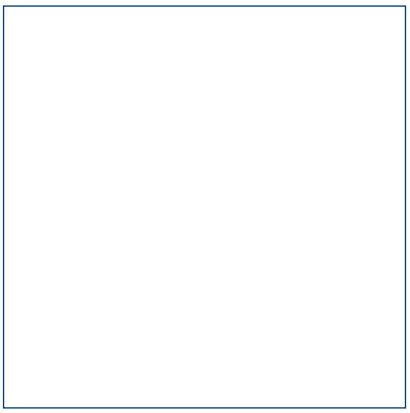
RPS koltasz smith

TOWN PLANNING PROJECT MANAGEMENT URBAN DESIGN DEVELOPMENT CONSULTING

Wedgefield Industrial Estate

Development Plan

December 2009



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1. INTRODUCTION

1.1 BACKGROUND

The Wedgefield Industrial Estate Development Plan (WIEDP) has been prepared for an approximately 280ha area of land located to the east and south east of the existing Wedgefield industrial area, within the Town of Port Hedland (**Plan 1 – Aerial Overview**). The WIEDP has been prepared to coordinate the strategic expansion of Wedgefield and provides for a range of transport and light industrial uses. The WIEDP includes a land use review of the existing Wedgefield industrial area, but does not formally include it within the Development Plan area.

The WIEDP aims to be consistent with the recommendations of the recently adopted Port Hedland Land Use Master Plan (LUMP), which identifies the land surrounding the existing Wedgefield industrial area as the most appropriate location for the expansion of light and transport industry. The LUMP also highlights the large number of caretaker's dwellings located in the existing estate and the need to ensure the sensitivity of these uses are acknowledged in any new development of the surrounding area. Both of these elements of the LUMP are considered in this document.

1.2 THE PROCESS

The WIEDP has been prepared to meet the Development Plan requirements of the Town of Port Hedland Town Planning Scheme No.5 (TPS5), on the basis that it is ultimately adopted under TPS5 in conjunction with the associated rezoning of the expanded Wedgefield industrial area.

The WIEDP has been prepared following extensive consultation throughout 2008 and 2009 with agencies including:

- LandCorp
- Town of Port Hedland (ToPH)
- Main Roads Western Australia (MRWA)
- Port Hedland Port Authority (PHPA)
- Department of Planning (DoP) - (formerly Department for Planning & Infrastructure (DPI))
- Department of Environment and Conservation (DEC)
- Horizon Power (HP)

1.3 AIMS & OBJECTIVES

The WIEDP has been developed in response to demand for industrial land to service the mining and export markets in Port Hedland and the broader Pilbara. In this context, the proximity of the new WIEDP sites to the existing industrial estate and their location on Great Northern Highway at the 'entry' to Port Hedland are key considerations, with the main objectives being:

- The development of a shared long term vision between key stakeholders including the ToPH, LandCorp, Port Hedland Port Authority (PHPA), Main Roads Western Australia (MRWA) and, in particular, residents and

business operators for the orderly expansion and improved development standard of the Wedgefield industrial area;

- Providing appropriately located and sized new land-use precincts that will sufficiently accommodate demand for the release of light industry and transport use operations;

- Ensuring new land-use and development considers issues of amenity and land use sensitivity for development within the existing Wedgefield industrial area;

- Facilitating an attractive and landscaped industrial estate, particularly along Great Northern Highway (GNH), which is the main entrance to Port Hedland and provides road access between Port Hedland and South Hedland;

- The orderly provision of services and infrastructure including power, water, telecommunications and an expanded road network which accommodates the range of industrial uses and transport/infrastructure demands anticipated; and

- The planned orderly release of industrial land as part of an ongoing program to ensure regular industrial land supply.

1.4 MARKET CONSIDERATIONS

In order to refine the likely demand for industrial land in Wedgefield, LandCorp released an Industrial Land Survey to the public. This survey was made available on the LandCorp website and a supplementary survey was also conducted on paper. The survey results were finalised January 2009 and identified the following key points:

- There remains strong demand for industrial land within the next 2 years;

- Strong interest was expressed for light industrial land with lots of less than 5,000m2, though some respondents sought up to 12,000m2 in size and one party expressed interest in a 4ha lot; and

- Interest in Transport development sites related to lot sizes of 5000m² up to 5ha preferred.

In response to the above market feedback and the recommendations of the LUMP, a number of areas have been identified for development and release by LandCorp. An overview of the development areas is contained at **Plan 2 – Industrial Planning Precincts Plan**.

1.5 PROJECT COORDINATION & CONSULTING TEAM

A number of site visits to Port Hedland were undertaken, with several key stakeholder meetings held. Meetings conducted throughout 2008 and 2009 were attended, at various stages, by the following Technical Advisory Group (TAG) participants:

Planning TAG Meeting	Infrastructure TAG Meeting
Paul Schneider (LandCorp)	Paul Schneider (LandCorp)
Jermayne Fabling (WGE)	Jermayne Fabling (WGE)
Justin Zelones (WGE)	Justin Zelones (WGE)
Tom Carroll (RPS KS)	Tom Carroll (RPS KS)
Rod Dixon (RPS KS)	Rod Dixon (RPS KS)
Garry Sullivan (Whelans)	Garry Sullivan (Whelans)
Terry Sargent (ToPH)	Terry Sargent (ToPH)
Terry Dodds (ToPH)	Terry Dodds (ToPH)
Richard Bairstow (ToPH)	Richard Bairstow (ToPH)
Jim Kaucz (DoP)	Justin McKirdy (MRWA)
Wanda Kaucz (DoP)	Dave Pearson (MRWA)
	Frank Lyons (MRWA)
	Lynne Nanini (MRWA)
	Andre Bush (PHPA)
	Lyle Stanley (PHPA)
	Bob Cirulis (Horizon Power)

In addition to this, a number of Project Control Group (PCG) meetings were held with the project team, with attendance at different stages from members of the project team including the planning, engineering, environmental and landscape consultancies as discussed below.

This report has been prepared utilising the input of a range of project consultants comprising:

- Project Manager – LandCorp
- Town Planning and Urban Design – RPS Koltasz Smith
- Civil Engineering Consultants: Wood & Grieve
- Environmental Consultants: GHD
- Traffic & Transport Consultants: GHD
- Landscape Consultants: UDLA
- Storm Surge / Coastal Modelling: MP Rogers
- Surveyors: Whelans
- Anthropological Consultants: Anthropos Australis

2. CONTEXT, OWNERSHIP & LAND USE

2.1 REGIONAL CONTEXT

The WIEDP area is situated between South Hedland and Port Hedland. The site has frontage to Great Northern Highway, being the main entry road to Port Hedland and a primary transport route for a high number of heavy vehicles travelling into Port Hedland. The southern edge of the WIEDP area directly adjoins the Port Hedland - Goldsworthy railway. The industrial rail lines service the surrounding mining operations and allow for the transport of various natural resources to Port Hedland and Finucane Island for export. The Port Hedland airport is similarly in close proximity, being directly east of the WIEDP area.

The Boodarie Strategic Industrial Estate is located approximately 8 kilometres south west of the WIEDP area, with the Boodarie General Industry (Noxious Use) area identified for future development to the south of the main Strategic Industry Estate. The Boodarie General Industry (Noxious Use) area is ultimately intended to exclusively accommodate general and noxious industries more closely related to the mining and export industries, however detailed planning is still in its infancy. The Boodarie area also incorporates the Port Hedland Power Station.

South Creek lies to the immediate west of the WIEDP area.

A full overview of the regional context surrounding the WIEDP is provided as **Plan 3 - Regional Context Plan**.

2.2 LOCAL CONTEXT

The WIEDP area directly adjoins the existing Wedgefield industrial area, which is recognised as the Town of Port Hedland's main industrial area. The Wedgefield industrial area is almost fully developed except for a number of recently released lots along Manganese Street (referred to as "Light Industrial Area 1" (LIA1)). In LandCorp land release terms, the next stage of development is the Light Industrial Area 2 (LIA2) precinct, which has recently received subdivision approval from the WA Planning Commission for the creation of nineteen lots. The Wedgefield industrial area is currently serviced by a Horizon Power substation, which is located within the existing industrial area.

As the predominant industrial precinct in Port Hedland, the Wedgefield industrial area includes a variety of land uses ranging from light to heavy in nature. The industrial area also includes a high number of caretaker dwellings and a transient workforce accommodation facility, both of which are considered sensitive uses under the Environmental Protection Agency's Guidance Statement No.3. Further discussion on these uses, their buffers and the proposed use of transitional land uses in the WIEDP occurs later in this document.

A full overview of the local context surrounding the WIEDP is provided as **Plan 4 - Local Context Plan.**

2.3 LAND OWNERSHIP – WIEDP AREA

Land ownership within the WIEDP area includes a mixture of reserved/vested land and Unallocated Crown Land (UCL). Implementation of the project is made easier given that all of the land is under the control of state or local government, although land parcels the subject of reserve vesting orders and lease agreements will require review. **Table1** below shows the extent of land reserved within the WIEDP, the WIEDP precinct within which it lies and the land details.

The northern edge of the WIEDP area includes land lying within the Port Hedland Port Authority area. For the purposes of consistency in planning, the PHPA land area has been generally adhered to in designing both road layout and new lot boundaries. This WIEDP provides a coordinated lot and road layout between the PHPA land and the balance of the Wedgefield expansion areas, though it does not seek to rezone the PHPA land, or formally include it within the WIEDP under TPS5. (See **Plan 5 – Landownership Plan**).

Table 1 – Landownership Schedule

Precinct No	Lot No	Plan No	Total Lot Area (ha)	Total Area within Development Plan Area (approx)	Ownership Details
Light Industrial Area 3	5908	DP 192295	10.395	10.395	State of WA
Light Industrial Area 4	501	DP 61035	8.48	8.48	State of WA
Light Industrial Area 5	502	DP 41485	56.553	56.553	State of WA
	503	DP 40616	197.537	12.24	State of WA
Transport Development Area	503	DP 40616	197.537	182.505	State of WA
	5553	P186580	4.0	4.0	State of WA
	5858	P191016	2.890	2.890	DPI – Vested with ToPH
	5859	P191016	6.35	6.35	State of WA
	5874	-	0.163	0.163	State of WA
	5873	-	0.254	0.254	DPI
Industry Area	300	DP47358	2.539	2.539	State of WA
	301	DP47358	1.980	1.980	State of WA
	503	DP 40616	197.537	5.743	State of WA
	5871	P192054	0.928	0.928	State of WA
	5872	P192054	0.333	0.333	State of WA

2.4 LAND OWNERSHIP – EXISTING WEDGEFIELD

The WIEDP area is essentially an expansion of the existing Wedgefield estate, and accordingly, an assessment was made during late 2008 / early 2009 of existing land use within the established Wedgefield area. This survey of land use was compiled through:

- On-site site observation;
- Information from the Town of Port Hedland; and
- Information directory advice.

Plan 6 - Land Use Assessment Plan shows the outcome of the assessment. While every effort has been made to test the accuracy, it should be recognised that as circumstances change and businesses relocate or open, the documented land uses may vary. Importantly, every effort has been made to list more sensitive land uses, or those likely to require land use separation.

2.5 KEY DEVELOPMENT PRECINCTS

The WIEDP area comprises three distinct land areas separated by the existing regional and local road network:

- The first parcel of land is bound by Great Northern Highway to the south-east; Cajarina Road to the North West; the Port Hedland-Goldsworthy Railway to the south-west; and the Pinga Street to north east. The land is vacant, containing scrubland vegetation and a number of informal tracks. The WIEDP recognises this area as comprising LIA3 and LIA4.

- The second parcel is a triangular parcel of land bound between the Port Hedland-Goldsworthy Railway to the south; Great Northern Highway to the west; and Wallwork Road to the east. The land is vacant and incorporates a large portion of the Greater Northern Highway road reserve. The WIEDP recognises this area as comprising LIA 5.

- The third parcel, being the largest, is located between the existing Wedgefield industrial area, Great Northern Highway and the Port Hedland Port Authority lease area. A road house is located within the land; however the remainder is vacant and contains remnant scrubland. The WIEDP recognises this area as the Transport Development (TD) area.

3. TOWN PLANNING CONSIDERATIONS

3.1 TOWN PLANNING SCHEME NO.5 (TPS5)

The WIEDP area is predominantly reserved 'Other Public Purpose – Infrastructure' (**Plan 7 – Existing Zoning Plan)** under TPS5, though the following details list other zonings/reserves:

- Lot 300, 301, 5871, 5872, 5873 and 5874 Schillaman Street are zoned "Transient Workforce Accommodation (R20)";
- Lot 5858 Schillaman Street is reserved for "Parks and Recreation";
- Lot 5859 is zoned "Industry";
- Portions of Lots 502 and 503 are reserved for "State and Regional Road";
- Portions of the Moorambine Street and Schillaman Street road are reserved for 'Local Road'; and
- Portion of the Great Northern Highway is reserved for "State and Regional Road" and "District Road".

Rezoning of all the above land parcels, including the majority currently reserved for 'Infrastructure', is necessary as the industrial development contemplated would not be consistent with the existing infrastructure zone. A separate Scheme Amendment request submission to rezone the WIEDP area to "Light Industry" zone, "Industry" zone and "Transport Development" zone has been prepared to run concurrently with this Development Plan (December 2009) submission. **(See Plan 8 – Proposed Zoning Plan).**

The use of these zones in conjunction with this Development Plan (December 2009) will provide for consistency in land use and development control. Notwithstanding a number of minor zone amendments along the eastern periphery of the existing Wedgefield industrial area, the function of the existing industrial area is not affected by this proposal.

Clause 5.2 of TPS5 sets forth the requirements for the preparation of a Development Plan prior to considering subdivision or development proposals. More specifically, Development Plans are required under Clause 6.7.14 of TPS5 to address the matters outlined in Appendix 6. Appendix 6 sets out matters to be addressed by Development Plans in general, with a number of key requirements summarised below:

- *Landform, topography, vegetation and soils;*
- *Location and surrounding use;*
- *Ownership and encumbrances;*
- *Servicing infrastructure;*
- *Indigenous and European heritage;*
- *Road layout;*
- *Open space;*
- *The natural environment;*
- *Drainage;*
- *Lot layout and landscaping;;*

- *Development demand;*
- *Stages and timing; and*
- *Policy provisions.*

This Development Plan is being prepared as a requirement of the proposed new zones as part of the Scheme Amendment, and in a manner consistent with the requirements of similar existing zones under TPS5.

In addition to the above, it is acknowledged that TPS5 currently incorporates a register of Caretakers' Dwellings within the existing Wedgefield area, as well as a planning control mechanism prohibiting their further proliferation. All of the above elements are examined in the Development Plan section of this report to minimise the potential for future land use conflict and respond to the stated requirements of TPS5.

3.2 PORT HEDLAND LAND USE MASTER PLAN (LUMP)

The LUMP (**Plan 9**) is intended to guide the growth and development of Port Hedland through the next 20-25 years. Following its adoption by the Town of Port Hedland, it was endorsed by the Western Australian Planning Commission (WAPC) at its September 2008 meeting.

The LUMP notes the following of relevance:

> *"Despite the vast area currently devoted to industrial use, there is a critical shortage of land available for industrial expansion. Wedgefield is currently the town's main dedicated industrial precinct, but its capacity to satisfy the present demand is severely limited. Because of the density of caretakers' dwellings and more permanent homes that has evolved in the area, the addition of further high impact industrial uses would only exacerbate existing land use conflicts. Furthermore, Wedgefield is almost fully utilised with only a small section on Manganese Street still to be developed, offering lots of approximately 1 hectare in size." (p13)*

The LUMP also proposes the following general principles on industrial land use:

> *"2.4(a) Contain the spread of industrial uses in well planned, orderly precincts that are located to take advantage of existing infrastructure wherever possible, to support existing industrial development, and to avoid conflicts with adjacent land uses.*
>
> *2.4(b) Identify appropriate locations for different types of industrial uses, promoting synergies among related businesses and avoiding conflicts between noxious and light industrial uses.*
>
> *2.4(c) Establish high standards of design and construction quality and landscape development to protect the 'view from the road' on Great Northern Highway and the entries to South Hedland, Wedgefield and the Port Area." (p15)*

Ultimately the LUMP makes a number of recommendations regarding industry that are of relevance to Wedgefield. These are stated below in *italics* with the project team's response to the item following:

- *Proposed industrial expansion area to include "General Industry/Transportation Uses" east of Wedgefield to Great Northern Highway*: This is recognised within the WIEDP and reflected in the Scheme Amendment through a rezoning to the 'Transport Development' zone. The precinct will seek to accommodate demand for transport / haulage uses seeking to operate from larger premises or establish themselves in the Pilbara. It will not accommodate the full range of General Industry uses, as further consideration on the appropriateness of these uses identified that they are to be accommodated for in the Boodarie Support Industry Precinct, where land use buffer requirements can be met.

- *Light Industry to be located south of Wedgefield through to the Goldsworthy rail line and east to the Airport land*: This is acknowledged in the WIEDP.

- *In response to a range of incompatible land uses within the existing Wedgefield Industrial Area, rezone the land to "Light Industry" making any heavier "noxious" uses non-conforming, and converting existing general industrial uses to "additional use" for a period of 10 years from the date that new land suitable for general industrial use is released for development. Following this 10 year period, all general industrial uses in Wedgefield then become non-conforming also:* As stated, this document deals with LUMP's recommendations for the expanded Wedgefield rather than review or rationalisation of the existing Wedgefield industrial area. The ability to implement this LUMP recommendation will become clearer following the release of new General Industry (noxious use) land, facilitating the relocation of general / noxious industries from the existing Wedgefield industrial area.

- *Notwithstanding the adopted position to resolve the incompatibility of land use within Wedgefield, including in relation to the existing Tox Free operation, no commitments or funding have been secured:* As noted above, any ability to relocate more general and/or noxious land uses from existing Wedgefield will become clearer following the release of noxious use and general industry (noxious use) land at the southern end of Boodarie.

- *Under the Light Industrial zone proposed for Wedgefield, caretakers' dwellings should be permitted with Council approval ('SA') and regulated through the adoption of a Local Planning Policy. No further caretakers' dwellings, however, will be permitted until noxious and general industrial uses have been relocated:* The proposed WIDEP does not seek to include Caretaker's Dwellings within the new Light Industry zone or Transport Development zone.

- *To protect Wedgefield from the impacts of a General Industry zoning in surrounding areas, the use of a 500m buffer be applied within which only low impact industrial uses may be located*: The use of a generic buffer of 500m was suggested on the basis of a broad General Industry zone being introduced around the existing Wedgefield. As this is not to be the case, with new land release being either Light Industrial, or Transport related, no generic buffer is proposed. The WIEDP does recognise existing uses, including the Schillaman Street Workers Accommodation development, and therefore proposes a transition in land use nearby.

- As shown in Figure 5 of the LUMP, an indicative 500m buffer to the privately owned waste water treatment plant on Lot 1621 Schillaman Street is applicable, with a 1km buffer to the Tox Free facility located on Lot 5857 Schillaman Street.

- *Any review of local planning policy for caretakers' dwellings have regard to the greater issues for Port Hedland and Wedgefield beyond any need for on-site security which often relates to a financial capacity decision. Such a review may lead to the permissible size of caretaker's dwellings being considered, or the adoption of a new land use category such as "business residence:* As stated, the location of caretaker dwellings has been recognised as a land use issue, though no new caretaker dwellings are contemplated. Consistent with this approach, no review of local planning policy is sought as part of the WIEDP.

3.3 PORT PLANNING STUDY AND ULTIMATE DEVELOPMENT PLAN 2007

This Port Hedland Port Authority document seeks to review and provide updates on the 2003 Port Planning Study and acknowledges the significant increases in exports through the Port and the resultant changes to land use requirements in the region. The Port Planning Study (PPS) and Ultimate Development Plan (UDP) also makes specific reference to the establishment of the Boodarie Industrial Estate as a General Industry Estate to service heavier and possibly more noxious industries, with the PHPA area north of Wedgefield providing for industrial uses in support of Boodarie. **(**refer **Plan 10 – Port Hedland Planning Study Ultimate Development Plan (UDP))**

Importantly, the PPS explores a number of scenarios for the future development of the Inner Harbour via a short-term (5 year) Development Plan and a number of longer term options (20+ years). While the role of the Port Authority and the likely development within the port area is specific to port activities, it is important to recognise the potential impacts of increased industrial activities directly north of Wedgefield, within the PHPA area. This, together with Boodarie, highlights the need for coordination with the PHPA in regard to industrial land use and access to them.

3.4 PORT HEDLAND INDUSTRIAL LAND STRATEGY 2004

While this "PHILS" report is now somewhat superseded, with many of the key recommendations reiterated in the LUMP, there is a significant amount of commentary on the future of the Wedgefield Industrial area which bears relevance to the WIEDP.

The PHILS report suggests that the retention and acknowledgement of existing caretaker dwellings within Wedgefield should be formalised through the establishment of a 'Mixed Use Industrial/Residential' or 'Live/Work Industrial' precinct, with the preparation of an appropriate planning strategy to ensure that a greater level of amenity is provided in the area. This approach is less than ideal from a planning perspective given the significant risk of land use conflicts within Wedgefield in the absence of alternative industrial land. As a future exercise, in the context of an established WIEDP area, and potential relocation of more polluting industries out of the existing Wedgefield estate, rezoning to a "lighter" industrial zone would be entirely appropriate.

The PHILS report also suggested that more intensive industrial uses, such as storage/warehousing, transportation, building and construction, prefabrication, mechanical maintenance and repairs, etc, be located away from the existing caretaker' dwellings. This approach is consistent with what is proposed as part of the WIEDP, with a designated transport/logistics precinct and no new caretaker dwellings proposed.

3.5 DRAFT SPP 4.1 - STATE INDUSTRIAL BUFFER POLICY (1997)

This WAPC draft Statement of Planning Policy 4.1 (SPP4.1) provides guidance with respect to the allocation of a 'buffer area' around industry, within which sensitive land uses are prohibited or subject to controls to protect against the impacts of the industrial uses. This policy acknowledges the role of the EPA's *Guidance for the Assessment of Environmental Factors No. 3* document in its application of generic buffers, albeit acknowledging the generalised nature of the buffer distances.

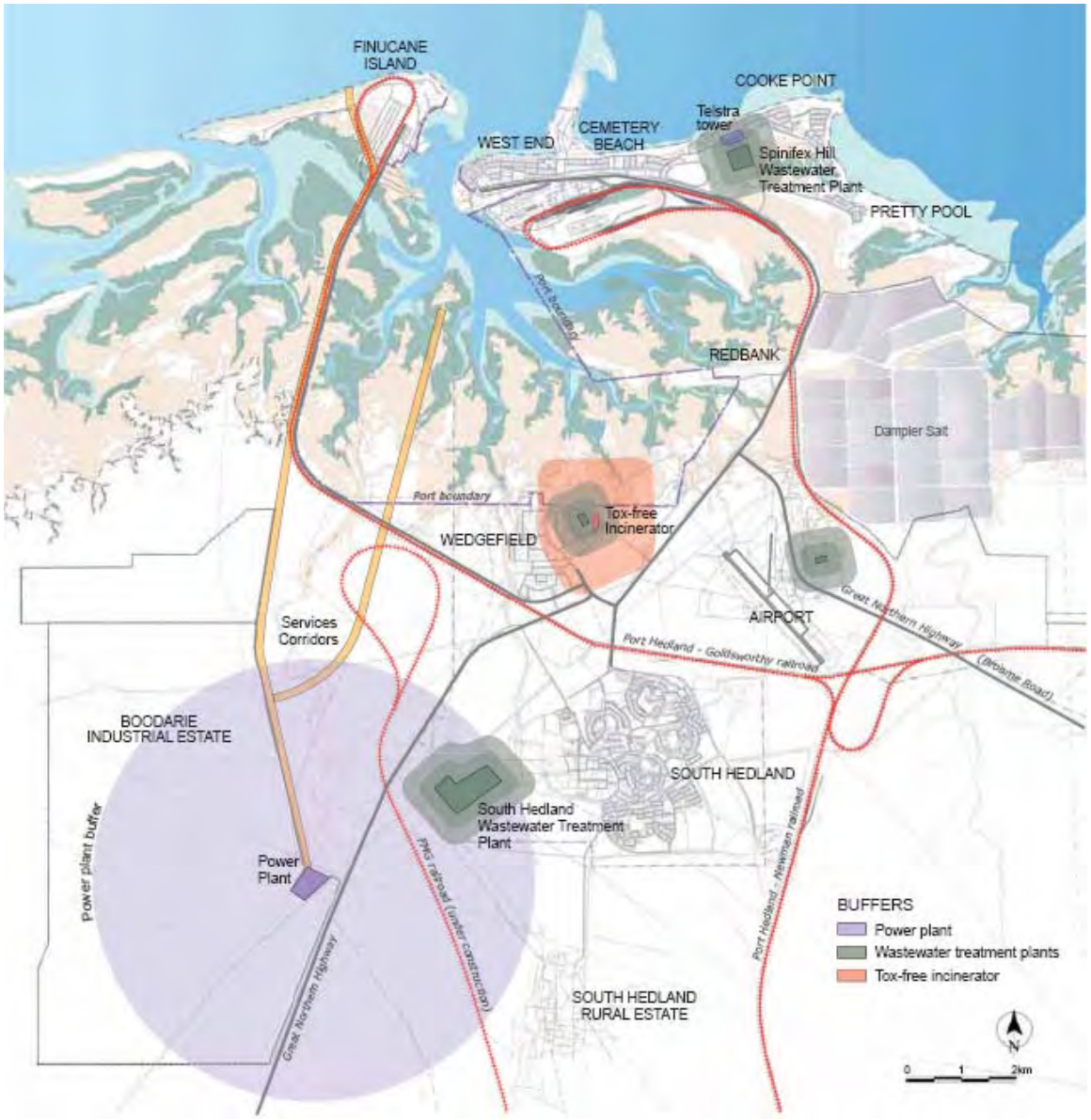
Importantly, the draft statement of planning policy indicates that in the instance where site specific modelling is not undertaken, any assessment of a proposed project will be assessed against the buffer distances outlines in table 2.2 of the EPA's *Guidance for the Assessment of Environmental Factors No. 3 – Separation Distances between Industrial and Sensitive Land Uses*. Both documents are of direct relevance to the Wedgefield project in providing guidance on the minimisation of conflict between industrial activities and sensitive land uses.

The two current uses within the existing Wedgefield area to which this policy specifically applies are the Tox Free facility and a privately owned Waste Water Treatment Plant. The description of industry under the EPA's policy that best describes the Tox Free facility as 'Incineration - for biomedical, chemical or organic waste', with an applicable buffer of 500-1000m (based on size). A wastewater treatment plant is not allocated a generic buffer distance under the EPA's policy, with reference made to ongoing buffer studies in progress to determine appropriate separation distances. Given that no sensitive uses are proposed as part of the WIEDP, these buffer requirements are acknowledged but do not materially impact on the WIEDP.

3.6 EPA GUIDANCE STATEMENT – ASSESSMENT OF ENVIRONMENTAL FACTORS NO. 3

The Environmental Protection Authority (EPA) Guidance Statement for the Assessment of Environmental Factors No.3 allocates generic separation distances between industrial and sensitive uses to avoid land use conflicts. For the purposes of the Wedgefield project, likely sensitive uses as defined in the document are likely to be limited to residential development (including caretaker's residences). The document also suggests that *'Some commercial, institutional and industrial land uses which require high levels of amenity or are sensitive to particular emissions may also be considered "sensitive land uses". Examples include some retail outlets, offices and training centres, and some types of storage and manufacturing facilities.'*

The implications of this document are therefore relevant in acknowledging the likely separation distances required between any future industrial expansion in the Wedgefield area, and existing caretaker dwellings within the balance of the industrial area. **(**See **Plan 11 - LUMP Key Existing Infrastructure Plan**).



Plan 11 - LUMP Key Existing Infrastructure Plan

The WIEDP area is relatively close to some existing uses for which land use buffers must be considered. These are shown in **Table 2** below.

Table 2 – Land Use Buffers

Land Use	Location	Buffer Requirements
Tox-Free Facility	Lot 5857 Schillaman Street	500-1000m (1000m as per LUMP)
Waste Facility	Lot 1621 Schillaman Street	Buffer studies in progress to determine appropriate buffer distances (500m as per LUMP)

4. ENVIRONMENT & HERITAGE

The following information has been taken from a Preliminary Environmental Impact Assessment and Biological Survey report prepared by GHD on behalf of LandCorp. The following summary comments outline the key aspects of the survey and reporting, with a full copy of the report attached at **Appendix 1.**

4.1 FLORA AND VEGETATION

GHD undertook site visits and a flora field survey of the subject land on 23 June 2008 and 11 June 2009 and concluded that the site contains a limited variety of plant species and importantly, that no Declared Rare or Priority flora species were recorded. For full details please refer **Appendix 1**.

Vegetation across the site is generally uniform and is described as '*Acacia stellaticeps* over mixed tussock grassland of *Triodia epactia* and *T. schinzii* over very open herbs.' While the condition of the vegetation is noted as 'excellent' and 'good', it is acknowledged in the report that this vegetation type is well represented in the region, with approximately 196,000 ha remaining undisturbed. A number of minor vegetation types associated with the tidal/mud flats exist within the northern-most portion of the study area and are further detailed in the attached report.

4.2 FAUNA

During the initial environmental survey undertaken in June 2008, potential Mulgara burrows were observed in parts of the site proposed to be developed over the next 5 year time frame. A number of photos of potential burrows were shown to Peter Kendrick at DEC, Karratha and he indicated that they were unlikely to be used by Mulgara. All the burrows on the site appeared to be inactive.

A supplementary survey of the northern portion of the Transport Development area occurred during June 2009, whereby evidence of active Mulgara burrows, tracks and scats were observed in the northern portion of the Transport Development area.

The ultimate development of the Transport Development area will occur in a staged manner commencing from the south western end of the estate (Pinga Street) and gradually extending north over an estimated 10 to 15 year development time frame. The location where Mulgara activity was observed is situated in the northern portion of the Transport Development area. This area is low lying, requires considerable fill material and is well removed from services. Accordingly, development of this land is not expected to take place until stages 5 or 6 of the development, which is estimated to occur after 2016.

LandCorp will re-survey for Mulgara activity prior to the development of each stage of the Wedgefield Industrial Estate expansion. Should Mulgaras appear to be active; a trapping and relocation program will be initiated.

The potential for additional significant fauna species to occur within the subject land is discussed in detail as part of the report at **Appendix 1**; however no species are noted to favour the habitat provided.

4.3 DISTRICT WATER MANAGEMENT & DEVELOPMENT LEVELS

The following preliminary District Water Management information has been prepared in support of the rezoning application and is based on current available information on storm surge, flood levels, drainage, ground water, scheme water. Details on further investigations and studies required to be undertaken prior to final adoption of the Development Plan are also provided.

4.3.1 Storm Surge

Preliminary analysis has been undertaken by Coastal Engineers, MP Rogers and Associates (MPRA), with respect to Storm Surge and a desktop study of flood levels has been completed by JDA Consultant Hydrologists (JDA). Outcomes of these investigations indicate that a 50 year return period or Average Recurrence Interval (ARI) is an appropriate design criteria for industrial development.

A review of the State Coastal Planning Policy, Statement of Planning Policy 2.6 (SPP 2.6), in relation to Wedgefield is outlined in MPRA's letter to LandCorp dated 22 June 2009 (refer to **Appendix 2A**). This letter indicates that the current interpretation of SPP 2.6 equates to design storm in the order of the 500 year ARI event in Port Hedland and provides reasoning for the recommended 50 year ARI as a design criteria for industrial development.

4.3.2 Flooding

South Creek forms the western boundary of the Wedgefield Industrial Estate and is the main potential source of flood water. During significant storm events, there is understood to be an interaction between South and South West Creeks. The location of these water courses relative to Wedgefield are identified in the plan provided as **Appendix 2B**.

A desktop flood study was completed by JDA in October 2009 and is at **Appendix 2C**. This report identifies a possible margin of error of + / - 0.5 metres in respect to the most recent flood levels and that some of the assumptions for earlier studies need to be clarified. Further investigations are recommended using a 2D hydraulic model, such as MIKE 21, and this approach is supported by the Department of Water and detailed in correspondence provided at **Appendix 2D**.

JDA agrees with the submission by MPRA regarding suitable design flood levels for Wedgefield, given current information available. Details of MRPA's preliminary estimates (February 2009) which recommends adopting a 50 year ARI for industrial development associated with the expansion of Wedgefield is referenced at Appendix 1 of the JDA report.

Based on the above, it is proposed to have building floor levels at a minimum height of 6.3m Australian Height Datum (AHD) or above. This acknowledges the 50 year ARI storm surge return period, which includes other allowances as outlined in MPRA's estimates of February 2009. In consideration of onsite drainage requirements and the difference between building floor levels and the balance of the site, a minimum height for developable areas of each lot (i.e. excluding boundary setbacks provisions) is proposed to be at 6.0m AHD.

A number of additional management measures will apply to minimise any potential damage as a result of a flood event. These may include:

- Relatively small building footprints in the Transport Development area;
- Locating all electrical fittings above the potential flood level;
- Storage of any valuable or hazardous goods to be above the potential flood level;
- Use of water resistant building materials for foundations, footings, floors and walls up to the potential flood level; and
- Application of planning and design guidelines, as well as purchaser and certificate of title notifications.

4.3.3 Drainage

There are no defined water courses through the proposed expansion area. The intended drainage strategy for the expansion areas will be to convey stormwater runoff via open channels within road and drainage reserves maintaining the existing flow paths where practical.

The outfall for runoff from LIA 3 & 4 will be via existing open drains in the vicinity of Cajarina Road and Kangan Way to the north-west and out to South Creek. The existing natural surface levels within the LIA 5 area indicate that the land falls towards the north and west with the lowest point occurring where the rail meets Great Northern Highway. From available survey it would appear that stormwater is being intercepted by the rail and the highway reserves where it is then directed to outfall at South Creek. Liaison will be required with the owners of both the highway and rail to ensure that the increase in storm runoff from LIA 5 will not exceed the capacities of their existing drainage systems.

The existing natural surface levels within the Transport Development area indicate that the land typically falls from the southern portion of the site to the north, out falling into the existing tidal flats / creek system. A similar drainage strategy to the light industry area will be adopted using open channels to maximise infiltration. Rather than concentrate the storm water into one major drainage corridor, a number of moderately sized drains are proposed to spread the stormwater flows and maintain near natural drainage paths to the tidal flats. Further details on the estate drainage strategy are contained under Part 5 "Servicing and Infrastructure".

Top soil collected during excavation works will be applied to the open drain batters and seeded with suitable native vegetation for stabilisation.

4.3.4 Onsite Investigations

Geotechnical site investigations were undertaken in early August 2009 on LIA 2, 3 and the initial stages of the Transport Development area. These investigations involved 52 test pits using an 8 tonne backhoe, to a target excavation depth of 3.0 metres. No ground water was encountered during these investigations. An extract of the

executive summary, subsurface conditions and the test pit locality plan are at **Appendix 3**. A full copy of the report can be made available on request.

The Preliminary Environmental Impact Assessment and Biological Survey (October 2009) is at **Appendix 1**. Observations on hydrology and hydrogeology (Section 2.5) and wetlands and watercourses (Section 2.6) are noted in the report.

4.3.5 Ground Water

Communications with Mr Kevin Hopkinson, Senior Natural Resource Management Officer, Department of Water, Pilbara Region on 16 November 2009 indicate that there is unlikely to be any interaction between surface disturbing activities and ground water. The regional water table at Wedgefield is likely to be saline, greater than 3 metres in depth and considered low risk.

There may be a higher, perched groundwater system up to 2m deep that is connected laterally to the tidal marsh areas, and whilst this will be shallower closer to the marsh and creek margins, it may extend into the development area. There may also be smaller pockets of fresher water lenses perched above the mangrove mud layer throughout the site. Any excavation that may extend beyond the depth of fill into the natural horizon may potentially intercept these layers and be considered a medium to high risk, depending on the depth of the excavation and proximity to the tidal and creek systems.

4.3.6 Water Supply

The main proposed zonings / land uses for the expansion of Wedgefield are Transport Development and Light Industry which are not expected to consume large quantities of water. The purpose of the Transport Development zone is to provide land for specialised transport related uses such as storage yards, refuelling facilities, road train assembly and break-down sites, tyre replacement depots, truck washes and maintenance yards. The intent of the Light Industry zone is to provide land for the purpose of generally small scale industrial development, which exhibit a high standard of design and environmental performance in terms of amenity, noise, emissions and generation of vehicular traffic. A relatively small proportion of the expansion area is identified for Industry zoning being comparable to the established areas of Wedgefield.

Major water infrastructure currently exists to the south of Light Industrial Area 5 (LIA 5) with several mains of varying sizes (a 250mm diameter, two 375mm diameter and one 600mm diameter main) crossing the south east corner of the LIA 5 area. Other water mains are located in the established streets and a water reticulation strategy for the extension and reticulation of services is detailed under Item 5 "Infrastructure and Servicing".

The water reticulation strategy has been prepared in consultation with the Water Corporation. Indications are that the existing infrastructure has adequate capacity to reticulate water to the proposed expansion areas of the Wedgefield Industrial Estate. The identified development areas will be progressively released over a 10 to 15 year timeframe and LandCorp will continue to work with the Water Corporation on the forecasted staging of future releases to ensure that any upgrades are appropriately planned and programmed.

4.3.7 Further Investigations / Studies

LandCorp is preparing a flood / storm surge modelling brief and will consult with the Department of Water, Town of Port Hedland, Department of Planning, Department of Transport, Main Roads WA and the Port Hedland Port Authority on the proposed scope and methodology. This study will include a 2D hydraulic model, such as MIKE 21, a review of the catchment hydrology, the MPRA storm surge analysis and the timing difference of the two types of flooding regimes.

In recognition of storm water management requirements for the site, a Local Water Management Strategy (LWMS) will be prepared to meet the Department of Water policy requirements. The LWMS will address the above issues including the results of storm surge / flood modelling and analysis of geotechnical information collected by LandCorp and MRWA to more accurately determine ground water levels in the area. The Development Plan will be finalised once the LWMS has been endorsed by the respective agencies.

4.4 ABORIGINAL HERITAGE

An anthropological and archaeological survey was undertaken by Anthropos Australis Pty Ltd on behalf of Marapikurrinya Pty Ltd and LandCorp during November 2008. Further anthropological consultation was undertaken in March 2009.

A summary report was prepared following the completion of the survey work, with the key recommendations of the report as they apply to the WIEDP area provided as **Appendix 4**.

5. SERVICING & INFRASTRUCTURE

The WIEDP area is capable of being serviced by all necessary utility services. Wood and Grieve Engineers have provided the following information (full report attached as **Appendix 5**).

5.1 ELECTRICITY

Power supply to the proposed lots within LIA 3 and LIA 4 is based on the standard 200kVA per hectare. Confirmation has been received from Horizon Power that sufficient capacity exists to service the proposed development and also, if necessary, any advice on upgrading work to ensure sufficient serviceability of the proposed development.

It is intended that the power supply to LIA 5 be initially limited to 100kVA/ha at the time of land release, with internal reticulation, including transformers, being sized to 200kVA/ha (or as agreed with Horizon Power). This will allow for lot owners to ultimately upgrade their power supply on an individual basis without incurring significant infrastructure upgrade costs, while also recognising that not all landowners may choose to do so.

The Transport Development Area provides larger sites to accommodate road train movements and yard storage for logistics activities. Generally, power usage is expected to be lower and power supply will be capped at 50kVA/ha, with transformers sized at 100kVA/ha capacity (or as agreed with Horizon Power) and underground cables to 200kVA/ha. Small clusters of lots between 0.5 – 1ha in size will be serviced from the outset with a high power supply, limited to 100kVA/ha, but with 200kVA/ha reticulation. The notional allocation of higher power rated lots within the Transport Development Area are shown on **Plan 12 Indicative Power Supply Plan.** The reader is reminded of the notations on Plan 12. These notes remind the reader that the plan is indicative only and that final power allocation will be reflected in sales plans once detailed reticulation power design and site surveying is completed.

The above approach reflects discussions between Horizon Power, LandCorp and the project engineers, Wood and Grieve. A preliminary analysis of Wedgefield's existing consumption and investigations into power demand for typical businesses in the Transport Development area suggests that a lower demand than standard supply will be required. The proposed power strategy (reflected in Plan 12) will rationalise electricity allocations in line with existing and forecasted consumption and minimise unnecessary major infrastructure upgrades. It will provide appropriately sized underground infrastructure to provide owners with the flexibility to upgrade power to meet specific high demand needs, should these arise.

The project surveyor, Whelans, have undertaken a survey of the proposed Transport Development area and have confirmed the alignment of the existing high voltage powerlines running along the eastern edge of the existing Wedgefield area. Wood and Grieve Engineers in discussions with Horizon Power have indicated that a 30m wide easement would be appropriate to accommodate the current alignment of the powerlines. Where possible, powerlines are to be contained within road reserves.

5.2 TELECOMMUNICATIONS

Telstra cabling currently runs in Cajarina Road and Pinga Street. It is expected that lots forming LIA 3, LIA 4 and LIA 5 will be able to gain service from an extension to the existing cabling.

Telstra cabling currently runs in the Great Northern Highway reserve adjacent to the Transport Development area and also other proposed connecting roads adjacent to the site. It is expected that lots forming the Transport Development area will be able to gain service from an extension of the existing cabling.

5.3 GAS

Alinta has noted that they have no assets in this area. Reticulated gas supply is not planned as part of the WIEDP area.

5.4 SEWERAGE

There is no sewer present in Wedgefield. Provided lot sizes are kept above 2,000m2 it is expected that the Water Corporation will not include a requirement to connect to sewer.

The Water Corporation have also noted that the WIEDP area is beyond their current sewer operating licence area and that additionally they have no sewer planning or capacity for this area.

It is understood that the current arrangement for disposal of effluent in Wedgefield is via on-site methods. Geotechnical investigations have noted that due to the permeability of the land, on-site disposal systems will be suitable but will typically need to be oversized and should be assessed on a lot by lot basis.

5.5 WATER SUPPLY

The Water Corporation have indicated that Light Industrial Area 3 and 4 (LIA 3 & LIA 4) will be served by the existing 150mm diameter water main in Cajarina Road and Pinga Street. Should any internal roads be created within LIA 3 or LIA 4, an extension to the 150mm diameter water main will be required.

Major water infrastructure currently exists to the south of Light Industrial Area 5 (LIA 5) with several mains of varying sizes (a 250mm diameter, two 375mm diameter and one 600mm diameter main providing the water service to Port Hedland) crossing the south east corner of the LIA 5 area. The Water Corporation has noted these water mains are of strategic importance and reservation in road reserve or under separate title is the required outcome. The ultimate extent of development to the south-east of the LIA 5 area has therefore been amended to acknowledge the existing mains infrastructure.

The Water Corporation have advised that to serve LIA 5, a connection to one of the existing mains travelling north-east toward Port Hedland with a 300mm diameter water main will be required. Pending further discussion with the Water Corporation, this may require a minor mains upgrade, to be funded by the developer. The 300mm diameter main will extend through LIA 5 with the reticulation of the area being via 150mm diameter mains connecting off the

300mm diameter main. It is also noted that the 300mm diameter main will be ultimately required to extend to the Transport Development area.

Existing 150mm diameter water mains runs in the road reserves to the west of the Transport Development area. The Water Corporation has noted that the extension of these mains will be necessary to supply the Transport Development areas.

In addition, a 300mm diameter distribution main will need to be extended along Great Northern Highway to assist with maintaining adequate pressure within the system. As noted in LIA 5, the 300mm diameter distribution main will be an extension from the LIA 5 installation.

The mains servicing the existing Wedgefield Industrial Estate can be relocated, at the developer's expense. These details will be further discussed with the Water Corporation to identify the most appropriate method to service the expanded Wedgefield Industrial Estate.

5.6 STORMWATER DRAINAGE

The existing stormwater drainage operating within the LIA 3 and LIA 4 area allows stormwater runoff to egress via the road network and open drainage channels within the road reserve. The outfall for runoff in this area is to the north-west through the proposed LIA 2 and out to South Creek.

The drainage strategy for the WIEDP area will be a similar approach, with the intent being to direct stormwater to open drains within the road reserve and then connect these drains to the existing system.

The existing natural surface levels within the LIA 5 area indicate that the land falls towards the north and west with the lowest point occurring where the rail meets Great Northern Highway. From available survey it would appear that stormwater is being intercepted by the rail and the highway reserves where it is then directed to outfall at South Creek.

The intended drainage strategy for the area will be to convey stormwater runoff via open channels within road reserves and maintain the existing flow path. As this will increase the impervious area within LIA 5 and therefore burden the existing highway and rail drainage further it will be necessary to liaise with the owners of both the highway and rail to ensure the increase in storm runoff will not exceed the capacities of their existing drainage systems.

The existing natural surface levels within the Transport Development area indicate that the land typically falls from the southern portion of the site to the north out falling into the existing creek system. Due to the existing road networks adjacent to the west of the site, the connection of the future roads with the Transport Development area means that some stormwater runoff may head west out falling to South Creek. This can be confirmed during detailed design.

The intended drainage strategy for the area will be to convey stormwater runoff via open channels within road reserves and maintain the existing flow paths. This will therefore maintain outfalls to the northern creek system and South Creek.

It is also noted that a storm surge and flood study is currently underway for LandCorp's proposed developments in Wedgefield. This information will have a bearing on the drainage design as well as the required bulk earthworks necessary to protect against seasonal flooding, though it does not obviously preclude the proposed rezoning process.

6. TRAFFIC & TRANSPORTATION

6.1 REGIONAL ROAD NETWORK

LIA 3, 4 and 5 and the Transport Development area all have a significant frontage to Great Northern Highway, which provides the main road traffic route linking Perth to the Pilbara, and extends further north into the Kimberley. It is therefore important to protect the function of the Great Northern Highway, not only in context of traffic movement into the Wedgefield industrial area, but also both private and heavy vehicle movement in a regional context.

The Town of Port Hedland has indicated that the view of both the Light Industry and Transport Development area from Great Northern Highway are to be protected through various visual screening options including earth bunds and plantings. This reflects a desire to protect the visual amenity of the entrance into Port Hedland and screen, where possible, the view of industrial uses from Great Northern Highway.

6.2 RAIL NETWORK

The Port Hedland – Goldsworthy Railway forms the southern most boundary of the LIA 5 area and as such, creates a significant constraint to the extension of industrial development. It is also acknowledged that there are traffic related issues associated with the at grade intersection with both Great Northern Highway and Wallwork Road. Whilst the Town of Port Hedland has indicated a desire for the construction of a grade separated crossing where Wallwork Road intersects the railway, planning is in its infancy and no funding sources have been identified in order to progress the design.

6.3 EXISTING WEDGEFIELD ROAD NETWORK

Whilst the road network within the existing Wedgefield industrial area is well established, MRWA has identified a number of key intersection and road upgrades in the short term (**Appendix 6 – MRWA Road Improvement Plan**). Also considered in longer term planning by MRWA is the planning and construction of a 'Loop Road', running to the north and west of Wedgefield. The Loop Road has been designed to redirect heavy vehicle movement away from the Great Northern Highway/Wallwork Road intersection and the Great Northern Highway/Pinga Street intersection.

In acknowledging the progressed nature of both short and long term road planning by MRWA, a plan has been prepared demonstrating the ultimate road network envisaged for the Wedgefield industrial estate (**Plan 13 – Road Network Plan**).

6.4 OBSTACLE LIMITATION SURFACES

Preliminary enquiries with the Town of Port Hedland (Manager - Airport Operations) confirm that land use controls and management practices may need to apply to the north-east corner of the TD area to meet Obstacle Limitation Surfaces (OLS) requirements.

The OLS impacted land is part of the later stages of the TD area. LandCorp will continue to work with the ToPH on structure height limitations. Other factors apart from height restrictions (radio masts, construction cranes or crane hire, scissor lifts etc) that would need to be taken into account would be, smoke emissions, roof glare and any other factor that may impinge on safety.

6.5 SUMMARY

Ongoing discussions between LandCorp and the Department of Planning have acknowledged the ultimate potential impacts of increased traffic as a result of the expansion of the Wedgefield Industrial Area. Based on discussions with the TAG group, preliminary investigations involving traffic data collection were undertaken resulting in an origin and destination survey. The traffic data report has been circulated to MRWA and the Department of Planning, with an outcome of the report including a recommendation to undertake traffic modelling. LandCorp is now working with the Port Hedland Port Authority (PHPA) to utilise the existing Utah Point traffic model for the Wedgefield expansion. LandCorp will continue to work in a collaborative manner with the PHPA, MRWA and Town of Port Hedland and has detailed the status of further traffic investigations in a letter to the Department of Planning (refer to **Appendix 7**). This detailed traffic information will ultimately be used to inform and refine the final Development Plan.

7. THE DEVELOPMENT PLAN

The WIEDP acknowledges the various Light Industry, Industry and Transport Developments zones as they are outlined on the accompanying Scheme Amendment, with each zone having a range of permissible uses based on its envisaged role in relation to the broader Port Hedland area. Refer **Plan 14 – Wedgefield Industrial Estate Development Plan.**

7.1 DESIGN PRINCIPLES

The key design principles for the WIEDP are based on the results of consultation undertaken through numerous TAG meetings, the recommendations of the LUMP, and the key opportunities and constraints that have been identified through discussions with various agencies and stakeholders. The following principles have dictated the design of the plan and accompanying development requirements:

- Developing an attractive and presentable 'Gateway' to Port Hedland along both Great Northern Highway and Wallwork Road;
- Containing the spread of industrial uses in well planned and orderly precincts that will support light industry and transport related uses;
- Acknowledging and responding to the recommendations and suggestions of previous strategic documents, notably the Port Hedland Land Use Master Plan (LUMP);
- Restricting land-uses which may adversely impact on the existing residents of the Wedgefield Industrial area;
- Providing allotments that meet market demands;
- Providing for a permeable road and movement network that accommodates heavy transport vehicles through properly designed intersections and road carriageway widths that will allow for ease in circulation and movement; and
- Encouraging attractive and high quality built form that integrates sustainable design components which will respond to Port Hedland's unique climate.

7.2 DEVELOPMENT PRECINCTS

A number of concepts were prepared early on and, following TAG meeting consultation, these have been refined to form the Development Plan now proposed. **Plan 2 - Industrial Planning Precincts**, illustrates the relationship between the various Light Industrial, Industry and Transport Development areas.

7.2.1 Light Industrial Areas 3 & 4 (LIA 3 & 4)

Whilst the specific number of lots ultimately created within each precinct will be refined at the subdivision stage, these sites initially comprise:

- LIA 3: approximately 29 lots ranging in size from 2013m² to 5858m².
- LIA 4: an isolated land parcel lying between Great Northern Highway, the Port Hedland-Goldsworth Railway and the new Finucane Island access road. It is anticipated that a low traffic generating use may be allocated for this site in the short term whilst the Finucane Island access road continues in its existing alignment (subject to MRWA agreement). The ultimate development of the site is only likely to be realised once the Loop Road is operational and the Finucane Island access road has been removed.

The current concept for LIA 3 and LIA 4 recognises the intended development of a landscaped buffer within the existing MRWA Road Reserve (See draft landscape plan at **Appendix 8**). The site gains relatively good exposure to key adjoining transport routes and LIA3 and LIA4 will be subject to stricter controls on the visual amenity of the industrial uses and may therefore ultimately form part of a 'Gateway' to the Wedgefield Industrial Estate.

Due to its proximity to the existing industrial area, land use will be restricted to small service and light industrial uses which are recognised by the EPA Guidance Statement No.3 as being appropriate for location in close proximity to sensitive uses.

Due to the proximity and frontage to Great Northern Highway, it is likely any development within the precinct will be visible from the road. It is noted that a landscape buffer containing both earth bunds and plantings is provided within the 100m wide road reserve, with approximately 40m of separation between the precinct and the road carriageway. All development will also be required to address Great Northern Highway in an attractive manner. Due to the relative heights of the Great Northern Highway and the ultimate built form, earth bunding/landscaping will not be able to block the view of developments but will provide a screening effect. Accordingly, the Development Plan will incorporate appropriate development and landscaping controls to ensure that development contributes to an attractive entrance to Port Hedland through the use of Design Guidelines.

7.2.2 Light Industrial Area 5 (LIA 5)

LIA 5 comprises a number of potential development cells, with an ultimate yield of 60-80 lots, with lots intending to range from approximately 2000m² to 5ha. Given the site's location, with high exposure to Great Northern Highway and Wallwork Road, controls on land use and development standards are therefore higher than for the broader internal core industrial and transport development areas.

The layout of LIA 5 acknowledges the existing Water Corporation water main infrastructure located in the south-eastern corner of LIA 5 and generally running parallel to Wallwork Road, as well as water mains running across LIA 5 from Wallwork Road to Pinga Street. The water mains along Wallwork Road are intended to be contained within the road reserve as shown on the Development Plan, with the water mains bisecting LIA 5 to be contained within an easement and/or within an internal road reserve. Further design details will be confirmed at the subdivision stage.

As outlined in Part 6.2, the layout of LIA 5 considers the ultimate construction of a fly-over where Wallwork Road intersects the Port Hedland – Goldsworthy Railway. Should the fly-over be created, there may be an opportunity to extend the southernmost internal LIA 5 road east under the railway fly-over to provide access to land to the east.

Landscaping and built form presentation will also be required to be of a higher standard for lots fronting Great Northern Highway and Wallwork Road. Similar to LIA 3 & 4, appropriate design guidelines will ensure that development contributes to the enhancement of the main entry into Port Hedland in accordance with the requirements of the LUMP.

7.2.3 Industry Area

A small area of land currently "Transient Workforce Accommodation (R20)" is proposed to be rezoned to the "Industry" zone as it currently exists under TPS5. This is intended to acknowledge the current use of these sites for Transient Workforce Accommodation (TWA) by affording the sites ongoing non-confirming use rights for the period of their current lease arrangements. Following the expiration of the lease arrangement, development of the sites would have to be in accordance with the industry zone. The rezoning of this land as part of the WIEDP process provides certainty for the both WIEDP project and surrounding private landowners, and removes any ongoing question of land use incompatibility. A letter of support for the inclusion of the TWA site has been received from the Department of Regional Development and Land – State Lands and is provided at **Appendix 9.**

It is acknowledged that in the short term, the ongoing operation of the TWA site impacts on the permissibility of industrial uses within proximity to the TWA site and therefore requires consideration of the ultimate staging of industrial development. Discussions with the Department of Environment and Conservation and the Town of Port Hedland have informed the staging plan included in this WIEDP report (**Plan 15)**. Based on development timeframes and the remaining lease terms of the TWA site, it is anticipated that the release of a 2nd stage of the Transport Development area can occur, with the inclusion of an 'Additional Control Area' as identified on **Plan 14**.

A proposed open drainage channel to the north-west of the Tox Free site (Lot 5857 Schillaman Street) will define the boundary between the "Industry" and "Transport Development" zones.

7.2.4 Transport Development (TD) Area

The Transport Development area comprises land immediately south of the Port Hedland Port Authority area, with proposed lot sizes ranging from 6000m² to 13.5ha. The demand for smaller lots is supported by preliminary market feedback provided at **Appendix 10**.

It is generally intended for less visually appealing activities (ie. Storage and lay down areas) to be confined to the centre of the precinct, with more presentable uses located along higher traffic routes.

Whilst the development of the TD area is somewhat reliant on the construction of the proposed Loop Road, primary access is available via the new road off Pinga Street running parallel to Anthill Street, with secondary access likely to be available via an extension of Schilliman Street and Moorambine Street.

The TD area will be specifically oriented toward providing land for more specialised transport related uses such as refuelling, break-down sites, tyre replacement depots, truck washes and maintenance yards.

The PHPA have been active participants in the WIEDP planning process and provided comment both in respect to PHPA activities and also the plans proposed in this document. The design of the WIEDP road network and lot configurations has, wherever possible, had due regard to PHPA requirements.

The TD area faces two distinct considerations that will affect the permissibility and site development of some uses internally:

- The TD areas direct proximity and abutment to the existing Wedgefield industrial area and the Transient Workforce Accommodation (TWA) facility; and
- The TD areas direct frontage to Great Northern Highway.

The above two matters are dealt with through the inclusion of 'Control Area 1' and 'Control Area 2' respectively in the WIEDP.

Control Area 1 will remain as an important land use, development and operational control for as long as the Transient Workforce Accommodation facility remains in place. The provisions relating to Control Area 1 are stated on the Development Plan and reflect a review undertaken of the potential for land use conflict by LandCorp, RPS Koltasz Smith, the DEC and Herring Storer Acoustics. The provisions address matters of site planning, hours of operation, general noise generation and the requirement for any proponent to provide a strategy for noise emission reduction and control. Ultimately, as the TWA lease expires and the land use of the TWA site converts to industrial, the role of Control Area 1 will cease with the removal of the land use conflict potential.

Control Area 2 will address the key objective of presentation of the industrial estate to Great Northern Highway as the gateway to Port Hedland. Control Area 2 will require higher levels of landscape and presentation and as a result will influence land use. The provisions for Control Area 2 are stated on the Development Plan and require Design Guidelines to protect the interface of the development along Great Northern Highway. Additional requirements in the Design Guidelines will include screening of development, landscaping and the like.

Control Areas 1 and 2 are intended to benefit existing and future operations in recognising existing use (the TWA) and recognising the role of Great Northern Highway. They will affect the location of uses which may be visually obtrusive (i.e. Scrap Storage or break down areas) or noise generating uses that can't be located within a certain distance of the TWA site.

7.3 LANDUSE

7.3.1 Transient Workforce Accommodation

Development within the Transport Development area is to be restricted (in terms of hours of operation and permissibility of uses) within proximity to the existing Transient Workforce Accommodation site (as shown on **Plan**

14) and described above in respect to Control Area 1. These restrictions are based on discussions with the DEC in order to minimise the impacts of noise on the current Transient Workforce Accommodation facility.

A copy of noise restriction measures extracted from correspondence between LandCorp and the DEC is provided at **Appendix 11**.

7.3.2 Caretakers Dwellings

Caretakers Dwellings will not be permitted in any areas of the WIEDP.

Furthermore, consideration must be given to WAPC Planning Bulletin No.70 which highlights the following objectives with regards to Caretaker's Dwellings:

a) *"To discourage the establishment of residential uses in industrial areas which may compromise the integrity of industrial areas and create unacceptable residential environments.*

b) *To provide for caretakers dwellings in industrial areas in limited circumstances and subject to appropriate planning controls."*

Subject to Council consideration on the appropriateness of caretaker's dwellings in the existing Industrial area and the development of appropriate planning controls to ensure the integrity of Wedgefield as an industrial area is not further compromised, it may be that Council reconsiders the matter at a later date in order to permit Caretaker's dwellings in certain areas, such as the LIA precincts. This would be facilitated by a minor amendment to the Scheme and require review of relevant scheme provisions and existing land uses at that time.

7.3.3 General Industry

The Boodarie Industrial estate has been identified as an appropriate location for heavier industrial land-uses including General Industry, Noxious Industry and Extractive Industry.

Development of this land for such purposes is the most appropriate manner to rationalise industrial land use in the Town of Port Hedland as it would not result in an adverse impact on the health and safety of people or detrimentally affect the entrance to Port Hedland. Accordingly, no General, Heavy or Noxious Industry will be permitted within the WIEDP area.

7.4 ROADS & MOVEMENT

7.4.1 Road Network

A Road Network Plan has been prepared to indicatively show the hierarchy of both existing and proposed road networks within the WIEDP area (refer **Plan 12**). Future roads shown on the plan will be required to cater for road trains (including triples and quads) and include:

- MRWA indicative 'Loop Road' running around the northern and western boundaries of the Wedgefield area which will ultimately become the designated heavy vehicle route;
- Creation of new fly-over for intersection of Loop Road and Great Northern Highway; and
- Realignment of Great Northern Highway as per MRWA short term improvement plans.

It is also suggested that the future extension of Pinga Street through to the Loop Road would increase the overall permeability of the estate and result in a clear 'spine road' running from Great Northern Highway through to the proposed Loop Road. This would however require either the purchase or some form of negotiation with the owner of Lot 2448 Moorambine Street. Given the complexities of land acquisition by LandCorp, this has been shown as an ultimate desired outcome on the Road Network Plan, with further negotiation required at a later stage. The alternative extension of Draper Street also provides access through to the Loop Road, albeit it in a less direct fashion.

7.5 DRAINAGE AND WATER MANAGEMENT

The existing stormwater drainage operating within the LIA 3 and LIA 4 area allows stormwater runoff to egress via the road network and open drainage channels within the road reserve. The outfall for runoff in this area is to the north-west through the proposed LIA 2 and out to South Creek.

Drainage for the remainder of the WIEDP area will be similar, with stormwater directed to open drains within the road reserve and then connected to the existing system.

7.6 LANDSCAPING

Landscape Consultants UDLA have prepared an Indicative Landscape Plan, with elevations demonstrating a number of key road layouts and proposed planting and bunds along Great Northern Highway to provide an attractive entry into Port Hedland. This plan is provided at **Appendix 8**.

The plan demonstrates the manner in which earth bunds and selective plantings will be used in order to provide a screening of industrial uses from Great Northern Highway.

8. ADOPTION & IMPLEMENTATION

8.1 SCHEME AMENDMENT

To facilitate the ultimate adoption of this Development Plan, it is necessary to amend TPS5 to:

i. modify the 'Airport Development Plan Area' in Appendix 5 of TPS5 to reflect the WIDEP area;

ii. create a 'Transport Development' zone;

iii. create a 'Light Industry' zone;

iv. rezone the WIEDP area appropriately; and

v. rezone the TWA site to "Industry" zone.

A separate amendment request has been lodged simultaneously with this Development Plan to allow for joint assessment, advertising and determination. It is acknowledged that there is an additional body of information required prior to the finalisation and endorsement of the Development Plan, however discussions with the various referral agencies have confirmed that the information provided is sufficient to support the progression of the Scheme Amendment. The Development Plan will therefore continue to inform the Scheme Amendment, with the ultimate endorsement of the Development Plan once the traffic assessment report and LWMS have been completed.

8.2 SUBDIVISION

The provisions of the WIEDP will require any super lot subdivision to be in accordance with the approved WIEDP. Otherwise, the WIEDP limits further subdivision following the initial creation of the lots.

8.3 STAGING & LAND RELEASE

An indicative staging plan for the Transport Development area is provided as **Plan 15**. This plan has been prepared to demonstrate the ability for the land to be released in a manner that allows for the logical creation of a road network on a staged basis, as well as allowing for the coordinated extension of services.

The staging plan considers:

i. the progressive extension of the TD area eastwards from Pinga Street;

ii. the orderly growth of the road network through a series of 'loop extensions' that avoid the use of undesirable temporary cul-de-sacs in an industrial area;

iii. the inclusion of a variety of lot product both in size and frontage in each stage; and

iv. the allowance for ultimate staging extensions northwards to link with the outer loop road alignment.

8.4 DESIGN GUIDELINES & BUILT FORM

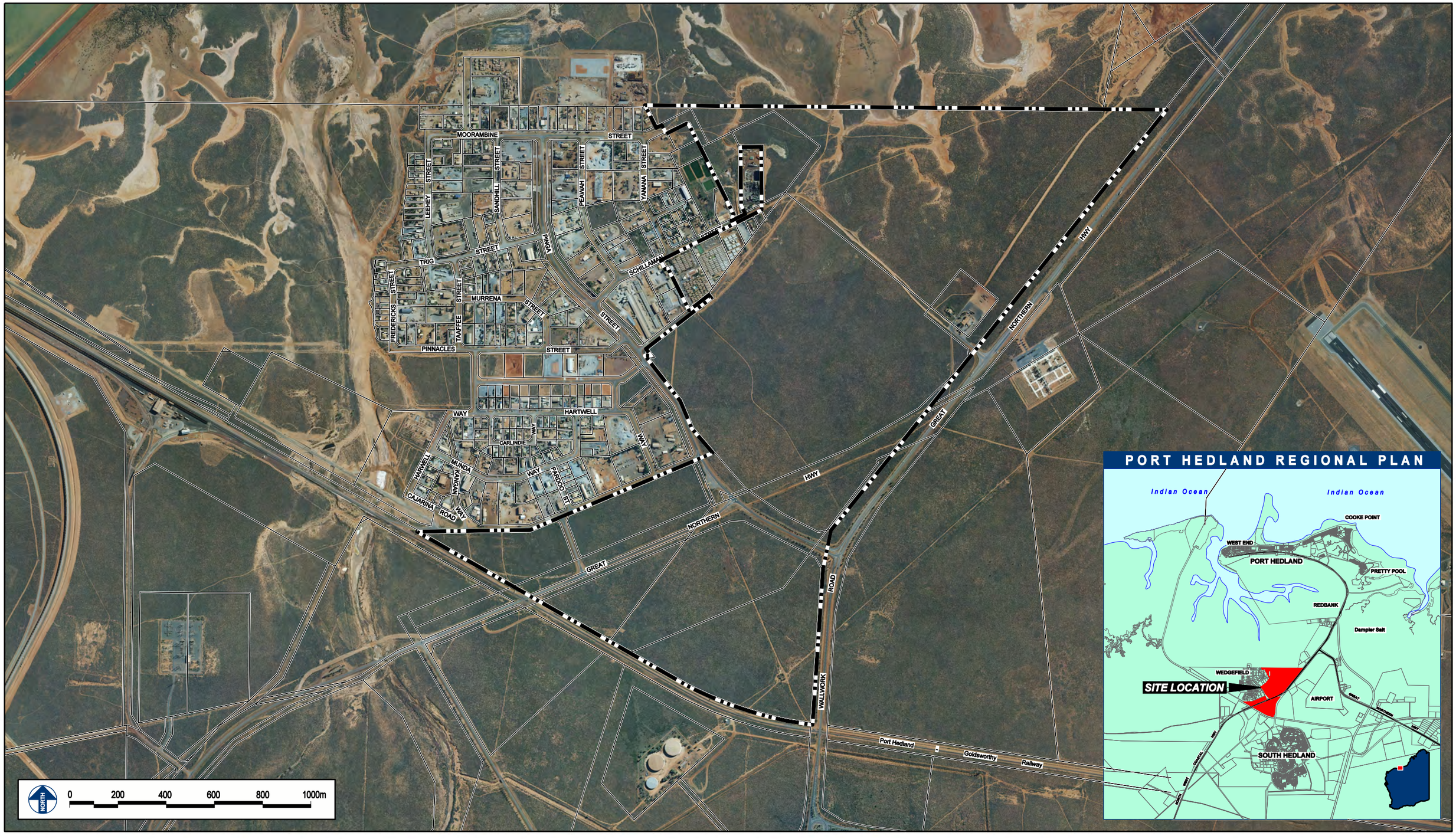
Consistent with earlier LandCorp industrial land releases in the region, the WIEDP requires that development be undertaken in accordance with estate Design Guidelines. A range of matters that may be included in the Design Guidelines are recognised in the main WIEDP shown as **Plan 14**.

The Design Guidelines will be finalised in conjunction with subdivision approval being obtained for each of the precincts, and while it is not intended that the Design Guidelines be adopted as policy by Council, it is anticipated that compliance will be required as a condition of sale of individual lots. Adoption by the Town of Port Hedland as a policy under TPS5 will be canvassed with the Town as the project progresses and draft Design Guidelines are developed.

9. SUMMARY

This WIEDP has been prepared in conjunction with a proposed amendment to TPS5 in order to facilitate the orderly and coordinated expansion of industrial uses at Wedgefield, Port Hedland.

Once adopted, the WIEDP will continue to form the framework for subdivision of the land and allocate distinct development parcels to allow for the timely development and release of land to the market. The WIEDP details the ultimate form of the Wedgefield industrial area, with the appropriate supporting documents including traffic, engineering and environmental reporting.



AERIAL OVERVIEW PLAN

WEDGEFIELD INDUSTRIAL ESTATE

LEGEND

Wedgefield Industrial Estate Development Plan Area

Base data supplied by Landgate

Aerial Photography dated October 2008, accuracy +/- 4m, Projection MGA Zone 50

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N.T.	:	CHECKED

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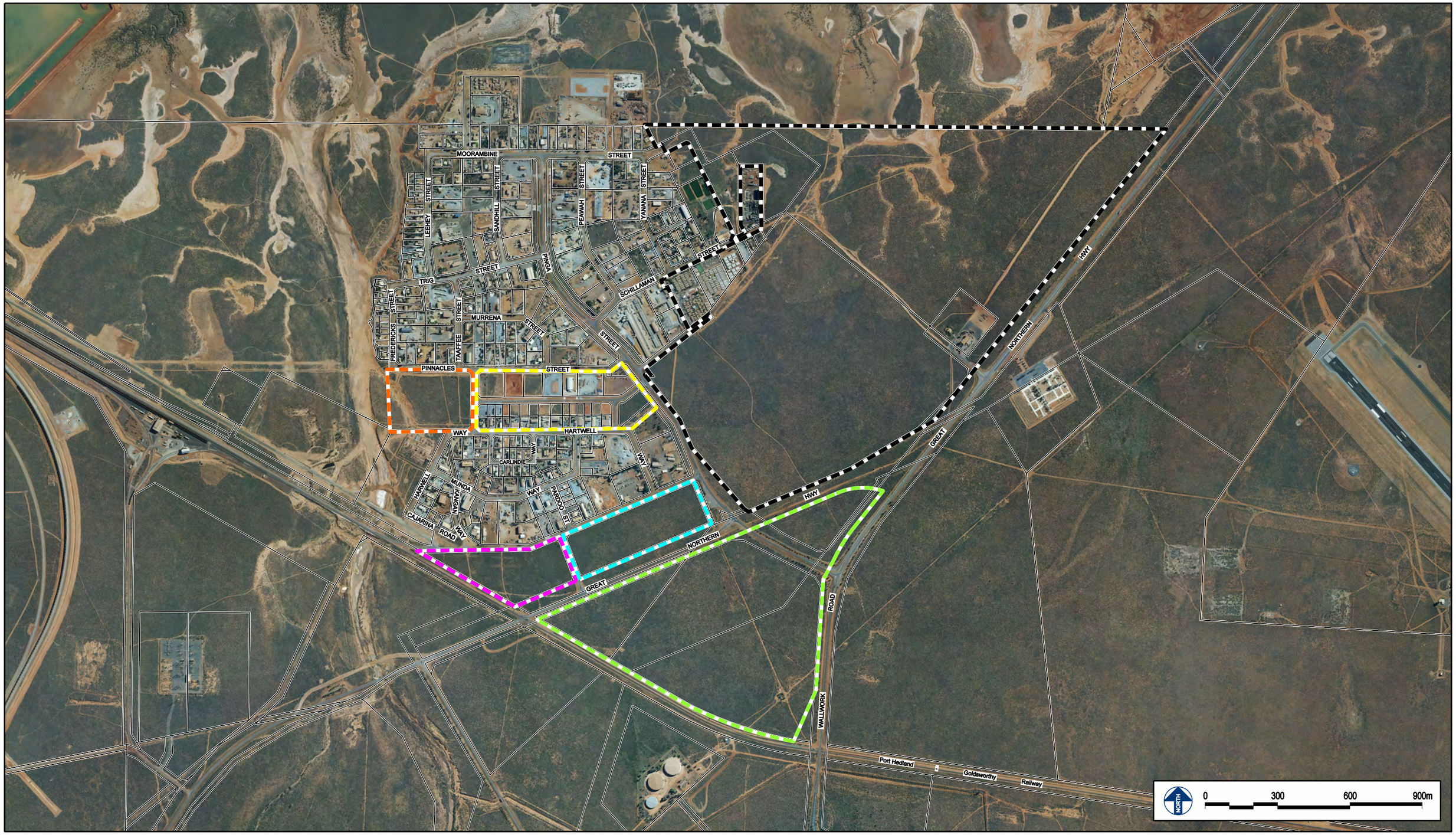
PLAN 1



INDUSTRIAL PLANNING PRECINCTS

WEDGEFIELD INDUSTRIAL ESTATE

LEGEND

- Light Industrial Area (LIA 1) - Subdivision Completed 2007/8
- Light Industrial Area (LIA 2) - Subdivision Approved 2009
- Light Industrial Area (LIA 3) - Wedgefield Industrial Estate Development Plan
- Light Industrial Area (LIA 4) - Wedgefield Industrial Estate Development Plan
- Light Industrial Area (LIA 5) - Wedgefield Industrial Estate Development Plan
- Transport Development Area (TD) - Wedgefield Industrial Estate Development Plan

Base data supplied by Landgate

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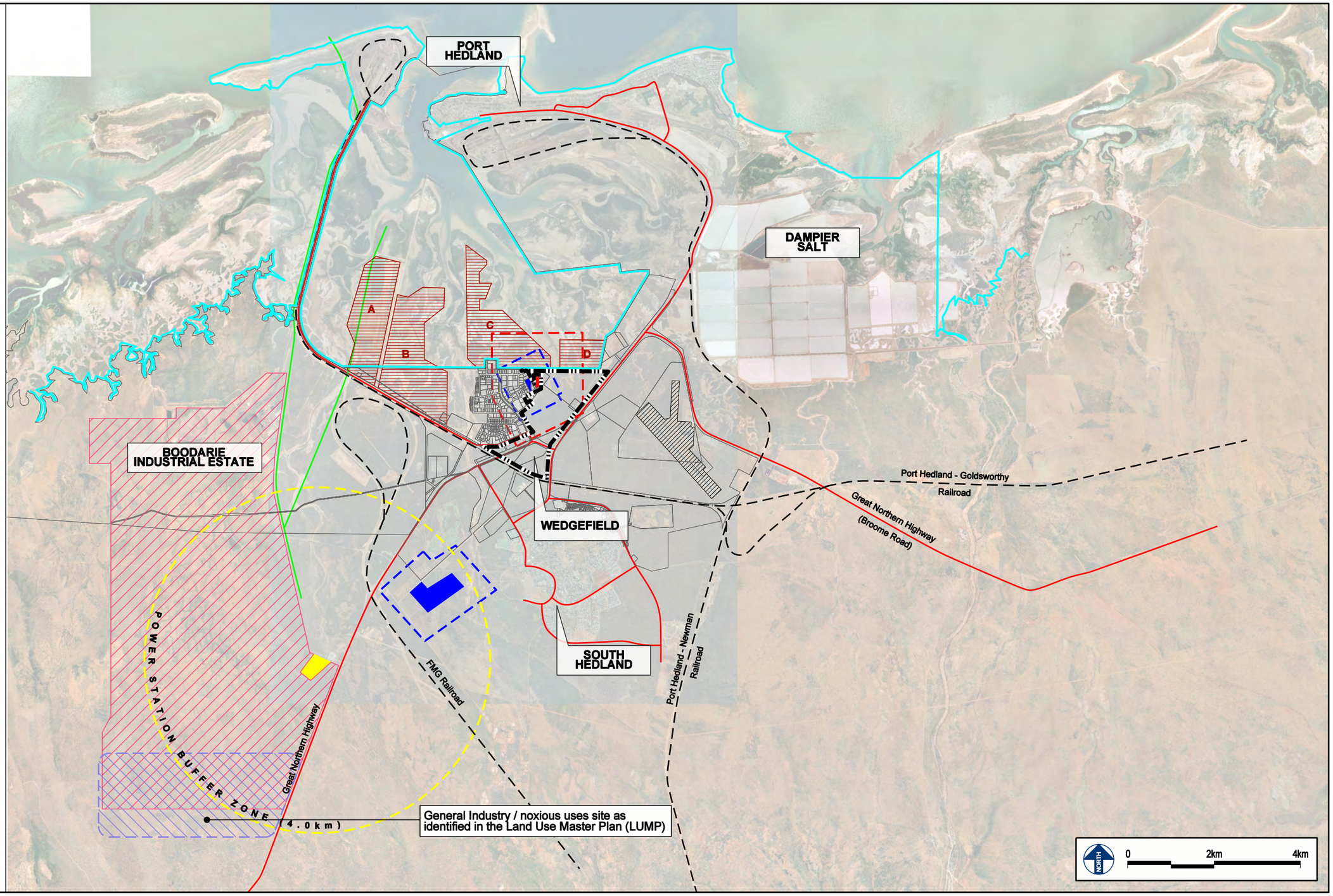
PLAN 2

LEGEND

- Wedgefield Industrial Estate Development Plan Area
- Port Authority Boundary
- Service Corridor
- Existing Major Roads
- Railway
- 4km Buffer from Power Station
- 500m Buffer from Water, Sewage and Drainage
- 1km Buffer from Tox Free Site
- Waste Water Treatment Plant and buffer
- Tox Free Site
- Power Station
- Boodarie Industrial Estate
- A — Future Port Hedland Port Authority Reclamation Area
- Port Hedland Airport
- General Industry / noxious uses



REGIONAL CONTEXT PLAN

WEDGEFIELD INDUSTRIAL ESTATE

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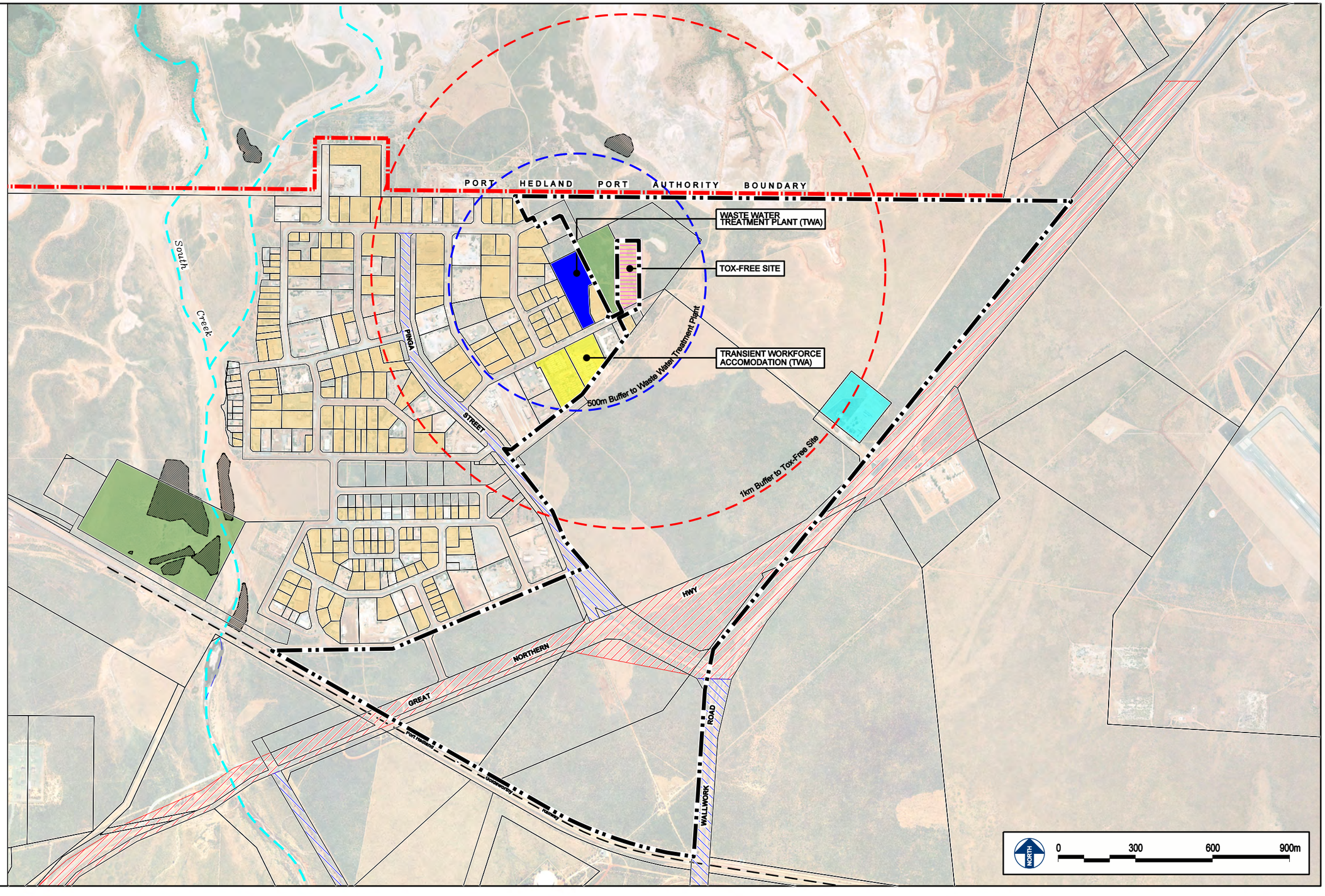
PLAN 3

LEGEND

- Wedgefield Industrial Estate Development Plan Area
- Port Hedland Port Authority Boundary
- Creek Line
- Port Hedland To Goldsworthy Railway
- Caretaker Dwellings (as per Appendix 2 of T.P.S)
- Tox Free Site
- Waste Water Treatment Plant
- Roadhouse
- Parks and Recreation
- Aboriginal Heritage Sites - DIA - 20081214
- District Road Reserve
- State and Regional Roads Reserve



LOCAL CONTEXT PLAN

WEDGEFIELD INDUSTRIAL ESTATE

Base data supplied by Landgate, Projection MGA Zone 50

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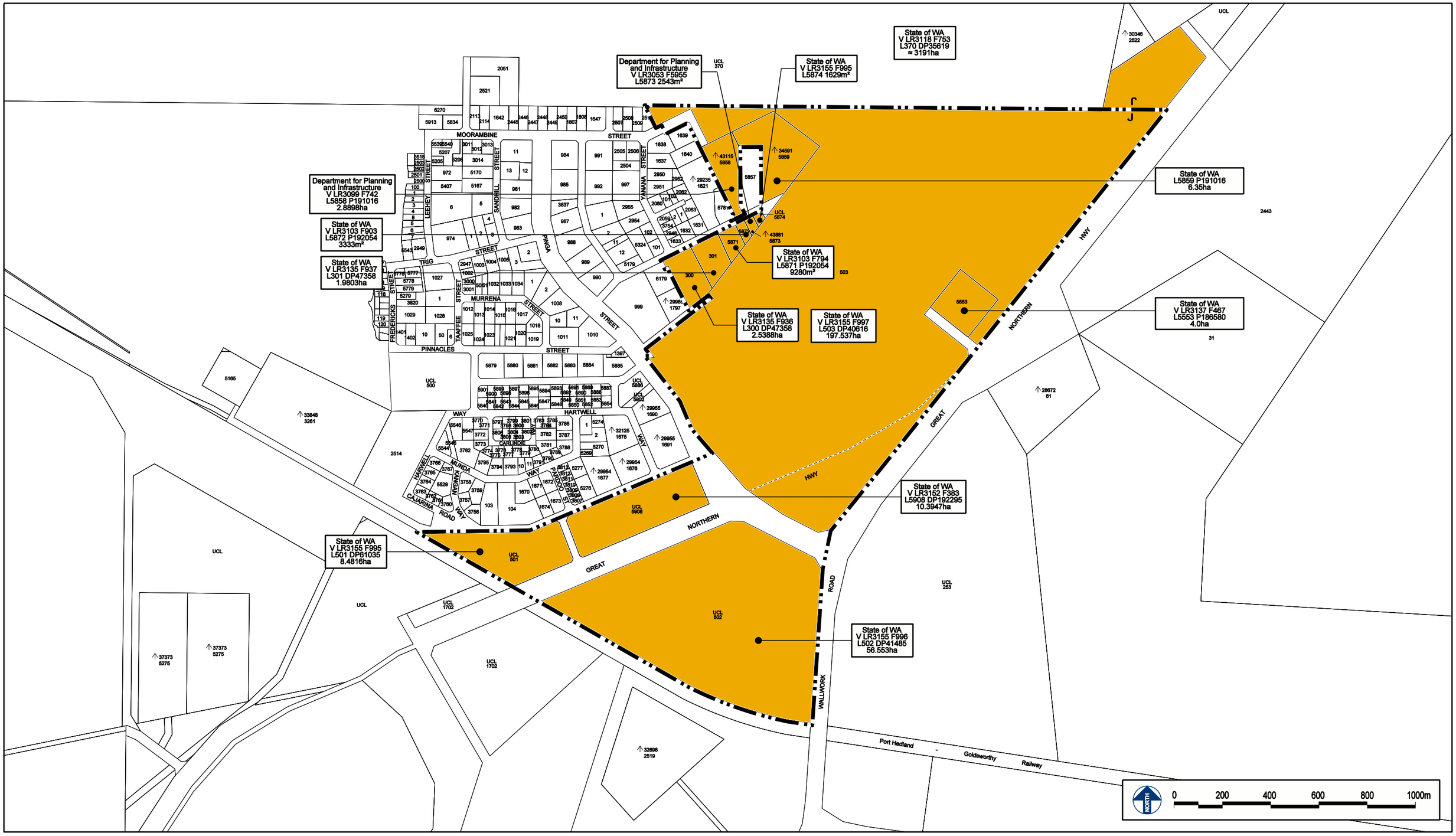
PLAN 4



LANDOWNERSHIP PLAN

WEDGEFIELD INDUSTRIAL ESTATE

LEGEND

- Wedgefield Industrial Estate Development Plan Area
- Crown / Government Land

Base data supplied by Landgate, Projection MGA Zone 50

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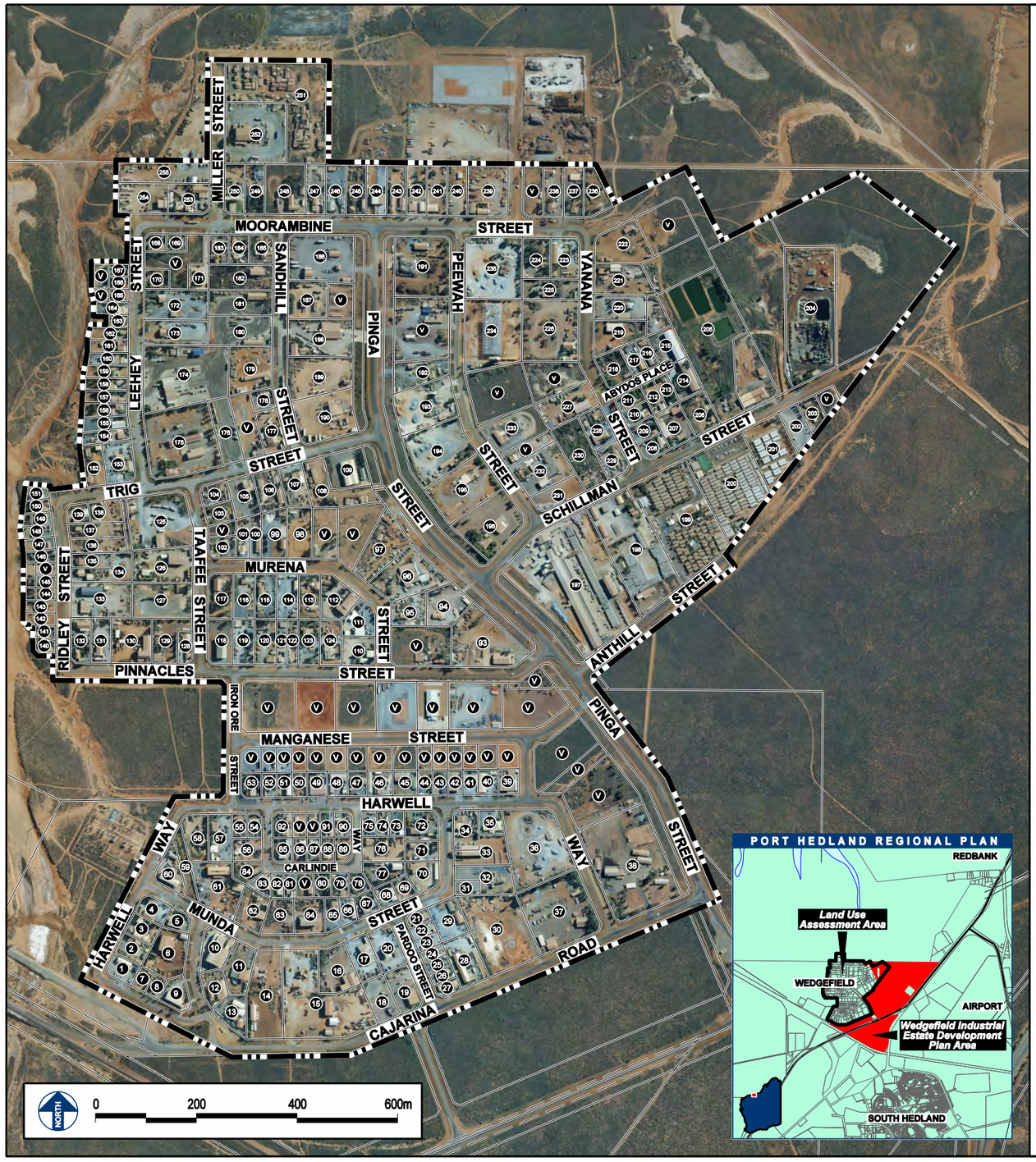
PLAN 5



1. Thrifty
2. Pilbara Waste Disposal
3. South Hedland Plumbing
4. Town Link Couriers
5. J.W Yard Works
6. Ngarda Civil and Mining
7. AgWA
8. N-W Plumbing
9. CBC Consolodated Bearing Co.
10. Inline Engineering Services
11. Unknown
12. Bilfinger Berger Services
13. Pilbara Boats and Bikes/ Hedland Pleasure Marine
14. DTMT Constructions Concrete Logistics
15. Truck Centre Port Hedland (Boral)
16. Downer Engineering
17. Downer Engineering
18. 24hr Caltex Service Station (Pumps)
19. 24hr Caltex Service Station
20. Transpacific Industrial Solutions
21. Roebuck Bay Services
22. Unknown
23. Hedland Eski Ice/ J&K Training Services
24. Unknown
25. N&C Mechanical
26. J.W Yard Works
27. Komatsu
28. Bridgestone
29. True Blue Hire
30. Town of Port Hedland Depot
31. Road Base Storage
32. Road Base Storage
33. One Steel
34. Pilbara Hall of Frames
35. Sarwel Plumbing
36. Road Base Storage
37. Dog Pound
38. MRWA Pilbara Region Depot. and Gould Bulk Haulage
39. Broadspectrum (Electrical/Mechanical)
40. Custom Glass/T&J Painting
41. Unknown Warehouse
42. North West Signs
43. Wormald
44. Unknown Storage
45. WKL Constructions
46. Town Link Couriers
47. Unknown (Logistics or Maintenance)
48. Northfleet Bus Contractors
49. Galvins Plumbing
50. Unknown - Warehouse under construction
51. Unknown Warehouse with Residence
52. West Kimberley Construction
53. Unknown Residence
54. Scrap Metal
55. Telecommunication at Rear/ Vacant Shed
56. Residential
57. Capricorn Homes
58. Sanmel Contracting
59. Access Way
60. Diverse Directional Drilling Pty Ltd
61. RCR Construction and Maintanence
62. Site Storage
63. Storage
64. Fix 'n Fab Welding
65. Haglunds Technical
66. Zooby Cabinets
67. Auto Electrics
68. Metsa Minerals
69. Unknown
70. Hedland Self Storage
71. Pilbara Earth Moving/ Atlas Construction Ltd.
72. Mundo Fabrication
73. B&R Tiles
74. B&R Tiles
75. B&R Tiles
76. Boom Logistics
77. Svedala Machinery Australia Pty Ltd
78. Scarboro Painting Services
79. Domestic and Commercial Garage Doors
80. Advanced Irrigation Systems
81. Top West Carpentry
82. Unknown
83. Residential
84. Residential
85. Western Geotechnics
86. Unknown/Residential
87. Unknown/Residential
88. Unknown/Residential
89. Unknown/Residential
90. Platinum Panel & Paint
91. Groundworking, Retic and Landscaping
92. Tim Davies Landscaping
93. Unknown - Diesel Mechanics
94. ER Tech
95. Unknown
96. Goodline
97. Storage/Spoil
98. Warehouse Under Construction
99. Vacant/Storage
100. Hedland Glass House
101. Goldman Constructions
102. H. Wotke Paving/Bricklaying
103. Hedland Rewind Service
104. Vehicle Storage
105. Sheds
106. Wedgefield Warehouse and Storage
107. Deli (Sue's Place)
108. Disused Transportables
109. Coventry's
110. MSTS Training Centre (Under Construction)
111. Pilbara Logistics
112. Hedland Duty Total Food Services
113. Hedland Duty Total Food Services
114. Ontraq Haulage/ Broome Freightlines
115. JK's Aluminium
116. Robert Hogan - Fixed Plant Maintanence
117. Storage
118. Apex Fenrer Conveyor Services
119. Naero Logistics
120. Australians Civil Pty Ltd
121. Residential/Shed
122. Residential/Shed
123. Alliance Contracting
124. Clyde's Auto Repairs
125. Fuel Transport Tankers. (Fuel Trans)
126. Force Equipment
127. Leeds Cattle Transport
128. Boundaries WA Pilbara
129. Storage
130. Mid West Mechanical Contractors
131. National Tyres (Yokohama Tyres)
132. Unknown
133. Force Equipment
134. Gardner Engineering
135. Gardener Engineering
136. Wright Way Road Training
137. Arrowsmith Transport
138. Arrowsmith Transport
139. Unknown
140. Rebel Engineering
141. Unknown
142. Unknown
143. Unknown
144. Self Storage
145. Residential
146. Unknown
147. Bresen (WA) Pty
148. Shed/House at Rear
149. Residential
150. S.R Marine Building Contractors
151. Residential
152. NW Roadways Transport
153. Hedland Diesel and Exhaust
154. Hedland Automotive Services
155. Urban/Residence
156. Urban/Residence
157. Urban/Residence
158. Tykes Transport
159. Fred Elliot's Mechanical
160. P&S Reibel Concrete Contractors
161. Pilbara Mid-West Fire and Safety
162. Shed/Store
163. Pilbara Mid-west Fire and Safety
164. Tattoo Fever
165. Unknown/Residence
166. Shed/Residence
167. Shed/Residence
168. Shed/Residence
169. Shed/Residence
170. Shed
171. Shed
172. Connector Drilling
173. Shed/Storage
174. Mitchell West Transport (Fuel Pumps/Wash Down Pump)
175. WaterCorp. East Pilbarra Depot
176. Mitchell West Transport
177. Allied Pickfords
178. Unknown
179. Jaxon
180. Mitchell West Transport
181. Mitchell West Transport
182. Scrapyard
183. Toll IPEC
184. RJ's Wheeler/Water Cart Hire
185. Enzed (Houses)
186. Toll West
187. Kleenheat Depot
188. Asset Kinetics & Australian Mud Co
189. Centurion Transport
190. Centurion Transport
191. Scrap Metal (Sim's Metal)
192. Northaus Transport
193. Harwell Holdings (Earthmoving)
194. Hanson
195. Pioneer Road Services
196. (Donner) Works Inf.
197. Austrak
198. Unknown
199. Wedgefield Accomodation Village
200. Wedgefield Accomodation Village
201. Wedgefield Accomodation Village
202. Asphalted Truck/Trailer Lay Down
203. Sheds (Not Used)
204. Oil Energy Corporation
205. Treated Effluent Tanks
206. Site Storage
207. Hedland Bus Lines
208. North West Communications
209. Hedland Mechanical & Hedland Brake and Clutch
210. Hedland Funeral Services
211. House/Unknown
212. HBL Panel and Paint
213. Residence/Unknown
214. Robil Engineering Site Service/Training
215. Robil Engineering Site Service/Training
216. Unknown
217. Cloth Jupiter Contractors (Builders)
218. Storage and Bird Cage
219. Shed
220. A&J Nichols Haulage
221. Unknown
222. Turners Equipment
223. Statewide Access Hire
224. Unknown
225. High Rock Transport
226. High Rock Transport
227. Pilbarra Meta Maya Corp.
228. McLoren Vehicle Rental
229. Hedland Tilt Trays & DRM Contracting
230. Unknown
231. Self Storage
232. Westanies & Jamieson Transport
233. BOC G&S
234. Cockburn Cement
235. Cemex Concrete Plant
236. Residence/Shed
237. Shed
238. CMA Recycling
239. Laing O'Rourke
240. Open Storage
241. BOC
242. BOC
243. QAL Refridgeration
244. LML Electrical (For Sale)
245. Car Bodies
246. Shed/Residence
247. P&A Concrete Contractors
248. Grace Removals
249. Wedgefield Garden Centre
250. Skender Contracting
251. Storage
252. N&L Transport
253. O&W Machinery
254. Hedland Hose & Hydraulics
255. CL Blasting/Painting

LAND USE ASSESSMENT PLAN (Indicative Only)

WEDGEFIELD INDUSTRIAL ESTATE

LEGEND

- Land Use Assessment Area
- (99) Reference Number
- (V) Vacant

Base data supplied by Landgate

Aerial Photography dated October 2008, accuracy +/- 4m, Projection MGA Zone 50

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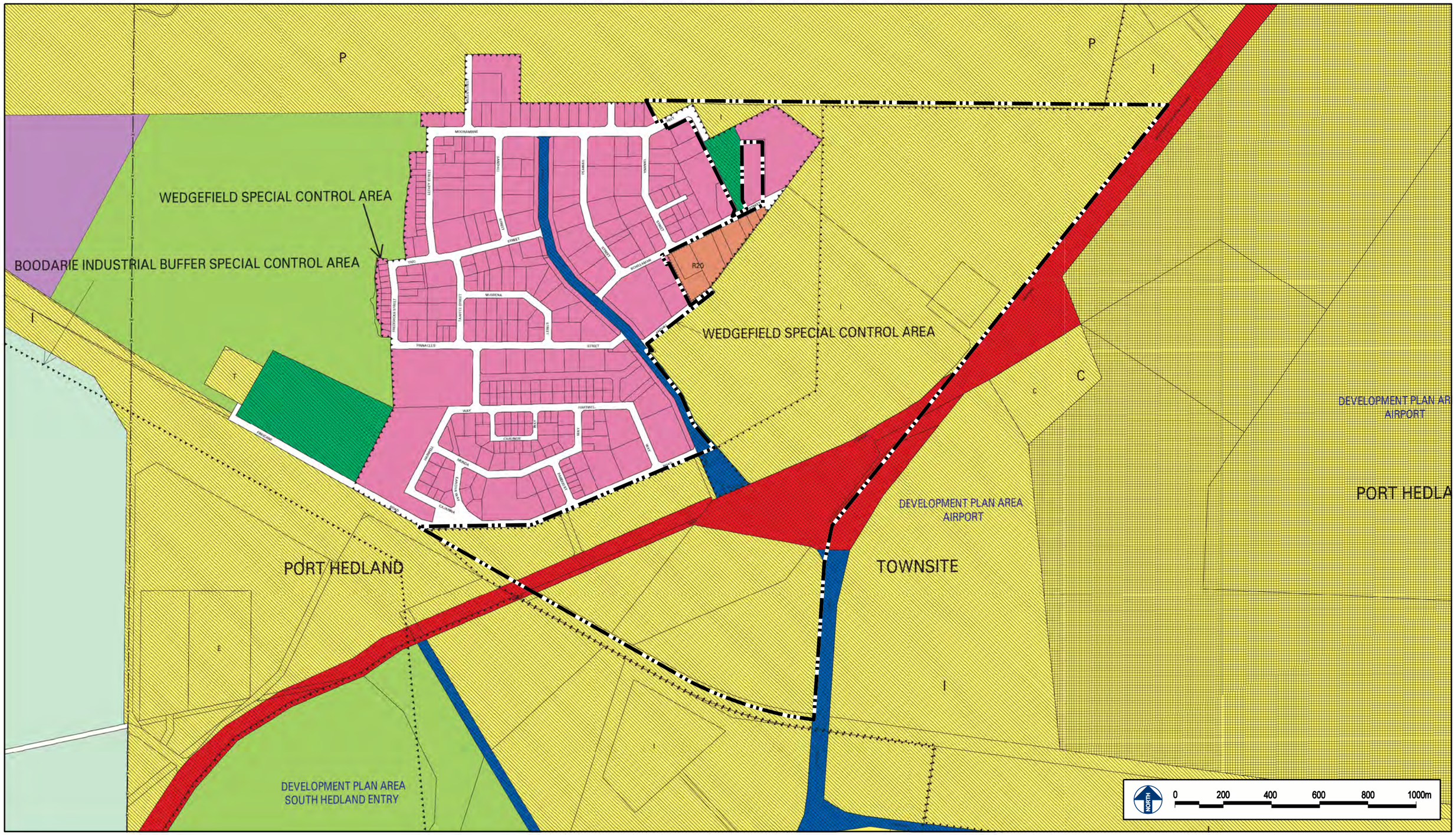
PLAN 6



EXISTING ZONING PLAN

WEDGEFIELD INDUSTRIAL ESTATE

Base data supplied by Landgate

Aerial Photography dated October 2008, accuracy +/- 4m, Projection MGA Zone 50

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LEGEND

Wedgefield Industrial Estate Development Plan Area

LOCAL SCHEME RESERVES

- CONSERVATION RECREATION AND NATURAL LANDSCAPES
- LOCAL ROAD
- OTHER PUBLIC PURPOSES
- OTHER PUBLIC PURPOSES DENOTED AS FOLLOWS: C CEMETERY; P PORT FACILITIES; T TELECOMMUNICATIONS
- OTHER PURPOSES DENOTED AS FOLLOWS: I INFRASTRUCTURE
- PARKS AND RECREATION
- STATE AND REGIONAL ROAD
- DISTRICT ROAD

ZONES

- TRANSIENT WORKFORCE ACCOMMODATION
- AIRPORT
- COMMUNITY DENOTED AS FOLLOWS: CM COMMUNITY; ED EDUCATION; H HEALTH
- INDUSTRIAL DEVELOPMENT
- INDUSTRY
- STRATEGIC INDUSTRY
- RURAL

OTHER

- R20 R-CODES
- SCHEME BOUNDARY
- LOCAL GOVERNMENT BOUNDARY
- TOWNSITE - LAND ACT
- SPECIAL CONTROL AREAS
- DEVELOPMENT PLAN AREAS
- NO ZONE

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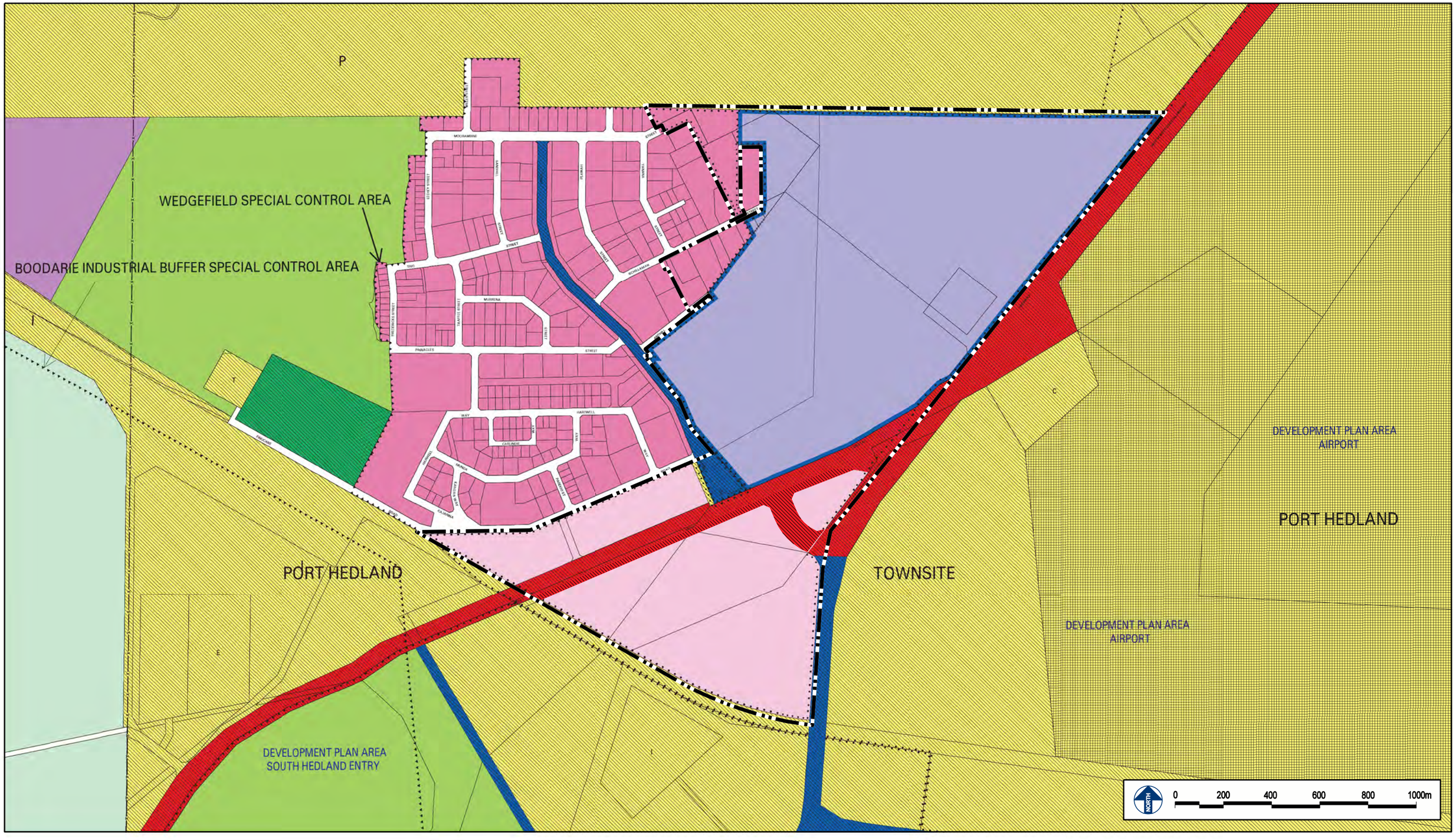
PLAN 7



PROPOSED ZONING PLAN - TPS 5

WEDGEFIELD INDUSTRIAL ESTATE

LEGEND

Wedgefield Industrial Estate Development Plan Area

LOCAL SCHEME RESERVES

- CONSERVATION RECREATION AND NATURAL LANDSCAPES
- LOCAL ROAD
- OTHER PUBLIC PURPOSES
- OTHER PUBLIC PURPOSES DENOTED AS FOLLOWS: C CEMETERY; P PORT FACILITIES; T TELECOMMUNICATIONS
- OTHER PURPOSES DENOTED AS FOLLOWS: I INFRASTRUCTURE
- PARKS AND RECREATION
- STATE AND REGIONAL ROAD
- DISTRICT ROAD

ZONES

- TRANSIENT WORKFORCE ACCOMMODATION
- AIRPORT
- COMMUNITY DENOTED AS FOLLOWS: CM COMMUNITY; ED EDUCATION; H HEALTH
- INDUSTRY
- LIGHT INDUSTRY
- STRATEGIC INDUSTRY
- TRANSPORT DEVELOPMENT
- RURAL

OTHER

- R CODES
- SCHEME BOUNDARY
- LOCAL GOVERNMENT BOUNDARY
- TOWNSITE - LAND ACT
- SPECIAL CONTROL AREAS
- DEVELOPMENT PLAN AREAS
- NO ZONE

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PLAN 8

Wedgefield Industrial Estate Development Plan Area

LAND USE MASTER PLAN (LUMP)

WEDGEFIELD INDUSTRIAL ESTATE

Image supplied by Town of Port Hedland

Projection MGA Zone 50

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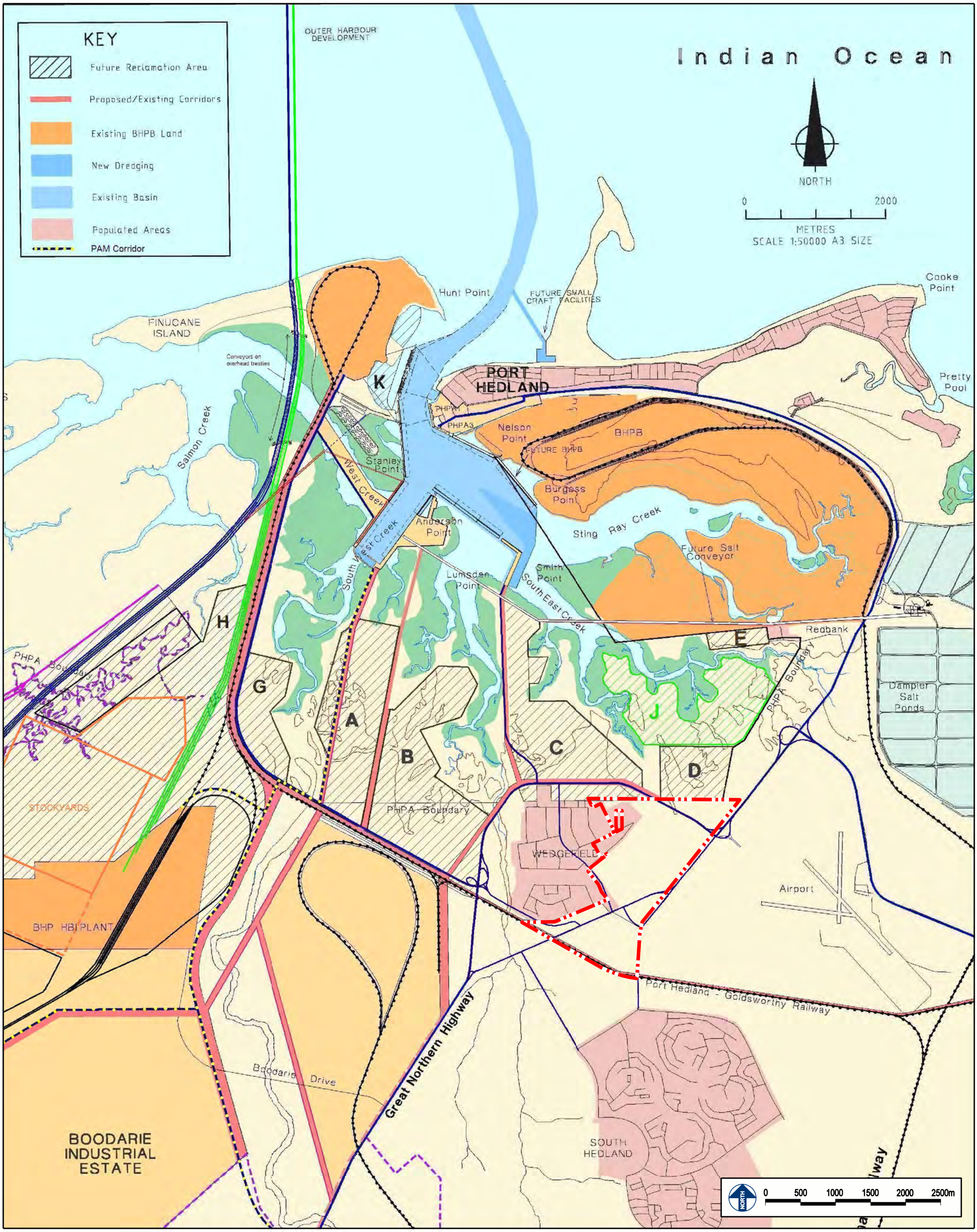
PLAN 9



Wedgefield Industrial Estate Development Plan Area

PORT HEDLAND PLANNING STUDY ULTIMATE DEVELOPMENT PLAN

WEDGEFIELD INDUSTRIAL ESTATE

Image supplied by Port Hedland Port Authority

Projection MGA Zone 50

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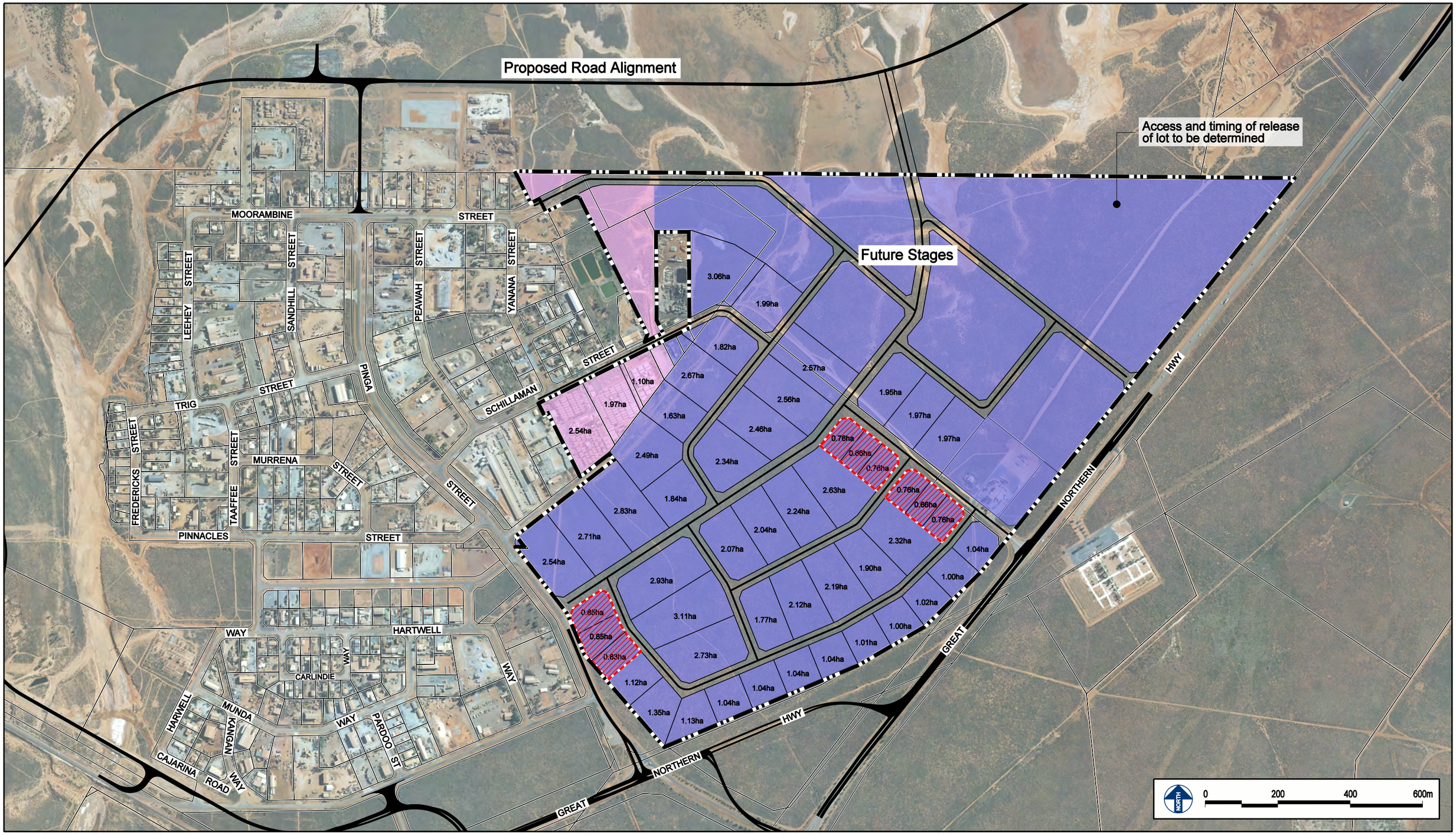
PLAN 10



INDICATIVE POWER SUPPLY PLAN

WEDGEFIELD INDUSTRIAL ESTATE

LEGEND

- Wedgefield Industrial Estate Development Plan Area
- 100KVA / ha Power Supply
- Transport Development
- Industry

Base data supplied by Landgate & Main Roads, Projection MGA Zone 50

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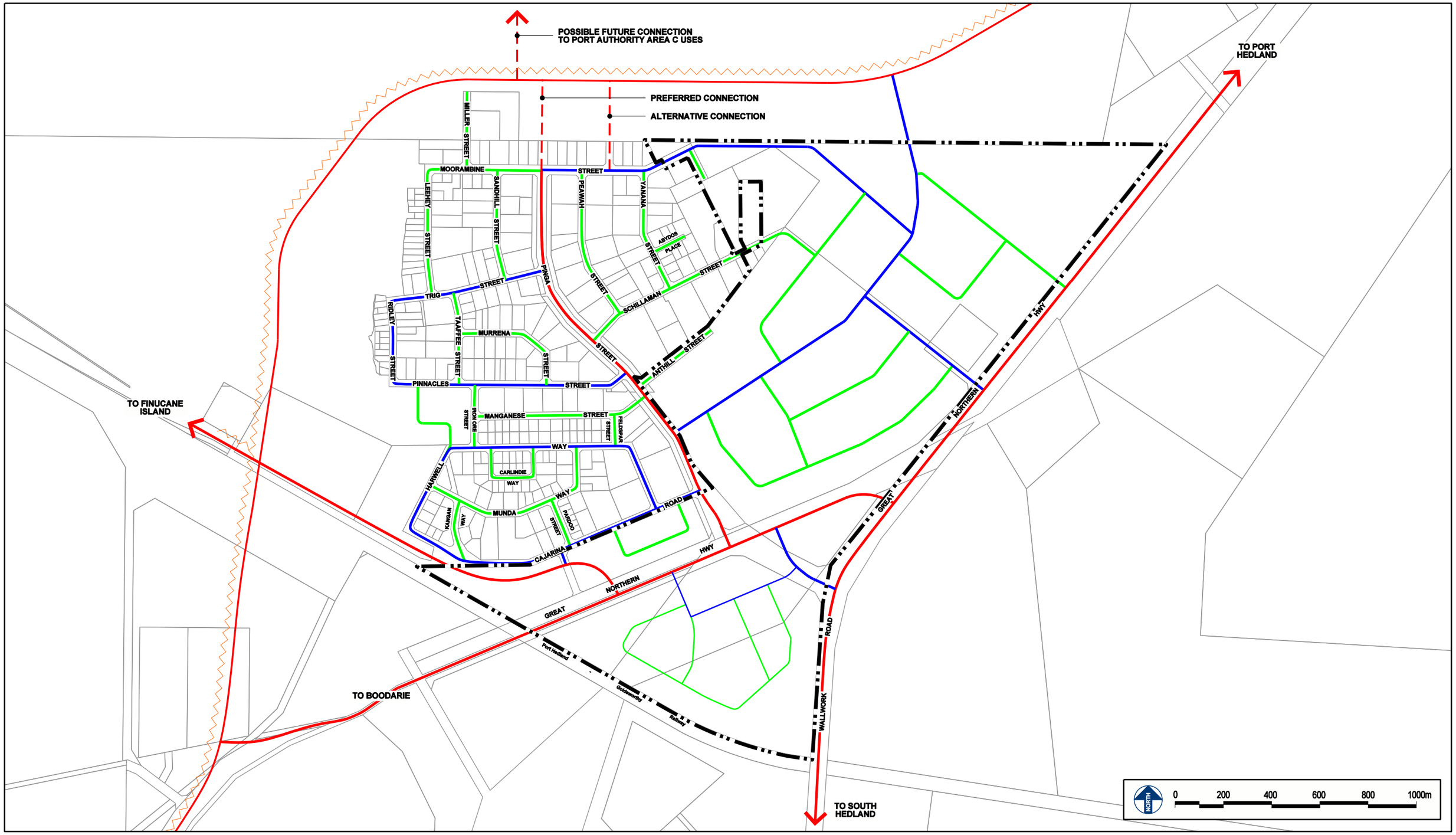
PLAN 12



PROPOSED ROAD NETWORK PLAN

WEDGEFIELD INDUSTRIAL ESTATE

LEGEND

- WEDGEFIELD INDUSTRIAL ESTATE DEVELOPMENT PLAN AREA
- DISTRICT CONNECTOR ROADS
- LOCAL CONNECTOR ROADS
- LOCAL STREET
- PRIMARY ROAD FREIGHT NETWORK
- POSSIBLE FUTURE DISTRICT CONNECTOR ROADS

Base data supplied by Landgate, Projection MGA Zone 50

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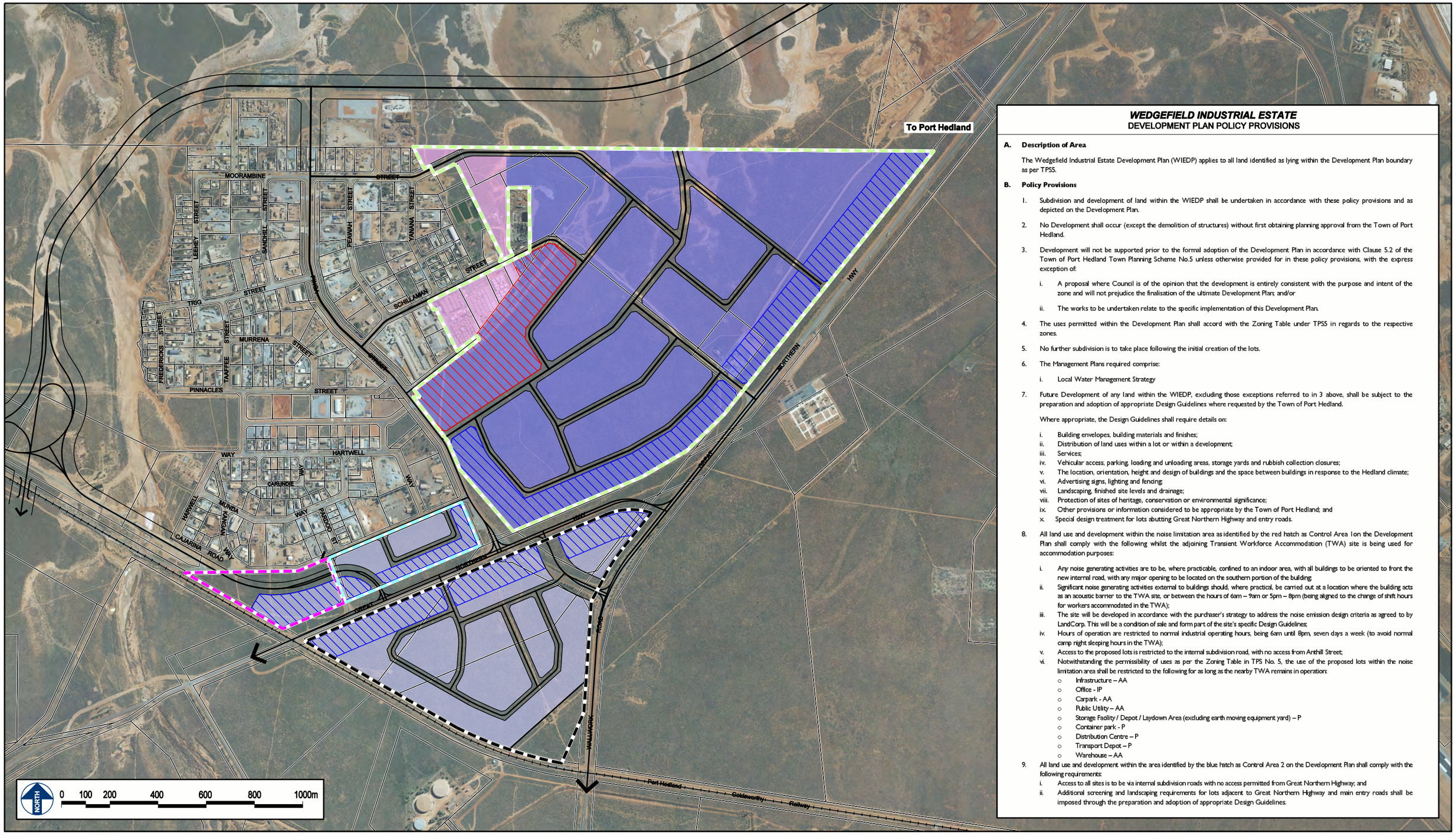
PLAN 13



WEDGEFIELD INDUSTRIAL ESTATE
DEVELOPMENT PLAN POLICY PROVISIONS

A. Description of Area

The Wedgefield Industrial Estate Development Plan (WIEDP) applies to all land identified as lying within the Development Plan boundary as per TPS5.

B. Policy Provisions

1. Subdivision and development of land within the WIEDP shall be undertaken in accordance with these policy provisions and as depicted on the Development Plan.
2. No Development shall occur (except the demolition of structures) without first obtaining planning approval from the Town of Port Hedland.
3. Development will not be supported prior to the formal adoption of the Development Plan in accordance with Clause 5.2 of the Town of Port Hedland Town Planning Scheme No.5 unless otherwise provided for in these policy provisions, with the express exception of:
   i. A proposal where Council is of the opinion that the development is entirely consistent with the purpose and intent of the zone and will not prejudice the finalisation of the ultimate Development Plan; and/or
   ii. The works to be undertaken relate to the specific implementation of this Development Plan.
4. The uses permitted within the Development Plan shall accord with the Zoning Table under TPS5 in regards to the respective zones.
5. No further subdivision is to take place following the initial creation of the lots.
6. The Management Plans required comprise:
   i. Local Water Management Strategy
7. Future Development of any land within the WIEDP, excluding those exceptions referred to in 3 above, shall be subject to the preparation and adoption of appropriate Design Guidelines where requested by the Town of Port Hedland.

   Where appropriate, the Design Guidelines shall require details on:

   i. Building envelopes, building materials and finishes;
   ii. Distribution of land uses within a lot or within a development;
   iii. Services;
   iv. Vehicular access, parking, loading and unloading areas, storage yards and rubbish collection closures;
   v. The location, orientation, height and design of buildings and the space between buildings in response to the Hedland climate;
   vi. Advertising signs, lighting and fencing;
   vii. Landscaping, finished site levels and drainage;
   viii. Protection of sites of heritage, conservation or environmental significance;
   ix. Other provisions or information considered to be appropriate by the Town of Port Hedland; and
   x. Special design treatment for lots abutting Great Northern Highway and entry roads.
8. All land use and development within the noise limitation area as identified by the red hatch as Control Area 1on the Development Plan shall comply with the following whilst the adjoining Transient Workforce Accommodation (TWA) site is being used for accommodation purposes:
   i. Any noise generating activities are to be, where practicable, confined to an indoor area, with all buildings to be oriented to front the new internal road, with any major opening to be located on the southern portion of the building;
   ii. Significant noise generating activities external to buildings should, where practical, be carried out at a location where the building acts as an acoustic barrier to the TWA site, or between the hours of 6am – 9am or 5pm – 8pm (being aligned to the change of shift hours for workers accommodated in the TWA);
   iii. The site will be developed in accordance with the purchaser's strategy to address the noise emission design criteria as agreed to by LandCorp. This will be a condition of sale and form part of the site's specific Design Guidelines;
   iv. Hours of operation are restricted to normal industrial operating hours, being 6am until 8pm, seven days a week (to avoid normal camp night sleeping hours in the TWA);
   v. Access to the proposed lots is restricted to the internal subdivision road, with no access from Anthill Street;
   vi. Notwithstanding the permissibility of uses as per the Zoning Table in TPS No. 5, the use of the proposed lots within the noise limitation area shall be restricted to the following for as long as the nearby TWA remains in operation:
      - Infrastructure – AA
      - Office - IP
      - Carpark - AA
      - Public Utility – AA
      - Storage Facility / Depot / Laydown Area (excluding earth moving equipment yard) – P
      - Container park - P
      - Distribution Centre – P
      - Transport Depot – P
      - Warehouse – AA
9. All land use and development within the area identified by the blue hatch as Control Area 2 on the Development Plan shall comply with the following requirements:
   i. Access to all sites is to be via internal subdivision roads with no access permitted from Great Northern Highway; and
   ii. Additional screening and landscaping requirements for lots adjacent to Great Northern Highway and main entry roads shall be imposed through the preparation and adoption of appropriate Design Guidelines.

WEDGEFIELD INDUSTRIAL ESTATE DEVELOPMENT PLAN
WEDGEFIELD INDUSTRIAL ESTATE

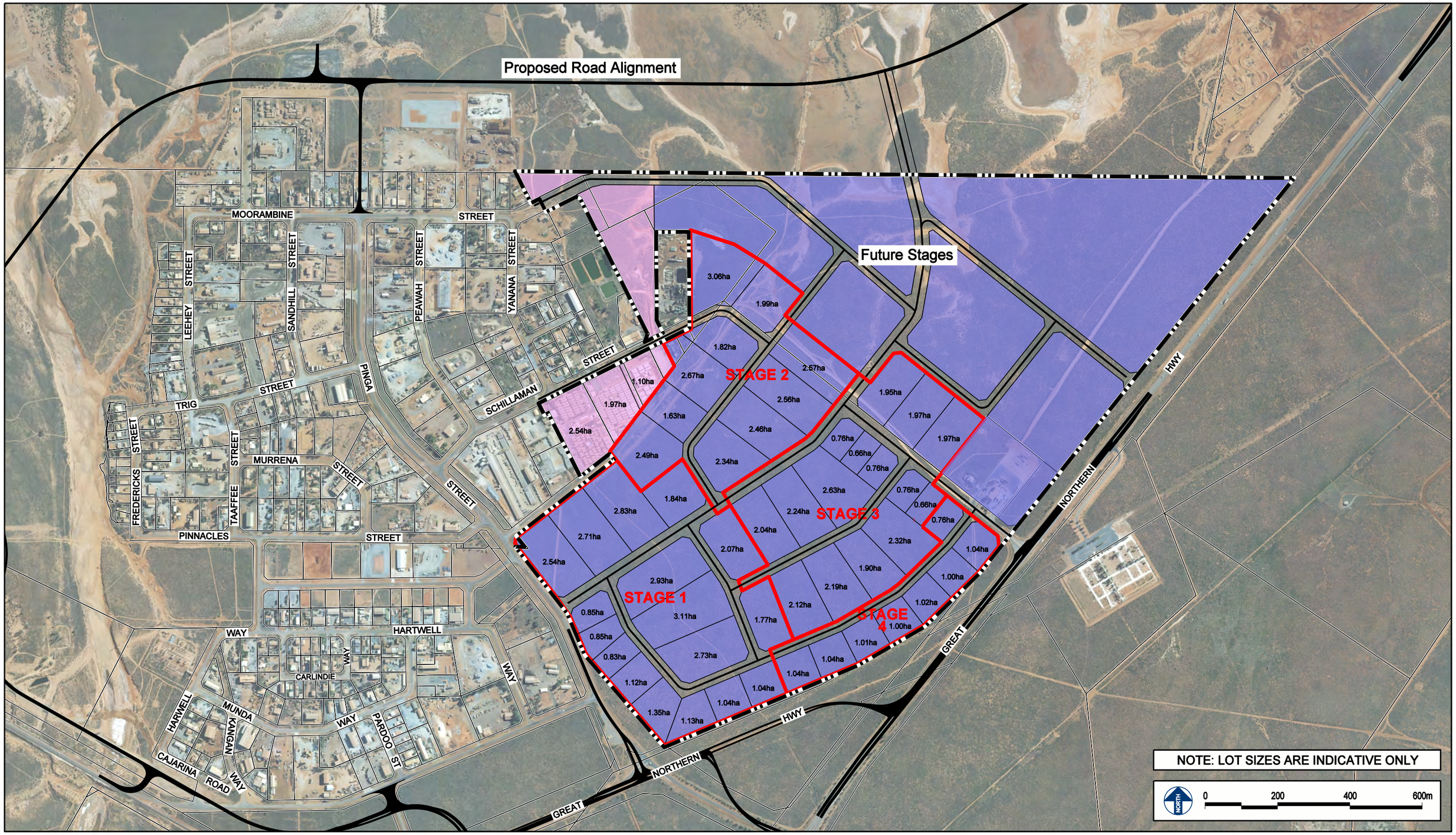
LEGEND

- LIA 3
- LIA 4
- LIA 5
- TRANSPORT DEVELOPMENT
- LIGHT INDUSTRY
- TRANSPORT DEVELOPMENT
- INDUSTRY
- CONTROL AREA 1
- CONTROL AREA 2

LandCorp	:	CLIENT
1:15,000@A3	:	SCALE
2 December 2009	:	DATE
3414_1-4-005c_DP.dgn	:	PLAN No
c	:	REVISION
T.C.	:	PLANNER
M.H.	:	DRAWN
N.T.	:	CHECKED

RPS koltasz smith
TOWN PLANNING PROJECT MANAGEMENT URBAN DESIGN DEVELOPMENT CONSULTING
141 Burswood Road BURSWOOD WA 6100 Tel. (08) 9486 2222 Fax. (08) 9486 2233
PO Box 127 BURSWOOD WA 6100 Email:perth@ksap.com.au

PLAN 14



TRANSPORT DEVELOPMENT AREA - Indicative Staging Plan

WEDGEFIELD INDUSTRIAL ESTATE

LEGEND

- Wedgefield Industrial Estate Development Plan Area
- Staging Boundary
- Transport Development
- Industry

Base data supplied by Landgate & Main Roads, Projection MGA Zone 50

Areas and dimensions shown are subject to final survey calculations. All carriageways are shown for illustrative purposes only and are subject to detailed engineering design.

LandCorp	CLIENT
1:10,000@A3	SCALE
1 December 2009	DATE
3414_1-1-019c_DP.dgn	PLAN No
c	REVISION
T.C.	PLANNER
R.F.	DRAWN
N.T.	CHECKED

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PLAN 15

APPENDIX I

ENVIRONMENTAL REPORT – GHD CONSULTANTS

CLIENTS | PEOPLE | PERFORMANCE

LandCorp

Report for Port Hedland Industrial Land LIA 3,4,5, General Industry/Transport Part A and Part B

Preliminary Environmental Impact Assessment and Biological Survey

October 2009

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Appendices

Executive Summary

Background and Scope

LandCorp has commissioned GHD Pty Ltd (GHD) to complete a combined Preliminary Environmental Impact Assessment (PEIA) and Biological Survey for the proposed subdivision and development of Light Industry Area (LIA) 3,4,5, and the General Industry/Transport Area Part A. An additional flora and fauna survey was conducted in June 2009 of the Transport Use Area Part B at Wedgefield and the Port Hedland Port Authority land for the new loop road. These areas are located approximately 10km south of Port Hedland.

LandCorp is investigating opportunities to deliver further industrial land in Port Hedland to meet an increasing and demonstrated demand from the expanding mining, export, transport, construction and service industries.

The Draft Port Hedland Land Use Master Plan (LUMP) has identified the following Crown Land Areas to provide for industrial growth.

Proposed Light Industrial Area (LIA) Subdivisions are:

- LIA 2 (Infill) 8.1 ha at Iron Ore and Pinnacles Streets, Wedgefield
- LIA 3 (Infill) 10.4 ha at Pinga Street and Cajarina Roads, Wedgefield
- LIA 4 (Infill) 13.3 ha at Cajarina and Dalton Roads, Wedgefield
- LIA 5 (Broad acre) 58 ha bounded by Great Northern Highway, Wallwork Road and Goldsworthy Railway, Wedgefield

The above parcels are proposed to be subdivided into lots between 2000m^2 and 8000m^2 for light industrial development.

Proposed Transport Land Subdivisions (Part A and B) are:

- 271 ha between the existing Wedgefield Industrial area and Great Northern Highway.

GHD has undertaken a desktop investigation and site survey of the proposed LIAs in order to ensure that all potential environmental and social issues relating to the proposed land development have been considered.

The field survey for the proposed LIA 3, 4, 5 and the General Industry/Transport Area Part A was undertaken by a qualified ecologist in June 2008. An additional survey of Transport Use Area Part B and the Port Hedland Port Authority land for the new loop road was undertaken in June 2009.

The field assessment included a Level 2 Flora survey (as per EPA Guideline 51) which included:

- Surveying of 50m x 50m quadrats, within representative vegetation types;
- Surveying along targeted and random transects throughout the sites;
- Development of a full flora list;

» Assessment of the vegetation condition and any threatening processes.

Fauna was recorded opportunistically, through examination of scats, tracks, burrows and with a visual and aural survey. An additional visit was made to the area on dusk to attempt to observe any nocturnal species.

Survey and Assessment Outcomes

» The study areas were found to contain similar vegetation across them. The vegetation community is as expected for the area as per existing regional vegetation mapping (Beard, 1974) and remains well conserved.

» Vegetation was in excellent to pristine condition over much of the survey area, with small patches having been degraded by previous activities, tracks and weed invasion.

» No Declared Rare or Priority flora species were identified.

» Evidence of the Mulgara, a fauna species of conservation significance, was identified during the recent field assessment.

» Tidal mudflats occur in the northern boundary of Transport Area B.

» No site contamination or acid sulphate soils are evident or likely to be present.

» Four aboriginal heritage sites have been previously recorded within the study areas.

» Adjacent land uses are compatible with the proposed development.

Actual and Potential Impacts

» Clearing of approximately 353 ha native vegetation in good to excellent condition

» The vegetation of the area is well represented in the Pilbara region, with approximately 196,372.2 ha remaining undisturbed.

» Clearing of fauna habitat as above. The areas are likely to support a range of reptiles which will be killed or displaced as a result of vegetation clearing and land disturbance.

» Clearing of fauna habitat which could support the conservation significant Mulgara. The significance of the impact on the Mulgara would need to be further investigated and the impacts relate specifically to Transport Area B. Further to any development within the Transport Area B, LandCorp will undertake Level 2 fauna assessments and will liaise with DEC regarding potential management of any Mulgara found.

» Post-development impacts on adjacent bushland. The operation of new industrial lots will have potential impacts on bushland remaining in the area. The impacts will primarily be on fauna and issues could include:

  – Light overspill;
  – Litter;
  – Noise and vibration disturbance;
  – Dust production;
  – Increased predators; and
  – Increased traffic.

These issues have the potential to disturb or harm fauna remaining in the adjacent areas.

Physical and Social Impacts

» Alteration to surface drainage. As a result of vegetation clearing and the development of building and hard stands, there will be a reduction in infiltration to the ground and an increase in runoff from the sites. This runoff will be collected in drainage systems and most likely transferred to South Creek.

» Nuisance impacts such as dust or pollutant production and noise and vibration will occur during the construction phases of the subdivision and during development of individual lots. Given the industrial location, it is likely that noise and vibration will not be a significant issue, however some caretaker residences and transient workforce accommodation are present within the existing Wedgefield area. LandCorp has considered a range of planning and development measures in order to mitigate noise risks to these receptors.

» Additional traffic will be generated as a result of new businesses. This will create impacts of noise, safety and possible delays, especially as a result of large turning movements.

» The addition of industrial lots closer to Great Northern Highway will have the potential to create a less desirable visual impact for tourists and travellers. Due to the nature of industrial lots and the likelihood of storage of equipment outside, such areas can be messy and unsightly. Some screening may be required to GNH.

Recommendations

Sensitive design of the proposed developments has the potential to mitigate a number of the potential impacts above. Suitable design and planning controls can reduce the impacts related to:

» Degradation of adjacent bushland;

» Visual impact;

» Changes to hydrology;

» Noise and pollution risks to adjacent land occupiers;

» Traffic risks.

Initial fauna surveys have indicated evidence for the presence of Mulgara, listed as Vulnerable under the EPBC Act, within parts of Transport Area B. Given the likely presence of this species within the northern part of the study area, the project may require referral to the DEWHA for assessment under the EPBC Act and/or referral to the EPA under the Environmental Protection Act.

Further detailed fauna investigations (Level 2 fauna survey) would be required to verify the population size of this species within the study area. This investigation will be undertaken prior to any development of the high risk area of Transport Area B.

Careful management of vegetation clearing and development of a fauna relocation program could reduce the risk of impacts to any Mulgara resident on the site.

1. Introduction

LandCorp has commissioned GHD Pty Ltd (GHD) to complete a combined Preliminary Environmental Impact Assessment (PEIA) and Biological Survey for the proposed subdivision and development of Light Industry Area (LIA) 3,4, and 5, the General Industry/Transport Area Part A and Part B and the Port Hedland Port Authority land for a new access road. These areas are located approximately 10km south of Port Hedland. The study areas are shown in Figure 1, Appendix A.

LandCorp requires a biological survey of the study areas. The purpose of the survey is to provide an appropriate examination and description of the receiving environment to ensure that all aspects of biological/ecological significance are identified and recorded.

This combined PEIA and Biological Survey seeks to determine and assess the potential environmental impacts of the proposed works within the project area. Recommendations to LandCorp on the actions and requirements necessary for completion of this project with legislative guidelines are also provided.

1.1 Background

LandCorp is investigating opportunities to deliver further industrial land in Port Hedland to meet an increasing and demonstrated demand from the expanding mining, export, transport, construction and service industries.

The Draft Port Hedland Land Use Master Plan (LUMP) has identified the following Crown Land Areas to provide for industrial growth.

Proposed Light Industrial Area (LIA) Subdivisions are:

- LIA 2 (Infill) 8.1 ha at Iron Ore and Pinnacles Streets, Wedgefield
- LIA 3 (Infill) 10.4 ha at Pinga Street and Cajarina Roads, Wedgefield
- LIA 4 (Infill) 13.3 ha at Cajarina and Dalton Roads, Wedgefield
- LIA 5 (Broad acre) 58 ha bounded by Great Northern Highway, Wallwork Road And Goldsworthy Railway, Wedgefield

The above parcels are proposed to be subdivided into lots between 2000m^2 and 8000m^2 for light industrial development.

Proposed Transport Land Subdivisions are:

- Transport Area Part A - 101 ha between Wedgefield Industrial area and Great Northern Highway;
- Transport Area Part B - 170 ha adjacent to Transport Area Part A, between Wedgefield Industrial area and Great Northern Highway; and

The above transport areas are proposed to be subdivided into lots between 1.0 ha to 2.5 ha for general industry/transport use development. A new loop road is proposed on Port Hedland Port Authority land, part of Transport Area Part B.

This report focuses on the environmental aspects of LIA 3,4,5, the General Industry/Transport areas Part A and Part B and the Port Hedland Port Authority land for the new loop road. A separate report has been prepared for LIA 2.

1.2 Scope of the Report

This PEIA and Biological Survey has been prepared according to the scope of works requested by LandCorp and includes a desktop assessment, contaminated sites assessment and a field biological survey.

1.2.1 Desktop Assessment

The desktop assessment considered all biological constraints, which may be in, or adjoining the project area. This included, but was not limited to, an examination of the following matters:

- Adjoining land use
- Broad vegetation types
- Threatened Ecological Communities (TECs)
- Declared Rare and Priority flora
- Threatened or otherwise protected fauna
- Remnant Vegetation in relation to statutory requirements;
- Listed wetlands
- Public Drinking Water Source Areas (PDWSA)
- Other lists of significant areas

1.2.2 Contaminated Sites Assessment

The contaminated site assessment involved the following:

- Review of existing investigations and other data available made available by LandCorp;
- A search of historical title deeds to determine past owners of the site, and the likely associated site uses;
- A review, on a 10-year basis, of historical aerial photographs showing the site, to assist in establishing the patterns of site development over time;
- A review of any available historical site plans that may be provided to GHD that will help identify the nature and location of any potential contaminant sources at the site;
- A review of information made available to GHD, which documents historical spills, waste disposal, or other potentially contaminating activities at the site;
- A review of regional geology and hydrogeology, which will assist in determining the likely soil type and groundwater regime at the site, including a review of Department of Water Registered Bore Search to ascertain local hydrogeological conditions;

- A Department of Consumer and Employment Protection Dangerous Goods Licence Freedom of Information Search will be requested to ascertain whether underground storage tanks (USTs) are present at the property;
- A search of the Department of Environment and Conservation *Contaminated Sites Register* to ascertain whether the site or surrounding properties have been registered as potentially contaminated sites;
- Contact local planning authorities to determine whether potential environmental issues are likely to exist at the site.

1.2.3 Field Biological Survey

The field survey will seek to verify the desktop study and provide a detailed assessment of the existing environment in the project areas and its relationship to adjoining areas. The survey included the following:

Vegetation and Flora

- An inventory of the vascular plant species in the survey area;
- A review of, and search for, native plant species considered to be rare or potentially endangered. Locations of Declared Rare or Priority Flora will be accurately mapped at a suitable scale. Other species of interest, including those of limited distribution or outliers from their known range, will be discussed.
- An inventory of dominant exotic plants and also including declared noxious plants and environmental weed species;
- Advice on whether weeds are likely to spread to and result in environmental harm to adjacent areas of native vegetation that is in good or better condition;
- A description and location, including mapping, of plant communities.
- A rating of condition of the vegetation communities or areas using a published rating scale (Western Australian Government, 2000);
- A review of the local and regional significance of the plant communities in terms of their intrinsic value, extent, rarity and condition;
- An flora assessment with regards to EPA Guidance Statement No. 51;
- An assessment of the proposed clearing against the 10 clearing principles. Each principle shall be properly assessed in accordance with the Department of Environment and Conservation's (DEC's) Guideline to Assessment – Clearing of Native Vegetation.

Fauna

- An inventory of the vertebrate fauna species in the survey area. This does not require a trapping program but will require a targeted search and opportunistic recording of species;
- A review of the fauna species considered to be rare or in need of special protection;
- A review of the presence and abundance of pest, declared or feral animals;
- Habitats of significance and the risks to fauna from loss of the habitat.

Wetlands and Drainage

» A description of existing surface drainage patterns with respect to topography, and to flora and fauna communities;

» An inventory and brief description of any wetlands and their conservation value.

Contaminated Sites

» A brief examination of the area with regard to previous dumping, any surface aspects such as drum storage, obvious contamination.

» Photographs of any potential issues/areas of concern.

2. Desktop Investigation

2.1 Legal Identification

Table 1 Legal Identification

Site	Identification	
LIA 3	Street Address	No Street Address Information Available
	Description	Unallocated Crown Land
	Local Government Authority	Town of Port Hedland
	Ownership	State of Western Australia
LIA 4	Street Address	No Street Address Information Available
	Description	Unallocated Crown Land
	Local Government Authority	Town of Port Hedland
	Ownership	State of Western Australia
LIA 5	Street Address	No Street Address Information Available
	Description	Unallocated Crown Land
	Local Government Authority	Town of Port Hedland
	Ownership	State of Western Australia

2.2 Site Description

The layout and location of the sites is displayed in Figure 1, with site description provided in Table 2.

Table 2 Site Descriptions

Site	Identification
LIA3	The approximate 104,00m^2 and comprises of vegetation common to the Pilbara region. During the site visit no areas of particular interest (such as rubbish or earth disturbance) where noted at this site.
LIA4	The site is approximately 133,300m^2 and comprises of vegetation common to the Pilbara region. During the site visit no areas of particular interest (such as rubbish or extensive earth disturbance) where noted at this site. However the site does contain some cleared areas including vehicle tracks and 4 trenches (unknown use).
LIA5	The site is approximately 580,000m^2 and comprises of vegetation common to the Pilbara region. During the site visit no areas of particular interest (such as rubbish or extensive earth disturbance) where noted at this site. However the site does contain cleared areas including vehicle tracks, overhead power cable clearings and underground water pipes.
Transport	The site is approximately 1,010,000 m^2 and comprises native vegetation.

Site	Identification
Part A	No significant areas of previous disturbance were noted, apart from a small, fenced area which may have been a horse yard.
Transport Part B	The site is approximately 1,700,000 m^2 and comprises predominately of native vegetation. Disturbances to the site include a petrol station, roads and tracks and the existing Wedgefield Industrial area.

In general all the sites display similar levels of disturbance with previous indicators of human activity including cleared areas, roads and tracks, industrial development, petrol station and small amounts of dumped rubbish including old fuel/oil drums, concrete bonded fencing and small areas of pushed up earthen material.

2.3 Climate

The climate of the Pilbara region is arid (semi-desert) tropical with highly variable rainfall, which falls mainly in summer. Cyclonic activity is a significant aspect of the weather in the region.

The closest Bureau of Meteorology weather station to the study area is located at Port Hedland Airport. Recorded climatic data for this weather station is summarised below:

- Mean Daily Maximum Temperature: 27.1°C (July) – 36.8°C (March)
- Mean Daily Minimum Temperature: 12.2°C (July) – 25.5°C (Jan/Feb)
- Annual Rainfall: 313.5 mm
- Mean Annual Rain Days: 20.6 days

(Source: BOM, 2009)

2.4 Topography and Soils

The study area is located on the Abydos Plain. The geology of this area is described as Quarternary alluvium near the coast, further inland Archean granite; other Archean rocks outcropping in small hills, ranges and dykes.

The project areas are situated entirely on the coastal alluvium, with the surface soil being red silty sand. At the north eastern corner of the site, the soils become saline, probably as a result of periodic inflows from the coastal flood zone during high tide and storm surge events.

2.5 Hydrology and Hydrogeology

There are no surface freshwater flows within or adjacent to the study area.

The Department of Environment and Conservation (DEC) bore database search indicates that there are seven registered bores within a five kilometre radius. One bore was identified in the proposed Wedgefield Industrial Site in the north and another within one kilometre of LIA 5 in a southerly direction. This bore was stipulated in the DEC database as being used for livestock watering purposes.

No groundwater information is available for the sites.

2.6 Wetlands and Watercourses

No freshwater wetlands or watercourses occur on or adjacent to the project area.

A creekline, South Creek, flows from the south to the north approximately 200 m west of the western corner of the LIA 3. It is likely that runoff from the broader area enter this creek. The creek channel is also possibly inundated during high tide and storm surge events.

The northern boundary of the proposed Transport Part B area is within and adjacent to an area of semi- saline low lands (mudflats) which again, may be inundated during storm surge events. However, there is no wetland specific vegetation within proximity to the project sites. *(Note: further information on the risks of storm surge events and the water levels in the channel will be provided in the engineering report.)*

2.7 Public Drinking Water Source Areas

There are no Public Drinking Water Source Areas within the vicinity of the proposed study areas.

2.8 Acid Sulphate Soils

Acid sulphate soils (ASS) are mapped at Figure 2. The majority of the study areas are situated on an area believed to have no known risk of ASS to a depth of 3 m, however the northern most boundary of the proposed Industrial Site is considered to have a high to moderate ASS disturbance risk to a depth of 3 m.

2.9 Contaminated Sites

As identified from the Department of Environment and Conservation (DEC) Contaminated Sites Search there are no registered contaminated sites located within or adjacent to the study areas. One registered contaminated site was identified approximately 7 km to the north east of the study areas.

Site investigations undertaken by GHD employees did not identify any areas within the project area that would indicate contamination of areas LIA 3, 4 and 5 and Transport Area A. A range of drums, old building materials and general building waste was located as fill under the powerline running north through Port Authority land north of Transport Area B. The powerline fill may warrant more detailed investigation prior to development in the future.

The service station between Transport Areas A and B indicates a potential for hydrocarbon contamination in the water table below the area. This is only of concern if water is to be drawn from bores in the area or if the water table is breached during subdivision earthworks. As the land is relatively low-lying, it is unlikely that earthworks will occur much below natural ground level.

2.10 Surrounding Land Use

The land use surrounding the 3 proposed LIAs, Transport Area A and Transport Area B is described in Table 3.

Table 3 Surrounding Land Uses

Site	Identification
LIA3	The subject site is part of the larger Wedgefield Industrial Estate. Existing industrial / residential properties occur to the north, with both occupied and unoccupied lots existing in this area. South of the site is vacant land and contains vegetation and cleared areas similar to the site under investigation. To the west of the site the land is vacant, and the Wedgefield Industrial area industrial leading down to the tidal/ephemeral South Creek. East of the site is undeveloped land containing tracks and vehicle access paths, this area is predominately undisturbed.
LIA4	The subject site is part of the larger Wedgefield Industrial Estate. Existing industrial / residential properties occur to the north, with both occupied and unoccupied lots in this area. South of the site is the access road and railway to Finucane Island with vacant land beyond. The vacant land contains vegetation similar to the survey site. To the west the land is vacant land and leads down to the tidal/ephemeral South Creek. East of the site is the proposed LIA 3 area and undeveloped land containing tracks and vehicle access paths, this area is predominantly undisturbed.
LIA5	The subject site is part of the larger Wedgefield Industrial Estate. The vacant land of proposed LIA sites 3 and 4 exists immediately to the north with Wedgefield industrial area existing past this. Immediately south of the site is the access road and railway to Finucane Island, and vacant land with South Hedland existing past this. The South Hedland water storage tanks are in this location. To the west the land is vacant land and leads down to the tidal/ephemeral South Creek. The land east of the site vacant land containing tracks and vehicle access paths, this area is predominantly undisturbed bushland common to the area.
Transport Area A	Land to the north west and west is part of the existing Wedgefield Industrial Estate, and includes vacant land at LIA 3 and 5 across Pinga Road. Land to the south east is bordered by the Great Northern Highway, and beyond that unallocated crown land and the Port Hedland Cemetery. Immediately to the north-east is a service station and attached dwelling and an area proposed for General Industry (Transport Part B) which is currently unallocated crown land.
Transport Area B	Transport Area B is bordered by Transport Area A to the south. Land to the west is part of the existing Wedgefield Industrial Estate, with parts

Site	Identification
	of the proposed site already been cleared. Land to the east is bordered by the Great Northern Highway, and beyond that unallocated crown land and the Port Hedland Cemetery. A service station and attached dwelling exists within the south east corner of the site. Tidal flats and a motorcross tracks exists to the north.

2.11 Review of Aerial Photography

GHD has reviewed aerial photographs of the site from 1949 to 2004 to ascertain the development history of the site and land uses and practices that may lead to potential contaminating activities.

The photographs are reproduced in Appendix D and summaries of observations are provided in Table 4.

Table 4 Aerial Photograph Review

Photo Date	Description
19 June 1949	This photograph displays that no development has occurred within or nearby to the site.
13 September 1971	The LIA 5 area is clearly visible. LIA areas 3 and 4 still remain within a larger block of land with some clearing occurring adjacent to LIA 3.
04 August 1993	The proposed LIA areas are clearly visible. The aerial pictures display that activities are occurring within the sites, specifically the creation of tracks or boundary lines. Urban/residential development exists to the north of areas 3 and 4.
31 July 2004	The proposed LIA areas 3, 4, and 5 are clearly visible with no indication from the aerial pictures of development activities occurring within the designated areas. Urban/residential development surrounds the site. A petrol station exists between the Transport Use Areas, along the Great Northern Highway.

2.12 Certificate of Title Review

The ownership of the three LIA sites as identified from the Certificate of Titles for the sites is outlined in Table 5. The Certificate of Titles are provided in Appendix D.

Table 5 Certificate of Title Review

Site	Certificate of Title
LIA3	The Certificate of Title indicates that this land is Unallocated Crown land with the primary interest holder being the State of Western Australia.

Site	Certificate of Title
LIA4	Unallocated Crown Land – No Certificate of Title was available.
LIA5	The Certificate of Title indicates that this land is Unallocated Crown land with the primary interest holder being the State of Western Australia.

2.13 Aboriginal Heritage

The Aboriginal Site Register is held under Section 38 of the State *Aboriginal Heritage Act 1972.* It protects places and objects customarily used by, or traditional to, the original inhabitants of Australia.

Where an activity disturbs an Aboriginal site or object an application for permission to disturb those sites will need to be submitted under Section 18 of the *Aboriginal Heritage Act 1972.* Where an area of previously unknown Aboriginal heritage is to be disturbed, it is advised that a detailed anthropological and archeological heritage survey is undertaken to find if there any sites or objects of significance in that area, as it is an offence to disturb all Aboriginal Heritage sites even those not contained on the Aboriginal Heritage Site Register.

A search of the Department of Indigenous Affairs (DIA) Aboriginal Heritage Inquiry system in July 2009, indicated that, at that time, ten heritage sites were within 500m of the study area, these are shown in Table 6.

Table 6 Aboriginal heritage sites within the study area

Site ID	Site Name	Site Type
23612	Fmg Par 06-09	Midden / Scatter
23609	Fmg Par 06-06	Midden / Scatter
23605	Fmg Par 06-02	Midden / Scatter
23606	Fmg Par 06-03	Midden / Scatter
23611	Fmg Par 06-08	Midden / Scatter
23548	Fmg Par 06-01 (Shell Midden Scatter)	Engraving
25005	WN 07 - 13	Midden / Scatter
24995	WN 07 - 03	Midden / Scatter
26699	Lan 08 - 02	Midden / Scatter
26700	Lan 08 - 03	Midden / Scatter
26701	Lan 08 - 04	Midden / Scatter

Four of these heritage sites are recorded within the study areas. These are shown in Figure 2, Appendix A.

To confirm the occurrence and significance of sites within the study, a detailed Aboriginal heritage survey was undertaken in November 2008 by Anthropos Australis (March, 2009). This

survey and consultation considered the shell midden sites within Transport Area B and made recommendations as to the extent of Site IS 22874, which also impacts Transport Area B.

2.14 Native Title

The Port Hedland area is subject to one Native Title application, that being WC 99/3 for the Kariyarra people. Consultation over the use of Crown Land must be held with representatives of this group prior to development.

2.15 Environmentally Sensitive Areas

The DEC's online Native Vegetation Viewer was searched to determine the location of any Environmentally Sensitive Areas (ESAs) within the vicinity of the project area, as declared by a Notice under Section 51B of the *Environmental Protection Act 1986*.

The search confirmed that there are no ESAs within or adjacent to the study areas.

2.16 Reserves and Conservation Areas

There are no conservation reserves managed by the Department of Environment and Conservation within or immediately adjacent to the study areas.

2.17 Vegetation

2.17.1 Vegetation Description

The study areas fall within the Roebourne subregion of the Pilbara Biogeographic region of Western Australia. The environment of this subregion has been described as coastal and sub-coastal plains with a grass savannah of mixed bunch and hummock grasses and dwarf shrub steppe of *Acacia stellaticeps* or *A. pyrifolia* and *A. inaequilatera* (Kendrick and Stanley, 2001). The uplands of the region support *Triodia* hummock grasslands and the ephemeral drainage lines support *Eucalyptus victrix* or *Corymbia hamersleyana* (Kendrick and Stanley, 2001).

Remnant native vegetation mapped for the project area can be assessed using recently acquired data from the Western Australian Department of Agriculture (Shepherd, 2002; 2005), based on vegetation association mapping undertaken by Beard (1971). The major vegetation association occurring within the study areas is "Hummock grasslands, dwarf-shrub steppe; *Acacia translucens* (now *A. stellaticeps*) over soft spinifex". The vegetation association within the northern boundary of proposed Industrial site is described as "Bare areas; mud flats".

2.17.2 Vegetation Extent and Status

A vegetation type is considered underrepresented if there is less than 30 percent of its original distribution remaining. From a purely biodiversity perspective, and not taking into account any other land degradation issues, there are several key criteria now being applied to vegetation (EPA, 2000).

» The “threshold level” below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at 30% of the pre-European / pre-1750 extent for the vegetation type;

» 10% of the pre-European / pre-1750 extent for the vegetation type is regarded as being a level representing *Endangered*; and

» Clearing which would put the threat level into the class below should be avoided.

Such status can be delineated into five (5) classes, where:

» *Presumed Extinct*: Probably no longer present in the bioregion

» *Endangered**: <10% of pre-European extent remains

» *Vulnerable**: 10-30% of pre-European extent exists

» *Depleted**: >30% and up to 50% of pre-European extent exists

» *Least Concern*: >50% pre-European extent exists and subject to little or no degradation over a majority of this area.

* or a combination of depletion, loss of quality, current threats and rarity gives a comparable status

Native vegetation types represented in the survey areas; their regional extent and reservation status are drawn from Shepherd, *et al*. (2002), and Shepherd pers. comm. (2005). These are shown in Table 7.

Table 7 Major Vegetation System Associations within the Study Area (after Shepherd, 2002).

Vegetation Association Number	Association Description	Pre-European Extent (ha) in Roebourne IBRA subregion	Current Extent (ha) in Roebourne IBRA subregion	% Remaining	% Pre-European Extent in Conservation Reserves
647	Hummock grasslands, dwarf-shrub steppe; Acacia translucens over soft spinifex	189414	189414	100	0
127	Bare areas; mud flats	179917	177262	98.5	0

The extent of the vegetation in the study areas is considered of *Least Concern*, i.e. intact, with 100% of the pre-European extents of the vegetation type considered to be remaining.

2.17.3 Threatened Ecological Communities

Ecological communities are defined as ‘naturally occurring biological assemblages that occur in a particular type of habitat’ (English and Blythe, 1997). Threatened Ecological Communities (TECs) are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community, i.e. Presumed Totally Destroyed, Critically Endangered, Endangered, and Vulnerable.

Some TECs are protected under the *EPBC Act*. Although TECs are not formally protected under the State *Wildlife Conservation Act 1950,* the loss of, or disturbance to, some TECs triggers the *EPBC Act*. The Environmental Protection Authority's (EPA's) position on TECs states that proposals that result in the direct loss of TECs are likely to require formal assessment.

Possible TECs that do not meet survey criteria are added to the Department of Environment and Conservation's (DEC) Priority Ecological Community (PEC) Lists under Priorities 1, 2 and 3. These are ecological communities that are adequately known; are rare but not threatened, or meet criteria for Near Threatened. PECs that have been recently removed from the threatened list are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

The Department of Environment and Conservation's (DEC's) Threatened Ecological Community (TEC) database was queried for known occurrences of TECs and PECs near the study area. No TECs or PECs have been recorded within or in the vicinity of the study areas.

2.18 Flora

2.18.1 Significant Flora

Commonwealth

Species of significant flora are protected under both State and Commonwealth Acts. Any activities that are deemed to have a significant impact on species that are recognised by the *EPBC Act*, and the *Wildlife Conservation Act 1950* can trigger referral to the DEWHA and/or the EPA.

A description of Conservation Categories delineated under the *EPBC Act* is detailed in Table 11, Appendix B. These are applicable to threatened flora and fauna species.

A search of the *EPBC Act* Protected Matters Search Tool did not identify any Commonwealth protected flora species within 20 km of the survey area.

State

In addition to the *EPBC Act,* significant flora in Western Australia is protected by the *Wildlife Conservation Act 1950*. This *Act*, which is administered by the DEC, protects Declared Rare Flora (DRF) species. The DEC also maintains a list of Priority Listed Flora (PLF) species. Conservation codes for flora species are assigned by the DEC to define the level of conservation significance. PLF are not currently protected under the *Wildlife Conservation Act 1950*. PLF may be rare or threatened, but cannot be considered for declaration as rare flora until adequate surveys have been undertaken of known sites and the degree of threat to these populations clarified. Special consideration is often given to sites that contain PLF, despite them not having formal legislatory protection. A description of the DEC's Conservation Codes that relate to flora species is provided in Table 12, Appendix B.

A search of the DEC's Rare Flora Databases and the Western Australian Herbarium (WAHERB) records was undertaken. Significant flora species recorded in these databases for the general Port Hedland area are outlined databases are outlined in Table 8.

Table 8 Significant flora previously recorded in the Port Hedland area from records of the DEC and WAHERB

Family	Genus	Species	Details and Habitat	DEC Conservation Code
Asteraceae	*Pterocaulon*	sp. A Kimberley Flora (B.J. Carter 599)	Compact shrub, to 0.5 m high. Flowers blue, purple, Apr–Aug. Preferred habitat is sand in coastal areas, saline sandy flats, and pindan sandplain.	P2
Amaranthaceae	*Gomphrena*	*pusilla*	Slender branching annual, herb, to 0.2 m high. Flowers white, March-June. Preferred habitat is fine beach sand behind foredune on limestone.	P2
Amaranthaceae	*Ptilotus*	*appendiculatus* var. *minor*	Prostrate or ascending perennial, herb or shrub.	P1
Asclepiadaceae	*Gymnanthera*	*cunninghamii*	Erect shrub, 1–2 m high. Flowers cream, yellow, green, Jan–Dec. Preferred habitat is sandy soils.	P3
Boraginaceae	*Heliotropium*	*muticum*	Ascending to spreading perennial, herb, to 0.3 m high.	P1
Cyperaceae	*Bulbostylis*	*burbidgeae*	Tufted, erect to spreading annual, grass-like or herb (sedge), 0.03–0.25 m high, spikelets in a simple umbel or rarely solitary; stamens 3; involucral bracts long, hairy. Flowers brown, Mar/Jun–Aug. Preferred habitat is granitic soils on granite outcrops and cliff bases.	P3
Euphorbiaceae	*Euphorbia*	*clementii*	Erect herb, to 0.6 m high. Preferred habitat gravelly hillsides and stony grounds.	P2
Mimosaceae	*Acacia*	*glaucocaesia*	Dense, glabrous shrub or tree, 1.8–6 m high. Flowers yellow, Jul–Sep. Preferred habitat red loam, sandy loam, clay on floodplains.	P3

Family	Genus	Species	Details and Habitat	DEC Conservation Code
Papilionaceae	*Crotalaria*	*spectabilis* subsp. *spectabilis*	Annual herb, ca 2 m high. Flowers yellow.	P1
Papilionaceae	*Tephrosia*	*andrewii*	Ascending, multistemmed shrub, to 0.8 m high. Flowers orange, Apr/Oct. Preferred habitat sand in pindan country.	P1
Papilionaceae	*Tephrosia*	*rosea* var. *venulosa*	Erect shrub, to 1.7 m high. Flowers re, purple, Aug-Sep. Preferred habitat in red sand near creeks.	P1

None of these species has been previously recorded either within or closely adjacent to the study areas. The two large shrub species, *Acacia glaucocaesia* and *Gymnanthera cunninghamii*, are unlikely to have been overlooked during the survey, as there were very few tall shrubs in the study areas. Other species, such as *Gomphrena pusilla, Bulbostylis burbidgeae* and *Euphorbia clementii,* are known to grow on soil types that were not present in the area, so are unlikely to be present.

2.19 Fauna

2.19.1 Fauna Previously Recorded

The Western Australian Museum *NatureMap* online search was conducted for a 20 km buffer of the study areas. The search identifies terrestrial vertebrate species recorded in the collections of the Western Australian Museum and the Department of Environment and Conservation (DEC) records. The search identified the potential presence of twenty-four bird, fifty-nine reptile, seven amphibians and seventeen mammal species.

A full list of species recorded from the WA Museum database is presented in Table 16, Appendix C.

It should be noted that some of the records of the Museum are historical and some of the recorded species may now be locally extinct. Additionally these records may include species (particularly bird species) that are vagrants or present in the general area but not present within the study area due to lack of suitable habitat.

2.19.2 Significant Fauna Species

The conservation of fauna species and their significance status is currently assessed under both State and Commonwealth Acts. The acts include the *Western Australian Wildlife Conservation Act* 1950; *Wildlife Conservation (Specially Protected Fauna) Notice 2003,* and the *EPBC Act*.

The significance levels for fauna used in the *EPBC Act* are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN). A description of Conservation Categories delineated under the *EPBC Act* is detailed in Table 11, Appendix B and the circumstances under which a project will trigger referral to the DEWHA are described in Appendix C. The *WA Wildlife Conservation Act 1950* uses a set of Schedules but also classifies species using some of the IUCN categories. These Schedules are described in Table 14, Appendix C. The *EPBC Act* also protects migratory species that are listed under the following International Agreements:

» Appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals) for which Australia is a Range State under the Convention;

» The Agreement between the Government of Australia and the Government of the Peoples Republic of China for the Protection of Migratory Birds and their Environment (CAMBA);

» The Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); and

» The Agreement between the Government of Australia and the Government of the Republic of Korea on the Protection of Migratory Birds (ROKAMBA).

Listed migratory species also include species identified in other international agreements approved by the Commonwealth Environment Minister.

The Act also protects marine species on Commonwealth lands and waters.

In Western Australia, the DEC also produces a supplementary list of Priority Fauna, these being species that are not considered Threatened under the Western Australian *Wildlife Conservation Act 1950* but for which the Department feels there is a cause for concern. These species have no special legislatory protection, but their presence would normally be considered. Such taxa need further survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna. Levels of Priority are described in Table 15, Appendix C.

The DEWHA maintains a database of matters of national environmental significance that are protected under the *EPBC Act.* An *EPBC Act* Protected Matters Report was generated (from the website of the DEWHA), for the matters of significance that may occur in, or may relate to, the survey area. A search of the DEC's Threatened Fauna database for any rare and priority species that may occur in the survey area was also undertaken.

From the DEC and DEWHA databases and the records of the Western Australian Museum (WAM), a number of protected fauna species were identified as potentially occurring within the survey area, which are listed in Table 17, Appendix C.

It should be noted that some species that appear in the *EPBC Act* Protected Matters Search Tool are often not likely to occur within the specified area, as the search provides an approximate guidance to matters of national significance that require further investigation. The records from the DEC and WA Museum searches of threatened fauna provide more accurate information for the general area, however some records of sightings or trappings can be dated and often misrepresent the current range of threatened species.

More detail on the likely presence of threatened species in the study areas is provided in Section 3.4 below.

3. Field Assessment

3.1 Field Survey Methodology

The field survey of LIA 3, 4, and 5 and the General Industry/Transport Part A sites was undertaken by GHD on June 23rd 2008 by Anna Napier, an experienced ecologist and Lisa Marwick, an environmental scientist.

An additional flora and fauna survey was conducted on the 11th June 2009 of the General Industry/Transport Area Part B and the Port Hedland Port Authority land for the new loop road. This was undertaken by Georgina Nielssen, an experienced ecologist and Erin D'Raine, an environmental scientist.

3.1.1 Flora and Vegetation Assessment

The field assessments included a Level 2 Flora survey (as per EPA Guideline 51) which included:

- Surveying of 50m x 50m quadrats, within representative vegetation types;
- Surveying along targeted and random transects throughout the sites;
- Development of a full flora list;
- Assessment of the vegetation condition and any threatening processes;

In addition, the presence of Declared Rare or Priority Flora was assessed. Suitable habitat for DRF and Priority Flora species was searched. Vegetation was also assessed to determine the presence of TECs within the study area.

Where identification of flora species was uncertain, confirmation was made at the Western Australian State Herbarium.

3.1.2 Fauna Assessment

GHD's qualified ecologists conducted the fauna investigation in conjunction with the flora investigation. The Level 1 fauna survey included desktop investigations and field surveys, conducted with regard to the EPA's Guidance Statement No. 56, where possible.

The fauna survey was an opportunistic survey and did not involve any fauna trapping. The survey involved visual and aural surveys for any fauna species utilising the study area. The study area was also searched for any fauna signs, such as tracks, scats, bones, diggings and feeding signs.

Surveys also included systematic searching across all habitat types, which is an effective method of surveying for many reptile species. This involved searching through microhabitats where reptiles are known to frequent, including turning over logs or rocks, turning over leaf litter and examining hollow logs. Reptiles were also sighted as they basked during the day.

Species – specific search strategies were used to identify any protected species in the area or evidence that they utilise the study area.

3.1.3 Nomenclature

Nomenclature used in this report follows that used by the DEC's *FloraBase* program and Western Australian Museum *NatureMap* program as they are deemed to contain the most up-to-date species information for Western Australia.

3.1.4 Limitations

Complete flora and vegetation surveys can require multiple surveys, at different times of year, and over a period of a number of years, to enable observation of all species present.

Some flora species, such as annuals, are only available for collection at certain times of the year, and others are only identifiable at certain times (such as when they are flowering). Additionally, climatic and stochastic events (such as fire) may affect the presence of plant species. Species that have a very low abundance in the area are more difficult to locate, due to above factors. Therefore, while this flora survey was relatively exhaustive, and was conducted at a time of year when the majority of the flora species would be able to be identified, there is the possibility that some species with low abundance in the area have been overlooked.

The flora surveys were also restricted to predominantly flowering plants, with consideration of some other vascular plants such as cycads. Non-vascular plants were not systematically searched for, as the information available on these plants is generally limited.

The fauna survey undertaken was a reconnaissance survey only and thus only sampled those species that can be easily seen, heard or have distinctive signs, such as tracks, scats, diggings etc. Many cryptic and nocturnal species would not have been identified during a reconnaissance survey. Extensive detailed fauna surveys, involving trapping surveys, are required to obtain a more comprehensive list of fauna species that may utilise the site.

This survey was aimed at identifying the terrestrial vertebrate fauna of the study area; no sampling for invertebrates or aquatic species occurred.

3.2 Flora

A total of 123 species of plants was recorded within the combined study areas. Of these, three were introduced weed species and three were planted.

The study areas contain moderate species diversity, due partly to the limited range of habitats (i.e. the area was all flat, near coastal, mostly red sand plain) and also to the size of the survey area. Spinifex (*Triodia*) species dominate the vegetation, with a range of small shrubs and herbs also being present. The most diversity was observed in disturbed areas such as road edges, where grading has disturbed the soil and extra water runoff had produced conditions more suitable for herbaceous species to occur.

It is likely that these species are present over much of the area but are currently dormant (in seed form) and will only appear following a disturbance such as fire and after good rains.

The dominant families are:

- Poaceae (grasses) 20 species
- Papilionaceae (peas) 17 species
- Amaranthaceae (mulla-mullas) 10 species
- Mimosaceae (wattles) 10 species
- Convolvulaceae (morning glorys) 8 species

Well represented genera were: *Acacia* (wattles), *Ptilotus* (mulla mullas) and *Eragrostis* (grasses).

A complete list of the flora is provided at Table 13, Appendix B.

No Declared Rare or Priority flora species were identified during the survey.

3.3 Vegetation

3.3.1 Vegetation Type

The vegetation is almost completely uniform across the survey areas, with minor changes due to differing dominance of individual grass/Spinifex species, and also to historical disturbance. The northern-most part of the Transport Use Area (Lot B) consists predominately of bare areas with some vegetation associated with tidal/mud flats and contains a mixture of chenopod and saline-adapted species.

Four vegetation types were recorded within the study areas. The vegetation types match the descriptions by Beard (1971) and Kendrick and Stanley (2001) and are described as follows:

1. Low shrubland of *Acacia stellaticeps* over mixed tussock grassland of *Triodia epactia* and *T. schinzii* over very open herbs

This vegetation supports a small range of herbaceous and trailing plants, primarily: *Hybanthus aurantiacus, Eragrostis cumingii, Eragrostis eriopoda, Corchorus walcottii, Bonamia erecta, Cassytha* and the introduced Buffel grass (*Cenchrus ciliaris*).

Occasional patches of taller Acacia species occur, primarily in disturbed areas. The Acacia species include: *Acacia trachycarpa, A. colei, A. ampliceps, A. bivenosa and A. sericophylla*.

2. Bare Areas/Tidal Flats with low scattered shrubs of Chenopod spp.

This area consists of tidal soils with predominately bare, open ground with occasional patches of very scattered low shrublands of Chenopod spp., Mangrove spp., Trianthema spp. with scattered grasses including *Sorghum timorense, Eragrostis falcata, Panicum decompositum* and introduced Buffel Grass (*Cenchrus ciliaris*).

3. Tussock grassland of *Triodia secunda, Triodia schinzii*, and *Sorghum timorense* over scattered herbs and Chenopod spp.

This vegetation occurs along the fringes of the tidal flats/drainage areas in the northern half of Transport Area Part B. This vegetation type supports a small range of herbaceous and Chenopod species including *Commelina ensifolia, Desmodium filiforme, Frankenia ambita, Trianthema* spp*., Tecticornia* spp*.,* and *Salsola tragus.*

4. Cleared/Disturbed Areas

Heavily disturbed / predominantly cleared areas, with occasional planted species and some disturbance opportunists such as **Cenchrus ciliaris* present

Details of the quadrats representing these vegetation types are provided in Appendix B. The vegetation types have been mapped in Figure 3, Appendix A.

3.3.2 Vegetation Condition

Developed for Bush Forever, the vegetation Condition Rating is a scale that recognises the intactness of vegetation, which is defined by the following (Government of WA, 2000):

- Completeness of structural levels;
- Extent of weed invasion;
- Historical disturbance from tracks and other clearing or dumping; and
- The potential for natural or assisted regeneration.

The scale therefore consists of six (6) rating levels as outlined below in Table 9.

Table 9 Bush Forever (Government of WA, 2000) vegetation condition rating scale.

Vegetation Condition Rating	Vegetation Condition	Description
1	*Pristine or Nearly So.*	No obvious signs of disturbance.
2	*Excellent*	Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species.
3	*Very Good*	Vegetation structure altered, obvious signs of disturbance.
4	*Good*	Vegetation structure significantly altered by very obvious signs of multiple disturbances retains basic vegetation structure or ability to regenerate it.
5	*Degraded*	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not in a state approaching good condition without intensive management.
6	*Completely Degraded*	The structure of the vegetation is no longer intact and the area is completely or almost without native species.

The vegetation within the study areas is generally in *Excellent* condition, with small parts having a rating of *Good* to *Completely Degraded* due to clearing and other disturbances. Signs of disturbances across the study areas included old tracks, powerlines, petrol station and an existing industrial area.

There are few weeds species present across the area, with the most common, Buffel Grass, occurring primarily along the edges of tracks and roads and in other disturbed areas.

Vegetation condition is mapped in Figure 4, Appendix A.

3.3.3 Threatened Ecological Communities

No TECs or PECs were identified as occurring on the site during the field survey.

3.4 Fauna

3.4.1 Observed Fauna

A total of twenty bird, four mammal and three reptile species were recorded during the reconnaissance survey of the study areas. These species are listed in Table 18, Appendix C.

This survey only provides a brief snapshot of those species present at the time of sampling (daytime), in one season, over two years (2008 and 2009 surveys). Not all potentially occurring species would be recorded during a single survey due to spatial and temporal variations in fauna population numbers.

A number of tracks (mostly from reptiles) were observed on sand tracks within the LIA sites however, none of these were positively identified.

In addition, a number of fauna burrows were observed. These were present across all sites during both field surveys (Plates 2 and 3 below).

Plate 2 Burrow, LIA 3 (2008)

Plate 3 Burrow, LIA 5 (2008)

Significant Fauna Species

Brush-tailed Mulgara (*Dasycercus blythi*) Priority 4 (Wildlife Conservation Act)

Brush-tailed Mulgara (*Dasycercus cristicauda)* Schedule 1 (Wildlife Conservation Act, Vulnerable, EPBC Act*)*

Dasycercus blythi has been lumped with the *D. cristicauda* (Crest-tailed Mulgara) for the last 40 years or so. Both species of Mulgara have been found, at least in the past, throughout much of the arid zone, but until specimens in museum collections are correctly identified the distribution of each species is uncertain (Van Dyck and Strahan, 2008). *Dasycercus cresticauda* is listed as Schedule 1 under the Wildlife Conservation Act 1950 and Vulnerable under the EPBC Act whereas *D. blythi* is only listed as a Priority 4 species.

The Brush-tailed Mulgara is primarily nocturnal, shelters in burrows and feeds on insects, other arthropods and small vertebrates. This species inhabits spinifex grasslands and, in central Australia, lives in burrows that it digs on the flats between low sand dunes (Van Dyck and Strahan, 2008).

The Schedule 1 species, Mulgara (*Dasycercus cristicauda*) has previously been recorded in surveys of the Fortescue Metals Group land, west of Wedgefield (FMG, pers. comm.). In addition, Mulgara were recently trapped during a Level 2 fauna survey conducted by GHD in the surrounding Wedgefield area.

Burrows recorded during the 2008 survey may have been indicative of this species. A range of photos of the burrows was sent in 2008 to Dr Peter Kendrick at the DEC in Karratha for any advice on their potential occupants. On the verbal evidence of GHD, and the photos, Dr Kendrick was of the opinion that the burrows looked unused and that although some looked like potential Mulgara burrows they were now more likely to be used by lizards (P. Kendrick pers. comm. Aug 2008).

During the 2009 survey of the Transport Area Part B study area, evidence of the Mulgara species, including scats, tracks and diggings, was recorded (locations shown in Figure 2). Most of the survey area is suitable Mulgara habitat but recent use of the area by Mulgara has only been indicated in Transport Area B.

3.4.2 Potential for Other Significant Fauna Species

The desktop surveys indicated that a number of protected fauna may occur within the study area. The habitat requirements of these species and the likelihood of their occurrence in the site (with information from the field surveys) are considered below.

Southern Giant Petrel (*Macronectes giganteus*) Schedule 1, Endangered

The Southern Giant Petrel is a marine bird and occurs over open seas and inshore waters in Antarctic and subtropical waters. In summer they occur predominately in sub-Antarctic to Antarctic waters, usually below 60ºS in the South Pacific and southeast Indian Oceans. During winter most adults disperse widely and are rare in the southern waters of the Indian Ocean. The Southern Giant Petrel breeds on the Antarctic Continent, Peninsula and islands, and on sub-Antarctic islands and South America.

Habitat Assessment: The Southern Giant Petrel is an occasional vagrant within the area. The study areas are considered not to contain significant habitat for this species.

Northern Quoll (*Dasyurus hallucatus*) Schedule 1, Endangered

This species of quoll once occurred across the majority of northern Australia but its range has contracted seriously. It still occurs in the Pilbara region but in disjunct populations, predominantly in the larger conservation reserves. The Northern Quoll inhabits a range of vegetation types but is especially abundant on dissected rocky escarpment and eucalypt woodland within 200 km of the coast. They are predominately nocturnal but occasionally active during the day, particularly during the mating season or in overcast weather (Van Dyck and Strahan, 2008).

Habitat Assessment: The study areas are within the range of this species but do not contain suitable habitat as there are no trees for shelter. Additionally, the proximity to dogs and cats would likely preclude the use of the site by this animal.

Bilby (Macrotis lagotis) Schedule 1, Vulnerable

The Bilby distribution in Western Australia is restricted to the north, including the Pilbara and the Sandy and Gibson deserts. The Bilby usually spends the daytime in burrows, often built against termite mounds spinifex hummock or shrub. After dark they leave their burrows to feed and populations are known to move long distances when current habitat ranges become unsuitable. Bilbies are largely solitary, widely dispersed and found in low numbers. Bilbies have now disappeared from many areas where they were common 10 to 15 years ago, such as between Broome and Port Hedland and the Tanami Desert. Grazing by rabbits and livestock, changes in fire regime, and predation by foxes and feral cats are thought to be the main factors influencing the Bilby's decline.

Habitat Assessment: No evidence (burrows or diggings characteristic of this species) for the presence of Bilbies was observed during the field surveys. The study areas do not contain significant habitat for this species and is unlikely to occur here.

Banded Hare-wallaby (*Lagostrophus fasciatus* subsp. *fasciatus*) Schedule 1, Vulnerable

This small macropod is herbivorous, and dependent upon dense thickets of shrubs and heath for shelter. The Banded Hare-wallaby is currently restricted to Bernier and Dorre Islands in Shark Bay. It is presumed that the mainland populations of this species are now extinct. The last specimen from mainland Australia was collected in 1906 (Richards, 2003). An attempted reintroduction to Peron Peninsula showed that the species is highly vulnerable to predation from cats as well as foxes.

Habitat Assessment: The study area is outside the current range of the Banded Hare-wallaby. Given that the mainland populations of this species are thought to be extinct, it is unlikely to occur within the study areas.

Pilbara Leaf-nosed Bat (*Rhinonicteris aurantius*) Priority 1, Vulnerable

The Pilbara Leaf-nosed Bat roosts in deep caves or mines in the wet season and forages nearby. This species occurs in the Pilbara region of WA where its populations are scattered and localised. There are a few known populations of this species in the western Pilbara, roosting in caves formed in gorges that dissect massive siliceous

sedimentary geology. It is most often observed in flight over waterholes in gorges, but appears to be rare even in the Hamersley Range where this habitat is common (Van Dyck and Strahan, 2008). Optimal roosts are thought to occur in caves that form between ascending rock layers, where humidity is maintained from seeping groundwater (Van Dyck and Strahan, 2008).

Habitat Assessment: There are no suitable roosting areas for this species within the study areas making it unlikely to occur, except possibly as a forager.

Woma (*Aspidites ramsayi*) Schedule 4

The Woma Python is a nocturnal snake that feeds on lizards, snakes, birds and small mammals. This species occurs in the arid zones of Western Australia, favouring open myrtaceous heath on sandplains, and dunefields dominated by spinifex. They often inhabit animal burrows but may also use their head and neck to excavate shelters under hummock grasses or dense bushes. Land clearance and introduced predators have results in significant declines of this species. Populations are known from the Pilbara coast, north to the Eighty-mile Beach area, and south-west Western Australia, from Cape Peron south and east to the eastern Goldfields.

Habitat Assessment: Suitable habitat for the Woma Python occurs within the study area. This species may occur within or in the vicinity of the study areas.

Little North-western Mastiff Bat (*Mormopterus loriae* subsp. *cobourgiana*) Priority 1

The Little North-western Mastiff bat occurs along the Western Australia coast from Lake McLeod to Point Torment, occurring sparsely across its range. The Western Australian population have only been recorded from mangrove stands, particularly those that include mature Grey Mangroves (Van Dyck and Strahan, 2008).

Habitat Assessment: There are no suitable roosting areas for this species within the study area. The study area is considered not to contain significant habitat for this species however it may utilise the area for foraging.

Australian Bustard (*Ardeotis australis*) Priority 4

The Australian Bustard occurs across much of Australia, including across most of Western Australian, excepting heavily wooded areas in the south. The Australian Bustard occurs mainly in open country, such as low heath or lightly wooded grassland.

Habitat Assessment: This species may occur within the study areas as it contains potential habitat and has been recorded utilising the nearby Boodarie area. However, due to the likely prevalence of cats and dogs in the vicinity it is highly unlikely that the Australian Bustard would utilise the area. In addition, this species is widespread and the study area is not considered to contain significant habitat for this species. Impacts associated with the proposed activities are unlikely to have a significant impact on this species.

Eastern Curlew (*Numenius madagascariensis*) Priority 4

The Eastern Curlew is a large, migratory wader. It is widespread in coastal regions in the northeast and south of Australia and is rarely seen inland. This species is found on

intertidal mudflats and sandflats, often with seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons (Australian Museum, 2008)

Habitat Assessment: The study area does not contain significant habitat for this species and is unlikely to occur here.

Star Finch (Western) (*Neochima ruficauda* subsp. *subclarescens*) Priority 4

This species is endemic to Australia where it is found from the Pilbara to south-eastern Australia. Its population has not been estimated but the species is typically patchy and highly variable in abundance. The Star Finch is a nomadic species which inhabits reedbeds, grasslands and eucalypt woodlands along permanent waterways. It typically nests in March and April and its nest is usually built in reeds up to several metres above ground. The main threat to this species is considered to be overgrazing by stock along waterways, which destroys the riparian vegetation on which they depend (Garnett and Crowley, 2000). Records from the DEC database have shown one confirmed sighting of this species recorded in South Hedland in 2005.

Habitat Assessment: The Star Finch was not recorded during the field surveys. There are no permanent watercourses or significant habitat for this species within the study area therefore this species is unlikely to be a permanent resident in the area. This species however, may utilise the study area while moving through areas and for foraging.

Migratory species

Two migratory species were observed over the study areas, the Black-shouldered Kite and Black Kite. Two marine species were observed over the study areas', including the Black-faced Cuckoo-Shrike and Nankeen Kestrel and one species recognised as Marine and Migratory, the Rainbow Beet-eater, was also recorded. Most of these species were observed flying over the study area; however the Rainbow Bee-eater was observed utilising the area for feeding. No existing breeding areas for the Rainbow Bee-eater were observed during the field surveys. The study areas are not deemed critical habitat to the above species for survival.

In addition to those species recorded during the field survey, a number of species included in the list of significant fauna species that could potentially occur in the study area were migratory terrestrial, marine and wetland species. There is the potential for these bird species, such as the White-bellied Sea-Eagle, to occur occasionally within the study area. However most of these species require wetlands where they feed (Oriental Plover, Oriental Dotterel, Egrets, Little Curlew) or trees, cliffs or embankments where they roost or breed (White Bellied Sea eagle and Southern Giant Petrel). It is not considered that the study areas provide any suitable feeding or breeding habitat for migratory species.

Other Species

In addition to the above species, the DEC and *EPBC Act* Protected Matters Search also recorded a number of marine mammals, shark species, ray-finned fishes and marine reptiles, listed under the *Wildlife Conservation Act 1950* and/or the *EPBC Act 1999*, to occur within the search area. The study area is located in close proximity to

the coastline and therefore the marine environment was included in the 20 km buffer area. Given that this is a terrestrial ecological survey and the proposed projects will not impact on the marine environment, these species have not been considered in this report.

3.4.3 Introduced Fauna

Evidence of two introduced species were recorded during the field surveys, including the Feral Cat and Dog (domestic/wild).

3.4.4 Fauna Habitat

The field fauna assessment covered two main fauna habitat types, including:

» Low open shrubland over tussock grasslands; and

» Tidal mud flats/Chenopod shrubland.

The study area was dominated by low open shrubland over tussock grasslands which were found to provide ideal fauna habitat, particularly for reptiles and small mammals.

Evidence of the Mulgara species (scats, burrows and prints) was found within the vegetation type described as 'Low shrubland of *Acacia stellaticeps* over mixed tussock grassland of *Triodia epactia* and *T. schinzii* over very open herbs.' The location of Mulgara evidence is in the north of the development site, in Transport Area B. Most of this area will be not developed for some 8 to 10 years.

Within the northern half of the proposed transport use area, tidal mudflats are present that support numerous bird and potentially fiddler crab species.

Habitat Value

The majority of the study areas were considered to contain native vegetation in excellent condition, offering suitable habitat for native fauna. The low open shrubland over tussock grasslands of the study area is considered to be potentially good Mulgara habitat. However, this vegetation type covers some 189,000 ha in the near-coastal Pilbara, as indicated by the Shepherd *et al.* data provided in Section 2.17.2.

Native vegetation, including the vegetation types found within the study areas (including the Mulgara habitat) is found outside the survey areas in the surrounding area and is of similar condition to that of the survey area.

Clearing for tracks, roads, petrol station, motocross track and other infrastructure that have occurred within and adjacent to the study areas have reduced the habitat value within some sections of the study areas.

Habitat Linkages

Habitat linkages are important to allow animals to move between areas of resource availability. Habitat linkage is important for ground and aerial fauna, providing cover, resources, and linking areas suitable for rest and reproduction.

Fragmentation of habitat limits the resources available to species, particularly sedentary species, which means they may be more vulnerable to natural disasters or

habitat changes over time. Fragmentation of habitat can also lead to edge effects, leading to degradation of the habitat. Where the distance between habitat fragments is small, species may still be able to move between these habitat areas, but may be more exposed to predation pressures in the cleared areas.

Clearing of the native vegetation remaining within the study area could cause breaks to habitat linkages for the Mulgara population within and outside the survey areas. Fragmentation of this habitat may restrict the species from accessing temporary refugia and other members of the population, which may in turn lead to a local decline of these species. It could also result in direct mortality to the species during clearing.

4. Clearing of Native Vegetation

Any clearing of native vegetation will require a permit under Part V Division 2 of the *Environmental Protection Act 1986* (EP Act), except where an exemption applies under Schedule 6 of the Act or is prescribed by regulation in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, and it is not in an Environmentally Sensitive Area (ESA).

Table 10 provides an assessment of the proposed project against the "10 Clearing Principles" as outlined in Schedule 5 of the *Environmental Protection Amendment Act 2003* to determine whether it is at variance to the Principles. These Principles aim to ensure that all potential impacts resulting from removal of native vegetation can be assessed in an integrated way.

This project has been assessed to "*may be at variance*" to Principle (b) and not at variance or not likely to be at variance with any of the other 9 Clearing Principles.

The project may be at variance to Principle (b) due to the potential presence of the Mulgara species, which is classified as Vulnerable and Schedule 1, in the study areas.

Table 10 Assessment against the Ten Clearing Principles

Principle Number	Principle	Assessment	Outcome
(a)	Native vegetation should not be cleared if it comprises a high level of biological diversity.	The study area is not considered to be of higher biodiversity than the surrounding areas, and the proposed clearing is unlikely to have any significant impact on the biodiversity of the region.	The proposal is unlikely to be at variance with the Principle.
(b)	Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous Western Australia.	The project areas are likely to support a number of reptile, bird and mammal species. The 2008 survey of the LIAs and Transport Area A sites appeared to have supported small mammals but burrows seemed to be unused. However during the 2009 survey of the Transport Area B, evidence of the Mulgara species, including scats, tracks and diggings, was recorded. Mulgara are a conservation significant fauna that are known to occur within the Port Hedland and Wedgefield area. *Dasycercus cristicauda* (Mulgara) has recently been recorded by GHD in the nearby Wedgefield area. Due to the proximity of the sites to human populations and the presence of feral cats and dogs, the Mulgara may no longer occur in much of the study area. A detailed fauna survey would be required to verify the population of this species within the study area.	The proposal may be at variance with the Principle.
(c)	Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	No Declared Rare flora species are known from the general area. Some Priority species could potentially be present but none were recorded during the field survey.	The proposal is unlikely to be at variance with the Principle.

Principle Number	Principle	Assessment	Outcome
(d)	Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	No TECs are known to occur within or adjacent to the study area.	The proposal is unlikely to be at variance with the Principle.
(e)	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	The extent and status of vegetation identified for the study area (Beard, 1973; Shepherd pers. comm., 2005) has indicated that the vegetation association, Hummock grasslands, dwarf-shrub steppe; *Acacia translucens* (now *A. stellaticeps*) over soft spinifex has 100% remaining and is classed Least Concern.	The proposal is unlikely to be at variance with the Principle.
(f)	Native vegetation should not be cleared if it is growing in or in association with a watercourse or wetland.	There are no wetlands or permanent watercourses within the study area.	The proposal is not at variance with the Principle.
(g)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	Clearing of the land is unlikely to cause appreciable degradation to adjoining land. Clearing will create runoff to constructed drainage systems which will eventually flow into the saline coastal tidal zones during heavy rainfall events. The major weed of the area, Buffel grass, is widespread on adjacent tracks and disturbed areas. Clearing may create further weed spread. These potential impacts can be mitigated by use of appropriate management plans.	The proposal is not likely to be at variance with the Principle.

Principle Number	Principle	Assessment	Outcome
(h)	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	There are no conservation areas within or in the vicinity of the study areas.	The proposal is not at variance with the Principle
(i)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	Clearing will create runoff to constructed drainage systems which will eventually flow into the saline coastal tidal zones during heavy rainfall events. This may create additional sedimentation for short periods but is unlikely to cause deterioration of surface water overall.	The proposal is unlikely to be at variance with the Principle
(i)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the intensity of flooding.	Runoff from the study areas will be directed into constructed drainage and then to South Creek and the coastal tidal zone. A potential flood analysis is being undertaken.	The proposal is unlikely to be at variance with the Principle.

5. Impacts and Management

5.1 Actual and Potential Environmental Impacts

The proposed development of LIAs 3, 4 and 5, Transport Area Part A and Part B and the Port Hedland Port Authority land will have a range of impacts on the environment.

Biological Impacts

- Clearing of native vegetation in good to excellent condition as follows:
  - LIA 3: 10.4 ha
  - LIA 4: 13.3 ha
  - LIA 5: 58 ha
  - Transport Part A: 101 ha.
  - Transport Part B: 170 ha
- The vegetation of the area is well represented in the Pilbara region, with approximately 196,372.2 ha remaining undisturbed.
- Clearing of fauna habitat as above. The areas are likely to support a range of reptile and small mammal species which will be killed or displaced as a result of vegetation clearing and land disturbance. Although none was observed during the survey, evidence of the Mulgara species (Vulnerable, Schedule 1) was recorded within Transport Area Part B. A detailed (Level 2) fauna survey would be required to verify the population size of this species within the study area of Transport Area Part B. Clearing of Mulgara habitat may have a significant impact on the population of this mammal species in the Port Hedland area, dependent on the outcomes of a detailed survey. Transport Area Part B will not be developed for at least 10-15 years. It is the last of the areas proposed for development as part of this project.
- Clearing within potential Mulgara habitat may cause breaks to habitat linkages within the Mulgara population.
- Post-development impacts on adjacent bushland. The operation of new industrial lots will have potential impacts on bushland remaining in the area. The impacts will primarily be on fauna and issues could include:
  - Light overspill;
  - Litter;
  - Noise and vibration disturbance;
  - Dust production;
  - Increased predators; and
  - Increased traffic.

  These issues have the potential to disturb or harm fauna remaining in the adjacent areas.

» Changes to natural drainage from clearing may impact on the vegetation types and fauna in the area.

Physical and Social Impacts

» Alteration to surface drainage. As a result of vegetation clearing and the development of building and hard stands, there will be a reduction in infiltration to the ground and an increase in runoff from the sites. This runoff will be collected in drainage systems and most likely transferred to South Creek.

» Nuisance impacts such as dust or pollutant production and noise and vibration will occur during the construction phases of the subdivision and during development of individual lots. Given the industrial location, it is likely that noise and vibration will not be a significant issue, however some caretaker residences and transient workforce accommodation are present within the existing Wedgefield area. LandCorp has considered the potential noise risks to the existing transient workforce accommodation and has developed the following mitigation:

  – Changes to the estate layout;
  – a sale strategy;
  – design guidelines; and
  – planning controls.

  This mitigation is detailed in a letter to the DEC of September 2009 which is attached at Appendix E.

» Additional traffic will be generated as a result of new businesses. This will create impacts of noise, safety and possible delays, especially as a result of large turning movements.

» The addition of industrial lots closer to Great Northern Highway will have the potential to create a less desirable visual impact for tourists and travellers. Due to the nature of industrial lots and the likelihood of storage of equipment outside, such areas can be messy and unsightly. Some screening may be required to GNH.

5.2 Possible Impact Management Actions

Some of the actual and potential impacts of the development of the LIA and Transport landuses will be manageable through design, construction controls and by-laws. Other impacts cannot be easily mitigated.

Biological Impact Management

Clearing of native vegetation cannot be mitigated in the immediate area. The loss of vegetation is not considered significant regionally, but will have an impact visually and on native fauna.

Suggested management actions are as follows:

» Ensure lot design provides for retention of ‘nature strips’, particularly bordering Great Northern Highway;

- Minimise clearing adjacent to the development during construction phases;
- Ensure cleared bushland and topsoil is removed from site or used in rehabilitation of any adjacent disturbed areas (i.e. not retained in mounds or windrows);
- During major clearing, allow any existing fauna to move off-site, if possible, and discourage or prohibit the presence of dogs. This can be achieved with the following actions:
  - clear vegetation from disturbed areas towards undisturbed (or outward from already developed areas);
  - use experienced fauna clearance personnel to spot and catch Mulgara which may be disturbed and which are moving away from clearing machinery; and
  - develop a relocation program.
- Mulgara are not readily trapped and avoidance of active burrows is recommended over relocation. Where avoidance of active burrows is not possible, trapping and relocation to nearby similar vegetation immediately prior to clearing is recommended. Trapping and relocation works are to be done by suitable qualified and experienced fauna consultants only, and in consultation with the DEC.

Physical and Social Impact Management

- Ensure drainage design reduces the risk of scour and sedimentation into South creek;
- Provide planning guidelines with regard to developing new caretaker residences in the development areas and with regard to noise impact on existing caretaker residences and transient workforce accommodation;
- Follow Council by-laws with regard to construction noise and dust, and DEC Guidelines where appropriate;
- Consider traffic flows during design and develop a traffic management plan for the initial construction phase; and
- Provide lot development guidelines for setbacks, verges and fencing. Provide screening design along Great Northern Highway.

6. Environmental Approvals

6.1 Referral to the Department of Environment, Water, Heritage and the Arts (DEWHA)

Referral to the Commonwealth Department of the Environment, Water, Heritage and the Arts under the *Environment Protection and Biodiversity Conservation Act 1999* (the *EPBC Act*) is triggered by seven major issues. These are:

- World Heritage properties;
- National Heritage places (from 1 January 2004);
- Ramsar wetlands of international significance;
- Nationally listed threatened species and ecological communities;
- Listed migratory species;
- Commonwealth marine areas; and
- Nuclear actions (including uranium mining).

The *EPBC Act* is also triggered if a proposal is likely to have a significant environmental impact on Commonwealth Land.

Initial fauna surveys have indicated evidence for the presence of Mulgara, listed as Vulnerable under the EPBC Act, within parts of Transport Area B. Given the likely presence of this species within the northern part of the study area, the project may require referral to the DEWHA for assessment under the EPBC Act.

Further detailed fauna investigations (Level 2 fauna survey) would be required to verify the population size of this species within the study area. This investigation will be undertaken prior to any development of the high risk area of Transport Area B.

6.2 Referral to the Environmental Protection Authority (EPA)

Projects may require referral to the EPA under Part IV of the *Environmental Protection Act, 1986*, if the project will have significant impacts on any of the following matters:

- Native remnant vegetation;
- Rare flora and fauna species and threatened communities;
- Wetlands;
- Watercourses and rivers;
- Estuaries and inlets;
- Coastlines and near shore marine areas;
- Catchments with special requirements;
- Contaminated soils;
- Noise and vibration;

- Public Drinking Water Source Areas - groundwater and surface water;
- Aboriginal heritage;
- European cultural heritage; or
- Adjacent land uses.

Matters relating to this proposal which could require referral under this Act include:

- Impacts on threatened fauna.

Mulgara are listed as a Schedule 1 species under the *Wildlife Conservation Act 1950*. The clearing and proposed development of the study areas could cause breaks to habitat linkages for the Mulgara population within and outside the survey area.

Further detailed fauna investigations (Level 2 fauna survey) are recommended to verify the population size of this species prior to any development in Transport Area B.

Formal assessment of the project would preclude the requirement to obtain a separate Clearing Permit. Clearing Permits are required under the *Environmental Protection Act (Clearing of Native Vegetation Regulations) 2004* for any loss of native vegetation. However, if the project is formally assessed, the provisions for a clearing permit would be considered as part of that assessment.

The DEWHA has signed a Bilateral Agreement with the DEC. This agreement gives the DEC the power to assess some projects which would otherwise be assessed by the DEWHA. Projects which trigger the *EPBC Act* must still be referred under that *Act* but there will not be a duplication of assessment at both a State and Federal level.

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Appendix A

Figures

Proposed Wedgefield Industrial Site

Proposed Wedgefield Industrial Site

General Industry/Transport Part A

LIA2

LIA3

LIA4

LIA5

MILLER ST
MOORAMBINE ST
LEEHEY ST
PINGA ST
ABYDOS PL
SCHILLAMAN ST
TRIG ST
RIDLEY ST
PINNACLES ST
MANGANESE ST
HARWELL WY
MUNDA WY
CAJARINA RD
AMTHILL ST
GREAT NORTHERN HWY
FINUCANE ISLAND ACCESS
UNKNOWN RD
WALLWORK RD
HAMILTON RD
NORTH CIRCULAR RD EAST
NORTH CIRCULAR RD WEST
EDWINS WY
GREENE PL
STANLEY ST
DRIVER WY
PARKER ST
CATAMORE CT
TRAINE CR
BROOME CR
BECKER CT

Locality Map

INDIAN OCEAN

PORT HEDLAND

SOUTH HEDLAND

665,000 665,500 666,000 666,500 667,000 667,500 668,000 668,500

7,748,500 7,748,000 7,747,500 7,747,000 7,746,500 7,746,000 7,745,500 7,745,000 7,744,500 7,744,000 7,743,500

LEGEND

- Proposed Wedgefield Industrial Site
- Areas of Interest
- Cadastre

1:15,000 (at A3)

0 75 150 300 450 600 750

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 50

N

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Landcorp
LECP - Port Hedland Industrial Land PEIA

Job Number 61-22635
Revision A
Date 20 JUL 2009

Locality Map

Figure 1

G:\61\22635\GIS\mxds\6122635-G009_RevB.mxd

GHD House, 239 Adelaide Terrace Perth WA 6004 **T** 61 8 6222 8222 **F** 61 8 6222 8555 **E** permail@ghd.com.au **W** www.ghd.com.au

Data Source: Landgate: Pt Hedland Mosaic - 2008; MRWA: Cadastre - 200811, Roads - 2009; GHD: Boodarie Industrial Estate (incl. Alternative Site) - 20090716. Created by: slee2

665,500 667,000 668,500

7,747,500

WN 07 - 17
WN 07 - 07
MARAPIKURRINYA YINTHA SITE
BOODARIE 03
WN 07 - 09
WN 07 - 12
WN 07 - 10
WN 07 - 01
WN 07 - 08
WN 07 - 14
WN 07 - 06
WN 07 - 04
WN 07 - 05
WN 07 - 02
WN 07 - 13
WN 07 - 03
CKAR 08-007
CKAR 08-005
LAN 08 - 02
LAN 08 - 03
LAN 08 - 04
GREAT NORTHERN HWY
MILLER ST
MOORAMBINE ST
LEEHEY ST
SANDHILL ST
PINGA ST
PEAWAH ST
YANANA ST
ABYDOS PL
SCHILLAMAN ST
TRIG ST
RIDLEY ST
MURRENA ST
ANTHILL ST
FMG PAR 06-09
FMG PAR 06-06
PINNACLES ST
MANGANESE ST
FELDSPAR ST
HARWELL WY
CARLINDIE WY
FMG PAR 06-08
MUNDA WY
FMG PAR 06-01
(SHELL MIDDEN SCATTER)
CAJARINA RD
KANGAN WY
DALTON RD
FMG PAR 06-03
FMG PAR 06-02
GREAT NORTHERN HWY
WALLWORK RD
WALLWORK RD
HAMILTON RD

7,746,000

7,744,500

665,500 667,000 668,500

LEGEND

- Evidence of Mulgara (Vulnerable Fauna)
- Aboriginal Heritage Sites
- Register of National Estate
- Study Area

Acid Sulfate Soils

- High to moderate ASS disturbance risk (<3m from surface)
- Moderate to low ASS disturbance risk (<3m from surface)
- No known ASS disturbance risk (<3m from surface)

1:15,000 at A3

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 50

N

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Environmental Constraints

LIA 3, LIA 4, LIA 5, General Industry/Transport Part A, B

Job Number 61-22635
Revision 1
Date 20 OCT 2009

Figure 2

G:\61\22635\GIS\mxds\6122635-G01_Rev01.mxd

239 Adelaide Terrace Perth WA 6004 Australia **T** 61 8 6222 8222 **F** 61 8 6222 8555 **E** permail@ghd.com.au **W** www.ghd.com.au

Data Source: Landgate: Port Hedland Townsite Mosaic - 200208 (SLIP: 20090811); GHD: Study Area - 20090811, Mulgara (Vulnerable Fauna) - 20091020; DIA: Aboriginal Heritage Sites - 20090715; DEH: Register of National Estate - 2006; DEC: Acid Sulfate Soils - 20060906. Created by: C Hoermann, K Iralu

665,500 666,000 666,500 667,000

7,745,500

7,745,000

LIA3

LIA4

LIA5

General Industry/Transport Part A

1:5,000 (at A3)

0 25 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

Study Area

Cadastre

Vegetation Type

Cleared/Disturbed areas

Low shrubland over mixed tussock grassland over very open herbs

GHD

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PEIA

Job Number 61-22635
Revision 0
Date 20 AUG 2009

LIA 3, LIA 4, LIA 5 Vegetation Type

Figure 3

G:\61\22635\GIS\mxds\6122635-G013.mxd

Data Source: GHD: Study Areas (LandCorp) - 20090811, Vegetation Type - 20080904; Landgate: Cadastre - 20090727; Landgate: WA Wedgefield Project Port Hedland Jun 2008 Mosaic - June 2008 (SLIP: 20090820). Created by: kdiralu

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1:7,500 (at A3)

0 37.5 75 150 225 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

Study Area

Cadastre

Vegetation Type

Cleared/Disturbed areas

Low shrubland over mixed tussock grassland over very open herbs

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LECP - Port Hedland Industrial Land PEIA

General Industry/ Transport Part A Vegetation Type

Job Number	61-22635
Revision	0
Date	20 AUG 2009

Figure 3

G:\61\22635\GIS\mxds\6122635-G014.mxd

Data Source: GHD: Study Areas (LandCorp) - 20090811, Vegetation Type - 20080904; Landgate: Cadastre - 20090727; Landgate: WA Wedgefield Project Port Hedland Jun 2008 Mosaic - June 2008 (SLIP: 20090820). Created by: kdiralu

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1:10,000 (at A3)

0 50 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

- Proposed Wedgefield Industrial Estate
- Cadastre

Vegetation Type

- Bare areas/tidal flats
- Cleared/Disturbed areas
- Low shrubland over mixed tussock grassland over very open herbs
- Tussock grassland over scattered herbs

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General Industry/ Transport Part B Vegetation Type

Job Number	61-22635
Revision	0
Date	20 AUG 2009

Figure 3

G:\61\22635\GIS\mxds\6122635-G016.mxd

Data Source: GHD: Proposed Wedgefield Industrial Estate - 20090716; GHD: Vegetation Type - 20080904; Landgate: Cadastre - 20090727; Landgate: WA Wedgefield Project Port Hedland Jun 2008 Mosaic - June 2008 (SLIP: 20090820). Created by: kdiralu

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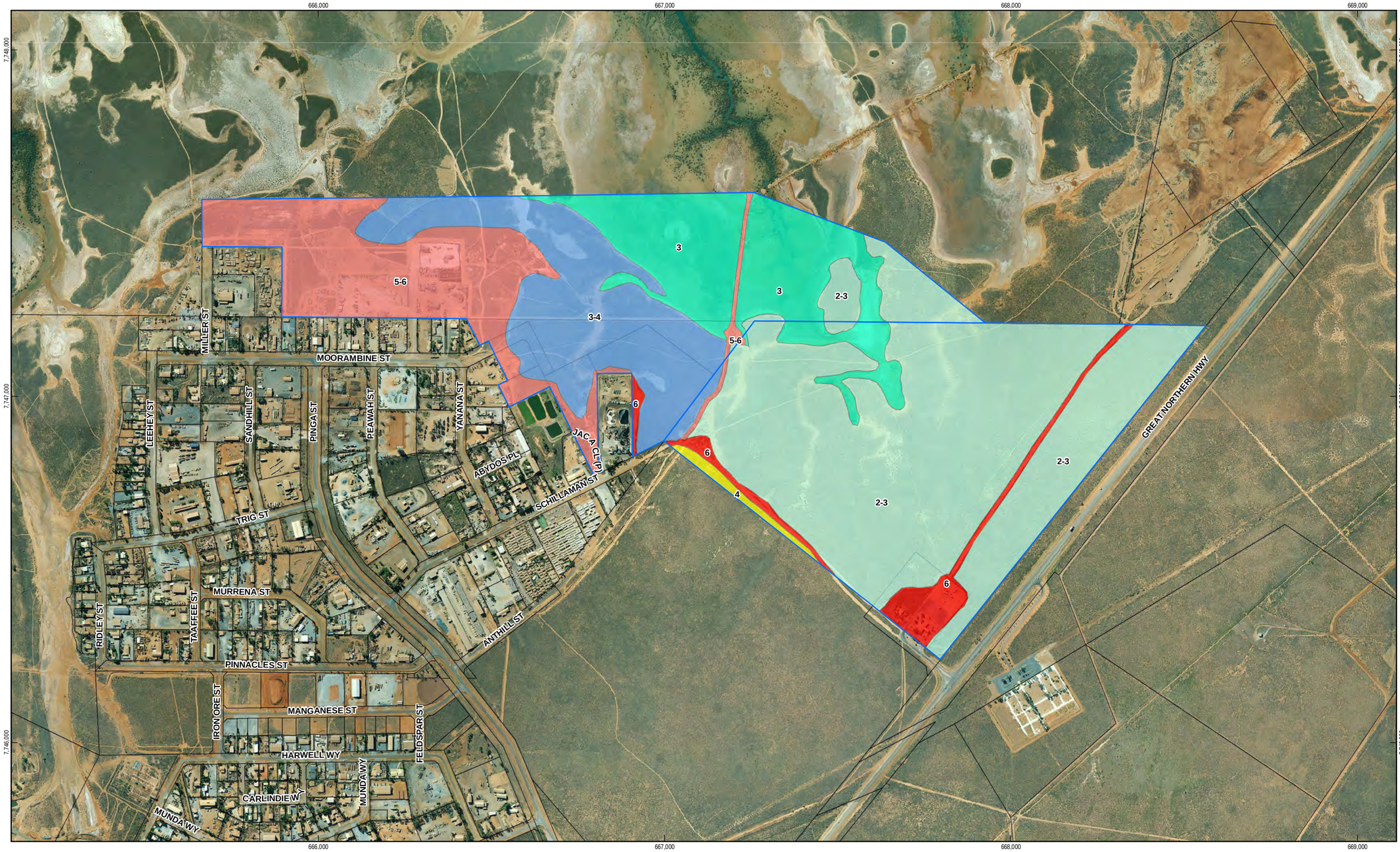

1:10,000 (at A3)

0 50 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

- Proposed Wedgefield Industrial Estate
- Cadastre

Vegetation Condition

1. Pristine or nearly so
2. Excellent
3. Very Good
4. Good
5. Degraded
6. Completely degraded

CLIENTS | PEOPLE | PERFORMANCE

LandCorp
LECP - Port Hedland
Industrial Land PEIA

Job Number	61-22635
Revision	0
Date	20 AUG 2009

General Industry/Transport Part B Vegetation Condition

Figure 4

G:\61\22635\GIS\mxds\6122635-G015.mxd

Data Source: GHD: Proposed Wedgefield Industrial Estate - 20090716; GHD: Vegetation Condition - 20080904; Landgate: Cadastre - 20090727, WA Wedgefield Project Port Hedland Jun 2008 Mosaic - June 2008 (SLIP: 20090820). Created by: kdiralu

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Appendix B

Flora

Conservation Categories and Definitions for *EPBC Act* Listed Flora and Fauna Species

Conservation Codes and Descriptions for DEC Declared Rare and Priority Flora Species

Flora Species Recorded within the Study Areas

Quadrat Data

Table 11 Conservation Categories and Definitions for *EPBC Act* Listed Flora and Fauna Species

Conservation Category	Definition
Extinct	Taxa not definitely located in the wild during the past 50 years
Extinct in the Wild	Taxa known to survive only in captivity
Critically Endangered	Taxa facing an extremely high risk of extinction in the wild in the immediate future
Endangered	Taxa facing a very high risk of extinction in the wild in the near future
Vulnerable	Taxa facing a high risk of extinction in the wild in the medium-term
Near Threatened	Taxa that risk becoming Vulnerable in the wild
Conservation Dependent	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classified as Vulnerable or more severely threatened.
Data Deficient (Insufficiently Known)	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
Least Concern	Taxa that are not considered Threatened

Table 12 Conservation Codes and Descriptions for DEC Declared Rare and Priority Flora Species

Conservation Code	Description
R: Declared Rare Flora – Extant Taxa	Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.
P1: Priority One – Poorly Known Taxa	Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P2: Priority Two – Poorly Known Taxa	Taxa which are known from one or a few (generally<5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
P3: Priority Three – Poorly Known Taxa	Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.
P4: Priority Four – Taxa in need of monitoring	Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5 – 10 years.

Table 13 Flora Species Recorded within the Study Areas

Family	Genus	Species	Common Name	Status
Aizoaceae	*Trianthema*	*pilosa*		
Aizoaceae	*Trianthema*	*turgidifolia*		
Amaranthaceae	*Aerva*	*javanica*	Kapok Bush	*
Amaranthaceae	*Gomphrena*	*canescens* ssp. *canencens*		
Amaranthaceae	*Gomprena*	*sordida*		
Amaranthaceae	*Hemichroa*	*diandra*		
Amaranthaceae	*Ptilotus*	*?macrocephalus*	Featherheads	
Amaranthaceae	*Ptilotus*	*arthrolasius*		
Amaranthaceae	*Ptilotus*	*austrolasius*		
Amaranthaceae	*Ptilotus*	*axillaris*	Mat Mulla Mulla	
Amaranthaceae	*Ptilotus*	*fusiformis*		
Amaranthaceae	*Ptilotus*	*obovatus*	Cotton Bush	
Amaranthaceae	*Ptilotus*	*polystachyus*	Prince of Wales Feather	
Apocynaceae	*Carissa*	*lanceolata*		
Asteraceae	*Pterocaulon*	*sphacelatum*	Apple Bush	
Asteraceae	*Pterocaulon*	*sphaeranthoides*		
Asteraceae	*Streptoglossa*	*liatroides*		
Avicenniaceae	*Avicennia*	*marina*	White Mangrove	
Bignoniaceae	*Dolichandrone*	*heterophylla*		
Boraginaceae	*Heliotropium*	*vestitum*		
Caesalpiniaceae	*Senna*	*artemisioides*		
Caesalpiniaceae	*Senna*	*artemisioides* subsp. *oligophylla*		
Caesalpiniaceae	*Senna*	*glutinosa* subsp. *glutinosa*		
Caesalpiniaceae	*Senna*	*notabilis*		
Caryophyllaceae	*Polycarpaea*	*?corymbosa*		
Chenopodaceae	*Neobassia*	*astrocarpa*		
Chenopodaceae	*Tecticornia*	*pergranulata*		
Chenopodaceae	*Tecticornia*	*pterogosperma*		
Chenopodiaceae	*Dysphania*	*kalpari*	Rat's Tail	
Chenopodiaceae	*Salsola*	*tragus*		
Chenopodiaceae	*Threlkeldia*	*diffusa*	Coast Bonefruit	

Family	Genus	Species	Common Name	Status
Commelinaceae	*Commelina*	*ensifolia*		
Convolvulaceae	*Bonamia*	*linearis*		
Convolvulaceae	*Bonamia*	*alatisemina*		
Convolvulaceae	*Bonamia*	*erecta*		
Convolvulaceae	*Evolvulus*	*alsinoides* var. *villosicalyx*		
Convolvulaceae	*Ipomoea*	*muelleri*	Poison Morning Glory	
Convolvulaceae	*Ipomoea*	*pes-caprae*		
Convolvulaceae	*Merremia*	*davenportii*		
Convolvulaceae	*Operculina*	*aequisepala*		
Cucurbitaceae	*Cucumis*	*maderaspatanus*		
Cyperaceae	*Bulbostylis*	*barbata*		
Cyperaceae	*Cyperus*	*hesperius*		
Euphorbiaceae	*Euphorbia*	*australis*	Namana	
Euphorbiaceae	*Euphorbia*	*coghlanii*	Namana	
Frankeniaceae	*Frankenia*	*ambita*		
Goodeniaceae	*Goodenia*	*forrestii*		
Goodeniaceae	*Goodenia*	*muelleriana*		
Gyrostemonaceae	*Codonocarpus*	*cotinifolius*	Native Poplar	
Lamiaceae	*Clerodendrum*	*floribundum*	Lollybush	
Lauraceae	*Cassytha*	*filiformis*	Love Vine	
Malvaceae	*Abutilon*	sp.(insufficient material)		
Malvaceae	*Hibiscus*	*brachychlaenus*		
Malvaceae	*Sida*	*clementii*		
Malvaceae	*Sida*	*rohlenae* subsp. *rohlenae*		
Mimosaceae	*Acacia*	*ampliceps*		
Mimosaceae	*Acacia*	*colei*	Cole's Wattle	
Mimosaceae	*Acacia*	*sericophylla*		
Mimosaceae	*Acacia*	*stellaticeps*		
Mimosaceae	*Acacia*	*trachycarpa*	Minni Ritchi	
Mimosaceae	*Acacia*	*ancistrophylla*		P
Mimosaceae	*Acacia*	*bivenosa*		
Mimosaceae	*Acacia*	*pyrifolia*	Kajni bush	
Mimosaceae	*Acacia*	*tumida*		
Mimosaceae	*Neptunia*	*dimorphantha*	Sensitive Plant	

Family	Genus	Species	Common Name	Status
Molluginaceae	*Mollugo*	*molluginea*		
Myrtaceae	*Eucalyptus*	*victrix*		P
Myrtaceae	*Melaleuca*	sp. (insufficient material)		P
Myrtaceae	*Melaleuca*	*lasiandra*		
Papilionaceae	*Cajanus*	*cinereus*		
Papilionaceae	*Cajanus*	*marmoratus*		
Papilionaceae	*Cleome*	*viscosa*	Tickweed	
Papilionaceae	*Crotalaria*	*cunninghamii*	Bird flower	
Papilionaceae	*Crotularia*	*ramosissima*		
Papilionaceae	*Cullen*	*pognocarpum*		
Papilionaceae	*Cullen*	*stipulaceum*		
Papilionaceae	*Desmodium*	*filiforme*		
Papilionaceae	*Indigofera*	*linifolia*		
Papilionaceae	*Indigofera*	*linnaei*		
Papilionaceae	*Indigofera*	*monophylla*		
Papilionaceae	*Rhynchosia*	*minima*	Rhynchosia	
Papilionaceae	*Sesbania*	*cannabina*	Sesbania Pea	
Papilionaceae	*Swainsona*	*pterostylis*		
Papilionaceae	*Tephrosia*	*leptoclada*		
Papilionaceae	*Tephrosia*	*rosea*		
Papilionaceae	*Vigna*	*lanceolata* var. *lanceolata*		
Plumbaginaceae	*Muellerolimon*	*salcorniaceum*		
Poaceae	*Aristida*	*holathera* var. *holathera*		
Poaceae	*Cenchrus*	*ciliaris*	Buffel Grass	*
Poaceae	*Chloris*	*barbata*	Purpletop Chloris	*
Poaceae	*Digitaria*	*brownii*		
Poaceae	*Eragrostis*	*cumingii*		
Poaceae	*Eragrostis*	*dielsii*		
Poaceae	*Eragrostis*	*eriopoda*	Woollybutt Grass	
Poaceae	*Eragrostis*	*falcata*		
Poaceae	*Eragrostis*	*speciosa*		
Poaceae	*Eriachne*	*aristidea*		
Poaceae	*Eriachne*	*obtusa*	Northern Wanderrie Grass	

Family	Genus	Species	Common Name	Status
Poaceae	*Panicum*	*decompositum*	Native Millet	
Poaceae	*Paraneurachne*	*muelleri*	Northern Mulga Grass	
Poaceae	*Paspalidium*	*constrictum*		
Poaceae	*Sorghum*	*plumosum*		
Poaceae	*Sorghum*	*timorense*		
Poaceae	*Triodia*	*epactia*		
Poaceae	*Triodia*	*schinzii*		
Poaceae	*Triodia*	*secunda*		
Poaceae	*Yakirra*	*australiensis*		
Portulacaceae	*Calandrinia*	sp. Pinga		
Portulacaceae	*Calandrinia*	*stagnensis*		
Proteaceae	*Hakea*	*lorea*	Witinti	
Santalaceae	*Santalum*	*lanceolatum*	Northern Sandalwood	
Sapindaceae	*Dodonaea*	*coriacea*		
Scrophulariaceae	*Stemodia*	*grossa*	Vicks bush	
Solanaceae	*Solanum*	*diversiflorum*		
Sterculiaceae	*Waltheria*	*indica*		
Thymelaceae	*Pimelea*	*ammocharis*		
Tiliaceae	*Corchorus*	sp.(insufficient material)	'Round leaf'	
Tiliaceae	*Corchorus*	sp. (insufficient material)	'Linear leaf"	
Tiliaceae	*Corchorus*	*walcottii*	Woolly Corchorus	
Tiliaceae	*Triumfetta*	*appendiculata*		
Tiliaceae	*Triumfetta*	*ramosa*		
Violaceae	*Hybanthus*	*aurantiacus*		
Zygophyllaceae	*Tribulus*	*occidentalis*	Perennial Caltrop	

* Introduced
P Planted

QUADRAT DATA – Field Survey June 2008

LIA 3 Quadrat 1

Field Vegetation Description: *Acacia stellaticeps* and *Triodia* very low shrubland over scattered herbs.

Landform/soil: Flat; red sandy loam

Open ground: 20%

Leaf Litter: <5%

Rocks 0%

Condition: 1/2

Disturbance: Scattered Buffel Grass. Occasional rubbish.

Quadrat 1 species data

Family	Genus	Species	Status	Height (m)	Coverage (%)
Mimosaceae	*Acacia*	*stellaticeps*		<0.5m	30-40%
Poaceae	*Triodia*	*epactia*		0.6	10
Poaceae	*Triodia*	*schinzii*		0.6	10
Poaceae	*Eriachne*	*obtusa*		0.5	10
Mimosaceae	*Acacia*	*colei*		2	<2
Papilionaceae	*Indigofera*	*monophylla*		0.3	<2
Convolvulaceae	*Bonamia*	*erecta*		0.3	2-10
Violaceae	*Hybanthus*	*aurantiacus*		0.3	2-10
Lauraceae	*Cassytha*	*filiformis*		N/A	2-10

Family	Genus	Species	Status	Height (m)	Coverage (%)
Tiliaceae	*Corchorus*	*sp.*		0.4	<2
Poaceae	*Cenchrus*	*ciliaris*	*	0.5	<2

LIA 4 Quadrat 1

Field Vegetation Description: *Acacia stellaticeps* and *Triodia* very low shrubland over very scattered herbs.

Landform/soil: Flat; red sandy loam

Open ground: 25%

Leaf Litter: <5%

Rocks 0%

Condition: 1/2 Very mature (long unburnt), plants ageing.

Disturbance: Very scattered Buffel grass.

Quadrat 1 species data

Family	Genus	Species	Status	Height (m)	Coverage (%)
Mimosaceae	*Acacia*	*stellaticeps*		<0.5m	30%
Poaceae	*Triodia*	*epactia*		0.6	20
Poaceae	*Triodia*	*schinzii*		0.6	10
Poaceae	*Eriachne*	*obtusa*		0.5	2-10
Poaceae	*Cenchrus*	*ciliaris*	*	0.5	<2

LIA 5 Quadrat 1

Field Vegetation Description: *Acacia stellaticeps* and *Triodia* low shrubland over scattered herbs.

Landform/soil: Flat; red sandy loam

Open ground: 20%

Leaf Litter: <5%

Rocks 0%

Condition: 1/2

Disturbance: Buffel grass.

Quadrat 1 species data

Family	Genus	Species	Status	Height (m)	Coverage (%)
Mimosaceae	*Acacia*	*stellaticeps*		<0.6m	30-40%
Poaceae	*Triodia*	*epactia*		0.6	10
Poaceae	*Triodia*	*schinzii*		0.6	10
Poaceae	*Eriachne*	*obtusa*		0.5	2-10
Convulvulaceae	*Bonamia*	*alatisemina*		0.2	2-10
Amaranthaceae	*Ptilotus*	*macrocephalus*		0.5	<2
Amaranthaceae	*Ptilotus*	*austrolasius*		0.4	<2
Lauraceae	*Cassytha*	*filiformis*		N/A	2-10
Caesalpinaceae	*Senna*	*nemophila*		0.4	<2
Poaceae	*Cenchrus*	*ciliaris*	*	0.5	<2

LIA 5 Quadrat 2

Field Vegetation Description: *Acacia stellaticeps* and *Triodia* low shrubland over scattered herbs.

Landform/soil: Flat; red sandy loam

Open ground: 25%

Leaf Litter: <5%

Rocks 0%

Condition: 1/2

Disturbance: Buffel Grass.

Quadrat 2 species data

Family	Genus	Species	Status	Height (m)	Coverage (%)
Mimosaceae	*Acacia*	*stellaticeps*		<0.7m	30%
Poaceae	*Triodia*	*epactia*		0.6	10
Poaceae	*Triodia*	*schinzii*		0.6	10
Poaceae	*Eriachne*	*obtusa*		0.5	10
Convulvulaceae	*Bonamia*	*alatisemina*		0.2	2-10
Poaceae	*Cenchrus*	*ciliaris*	*	0.5	15%

Transport Area A <u>Quadrat 1</u>

Field Vegetation Description: *Acacia stellaticeps* and *Triodia* very low shrubland over scattered herbs.

Landform/soil: Flat; red sandy loam

Open ground: 20%

Leaf Litter: <5%

Rocks 0%

Condition: 1

Disturbance: None.

Quadrat 1 species data

Family	Genus	Species	Status	Height (m)	Coverage (%)
Mimosaceae	*Acacia*	*stellaticeps*		<0.3m	10-15
Poaceae	*Triodia*	*epactia*		0.4	40
Poaceae	*Eriachne*	*obtusa*		0.4	30
Poaceae	*Sorghum*	*plumosa*		0.6	2-10
Violaceae	*Hybanthus*	*aurantiacus*		0.2	<2
Cyperaceae	*Cyperus*	*bulbosus*		0.5	<2
Lauraceae	*Cassytha*	*filiformis*		0.2	2-10
Papilionaceae	*Indigofera*	*linifolia*		0.3	2-10
Convolvulaceae	*Bonamia*	*alatisemina*		0.2	<2
Sapindaceae	*Dodonaea*	*coriaceae*		1.0	<2
Tiliaceae	*Corchorus*	*walcottii*		0.5	<2

Transport Area A Quadrat 2

Field Vegetation Description: *Triodia* and tussock grassland

Landform/soil: Flat; red sandy clay loam

Open ground: 20%

Leaf Litter: <5%

Rocks 0%

Condition: 1

Disturbance: None.

Quadrat 2 species data

Family	Genus	Species	Status	Height (m)	Coverage (%)
Poaceae	*Triodia*	*epactia*		0.4	<60
Poaceae	*Triodia*	*schinzii*		0.4	15
Poaceae	*Sorghum*	*plumosa*		0.6	2-10

QUADRAT DATA – Field Survey June 2009 (Transport Area B)

Quadrat 1

Field Vegetation Description: *Acacia stellaticeps* over *Triodia epactia* and *T. schinzii* hummock grassland

Landform/soil: Flat; red sand

Open ground: 20%

Leaf Litter: <5%

Rocks 0%

Condition: 1/2

Disturbance: None.

Quadrat 1 species list

Family	Genus	Species	Common Name	% Cover
Mimosaceae	*Acacia*	*stellaticeps*		50
Poaceae	*Triodia*	*epactia*		5-10
Poaceae	*Triodia*	*schinzii*		20
Poaceae	*Eragrostis*	*cumingii*		1-2
Cyperaceae	*Bulbostylis*	*barbata*		2
Euphorbiaceae	*Euphorbia*	*coghlanii*	Namana	2
Poaceae	*Eragrostis*	*speciosa*		2
Asteraceae	*Streptoglossa*	*liatroides*		1

Amaranthaceae	*Ptilotus*	*fusiformis*		1
Sapindaceae	*Dodonaea*	*coriacea*		1
Caesalpiniaceae	*Senna*	*glutinosa* subsp. *glutinosa*		1
Amaranthaceae	*Ptilotus*	*obovatus*	Cotton Bush	1
Amaranthaceae	*Ptilotus*	*polystachyus*	Prince of Wales Feather	1
Mimosaceae	*Acacia*	*sericophylla*		1

Quadrat 2

Field Vegetation Description: *Triodia epactia* and *T. schinzii* hummock grassland over low open shrubland of *Acacia stellaticeps*.

Landform/soil: Flat; red sand

Open ground: 5%

Leaf Litter: <5%

Rocks 0%

Condition: 2

Disturbance: Some old vehicle tracks

Quadrat 2 species list

Family	Genus	Species	Common Name	% Cover
Poaceae	*Triodia*	*schinzii*		40

Poaceae	*Triodia*	*epactia*		40
Mimosaceae	*Acacia*	*stellaticeps*		5
Poaceae	*Eragrostis*	*cumingii*		5
Violaceae	*Hybanthus*	*aurantiacus*		1
Cyperaceae	*Cyperus*	*hesperius*		1
Asteraceae	*Pterocaulon*	*sphacelatum*	Apple Bush	1

Quadrat 3

Field Vegetation Description: *Acacia stellaticeps* over *Triodia epactia* and *T. schinzii* hummock grassland

Landform/soil: Flat; red sand

Open ground: 20%

Leaf Litter: <5%

Rocks 0%

Condition: 2

Disturbance: Old vehicle tracks

Quadrat 3 species list

Family	Genus	Species	Common Name	% Cover
Poaceae	*Triodia*	*schinzii*		25
Mimosaceae	*Acacia*	*stellaticeps*		30

Poaceae	*Triodia*	*epactia*		5
Poaceae	*Aristida*	*holathera* var. *holathera*		5
Amaranthaceae	*Ptilotus*	*arthrolasius*		1
Tiliaceae	*Corchorus*	*walcottii*	Woolly Corchorus	1
Sterculiaceae	*Waltheria*	*indica*		1
Violaceae	*Hybanthus*	*aurantiacus*		1
Poaceae	*Eragrostis*	*cumingii*		1
Malvaceae	*Hibiscus*	*brachychlaenus*		1
Amaranthaceae	*Ptilotus*	*polystachyus*	Prince of Wales Feather	1
Bignoniaceae	*Dolichandrone*	*heterophylla*		1
Lamiaceae	*Clerodendrum*	*floribundum*	Lollybush	1

Quadrat 4

Field Vegetation Description: *Acacia stellaticeps* over *Triodia epactia* and *T. schinzii* hummock grassland

Landform/soil: Flat; red sand

Open ground: 20%

Leaf Litter: <2%

Rocks 0%

Condition: 2

Disturbance: Minor disturbance – old tracks

Quadrat 4 species list

Family	Genus	Species	Common Name	% Cover
Poaceae	Triodia	schinzii		50
Mimosaceae	Acacia	stellaticeps		15
Poaceae	Digitaria	brownii		5
Poaceae	Triodia	epactia		5
Poaceae	Eragrostis	eriopoda	Woollybutt Grass	1
Boraginaceae	Heliotropium	vestitum		1
Molluginaceae	Mollugo	molluginea		1
Poaceae	Yakirra	australiensis		1
Tiliaceae	Corchorus	walcottii	Woolly Corchorus	1
Cyperaceae	Cyperus	hesperius		1
Poaceae	Eragrostis	cumingii		1

Quadrat 5

Field Vegetation Description: *Triodia epactia, T. schinzii* and *Sorghum timorense* grassland.

Landform/soil: Flat; red sand

Open ground: 10%

Leaf Litter: <2%

Rocks 0%

Condition: 2

Disturbance: No evidence of disturbance

Quadrat 4 species list

Family	Genus	Species	Common Name	% Cover
Poaceae	*Sorghum*	*timorense*		20
Poaceae	*Triodia*	*epactia*		40
Poaceae	*Triodia*	*schinzii*		30
Poaceae	*Eragrostis*	*cumingii*		1
Mimosaceae	*Acacia*	*stellaticeps*		1
Asteraceae	*Pterocaulon*	*sphaeranthoides*		1
Cyperaceae	*Cyperus*	*hesperius*		1

Appendix C

Fauna

EPBC Act Fauna Conservation Categories

Western Australian Wildlife Conservation Act 1950 Conservation Codes

DEC Priority Fauna Codes

WA Museum / DEC “NatureMap” Fauna Records within 20 km of the Study Area

Listing of Potentially Occurring Significant, Rare and Priority Fauna Species within 20 km of the Study Area, with Information Source

Fauna Species Observed within the Study Area During the Field Survey

EPBC Act Fauna Conservation Categories

Listed threatened species and ecological communities

An action will require approval from the Environment Minister if the action has, will have, or is likely to have a significant impact on a species listed in any of the following categories:

» extinct in the wild,

» critically endangered,

» endangered, or

» vulnerable.

(See Table 11)

Critically endangered and endangered species

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered species if it does, will, or is likely to:

» lead to a long-term decrease in the size of a population, or

» reduce the area of occupancy of the species, or

» fragment an existing population into two or more populations, or

» adversely affect habitat critical to the survival of a species, or

» disrupt the breeding cycle of a population, or

» modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or

» result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*, or

» interfere with the recovery of the species.

**Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a critically endangered or endangered species by direct competition, modification of habitat, or predation.*

Vulnerable species

An action has, will have, or is likely to have a significant impact on a vulnerable species if it does, will, or is likely to:

» lead to a long-term decrease in the size of an important population of a species, or

» reduce the area of occupancy of an important population, or

» fragment an existing important population into two or more populations, or

» adversely affect habitat critical to the survival of a species, or

» disrupt the breeding cycle of an important population, or

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
- result in invasive species that are harmful a vulnerable species becoming established in the vulnerable species' habitat*, or
- interferes substantially with the recovery of the species.

An important population is one that is necessary for a species' long-term survival and recovery. This may include populations that are:

- key source populations either for breeding or dispersal,
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

*Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a vulnerable species by direct competition, modification of habitat, or predation.

Listed migratory species

An action will require approval from the Environment Minister if the action has, will have, or is likely to have a significant impact on a listed migratory species. Note that some migratory species are also listed as threatened species. The criteria below are relevant to migratory species that are not threatened.

An action has, will have, or is likely to have a significant impact on a migratory species if it does, will, or is likely to:

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species, or
- result in invasive species that is harmful to the migratory species becoming established* in an area of important habitat of the migratory species, or
- seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of thespecies.

An area of important habitat is:

1. habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, or
2. habitat utilised by a migratory species which is at the limit of the species range, or
3. habitat within an area where the species is declining.

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an ecologically significant proportion of the population varies with the species (each circumstance will need to be evaluated).

*Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a migratory species by direct competition, modification of habitat, or predation.

The Commonwealth marine environment

An action will require approval from the Environment Minister if:

» the action is taken in a Commonwealth marine area and the action has, will have, or is likely to have a significant effect on the environment, or

» the action is taken outside a Commonwealth marine area and the action has, will have, or is likely to have a significant effect on the environment in a Commonwealth marine area.

An action has, will have or is likely to have a significant impact on the environment in a Commonwealth marine area if it does, will, or is likely to:

» result in a known or potential pest species becoming established in the Commonwealth marine area*, or

» modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area results, or

» have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (eg breeding, feeding, migration behaviour, and life expectancy) and spatial distribution, or

» result in a substantial change in air quality** or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity, social amenity or human health, or

» result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected.

*Translocating or introducing a pest species may result in that species becoming established.

**The Commonwealth marine area includes any airspace over Commonwealth waters.

Table 14 *Western Australian Wildlife Conservation Act 1950* Conservation Codes

Conservation Code	Description
Schedule 1	"…fauna that is rare or likely to become extinct, are declared to be fauna that is in need of special protection."
Schedule 2	"…fauna that is presumed to be extinct, are declared to be fauna that is in need of special protection."
Schedule 3	"…birds that are subject to an agreement between the governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction, are declared to be fauna that is in need of special protection."
Schedule 4	"…fauna that is in need of special protection, otherwise than for the reasons mentioned [in Schedule 1 – 3]"

Table 15 DEC Priority Fauna Codes

(Species not listed under the *Wildlife Conservation Act 1950*, but for which there is some concern).

Conservation Code	Description
Priority 1	Taxa with few, poorly known populations on threatened lands.
Priority 2	Taxa with few, poorly known populations on conservation lands. Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown Land, water reserves, etc.
Priority 3	Taxa which are known from few specimens or sight records, some of which are on lands not under immediate threat of habitat destruction or degradation.
Priority 4	Rare taxa. Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5 – 10 years.
Priority 5	Taxa in need of monitoring. Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Table 16 WA Museum / DEC "NatureMap" Fauna Records within 20 km of the Study Area

Species	Common Name	Status
Amphibians		
Cyclorana australis	Giant Frog	
Cyclorana maini	Sheep Frog	
Litoria rubella	Little Red Tree Frog	
Neobatrachus aquilonius	Northern Burrowing Frog	
Notaden nichollsi	Desert Spadefoot	
Opisthodon spenceri	Centralian Burrowing Frog	
Uperoleia russelli	Northwest Toadlet	
Birds		
Ardeotis australis	Australian Bustard	Priority 4
Arenaria interpres subsp. *interpres*		
Artamus cinereus subsp. *melanops*		
Artamus leucorynchus	White-breasted Woodswallow	
Calidris ruficollis	Red-necked Stint	
Corvus orru subsp. *cecilae*	Western Crow	
Eopsaltria pulverulenta	Mangrove Robin	
Gallinago stenura	Pin-tailed Snipe	
Gallirallus philippensis subsp. *mellori*		
Limnodromus semipalmatus	Asian Dowitcher	
Motacilla flava subsp. *simillima*		
Neochima ruficauda subsp. *subclarescens*	Star Finch (western)	Priority 4
Numenius madagascariensis	Eastern Curlew	Priority 4
Nycticorax caledonicus subsp. *hilli*		
Oceanites oceanicus	Wilson's Storm Petrel	
Pachycephala lanioides	White-breasted Whistler	
Passer montanus	Eurasian Tree Sparrow	
Ptilonorhynchus maculatus subsp. *guttatus*	Western Bowerbird	
Sterna caspia	Caspian Tern	
Sterna leucoptera	White-winged Black Tern	
Tringa brevipes	Grey-tailed Tattler	

Species	Common Name	Status
Tringa cinerea	Terek Sandpiper	
Turnix velox	Little Button-quail	
Tyto alba subsp. delicatula		
Mammals		
Antechinomys laniger	Kultarr	
Chaerephon jobensis	Northern Freetail-bat	
Dasycercus blythi	Brush-tailed Mulgara, Ampurta	Priority 4
Dasykaluta rosamondae	Little Red Kaluta	
Dasyurus hallucatus	Northern Quoll	Endangered
Dugong dugon	Dugong	Schedule 1
Lagostrophus fasciatus subsp. *fasciatus* Bernier Is.	Banded Hare-wallaby (name not current)	Vulnerable
Macropus robustus subsp. *erubescens*	Euro, Biggada	
Macrotis lagotis	Bilby, Dalgyte	Vulnerable
Mormopterus loriae subsp. *cobourgiana*	Little North-western Mastiff Bat	Priority 1
Nyctophilus arnhemensis	Arnhem Land Long-eared Bat	
Nyctophilus geoffroyi	Lesser Long-eared Bat	
Pseudomys hermannsburgensis	Sandy Inland Mouse	
Sminthopsis youngsoni	Lesser Hairy-footed Dunnart	
Sousa chinensis	Indo-Pacific Humpback Dolphin	Priority 4
Vespadelus finlaysoni	Finlayson's Cave Bat	
Reptiles		
Acanthophis pyrrhus	Desert Death Adder	
Amphibolurus longirostris		
Antaresia perthensis	Pygmy Python	
Aspidites melanocephalus	Black-headed Python	
Aspidites ramsayi	Woma	Schedule 1
Chelonia mydas	Green Turtle	Vulnerable
Cryptoblepharus buchananii		
Ctenophorus caudicinctus subsp. *caudicinctus*		
Ctenophorus isolepis subsp. *isolepis*		
Ctenotus duricola		

Species	Common Name	Status
Ctenotus hanloni		
Ctenotus helenae		
Ctenotus pantherinus subsp. *ocellifer*		
Ctenotus rufescens		
Ctenotus saxatilis	Rock Ctenotus	
Ctenotus serventyi		
Delma haroldi		
Delma pax		
Delma tincta		
Demansia rufescens	Rufous Whipsnake	
Diplodactylus conspicillatus	Fat-tailed Gecko	
Diporiphora winneckei	Blue-lined Dragon	
Disteira stokesii		
Eremiascincus fasciolatus	Narrow-banded Sand Swimmer	
Eretmochelys imbricata subsp. *bissa*	Hawksbill Turtle (name not current)	
Fordonia leucobalia	White-bellied Mangrove Snake	
Furina ornata	Moon Snake	
Gehyra pilbara		
Gehyra punctata		
Gehyra purpurascens		
Gehyra variegata		
Hemidactylus frenatus	Asian House Gecko	
Hydrelaps darwiniensis		
Hydrophis elegans		
Lerista bipes		
Lerista clara		
Lialis burtonis		
Lucasium stenodactylum		
Menetia greyii		
Nephrurus levis subsp. *pilbarensis*		
Pogona minor subsp. *mitchelli*		
Pseudechis australis	Mulga Snake	
Pseudonaja modesta	Ringed Brown Snake	

Species	Common Name	Status
Pseudonaja nuchalis	Gwardar	
Pygopus nigriceps		
Ramphotyphlops ammodytes		
Ramphotyphlops braminus		
Ramphotyphlops grypus		
Ramphotyphlops pilbarensis		
Simoselaps anomalus	Desert Banded Snake	
Strophurus ciliaris subsp. *aberrans*		
Strophurus elderi		
Strophurus jeanae		
Suta punctata	Spotted Snake	
Tiliqua multifasciata	Central Blue-tongue	
Varanus acanthurus	Spiny-tailed Monitor	
Varanus brevicauda	Short-tailed Pygmy Monitor	
Varanus eremius	Pygmy Desert Monitor	
Varanus gouldii	Bungarra or Sand Monitor	

Table 17 Listing of Potentially Occurring Significant, Rare and Priority Fauna Species within 20 km of the Study Area, with Information Source

Genus	Species	Common Name	Listing under Wildlife Conservation Act 1950 or DEC Priority List	Listing under EPBC Act	Source of Information		
					DEC Database	EPBC Protected Matters Search Tool	NatureMap
Birds							
Macronectes	*giganteus*	Southern Giant-Petrel	Schedule 1	Endangered,		X	
Haliaeetus	*leucogaster*	White-bellied Sea-Eagle		Migratory, Listed, overfly marine areas		X	
Hirundo	*rustica*	Barn Swallow		Migratory, Listed, overfly marine areas		X	
Merops	*ornatus*	Rainbow Bee-eater		Migratory, Listed, overfly marine areas			
Ardea	*alba*	Great Egret, White Egret		Migratory, Listed, overfly marine areas		X	
Ardea	*ibis*	Cattle Egret		Migratory, Listed, overfly marine areas		X	
Charadrius	*veredus*	Oriental Plover, Oriental Dotterel		Migratory, Listed overfly marine areas		X	

Genus	Species	Common Name	Listing under Wildlife Conservation Act 1950 or DEC Priority List	Listing under EPBC Act	Source of Information		
					DEC Database	EPBC Protected Matters Search Tool	NatureMap
Glareola	*maldivarum*	Oriental Pratincole		Migratory, Listed, overfly marine areas		X	
Limicola	*falcinellus*	Broad-billed Sandpiper		Migratory, Marine		X	
Numenius	*minutus*	Little Curlew, Little Whimbrel		Migratory, Listed, overfly marine areas		X	
Tringa	*nebularia*	Common Greenshank, Greenshank		Migratory, Marine		X	
Calidris	*melanotos*	Pectoral Sandpiper		Marine		X	
Calidris	*subminuta*	Long-toed Stint		Marine		X	
Charadrius	*ruficapillus*	Red-capped Plover		Marine		X	
Himantopus	*himantopus*	Black-winged Stilt		Marine		X	
Ardeotis	*australis*	Australian Bustard	Priority 4		X		X
Numenius	*madagascariensis*	Eastern Curlew	Priority 4				X
Neochima	*ruficauda* subsp. *subclarescens*	Star Finch (western)	Priority 4		X		X
Apus	*pacificus*	Fork-tailed Swift		Migratory, Listed, overfly marine areas		X	

Genus	Species	Common Name	Listing under Wildlife Conservation Act 1950 or DEC Priority List	Listing under EPBC Act	Source of Information		
					DEC Database	EPBC Protected Matters Search Tool	NatureMap
Mammals							
Mormopterus	*loriae* subsp. *cobourgiana*	Little North-western Mastiff Bat	Priority 1		X		X
Macrotis	*lagotis*	Bilby, Dalgyte	Schedule 1	Vulnerable			X
Dasycercus	*blythi*	Brush-tailed Mulgara, Ampurta	Priority 4				X
Dasyurus	*hallucatus*	Northern Quoll	Schedule 1	Endangered	X	X	X
Lagostrophus	*fasciatus* subsp. *fasciatus* Bernier Is.	Banded Hare-wallaby	Schedule 1	Vulnerable	X		X
Rhinonicteris	*aurantius* (Pilbara form)	Pilbara Leaf-nosed Bat		Vulnerable		X	*
Reptiles							
Aspidites	*ramsayi*	Woma	Schedule 4				X

Table 18 Fauna Species Observed within the Study Area During the Field Survey

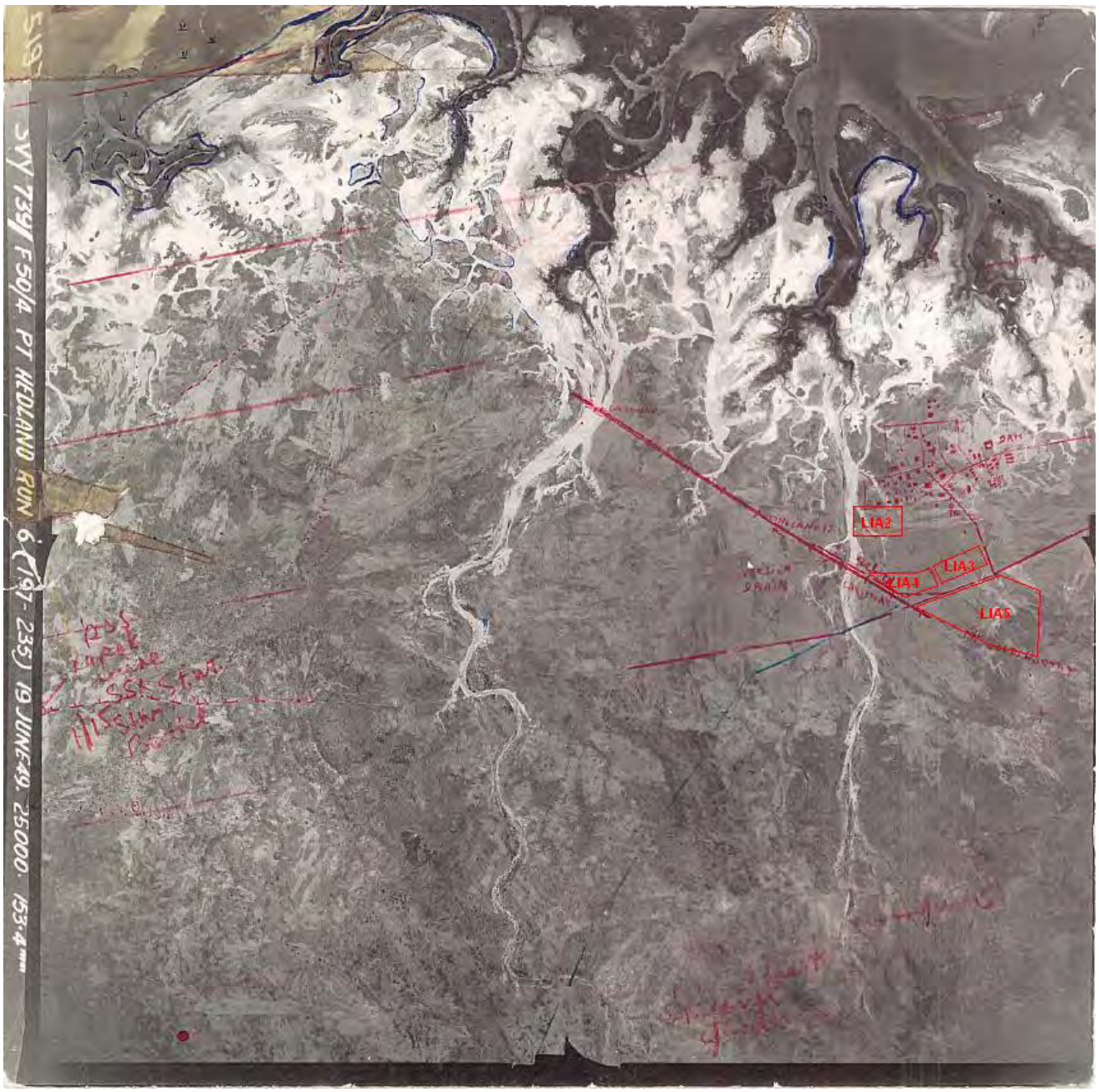
Family	Genus	Species	Common Name	Status
Birds				
Accipitridae	*Elanus*	*caeruleus*	Black-shouldered Kite	Mi
Accipitridae	*Milvus*	*migrans*	Black Kite	Mi
Alcedinidae	*Geopelia*	*humeralis*	Bar-shouldered Dove	
Artamidae	*Artamus*	*cinereus*	Black-faced Woodswallow	
Artamidae	*Artamus*	*leucorynchus*	White-breasted Woodswallow	
Campephagidae	*Coracina*	*novaehollandiae melanops*	Black-faced Cuckoo-Shrike	Ma
Columbidae	*Ocyphaps*	*lophotes*	Crested Pigeon	
Corvidae	*Corvus*	*orru*	Torresian Crow	
Dicruridae	*Rhipidura*	*leucophrys*	Willie Wagtail	
Dricruridae	*Grallina*	*cyanoleuca*	Magpie-Lark	
Falconidae	*Falco*	*cenchroides*	Nankeen Kestrel	Ma
Halcyonidae	*Todiramphus*	*pyrrhopygia*	Red-backed Kingfisher	
Maluridae	*Malurus*	*leucopterus*	White-winged Fairy Wren	
Meliphagidae	*Lichenostomus*	*virescens*	Singing Honeyeater	
Meliphagidae	*Manorina*	*flavigula*	Yellow-throated Miner	
Meropidae	*Merops*	*ornatus*	Rainbow Bee-eater	Mi, Ma
Motacillidae	*Anthus*	*australis*	Australian Pipit	
Passeridae	*Taeniopygia*	*guttata*	Zebra Finch	
Psittacidae	*Cacatua*	*sanguinea*	Little Corella	
Psittacidae	*Eolophus*	*roseicapilla*	Galah	
Mammals				
Canidae	*Canus*	*domesticus*	Dog	*
Dasyuridae	*Dasycercus*	*cristicauda*	Mulgara	V, S1
Felidae	*Felis*	*catus*	Feral Cat	*
Macropodidae	*Macropus*	*rufus*	Red Kangaroo	
Reptiles				
Agamidae	*Ctenophorus*	*isolepis isolepis*	Central Military Dragon	
Scincidae	*Ctenotus*	*pantherinus ocellifer*	Leopard Ctenotus	
Varanidae	*Varanus*	*brevicauda*	Short-tailed Pygmy Monitor	

Appendix D

Contaminated Sites Desktop Review

Aerial Photographs

Certificate of Title



Legend

Approximate Site Boundary

N

Created By	Checked	Approved
GB	XX	XX

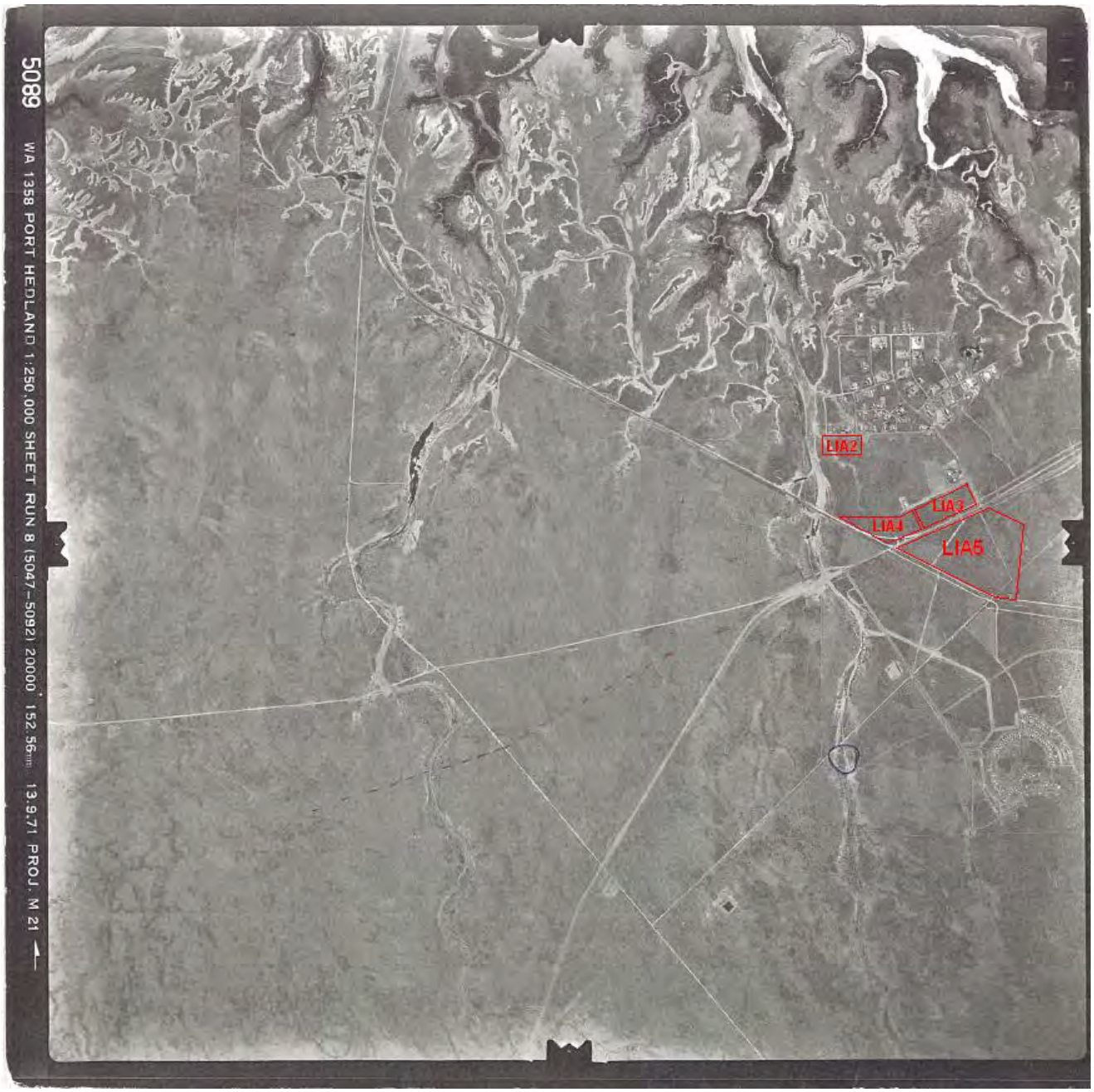
Date	File location
01/10/08	61/22635/Contaminated site/aerials.pdf

Revision	Source
0	Landgate

Light Industrial Areas
Preliminary Site Investigation
Aerial Photo
19 June 1949

1949

GHD



Legend

Approximate Site Boundary

N

Created By	Checked	Approved
GB	XX	XX

Date	File location
01/10/08	61/22635/contaminated sites/aerials.pdf

Revision	Source
0	Landgate

Wedgefield Light Industrial Areas
Preliminary Site Investigation
Aerial Photo
13/09/1971

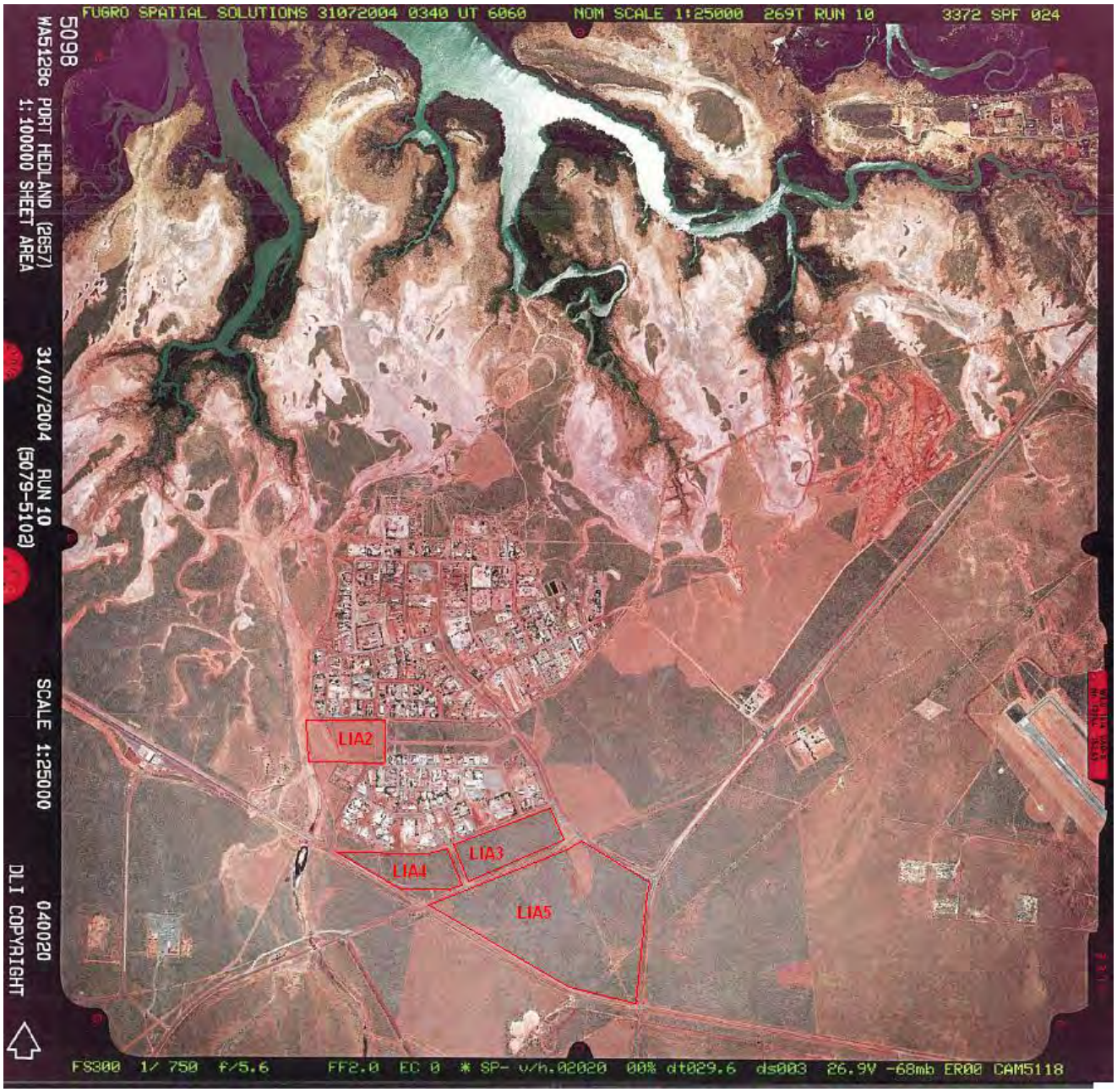
1971

GHD

Legend Approximate Site Boundary N	Created By GB	Checked XX	Approved XX
	Date 01/10/08	File location 61/22635/Contaminated Sites/aerials.pdf	
	Revision 0	Source Landgate	**1993**

Wedgefield Light Industrial Area
Preliminary Site Investigation
Aerial Photo
04/08/1993

GHD



Legend

Approximate Site Boundary

N

Created By	Checked	Approved
GB	XX	XX

Date	File location
01/10/08	61/226351/contaminated sites/aerials.pdf

Wedgefield Light Industrial Area
Preliminary Site Investigation
Aerial Photo
31/07/2004

Revision	Source	**2004**
0	Landgate	

GHD

REGISTER NUMBER	
6138/DP214753	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	**N/A**

WESTERN AUSTRALIA

VOLUME **LR3124** FOLIO **271**

RECORD OF CERTIFICATE OF CROWN LAND TITLE

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 6138 ON DEPOSITED PLAN 214753

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: UNALLOCATED CROWN LAND

PRIMARY INTEREST HOLDER: STATE OF WESTERN AUSTRALIA

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF CROWN LAND TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: DP214753 [SHEET 1].
PREVIOUS TITLE: THIS TITLE.
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AREA: TOWN OF PORT HEDLAND.

NOTE 1: J198435 CORRESPONDENCE FILE 01957-1975-03RO
NOTE 2: K671562 DEPOSITED PLAN 41485 LODGED.
NOTE 3: K671561 DEPOSITED PLAN 40616 LODGED.

REGISTER NUMBER	
5908/DP192295	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	**N/A**

WESTERN AUSTRALIA

VOLUME **LR3152** FOLIO **383**

RECORD OF CERTIFICATE OF CROWN LAND TITLE

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 5908 ON DEPOSITED PLAN 192295

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: UNALLOCATED CROWN LAND

PRIMARY INTEREST HOLDER: STATE OF WESTERN AUSTRALIA

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF CROWN LAND TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: DP192295 [SHEET 1].
PREVIOUS TITLE: THIS TITLE.
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AREA: TOWN OF PORT HEDLAND.

NOTE 1: K551671 CORRESPONDENCE FILE 00264-2008-01RO

Appendix E

Potential Noise Impact Mitigation

Letter to DEC – September 2009

Your Ref:
Our Ref: A84350
Enquiries: Paul Schneider Ph 9482 7574

Mr Mike Pengelly
Environmental Officer
Environmental Impact Assessment Division
Department of Environment & Conservation
Locked Bag 33,
Cloisters Square,
PERTH WA 6850

Dear Mike

WEDGEFIELD TRANSPORT PRECINCT – NOISE MANAGEMENT MEASURES

I refer to our meeting on 29 July 2009 regarding the above.

Below is a summary of our understanding of the issues and the proposed management measures for consideration by the Department of Environment & Conservation (DEC).

ISSUE

The Transient Workforce Accommodation (TWA) facility is situated within the established industrial area of Wedgefield. The TWA site adjoins the 'Transport Development' area planned as part of the expansion of Wedgefield. The Transport Development area is intended to potentially operate as a 24 hour / 7 day a week estate for industries using oversized equipment and support servicing / maintenance activities. The proposed land uses are in accordance with the intentions of the Port Hedland Land Use Master Plan. The following information details the parameters to be incorporated into the Wedgefield Scheme Amendment, Development Plan and the land release strategy to address this short term land use interface issue.

TWA TENURE

State Land Services (SLS) of the Department of Regional Development and Lands administer the four ground leases occupied by the TWA. Some of these leases are due to expire shortly and the TWA is seeking to amalgamate the leases into a single agreement for a new term of 5 years. SLS has assured LandCorp that any new lease arrangement with the TWA operators will be in full consultation with LandCorp and will not exceed a maximum 5 year term from mid 2009 until mid 2014. The Town of Port Hedland (ToPH) administration may seek a shorter lease term in consideration of existing and potential land use conflicts

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Level 3 Wesfarmers House
40 The Esplanade Perth Western Australia 6000
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www.landcorp.com.au

and the potential availability of other suitable sites for the TWA. This matter will be resolved directly between SLS and ToPH administration after consultation with its Council.

The measures detailed below are therefore intended to address the potential land use conflicts during the initial business operations of Stages 1 & 2 of the Transport Precinct for a maximum period up to 30 June 2014. Thereafter the TWA will have ceased operations in this locality.

The new lease conditions will not permit the TWA operator to transfer or assign the lease to any other party, thereby negating the potential for future 3rd party involvement.

REZONING OF THE TWA SITE

The TWA site will be included into the Wedgefield Town Planning Scheme (TPS) amendment and rezoned to the 'Industrial' Zone. The TWA will then continue to enjoy non-conforming use rights during the remainder of its lease. No further lease will be issued and thereafter only industrial development will be permissible under Council's TPS.

TWA OPERATIONS

LandCorp's communications during July 2009 with the operator of the TWA indicate that they do not experience any significant noise issues from the established industrial activities and road train movements occurring in the immediate vicinity of the site. The 711 bed camp has an average occupancy of 550 workers, with night shift workers generally limited to around 50 workers (rarely more than 100). Night shift workers are located in the quieter areas of the camp, subject to internal and external activities at the time.

The proposed 5 year lease term from mid 2009 is adequate for the TWA commitments to accommodate workers on Rapid Growth Projects (RGP) 5 and 6. It also provides ample opportunity for the well planned and programmed relocation of the camp to an alternative site.

SUBDIVISION LAYOUT CHANGES

Attached are plans of the revised layout and staging. The main changes since our meeting of late July include:

1. No Transport Development lots will have vehicle access to Anthill Street, which will remain for light vehicle access to the TWA only.

2. The Transport Development area will be accessed from a single road off Pinga Street with the road pavement being located in excess of 250 metres from the TWA boundary.

3. Large lots adjoining the TWA, therefore allowing the purchaser / operator greater flexibility in how they utilise the site (ie: ability to implement noise mitigation measures and locate noisier activities further from the TWA). Larger sites are considered to be more manageable with fewer operators to control.

4. Stage 1 has been increased in area to provide a greater variety of lot sizes and provides flexibility to allocate land uses to the most appropriate location.

It should be noted that the revised layout is preliminary in nature. LandCorp reserves the right to refine this layout. LandCorp will consult with DEC on any substantial changes which impact the intentions / measures outlined in this letter.

PROPOSED STAGING OF TRANSPORT DEVELOPMENT AREA

Stage	Construction Commencement	Issue of Titles	Likely Operation of Businesses
1	October 2010	June 2011	June 2012
2	April 2012	December 2012	December 2013
3	April 2014	December 2014	December 2015

The above indicative time schedule was tabled at our meeting on 29 July 2009. The table identifies the targeted dates for commencement of construction, the issue of titles and the likely commencement of business operations for the first three stages of the Transport Development area. As noted earlier, the extent of Stage 1 has increased significantly in overall area (36 hectares), the number of lots (16) and the average lot size (1.87 hectares). The timing for Stage 2 will be subject to the take up of lots in Stage 1 and the anticipated future demand. Given the significant size of Stage 1, it is unlikely that Stage 2 will be developed in advance of the above timeline and is more likely to be pushed back 12 months. The TWA will therefore be relocated prior to the likely commencement of business operations on Stage 2.

NOISE INVESTIGATIONS TO DATE

The attached plans identify the extent of the anticipated noise affecting the transport precinct areas for daytime (L_{A10} of 49 dB) and night time (L_{A10} of 39 dB) environmental noise criteria, shown respectively on Attachments A & B. The noise levels apply to:

1. Road Truck (inner circle);

2. Industrial Truck (road train equivalent – mid circle); and

3. Front end loader (earth moving equipment – outer circle).

LAND USES

The table at Attachment C has been completed by our commercial sales agent, Hedland First National. It identifies likely land uses, approximate hours of operation and main noise generating activities based on their knowledge of parties who are interested in occupying the estate. Most of the identified uses operate predominantly during the daytime allocations. Generally, this is unlikely to change in the short term due to the high labour costs in the Pilbara making after hours operations more expensive and often uneconomical.

Individual interviews have also been recently undertaken by LandCorp with some of the main transport companies operating in Port Hedland with the following findings:

– Seeking a 20,000m^2 (2 hectare) site. 99% of their operations occur during daytime hours, in particular 6am to 4pm. No onsite after hours activity, except for emergency / break downs situations. No maintenance / workshop activities on site. Main noise emissions are from freezer trailers and this can be managed by locating the trailers away from sensitive uses.

– Interest in up to 6,000m^2. Single & B Double transports are the largest vehicles. Operate 7am to 5pm Monday to Friday and 8am to 5pm on Saturdays. Most noise is generated from fork lifts.

– Interest in up to 30,000m^2 (3 Hectares). Transport bulk ore and quarry products only. Operate 24 hours a day for truck movements and daytime hours for the on-site workshop. Propose to operate workshop on 24 hour basis in the future subject to workload. Main noise activities are from workshop operations, including grinders and sheet metal work (i.e. trailer body / panel repairs).

DEVELOPMENT PLAN CONTROLS

The proposed land uses on Lots 1 to 7 within Stages 1 & 2 (refer to Attachment A) of the 'Transport Development' zone will be subject to special limitations / conditions.

LandCorp will sell all lots via a tender process providing the opportunity to critically review the potential purchaser's proposed land use. In regard to Lots 1 to 7, specific tender conditions will apply and potential purchasers will need to demonstrate how they will meet the noise emission design criteria while the TWA continues to operate. DEC's input into the design criteria and possible mitigation strategies would be welcomed. The strategies by each successful purchaser (i.e. site utilisation layout, building envelopes, direction of building openings, etc) will become a condition of sale and part of their specific Design Guidelines.

All land use and development within the noise limitation area (Lots 1 to 7) as identified on the Development Plan shall comply with the following whilst the TWA site is being used for accommodation purposes:

- Any noise generating activities are to be, where practical, confined to an indoor area, with all buildings to be oriented to front the new internal road, with any major opening to be located on the southern portion of the building;

- Significant noise generating activities external to buildings should, where practical, be carried out at a location where the building acts as an acoustic barrier to the TWA site, or between the hours of 6am – 9am or 5pm – 8pm (being aligned to the change of shift hours for workers accommodated in the TWA);

- The site will be developed in accordance with the purchaser's strategy to address the noise emission design criteria as agreed to by LandCorp. This will be a condition of sale and part of that site's specific Design Guidelines;

- Hours are restricted to normal industrial operating hours, being 6am until 8pm, seven days a week (to avoid normal camp night sleeping hours in the TWA);

- Access to the proposed lots is restricted to the internal subdivision road, with no access from Anthill Street;

- Notwithstanding the permissibility of uses as per the Zoning Table in TPS No. 5, the use of the proposed lots within the noise limitation area shall be restricted to the following for as long as the nearby TWA remains in operation:

    - Infrastructure – AA
    - Office - IP
    - Carpark - AA
    - Public Utility – AA
    - Storage Facility / Depot / Laydown Area (excluding earth moving equipment yard) - P
    - Container Park - P
    - Distribution Centre - P
    - Transport Depot - P
    - Warehouse - P

- Sale contract conditions and LandCorp's standard certificate of title caveat will provide LandCorp with the option to repurchase any lots if they are not developed in accordance with the Design Guideline requirements and within a defined construction timeframe.

- The caveat will not be removed until practical completion of the site improvements / development is completed and transfer of ownership cannot occur until the caveat is lifted.

- Development Guidelines will be an enforceable item under the provisions of the Development Plan. Breach of conditions may result in actions utilising the normal town planning provisions.

Any 24 hours transport depots (i.e. similar to) will be situated on Lots A to J (refer to Attachment B). These lots are situated outside the industrial truck (road train equivalent) buffer for night time operation. It is not anticipated that any earth moving businesses generating noise equivalent to a front end loader will be operating on a 24 hour basis.

We believe the changes to the estate layout, proposed sale strategy, design guidelines, planning controls and other management measures outlined in this letter will adequately address any noise buffer issues associated with the remaining short term operation of the TWA. These measures were endorsed by the Wedgefield Technical Advisory Group (TAG) at our meeting on 21 August 2009. The Wedgefield TAG comprises representatives from the Town of Port Hedland, Main Roads WA, Department of Planning and Port Hedland Port Authority.

All of the measures outlined in this letter will be detailed in the relevant sections of our Rezoning and Development Plan applications. We look forward to DEC's favourable consideration of these soon to be lodged applications to achieve the timely release of Transport Development land.

Should you have any queries, please do not hesitate to contact me on Ph 9482 7574.

Yours sincerely

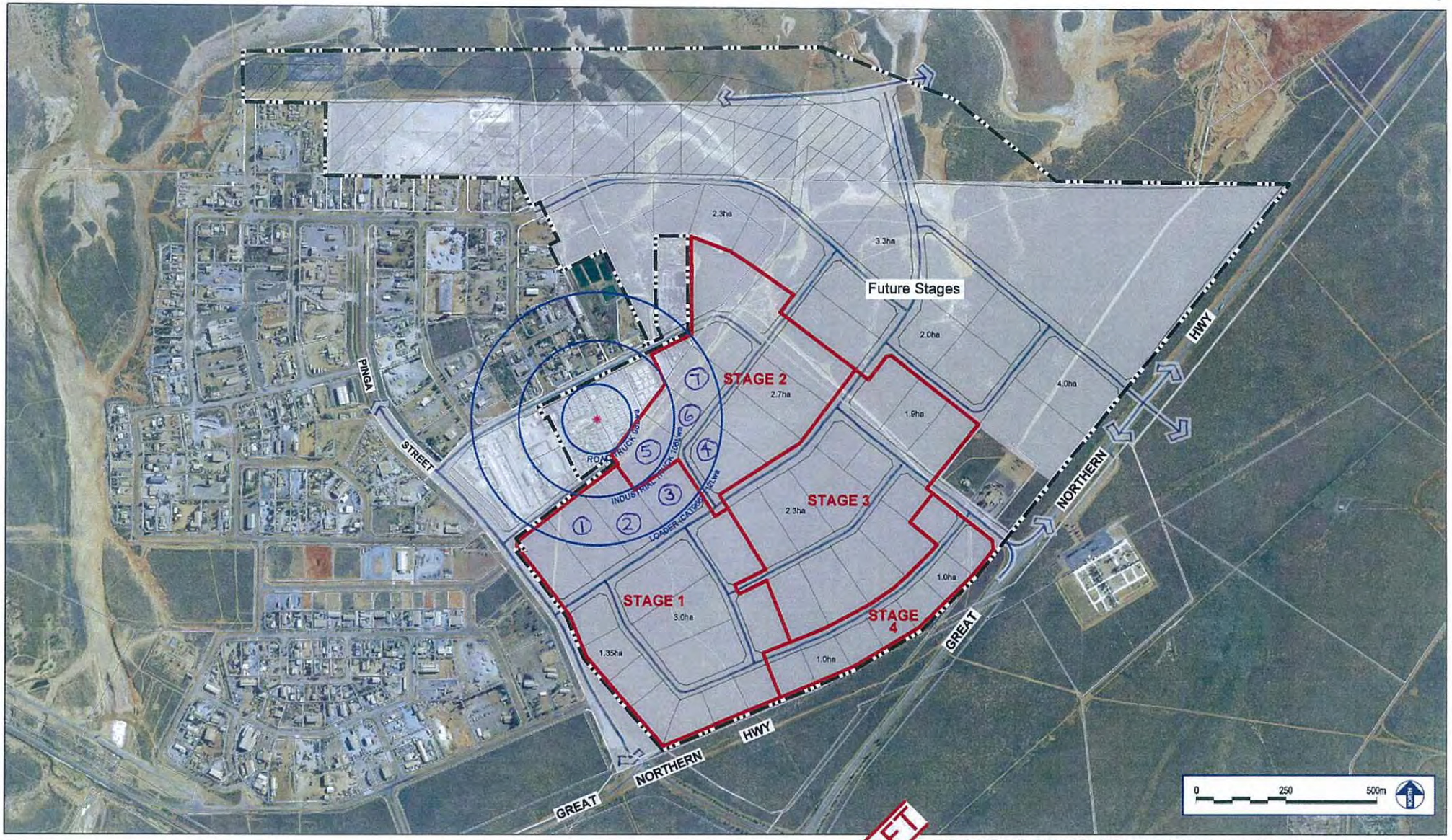
Paul Schneider
PROJECT MANAGER

9 September 2009

cc: Murray Raven, Regional Manager, State Land Services

Chris Adams, CEO, Town of Port Hedland

A.



DAYTIME BUFFER

DRAFT

TRANSPORT USE PRECINCT - Indicative Staging Plan
(With Daytime Noise Levels)
WEDGEFIELD INDUSTRIAL ESTATE

Base data supplied by Landgate & Main Roads

Aerial Photography dated October 2006, accuracy +/- 4m, Projection MGA Zone 50

Areas and dimensions shown are subject to final survey calculations. All carriageways are shown for illustrative purposes only and are subject to detailed engineering design.

LEGEND

- Site Boundary
- Staging Boundary
- Daytime Noise level L_{A10} in db(A) = 49 (Source: Herring Storer)
- Port Hedland Port Authority Area
- Point Noise Source - Noise Sources (Inner to Outer Circles)

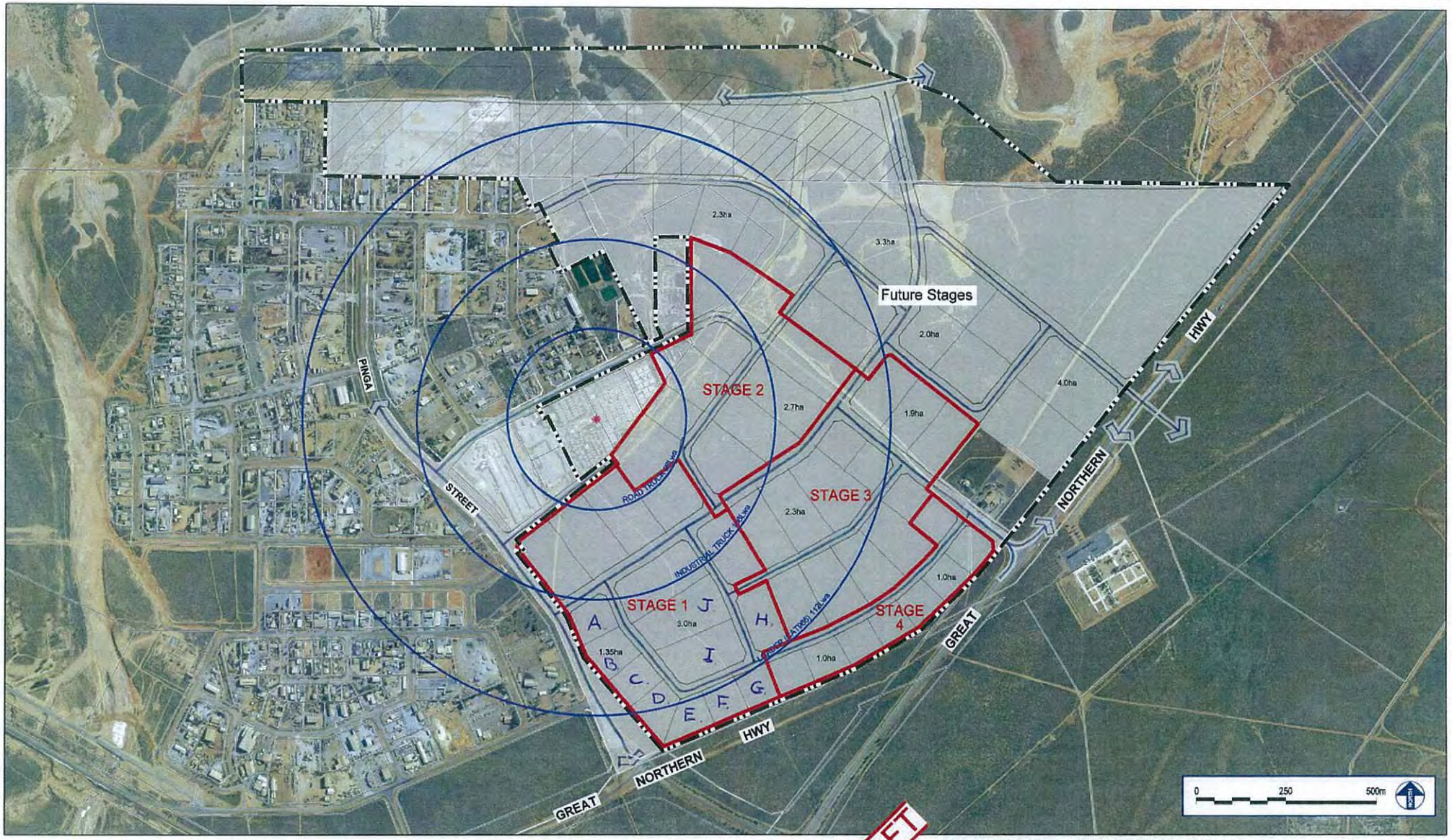
Road Truck (98L_{WA})
Industrial Truck (106L_{WA})
Loader (CAT 966) (112L_{WA})

Landcorp	:	CLIENT
1:5,000@A1 / 1:10,000@A3	:	SCALE
18 August 2009	:	DATE
3414_1-1-016.dgn	:	PLAN No
-	:	REVISION
T.C	:	PLANNER
R.F	:	DRAWN

RPS koltasz smith
TOWN PLANNING PROJECT MANAGEMENT URBAN DESIGN DEVELOPMENT CONSULTING
141 Burswood Road BURSWOOD WA 6100 Tel. (08) 9486 2222 Fax. (08) 9486 2233
PO Box 127 BURSWOOD WA 6100 Email:perth@ksap.com.au

A

B.



NIGHT-TIME BUFFER

DRAFT

TRANSPORT USE PRECINCT - Indicative Staging Plan

(With Night-time Noise Levels)

WEDGEFIELD INDUSTRIAL ESTATE

LEGEND

- Site Boundary
- Staging Boundary
- Night-time Noise level L_{A10} in db(A) = 39 (Source: Herring Storer)
- Port Hedland Port Authority Area
- Point Noise Source - Noise Sources (Inner to Outer Circles)

Road Truck (98L_{WA})
Industrial Truck (108L_{WA})
Loader (CAT 966) (112L_{WA})

Landcorp	:	CLIENT
1:5,000@A1 / 1:10,000@A3	:	SCALE
18 August 2009	:	DATE
3414_1-1-017.dgn	:	PLAN No
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U

ATTACHMENT C

TRANSPORT DEVELOPMENT – LIKELY LAND USES

Completed by Hedland First National - 18 August 2009

Type of Operation	Size of Block (m2)	Expected Demand (high, med, low)	Hours of Operation	Major noise activities
Large Transport Depot	15,000 to 30,000	high	6am to 6pm	Access / egress of road trains, loading.
Small Transport Depot	10,000 to 15,000	Med	6am to 6pm	Semi load/unload forklift, reverse beeper
Vehicle Repair / Maintenance / Service	3-4000	High	6am to 6pm	Semi load/unload forklift, reverse beeper
Earthmoving Yard	4-6000	High	6am to 6pm	Semi/float load/unload forklift, reverse beeper
Industrial Hire Business	4-8000	Low	6am to 6pm	Semi load/unload forklift, reverse beeper
Container Park	4-8000	Med	6am to 6pm	Semi load/unload forklift, reverse beeper
Motor Vehicle Wash	Part of 3		6am to 6pm	Reverse beepers
Warehouse	2-8000	V High	6am to 6pm	Semi load/unload forklift, reverse beeper
Car Park	2-4000	V Low	6am to 6pm	Reverse beepers.

GHD

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	L Marwick/A Napier/G Bishop	A Napier		A Napier		
1	E D'Raine	G. Nielssen		A Napier		6/11/09

APPENDIX 2

PRELIMINARY DISTRICT LEVEL WATER MANAGEMENT INFORMATION

APPENDIX 2A

REVIEW OF SPP 2.6 IN LETTER FORMAT - MP ROGERS & ASSOCIATES

m p rogers & associates pl ABN 14 062 681 252
consulting engineers specialising in coastal, port and marine projects

Form 001 12/02/07

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t: +61 8 9444 4045
f: +61 8 9444 4341

Our reference: J741/1:CRD/MPR:Letter 09102 Rev 0
Enquiries: Clinton Doak, direct line: 9444 4713

22 June 2009

Mr Paul Schneider
LandCorp
Locked Bag 5
PERTH BUISNESS CENTRE WA 6849

Dear Paul

WEDGEFIELD INDUSTRIAL AREA EXPANSION, PORT HEDLAND
INDUSTRIAL AREA DEVELOPMENT LEVELS

This letter confirms our understanding of the project team's general position with regard to the development of the Wedgefield area. Further, this letter outlines some of the background to the project and other pertinent information that we believe should be kept front of mind during assessment of the required design criteria for the expansion of the Wedgefield precinct.

Statement of Planning Policy 2.6 – State Coastal Planning Policy

In June 2003, the Western Australian State Government released Statement of Planning Policy No. 2.6: The State Coastal Planning Policy (SCPP). The SCPP provides guidance on the siting of new development, including subdivision and strata subdivision, on the Western Australian coastline. Schedule One of the SCPP outlines the recommended criteria for use in determining the appropriate Physical Processes Setback (PPS). This setback should provide adequate protection from physical coastal processes over a 100 year planning horizon.

As Port Hedland is north of latitude 30 degrees, the SCPP specifies that development should be set back from the coast to afford protection from the impact of cyclonic storms. This requires a variation to the general case of development on an undeveloped sandy shoreline. The SCPP recommends that the setback be taken as the greater of the maximum extent of wave run up for a direct hit category 5 cyclone at a high tide or the summation of factors derived from the assessment of storm erosion, long term shoreline movement and erosion caused by climate change induced sea level rise.

It is noted that the storm surge that accompanies coastal cyclones can cause significant inundation of coastal areas inland from the high water mark. To this end, the SCPP states that development should be setback from the area of inundation experienced during the progression of a category 5 cyclone tracking to maximise its associated storm surge at the specified location whilst coincident with a mean spring tide high water level.

MRA has previously outlined areas for improvement to the SCPP. A copy of the MRA submission on the draft SCPP has been attached to this letter. Along with highlighting some issues regarding the general application of the SCPP, this submission also highlights that the use of a category 5 cyclone tracking to maximise its storm surge at a mean high spring tide water level would result in total water levels with Average Recurrence Intervals (ARI) **far greater** than used for setting development levels in other areas, including Perth. Furthermore, the actual recurrence interval and degree of risk will vary from one location to another as a category 5cyclone is more common in the Pilbara than it is at Geraldton for instance, however the SCPP treats these locations the same. It is estimated that even at Port Hedland the severity of the design storm is in the order of the 500 yr ARI event.

Another important point regarding the SCPP is that no distinction is made between the setback requirements for different types of land uses. This results in the case where development requirements for typically low value transport use land are identical to the requirements for high value residential developments.

Review of the existing policy is recommended in order to take account of these and other concerns regarding the policy's application and to therefore help streamline the approval process.

The Proposed Wedgefield Development

The Port Hedland Land Use Master Plan recommended the vacant land immediately to the east of Wedgefield be developed as a general industry transport hub. Development as a transport hub would typically comprise of small building areas with large open spaces for road train movements and yard storage. Additionally, dwellings and caretaker residences would be prohibited within the development area.

The Land Use Master Plan noted that this area was largely within the flood plain and filling of the area would be required however it was also noted that the flooding threat could be eliminated by the construction of a causeway for the realignment of the Great Northern Highway along the western and northern boundaries of Wedgefield. Nevertheless, this approach is not supported due to a number of issues, such as those regarding the drainage of the site.

Landcorp currently propose to fill the site to allow development of the area to occur. The extent to which filling is required depends on the design criteria that are imposed for the site. It is generally accepted that the SCPP should apply at this site due to the potential for cyclone induced flooding to inundate the development area. Nevertheless, as outlined above SPP 2.6 provides no distinction or guidance on the design criteria requirements for development of an industrial nature versus residential development. Moreover, this distinction is poorly covered in most of the various development policies and codes. Intuitively, the risk profile for industrial development with no dwellings or caretaker residences should be very different to that of residential development and therefore different design criteria should be applicable.

In order to determine design criteria applicable for industrial development as a transport hub other factors such as management actions for the area should be considered. Additionally, other documents that provide guidance with regard to the design criteria for industrial development can help to establish an appropriate design guideline. For instance, Australian Standard 4678 – 2002 *Earth Retaining Structures* provides recommendations of the design life for both industrial structures and structures associated with residential dwellings. It is recommended that industrial structures have a medium term design life in the order of 30 years, whereas structures associated with residential dwellings should have a long term design life at least in the order of 60 years.

Current Storm Surge and Cyclone Management undertaken by FESA

Sections of the existing development at Wedgefield are as low as 4 mAHD. This level is only slightly higher than the maximum astronomical tide that is experienced in the Port Hedland area, which reaches a level of around 3.6 mAHD. As a result, this area is obviously vulnerable to storm surge, however management practices are in place to mitigate this risk.

It is understood that the broad protocol used by FESA to manage the impact of storm surge is as follows:

- FESA receive an update from the Bureau of Meteorology regarding the cyclone and potential storm surge heights.

- Topographic charts are used to determine the potential area of impact of the storm surge.

- FESA send personnel out to notify people of the potential storm surge and evacuations occur as necessary. Radio transmissions are also used to notify people.

Another component of the management procedure is the cyclone alert system that is used. This system assigns an alert level to a general area depending on the movement and predicted movement of the cyclone. The alert levels and their associated actions are as follows:

- Blue alert – a tropical cyclone has formed and may affect the area within 24 hours. At this stage preliminary actions are taken.

- Yellow alert – a tropical cyclone is moving closer and is likely to affect the area within 12 hours. At this stage most workplaces are closed and staff sent home.

- Red alert – a tropical cyclone is imminent. Everyone is to remain indoors until the all clear is given.

Given the development of the transport use area will prohibit the presence of dwellings or caretaker residences of any kind, it is expected that with the combination of these warning systems all personnel would be out of the area prior to the storm surge becoming an issue. The risk to life is therefore considered to be very low.

Approaches used elsewhere in Australia

The documentation for the Victorian Planning Provisions outlines the requirements for development of industrial and commercial buildings in flood prone areas. These documents acknowledge that it is not always practical or feasible to fill areas that are destined for industrial uses. As a result, certain management measures are recommended to help overcome potential issues that could lead to more widespread damage of adjacent areas or to environmental degradation. Flood proofing of buildings up to the 100 yr ARI event flood level where possible is therefore required. This flood proofing includes actions such as:

- Using water resistant building materials for foundations, footings, floors and walls up to the flood level;

- Locating all electrical fittings above the flood level;

- Sewer fixtures complying with the requirements of the relevant water authority; and

- Providing adequate storage and shelving areas above the flood level for the storage of valuable goods and hazardous materials.

It is envisaged that similar management strategies could be enforced as part of the Wedgefield expansion.

Proposed Design Criteria and Development Levels for Wedgefield

Further development of the Wedgefield precinct, consisting of the development of a general industry transport hub, is assessed as having a very low level of risk to life and property during the incidence of significant storm surge. This is largely due to the management strategies that are currently in place for the existing Wedgefield area, and would also be applicable to the Wedgefield expansion, combined with the prohibition of dwellings or caretaker residences within the new development.

As noted, the SCPP provides no distinction between residential development and industrial development with regard to the design criteria, however rationally there is an obvious case for a distinction between the requirements for residential development versus a low value industrial land use such as that proposed at Wedgefield. The consequences of inundation of these different land uses are almost entirely dissimilar.

It is therefore proposed that the development levels for the Wedgefield expansion be set based on the 50 yr ARI design criteria with an additional allowance for climate change induced sea level rise that may occur during this period, as well as a 0.5 m freeboard, or factor of safety, over and above this level. The combination of these factors, or allowances, should achieve a level of protection for the development that is well in excess of that experienced during a 50 yr ARI event.

Summary

The SCPP provides a methodology for the calculation of the setback requirements and subsequent development levels associated with development along the coastline and in areas affected by the action of the ocean. A significant level of conservatism is contained within the policy; however this level of conservatism varies greatly along the coastline. Further, there is no distinction within the policy as to the design criteria applicable to the development of low value industrial land uses versus high value residential development. Clearly there are substantially different risk profiles in terms of life and property for these different uses and it follows that different design criteria should apply. It is recommended that a review of the existing policy be completed in order to take account of these and other concerns regarding the policy's application.

Various documents and Australian Standards acknowledge the difference in design criteria requirements for industrial and residential land uses. Additionally, management practices and the prohibition of dwellings or caretaker residences in the Wedgefield expansion area result in a very low level of risk to life in this area in the event of significant storm surge.

Acknowledging the management actions already in place, along with other management actions and development conditions that could be enforced for the development area, such as those outlined within the Victorian Planning Provisions, it is recommended that the Wedgefield expansion be assessed based on the following design criteria:

- 50 yr ARI storm surge event including full extent of wind and wave setup; plus
- Allowance for climate change induced sea level rise over the coming 50 years; plus
- A 0.5 m freeboard or factor of safety.

Whilst based on the 50 yr ARI event, the actual level of protection offered as a result of the inclusion of the additional factors would mean that the resulting development level would be well above the level experienced during a 50 yr ARI event.

We trust the above is satisfactory for your needs, however please do not hesitate to contact us if you have any queries or would like any more information.

Yours sincerely,

for and on behalf of
m p rogers & associates pl

Attachments: MRA Submission on Draft SCPP

M P ROGERS & ASSOCIATES PTY LTD

ABN 14 062 681 252
Form 001 24/8/00

Unit 2, 133 Main Street, Osborne Park, WA 6017, AUSTRALIA
Phone: +618 9444 4045 Fax: +618 9444 4341
Email: rogers@tpgi.com.au

Our reference: A004:MPR:Letter 01109
Enquiries: Mick Rogers

7 December 2001

Draft ENR SPPs – Environmental Protection Branch
Department for Planning & Infrastructure
Reply Paid 68766
PERTH WA 6000

Dear Sir

DRAFT SPP – STATE COASTAL PLANNING POLICY
SCHEDULE 1 – COASTAL DEVELOPMENTS SETBACK GUIDELINES

We have reviewed the Draft Coastal SPP document dated November 2001 and congratulate you for this significant step forward in providing clear guidelines for assessment of the appropriate coastal setback distance.

Our comments relate solely to Schedule One – Coastal Development Setback Guideline for Physical Processes. All of our thoughts are offered to promote discussion and hopefully lead to improvements and provide for a more robust set of guidelines.

D1. (S1) Distance for Absorbing Acute Erosion (Extreme Storm Sequence)
In this section, the S1 recession is given as the recession of the mean sea level contour. This has probably been chosen because it is clear and easy to quantify. However, the recession of the mean sea level contour is not the important factor. The important factor is how far landward the erosion affects. This is the top of the erosion scarp. Any structure located seaward of this would be undermined by the erosion event. Sbeach is capable of predicting the landward extent of the erosion and in our opinion this should be used. The S1 factor would equal the distance from the Horizontal Setback Datum to the landward extent of the erosion as calculated using a conservative estimate of the storm with a 100 year Average Recurrence Interval.

We recently calculated the severe storm erosion at Florida south of Mandurah. Sbeach calculated about 11 metres recession of the mean sea level contour and 29 metres erosion behind the vegetation line.

D2. (S2) Distance to Allow for Historic Trend (Chronic Erosion or Accretion)
This section seems to have a built in factor of safety for the case of an historic erosion trend less than 0.2 m/yr. If the historical trend was for no net movement, then the factor of safety would be 20 metres because this is the minimum except where there is a significant accretion trend. This is all very well, except when considering the case of significant chronic erosion, say 0.5 m/yr. Then the allowance would be S2 = 100 yrs x 0.5 m/yr = 50 metres without any factor of safety for uncertainty and error in the data. We feel it would be better to calculate

the S2 from the data for eroding coasts and apply a separate factor of safety. For coasts with an accretion trend, the S2 would be zero.

We feel that the separate Factor of Safety could be set by calculating a component for each item and summing to obtain the overall Factor of Safety.

Quality of S1 modelling & data	High = 0 m	Medium = 10 m	Low = 20 m
Quality of S2 data	High = 0 m	Medium = 10 m	Low = 20 m
Long term accretion trend	20 m – 100 yrs x accretion rate (m/yr) or 0 m whichever is larger		

Using this method, an assessment with high quality data and modelling for S1, high quality data for S2 and a long term accretion rate of 0.3 m/yr would have a Factor of Safety of 0 metres. Whereas, if there was no accretion trend, then the Factor of Safety would be 20 metres.

We also believe that it would be reasonable to set a minimum setback distance of 60 metres for a sandy beach regardless of the calculations of S1, S2, S3 and the Factor of Safety S4. A schematic of this suggested setback calculation method has been attached as Figure 1.

F3. Development on a Rocky Shoreline

The provision of a minimum of 50 metres for a rocky coast is much more conservative than the criteria put forward in the document for a sandy coast. In our opinion, the minimum for a rocky coast should be less than for a sandy coast. We suggest that there should be a minimum setback distance equal to the greater of 30 metres or 3 times the height of the land above Mean Sea Level for a rocky coast that has been assessed to erode less than 30 metres in a 100 year period.

F4. Development in Cyclone Prone Areas

We believe that the setback distance to avoid erosion should be completed in the same way as for non-cyclonic areas. In addition, the development should be located and designed to avoid flooding in severe events. The Water & Rivers Commission have previously used the 100 yr flood event and a 0.7 metre freeboard in determining minimum development levels.

The use of the inundation level by a direct hit Category 5 Cyclone on the worst possible track for storm surge is somewhat misleading. In many locations, the astronomical tide is just as important as the storm surge. There needs to be proper account of the joint probability of the astronomical tide and the storm surge. Some locations, such as Geraldton at 28 degrees 50 minutes, would be north of latitude 30 degrees but rarely would experience a direct hit by a Category 5 Cyclone. Such an occurrence would be far less frequent than the 100 yr ARI event. We suggest that the 100 year ARI total water level be used in the assessment. On top of this, the minimum development level should have an allowances for the following.

- 0.38 metre rise in mean sea level due to Climate Change to 2100,
- Local wave and wind set up,
- Local wave run up / overtopping, and
- Factor of Safety of at least 0.3 metres.

We hope that our comments assist you in the refinement of the Coastal Planning Policy. Should you wish to discuss any aspect, please don't hesitate to contact us.

Yours faithfully

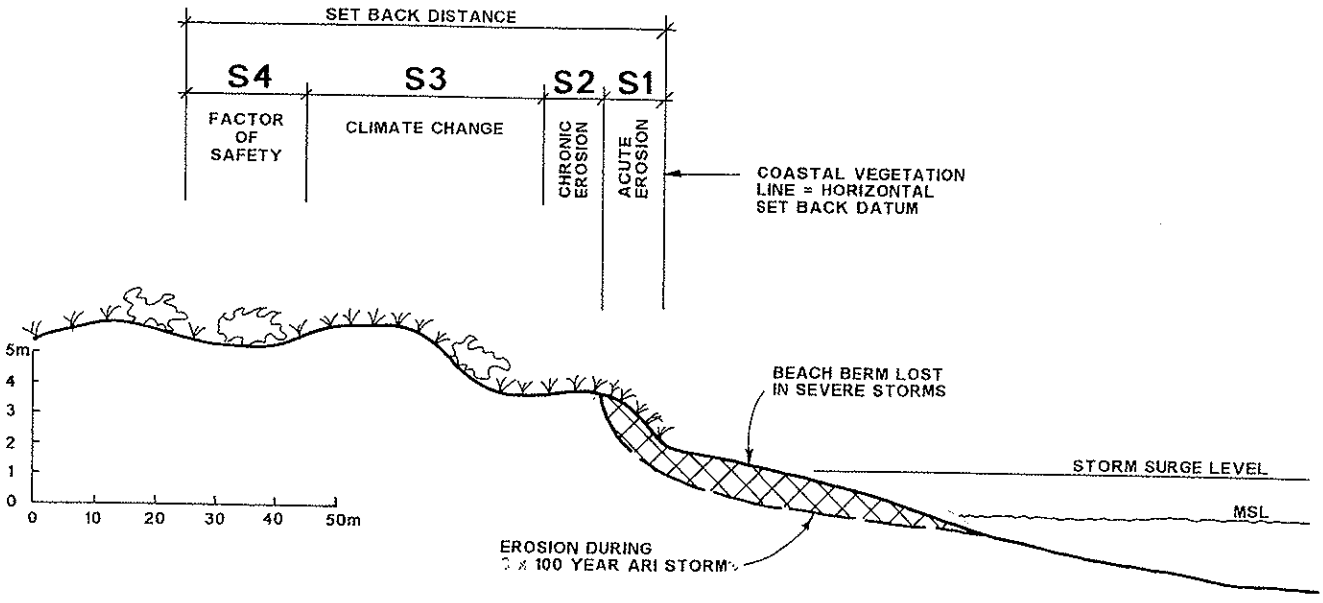
Nick Rogers

for and on behalf of
M P Rogers & Associates Pty Ltd

cc Mr Peter Boreham, Senior Coastal Engineer, DPI

Mr Rick Bretnall, Senior Engineer, W&RC

Figure 1. Schematic of Setback Distance



TYPICAL SANDY BEACH

APPENDIX 2B

CREEKLINE PLAN

Wedgefield Industrial Estate Development Plan Area

Indicative Creeklines

INDICATIVE CREEKLINES
WEDGEFIELD INDUSTRIAL ESTATE

Base data supplied by Landgate & Main Roads

Projection MGA Zone 50

Areas and dimensions shown are subject to final survey calculations. All carriageways are shown for illustrative purposes only and are subject to detailed engineering design.

LandCorp	CLIENT
1:40,000@A3	SCALE
1 December 2009	DATE
3414_1-5-009.dgn	PLAN No
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T.C.	PLANNER
R.F.	DRAWN
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RPS koltasz smith
TOWN PLANNING PROJECT MANAGEMENT URBAN DESIGN DEVELOPMENT CONSULTING
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APPENDIX 2b

APPENDIX 2C

DESKTOP FLOOD STUDY - JDA CONSULTANT HYDROLOGISTS

Landcorp

Wedgefield Industrial Estate, Port Hedland – Flood Levels

October 2009

JDA Consultant Hydrologists

DISCLAIMER

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QUALITY ASSURANCE

JDA provides quality assurance through all aspects of the company operation and is endorsed to AS/NZS ISO 9001:2000 Quality Assurance Accreditation, with third party certification to Bureau Veritas Quality International.

CONTENTS

LIST OF FIGURES

APPENDIX

1. INTRODUCTION

This report was commissioned by Paul Schneider Landcorp as a desktop review of previous studies of likely storm surge levels and rainfall runoff flood levels which may affect Wedgefield Industrial estate Port Hedland.

The report describes previous studies, expected water levels (mAHD) and the accuracy of the assessments.

The report makes recommendations for future studies.

2. PUBLISHED FLOOD STUDIES

The 100 yr ARI flood estimates from the following studies are all shown on Figure 1.

2.1 Town Planning Flood Study for South Hedland (Wyche, 1975)

This study was carried out to determine the constraints upon the development of South Hedland from flooding of South Creek and South West Creek systems, and to design flood protection to increase land use in the flood prone area. The design flood was taken as the 100 yr average recurrence interval (ARI) event, estimated in the 2 creeks combined as 1415 m^3/s. The study assumed a sea level of 5 mAHD. Using Mannings equation, and available topographic data to compile cross-sections, 100 yr ARI flood levels were estimated as shown on Figure 1 ranging between 7.5 mAHD just upstream of Great Northern Highway over South Creek, to 13.5 mAHD, at a distance of 4 km south (upstream) of the Highway.

No flood level estimates were made north (downstream) of the Highway.

2.2 South Hedland Town Centre Stormwater Drainage (PWD, 1976)

JDA has obtained from Water Corporation Reprographic Section a copy of PWD Drainage Drawings for South Hedland Town Centre are referred to collectively here as PWD (1976). These drawings show that the drainage for the Town Centre of South Hedland was designed assuming a water level of 10.7 mAHD in South Creek at a distance of 2.5 km upstream of Great Northern Highway. This level was derived from Wyche (1975) 100 yr ARI estimate of 11.2 mAHD, less 0.5 m. No recommended finished surface levels for the Town Centre are shown on these drawings.

No flood level estimates were made north (downstream) of the Highway.

2.3 Port Hedland Storm Surge Inundation Study Preliminary Report (Smith & Hubbert, 1993)

The report estimates 100 yr ARI storm surge levels at the harbour entrance of 6.2 mAHD. This level is referred to as a stillwater level on the coast, defined as tide plus storm surge. As the sea water passes through the harbour entrance, water levels are predicted to rise due to wave setup up to 7.4 mAHD within the harbour. Hence at Wedgefield, this report predicts 100 yr ARI flood level due to tide, surge and wave setup (but neglecting rainfall run-off) of 7.4 mAHD. This water level (7.4 mAHD) is close to the 7.5 mAHD estimated by Wyche (1975) at South Creek Great Northern Highway bridge using rainfall run-off modelling. This similarity is apparently coincidental.

2.4 Boodarie Resource Processing Estate Drainage and Flood Management (JDA, 1995)

This report describes a 1D model of South West Creek over the Boodarie Estate, north of Great Northern Highway. The report does not extend as far east as South Creek, but extrapolating the flood maps indicates a 100 yr ARI flood level on South Creek at Great Northern Highway of between 7 and 8 mAHD. Hence this study did not specifically cover Wedgefield on South Creek, but the results provide a range (7 to 8 mAHD) which is consistent with the previous studies referred to above. The results of this study are not shown on Figure 1.

2.5 Port Hedland Stormwater Level Study (Egis, 1999)

This report was a review of stormwater levels for planning purposes. The report concluded that the Smith & Hubbert (1993) report referred to above was reliable. Subsequent 1994 and 1995 studies by the Bureau of Meteorology were not considered as reliable as they assumed mean sea level combined with a storm surge, whereas a higher sea level combined with storm surge was considered appropriate by Egis (1999).

The report recommended that inundation modelling should be performed, similar to that already performed by the Bureau of Meteorology in other studies.

2.6 Greater Port Hedland Storm Surge Study (Gems, 2000)

Following the recommendation by Egis (1999) above, this reports shows the results of inundation modelling for South West Creek, South Creek, Beebingarra (Twelve Mile) Creek and Turner River to define the flooding potential for the residential areas of South Hedland, Wedgefield and Twelve Mile (Tjalkuwarra) Aboriginal Community. The modelling was performed as a guide to identify land unsuitable for development as proposed in the (then) Draft Port Hedland Town Site Structure Plan. A second objective of the report was to determine safe storm surge levels for the Port Hedland Town Site for Town Planning purposes.

The report describes inundation modelling using both ocean storm surge and land rainfall run-off processes. The combined flow of South West Creek and South Creek adopted for the study was 2300 m^3/s.

The report notes that the worst historic flooding in 1939 was a result of storm surge reaching a maximum of 5.7 mAHD along the coast.

The report further notes that more recent flooding has been inland, not coastal, and associated with South West Creek and South Creek in March 1988 and March 1989.

The reports identifies the 100 yr ARI cyclone as the cyclone with central pressure 920 hPa and radius of maximum winds over Port Hedland, as resulting in 6.2 mAHD sea level at the coast.

The report argues that peak storm surge levels generally occur well before any associated rainfall run-off peak water levels. As such, peak storm surge levels were assumed to not occur simultaneously with peak rainfall run-off events. Consequently the modelling of rainfall run-off floods, which tend to dominate the flood processes inland, assumed a spring high tide sea level rather than a higher level associated with storm surge.

The report states that storm surge and rainfall run-off were treated as "quasi-independent" events. The report (Page 41) states that while there is no explicitly "correct" method for aggregating the results of the two approaches, by overlaying the datasets from the two approaches a single map showing the 50 and 100 yr ARI flood regions were obtained. These maps show the regions which can be expected to flood at least once every 50 yrs and at least once every 100 yrs respectively, either as a result of storm surge or rainfall run-off flooding, or a combination of the two processes.

The hydrology study of rainfall run-off was performed by Consultant David Flavell as a sub-consultant with GEMS.

The methodology used to estimate flood hydrographs was different to that in the national publication by the Institution of Engineers Australia titled "Australian Rainfall and Run-off – A Guide to Flood Estimation" (IEA, 1987).

The methodology used by GEMS, referred to as the Revised Index Flood Method (RIFM) appears to provide flood estimates intermediate between those which would be produced by applying the two methods recommended in IEA (1987) namely the Runoff Routing Method and the Index Flood Method.

The RIFM method is not fully explained in GEMS (2000), so it is not possible to review its suitability.

In reality there is very little hydrological data for South West Creek or South Creek with which to calibrate any hydrological model to estimate the rainfall run-off process reliably.

The report (page 5) refers to a computer program "Floodmap" which allows a user to identify the 50 and 100 yr ARI flood levels for any particular location within the study region.

Specific flood levels from this program are not presented in the report so that the Wedgefield predicted flood levels are not readily available from the report.

The report notes that portions of Wedgefield Townsite are subject to storm surge and flood risk, and lower lying parts of this Townsite are within the 50 yr ARI flood zone and that a slightly larger area falls within the 100 yr ARI flood zone.

2.7 Pilbara Iron Ore and Infrastructure Project – Flood Study Overview Anderson Point to White Hills (FMG, 2004)

This study summarises the investigations by FMG of the potential flood impacts of the Project on existing communities at Wedgefield and South Hedland.

The flood study was broken into two units, north and south of the artificial barrier caused by the BHP Billiton Iron Ore (BHPBIO) Railway Line.

The project development in the Port Hedland area includes:

- A railway approaching the Port Hedland area from the south located to the west of the White Hill Rural Estate and following the rise to cross the North West Coastal Highway within 500 m west of the road bridge over the South West Creek;

- From there the railway turns into a marshalling yard between the Highway and the BHPBIO Railway Line to Finucane Island;

- A screening plant and stockpile to be constructed on reclaimed tidal flats.

The northern study was conducted using EFBC modelling software and is a 2 dimensional approach similar to that used by GEMS (2000). This northern study showed that there would be no measurable increase in flood level at Wedgefield due to the proposed works north of the BHPBIO Railway Line.

The southern area study used 1 dimensional models (Culvert W and HECRAS) together with flood hydrographs from GEMS (2000). The railway alignment (as shown on Figure 2) lies between South West Creek and South Creek to the north of the NWCH, and crosses South West Creek near the Highway crossing. To the south the projects' railway embankment divides the catchment for South West Creek such that approximately 25% is to the west of the embankment and 75% to the east of it. The flow rejoins South West Creek just south of the NWCH bridge via the series of culverts. The report concludes that these culverts will act as flow regulators thus delaying the flood waters and reducing the peak flood level at the Bridge. It is stated that the reduced peak flood level reduces the potential of South West Creek overflowing into South Creek and its consequential impacts on south Hedland and Wedgefield, until the railway embankment is overtopped in larger floods.

The report draws attention to the proposed Hope Downs Railway alignment and concludes that if it is on the same alignment as the FMG railway line it also will reduce the potential for increased flooding issues in South Hedland and Wedgefield.

2.8 Flood Map Version 3.1 (2008?)

This CD, as referred to in GEMS (2000), allows the user to click on the screen to plot natural surface and 50 yr and 100 yr ARI flood levels (mAHD) resulting from the combined effects of storm surge and rainfall run-off.

It is evident using the CD that there are anomalous values particularly south (upstream) of the Highway where large differences in flood levels occur over short distances, suggesting model numerical instability.

Downstream (north) of the Highway flood levels are consistent in the vicinity of Wedgefield, suggesting model numerical instability.

2.9 MPR Submission to Landcorp 5/2/09 (Appendix 1)

MPR submission to Landcorp 5/2/09, attached as Appendix 1, recommends the development of level at Wedgefield of 6.3 mAHD, based on 50 yr ARI stillwater level of 5.3 mAHD, +0.3 m near shore setup, +0.2 m sea level rise over the next 50 years, +0.5 m freeboard.

This stillwater level is taken from Floodmap V3.1 presumably, and setup estimated by MPR.

MPR take the view that an industrial site, being non-residential, should have a lower level flood risk security than residential – a view which JDA shares.

The official IPCC position on sea level rise is still 0.4 m to 2100, although this may be varied upwards by "Copenhagen Meeting" later this year.

For a 50 yr land use horizon and associated sea level rise, JDA agrees with MPR's submission.

3. REVIEW

Various studies have been conducted into 100 yr ARI flood levels between the coast at Port Hedland inland to South Hedland Townsite since 1975. The methods used the best available techniques at the time.

The most recent, namely Flood Map V3.1, is based on GEMS (2000).

If a flood study was to be conducted today it would probably use an internationally accepted hydraulic modelling package such as MIKE 21 developed by Danish Hydraulic Institute (DHI).

This model has been used for several flood studies in Western Australia in recent years including Exmouth, Boddington and, currently, Murray River.

This model is particularly suited to mapping the flood water surface elevation where rivers overtop their banks and converge with other rivers, as occurs with the South West Creek and South Creek at Port Hedland.

However, whichever hydraulic model is used there would still be uncertainty combining the effects of storm surge on sea level, together with rainfall run-off from the land catchment.

Any such model would need to be calibrated to the observed flood events and particularly records of flood levels which have occurred in the flood study area. To our knowledge Main Road Western Australia do record flood levels on the Great Northern Highway at South Creek and South West Creek and these were previously analysed by JDA (1995).

Without calibration to such historic events, any prediction of the 100 yr ARI flood levels would not be reliable.

Our estimate of the accuracy of the most current flood study results (GEMS, 2000 and Floodmap V3.1) based on our experience of such studies would be +/- 0.5 m in the vicinity of Wedgefield. Floodmap V3.1 also states “error 0.5m”, which we assume to be accuracy statement of program authors.

Given the high rainfall in March 2009 there may be flood debris levels (leaves/twigs left suspended in trees etc) still visible in the field which could be surveyed to check against the estimated 100 yr ARI flow levels in Figure 1. This would be a useful check that the Figure 1 flood levels are at least higher than the flood levels which have occurred earlier this year. The survey data would also be useful to calibrate any future model.

The FMG (2004) flood study used a 1D model to assess the impact of the proposed (now built) Railway on flood levels. As the Railway has significant embankment and affect the flow between South Creek and South West Creek, a 2D model would give a more reliable result. As such, it cannot be reliably said that the Railway does not increase the flood risk to Wedgefield and South Hedland above that shown on Floodmap V3.1.

JDA agrees with the submission by MPR (2009) with respect to suitable design flood level for Wedgefield based on current understanding.

4. CONCLUSIONS

- Various methods have been used to estimate 100 yr ARI flood levels at Port Hedland, including at Wedgefield. The most up to date method would involve a 2 dimensional hydraulic model such as MIKE 21 developed by Danish Hydraulic Institute (DHI).

- It is likely that the state Government Department responsible for flood plain management namely Department of Water, has not initiated such a study for Port Hedland due to the lack flood events and associated damages in recent years. Discussions with Ric Bretnall (Department of Water) suggests that Port Hedland is not a priority for floodplain mapping section of the Department at present.

- The likely accuracy of the most recent flood levels (Floodmap V3.1), in JDA's estimation is +/- 0.5 mAHD.

- The fact that the most recent study (GEMS, 2000) did not use the published methodology for estimating rainfall run-off from the catchment is of some concern and it would be worthwhile reviewing this in more detail to see if this would affect flood levels at Wedgefield.

- There may be flood debris left from the storms of March 2009 which could be surveyed (mAHD) to provide some measure of confidence in the published Floodmap V3.1 and for calibration of any future flood modelling.

- The FMG (2004) flood study conclusion that the recently built Railway does not worsen flood levels in Wedgefield and South Hedland may not be valid.

- JDA agrees with the submission by MPR (2009) regarding suitable design flood levels for Wedgefield, given current understanding.

5. RECOMMENDATIONS

- JDA recommends a review of the GEMS (2000) Flood Study component, possibly involving discussions with the author of the hydrology chapter namely David Flavell Private Consultant resident in Perth to better understand the methodology.

- JDA recommends the adoption of the Floodmap V3.1 flood level estimates and MPR (2009) interpretation of design levels for Wedgefield.

- JDA recommends sending this report to Department of Water, Attention Ric Bretnall for comment and endorsement.

- JDA recommends that given the significant infrastructure present and proposed for the Port Hedland District, the most reliable method of flood estimation should be used namely a 2D hydraulic model such as MIKE 21 by DHI as its currently been used for other locations in Western Australia.

- JDA recommends survey of flood debris levels from March 2009 to check against Floodmap V3.1 for calibration of any future model.

6. REFERENCES

Wyche, P.J. (1975) Town Planning Flood Study for South Hedland. Main Roads Department Western Australia technical Report No. 4. July 1975.

Global Environmental Modelling Systems (2000) Greater Port Hedland Storm-surge Study. Final Report to WA Ministry for Planning and Port Hedland Town Council October 2000.

Egis Group (1999) Port Hedland Storm Water Levels Study. Report to Ministry for Planning 8 February 1999.

JDA (1995) Boodarie Resource Processing Estate Drainage and Flood Management. Report to Department of Resources Development and Landcorp December 1995 (Ref: J244l).

JDA (1994) Pilbara Heavy Industry Site Planning Drainage Studies. Report to Department of Resources Development March 1994 (Ref: J144r).

WAPC (2006) Statement of Planning Policy No. 2.6 State Coastal Planning Policy.

Smith, S., Hubbert. G.D. (1993) Port Hedland Storm Surge Inundation Study Preliminary Report. Special Services Unit, Bureau of Meteorology, Melbourne September 1993.

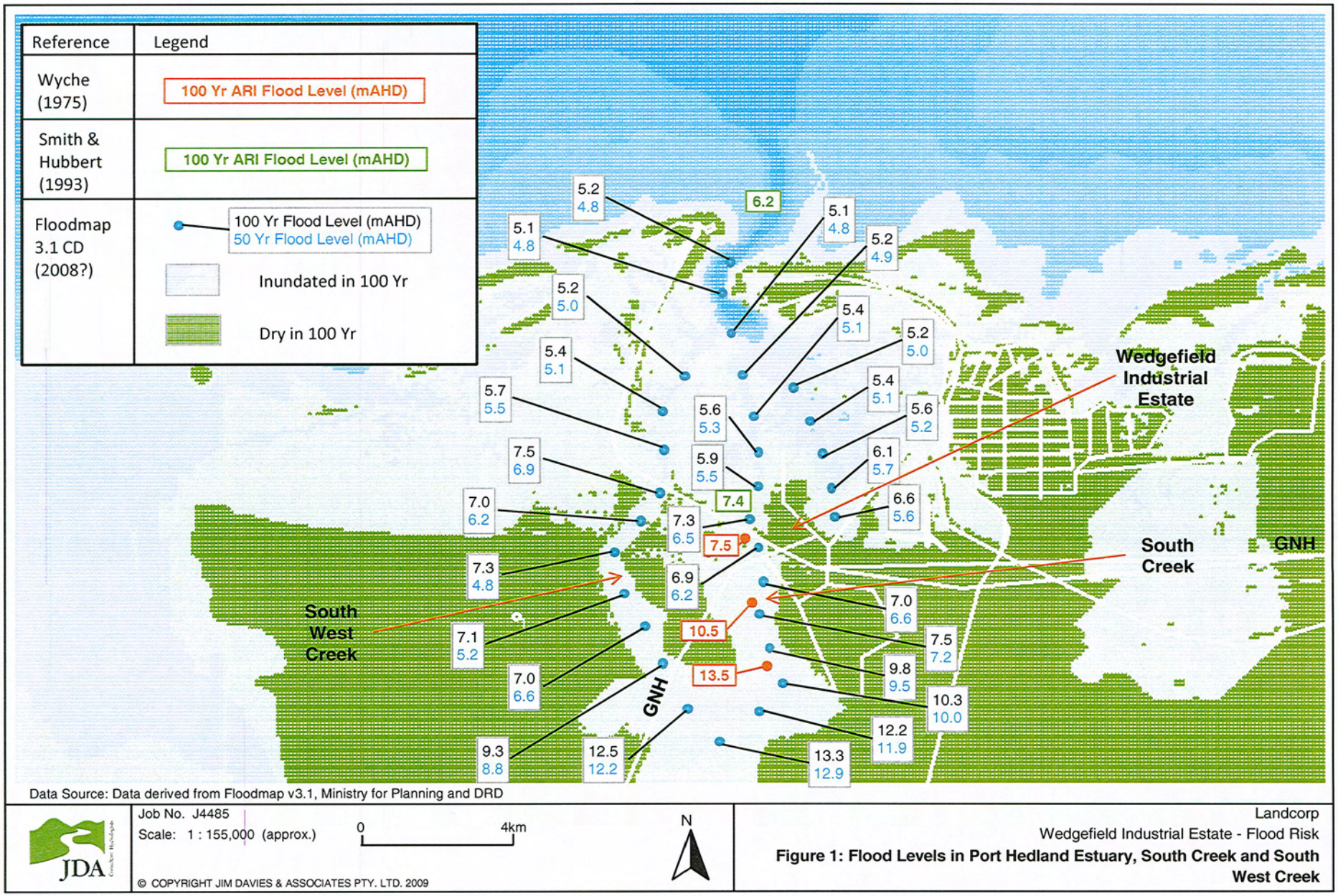
PWD (1976) South Hedland Town Site Drainage – PWWS 152/69 Drawings 483523.

Institution of Engineers Australia (1987). Australian Rainfall and Run-off – A Guide to Flood Estimation.

WAPC (2008?) Flood Map Version 3.1: Software for Viewing the Likely Impacts of Storm Surge and Freshwater Flooding in the Port Hedland Townsite. CD.

Fortescue Metals Group Ltd (2004) Pilbara Iron Ore and Infrastructure Project Flood Study Overview Anderson Point to White Hills. October 2004.

FIGURES



Data Source: Data derived from Floodmap v3.1, Ministry for Planning and DRD

Job No. J4485

Scale: 1 : 155,000 (approx.)

0 4km

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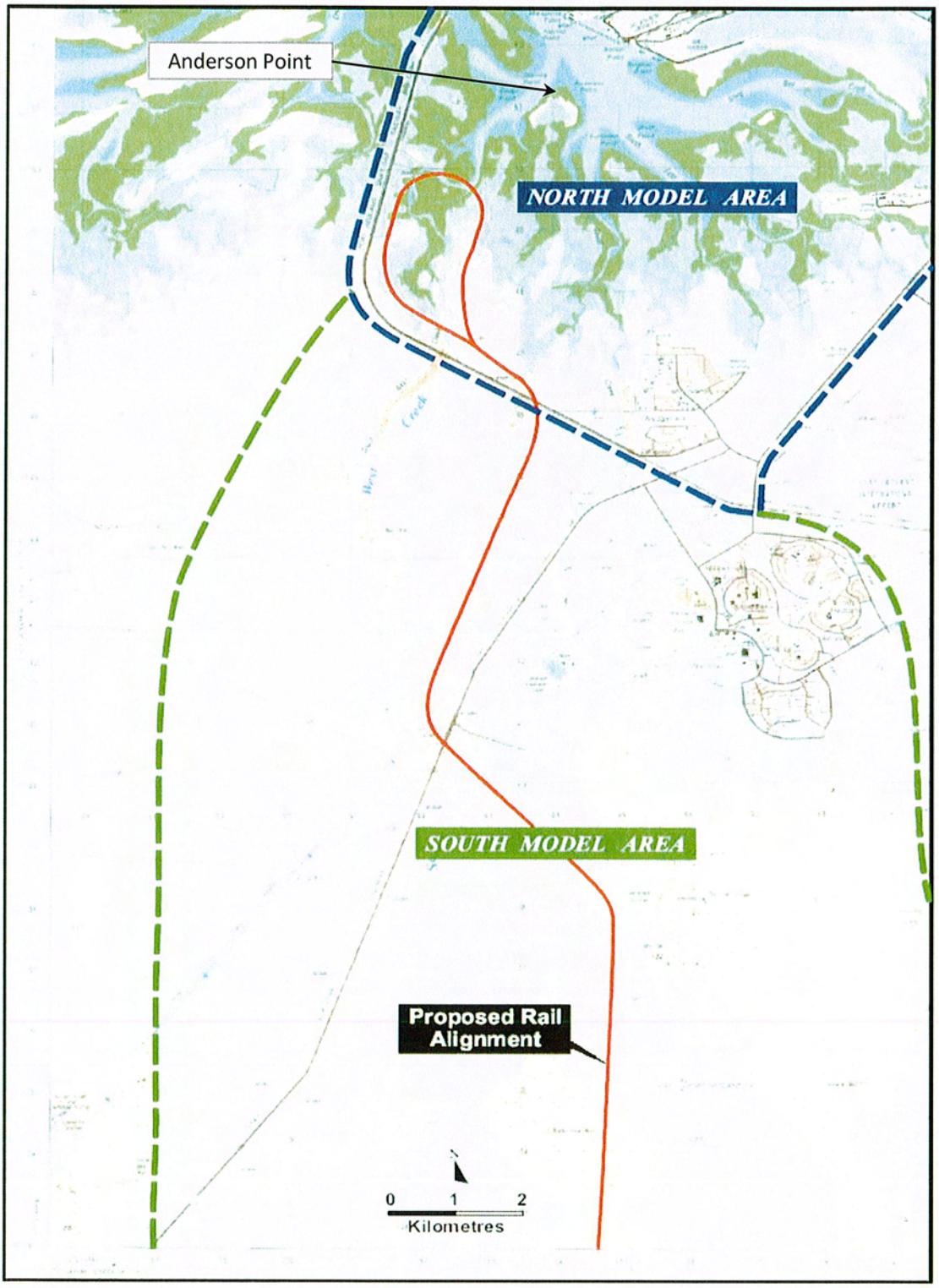
Landcorp

Wedgefield Industrial Estate - Flood Risk

Figure 1: Flood Levels in Port Hedland Estuary, South Creek and South West Creek



Data Source: Fortescue Metals Group Ltd (2004)

JDA

Job No. J4485

Landcorp

Wedgefield Industrial Estate - Flood Risk

Figure 2: Pilbara Iron Ore & Infrastructure Project Flood Study (FMG, 2004)

APPENDIX 1

Jim Davies

From: Clinton Doak [c.doak@coastsandports.com.au]
Sent: 05 February 2009 16:08
To: Paul Schneider
Cc: 'Justin Zelones (WGE)'
Subject: Wedgefield Storm Surge & Development Levels
Attachments: Preliminary Storm Surge & Development Levels for Wedgefield.pdf

Email reference: 186/09, Job number: J741

Dear Paul

Please find attached our preliminary estimates of the water levels and associated minimum development levels for the Wedgefield area. Included are estimates of the levels for the 25, 50 and 100 year return period events.

Please note that MRA's recommendation would be that the 50 yr ARI event be used as the basis for the development of Wedgefield since it would be an industrial development with no provision for onsite accommodation. Further, it is considered that the consequences of inundation of this area would be significantly less than that of a residential area so the requirement for the development need not adhere to the same guidelines. Essentially, this is as we have previously discussed.

Please note that these levels would be subject to refinement at the detailed design stage and should be used as a guide only, however, having said that they should be reasonably accurate.

Please call should you wish to discuss any of this further.

Kind regards
Clinton Doak
for and on behalf of

m p rogers & associates pl ABN 14 062 681 252
consulting engineers specialising in coastal, port & marine projects

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J741 - Wedgefield Storm Surge Investigations

MRA approximation of return period flood levels and associated development levels

	Return Period		
	25 years	**50 years**	**100 years**
Still Water Level (mAHD)	4.4	5.3	6.3
Nearshore setup (m)	0.2	0.3	0.3
Peak Steady Water Level (m AHD)	**4.6**	**5.6**	**6.6**
Allowance for climate change induced sea leve rise (m)	0.1	0.2	0.4
Freeboard / Factor of Safety (m)	0.5	0.5	0.5
Development Level (mAHD)	**5.6**	**6.3**	**7.5**

Note: Levels are preliminary estimates only and would be subject to further investigation

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APPENDIX 2D

CORRESPONDENCE REGARDING FLOOD STUDIES – DEPARTMENT OF WATER

Tom Carroll

From: BRETNALL Richard [Richard.BRETNALL@water.wa.gov.au]
Sent: Wednesday, 21 October 2009 5:22 PM
To: Paul Schneider
Cc: justin.mckirdy@mainroads.wa.gov.au; Clinton Doak; Tom Carroll; KEELER Lisa; LEACH Natalie; ABBOTT Darryl; RODGERS Simon
Subject: RE: Wedgefield Industrial Estate Expansion - Desktop Flood Study
Follow Up Flag: Follow up
Flag Status: Flagged
Attachments: PHEDG 2009-10-08 Wedgefield Desktop Flood Level Study by JDA (J4485a).pdf; Wedgefield_Ind_Estate.JPG; ATT08692.txt

Hi All

The Department of Water in carrying out its role in floodplain management provides advice and recommends guidelines for development on floodplains with the object of minimising flood risk and damage. The Department uses the following guidelines to ensure proposed development in floodprone areas is acceptable with regard to major flooding:

(1) Proposed development has adequate flood protection from a 100 year ARI flood.
(2) Proposed development does not detrimentally impact on the existing 100 year ARI flooding regime of the general area.

Based on the GEMS flood modelling, a major portion of the land in question is affected by major flooding (refer attachment) by either river/creek flooding or from tidal storm surge. Please note that DoW considers that the GEMS flood modeling only provides an indicative regional perspective on flooding (both storm surge and river/creek flooding) for the area.

It is also acknowledged that 100 year ARI flood protection may not be required in industrial type areas but the level of flood protection provided should conform with both the Building Code of Australia and Local Council requirements.

Summary

Proposed development of the area should conform with the abovementioned 2 guidelines. Consequently, in order to ensure that proposed development conforms with these guidelines, it is recommended that suitable hydraulic modeling (ie, MIKE21) be undertaken for the area and should include a review of the catchment hydrology, the MRA storm surge analysis, and the timing difference of the two types of flooding regimes.

Regards

Rick Bretnall
Manager, Water Resource Assessment
Department of Water
168 St George's Tce, Perth, 6000
Phone: (08) 6364 6922
Mobile: 0427 987 112
Email: richard.bretnall@water.wa.gov.au
Web: www.water.wa.gov.au

From: Paul Schneider [mailto:Paul.Schneider@landcorp.com.au]

Sent: Tuesday, 13 October 2009 11:51 AM
To: ABBOTT Darryl; LEACH Natalie; BRETNALL Richard
Cc: justin.mckirdy@mainroads.wa.gov.au; Clinton Doak; Tom Carroll
Subject: Wedgefield Industrial Estate Expansion - Desktop Flood Study

Darryl / Natalie,

I refer to our meeting on 14 July 2009 in Karratha involving the Water Corporation and the Dept of State Development.

As part of the update on LandCorp industrial projects across the Pilbara, we discussed Wedgefield which includes the rezoning of some 250 hectares to light industry and transport development uses. We also discussed the storm surge investigations undertaken to date by Mick Rogers & Associates (MRA) and their findings which indicated that flood levels would be below the storm surge level.

The main outcome from our discussions on Wedgefield was to close the loop on flood levels for the estate by undertaking formal flood investigations. LandCorp subsequently engaged Jim Davies & Associates (JDA) on the basis of a possible two phased investigation, being:

- Phase 1 – Desktop review of studies to date, consideration of MRA's investigations and recommendations on if further investigations are required; and
- Phase 2 – Subject to the outcomes of Phase 1.

For your reference, please find attached the JDA's report on Phase 1 investigations.

MRWA has also undertaken a Waterways Report (Nov 2008) which addresses tidal & hydrological considerations for Option B (realignment of the Great Northern Hwy around the western and northern sides of Wedgefield). Unfortunately, when I was instructing JDA, I was under the impression that the MRWA report only related to storm surge and therefore did not advise JDA of its existence. You will note that the MRWA report is not referenced in JDA's report. However, both reports do recommend 2D Hydraulic modeling to gain a better understanding of tidal surges & flood levels.

I have recently provided MRWA a copy of JDA's report and have asked if MRWA are interested in undertaking a joint 2D Hydraulic Model to better understand both flood & storm surge impacts for our respective projects. I will keep you advised on the outcomes of our discussions with MRWA.

Brett – In accordance with the recommendations of JDA's report, we seek your comments and endorsement on behalf of the Water Department.

Natalie – As discussed this morning, we have only recently become aware of the need for Urban Water Management Plans to be included with rezoning / development plan applications. Accordingly, we did not instruct JDA to include ground water and the associated investigations into his last consultancy. We would be happy to undertake an appropriate level of Urban Water Management Plan. However, please be aware that we are in the process of finalising our rezoning and development plan applications and we definitely need to hit the November 2009 Town of Port Hedland council meeting. Your assistance to clarify the need and level of Urban Water Management Plan would be appreciated. We would also like the Water Department's favourable consideration of LandCorp submitting the Urban Water Management Plan subsequent to lodging the formal rezoning / development planning applications.

Please also be aware that we are undertaking a further submission to the Department of Planning on interpretation / clarification of the Coastal Planning Policy (SPP 2.6). We would need to resolve a suitable storm surge design criteria for industrial uses at Wedgefield before we would commission any 2D Hydraulic Modeling. Resolution of a storm surge criteria for industrial uses is a priority for LandCorp.

We look forward to working cooperatively with the Water Department to address any outstanding issues and to ensure the timely consideration of our upcoming rezoning / development plan applications for the much needed expansion of the Wedgefield Industrial Estate.

Should you have any queries, please call me on 0409 372 482.

Regards

Paul Schneider
Project Manager

LandCorp

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E: Paul.Schneider@landcorp.com.au **W:** www.landcorp.com.au

APPENDIX 3

REPORT ON GEOTECHNICAL INVESTIGATIONS (EXTRACT) - GHD

CLIENTS | PEOPLE | PERFORMANCE

LandCorp

Wedgefield Industrial Area

Report on Geotechnical Investigation

November 2009

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

Executive Summary

LandCorp is proposing to further develop the Wedgefield Industrial Area, located to the south west of Port Hedland, Western Australia. The selected areas of the industrial estate to be developed at this stage comprise the Light Industrial Area 2 (LIA2), Light Industrial Area 3 (LIA3), and the Transport Use Area.

A geotechnical site investigation has been undertaken by GHD, involving the excavation of shallow test pits and laboratory testing of recovered soil samples for geotechnical, contamination and Acid Sulfate Soil (ASS) assessment.

The ground conditions at the proposed development sites are generally uniform and predominantly comprise clayey sand (Pindan Sand formation) to the full target depth of 3m. At the time of the investigation, groundwater was not visually observed in any of the test pit locations.

It is expected that excavations at the site will be within the operating capacity of typical mechanical excavators. Unretained temporary excavations should be battered back to a maximum slope of 1(V):1.5(H) unless supported using a proprietary supporting system or otherwise demonstrated by the earthworks Contractor.

The recommended site classification (to AS2870) for the proposed development sites is Class 'S', which is defined as a site with only slight (0 to 20mm) ground movement from moisture changes.

The intersected ground conditions are expected to be a suitable founding stratum for high level spread footings, with an estimated maximum allowable bearing pressure of 120kPa. Total and differential settlements, under the recommended maximum bearing pressure, would generally be anticipated to be less than 25mm and 15mm respectively.

The existing natural material consisting clayey sand would generally be considered suitable for re-use as engineering fill and as a reasonable quality pavement subgrade, with a recommended design CBR value of 7%. The material would be considered to be relatively impermeable and an in-situ coefficient of permeability of approximately 1m/day is suggested for design.

The contamination assessment indicates that the site should be suitable for its intended ongoing commercial/industrial land-use, and based on the results from the soil investigation should not pose a risk to human health or the environment.

Contamination analysis of the waste stockpile (located in LIA2) indicates that soil samples have lead concentrations that exceed DEP Landfill guidelines and further laboratory analysis of soil samples for leachate concentrations is recommended if disposal of the material is to be carried out.

Based on the findings of the Acid Sulfate Soil (ASS) assessment, it is considered that no further ASS investigations are likely to be required prior to commencement of the earthworks program provided that excavation is limited to a maximum depth of 3m below current ground level and that no de-watering is undertaken.

6. Subsurface Conditions

6.1 Pindan Sand

The geotechnical investigation results indicate that the ground conditions at the proposed development sites (LIA2, LIA3 and Transport Use Area) are generally uniform and predominantly comprise clayey sand (Pindan Sand formation).

Pindan Sand was intersected in all of the test locations to the full target excavation depth of 3m, comprising red / brown, clayey fine to medium grained, sub-angular to sub-rounded quartz sand. Unusually, local zones containing laterised gravel was intersected in numerous test pits across the sites and at variable depths.

Test pit observations and inferred PSP results indicate the in-situ relative density of the clayey sand is loose to medium dense near surface (typically within the upper 0.5m), becoming medium dense to dense with depth.

Grading analysis of the eight samples indicate that the clayey sand sampled contains between 17 and 31% clay and silt sized particles, between 57 and 81% sand and up to 20% gravel. Atterberg Limit tests conducted on the sample batch indicates that the clay component is generally of low plasticity and potentially slightly to moderately expansive based on measured liquid limits of between 18 and 36% and linear shrinkages of between 0.5 and 9.5%.

Modified compaction testing of six samples indicate that the clayey sand sampled has a modified maximum dry density (MMDD) of between 2.05 and 2.11t/m^3 and a modified optimum moisture content (MOMC) of between 7.3 and 8.3%. Californian Bearing Ratio tests (4 day soaked) conducted on the same sample batch compacted to 95% MMDD indicates a CBR subgrade value of between 7 and 14%.

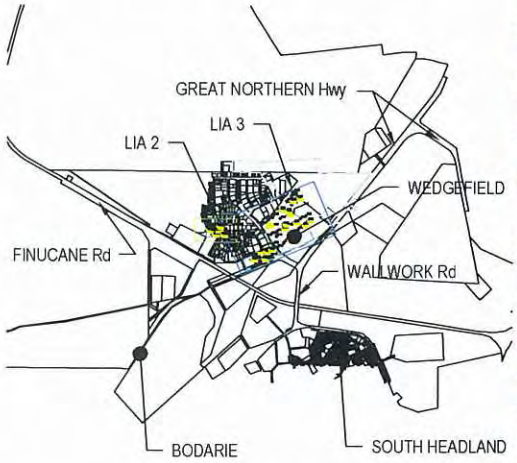
Shrink / swell index tests were undertaken on two remoulded soil samples compacted to 95% MMDD. The results indicate that the clayey sand samples have measured shrink / swell index values of between 0.4 and 0.6%.

The results from three infiltration tests indicate measured in-situ permeability coefficients in the order of 3 to 4m/day. However, based on correlation of the material classification with published data, an in-situ coefficient of permeability of approximately 1m/day is estimated.

6.2 Groundwater

No groundwater data in the immediate site vicinity was obtained from a search of the Department of Water *WIN* database. Available data from the surrounding area, located approximately 5kms away (groundwater depth of between 2.4 and 21.0m) is not considered to be representative of groundwater levels that would be anticipated at the development site.

At the time of the investigation, groundwater was not visually observed in any of the test pit locations. However, a noticeable increase of the soil moisture content (i.e. from dry to moist) was observed in the test pit excavations at a depth, typically between 1 and 2m below ground surface level.



SITE LOCALITY

SCALE 1:100 000

FIGURE 03
LIA 3 AND TRANSPORT AREA

FIGURE 02
LIA 2

PINGA STREET
ANTHILL St
PINNACLES St
MANGANESE St
HARWELL WAY
CAJARINA Rd
DALTON
GREAT NORTHERN HWY

TP01 TP02 TP03 TP04 TP05 TP06 TP07 TP08 TP09 TP10 TP11 TP12 TP13 TP14 TP15 TP16 TP17 TP18 TP19 TP20 TP21 TP22 TP23 TP24 TP25 TP26 TP27 TP28 TP29 TP30 TP31 TP32 TP33 TP34 TP35 TP36 TP37 TP38 TP39 TP40 TP41 TP42 TP43 TP44 TP45 TP46 TP47 TP48 TP49 TP50 TP51

PSP01 PSP02 PSP03 PSP04 PSP05 PSP06 PSP07 PSP08 PSP09 PSP10 PSP11 PSP12 PSP13 PSP14 PSP15 PSP16 PSP17 PSP18 PSP19 PSP20

INF01 INF02 INF03

0 1000 2000 3000m
SCALE 1:100,000 AT ORIGINAL SIZE

0 60 120 180m
SCALE 1:6000 AT ORIGINAL SIZE

LEGEND

TP1 TEST PIT
PSP1 PENETROMETER TEST
INF03 INFILTRATION TEST

GHD

CLIENTS | PEOPLE | PERFORMANCE

LANDCORP
WEDGEFIELD INDUSTRIAL AREA
GEOTECHNICAL INVESTIGATION
LOCALITY PLAN

Job Number | 61-23983
Revision | A
Date | Sep 2009

Figure 01

GHD House, 239 Adelaide Tce Perth WA 6004 T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com

Plot Date: 12 November 2009 - 3:59 PM Plotted by: Joshua Polenka Cad File No: G:\61\23983\CAD\61-23983-FIG-01-03.dwg

APPENDIX 4

HERITAGE SURVEY (EXTRACT) – ANTHROPOS AUSTRALIS

RECOMMENDATIONS

The *Marapikurrinya* Consultants that participated in the Survey have had the opportunity to view the Survey Area. *Marapikurrinya* also approved the recommendations set out in this document.

It is **recommended** that LandCorp ensure that its employees and contractors, as appropriate, are advised:

1. Of the existence and locations of registered Aboriginal site ID's 23609 (FMG PAR 06-06) and 22874 (*Marapikurrinya Yintha*);

2. That, with the following exceptions, registered Aboriginal site ID 22874 (*Marapikurrinya Yintha*) exists to the 3.63m RL line within proposed Lots A and D:

    a) The causeway within proposed Lot D, including coordinates: 667172.15mE 7747154.82mN; 667192.05mE 7747218.18mN and; 667197.63mE 7747218.13mN; **is** part of registered Aboriginal site ID 22874 (*Marapikurrinya Yintha*) and;

    b) The isolated section of the 3.63m RL line within proposed Lot D bounded by the coordinates: 666745.55mE 7746963.02mN; 666768.27mE 7746973.74mN and; 666765.49mE 7746942.49mN; **is not** part of registered Aboriginal site ID 22874 (*Marapikurrinya Yintha*).

3. That these locations constitute Aboriginal sites to which the *Aboriginal Heritage Act 1972* applies and should, therefore, be avoided;

4. Of the existence and locations of newly identified Aboriginal archaeological sites LAN08-01, LAN08-02, LAN08-03, LAN08-04; and

5. That these locations may constitute Aboriginal sites to which the *Aboriginal Heritage Act 1972* applies and should, therefore, be avoided.

It is a **recommendation** that an Aboriginal Heritage Survey that employs a Site Identification methodology, including a Cultural Significance Assessment, occurs for the above registered Aboriginal sites and newly located Aboriginal sites should LandCorp submit a Notice under Section 18 of the *Aboriginal Heritage Act 1972* to use the land for a particular purpose.

It is a **recommendation** all future development proposals that may impact Aboriginal site ID 22874 (*Marapikurrinya Yintha*) confirm its extent with *Marapikurrinya* People.

It is a **recommendation** that, prior to the commencement of the proposed works within Lots A (1) and A (2), the boundaries of Aboriginal site ID 23609 (FMG PAR 06-06) are staked and flagged by a *Marapikurrinya* Heritage Monitor and an Anthropos Australis Archaeologist.

It is a **recommendation** that rubbish along South West Creek be removed.

It is a **recommendation** that LandCorp engages *Marapikurrinya* to fence the registered Aboriginal sites and the newly located Aboriginal sites within proposed Lots B, C and D.

It is a **recommendation** that, if possible, LandCorp preserve the stands of native fruit trees identified in proposed Lots C and D.

It is a **recommendation** that, in accordance with the Agreement and given the potential for sub-surface Aboriginal cultural material, including skeletal, to be disturbed, *Marapikurrinya* nominated *Marapikurrinya* Heritage Monitors be engaged during ground disturbing activity associated with the proposed works, specifically, vegetation clearance, the "boxing out" of new roads and trenching for infrastructure.

It is a **recommendation** that, if any Aboriginal cultural material, including skeletal, is found during ground disturbing activity, then works stop and the *Marapikurrinya* People are consulted.

It is a **recommendation** that LandCorp liaise with *Marapikurrinya* regarding contracts for the proposed construction activity.

Finally, it is **recommended** that LandCorp keep *Marapikurrinya* informed of the proposed development of the Lots.

APPENDIX 5

ENGINEERING REPORT – WOOD & GRIEVE CONSULTANTS

ENQUIRIES: JUSTIN ZELONES
PROJECT NO: 20423-PER-C

26 November 2008

RPS Koltasz Smith & Partners
PO Box 127
BURSWOOD WA 6100

Attention: Mr Tom Carroll

Dear Tom

**RE: PORT HEDLAND INDUSTRIAL
LIGHT INDUSTRIAL AREA STAGE 2
SERVICING ADVICE**

Further to your request of 30 October 2008 please find below commentary on the servicing for Light Industrial Areas 3, 4 and 5 plus the General Industry/Transport Use area.

Light Industrial Area 3 and 4

Sewer Reticulation

There is no sewer present in Wedgefield. Provided lot sizes are kept above 2,000m^2 it is expected that the Water Corporation will not include a requirement to connect to sewer.

Water Reticulation

The Water Corporation have indicated that Light Industrial Area 3 and 4 (LIA 3 & LIA 4) will be served by the existing 150mm diameter water main in Cajarina Road and Pinga Street. Should any internal roads be created within LIA 3 or LIA 4 an extension to the 150mm diameter water main will be required. The required extension will consist of further 150mm diameter water main.

Power

Power supply to the proposed lots within LIA 3 and LIA 4 would be based on the standard 200kVA per hectare. We await confirmation from Horizon Power that sufficient capacity exists to service the proposed development and also, if necessary, any advice on upgrading work to ensure sufficient serviceability of the proposed development.

Communications

Telstra cabling currently runs in Cajarina Road and Pinga Street. It is expected that lots forming LIA 3 and LIA 4 will be able to gain service from an extension to the existing cabling.

Gas

Alinta has noted that they have no assets in this area.

Stormwater Drainage

The existing stormwater drainage operating within the LIA 3 and LIA 4 area allows stormwater runoff to egress via the road network and open drainage channels within the road reserve. The outfall for runoff in this area is to the north west through the proposed LIA 2 and out to South Creek.

Our drainage strategy for the area will be of a similar approach in that we intend to direct stormwater to open drains within the road reserve and then connect these drains to the existing system.

It is also noted that a storm surge and flood study is currently underway for LandCorp's proposed developments in Wedgefield. This information will have a bearing on the drainage design as well as the required bulk earthworks necessary to protect against seasonal flooding.

Light Industrial Area 5

Sewer Reticulation

There is no sewer present in Wedgefield. Provided lot sizes are kept above 2,000m^2 it is expected that the Water Corporation will not include a requirement to connect to sewer.

Water Reticulation

Major water infrastructure currently exists to the south of Light Industrial Area 5 (LIA 5) with several mains of varying sizes (a 250mm diameter, two 375mm diameter and one 600mm diameter main) severing the south east corner of the proposed development. The Water Corporation have noted that three of these lines can be relocated, however the fourth, a 600mm diameter main, could pose a difficult to relocate due to its regional importance.

The Water Corporation have advised that to serve LIA 5 a connection to one of the 375mm diameter water main with a 300mm diameter water main will be required. The 300mm diameter main will extend through LIA 5 with the reticulation of the area being via 150mm diameter mains connecting off the 300mm diameter main. It is also noted that the 300mm diameter main will be ultimately required to extend to the General Industry/Transport Use area.

Power

Power supply to the proposed lots within LIA 5 would be based on the standard 200kVA per hectare. We await confirmation from Horizon Power that sufficient capacity exists to service the proposed development and also, if necessary, any advice on upgrading work to ensure sufficient serviceability of the proposed development.

Communications

Telstra cabling currently runs in Cajarina Road and Pinga Street. It is expected that lots forming LIA 5 will be able to gain service from an extension to the existing cabling.

Gas

Alinta has noted that they have no assets in this area.

Stormwater Drainage

The existing natural surface levels within the LIA 5 area indicate that the land falls towards the north and west with the lowest point occurring where the rail meets Great Northern Highway. From available survey it would appear that stormwater is being intercepted by the rail and the highway reserves where it is then directed to outfall at South Creek.

Our drainage strategy for the area will be to convey stormwater runoff via open channels within road reserves and maintain the existing flow path. As this will increase the impervious area within LIA 5 and therefore burden the existing highway and rail drainage further it will be necessary to liaise with the owners of both the highway and rail to ensure the increase in storm runoff will not exceed the capacities of their existing drainage systems.

It is also noted that a storm surge and flood study is currently underway for LandCorp's proposed developments in Wedgefield. This information will have a bearing on the drainage design as well as the required bulk earthworks necessary to protect against seasonal flooding.

General Industry/Transport Use

Sewer Reticulation

There is no sewer present in Wedgefield. Provided lot sizes are kept above 2,000m^2 it is expected that the Water Corporation will not include a requirement to connect to sewer.

Water Reticulation

Existing 150mm diameter water main runs in the road reserves to the west of the area noted as General Industry/Transport Use (GI/TU). The Water Corporation has noted that the extension of these mains will be necessary to supply GI/TU areas.

In addition a 300mm diameter distribution main will need to be extended along Great Northern Highway to assist with maintaining adequate pressure within the system. As noted in LIA 5, the 300mm diameter distribution main will be an extension from the LIA 5 installation. Any development of LIA 5 and GI/TU will require this main and this will need to be considered when determining the timing of each development.

Power

The level of power supply to the proposed lots within GI/TU is currently being investigated and negotiated with Horizon Power to lower the standard 200kVA per hectare supply. An investigation into power demand for typical business's in this type of zoning is being investigated as it is expected that a lower demand than standard supply will be required. With lowering the allowable per hectare supply in the GI/TU area we hope to achieve less need for existing infrastructure to be upgraded to cope with increased demand in the Wedgefield area.

Regardless of the outcome of the above we still require information from Horizon Power on the capacity of the existing power infrastructure as upgrades can potentially have significant cost impacts.

Communications

Telstra cabling currently runs in Great Northern Highway adjacent to GI/TU and also other proposed connecting road adjacent to the site. It is expected that lots forming GI/TU will be able to gain service from an extension to the existing cabling.

Gas

Alinta has noted that they have no assets in this area.

Stormwater Drainage

The existing natural surface levels within the GI/TU area indicate that the land typically falls from the southern portion of the site to the north outfalling into the existing creek system. Due to the existing road networks adjacent to the west of the site, with the connection of the future roads with GI/TU some stormwater runoff may head west outfalling to South Creek. This can be confirmed during detailed design.

Our drainage strategy for the area will be to convey stormwater runoff via open channels within road reserves and maintain the existing flow paths. This will therefore maintain outfalls to the northern creek system and South Creek.

It is also noted that a storm surge and flood study is currently underway for LandCorp's proposed developments in Wedgefield. This information will have a bearing on the drainage design as well as the required bulk earthworks necessary to protect against seasonal flooding.

Should you require any additional information please contact the undersigned.

Yours faithfully

Justin Zelones
for **Wood & Grieve Engineers**

DOCUMENT: M:\TECH\20400\23\C_LIA 2 SERVICING ADVICE.DOC(KDB)

APPENDIX 6

ROAD IMPROVEMENT PLAN - MRWA

LEGEND

LAND REQUIREMENT (INDICATIVE ONLY)

NOTE

AREA OF WORK IS IN A NATIVE VEGETATION ZONE.

SKETCH ONLY

1:5000

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F: +61 8 63643399 E: info@bgeeng.com
PERTH • SYDNEY • MELBOURNE • DUBAI

PROJECT: MRWA BDS-ETS CONTRACT PSA PILBARA REGION

TITLE: GREAT NORTHERN HIGHWAY-PORT HEDLAND HIGHWAY REALIGNMENT CONCEPT OPTION B2A

PROJECT No.	DATE	SCALE	SKETCH No.	REV
P06105-011	21.07.2009	1:5000	P06105-011-SKC-018	A

APPENDIX 7

TRAFFIC CORRESPONDENCE WITH DEPARTMENT OF PLANNING

Our Ref: A91180
Enquiries: Ph 9482 7574

Mr B. Imre Szito
Team Leader
State Strategic Policy
State and Regional Policy Division
Department of Planning
Albert Facey House,
469 Wellington Street,
PERTH WA 6000

Dear Imre

TOWN PLANNING SCHEME AMENDMENT FOR THE EXPANSION OF THE WEDGEFIELD INDUSTRIAL ESTATE, PORT HEDLAND

I refer to our recent communications including your emails of 17 August and 16 September 2009 regarding the above.

This letter is intended clarify the status of existing and proposed traffic investigations to support the town planning scheme (TPS) amendment and development plan for the expansion of the Wedgefield Industrial Estate.

During early 2009, LandCorp prepared a traffic consultancy brief in association with the Wedgefield Technical Advisory Group (TAG), comprising representatives from Main Roads WA (MRWA), Town of Port Hedland (ToPH), Department of Planning (DoP) and the Port Hedland Port Authority (PHPA). Based on input from the TAG, the investigations were undertaken in two parts being Phase 1 – data collection; and Phase 2 - analysis & modelling.

In April 2009, GHD completed Phase 1 investigations being an origin and destination survey for the Wedgefield Industrial Estate and surrounding road network. The results were also compared to the NSW Guidelines to Traffic Generating Developments. Outcomes of these investigations are detailed in the attached report and the associated addendum.

One of the outcomes of Phase 1 was to make recommendations for the type of investigations to be undertaken in Phase 2. GHD recommended establishing a paramix model for the estate as detailed in their proposal dated April 2009. It is intended to undertake this Phase 2 modelling by utilising the PHPA paramix model which is currently being updated for the proposed expansion of the Utah Point facility. Once the Utah Point model has been updated, it is intended to

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utilise PHPA's consultant to input the Wedgefield traffic data into the same model.

LandCorp will continue to work with the PHPA with the view to finalising the Wedgefield traffic investigations during early 2010. Outcomes of the modelling exercise and associated findings will be reported to the TAG and forwarded to your office at the earliest opportunity.

Your interim support of the TPS amendment and development plan is appreciated. More detailed traffic analysis will be made available at a later stage of the rezoning and development approval process.

Should you have any further queries, please do not hesitate to contact me on Ph 9482 7574.

Yours sincerely

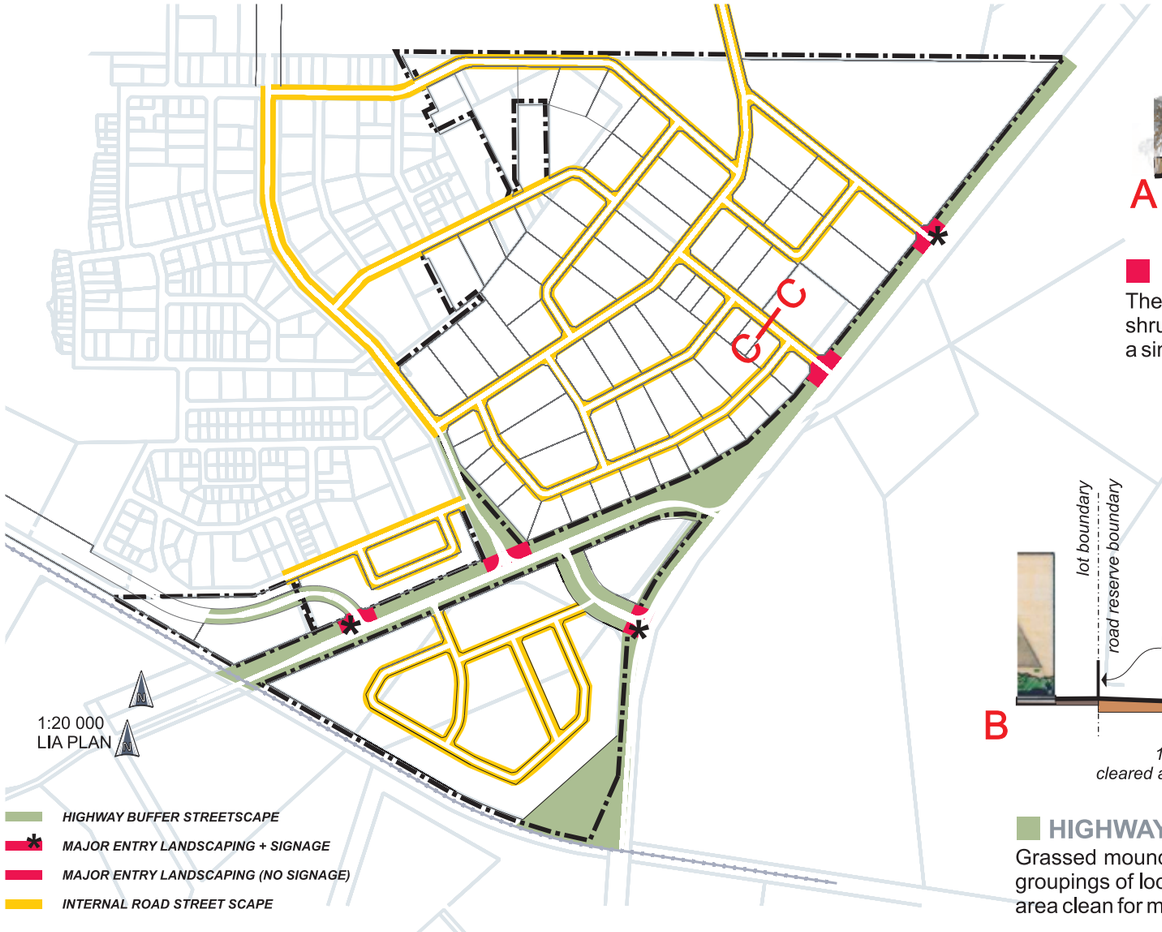
Paul Schneider
PROJECT MANAGER

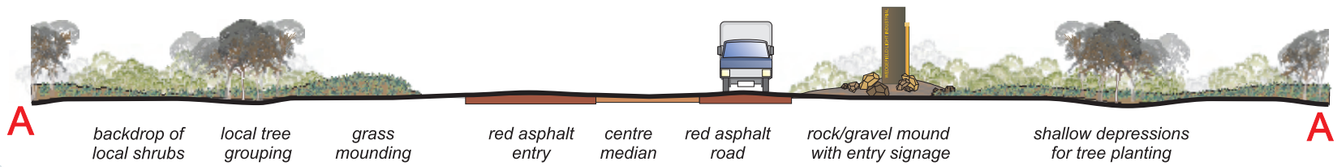
25 September 2009

cc: Craig Wilson, PHPA

APPENDIX 8

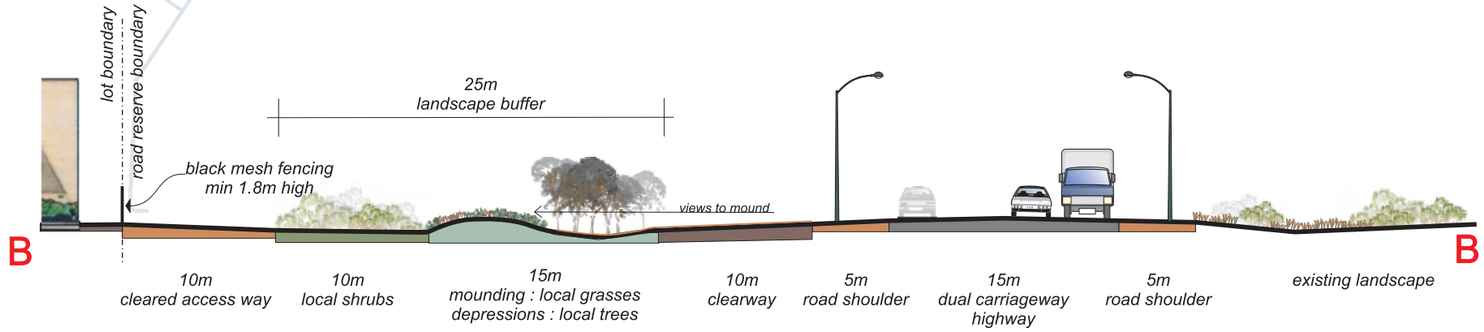
LANDSCAPE PLANS - UDLA





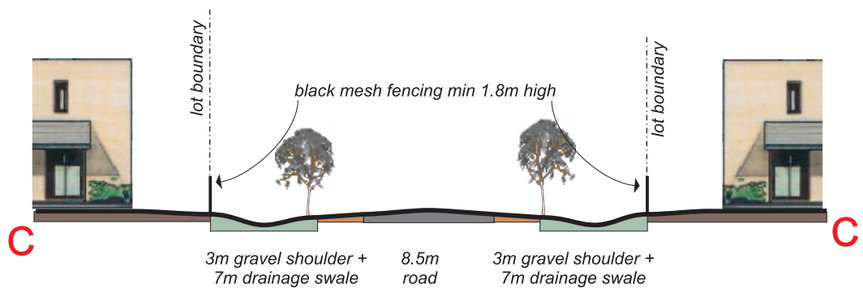
MAJOR ENTRY ELEVATION 1:400 @ A3

The grassy mound levels out cutting off the gravel apron. A new mound rises behind the grass and is covered in local gravels /rocks. The shrubbery remains as a backdrop. The exposed and rocky mound is ideal for signage in the form of a steel blade. The other side of the road has a similar scenario only the mound is smaller and ends earlier to fit in with the lot and remains grassy.



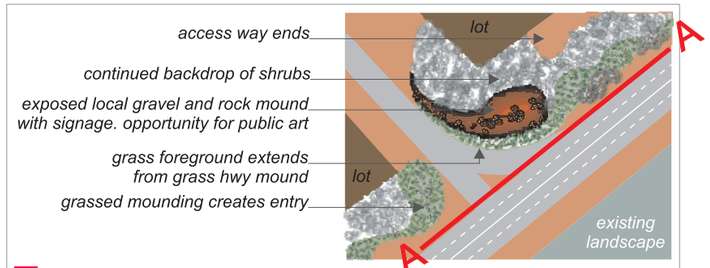
HIGHWAY BUFFER STREETSCAPE SECTION ELEVATION 1:400 @ A3

Grassed mounding divides two distinct areas. 1. A buffer of local shrubbery and a clear access way. 2. A series of depressions provides locations for groupings of local tree species. This clear planting strategy makes this design a usable seed bank for local projects. A gravel ground treatment keeps the area clean for maintenance as well as keeping views open from the road to the trees, grass mounding and a backdrop of local shrubbery.

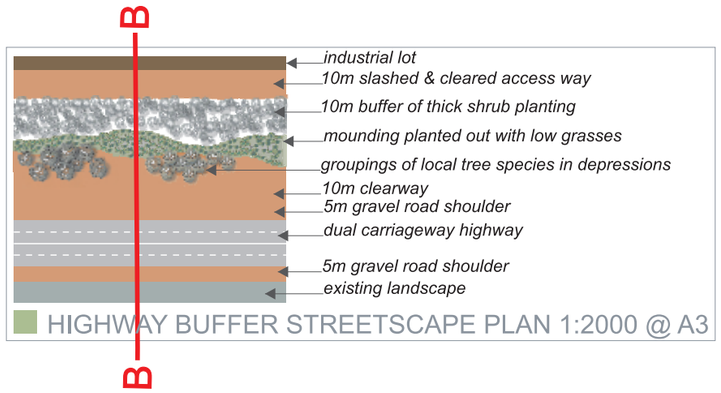


INTERNAL ROAD STREETSCAPE SECTION ELEVATION 1:400 @ A3

A clean, low maintenance outcome with a simple swale system within the road reserve. Tree species can be used to identify different zones within the industrial area.



MAJOR ENTRY PLAN 1:2000 @ A3



HIGHWAY BUFFER STREETSCAPE PLAN 1:2000 @ A3

INDICATIVE PLANTING LIST

TREES
Acacia *eriopoda*
Carissa *lanceolata*
Crotalaria *cunninghamii*
Eucalyptus *leucophloia*
Mallotus *nesophilus*
Melaleuca *acaciodes*
Persoonia *falcata*
Santalum *lanceolatum*
Terminalia *cunninghammii*
Terminalia *petiolaris*
Ventilago *viminalis*
Brachychiton *diversifolius*
Corymbia *deserticola*
Eucalyptus *flavescens*
Eucalyptus *vitrix*
Gardenia *pyriformis*
Grevillea *heliosperma*
Gyrocarpus *americanus*
Hakea *lorea*
Hakea *macrocarpa*
Melaleuca *argentea*
Owenia *reticulata*
Pouteria *sericea*
Syzygium *eucalyptoides*
Terminalia *canescens*

SHRUBS
Acacia *wickhamii*
Bridelia *tormentosa*
Capparis *spinosa*
Distichostemon *hispidulus*
Flueggea *virosa*
Tephrosia *crocea*
Acacia *colei*
Eremophila *fraserii*

GROUNDCOVER
Canavlia *rosea*
Swainsona *formosa*
Cynanchum *pedunculatum*

GRASSES
Trioda *pungens*
Plectrachne *schinzii*
Spinifex *longifolius*

DRAFT

LIA WEDGEFIELD STREETSCAPE

15 DEC 2009
REVISION 6

APPENDIX 9

REZONING LETTER OF SUPPORT – DEPARTMENT OF REGIONAL DEVELOPMENT AND LANDS

Government of **Western Australia**
Department of **Regional Development and Lands**
Lands Division

Your ref: A89902
Our ref: 00264-2008/2 Prompt Job No. 080982
Enquiries: Ross Coppin Ph: (08) 9347 5031
Fax: (08) 9347 5001
Email: ross.coppin@lands.rdl.wa.gov.au

1 December 2009

LandCorp
Locked Bag 5
PERTH BC WA 6849

Attention: Paul Schneider

Dear Paul

TRANSIENT WORKFORCE ACCOMMODATION – WEDGEFIELD INDUSTRIAL ESTATE EXPANSION.

I refer to your letter dated 9th September 2009 received at the Department of Regional Development and Lands (RDL) regarding the Transient Workforce Accommodation (TWA) and the expansion of the Transport Development Area at Wedgefield Industrial Estate and your recent amended layout plan current as at 27 November 2009.

RDL wishes to advise that it supports the strategy to allow the rezoning of the Transport Development area to proceed while the TWA continues to operate on a short term basis.

It is noted that the strategy refers to the following main issues and that these measures will be incorporated into the relevant sections of the Development Plan and Rezoning applications:

- Maximum new lease term up to 30 June 2014 for the continued operation of the TWA;
- This lease is anticipated to satisfy the TWA's needs to accommodate workers for the Rapid Growth Projects 5 & 6;
- The new lease should not allow the Lessee any ability to assign/transfer the lease of the TWA site;
- Council to negotiate directly with RDL should a shorter lease term be required by Council; and
- Rezoning of the TWA site to "industry" with the TWA operations continuing as a non conforming use until the lease expires.

With reference to the rezoning application for the expansion of Wedgefield, RDL as landlord supports the Wedgefield rezoning as detailed in the attached layout plan:

1. Light Industry – light purple areas;
2. Transport Development – dark purple areas; and
3. Industry – TWA site and land on northern side of Schillaman Street - pink areas.

In addition RDL supports the inclusion of the current roadhouse site leased by Shell within the planned rezoning to Transport Development.

Please do not hesitate to contact Ross Coppin on (08) 9347 5031 if you have further questions.

Yours faithfully

Ross Coppin
Team Leader
State Lands - Kimberley-Pilbara
LANDS DIVISION

APPENDIX 10

PRELIMINARY MARKET FEEDBACK EXCERPT – LANDCORP

Some of the main findings of the survey are:

- Businesses looking to purchase and develop land at Wedgefield industrial area are mostly owner-occupiers wanting to expand their businesses in Port Hedland.

- They are mostly interested in developing light industrial or both light industrial and transport use within the next 1 – 2 years.

- Businesses looking for light industrial are mostly interested in lots under 5,000sqm, while businesses interested in transportation use require a variety of lots sizes (i.e. from 0.5ha to more than 5ha).

- Respondents interested in light industrial land are looking to develop a larger proportion of their lot for buildings, while respondents interested in transport use sites plan to mostly cover their site with hardstand.

- Majority of the businesses will employ between 5-19 persons

- Most businesses expect vehicular activity accessing and exiting the site around the normal morning and afternoon peak periods. However, there were 6 businesses looking to operate 24 hours / 7 days.

- All respondents require broadband connection, while public transport was only required by a third of businesses.

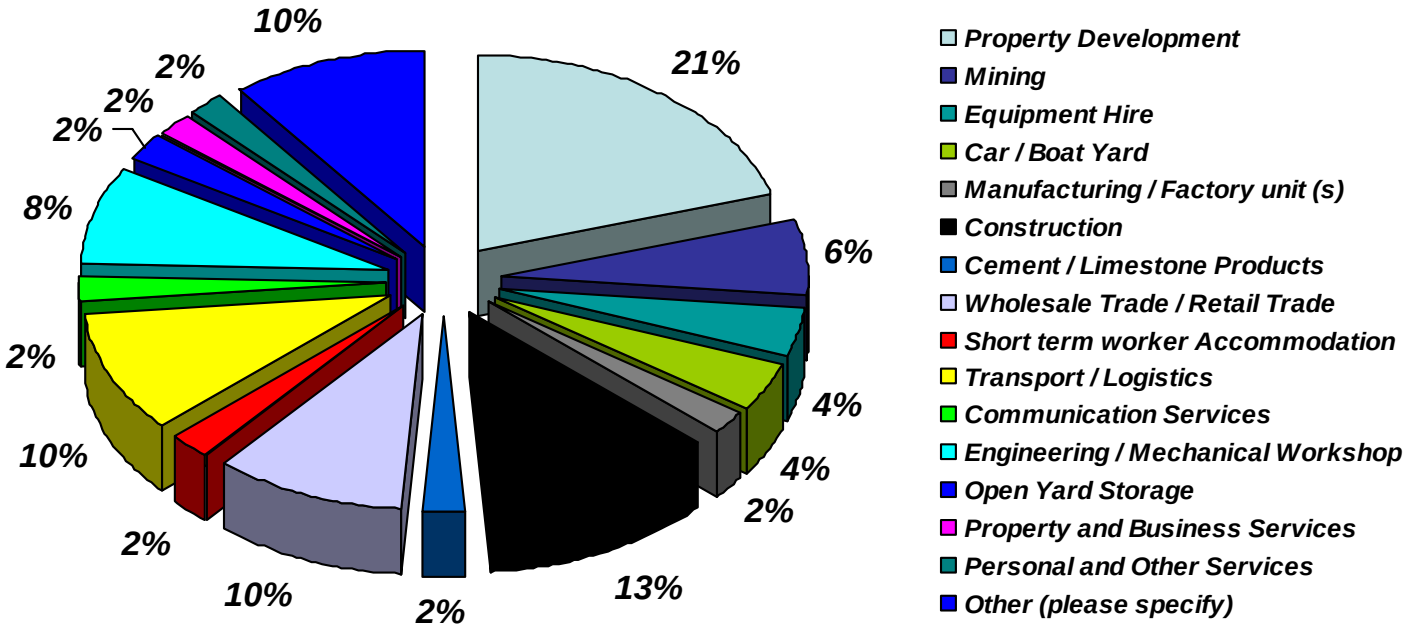
- Most businesses require in/out double entry for the site, while more than half are interested in having dual street frontage.

- Respondents showed strong interest in both incorporating sustainability practices at the site and expressed support for them to be included in the design guidelines for the estate.

- Amenities and services, such as security and quality appearance / presentation of the buildings, along with the overall appearance of the area were perceived to be most important features to have in the estate. Less than half of businesses were supportive of some type of contribution scheme to have their desired features included in the estate.

Industry profile of the respondents (n=49)

- Out of the 49 respondents in the sample, a wide range of industries were represented;
- The highest representation was from property developers with 21% (n=10), followed by construction industry with 13% (n=6);
- There were 5 respondents classified as other, and these included a civil engineering, a commercial laundry, civil earthworks and painting businesses.

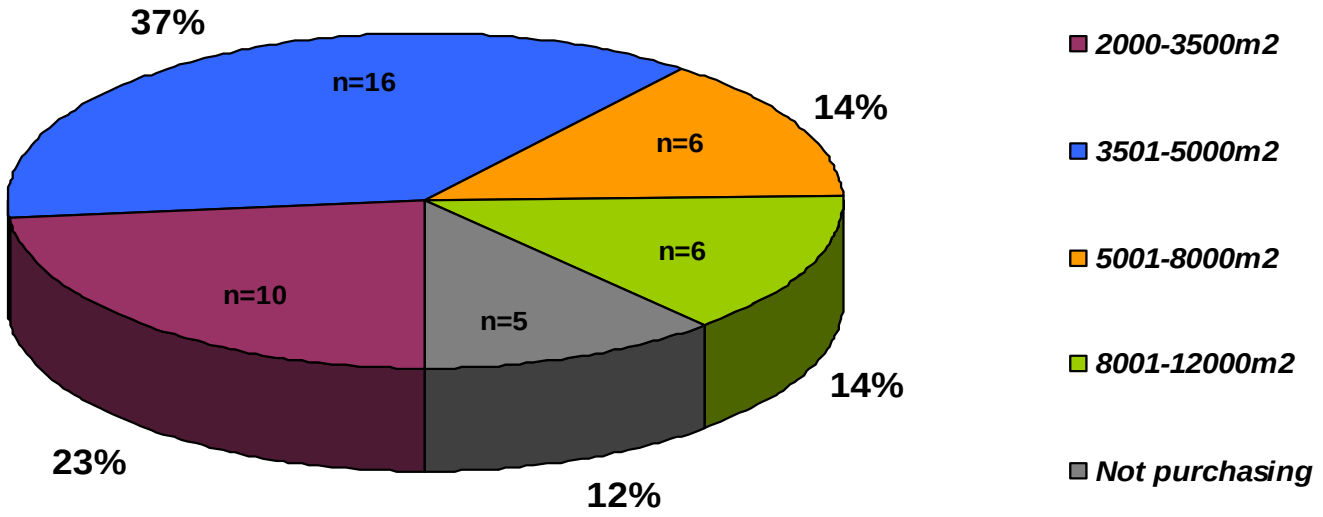


"Which of the following best describes the type of business you are engaged in?"

Note: "n" = number of respondents

Preferred lot sizes for Light Industrial (n=44)

- 60% of the respondents interested in light industrial (n=26) were interested in lots smaller than 5,000sqm;
- 14% of the respondents (n=6) were interested in light industrial lots between 5,000 and 8,000sqm
- 14% of the respondents (n=6) were interested in lots between 8,000 & 12,000sqm
- 1 respondent showed interest in a 4ha lot.



"What is your preferred lot size for Light Industry?"

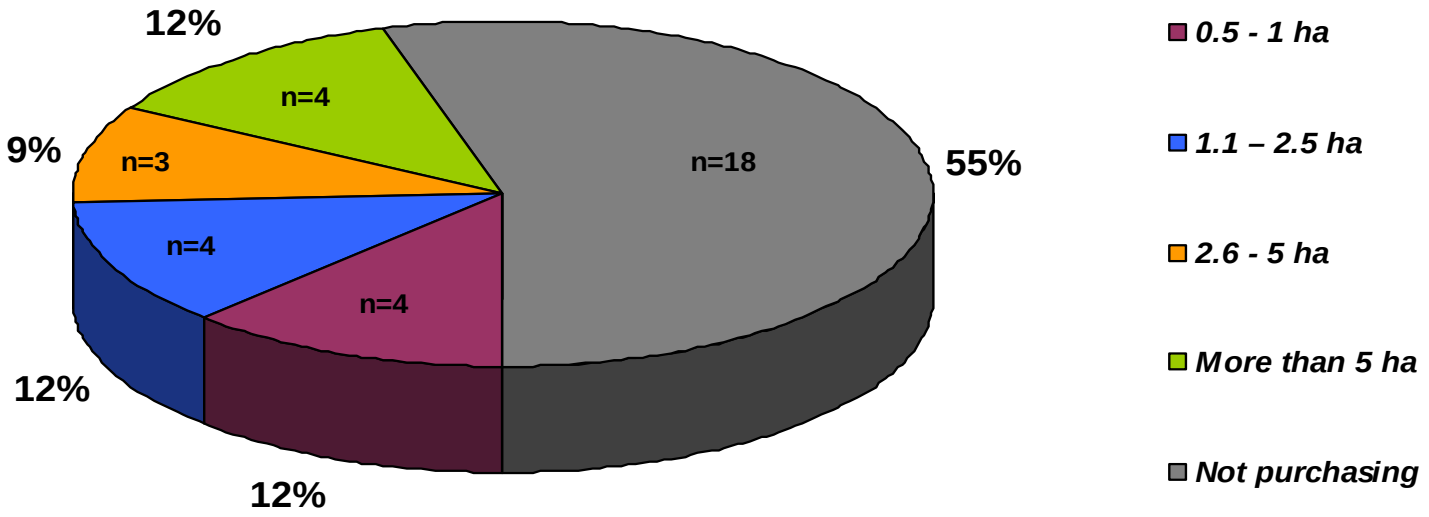
PILBARA

Note: "n" = number of respondents

LANDCORP

Preferred lot sizes for Transport use (n=33)

- 55% of respondents were not interested in purchasing Transport use lots.
- There was an equal interest of 12% (n=4) for all three lot sizes: 0.5-1ha, 1.1-2.5ha, and lots greater than 5ha.
- 9% respondent expressed interest in lots between 2.6-5ha.



"What is your preferred lot size for Transportation use?"

PILBARA

Note: "n" = number of respondents

LANDCORP

APPENDIX 11

NOISE RESTRICTION CORRESPONDENCE – LANDCORP

Your Ref:
Our Ref: A84350
Enquiries: Paul Schneider Ph 9482 7574

Mr Mike Pengelly
Environmental Officer
Environmental Impact Assessment Division
Department of Environment & Conservation
Locked Bag 33,
Cloisters Square,
PERTH WA 6850

Dear Mike

WEDGEFIELD TRANSPORT PRECINCT – NOISE MANAGEMENT MEASURES

I refer to our meeting on 29 July 2009 regarding the above.

Below is a summary of our understanding of the issues and the proposed management measures for consideration by the Department of Environment & Conservation (DEC).

ISSUE

The Transient Workforce Accommodation (TWA) facility is situated within the established industrial area of Wedgefield. The TWA site adjoins the 'Transport Development' area planned as part of the expansion of Wedgefield. The Transport Development area is intended to potentially operate as a 24 hour / 7 day a week estate for industries using oversized equipment and support servicing / maintenance activities. The proposed land uses are in accordance with the intentions of the Port Hedland Land Use Master Plan. The following information details the parameters to be incorporated into the Wedgefield Scheme Amendment, Development Plan and the land release strategy to address this short term land use interface issue.

TWA TENURE

State Land Services (SLS) of the Department of Regional Development and Lands administer the four ground leases occupied by the TWA. Some of these leases are due to expire shortly and the TWA is seeking to amalgamate the leases into a single agreement for a new term of 5 years. SLS has assured LandCorp that any new lease arrangement with the TWA operators will be in full consultation with LandCorp and will not exceed a maximum 5 year term from mid 2009 until mid 2014. The Town of Port Hedland (ToPH) administration may seek a shorter lease term in consideration of existing and potential land use conflicts

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www.landcorp.com.au

and the potential availability of other suitable sites for the TWA. This matter will be resolved directly between SLS and ToPH administration after consultation with its Council.

The measures detailed below are therefore intended to address the potential land use conflicts during the initial business operations of Stages 1 & 2 of the Transport Precinct for a maximum period up to 30 June 2014. Thereafter the TWA will have ceased operations in this locality.

The new lease conditions will not permit the TWA operator to transfer or assign the lease to any other party, thereby negating the potential for future 3rd party involvement.

REZONING OF THE TWA SITE

The TWA site will be included into the Wedgefield Town Planning Scheme (TPS) amendment and rezoned to the 'Industrial' Zone. The TWA will then continue to enjoy non-conforming use rights during the remainder of its lease. No further lease will be issued and thereafter only industrial development will be permissible under Council's TPS.

TWA OPERATIONS

LandCorp's communications during July 2009 with the operator of the TWA indicate that they do not experience any significant noise issues from the established industrial activities and road train movements occurring in the immediate vicinity of the site. The 711 bed camp has an average occupancy of 550 workers, with night shift workers generally limited to around 50 workers (rarely more than 100). Night shift workers are located in the quieter areas of the camp, subject to internal and external activities at the time.

The proposed 5 year lease term from mid 2009 is adequate for the TWA commitments to accommodate workers on Rapid Growth Projects (RGP) 5 and 6. It also provides ample opportunity for the well planned and programmed relocation of the camp to an alternative site.

SUBDIVISION LAYOUT CHANGES

Attached are plans of the revised layout and staging. The main changes since our meeting of late July include:

1. No Transport Development lots will have vehicle access to Anthill Street, which will remain for light vehicle access to the TWA only.

2. The Transport Development area will be accessed from a single road off Pinga Street with the road pavement being located in excess of 250 metres from the TWA boundary.

3. Large lots adjoining the TWA, therefore allowing the purchaser / operator greater flexibility in how they utilise the site (ie: ability to implement noise mitigation measures and locate noisier activities further from the TWA). Larger sites are considered to be more manageable with fewer operators to control.

4. Stage 1 has been increased in area to provide a greater variety of lot sizes and provides flexibility to allocate land uses to the most appropriate location.

It should be noted that the revised layout is preliminary in nature. LandCorp reserves the right to refine this layout. LandCorp will consult with DEC on any substantial changes which impact the intentions / measures outlined in this letter.

PROPOSED STAGING OF TRANSPORT DEVELOPMENT AREA

Stage	Construction Commencement	Issue of Titles	Likely Operation of Businesses
1	October 2010	June 2011	June 2012
2	April 2012	December 2012	December 2013
3	April 2014	December 2014	December 2015

The above indicative time schedule was tabled at our meeting on 29 July 2009. The table identifies the targeted dates for commencement of construction, the issue of titles and the likely commencement of business operations for the first three stages of the Transport Development area. As noted earlier, the extent of Stage 1 has increased significantly in overall area (36 hectares), the number of lots (16) and the average lot size (1.87 hectares). The timing for Stage 2 will be subject to the take up of lots in Stage 1 and the anticipated future demand. Given the significant size of Stage 1, it is unlikely that Stage 2 will be developed in advance of the above timeline and is more likely to be pushed back 12 months. The TWA will therefore be relocated prior to the likely commencement of business operations on Stage 2.

NOISE INVESTIGATIONS TO DATE

The attached plans identify the extent of the anticipated noise affecting the transport precinct areas for daytime (L_{A10} of 49 dB) and night time (L_{A10} of 39 dB) environmental noise criteria, shown respectively on Attachments A & B. The noise levels apply to:

1. Road Truck (inner circle);

2. Industrial Truck (road train equivalent – mid circle); and

3. Front end loader (earth moving equipment – outer circle).

LAND USES

The table at Attachment C has been completed by our commercial sales agent, Hedland First National. It identifies likely land uses, approximate hours of operation and main noise generating activities based on their knowledge of parties who are interested in occupying the estate. Most of the identified uses operate predominantly during the daytime allocations. Generally, this is unlikely to change in the short term due to the high labour costs in the Pilbara making after hours operations more expensive and often uneconomical.

Individual interviews have also been recently undertaken by LandCorp with some of the main transport companies operating in Port Hedland with the following findings:

– Seeking a 20,000m^2 (2 hectare) site. 99% of their operations occur during daytime hours, in particular 6am to 4pm. No onsite after hours activity, except for emergency / break downs situations. No maintenance / workshop activities on site. Main noise emissions are from freezer trailers and this can be managed by locating the trailers away from sensitive uses.

– Interest in up to 6,000m^2. Single & B Double transports are the largest vehicles. Operate 7am to 5pm Monday to Friday and 8am to 5pm on Saturdays. Most noise is generated from fork lifts.

– Interest in up to 30,000m^2 (3 Hectares). Transport bulk ore and quarry products only. Operate 24 hours a day for truck movements and daytime hours for the on-site workshop. Propose to operate workshop on 24 hour basis in the future subject to workload. Main noise activities are from workshop operations, including grinders and sheet metal work (i.e. trailer body / panel repairs).

DEVELOPMENT PLAN CONTROLS

The proposed land uses on Lots 1 to 7 within Stages 1 & 2 (refer to Attachment A) of the 'Transport Development' zone will be subject to special limitations / conditions.

LandCorp will sell all lots via a tender process providing the opportunity to critically review the potential purchaser's proposed land use. In regard to Lots 1 to 7, specific tender conditions will apply and potential purchasers will need to demonstrate how they will meet the noise emission design criteria while the TWA continues to operate. DEC's input into the design criteria and possible mitigation strategies would be welcomed. The strategies by each successful purchaser (i.e. site utilisation layout, building envelopes, direction of building openings, etc) will become a condition of sale and part of their specific Design Guidelines.

All land use and development within the noise limitation area (Lots 1 to 7) as identified on the Development Plan shall comply with the following whilst the TWA site is being used for accommodation purposes:

- Any noise generating activities are to be, where practical, confined to an indoor area, with all buildings to be oriented to front the new internal road, with any major opening to be located on the southern portion of the building;

- Significant noise generating activities external to buildings should, where practical, be carried out at a location where the building acts as an acoustic barrier to the TWA site, or between the hours of 6am – 9am or 5pm – 8pm (being aligned to the change of shift hours for workers accommodated in the TWA);

- The site will be developed in accordance with the purchaser's strategy to address the noise emission design criteria as agreed to by LandCorp. This will be a condition of sale and part of that site's specific Design Guidelines;

- Hours are restricted to normal industrial operating hours, being 6am until 8pm, seven days a week (to avoid normal camp night sleeping hours in the TWA);

- Access to the proposed lots is restricted to the internal subdivision road, with no access from Anthill Street;

- Notwithstanding the permissibility of uses as per the Zoning Table in TPS No. 5, the use of the proposed lots within the noise limitation area shall be restricted to the following for as long as the nearby TWA remains in operation:

    - Infrastructure – AA
    - Office - IP
    - Carpark - AA
    - Public Utility – AA
    - Storage Facility / Depot / Laydown Area (excluding earth moving equipment yard) - P
    - Container Park - P
    - Distribution Centre - P
    - Transport Depot - P
    - Warehouse - P

- Sale contract conditions and LandCorp's standard certificate of title caveat will provide LandCorp with the option to repurchase any lots if they are not developed in accordance with the Design Guideline requirements and within a defined construction timeframe.

- The caveat will not be removed until practical completion of the site improvements / development is completed and transfer of ownership cannot occur until the caveat is lifted.

- Development Guidelines will be an enforceable item under the provisions of the Development Plan. Breach of conditions may result in actions utilising the normal town planning provisions.

Any 24 hours transport depots (i.e. similar to) will be situated on Lots A to J (refer to Attachment B). These lots are situated outside the industrial truck (road train equivalent) buffer for night time operation. It is not anticipated that any earth moving businesses generating noise equivalent to a front end loader will be operating on a 24 hour basis.

We believe the changes to the estate layout, proposed sale strategy, design guidelines, planning controls and other management measures outlined in this letter will adequately address any noise buffer issues associated with the remaining short term operation of the TWA. These measures were endorsed by the Wedgefield Technical Advisory Group (TAG) at our meeting on 21 August 2009. The Wedgefield TAG comprises representatives from the Town of Port Hedland, Main Roads WA, Department of Planning and Port Hedland Port Authority.

All of the measures outlined in this letter will be detailed in the relevant sections of our Rezoning and Development Plan applications. We look forward to DEC's favourable consideration of these soon to be lodged applications to achieve the timely release of Transport Development land.

Should you have any queries, please do not hesitate to contact me on Ph 9482 7574.

Yours sincerely

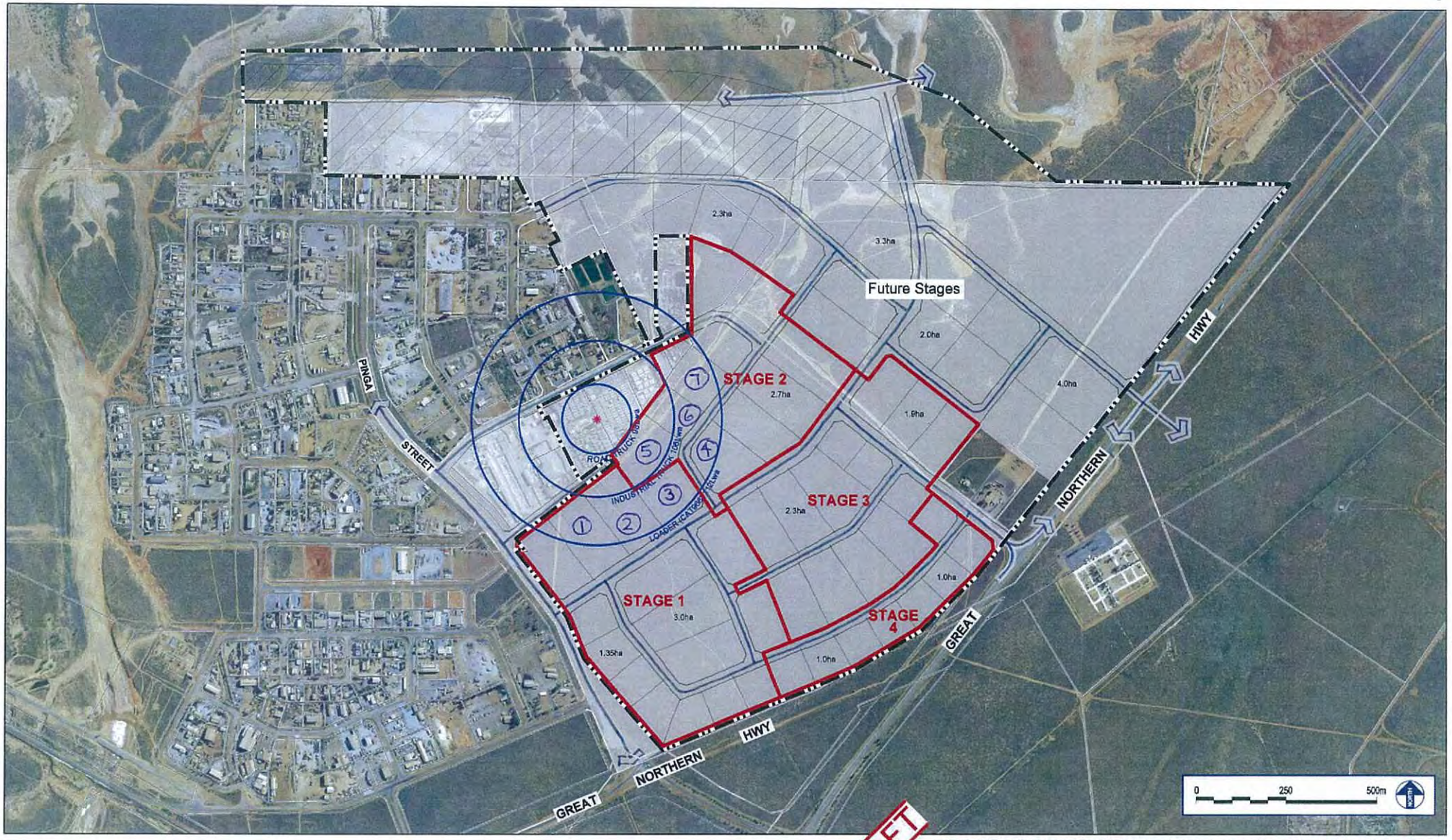
Paul Schneider
PROJECT MANAGER

9 September 2009

cc: Murray Raven, Regional Manager, State Land Services

Chris Adams, CEO, Town of Port Hedland

A.



DAYTIME BUFFER

DRAFT

TRANSPORT USE PRECINCT - Indicative Staging Plan
(With Daytime Noise Levels)
WEDGEFIELD INDUSTRIAL ESTATE

Base data supplied by Landgate & Main Roads

Aerial Photography dated October 2006, accuracy +/- 4m, Projection MGA Zone 50

Areas and dimensions shown are subject to final survey calculations. All carriageways are shown for illustrative purposes only and are subject to detailed engineering design.

LEGEND

- Site Boundary
- Staging Boundary
- Daytime Noise level L_{A10} in db(A) = 49 (Source: Herring Storer)
- Port Hedland Port Authority Area
- Point Noise Source - Noise Sources (Inner to Outer Circles)

Road Truck (98L_{WA})
Industrial Truck (106L_{WA})
Loader (CAT 966) (112L_{WA})

Landcorp	:	CLIENT
1:5,000@A1 / 1:10,000@A3	:	SCALE
18 August 2009	:	DATE
3414_1-1-016.dgn	:	PLAN No
-	:	REVISION
T.C	:	PLANNER
R.F	:	DRAWN

RPS koltasz smith
TOWN PLANNING PROJECT MANAGEMENT URBAN DESIGN DEVELOPMENT CONSULTING
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PO Box 127 BURSWOOD WA 6100 Email:perth@ksap.com.au

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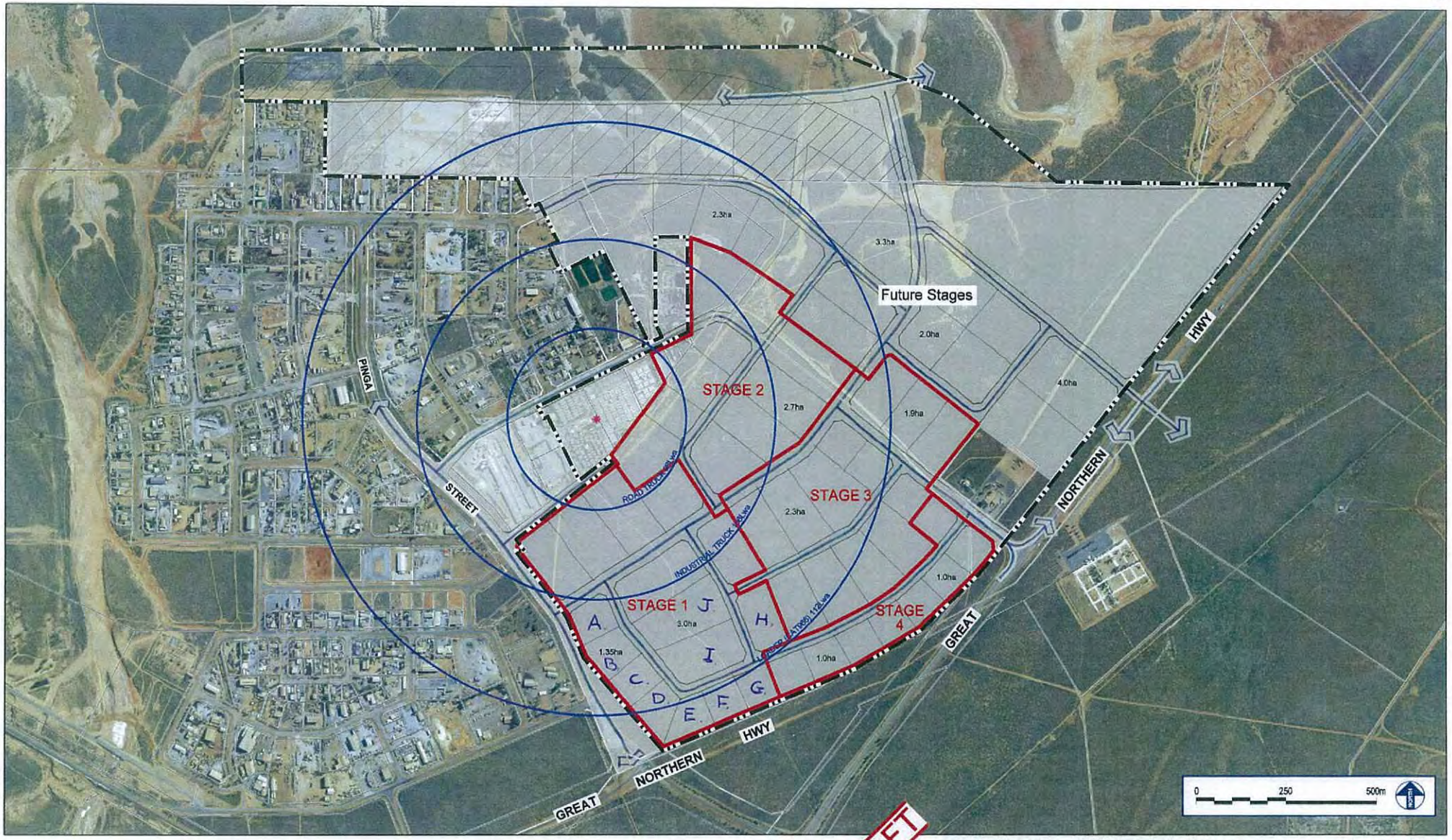
B.



NIGHT-TIME BUFFER

DRAFT

TRANSPORT USE PRECINCT - Indicative Staging Plan

(With Night-time Noise Levels)

WEDGEFIELD INDUSTRIAL ESTATE

LEGEND

- Site Boundary
- Staging Boundary
- Night-time Noise level L_{A10} in db(A) = 39 (Source: Herring Storer)
- Port Hedland Port Authority Area
- Point Noise Source - Noise Sources (Inner to Outer Circles)

Road Truck (98L_{WA})
Industrial Truck (108L_{WA})
Loader (CAT 966) (112L_{WA})

Landcorp	:	CLIENT
1:5,000@A1 / 1:10,000@A3	:	SCALE
18 August 2009	:	DATE
3414_1-1-017.dgn	:	PLAN No
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ATTACHMENT C

TRANSPORT DEVELOPMENT – LIKELY LAND USES

Completed by Hedland First National - 18 August 2009

Type of Operation	Size of Block (m2)	Expected Demand (high, med, low)	Hours of Operation	Major noise activities
Large Transport Depot	15,000 to 30,000	high	6am to 6pm	Access / egress of road trains, loading.
Small Transport Depot	10,000 to 15,000	Med	6am to 6pm	Semi load/unload forklift, reverse beeper
Vehicle Repair / Maintenance / Service	3-4000	High	6am to 6pm	Semi load/unload forklift, reverse beeper
Earthmoving Yard	4-6000	High	6am to 6pm	Semi/float load/unload forklift, reverse beeper
Industrial Hire Business	4-8000	Low	6am to 6pm	Semi load/unload forklift, reverse beeper
Container Park	4-8000	Med	6am to 6pm	Semi load/unload forklift, reverse beeper
Motor Vehicle Wash	Part of 3		6am to 6pm	Reverse beepers
Warehouse	2-8000	V High	6am to 6pm	Semi load/unload forklift, reverse beeper
Car Park	2-4000	V Low	6am to 6pm	Reverse beepers.