Department of Primary Industries and Regional Development

GOVERNMENT OF WESTERN AUSTRALIA

PILBARA DEVELOPMENT COMMISSION

Pilbara Truck Wash Feasibility Assessment

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Executive Summary

The Pilbara Development Commission's (PDCs) *Pilbara Regional Investment Blueprint* (PDC 2015), identified agriculture as an opportunity for the Pilbara (PDC 2015). A number of other studies have since been undertaken to investigate options for investing in agricultural development in the region. This process has indicated that expansion of the Port Hedland livestock export industry would be a potential option for agricultural development in the Pilbara region. However, certain constraints, such as lack of appropriate Port infrastructure, lack of holding yard infrastructure, and lack of pastoralist and exporter confidence, are considered to be preventing the industry from operating at its current and potential capacity.

As part its ongoing investment in agriculture the PDC engaged FSA Consulting Pty Ltd (FSA) to conduct a feasibility assessment into the development of wash down infrastructure in Port Hedland. This study has investigated, through review of existing information, stakeholder engagement, site investigations, and engineering design and costing, the feasibility of developing a truck wash down facility in Port Hedland.

This report has been prepared in consideration of an accompanying study investigating the feasibility of cattle holding yard developments in Port Hedland. The findings of the holding yard feasibility assessment showed that the optimal location for a truck wash facility would be as a co-location opportunity with a cattle holding yard development. This study has presented two options for the truck wash-down facility that accompany cattle holding yard developments at the existing South Hedland Holding yards and a greenfield site at Pippingarra Station.

The Pilbara Cattle Holding Yard Feasibility Assessment Report indicated that investment into expanding the Port Hedland live export industry through increasing user confidence and relationships was a pre-requisite to investing financially in infrastructure to support industry expansion. From a public perspective, the existing South Hedland holding yards require minimal financial investment to re-establish operations and this is potentially associated with substantial transport cost savings to the Western Australian Pastoral industry. However, as these transport cost savings also depend on the presence of an operating truck wash-down facility (assuming export country requirements will include the need for truck washing in the near future), a truck wash facility is a necessary infrastructure investment to allow live exports from the Port to re-establish. This study, in combination with the Pilbara Cattle Holding Yard's Feasibility Assessment indicates that re-establishment of existing holding yards and investment in a truck wash facility, combined with renewed use of the Port of Port Hedland for cattle exports by pastoralists and exporters, would be a viable investment if a throughput of at least 20,000 head of cattle per year could be maintained.

From a private investor perspective, the study has shown that investment in a Port Hedland truck wash facility would potentially be viable if a throughput of 333 6-deck road trains could be maintained and if the user charges for the facility were $1.35 per minute.

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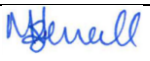
				Amended as per PDC comments		01/08/2017

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1. Introduction

1.1. Background information

Northern Beef Futures (NBF) is a project led by the Department of Agriculture and Food, Western Australia (DAFWA). NBF aims to boost capabilities, build value, strengthen relationships with existing supply chains, recognise and embrace relationships with new supply chains, and align products to suit new and expanding markets (DAFWA 2016). NBF projections show that there are significant growth opportunities from the live export market.

As part of NBF, a review of the infrastructure supporting the northern beef industry in the Pilbara and Kimberley regions (referred to as the northern beef region) was commissioned by DAFWA and Meat and Livestock Australia (MLA), with the aim of encouraging and supporting the development of the beef industry in the northern beef region (ACIL Allen Consulting 2016). Phase four of the review (referred to as the Northern Beef Industry Review; NBIR) involved development of a 10-year Northern Beef Infrastructure Plan to create a framework for implementing identified priority projects.

Development of holding yard infrastructure, in combination with a wash-down facility, to support live export out of the Port of Port Hedland was identified as one of fifteen priority projects. An overview of the priority infrastructure projects suggested that the Port Hedland holding yards and truck wash-down facility would potentially be associated with substantial transport cost savings, improved value adding capacity in the northern beef region, and would meet market and regulator standards such as biosecurity obligations.

FSA Consulting Pty Ltd (FSA) was engaged by the Pilbara Development Commission (PDC) to undertake a feasibility assessment of the holding yards and site selection and high level design of the truck wash by conducting stakeholder engagement, environmental and planning constraints assessment, consideration of the need for the facilities in terms of market demand, construction and operational costs, and high-level design of the facilities. The assessments of the holding yards and truck wash are being undertaken as separate projects. This report should be read in conjunction with the Pilbara Cattle Holding yards Feasibility Assessment Report.

By identifying the need for a truck wash, the NBF project highlighted the gradual change in quarantine standards which must be met to export cattle to various countries. While disinfection of trucks is not currently required for all countries receiving Australian cattle, it is becoming a more widespread requirement. This is identified in the Organisation for Animal Health's (OIE) Terrestrial Animal Health Code Article 7.3.5 – Planning the Journey. Section 4(c) of this code discusses the need to minimise disease spread in trucks. The article states:

> *"In order to minimise the likelihood of the spread of infectious disease during transport, vehicles and containers should be designed to permit thorough cleaning and disinfection, and the containment of faeces and urine during a journey".*

While the current environment dictates that only some countries currently require truck disinfection, this may change to a blanket rule in years to come. Additionally, as current regulation varies from country to country, some trucks only require washing before taking cattle from the holding yards to the port, while others require trucks to also be washed before taking cattle from farms to holding facilities. The location of the truck wash facility(s) must be conveniently located for trucks travelling to and from the holding (quarantine) facility.

1.1.1. Information review

Western Australia has a very strong agriculture sector and, as such, disease prevention and management are key to continued operating of the agricultural economy. Truck washing is an essential part of Western

Australia's agricultural industry and will continue to grow in importance for a number of reasons. In particular:

- Livestock export requires that livestock be clean at the point of sale and importing countries have specific requirements for pre-export truck washing procedures;
- To maintain an acceptable level of cleanliness for animal welfare purposes;
- To prevent the redistribution of a wide range of pest plant and animal species;
- To comply with applicable occupational and environmental health and safety standards;
- To prevent disease (including footrot), slipping injury, algae growth in roadway drainage systems, widespread nutrient pollution, manure drying (and becoming more difficult to remove), and increased fuel costs (from transporting the extra weight of manure (Government of Western Australia 2004)(Commonwealth of Australia 2011).

1.1.1.1. Pilbara Holding Yards Report

This report should be read in conjunction with the Pilbara Cattle Holding Yards Feasibility Assessment Report (FSA Consulting 2017).

1.1.1.2. Stakeholder engagement findings

A stakeholder engagement process was undertaken for the truck wash in conjunction with the holding yards. The details of the process and findings are presented in the holding yards report. Findings that are relevant to the truck wash include:

- The truck wash should be located at the same site or very close to the holding yards;
- The use of the truck wash should be restricted to agricultural trucks to prevent use by mining vehicles, which would be associated with generation of very different waste;
- The truck wash may not be feasible if it is only used by cattle trucks that are loading and unloading cattle for the Port of Port Hedland. Therefore, it would be advantageous to have a multi-purpose truck wash that could be used by cattle trucks travelling north or south via Port Hedland and by other agricultural vehicles to manage the prevention of weed and weed seed spread;
- The truck wash would likely be a user-pays facility and, therefore, it would be advantageous to find a reliable and cost-effective water source to keep user fees as low as possible;
- An operating model and cost of use should be developed and distributed to key stakeholders for assessment to ensure the facility will be used prior to committing resources to its development;
- Weed spread is a concern for pastoralists and the truck wash could potentially service general agricultural vehicles and light vehicles in addition to livestock transporters; and
- The truck wash and holding yards should be jointly privately and publicly funded.

1.1.1.3. Truck wash demand

Based on a potential capacity of 65,000 head of cattle per year from the Port of Port Hedland, there will be an approximate maximum of 13 ships, with capacity to load 5,000 head of cattle, that will use the Port each year. Approximately 8 trucks are anticipated to be required to load each cattle consignment. This means the total potential demand from trucks that will use the wash prior to transporting cattle to the port for export is currently around 104 trucks/year.

The truck wash will be used by export carriers as well as other agricultural or other vehicles as part of their weed seed hygiene practices. In addition, there are benefits of frequent washing, which include expansion of crate life by up to 30% and reduced washing times (Morrissey, Pers. Comm. 2017).

A recent truck wash feasibility study in Broome found that, in addition to use of the facility by trucks accessing the port for live export, use of the facility by a Broome-based trucking company with 18 permanent trucks would account for almost 216 additional truck washes per year at the worst case scenario (Mohr-Bell & Jewell 2017). Therefore, to account for greater agricultural use and truck maintenance regime, an additional 230

cattle trucks (based on a 18-20 permanent Port Hedland-based trucks) were assumed to represent the upper limit of potential use the facility each year. This equates to a maximum truck demand of 333 trucks/year or approximately 6.5 trucks/week.

It is considered that a truck wash with two wash bays will be required to accommodate this expected demand. Furthermore, two wash bays are very likely to be required if demand is found to be less than this. Each load out event would still require the same number of trucks and it would be inefficient to have to wash 8 trucks within one day if they had to share a wash bay.

1.1.1.4. Truck wash operation

It can take up to about 6 hours to wash down a type 2 Common Road Train (National Heavy Vehicle Regulator 2016). Ideally, the system would initially require two wash bays, with the possibility of expanding further as the demand for the truck wash increased. This will limit trucks having to wait to access the wash.

2. Legislative context

Unlike some other Australian states, there is currently no regulatory requirement in Western Australia for trucks to be washed for intrastate freight movements. However, the benefits of routine truck cleaning, particularly in weed control, are recognised. As a result, there are truck washing facilities available in many of the key agricultural regions of Western Australia. The Western Australian cattle industry considers that it is desirable and economically advantageous to develop a best practice network of specifically designed truck wash-down facilities located close to principal transport corridors.

The following section presents some of the main legislative and design requirements that must be considered in site selection, design and development of the potential truck wash.

2.1. Environmental Protection Act 1986

Intrastate truck wash-down facilities should be designed and constructed to meet contemporary standards of industry best practice, consistent with obligations under the *Environmental Protection Act, 1986* (EP Act) and should consider the specific needs and requirements of all involved in the Western Australian cattle industry. The object of the EP Act is to:

> "*prevent, control, and abate pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing*".

Along with the EP Act, development in Western Australia is subject to Environmental Protection Polices (EPPs) and State Environmental Policies (SEPs) (Environmental Protection Authority 2016). EPPs are statutory policies developed under Part III of the EP Act. Their purpose includes establishing environmental values and environmental quality objectives for a particular environment or component of the environment. SEPs are non-statutory policies developed by the EPA under Part II Section 17(3)(d) of the EP Act. Like EPPs, they establish environmental values and environmental quality objectives for a particular environment or component of the environment. There are not currently any EPPs or SEPs that are relevant to the Port Hedland and Pilbara region.

Chemicals and fuel must be stored and used to ensure they do not impact on surface water, groundwater and soil and the provisions of the EP Act.

2.2. Biosecurity and Agriculture Management Act 2007

The spread of weeds in Western Australia is controlled by the Department of Parks and Wildlife in accordance with the *Biosecurity and Agriculture Management Act 2007* and under Part IV of the EP Act.

The *Biosecurity and Agriculture Management Act 2007* and its regulations aim to:

- Prevent new animal and plant pests (vermin and weeds) and diseases from entering Western Australia;
- Manage the impact and spread of those pests already present in the state;
- Safely manage the use of agricultural and veterinary chemicals; and
- Increase control over the sale of agricultural products that contain violative chemical residues.

For the purposes of the *Biosecurity and Agriculture Management Act 2007*, livestock and other agricultural vehicles are "prescribed potential carriers". While regulations associated with these are generally applicable only where the prescribed potential carrier is entering Western Australia from another state, territory, or country, the importance of spreading weeds and other pests within Western Australia is still a major objective of the *Biosecurity and Agriculture Management Act 2007* and its regulations.

2.3. Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974

All works in relation to the design and construction of truck wash facilities must comply with the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974.*

2.4. Occupational Safety and Health Act 1984

The *Occupational Safety and Health Act 1984* (OSH Act) sets out the laws about the health and safety requirements affecting most workplaces, work activities and specified high risk plant in Western Australia. The OSH Act provides for "the promotion, co-ordination, administration and enforcement of occupational health and safety in Western Australia". Under the Act, certain duties of care for workplace safety and health and the prevention of accidents and injury or harm are placed on employers, principal/main contractors, sub-contractors, people involved in labour hire, employees, self-employed people, manufacturers, designers, importers and suppliers. The Act is supported by the *Occupational Safety and Health Regulations 1996* as well as codes of practice.

2.5. Work Health and Safety Regulation 2011

Chemicals must be stored and used in accordance with the *Work Health and Safety Regulation 2011* (WHS Regulations; Commonwealth Government) and the Western Australian *Occupational Safety and Health Act 1984* and subordinate legislation, and any local government requirements. The WHS Regulations cover workplace hazardous substances and dangerous goods under a single framework for hazardous chemicals and introduce a new hazard classification and hazard communication system.

2.6. Standards and codes of practice

All works in relation to the design and construction of truck wash facilities must comply with the *Australian Standard AS/NZS 3500.2:2003 Plumbing and Drainage*.

Furthermore, the bases of fuel storage areas must be compacted or concreted and bunding provided around these in accordance with the *Australian Standard AS1940:2004 (Storage and handling of flammable and combustible liquids)*.

There is also an Australian Code of Practice for the Selling of Livestock that outlines requirements for truck wash facilities in saleyards. The Code of Practice is not statutory, but is designed to outline practices required to underpin the key regulatory requirements that apply to saleyards within Australian jurisdiction. The outcome of the truck wash areas required in the Code is to construct "transport wash areas that enable effective cleaning of vehicles, prevent environmental contamination and eliminate any other animal welfare and biosecurity risks". Therefore, the requirements of the Code should be considered during design of truck washes for vehicles used for livestock transport. Under the Code, the truck washing area should be:

- Paved with concrete;
- Large enough to accommodate at least one maximum sized semi-trailer (approx. 20 metres) in areas where new truck washes are being constructed they should cater for B-doubles or road trains;
- Be graded to a drainage inlet large enough to accommodate wash water and solids (sediments);
- Except at entrances, be kerbed at the edges to a height of not less than 300 mm; and
- Provide sufficient volume of water at adequate pressure to clean all trucks as required.

Furthermore, under the Code:

- A wastewater management disposal system should be in place so that wastewater does not cause environmental problems;
- A clear notice displaying operating hours and adequate instructions for the use of the truck washing facilities should be provided at the truck wash; and
- Water recycling facilities should be considered in the installation of new truck wash facilities.

2.7. Permits and approvals

2.7.1. Trade waste permits

Truck wash areas that are connected to sewers are required to apply for approval to discharge trade waste (Water Corporation 2016). Approval requires compliance with the acceptance criteria for trade waste and must meet a number of other design requirements including:

- Wastewater generated from any wash down area will be required to discharge to a pre-treatment fixture. All pre-treatment fixtures used must be accepted for use within the operating areas;
- Sites must have an accepted oil water separator such as a vertical gravity separator (VGS), coalescing plate Separator (CPS), hydro cyclone or other pre-treatment fixture that is accepted for use for the waste being discharged;
- CPS, VGS and hydro cyclone units must have a written maintenance contract for servicing in line with the manufacturer's requirements;
- Single, double or triple interceptors will not be accepted as the final pre-treatment before discharge to sewer;
- Where the wash down process is limited to cleaning of road grime from the exterior of cars, and the concentrations of total petroleum hydrocarbons (TPH) and of benzene, toluene, ethylbenzene and xylene (BTEX) in the wastewater are within the acceptable limits in IWPUB06, a solids arrestor of an accepted type is appropriate pre-treatment;
- Only quick breakdown detergents are to be used;
- Wash down areas are to have a bund or be designed in such a way as to prevent excess rainwater entering the sewerage system. Areas adjacent to the wash down are to be graded away from the wash bay;
- Unroofed wash down areas are not to be greater than 20 m^2. Areas larger than 20 m^2 are required to be roofed. In exceptional circumstances this requirement may be waived, but conditions will apply.
- All open areas which are unroofed will attract a charge based on m^2 of the unroofed catchment unless their discharge to sewer is through a flowmeter (Water Corporation 2016).

As an alternative to sewer connection, truck wash facilities can include alternative solutions, such as evaporation ponds, to prevent the need for approval to discharge trade waste. Further information on trade waste discharge approval requirements can be obtained from the Water Corporation Website (Water Corporation 2016) or by contacting tradewaste@watercorporation.com.au.

2.8. Local authority

Development in the Town of Port Hedland must be in accordance with the following planning documents:

- *Town Planning Scheme No. 5*
- *Residential Design Codes*
- *Town Planning Policies*
- *Development Plans*
- *Local Development Plans*
- *Design Guidelines*
- *Flooding Information*
- *Town of Port Hedland Heritage Places*

These are available on the Town of Port Hedland website at http://www.porthedland.wa.gov.au/town-planning-planning-documents.aspx.

3. Site selection considerations

Selection of an appropriate site for a truck wash facility needs to take a number of physical, regulatory, economic, constructional, and operational aspects into consideration. These are discussed below.

3.1. Water

The volume and quality of water required for truck wash facilities will vary depending on the vehicle and machinery size, the configuration of the machinery to be cleaned down, levels of cleanliness required and water dispensing equipment, and the truck wash pad area.

Temporary facilities and mobile truck wash plants often utilise high pressure water. The use of low volume/high pressure is adequate for these situations. However, high volume/high pressure water is preferred for removing significant quantities of mud/manure and organic material build-up from agricultural machinery, earthmoving equipment and vehicles. As the primary users of the proposed facility are livestock trucks, a high volume/high pressure water supply will be required.

Recently developed truck wash facilities in Queensland use the high volume/high pressure concept with differing flow rates depending on the intended use of the facility. As a guide, these facilities have a hose flow rate of 2 L/s @ 60m head. Therefore about 3.6 kL would be required for each half hour (7.2 kL/hour) of clean down time. As an example, if the wash down time for a Type 2 road train (3 trailers) is 6 hours, the total water consumption would consist of up to 43.2 kL/truck.

The supply may be available from a local municipal or privately owned system or it may be necessary to utilise surface, subsurface or recycled water sources. In this case, it is essential to confirm that a sufficient supply of suitable quality water is available. This would include:

- Analysis of groundwater resources and geology of the site including details of any bores on the subject property. Pump testing of bores is recommended;
- Analysis of possible sources of surface water;
- Consideration of water licensing. If water rights are required, it will be necessary to ensure that an agreement for water rights provides sufficient quantity for present and future use. Water licensing requirements vary between states and regions within states. It is essential to confirm that water can legally be used. It should be remembered that the holding of a water allocation may not guarantee the supply of that volume;
- Analysis of water quality. Water quality and type of treatment required will need to be compatible with the equipment used at the facility.

Water will be required to be stored in a balancing tank to ensure water is always available for operation of the facility.

3.2. Land

Land constraints must be taken into consideration when selecting the location for the truck wash. Selection of an appropriate site may greatly decrease both construction and operational costs.

3.2.1. Strategic Location

3.2.1.1. Pilbara Region

There is currently no truck wash in the Pilbara and the closest available truck washes are located in Kununurra and Geraldton (1,584.8 and 1,337.6 km away respectively). If live export is to be re-established at Port Hedland, a truck wash-down facility will be required. The truck wash will service cattle trucks associated with Port Hedland live exports, but will also be able to be used for biosecurity wash-down to prevent the spread of declared pest plants by vehicles travelling between Port Hedland and cattle stations further inland, as well

as other agricultural vehicles. The stakeholder consultation process identified that the best location for a truck wash servicing the live export industry would be within close proximity (10-50 km) of the port and that the facility should be restricted to use by large agricultural vehicles and other light vehicles, rather than large mining vehicles. This study therefore assumes the facility will be restricted to use by agricultural and light vehicles. However, it is noted that expanding the facility so that it can be used by larger mining vehicles may contribute to its feasibility.

3.2.1.2. Local Area

The proposed facility location should be located close to the highway to facilitate accessibility of trucks travelling north and south. This would increase potential use of the new facility.

3.2.2. Access

The following recommendations apply to access considerations for the truck wash site selection:

- Truck wash facilities that are conveniently located close to major roads are more likely to be used by industry;
- The truck wash facility will require all weather access;
- Due to the all-weather access requirement, a wash down facility located on an existing gravel road will likely require a road upgrade;
- Access roads should be located to minimise erosion and the alteration of drainage lines;
- Layout of access roads will be based on volume and type of traffic, traffic speed, and traffic patterns;
- Access roads to the facility should be designed and constructed to minimise costs, while providing easy access for the expected traffic under the various conditions affecting the site; and
- Design and construction criteria including sight distance, road standard geometry and design of turn outs from highways will usually be governed by the local government authority in the area.

Ideally the facility is to be located outside of the built-up township areas of Port Hedland and South Hedland, but located close to the main roads as this will likely increase facility uptake. All weather access is essential for the proposed truck wash. Therefore, it would be more cost effective to construct the facility closer to existing main roads as developing and/or upgrading an inferior road into an all-weather road infrastructure is likely to be cost prohibitive.

Design and construction criteria include line of sight distance, road geometry and vehicle turn in and out. These are all important considerations and are generally governed by local government.

3.2.3. Land availability

The availability of the land needs to be considered during the site selection process. In particular:

- The current and future land zoning of the subject property and surrounding land with the local government authority should be investigated. This may quickly identify properties that are unsuitable because of land use, zoning or legal constraints.
- Property size is an important consideration. Ideally, the subject property should be large enough to contain the washing facility and all other associated infrastructure including vehicle parking during busy periods, waste treatment and any waste utilisation areas.
- Land buffers around the facility complex prevent encroachment by other developments on nearby land and the land should be adequately sized to ensure that area for land buffers area available.

The proposed facility location should have ample location for all associated infrastructure including: the proposed number of washing bays, waste treatment equipment, clean water storage, truck waiting bays and if possible additional area for expansion.

3.2.4. Siting and construction

The siting and construction of the facility needs careful consideration of the local landforms surrounding the facility as they may influence:

- The type of wastewater disposal method that can be utilised;
- The suitability of the site for construction of service facilities;
- Surface water management and contamination risk;
- Groundwater management and contamination risk;
- Flood risk;
- Soil erosion risk;
- Access to the site; and
- Ability to provide visual screening of the site.

3.2.5. Soils

The range and distribution of soil types on a subject site should be confirmed during the site selection process. The surrounding soil types will influence the requirement for earthworks or gravel to establish foundations for the concrete pads, water tanks and access roads into the facility. Furthermore, soil structure should be assessed to determine suitability for construction of truck wash pads and drainage works, as well as for excavation of storage ponds if required. For example, loam soils are often preferred for construction as they are stable and do not exhibit excessive shrink-swell characteristics. Soils with high clay content best suit storage ponds and solid waste storage sites, since these soils have good workability and can be compacted to provide a low permeability.

Soil structure should be suitable for construction of clean down pad and drainage works, as well as for excavation of storage ponds if required.

3.2.6. Topography

A flat to slight (2.0 – 4.0 %) fall across the site is ideal for the development of the facility. This fall minimises the requirement for pumping as water can be gravity fed through the site.

Finding a site with ideal topography reduces the likelihood of community amenity complaints and can reduce design and construction costs.

3.3. Electricity

The type of equipment to be installed will determine the electricity requirements at the site. This factor may also help determine the facility location. Truck wash facilities may require single or three phase power to operate equipment such as water pumps, lighting, and air compressors.

The need for electricity at the site needs to be determined. This factor may also help determine the facility location. Truck wash facilities may require single or three phase power to operate air compressors, vacuums or pumps.

The use of mains power is the recommended option. Extension to power lines to a facility is cost prohibitive and therefore, the facility should be located as close as possible to existing power infrastructure.

3.4. Amenity

Design and siting of effective and efficient truck wash facilities will occur in consultation with the community. If conflicts arise between facilities and neighbours, they can often be very emotive. The people involved

sometimes experience great personal stress. In the long-term interests of facility survival, conflicts must be resolved. Community amenity issues prevent unreasonable interference with the use and enjoyment of property rights and avoiding these problems involves a combination of appropriate site selection, layout, design, management and communication. Community amenity issues may arise from:

- Excessive noise - activities including equipment use and vehicle movement inherently generate noise. Each state has its own regulations or guidelines pertaining to noise. Careful route selection and suitable driving may assist to reduce traffic noise nuisance
- Excessive dust generation - most dust is generated from traffic movements along unsealed roads or off gravelled truck wash pads. Traffic dust can be reduced through road watering, using sealed routes (if available) and driving at suitable speeds.
- Attraction of flies and vermin – proper management of solid waste collection and disposal will avoid any potential problems with flies and vermin. Mosquito breeding relies on protected water habitats for the wriggler stage. Liquid waste disposal ponds with steep banks, flat bases and absence of vegetative growth do not provide suitable habitats.
- Reduction of visual amenity - the development of a facility may be the subject of negative community perception. Shielding the facility from public view may be desirable and vegetation around the complex can significantly improve the visual appeal and can help in dispersing noise and dust.
- Odour Nuisance - odour from sludge scraped from sediment traps and treatment of wastewater may present problems for nearby receptors. This may be exacerbated in facilities with a heavy usage of cattle transport trucks as the manure that they remove contains a high level of volatile solids. The breakdown of volatile solids can result in the release of offensive odours
- Lighting Nuisance - inappropriate lighting in terms of location, timing, intensity and design can cause public nuisance.

3.5. Flora and fauna

Environmental impacts to flora and fauna, areas of remnant vegetation, wildlife movement corridors/habitats and natural wetlands should be avoided when selecting a site and waste disposal area. This also minimises the impact on the environment of unintentional escape of weed seeds. Relevant local and state authorities should be consulted to determine any vegetation clearing restrictions if required. This should also be considered for future expansion plans.

3.6. Sensitive land uses

Care should be taken to ensure that the establishment of a truck wash facility will not jeopardise any environmentally sensitive areas or have a negative impact on existing or future land uses. Long term planning projections will be of help in assessing this. Risks to public health and impacts on the areas surrounding the truck wash facility can be limited by providing buffer zones between the facility and sensitive areas. Local authorities may have specific by-laws or other planning instruments that stipulate separation distances and buffers for facilities. Appropriate planning is needed to maintain these separation distances and buffers between facilities and environmentally sensitive and land use areas. Sensitive environmental and land use areas include:

- Watercourses (both surface and groundwater)
- National Parks

- Cultural significance –Aboriginal/European sites
- Public roads
- Industrial developments
- Urban residential/commercial areas
- Rural residential areas.
- Good design, construction and management are the most important factors for preventing impacts to sensitive locations. However, providing adequate separation and buffer distances between facilities and
- Sensitive locations are important secondary measures for minimising the risk of environmental degradation and avoiding conflicts relating to community amenity issues.

Protection of surface waters can be achieved by buffers which provide secondary protection against liquid waste entry to surface waters through runoff. Liquid waste may be nutrient rich from manures and other organic contaminants. Maintaining vegetative cover, particularly riparian vegetation, wherever possible, will minimise the movement of runoff and eroded soil into surface waters.

The appropriate buffer width depends on the vegetative cover of the buffer area and the presence of other stormwater control devices such as diversion banks and terminal ponds. Vegetative filter strips (VFS) planted with runner developing, non-clump forming grass can very effectively reduce nutrient entry to watercourses (naturally occurring drainage channels including creeks, streams and rivers) by reducing the nutrient concentration of runoff through particle trapping and by reducing runoff volumes by promoting increased infiltration. Generally, the wider a VFS, the greater the reduction in soil loss rate. However, for the same soil loss rate, areas with higher slopes need a wider VFS than areas with lower slope. To be most effective, VFS should be located as close as possible to the by-product utilisation area to minimise additional runoff through the vegetative filter strip. It is also critical to locate the VFS before any convergence of stormwater runoff.

3.7. Flooding and drainage

Managing flooding is an important consideration in the siting, design and construction of a truck wash facility. Due to the flat topography experienced around Port Hedland, this is of particular concern. To limit any potential damage to infrastructure and to limit the required size of the effluent treatment system, the facility is to be located outside of any Q_{20} flood impact zones.

3.8. Waste collection treatment and disposal

Wastes produced from the truck wash process include water, dirt from the exterior of vehicles, manure, tree bark, oil that has spilled or leaked onto vehicle exterior surfaces, lubricants and other fluids from the vehicle interior, and various floating debris resulting from poor hygiene.

The proposed facility will require some form of wastewater treatment. There are essentially three main approaches to final effluent disposal at a truck wash facility. These are:

1) Minimal level effluent treatment and direct discharge into the municipal sewer system;
2) Medium level effluent treatment and final effluent disposal through evaporation or irrigation; and
3) High level effluent treatment for effluent recycling and reuse within the truck wash.

For the proposed Port Hedland facility, there are two treatment train options for consideration:

Option A: The manure contaminated truck wash effluent will be captured and treated through simple cost effective technologies. This system combines a static screen to remove large solids, a sedimentation basin and an evaporation pond. In this treatment option, effluent will not reach a water quality above Class C and is, therefore, unsuitable for recycling. Effluent will be disposed of through evaporation and will not require irrigation or sewer discharge.

Option B: The manure contaminated truck wash effluent will be captured and treated through a complex series of modern technologies that are capable of a greater solid and nutrient removal than Option A. This system combines a static screen, sedimentation basin, hydro-cyclone, oil and grease separator, a zeolite ultrafiltration unit and UV disinfection. This treatment option will produce Class A water that can be reused by the truck wash facility.

3.8.1. Oil and grease traps

Pollution prevention is a major design consideration when siting a truck wash facility. Oils and grease are removed in traps that skim the less dense grease materials floating on the water. This requires low flow rates through the trap to allow separation of the oil from the general water column. Many heavily used facilities have found that grease traps tend to be ineffective due to the large quantities of water flowing through them, which increases water spend and reduces the hydraulic retention time. Blockages and clogging up of these traps is another issue due to excessive amounts of manure, straw and other material from cattle trucks and other agricultural vehicles.

3.8.2. Sediment traps

Sediment traps act to detain runoff water in the trap for long enough to allow sediment and heavy course material contained in the wastewater to settle through the water column. Ideally, design of sediment traps need to cater for the access of a bobcat/front end loader, backhoe or equivalent for cleaning. It is important to ensure the sediment trap is large enough in volume to accommodate expected sludge accumulation and cleaning. Consideration must be made to ensure the sedimentation trap is sized adequately for both current and future demand, or alternatively the option for expansion is available.

3.8.3. Holding Ponds

Wastewater is usually drained from the sediment trap/sumps into holding ponds. A number of ponds may be required. This will be determined by the demand on the facility and water usage. These ponds act as treatment and/or evaporation ponds.

Ponds need to be accessible for desludging and maintenance. Batters should be designed to maintain the pond integrity based on a soil stability assessment. Adequate soil compaction and correct moisture content are required to produce a maximum design permeability of less than 1 X 10-9 m/s for a depth of 300 mm for ponds up to 2 m deep or 450 mm for deeper ponds (compacted layers should not exceed 150 mm depth). Ponds constructed using soils containing less than 20 % clay will require sealing with clay. For treatment and storage ponds, the base ground level (base of works) should always be at least 2 m above the water table.

The pond system must have sufficient storage capacity to contain the inflow of wastewater, plus rainfall and runoff during extended periods of wet weather, such that overtopping would not occur on average more than once every twenty years (i.e. system design for Q_{20} weather event). To limit the size of the effluent management system, the entry of clean stormwater runoff should be avoided or minimised. Diversion banks should be used around the wash bays and around the wastewater treatment system to reduce the amount of rainfall runoff entering the system, therefore ensuring the ponds only collect contaminated stormwater runoff. Roofed facilities are sometimes used and can be a requirement depending on facility size.

3.8.4. Final discharge

Depending on the effluent system utilized, effluent water may be discharged into an existing sewer network. If this is the case, the water should be cleaned as best as possible to prevent shock loading events to the system. An approval to discharge trade waste into the sewer network may also be required. Alternatively, water may be evaporated from the effluent ponds or used for irrigation.

Depending on the available water supply and ability to discharge wastewater, recycling and reuse is the preferred method of wastewater management. The ability to recycle water, increases Capital Expense (CAPEX), but decreases clean water requirements and wastewater treatment and has a range of environmental benefits.

3.8.5. Solid waste

The sludges and solids removed from sediment traps exhibit certain characteristics. Sludge and solids are generally disposed of in deep pits or stockpiled for later disposal at earth fill refuse tips. Consideration needs to be given to the possibility of weed seed contaminants or oil and grease as possible environmental pollutants.

3.9. Industry preferences

Different industries have different priorities in terms of truck wash operation and performance. For example, the general agricultural weed seed wash downs will place a greater emphasis on the wheel arch and undercarriage than the cattle truck wash operators will.

The proposed truck wash is to be primarily used by the cattle trucking industry and, therefore, the main requirement is to provide adequate cleaning of the trailer frames and decks to remove the potential of disease spread from one load to another. The live export industry is currently experiencing greater scrutiny from importing countries and, as such, there is a growing requirement for the disinfection of trailers. Therefore, the ability to disinfect trailers after the bulk of material has been removed is key to the final facility design.

3.10. Technology and innovation

3.10.1. Recycling of waste water

Wastewater reuse and recycling systems should be a consideration in the truck wash development. There are a range of technologies available which vary in complexity and the level of treatment.

3.10.2. Avdata compatibility

The Avdata centralised billing service was developed in 1990 and provides billing, reporting, monitoring and access control services for airport, truck wash, water standpipe and other facilities across Australia

The system is currently operated in over 100 truck washes of varying scales throughout Australia (Avdata Australia 2017). Avdata is a complete system that manages the entire billing process, including:

- Maintaining a database of truck owners and operators;
- Collecting and processing truck wash data;
- Calculating charges;
- Printing and mailing statements/tax invoices

The system provides a number of key benefits, which include:

- All facilities throughout Australia are accessible;
- Regardless of how many different Avdata truck wash facilities are used, each customer receives one statement/tax invoice per month for all charges;

- Avdata handles all customer queries and receipts payments on behalf of the truck wash;
- Avdata provides an online database of facility usage which is used to generate reports that can aid in improving facility management, ongoing planning and adjusting cost structure.

Due to the widespread use of Avdata throughout Australia, it has been requested and recommended that the Avdata truck wash billing service is utilised in the development of an operating model that can be provided to potential stakeholders to gauge the level of potential use.

3.10.3. Elevated platform and hose gantry for upper and lower deck cleaning

The primary reason for the proposed truck wash is to remove manure from the cattle decks within the trailers. Therefore, to aid cleaning of the upper decks, an elevated platform is proposed. At most existing truck wash facilities, there is no platform and operators must climb into the top deck to effectively clean it.

The proposed facility will provide high pressure/high flow hose lines that are suspended from a gantry. The elevated hoses are to be access from the elevated platform, which will provide a safe and easily accessible approach to cleaning the upper deck of a cattle trailer. The elevated platform will also allow better spray angles for cleaning the decks.

Working from heights can be subject to workplace safety and health compliance measures at some site, such as mines. Depending on the classification of the type of work site, consideration should be given to the safety measures required to ensure safety of all users of the facility. These may include appropriately designed mobile elevated work platforms (MEWPs) or fixed elevated infrastructure.

3.10.4. Disinfection

With the increased number of live export cattle throughout the world, importing countries are beginning to implement tighter regulations around quarantine and disease control. As a result, there is a growing list of importing countries that require cattle trucks to be washed and disinfected prior to the transportation of cattle from export holding yards to ports. Live export cattle that are sent to China may also require trucks to be washed when transporting cattle from the farm gate to the export holding yards. Specific pre-export requirements associated with trade agreements with China are still being negotiated, but it is possible that this requirement will be enforced and that other countries may adopt this requirement as well.

To ‘future proof’ the proposed truck wash, allowances will be made to alternate from bulk cleaning with clean water, to rinsing and final washing with chemically dosed water for disinfection.

3.11. Staffing

On-site personnel are not required for the ongoing operation of a truck wash facility. However, in the event of failure, maintenance staff would be required to visit the site. Therefore, the truck wash is best located within 20 minutes from Port Hedland/South Hedland.

4. Potential sites

4.1. Site selection options

The initial site investigations for the potential truck wash development have centred around co-locating the facility with the proposed Port Hedland cattle yards. The three sites that were investigated on the 21st February (refer to the Pilbara Holding Yards Feasibility Assessment Background Report):

1. The existing Port Hedland Shire-owned cattle yards;
2. The Port Hedland WWTP; and
3. Pippingarra Station.

Aside from the beneficial co-location opportunities, these sites were deemed highly desirable due to proximity to both Port Hedland and the Great Northern Highway.

Each site below is assessed against a list of development considerations as having one of three overall assessment outcomes:

1. Acceptable;
2. Information required; and
3. Of concern.

Each of the three sites were initially assessed through a high level desktop assessment, prior to conducting onsite formal site inspections.

4.1.1. Site 1 – South Hedland Cattle Holding Yards

The existing South Hedland Cattle Holding Yards are located approximately 22 km south east of Port Hedland on the western side of the Great Northern Highway. The facility currently has the potential to hold 5,000 head of cattle when fully stocked. The Pilbara Cattle Holding Yards Feasibility Assessment Report indicated that there is space on the existing site for expansion of the holding yards to 8,000 head and a truck wash facility including an evaporation pond.

A site inspection was conducted in March 2017. The findings of this inspection, as well as discussions with the current operator of the holding yards is provided in the Pilbara Cattle Holding Yards Feasibility Assessment Report. Findings specific to the truck wash include:

- The operator is considering including a truck wash in the expansion plans due to Chinese requirements.
- The site has ample water and has access to a main water pipeline. There are tanks onsite that provide 2 days of contingency storage. There is potential access to groundwater.
- The site is located above the flood waters.
- Pen grades throughout the facility are minimum and there is a lack of effluent management controls.
- There is adequate power supply.
- There is lighting to allow load out at night in the existing yards.

4.1.1.1. Compliance with development considerations

Based on the initial desktop assessment, site investigation, and discussions with the current site operator, Site 1 – South Hedland Cattle Holding Yards, is considered a viable option for the location of the proposed truck wash. The key opportunities for the site were the availability of a power and water and co-location with existing holding yards.

The major concerns for Site 1 is the restricted space available for the truck wash development. The Pilbara Cattle Holding Yards Feasibility Assessment Report indicates that there is enough area to accommodate the potential yard expansion and the truck wash-down facility (including an evaporation pond). However, there is currently no specific effluent management system for the holding yards and there have been no allowances made for this in the proposed holding yard expansion. Therefore, further investigation on the potential space restrictions are recommended prior to committing to the development. A site selection summary is provided in Table 4-1.

The other concern around the location for the truck wash is the rural zoning associated with the properties where the existing yards are located. Under the Town of Port Hedland Town Planning Scheme No. 5, motor vehicles washes are not a permitted use in the rural zone. Motor vehicle washes are permitted with or without approval in the transient workforce accommodation, town centre, commercial, airport, strategic industry, industry, industrial development, transport development and light industry zones. The Town of Port Hedland would need to grant planning approval for the truck wash if it were to proceed on either Lot 364 on DP 42164 or Lot 702 on P400624, where the existing yards are located. It is the responsibility of the leaseholder to consult with the Town of Port Hedland to ensure that appropriate permits are in place for the operation of a truck wash on the property.

Table 4-1– Site Selection Assessment - Option 1 – Existing Port Hedland Yards

Section	Criteria	Outcome
Strategic Location (Regional)	Facility is located in an area that will meet the demands of a large catchment	Acceptable
Strategic Location (Local)	Facility is located close to major road	Acceptable
Land availability	There is sufficient land for the truck wash and associated infrastructure	Acceptable
Access - Location	Location is within 20 minutes of Port Hedland	Acceptable
Access - All weather access	Access is directly from Great Northern Highway	Acceptable
Access - Road size	Access road is currently capable of managing b-double trucks	Acceptable
Access - Road line of site	Ample straight flat road in both directions	Acceptable
Access - Turning lanes	Road would likely require turning lane to be constructed in northern and southern directions	Of concern
Staffing	Location is within 20 minutes of Port Hedland	Acceptable
Topography	Site is flat with slopes of <3.0%	Acceptable
Soils	Soils are highly sandy with minimal clay and gravel	Acceptable
Water source	The operator of the holding yards believes there is adequate water to operate a truck wash	Acceptable
Waste management	Adequate irrigation area available if constructed according to FSA design (Figure 5-1)	Acceptable
Power Supply	Mains power is located adjacent to the property	Acceptable
Flora & Fauna	Limited vegetation on-site, the area set aside for the truck wash is currently cleared.	Acceptable
Community Amenity	Located away from town and beside the existing holding yards	Acceptable
Sensitive Land Uses	Site has an existing cattle holding yard facility and is presumed non-sensitive	Acceptable

4.1.2. Site 2 - Port Hedland Waste Water Treatment Plant

The Port Hedland WWTP is located on Shoata Road and is approximately 2 km from South Hedland and 4 km from Port Hedland. The Western Australia Department of Water have potentially 50 ha of land south of the WWTP that could potentially be used for the proposed truck wash facility. The WWTP currently supplies Class A treated water to South Hedland and Port Hedland for use on the golf course, sporting fields and other green space areas. The WWTP may be able to supply an allocation of Class A treated water to the truck wash facility. The WWTP has also suggested that they would be capable of handling effluent from the truck wash, provided it has had undergone pre-treatment to remove as much solids and nutrients as possible, and minimising shock loading as best as possible.

4.1.2.1. Compliance with development considerations

Based on the initial desktop assessment Site 2 – Port Hedland Waste Water Treatment Plant was considered a viable option for the location of the proposed truck wash. The key opportunities for the site were the possibility of a water supply, the option for effluent disposal and the proximity to the highway and power. The major concerns for Site 2 identified from the initial desktop assessment were the potential road upgrade and the proximity to South Hedland. However, the site inspection that was scheduled in March 2017 could not be undertaken as it took place after a rainfall event, and access to the site was cut off due to inundation. Based on this, the site is considered to be unviable for use as a truck wash due to potential for frequent facility closure as a result of flooding. The leaseholder, owner, or operator of the facility will need to consult the Town of Port Hedland to ensure that the appropriate permits are in place for the operation of a truck wash on the property.

A site selection summary is provided in Table 4-2.

Table 4-2 – Site Selection Assessment - Option 2 – Port Hedland WWTP

Section	Criteria	Outcome
Strategic Location (Regional)	Facility is located in an area that will meet the demands of a large catchment	Acceptable
Strategic Location (Local)	Facility is located close to major road	Acceptable
Land availability	There is sufficient land for the truck wash and associated infrastructure	Acceptable
Access - Location	Location is within 20 minutes of Port Hedland	Acceptable
Access - All weather access	Access is via Shoata Road, a dirt/gravel road	Of concern
Access - Road size	Access road is not currently capable of managing b-double trucks and would require an upgrade	Of concern
Access - Road line of site	Ample straight flat road in both directions	Acceptable
Access - Turning lanes	Turning from the highway to the minor roads is already in place	Acceptable
Staffing	Location is within 20 minutes of Port Hedland	Acceptable
Topography	Site is flat with slopes of <3.0%	Acceptable
Soils	Soils are highly sandy with minimal clay and gravel	Acceptable
Water source	Water source unknown at this stage	Information required
Waste management	Possibility to direct discharge to WWTP after high solids are removed and possibility for irrigation	Acceptable
Power Supply	Mains power is provided to the WWTP, but proximity to power depends on location of truck wash	Information required
Flora & Fauna	Limited vegetation on-site, but further investigation required	Information required
Community Amenity	Located away from town and beside the existing WWTP. Possible concerns over proximity to the Port Hedland golf course	Information required
Sensitive Land Uses	Site is adjacent to an existing WWTP and is presumed non-sensitive	Acceptable

4.1.3. Pippingarra Pastoral Station

Pippingarra Pastoral Station surrounds Port Hedland and is ideally located in terms of proximity to the Port for development of the holding yards and truck wash. The property has multiple locations that could be used for the proposed truck wash facility.

4.1.3.1. Compliance with development considerations

A site inspection was conducted in March 2017. Four sites within Pippingarra were investigated and the findings are presented in the Pilbara Cattle Holding Yards Feasibility Assessment Report. A location on the corner of Pippingarra Road and the Great Northern Highway was selected as the preferred site for the location of the truck wash and holding yards.

Based on the initial desktop assessment Site 3 – Pippingarra Pastoral Station is considered a viable option for the location of the proposed truck wash. The key opportunities for the site are the proximity to major roads and power, the ability for effluent irrigation and the available buffers between the facility and any sensitive receptors. The major concern for Site 3 is the availability of a reliable and sufficient water source. The leaseholder, owner, or operator of the facility will need to consult the Town of Port Hedland to ensure that the appropriate permits are in place for the operation of a truck wash on the property.

A site selection summary is provided in Table 4-3.

Table 4-3 – Site Selection Assessment - Option 3 – Pippingarra Station

Section	Criteria	Outcome
Strategic Location (Regional)	Facility is located in an area that will meet the demands of a large catchment	Acceptable
Strategic Location (Local)	Facility is located close to major road	Acceptable
Land availability	There is sufficient land for the truck wash and associated infrastructure	Acceptable
Access - Location	Location is within 20 minutes of Port Hedland	Acceptable
Access - All weather access	Depending on site location, access is from a sealed main road that joins onto the Great Northern Highway	Acceptable
Access - Road size	Access road is currently capable of managing b-double trucks. Main Roads WA also require an upgrade of the intersection on the Great Northern Highway	Acceptable
Access - Road line of site	Ample straight flat road in both directions	Acceptable
Access - Turning lanes	Road would likely require turning lane to be constructed in northern and southern directions	Acceptable
Staffing	Location is within 20 minutes of Port Hedland	Acceptable
Topography	Site is flat with slopes of <3.0%	Acceptable
Soils	Soils are highly sandy with minimal clay and gravel	Acceptable
Water source	Groundwater is available in the area	Acceptable
Waste management	No ability to direct connect into the sewer, but there is ample irrigation area	Acceptable
Power Supply	Mains power is located adjacent to the property, final cost will depend on final location of the truck wash	Acceptable
Flora & Fauna	Limited vegetation on-site, limited clearing would be required.	Acceptable
Community Amenity	Located well away from town	Acceptable
Sensitive Land Uses	Site has an existing cattle holding yard facility, which is old and run-down. The site is presumed non-sensitive based on the previous operation of these yards.	Acceptable

5. Wash-down facility and wastewater design

5.1. Climate in Port Hedland

The climate in Port Hedland is arid with very dry winters and less than 350 mm annual average rainfall (Table 5-1). The Pilbara Coast is known to experience more cyclones than any other part of Australia (BOM, 2017).

Table 5-1. Climate summary statistics for Port Hedland. Source: BOM (2017) and DSITIA (2017).

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	64.1	76.5	59.3	19.9	26.1	24.8	9.7	6.1	1.1	1.0	2.1	15.4
Mean Max. Temp. (°C)	36.6	36.5	36.8	35.2	30.7	27.4	27.0	29.2	32.3	34.8	36.5	37.0
Mean Min. Temp. (°C)	25.8	25.7	24.8	21.6	17.4	a	12.6	13.7	15.9	19.0	22.0	24.5
Evaporation (mm)	255.5	186.7	222.0	230.1	180.3	149.6	176.6	208.2	257.0	317.8	336.1	330.6

5.2. Truck wash-down design plans

High level layout plans have been prepared for the truck wash facilities at the South Hedland Yards (Figure 5-1) and Pippingarra (Figure 5-2). These indicate the proposed locations within each of the potential sites for the truck wash facilities as well as the holding yards. The proposed facilities consist of the infrastructure described in Section 3, including locations of proposed wastewater treatment and evaporation ponds.

Plans showing the dimensions of the heavy and light vehicle truck washes in more detail, including cross-sectional layouts, are provided in Appendix A.

Figure 5-1. Proposed South Hedland Yards holding yards and truck wash-down layout

Figure 5-2. Proposed Pippingarra holding yards and truck wash-down layout

5.3. Truck wash-down infrastructure requirements and costing

A detailed list of anticipated infrastructure and indicative costs required for the truck wash-down is provided in Appendix B and summarised in Table 5-2. These costs are based on a similar facility in eastern Australia and have been adjusted for anticipated sizing requirements for the Pilbara facilities.

Table 5-2. Indicative costs of wash-down facility infrastructure*.

Item description	Indicative cost
Preliminaries	$ 29,901.00
Evaporation pond	$ 79,130.00
Road pavement	$ 77,998.00
General	$ 73,400.00
Sedimentation pit	$ 73,428.00
Light vehicle – manual wash-down bay	$ 37,599.00
Two Heavy equipment wash-down bays	$ 147,440.00
Total	**$ 518,896.00**

*Note: Costs are estimates only. Costs are GST exclusive. Contingency costs of approximately 10% may also apply but have not been included.

5.4. Truck wash-down water management

5.4.1. Inflow volume

Water volume requirements for truck wash-down facilities depend on a range of parameters including throughput, wash-down capacity, truck size and wash durations. The volume of water required for the potential truck wash-down facilities in the Pilbara has been estimated to be approximately 14.4 ML per year based on the following assumptions:

- The truck wash-down facility includes 2 wash pads.
- The truck wash-down will be operational 260 days per year (5 days per week).
- 13 road trains (three double-deck trailers) will be washed each fortnight, equating to 333 per year.
- Each truck wash takes 6 hours (1 deck per hour).
- Water use is approximately 7.2 kL per hour of clean down time (refer to Section 3.1).

5.4.2. Outflow disposal options

Water treatment, recycling, and re-use is likely to be an unviable option based on the high capital expenditure and ongoing maintenance costs associated with infrastructure. This is based on indicative capital costs for a unit capable of producing Class A water at a rate of 3.0 kL/hour being approximately $160,000. Additionally, the operating costs of water recycling treatments are particularly high due to the ongoing requirement of chemical additives and energy consumption. Note that the South Hedland Holding Yards have access to an ample water supply based on available information and a groundwater source may be available for Pippingarra as well. This will need to be confirmed prior to proceeding with the development.

Installation and maintenance costs related to disposal of effluent by irrigation is likely to be cost-prohibitive for the truck wash-down facilities being proposed in this analysis. In eastern Australia, effluent irrigation is commonly used in similar facilities. These usually comprise a series of treatment ponds feeding effluent irrigation system and require labour, energy, land area suitable for irrigation and relatively high initial and ongoing capital input. They also generally require detailed soil and water modelling to determine appropriate irrigation rates and areas, as well as sophisticated crop selection to accommodate for climate, soil, and water variability.

Given that the annual average rainfall is far less than the annual average evaporation in Port Hedland (refer to Section 5.1), an evaporation pond is a practical solution for disposing of contaminated water. The concept of an evaporation pond requires the pond to have a high surface area to storage ratio, which results in a large footprint.

5.5. Evaporation pond sizing

The required size of the evaporation ponds for the facilities was estimated using a water balance model, Source Modelling (eWater Ltd 2012). Source allows the user to configure a catchment area (i.e., the truck wash pad) and apply a water balance algorithm to calculate the runoff volume given area specific meteorological data. Source is a full hydrological model and, as such, it considers all inputs of rainfall, including cyclones.

For this model, the Australian Water Balance Model (AWBM) was chosen as the most suitable algorithm, with meteorological data – daily rainfall and evaporation – sourced from Queensland Government's SILO climate data website, www.longpaddock.qld.gov.au, which interpolates historical meteorological data from surrounding Bureau of Meteorology weather stations. Source Modelling was then used to combine the calculated outflow from the catchment and the outflow from the truck wash water use and add this to a storage model. The storage model also incorporates meteorological inflows and outflows affecting the storage itself, that is, rainfall directly onto the storage area and evaporation removing water from the storage. The storage was sized to achieve a 20 year ARI, that is pond overtopping events are limited to a 20 year average recurrence interval. The modelling determined that the required surface area for the evaporation ponds at both sites would be 1,070 m^2. Rectangular configurations are also possible so long as the same surface area is achieved. Evaporation ponds have been included in the plans presented in Figure 5-1 to Figure 5-2.

6. Economic context

The truck wash facility will have both public and private costs and benefits, which both need to be considered. Public costs and benefits have been considered based only on the transport cost savings discussed in the NBIR (ACIL Allen Consulting 2016). There may also be other public benefits such as avoided losses associated with not having adequate market access and losses from spread of weeds. Data around these parameters is extremely difficult to obtain and has not been considered in this assessment.

6.1. Public perspective

The NBIR modelling indicated that optimal cattle exports at the Port of Port Hedland would be associated with transport cost savings of $8 per head. The establishment of an operational truck wash-down facility is a requirement for achieving optimal cattle exports at Port Hedland holding yards, adequate Port infrastructure, and renewed confidence in the industry by pastoralists and exporters all need to be present as pre-conditions and are not fully present currently. Therefore, only a portion of the transport cost savings can be reasonably attributable to the presence of an operational truck wash facility.

A preliminary cost benefit analysis (CBA) was conducted to investigate whether investment in the truck wash-down facility would be beneficial assuming that it would be associated with the $8 per head transport cost savings. The CBA considered initial capital expenditure and industry benefits only and did not consider the operational costs and benefits that would be incurred by the owner or operator of the facility.

Using the total capital expenditure from Table 5-2 for the truck wash-down development $518,896, the industry would benefit from a positive return on investment within 5 years of investment (NPV of 0.02 $million; Table 6-1) if an export throughput for Port Hedland of 20,000 head per year could be maintained.

Table 6-1. Results of cost benefit analysis for the re-establishment of the existing yards.

Investment Criteria	Years after last year of investment						
Years	**0**	**5**	**10**	**15**	**20**	**25**	**30**
Present Value of Benefits ($m)	0.00	0.61	0.98	1.22	1.36	1.45	1.51
Present Value of Costs ($m)	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Net Present Value ($m)	-0.52	0.08	0.46	0.70	0.84	0.93	0.99
Benefit-Cost Ratio	0.00	1.16	1.88	2.33	2.61	2.78	2.89

6.2. Private perspective

The private perspective considers the costs and benefits of the investment to a potential investor, including capital expenditure and fixed and variable operational costs. Fixed costs are based on indicative costs in Table 5-2. Operational costs and benefits are summarised in Table 6-2.

The analysis shown in considers the initial investment of $518,896 in the construction of a truck wash facility, a throughput of 333 trucks, a truck wash fee of $0.73 per minute, and is based on the assumptions listed in Table 6-2, a discount rate of 10%, and an investment period of 0-30 years. It shows that the NPV for the investment is $-0.36 million at the end of the 30 year period. Sensitivity analysis showed that the 20 year NPVs for the same period were $-0.35 million and $-0.38 million based on 2% reductions and increases respectively on operating costs. Table 6-4 shows the changes in 20 year NPV for a range of truck wash fees and throughputs. It shows that a private investor would need to charge a truck wash fee of $1.35 per minute and have a guaranteed throughput of the equivalent of approximately 333 trucks per year each with 6 decks for the facility to be viable. The current Kununurra truck wash facility charges a truck wash fee of $1.35 per minute so this would be a reasonable expectation for a fee at a Port Hedland facility. AvData user charges for the 109 existing facilities that are on the AvData system range from $0.20 per minute to $2.00 per minute,

so charging in excess of $1.35 would also potentially be a reasonable expectation. Table 6-4 also shows that a throughput of 333 trucks per year at a charge of $1.35 per minute represents a breakeven point for the truck wash facility.

Table 6-2. Indicative operating costs and benefits of truck wash facility

Component	Value	Comment
OVERVIEW		
Annual usage (6-deck trucks)	333	
Annual usage (total number of decks)	1,998	Variable range for investigation
CAPITAL COSTS		
Estimated construction costs	$518,896.00	Assumed to occur in the first year
Avdata connection	$3,000.00	Assumed to occur in the first year
FIXED FACILITY OPERATING COSTS		
Annual maintenance costs ($/year)	$10,377.92	2% of construction costs
Labour costs ($/year)	$9,990	Labour for truck washing provided by truck company. There would be labour costs to clean out sed. basin, manage ponds, maintain weeds and trouble shoot issues.
VARIABLE FACILITY OPERATING COSTS		
Electricity usage ($/truck)	$54.54	Based on usage of 3 KW/hour and cost of $3.03/KW
Water usage ($/truck)	$97	Based on 7.2 kL/hour and $2.256/kL
VARIABLE FACILITY FEES		
Truck wash fees ($/truck)	$43.80	Based on average user charges from AvData facilities across Australia of $0.73 per minute
COST ASSESSMENT		
Total Fixed Costs	$20,368	
Total Variable Costs	$50,616	
Total costs	$70,984	
Upper total costs (+ 2%)	$72,403.33	
Lower total costs (-2%)	$69,563.98	
Total Benefit	$87,512.00	

Table 6-3. CBA for private investor in the truck wash development based on 10% discount rate and first year of operation in 2019.

Investment Criteria	Years after last year of investment						
Years	**0**	**5**	**10**	**15**	**20**	**25**	**30**
Present Value of Benefits ($m)	0.00	0.06	0.10	0.13	0.14	0.15	0.16
Present Value of Costs ($m)	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Net Present Value ($m)	-0.52	-0.46	-0.42	-0.39	-0.38	-0.37	-0.36
Benefit-Cost Ratio	0.00	0.12	0.20	0.24	0.27	0.29	0.30

Table 6-4. 20 year NPV ($ million) for a range of throughputs and truck wash fees

Annual throughput (trucks)	Truck wash fees ($/minute)				
	0.73	**1.00**	**1.35**	**1.50**	**2.00**
100	-0.89	-0.81	-0.7	-0.65	-0.5
333	-0.37	-0.09	0.26	0.42	0.93
400	-0.22	0.11	0.54	0.72	1.34

7. Recommendations and conclusions

This report presents findings of a feasibility assessment into options for a truck wash facility in Port Hedland. It has been prepared in consideration of an accompanying study investigating the feasibility of cattle holding yard developments in Port Hedland. The findings of the holding yard feasibility assessment showed that the optimal location for a truck wash facility would be as a co-location opportunity with a cattle holding yard development. This study has presented two options for the truck wash-down facility that accompany cattle holding yard developments at the existing South Hedland Holding yYrds and a greenfield site at Pippingarra Station.

The Pilbara Cattle Holding Yard Feasibility Assessment Report indicated that investment into expanding the Port Hedland live export industry through increasing user confidence and relationships was a pre-requisite to investing financially in infrastructure to support industry expansion. The existing South Hedland holding yards require minimal financial investment to re-establish operations and this is potentially associated with substantial transport cost savings to the industry. However, assuming export country requirements will follow China's lead and include the need for truck washing in the future, these transport cost savings also depend on the presence of an operating truck wash down facility. Therefore, a truck wash facility may be a necessary infrastructure investment to allow live exports from the Port to re-establish. This study, in combination with the Pilbara Cattle Holding Yard's Feasibility Assessment indicates that re-establishment of existing holding yards and investment in a truck wash facility, combined with renewed use of the Port of Port Hedland for cattle exports by pastoralists and exporters, would be return a positive NPV to the State if a throughput of at least 20,000 head of cattle per year could be maintained.

From a private investor perspective, the study has shown that investment in a Port Hedland truck wash facility would potentially be viable if a throughput of 333 6-deck road trains per year could be maintained and if the user charges for the facility were $1.35 per minute.

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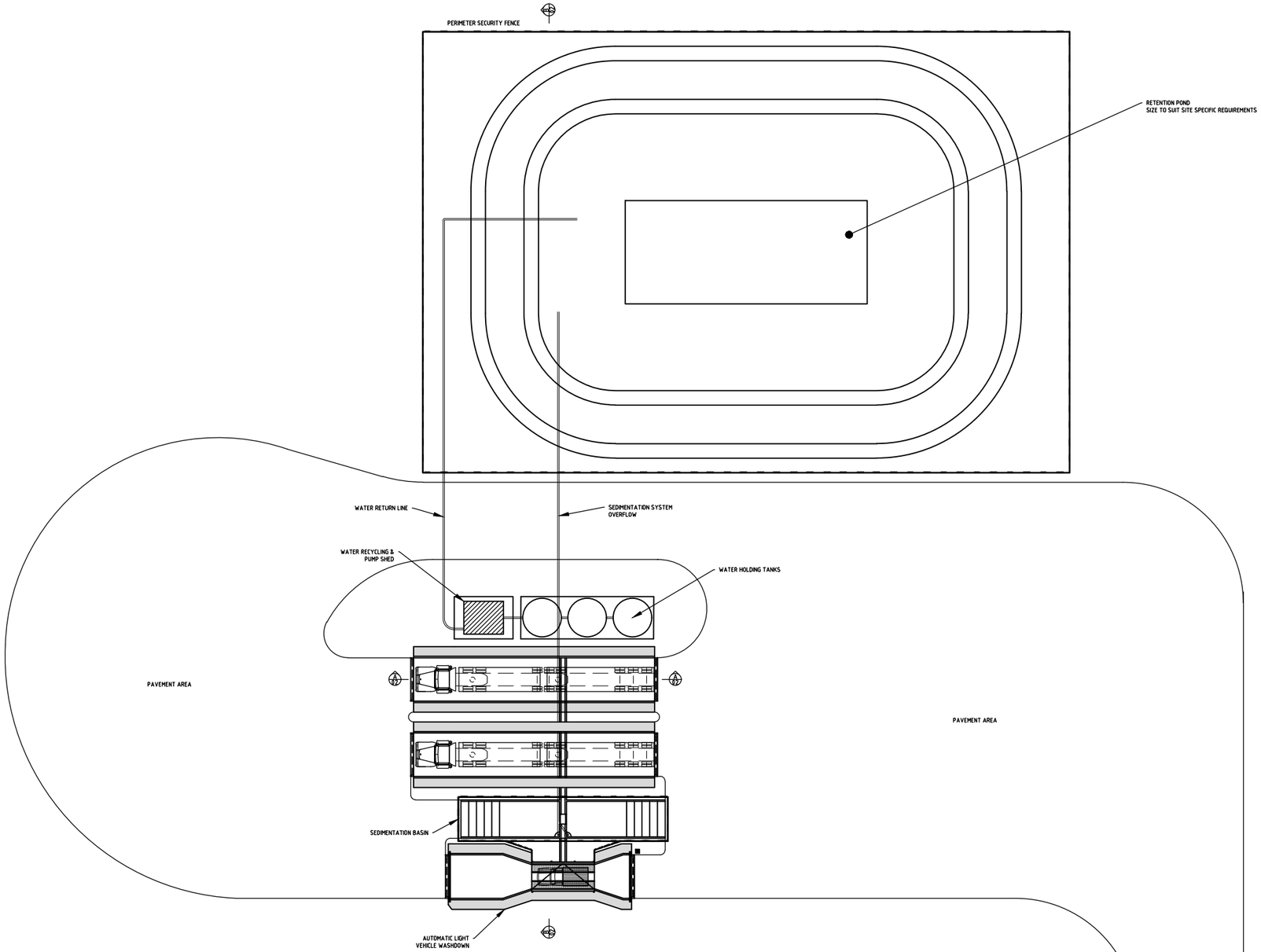
Appendix A Truck wash plans and cross section



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07/04/17	A	ORIGINAL ISSUE	TS

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FSA CONSULTING
PART OF O2UDP

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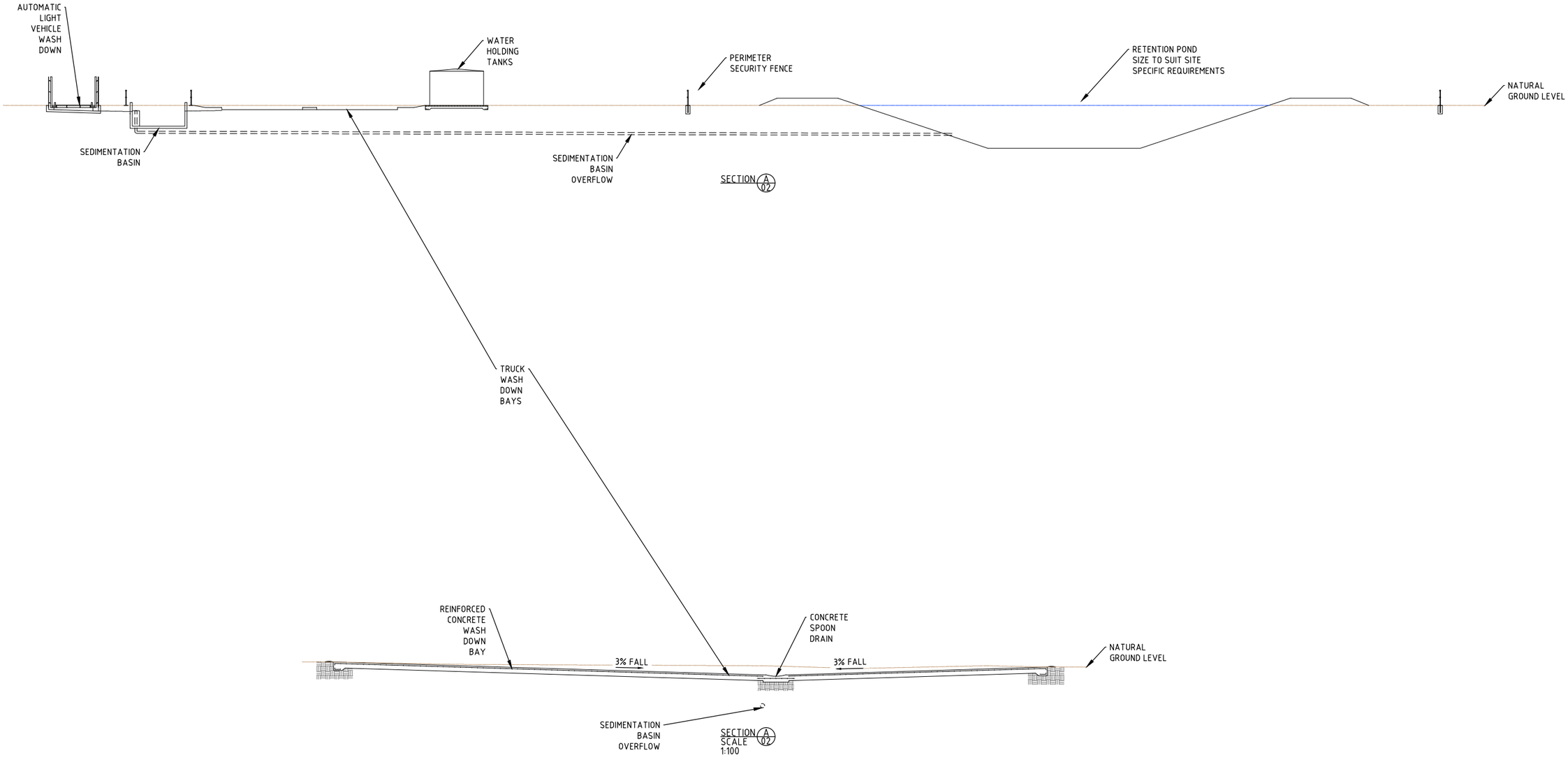
DRAWN	ML		
CHECKED	TS	DATE 07/04/17	SCALE 0 10 20 30m
DATE	07/04/17		SCALE 1:500 (A1)

CLIENT

PROJECT: PILBARA WASH DOWN FACILITY
LOCATION: PILBARA, WESTERN AUSTRALIA
SHEET TITLE: SITE PLAN

JOB CODE: 1085
SHEET NUMBER: FIGA1
REV: A

FORM E027
10 AUG 2006



DATE	REV	DESCRIPTION	APPROVED
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DRAWN ML			
CHECKED TS	DATE 07/04/17	SCALE 0 4 8 12m	
DATE 07/04/17		SCALE 1:200 (A1)	

CLIENT

PROJECT: PILBARA WASH DOWN FACILITY
LOCATION: PILBARA, WESTERN AUSTRALIA
SHEET TITLE: SECTIONS

JOB CODE: 1085
SHEET NUMBER: FIGA2
REV: A

FORM E027
10 AUG 2006

Appendix B Cost estimate

Item No.	Description	Unit	Quantity	Rate Per Unit (Inc Fuel) (GST Inc)	Fixed Total Price Inc. Fueld) (GST Inc)
SECTION 1 - PRELIMINARIES					$ 29,901
1.1	Mobilisation	Item	1	$ -	
1.2	Surveying & Set-out	Item	1	$ -	
1.3	Provision of site office & Amenities	Item	1	$ -	
1.4	Erosion & sediment control measures	Item	1	$ -	
1.5	Insurances & fees	Item	1	$ -	
1.6	Performance bonds (i.e. costs incurred in provision of Retention, security etc.)	Item	1	$ -	
1.7	Progressive and Final Cleanup and disposal of Rubbish & waste	Item	1	$ -	
1.8	Workplace Health and Safety requirements.	Item	1	$ -	
1.9	Compliance Testing	Item	1	$ -	
1.10	Accommodation	Item	1	$ -	
1.11	Any other item(s) shown on the drawings and/or specified or considered necessary for the completion of the works. (Tenderers to list items below)	Item	1	$ -	
			SUB TOTAL		**$ 29,901**

SECTION 2 - EVAPORATION POND		**Unit**	**Quantity**	**Rate**	**Fixed price**
2.1	Clearing and grubbing as required (Provisional Quantity)	ha	2.5	$1,000.00	$2,500
2.2	Strip topsoil (100mm) & stockpile on site as directed by Superintendent.	m³	2500	$2.50	$6,250
2.3	Ground surface preparation to pond base, including compaction of the Subgrade, prior to placement of fill.	m²	0	$1.00	$0
2.4	Ground surface preparation to embankment, including compaction of the Subgrade, prior to placement of fill.	m²	6600	$2.45	$16,170
2.5	Removal of Unsuitable material at Subgrade level & replacement with selected fill material. (Provisional Quantity).	m³	100	$5.00	$500
2.6	Bulk Earthworks - Cut to fill, from within the pond area, including compaction etc.- to bank around retention pond	m³	5000	$5.00	$25,000
2.7	Bulk Earthworks - Cut to fill, from within the pond area, including compaction etc.- to Pavement area	m³	0	$5.00	$0
2.8	Bulk Earthworks - Cut to Spoil, to areas as indicated on drawings or as otherwise directed by Superintendent.	m³	0	$4.00	$0
2.9	Bulk Earthworks - From borrow pits, as indicated on drawings or as otherwise directed by Superintendent, including compaction.	m³	0	$4.00	$0
2.10	Compaction of 'Clay Liner" 300mm thick to floor & internal batters of pond below natural ground surface level, including ripping of existing material, addition of water as required & compaction of material to 98% RDD within +2 & -0% of Optimum Moisture Content.	m²	18500	$1.50	$27,750
2.11	Spread topsoil 100mm thick to batters as directed by Superintendent. (Provisional Quantity).	m²	4800	$0.20	$960
			SUB TOTAL		**$ 79,130**

Item No.	Description	Unit	Quantity	Rate Per Unit (Inc Fuel)	Fixed Total Price Inc. Fueld)
SECTION 3 - ROAD PAVEMENT		**Unit**	**Quantity**	**Rate**	**Fixed price**
3.1	Gravel pavement to trafficked areas 300mm thick CBR 65min * reduced	m^3	1921	$38.00	$72,998
3.2	Bitumen sealing to trafficked areas 2 coat seal * removed	m^2	0	$7.50	$0
3.3	450mm Dia RC pipe Class 4 with Precast concrete head walls to suit.	Item	1	$5,000.00	$5,000
					$77,998

SECTION 4 - GENERAL		**Unit**	**Quantity**	**Rate**	**Fixed price**
4.1	23,000L Water tanks	Item	4	$4,100.00	$16,400
4.2	4m x 3.6m shed on 150mm concrete slab	Item	1	$8,000.00	$8,000
4.3	Supply & Install Pressure pump , suction & delivery lines (Provisional Sum)	Item	1	$15,000.00	$15,000
4.4	Supply & install spray lines & nozzle	Item	1	$5,000.00	$5,000
4.5	Supply & install Electrical Switchboard & submains from Service pole	Item	1	$10,000.00	$10,000
4.6	Coin Box Kit	Item	1	$3,500.00	$3,500
4.7	AvData System - including data modem	Item	1	$3,000.00	$3,000
4.8	Air Compressor	Item	1	$12,500.00	$12,500
			SUB TOTAL		**$73,400**

SECTION 5 - SEDIMENTATINO PIT		**Unit**	**Quantity**	**Rate**	**Fixed price**
6.1	Excavate to sub grade level	Item	1	$4,000.00	$4,000
6.2	Supply & install crusher dust to underside of slab	Item	1	$1,000.00	$1,000
6.3	200mm thick concrete slab on ground with 1 layer F92 mesh	m^2	92	$164.00	$15,088
6.4	300 mm thick concrete wall up to 1500mm high with N12 bars at 200mm spacing	m^2	54	$620.00	$33,480
6.5	150mm Dia PVC drainage pipe to retention basin up to 2.0m depth	lin m	80	$150.00	$12,000
6.6	Stainless Steel screen at inlet to pipe	Item	2	$600.00	$1,200
6.7	Monowills hand rails to edge of Sedimentation pit	lin m	38	$130.00	$4,940
6.8	3.8m wide gates to sedimentation pit	Item	2	$860.00	$1,720
			SUB TOTAL		**$73,428**

SECTION 6 - LIGHT VEHICLE - AUTOMATIC WASH DOWN BAY		**Unit**	**Quantity**	**Rate**	**Fixed price**
7.1	Excavate to sub grade level	Item	1	$2,920.00	$2,920
7.2	Supply & install crusher dust to underside of slab	Item	1	$500.00	$500
7.3	150mm thick concrete slab on ground with 1 layer F82 mesh	m^2	146	$140.00	$20,440
7.4	200 mm thick concrete wall up to 300mm high with N12 bars at 200mm spacing	lin m	23	$293.00	$6,739
7.5	Supply & install drainage channel Webforge WS20 with Class C Galvanised steel grate	lin m	1	$300.00	$300
7.6	Supply & install 600 x 600 drainage pit with steel grate Class C	Item	1	$600.00	$600
7.7	150mm Dia PVC drainage pipe	lin m	2	$50.00	$100
7.8	Height Gauge over entry to wash area	Item	2	$3,000.00	$6,000
			SUB TOTAL		**$37,599**

Item No.	Description	Unit	Quantity	Rate Per Unit (Inc Fuel)	Fixed Total Price Inc. Fueld)
SECTION 7 - HEAVY TRUCK WASH DOWN BAY		**Unit**	**Quantity**	**Rate**	**Fixed price**
8.1	Excavate to sub grade level	Item	2	$3,200.00	$6,400
8.2	Supply & install crusher dust to underside of slab	Item	2	$1,000.00	$2,000
8.3	200mm thick concrete slab on ground with 1 layer F92 mesh	m²	225	$164.00	$36,900
8.4	200 mm thick concrete wall up to 300mm high with N12 bars at 200mm spacing	lin m	100	$293.00	$29,300
8.5	150mm thick concrete slab on ground with 1 layer F82 mesh	m²	76	$140.00	$10,640
8.6	Supply & install drainage channel Webforge WS20 with Class C Galvanised steel grate	lin m	5	$300.00	$1,500
8.7	Supply & install 600 x 600 drainage pit with steel grate Class C	Item	1	$600.00	$600
8.8	150mm Dia PVC drainage pipe	lin m	2	$50.00	$100
8.9	Gantry/mezzanine floor 3.5m high, 2.0m wide x 25.0m long, with safety rails, stairs x 2, made from grid steel.	Item	1	$60,000.00	$60,000
			SUB TOTAL		**$147,440**

SUMMARY OF COSTS	**COST (GST INC.)**
SECTION 1 - PRELIMINARIES	$ 29,901
SECTION 2 - EVAPORATION POND	$ 79,130
SECTION 3 - ROAD PAVEMENT	$ 77,998
SECTION 4 - GENERAL	$ 73,400
SECTION 5 - SEDIMENTATINO PIT	$ 73,428
SECTION 6 - LIGHT VEHICLE - AUTOMATIC WASH DOWN BAY	$ 37,599
SECTION 7 - HEAVY TRUCK WASH DOWN BAY	$ 147,440
TOTAL	**$ 518,896**