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## **Attorney-General's Department**

### Report for Christmas Island Light Industrial Area Outline Development Plan

December 2010



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# 1. Introduction

## 1.1 Background

GHD has been engaged to prepare an Outline Development Plan (ODP) for the Light Industrial Area (LIA) on Christmas Island that will provide a land use planning framework to guide the future subdivision and development of the site.

The development of the LIA on Christmas Island has been slow and incremental in its expansion with limited long term strategic planning. In 2008, the Attorney-General's Department (AGD) initiated the development of a Crown Land Management Plan (CLMP) designed to inform the Commonwealth of land capability and suitability. The draft CLMP has highlighted the importance of developing the LIA as a precursor to a number of other important land dealings.

### 1.1.1 Crown Land Management Plan

GHD prepared the *Crown Land Management Plan for the Indian Ocean Territories – Christmas Island*, with the draft finalised in September 2009. The main objective of the project was to assess Crown land in the Indian Ocean Territories (IOT) and enable informed decisions to be made on its most suitable future uses which will lead to the overall better management of Crown land.

The project consisted of an initial assessment of Crown land in the IOT which has been undertaken by drawing on readily available information, mostly from resources provided by AGD and from the Department of Planning. The assessment provided the basis for a plan of management, which included recommendations on the appropriate future uses of land and land development priorities (i.e. short term, medium term, long term).

The assessment of the LIA revealed the following (GHD, 2009):

- ▶ The current LIA remains the most suitable area for industrial activities on the Island;
- ▶ There are possibilities to expand the current LIA in the current location;
- ▶ A new road link from Phosphate Hill Road to Murray Road that bypasses the Poon Saan residential areas is desirable;
- ▶ The need to preserve heritage areas within and adjacent to the LIA, as well as facilitate an environmental corridor from Phosphate Hill to the coastal National Park; and
- ▶ The need for a buffer between the hospital and the LIA activities.

It was identified in the CLMP that an ODP should be devised to formalise the ultimate subdivision design of the LIA. The ODP should be created under a partnership agreement between the four parties having legal interest in the land, these being AGD, the Shire of Christmas Island, Phosphate Resources Ltd (trading as Christmas Island Phosphates) and Acker Pty Ltd.

The ODP should identify land opportunities for:

- ▶ A Business Enterprise Centre (or incubator);
- ▶ The long term orderly expansion of the hospital;
- ▶ A secondary vehicular connection to the airport;



- ▶ Residential and recreation opportunities near existing residential areas;
- ▶ Shire leases for small industries;
- ▶ Long term depot requirements for AGD;
- ▶ The long term requirements of the Shire depot;
- ▶ Christmas Island Phosphates (CIP) leases for larger industries; and
- ▶ The relocation of industrial type businesses currently operating in inappropriately zoned areas.

The CLMP concluded by making a series of recommendations for the future use and management of Crown land on the Islands. The most relevant to the future use of the LIA are:

- ▶ AGD, SOCI and interested parties should reach an agreement to formulate an ODP that would lead to a restructure of the existing land holdings and the creation a new subdivision to allow the orderly expansion of the existing LIA and facilitation of direct vehicular movements between the LIA, the airport and the port;
- ▶ The recent approval for a trade training centre at the Christmas Island District High School should incorporate training for locally produced construction materials;
- ▶ The initiation of a survey of mining lease boundaries, with a priority for areas close to potential future development; and
- ▶ AGD should maintain ownership of the subdivision design process to ensure that appropriate social and urban design objectives are defined prior to the formalisation of land development agreements.

## 1.2 Study Area

The current LIA on Christmas Island is located on Phosphate Hill Road at the northern end of the runway. To the south are old pinnacle fields and anecdotal evidence suggest historical hand dug mine areas. To the north are more pinnacle fields and dense vegetation (see Figure 1).

Presently there are approximately 8 businesses located in the LIA, including the Shire of Christmas Island (SOCI) depot. Other businesses include a crushing plant in the eastern section that crushes rock from a nearby quarry, large plumbing and sewerage services, vehicle repair and small scale plumbing. Development to date has been on a small scale with little physical property delineation (i.e. boundary fencing) together with the accumulation of sea containers and disused machinery in an *ad hoc* fashion.

A recent subdivision application has been approved within the current LIA (see Figure 2). The purpose of this plan was to extend the Quarry Road reserve eastwards to provide a continuous road reserve for the length of the LIA. Other adjustments included the amalgamation of Lot 3032 and Lot 601 to form new Lot 555, the creation of new Lot 557 (future Indian Ocean Territories Power Authority offices) and the amalgamation of additional land into new Lot 556 (SOCI depot).

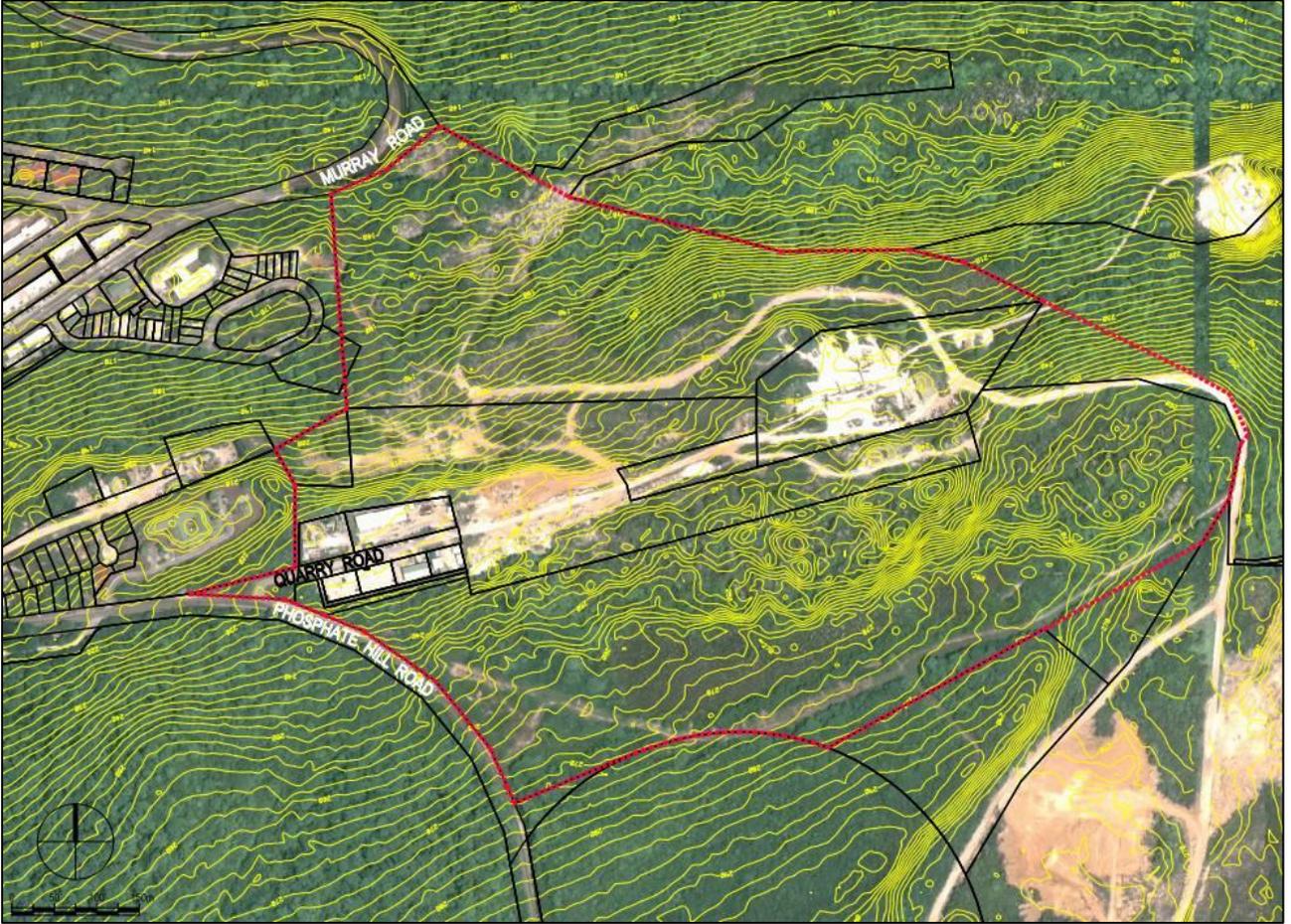


Figure 1: Indicative LIA Site Area

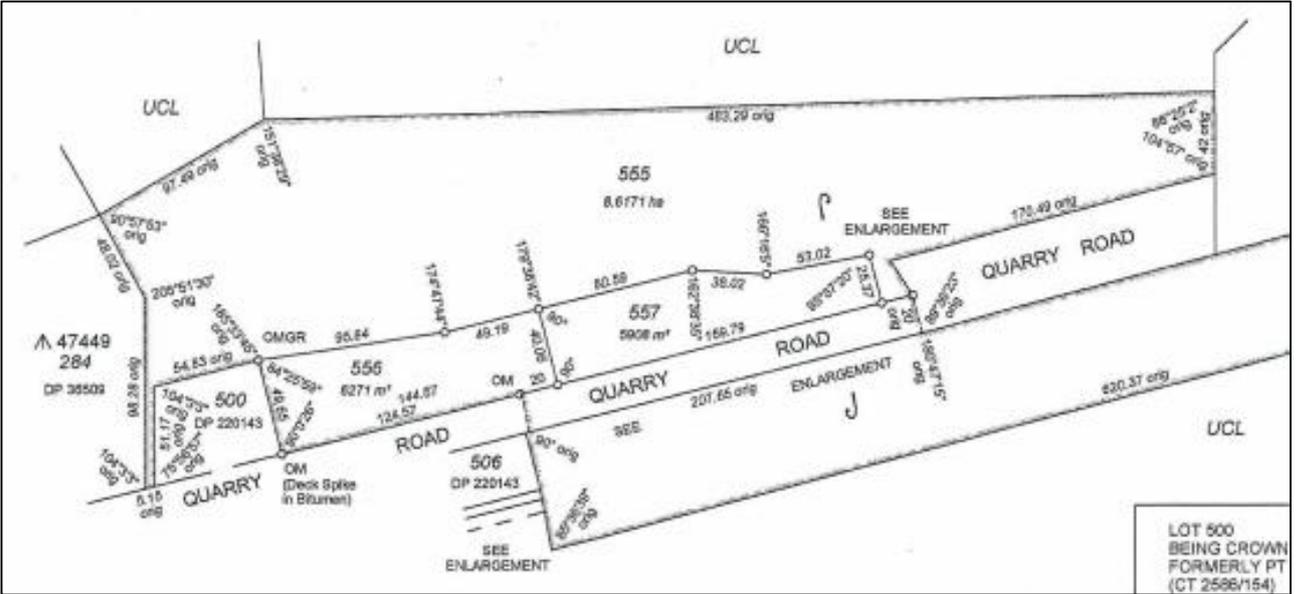


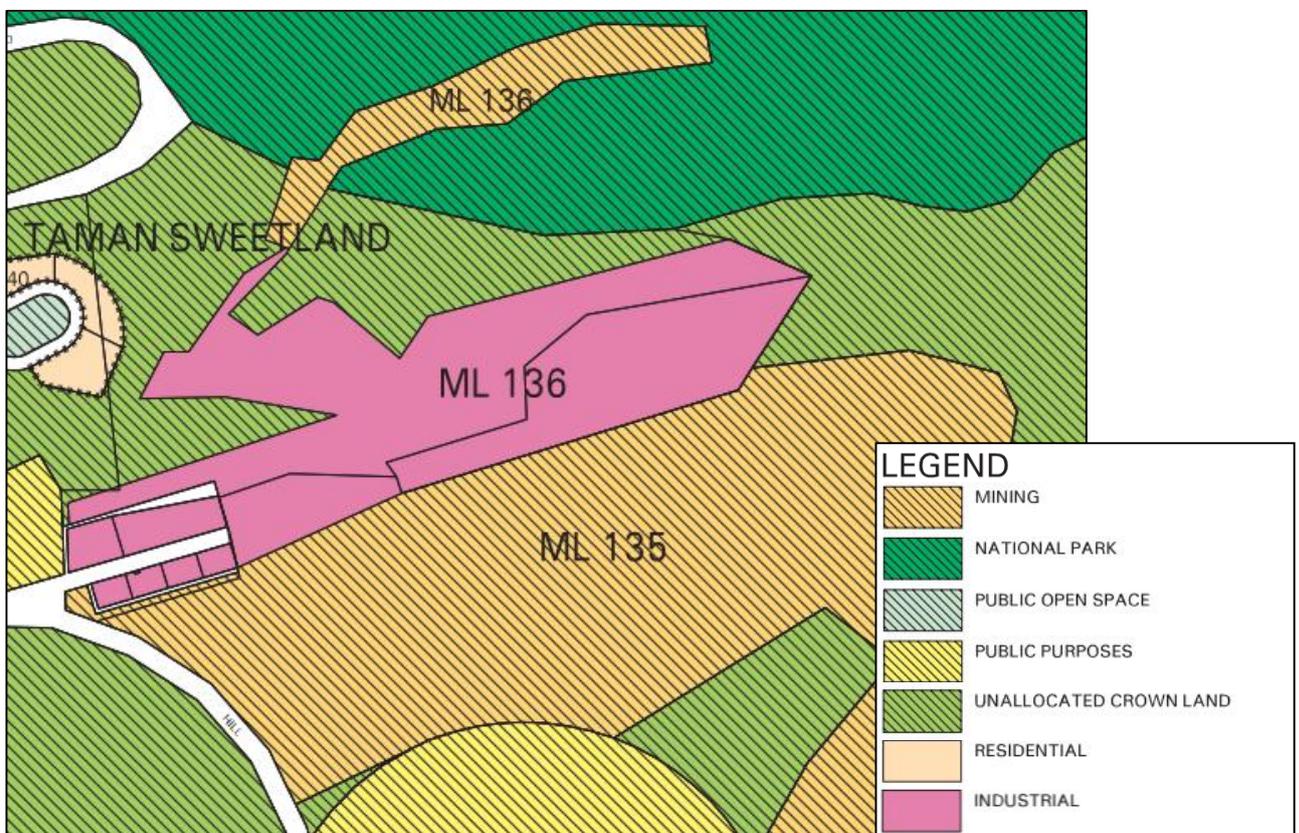
Figure 2: Recent Approved Subdivision

## 2. Land Constraints & Opportunities Analysis

Constraints and Opportunities mapping can be found at [Appendix A](#).

### 2.1 Planning Context

The ODP study area contains a range of different zonings and reservations under the Shire of Christmas Island Town Planning Scheme No. 1 (TPS). These include land reserved for Mining, Public Purposes and Unallocated Crown Land as well as land zoned for Industrial uses (Figure 3).



**Figure 3: Current Land Use Zoning**

A scheme amendment can be initiated by SOCI upon the endorsement of this ODP to rezone the appropriate land to 'Industrial' and to create the necessary new public roads. However, the Shire has just begun a review of their TPS (as of November 2010) and as part of this process, any required changes to land uses and their distribution to facilitate the ODP can be included within the amended TPS. This will remove the need for a scheme amendment process to be undertaken.

Whilst there is no specific provision in the TPS for an ODP to be prepared for any of these reserves or land use zones, an ODP would assist in aligning the multiple land owners, stakeholders and land uses to formalise the ultimate subdivision of the LIA. According to Clause 4.5.2 of the TPS, an ODP may include maps and other documentation and is required to include (as appropriate) the following details:

- ▶ The area to which the ODP applies;
- ▶ Key opportunities and constraints;



- ▶ The planning context for the ODP;
- ▶ Proposed land uses;
- ▶ The proposed indicative lot pattern;
- ▶ Estimates of projected lot yields, dwellings, population and employment;
- ▶ Provision of major infrastructure including drainage, sewerage and water supply;
- ▶ The proposed road network and hierarchy;
- ▶ Likely timeframe and staging of subdivision and development; and
- ▶ Such other information as may be required.

## **2.2 Physical Description**

The severe topography of the study area constrains the extent and nature of development possible on the site. There is a drop in elevation south to north on the site, from approximately 240m at Quarry Road to 150m at Murray Road. This results in an average gradient of approximately 18.5% over 850m. On the east-west axis, the land is relatively flat, with a general increase in slope from west to east across the site.

To the south of Quarry Road is an old phosphate mining area (known as the '500 foot quarry'), believed to have been dug by hand as part of historical mining operations. This area is characterised by large limestone pinnacles with deep crevices in between. On the southern edge of these pinnacles is a cliff face with a relatively flat area extending from the top of this cliff face southwards towards the airport beacon and existing power line.

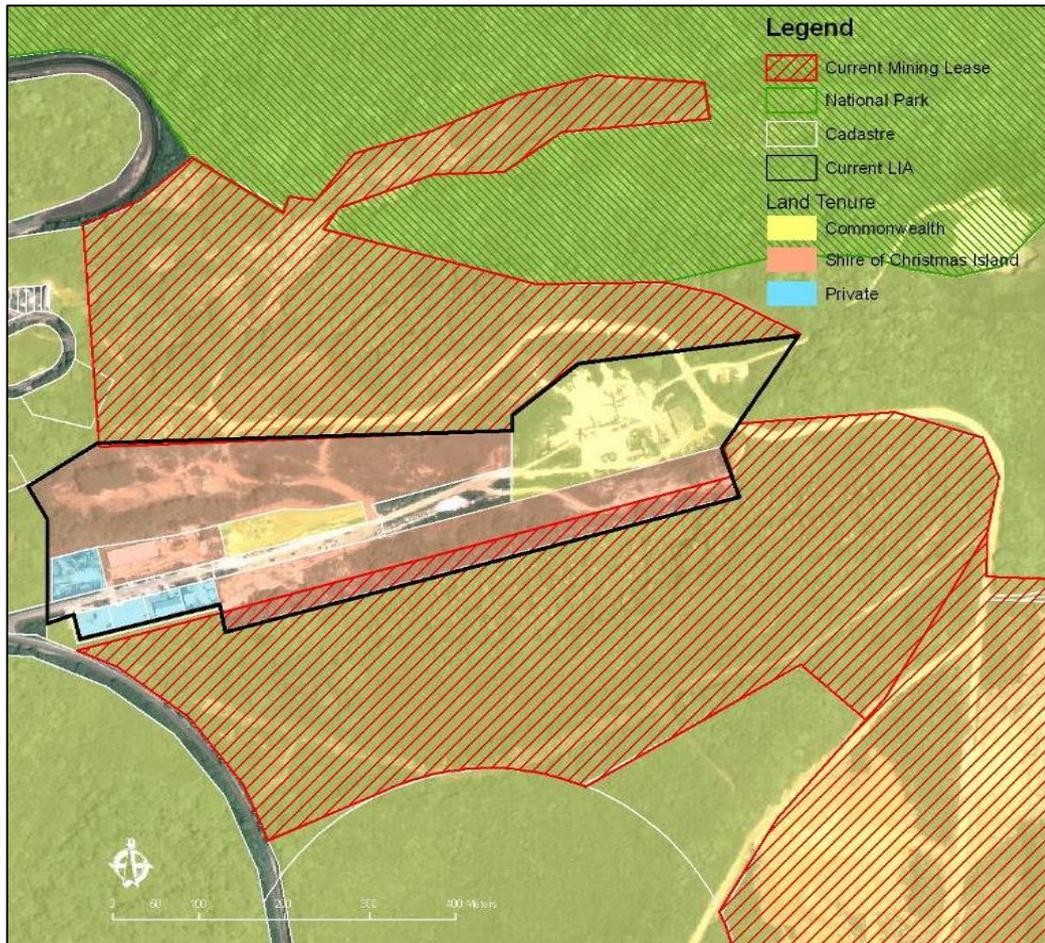
There are other smaller areas of pinnacle fields in the northern area of the site, adjacent to the National Park as well as remnants of historical mining and cultural activities.

Current development within the LIA is concentrated along Quarry Road, with areas of flat cleared land being utilised for the current industrial functions on the Island. There are numerous old tracks immediately to the north of Quarry Road that are now overgrown and disused.

## **2.3 Land Tenure**

SOCI owns Lots 555 & 556 and is therefore the main land owner in terms of land area within the current LIA area (see Figure 4). The Commonwealth owns Lot 3027 which is the site of a privately owned and operated sand and aggregate plant. There are four other individual private owners who own five LIA lots between them. The remainder of the subject area adjacent to the north and south of the current LIA area is mining lease operated by CIP on Crown land.

The Christmas Island National Park, managed by Parks Australia, is immediately adjacent the northern ODP site boundary.



**Figure 4: Land Tenure**

## 2.4 Heritage

Christmas Island has a vast and diverse cultural heritage with many sites and pieces of infrastructure of significant heritage value to the community. Many of these places are registered on the Commonwealth Heritage List (CHL), which comprises natural, Indigenous and historic heritage places on Commonwealth land. Entries on the CHL are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

There is one listed site within the study area, which is identified as the 'Phosphate Hill Historic Area'. The site is in the eastern section of the study area and encompasses the eastern portion of the deep pinnacle field, extending southwards towards the area adjacent to the airport beacon. It also includes an old Chinese cemetery and lookout area to the east of the study area.

According to the Australian Heritage Places Inventory, the Phosphate Hill area is historically significant as:

'the location of the first commercial mining of phosphate on the Island and the first phase of an industry that was to determine the history of the Island and the development of the Christmas Island community. The historic burial ground, which contains many of the early labourers who died of beri beri or dietary deficiencies, is a significant reminder of the hardships endured by the early indentured Asian labourers and a reflection of the multi-racial basis for the current community.'



Under the EPBC Act, an action that has, will have or is likely to have a significant impact on the listed place may be referred to the Federal Minister for the Environment, Heritage and the Arts for assessment.

## **2.5 Utilities Infrastructure**

### **2.5.1 Power**

An 11kV overhead line network, operated by the Indian Ocean Territories Power Authority (IOTPA), distributes power throughout Christmas Island to the Light Industrial Area. Some of the network at the site was upgraded in 1998 with the installation low voltage underground power cables, streetlights and the relocation of some of the existing power poles.

The overhead network is diverted to a step-down 0.415/11kV 315kVA ground mounted transformer kiosk (TX204) located within Lot 502 on Quarry Road. The existing load at the transformer was measured over a 27 hour period from 14 April 2010 and a peak load of 100.5A, 75kVA was recorded. This suggests that the transformer has approximately 200kVA spare capacity.

Other nearby power infrastructure includes

- ▶ Another step down 0.415/11kV 500kVA ground mounted transformer kiosk (TX203) is located at Lot 3027 to supply the sand and aggregate plant; and
- ▶ An 11kV overhead line easement in the southern section of the study area.

Future developer(s) of the site should liaise with the electricity supply authority IOTPA for connection to and/or extension of the power network.

### **2.5.2 Water**

Water to the LIA is supplied from the Hospital Tank (800m<sup>3</sup>, TWL 267m RL), approximately 1.8 km away. The water is transferred via a DN 100mm medium density PE pipe. This storage tank has an operating water level of 266m RL. The Hospital Tank and gravity pipeline at the northern part of the light industrial area has a capacity of approximately 20 services.

The southern part of the light industrial area cannot be supplied by gravity from the Hospital Tank. This area is at a higher elevation than Quarry Road and the highest points in this area are at 268m (which is higher in elevation than the Hospital Tank) and therefore would not provide the necessary pressure for gravity feed. This area would need to connect to another supply zone and would require new water distribution infrastructure. Options to supply the elevated southern region include a booster system at the Hospital Tank (this option is feasible however expensive) or to supply from the Airport Elevated Tank (there is insufficient storage in this tank and would require upgrading).

### **2.5.3 Wastewater**

The existing wastewater system within the LIA consists of a DN100 pressure main that feeds into a small ejector station servicing an industrial area in Taman Sweetland and discharging into the Pump Station 1 catchment. The capacity of this Ejector MH PS10 station is expected to be able to service the LIA, with possible upgrades required. It is also expected that the pump stations downstream from the area will need to be upgraded, providing extra means for service. Overall it is feasible to service any expansion to the LIA since the increase in sewage would be minimal and in line with expected population growth



demands for which the existing system was designed for. Also, given the terrain of the area, it is unlikely that there would be difficulties in connecting to a future sewer pump station for this area.

## 2.6 Environment

### 2.6.1 Vegetation

#### ***Protected Plants or Vegetation Types***

A search of the *Environmental Protection and Biodiversity Conservation Act (1999)* protected matters index was undertaken in March 2010 (<http://www.environment.gov.au/erin/ert/epbc/index.html>). The resultant report indicated that there is one protected plant species on Christmas Island (the fern *Tectaria devexa*) but no protected vegetation communities.

There are a number of animal species which are listed under the Act as threatened, marine or migratory. These include six bird species, two mammals and two reptiles. Some of the bird species may use vegetation on the proposed LIA sites and a detailed assessment will be required before any clearing is undertaken.

Much of the remaining rainforest area of Christmas Island is protected under the Commonwealth Heritage Areas list as the 'Christmas Island Natural Area'.

#### ***Existing Vegetation***

Much of the area proposed for development is highly disturbed, with clearing and mining having taken place previously. The areas immediately adjacent to the existing industrial area buildings consist of regrowth rainforest trees, palms and ferns, including a range of introduced species such as *Leucaena leucocephala* (Coffee Bush), *Turnera ulmifolia* and *Muntingia calabura* (Jamaican Cherry). Very small areas of plateau rainforest remain, supporting trees such as *Barringtonia racemosa*, *Hernandia ovigera*, *Macaranga tanarius*, *Ficus* sp., *Pandanus elatus* and the palm *Arenga listeri*. These species are also present as regrowth trees in previously cleared areas. The previously mined area supports limited trees due to the lack of soil and is primarily covered with ferns such as *Davallia denticulata*, *nephrolepis multiflora* and *Psilotum nudum*, and introduced species such as *Leucaena leucocephala*.

The threatened plant species, *Tectaria devexa*, has not been identified within the Poon Saan or Phosphate Hill area and primarily occurs in undisturbed rainforest on the plateau, in deep soil (Butz, 2004). The remaining known occurrences are in the southern part of the island, outside of areas disturbed by previous mining and other clearing activities.



Regrowth areas



Previously mined area

## 2.6.2 Geology & Groundwater Hydrology

The core of Christmas Island is composed of extremely hard and impervious volcanic material which is predominately basalt. The remnant of a coral reef forms a cap layer of limestone over the basalt core. Due to faulting in the limestone rock that sits above the basalt layer, an irregular limestone surface has resulted with a high potential for caves and sinkholes. This has implications for the stability of the development of the LIA. The area will need to be assessed for geotechnical stability and risks prior to any development taking place.

The dense jungle growth and generally highly permeable topography of the site tends to result in little overland flow of surface water. Surface drainages are therefore poorly developed as the majority of rainfall leaches through the porous limestone and down to the underground basalt layer, before flowing out to the ocean. The exact locations the water flows to the ocean, or pools on the basalt layer are currently unknown as there is no exact knowledge of the profile of the basalt layer.

The exact extent of the underground aquifer that sits on top of the basalt layer is also currently unknown. Whilst there is some existing GIS information depicting the basalt aquifer and catchment areas, it is not sufficient to assess with the required degree of accuracy the basalt profile or water catchment areas. Current information reveals that the southern portion of the LIA may be located above the northern edge of the catchment area. Any development therefore has the potential to impact upon this catchment that is used for the Island's potable water supply. It is especially relevant for any expansion of industrial land uses, given their increased potential for harmful substances to contaminate the water supply.

The identification of the whole island's underground water catchment through basalt profile mapping will allow the appropriate management of current water sources and the development of adequate contamination management measures. At the very least, any future development in the LIA will need to be appropriately managed to ensure that any leaching of potential contaminants is minimised where possible.

## 2.6.3 Soil Properties

Generally, the soils on the Island tend to be problematic for drainage as they are poorly developed with little clay content and in some places are highly dispersive. They scour and erode easily and are relatively permeable and exhibit high infiltration rates.

The majority of the site area has, at some stage, been previously mined by various parties and methods. A large portion of the area adjacent to Quarry Road and continuing north to the National Park boundary



now consists of shallow loose limestone (fractured limestone pieces remnant from mining process). The soil depth in these areas ranges from 1-2m to 2-4m. There is one small area of deep loose limestone (hard limestone with moderate gullies and some remnant loose limestone material) to the east of Taman Sweetland, with a depth of 4-6m.

To the south of Quarry Road, the soil consists of medium to deep hard pinnacles (hard limestone pinnacles with deep gullies). This area is widely believed to be one of the first areas mined by hand on the Island. The deep pinnacles are 5-20m deep and are immediately adjacent to the southern boundary of the current LIA. The medium depth pinnacles are 2-5m and are to the south of the deeper pinnacles.

## **2.7 Airport Height Restrictions**

### **2.7.1 Airport Navigation Beacon**

The VHF Omni-Direction Radio Range (VOR) (with Distance Measuring Equipment attached) beacon associated with the island's airport is located approximately 270m to the south of the the LIA, and is approximately 16m higher in elevation. The VOR beacon is an aircraft navigation aid that enables aircraft to locate the airport and provides an approach procedure to descend on an approach to the runway in non-visual meteorological conditions.

There are specific clearance requirements for the VOR beacon, which include:

- ▶ Vehicle Movements: Public roads shall not be closer than a 300m radius from the VOR beacon; and
- ▶ Clearance Zone: No structure, building, trees, fences, towers or power lines is permitted within a 600m radius of the VOR beacon if they will extend above an elevation angle of one degree as seen from the VOR beacon site.

### **2.7.2 Obstacle Limitation Surface (OLS)**

To ensure adequate obstacle clearance for aircraft approaching and leaving the airport, an OLS exists around the Christmas Island airport. The surface is defined to standard requirements and nothing may penetrate the OLS without approval from the Civil Aviation Safety Authority (CASA). Commencing at each side of the runway (in all directions), an imaginary plane rises at a gradient of 14.3%, called a transition surface (GHD, 2003). These transition surfaces define the maximum permissible height of structures adjacent to the runway.

Planning for a runway extension has been undertaken prior to the cancellation of the proposed satellite launch facility at South Point. Whilst there is no current intention to extend the runway, any proposed development within the LIA should not prejudice the opportunity for the extension in the future.

The height of the transition surface for an extended runway at the southern edge of the ODP is 300m. The transition surface increases to 305m a further 250m to the north within the LIA.



## 3. Stakeholder Consultation

Both off-island and on-island consultation with various stakeholders and the community were conducted during the formulation of the ODP. The purpose was to ascertain the level of support for the ODP concept and to receive feedback, both positive and negative, to enable any relevant modifications to be made. These consultations also focussed on possible implementation pathways for the ODP.

A summary of the consultations with the three major external stakeholders (landowners) as well as Parks Australia and the Christmas Island Economic Development Consultative Group (CIECDG) is outlined below. The full list of consultation outcomes can be found at [Appendix B](#).

### 3.1 Shire of Christmas Island

SOCI provided agreement in principle with the direction of the initial ODP concepts and in particular the merit of the direct road access to Murray Road that is proposed. There was an interest in the eventual gradient of this road as it will need to accommodate the heaviest vehicles on the Island. The potential of a minor road connection from below the current hospital eastwards to the new 'Murray Road link' would further enhance the proposed link by allowing more efficient ambulance access to the lower settlement areas in the event of an emergency as well as an alternative entry into the hospital precinct.

SOCI's first development priority is the land immediately opposite the future Indian Ocean Territories Power Authority offices (Lot 557). Council are likely to consider the following options for this land:

- ▶ Sale of freehold title with an appropriate caveat to ensure that development takes place within a reasonable period;
- ▶ Leasing arrangements; and
- ▶ Development of shed type structures to create leasable space for small industries.

The Shire requires a lay down area in addition to their current depot site and it was suggested that a large block immediately north of the current depot may be suitable if the 'Murray Road Link' is constructed.

### 3.2 Christmas Island Phosphates

CIP has identified future mining opportunities within ML135, without being able to identify exactly when these opportunities will be exploited.

At the conclusion of mining activities, the normal procedure is for CIP to write a letter to the WA Department of Mines and Petroleum (DMP) to initiate a partial surrender of the mining lease. This process normally takes 2 weeks. Under normal circumstances, DMP then declare the area surrendered as a File Notification Area (FNA), which then restricts the future uses on that land and prohibits any further mining activity.

It was discussed in consultations with CIP that to assist in facilitating the expansion of the LIA and to take advantage of the post mining landscape for road creation, AGD should arrange for future tenure requirements of the land post mining. This may allow further earthworks and other activities to be carried out in the area to facilitate the implementation of the ODP, as CIP is only required to meet regulatory requirements and 'make safe' conditions.



It was revealed that CIP have used portions of ML136 for revegetation studies, after re-planting occurred in 2002/2003 by CIP. This was not considered to be a major obstacle to the proposed layout although a loss of research material and study results may impede further shallow soil rehabilitation trials.

### **3.3 Acker Trading Pty Ltd**

Representatives of Acker Trading Pty Ltd (Acker) supported the plan in principle where it impacts on their operations. The main consideration is the relocation of a batching plant in the small clearing between the existing quarry and the main operations. Reconfigured lot boundaries may provide an opportunity to review the location of the batching plant given its potential direct access to the 'Murray Road Link'. However, the timing of the proposed batching plant relocation may not coincide with the development of the LIA.

Acker also has planning approval for a new office building in the south western corner of their site.

### **3.4 Parks Australia**

Representatives from Parks Australia (Parks) supported the proposed 'Murray Road Link', however raised the issue of red crab migration routes and the impact of the proposed link on these. It was identified however, that the proposed link could potentially reduce the number of road crossings in crab migration routes. The detailed design of the final road alignment will need to consider these migration routes and be designed appropriately.

### **3.5 Christmas Island Economic Development Consultative Group**

The Administrator of Christmas Island has indicated his encouragement of the ODP process and the proposed ODP and in his capacity as a member of the CIEDCG, has provided a letter of support to AGD (see [Appendix C](#)).



## 4. Outline Development Plan

### 4.1 ODP Philosophy

Historically the current LIA on Christmas Island has not developed in a co-ordinated manner. As there has been limited forward planning regarding the future of the LIA together with high development costs and land capacity constraints, many smaller industries have located either in the Central Area Workshops, or in residential areas. This has led to undesirable impacts within affected residential areas from these light industrial land uses. Consequently, the development of the LIA as a legitimate location for on-Island industries is required, to address a shortage of appropriately located and zoned industrial land.

According to the CIECG the orderly development and expansion of the LIA will assist in facilitating further economic development on Christmas Island. The expansion of the LIA will provide opportunities for a wider range of local industries as well as additional employment. The establishment of an efficient LIA can be considered as an important land release pre-requisite to stimulate other economic initiatives.

The purpose of the ODP therefore, is to facilitate the release of additional industrial land to provide these opportunities for further economic development opportunities on the Island. It will also allow the consolidation of those dispersed industrial land uses in other parts of the Island into one central location with similar industries. More efficient and safer heavy vehicle movements have also been considered to reduce the impact on nearby residential areas.

Having taken into consideration the operations of Acker and CIP, the ODP also ensures that the land assets of AGD, SOCI, Acker and CIP are planned collaboratively. The accessibility and efficiency of SOCI land assets within the LIA is also enhanced.

### 4.2 Land Use Distribution

Refer to Figures 5 and 6 for the proposed ODP (proposed land uses and aerial photo).

#### 4.2.1 Industrial

The ODP prepared for the site is for predominately industrial land uses and identifies a range of industrial lot sizes (see Table 1). The proposed lot sizes range from approx 40,000m<sup>2</sup> (the Acker site) down to approx 2,000m<sup>2</sup>. Several different levels, or 'plateaus', for the development of the lots will be required due to the extreme nature of the topography. The southern most lots are located on one plateau, at the top of the hill. The proposed lots fronting onto the Quarry Road reserve will be at the same level as the existing road. The northern most lots will be on a lower plateau again which will coincide with the northernmost proposed road level.

The smaller lots are concentrated along the existing Quarry Road alignment and will continue the development of this frontage as the central street in the LIA. These lots would be at the same level as Quarry Road, requiring minimal earthworks, and could accommodate small industries requiring a shed and storage space only.

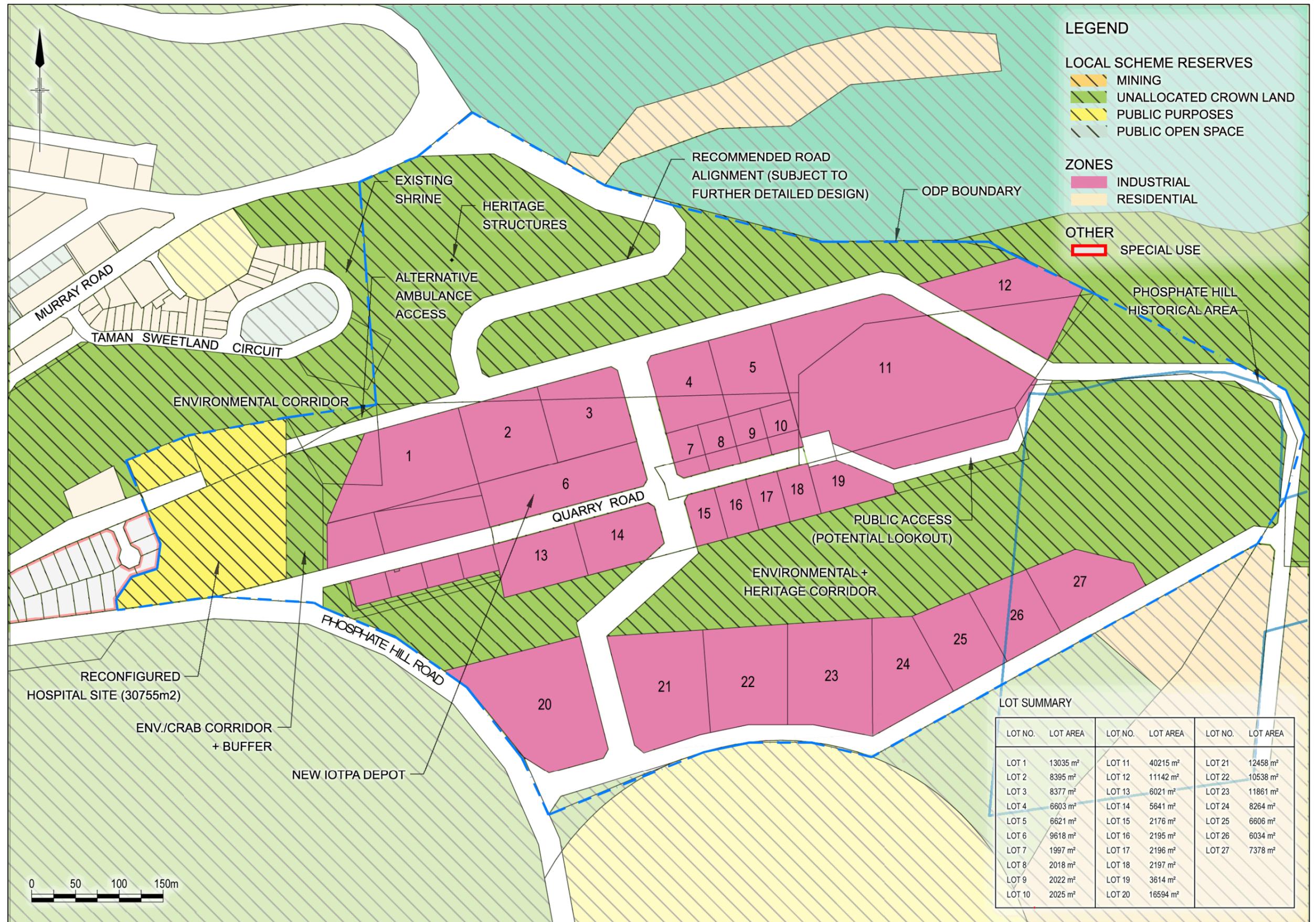


Figure 5: Outline Development Plan

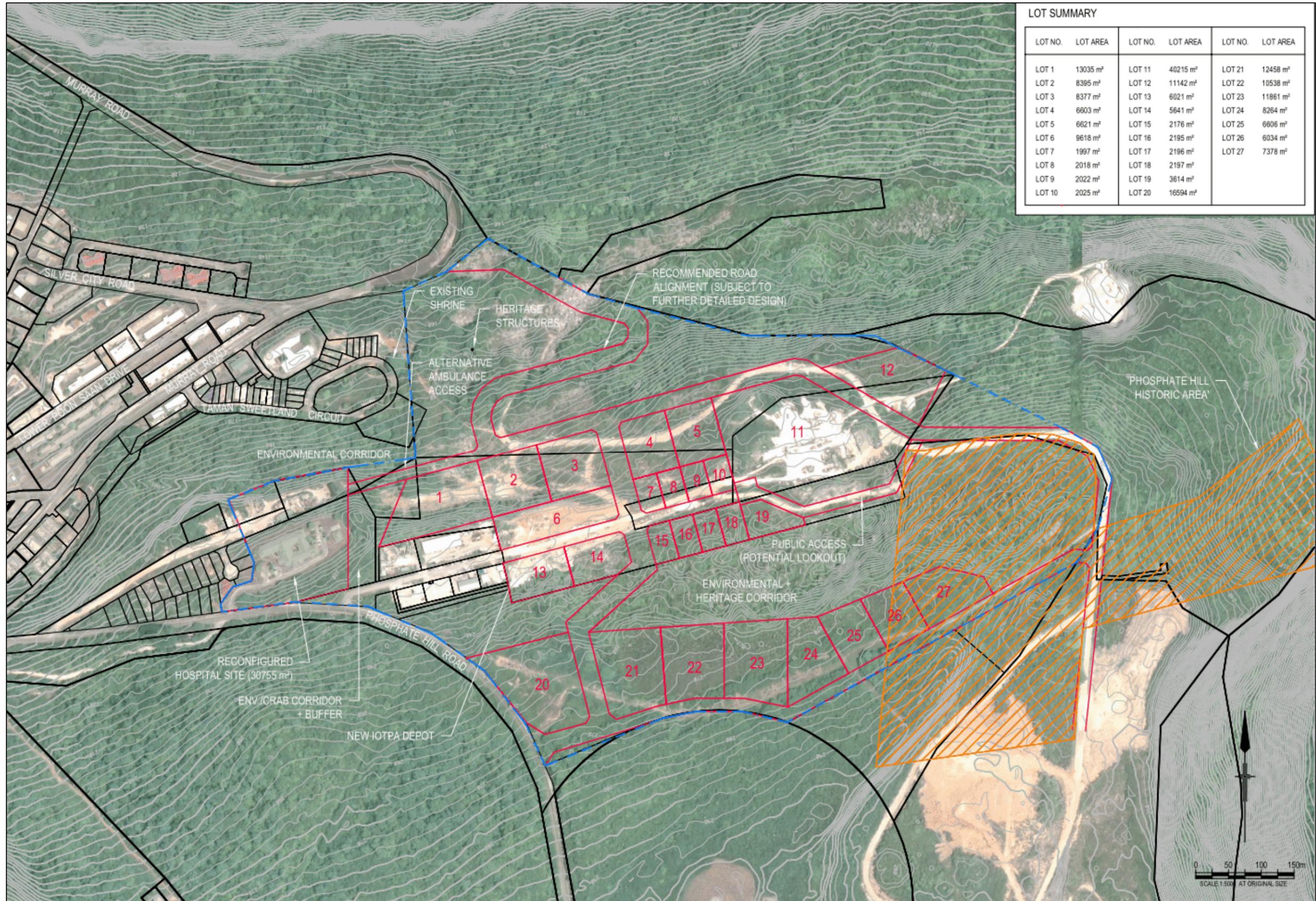


Figure 6: Outline Development Plan (with aerial photo)



The larger lots (approximately 6,000m<sup>2</sup>-8,000m<sup>2</sup>) are concentrated immediately to the north of the smaller lots on Quarry Road as well as on the south side of the proposed environmental buffer. The lots to the north of Quarry Road would be on a lower plateau than Quarry Road and therefore will need to accommodate the change in elevation, requiring extensive earthworks. This will reduce the useable space of the total lots; however these lots will still be able to accommodate larger industries requiring more room.

The proposed lots in the southern portion of the study area range from between 6,034m<sup>2</sup> and 16,594m<sup>2</sup>. This elevated area is relatively flat land and the majority of the area of these lots would be able to be utilised, with minimal earthworks required. These lots would accommodate large industries requiring large amounts of land for manufacturing and production facilities.

**Table 1: ODP Lot Size Summary**

Lot No.	Area (m <sup>2</sup> )	Lot No.	Area (m <sup>2</sup> )	Lot No.	Area (m <sup>2</sup> )
1	13,035	10	2,025	19	3,614
2	8,395	11	40,198	20	16,594
3	8,377	12	11,142	21	12,458
4	6,603	13	6,021	22	10,538
5	6,621	14	5,641	23	11,861
6	9,618	15	2,176	24	8,264
7	1,997	16	2,195	25	6,606
8	2,018	17	2,196	26	6,034
9	2,022	18	2,197	27	7,378

#### 4.2.2 Public Purposes

The ODP allows for an expanded and reconfigured hospital site, assuming the existing bus depot immediately to the north of the hospital is relocated into the LIA. Given the current increasing population and resultant demands on hospital infrastructure, this expanded site will provide room for the hospital to increase and diversify if and when required. It may also provide room for aged care facilities, which are currently lacking on the Island.

There is also an opportunity for a public access trail and lookout to the south of the current Acker site. It has been indicated in the ODP as a public reserve; however the intention is not to allow public vehicle access into this reserve. A lookout at the top of this elevated section would provide views north over the heritage pinnacle and environmental corridor. The lookout could form part of a heritage trail connecting historic rail infrastructure in Poon Saan and Phosphate Hill to the heritage area in the eastern part of the ODP area, and further on towards the Chinese cemetery further to the east.

There may also be opportunities for the establishment of community gardens within the Taman Sweetland residential area. Specifically, they could be located in the proposed buffer area on the eastern

edge of Taman Sweetland Circuit. Community gardens here would provide a productive use of otherwise unproductive land. The CLMP for Christmas Island identified the potential benefits of community gardens on the Island (community engagement, connection with the land and natural processes, production of fresh produce for local communities), and identified that almost any small, local public reserve area could be used for community garden activities. In addition, there is already an informal food garden area adjacent to a shrine in this location.



Existing informal food garden



Food garden in Murray Road reserve, Poon Saan

#### 4.2.3 Environmental Corridors/Buffers

Three environmental buffer/corridor areas have been identified within the ODP. One of these is located between the proposed residential lots and the hospital site and western edge of the LIA, running in an east-west direction. This will serve two functions; firstly to provide a visual and sound buffer between the residential lots and the hospital, and secondly to provide a buffer between the edge of the LIA and the Taman Sweetland area.

A second buffer is proposed between the hospital site and the western edge of the LIA in a north-south direction. This corridor will serve to buffer the hospital from the LIA area. Parks Australia has also identified this area as a crab migration route and the preservation of this corridor will allow migrations to continue in this area.

The third corridor is located within the LIA and is located between the proposed lots on Quarry Road and the elevated land to the south. This area has been mined in the past and is characterised by deep pinnacles and regrowth. It is also a significant heritage area for the Island. The corridor will provide an environmental link from Phosphate Hill to the east coast, as well as providing a heritage link with the Chinese cemetery located to the east of the LIA.

Historic mining heritage area within proposed environmental corridor



#### 4.2.4 Adjacent Land Uses

A small area on the southern side of Taman Sweetlands Circuit in Taman Sweetland has the potential to accommodate additional residential lots. These lots would compliment the residential development on the northern side of the road and could assist in alleviating the current pressure on residential land supply on the Island. This area has previously had temporary accommodation located here and so some earthworks have been carried out and services installed. A public access way has been provided with the intent of providing pedestrian access to the expanded hospital site to the south.

These lots and the area between the LIA and Murray Road should be subject to a separate ODP process to further investigate the possibility for residential expansion as well as other land uses. The ODP should also provide further detailed information regarding the expansion of the hospital.

#### 4.3 Heritage

As identified in Section 2.4, there is a Commonwealth Heritage Listed site in the eastern portion of the LIA study area, identified as the 'Phosphate Hill Historic Area'. Any action that may have an impact on a listed site may be referred to the Federal Minister for the Environment, Heritage and the Arts for assessment under the EPBC Act. Two of the proposed industrial lots extend into the outer area of the listed site. The site is registered as the first commercial mining area on the Island as well as the burial ground of early labourers. The proposed industrial lots do not encroach into either the mining area that is referred to (protected separately within the 'Environmental and Heritage Corridor') or the burial ground (Chinese cemetery). As a result, the impact on the heritage site is expected to be minimal.

During the ODP process, some heritage structures were identified during site visits within the study area that are not on the CHL. They are in the north western corner of the ODP area and consist of an old shrine and some walls constructed from limestone rocks. It is believed that this area was part of very early mining activities similar to the mining area registered on the CHL. The proposed development in the ODP has avoided this area and it has been incorporated into the environmental buffer/corridor areas.



Limestone wall heritage structures identified during site visit

#### 4.4 Airport Height Restrictions

##### 4.4.1 Airport Navigation Beacon

As mentioned in Section 2.7, there are specific clearance requirements for the VOR beacon, which include:



- ▶ Vehicle Movements: Public roads shall not be closer than a 300m radius from the VOR beacon; and
- ▶ Clearance Zone: No structure, building, trees, fences, towers or power lines is permitted within a 600m radius of the VOR beacon if they will extend above an elevation angle of one degree as seen from the VOR beacon site.

No public roads are proposed within 300m of the beacon.

An elevation angle of one degree over the 270m distance to the southernmost lots of the LIA results in a maximum allowable height of any structure of 4.7m. Due to the difference in elevation (-16m), the height restriction increases to approximately 21m. This should not pose any difficulties in the development of these lots.

#### **4.4.2 Obstacle Limitation Surface**

Section 2.7 indicated the need for the proposed LIA to not prejudice any future runway expansion potential for the Island. The height of the transition surface for an extended runway at the southern edge of the ODP is 300m. The transition surface increases to 305m a further 250m to the north within the LIA.

Taking into account the elevation at the 300m height limit mark (274m), structures at this point can be up to 26m high. This height restriction increases at a gradient of 14.3% until it reaches 305m. Therefore for any development adjacent to Quarry Road, the height restriction for structures is approximately 50m. Further north of this point the height restrictions remain at 305m. Taking into account the decrease in elevation from Quarry Road northwards, the permissible height would increase to approximately 90m at the northern most point of proposed development.

These height restrictions should not pose any problems for the development of the proposed lots within the LIA.

### **4.5 Vehicular & Pedestrian Connectivity**

#### **4.5.1 Proposed Road Network**

The main component of the road network of the ODP is a road link from the top of Phosphate Hill to Murray Road through the LIA that bypasses the Poon Saan area (see Section 4.4.2). This central road will intersect with the existing Quarry Road in the middle of the LIA. Quarry Road extends to the edge of the Acker site and the existing road reserve should be rationalised into a more conventional alignment.

There is currently an overgrown, little used track along the northern edge of the LIA that joins with a more heavily used track that curves around the eastern edge of the LIA and continues towards the airport. It is proposed that these two tracks are formalised as a dedicated road, providing vehicular access around the northern and eastern edges of the LIA. This road would also provide a shorter and quicker link to both Lily and Ethel beaches for the local community, direct from Murray Road that bypasses Poon Saan, removing through traffic from this residential area. It will also enhance access to the Acker site.



Existing track on the northern edge of the LIA

A third proposed major road is in the southern portion of the ODP area that will service the elevated plateau and the industrial lots proposed for this area. This road will connect Phosphate Hill Road to the 'Murray Road Link' as well as connecting to the eastern access road. The alignment follows closely an existing power line and access track. This will become a very important link in the road network if the runway is expanded in the future. Depending on the final length of any extended runway, this road may provide the only link to the eastern side of the runway, replacing the current road link further to the south at the end of the current runway. An alternative option to realign Lily Beach Road is likely to prove more costly as it will involve excavation of fill to lower the road, and still allows public vehicles through the runway/beacon corridor.

A minor road link is proposed between the hospital and the 'Murray Road Link' for emergency vehicles only. This link would provide a direct link to Murray Road, providing more efficient access to the lower Settlement area as well as the LIA itself for ambulance vehicles.

#### **4.5.2 'Murray Road Link'**

The 'Murray Road Link' would remove a large proportion of through traffic from the residential areas along Murray Road in Poon Saan and will provide a more direct route from the airport down to the Kampong and Settlement areas. It would also provide a safer and easier alternative for larger vehicles to travel between the airport and port. Taking into account the topography of the area, heritage and pinnacle areas, what is considered the most suitable alignment for this link has been identified.

The available road reserve is restricted by the National Parks boundary to the north-east, a heritage area and a vegetation corridor to the north-west.

The existing grade on the proposed road alignment varies from 9 %-16% over 260 m. The concept for the proposed new road has been developed with the following parameters:

- ▶ Develop a road suitable for heavy vehicles;
- ▶ A longitudinal grade to AUSTRROAD Rural Road Design Guide;
- ▶ Maintain the level of the existing access track to the existing crusher plant; and
- ▶ Limiting the proposed road reserve to ensure that the National Parks boundary and the heritage area are not compromised.

Proposed Road Features:



- ▶ Proposed road to be a 7.0 m wide double carriage way sealed road, with 1.0 m sealed and 0.5 m unsealed shoulders;
- ▶ Maximum grade of 10% over a distance of approximately 280m and a design speed limit of 40 km/h;
- ▶ Intersections as per MRWA requirements, i.e. 3% longitudinal grade on road for a distance of 20 m; and
- ▶ Road embankment with 1V:3H cut and fill batter slopes.

A new road alignment has been modelled that satisfies the above mentioned parameters. It should be noted that the alignment of the road is extreme in terms of grade, and horizontal radii would only be able to be negotiated at low speeds by heavy vehicles. However the geometry reflects the topography and is not unusual for roads on the Island. Significant earthworks and excavation is anticipated.

As a comparison, Link Water Road has greater grades (between 11% and 19%) over a greater distance (480m in length). With this profile and winding geometry, Link Water Road has been restricted to light vehicles (max. 4 tons) at low speed (30km/h posted speed).

The following investigations should be undertaken as part of the detailed design stage:

- ▶ Investigate the use of retaining wall and batter stabilisation methods to optimise the required earthworks;
- ▶ Drainage design for the site;
- ▶ Investigate on the methods for the treatment of the existing mine pits;
- ▶ Investigate the related environmental issues and crab migration issues;
- ▶ A more detailed study on the proposed new road and its features such as guardrails, side drainage, lighting, installation of round about at intersections, type of sealing;
- ▶ Optimise the earthworks operation by concurrently carrying out the industrial area's bulk earthworks;
- ▶ Geotechnical investigations on the site and the determine available construction materials;
- ▶ Coordinate with mining operators to involve them as partners in the project at an early stage and hence use available resources and expertise on the Island ; and
- ▶ Estimate the construction time and the construction costs given the volume of earthworks involved.

### **4.5.3 Traffic Analysis**

#### Existing Traffic Volumes

The Shire has advised of the following traffic volumes:

- ▶ Murray Road (Telstra Tower) 1,380vpd-1,500vpd (138vph-150vph assumed during peak hour).
- ▶ Phosphate Hill Road (near Murray Road intersection) 1,000-1,100vpd (estimated) (110vph assumed during peak hour).

#### Traffic Generation

There are no specific traffic generation rates available for Christmas Island and industry rates based on RTA Guidelines have therefore been used which would represent a 'worst case' scenario.

The heaviest traffic generation scenario for the proposed development has been estimated as follows:



**Table 2: Heavy Traffic Generation Scenario**

Land Use	Estimated Floor Area GLA (sqm)	Trip Rate	Trips per day	Trips per hour
Residential Taman Sweetland Circuit	16 +16 Existing properties	9/dwelling per day 0.85/dwelling/hr	288vpd	27vph
Lots 1-5 LIA	21,516	5/100m2 GLA per day 1 /100m2 GLA per day	1,076vpd	215vph
Lots 6-10 LIA	10,856	5/100m2 GLA per day 1 /100m2 GLA per day	543vpd	109vph
Lot 11 LIA	N/A - Crushing Plant		20vpd assumed	2vph
Lot 12 LIA	5,571	5/100m2 GLA per day 1 /100m2 GLA per day	279vpd	56vph
Lot 13-19 LIA	15,115	5/100m2 GLA per day 1 /100m2 GLA per day	756vpd	151vph
Lot 20-27 LIA	41,255sqm	5/100m2 GLA per day 1 /100m2 GLA per day	2,063vpd	413vph
Sub Total LIA			4,737vpd	946ph
Total inc residential	94,311sqm		5,025vpd	973vph

Note: Trip Rates based on NSW Guide to Traffic Generating Development

The above scenario indicates that the full development of the LIA will generate approximately 4,730vpd and 950vph during the evening peak hour. The residential area is likely to generate in the order of 290vpd and 30vph during the evening peak hour.

It is currently estimated that there is approximately 2,100 registered vehicles on Christmas Island. The above scenario would result in every registered vehicle on the Island making almost 2.5 trips a day to the LIA. This scenario is based on estimated GLA, which is difficult to estimate accurately at this level of strategic planning. The RTA Guide to Traffic Generating Development indicates that a figure of 28 employees per hectare may be used in this situation when floor areas are difficult to determine in the strategic planning stages of large industrial estates.

Using this figure, the LIA may be expected to generate approximately 500 employees (17.8 hectares proposed in the ODP). Applying the Main Roads WA industrial trip rate of 4.7 trips per employee, the LIA may be expected to generate approximately 2350 trips per day (1.1 trips to the LIA per day for every registered vehicle on the Island).



### Traffic Distribution

The following broad traffic distribution has been assumed for analysis of the key intersections (using the heaviest traffic generation scenario):

**Table 3: Traffic Distribution**

Destination		LIA vpd (4800 vpd LIA)	Through Traffic from Murray Rd (10% assumed)	Total vpd	Total vph
North to Murray Road via new link road	30%	1,440vpd	+140vpd	1,580vpd	302vph
South to Phosphate Hill Road via new road	25%	1,200vpd	+70vpd	1,270vpd	247vph
South to Phosphate Road via central access road (Quarry Road)	25%	1,200vpd		1,200vpd	240vph
East to Airport southern link road	10%	480vpd		480vpd	96vph
East to Airport via northern link road	10%	480vpd	+70vpd	550vpd	103vph
Taman Sweetland Circuit Residential Traffic	100% residential traffic	290vpd		290vpd	29vph

### Intersection Analysis

Based on the heaviest traffic generation scenario following full development of the LIA, intersection analysis has been undertaken for the following key intersections:

- ▶ Murray Road/Murray Link Road
- ▶ Phosphate Hill Road/Southern Link Road

Austrroads indicates thresholds where analysis is required based on traffic volumes and these values are compared with forecast volumes assuming 70% approach the intersection from the side road in the peak hour.



**Table 4: Murray Road/Murray Link Road**

Austrads Main Road Volumes (vph)	Austrads Approach or Turning Volumes	Actual Murray Road	Forecast Murray Link Road
400vph	250vph	138vph	211vph
500vph	200vph		
650vph	100vph		

**Table 5: Phosphate Hill Road/Southern Link Road**

Austrads Main Road Volumes (vph)	Austrads Approach or Turning Volumes	Actual Phosphate Hill Road	Forecast Southern Link Road
400vph	250vph	110vph	173vph
500vph	200vph		
650vph	100vph		

The above tables indicate that analysis or any particular measures are required to increase capacity.

Notwithstanding the capacity analysis the intersections should be designed to accommodate the design vehicle to facilitate all movements. Roundabouts at the two above mentioned intersections would accommodate forecast traffic volumes, the design would be subject detailed assessment of topography and sight distance requirements. The assessment indicates that 'T' intersections would also accommodate the traffic volumes, again subject to detailed assessment of topography and sight distance.

More detailed traffic count information would be required before a detailed analysis could be undertaken to determine the most appropriate intersection treatments.

#### Quarry Road/Phosphate Hill Road Intersection

The stopping sight distance on the westbound approach of Quarry Road bend needs to be checked together with tracking for opposing design vehicles on the bend to determine if improvements are required.

It may be concluded that the current road network can handle the worst case traffic scenario and in fact there is likely to be a lot less traffic generated by the planned development as indicated by other calculation formulas and the actual number of registered vehicles on the island. Targeted traffic surveys will be required at the detailed design stage to confirm or otherwise these projected numbers.

#### **4.5.4 Pedestrian & Cycle Links**

Due to the industrial nature of the proposed development and severe terrain, pedestrian and cyclist activity within the precinct will be limited. A dual use path is currently proposed along Phosphate Hill Road, adjacent to the LIA and there are no plans to bring this path into the LIA.

It is recommended that footpaths are provided on each side of the LIA roads where development is proposed on both sides and on one side elsewhere to provide for internal pedestrian movements.



## 4.6 Services

Refer to Figures 7 and 8 for indicative servicing plans for the proposed LIA.

Servicing potential for residential expansion in Taman Sweetland has also been investigated as part of this analysis.

### 4.6.1 Water

#### Industrial Lots:

The proposed development lies within the Phosphate Hill and Airport Tank catchments. The highest point in this area is RL 282m and the lowest levels are at RL 202m. With the increase in demand created by the proposed 27 lots in the LIA, a total demand of 1.38 L/s (average day peak week) is predicted. Considering the land level of the lots and the hydraulic heads of the water tanks, Lots 1 to 14 and Lot 19 will need to be supplied by the Phosphate Hill Tank (TWL RL 226m), and the remainder of lots will be need to be supplied by the Airport Tank which has the higher hydraulic head of 325m RL. In addition, a Pressure Reducing Valve (PRV) should be installed on the pipe which supplies Lots 15 to 18. The PRV should be set at RL 290m to avoid the excessive pressure for these lots.

Water gravitates from the Phosphate Hill Tank (TWL 226m RL) and Airport Tank (TWL RL 325m) to this subdivision area via DN100 pipes. To supply Lots 1 to 14 and Lot 19, a DN100 pipeline along Quarry Road will need to be connected to the existing DN100 water main which leads the Phosphate Hill Tank. To supply Lots 15 to 18 and Lots 20 to 27, a DN100 water pipeline with approximate length of 1 km will need to be built. This pipeline would connect to the Airport Tank via the airport administration building pipeline feed.

#### Residential Lots:

The potential residential subdivision in the Taman Sweetland area lies within the Drumsite Tank catchment. The highest point in this area is RL 179 m and the lowest levels are at RL 166 m. With the increase in demand created by approximately 16 lots, a total demand of 0.23 L/s (average day peak week) is predicted. Water gravitates from the Drumsite Tank (TWL 225.6m RL) to this subdivision area via existing DN100 pipes.

The existing DN100 pipe in the area will need to be relocated into the road reserve to ensure a 2.1m setback from the property boundary line.

This analysis will need to be subject to further detailed planning, such as a separate ODP process.

### 4.6.2 Wastewater

#### Industrial Lots:

The subject area has a downward slope to the north-west. The highest point in the area is RL 282m and the lowest levels are at RL 202 m. The current catchment design flow is 1.1L/s and the additional flow generated by the proposed LIA subdivision is estimated to be 4.3L/s. This projected flow, plus projected flows for the proposed residential lots and existing flows into the main pipe will result in a total catchment flow of 11.7L/s which will exceed the estimated 8L/s capacity for the current pipe.

For this subdivision to comply with Water Corporation requirements, the wastewater conveyance system needs to be upgraded in several locations.

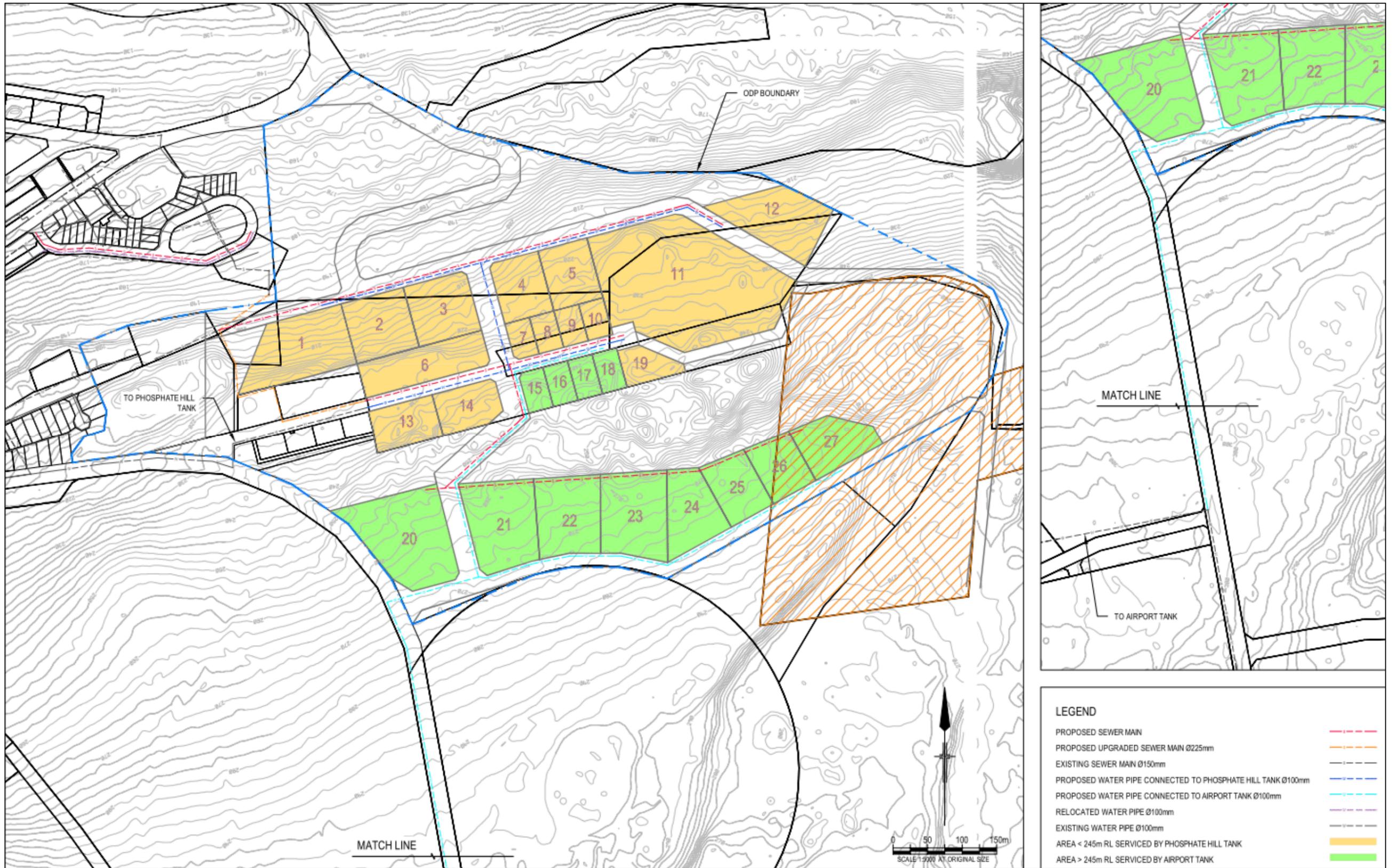


Figure 7: Indicative Water & Wastewater Servicing Plan

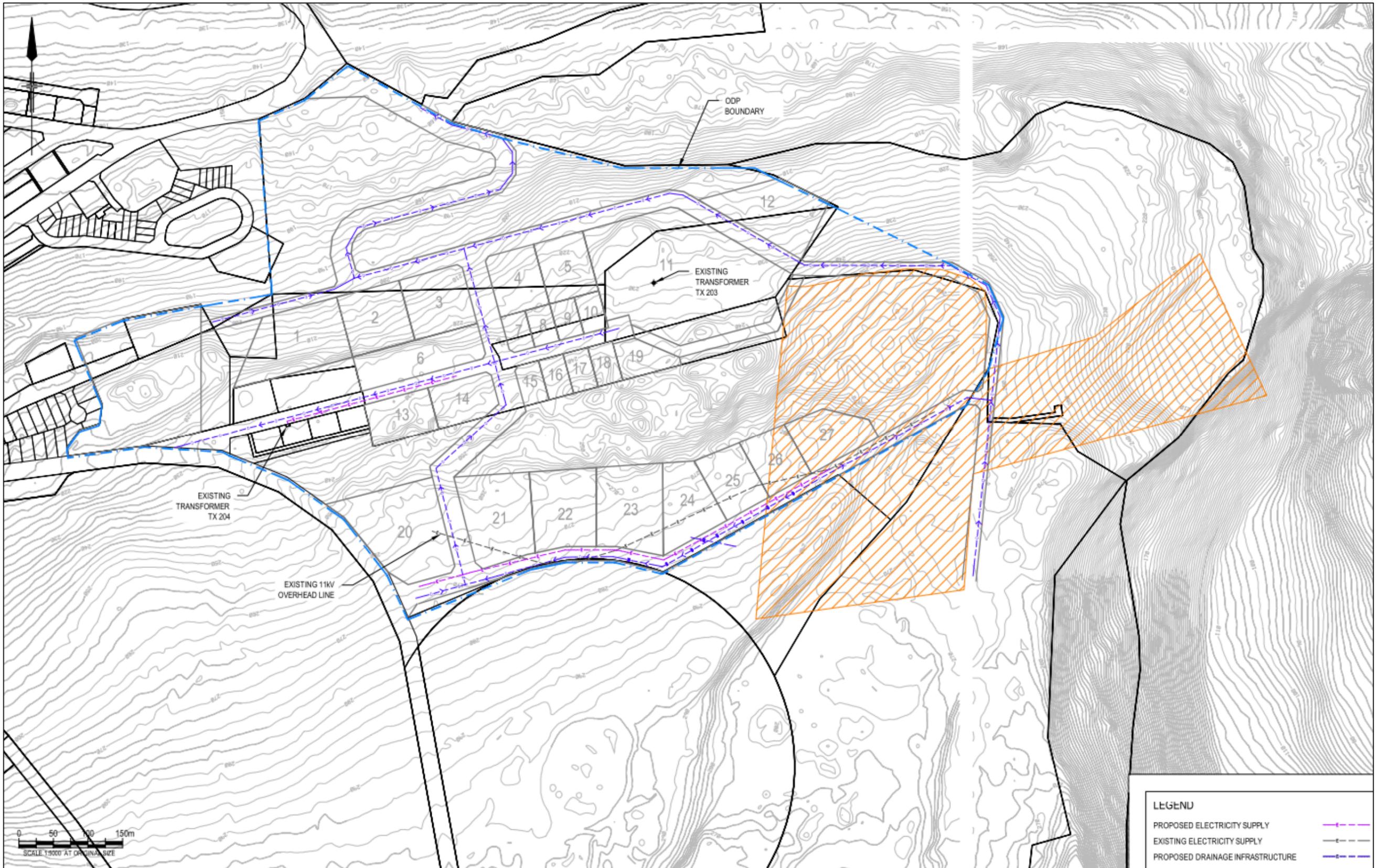


Figure 8: Indicative Drainage & Power Servicing Plan



The downstream conveyance pump stations will need upgrading and the downstream DN150 pipeline will need to be replaced with a new DN225 pipe. The system should be monitored, and when the inflow into access chamber SC51 approaches 8L/s the new DN225 pipe will need to be constructed. The new DN225 pipe will replace the existing DN150 pipe from access chamber SC51 to access chamber PH0120.

The gravity sewer pipelines for the proposed subdivision follow the natural slope of the land and proposed internal roads. The pipeline that services Lots 13 to 27 should be connected to the existing access chamber PH0120 at RL 229m, while the pipeline that services Lots 1 to 12 should be connected to the access chamber PH0116 at RL 223.74m.

#### Residential Lots:

The potential residential subdivision area has a downward slope to the north-west. The highest point in the area is RL 179 m and the lowest levels are at RL 166 m. The flow generated by the potential subdivision is estimated to be 0.18L/s and it is well below the designed 1.8L/s pipe capacity, hence no arterial sewer main upgrade is needed. The possible layout of the sewer pipeline follows the natural slope of the land and existing road reserve.

This analysis will need to be subject to further detailed planning, such as a separate ODP process.

### **4.6.3 Drainage**

In order to arrive at an indicative drainage design, a numerical model has been developed in DRAINS (drainage modelling software) adopting the runoff parameters and design rainfall events used for the Christmas Island Drainage Management Plan. The analysis has been undertaken without a review of the assumptions that are built into that model. It should be noted that the model uses intensity frequency duration (used to develop design storm events) data for Darwin and adopts an initial loss of 17 mm for natural areas and private lots, suggesting that some storage of stormwater will be required on each development site.

In order to design the drainage network the proposed cadastre and existing contours were used to estimate road levels throughout the study area. This was done by defining levels at key intersections and other various locations within the study area based on contours and then applying average gradients to estimate intermediate levels.

Proposed cadastre, contours and estimated road and cut/fill levels were used to formulate a proposed network of drainage infrastructure and delineate sub-catchments. It is assumed that some lots along the proposed southern access road will drain to into the environmental corridor and that the natural storage of stormwater within this corridor is sufficient such that there is no overflow to adjacent drainage networks.

Given the steep gradients in some parts of the road network it will be necessary to provide combination grated and side entry inlets (combination pits) in order to ensure adequate capture of flows. Indicative pit spacing and pipe sizes were determined by iteration such that the predicted width of gutter flows during a 5yr ARI event do not exceed 1.4m (i.e. 1m into the traffic lane). A total of 109 entry pits (including double pits at some locations) might be required to adequately service the proposed development. Table 1 summarises the length of pipe considered by the design. Additional pipe may be required to provide connections across the roadway and/or additional catch pits. Two channels are proposed to direct flows



from the piped drainage network to suitable overland discharge points. Given the steep gradients involved, relatively small channels (0.5m deep, 1m base) would be sufficient to contain flow.

**Table 6: Nominal Drainage Pipe Lengths**

Nominal Pipe Size (mm)	300	375	450	525	600	750
Total Length (m)	2162	559	229	138	23	20

The layout and sizing of drainage infrastructure will need to be reviewed during the detailed design phase of the subdivision. At this time it would be appropriate to consider the placement and size of additional structures required to capture sediment from stormwater flows in effort to limit downstream environmental impacts.

#### **4.6.4 Power**

The existing lots powered by TX204 are light industrial installations, for example a mechanics workshop. Lots 13 and 14 are approximately twice the size per unit area of these existing lots. Based on the assumption that these lots will be developed first and that they will have similar power requirements per unit area to the existing adjacent lots, then TX204 should have sufficient capacity to service Lots 13 and 14. The spare capacity of TX204 should be confirmed however once the load density at the new developments has been determined.

As identified in Section 2.5, other nearby power infrastructure includes:

- ▶ Another step down 0.415/11kV 500kVA ground mounted transformer kiosk (TX203) is located at Lot 11 to supply the sand and aggregate plant; however this transformer does not have spare capacity for future connections; and
- ▶ An 11kV overhead line easement which runs alongside Lot 20-27; however there are no transformers along this section.

Therefore new power infrastructure will be required for future developments beyond Lots 13 and 14 (the required infrastructure is difficult to determine without knowing the potential load). The existing transformer TX204 may be able to support the load for these lots, however this cannot be confirmed until the load to be installed at Lots 13 and 14 is determined.



## 5. Staging & Implementation

### 5.1 Proposed Staging

The staging of the proposed LIA development will need to take into account the complex land tenure arrangements, required Town Planning Scheme amendments, future mining activities and the cost of development on the Island (see [Appendix D](#)). The most immediate of these considerations are:

- ▶ The future mining intentions of CIP;
- ▶ The surrender of the mining lease at the rear of proposed Lots 13 – 19;
- ▶ The timing of any proposed mining; and
- ▶ Suitable post mining landscapes to facilitate development of proposed roads and lots.

Given the in-principle support that CIP has provided for this ODP, AGD should facilitate discussions as soon as practicable with CIP to discuss the implementation of the ODP in regards to these key considerations.

Subject to discussions between the relevant parties and commercially confidential mining information, the following staging for the development is proposed. The initiation of these stages and their components will be subject to appropriate demand for industrial land and available funding.

#### 5.1.1 Stage 1

The priority for Stage 1 is to facilitate the development of Lots 13 and 14 for use. These properties are already partially cleared, have access to a sealed road services, and are owned by SOCI. They are not likely to be subject to any land tenure arrangements and they can be made available for use relatively quickly. These lots can provide an immediate solution to the lack of light industrial land on the Island and facilitate the removal of small industrial activities (i.e. mechanics, panel beaters etc) from residential areas into the LIA.

#### 5.1.2 Stage 2

This stage would firstly involve sealing Quarry Road to service (and provide access for) Lots 7 to 11 and Lots 15 to 19. This will provide additional developable land in the established central section of the LIA along Quarry Road, as well as rationalising Acker's lease boundaries to conform to the ODP.

Secondly, Stage 2 would involve the construction of the 'Murray Road Link' from Murray Road in the north to the intersection with Quarry Road within the LIA, as well as the new emergency vehicle access to the hospital. The purpose is to construct the road in multiple stages given the high costs involved. This first stage of the road will still provide a direct link from the LIA to Murray Road, bypassing the Poon Saan residential area. This will also still provide direct access from the lower areas (Settlement, Kampong) to the airport utilising Quarry Road.

#### 5.1.3 Stage 3

The third stage would involve the development of the lower, northern 'terrace' (Lots 1 to 5) and the construction of the perimeter road along the northern and eastern boundaries of the LIA. This stage will allow the release of larger blocks on this lower terrace as well as facilitating a more direct access to Dolly



and Ethel beaches. Lots 1 to 3 could be developed as part of Stage 2 if the demand for larger lots was apparent at that time.

#### **5.1.4 Stage 4**

Stage 4 would involve the final works of the expansion of the LIA and would involve the development of the upper terrace (Lots 20 to 27), the southern east-west road to service them, and the southern portion of the 'Murray Road Link' from Quarry Road to Phosphate Hill Road.

### **5.2 Implementation Pathway**

In order for the ODP to be implemented to facilitate the subdivision and development of the LIA, the following pathway will need to be implemented:

1. Endorsement of the ODP by the Shire of Christmas Island as per Town Planning Scheme requirements (including any required adjustments).
2. Negotiations between SOCI, AGD, CIP and Acker will be required to agree on land swap, lease and future mining arrangements between the relevant parties based upon the endorsed ODP.
3. Initiation of a TPS amendment by the Shire to rezone the land based on the endorsed ODP.
4. Preparation of a detailed subdivision plan and associated report to create the public roads and lots based on the endorsed ODP.
5. Submission of the subdivision plan (and associated report) to the Western Australian Planning Commission (WAPC) for determination.
6. Upon conditional approval by WAPC, any required works can be commenced on the site to clear any relevant conditions (e.g. servicing of new lots).
7. AGD can tender for the construction of the public roads and new lots in accordance with any staging plans and WAPC conditions.
8. The site needs to be surveyed in order for a Deposited Plan to be lodged with the WAPC to enable the creation of Certificates of Title for the lots and to have the public roads gazetted.

It should be noted that the subdivision process can be undertaken as a Crown subdivision through the Western Australian Department of Regional Development and Lands. This process would not involve the WAPC and would reduce the time required for the creation of Certificates of Title and road gazettal.

### **5.3 Land Development Conditions**

1. Upon the Council's final adoption of the ODP, any future subdivision, development or use of the site shall be generally in accordance with the adopted ODP.
2. The provisions of the ODP apply to the land as if they were incorporated into the TPS and are binding and enforceable in the same way as Scheme provisions. Where any inconsistency arises between the ODP and the TPS, the ODP will prevail.
3. The Council may agree to minor changes or variation to the adopted ODP if, in the Council's opinions, the change or departure does not alter the intent of the ODP.



4. All new development and lots created through subdivision will be required to connect to utility services including reticulated sewerage, reticulated potable water, power and communications services.
5. Any development will need to have respect to any relevant heritage concerns in relation to either the immediate site or the surrounding area. Under the EPBC Act, an action that has, will have or is likely to have a significant impact on the listed place may be referred to the Federal Minister for Environmental Protection, Heritage and the Arts for assessment.
6. In the absence of any broader assessment of the geotechnical stability and potential risks of development within the LIA, individual assessment should be carried out on a site by site basis prior to any development taking place.
7. In the absence of a broader assessment of the extent of the groundwater catchment on the Island, any future development in the LIA will need to assess the potential impact on the groundwater catchment to ensure that any leaching of potential contaminants is minimised where possible.
8. All development within the LIA will need to comply with height restrictions associated with the VOR beacon as well as the Obstacle Limitation Surface (OLS) associated with the current runway. The projected OLS for an extended runway should also be considered so as to not interfere with the future expansion potential of the runway.



## 6. References

Butz M. 2004. *National Recovery Plan for Tectaria devexa*. Department of the Environment and Heritage, Canberra.

Department of the Environment, Water, Heritage and the Arts. 2004. *Australian Heritage Database*, available from: <http://www.environment.gov.au/heritage/places/commonwealth/index.html>.

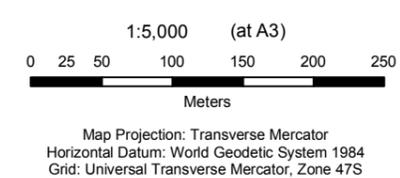
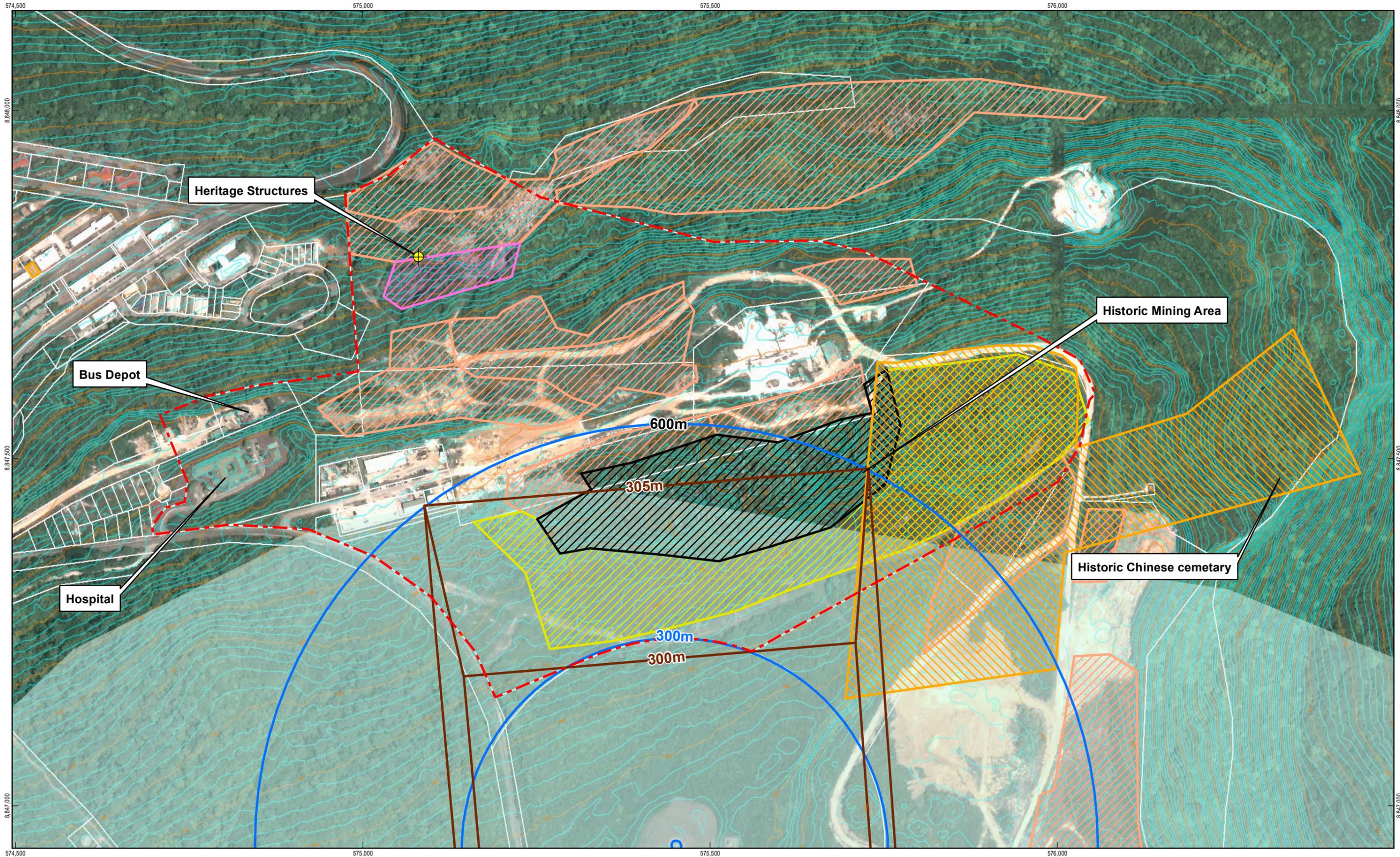
GHD, 2003. *Christmas Island – Airport Upgrade Environmental Impact Statement*, 14<sup>th</sup> October 2003.

GHD. 2009. *Crown Land Management Plan for the Indian Ocean Territories: Christmas Island*, 29<sup>th</sup> September 2009.

Western Australian Planning Commission. 2004, *Shire of Christmas Island Town Planning Scheme No. 1*, gazetted 4<sup>th</sup> July 2002.



Appendix A  
Opportunities & Constraints Mapping



LEGEND	
	Indicative Study Area
	Commonwealth Heritage List
	Perched Aquifer - Fresh
	Contours
	VOR Beacon & Buffers
	Transition Surface Height Limits
	Deep Hard Pinnacles
	Deep Loose Limestone
	Shallow Loose Limestone
	Meduim Depth Hard Pinnacles
	Soil Properties



Attorney-General's Department  
Christmas Island Light Industrial Area  
Outline Development Plan

Job Number 61/24888  
Revision A  
Date 27 May 2010

**Constraints & Opportunities Appendix A**

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Data Source: GHD: Study Area - 20100527, VOR Beacon - 20100527, Transition Surface - 20100528, Geoscience Australia: Commonwealth Heritage Register - 20031014, Perched Aquifer - 20101014, Soil Properties - 20100331. Created by: SJ



Appendix B  
Consultation Outcomes



## Christmas Island LIA ODP - Summary of Consultations – 17 – 19 February 2010

### **Attorney-General's Department – SJ, HC, Katherine Wildermuth (AGD), Simon Millcock (AGD), Leslie Heath (AGD), Stephen Elliott (AGD) – 17/2/10**

- ▶ Presentation for the Q-Station ODP was made and two questions were raised:
  - Why were only WA universities approached (budget and location restrictions)
  - What branch of CSIRO are GHD consulting with (research or business)?
- ▶ Presentation for the LIA ODP was made.
- ▶ Status of Mining Lease ML 135 and the beacon lease needs to be confirmed.
- ▶ It was determined that the LIA would be suitable for a central food storage facility and not a suitable location for a supermarket.
- ▶ It was discussed that the LIA would not be suitable for the relocation of government offices.
- ▶ The ODP may take into consideration the WA Fisheries Draft IOT Aquaculture plan.
- ▶ There was a general consensus on the merit of the draft LIA ODP.

### **Shire of Christmas Island – SJ, HC, Stephen Elliott (AGD), David Nielson (Acting CEO), Colin Wheadon (Manager Planning, Building & Health), Ian Hamilton (Acting Works and Services Manager) – 17/2/10**

- ▶ The existing Quarry Road will be sealed to the eastern boundary of the AGD site.
- ▶ The Shire's first development priority is Lots 2 & 3 of the WML subdivision plan (August 06).
- ▶ At this stage selling Lots 1 & 2 is not the Shire's preferred option.
- ▶ The Shire is considering building a structure on Lot 2 to create leaseable space for small industries, some of which currently operate from private homes.
- ▶ Existing sewer and water services extend to the eastern boundary of the Shire depot.
- ▶ According to the Shire, there is a private 50mm sullage line extending to the Acker site.
- ▶ There was a general agreement in principle supporting the plan and in particular the merit of the direct road access to Murray Road.
- ▶ The key concern was the gradient of the proposed roads as it would need to accommodate the heaviest vehicles on-Island.
- ▶ The Shire requires a lay down area in addition to their current depot site and currently their preference is Lot 1 in close proximity to their current depot.
- ▶ It was suggested that a large block immediately north of the current depot may be suitable if the 'Murray Road Link' is constructed.
- ▶ The desired location for Acker's office was discussed as being within their existing boundary in the western portion of the site.



- » The potential of a minor road connection from just below the current hospital eastwards to the new Murray Road link would further enhance the Murray Road link by allowing quicker ambulance access to the lower settlement areas in the event of an emergency as well as an alternative entry into the hospital precinct.

**Acker Pty Ltd – SJ, HC, Stephen Elliott (AGD), Leslie Heath (AGD), John Wildermuth (Acker) – 18/2/10**

- » John considered that the overall plan was acceptable in principle.
- » Acker is considering locating their batching plant in the small clearing between the quarry and the main operations.
- » A reconfigured block may provide an opportunity to review the location of the batching plant given its potential direct access to the Murray Road Link.
- » The new area in a reconfigured block may also be suitable as a certain height differential is required for the batching plant.
- » A copy of the plan was provided to John for further consideration by Acker.

**Christmas Island Phosphates – SJ, HC, Sunil (GHD), Stephen Elliott (AGD), James Keogh (CIP), Kane Martin (CIP) – 18/2/10**

- » James located and identified an old shrine and heritage area adjacent to the hairpin in Murray Road and surveyed the co-ordinates (575080E, 8847790N). This site is very degraded with a lot of old rubbish and railway debris.
- » An update was provided on some of the possible future mining intentions for ML135 and 136.
- » An application has been made under the current clearing permit to mine a portion of ML136 which has been approved in principle. The mining of this area has not been scheduled by CIP.
- » A 50m buffer to the National Park from mining activity must be observed by CIP.
- » CIP then has to apply to AGD for approval to mine the area, during which time AGD will approach the WA DEC for advice. This generally takes up to 2 months.
- » CIP estimates that this area could represent 3-6 months of mining activity.
- » The resource in the area is estimated to be 1.5m-2.5m in depth.
- » At the conclusion of mining, the normal procedure is for CIP to write a letter to the WA Department of Mines and Petroleum to initiate a partial surrender of the mining lease. This process normally takes 2 weeks.
- » Under normal circumstances, DMP then declare the area surrendered as a File Notification Area (FNA), which then restricts the future uses on that land and prohibits any further mining activity.
- » It was discussed that to assist in facilitating the expansion of the LIA and to take advantage of the post mining landscape for road creation, AGD should arrange for future tenure requirements of the land post mining. This may allow further earthworks and other activities to be carried out in the area to facilitate the implementation of the ODP as CIP is only required to meet regulatory requirements only and meet 'make safe' conditions.



- » CIP have used portions of ML136 for revegetation studies, after re-planting occurred in 2002/2003 by CIP. This was not considered to be a major obstacle to the proposed layout although a loss of research material and study results may impeded further shallow soil rehabilitation trials.
- » CIP have identified a small stockpile (9P) in the western portion of ML135, adjacent to Phosphate Hill Road, for future mining. This has been approved for mining.
- » It is proposed to utilise the cleared corridor under the power line as a vehicular access to stockpile 9P from the east.
- » CIP do not have any plans for the remainder of the ML135 lease area, although it does contain an old explosive magazine.
- » The post-mining landscape generally consists of loose limestone rocks with a sporadic (<1m) cover of soil.
- » The northern portion of ML136 adjacent to Murray Road consists of hard sub-surface limestone, which may be suitable for road base construction.
- » CIP does not have a crusher on the Island capable of handling the material.
- » There is softer limestone material in the CIP chalk pit along Lily Beach Road near the airport that CIP uses as backfill for access tracks.
- » James will investigate any existing technical data on the limestone materials and send to GHD. Drilling is scheduled along old access tracks during March/April 2010. Geotechnical data of limestone will be required, with previous test results available from Acker Trading.

### **Public Information Meeting – SJ, HC, Stephen Elliott (AGD), David Nielson (Acting CEO), Shane Adams – 18/2/10**

- » A presentation was made to the public at the Recreation Centre in the evening. There was one attendee in addition to the Shire CEO.
- » There was support for the Murray Road Link.
- » Shane has an interest in constructing tilt-up factories and leasing out small spaces.
- » Shane indicated that there is a demand for industrial land as businesses such as auto shops, spray shops, boat storage, mechanics and other storage that currently occurs in residential areas.
- » The planned closure of the Central Area Workshops may also impact on this shortage of industrial land.

### **Parks Australia – SJ, HC, Stephen Elliott (AGD), Marjorie Gant (Parks) – 19/2/10**

- » Marjorie supported the proposed Murray Road Link, however raised the issue of red crab migration routes and the impact of the proposed link.
- » The proposed link could potentially reduce the number of road crossings in crab migration routes.
- » The detailed design of the final road alignment will need to consider these migration routes and be designed appropriately.
- » Marjorie raised a question regarding the potential demand for LIA land and what kind of industries would locate here.



- » Marjorie also enquired about the surrender of a portion of ML 136 (the 'finger') to the National Park as well as long term access arrangements to the Acker quarry through the National Park.

**Acker Pty Ltd – SJ, HC, Stephen Elliott (AGD), Leslie Heath (AGD), John Wildermuth (Acker) – 19/2/10**

- » John indicated that the timing of the proposed batch plant relocation may not coincide with the development of the LIA.
- » Acker requires direction over where to place the batching plant in the context of the proposed ODP for the LIA.
- » Acker is under internal and external pressure to relocate the batching plant.
- » Potential land swaps were discussed that would facilitate the creation of the LIA between the Shire and Acker, within which Acker may provide tourist facilities (i.e. a lookout/boardwalk) as part of any swap.
- » Further discussions between the Shire and Acker would need to occur to determine how any negotiations would evolve.
- » The Shire may already have a clearing permit for their land within the LIA.



Appendix C  
CIEDCG Letter of Support



**OFFICE OF THE ADMINISTRATOR  
INDIAN OCEAN TERRITORIES**

**Territory of Christmas Island  
Territory of Cocos (Keeling) Islands**

Mr Stephen Elliott  
Land Environment Heritage Manager  
Attorney-General's Department  
PO Box 868  
Christmas Island  
Indian Ocean WA 6798

**Subject: Light Industrial Area Christmas Island**

Dear Stephen,

I would like to take this opportunity to thank you for your presentation to the Christmas Island Economic Development Consultative Group (CIEDCG) on Wednesday 21 April 2010.

The CIEDCG is extremely supportive of the work being undertaken on the Light Industrial Area (LIA) by AGD as identified in the Crown Land Management Plan report from 2009.

The CIEDCG recognises the current needs for housing, retail and commercial precincts including the current demand for storage, commercial use and other business related activities.

The CIEDCG wishes you to advise the Attorney-General's Department that, in its view, the development of the LIA is a priority for Economic Development on CI. It recommends that the outcomes for the LIA Outline Development Plan be adopted without delay and that implementation be accelerated.

The CIEDCG supports the immediate development of the current available allotments in the Light Industrial Area and would welcome any endeavours from the Commonwealth that could help to facilitate that outcome.

Yours sincerely

A handwritten signature in black ink that reads 'Brian Lacy'.

Brian Lacy  
Administrator

21 April 2010

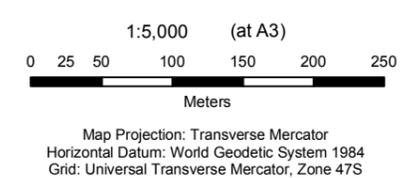


Appendix D

## ODP Implementation Context Mapping

Current Land Tenure

Current TPS Zoning



LEGEND	
	Proposed ODP
Land Tenure	
	Current Mining Lease
	Commonwealth
	Shire of Christmas Island
	Private
	National Park



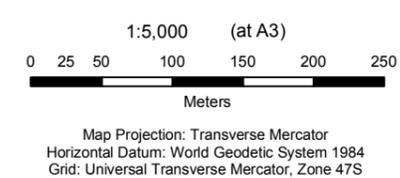
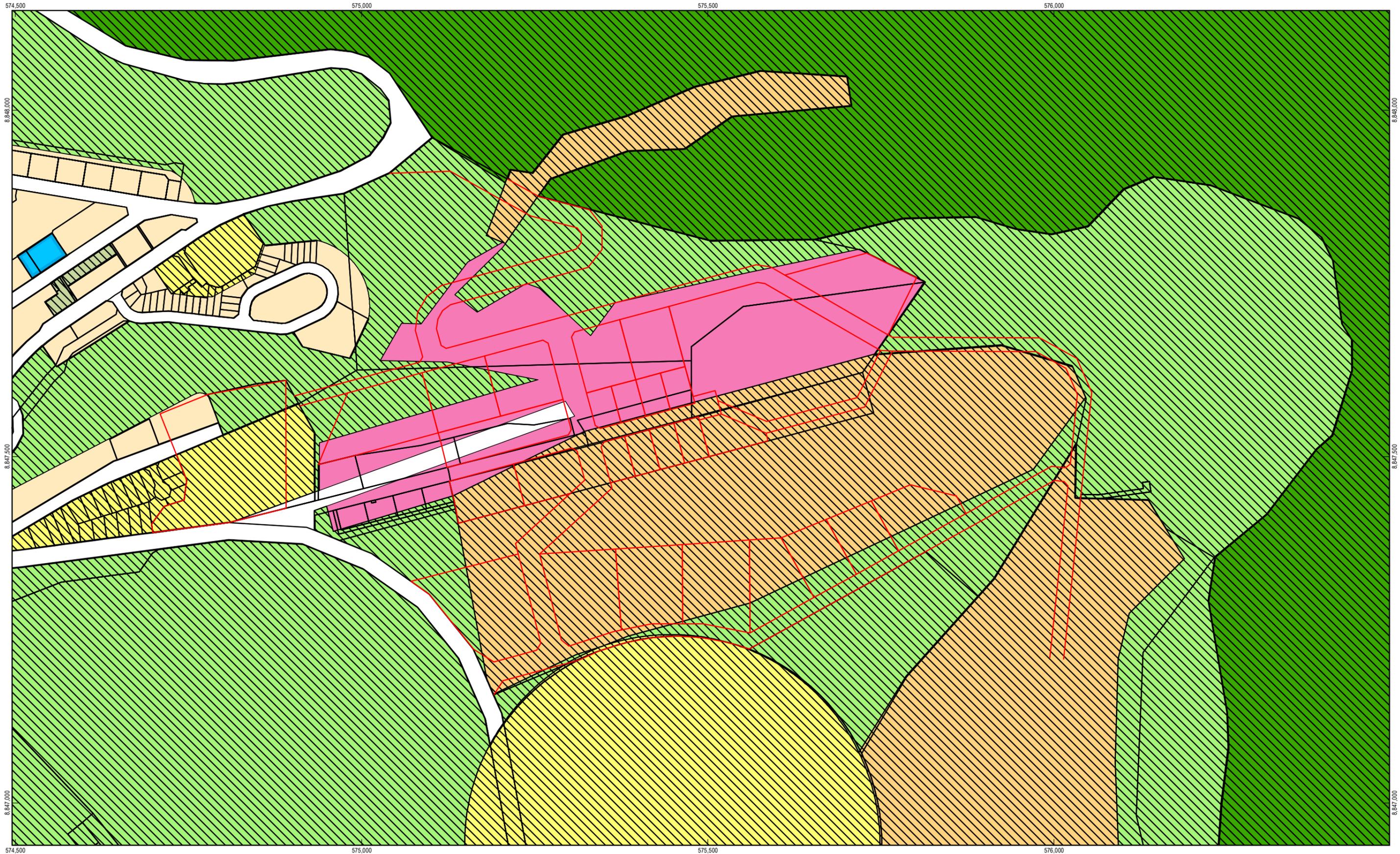
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### Current Land Tenure

### Appendix D

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Data sources: Geoscience Australia; Cadastre - 20080417, Mining Leases - 20071204, National Park - 20031014; GHD: Proposed ODP - 20101207. Created by: SJ



LEGEND	
	Proposed ODP
	Cadastre
Zoning	
	Public Purposes
	National Parks
	Public Open Space
	Industrial
	Mining Lease
	Residential
	Commercial
	Vacant Crown Land



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Current TPS Zoning

Appendix D



**GHD**

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		Name	Signature	Name	Signature	Date
0	SJ	Scott Jeffrey		Jamie Thorburn		07/12/2010