



TOWN OF PORT HEDLAND

P O R T H E D L A N D
I N T E R N A T I O N A L A I R P O R T
L A N D U S E
M A S T E R P L A N

PREPARED BY:



AND



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1. EXECUTIVE SUMMARY

The Port Hedland International Airport [PHIA] is located between the settlements of Port Hedland, and South Hedland, on over 900 hectares of land that is predominantly owned by the Town of Port Hedland [ToPH].

The airport is an integral part of the community and the economy of Port Hedland, and is a critical component of the resource industry of the Pilbara region, providing for Regular Passenger Transport [RPT] and General Aviation [GA] air services to service the community and industry. The airport accommodates more than 250,000 passengers and 20,000 flights annually.

The airport has 2 Runways, one at 2500 metres [direction 14/32], used primarily for RPT, and one at 1000 metres [direction 18/36], used primarily for GA.

Increased development pressure within the township in recent years, due to a number of factors, has provided the impetus to develop airport land, which is largely vacant with the exception of airport infrastructure and related commercial use around the terminal. The requirement for preparation of the Land Use Master Plan was therefore determined to ensure that development of any land within the airport occurs on a planned, orderly and rational basis.

Whelans and Parsons Brinckerhoff have prepared this report on behalf of the Town of Port Hedland [the Town].

The purpose of the Land Use Master Plan is to guide the subdivision and development of land owned by the Town over time, whilst providing security to Airport related land uses. A fundamental aspect of this report and the Land Use Master Plans is the protection of operational aspects of the airport.

The Land Use Master Plan is divided into logical Precincts that are defined by both geography and preferred land use. There are four land use precincts, which have been identified as having subdivision and land use potential, and a fifth 'airport' precinct, which contains existing airport land uses and allows for expansion of operational land uses [no Land Use Master Plan has been prepared for this last precinct].

A number of issues have been identified, including buffers required to air navigation infrastructure and aircraft operational requirements; land assembly requirements; critical infrastructure constraints, especially water and road transport, as well as potential land use conflicts.

The Land Use Master Plan identifies that there is, indeed, significant development potential, and that the development issues, while guiding development in each precinct in specific directions, should not prohibit development. The report identifies that it is, however, important to develop any land in an integrated manner, and not in isolation to other subdivision and land development projects occurring in Port Hedland, and that careful use of land use planning controls will be required.

It will be important to develop a range of land use planning and land tenure controls to ensure that development of land within each precinct does not detrimentally impact the long term future of the airport.

The Draft Land Use Master Plan was advertised in October and November 2010. Advertising consisted of consultation with specific agencies and stakeholders, as well broad public notice advertising to the general public. Few submissions were received, and only minor amendments to the report and plans were required as a result of the advertising process.

The Land Use Master Plans for Precincts 1 & 2 build on existing airport related land uses and development within these precincts, and attempt to resolve existing land use and development conflicts [especially Precinct 1].

Precinct 3, despite having some building height constraints, has been identified as having significant development potential, and is a logical extension of Industrial land uses that are expanding on the western side of Great Northern Highway and Wallwork Road, in the vicinity of the Wedgefield Industrial Area. The land within Precinct 3 has potential to create over 250 Industrial lots, ranging from 2000 square metres to over 20 hectares.

The Land Use Master Plan has determined that Precinct 4 has significant constraints, and has the least development potential. Notwithstanding this, there is significant land area in this precinct, and it does have some development potential.

Overall, it is considered that the Port Hedland International Airport requires some rationalisation of land uses, and has significant development potential, and this Land Use Master Plan will form an important guide in future development of the airport.

2. INTRODUCTION

The Port Hedland International Airport [PHIA] is located on over 900 hectares of land situated between the settlements of Port Hedland and South Hedland, and is predominantly owned by the Town of Port Hedland [ToPH]. See Figure 1 – Location Plan.

The airport is an integral part of the community and the economy of Port Hedland, and is a critical component of the resource industry of the Pilbara region, providing for Regular Passenger Transport [RPT] and General Aviation [GA] services to the community and industry. The airport accommodates more than 250,000 passengers and 20,000 flights annually. It is expected that this will grow to over 450,000 passengers by 2015.

The airport has 2 Runways, one at 2500 metres [direction 14/32], used primarily for RPT, and one at 1000 metres [direction 18/36], used primarily for GA. Both runways are chip sealed. The airport terminal is relatively old, but is soundly constructed, and terminal upgrades have been identified as a priority.

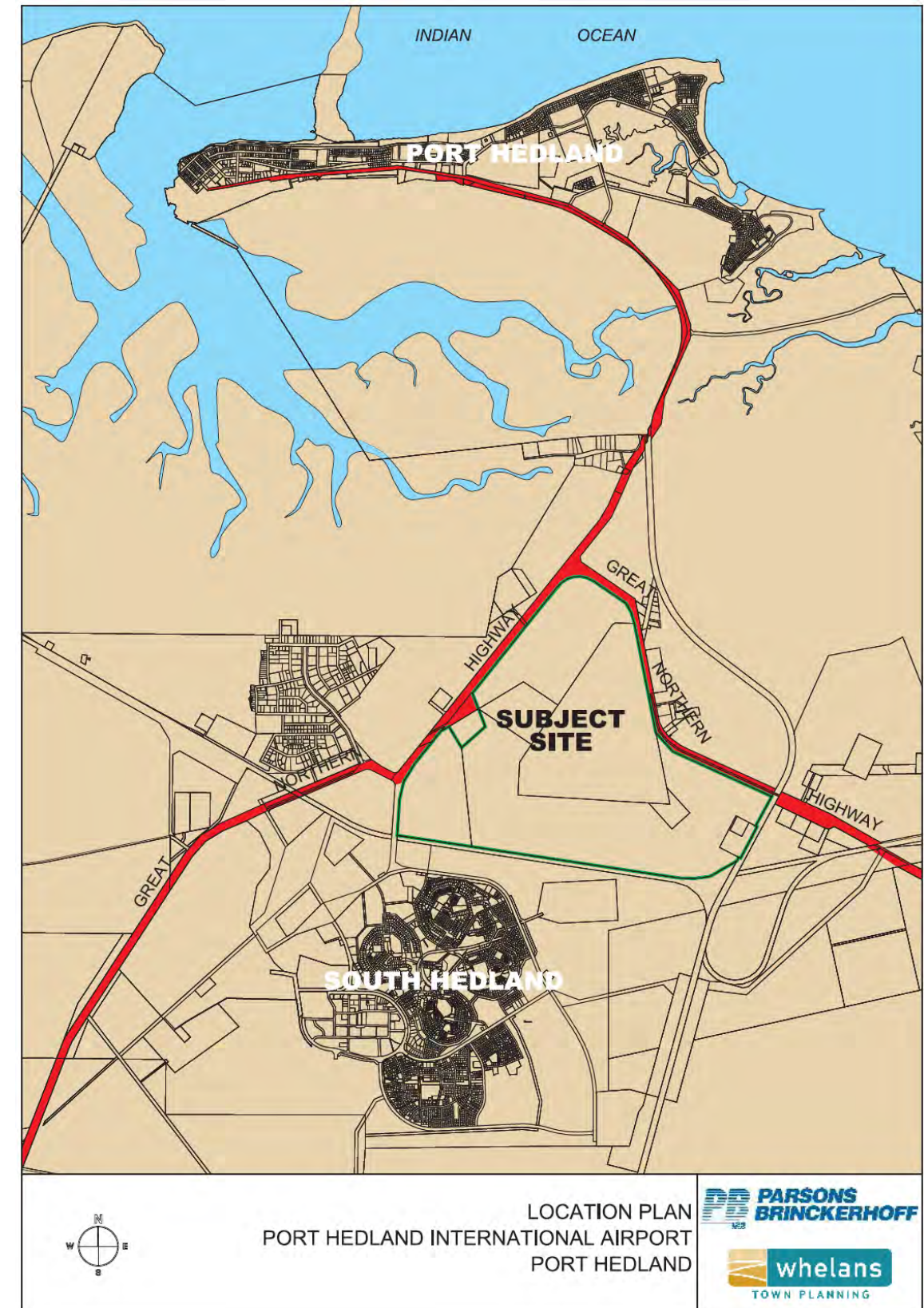
Increased development pressure within the township, due to land shortages and rapid growth, has led to increased pressure to develop airport land, which is largely undeveloped with the exception of airport infrastructure. Ad hoc development has serious potential to detrimentally impact on airport operations and could also constrain rational growth of the airport.

The requirement for preparation of a Land Use Master Plan was therefore determined to ensure that development of any land within the airport occurs on a planned, orderly and rational basis. Whelans Town Planning Pty Ltd and Parsons Brinckerhoff have prepared this report on behalf of the Town of Port Hedland to achieve this purpose. The Land Use Master Plan report addresses land assembly, land use and development, environmental and engineering issues, as well as traffic and access issues. The report was advertised for public comment and for specific stakeholder comment, though few submissions were received. The report has been modified as a result of the comments received, where deemed appropriate, and a summary of the submissions and modifications has been included.

A fundamental aspect of this report and the Land Use Master Plans is to protect operational aspects of the airport. The purpose of the Land Use Master Plan is to guide the subdivision and development of land owned by the Town over time, whilst providing security to Airport related land uses.

The Land Use Master Plan is divided into logical Precincts that are defined by both geography and preferred land use. There are four land use precincts, which have been identified as having subdivision and land use potential, and a fifth 'airport' precinct, which contains existing airport land uses. The report addresses the four land use precincts, although some comment is made on land assembly of the fifth precinct.

Figure 1: Location Plan



2.2 PURPOSE

There are a number of key objectives of this report:

- Resolve immediate land use conflicts within the Terminal Precinct [Precinct 1];
- Identify development potential of the land within the Study Area;
- Provide for the orderly and rational development of land within the Study Area over time; and
- Identify any land use controls required to protect the operational use of the airport.

The Land Use Master Plan is effectively a guide to the Town of Port Hedland about how to use and develop the PHIA over time. The Land Use Master Plan will allow the ToPH to take advantage of the significant land holding of the airport, and allowing for development that will benefit the entire Town area over the long term. It is recognised however that this must be approached in a manner that does not compromise the use or potential expansion of the airport activities, and must also be undertaken in a way that integrates with other land use and subdivision developments within the locality.

The individual precinct plans should guide development at a macro level, while allowing sufficient flexibility to accommodate significant changes in parameters in such as preferred lot sizes and land uses.

2.3 STUDY AREA

The Study Area is compiled of the land parcels which comprise the Port Hedland International Airport, and the immediately surrounding land uses. The Study Area includes land owned by the Town of Port Hedland as well as some crown land. The total area of land included in the study area is 1007.38 hectares, with the Town of Port Hedland owning 894.787 hectares of this land in freehold title. See Figure 2 - Land Tenure overleaf.

The Area is roughly triangular in shape and is defined by Great Northern Highway on two sides, and the BHP Billiton Iron Ore (BHPBIO) Railway line along the southern periphery.

The Area is made up of predominantly freehold land, with the exception of one Unallocated Crown Land [UCL] lot located in the south west of the site. The existing lot boundaries do not correlate with land uses and lease areas.

The existing cemetery is within the above defined bounds, however has been excluded from the Study Area as it is to remain under its current use, although as a result of development of Precinct 3, some rationalisation of the cemetery boundaries is likely. These changes will not impact on the developed portion of the cemetery.

2.2.1 PRECINCTS

The Study Area is divided into four precincts as identified in Figure 2 overleaf. These precincts have been defined by the specific instructions of the Town of Port Hedland, but have, however, been slightly modified to align with logical delineations between Precincts 1 and 2. These precincts have been rationalised by existing land uses and airport related infrastructure.

Precinct 1 encompasses the airport terminal and the surrounding airport related commercial leases, extending to the north beyond the Bureau of Meteorology site. The site is bound by Great Northern Highway to the east, and a runway to the west. The southern boundary for this precinct has been defined by the town planning and engineering considerations to the south, and the location of the existing Council work depot.

Precinct 2 adjoins Precinct 1 immediately to the south east, bound by Great Northern Highway to the east, BHPBIO railway line to the south, and the main runway to the west. This Precinct currently comprises Air Services Australia Infrastructure and mining related transient workers accommodation encampments.

Precinct 3 is the largest area of land identified for development within the Study Area. It is located to the west of the main runway, bound by the BHPBIO railway line to the south, with frontage along Great Northern Highway to the west, which the Cemetery disrupts. The site is currently predominantly vacant land, comprising both freehold titles in ownership by the Town, as well as UCL lot 253.

Precinct 4 is located in the northern most portion of the Study area bound by Great Northern Highway and the two existing airport runways.

2.2.2 CROWN LAND

The Study Area also includes UCL Lot 253, located in the south western corner of Precinct 3, as noted above.

Figure 2: Land Tenure



LAND TENURE
PORT HEDLAND INTERNATIONAL AIRPORT
PORT HEDLAND

3. SITE ANALYSIS

3.1 PHYSICAL DESCRIPTION

The Study Area is situated in the locality of Port Hedland and is located within the Port Hedland Town Site boundary. The Airport terminal is located approximately 13 kilometres from the town centre of Port Hedland, and some 10 kilometres from the centre of South Hedland.

The northern and western sides of the site have frontage to the Great Northern Highway, while the remaining periphery adjoins the BHP Billiton Railway servicing Port Hedland. The only public access points to the airport are located on the northern boundary of the site, within Precinct 1.

The land undulates gently and generally slopes to the north western junction of the site.

All airport operations areas have been cleared, along with all developed areas. The southern portion of the site contains extensive remnant vegetation, although small areas have been cleared for access tracks, borrow pits and for infrastructure.

A more detailed analysis of the site is provided in Section 3.5.

3.2 LAND TENURE

The Town of Port Hedland acquired the PHIA in 1985, when the land was transferred from the Commonwealth Government to the Town. Most of the study area is freehold land, owned by the Town of Port Hedland, with the exception of the cemetery site, which is a Reserve vested in Council, and UCL lot 253 in the south western corner of the Study Area. See Figure 2 – Land Tenure.

3.2.1 TOWN OF PORT HEDLAND

The Town of Port Hedland owns most of the land within the Study Area. Lot 61 is a Reserve Vested in the Town for Cemetery purposes and Lot 253 is UCL. Table 1 shows the land owned by the Town of Port Hedland, as well as the two lots not owned by Council. Figure 2 shows the location of each of these lots.

Table 1: Land Ownership:

LOT	TITLE	AREA	TYPE	OWNERSHIP
11	CT 1657-119	277.050 ha	Freehold	Town of Port Hedland
15	CT 1657-119	3.441 ha	Freehold	Town of Port Hedland
16	CT 1657-120	10.700 ha	Freehold	Town of Port Hedland
29	CT 1657-119	10.507 ha	Freehold	Town of Port Hedland
31	CT 1259-730	41.249 ha	Freehold	Town of Port Hedland
2443	CT 2212-731	159.200 ha	Freehold	Town of Port Hedland
2444	CT 2212-731	392.640 ha	Freehold	Town of Port Hedland
61	Reserve 28672	11.623 ha	Vested	Town of Port Hedland
253	LR 3039-748	100.970 ha	UCL	State of WA

3.2.2 UNALLOCATED CROWN LAND

As previously stated, the Study Area includes a parcel of land that is classified as Unallocated Crown Land. This land is identified as Lot 253 located within Precinct 3, and has an area of 100.970 hectares. Lot 253 is Reserved under TPS 5 for Public Purposes - Infrastructure, and is located within the Airport Development Plan Area.

Acquisition of Lot 253 or a joint venture subdivision/development will be critical to the overall development of Precinct 3, as this UCL provides access and lot yield advantages that improve the viability of subdivision of Precinct 3. This is outlined further in Sections 6 and 7.

3.2.3 NATIVE TITLE

The majority of the Study Area is owned in free hold title by the Town of Port Hedland, which ensures that Native Title is extinguished. Native Title is therefore not required to be addressed in the development of the land held by the Town.

Lot 253, being UCL on the other hand, is subject to Native Title and therefore will need to be resolved prior to development. This will impact upon the acquisition and timing of development over this portion of the Study Area. This land is recommended to be acquired by the Town of Port Hedland to allow for development of Precinct 3 or alternatively developed by LandCorp. This is discussed further in Section 7.

3.3 LAND USE

The predominant land use of the Study Area is the operation of the PHIA, such as aircraft runways and aprons which cover the majority of the Area and define the Precincts subject of this Land Use Master Plan. Terminal services are also a key use, together with the adjoining airport associated uses including freight, logistics, commercial aircraft services and car hire companies. The terminal area is the commercial precinct of PHIA.

Land has also been made available for non-airport related uses such as the Bureau of Meteorology and transient workers accommodation (TWA). Specific uses are discussed in further detail below.

Figures 3 and 4 show the location of these uses and lease areas.

3.3.1 EXISTING LEASES

There are various existing leases within the terminal area [Precinct 1] and surrounding land [Precincts 2]. The leases within and around the terminal are airport related uses and include the Royal Flying Doctors Service, Polar Aviation, Golden Eagle, and Air BP as well as car hire companies Thrifty, Hertz, Budget and Avis. Pearl Aviation also leases 6 parking bays in close proximity to the terminal, for use by staff.

To the south of the terminal area, leases and associated land uses are predominantly non-airport related in nature. These include the Hedland Riders Club which fronts Great Northern Highway, the Auscorp transient workers accommodation (TWA) and the Port Haven TWA.

Airservices Australia also operate infrastructure to the rear of the Port Haven TWA, as discussed above. This lease covers the high frequency transmitters and non-directional beacons (NDB).

The Bureau of Meteorology has a substantial lease area to the north of the terminal access road, with frontage to Great Northern Highway.

Some leases are recommended to be relocated as part of this Land Use Master Plan in order to promote a more cohesive access and development outcome and to address the future expansion requirements of the Airport Terminal. Furthermore, it is intended that existing lease areas be rationalised into individual freehold lots where appropriate.

Table 2 below outlines the existing lease arrangement details and their precinct locations. Please note that some of the information provided in this Table may require updating.

Table 2. Existing Lease Details:

PRECINCT	LEASE HOLDER	AREA (m2)	PURPOSE	TERM
1	Bureau of Meteorology	4,354	Weather Station	01/07/2014
2	Compass Group: Port Haven		Transient Workers Accommodation	19/03/2019
2	Airservices Australia		Airport Operations	
2	Auscorp: Mia Mia	27,940	Transient Workers Accommodation	11/09/2009
2	Hedland Riders Association		Club Grounds	
1	Royal Flying Doctors Service	897	Aircraft Hangar and Operations	30/07/2019
1	Polar Aviation	2,189	Aircraft Hangars	2014
1	Thrifty	148.6	Car Hire Services and Office	30/06/2017
1	Hertz	632.5	Car Hire Services and Office	30/06/2017
1	Avis	671.9	Car Hire Services and Office	30/06/2011
1	Budget	619.5	Car Hire Services and Office	01/07/2017
1	Pearl Aviation		Parking, Offices and Facilities	30/06/2011
1	Mobil Aviation	2,340	Fuel Storage and Administration	Expired
1	Golden Eagle	570	Airfreight Office and Hangar	Expired
1	Air BP	90	Fuel Storage	Expired

Figure 3. Existing Land Use and Lease Area Plan A

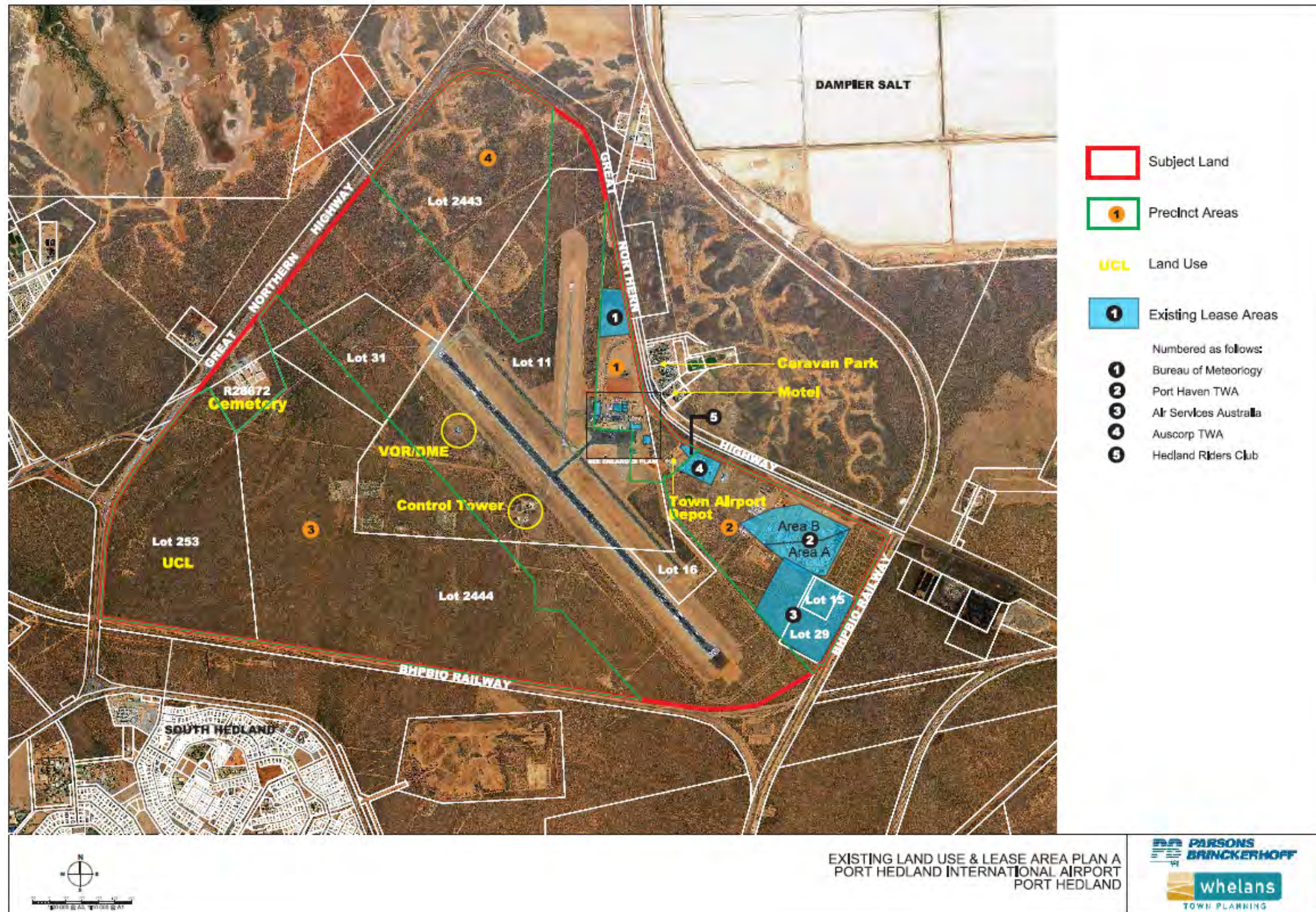
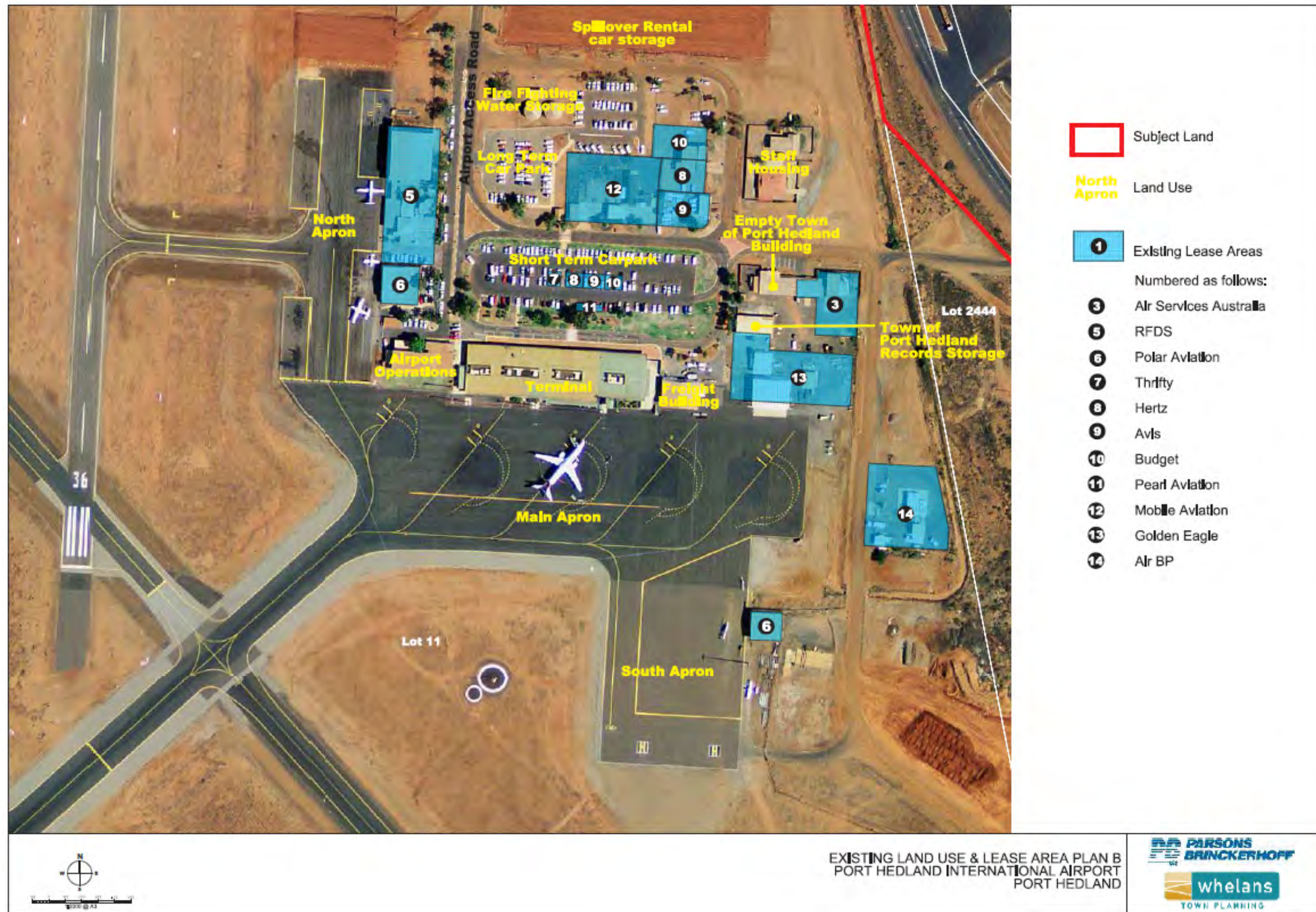


Figure 4. Existing Land Use and Lease Area Plan B



EXISTING LAND USE & LEASE AREA PLAN B
PORT HEDLAND INTERNATIONAL AIRPORT
PORT HEDLAND



3.3.3 ADDITIONAL USES

There is a range of derelict and operational infrastructure spread across the Study Area. A fire training module operated by Air Services Australia [ASA] is located within Precinct 3 which is currently unused, as well as an incinerator located in close proximity to this facility, which is operated by the Town of Port Hedland. To the north of the terminal area is a mound dam which is no longer in use and water tanks which are to remain in their current location. To the south of the terminal is a wastewater treatment pond located to the rear of the Auzcorp TWA. It is understood this pond is to be relocated in the future as part of the lease arrangement for the Port Haven TWA.

This Land Use Master Plan accommodates existing infrastructure where deemed necessary, and will recommend relocation of remaining infrastructure to more appropriate locations.

3.3.4 SURROUNDING LAND USES

The town's cemetery is located along the eastern frontage of Great Northern Highway. This site is located within the physical bounds of the Study Area but has been excised as it is intended to remain separate from the Airport land.

Directly opposite the terminal area, across Great Northern Highway, there currently exists a caravan park and motel, behind which is a wastewater treatment plant. Dampier Salt operations are also located to the north-east of the Study Area.

Approximately 2 kilometres to the west of the Study Area is the Wedgefield Industrial Estate which is the existing primary industrial area for the Port Hedland township. The Toxfree incinerator is located to the east of Wedgefield. The South Hedland town site is located to the south of the Study Area, the closest residential land being approximately 500m from the southern most portion of Precinct 3.

LandCorp are currently progressing a proposal to develop land west of the subject site, between Great Northern Highway and Wallwork Road, and Wedgefield, for the purpose of light industrial and transport related uses. Main Roads are also currently preparing design drawings for an interchange facility at the Great Northern Highway Broome turn off and a bridge for the BHPBIO railway crossing at Wallwork Road. These projects are currently still in the design stage, and are discussed in further detail below.

3.4 AIRPORT OPERATIONS

It is critical that any land use proposed within the Study Area does not impact on the operation of the airport. The report prepared by Airport Land Use Master Plan Consultants [AMPC] discusses a number of operational constraints which were taken into consideration in the identification and definition of the Precinct boundaries. Figure 5 – Airport Operations Constraints has been prepared using pertinent buffer mapping provided by AMPC.

The Port Hedland Land Use Master Plan [LUMP] specifies a 1000 metre buffer to allow for expansion. Port Hedland Airport is unlikely to require a second runway in the foreseeable or even the distant future [as an example, Perth airport provides for far greater volumes than Port Hedland, and is unlikely to require a second [or third] runway for at least 20 years].

Lighting within the subdivision areas closest to the runways [within approximately 600 metres of runway centre line] will also be affected.

ASA operates the airport infrastructure and equipment discussed below.

3.4.1 OBSTACLE LIMITATION SURFACE [OLS]

Obstacle Limitation Surfaces [OLS] are developed to ensure that the airspace approach and departure routes of aircraft are protected. The OLS for Port Hedland International Airport are shown on Figure 6. The OLS effectively limits the height at which structures can be constructed within the OLS contour levels. The height limit at a location 500 metres from the centre line of the runway is 52 metres above Australian Height Datum [AHD]. This height limit covers all of the airport site, as well as most of South Hedland and Wedgefield.

Land within the airport varies from 6 metres AHD in the northern 'corner' to 10 metres AHD along the southern boundary. Accordingly, the maximum height that any new buildings in the various Precincts can be constructed to will range from 46 metres to 42 metres, dependant on the contours within the precincts.

The land identified for development within each precinct is in accordance with the OLS contour requirements.

Figure 5. Airport Operations Constraints

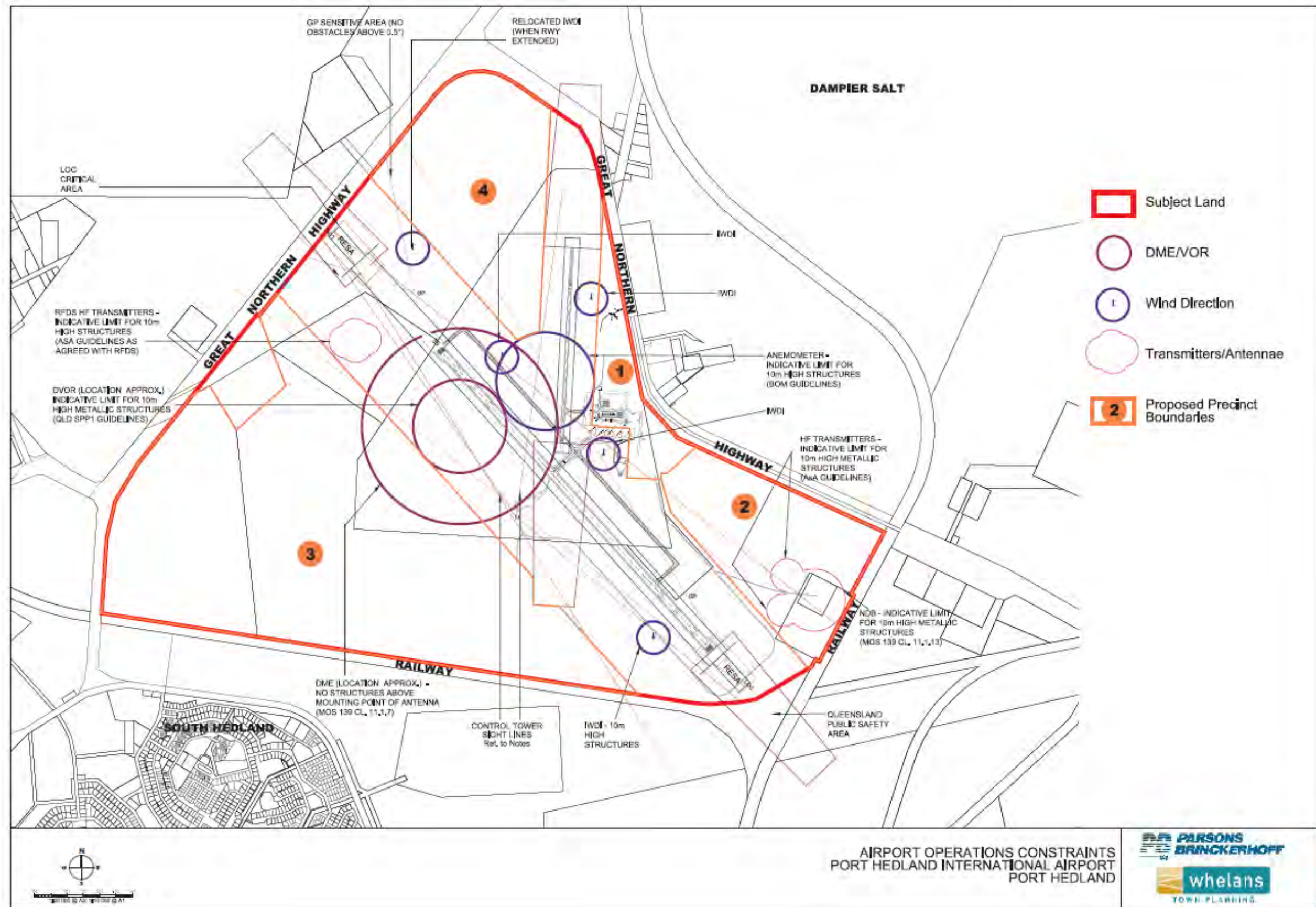


Figure 6. Obstacle Limitation Surfaces (Source: LUMP)



3.4.2 NON DIRECTIONAL BEACON [NDB] & HIGH FREQUENCY ANTENNA ARRAY

The NDB is a navigation aid located within Precinct 2, in the south eastern corner of the Study Area (see Figure 5). The NDB & High Frequency Radio Antenna Array consists of transmitter and receiver towers, antenna arrays and related infrastructure huts. Buffers are required to this infrastructure, namely restrictions on the height of structures within the buffer area, to protect radio receipt and transmission. These buffers extend to 500 metres from the NDB, at an angle of 3 degrees vertical from the NDB antenna array.

The affect of this buffer is to limit the potential height of any buildings or structures within the Lot identified as Lot 8 in Precinct 2 [see Figure 10]. The height limit is calculated at 20 metres from the eastern side of Lot 8 to 26 metres on the western side of this lot. Other lots in this precinct [Lots 1 - 11] have been measured and calculated to be located outside the 500 metre buffer.

To be sure that any height restrictions are captured and accounted for, it is recommended that height limits are encapsulated in a combination of Scheme provisions and restrictive covenants and memorials on the titles of any lots created, or within lease conditions if the land is leased without any subdivision. Scheme provisions will ensure enforceability and Restrictive Covenants and memorials will ensure that successive landowners are aware of any such restrictions.

Any proposed rezoning of the land or any subdivision or development should be referred to Civil Aviation Safety Authority [CASA] as well as ASA to ensure that any height restrictions are calculated and can then be used to formulate specific Scheme provisions to protect this equipment.

3.4.3 DISTANCE MEASURING EQUIPMENT [DME]

Distance Measuring Equipment [DME] is located on the southern side of runway 14/32. This equipment also requires buffers that restrict the height of structures. This buffer requires height restrictions to below a plane measured between 10 and 1500 metres from 1 metre below the antenna, at an angle of 0.5 degrees.

This results in a height limit of approximately 4 metres at 300 metres from the DME, and a limit of 13 metres at 1500 metres from the DME. This severely impacts on the viability of any land located within 1500 metres from the DME in Precinct 3, which is essentially all land owned by the ToPH. UCL located on the south western side of the Airport is not significantly impacted.

However, it is understood that these height limits generally run in a linear path in the direction of 14/32, and that height limits perpendicular to the runway

may not be as restrictive. It is also understood that even within the buffer area “small buildings, trees and power lines can be tolerated”. Referral to CASA and ASA to determine specific height limits within Precinct 3 that could again be captured as Scheme provisions and restrictive covenants on titles is therefore paramount.

3.4.4 DOPPLAR VERY HIGH FREQUENCY OMNI RANGE [DVOR]

DVOR is another air navigation aid that requires specific height restrictions. This equipment is located at the same site as the DME, on the southern side of runway 14/32. This equipment also requires buffers that restrict the height of structures. This buffer requires height restrictions to below a plane measured between 10 and 1500 metres from 1 metre below the antenna, at an angle of 0.5 degrees.

Unlike the DME, which requires linear buffers, the DVOR requires height limits on a radial basis from the DVOR. These buffers range from 150 metres to 1000 metres, again with a buffer extending at an angle from the DVOR. This results in a graduated height limit ranging from 20 - 35 metres.

3.5 ENVIRONMENT

The topography of Port Hedland and the surrounding area is generally flat, with occasional rocky outcrops, rising to 20m AHD above the coastal plain at its highest elevation. The topography of the site has generally a flat gradient which rises from

approximately 4m AHD , in the north west corner, to approximately 11m AHD on the southern side of the site.

The topography of the development area has been assessed using the contours provided by the Water Corporation, along with the wastewater, water reticulation and drainage infrastructure assets.

It should be noted that these contours provided an indicative topography of the land and should not be used for design. A full feature topographical survey should be undertaken prior to design stage to accurately determine the site contours to for design purposes.

3.5.1 HYDROLOGY

The ground water table is a perched table approximately 2.2m below ground level (BGL), however the site is not susceptible to flooding in a 100 year ARI storm (Town of Port Hedland Website, 2008). The geotechnical investigation conducted by SGS (SGS, 2009) in the Port Haven TWA location, east of the airport runway and south of the terminal, did not encounter water in any of the CPT holes or test pits, and to a depth deeper than 4.5m. Table 3 below summarises the regional hydrogeology information.

Table 3: Regional Hydrogeology Summary

Aquifer:	Yule River well field
Top of Aquifer:	~2 -10m BGL
TDS (mg/L):	1000-3000 mg/L (DoW)
Highest Beneficial Use:	Drinking water (WRC, 2000)
Permeability:	Unknown
Expected Flow Direction and Discharge Point:	Locally, drainage to the flood plains to the north west, aquifer flows north easterly towards the coast
Preferred Pathways:	Discontinuous beds of sand, silt, clay and gravel of 25-50 metres thickness

Taken from Yule River Water Reserve Water Source Protection Plan (Water and Rivers Commission, 2000) and DoW Hydrogeological Atlas online.

3.5.2 VEGETATION

The site is located within the Roebourne subregion. This region is described as “Quaternary alluvial and older colluvial 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*”. Resistant linear ranges of basalts occur across the coastal plains, with minor exposures of granite. Nearby islands are either Quaternary sand accumulations, or composed of basalt or limestone, or combinations of any of these three.

The climate is arid (semi-desert) tropical with highly variable rainfall, falling mainly in summer. Cyclonic activity is significant, with several systems affecting the coast and hinterland annually. Tides are semidiurnal with neap and spring tides ranging from 1.0 to 3.6m, with the highest astronomical reading 5m. The subregional area is 2,008,983ha.

The uplands are dominated by *Triodia* hummock grasslands. Ephemeral drainage lines support *Eucalyptus victrix* or *Corymbia hamersleyana* woodlands. Samphire, *Sporobolus* and mangal occur on marine alluvial flats and river deltas. Mangrove forests fringe the natural harbour and salt flats fringe the associated tidal creeks (Lyne et al., 2006). Extensive intertidal flats usually back fringing mangroves. Besides their rich and diverse faunas of burrowing invertebrates and their use as feeding areas for migratory birds, these intertidal flats are strongly linked to the functioning of the mangrove ecosystems (DEC, 2006). Areas of stagnant water can become breeding grounds for *Ochlerotus vigilax*, a salt marsh mosquito capable of transmitting both the Ross River Virus (RRV) and the Barmah Forest Virus (BFV).

The site consists mostly of degraded and poor vegetation complexes containing low lying grass and spinifex. This ‘Spinifex Grassland’ complex is widespread across both the site and on a regional scale as illustrated in Appendix A.

3.5.3 GEOTECHNICAL CAPABILITY

The surface geology comprises quaternary alluvial sediments overlying Archaean rocks, including granite, schist and quartzite (Water and Rivers Commission, 2000). The topsoil is classified as red/brown silty sand (Town of Port Hedland Website, 2008) however some clayey soils can be encountered at depth. A review of the 1:50,000 Environmental Geology Map of Port Hedland indicates that this soil was formed by reworking of the earlier (high level) sand due to flooding rivers. The silty sand, in general, is composed of unsorted to poorly sorted, fine to coarse, sub-angular to surrounded iron stained quartz grains, with minor amounts of feldspar and limonite, and Precambrian rock fragments.

Table 4: Regional Geology Summary

Geological Unit	Description
Quaternary alluvial deposits	Floodplain deposits, sand, silt, clay and gravel adjacent to main drainage channels, unconsolidated.
Myanna Leucogranite	Biotite-muscovite monzogranite; locally with quartz and K-feldspar phenocrysts, massive to weakly foliated, metamorphosed.

Local geological Information was obtained from the Department of Water (DoW) bore logs for groundwater in the region, as shown in Table 5 (see Appendix B for full bore search).

Table 5: Local Geology Summary from Bore Logs

Bore ID/name	Description	Approx. occurrence (mBGL)
20067000/ARMY C51	Quaternary granite sand	0 - 4.57
	Decomposed/weathered granite	4.57 – 10.06
20067007/ARMY C48	Quaternary sandy clay	0 – 1.52
	Decomposed/weathered granite	1.52 - 8.83
	Granite bedrock	8.83 – 8.84

mBGL Denotes metres below ground level

A Geotechnical Investigation was conducted by SGS in 2009 within the Proposed TWA Area known as Port Haven. The report consisted of a desktop investigation to study the relevant site conditions and available Geological information of the site, study of the relevant climatic information available for the Port Hedland area, and review the relevant groundwater information available for the Port Hedland area. Fieldwork was conducted on the 27th of January 2009 which involved:

- Five (5) Cone Penetrometer Test (CPT) for the deep probing to refusal at locations selected by the client.
- Positioning of CPT locations using a GPS system.

The results of the fieldwork were summarised including a typical Foundation Design based on the CPT results. As there was no structural loading available at the time of fieldwork, the calculations were based on considering a 500mm diameter bored pile.

- CPT7, CPT8, CPT9, CPT10 and CPT11 were terminated at 4.85 metres, 4.65 metres, 5.3 metres, 4.74 metres and 4.35 metres respectively due to refusal on dense sands, gravelly soils or rock.
- Groundwater was not detected at any CPT location. Based on the Friction Ratios obtained, the soil material was interpreted to consist of a mixture of Silt and Sand material. The observed settlement was expected to be small, based on the soil material information.
- The site was observed to be relatively flat. It was concluded that earthworks could be constructed using conventional heavy earthmoving equipment. If clay material is found at the depth, excavation conditions may become difficult if the material becomes wet and softens. Due to the inherent nature of "natural ground" it is possible that subsurface conditions will vary over short distances within the site.
- The soils on the site were considered suitable for general use, except as structural fill for foundation works. Where there was presence of minor organics, it was recommended they were be screened and removed. It was also suggested that prior to any compaction work, care was taken for the moisture conditioning of the material. Under wet conditions, the soil may become too wet and difficult to work and compact.
- In general, it was recommended that the site should be proof rolled with a minimum of five passes with a vibratory roller (minimum mass of 10t). Any loose or areas of weakness should be removed and backfilled with approved granular fill. If boulders or rocks (>300mm) are encountered, they should generally be removed from the works. Footings should be excavated to the depth of the footing base. The exposed surface should be compacted to achieve a dry density ratio of 96% (Modified compaction) to a depth thickness of 0.3m.
- With regard to backfill materials, imported fill material for general fill and pipe work should be clean sand with maximum 15% passing 0.075 mm sieve, whereas imported fill material for structural fill should be clean sand with maximum 5% passing 0.075 mm sieve, or other approved material.
- All fill is to be compacted in layers of 300mm and compacted to achieve the specified minimum density ratio by an approved method. Selected fill should be used up to a depth of 300mm below the underside of the footings/slabs structures.
- The plasticity index for backfill materials should be < 10%.

As part of site preparation works, a recommendation was made that all surface organic material, root matter and vegetation are to be removed. It was also noted that the compaction is required to achieve a minimum dry density ratio using modified effort of 93% (clayey material) or 96% (gravelly material) to a depth of 200mm, and should be conducted in accordance to AS 1289.5.2.1.

Earthquake design was also taken into consideration. The Acceleration Coefficient (a) which is dependent on the geographic location and Site Factor

(S) which depends on the soil profile were determined. Based on the site investigation and review of AS1170.4_1993 SGS deemed the following factors to be appropriate for use in the structural design for the site.

- ACCELERATION COEFFICIENT (a) = 0.12 (Port Hedland).
- SITE FACTOR (S) = 1.0 (General structures less than 30 m of soft soil).

3.6 INFRASTRUCTURE

The following outlines the existing infrastructure servicing the Study Area and provides preliminary comment on future expansion and associated capacity considerations.

3.6.1 POWER

Power in the Hedland area is distributed from the Hedland Terminal Power Station located to the south of the Wedgefield Industrial Area through a network of transmission lines linking 4 substations (Port Hedland, South Hedland, Wedgefield and Finucane Island) around the Hedland area.

Horizon Power has confirmed that there is capacity at the Horizon Terminal Power Station for the proposed development, however does not have the capacity to feed from the existing network of overhead transmission lines due to the size of the proposed development.

Precinct 1 & 2 are already serviced from the existing overhead power lines, which run to the northern side of the site and could possibly be utilised for the proposed developments within these precincts. Depending on the requirements of the individual lots this may require some upgrading to provide the power capacity. This can only be determined at a more detailed design stage once power loadings have been determined and submitted to Horizon Power.

Precincts 3 & 4 are not currently served from the existing networks and it is not possible to be serviced from the existing networks without major upgrade works.

3.6.2 RETICULATED WATER

The water scheme extracts groundwater from the De Grey River & Yule River Alluvial Aquifers, which is then pumped to ground bulk storage tanks in South Hedland and then to Port Hedland & Finucane Island. Elevated tanks are provided in Port Hedland and South Hedland which provides the head of pressure required for their associated catchments.

Water supplies in Port Hedland are under considerable pressure, and water shortages are an imminent likelihood. Water shortages are likely to limit development potential in the short term.

These shortages are currently being investigated, and it is anticipated that a water source will be available, however, timeframes and infrastructure implications are currently unknown.

There may be significant impacts on water supplies, and subsequently development potential, on individual precincts [especially precincts with better short term development potential such as Precincts 1 & 2] as these issues are resolved.

Precinct 1. The water facilities within Precinct 1, i.e. the terminal, RFDS, fire fighting, water storage, etc, is served from a 100mm diameter water main connected to the Great Northern Highway 150mm diameter main. This feed is located in the near vicinity of the existing access road to the terminal.

Precinct 2. The transient workers accommodation sites are provided from the same main as Precinct 1, however this main reduces from a 150mm diameter to a 100mm diameter. The connection to the site is then increased in diameter to 150mm to serve the new Port Haven facility.

Precinct 3. This area is currently unserved as there are no developed areas in this precinct; however there are four water mains (1 x 600mm in diameter, 2 x 375mm in diameter and 1 x 200mm diameter) laid within the Precinct. The 600mm diameter main is laid along the Southern boundary running parallel to the railway line in Lots 253 & 2444 and has an easement of approximately 5m over the length of this main. The remaining three mains run in a north east direction. The mains enter the existing UCL land (Lot 253) at approximately midway along Wallwork Road and runs parallel to the rear of the Cemetery through Lots 2444, 31 & 2443. The required easement to each of the mains is likely to be 3m and for the development of the Land Use Master Plan layout an easement of 10m has been assumed. The actual width of the easement over these three mains will be dependent on the alignment and depth. A 100mm diameter main has been provided from the 200mm diameter main and runs on

the south west side of the Cemetery to serve the Shell Service Station opposite the Cemetery.

Precinct 4. This area is also unserved as there are no areas currently developed in this precinct, however three water mains (2 x 375mm diameter and 1 x 200mm diameter) as discussed in Precinct 3 cross within the Precinct.

Through discussions with the Water Corporation the area surrounding the Airport area is currently experiencing low pressure within the pipework system. The Water Corporation believe this is due to a 150mm diameter main constructed downstream of the 100mm diameter main to serve the Port Haven development. It is understood that the Water Corporation has placed demand restrictions on Port Haven to minimise the disruption to the system.

3.6.3 WASTEWATER

Water Corporation has confirmed that the area is not currently served by a Water Corporation wastewater system, nor is this area located within the wastewater catchments. Currently the Water Corporation has no plans to provide gravity, vacuum or pumped wastewater system for the proposed development area. The Water Corporation has also stated that the Wedgefield area is serviced by septic tanks and would suggest a similar system for this development.

Precinct 1. Currently Precinct 1 disposes of its wastewater to an onsite treatment plant located to the north side of the current building area.

Precinct 2. The Auzcorp transient workers accommodation sewage disposal system includes an evaporation area located approximately 100m to its south side, whilst Port Haven currently treats the sewage and disposes of the treated water via an irrigation system to the west of the Port Haven site.

Precincts 3 and 4. Currently these precincts are not serviced by a wastewater system.

4. PLANNING FRAMEWORK

The PHIA is located within the Town of Port Hedland. A number of planning instruments at the State and Local level apply to the subject land.

4.1 STATE PLANNING POLICIES

The Western Australian Planning Commission prepares State Planning Policies [SPP] to address a range of issues of statewide significance. The policies are made and implemented under part 3 of the *Planning and Development Act 2005*. The policies relevant to this Land Use Master Plan are as follows:

4.1.1 SPP 4.1 STATE INDUSTRIAL BUFFER (2009 DRAFT)

The purpose of SPP 4.1 is to; avoid conflict between industry and/or essential infrastructure; protect these uses from encroachment by incompatible, sensitive uses; provide development outcomes which maximise amenity, minimise environmental and health impacts and accounts for risks to nearby sensitive uses; and promote compatible uses in areas affected by off-site impacts of industry and/or essential infrastructure.

SPP 4.1 applies statewide, to planning decision making, and proposals which seek to provide for new industrial areas and uses, and essential infrastructure; sensitive uses in proximity to existing industrial areas and/or essential infrastructure; and expansion of change in the operations of existing industry and essential infrastructure.

The Policy details the definition of buffer areas and the specific requirements for technical analysis. Applicable criteria noted include odour, noise, risk, light spill, dust and air quality. SPP 4.1 further outlines the required approval processes, and means of implementation through the planning framework.

Application of SPP4.1 to this Land Use Master Plan primarily relates to the design and land use recommendations for Precinct 3 which has been identified for industrial development. The policy will guide the rationale behind the layout of the Precinct and the types of uses recommended within the overall subdivision.

As noted above, this Policy is currently in the Draft stage. Public comment has been received and the Department of Planning has advised it will likely be finalised shortly. This Policy should be reviewed further once formalised.

4.1.2 SPP 5.2 TELECOMMUNICATIONS INFRASTRUCTURE

The key objectives of SPP 5.2 relate to the efficient and cost effective provision of infrastructure with minimal disturbance to the environment and amenity of the subject land area. These are particularly relevant to aerial cabling and mobile telephone networks. This Policy is therefore not considered to apply to the existing underground telecommunications cable which runs along the eastern boundary of the Study Area in close proximity to the Cemetery.

4.2 DEVELOPMENT CONTROL POLICIES

In addition to State Planning Policies, the WAPC also prepares Development Control Policies [DCP] to address a range of development specific matters. The policies relevant to this Land Use Master Plan are detailed below.

4.2.1 DCP 1.1 SUBDIVISION OF LAND – GENERAL PRINCIPLES

The purpose of DCP 1.1 is principally to ensure the subdivision of land is consistent with State and Local planning legislation and regulations, through a co-ordinated and comprehensive approach. It further outlines the necessary approval processes from structure planning to subdivision applications, as well as addressing matters such as public utility service provision, public road frontage and access, and developer contributions for the provision of infrastructure and services.

In application to this Land Use Master Plan process, DCP 1.1 guides the steps required to progress this strategic document through to saleable freehold lots. Subdivision will be discussed further in section 7.

4.2.2 DCP 4.1 INDUSTRIAL SUBDIVISION

DCP 4.1 provides guidance on the matters considered by the WAPC when determining applications for industrial subdivision throughout the State, including design and shape of lots, road layout and utility provision. The objectives of the policy are to encourage well designed industrial areas with safe and efficient traffic movement and sufficient infrastructure services.

Key considerations relevant to the Land Use Master Plan are as follows:

- (1) The land must be zoned industry under the local planning scheme to allow subdivision
- (2) The design of the area is compatible with surrounding land uses
- (3) Lots should be designed to provide sufficient building space and accessibility, ranging in areas to provide for the appropriate uses
- (4) Design should allow for maximum flexibility in lot areas and overall staging
- (5) Provision of a simple, legible and fluid road network allowing good access and an optimal number of access points

DCP 4.1 will guide the design exercise specifically relating to Precinct 3 of the Land Use Master Plan. The principles stated in DCP 4.1 will provide the rationale for road layout, lot design and servicing provision. The staging and release management of the subsequent subdivision will also be guided by this policy.

4.2.3 DCP 4.2 PLANNING FOR HAZARDS AND SAFETY

The purpose of DCP 4.2 is to provide guidelines for proper planning of contaminated land, hazardous industry and dangerous goods. The policy defines these uses and the associated risk categories, further providing the procedural guidelines to address the issues of concern.

Although no hazardous industry is proposed for the Land Use Master Plan at this stage, DCP 4.2 is the appropriate reference should the Town seek to provide for such uses in the future.

It is noted that several previous uses within the Study Area require a level of site contamination investigation. This is to be discussed further in Section 5.1.1 - Contamination.

4.3 PORT HEDLAND LAND USE MASTER PLAN

The Port Hedland Land Use Master Plan [LUMP] was prepared in 2007 for the Town of Port Hedland and was subsequently adopted by the Western Australian Planning Commission.

The LUMP covered the entire local government area, but was prepared to guide development predominantly over the developed parts of the Shire, and specifically Hedland and South Hedland.

The LUMP refers to the PHIA, and states:

The Port Hedland International Airport is operated by the Town of Port Hedland, on land partially controlled by the Commonwealth Government. It has one of the longest runways in WA which meets the specifications for Boeing 737s and can accommodate larger aircraft in emergencies. There are no current plans for extension of the runways or other major infrastructure improvements. Should expansion be required in the future, the most likely extension of the runway will be to the northwest, where its length can be extended by approximately 20% without interference from the highway. Preserving this expansion corridor leaves considerable land available for other development, as outlined under 3.2 Industry. With respect to the air transport function of the airport area, the following actions are recommended:

- ➔ *Preserve a future expansion corridor of approximately 1 kilometre in width, extending northwest along the centreline of the main runway.*
- ➔ *Limit development in areas adjacent to the runways to compatible uses that neither interfere with aircraft movements (excluding, for example, uses that attract birds or industrial processes that produce significant air quality impacts), nor are disturbed by them (excluding, for example, housing). The maximum height of development in surrounding areas is 52 metres, including chimneys and emissions plumes.*

During preparation of the LUMP, a number of discussion papers were prepared to provide concepts and ideas feeding into the preparation of the report. Discussion paper No 3 related to Infrastructure, and included identification of land on the southern side of the airport for potential industrial subdivision. This was recommended due to the identification of a potential new road adjacent to the Port Hedland Goldsworthy Railway providing access to the site [LUMP p73].

The PHIA Master Plan includes buffers to the runways at 500 metres offsets from the centreline of 14/32. Measures to limit development adjacent to the runways are outlined in Section 6. The Master Plan does not, however, include any access across the Goldsworthy Railway. The road identified in the LUMP is unlikely to proceed, and access across the railway is also unlikely, at least in the short to medium term.

In general terms the PHIA Master Plan is consistent with the LUMP.

4.4 TOWN OF PORT HEDLAND LOCAL PLANNING SCHEME

The Subject Site is zoned Airport under the Town of Port Hedland Local Planning Scheme No 5 [LPS5]. Clause 6.15 of the Scheme contains provisions that relate to the Airport zone:

6.15 AIRPORTS

- 6.15.1 No development, within the height restriction areas indicated on the Obstacle Limitation Surfaces map in the Policy Manual shall exceed the height restrictions indicated in the manual.
- 6.15.2 Development within the Residential, Commerce, Health, Welfare and Community or Entertainment, Recreation and Culture categories in the zoning table is not permitted inside the 25 ANEF contour of the Australian Noise Exposure Forecast map contained in Appendix 9. When considering planning applications Council may vary the requirements of this clause where it is satisfied that aircraft noise will not unduly impact on the proposed use or the development is specifically constructed to attenuate the impact of aircraft noise.

As discussed in Section 3.4, the OLS provisions impact on land uses within the airport land, and outside of this area, however, the height limit of 52 metres is not considered to prohibit development. Similarly, Clause 6.15.2 of the Scheme relating to ANEF contours will not prohibit development in accordance with the Land Use Master Plan.

The PHIA is also located within a Development Plan Area, as designated by Appendix 5 of the Scheme. Appendix 6 of the Scheme contains provisions that relate to Development Plan Areas:

APPENDIX 6 - MATTERS TO BE ADDRESSED BY DEVELOPMENT PLANS

All development plans shall address the following matters:

- (i) Landform, topography, landscape, vegetation and soils of the area,
- (ii) Location, existing roads, land uses and surrounding land uses and features,
- (iii) Legal considerations, ownership, title description, area and encumbrances,
- (iv) Existing and proposed services and infrastructure including reticulated or other potable water supply, wastewater, energy, communications, drainage and catchment considerations,
- (v) existing places and features of Aboriginal and non-Aboriginal heritage and/or cultural significance, including natural landscapes, flora and fauna in addition to built structures and other modified environments,
- (vi) Road layouts and traffic assessments, communal and incidental parking areas, pedestrian/cycle network/underpasses, including impacts on the surrounding movement networks.
- (vii) Public open space and recreation provision, environmental protection areas, and relationships to natural features,

- (viii) Assessment of the impact of the proposal on the natural environment, including management of potential effluent, emissions and other forms of pollution,
- (ix) Comprehensive drainage systems for stormwater runoff and natural drainage lines,
- (x) Indicate the design of the proposal including lot layout, major buildings roads and landscaping proposals,
- (xi) The demand for the development in relation to the overall market for similar developments
- (xii) The method of carrying out the development including the projected times of completion of each stage,
- (xiii) Provide provisions, as may be considered appropriate by Council, for inclusion in the Policy Manual,
- (xiv) Other information as may be required by the Council.

Development plans in specific zones should also address the following additional matters:

Urban Development Zone

- (i) Location and density of housing areas, including lot and dwelling yield, population outcomes, net residential density and detailed subdivision standards relating to solar access, efficient use of water resources, design features and density rationale,
- (ii) Indicate demand for commercial and community facilities, including schools, generated by the proposal and implications for the provision of these within the development area or elsewhere

Industrial Development Zone

- (i) Location and characteristics of industrial precincts, including likely industrial uses, developments and materials processing,
- (ii) On-site and off-site buffers required to separate uses within industrial areas and industrial uses from adjacent incompatible uses,

Rural

- (i) The impact of the proposal on the local settlement and rural land use patterns in the Scheme Area.

- (ii) *The demand for commercial and community facilities, including schools, generated by the proposal and implications For the provision of these within the development area or elsewhere*
- (iii) *The intended range of land uses and development for the site, particularly agriculture and intensive agriculture and any proposed limitations on these uses*
- (iv) *Land tenure proposals including any cooperative arrangements for shared management of land.*

Under these current provisions of the Scheme, a development plan is required to be prepared for the airport as part of the development process. The Land Use Master Plan can be considered to meet part of this requirement, and can be used to guide the preparation of further detailed Development Plans for any precinct recognised as requiring them.

Any other potentially conflicting land uses proposed in these precincts that are not consistent with this zoning will therefore require a separate rezoning. A rezoning is recommended to ensure provisions regarding height and land use limits.

Notwithstanding these existing Scheme provisions requiring Development Plans, to ensure that development properly addresses the buffers outlined in Section 3.4 [NDB, DME & DVOR buffers] it is recommended that part or all of Precincts 1, 2 & 3 are rezoned. Specific zoning will be dependent on the intended land use for each lot within each precinct, however, any rezoning will be required to include provisions relating to these buffers.

Rezoning could incorporate a Development Plan in accordance with Appendix 6 of the Scheme, and provisions addressing permitted land uses could be incorporated into the existing Scheme provisions relating to Airport land uses.

It is envisaged that provisions would be incorporated into Clause 6.15 to better define suitable land uses for each of the precincts.

While rezoning is recommended, the base zoning of precincts 1, 2 & 4 is recommended to remain as 'Airport', to ensure that land uses specifically related to airport function prevail.

Recommended zoning for Precinct 3 is Industrial Development Zone. Similar to the current zoning, this zoning will require preparation of a Development Plan, ensuring that appropriate assessments are undertaken to confirm the suitability of the land for development.

During rezoning, along with specific land use controls, Scheme provisions that address the height restrictions required for various Precincts can be developed. It is recommended that the following requirements are captured in the Scheme provisions for any such rezoning:

- ➔ *Referral to CASA for any proposed development*
- ➔ *Referral to ASA for any proposed development*
- ➔ *Inclusion of height restrictions in accordance with CASA and ASA recommendations*
- ➔ *Restrictions on land uses in accordance with CASA and ASA recommendations*
- ➔ *Inclusion of Restrictive Covenants and Memorials on Titles relating to height and land use restrictions*

It is also strongly recommended that any rezoning is prepared in close consultation with CASA and ASA to ensure any height restrictions and limits on land uses are addressed prior to subdivision and development of the subject land.

Rezoning is discussed in further detail in Section 7.1.

5. POTENTIAL DEVELOPMENT ISSUES

5.1 ENVIRONMENTAL

5.1.1 GEOTECHNICAL

5.1.1.1 CONTAMINATION

The site is not known to be contaminated. The only land use that has occurred on the site is refuelling of aircraft and motor vehicles, and other than the potential for minor fuel spills, there is likelihood that contamination has occurred.

Contamination status of the site was determined by examining historical records for the site, including:

- Historical Certificates of Title and aerial photographs: to determine previous land uses
- Department of Mines and Petroleum (DoMP) Dangerous Goods License applications: to determine history of contaminant storage at site
- Department of Environment and Conservation (DEC) database: to identify known or suspected contamination on site
- Town of Port Hedland Environmental Health records: to identify potential contamination issues associated with the site (including records of contaminant spills and odour complaints)

Historical Certificates of Title

Copies of the historical certificates of title were supplied by Whelans. Details of the certificates of title are summarised below in Table 6. The current and historical certificates of title are included in Appendix C. Further historical certificates of title were obtained from Landgate. A summary of the historical land owners is provided below in Table 6.

Historical aerial photography

Historical aerial photographs for the site were reviewed to determine historical site use. The results are tabulated below.

A basic summary of records search was conducted by the Department of Environment and Conservation [DEC]. The following

lots have not been reported to the DEC as a known or suspected contaminated sites either prior to or after the commencement of the Contaminated Sites Act (2003):

- Lot 2443, Lot 2444, Forrest Locations 16, 29, 31 and 253 (as of 29 June 2010)
- Lot 11 (as of 17 May 2010)

DEC Contaminated Sites Search

A copy of the search results obtained by the DEC is included in Appendix D. None of the Lots have been reported as known or suspected contaminated sites.

A search of the DEC contaminated sites database identified no suspected or known contamination within 1 km of the site. However three parcels were identified as contaminated in the Port Hedland area as outlined in Table 8.

Town of Port Hedland Environmental Health records search

A search was conducted of the Town of Port Hedland's Environmental Health records for the site. As of the 16th of December 2008, the Town of Port Hedland held no record indicating any health complaint or report pertaining to Lot 2444. As of the 18th May 2010, the Town of Port Hedland informed PB that for the whole of site:

- No reports of illegal dumping have been received
- Minor complaints regarding mosquito activity had been received
- No clean up notices had been issued
- Waste disposal records consist of: 1 x Sewage plant - evaporation pond, 1 x biomax installed – possibly not in use.

Correspondence on the 4th May 2010 from the Council suggests that fly tipping was common practice in Port Hedland historically until a designated rubbish tip was constructed. Therefore, buried refuse may be present on site. It was also suggested that numerous effluent lines associated with the airport are present on site, leading to three evaporation ponds: one associated with the airport, one associated with transient workers accommodation, and one associated with a reticulation area in the south eastern portion of the site.

Table 6 Summary of current and historic certificates of title for Lots 11, 15, 16, 29, 31, 253, 2443 and 2444

Certificate of Title (Vol./Folio)	Date of issue	Proprietor	Parent title	Property description/purpose
1072/164	12 September 1940	The Commonwealth of Australia	Nil	Forrest Location 11
1115/841	11 January 1949	The Commonwealth of Australia	1072/164	Forrest Locations 11 and 15
1199/227	21 January 1957	The Commonwealth of Australia	Nil	Forrest Location 16
1252/726	21 August 1963	The Commonwealth of Australia	Nil	Forrest Location 29
1276/142	17 September 1963	The Commonwealth of Australia	1115/841, 1252/726	Forrest Locations 11, 15 and 29.
1259/730	1 September 1964	The Commonwealth of Australia	Nil	Forrest Location 31
	2 December 1983	Shire of Port Hedland	1259/730	Lot 31 on Deposited Plan 168868
1512/515	25 August 1978	The Commonwealth of Australia	Nil	Lots 2443 and 2444
1591/684	19 May 1981	The Commonwealth of Australia	1512/515	Lots 2443 and 2444
1657/119	2 December 1983	Shire of Port Hedland	1276/142	Lot 11 on Deposited Plan 144237, Lot 15 on Deposited Plan 161311, Lot 29 on deposited plan 168193
1657/120	2 December 1983	Shire of Port Hedland	1199/227	Lot 16 on Deposited Plan 163352
2027/995	10 January 1995	Town of Port Hedland	1591/684	Lot 2443 and portion of Lot 2444
3039/748	7 May 1999	State of Western Australia	Nil	Forrest Location 253 on Land Administration Plan 18989
2212/731	28 May 2001	Town of Port Hedland	2027/995	Lots 2443 and 2444 on Deposited Plan 212197

Table 7 Summary of historical aerial photography

Photograph Date	Scale	Site Coverage	Surrounding area coverage
20 June, 1968	7920'6"	Native vegetations covers the majority of the site. A radio antenna and associated office infrastructure lay on the eastern boundary. Native vegetation has been cleared east of the airport. A pit has been excavated on the southern site boundary, assumedly for building sand. Bush fire vegetation scars are apparent across the southern portion of the site. A runway has been constructed running east-west, to the west of the airport. Various access tracks and airport infrastructure exists across the site. A builders camp associated with antenna construction can be found in the northern portion of the site.	Perennial creeks and areas of mangroves lie north, north east and north west of the site. Pits have been dug either side of the railway south and east of the site. A light industrial yard with what appears to be shipping containers lays south of the site.
20 November, 1971	1:15,000	Antennas have been constructed in the north west portion of the site. The rest of the site appears unchanged.	A cemetery lies west of the site. A salt farm lies north east of the site, along with light industrial infrastructure. A transient workers camp lies immediately east of the airport, along with what appears to be associated sumps/sewer ponds. Construction of South Hedland has commenced south west of the site.
28 May, 1986	1:20,000	The runway running east-west has been decommissioned. Vegetation and topsoil have been removed from areas south of the decommissioned runway. Soil has been excavated and stockpiled near the southern boundary of the site.	South Hedland construction is complete. Areas of native vegetation have been cleared, and topsoil removed assumedly during the construction of South Hedland. What appears to be a fuel station and truck bay lies west of the site. An industrial yard lies east of the site.
25 July, 1999	1:25,000	Site appears unchanged.	Surrounds appear unchanged.
12 May, 2009	1:25,000	Transient workers accommodation has been constructed south - east of the airport.	Surrounds appear unchanged.

Table 8 DEC Contaminated Sites database search results

Lot/House Number	Distance from Site	Contamination Status	Contaminants present
Lot 6179 On Plan 26719 Wedgefield WA 6721	1.5 km east	Contaminated - remediation required (05/02/2010)	Hydrocarbons (such as from petrol/diesel/oil) and heavy metals are present in groundwater
Rio Tinto Dampier Salt Site, just off Great Northern Highway & Wilson Street, Port Hedland WA 6721	2 km north east	Contaminated - remediation required (11/07/2008)	Hydrocarbon products (such as from diesel) are present in the soils and groundwater in the vicinity of the existing workshops and refuelling areas east of the wet salt stock pile. The full extent if the hydrocarbon contaminated groundwater has not been delineated on the west, under the wet salt stockpile and to the north, beyond the current re-fuelling Depot.
6 Trig St Wedgefield WA 6721	2.5 km east	Contaminated - remediation required (05/02/2010)	Total petroleum hydrocarbons and heavy metals are present in groundwater

5.1.1.2 DANGEROUS GOODS

A search of the Department of Minerals and Petroleum (DoMP) Resources Safety Division under the FOI Act on 7 January 2009 found no records of applications for the storage of dangerous goods at the “Port Hedland Airport, Great Northern Highway (opposite Stirrupiron St)” portion of the site. More information was sought regarding Lots 11, 15, 16, 29, 31, 253, 2443 and 2444 specifically. This information is listed below in Table 9. It is considered that the exact locations of these underground and above ground storage tanks are located within the current Port Hedland Airport boundaries (eastern portion of Lot 11), and so do not affect the contamination status of soil on the rest of site (western portion of Lot 11, and Lots 15, 16, 29, 31, 253, 2443 and 2444).

The following licenses pertain to the Royal Flying Doctors Service (RFDS) airport, also called “Port Hedland Airport” but located north of the site and was provided by DoMP erroneously.

- DGS010935: 18 December 2005 – 2 USTs containing petrol and kerosene totalling 30.2 kL for the RFDS at Waldron Drive, Port Hedland.
- DGS010935: 21 December 1987 - 2 USTs totalling 30.2 kL (Class 1 and Class 2 flammable liquids and oils) for RFDS at “Port Hedland Aiport”.

A copy of this information is included in Appendix E.

Unexploded Ordinance

The site used to operate as part of the RAAF 78 Operational Base Unit, to support RAAF operations during World War II. In May and July 1942, the town of Port Hedland and the airfield were bombed

by Japanese Forces. According to the limited information available, at least 30 bombs were dropped during the first attack. According to FESA’s records, the second incident occurred at 07:20 on the 30th July 1942 where at least nine Japanese Bombers attacked the Port Hedland Aerodrome from the North East. Over 50 high explosive and incendiary bombs were dropped on and in the vicinity of the “Drome”.

Correspondence with the Department of Defence indicated that Fire and Emergency Services (FESA) have conducted UXO surveys for the Port Hedland area. The results are as follows:

- Reference: Location N2, page C-4. This is a 165 km diameter circle, named "Hostile Bombardment". It covers the whole of the Port Hedland area and almost reaches as far south as Gillam, almost to Goldsworthy in the East, and almost to Mallina in the West.
- Reference: Location N30, page C-28. This is a 12 km diameter circle, named "Port Hedland". It is centred on the Port Hedland airport.
- Reference: Location N30, page C-38. This is a 13 km diameter circle that just touches Lot 2443. It is also named "Port Hedland".

Further details information from FESA indicated that they are of the opinion that the general lot areas as described pose minimal risk in regards to possible unexploded ordnance contamination.

However, having said that, review and interpretation of the records has indicated that there may be a slightly higher than minimal risk of actual ordnance related contamination, particularly in close proximity to the current and former WWII runways (these are the current two northern most runways, and the decommissioned runway previously running east/west).

Table 9 DoMP Dangerous Goods search results

DGS ID	Date	Owner	Location as listed on DGS license	Details
DGS010156	10 February 1986	Budget Rent A Car	Port Hedland Airport	2 underground storage tanks (USTs) totalling 23,000 kL (Class 1 and Class 3 flammable liquids and oils), and 20 L degreaser
	22 June 1989	Budget Rent A Car	Air Port, Port Hedland	1 UST and 1 above ground tank (AST) containing Class 3.1 and 3.3 liquids and oils totalling 20.9 kL
	7 April 2006	Nade Pty Ltd	Nade Pty Ltd , Port Hedland	2 USTs containing petrol and diesel fuel totalling 23,000 kL
DGS007203	4 October 1985	Avis Rent-A-Car Systems	Avis Rent-A-Car, Port Hedland Airport	1 UST containing Class 1 liquids totalling 9.8kL
DGS002457	31 October 1969	Mobil Oil Australia	Port Hedland Airport	5 USTs and 1 drum depot containing Class 1, 2, and 3 flammable liquids and oils, totalling 36,100 kL
	29 June 1993	Milne Aviation Supplies	Port Hedland Airport	2 USTs and 7 ASTs containing aviation fuel and motor spirit (Class 3), totalling 258 kL
	31 May 2007	Mobil Oil Australia	Mobil Oil Australia, Port Hedland	7 USTs and 2 ASTs containing Class 3 liquids totalling 260 kL
DGS002320	10 November 1969	BP Australia Ltd	Port Hedland Airfield	2 USTs containing Class 1 flammable liquid and oils totalling 30.2 kL.
	18 October 1996	BP Australia Ltd – Air BP	Port Hedland Airport	2 USTs containing aviation gasoline and aviation turbine kerosene (Class 3) totalling 180 kL
	18 August 2008	BP Australia Ltd – Air BP	Port Hedland Airfield	2 ASTs containing aviation gasoline and aviation turbine kerosene (Class 3) totalling 180 kL

A report on the bombing raid by the 3rd Australian Bomb Disposal Co. indicate that 7 UXB's (unexploded bombs), 3 high explosive and 4 incendiary, were located on and adjacent the runways and were eventually destroyed by this unit in August 1942. At least 10 high explosive bombs found their target on the runways and craters ranged in size from 2m wide x 0.5m deep to over 6m wide x 2m deep. Most of the bombs appear to have been targeted at or near the northwest runway. The report for this event states that all resulting UXO were located and destroyed, however, no absolute guarantee can be given that all such UXO have been found.

Whilst the risk of UXO from the above activities is considered by FESA to be very low, it must also be noted that a large quantity of RAAF and Army high explosive ordnance was stored at the airfield throughout WWII and that Army anti-aircraft units were also located in the vicinity of both the town site and airport. Apart from any defensive firing that may have occurred from these positions during the air raids, live firing practices using high explosive ammunition would most likely have occurred. Any of the activities described above are capable of producing UXO. Excluding the aforementioned Bomb Disposal search in Aug 1942 (visual

only, no metal detection equipment used) there has been no known attempt formally search for UXO in this region.

In this regard, depending on how close the proposed subdivision is likely to impact the existing airfield area, FESA consider that it may be appropriate to have a Defence Accredited UXO company conduct a field validation survey to assess the true nature and extent of possible/potential contamination that may exist beyond the immediate areas of the runways. In the meantime, FESA suggest that it may be appropriate to have some form of disclosure or statement in the management plan for the project to advise all Stakeholders, Contractors, Surveyors, and Site Workers that may need to access the site, such as:

FESA's UXO Unit has revealed that during WWII, former elements of Australian Defence or Enemy forces conducted training and/or operational or hostile activities within or close to the area in question and that as a result of those activities, the subject area may contain unexploded ordnance (UXO). Whilst it is considered by FESA that the possible risk from UXO is minimal, an absolute guarantee that the area is free from UXO cannot be given. Should, during subdivisional works or at any other time, a form or suspected form of UXO be

located, FESA has advised that the following process must be initiated.

1. Do not disturb the site of the known or suspected UXO, this includes any attempt to handle or move the item to another or safe location
2. Without disturbing the immediate vicinity, clearly mark the site of the UXO
3. Notify the Police of the circumstances/situation as quickly as possible
4. Maintain a presence near the site to prevent others from disturbing the item until advised to the contrary by a member of the WA Police Service or Defence Forces.

Further advice on this issue may be obtained by contacting the Unexploded Ordnance Unit, Fire & Emergency Services Authority of WA on (08) 9331 7218.

Contamination status summary

- The site was acquired by the Commonwealth of Australia in the 1940's and 50's, and between 1983 and 2001 was transferred to the Town of Port Hedland.
- Historical aerial photography suggests that since the late 1960's the primary site use was as an airport, located in the eastern portion of the site. The remainder of the site is vacant, with radio antennas erected west of the airport in the 1970's, areas of soil excavation in the southern portion during the 1980's, and transient workers accommodation erected south east of the airport in the 2000's. The only potentially contaminating land use indentified from aerial photography is the airport runway and aircraft hangar areas.
- Records of historical Dangerous Goods License applications indicate that excluding goods currently stored at the operational airport, there are no dangerous goods affecting the contamination status of soil on the site.
- Records have been obtained regarding the contamination status of the site from the DEC. None of the Lots have been reported as known or suspected contaminated sites. The closest contaminated sites identified by the DEC are 1.5 to 2.5 km east and north east of the site. These are considered too far away to affect the site.

- According to the Town of Port Hedland, no records of illegal dumping have been received for the site. In addition, no cleanup notices have been issued for the site. There have been minor complaints about the presence of mosquitoes at the site. A sewage plant evaporation pond and associated treatment infrastructure has been installed in the eastern portion of the site. Further records would need to be obtained regarding the integrity of the pond lining as to whether potential contamination is present.
- The site was a RAAF base during World War II, and suffered two bombing attacks by Japanese Forces in 1942. It was also used as a training ground for RAAF recruits. FESA consider that there may be a slightly higher than minimal risk of actual ordnance related contamination, particularly in close proximity to the current and former WWII runways. Depending on how close the proposed subdivision is likely to impact the existing airfield area, FESA consider that it may be appropriate to have a Defence Accredited UXO company conduct a field validation survey to assess the true nature and extent of possible/potential contamination that may exist beyond the immediate areas of the runways. In the meantime, FESA suggest that it may be appropriate to have some form of disclosure or statement in the management plan for the project to advice all Stakeholders, Contractors, Surveyors, and Site Workers.

5.1.2 HYDROLOGY + DRAINAGE

Stormwater receptors

The tidal creeks of the Port Hedland natural harbour are considered to be nearby stormwater receptors. The tidal creeks cross the northern site boundary, while the natural harbour lies some 2 km north east of the site. There are also various other unnamed water bodies to the north of the site with the Turner River located 2km east of the site and the Yule River located approximately 4km north west.

Rainfall and subsequent creek flow is mainly associated with cyclonic events over the summer months. Although these creeks flow infrequently, they can discharge very large volumes of runoff into the harbour over relatively short periods, particularly if a tropical low pressure system moves through the area.

According to the DEC's "Pilbara Coastal Water Quality Consultation Outcomes - Environmental Values and Environmental Quality Objectives" (DEC, 2006), in 2003 the DoE and the CSIRO undertook baseline water quality surveys around

Port Hedland to determine dissolved concentrations of organic chemicals (such as petroleum hydrocarbons) and heavy metals in marine waters. These coastal waters were considered to be of very high quality, with no recorded organic chemicals detected in any of the samples and dissolved concentrations of metals approaching those found in the open ocean. Lead concentrations exceeding 0.01 µg/L were detected in water in the Port Hedland inner harbour (Wenziker et al.2004). Dissolved concentrations for cadmium, copper, mercury and zinc were also detected above laboratory limits of detection (Wenziker et al., 2004). These localised elevations are associated with industrial centres. Copper and zinc were above the background coastal levels; however “the 95% species protection guidelines used in the report representing a high level of protection were easily met in the inner harbour” (Wenziker et al., 2004).

Background salinity for these coastal waters is approximately 34 - 36 Practical Salinity Units (PSU), or 34,000 to 36,000 total dissolved solids (TDS) (Wenziker et al., 2004).

Table 10 DoW groundwater bores search results

Bore ID	Distance/ direction from site centre	Owner	Depth to groundwater (mAHD & mBGL)	TDS (mg/L)
20067005	~ 3.0 km NW	Bradford Kendall Foundries	-	-
20067007/ARMY C48	~ 4.2 km SE	'Army'	11.58/3.66*	4,468*
20067000/ARMY C51	~2.0 km NE	'Army'	12.8/2.44**	5,720**

* Last measurement taken on 23 October 1943
 ** Last measurement taken on 4 November 1943

TDS data from bores indicate that groundwater quality in the superficial aquifer is variable ranging from 4,468 – 5,720 mg/L within a 4.5 km radius of the site. Based on this information, groundwater beneath the site has a highest potential beneficial use for groundwater ecosystems maintenance purposes (TDS <3,500 mg/L). However, this data was collected in 1943, so more current data was gathered from the online DoW Groundwater Atlas. This information is summarised in Table, with TDS values of 1,000-3,000 mg/L. Based on this information, groundwater beneath the site has a highest potential beneficial use for irrigation (TDS 1,000 – 3,500 mg/L).

Due to the TDS concentration of groundwater, it is expected that if any unregistered bores exist down gradient of the site, extracted groundwater would only be used for irrigation or domestic recreational use.

Groundwater receptors

A search of the Department of Water (DoW) groundwater database produced information regarding nine WIN registered bores (classed as 'Groundwater Sites - other non-DoW') within a 2.5 km radius of the site, as presented in Appendix B. Of these, three bores are located either down or cross hydraulic gradient of the site specific groundwater flow (north east).

The closest bores down and cross gradient of the site are located approximately 2 km north east, 3.0 km north west and 4.2 km south east of the site. Bore purposes are not listed. There may also be additional unregistered production bores in the area in use by down gradient properties.

Wetlands

The WA Wetlands Database, WetlandBase (DEC, <http://spatial.agric.wa.gov.au/wetlands/index.asp>), was accessed by PB (27th April 2010) to identify wetlands of state, national and international significance located at or nearby the site. The closest RAMSAR wetland international significance is Eighty Mile Beach located 120 km east north east of the site, while the closest wetland of national significance is the Leslie (Port Hedland) Saltfields System (PIL004WA) 15 km north east of the site.

No wetlands of state/subregional significance are located within 10 km of the site. However, WetlandBase identified many unnamed water bodies that exist immediately north of the site and their locality may warrant further investigation. In this region, mangroves fringe the harbour edges, with associated salt tidal flats.

Acid Sulfate Soils

A search of the DEC's Acid Sulphate Soils Geographic Data Atlas has determined that the site is unlikely to be affected by Acid Sulphate Soils (ASS).

According to CSIRO's online Australian Soil Resource Information System (ASRIS) accessed on the 22nd April 2010, the probability of acid sulfate soil occurring within 4m of the surface profile is extremely low; however due to the lack of information available for this region CSIRO deem the data to be very low confidence.

Drainage

The topography of the development area has been assessed using the contours provided by the Water Corporation, along with the wastewater, water reticulation and drainage infrastructure assets. It should be noted that these contours provided an indicative topography of the land and should not be used for design. A full feature topographical survey should be undertaken prior to design stage to accurately determine the site contours to for design purposes.

Precinct 1 has little piped stormwater drainage and generally relies on overland flows to dispose of the rainwater. In discussions with the airport representatives the overland flow is generally towards the Great Northern Highway, which then discharges into an open stormwater drain which runs northwards to the entrance to the airport. A small (150mm) diameter culvert beneath the Great Northern Highway conveys the stormwater from the precinct to the open watercourses on the northern side of the Great Northern Highway. Similarly an open stormwater drain has been formed across the northern end of the airport area to collect overland flows that ultimately discharges through the small diameter pipe under the Great Northern Highway.

During the site visit it was stated by the airport representative that during heavy rainfalls overland flows from the runway areas also contribute stormwater disposal to this area resulting in flooding to the airport area. This would indicate that there is insufficient drainage to cater for the runway catchment and that the site topography conveys the overland stormwater flows into Precinct 1. Ultimately this increased catchment and the small diameter culvert beneath the Great Northern Highway is the main cause of the stormwater flooding in Precinct 1. It is also likely that Precinct 2 also contributes to the catchment and is discussed in Precinct 2.

From the onsite visit and information from the airport representatives, it would appear that the small diameter culvert and storage capacity of the open stormwater drains are inadequate of disposing/attenuating the stormwater for the large catchment.

It is suggested that the following items should be undertaken. (refer to the Precinct 1 Land Use Master Plan Layout)

- A cut-off drain is provided outside the Precinct area adjacent the runways to collect the overland flows and direct the stormwater to Precinct 4. This will reduce the catchment area and flows from entering Precinct 1 catchment.
- Additional open stormwater drains are formalised/provided, especially to the new roadways of the proposed development. This will not only reduce the length of overland stormwater flows and scouring of the surface area, but will increase storage capacity on the system. Baffles within the system should be considered to attenuate flows and maximise the storage capacity.
- Additional attenuation ponds are provided for additional storage on the system. Consideration should be given for evaporation disposal of the attenuated stormwater.
- Individual lots are to provide attenuation basins to store the 1 in 10 year storm events. The 1 in 5 year storm event shall be the minimum attenuated on the individual lots. A small discharge pipe from the lot attenuation basin to the open stormwater drains should be considered to allow drain down of these basins after the storm event.
- The small diameter culvert beneath the great Northern Highway should be redesigned taking into account the new catchment area of the precinct to prevent flooding within this area. The design should maximise the usage/storage within the open stormwater drains and attenuation areas on the proposed stormwater system.
- Redesign the diameter of the discharge culvert from the precinct to prevent flooding, however should maximise the usage/storage within the open stormwater drains and attenuation areas.

Within Precinct 2 it has not been possible to determine the existing stormwater drainage system for the Auzcorp or Port Haven developments. The remainder of the area is undeveloped and relies on overland flows, infiltration and evaporation to discharge the rainwater. The majority of the flows are likely to be overland flows that will discharge the majority of the stormwater which will follow the natural topography of the land, which is in a north west direction towards Precinct 1. These flows are likely to be contributing to the flooding to Precinct 1. It is suggested that the following items should be undertaken. (refer to the Precinct 2 Land Use Master Plan Layout)

- A cut-off drain is provided between the Precincts and/or earthworks are undertaken to retain the flows within Precinct 2 and prevent overland flows to Precinct 1. This will reduce the catchment drains and flows from entering Precinct 1.

- Additional open stormwater drains are provided, especially to the new roadways with the proposed development. This will increase storage capacity on the system and channel the stormwater to the discharge location. Baffles within the system should be considered to maximise the storage capacity.
- Individual lots shall provide attenuation basins to store the 1 in 10 year storm events due to the larger area of the lots. A small discharge pipe from the lots to the open stormwater drains should be considered to allow drain down of these basins after the storm event.
- Provide a new discharge location to prevent stormwater retention on the site and ultimately prevent flooding to the Precinct, however should maximise the usage/storage within the open stormwater drains and attenuation areas.

During the detail design of the Precinct the drainage systems of the Auzcorp and Port Haven developments should be determined and included into the overall drainage network if necessary.

Currently precinct 3 is undeveloped (approximately 360 hectares), and relies on overland flows, infiltration and evaporation to discharge the rainwater. Overland flows currently discharge a majority of the stormwater which follows the natural topography of the land, which is in a north west direction towards Precinct 4. Although the airports runway is within the overland flow path the onsite inspection suggested that the runway is slightly elevated, therefore the flows would be diverted rather than flowing across the runway. Ultimately the stormwater discharges into the low lying Precinct 4 (discussed below). The topography to an area to the south west corner of the site appears to have a small depression, however ultimately the overland flows will flow into Precinct 4.

It is therefore suggested that the following should be undertaken. (refer to the Precinct 3 Land Use Master Plan Layout)

- A network of open stormwater drains (living streams/swales for beautification) is provided within the road reserves, to convey the stormwater runoff to Precinct 4. Baffles within the system should be considered to maximise the storage capacity. It may be possible to direct the south west area to the existing open drainage channel located on the southern side of the railway line. This is dependent on levels and permissions to provide a discharge culvert beneath an existing railway line. Should this not be feasible/possible, then this catchment shall be directed to Precinct 4.
- Surface water drainage piped networks is the Town of Port Hedland's preferred option of stormwater conveyance, therefore drainage pipes should be used rather than open channels. Due to the flat topography of the site it is accepted that a piped network would not be possible to convey the large volumes of stormwater without increasing the levels of the

development, which would not be practical or cost effective. It is therefore recommended to maximise pipe drainage without affecting site surface levels and minimise open drains.

- Individual lots are to provide attenuation for the 1 in 10 year storm events. A small discharge pipe from the lots to the open stormwater drains should be considered to allow drain down of these basins after the storm event.

Precinct 4 is currently undeveloped and is the lowest area within the development. A discharge culvert is provided near the north west corner of the area, beneath the Great Northern Highway. This Precinct area is to contain the detention area for Precinct 3 and diverted run off from the runway area as discussed in the previous precincts. It should also be noted that Main Roads WA have a concept plan for the alteration of the Great Northern Highway intersection, located at the north west side of the development and appears to encroach on some of the development area. This may require the relocation of the culvert and reduction of the precinct area. Design of drainage and detention for Precinct 4 will be required to be undertaken in conjunction with Main Roads WA to ensure that drainage of Precinct 4 is accommodated in design of the new Heavy Haulage Route, especially given that other Precincts drain into Precinct 4.

Part of Precinct 4 is proposed to act as the surface water detention area prior to discharge through the culvert. Some preliminary modelling has been undertaken to determine the extent of land to be used as surface water detention and is summarised as:

- Model 1 - 100 yr 24hr full storage condition. All inflow stored within Precinct 4 with fully blocked outlet (assumed storm surge blocking outflow).
 - 1,386,194m³ of storage is required within Precinct 4 to fully contain a 100yr 24hr event
 - Equivalent to 1.25m deep basin for all of the 111ha precinct.
 - or
 - Equivalent to 62.5% of the 111ha precinct at 2.0m deep basin.
- Model 2 - 100 yr 24hr with free outfall via a 1.8m x 1.2m culvert
 - 370,893m³ of storage is required within the precinct
 - Equivalent to 16.75% of the 111ha precinct at 2.0m deep basin
 - Maximum outflow achieved is 8.9m³/s
- Model 3 (100 yr 24hr with outfall via a 1.8m x 1.2m culvert, backwater condition covering 50% of culvert and modelled with floodgate)
 - 375,085m³ of storage is required within the precinct
 - Equivalent to 17% of the 111ha precinct at 2.0m deep basin
- Maximum outflow achieved is 9m³/s

Various assumptions have been made during the modelling analysis and the extent of storm surge on the development, hence the effects are unknown.

Due to the assumptions made and the complexity of the modelling, due to storm surge, it is recommended that a flood risk assessment, including storm surge is undertaken to allow accurate storm water modelling at detail design. This modelling will determine the extent of area in Precinct 4 that will require allocating to storm water storage.

Flooding

Port Hedland is subject to cyclonic events during the wet season, being November to April, with approximately 2-4 cyclones per annum and appears to be the main source of heavy/intense rainfalls and ocean storm surges associated with the flooding.

During a site visit in April 2010 it was noted that the northern most section of Precinct 4, near the culvert beneath the Great Northern Highway, had water logged ground. It was also stated by an airport representative that the ground at this location commonly has standing water throughout the year. Considering the area, information from the airport representative and weather condition at the time, it is possible that this ponding water was due to high ground water table caused by the tidal activity.

The Greater Port Hedland Storm Surge Study Report was released in October 2000, which included the area within this Land Use Master Plan. This report identifies the potential sources of flooding to the Greater Port Hedland Area and predicted the 1 in 100 year extent of flooding to the area. Figure 24 in this report depicts the 1 in 100 year flood plain diagram which shows flooding to Precincts 1, 3 and 4 and possibly the north west area of Precinct 2.

This 1 in 100 year flood plain diagram was reproduced in the following reports

- The Port Hedland Planning Study Report dated September 2003 (Map 4).
- Port Hedland Land Use Master Plan dated September 2008 (Figure 3)
- The Port Hedland International Airport Strategic Master Plan dated November 2008 (Figure 5.2)

The later of the reports highlights a debate on the accuracy of the 1 in 100 year prediction and also stated that there is a general agreement that the 1 in 100 year flood level is approximately RL 7m AHD. As the report is for the airport it may be assumed that this level is for the airport, however it is unclear on the location.

It is recommended that a flood risk assessment is undertaken on the development to determine the flood levels over the whole area of the site, which includes storm surge giving confidence to the finalising of development finished floor levels. Also due to the ponding area in Precinct 4 it is also recommended that a geotechnical investigation is undertaken, which includes at least 18 months, minimum of 2 wet seasons, of groundwater monitoring to determine the average annual groundwater levels across the whole area of the development.

5.1.3 FLORA

The DEC's Native Vegetation Map Viewer was accessed to assess if there are Environmentally Sensitive Areas (ESAs) on site that are protected by clearing regulations under the Environmental Protection Act 1986. No ESA's were identified on site although the site was identified as an area where low impact mineral and petroleum activities cannot occur, as defined under Schedule 1 of the Environmental Protection (Clearing of Native Vegetation) Regulations 2004.

On the 5 May 2010 a search was undertaken on the Department's Threatened and Priority Ecological Communities online database, indicating that there are no known occurrences of threatened ecological communities recorded within the site boundary, or a 20 km radius terrestrial area around the site.

Another initial search was conducted to identify priority flora and fauna in the region using the NatureMap online database. NatureMap is a joint project of the Department of Environment and Conservation (DEC) and the Western Australian Museum, which "presents the most comprehensive and authoritative source of information on the distribution of Western Australia's flora and fauna" (DEC, 2007). Five 'Priority Ecological Communities for Western Australia' were initially identified as occurring in the Pilbara region and potentially occurring on site and are listed in Table 11.

A more detailed search was undertaken for the site by the DEC using the (1) the Department's Threatened (Declared Rare) Flora database, the Western Australian Herbarium Specimen database for priority species opportunistically collected in the area of interest, and the Department's Declared Rare and Priority Flora List. The results of the search are included as Appendix F, and are outlined below.

The WA Herbarium Specimen database search found that six species are listed as Priority 1, two are listed as Priority 2, three are listed as Priority 3 and one is listed as Priority 4 within the Port Hedland Region. None of these specimens were recorded within the site boundaries. The full list of species and exact specimen locations are listed in Appendix G.

Table 11: NatureMap 'Priority Ecological Communities for Western Australia' search results

Community Name	Description	Threats to community	Priority
Burrup Peninsula rock pool communities	Calcareous tufa deposits. Interesting aquatic snails.	Recreational impacts, and potential development; possibly NOX and SOX emissions.	1
Burrup Peninsula rock pile communities	Comprise a mixture of Pilbara and Kimberley species, communities are different from those of the Hamersley and Chichester Ranges. Short-range endemic land snails.	Industrial development.	1
Roebourne Plains coastal grasslands with gilgai microrelief on deep cracking clays (Roebourne Plains gilgai grasslands)	The Roebourne Plains coastal grasslands with gilgai micro-relief occur on deep cracking clays that are self mulching and emerge on depositional surfaces. The Roebourne Plains gilgai grasslands occur on microrelief of deep cracking clays, surrounded by clay plains/flats and sandy coastal and alluvial plains. The gilgai depressions supports ephemeral and perennial tussock grasslands dominated by Sorghum sp. and Eragrostis xerophila (Roebourne Plains grass) along with other native species including Astrebla pectinata (barley mitchell grass), Eriachne benthamii (swamp wanderrie grass), Chrysopogon fallax (golden beard grass) and Panicum decompositum (native millet). It differs from the surrounding clay flats of the Horseflat land system which are dominated by Eragrostis xerophila and other perennial tussock grass species (Eragrostis mostly).	Grazing, clearing for mining and infrastructure and urban development, weed invasion, basic raw material extraction.	1
Stony Chenopod association of the Roebourne Plains area	The association appears to be uncommon. Only one occurrence has been located to date (Roebourne Airport). The community is dominated by Eragrostis xerophila and chenopods growing in saline clay soils with dense surface strew of pebbles and cobbles. This community is likely to be linked with the Cheerawarra land system.	Grazing, clearing, and weeds especially buffel grass.	1
Peedamulla Marsh vegetation complex	Peedamulla (Cane River) Swamp Cyperaceae community, near mouth of Cane River. Plants are unusual.	Grazing, weed invasion, altered surface hydrologic flows.	1

Table 12: Summary of Threatened (Declared Rare) Flora Database search results

Species name	Conservation Code	Conservation Code definition	Latitude*	Longitude*
<i>Abutilon pritzelianum</i>	1	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.	20E42' 33.4"	118E16' 58.6"
<i>Atriplex eremitis</i>	1		20E09' 44.1"	118E58' 25.8"
<i>Gymnanthera cunninghamii</i>	3	Priority Three - 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.	20E20' 16.6"	118E31' 52.3"

* Coordinates are GDA94

Table13: Summary of Declared Rare and Priority Flora List search results

Species/Taxon	Conservation Code	Distribution	Flower Period
<i>Acacia glaucocaesia</i>	3	Karratha, Port Hedland, Mardie,	July-September
<i>Dentella pulvinata</i>	1	Boodarie Stn	November
<i>Euphorbia clementii</i>	2	Port Hedland area, Yarrie	June
<i>Gymnanthera cunninghamii</i>	3	Minilya, Dampier Archipelago,	April, December
<i>Ptilotus appendiculatus var. minor</i>	1	Port Hedland, Boodardee	April, October
<i>Tephrosia andrewii</i>	1	Port Hedland - Broome	April, October

- 1: 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.
- 2: 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.
- 3: 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.

Invasive Species

Invasive species were searched using the EPBC Act Protected Matters tool. The database search returned the results provided in Table 14. Weeds reported here are the 20 species of national significance (WoNS), along with other

introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. Weeds of National Significance status will bring a weed species under national management for the purpose of restricting its spread and/or eradicating it from parts of Australia (National Weeds Committee, 2010).

Table 14 Listed invasive plant species

Plants	Status	Type of presence
<i>Cenchrus ciliaris</i> - Buffel- grass, Black Buffel-grass	Invasive	Species or species habitat likely to occur within area
<i>Parkinsonia aculeate</i> - Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean	WoNS	Species or species habitat may occur within area
<i>Prosopis</i> sp. – Mesquite, Algaroba	WoNS	Species or species habitat likely to occur within area
<i>Salvinia molesta</i> - Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed	WoNS	Species or species habitat may occur within area

Flora Recommendations

No ESA’s were identified on site although the site was identified as an area where low impact mineral and petroleum activities cannot occur, as defined under Schedule 1 of the Environmental Protection (Clearing of Native Vegetation) Regulations 2004. However, proposed development for this site is for light industry only. For clearing purposes the proponent will need to complete Form C1: Application for a Clearing Permit (Area Permit).

The DEC state that the supplied data do not necessarily represent a comprehensive listing of potential rare flora at the site, as the level of detailed information about an area is dependent on the amount of surveys carried out within the specified area. They also suggest that “the receiving organisation

should employ a botanist, if required, to undertake a survey of the area under consideration”. Given these conditions ascribed by the DEC, a detailed flora survey would be required prior to site development to determine the presence of rare or significant species on site.

5.1.4 FAUNA

A search was undertaken for the site, and a 20 km radius surrounding the site, by the DEC (Appendix H) using the Department's Threatened Fauna database, which includes species which are declared as 'Rare or likely to become extinct (Schedule 1)', 'Birds protected under an international agreement (Schedule 3)', and 'Other specially protected fauna (Schedule 4)'.

Table 15 DEC’s Threatened Fauna database search results

Species	Date*	Certainty*	Seen*	Location name*	Method*
Schedule 1 - Fauna that is rare or is likely to become extinct					
<i>Dasyurus hallucatus</i> Northern Quoll	-	1	1	Boodarie/Port Hedland	-
<i>Lagostrophus fasciatus fasciatus</i> , Banded Hare-wallaby, Mernine	-	2	-	Port Hedland	Day sighting
Schedule 4 - Other specially protected fauna					
<i>Aspidites ramsayi</i> , Woma	2001	1	1	Pippingarra	Day sighting
Priority One: Taxa with few, poorly known populations on threatened lands					
<i>Mormopterus loriae cobourgiana</i> , Little North-western Mastiff Bat	2001	2	0	Boodarie	Heard
	2001	2	0	Boodarie	Heard
	2001	2	0	Boodarie	Heard
	2005	1	-	Port Hedland /Pippingarra	Heard
	2005	1	0	Port Hedland /Pippingarra	Heard
Priority Four: Taxa in need of monitoring					
<i>Dasyercus blythi</i> , Brush-tailed Mulgara, Ampurta	2008	1	2	Boodarie	Caught or trapped
<i>Ardeotis australis</i> , Australian Bustard	2001	1	1	Boodarie	Day sighting
	2005	1	1	Port Hedland	Day sighting
<i>Neochmia ruficauda subclarescens</i> , Star Finch (western)	2005	1	30	South Hedland	Day sighting

*Information relating to any records provided for listed species:
 Date - date of recorded observation
 Certainty (of correct species identification) - 1=Very certain; 2=Moderately certain; and 3=Not sure.
 Seen - Number of individuals observed.
 Location Name - Name of reserve or nearest locality where observation was made
 Method - Method or type of observation

In April 2010 the Environment Protection and Biodiversity Conservation (EPBC) Protected Matters Search Tool was used to identify any Matters of National Significance (MNES) that possibly exist on site, as defined by the EPBC Act 1999, and the report is presented in

Appendix I. The search was defined with the following coordinates with an area that covered Lots 11, 15, 16, 29, 31, 253, 2443, and 2444, Great Northern Highway, Port Hedland, and surrounding area. The coordinates of the search are as follows:

Table 16 Coordinates of EPBC Protected Matters Search Tool

LATITUDE	LONGITUDE
20.35618	118.62313
20.38212	188.60196
20.38946	118.60135
20.39497	118.64295
20.38322	118.64907
20.37723	118.63500
20.36132	118.63084
20.36071	118.63047

Threatened species

Threatened species listed under the EPBC Act in any one of the following categories as defined in Section 179 of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act):

- Extinct
- Extinct in the wild

- Critically endangered
- Endangered
- Vulnerable
- Conservation dependent

Table 17 highlights three threatened species protected under the EPBC Act likely to occur within the site.

Table 17 Listed EPBC Act 1999 Threatened Species

Species	Status	Type of presence
<i>Mammals</i>		
Northern Quoll - Dasyurus hallacatus	Endangered	Species or species habitat likely to occur within area
Greater Bilby - Macrotis lagotis	Vulnerable	Species or species habitat may occur within area
Pilbara Leaf-nosed Bat - Rhinonicteris aurantia (Pilbara form)	Vulnerable	Species or species habitat likely to occur within area

Migratory terrestrial, wetland and marine species

Migratory species listed under the EPBC Act are those protected under international agreements to which Australia is a signatory. These include the Japan Australia Migratory Bird Agreement (JAMBA), Republic of Korea-Australia Migratory Bird Agreement (RoKAMBA), the China Australia Migratory Bird

Agreement (CAMBA) and the Bonn Convention on the Conservation of Migratory Species of Wild Animals.

Migratory terrestrial and wetland species were searched using the EPBC Act Protected Matters tool. The database search returned the results provided in Table 18.

Table 18 EPBC Protected Matters Search Tool results

Migratory Terrestrial Species		
<i>Birds</i>	<i>Status</i>	<i>Type of presence</i>
White-bellied Sea-eagle - Haliqetus leucogaster	Migratory	Species or species habitat likely to occur within area
Barn Swallow - Hirundo rustica	Migratory	Species or species habitat may occur within area
Rainbow Bee-eater - Merops ornatus	Migratory	Species or species habitat may occur within area
Migratory Wetland Species		
<i>Birds</i>	<i>Status</i>	<i>Type of presence</i>
Great Egret, White Egret - Ardea alba	Migratory	Species or species habitat may occur within area
Cattle Egret - Ardea ibis	Migratory	Species or species habitat may occur within area
Oriental Plover, Oriental Dotterel - Charadrius veredus	Migratory	Species or species habitat may occur within area
Oriental Pratincole - Glareola maldivarium	Migratory	Species or species habitat may occur within area

Migratory Marine Bird Species		
Birds	Status	Type of presence
Fork-tailed Swift - Apus pacificus	Migratory	Species or species habitat may occur within area
Great Egret, White Egret - Ardea alba	Migratory	Species or species habitat may occur within area
Cattle Egret - Ardea ibis	Migratory	Species or species habitat may occur within area
Listed Marine Species		
Birds	Status	Type of presence
Fork-tailed Swift - Apus pacificus	Listed – overfly marine area	Species or species habitat may occur within area
Great Egret, White Egret - Ardea alba	Listed – overfly marine area	Species or species habitat may occur within area
Cattle Egret - Ardea ibis	Listed – overfly marine area	Species or species habitat may occur within area
Oriental Plover, Oriental Dotterel - Charadrius veredus	Listed – overfly marine area	Species or species habitat may occur within area
Oriental Pratincole - Glareola maldivarium	Listed – overfly marine area	Species or species habitat may occur within area
White-bellied Sea-eagle - Haliqetetus leucogaster	Listed – overfly marine area	Species or species habitat likely to occur within area
Barn Swallow - Hirundo rustica	Listed – overfly marine area	Species or species habitat may occur within area
Rainbow Bee-eater - Merops ornatus	Listed – overfly marine area	Species or species habitat may occur within area

Stygofauna

Groundwater fauna contribute substantially to the biodiversity of Australia. Consideration must be given to the potential presence of groundwater fauna (stygofauna) in groundwater aquifers beneath the site. The presence and distribution of stygofauna in aquifers throughout the Pilbara has been documented, but true population sizes, species distribution and endemism is still poorly known.

Stygofaunal communities typically comprise species found only in very small areas and therefore are vulnerable to changes (Humphreys, 2006). Water abstraction, artificial filling and contamination of aquifers are threats to stygofauna, especially where groundwater drawdown may affect the entire distribution of short-range endemics (Humphreys, 2006).

A study for the BHP Hot Briquetted Iron (HBI) by the EPA indicated that limestone may be present in the HBI study area (west of the Port Hedland Airport and South Hedland) (EPA, 1995). The Western Australian Museum stated that “all developments on limestone should assess for stygofauna”. However the EPA responded that there were conflicting views regarding the presence of limestone in the area, and as such the occurrence of porous substrate including limestone, porous shale deposits and gravels beneath the site should be verified.

Invasive Species

A search for invasive species was undertaken using the EPBC Act Protected Matters tool. The database search returned the results provided in Table 19.

Table 19 Listed invasive mammal species

Mammals	Status	Type of presence
Cat, House Cat, Domestic Cat – Felis catus	Feral	Species or species habitat likely to occur within area
Rabbit, European Rabbit – Oryctolagus cuniculus	Feral	Species or species habitat likely to occur within area
Red Fox, Fox – Vulpes vulpes	Feral	Species of habitat may occur within area

Fauna Recommendations

Two species of mammals classed as “rare or likely to become extinct”, one species of reptile classed as “specially protected”, one species of mammal classed as “taxa with few, poorly known populations on threatened lands” and three species (one mammal, two avian) classed as “in need of monitoring” were identified in the Port Hedland area using the DEC Threatened Fauna database.

The Environment Protection and Biodiversity Conservation (EPBC) Protected Matters Search Tool identified one endangered and two vulnerable mammal species and/or species habitat that are likely to/may occur within the site boundaries.

The EPBC search tool also identified 10 migratory bird species and/or species habitat that are likely to/may occur within the site boundaries. Under the EPBC Act 1999, an action is likely to have a significant impact on a Migratory species if it substantially modifies, destroys or isolates an area of important habitat for the species. A detailed habitat survey would determine if the site comprises important habitat for the listed species, including but not limited to:

- Habitat used by a Migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species.
- Habitat that is of critical importance to the species at particular life-cycle stages.
- Habitat used by a Migratory species that is at the limit of the species' range.
- Habitat within an area where the species is declining.

The DEC notes that "the information supplied should be regarded as an indication only of the threatened fauna that may be present". They also state that the supplied data do not necessarily represent a comprehensive listing of threatened fauna at the site, as the level of detailed information about an area

is dependent on the amount of surveys carried out within the specified area. They also suggest that "the receiving organisation should employ a biologist/zoologist, if required, to undertake a survey of the area under consideration".

The potential presence of stygofauna beneath the site should be determined by verifying the occurrence of porous substrate including limestone, porous shale deposits and gravels beneath the site.

5.2 LAND TENURE & HERITAGE

5.2.1 CROWN LAND

To progress the development of Precinct 3, it will be necessary to acquire the UCL Lot located in the south western corner of the site. This land, Lot 253, equates to 10% of the total site area of the airport, and is critical to providing access and lot yield to the Precinct 3 Land Use Master Plan.

All Crown Land is managed by the Department of Regional Development & Lands [RDL], and the Dept of RDL can and does develop Crown land around the state. However, LandCorp, a development arm of the State, has the first right of refusal to develop Crown Land.

LandCorp is currently preparing plans and Scheme provisions for a Transport Development precinct on land located between the existing Wedgefield Industrial Area and the Airport. This Transport Development precinct will provide for extensive layover, truck and trailer break down and hardstand storage areas.

It is understood that Scheme provisions being prepared will include a specific Transport Development Zone [TDZ] that will limit the use of any land that is zoned for this purpose to specifically vehicular transport related uses.

Given the proximity of this TDZ to the land in Precinct 3 and LandCorp's imprimatur to develop Crown Land, it is logical that LandCorp may have some involvement in the development of the Crown Land in Precinct 3. It seems likely that LandCorp would seek to acquire this land, and initial discussions with LandCorp confirm that Lot 253 is identified as a separate but integral stage in LandCorp's plans to develop and release Industrial land.

Similar to any other agency or developer that seeks to acquire and develop Lot 253, including the ToPH, LandCorp will have to obtain the land. This process

involves resolving native title, as Lot 253 is likely to be subject to Native Title, as well as valuation and purchase of the land.

This acquisition process is likely to result in lengthy time frames, and it is estimated that it is likely to take 2 - 5 years from the time the acquisition commences before the land could be developed.

5.2.2 SITES OF ABORIGINAL SIGNIFICANCE

An Indigenous Heritage search was undertaken on the 6 March 2010 by the Department of Indigenous Affairs (DIA) of the Register of Aboriginal Sites.

Eleven sites of Indigenous Heritage significance were identified at the site. All sites are classified as open access with no site access restrictions (pertaining to gender). The details of each site are summarised below, and records obtained by the DIA are included as Appendix J.

It is an offence under Section 17 of the Aboriginal Heritage Act 1972 to damage or alter both registered and unregistered Aboriginal sites. As per the DIA's 'Application to use land: Section 18 Notices' information, site owners that wish to develop land which on which an Indigenous Heritage site is located need to apply for consent from the Minister for Indigenous Affairs to do so, under Section 18 of the Aboriginal Heritage Act 1972.

Table 20 Indigenous Heritage search results

Site ID	Status	Site type	Additional information	Coordinates (MGA Zone 50 [Reliable])
26699	L	Midden/Scatter	Shell	666968mE, 7747153mN
26700	L	Midden/Scatter	Shell	667229mE, 7747082mN
26701	L	Midden/Scatter	Shell	666847mE, 7746605mN
27816	IR	Midden/Scatter	Archaeological Deposit, Shell	668115mE, 7747838mN
27817	IR	Artefacts/Scatter Midden/Scatter	Archaeological Deposit, Shell	668477mE, 7748038mN
27818	P	Midden/Scatter	Archaeological Deposit, Shell	668230mE, 7748055mN
27819	P	Midden/Scatter	Archaeological Deposit, Shell	668047mE, 7747932mN
27820	P	Midden/Scatter	Archaeological Deposit, Shell	667573mE, 7747639mN
27821	I	Midden/Scatter	Archaeological Deposit, Shell	667417mE, 7747576mN
27834	IR	Midden/Scatter	Archaeological Deposit, Shell	669010mE, 7747844mN
27835	P	Midden/Scatter	Archaeological Deposit, Shell	668975mE, 7747560mN

L Lodged
 IR Insufficient Information (as assessed by Site Assessment Group)
 P Permanent register

5.2.3 NATIVE TITLE

Almost all of the Town of Port Hedland is under Native Title claims. The Airport land is predominantly freehold land, and is subsequently not subject to Native Title, although as previously stated, the UCL lot 253 which forms part of the Study Area is likely to be subject to Native Title.

LandCorp is the State Government’s property and land developer as enacted under the *Western Australian Land Authority Act 1992*. One of the key functions of LandCorp is to dispose of land on behalf of the Crown, public authorities and Local Government. Should the Town seek to sell or subdivide this Lot independently they will need to first acquire the land from the State Government. Alternatively a joint venture with LandCorp may be a viable option.

5.3 INFRASTRUCTURE

The buried pipes and cables associated with the Antenna Air Services Farm exist in the eastern portion of the site, within Lot 2444. Open drains are present in this portion of the site, two of which carry stormwater away from the airport runway to the west.

A search request was submitted to the Town of Port Hedland’s Planning Department, seeking access to historical planning records for the site. Historical applications can be seen below, and in further detail in Appendix K.

Table 21 Proposals for previous infrastructure on site received by the Town of Port Hedland

Lot Number	Proposal	Status
Lot 11	Aerodrome – Royal Flying Doctors Service	Approved with conditions.
	Public Utility – Meteorological office	Approved with conditions.
	Radio Antenna – construction of 3 HF radio antennas	Approved with conditions.
	Erection of communications tower (tower 24 m and highest antenna 7m) at the ASA site satellite ground station	Cancelled.
	Aerodrome – Sea Container addition. Note: 20 foot Sea Container used for the purpose of storing equipment and non-hazardous materials, at HF Transmitter and NDB site.	Approved with conditions.

Lot Number	Proposal	Status
Lots 2443 and 2444	To clear native vegetation for the purpose of creating an accommodation camp - FMG. Note: No planning approval sought, building licence issued. DEC raised no objections to clearance.	Building Licence approved No. 61180 and 71027.
Lot 2444	1202 room Temporary Workforce Accommodation Village (Port Haven). 1202 units on a 12 hectare portion of Pt Lot 2444. DEC – cleared works for Wastewater treatment system.	Conditional approval.
	Temporary Kitchen/diner facilities to cater for initial 200 rooms (relating to Port Haven TWA Village). Notice of Proposal to construct DN120 Water Reticulation Main issued as required under Water Agencies (Powers) Act 1984. Supply of water to be constructed 1320m below ground reticulation water main of 150mm nominal diameter and connected to the village within Great Northern Highway Road reserve.	Conditional approval.

5.3.1 POWER SUPPLY

The existing Power Station to the South of Wedgefield currently has sufficient capacity to serve the development area, however Horizon Power has confirmed that the existing overhead feeder cables will not have capacity to provide a service to Precinct 3 due to the size of the development and the likely power demands.

As stated in Section 3.5.1 Precincts 1 & 2 are currently supplied via overhead power lines, which run to the northern side of the site. The future developments within these precincts have the potential to push the overhead power system to capacity leaving insufficient power for the remainder of the precincts. Generally, for subdivision approvals a WAPC condition is given for the ‘provision of an underground electric supply to service the lots’. This may be applied to this precinct and may be beneficial as a power upgrade is likely to provide the required demand to the precinct. An alternative option may be explored, by extending the new supply to Precinct 3 and is discussed below.

As discussed previously, Horizon Power currently has no capacity to provide a connection to Precinct 3 from any existing adjacent infrastructure due to the size and likely power demands from this industrial subdivision. The existing power station has capacity to serve the development, however a new feeder cable will be required, with this cable connecting direct from the power station to the Precinct. Due to this new feeder cable requirement, consideration should be given to include serving Precinct 4 for possible future alterations and extending this new power network to supply the new developments in Precincts 1 & 2. Common trenching would be recommended to connect additional services from Precinct 3 to the other precincts.

It is not currently recommended in this Land Use Master Plan to provide any major facilities requiring power to Precinct 4. Should future alteration require a power supply then it would be recommended that a feed is provided from the new main suggested for Precinct 3.

Horizon Power generally uses the Western Power UDS Manual for guidance. For non-residential areas the guidance stipulates that a 3 phase power supply

with a minimum requirement of 200KVA/ha is provided to new developments. Should the individual lot require a larger power supply than that supplied then the lot owner can install their own transformer to provide their required power demand.

5.3.2 WATER SUPPLY

Water supplies in Port Hedland are under considerable pressure, and water shortages are an imminent likelihood. Water shortages are likely to limit development potential in the short term. These shortages are currently being investigated, and it is anticipated that a new water source will be available, however, timeframes and infrastructure implications are currently unknown. There may be significant impacts on water supplies, and subsequently development potential, on individual precincts [especially precincts with better short term development potential such as Precincts 1 & 2] as these issues are resolved.

Precinct 1. The existing connection to Precinct 1 is via a 100mm diameter feed off the 150mm diameter main located in the Great Northern Highway road reserve. This main is downstream of the 200mm diameter main that is laid within Precincts 3 & 4 and is discussed in Section 3.5.2. As stated in the previous Section the main surrounding the development area is currently experiencing low pressures, therefore any further demand on this system is likely to cause further pressure loss and possible disruption on the system. To determine the extent of disruption it is recommended that hydrostatic testing is undertaken to clarify the existing capacity on the system and modelling undertaken, including the future demand, to determine the effects of the development. This modelling shall also to include the current fire fighting facilities to ensure adequate water supply and pressures are achieved. A possible solution to the low pressure is discussed in Precinct 3 below.

Precinct 2. Similar to Precinct 1, Precinct 2 is also served from the same 200mm diameter main laid within Precincts 3 & 4, however this main reduces to a 100mm diameter after the connection to Precinct 1. The Water Corporation has confirmed that the Transient Workers Accommodation are connected to this

main, however the connection from the 100mm diameter main to the Port Haven development increases to a 150mm diameter and is believed to be a contributing factor to the pressure loss on the water system. Similarly any further demand on this system is likely to cause further pressure loss and possible disruption on the system. To determine the extent of disruption it is recommended that hydrostatic testing is undertaken to clarify the existing capacity on the system and modelling undertaken, including the future demand, to determine the effects of the development. This modelling is also to include the current fire fighting facilities to ensure adequate supply and pressures are achieved. A possible solution to the low pressure is discussion in Precincts 3 below.

Precinct 3. As discussed in Section 3.5.2, four water mains are laid within this precinct, however the Water Corporation has confirmed that neither of these mains will be suitable to serve this development due to the pressure loss experienced on the existing system. In discussions with the Water Corporation, it has been suggested that a new 300mm diameter main can be provided from the existing elevated tanks, located to the North side of South Hedland (Lot 2519).

This new main would be provided to supply a water and fire fighting supply to the Precinct 3 Industrial subdivision. Due to the type of development proposed in this Precinct a minimum 300mm diameter main with sufficient pressure to meet fire fighting standards must be provided, hence booster pumps on the new system are likely to provide the required pressures.

It would also be beneficial to provide a linkage from this system and connect to the 150mm diameter main located on the Great Northern Highway which feeds Precincts 1 & 2. This linkage, including a booster pump is likely to increase the pressures on this system and will facilitate restoring normal pressures for Precinct 1, Precinct 2 and surrounding properties. Again it is recommended that modelling is undertaken, including the future demand, to determine the effects of the development, including the current and proposed fire fighting facilities to ensure adequate supply and pressures are achieved to the new developments.

Precinct 4. Passive low key uses are planned for some of this precinct and as with Precinct 3, the Water Corporation has confirmed that neither of these mains will be suitable to serve this development due to the pressure loss experienced on the existing system. It is suggested that a connection from the Precinct 3 is provided to serve this area. Relevant modelling of the system would be recommended, as discussed in Precinct 3, to ensure adequate supply.

5.3.3 WASTEWATER

The developments to all Precincts will be required to provide an onsite effluent disposal, due to un-availability of wastewater systems in the area. As discussed in Section 3.5.3, the Water Corporation have no plans to provide a wastewater system for the proposed development area, therefore options were discussed to meet this requirement.

Precinct 1. Due to the small scale developments within this area it is recommended that the individual lots supply, install and maintain an onsite disposal system. Septic tanks are one system that could be installed. However Aerobic Treatment Units are a more advanced multi stage alternative to conventional septic tanks and provide an improved quality of effluent treatment. Some developments are required to treat wastewater and reuse as irrigation, however due to the airport operations, consideration to the extent should be considered to discourage the presence of birds including water fowl.

Precinct 2. Due to the small-medium scale developments within this area it is again recommended that individual developments supply, install and maintain an onsite disposal system. Septic tanks are one system that could be installed. However as discussed in Precinct 1, Aerobic Treatment Units are an advanced multi stage alternative to conventional septic tanks and provide an improved quality of effluent treatment. Some developments are required to treat wastewater and reuse as irrigation, however due to the airport operations, consideration to the extent should be considered to discourage the presence of birds including water fowl.

The Waste Water Treatment Plant serving the Auzcorp Transient Workers Accommodation should be reconsidered. It may be possible to divert this wastewater to new Aerobic Treatment Units to maximise land use. Contamination remediation should be included during this process.

Precinct 3. The lots within this area of the development ranges from 2000m² to over 8ha in area with an overall Precinct area of approximately 360ha. Two options have been considered for this development being: to provide a Wastewater Treatment Plant, which would require a gravity piped system from the lots to the Wastewater Treatment Plant, with pumping stations to lift the sewage as required. This option would also require a corporate body as it is unlikely that the Water Corporation will take responsibility for this option.

The second and preferred option is to again recommend that individual developments supply, install and maintain an onsite disposal system. Option 2 is recommended. Septic tanks are one system that could be installed. However as discussed in Precinct 1, Aerobic Treatment Units are a more advanced multi stage alternative to conventional septic tanks and provide an improved quality of effluent treatment. Some developments are required to treat wastewater and

reuse as irrigation, however due to the airport operations, consideration to the extent should be considered to discourage the presence of birds including water fowl.

Precinct 4. It is not currently within this Land Use Master Plan to provide any facilities, requiring wastewater, however should future alteration requiring wastewater disposal then it would be recommended that Aerobic Treatment Units are used. Some developments are required to treat wastewater and reuse as irrigation, however due to the airport operations, consideration to the extent should be considered to discourage the presence of birds including water fowl.

Guidance for the Aerobic Treatment Units wastewater management can be found on the Department of Health's Public Health Website:

http://www.public.health.wa.gov.au/3/663/2/aerobic_treatment_units.pm

and legislation is also in place for the Aerobic Treatment Units. This code of practice is also located on the same website:

<http://www.public.health.wa.gov.au/cproot/1329/2/ATU%20COP.pdf>

5.3.4 TRANSPORT

Various transport related development issues are associated with the Study Area itself, as well as the operations of the airport. The following details these considerations.

5.3.4.1 ROAD NETWORK

The Great Northern Highway (GNH) provides vehicle access to all Precincts. Preliminary liaison with Main Roads WA indicated that the number of access points and crossovers are to be limited and existing access scenarios to be used wherever possible. New access points would be accepted only as part of rationalisation of existing access points.

Access to Precinct 1 and 2 are recommended to remain predominantly the same, with proposed consolidation of crossovers and access where available. It is intended that the gated southern terminal access road be closed, and access relocated further south. Access to Auzcorp's Mia Mia and Port Haven's TWA's and the State Emergency Services site in Precinct 2 are also recommended to be rationalised in a similar manner.

The Town of Port Hedland freehold land in Precinct 3 is significantly constrained for access, due to the cemetery site and UCL lot 253 encompassing the majority of frontage to GNH. Access issues for Precinct 3 as a whole are further compounded by Main Roads WA's projects currently in the preliminary design stage. These include the GNH realignment project which is proposing an interchange at the intersection of GNH and Port Hedland Road, as well as construction of a bridge along Wallwork Road providing vehicular crossing over the railway line. Both of these projects will further impact the access parameters to GNH, and should be further investigated once design has been finalised.

In addition, Landcorp's development of the Transport Development Zone [TDZ] on vacant land west of the Study Area will also provide a further constraint on future potential access arrangements. Liaison with Landcorp has taken place in this regard to allow for integration of access onto GNH.

Detailed traffic impact assessments, on both the impact of these projects on the Land Use Master Plan areas, as well as the impact of the proposed subdivision land, will be required as further progress is made on potential development of each of the Precincts.

5.3.4.2 RAIL NETWORK

The BHP Billiton railway line currently runs along the southern side of the Study Area. Further expansion of this service is planned, proposed to duplicate the existing line. Although this is not anticipated to directly impact upon the Study Area, it will further reinforce this as a limit on any future expansion of Precinct 3 south.

5.3.4.3 AIR FREIGHT

There currently exists minor conflict between the operations of the RPS terminal and air freight logistics. Although this conflict has remained manageable, as these uses increase in volume of turnover, it is likely this situation will worsen.

It is therefore recommended that land for air freight operations be rationalised and located within a distinct area, providing for future expansion of these operations, whilst providing efficient and separate apron access arrangements.

6. PORT HEDLAND INTERNATIONAL AIRPORT LAND USE MASTER PLAN

This report and the accompanying plans form the Port Hedland International Airport Land Use Master Plan. Specific precinct plans have been prepared for each precinct, and this report should be read in conjunction with these plans, and vice versa.

6.1 PRECINCTS

As previously discussed, the PHIA Land Use Master Plan is divided into Precincts to guide development according to geographic and land use considerations. Each precinct has distinct objectives with specific strategies according to the location and existing and preferred land tenure and land use. Each precinct should provide for a variety of land uses according to the Land Use Master Plan for that specific precinct. However, it is recommended that no commercial or retail land uses not directly related to airport associated uses should be permitted in any of the precincts.

Descriptions of each precinct are detailed below. Proposed zoning for each of the precincts is outlined in Section 7.1.

6.1.1 PRECINCT 1 - TERMINAL PRECINCT

Precinct 1 is the most developed component of the Airport and includes a variety of existing land uses. Most are directly or incidentally related to the function of the runway and terminal uses, and includes car hire, terminal services, Royal Flying Doctor Service and Bureau of Meteorology, as well as freight and General Aviation.

This precinct is currently considered to be cluttered and ad hoc, and does not function optimally. There are a number of land use and activity conflicts within this precinct:

- ➔ Freight, GA and RPT activities are located in close proximity, and need to be separated;
- ➔ There is insufficient car parking for vehicle hire and public car parking; and
- ➔ Outdated facilities such as the Terminal and car parking areas need to be expanded and upgraded.

Additionally, as the airport continues to grow, there will be increased demand for growth in freight and logistics, tourism and vehicle hire. To resolve these conflicts and provide for growth, the purpose of the Land Use Master Plan for Precinct 1 is therefore threefold:

- ➔ Resolve existing land use conflicts by rationalising land uses, especially in close proximity to the Terminal and Aprons;

- ➔ Identify new locations for some existing uses; and
- ➔ Provide for the expansion of land uses as required.

To achieve these objectives the following recommendations are made regarding land use and development:

- ➔ Relocate land uses conflicting with RPT activities and terminal expansion
- ➔ Implement a freight and logistics precinct to accommodate rationalisation and expansion of these uses.
- ➔ Create lots for car hire company operations within close proximity to parking areas and the Terminal
- ➔ Expand public car parking areas
- ➔ Rationalise access and traffic flow
- ➔ Extend the northern and southern GA aprons and accommodate expansion of GA away from RPT activities
- ➔ Create 'cut off' drains to divert stormwater away from the precinct
- ➔ Extend drainage lines and install attenuation basins to adequately manage stormwater
- ➔ Implement landscaping and entry statements to the primary access point from GNH

Significant upgrades to car parking and terminal facilities are proposed. In the longer term, the land identified as 'short term' parking on the Land Use Master Plan can be developed with a multi story car park providing elevated access to proposed new terminal facilities.

Significant modifications to existing drainage network are also proposed to better deal with stormwater drainage in this precinct.

6.1.1.1 LAND USES

The Land Use Master Plan for Precinct 1 has been developed to further categorise land uses into distinct groupings within the precinct. These can be categorised as Airport Operations [such as terminal, maintenance and emergency services], Freight and Logistics, and Airport Commercial [such as GA, RFDS, Vehicle Hire and Tourism].

Accordingly, the Land Use Master Plan allocates land such that uses directly related to Terminal activities, such as parking, storage and workshops are all located within close proximity to the terminal, and uses that conflict with terminal activities, such as logistics and freight, are located within a specific precinct for this purpose. Similarly, commercial airport uses such as vehicle hire and GA and charter services are located within specific precincts. The Land Use Master

Plan creates 32 new lots to accommodate these land uses, with an additional two lots subject to existing lease area modification. The following land use categories are identified within this precinct:

Table 22: Proposed Land Use Categories & Yields

CATEGORY	PROPOSED LAND USES	No LOTS
Airport Operations	Terminal Services, Car Parking, Aircraft fuel supply	NA
Freight / Logistics	Air Freight & Logistics	11
Airport Commercial	Vehicle Hire Compounds, Charter, General Aviation, Tourism	21 (+2)

A number of the Airport Commercial lots are created on the northern side of the BOM site. The use of these lots is dependent on access to the GNH, and their development potential may be impacted on by this requirement. A service or slip road may be required to provide access to these sites. Additionally, it is suggested that the BOM lease could be modified to create additional lots, to both the north and south of this lease area. Lots 1-9, which are adjacent to the runway, are proposed with access to extended northern Aprons to allow for GA uses.

The Freight and Logistics category area is proposed to the east and south of the terminal. This area provides land in close proximity to the apron and runways, whilst having separate vehicular access from the GNH to passenger terminal area. This land will also provide sites to enable resolution of some land use and built form conflicts which currently exist.

There are currently a number of buildings that are located within close proximity to the terminal that conflict with the terminal RPT use, such as the existing freight shed adjacent to the terminal building and Golden Eagle Aviation. It is proposed to relocate these uses over the medium to long term to the Freight and Logistics categorised land, to remove this conflict. While no specific lot allocation is proposed under this Land Use Master Plan, there are sufficient lots created that will be capable of accommodating these land uses. Extensions to the northern and southern GA aprons will facilitate relocation of conflicting uses.

A variety of existing land uses within this precinct are not directly related to these above prescribed use categories. The Royal Flying Doctor Service, Bureau of Meteorology [BOM] and ASA all have infrastructure and buildings located within this precinct. While the

BOM and RFDS leases should be maintained, the ASA building is currently vacant, and any future need for office or storage floor space could be provided for in an alternative location.

The Air BP lease is proposed to be retained with a modified lease area to allow for a proposed road extension and realignment, as well as improved heavy vehicle traffic movement through the site.

The Port Hedland Riders Club lease is not directly related to the purpose of the airport, and should be relocated. It is understood that this is intended to occur, and is currently being undertaken.

The Council Works Depot, situated adjacent to the Riders Club is proposed to be relocated to allow for coherent land use within the Freight and Logistics category area.

Relocation of the Riders Club and Depot are important to provide for rationalisation of access to the airport due to serious traffic conflicts associated with current development on Great Northern Highway. This will provide for a reduction in traffic within the overall precinct, as hire cars will be able to use this new secondary access.

Existing staff housing has been retained in its current location, with additional land set aside for any future need for more on-site housing. This land has been included within the 'Airport Operations Use' land.

Land use areas that are identified as being in conflict with Terminal RPT uses should be encouraged to relocate, and accordingly leases for these sites should not be renewed.

It is unlikely that the number of lots allocated to Freight and Logistics or Airport Commercial land uses will sustain the demand for such land supply within the medium term. Therefore the Land Use Master Plan is intended to identify strategic long term land supply for these land uses, subject to evolving demand and supply factors. It is anticipated that the Land Use Master Plan identifies land supply in the order of 10 - 15 years for Airport Commercial and Freight/Logistics land uses.

It is critical that land uses not consistent with or directly related to Airport activities are prohibited from this Precinct. This is addressed further in Section 7.1.

6.1.1.2 LOT LAYOUT

The design of Precinct 1 is predicated on the existing access roads and land uses. A number of lots are proposed to be created under the Land Use Master Plan for Precinct 1. The table below shows the break up of lots that are proposed to be created:

Table 23: Proposed Lot Categories, Yields & Areas

CATEGORY	No LOTS	LOT RANGE	AVERAGE SIZE
Airport Operations	NA	NA	NA
Freight Logistics	11	2044 - 3246m ²	2535m ²
Airport Commercial	21	2010 - 2.32ha	3,800m ²

This assessment excludes Lot 10, due to its size. This lot has been identified for a potential Hotel/Shirt Stay Accommodation use, and is required to be large enough to accommodate this use.

Lots are proposed to be located along extended northern and southern GA Aprons. This will provide for expanded logistics, freight and charter GA services. Additionally, lots are proposed to be created for vehicle hire companies.

Once these lots are created, they can be sold. Freehold land ownership in this precinct is not considered to be detrimental to the future of airport operations, and will be an important method of raising capital for upgrades to terminal and parking facilities.

Along with lots for Airport Commercial, Freight and Logistics lots, it is recommended that lots are created for specific airport related land uses:

- ➔ Short and Medium and Long Term Car Parking
- ➔ ToPH Airport Housing
- ➔ Operations and maintenance

6.1.1.3 TRANSPORT AND ACCESS

Public access to Precinct 1 is currently off Great Northern Highway. A secondary access point with no public access is located to the south of the public access point. Proposed access to Lots 1 - 4 will depend

on land use and demand, and may be problematic due to the requirement for an additional access point to the GNH.

It is recommended that the public access to this precinct be landscaped and better delineated to provide a landmark gateway to the airport terminal.

The existing secondary access point is currently restricted, and is used for airport operations and refuelling of aviation fuel facilities. It is proposed to relocate this access to provide improved vehicle movement to the expanded freight and logistics precinct. This will provide increased separation to other access points on the highway. General public access should not be provided through this new entrance. The proposed ne access may provide for a connection to the service road proposed to provide access to Mia Mia and the SES sites within Precinct 2.

As part of the redesigned layout of lease areas and road access, the emergency access points to the aprons and runway have been relocated. These remove restrictions on the extension of the RPS terminal and RFDS lease, whilst providing efficient emergency vehicle access and movement.

6.1.1.4 DRAINAGE

The drainage system proposed in Precinct 1 follows the recommendations provided in Section 5.1.2 of this report. The existing drainage has been relocated in order to integrate with the proposed roads and realignments of existing roads. The length of the drainage course has been significantly lengthened to enable increased capacity to better attenuate heavy rainfall and flooding scenarios. Two detention/infiltration basins have also been proposed to further increase capacity.

To the south of the Freight and Logistics lots, it is proposed to construct an earth bund to redirect drainage off the runway away from the main apron, and into the drainage system within the road reserve. A drainage swale also runs along the extended apron north of the terminal, directing run-off north towards Precinct 4.

6.1.2 PRECINCT 2 - EASTERN PRECINCT

Precinct 2 has been predominantly developed with two Transient Workforce Accommodation developments; Auzcorp’s Mia Mia site, and the 2000+ person Port Haven site. ASA’s navigation and communications infrastructure is also located within this precinct, consisting of the NDB and a High Frequency Radio Antenna Array as discussed in Section 3.4. The State Emergency Service depot is also located within the precinct, to the south-east of the Mia Mia encampment.

Development within this precinct must recognise existing land uses to ensure that conflicts are minimised. Additionally, it is recommended that long term use of the land is embargoed to ensure that any long term requirement for the use of this land for airport related uses can be pursued. Accordingly it is recommended that this land, even if subdivided, should be leased, and not sold to developers. This will ensure that the land is protected for the long term.

6.1.2.1 LAND USES

Only land uses compatible with existing Precinct 2 land uses and that will not impact on the NDB or Antenna Array should be considered for this Precinct. Land uses considered compatible with these uses are:

- ➔ Transient Workers Accommodation
- ➔ Transport Development [consistent TDZ draft Scheme provisions]
- ➔ Hotel/Motel

This precinct provides for subdivision into multiple lots, or development of a single lot, depending on proposed land use and requisite lot sizes. If smaller lots are required, a range of lot areas can be provided, while if a large TWA similar to the Port Haven TWA is required, a single lease could be pursued. This is demonstrated on the precinct plan.

Again, it is critical that land uses not consistent with or directly related to Airport activities are prohibited from this Precinct. This is addressed further in Section 7.1.

6.1.2.2 LOT LAYOUT

The layout of lots within Precinct 2 will be dependent on the type/s of land uses that are located on the land, determined by land use controls as well as demand side factors. Two options are proposed,

one providing 11 new lots, 2 of which require relocation of existing evaporation ponds serving the Mia Mia TWA. The alternative proposes a single lot for a large scale use, such as a TWA encampment.

Table 24: Proposed Lot, Areas & Yields:

Option	LOT SIZE RANGE	No LOTS
1	1ha - 2ha	6
	2-5ha	4
	5ha +	1
2	30 ha	1

Modification of the Port Haven TWA lease area has been proposed, to rationalise the boundary alignments and include the treated wastewater disposal site within the designated lease area.

An easement has also been proposed between Lots 7 and 8 to protect water pipeline infrastructure.

6.1.2.3 TRANSPORT AND ACCESS

Access to developable portions of Precinct 2 can be provided off GNH. If subdivided into multiple lots, access can be provided via a loop road system that would theoretically provide access for trucks and potentially road trains.

Given that there are multiple access points along this stretch of the GNH, access to the Mia Mia TWA and SES depot can be rationalised to reduce the number of access points on to the GNH. Alternatively, should this precinct be utilised by a single owner, a single common access could be developed that would also provide access to the SES and Mia Mia sites.

The access arrangement to and from the ASA infrastructure to the runway, has been modified to reflect the proposed lot boundaries.

Landscaping has also been proposed along GNH to provide a visual buffer as well as a potential entry statement to the additional land uses.

6.1.3 PRECINCT 3 - SOUTH WESTERN PRECINCT

Precinct 3, while constrained by height limits from DVOR and DME infrastructure [see Section 3.4], has significant potential for subdivision and development. This precinct can yield over 250 lots, ranging in size from 2000m² to over 20ha. Restrictions to land uses will be required to ensure that the operating parameters of the DVOE and DME are not detrimentally affected. This is discussed further in Section 7.

Subdivision of this precinct will require access from GNH. Limited points are available to access the ToPH land due to UCL lot 253 and the cemetery site consuming the majority of the frontage to GNH. As a result only one location for access is available, situated on the northern side of the ToPH cemetery.

The subdivision of Precinct 3 is a logical expansion of the Wedgefield Industrial Area and the TDZ currently being planned for by LandCorp. Additionally, the presence of the runways and railway lines further limit the potential for this land to be developed for anything other than Industrial purposes.

The existing ToPH Incinerator and ASA Fire Training Module currently located within this precinct will be required to be relocated. These pieces of infrastructure are not considered to be significant, and alternative locations should be able to be readily identified. Given that Precinct 4 is constrained by access and hydrology issues, these may be able to be relocated to this precinct, although other suitable locations should be able to be readily determined.

6.1.3.1 LAND USES

As discussed above, logical use and development of this land is to extend and integrate industrial and transport uses, both existing within the adjacent Wedgefield Industrial Area as well as proposed as part of LandCorp’s TDZ [providing specifically for transport laydown, vehicle break down and storage areas]. The expansion of industrial uses into this land was also identified within the LUMP.

The substantial available developable land area of Precinct 3 presents the potential to provide for a considerable range of lot sizes that cannot be provided in other areas of the township capable of being developed for Industrial land use purposes. Significantly, it can provide for larger lots in the range of 10 to 20 hectares should market demand require.

However, land uses within this precinct, specifically those with the ToPH land, will be constrained by heights restrictions, as identified

Section 3.4. Detailed analysis in this regard should be undertaken by, or in conjunction with, CASA and ASA, to ensure the necessary land use controls are implemented – discussed further in Section 7.

6.1.3.2 LOT LAYOUT

Lot sizes within this precinct range from 2000 square metres to over 20 hectares or 200,000 square metres. This represents a significant lot variance capability. The following table demonstrates the projected lot yield, divided into land owned by the ToPH and UCL.

Table 25: Lot Ownership, Areas & Yields

LOCATION	LOT SIZE RANGE	No LOTS
ToPH Land	2000 sq m - 5000 sq m	13
	5000 sq m - 1 ha	13
	1 ha - 2ha	23
	2 ha - 4 ha	11
	4 ha - 8ha	9
	8 ha +	8
UCL	2000 sq m - 5000 sq m	94
	5000 sq m - 1 ha	21
	1 ha - 2ha	3
	2 ha - 4 ha	3
	4 ha - 8ha	2
	8 ha +	0

Lots have been designed to be evenly shaped and sized to accommodate Industrial land uses. Larger lots are generally located further into the subdivisional area, as these are likely to be less reliant on public access. Lots located within the UCL component of the precinct are generally smaller, and represent an extension of the proposed industrial land on the opposite side of Wallwork Road. Lots along the major arterial roads have also been proposed with smaller areas for commercial purposes, as have lots with exposure along GNH.

Lots affected by the water pipeline and fibre optic cable easements will require additional land area to compensate prospective purchasers for this burden, and allow an appropriate land area for development.

A parcel of land of approximately 50 hectares in area has also been identified in the Land Assembly Plan for Precinct 3, for potential development of a Department of Defence base, as per the ToPH's request. Should this base proceed, this will not impact upon the traffic movement or drainage for the rest of the Precinct. The Land Assembly Plan also identifies the strip of land closest to the runway as a potential buffer to any future second runway, should the need be confirmed.

6.1.3.3 TRANSPORT AND ACCESS

The proposed road network within this precinct provides for a permeable circular traffic movement, designed for industrial traffic. This allows for road trains to easily traverse the road system. Two main entry points are proposed into the precinct. The northern access on the northern side of the cemetery provides road train access to and from the subdivision. Larger lots are all accessible from the northern access point off Great Northern Highway to ensure road train access to these larger sized lots. A roundabout is proposed to provide access into the subdivisional area off Wallwork Road. No road train access will be permitted off this roundabout access.

A road interface with the UCL is provided to account for the untimely acquisition of the UCL. If this acquisition does not occur within a satisfactory timeframe the two components can be integrated when subdivision of the UCL takes place.

The road network also accommodates a corridor for the existing 300 mm water main traversing this precinct. The road reserve within which this main lies is 50 metres in width to accommodate this infrastructure together with the road carriageway and a swale drain to provide for stormwater drainage. Several roads within this precinct are proposed to be 40 metres wide to accommodate the road carriageway and a swale drain, while roads where drainage will only occur within the carriageway are proposed to be 30 metres in width to provide for industrial traffic and road trains.

A critical issue for access and transport in this precinct will be the acquisition of the UCL at the western side of the site, as this UCL provides for access to Wallwork Road. Without the access point provided by the UCL, a single entry point on the northern side of the cemetery would provide the only access point to the Precinct. While this access will be sufficient, it provides less road frontage and visibility to land uses within the proposed subdivisional area.

Also of consideration to future access and traffic considerations are the Main Roads projects discussed in Section 5.3.4, which are currently in the preliminary design stage. The impacts of these projects on the proposed access and traffic flows will need to be examined in detail once they are further progressed.

6.1.4 PRECINCT 4 - NORTH WESTERN PRECINCT

The North Western Precinct is located at the junction of Great Northern Highway and Port Hedland Road. This precinct is bounded by the GNH, which effectively 'wraps' around the precinct, and both runways. This land has some clear physical characteristics [discussed in detail in Section 3.5] that result in the land likely being subject to inundation. Combined with buffers and access issues due to its locational constraints, this Precinct is the most prohibited for development potential.

6.1.4.1 LAND USES

Given the location of the site, hydrological and access issues, this Precinct is only suitable to be used for 'passive' uses over active land uses such as industrial or commercial development. Hydrological and operational issues are unlikely to be able to be overcome.

Passive uses constitute land uses that generate little traffic or access requirements, and don't require significant development other than earthworks. Land uses such as plant or turf farm, solar farm, wind farm or long term storage would suit this precinct. Public utilities such as a waste water recycling plant could also be considered.

Uses such as plant or turf farms and solar farms, however, generate potential conflicts with aircraft, such as attracting birds in the case of plant farms or reflections and glare in the case of a solar farm. These uses will require careful consideration prior to implementation. It is noted that solar farms have been developed on airport land in other locations, such as Alice Springs airport, and may be suitable, subject to design considerations to ensure glare does not affect aircraft.

A wind farm would need to comply with OLS requirements, however, it is considered that a wind farm can be accommodated, and would be an excellent use of the land.

Storage, such as the Transport Development Zone proposed on the other side of the Highway, would be suitable, however, may not be aesthetically acceptable, and access may be problematic. Notwithstanding aesthetics, this use would be compatible with proposed adjoining land uses, and if access and aesthetics can be resolved, part of the land that is not subject to inundation could be utilised.

Another use that may be permitted in this precinct is a 'Fly In Estate'. An estate of this type provides a taxiway from a runway to an area of land that can be developed with aircraft hangers and a dwelling, either separate or on top of the hanger, and allows for residents to park aircraft within the estate. Given the high costs involved [taxiways and apron costs would have to be absorbed onto the estate costs] demand for this type of development is not likely to be high, however, this type of development is a recent innovation.

Given the constraints on Precinct 4, this use may be suitable, as it is unlikely to generate significant traffic, and can utilise proximity to the secondary runway.

Any land uses proposed for this precinct will require careful consideration, as well as development provisions to accommodate minimum floor levels to ensure it is not subject to inundation, as this precinct is identified as potentially subject to inundation as discussed above.

6.1.4.2 LOT LAYOUT

Due to proximity to the Port Hedland Road, access restrictions are likely to result in a single or limited entry points into this precinct from Great Northern Highway, and will limit access to any subdivision or development of the site. Lot sizes and lot layout will be dependent on the ultimate use of the land, and have not been shown for this reason. No lot yield is able to be projected for this Precinct, given that no intensive land uses are likely.

Figure 7: Port Hedland International Airport Land Use Master Plan

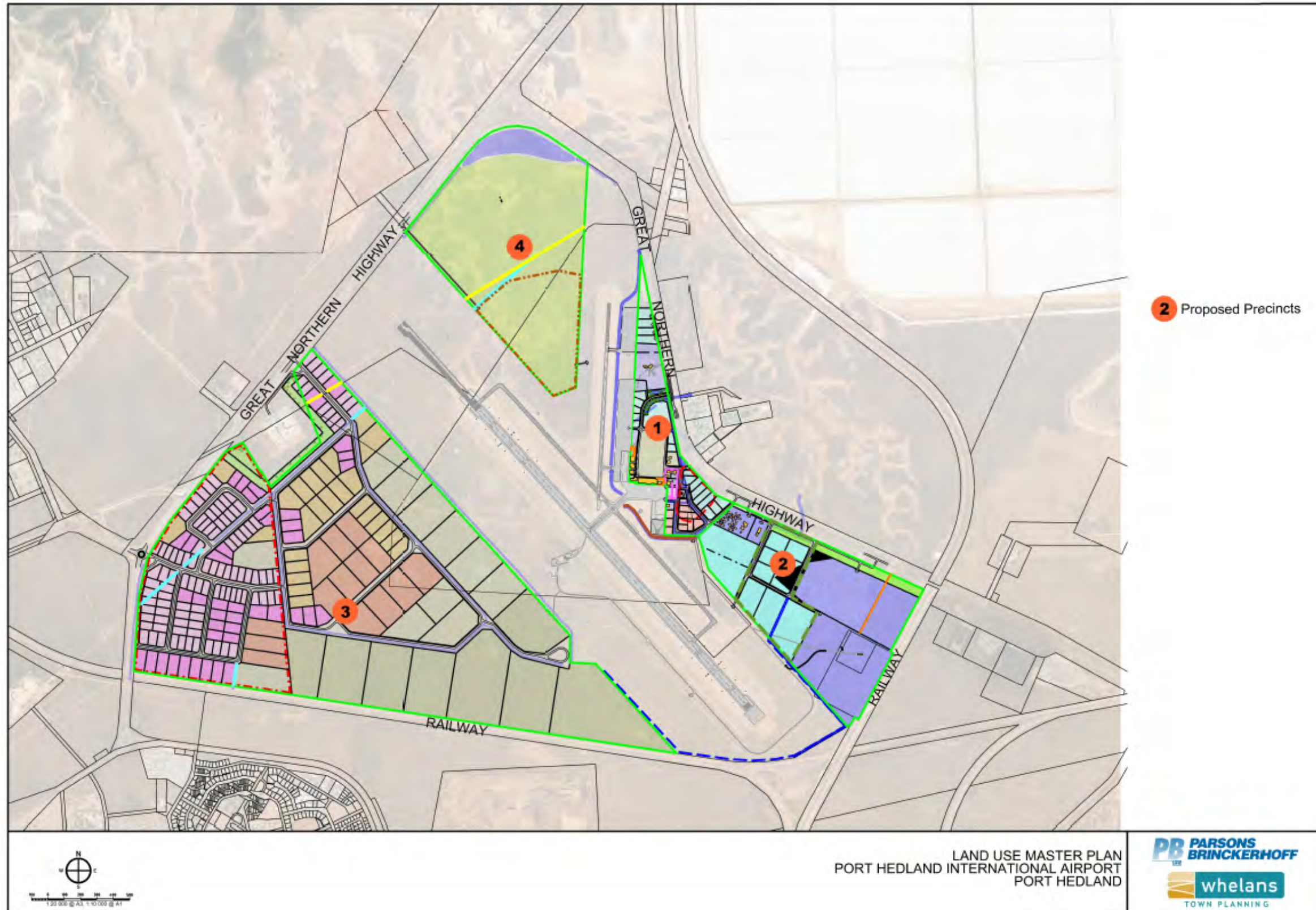


Figure 8. Land Use Master Plan - Precinct 1 Land Use Master Plan

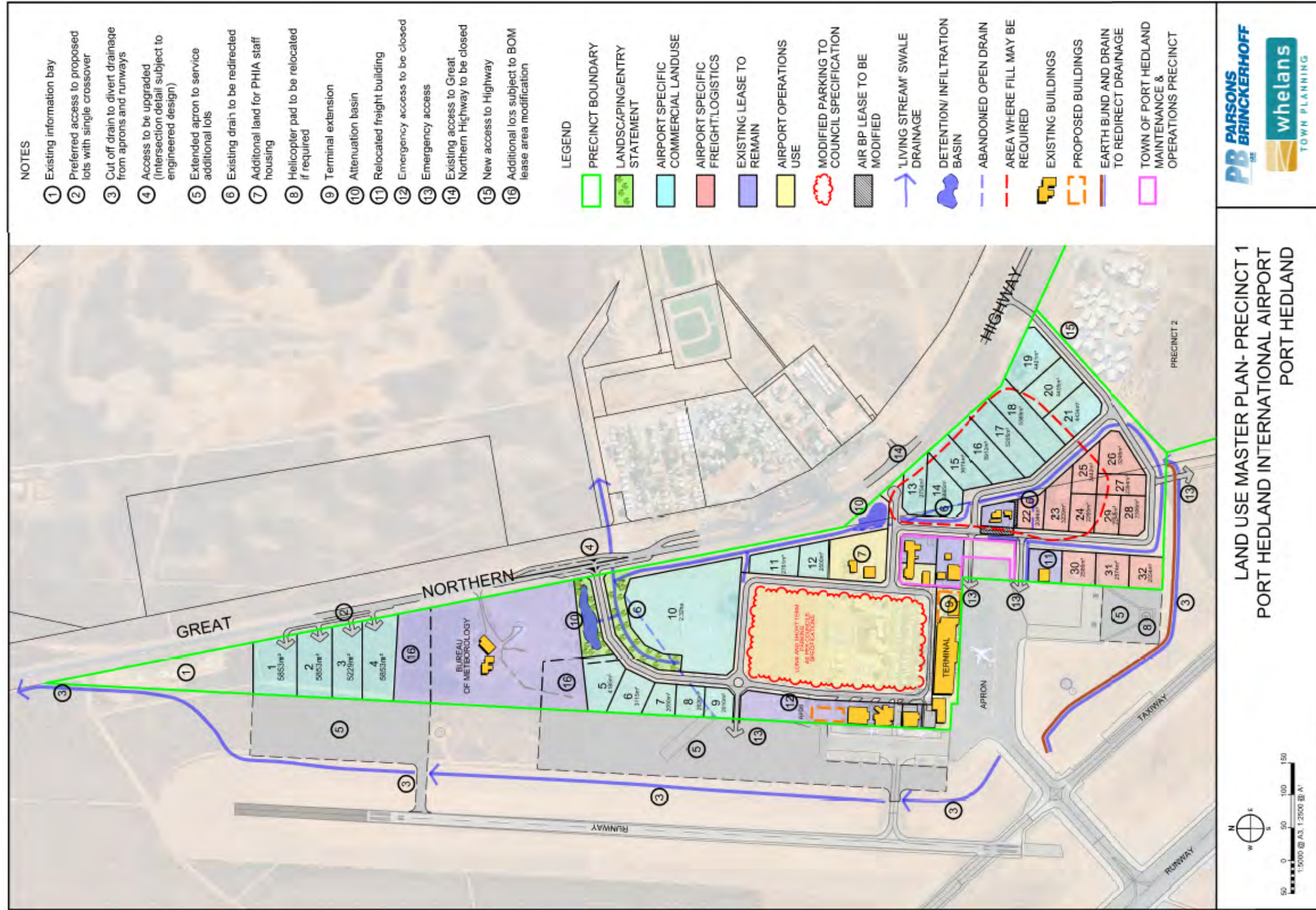


Figure 9. Land Use Master Plan - Precinct 1 Detail

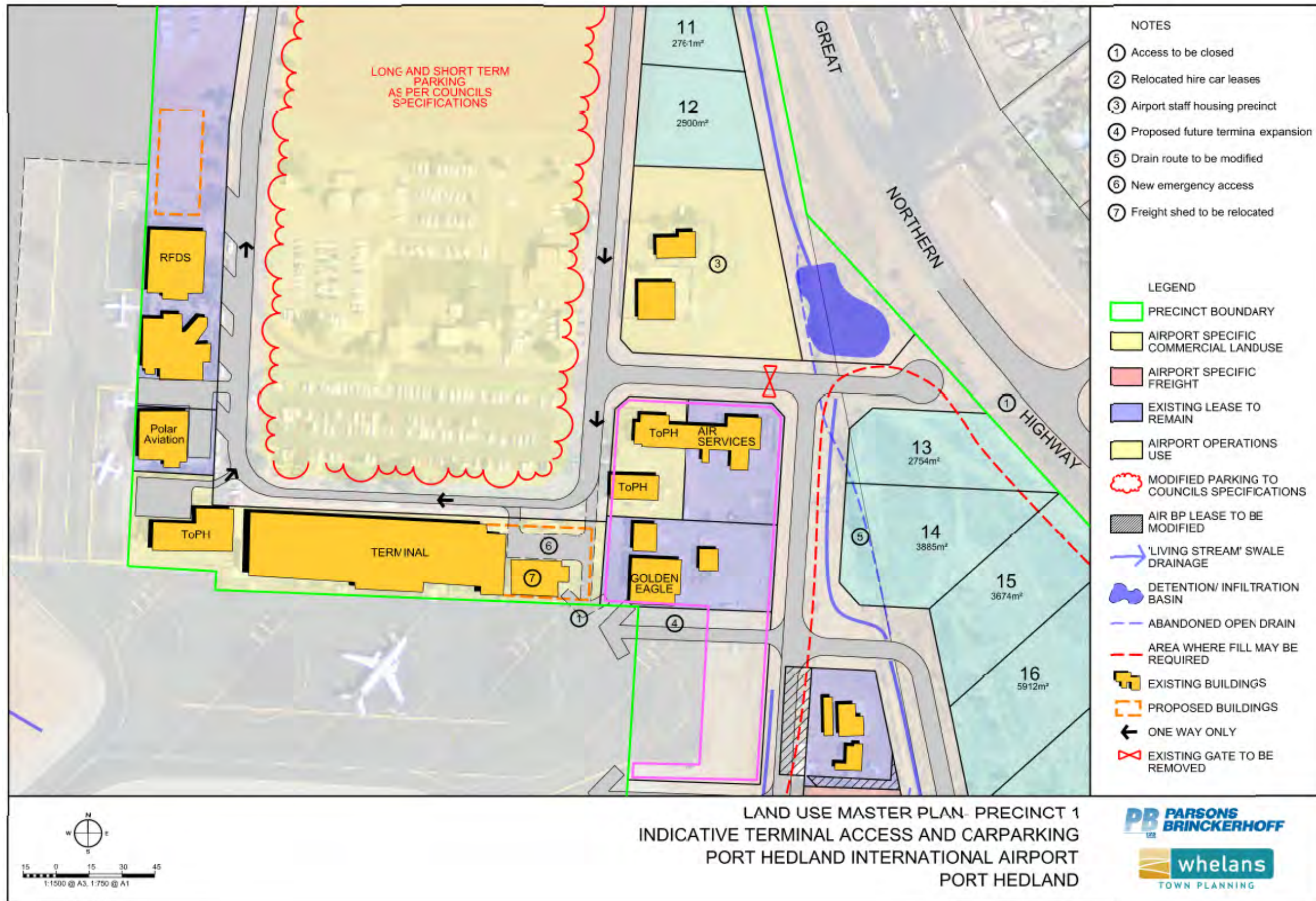


Figure 10. Land Use Master Plan - Precinct 2

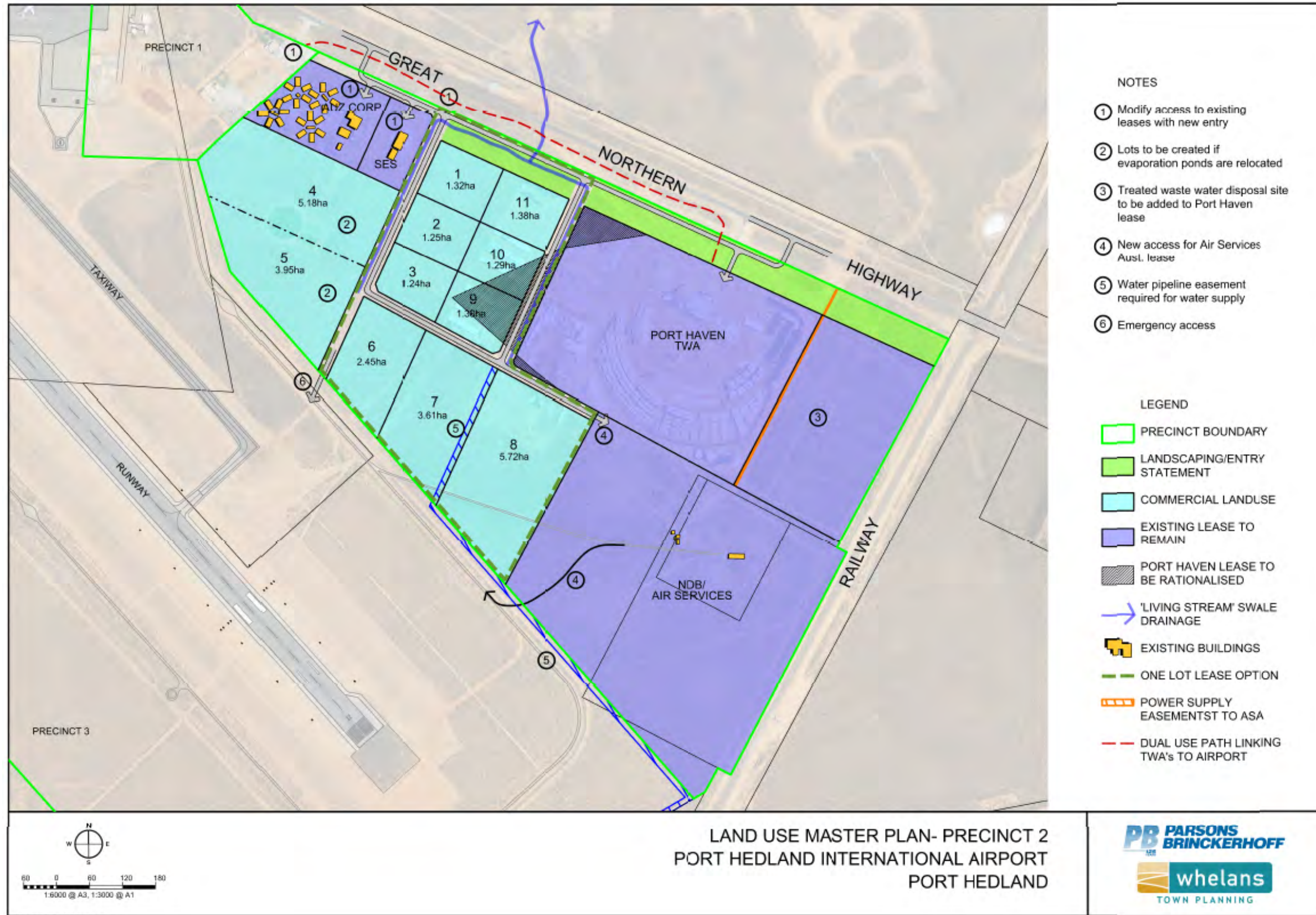


Figure 11: Land Use Master Plan - Precinct 3

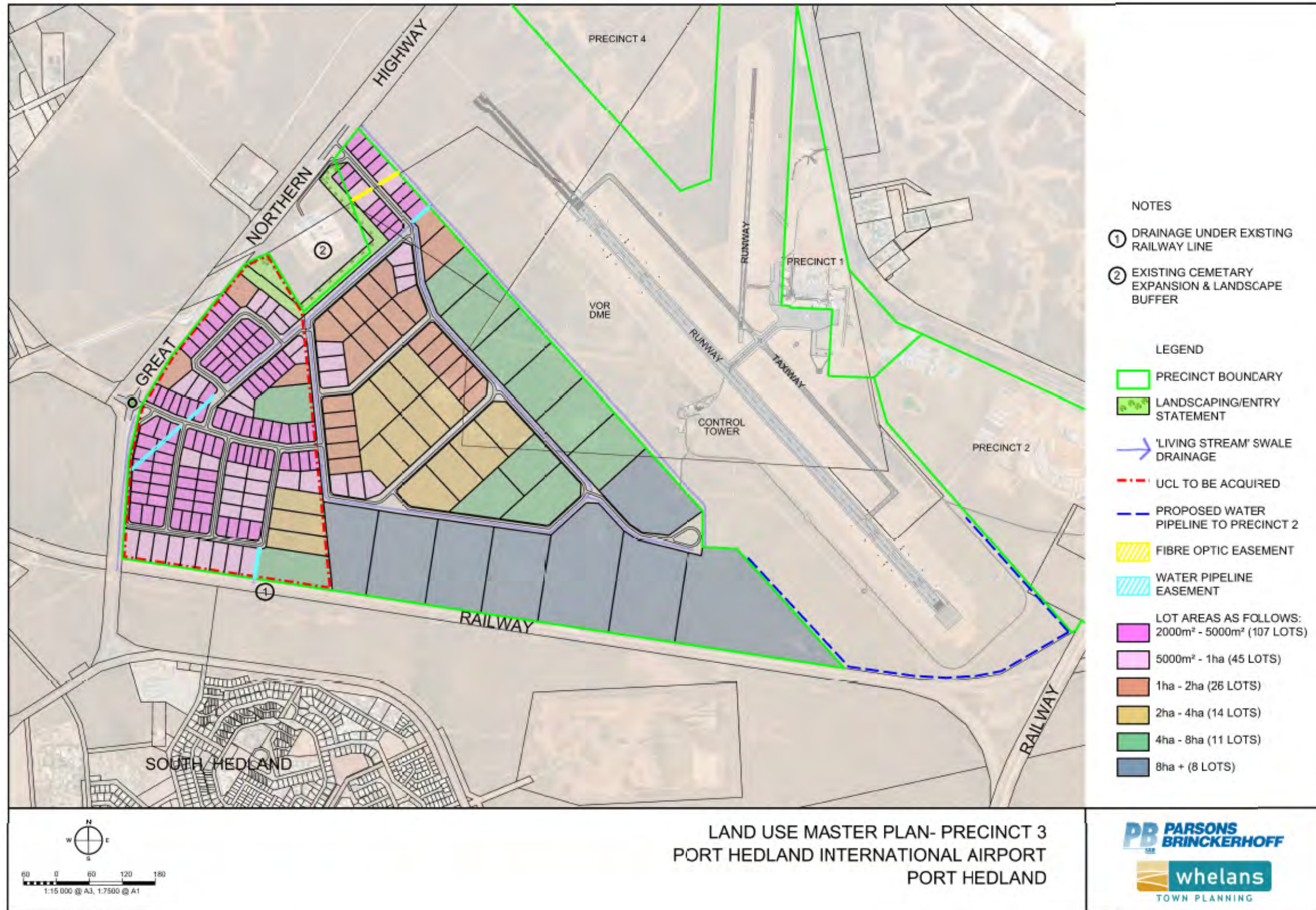


Figure 12: Precinct 3 - Land Assembly Plan

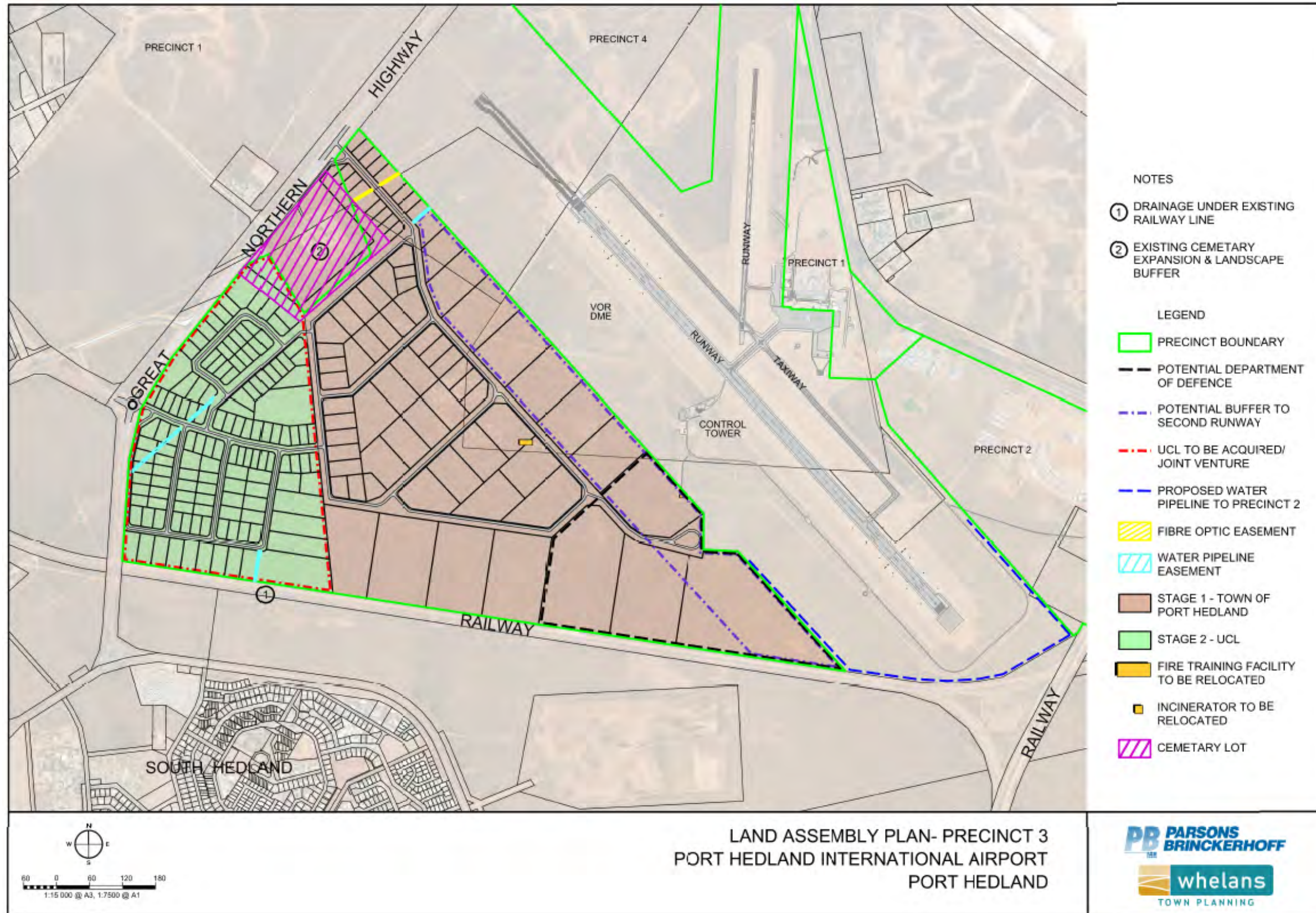


Figure 13: Land Use Master Plan - Precinct 4



7. CONSULTATION & ADVERTISING OF DRAFT REPORT

During preparation of the report, a number of agencies were consulted, primarily for the purpose of obtaining data and input, to ensure the report reflect accurate and updated available data. Additionally, discussion with the Shire was ongoing during the preparation process. This included reference to the Shire’s Airport Manager, Planning staff and Engineering staff. A number of changes were made during preparation of the report in response to comment from the Shire.

The report was also provided to the Shire’s Airport Committee, and at a meeting of the Airport Committee, the Land Use Master Plan was presented. At this presentation, all opportunities and constraints were discussed, and each Precinct was discussed in detail.

Again, a number of comments made by the Committee during the presentation were incorporated into the draft report.

The draft report was advertised for public comment, and was also referred to specific agencies and stakeholders for comment. This process was undertaken by the Town of Port Hedland.

During this process, 4 submissions were received. Where appropriate, comments were incorporated into the report and plans, as per actions within the Summary of Submissions. Submissions and responses to them are contained within Table 26 below.

Table 26: Summary of Submissions:

No	Agency/Person	Comment	Response	Comment	Action
1	Main Roads WA	Main Roads WA [MRWA] is investing significantly in realignment of Great Northern Highway [GNH]	Note	Nil	Nil
		Impacts of subdivision and development of Precincts 1-3 will be significant. A traffic Study is required to assess impacts of traffic on Great Northern Highway.	Support	Not required as part of Land Use Master Plan process which is conceptual only. Traffic Study should be undertaken as planning of Precincts 1-3 progresses	Traffic assessment during rezoning and subdivision of Precincts.
		Realignment of GNH north of Precinct 2 should be considered	Note	Development on northern side of GNH near Airport is being redeveloped. Conditions of approval should be conditioned to require modification to access and egress to GNH. Assess during traffic assessment referred to above.	Develop set of conditions for development on northern side of GNH [Lots]
		A plan showing road network should be included.	Note	Plans show existing regional road network.	Nil
		Drainage impacts on GNH needs to be reviewed	Support	Report includes reference to requirement for drainage design to be considered in conjunction with MRWA	Drainage assessment during rezoning
		Flood Assessment needs to be undertaken	Note	Report includes requirement for Flood Assessment	Hydrological assessment during rezoning.
		Upgrade of existing terminal access is supported	Note	Nil	Nil
		Access on Northern side of GNH requires review	Support	Review of existing access on Northern side of GNH should be undertaken	Traffic assessment during rezoning or subdivision of Precincts.
		Creation of Commercial lots abutting GNH not supported	Note	Report accepts that design review may be required when detailed design occurs.	Traffic assessment during rezoning or subdivision of Precincts.
		Pedestrian access across GNH should be reviewed	Support	Not assessed in Land Use Master Plan, but review is supported	Traffic assessment during rezoning or subdivision should include pedestrian access assessment.
		Rationalisation and reduction of access points is supported	Note	Report suggest rationalisation and reduction	Nil
		No drainage basins should be located within GNH road reserve	Note	Drainage basin is located within Airport Boundary	Nil
		No service roads to be located within GNH road reserve	Note	Plans modified as such	Nil
		No road train access permitted within Precinct 3.	Note	Detailed traffic assessment to determine level of access for Precinct 3.	Traffic assessment during rezoning or subdivision of Precincts.

		<p>Precinct 3 access near Cemetery to be designed to meet minimum separation distances</p> <p>Development of Precinct 3 subject to implementation of realignment of GNH in 2013</p> <p>Inclusion of UCL important to development of Precinct 3</p> <p>Design of Precinct 3 dependant on bridge over railway on Wallwork Road</p> <p>Access to Precinct 4 is constrained by development of realignment of GNH</p> <p>Level of consultation is not referred to in report</p>	<p>Support</p> <p>Note</p> <p>Note</p> <p>Note</p> <p>Note</p> <p>Note</p>	<p>LandCorp TDZ to be modified such that access can be provided to Precinct 3 - included in report. Consultation took place with LandCorp to this effect.</p> <p>Precinct 3 is extremely unlikely to be developed prior to realignment of GNH, and is more likely 5-7 years from any on ground subdivision or development works. GNH works are scheduled for 2013. Additional works such as rezoning, subdivision and civil works are required prior to development of Precinct 3.</p> <p>Report reaches same conclusion, and this is a specific recommendation in the report.</p> <p>Design incorporates sufficient separation distance to railway, and was modified to provide such distance after consultation with MRWA Port Hedland office and LandCorp</p> <p>Report reaches same conclusion. Access to Precinct 4 is identified as light service vehicles on an irregular basis only, and land uses proposed reflect this.</p> <p>Consultation with MRWA took place as part of preparation of the report, and all comments were incorporated into the report eg Wallwork Road railway bridge. This occurred with the Port Hedland office of MRWA. Formal referral to MRWA occurred as part of advertising process, and draft report has been modified to reflect this.</p>	<p>Continue discussions with LandCorp to ensure TDZ access is modified.</p> <p>Nil</p> <p>Nil</p> <p>Nil</p> <p>Nil</p> <p>Nil</p>
2	Department of Transport	<p>Department of Transport commends ToPH for undertaking Mater Plan process.</p> <p>Land Use Master Plan should be long term – 2025 and beyond</p> <p>Further consultation as Land Use Master Plan and planning processes proceed would be appreciated</p>	<p>Note</p> <p>Note</p> <p>Note</p>	<p>Nil</p> <p>Land Use Master Plan timeframes are for 10 years, beyond which review is required.</p> <p>Further consultation is recommended in Land Use Master Plan. Additional consultation will be undertaken during both rezoning and subdivision stages.</p>	<p>Nil</p> <p>Nil</p> <p>Nil</p>
3	Pilbara Assoc of Non-Government Organisations [PANGO]	<p>PANGO has repeatedly advocated for affordable housing due to high rents and cost of living in Pilbara, significant issues with Homeswest waiting lists and social housing crisis. Lack of affordable housing causing significant hardship.</p> <p>PHIA Land Use Master Plan focus is on commercial aspects and transient workforce accommodation, rather than affordable housing. No mention is made on the need for community sector accommodation.</p> <p>Comment on Hedland Future document</p>	<p>Note</p> <p>Note</p> <p>Note</p>	<p>Town of Port Hedland is working with all government sectors to address housing affordability issues.</p> <p>Airport is not an appropriate location for traditional housing, and workforce accommodation is transient only.</p> <p>Nil</p>	<p>Nil</p> <p>Nil</p> <p>Nil</p>
4	Greg Rowe and Associates on behalf of Complete Hire and Sales Pty Ltd	<p>The submission relates directly to proposed Lots 11-21 located within Precinct 1. Seeking allowance of Short Stay Accommodation within land designated as Airport Specific Commercial</p> <p>Client intends to expand land use potential of Lots 11-21 for short stay accommodation.</p>	<p>Note</p> <p>Note</p>	<p>Council plans include provision of short stay accommodation at the airport, on Council owned land, in a co-ordinated manner that allows for centralised location, in conjunction with multi story parking facilities, and does not detrimentally affect strategic airport uses such as vehicle hire, logistics and tourism.</p> <p>Client does not have any tenure over the land. Subject land is identified for, and is currently in process of being leased to hire car companies.</p>	<p>Nil</p> <p>Nil</p>

	<p>Subject site is strategically located within proximity to airport terminal and GNH</p> <p>Client does not have definitive development plans, however, intends to develop Lots 11-21 for short stay accommodation, by removing the central access road to create a single development area.</p> <p>Treating the land holdings as a single entity creates more flexibility.</p> <p>A plan showing intended amalgamation is included in submission</p> <p>There is a shortage of affordable housing in the Pilbara including South and Port Hedland. The provision of short term accommodation for travellers is necessary, and supply of short term accommodation within Port Hedland and South Hedland is at capacity.</p> <p>Increase in traveller numbers will increase demand for short stay accommodation in convenient location.</p> <p>The ToPH Strategic Plan 2010 – 2015 identifies ‘Airport Housing’ as an immediate priority.</p> <p>The ToPH Strategic Plan 2010 – 2015 refers to increasing passenger numbers from 280,000 to 450,000, and the town will need to address current accommodation shortage.</p> <p>Land Use Master Plan fails to consider current housing shortage as well as future accommodation needs and demand at the Airport.</p> <p>Submission advocates use of subject land identified for hire car companies for short stay accommodation</p> <p>Other Airports allow for Short Stay accommodation [gives examples]</p>	<p>Note</p> <p>Dismiss</p> <p>Dismiss</p> <p>Dismiss</p> <p>Note</p> <p>Note</p> <p>Note</p> <p>Dismiss</p> <p>Dismiss</p> <p>Dismiss</p> <p>Dismiss</p> <p>Dismiss</p>	<p>It is agreed that the subject land is strategic, and accordingly is important to be retained for uses that are strategic to airport operations. A fundamental aspect of this report and the Land Use Master Plans is the protection of operational aspects of the airport.</p> <p>Council owns the land, and the scope of works for the preparation of the Land Use Master Plan specifically precluded non-airport uses on the subject land.</p> <p>Council owns the land, and the scope of works for the preparation of the Land Use Master Plan specifically included the objective of creating a minimum of four 4000m² parcels of land for vehicle hire companies. Amalgamation of the lots would prohibit this outcome.</p> <p>Council owns the land, and the scope of works for the preparation of the Land Use Master Plan specifically included the objective of creating a minimum of four 4000m² parcels of land for vehicle hire companies. Amalgamation of the lots would prohibit this outcome.</p> <p>Housing shortage is documented. Airport is not an appropriate location for traditional suburban housing</p> <p>Address through provision of short term accommodation in Port Hedland and South Hedland</p> <p>Agreed, however, this should not be at expense of other strategic land uses that are also required to be located adjacent to the Airport terminal, and location of tourist activities should be located in town sites of Port and South Hedland.</p> <p>The Strategic Plan states: 3. Undertake Council operated land and building projects including: b. Airport Housing</p> <p>This reference is to Airport Staff housing, not traditional residential development for public residences. Increases in passenger numbers reflects statistical data. Increase in numbers does not require housing at airport or short stay accommodation at the airport. Purpose of the Land Use Master Plan was to identify development opportunities of the Airport without compromising Strategic Airport land uses. Council has already identified an opportunity for Short Stay Accommodation close to the terminal in conjunction with multi storey car parking.</p> <p>It is considered that use of the land for Short Stay Accommodation will compromise the future Strategic Airport land uses. Additionally, the land is currently in the process of being leased to various Hire Car companies.</p> <p>Land Use Master Plan allows for Short Stay accommodation as per Council’s preferred location. Purpose of Land Use Master Plan is to protect Strategic Airport uses from intrusive uses such as Accommodation.</p>	<p>Nil</p> <p>Nil</p> <p>Nil</p> <p>Nil</p> <p>Nil</p> <p>Nil</p> <p>Nil</p> <p>Nil</p> <p>Nil</p> <p>Mil</p> <p>Nil</p> <p>Nil</p>
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	Subject site is ideally located to provide for Short Stay Accommodation.	Dismiss	Land Use Master Plan allows for Short Stay accommodation as per Council's preferred location. Purpose of Land Use Master Plan is to protect Strategic Airport uses from intrusive uses such as Accommodation.	Nil
	Hotel/Motel should be permitted on the subject land.	Dismiss	Hotel and Motel are currently AA & SA uses respectively under the Airport zoning of the current Scheme, and the Land Use Master Plan retains this zoning for the subject site [as well as Precincts 1, 2 & 3]. The Land Use Master Plan does not define which uses are permitted, the Scheme does.	Nil
	Short Stay Accommodation could create an aesthetically pleasing entry statement, and use of the entire site will form a consistent entry.	Note	Council plans include provision of short stay accommodation at the airport, on Council owned land, in a co-ordinated manner that allows for centralised location, in conjunction with multi story parking facilities, and does not detrimentally affect strategic airport uses such as vehicle hire, logistics and tourism.	Nil
	Land Use Master Plan has omitted the evident trend of locating short stay accommodation within proximity to the airport terminal.	Dismiss	Client does not have any tenure over the land. Subject land is identified for, and is currently in process of being leased to hire car companies. The Land Use Master Plan does not prohibit Short Stay Accommodation.	Nil
	Land Use Master Plan does not define what is meant by particular land uses notated as 'commercial'.	Dismiss	It is not the role of the Land Use Master Plan to specifically define permitted land uses. The Land Use Master Plan suggests an amendment to the Scheme to better define permitted uses to ensure Strategic Airport Land Uses prevail.	Nil
	Summary of above points	Note	Nil	Nil

8. IMPLEMENTATION

Each precinct will require differing processes and mechanisms to allow for development, determined by the preferred short and long term land uses.

To achieve eventual development of the land, whilst protecting airport land uses, it is likely that it will be required to be rezoned and then subdivided.

8.1 REZONING

The current zoning of all of the Airport land is 'Airport', with the exception of the UCL which is reserved under the Scheme for Public Purposes.

All of this land is also denoted as the Airport Development Plan Area. Under the provisions of the Scheme, a development plan is required to be prepared for the airport as part of the development process. The Land Use Master Plan can be considered to meet part of this requirement, and can be used to guide the preparation of further detailed development plans for any precinct recognised as requiring more specific planning, especially Precincts 1, 2 & 3.

It is recommended that part or all of Precincts 1, 2 & 3 are rezoned, dependant on the intended land use for each lot within each precinct.

The preferred zoning for Precinct 1 is Airport. This is consistent with current zoning, however, it is considered that further detailed land use restrictions relating to height restrictions and permitted land uses should be implemented. Special controls should be put in place to prohibit non-airport related uses.

The recommended zoning for Precinct 2 is either Airport or Transient Workers Accommodation. These zones allow Hotel, Motel and Transient Workforce Accommodation. Again, it is considered that further detailed land use restrictions relating to height restrictions and permitted land uses should be implemented. Design and amenity controls in this precinct, given its proposed workforce residential use, should also be considered.

Recommended zoning for Precinct 3 is Industrial Development Zone. Similar to the current zoning, this zoning will require preparation of a development plan, ensuring that appropriate assessments are undertaken to confirm the suitability of the land for development. Rezoning will also ensure the preparation and implementation of appropriate mechanisms to protect operational aspects of the airport.

This precinct is affected most by height restrictions, and it is recommended that these height restrictions be encapsulated in specific Scheme provisions.

Any development plan prepared for this precinct can assign zones consistent with the provisions being developed by LandCorp for the TDZ and Light Industry zones with the Wedgefield expansion.

Given the constraints of drainage and access on Precinct 4, it is recommended that the zoning of this precinct remain as 'Airport', to ensure that land uses specifically related to airport function prevail. Specific controls should also be implemented for this precinct.

Accordingly, notwithstanding existing Scheme provisions requiring Development Plans, to ensure that land use and development does not conflict with operational requirements, as well as addressing the buffers outlined in Section 3.4 [NDB, DME & DVOR buffers] it is recommended that part or all of Precincts 1, 2 & 3 are rezoned.

It is imperative that any such rezoning defines specific land uses permitted within each Precinct, and that such land use controls are incorporated into the objectives of the Airport zone, as well as into Clause 6.15 of the Scheme.

Rezoning could incorporate a Development Plan in accordance with Appendix 6 of the Scheme, and provisions addressing specific permitted land uses could be incorporated into the existing Scheme provisions relating to Airport land uses.

For all precincts, rezoning should implement Scheme provisions that require the following as part of the Subdivision process:

- ➔ Referral to CASA for any proposed development
- ➔ Referral to ASA for any proposed development
- ➔ Inclusion of height restrictions in accordance with CASA and ASA recommendations
- ➔ Restrictions on land uses in accordance with CASA and ASA recommendations
- ➔ Inclusion of Restrictive Covenants and Memorials on Titles relating to height and land use restrictions

Rezoning will also ensure that issues such as hydrology, a Traffic Impact Assessment and formal environmental assessments are undertaken.

8.2 DEMAND, PRECINCTS + STAGING

Within Precinct 1, freehold ownership should be permitted to allow quality of development, as leasehold land encourages low capital investment. Given that the airport is a major gateway and has significant public access, considerable thought should be given to aesthetics. Freehold ownership encourages capital investment, however, design guidelines should also be considered if Council seeks to encourage quality of design or a design theme.

Demand for land within precinct 1 is related directly to airport related uses, and to a large extent land supply has not kept up with the rapid increase in passenger numbers and consequent demand for services such as freight and vehicle hire. Many modifications to the road network and access are required as a priority to resolve conflicts caused by the rapid increase in passengers, and accordingly release of lots for land uses for these services will follow these improvements.

While land for uses such as freight and logistics is limited, and is unlikely to experience significant demand beyond any initial land release, initial infrastructure will be required [such as roads and drainage] to resolve existing conflicts, and additional land supply for future land release can be created at the same time. Similarly, while additional demand is likely to be low and ad hoc, as lots are created for the existing vehicle hire companies additional lots can easily be accommodated for future supply during supply of these initial lots

Therefore, beyond initial land releases required to resolve existing conflicts, additional lots within precinct 1 can and should be released on an as required basis.

Demand for land within Precinct 2 is similarly dependant on specific demand, in this case for transient worker accommodation, and land can be release on an as required basis for this use. Any infrastructure development costs would be the responsibility of the developer.

It is recommended that within Precinct 2 only short to medium term lease hold land tenure should be pursued. Lease hold will allow for secession of land uses. This will ensure that any long term land requirements for Airport related uses are protected, while allowing short to medium term use of the land. This may be critical given the cyclical nature of the resource sector.

Development of Precinct 3 is likely to occur in stages, according to market demand for Industrial land. Freehold land tenure should be provided, in any land release although areas identified as potential expansion areas for airport or Department of Defence could be long term leases to allow sub succession of land uses.

Demand for industrial land is likely to be high, however, as LandCorp progresses development of the expansion of the Wedgefield Light Industrial Area and the Transport Development Zone, sufficient industrial land will be available. Development of Precinct 3 is therefore unlikely to be required in the short term, unless LandCorp is unable to release additional industrial land. Accordingly, it is recommended that Precinct 3 is developed in conjunction with staging of LandCorp's industrial subdivisions. Development and release of this land concurrent to LandCorp's land releases will potentially cause a glut in land supply. Discussions with LandCorp indicate that they anticipate a length of 5 years for release of the Wedgefield LIA expansion. It is expected that land within Precinct 3 will therefore be able to be released within 5 years, however, this will be dependant on take up of the LandCorp land.

Staging of Precinct 4 will be dependent on the preferred use of the land. As with Precinct 2, use of this land should be restricted to leasehold. However, long term leases shouldn't necessarily be detrimental to the long term use of the land. This will ensure that undesirable long term land uses do not become permanent, and allows Council as the land owner to control the form and function of any proposed development on any lease of any portion of the land.

8.3 SUBDIVISION

Subdivision of the land will occur after rezoning, however, the Land Use Master Plan will guide both the rezoning and subdivision. During rezoning, issues such as traffic and environmental assessments should have been undertaken, as without these subdivision is unlikely to proceed.

8.3.1 SUPERLOT SUBDIVISION

It is recommended that each precinct be 'super lotted' to create 5 lots, including a 'parent' lot for the airport. Currently the lot layout of the airport is ad hoc, and development crosses multiple lots. Super lotting each precinct will create separate lots that can be subsequently subdivided. Due to the current lot layout, further subdivision to create single landholdings for each precinct will be required to take place after amalgamations and 'super-lot' subdivision. Each precinct can then be re-subdivided according to the Land Use Master Plan recommendations for the precinct. In this way,

the land tenure and lot sizes for each precinct can be progressed individually in accordance with timing parameters and as the ToPH sees fit.

This will also result in the rationalisation of the Town's existing land holdings, leaving the airport runways, taxiways, terminals and aprons on a single title.

8.3.2 ToPH SUBDIVISION

The Town of Port Hedland could undertake subdivision of each of the precincts on an as required basis, with the probable exception of Precinct 3.

Precincts 1 & 2 are logical subdivisions that could be undertaken by the Town. These precincts have relatively low lot yields, will cater for relatively specialised land uses, and can be readily subdivided on an as needed basis.

Precinct 3 is more problematic, and would likely require a specific project manager to achieve. This is discussed in section 7.3.3.

Precinct 4 is unlikely to be subdivided or developed in the short to medium term, and if and when subdivided, could be managed by the Town.

8.3.3 JOINT VENTURE

Precinct 3 will result in significant lot yields, and will also require significant engineering and development costs.

To achieve subdivision and eventual development of this Precinct, a joint venture [JV] could be pursued. This would result in the ToPH partnering with a joint venture partner to subdivide and develop the Precinct. This JV could be a State Government agency, most likely LandCorp if the subdivision or development includes the UCL within Precinct 3, or with a private developer. The result would be a profit and risk sharing undertaking that would see the Town of Port Hedland contributing land, expertise and possibly some capital, and the chosen JV partner contributing expertise and capital.

Given that LandCorp has responsibility for development of Crown Land, and that Precinct 3 contains a significant component of UCL, a logical JV would be the development of Precinct 3 in conjunction with LandCorp. Similarly, a JV could be pursued with LandCorp for Precinct 2, dependant on the preferred final use of the land.

Another alternative would be to pursue acquisition of the UCL through the Department of Regional Development & Lands, and pursue subdivision through this department.

Figure 14: Land Use Master Plan - Proposed Zoning

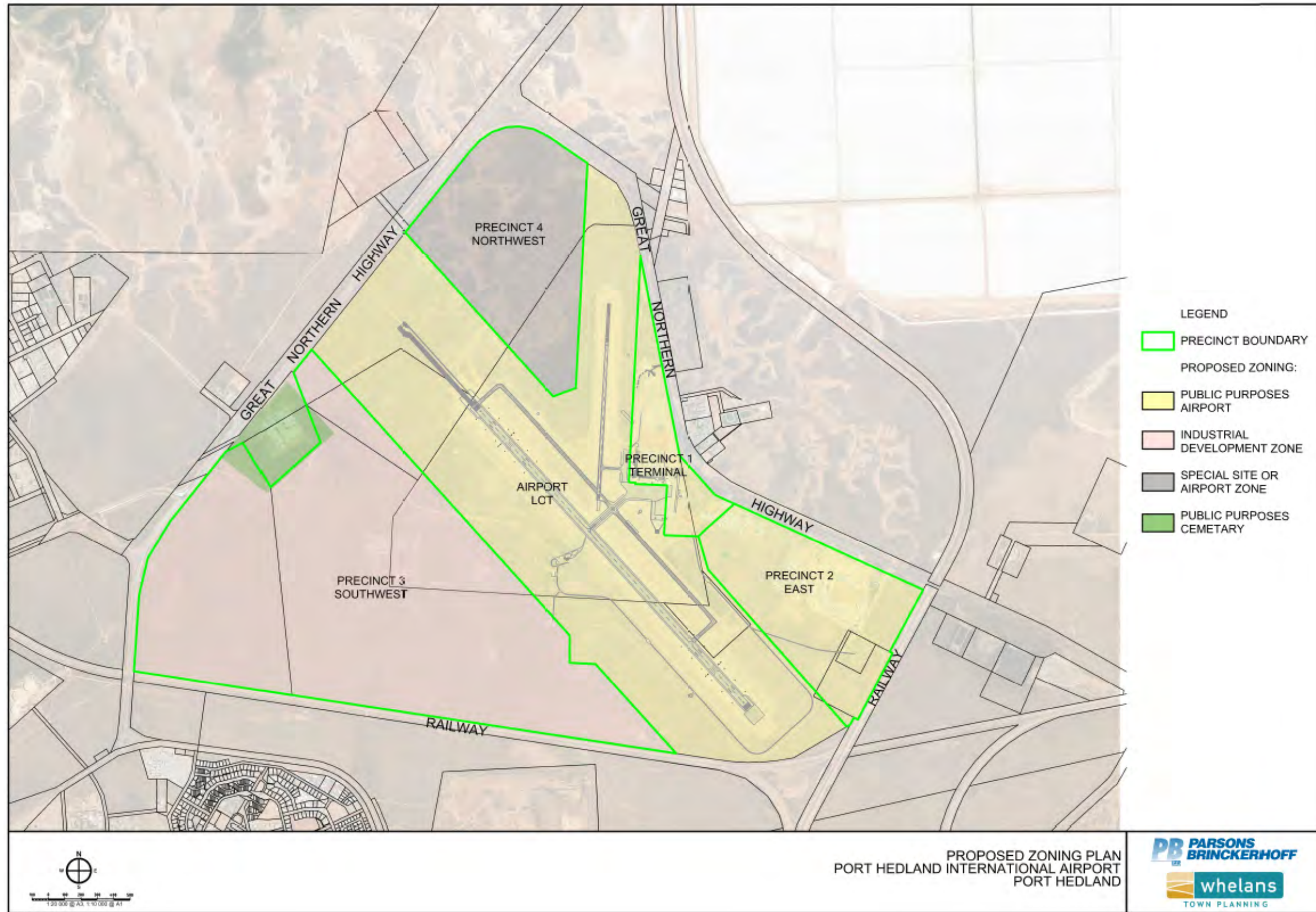


Figure 15: Land Use Master Plan - Land Assembly

