA, are undertaken when this device is to be used.

7. Monthly chemical stock return

Chemical stock reconciliation must be completed on a monthly basis. The Grain Protection monthly chemical stock return must be updated electronically on the last Friday in each month. The Grain Protection Operations spreadsheet allows the user to allocate chemical use on a daily basis. This automatically updates the monthly stock return. To maintain currency incoming stock must also be allocated within the spreadsheet.

The monthly chemical stock return must be checked against physical stock and SAP stock to ensure all balances are correct.

8. Tools and Equipment

The Grain Protection Officer is responsible for the maintenance of the Grain Protection vehicle and equipment. The vehicle has undergone a process of 5S to standardise all equipment requirements.

8.1 Standard Tool List

- 1 x Tool Box with fold out or lift out tray
- 1 x pr 250mm multigrips pliers
- 1 x 150mm combination pliers
- 1 x 5mm blade - 100mm screw driver
- 1 x 8mm blade - 200mm screw driver
- 1 x 10mm blade - 250mm screw driver
- 1 x No1 point - 150mm Philips screw driver
- 1 x No2 point - 150mm Philips screw driver
- 1 x No3 point - 150mm Philips screw driver
- 1 x 250 mm tinsnips
- 1 x 5m measuring tape
- 2 x Stanley trimmer knives (retractable blade)
- 1 x socket set Sid chrome 20 piece set no 324-4
- 1 x socket set Sid chrome 14 piece set no 224-1 including socket extension bar
- 1 x 1/4 + 5/16 O/E BSW spanner
- 1 x 7/16 + 1/2 O/E AF spanner
- 1 x 3/8 + 7/16 O/E AF spanner
- 1 x 1/8 + 1/4 O/E BSW spanner
- 1 x 5/16 + 3/8 W ring spanner
- 1 x 150mm adjustable wrenches

CBH header

- 1 x 200mm adjustable wrenches
- 1 x 300mm adjustable wrenches
- 1 x 0450kg claw hammer
- 1 x 0450kg ball pin hammer
- 1 x 100mm centre punch
- 1 x pipe wrench rigid or Stilson 75mm jaws
- 1 x set Allen keys (Hexagon wrenches) metric 1.5mm to 10mm
- 1 x set Allen keys (Hexagon wrenches) imperial 1/16" to 3/8"
- 1 x 300mm frame hack saw & blades
- 1 x 8mm chuck hand drill
- 1 x set high speed jobbers drills 1/16" to 1/4"
- 1 x 20mm blade cold chisel
- 1 x HP grease gun (cartridge type)
- 1 x torch (rechargeable)
- 1 x 150mm round file (second cut)
- 1 x 150mm flat file (second cut)
- 1 x 10mm Makita Electric Drill
- 1 x 100mm Makita Angle Grinder
- 2 x 25mm Electric Extension Lead

8.2 Safety equipment

The unit should carry minimum of two sets of the following items at all times:

-) Rubber Knee Boots
-) Goggles
-) P.V.C. Gloves
-) Pesticide Masks
-) Gas Masks and Canisters
-) Escape kits
-) SCBA

In addition there should be on each unit:

-) First aid kit (In date)
-) Gas Detector Tubes and Pump
-) Canister supply (see types below)

9. Gas masks

All personnel required to wear a full face respirator must pass a fit test for that specific make and model of respirator. A negative pressure test must also be carried out every time prior to use. All personnel are required to be clean shaven at all times should the need arise to wear a respirator.

10. Methyl Bromide

100% Methyl bromide is an alternative fumigant to Phosphine. The precautions to be taken when methyl bromide is used for grain fumigation are outlined below. Where any Methyl Bromide fumigations are to take place a full risk assessment must take place prior to application.

10.1 General characteristics

Methyl bromide is normally supplied as a liquid under pressure in steel cylinders. When released to atmosphere the liquid takes in heat and boils, generating a greatly increased volume of vapour. Methyl bromide vapour is not highly absorbed by most materials, and is capable of penetrating quickly and deeply into stored grain, and dissipated quickly on ventilation at the end of treatment. Mixtures of methyl bromide vapour and air are non-flammable, and the fumigant can be used without special precautions against fire and explosion. It is the combination of good penetrability, low sorption and high toxicity to the insect pests of stored products which makes methyl bromide so valuable for the fumigation of bulk and bagged grain, and the low boiling point of the liquid enables fumigation to be performed at temperatures as low as 4°C.

At normal fumigation concentrations, methyl bromide is odourless. Therefore it is critical to have a rigorous monitoring regime.

10.1.1 Health hazards

Injury may result from inhalation, skin contact, or eye contact. Single inhalation exposures to 1,000 ppm are immediately dangerous to life.

The effects are on both the respiratory and central nervous system. Unless the concentration is high enough to cause rapid narcosis and death from respiratory failure, the most common symptom to exposure of high concentrations will be lung irritation resulting in congestion and oedema. Pulmonary effects may be somewhat delayed and Bronchial pneumonia may cause death.

Other symptoms may include nausea and vomiting, cough, chest pain and shortness of breath. Individuals exposed by inhalation to lower concentrations may show only central nervous symptom effects; their symptoms would include nausea and vomiting, dizziness, blurred vision, staggering gait and slurred speech.

Exposure to low, but harmful concentrations of methyl bromide over a period of time results in a variety of symptoms and signs, most of which are due to injury of the central nervous system. In the order of frequency these are: visual disturbances, slurred speech, numbness of the extremities, mental confusion, hallucinations, tremor, coma or frequent fainting attacks.

Symptoms may subside within a few days after termination of exposure, or may persist for several months. Numbness of the extremities and visual disturbances are the last to subside. Methyl bromide has also been reported as causing damage to liver and kidneys. It should be noted that there is no known antidote for methyl bromide poisoning.

Direct contact to liquid methyl bromide with the eyes or eyelids may cause serious injury. The eyes should be immediately flooded with water and should be irrigated copiously for at least 15 minutes. Contact with the skin may produce burns, blisters or an itching dermatitis. The affected parts of the skin should be quickly washed with soap and water. Care should be taken to avoid spilling the liquid fumigant on to clothing and footwear, as these are likely to retain the liquid and hold it in contact with the skin. In such cases the contaminated articles should be removed and thoroughly aired.

10.1.2 Detection of fumigant

Direct-reading methyl bromide detectors based on chemical reaction are commercially available; a measured

volume of the air to be analysed is drawn through a granular reagent contained in a glass tube, a coloured reaction product forms, and the length of column discoloured is a measure of the methyl bromide concentration of the sample. A fresh tube is used for each determination.

PID monitors are also used to detect methyl bromide. These devices are used as personal monitors as well as monitoring fumigation concentrations.

10.2 First Aid Measures

Any clothing which may have become contaminated with the liquid fumigant should be removed immediately, and the relevant part of the skin washed thoroughly. The individual concerned should then report to a doctor with a minimum of delay.

If any symptoms are observed following exposure to the gaseous fumigant or if exposure is known or suspect to have taken place, the person should be treated as a stretcher case and sent to hospital immediately with a companion who has full knowledge of the circumstances of the exposure.

Refer to relevant MSDS for further information.



NOISE MANAGEMENT PLAN

M-2602 Narngulu Expansion - Construction Activities

SOW Document no :
Company Representative : Donovan Reddy

Revision	Date	Preparation	Approval	Status	Comments
A	20/11/18	Graham Penter	Donovan Reddy	Approved	



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1. Purpose

This management plan defines the requirements associated with the process of minimising the impact of noise emissions during construction activities scheduled for the CBH Narngulu Grain Storage Site as part of the 2019 site expansion project.

2. Objectives

The objectives of this noise management plan are to minimise significant impacts on amenity and the environmental impact of construction works and activities.

CBH is committed to improving the overall environmental impacts of its business, and in achieving the environmental objectives outlined in the CBH Group Health, Safety and Environmental Policy.

3. Scope

All construction activities undertaken by the Contractor and its Sub-Contractors as part of the earth works and construction activities associated with CBH Narngulu Grain Storage Site expansion project must comply with this Noise Management Plan.

4. Relevant Legislation

Relevant legislation or guideline	Application
Environmental Protection Act 1986	The principal statute relevant to environmental protection in WA. It provides for the establishment of the EPA, preparation and implementation of EPPs, environmental impact assessment and approvals for new developments, licensing and permitting, and waste management
Environmental Protection (Noise) Regulations 1997	Prescribes standard for noise emissions. Applies where noise has potential to affect nearby sensitive premises (e.g. residences) above assigned noise levels



5. Noise Management Commitments

Noise Management will comply with *Environmental Protection (Noise) Regulations*, all applicable sections of *Australian Standard 2436 - 2010 Guide to Noise Control on Construction, Maintenance and Demolition Sites* and *Noise Management in the Construction Industry: A Practical Approach* (Work Safe Western Australia).

During the construction phase noise will be generated through several processes, including:

- Construction traffic;
- Unloading of construction materials;
- Preparation of site for earth works and construction;
- Constructing and make good of grain storages, pits, grain elevators, road ways, drainage and associated infrastructure.

The Noise Management Plan has been developed for use during all earth works and construction activities. This plan includes the following commitments.

- Construction lay down areas will be established away from any residential properties;
- Construction will not involve blasting or pile driving;
- Restriction on working hours for construction to between 7.00am to 7:00pm on any day that is not Sunday or a public holiday;
- All plant equipment and vehicles fitted with appropriate noise suppression equipment to reduce noise levels as far as practicable;
- Any contractor involved in earth works or construction will need to demonstrate and have procedures in place to ensure that all equipment is operating in good condition;
- An induction process for contractors covering all on site environmental, health and safety and operational considerations will take place prior to site works being undertaken;
- All site workers will be informed of noise reduction strategies (such as proper use of machinery and the use of hearing protection) and informed of locations requiring the use of such equipment;
- Warning signs are to be set up in active work areas, prohibiting entry to persons without hearing protection;
- Any public complaints or concerns around noise emissions are logged and investigated, and directed through to the relevant manager or local CBH office.

6. Contacts and Responsibilities

CBH will assign a 'Site Supervisor' for the entirety of the construction phase who will have overall responsibility for the site works and/or Contractor and Sub Contractors.

A CBH point of contact (*to be confirmed*) will be provided to the City of Greater Geraldton for handling enquiries and complaints regarding the construction phase.

All relevant contact details relating to the site works are to be located on the outside of the site office and/or on the main entry to the site.



7. Internal Reporting

All CBH employees and contractors will be required to report generation of significant noise emissions, and /or any increase in noise levels to the Site Supervisor and/or Project Manager.

8. Incident Reporting (including complaints process)

Any unplanned event with potential to cause harm to the environment will be investigated thoroughly to prevent a recurrence.

With regards complaints related to noise, in the first instance an investigation into the complaint should take place, site activities and procedures should be altered to reduce nuisance issues and liaison should take place with the administering authority and/or complainant over remedial action.

Details shall be recorded using the CBH Group online reporting system 'SHARE'.

For any complaint that is determined to be of a CBH environmental incident classification level 3 (moderate) or above then the City of Greater Geraldton is to be informed of the nature of the complaint, any investigation findings, and/or remedial action taken.

9. Training

All employees and subcontractors will be required to undergo a pre work induction, outlining environmental controls to be implemented and monitored during operations. The induction will provide necessary awareness of noise management and the procedures and work practices to minimise and report excessive noise generation.

Regular toolbox meetings will also be held to reinforce a positive attitude to environmental matters and to highlight any issues that arise during the course of site operations.

10. Audit

Audit activities should take place during the construction phase to ensure the objectives of the Noise Management Plan are being met, and to identify any areas for improvement in the management of site activities.



11. Definitions

Noise is defined in the Environmental Protection Act 1986 (the Act) to include vibration of any frequency, whether transmitted through air or any other physical medium. "Pollution" is defined in the Act to mean direct or indirect alteration of the environment (a) to its detriment or degradation; (b) to the detriment of any beneficial use; or (c) of a prescribed kind.

The Act does not define "Noise Pollution" however it is defined in NSW legislation as: the emission of offensive noise, which means noise that by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances, is harmful (or is likely to be harmful) to or interferes unreasonably (or is likely to interfere unreasonably) with the comfort or repose of a person outside the premises from which the noise is emitted'.

12. Attachment

CBH Group Health, Safety and Environmental Policy [STORE ID: 10193562].

CBH Noise Management Plan Operational Activities

CBH Narngulu Grain Storage Site

NOISE MANAGEMENT PLAN

Operational Activities

Store ID: 16330195

Noise Management Plan CBH Narngulu – Operational Activities

1. Purpose

This management plan defines the requirements associated with the process of minimising the impact of noise emissions during operations at the CBH Narngulu Grain Storage Site [Lot 15, Arthur Road, Bootenal].

2. Objectives

The objectives of this noise management plan are to minimise significant impacts on amenity and environmental impact of CBH Group operational activities.

CBH is committed to improving the overall environmental impacts of its business, and in achieving the environmental objectives outlined in the CBH Group Health, Safety and Environmental Policy.

3. Scope

All operational activities undertaken at the CBH Narngulu Grain Storage Site must comply with this Noise Management Plan.

The plan will be subject to on going review and therefore will be subject to change to ensure that it remains relevant and effective in light of site performance, past results and technological advances through out the life of the site.

4. Relevant Legislation

Relevant legislation or guideline	Application
Environmental Protection Act 1986	The principal statute relevant to environmental protection in WA. It provides for the establishment of the EPA, preparation and implementation of EPPs, environmental impact assessment and approvals for new developments, licensing and permitting, and waste management
Environmental Protection (Noise) Regulations 1997	Prescribes standard for noise emissions. Applies where noise has potential to affect nearby sensitive premises (e.g. residences) above assigned noise levels

5. Noise Management Commitments

Noise Management will comply with *Environmental Protection Act 1986* and the *Environmental Protection (Noise) Regulations* and the *Occupational Safety and Health Regulations 1996*.

During operation the CBH Narngulu Grain Storage Site will produce noise from two main sources:

- Plant and equipment; and
- Grain truck movements within the site.

Standard operating practices for the CBH Narngulu Grain Storage Site will involve the following:

- All plant equipment and vehicles are fitted with appropriate noise suppression equipment to reduce noise levels as far as practicable;
- Routine maintenance schedules are designed to identify and assist in reducing noise being generated from moving equipment and machinery;
- Only machinery/equipment essential to the operational activity is run. This includes storage fans, belts, elevators etc;
- Site operational staff are advised to ensure any sources of 'unusual' noise that are above normal operating levels such as noise emanating from faulty compressors, conveyers etc are to be immediately referred to management or the relevant CBH office;
- An induction process for all employees and contractors covering all on site environmental, health and safety and operational considerations will take place prior to site works being undertaken;
- All site workers will be informed of noise reduction strategies (such as proper use of machinery and the use of hearing protection) and informed of locations requiring the use of such equipment;
- Warning signs are to be set up in active work areas, prohibiting entry to persons without hearing protection;
- Any public complaints or concerns around noise emissions are logged and investigated, and directed through to the relevant manager or local CBH office.

6. Contacts and Responsibilities

Overall responsibility for the management of the site is with the CBH Area 1 Manager [Mr Corey Foot – 0417 726 001].

During operational activities the CBH Group has a designated employee assigned day to day responsibilities for the activities at the site in the position of 'Site Manager'. When the site is operational this person is contactable directly via the CBH Narngulu Grain Storage Site on *to be confirmed*.

Overall responsibility for the Geraldton Zone is with the CBH Geraldton Zone Manager [Mr Duncan Gray – (08) 9921 9499].

7. Internal Reporting

All CBH Group employees and contractors will be required to report generation of significant noise emissions, and /or any increase in noise levels to the Site Manager.

8. Incident Reporting (including complaints process)

This section outlines the responsibilities for all concerned, not only the individual with specified tasks but all employees, contractors and visitors to CBH sites and receival points.

All hazards and/or incidents witnessed ***as well as complaints received*** relating to the environment must be recorded using 'SHARE' - our online reporting system. The incident and hazard reporting system is designed to automatically escalate the report to the relevant management and assign action to appropriate parties. We therefore endeavour to act upon and mitigate any issues or complaint in an effective and timely manner.

Hazards and/or incidents that require reporting and/or investigation may include but is not limited to a diesel fuel spill, chemical spill, fugitive dust emissions, and noticeable increases in the noise profile of the site or its machinery.

In addition ***any complaints received*** regarding dust and/or noise is immediately referred to the Site Manager, who would then notify the Area or Zone Manager of the following information.

- Date of complaint
- Time of Complaint
- Location of Complaint
- Nature of Complaint
- Name of Complainant (if given)
- A summary of any action taken

For any complaint that is determined to be of a CBH environmental incident classification level 3 (moderate) or above then the City of Greater Geraldton is to be informed of the nature of the complaint, any investigation findings, and/or remedial action taken.

9. Training

All employees and subcontractors will be required to undergo a pre work induction, outlining environmental controls to be implemented and monitored during operations. The induction will provide necessary awareness of noise management and the procedures and work practices to minimise and report excessive noise generation.

Regular toolbox meetings will also be held to reinforce a positive attitude to environmental matters and to highlight any issues that arise during the course of site operations.

10. Definitions

Noise is defined in the Environmental Protection Act 1986 (the Act) to include vibration of any frequency, whether transmitted through air or any other physical medium. “Pollution” is defined in the Act to mean direct or indirect alteration of the environment (a) to its detriment or degradation; (b) to the detriment of any beneficial use; or (c) of a prescribed kind.

The Act does not define “Noise Pollution” however it is defined in NSW legislation as: the emission of offensive noise, which means noise that by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances, is harmful (or is likely to be harmful) to or interferes unreasonably (or is likely to interfere unreasonably) with the comfort or repose of a person outside the premises from which the noise is emitted’.

11. Attachments

CBH Group Health, Safety and Environmental Policy [STORE ID: 10193562].



STORMWATER REPORT

NARNGULU

BULK HEAD EXPANSION

307-2602-CI-RPT-0001



REVISION STATUS

REV	DATE	DESCRIPTION	BY	CHECKED
A	3/12/18	ISSUED FOR DA	HM	MM



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1. Introduction

McDowall Affleck has been appointed by CBH as Engineering Consultants for the proposed Bulk Head Expansion at Narngulu.

The proposed expansion has a total impervious area of approximately 13.8 hectares.

1.1 Objectives

The objective of this Stormwater Design Report (SDR) is to assess the predevelopment and post development conditions of the subject land in accordance with guidelines set by the CBH and the City of Greater Geraldton's stormwater management standards.

This SDR provides details on how stormwater will be managed.

2. Pre-development Environment

2.1 Geotechnical Conditions

A Geotechnical investigation has been undertaken by Black Top Consulting Engineers in Nov 2017. Based on the geotechnical test pits, the soil profile generally across the site comprises of alluvial soils comprising of sand, silt and clay. The site is expected to be suitable for proposed development purposes with a Site Classification of S.

Groundwater was not encountered in any of the test pits to a maximum depth of investigation of 3.0 m.

Infiltration rates have been recorded to be less than of 0.06m/day. Based on this infiltration is considered negligible.

2.2 Existing Basins

One existing basin is located west of the proposed bulk heads and captures flow from existing bulkheads. It is not proposed to reuse or expand this existing basin.

3. Stormwater Management Principles

The CBH guidelines require storage of the 20-year post development ARI less the Pre-development ARI. All culverts are to be designed for the 20-year ARI conveyance.

The City of Greater Geraldton stormwater storage requirements are for the 10-year ARI with storage provided for 31mm of rainfall, in accordance with their information sheet DE08 - Stormwater Drainage Disposal Requirements.

Both criteria have been assessed and summarized in the below sections.

3.1 Rainfall Data

Design rainfall Intensity Frequency Duration (IFD) data was produced using the Bureau of Meteorology AEP software based on the co-ordinates of the proposed bulk heads.

The summary of the IFD table is shown below:



Table 1: Summary of IFD

	EY	Annual Exceedance Probability (AEP)					
Duration	1EY	50%	20%	10%	5%	2%	1%
1 min	1.47	1.67	2.33	2.82	3.32	4.04	4.62
2 min	2.45	2.77	3.83	4.61	5.41	6.61	7.6
3 min	3.37	3.81	5.28	6.36	7.48	9.13	10.5
4 min	4.19	4.74	6.59	7.95	9.36	11.4	13.1
5 min	4.91	5.57	7.76	9.37	11	13.4	15.4
10 min	7.64	8.68	12.1	14.7	17.3	21	24
15 min	9.48	10.8	15.1	18.2	21.4	26	29.7
30 min	12.9	14.6	20.4	24.6	29	35.2	40.2
1 hour	16.6	18.8	26.2	31.6	37.2	45.3	51.9
2 hour	20.8	23.5	32.7	39.6	46.8	57.1	65.8
3 hour	23.6	26.7	37.2	45.1	53.4	65.3	75.3
6 hour	29.2	33	46.2	56.1	66.7	81.7	94.3
12 hour	32.9	37.3	52.3	63.5	75.4	92.3	106
24 hour	35.8	40.6	56.9	69	81.7	100	115
48 hour	43.3	49.2	68.4	82.3	96.5	117	134
72 hour	51.2	58.1	79.9	94.7	109	132	150
96 hour	56.2	63.6	86.8	102	117	140	159
120 hour	60.2	68	92.4	109	124	148	167
144 hour	63.8	72	97.7	115	132	157	177
168 hour	67.3	75.8	103	122	141	167	187

3.2 Pre-development and Post- development Flow Calculation

At post development stage, all runoff will be directed into the basin.

The rational method has been used to calculate the predevelopment and post development flow of the site with time of concentration calculated using the kinematic wave equation.

The CBH design standard specifies a 20-year coefficient of runoff. ARR uses a 10-year coefficient as the basis of the calculations, therefore in accordance with ARR we have used a frequency factor to convert the 20 Year coefficient to a 10 year coefficient for calculation purposes.



For predevelopment flow:

- Surface roughness coefficient $n^* = 0.035$ for vegetated surface
- For 1 in 20 yrs, $C_{20} = 0.2$
- For 1 in 10 yrs, $C_{10} = 0.19$

For post development flow:

- Surface roughness coefficient $n^* = 0.022$ for open channels
- For 1 in 20 yrs, $C_{20} = 0.9$ for paved surface
- For 1 in 10 yrs, $C_{10} = 0.86$

4. Basins

4.1 City of Greater Geraldton Basin Calculation

The City of Greater Geraldton stormwater storage requirements are for the 10-year ARI with storage provided for 31mm of rainfall, in accordance with their information sheet DE08 - Stormwater Drainage Disposal Requirements Refer to Appendix 3.

- ARI = 10 years
- Impervious Area = 137,780m²
- Coefficient of Runoff = 0.9
- Storage Requirement = 31mm over impervious area
- Total Storage = 3,844m³

Refer to Appendix 3 for calculations.

4.2 CBH Criteria Storage

The basin's storage has been sized to have a storage capacity to cater for 1 in 20 years ARI less the predevelopment flow, with a minimum freeboard of 300mm. Storage volumes are calculated using the Modified Copas equation as shown in Appendix 3.

Basis of design and assumptions are described as follows:

- ARI = 20 years
- Impervious Area = 137,780m²
- Post Development Coefficient of Runoff $C_{10} = 0.86$ $C_{20} = 0.2$
- Pre-Development Coefficient of Runoff $C_{10} = 0.19$ $C_{20} = 0.2$
- Infiltration = Nil
- Total Storage 20 Year ARI = 3,878m³
- Total Storage 10 Year ARI = 3,165m³

4.3 Adopted Criteria

The CBH criteria of Storage for the 20-year ARI less pre-development flow has been adopted as most conservative result.

Minimum Storage to be designed = 3,878m³

5. Culverts

Culverts will be required beneath pavements to convey storm flow from the bulkheads. The Criteria for culverts is to convey the 20 year ARI.

The below table summarises the proposed culvert dimensions, culvert locations are documented on the general arrangement plan, Appendix 1



CULVERT	CATCHMENT m ²	SIZE (mm)	TYPE	FLOW L/S	CAPACITY L/S
1 Existing	30000	900x300	BOX	397	470
2	11000	450	RCP	156	218
3	11000	450	RCP	156	218
4	11000	450	RCP	156	218
5	20000	600X300	Box	264	294
6	80000	2x450	RCP	389	436
7	55000	2x450	RCP	264	436

It is noted the proposed culvert size and type may change subject to detailed design levels and catchments of the pavement.

Refer to Appendix 2 for culvert calculations.

6. Summary

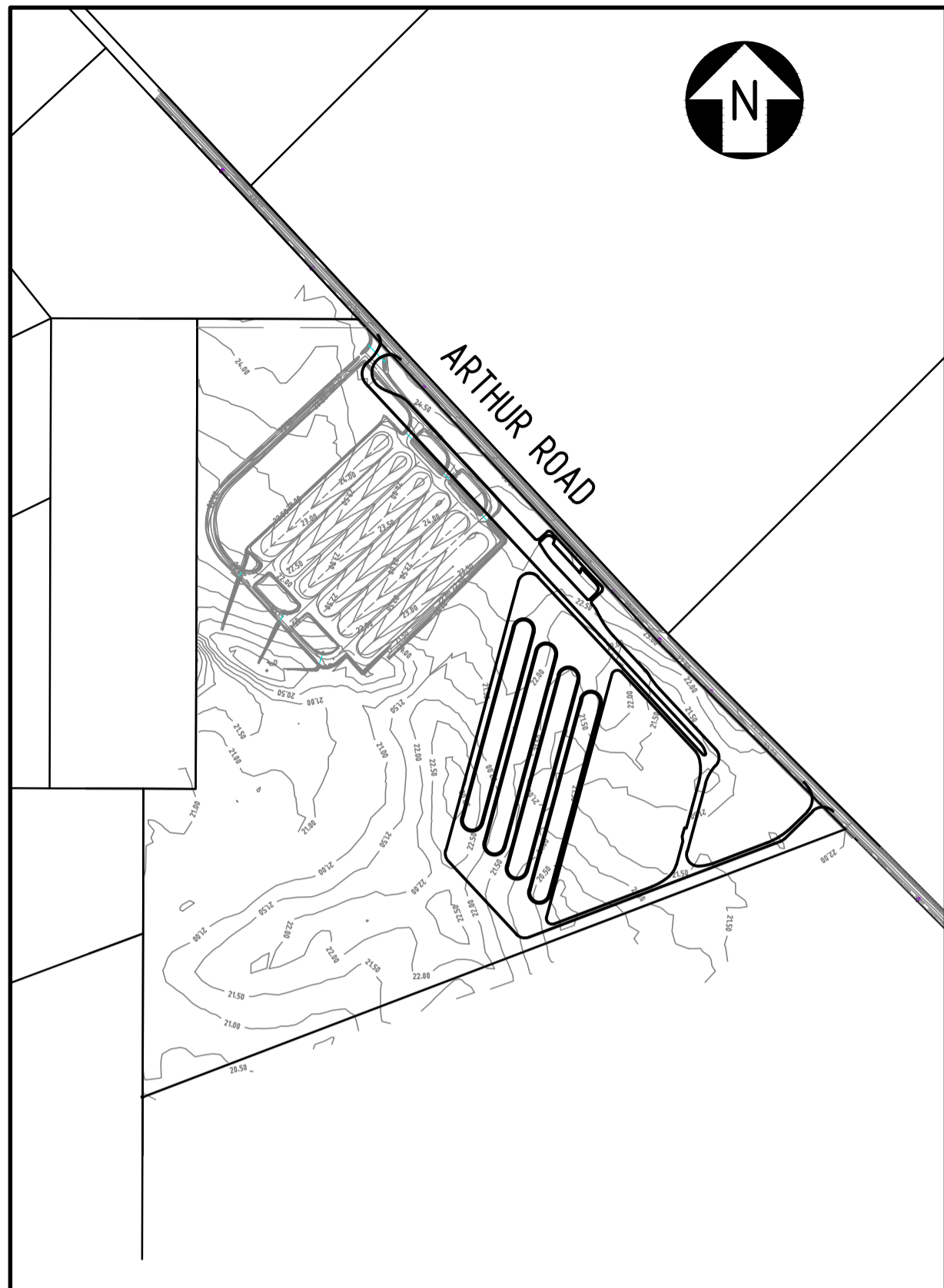
The stormwater basin design will be to CBH specifications, being the 20-year ARI less the predevelopment flow. This criteria is more conservative than the City of Greater Geraldton 31mm of storage.

The basin size under detailed design will accommodate 3,900m³.

Open drains and culverts will be designed to convey the 20 year ARI, with the top water level 100mm lower than the sub-base of the pavement structure.



APPENDIX 1 – GENERAL ARRANGEMENT PLAN



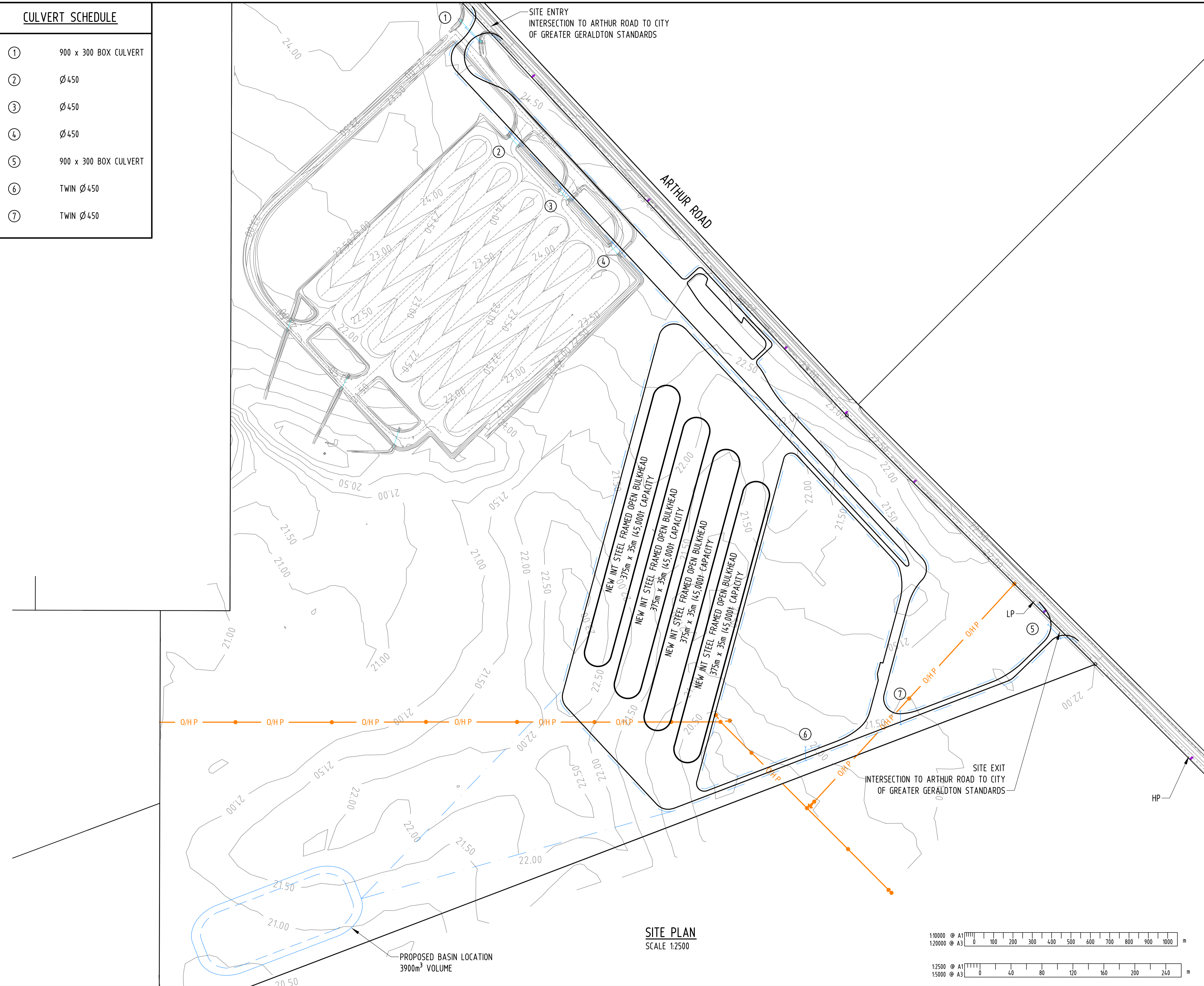
SITE KEY PLAN
SCALE 1:10,000

LEGEND

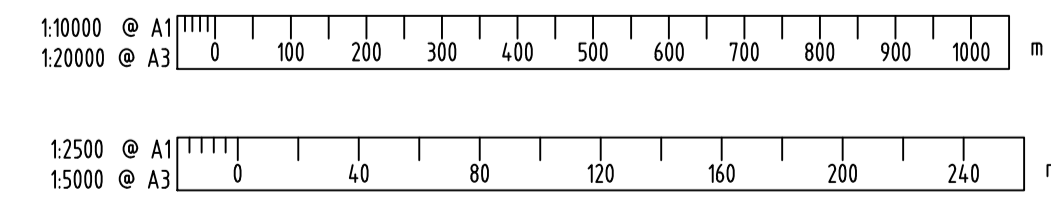
	CADASTRAL
	EXISTING CONTOUR
	EDGE OF ASPHALT
	OPEN DRAIN
	DRAINAGE CULVERT AND NUMBER
	DRAINAGE BASIN
	OVERHEAD POWER
	LOW POINT/HIGH POINT

CULVERT SCHEDULE

①	900 x 300 BOX CULVERT
②	Ø450
③	Ø450
④	Ø450
⑤	900 x 300 BOX CULVERT
⑥	TWIN Ø450
⑦	TWIN Ø450



SITE PLAN
SCALE 1:2500



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SCALE	AS SHOWN	DRAWN	G SPELDEWINDE	3/12/2018	TITLE NARNGULU SITE DEVELOPMENT 4 x NEW OPEN BULKHEADS GENERAL ARRANGEMENT ORG No: 307-ENG-CI-DGA-0001-A
SHEET	A1	CHECKED	H MILLEN	3/12/2018	
PROJECT	M-2602	DESIGNED	H MILLEN	3/12/2018	
CONTRACT No.		DESIGN APPR	M MCCAFFERTY	3/12/2018	
		PROJECT APPR	H MILLEN	3/12/2018	
SHEET					1 OF 1
					REV. A



APPENDIX 2 – DE08 STORMWATER DRAINAGE DISPOSAL REQUIREMENTS



STORMWATER DRAINAGE DISPOSAL REQUIREMENTS

FOR RESIDENTIAL AND NON-COMMERCIAL DEVELOPMENTS

The City of Greater Geraldton requires that all stormwater run-off from multi-unit developments (two until and above) is to be retained on-site by the use of soak wells, infiltration basin, open swales, rain water tanks, or any other form of stormwater storage systems. In addition to these systems, an overland flow path must be designed to cater from major storm events; designating a route for excess stormwater in the situation where the storage system overflows. In a major event, the stormwater flow path must take into consideration buildings of neighbouring properties. The objective is to prevent stormwater flooding into properties with lower floor finish level.

The stormwater storage system must be maintained by the property owner(s) to cater for the designed capacity, as the storage volume will decrease over time for some systems (fines and sediment migration). For some systems, the property owner will have to empty the system at least annually to ensure storage capacity (e.g. rain water tank, underground storage tank).

The formula (below) shows the calculation of the required storage volume;

$$\frac{\text{Total Impervious Area * in m}^2 \times 0.9}{50 \text{ for Clayey/Silty or } 60 \text{ for Sandy subsoil}} = \text{Storage Volume required in m}^3$$

* Total Impervious Area (roof's, paving etc)

The table (below) shows the area drained according to different soak well sizes;

DIAMETER (mm)	DEPTH (mm)	VOLUME (m ³)	AREA DRAINED PER SOAKWELL		
			Ea/60m ²	Ea/50m ²	Landscaping
600	600	0.17	11.3	9	56 m ²
900	900	0.57	38.0	32	171 m ²
1200	1200	1.36	91.0	77	407 m ²
1800	600	1.53	102.0	85	460 m ²
1800	1200	3.05	205.0	170	915 m ²
1800	1800	4.58	305.0	254	1375 m ²

FOR COMMERCIAL AND INDUSTRIAL DEVELOPMENTS

The City of Greater Geraldton requires that all stormwater is to be retained on-site by the use of soak wells, drainage basins, open swales, or any other form of above and underground stormwater storage systems. Sumps are not allowed unless all other stormwater storage systems are not practical.

In addition to these systems, an overland flow path must be designed to cater for major storm events; designated a route for excess stormwater in the situation where the storage system overflows. In a major event, the stormwater flow path must take into consideration buildings of neighbouring properties.

The stormwater storage system must be maintained by the property owner(s) to cater for the designed capacity, as the storage volume will decrease over time for some systems (fines and sediment migration). Generally above ground systems should be landscaped to increase aesthetical value of the area and encouraging infiltration volume.

The minimum storage volume is calculated based on a 10-year one hour storm event (31mm) as recommended by IPEWEA Guidelines.

The formula (below) shows the calculation of the required storage volume;

$$\begin{aligned} & \text{Total Impervious Area * in m}^2 \times 0.9 \times 0.031 \\ & = \text{Storage Volume required in m}^3 \\ & * \text{Total Impervious Area (roof's, paving etc)} \end{aligned}$$



APPENDIX 3 - CALCULATIONS

Modified Copas Equation		Job No.	15975
		Rev	A
Project	Narngulu Bulk Head Expansion	Date	30/11/2018
		Calcs By	HM

IFD Location 28.8375 S 114.7125 E

Catchment Area Proposed Roads and Bulkheads (Impervious Surface)

The Kinematic Wave Equation has been used to calculate overland flow times (AR&R 1987 Volume 1)

PARAMETERS

Pre Development	
Total Area (m ²)	137,780
Coeff of Runoff C ₁₀	0.19
Slope (m/m)	0.005
n*	0.035
Length (m)	1,892

Constant Inflow Rate (l/s) = 0
Duration (min) = 0

City of Greater Geraldton Requirements	
Total Area Impervious (m ²)	137,780
ARI (Yrs)	10
Coefficient C	0.9
mm to store	31
Volume	3,844

Post Development	
Total Area (m ²)	137,780
Area of Pervious (m ²)	0
Area of Impervious (m ²)	137,780
Slope (m/m)	0.005
n*	0.022
Length (m)	1,892
C ₁₀ of Impervious	0.86
C ₁₀ of Pervious	0.19
Ave Coeff of Runoff C ₁₀	0.86
Limit Post Development Outflow	Yes
Limit Post Development Outflow To 1 in X	All
Pipe Outflow Rate (l/s)	
Infiltration Rate (m/d)	
Area of Infiltration (m ²)	
Infiltration Rate (l/s)	0.0
Total Outflow or Infiltration Rate (l/s)	0.0

RESULTS

Storm Event (Yr)	Pre Development		Post Development				
	T _c (min)	Predev Flow Rate (l/s)	T _s (min)	T _c (min)	PostDev flow Rate (l/s)	PostDev Outflow Rate (l/s)	Storage Required (m ³)
1	191.1	43.2	240	128.5	258	43.2	1,454.0
2	177.3	50	240	119.5	286	50	1,788.0
5	147.8	98	180	100.7	603	98	2,535.0
10	132.6	134	180	91.0	829	134	3,165.0
20	120.4	175	180	83.2	1089	175	3,878.0
50	108.7	261	180	74.5	1546	261	4,939.0
100	101.0	335	180	68.8	1870	335	5,481.0

Storage Volume Required

Storm ARI City of Greater Geraldton	10	Minor Storm Volume (inc Water Quality) Reqd.	3844.1
Storm ARI Post - Pre Development	20	Major Storm Volume (inc Water Quality) Reqd.	3878.0
Volume Required:			3878.0

Modified Copas Equation		Job No.	15975				
		Rev	A				
Project	Narngulu Bulk Head Expansion	Date	30/11/2018				
		Calcs By	HM				
IFD Location	28.8375 S 114.7125 E						
Catchment Area	Culvert 1						
<i>The Kinematic Wave Equation has been used to calculate overland flow times (AR&R 1987 Volume 1)</i>							
PARAMETERS							
Pre Development		Post Development					
Total Area (m ²)		Total Area (m ²)	30,000				
Coeff of Runoff C ₁₀		Area of Pervious (m ²)	0				
Slope (m/m)		Area of Impervious (m ²)	30,000				
n*		Slope (m/m)	0.003				
Length (m)		n*	0.022				
		Length (m)	550				
Constant Inflow Rate (l/s) =	0	C ₁₀ of Impervious	0.86				
Duration (min) =	0	C ₁₀ of Pervious	0.19				
		Ave Coeff of Runoff C ₁₀	0.86				
		Limit Post Development Outflow	Yes				
		Limit Post Development Outflow To 1 in X	All				
		Pipe Outflow Rate (l/s)					
		Infiltration Rate (m/d)					
		Area of Infiltration (m ²)					
		Infiltration Rate (l/s)	0.0				
		Total Outflow or Infiltration Rate (l/s)	0.0				
RESULTS							
Storm Event (Yr)	Pre Development		Post Development				Storage Required (m ³)
	T _c (min)	Predev Flow Rate (l/s)	T _s (min)	T _c (min)	PostDev flow Rate (l/s)	PostDev Outflow Rate (l/s)	
1			-	56.9	100		
2			-	53.4	113		
5			-	45.0	227		
10			-	40.7	307		
20			-	37.2	397		
50			-	33.4	555		
100			-	30.9	664		
Box Culvert Capacity							
Manning's n	CBH = 0.012			0.012			
Slope (1/x)				131			
Internal Height (m)				300			
Internal Span (m)				920			
Cross Sectional Area (A)				0.276			
Wetted Perimeter (m)				2.44			
Hydraulic Radius				0.113			
Pipe Capacity (L/s)				470			
Velocity In Pipe (m/s)				1.70			

Modified Copas Equation		Job No.	15975
		Rev	A
Project	Narngulu Bulk Head Expansion	Date	30/11/2018
		Calcs By	HM

IFD Location 28.8375 S 114.7125 E

Catchment Area Culverts 2-4

The Kinematic Wave Equation has been used to calculate overland flow times (AR&R 1987 Volume 1)

PARAMETERS

Pre Development	
Total Area (m ²)	
Coeff of Runoff C ₁₀	
Slope (m/m)	
n*	
Length (m)	

Constant Inflow Rate (l/s) = 0
Duration (min) = 0

Post Development	
Total Area (m ²)	11,000
Area of Pervious (m ²)	0
Area of Impervious (m ²)	11,000
Slope (m/m)	0.003
n*	0.022
Length (m)	450
C ₁₀ of Impervious	0.86
C ₁₀ of Pervious	0.19
Ave Coeff of Runoff C ₁₀	0.86
Limit Post Development Outflow	Yes
Limit Post Development Outflow To 1 in X	All
Pipe Outflow Rate (l/s)	
Infiltration Rate (m/d)	
Area of Infiltration (m ²)	
Infiltration Rate (l/s)	0.0
Total Outflow or Infiltration Rate (l/s)	0.0

RESULTS

Storm Event (Yr)	Pre Development		Post Development				Storage Required (m ³)
	T _c (min)	Predev Flow Rate (l/s)	T _s (min)	T _c (min)	PostDev flow Rate (l/s)	PostDev Outflow Rate (l/s)	
1			-	48.8	42		
2			-	45.7	46.7		
5			-	38.2	91		
10			-	34.4	122		
20			-	31.4	156		
50			-	28.3	221		
100			-	26.4	269		

Pipe Capacity

Manning's n CBH = 0.012	0.012
Slope (1/x)	200
Diameter (mm)	450
Pipe Capacity (L/s)	218.40
Velocity In Pipe (m/s)	1.37

Modified Copas Equation		Job No.	15975				
		Rev	A				
Project	Narngulu Bulk Head Expansion		Date	30/11/2018			
			Calcs By	HM			
IFD Location		28.8375 S 114.7125 E					
Catchment Area		Culverts 5					
<i>The Kinematic Wave Equation has been used to calculate overland flow times (AR&R 1987 Volume 1)</i>							
PARAMETERS							
Pre Development		Post Development					
Total Area (m ²)		Total Area (m ²)	20,000				
Coeff of Runoff C ₁₀		Area of Pervious (m ²)	0				
Slope (m/m)		Area of Impervious (m ²)	20,000				
n*		Slope (m/m)	0.003				
Length (m)		n*	0.022				
		Length (m)	550				
	Constant Inflow Rate (l/s) = 0	C ₁₀ of Impervious	0.86				
	Duration (min) = 0	C ₁₀ of Pervious	0.19				
		Ave Coeff of Runoff C ₁₀	0.86				
		Limit Post Development Outflow	Yes				
		Limit Post Development Outflow To 1 in X	All				
		Pipe Outflow Rate (l/s)					
		Infiltration Rate (m/d)					
		Area of Infiltration (m ²)					
		Infiltration Rate (l/s)	0.0				
		Total Outflow or Infiltration Rate (l/s)	0.0				
RESULTS							
Storm Event (Yr)	Pre Development		Post Development				
	T _c (min)	Predev Flow Rate (l/s)	T _s (min)	T _c (min)	PostDev flow Rate (l/s)	PostDev Outflow Rate (l/s)	Storage Required (m ³)
1			-	56.9	66		
2			-	53.4	75		
5			-	45.0	151		
10			-	40.7	204		
20			-	37.2	264		
50			-	33.4	370		
100			-	30.9	442		
Box Culvert Capacity							
Manning's n	CBH = 0.012					0.012	
Slope (1/x)							131
Internal Height (m)							300
Internal Span (m)							620
Cross Sectional Area (A)							0.186
Wetted Perimeter (m)							1.84
Hydraulic Radius							0.101
Pipe Capacity (L/s)							294
Velocity In Pipe (m/s)							1.58

Modified Copas Equation		Job No.	15975
		Rev	A
Project	Narngulu Bulk Head Expansion	Date	30/11/2018
		Calcs By	HM

IFD Location 28.8375 S 114.7125 E

Catchment Area Culverts 6

The Kinematic Wave Equation has been used to calculate overland flow times (AR&R 1987 Volume 1)

PARAMETERS

Pre Development	
Total Area (m ²)	
Coeff of Runoff C ₁₀	
Slope (m/m)	
n*	
Length (m)	

Constant Inflow Rate (l/s) = 0
Duration (min) = 0

Post Development	
Total Area (m ²)	80,000
Area of Pervious (m ²)	65,000
Area of Impervious (m ²)	15,000
Slope (m/m)	0.003
n*	0.022
Length (m)	550
C ₁₀ of Impervious	0.86
C ₁₀ of Pervious	0.19
Ave Coeff of Runoff C ₁₀	0.32
Limit Post Development Outflow	Yes
Limit Post Development Outflow To 1 in X	All
Pipe Outflow Rate (l/s)	
Infiltration Rate (m/d)	
Area of Infiltration (m ²)	
Infiltration Rate (l/s)	0.0
Total Outflow or Infiltration Rate (l/s)	0.0

RESULTS

Storm Event (Yr)	Pre Development		Post Development				Storage Required (m ³)
	T _c (min)	Predev Flow Rate (l/s)	T _s (min)	T _c (min)	PostDev flow Rate (l/s)	PostDev Outflow Rate (l/s)	
1			-	56.9	98		
2			-	53.4	111		
5			-	45.0	223		
10			-	40.7	301		
20			-	37.2	389		
50			-	33.4	545		
100			-	30.9	670		

Pipe Capacity

Manning's n CBH = 0.012	0.012
Slope (1/x)	200
Diameter (mm)	450
Pipe Capacity (L/s)	218.40
Velocity In Pipe (m/s)	1.37

Modified Copas Equation		Job No.	15975
		Rev	A
Project	Narngulu Bulk Head Expansion	Date	30/11/2018
		Calcs By	HM

IFD Location 28.8375 S 114.7125 E

Catchment Area Culverts 7

The Kinematic Wave Equation has been used to calculate overland flow times (AR&R 1987 Volume 1)

PARAMETERS

Pre Development	
Total Area (m ²)	
Coeff of Runoff C ₁₀	
Slope (m/m)	
n*	
Length (m)	

Constant Inflow Rate (l/s) = 0
Duration (min) = 0

Post Development	
Total Area (m ²)	55,000
Area of Pervious (m ²)	45,000
Area of Impervious (m ²)	10,000
Slope (m/m)	0.003
n*	0.022
Length (m)	550
C ₁₀ of Impervious	0.86
C ₁₀ of Pervious	0.19
Ave Coeff of Runoff C ₁₀	0.31
Limit Post Development Outflow	Yes
Limit Post Development Outflow To 1 in X	All
Pipe Outflow Rate (l/s)	
Infiltration Rate (m/d)	
Area of Infiltration (m ²)	
Infiltration Rate (l/s)	0.0
Total Outflow or Infiltration Rate (l/s)	0.0

RESULTS

Storm Event (Yr)	Pre Development		Post Development				Storage Required (m ³)
	T _c (min)	Predev Flow Rate (l/s)	T _s (min)	T _c (min)	PostDev flow Rate (l/s)	PostDev Outflow Rate (l/s)	
1			-	56.9	66		
2			-	53.4	75		
5			-	45.0	151		
10			-	40.7	204		
20			-	37.2	264		
50			-	33.4	370		
100			-	30.9	455		

Pipe Capacity

Manning's n CBH = 0.012	0.012
Slope (1/x)	200
Diameter (mm)	450
Pipe Capacity (L/s)	218.40
Velocity In Pipe (m/s)	1.37



TRAFFIC IMPACT ASSESSMENT REPORT

**CBH Geraldton
Grain Storage Expansion Project**

Lot 15 Arthur Road, Narngulu WA

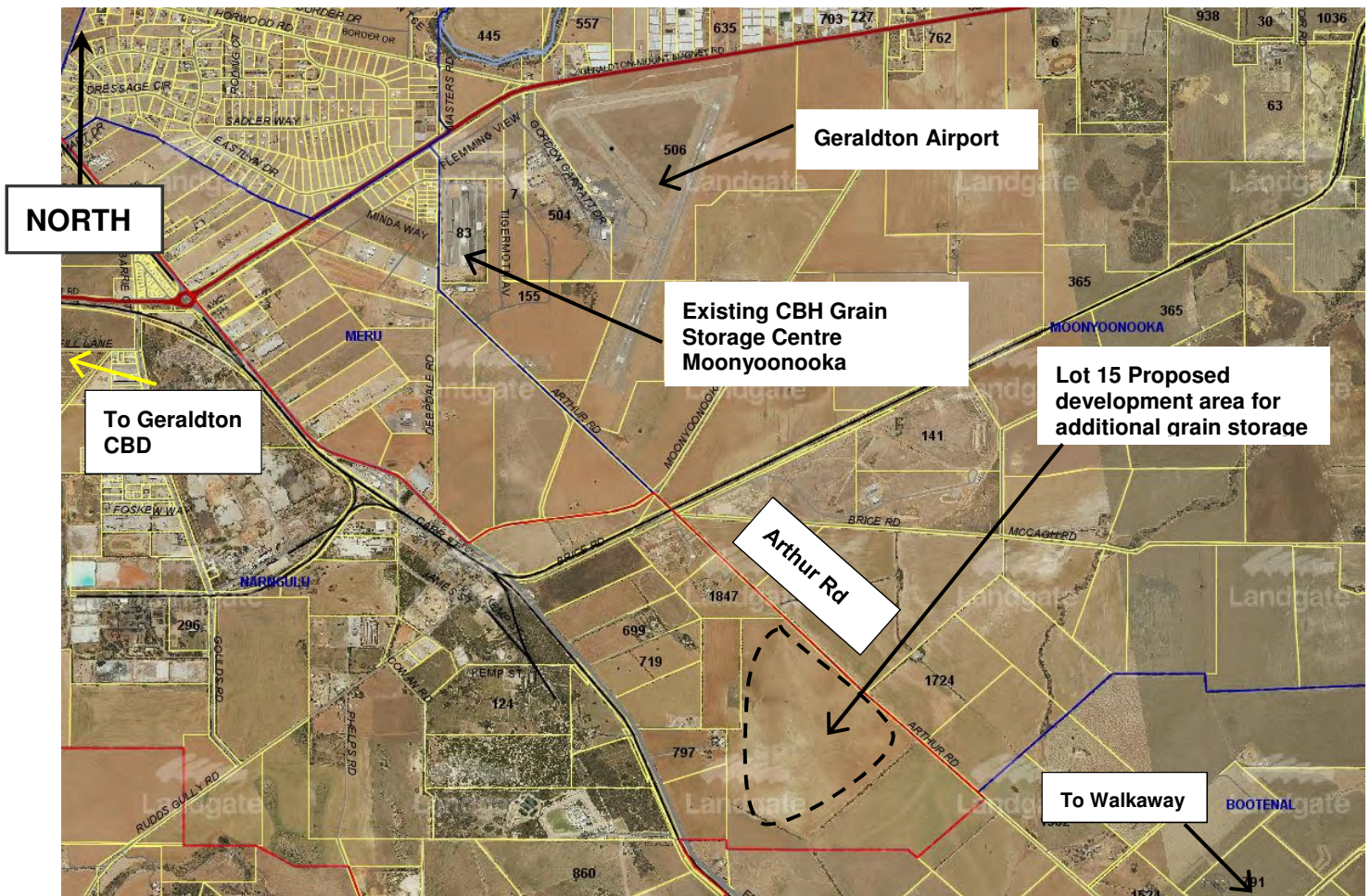
CITY of GREATER GERALDTON

PREPARED FOR:	CBH
PREPARED BY:	Tony Saraullo
DATE:	24th January 2018
Roadswest Reference No:	R2010-02
Roadswest Doc. No	R2010-02 Rev 4 Issued 19/11/18

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1 Locality Plan



NOT TO SCALE

2 Background

2.1 General

This report outlines the methodology adopted and criteria used to undertake a traffic impact assessment associated with the proposed development of Lot 15 Arthur Rd into a grain storage facility for CBH Pty Ltd (CBH).

The location of the CBH property in relation to the adjacent roads within the City of Greater Geraldton, is shown in the Locality Plan.

CBH are currently using the property for short term temporary grain storage activities, due to the varying grain harvest demand.

The temporary facilities including the road access points, were approved conditional on the future permanent facility being constructed outside the EPA Industrial/Sensitive land use zones. Refer to the conceptual design layout shown in Figure 2

CBH now wish to proceed with a development application for the construction of the permanent facility.

The proposal will allow CBH to increase their grain storage capacity and enable the planning and implementation of future infrastructure on the site.

The proposal will provide for safer transport efficiencies in the Moonyoonooka/Narngulu area within the City of Greater Geraldton

This traffic impact assessment report is required to provide the City of Greater Geraldton with sufficient information so that formal approval to proceed with the commencement of the works associated with the construction of grain storage facility including associated roads, hardstands and drainage infrastructure.

2.2 Site Inspection

A site inspection of the property by the author was undertaken on 19th July 2017.

2.3 Transport Impact Assessment Checklist

The proposed development was assessed using the guidelines provided by the Department of Planning document:

Transport Impact Assessment Guidelines (August 2016) and more specifically *Volume 4 Appendix A1 Completed Checklist for Individual Development Transport Impact Statement*

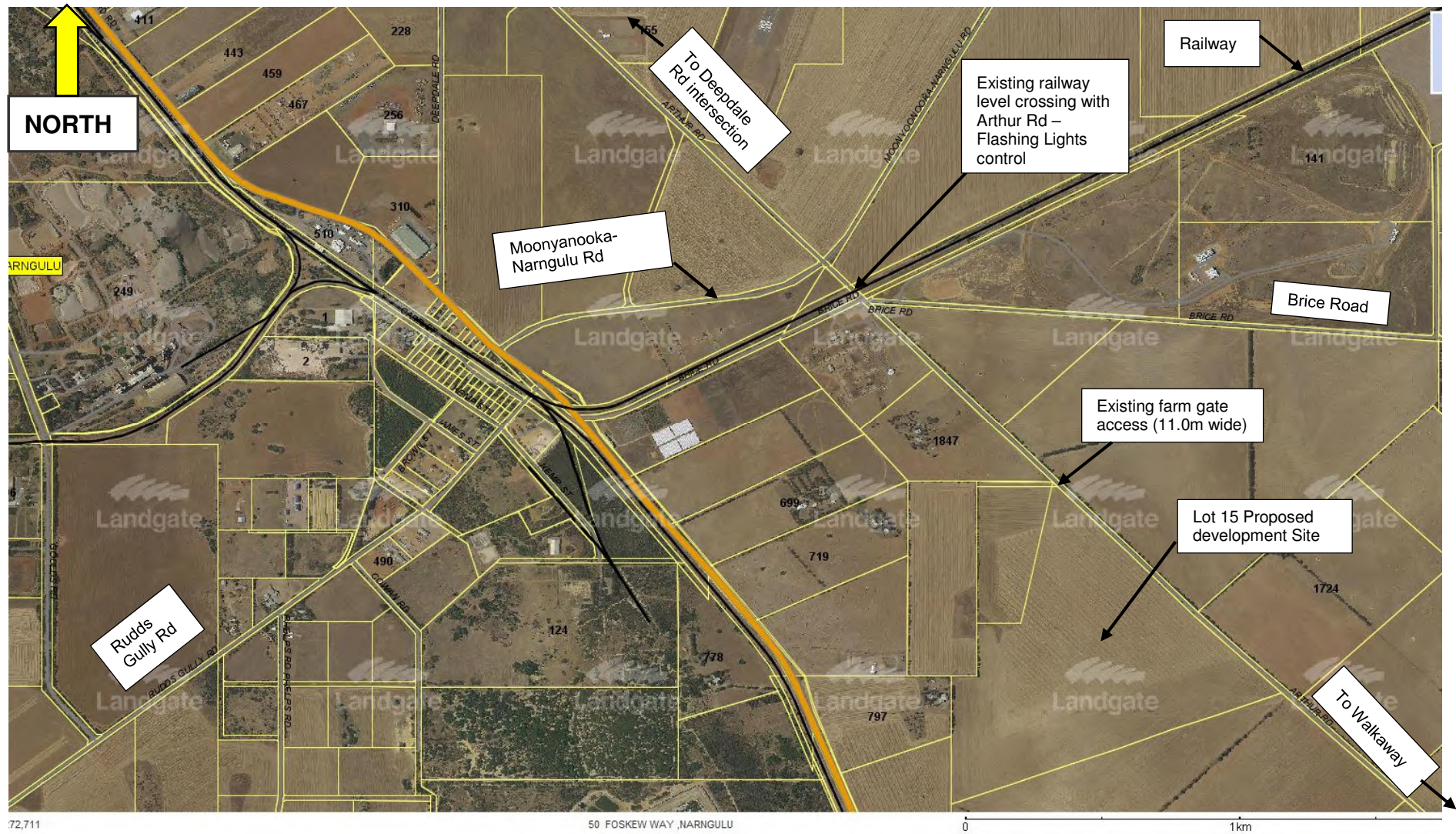


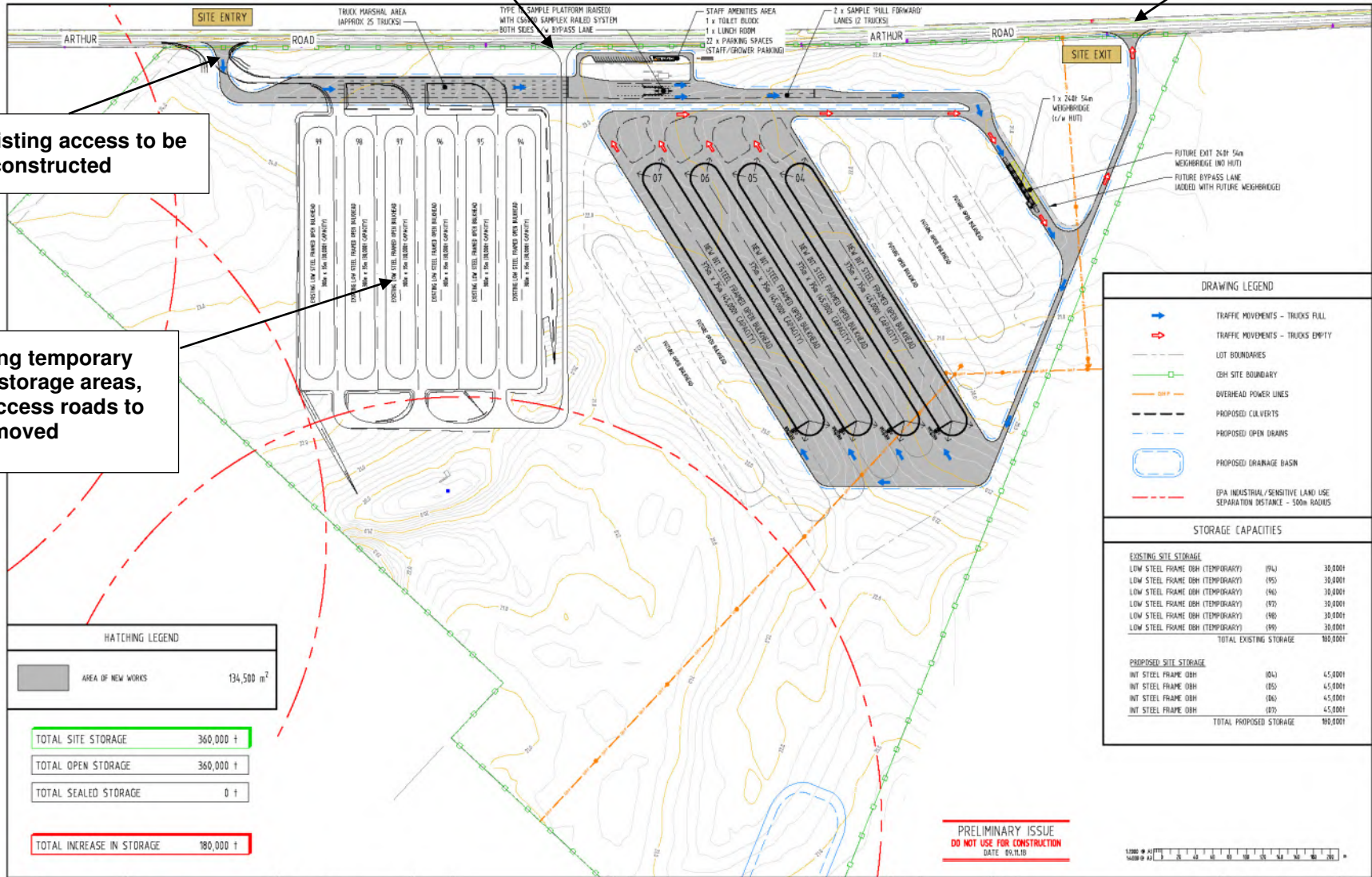
Figure 1. Location of existing property access and the proposed area of development

Existing access to be removed

Construct new Site Exit - access

Existing access to be reconstructed

Existing temporary grain storage areas, and access roads to be removed



HATCHING LEGEND

AREA OF NEW WORKS 134,500 m²

TOTAL SITE STORAGE	360,000 t
TOTAL OPEN STORAGE	360,000 t
TOTAL SEALED STORAGE	0 t
TOTAL INCREASE IN STORAGE	180,000 t

PRELIMINARY ISSUE
DO NOT USE FOR CONSTRUCTION
DATE: 09.11.18



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		CBH GROUP HEAD OFFICE 30 BELLA STREET WEST PERTH WA 6150 PH (08) 9357 9400 FAX (08) 9352 3942	REVIEWED: [] DATE: []	PROJECT: [] SHEET: []	PROJECT: [] SHEET: []			

Figure 2. CBH Site Plan showing area of grain storage, and proposed access to the site via separate ENTRY and EXIT crossovers

3 Description of the Development

In summary the development application is proposing to upgrade the property to include:

- 4 No 375m long x 35m wide x 1.8m high open bulkheads for grain storage, including associated hopper pit, elevators and ground conveyors.
- Lighting towers to illuminate the hopper pit and open bulkheads, during grain receivals, out loading and facility maintenance activities.
- Grain sampling platform (raised) with Type C56000 Simplex railed system both sides.
- Installation of a bypass truck lane adjacent the sampling platform
- 1 x 240tonne capacity 54m long weighbridge complete with personnel hut, for weigh in and weigh out truck movements.
- Truck marshalling area accommodating 25 No 53.5m long road trains
- Internal roads around grain storage area, and grain sampling /truck weighing facility
- Separate staff amenities area comprising:
 - 1 x Toilet Block
 - 1 x Lunch Room
 - 1 x Wastewater management system to Health Dept and LGA regulations
 - 2 x Disabled Parking Bays
 - 20 x Parking spaces for light vehicles for staff and grower parking.
- 2 No Sample “ Pull forward traffic lanes for 2 trucks”
- Stormwater drainage and collection infrastructure

The proposal also includes for the reconstruction of the existing Site Entry point and construction of a new Site Exit point off Arthur Road

The 2 accesses are shown on the conceptual design layout plan shown in Figure 2

4 Existing Operational Conditions

4.1 Affected roads

Arthur Road (Road No 5051008) is owned and maintained by City of Greater Geraldton and as such any proposed development impacting on this road and within their road reserve will require planning, designing and constructing in accordance with their standards and guidelines.

Arthur Road is the only road that can be used to access the CBH development property.

4.2 Existing Accesses

4.2.1 Main Access off Arthur Road

There is one existing access located at the North West corner of the property. Refer to Photograph 1 and Figure 2.

The access is a “farm gate” used by agricultural plant and equipment to work the land.

This access will not be affected by the proposed development.



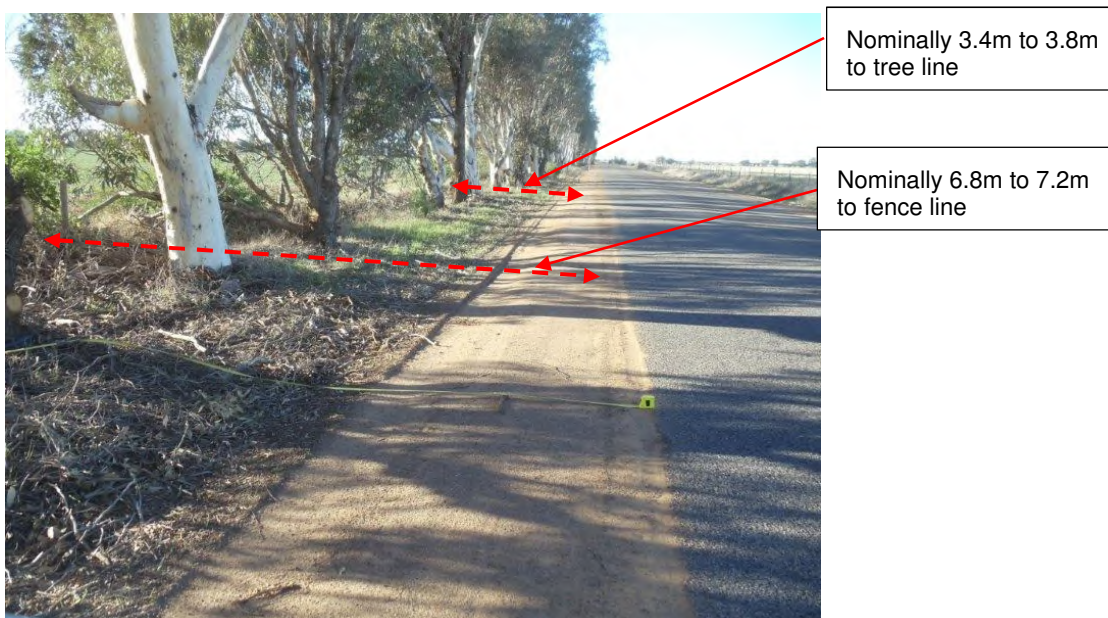
Photograph 1 View west – Existing farm gate (11.0m wide) currently used to access the CBH property



Photograph 2 View south east – General view of Arthur Road



Photograph 3 View south east – Arthur Road



Photograph 4 View south east Arthur Road –Proximity to fences and existing vegetation

4.3 Adjacent Road intersections or features

Refer to the Locality Plan and Figure 1 showing the external road and rail network system, in the vicinity of CBH development site.

4.4 Traffic Data and Parking Capacity

4.4.1 General –Road Data

Arthur Road is classified by Main Roads of Western Australia (MRWA) and local government of WA as hierarchy of “Access Road” and its function class rated as “Rural Local Road”.

Arthur Road commences at the Deepdale Rd intersection designated as 0.00SLK

(SLK = Straight Line Kilometre)

The location of the proposed CBH Exit and Entry points is noted as 3.35SLK and 4.32SLK respectively.

Arthur Road currently has a nominal seal width of 7.0m and a formation width of 9.0m

The bituminous seal on Arthur Road terminates at 5.00SLK thereafter southwards, it is an unsealed road with formation width of 10.0m typically.




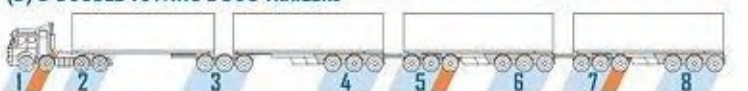

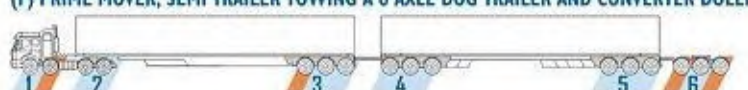

4.4.2 Main Roads Western Australia RAV Rating

Arthur Road is designated by MRWA on their *Restricted Access Vehicle Road Network (RAV)* as a RAV N10.1 road. RAV 10 vehicles comprises prime mover and trailer combinations up to a maximum length of 53.5m and up to a maximum gross mass of 147.5 tonnes

The MRWA RAV10 mass permitted vehicles on Arthur Rd applies from Deepdale Rd to the southern end of the CBH property at 4.5 SLK. Beyond this point southwards, the RAV rating changes to N7.2. Heavy vehicle combinations that cannot exceed 36.5m in length and maximum gross mass of 107.5 tonne.

The RAV rating of Arthur Road is not conditional, accordingly mass permitted vehicles are allowed to operate all hours. It is understood that school bus operations on this section of Arthur Road is not used.

Cartage contractors and hauliers that access CBH property from Arthur Road will use a variety of combinations of truck- trailer/s configurations and a number operate under mass permit conditions. Typical combinations is shown below:

	Length (m)	Max Mass (tonnes)		
 <p>(A) PRIME MOVER, SEMI TRAILER TOWING 2 X DOG TRAILERS</p>	(A) >36.5, ≤53.5	127.5	7	Network 10 (Road Name Order)
 <p>(B) B-DOUBLE TOWING A CONVERTER DOLLY CONNECTED TO 2 SEMI TRAILERS</p>	(B) >36.5, ≤53.5	127.5	7	
 <p>(C) PRIME MOVER, SEMI TRAILER TOWING B TRIPLE</p>	(C) >36.5, ≤53.5	127.5	7	
 <p>(D) B-DOUBLE TOWING 2 DOG TRAILERS</p>	(D) >36.5, ≤53.5	147.5	8	Network 10 (LGA Order)
 <p>(E) DOUBLE ROAD TRAIN TOWING B-DOUBLE TRAILERS</p>	(E) >36.5, ≤53.5	147.5	8	
 <p>(F) PRIME MOVER, SEMI TRAILER TOWING A 6 AXLE DOG TRAILER AND CONVERTER DOLLY</p>	(F) >36.5, ≤53.5	87.5+d	6	 Map

4.4.3 Existing Parking

Arthur Road at the development site, is a rural road and does not have any existing parking facilities. Observations of the road structure indicates it is a control of access road within the Narngulu, Moonyoonooka and Bootenal localities.

4.4.4 Arthur Road Traffic

Existing traffic data and forecast growth of traffic using Arthur Rd is shown in TABLE 1

Vehicle Description	MEASURED Total ADT *	CALCULATED PRESENT DAY Total ADT **
Heavy Vehicles Classes 3 to 12 (26.5%)	30	32
Light Vehicles Classes 1 to 2	83	87
TOTAL Traffic	113	119

TABLE 1:

Legend

ADT = Average Daily Traffic (Both directions)

* Traffic count data extracted from MRWA Road Information System
October 2016 Refer FIGURE 3

** Based on a compound growth rate of 2.5% over 2 years

Weekly Class Report

Count: Both Directions Road Name: Arthur Rd (5051008)
 Site No: 52037 Location Description: S of Brice Rd (SLK 2.60)
 Date Range: 27 Oct 2016 to 13 Nov 2016

Vehicle Classification Scheme (AustRoads94)														
Class	1	2	3	4	5	6	7	8	9	10	11	12	% Heavy	Vehicles
Monday	94	6	10	6	3	0	0	1	1	1	6	1		125
%	75.2	4.8	8.0	4.8	2.4	0.0	0.0	0.8	0.8	0.8	4.8	0.8	23.2	
Tuesday	84	5	12	5	3	0	1	1	0	6	3	0		114
%	73.7	4.4	10.5	4.4	2.6	0.0	0.9	0.9	0.0	5.3	2.6	0.0	27.2	
Wednesday	79	4	10	9	5	1	2	1	0	0	3	0		110
%	71.8	3.6	9.1	8.2	4.5	0.9	1.8	0.9	0.0	0.0	2.7	0.0	28.2	
Thursday	76	4	11	8	5	1	0	0	5	0	3	0		114
%	66.7	3.5	9.6	7.0	4.4	0.9	0.0	0.0	4.4	0.0	2.6	0.0	28.9	
Friday	77	3	8	6	2	0	1	1	2	0	4	0		104
%	74.0	2.9	7.7	5.8	1.9	0.0	1.0	1.0	1.9	0.0	3.8	0.0	23.1	
Saturday	62	5	5	4	2	0	2	1	1	0	3	0		86
%	72.1	5.8	5.8	4.7	2.3	0.0	2.3	1.2	1.2	0.0	3.5	0.0	20.9	
Sunday	60	6	8	2	1	0	0	0	1	0	4	0		84
%	71.4	7.1	9.5	2.4	1.2	0.0	0.0	0.0	1.2	0.0	4.8	0.0	19.0	
Avg Daily Vol														
ADT (M-S)	76	5	9	6	3	0	1	1	1	1	4	0		105
%	72.4	4.8	8.6	5.7	2.9	0.0	1.0	1.0	1.0	1.0	3.8	0.0	24.8	
AWT (M-F)	82	4	10	7	4	0	1	1	2	1	4	0		113
%	72.6	3.5	8.8	6.2	3.5	0.0	0.9	0.9	1.8	0.9	3.5	0.0	26.5	
Weekend	61	6	7	3	2	0	1	1	1	0	4	0		85
%	71.8	7.1	8.2	3.5	2.4	0.0	1.2	1.2	1.2	0.0	4.7	0.0	22.4	

% Heavy = Classes 3 - 12

Figure 3. Extract from MRWA Road Information System- Arthur Road – Both Directions (data extracted 22nd June 2017) Composition of Traffic for count undertaken from 27th October 2016 to 13th November 2016

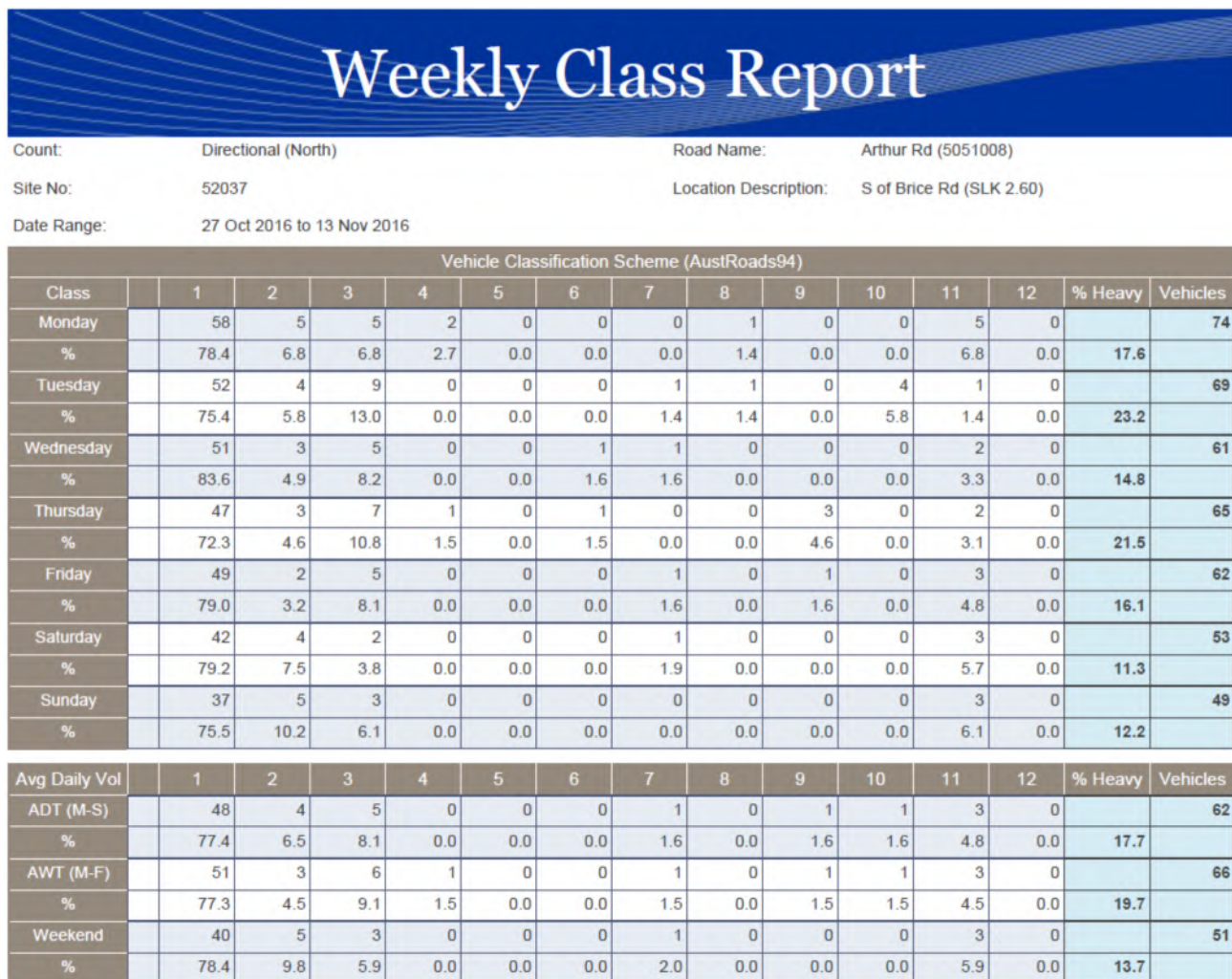


Figure 4. Extract from MRWA Road Information System- Arthur Road -North Direction only (data extracted 22nd June 2017) Composition of Traffic for count undertaken from 27th October 2016 to 13th November 2016

Weekly Class Report

Count: Directional (South) Road Name: Arthur Rd (5051008)
 Site No: 52037 Location Description: S of Brice Rd (SLK 2.60)
 Date Range: 27 Oct 2016 to 13 Nov 2016

Vehicle Classification Scheme (AustRoads94)														
Class	1	2	3	4	5	6	7	8	9	10	11	12	% Heavy	Vehicles
Monday	36	1	5	4	3	0	0	0	1	1	1	1		51
%	70.6	2.0	9.8	7.8	5.9	0.0	0.0	0.0	2.0	2.0	2.0	2.0	31.4	
Tuesday	32	1	3	5	3	0	0	0	0	2	2	0		45
%	71.1	2.2	6.7	11.1	6.7	0.0	0.0	0.0	0.0	4.4	4.4	0.0	33.3	
Wednesday	28	1	5	9	5	0	1	1	0	0	1	0		49
%	57.1	2.0	10.2	18.4	10.2	0.0	2.0	2.0	0.0	0.0	2.0	0.0	44.9	
Thursday	29	1	4	7	5	0	0	0	2	0	1	0		49
%	59.2	2.0	8.2	14.3	10.2	0.0	0.0	0.0	4.1	0.0	2.0	0.0	38.8	
Friday	28	1	3	6	2	0	0	1	1	0	1	0		42
%	66.7	2.4	7.1	14.3	4.8	0.0	0.0	2.4	2.4	0.0	2.4	0.0	33.3	
Saturday	20	1	3	4	2	0	1	1	1	0	0	0		33
%	60.6	3.0	9.1	12.1	6.1	0.0	3.0	3.0	3.0	0.0	0.0	0.0	36.4	
Sunday	23	1	5	2	1	0	0	0	1	0	1	0		35
%	65.7	2.9	14.3	5.7	2.9	0.0	0.0	0.0	2.9	0.0	2.9	0.0	28.6	
Avg Daily Vol	1	2	3	4	5	6	7	8	9	10	11	12	% Heavy	Vehicles
ADT (M-S)	28	1	4	5	3	0	0	0	1	0	1	0		43
%	65.1	2.3	9.3	11.6	7.0	0.0	0.0	0.0	2.3	0.0	2.3	0.0	32.6	
AWT (M-F)	31	1	4	6	4	0	0	0	1	1	1	0		47
%	66.0	2.1	8.5	12.8	8.5	0.0	0.0	0.0	2.1	2.1	2.1	0.0	36.2	
Weekend	22	1	4	3	2	0	1	1	1	0	1	0		34
%	64.7	2.9	11.8	8.8	5.9	0.0	2.9	2.9	2.9	0.0	2.9	0.0	38.2	

Figure 5. Extract from MRWA Road Information System- Arthur Road -South Direction only (data extracted 22nd June 2017) Composition of Traffic for count undertaken from 27th October 2016 to 13th November 2016

4.5 Existing Road Impacts and Deficiencies

4.5.1 Road Width

The existing bitumen seal width on Arthur Road adjacent to the Entry and Exit driveways to CBH, is 7.0m wide and the formation width is 9.2m

Currently any heavy vehicles turning left out from the CBH property will turn into the opposing lane and conflict with southbound traffic.

The development proposal provides for both Entry and Exit driveways to be sufficiently wide to allow for a RAV10 vehicle turning movements without conflicting with opposing traffic.

Reference to APPENDIX 2 demonstrates RAV10 and RAV 7 vehicle turning paths at each proposed Entry and Exit driveways.

4.6 Accident Data

Investigations into MRWA's crash history information database, confirms that from 1st January 2012 to 31st December 2016, there were no recorded accidents on Arthur Road adjacent to the CBH development site.

However there was one accident, rated as *Major PDO* recorded at the intersection with Moonyoonooka Narngulu Rd and Arthur Rd.

The accident occurred on 18th September 2013 in daylight and involved a right angle collision between 2 vehicles, at the intersection.

Refer to Appendix 1 for detailed crash data report

4.7 Existing Speed Zones

There is no designated speed zone along Arthur Road at the proposed CBH entry and exit points. The road is classified as de restricted speed zone, accordingly road users require to drive to a safe speed in line with the actual condition of the road.

In terms of the proposed CBH internal road system, the speed zone for all vehicles will be posted at 20Km/Hr, with a reduction to 5Km/Hr within the grain unloading and weighbridge area.

4.8 Existing Pedestrian Movements

There are no defined footpaths or cycle ways located on subject road reserves or adjoining properties

Pedestrian movements will be mainly generated from vehicles that park within the property. Footpaths are planned to be constructed between the car park, the office amenities building and the sample platform .

4.9 Existing Utility Services

A DBYD investigation of the area has revealed that there is Telstra underground communications cables on both sides of the Arthur Road verges.

On the eastern verge, there is a 10 pair cable/conduit adjacent to the fence line, and on the CBH property verge, there is a fibre optic cable running approximately 10m offset from the road reserve boundary within CBH property.

These cables will require to be located and surveyed during the design development of the CBH facility.

There are no other underground services affected.

5 Planned Operational Conditions

5.1 Development Opening Time

The development will generally operate 6 days per week, and opening times within daylight hours. During the grain harvest season (notionally September to January), the grain facility will operate 7 days per week.

5.2 Proposed Grain Management System

Briefly the internal management of traffic and grain comprises the following:

- 1) Enter site
- 2) Park up at the Marshalling Area and await call from sampling station
- 3) Sample grain and report
- 4) Weigh In at the weighbridge
- 5) Unload grain at designated point
- 6) Weigh out (Empty) at weighbridge
- 7) Exit site

5.3 Forecast traffic volumes for the CBH Development

Shown in Table 3 below

	Column 1	Column 2	Column 3	Column 4	Column 5
Vehicle Description	Predicted Traffic generated by CBH Grain Operations at Narngulu ADT *	Additional Traffic due to likely out loading events during any one year ADT **	Forecast CBHTraffic Total ADT	Average Daily Traffic on Arthur Road (non harvest period) for 2018	Predicted Total traffic on Arthur Road due to CBH development Total ADT (3 + 4)
Heavy Vehicles Classes 3 to 12	56	12	68	32	100
Services Vehicles	1	2	3	-	3
Cars	2	2	4	87	91
TOTAL Traffic ADT	61	16	75	119	194

TABLE 3: EXISTING and FORECAST TRAFFIC DATA

* Traffic volume calculated based on harvest periods assuming a notional harvest period of 3.5 months. Assumed 20% RAV10 vehicles and 80% RAV7 vehicles

** For this assessment the typical vehicle used for outbound haulage task is a RAV10 vehicle with 85 tonne load and that 2 No open bulk heads will be emptied over a 6 day period. This task is assumed to occur 20 times per year

6 Recommendations and Conclusions

After consideration of all the development information provided, the traffic data and observations from the site inspection undertaken on 19th July 2017, the author recommends the following:

The capacity of Arthur Road to accommodate the additional traffic generated by CBH's development, is rated as adequate subject to the following being undertaken.

6.1 CBH Entry

Due to the extended length and greater mass of RAV 7 and RAV10 road trains, the approach speeds at the Entry cross over and the outbound speed onto Arthur Rd at the Exit cross over , will be at slow to crawl speeds.

The current speed zone on Arthur Rd is rated as de restricted, however due to the long straight alignment of the road, the anticipated 85th percentile operating speed, would likely to be over 100Km/Hr.

The volume of through traffic on Arthur Road is currently 120vpd (combined both directions).

There is a high likelihood that south and northbound through vehicles following behind the grain trucks will attempt to get around on the left road shoulder to pass the slow moving trucks, whilst negotiating the entry and exit movements.

To reduce the risk for the road user, the following is recommended.

Implement a 90Km/Hr speed reduction zone in accordance with Main Roads Western Australia requirements (MRWA), to control the speed of the through traffic in the vicinity of the development and extending the zone northwards on Arthur Rd to incorporate the railway level crossing and the Moonyanooka-Narngulu Rd/Arthur Road intersection.

6.2 CBH Exit

The width of Arthur Road at the Exit crossover will require to be widen as shown on Figure 2, CBH drawing 2018-307-1071-C.

This will allow for heavy vehicle turning paths to exit lane correct onto Arthur Road. This will stop the left turn out movement from conflicting with southbound through vehicles.

6.3 Crossover and structural design of the pavements

It is understood that the scope of the detailed design phase of the CBH grain storage facility will include a geotechnical investigation and materials testing regime, of the existing property soil subgrades under the internal road and hardstand areas.

In addition it will include for one test pit to be excavated at each of the Entry and Exit locations adjacent to Arthur Rd pavement, to ensure design of crossover pavements are adequate.

This will result in a pavement design and surfacing treatments to apply on all heavy vehicle access roads, and hardstand areas of the project.

In terms of **surfacing treatment** at the entry/exit crossovers and other heavy vehicle turning areas of the facility, it is recommended as a minimum, that the following specification be adopted:

- 2 coat bituminous chip seal using 14mm/7mm aggregates
- followed by a 30mm thick dense graded asphalt using a MRWA intersection design mix.

6.4 Road Signage

Any road widening works that occurs on Arthur Road in the vicinity of the CBH property is to include an upgrade of all advance warning road signage and pavement marking so that they are in conformity with Australian Standard AS1742.2-2009-2 Manual of Uniform Traffic Control Devices

6.5 Road Design Standards

The design of the road widening works that is required on the Arthur Road reserve, as a result of this development, will require to be undertaken in accordance with the following standards and guidelines:

- 1) Road Geometry in accordance with the latest Austroads Guide to Road Design 2009 –Parts 1 to 11 , as applicable
- 2) The City of Greater Geraldton Infrastructure construction requirements as applicable.
- 3) Road signs and pavement marking in accordance with Australian Standards
 - AS1742.1-2014 Manual of Uniform Traffic Control Devices- General Introduction and Index of Signs
 - AS1742.2-2009 Manual of Uniform Traffic Control Devices -Traffic Control Devices for General use
- 4) Speed Zone amendments and associated speed signs to be undertaken in accordance with MRWA Policy and Application Guidelines for Speed Zoning Document No D14#271254 Rev 7 July 2014

APPENDIX 1

MRWA Detailed Crash History Data

Detailed Crash History



Report Criteria

Road	SLK	CWY
5051008 - Arthur Rd	0.00 to 10.34	All

Parameter	Value	Description
From Date	01/01/2012	
To Date	31/12/2016	
Crash Type	All	
Severity	All	

Road	SLK	CWY	True Dist	Loc End Date	Dist Error	Intersection	Date	Day	Time	Severity	Crash No.	Type	Light Cond	Road Cond	Speed Limit	Traffic Control	Road Feature	Road Alignment	Speed Factor	MR Nature	Location	RUM	Unit	Unit Type	From Dir	To Dir	Veh/Ped Move	First Object Hit	Second Object Hit	Third Object Hit	Target Impact Point	
5051008	2.01	S	2.01			MOON/YOON/OOKA - NARNGULU RD (022312)	18/09/2013	Wednes day	1900	PDO Major	2013180954	Intersection	Daylight	Dry		Give Way Sign	4-way Int.	Straight			Right Angle	On Oway	11:Intr: Thru - Thru	Target	Four Wheel Drive (Not Car Design)	N - MOON YOOKA - NARN GULU RD	S - MOON YOOKA - NARN GULU RD	Straight Ahead: Not Out Of Control				Side
																							Colliding	Four Wheel Drive (Not Car Design)	S - ARTH UR RD	N - ARTH UR RD	Straight Ahead: Not Out Of Control					

END REPORT