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BAYONET HEAD - PLAN FOR DEVELOPMENT STRATEGIC ENVIRONMENTAL ASSESSMENT (EPA ASSESSMENT NO. 1758) ENVIRONMENTAL SCOPING DOCUMENT

Prepared for:

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1 PURPOSE OF DOCUMENT

The landowners of the Bayonet Head Outline Development Plan area referred the proposed development of the site to the Environmental Protection Authority (EPA) on 30 September 2008, requesting that the proposed development of the site be assessed as a Strategic Environmental Assessment (SEA). Under s37B(2) of the *Environmental Protection Act 1986* (EP Act) an SEA is a formal level of assessment that allows for conditions to be set on development by the Minister for the Environment. The EPA has determined (November 5th 2008) that the proposal is a strategic proposal under the provisions of the EP Act and should be assessed as an SEA (Assessment No. 1758).

The objective of the SEA is to determine the environmental values of the site, assess the impact of the proposed development on the environment and to identify future management of the proposed development to ensure long-term protection of environmental values.

The initial step in the preparation of a SEA for the proposed development is the preparation of an Environmental Scoping Document. The purpose of the Scoping Document is to assist the EPA in identifying the work required to ensure that all significant environmental issues are properly considered as part of the EPA's environmental process of the proposal. The Scoping Document outlines the studies that have been undertaken on the site to date and describes the further investigations that are required to be completed to fulfil the reporting requirements of the SEA.

This Scoping Document has been prepared in accordance with the *Guide to Preparing an Environmental Scoping Document* (EPA 2004a), with additional advice from the EPASU regarding proposed changes to the EPA Environmental Impact Assessment (EIA) process.

2 IDENTIFICATION OF PROPONENT AND CONSULTANT

2.1 Proponent Details

Proponent:	Lowe Pty Ltd (ACN 009 354 143; ABN 29 009 354 143), Housing Authority, Kenneth Lindsay Slee, Ewin McNicol Cameron and Maureen Bertha Cameron, Martin John Greer and the City of Albany.
Nominated Contact Person:	Brian Newman, Heath Development Company.
Position:	Project Manager
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Heath Development Company is the appointed project manager of the Oyster Harbour Joint Venture which encompasses land owned by Lowe Pty Ltd and the Housing Authority. Lowe Pty Ltd is the owner of the trading company Heath Development Company. Heath Development Company and Coffey Environments have been assigned responsibility to liaise with the other proponents in the preparation of the Strategic Environmental Assessment.

2.2 Environmental Consultant Details

Company:	Coffey Environments
Nominated Contacts:	Dr Paul van der Moezel / Melanie Price
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3 PROJECT PLANNING BACKGROUND AND SUMMARY ACTION

3.1 Planning Background

Bayonet Head is situated 7km north east of the Albany Central Business District (Figure One and Two). The strategic planning of the Bayonet Head area has its origins in the preparation of an early layout and structure plans in the late 1970s (Taylor Burrell, 2001).

In 2001 the Bayonet Head Outline Development Plan (BHODP) was released (Taylor Burrell, 2001; Figure 12) as part of the City of Albany's strategic approach to land use planning designed to allow for cohesive and equitable development of the Bayonet Head area 'whilst ensuring that environmental and community priorities are maintained' (Taylor and Burrell, 2001).

The BHODP acknowledged that:

> *'The land encompassed by the ODP presents numerous environmental, landform and ownership issues which created the need for a sensitively designed and practical plan to ensure that these matters are closely considered and properly address during the process of development.'* (Taylor Burrell 2001 p.1)

The strategic rationale associated with the various elements of the 2008 BHODP (referred to in this document as 'Plan for Development') has its origins in earlier studies and plans prepared for the City of Albany. With regard to environmental aspects associated with the original design for the ODP area, three studies were integral to assisting this design:

i) Bayonet Head Physical Assessment Study (P & M Tooby 1983);

ii) Bayonet Head Drainage Study (Wood & Grieve 1999); and

iii) *Bayonet Head Flood Management Plan* (PPK Environment and Infrastructure, 2000).

All three studies resulted in recommendations that were either site-specific or pertaining to portions of the ODP such as on a catchment or sub-catchment basis. It is important to note that some of the recommendations contained within these reports reflected the planning and design philosophies current at the time of reporting and the various reports recommend that a review of data/information be undertaken at the time the land is being considered for development in light of changes to regulatory requirements, planning and detailed design.

A further document, *The Albany Residential Expansion Strategy to the Year 2021,* identified the Bayonet Head locality as one of the key development areas to cater for the bulk of Albany's growth to the year 2021. The Strategy made a number of recommendations that were pivotal in guiding the design of the ODP area. These were:

- Detailed consideration being given to staging and co-ordination of development;
- The provision of infrastructure and services based on an orderly pattern of development and in accordance with the Water Corporations Modified Waste Water Scheme Plan;
- The development of low lying areas to be avoided and such areas to be used for controlling drainage and nutrient dispersal;
- The development of a housing strategy that provides for the needs of smaller households, particularly the elderly;
- The promotion of alternative housing types, "green street" initiatives and energy efficient designs;

- The development of comprehensive and attractive neighbourhood centres as focal points for surrounding residents;
- Provision of a comprehensive network of passive and active public open space, pedestrian footpaths and cycleways;
- Creation of nutrient sinks to minimise pollution of harbours;
- Retention of the biological diversity of the study area; and
- Provision for wildlife corridors and habitats.

(Taylor-Burrell Planning and Design, 2001).

The BHODP was commissioned by the City of Albany in 2001 as part of the City's overall strategic approach to land use planning designed to allow for 'cohesive and equitable development' of the area 'whilst ensuring that environmental and community priorities are maintained' (Taylor Burrell, 2001) and was subsequently adopted by Council and the Western Australian Planning Commission (WAPC) in 2001 as a guide to coordinate future development and subdivision of the area.

In 2005 an Interim Revised BHODP was developed (Chappell and Lambert, 2005) and incorporated greater recognition of the environmental values of the native vegetation and wetlands. The 2005 BHODP proposed a series of green corridors (Figure 13). Input from the EPA on the 2005 BHODP suggested that the corridors were not considered sustainable in the long term which has led to the current Draft Plan for Development (Figure 3).

Several areas that were originally part of the BHODP area have received subdivision approval and are not the subject of this SEA. These areas include Lot 43 Elizabeth St, Lot 9000 Elizabeth St, Part of Lot 42 Lower King Road, Lot 285 Allwood Parade and Lot 9000 Allwood Parade. A development proposal for Lot 500 Alison Parade has previously been considered by the EPA. The EPA set a s.38 Level of Assessment at 'Not Assessed – Public Advice Given' for the proposal and for the purposes of the SEA, Lot 500 will be considered as part of the regional context of the Plan for Development.

The proposed development of Lot 1000 Lower King Road (previously known as Part Lot 760 Lower King Road) was referred to the Environmental Protection Authority (EPA) by the Department for Planning and Infrastructure on the advice of the Department of Environment (now the Department of Environment and Conservation). On 9 January 2006 the EPA set the level of assessment at 'Public Environmental Review' (PER) (Assessment No. 1623) under Section 38(1) of the *Environmental Protection Act 1986*. In addition, the EPA decided to formerly assess an amendment application to the Albany District Town Planning Scheme for Part Lot 1 Yatana Road and Lot 476 Sibbald Road, Bayonet Head where it was proposed to change the zoning from 'Rural' to 'Residential Development' (City of Albany Amendment No. 242, EPA Assessment No. 1640). The PER and ER are currently being held in abeyance while the SEA is being developed. The scoping document for the PER and instructions for the ER provided the basis for Environmental Factors in this SEA.

The Plan for Development that is the subject of this SEA comprises the landholdings as shown in Table 1 and is illustrated in Figure 3.

TABLE 1

DETAILS OF THE LAND INCLUDED IN THE PLAN FOR DEVELOPMENT

Property	Lot Area (ha)	Landowner
Part Lot 39 Elizabeth Street, Bayonet Head	18.86	K.L. Slee
Lot 38 Elizabeth St, Bayonet Head	16.76	Lowe Pty Ltd and Department of Housing
Lot 37 Elizabeth St, Bayonet Head	1.56	Lowe Pty Ltd and Department of Housing
Lot 3 Alison Parade, Bayonet Head	15.39	Lowe Pty Ltd and Department of Housing
Lot 2 Alison Parade, Bayonet Head	2.22	M.J. Greer
Lot 286 Alison Parade, Bayonet Head	24.28	Lowe Pty Ltd and Department of Housing
Part of Lot 42, Lower King Road, Bayonet Head	8.6	Lowe Pty Ltd and Department of Housing
Lot 1001 Lower King Road, Bayonet Head	26.62	Lowe Pty Ltd and Department of Housing
Lot 1000 Lower King Road, Bayonet Head	30.97	Lowe Pty Ltd and Department of Housing
Part Lot 1 Yatana Rd, Bayonet Head	26.26	Lowe Pty Ltd and Department of Housing
Location 476 Sibbald Rd	18.61	E.M. & M.B. Cameron
Lot 0	0.96	City of Albany
TOTAL AREA	**191.09**	

Lot 15 Hooper Road (owned by Water Corporation) has not been included in the SEA area, but will be considered in a regional context in the documentation. Similarly, Lot 500 Alison Parade, which contains a large lake/wetland area will be discussed in terms of its proximity and function for water management.

The SEA seeks to address environmental considerations for the Bayonet Head area at the most strategic level of land use planning which will allow for flexibility and consideration of various development alternatives and options. The resulting design will provide the basis for better environmental outcomes and a higher degree of certainty for the rezoning and development of areas in Bayonet Head. The Plan for Development identifies conservation and development 'footprints'. Sufficient detail has been provided to identify proposed land uses and key infrastructure.

If subsequent proposals are in accordance with the assessed SEA they will be considered by the EPA as derived proposals and will not be subject to further assessment by the EPA.

3.2 Project Summary Description

A Plan for Development has been prepared to guide development of the Bayonet Head area. The Plan is based on input over the last 15 years and is responsive to:

- Previous Agency comments on Adopted ODP (2001) and Interim Revised ODP (2005);
- Historical documents relating to servicing and stormwater management;
- Environmental assessments undertaken by Coffey Environments; and
- Comments from the City of Albany (CoA), Department of Water (DoW) and the Department of Environment and Conservation (DEC) from meetings held in 2008 have been incorporated into the Plan for Development.

The Plan for Development consists of the following components as shown in Figure 3:

- A district recreation area associated with the existing primary school on the middle southern boundary;
- Residential lots (R20) forming the majority of the proposed development
- Cottage lots (R40) centred around neighbourhood nodes;
- Public open space (POS) to incorporate pocket parks for low key active recreation, passive recreation areas to include the foreshore of Oyster Harbour, Conservation Category wetlands, significant vegetation units and fauna habitat;
- Stormwater drainage areas and associated infrastructure; and
- Primary and secondary arterial roads.

The Bayonet Head Draft Plan for Development area is approximately 191.58ha. The layout of areas to be retained in recognition of its conservation values seeks to strike a balance between large, consolidated, areas for sustainable management and a linear POS function to support a level of connectivity.

Servicing/Infrastructure Requirements

The following is a summary of the servicing and infrastructure requirements for the BHODP (Taylor-Burrell Planning and Design 2001) which will also apply to the Plan for Development.

Roads

The road hierarchy within the Plan for Development is based on the functional structure promoted in 'Liveable Neighbourhoods' (WAPC, 2008). Higher order access streets link Lower King Road at two points, through to a central north-south high order access street and beyond to the Oyster Harbour foreshore. A network of access streets links the higher order access streets through to residential, Public Open Space and school areas.

The road surface profile will be consistent with the proposed method of stormwater management. The proposed layout of high order roads is shown in Figure 3.

Power

Power will be obtained from the existing power network without additional major infrastructure construction. Underground powerlines will be installed within common use trenches with other services to minimise disturbance.

Drainage and Stormwater Management

Stormwater drainage and flood management for the Bayonet Head ODP area has initially been addressed by Wood and Grieve (1999) and PPK Environment and Infrastructure Pty Ltd (2000). The documents identified that the area is made up of three main catchments which direct stormwater and groundwater:

- From the majority of the Plan for Development area, north east to the lake on Lot 500 Elizabeth St and subsequently to Oyster Harbour;
- South from Lots 1000 and 1001 Lower King Road to the City of Albany drainage system in Purdie Road and McGonnell Park and subsequently to Yakamia Creek and Oyster Harbour; and
- West from Lot 47 (subdivision already approved) to City of Albany Reserve 329, into King River and subsequently to Oyster Harbour.

Wood and Grieve (1999) identify subcatchments, stormwater basin requirements and overland flow requirements (via road systems). Water management for the Plan for Development area will be designed to consider the urban water cycle as a single system where water supply, stormwater, wastewater, flooding, wetlands, waterways, estuaries and coastal waters are recognised through total water cycle management and water sensitive urban design principles and ensure that development is consistent with current best management practices and best planning practices for the sustainable use of water resources.

Significant wetlands within the Plan for Development area will be protected from direct inflow of stormwater.

Wastewater Management

The development will be serviced by a reticulated deep sewerage system connected via the Warrangoo Road pump station to the Timewell Road Waste Water Treatment Plant.

Potable Water

Water for the Albany area is supplied from the Sand Patch, prison and racecourse bore fields, which are located to the south west of Princess Royal Harbour. A pipe head on Angove Creek at Two Peoples Bay also contributes to this supply. The water is treated, pumped into the Albany town site, stored in reservoirs on Mt Clarence and Mt Melville, and reticulated through the City of Albany area.

A 300mm diameter main to Two Peoples Bay is located in Lower King Road and supplies water directly to the Bayonet Head area. The residential development proposed for Lot 1000 will receive a water supply from this main without further head-works being required within the Plan for Development area

Potable PVC water pipes to normal subdivisional standards will be installed on all lots. Fire hydrants, sluice valves and fittings will be installed in accordance with standard practice.

4 ALTERNATIVE OPTIONS CONSIDERED

The Bayonet Head area has been the subject of long term planning and development for residential purposes is supported by the Albany Local Planning Strategy (City of Albany, 2006) and previous Town Planning Scheme Amendments in the City of Albany's Town Planning Scheme No. 3. Therefore, no alternative options to residential development have been considered. The Plan for Development considers environmental issues such as native vegetation and wetland preservation in much more depth than the WAPC adopted BHODP (Taylor Burrell, 2001).

Further refinement of the Plan for Development will be considered during the Strategic Environmental Assessment process.

5 BASIS FOR JUSTIFYING PROPOSAL AND SELECTING PREFERRED OPTION

The preferred option for the urban development of the Bayonet Head 'Plan for Development' area is consistent with the zoning of some of the land (e.g. Lot 1000 Lower King Road is zoned 'Residential') and its designation in the Albany Local Planning Strategy (City of Albany, 2006). The Plan for Development has been prepared following long term and ongoing consultation with government agencies (including the Department for Planning and Infrastructure (Albany), the Department of Water and the Department of Environment and Conservation) and the City of Albany) and includes consideration of often competing requirements. For example, retention of native vegetation has been balanced with concerns that the City of Albany has about the management burden of POS for conservation purposes. The Plan for Development has not necessarily been endorsed by all parties consulted.

In summary, the proposed Plan for Development:

- Is generally consistent with the major principles and key components of the 2001 BHODP;
- Represents an improvement to the existing ODP in terms of retention of significant vegetation and wetlands;
- Is consistent with the WAPC's Liveable Neighbourhoods (WAPC, 2008);
- Meets the minimum and average lot size requirements of the Residential Design Codes;
- Ensures good connectivity and permeability and integration with the future roads as proposed in the Concept Plan;
- Ensures a balance of active, passive and conservation areas of open space and importantly will provide a regionally important recreational facility for the City of Albany; and
- Promotes a variety of housing types relative to the location, topography and features of the site.

6 REGIONAL SETTING

The Bayonet Head Plan for Development area is located approximately 7km northeast of Albany on the south coast of Western Australia (Figure 1). The site is situated within the City of Albany and is currently zoned 'Residential' and 'Rural' in the City of Albany's Town Planning Scheme No. 3 (Figure 4). The area contains cleared farmland, native vegetation and wetlands.

The land surrounding the Plan for Development area has the following current and proposed land uses (Figure 5):

- Native vegetation to the west in City of Albany Reserves No 329 with a purpose of 'Recreation'
- Native vegetation and Cemetery to the west in Reserve 23074 with a purpose of 'Cemetery'
- Native vegetation in Reserves 31174 and 31175 with a purpose of Church and School Site – Church of England and Roman Catholic (respectively). These areas are shown as 'Local Reserves' in the Albany Local Planning Strategy (City of Albany, 2006)
- A residential suburb to the north (Lower King)
- A residential area to the south (Bayonet Head) including Primary School and Neighbourhood Centre; and
- Oyster Harbour to the east (existing foreshore of between 7m and 50m width and 560m in length).

6.1 Climate

The climate of the Bayonet Head area is characterised by cool, wet winters and warm, dry summers. During winter, anticyclonic depressions cause rain to approach from the south-west for periods of up to three to five days as they move from west to east across the Australian continent. During summer, the low pressure systems are located further to the south of Australia and a series of high pressure systems affect most of the continent, bringing associated easterly winds that result in warmer, dry air.

The hottest month is January with the mean temperature ranging from 18°C to 25°C with a maximum mean temperature of 25.8°C, while in winter the mean minimum and maximum temperatures range from 7°C to 17°C and the coolest month is August with a maximum mean temperature of 15.5°C (ATA Environmental, 2005).

The mean annual rainfall for Albany is 936mm, the majority of which falls between the wettest period occurring from May and October (Bureau of Meteorology 2007).

6.2 Topography

The site is dominated by a broad plateau lying at approximately 40m-45m AHD over the mid western portion of the Plan for Development area, which falls away to approximately 20m AHD in the southwest, 26m AHD in the south east, 10m AHD in the north and 4m AHD in the northeast of the site. A steep lateritic scarp (32m AHD to 0m AHD, over 65 linear metres separates the Plan for Development area from Oyster Harbour).

6.3 Geology and Soils

A review of the Environmental Geology Series maps prepared by the Geological Survey of Western Australia was undertaken to determine the geology of the site. The site is located on the Albany Part Sheets 2427 I, 2428 II, 2527 IV and 2528 III (Gozzard 1989).

The geology of the site is mapped as comprising predominantly laterite within a gently undulating upland, with the western portion along Lower King Road falling away to a colluvial slope while the northern portion comprises an alluvial plain.

The majority of the superficial soils across the site consist of light grey to white sands (predominantly quartz sand) overlying laterite at variable depths.

WAPC Planning Bulletin 64 identifies the southern portion of the study area as having "low to no known risk of ASS occurring within 3m of natural soil surface (or deeper)" (WAPC, 2003b). The wetland areas on Lot 15 Hooper Rd, Lot 3 Alison Parade, Lot 500 Alison Parade, Lot 38 Elizabeth Street and Lot 39 Elizabeth Street have a high risk of actual acid sulfate soils and potential acid sulfate soil less than 3m from the ground surface.

6.4 Surface and Groundwater

There is no information on regional groundwater beneath the Bayonet Head area (Barber, 2008), although bores identified on low lying land to the south of the area are possibly associated with a regional groundwater table in dune sands. The shallow groundwater levels in these bores at elevations just above sea level indicate that groundwater associated with the Bayonet Head paluslope wetlands has little direct connection with groundwater on the lower lying groundwater around Oyster Harbour (the shallow groundwater system beneath the site is a separate and distinct hydrological system, localised to the higher ground. The thin sands and laterite on the site were not considered to be prospective for groundwater supplies by Moncrieff (1992) because of their thin and discontinuous nature. However, shallow perched water tables were identified as occurring within the sands on higher ground in the landscape above the regional water table. These areas have been mapped as wetlands where wetland vegetation occurs (Department of Water, 2007). There are no permanent surface water courses on the site, although there is evidence that a seasonal creek runs south from a wetland in Lot 1000. A large permanent lake exists on Lot 500 Alison Parade, with an associated wetland on Lot 38 Elizabeth Street.

6.5 Coastline

The eastern boundary of the property abuts a foreshore reserve on Oyster Harbour for approximately 560m. The Reserve is unmanaged crown land and comprises a steep scarp of shallow grey sand over laterite. The cliff rises steeply from sea level up to 32m AHD over a distance of 65m (grade of almost 50%). The scarp contains intact native vegetation and is considered to be stable due to its rocky nature.

6.6 Native Terrestrial Vegetation

The vegetation of the study area has previously been broadly mapped according to rainfall variations and landform/soil properties (Beard 1981). Beard described the vegetation of the Albany area as representative of the Albany System within the Menzies Subdistrict Vegetation Unit, and more specifically mapped the study area as a Jarrah (*Eucalyptus marginata*) and Jarrah-Sheoak (*Allocasuarina fraseriana*) Low Woodland.

Connell and ATA Environmental (2001) conducted a study to investigate the distribution and condition of remnant vegetation in the Albany hinterland. Vegetation mapping for the Albany hinterland, including the Albany municipality, was prepared based on climate, soils and the general landform of the area. The results of this study should be viewed as being a compromise in terms of data depth and geographic breadth. In order to document the state of the vegetation in the study area, it was

necessary to develop rapid assessment techniques and therefore the information contained in that report should only be used at the landscape scale (Connell and ATA Environmental 2001 p.3).

Maps contained within Connell and ATA Environmental's 2001 study identified two main Vegetation Complexes as occurring within the study area:

- Eucalyptus-Casuarina Low Forest G; and
- Eucalyptus-Casuarina Low Forest I.

***Eucalyptus-Casuarina* Low Forest G:**

Low *Eucalyptus marginata/E. decipiens* and *Allocasuarina fraseriana* forest on low tertiary plains (<15m elevation). Soils are leached sands, sometime yellow, gravelly or swampy. Species include *Callistemon speciosus*, *Beaufortia sparsa*, *Nuytsia floribunda* and *Banksia dryandroides*.

***Eucalyptus-Casuarina* Low Forest I:**

Low *Eucalyptus marginata/E. decipiens* and *Allocasuarina fraseriana* forest on low hills (30m-90m). Soils are leached sands. Species include *Lambertia inenis*, *Dasypogon bromelifolius* and *Xanthosia rotundifolia*.

A regional assessment of floristic community variation within vegetation complexes using floristic quadrats has been undertaken for the Albany area (Albany Regional Vegetation Assessment – Phase 1, Coffey Environments, in prep.). The focus of the study was on Bayonet Head, Yakamia and Emu Point with comparisons to Reserves in the Albany and Denmark area. Analysis and reporting for this study is still being finalised.

A flora and vegetation assessment of the southern portion of the BHODP was conducted by ATA Environmental in October 2005 while supplementary quadrat survey of Lots 1000 and 1001 Lower King Road were by Coffey Environments in October 2007 (Figures six & seven). A targeted survey was undertaken in July 2005 by ATA Environmental to determine if the Priority 4 species *Laxmannia jamesii* is present within the study area. An additional targeted survey for the Declared Rare Flora species *Microtis globula* (Globular Mignonette Orchid) was undertaken by ATA Environmental in January 2006 following a fire in the northern portion of Pt Lot 1 Yatana Road.

The assessments were conducted in accordance with ATA Environmental and Coffey Environments' interpretation of the Environmental Protection Authority (EPA, 2004b) Guidance Statement 51: *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia.*

6.7 Native Terrestrial Fauna

Coffey Environments (formerly ATA Environmental) have carried out a Level 2 Fauna assessment of Lots 1000 and 1001 Lower King Road, Part Lot 1 Yatana Road and Location 476 Sibbald Road in accordance with EPA Guidance Statement No. 56: *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (Environmental Protection Authority 2004c).

Fauna habitat quality within southern portion of the Plan for Development area is generally classified as very good (ATA Environmental, 2006).

Desktop searches of the *FaunaBase*, previous surveys within the region and an on-site reconnaissance survey identified 15 species of amphibian, 41 species of reptile and 30 species of mammal (five introduced or feral) that may be present on the ODP area. Based on the results of the database searches, a total of 148 species of birds may potentially occur within the ODP area. Of the species

listed under State and Commonwealth government legislation the Western Ringtail Possum and Black-Cockatoos have been recorded within the BHODP area.

6.8 Aboriginal Heritage

Before Eurpopean settlement (estimated to be at least 18,000 years), Nyungar people of the Meananger (or Mineng) group inhabited the area around Albany (City of Albany, 2006). In distant and more recent times, important resources and sites were used by Aboriginal people. Many of these sites have been listed for protection under the *Aboriginal Heritage Act 1972*.

An Aboriginal heritage survey of the BHODP area has been undertaken (Goode and Associates, 2007). This work involved a review of records describing known sites, a survey of the site, and consultations with local Aboriginal people to determine whether any ethnographic sites were present.

7 SUMMARY OF POTENTIAL IMPACTS, THEIR SIGNIFICANCE AND POTENTIAL MANAGEMENT RESPONSES

7.1 Introduction

Based on previous work undertaken for the Plan for Development area, consultation with industry professionals and the EPA, the potential environmental factors identified as relating to the site are considered to be:

Biophysical

- Native Terrestrial Vegetation and Flora;
- Native Terrestrial Fauna;
- Coastal Foreshore
- Wetlands;
- Pollution Management - Acid Sulfate Soils;
- Surface Water Quantity and Quality and
- Groundwater Quantity and Quality.

Social Surroundings

- Aboriginal Heritage.

7.2 Summary of Issues

The EPA's environmental objective for each of these environmental factors, a brief overview of the existing environment, potential impacts, proposed additional investigations and proposed management are presented in Table 2.

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
Integration						
Biophysical						
Native Terrestrial Vegetation and Flora	Project area (~136.5ha of native vegetation)	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystems levels through the avoidance or management of adverse impacts and improvement in knowledge.	• EPA (2004b) Guidance Statement No. 51 – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia. • *Environment Protection and Biodiversity Conservation Act 1999.* • *Wildlife Conservation Act 1950.* • Biodiversity Conservation 2001-2005. • Commonwealth of Australia (2001) National Targets and Objectives for	Proposed development will involve: • Clearing areas of remnant native vegetation. • Fragmentation of vegetation, which may lead to unviable/unsustainable native vegetation conservation outcomes.	Description of vegetation associations in accordance with the National Vegetation Information System (NVIS) Level 5. Compilation of a current and comprehensive flora list for the Plan for Development. A supporting matrix listing the species present in each vegetation unit.	Discussions with DEC will be initiated following regional vegetation survey to confirm the requirements for any areas identified as poorly represented. Areas of vegetation that are considered to be poorly represented will be retained within areas of POS and managed for conservation purposes.

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
			• Commonwealth of Australia (1996) National Strategy for the Conservation of Australia's Biological Diversity. • City of Albany Town Planning Scheme No. 3.		Description of previous studies in reference to EPA Guidance Statement 51 addressing previous studies in relation to regional datasets and soil/landform mapping. Analysis of Ecological linkages and direct and indirect impacts on adjacent reserves.	Landowners will be required to prepare and implement a Vegetation, Flora and Fauna Management Plan as a condition of subdivision approval (where appropriate) to address measures to reduce potential impacts associated with development
					Determination of the significance of the vegetation in a regional context and liaison with DEC officers to determine conservation significance. Discussion with DEC on options for managing any areas of conservation significance in the Plan for Development.	

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
Terrestrial Flora – Declared Rare and Priority Flora; Flora of conservation significance (including Threatened Ecological Communities)	Project area (~136.5ha of native vegetation)	Protect Declared Rare and Priority Flora consistent with the provisions of the *Wildlife Conservation Act 1950*, and the *Environment Protection and Biodiversity Act 1999*.	• EPA (2004b) Guidance Statement No. 51 – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia.	No loss of, or disturbance to any known species of Declared Rare Flora and Priority Flora is anticipated.	Investigations to determine the extent of the Priority 1 Ecological Community (Open Low *Allocasuarina fraseriana* – *Eucalyptus staeri* woodland in association with *Banksia coccinea* thicket) which occurs principally within Lots 1000 and 1001 including boundary and condition mapping.	Discussions with DEC will be initiated following identification of any poorly reserved vegetation types or significant floristic communities present within the study area.

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
		Protect other flora of conservation significance.	• *Environment Protection and Biodiversity Conservation Act 1999.* • *Wildlife Conservation Act 1950.* • Commonwealth of Australia (2001) National Targets and Objectives for Biodiversity Conservation 2001-2005.	The proposed development may lead to fragmentation, which could lead to unviable/unsustainable native vegetation conservation outcomes.	The presence of dieback (*Phytophthora cinnamomi)* in association with the Priority 1 Ecological Community will be assessed. The study area for dieback will comprise Lot 1000 and Lot 1001 Lower King Road.	Areas containing vegetation identified in the regional study as being significant will be retained within areas of POS and managed for conservation purposes.

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
			• Commonwealth of Australia (1996) National Strategy for the Conservation of Australia's Biological Diversity. • City of Albany Town Planning Scheme No. 3.	Potential impacts to the Priority 1 Ecological Community. (Open Low *Allocasuarina fraseriana – Eucalyptus staeri* woodland in association with *Banksia coccinea* thicket) on Lot 1000 and 1001.	Describe previous studies in reference to EPA Guidance Statement 51 and to address all previous studies in relation to regional datasets and soil/landform mapping. Ecological linkages and direct and indirect impacts on adjacent reserves. Additional studies will be undertaken in order to determine the significance of the floristic communities in a regional context and liaison with DEC officers will be undertaken in relation to those communities of conservation significance. Discussion on options for managing any areas of conservation significance in the proposed development.	Protection of Declared Rare and Priority Flora to be addressed in a Vegetation, Flora and Fauna Management Plan to be prepared by the landowners as a condition of subdivision approval (where appropriate) in consultation with DEC and the City of Albany.

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
Terrestrial Fauna	Project area (~191.6ha)	To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	• *Wildlife Conservation Act 1950.* • *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).* • EPA (2004c) Guidance No. 56 - Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia. • City of Albany Town Planning Scheme No. 3	Clearing of vertebrate and invertebrate fauna habitat. Fragmentation of vegetation, which may lead to unviable/unsustainable populations of fauna.	A combination of Level 1 with reconnaissance (northern portion of Plan for Development area) and Level 2 fauna surveys (southern portion of Plan for Development area) will be undertaken to address the requirements of the EPA Guidance Statement 56 (EPA 2004c). Results of surveys will be analysed to identify and assess potential direct and indirect impacts as a result of the proposed development. Discussion of the viability of consolidated areas proposed to be retained for key fauna habitat purposes.	Protection of fauna to be addressed in a Vegetation, Flora and Fauna Management Plan to be prepared by the landowners as a condition of subdivision approval (where appropriate) in consultation with DEC and the City of Albany.

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
Terrestrial Fauna – Specially Protected (Threatened) Fauna	Project area (~191.6ha)	Protect Specially Protected (Threatened) Fauna, consistent with the provisions of the *Wildlife Conservation Act, 1950,* and the Commonwealth *Environment Protection and Biodiversity Act, 1999.* Protect other fauna of conservation significance.	• *Wildlife Conservation Act 1950.* • *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).* • EPA (2004c) Guidance No. 56 - *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* • City of Albany Town Planning Scheme No. 3	Potential clearing of Threatened fauna habitat. Fragmentation of vegetation, which may lead to unviable/unsustainable populations of fauna.	A combination of Level 1 with reconnaissance (northern portion of Plan for Development area) and Level 2 fauna surveys (southern portion of Plan for Development area) will be undertaken to address the requirements of the EPA Guidance Statement 56 (EPA 2004c). Discussion of results of surveys to identify and assess any potential direct and indirect impacts as a result of the proposed development.	Protection and/or relocation of Threatened fauna and other species of native fauna to be addressed in a Vegetation, Flora and Fauna Management Plan to be prepared by the landowner as a condition of subdivision approval (where appropriate) in consultation with DEC and City of Albany

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
Coastal Foreshore		To maintain the integrity of the Coastal Foreshore by maintaining its, ecological function and environmental values.	• Western Australian Planning Commission (2003a) State Planning Policy No. 2 Environment and Natural Resources Policy. • *Planning and Development Act 2005.*	Potential changes to environmental processes on the Oyster Harbour foreshore.	Identification of horizontal setbacks required (for rocky coast scenario) as outlined in WAPC's State Planning Policy 2.6 including:	. Protection of foreshore values and ecological functions to be addressed through preparation of a POS and Foreshore Management Plan.
	Western edge of Oyster Harbour (eastern edge of BHODP area - 500 linear metres).		• Western Australian Planning Commission (2003) State Planning Policy 2.6 State Coastal Planning Policy.		• Establishment of horizontal setback datum; and • (if the proposed minimum setback is less than 50m) a geotechnical survey.	Identification of adequate wetland buffers will be included in the Plan for Development.

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
Wetlands	Project area (~191.6ha)	To maintain the integrity, ecological functions and environmental values of wetlands.	• Government of Western Australia (1997) Wetlands Conservation Policy for Western Australia.	Potential clearing of wetlands Through changes in the groundwater regime due to development, potential changes may occur to the hydrology within the project area.	Undertake site specific investigations and analysis for the subject land and adjacent areas to determine wetland classification and management requirements.	Management of the water systems associated with the subject land will need to be addressed to ensure that the water balance and hydrological regime of wetland areas within and adjacent to the subject land will not be adversely impacted.

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
			• DEC (2007) Framework of Mapping, Classification and Evaluation for Wetlands in Western Australia. • Department of Water (2007) *The South Coast Wetland Mapping, Classification and Evaluation Project.* 2007. • EPA (2004d) Position Statement No. 4 - Environmental Protection of Wetlands • EPA (2008) Guidance Statement 33 – Environmental Guidance for Planning and Development and its references, including:	Characteristics of the wetlands in the Plan for Development area may be impacted by increased densities of people in wetland and their buffers. Potential changes to hydrology arising from the proposal may impact wetlands and other groundwater dependent ecosystems outside of the project area.	A study will be undertaken to: a) Map the extent of wetland areas within and adjacent to the subject land and classify wetland types in accordance with *Framework for mapping classification and evaluation for wetlands in Western Australia* (DEC 2007). b) Identify and assess function, value and significance of the wetland areas within the subject land and adjacent area in a local, regional and state context c) Identify wetland hydrological processes including determination of whether wetlands present in and adjacent to the subject land are groundwater dependant or perched..	A Local Water and Wetland Management Strategy will be prepared as a condition of subdivision approval to the satisfaction of the DOW, DEC and other relevant authorities and should include but not be limited to: • Overall water balance, flood management and groundwater levels; • Rehabilitation and revegetation strategy (native local provenance to be used) of wetlands and wetland buffers, • Mitigation strategies; • Monitoring and evaluation program; • Performance and compliance reporting and audit procedures;

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
			- Hill, A.L., Semeniuk, C. A., Semeniuk, V. and Del Marco, A. 1996a and b *Wetlands of the Swan Coastal Plain Volumes 2a and 2b Wetland Mapping, Classification and Evaluation* Department of Environmental protection (DEP) and Water and Rivers Commission (WRC), Perth - Semeniuk, V and C Research Group 1998 *Preliminary Delineation of Consanguineous Wetland Suites between Walpole and Fitzgerald Inlet, Southern Western Australia* unpublished report prepar- A Directory of Important Wetlands in Australia (Environment Australia 2001b)ed for WRC, Perth		d) Describe and assess potential direct and indirect impacts on wetlands in and adjacent to the subject land, likely to arise as a result of the proposed development, including clearing of wetland vegetation e) Describe any appropriate management mechanisms to be implemented to ensure the long term values and viability of wetland areas within and adjacent to the subject land are maintained.	• Contingency plans in the event that impacts to areas of high conservation significance are detected; and • Timing, implementation and review schedules.

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
			- Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998 (Government of Western Australia 1998b). • WRC (2001) Water and Rivers Commission Position Statement: Wetlands. • WAPC (2006) State Planning Policy 2.9 - Water Resources. • WRC (2001) Water and Rivers Commission Position Statement: Wetlands.		f) Describe appropriate contingency plans which may include (but are not limited to) further investigations and monitoring, consultation with DEC and DoW officers and changes to mitigation and management regimes The local DEC and DoW offices will be consulted during the assessment process.	

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
Pollution Management						
Surface and Groundwater Quantity and Quality	Project area (~191.6ha)	To maintain the quantity of water (surface and ground) so that existing and potential environmental values, including ecosystem maintenance, are protected. To ensure that the quality of water emissions (surface, ground, and marine) does not adversely affect environmental values or the health, welfare and amenity of people and land uses, and meets statutory requirements and acceptable standards.	Latest updates of the following • Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy, October 2000, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000a)	Increased levels of nutrients, pesticides, pathogens, irrigation and stormwater run-off may impact upon surface water, groundwater and marine water quality of the surrounding area. Potential changes to hydrology arising from the proposal may impact wetlands and other groundwater dependent ecosystems outside of the project area.	The installation of permanent boreholes and temporary piezometers within the study area to determine hydrological regime will be required Data collected during installation and baseline monitoring of the bores will provide information on the following; • Soil profile, including the nature and depth of any confining layers;	Management of groundwater and surface water within subject land will include, but is not limited to: • Preparation of a Local Water and Wetland Management Strategy • Best Management Practices for stormwater management; • At-source pollutant/nutrient input minimisation;

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
			• Australian Guidelines for Water Quality Monitoring and Reporting, National Water Quality Management Strategy, October 2000, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000b)		• Connectivity of groundwater between wetlands in and adjacent to the subject land; • Groundwater levels including timing, frequency, duration, extent, depth and variation; • Water source, flow and direction for surface and groundwater;	• Water conservation strategy to minimise ex-house potable water use; • Collection of pre-development baseline water quality and quantity data; • Monitoring programs including water quality and quantity data to enable compliance reporting. • Provision and connection of reticulated sewerage for the entire development.

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
			• Australian Guidelines for Urban Stormwater Management, National Water Quality Management Strategy, 2000, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000c)		• Baseline water quality; • Likely impacts on wetlands from development; and • Indications of buffers required for wetlands based on hydrological catchments.	

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
			• Department of Water (2004 - 2007) Stormwater Management Manual for Western Australia. • Department of Environment (2005) Decision Process for Stormwater Management in W.A.. • EPA (2008) Guidance Statement 33 – Environmental Guidance for Planning and Development • Australian Drinking Water Guidelines 2004.		Information collected will be used to predict any potential impacts from the proposed development of the area on surface and groundwater systems within and adjacent to the subject land. The hydrological study will also be used to predict any potential impacts from the proposed development of the subject land on Oyster Harbour and Yakamia Creek.	

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
			• Rights in Water and Irrigation Act 1914 • Metropolitan Water Supply, Sewerage and Drainage Act, 1909, or Country Towns Sewerage Act, 1914 • WAPC (2006) State Planning Policy 2.9 –Water Resources		Following the collection of baseline information the following will be undertaken • Desktop review of studies and plans previously prepared for drainage management; proposal is consistent with current planning policy and current best practice stormwater management techniques; and	
					• Assessment of drainage management to ensure • Modification as needed to ensure proposed drainage management is consistent with current best practice management techniques.	

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
			• WAPC (2003) State Planning Policy 2 – Environment and Natural Resources Policy • Department of Water (2008) Urban Water Management Plans		Review previously prepared Flood Management and Drainage Management Plans. Discuss results of previous studies and provide updated information (if required) regarding stormwater and nutrient management. Demonstrate that the proposal is in accordance with relevant guidance statements, manuals and Planning Policies.	
					Determine potential direct or indirect impacts on groundwater systems, and adjacent surface water sources such as Yakamia Creek and Oyster Harbour.	

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
Acid Sulphate Soils	Project area (~191.5ha)	To minimise the risk to the environment resulting from Acid Sulphate Soils, to be achieved by implementing appropriate detection and management strategies.	• *Contaminated Sites Act 2003* • DEC (2003-2006) Acid Sulphate Soils Guideline Series: • DEC (2006) Policy Position Acid Sulphate Soils and the Contaminated Sites Act 2003 •	Disturbance of ASS through earthworks associated with the development of the subject land for residential purposes could result in generation of sulphuric acid and iron compounds. This could result in the release of other substances, including heavy metals, from the soil and into the environment, thereby impacting on environmental values and attributes associated with the study area.	Preliminary desktop investigations for ASS are proposed. These will include the following • Review of published ASS risk information pertaining to the study area. • Review of geological information pertaining to the study area	If ASS are identified, an Acid Sulphate Soils Management Plan will be prepared in accordance with the DEC (2003 - 2006) *Acid Sulphate Soils Guideline Series*. The plan will be submitted to the DEC for approval prior to the disturbance of affected soil or groundwater.
			• WAPC (2009) Planning Bulletin No. 64/2009: Acid Sulphate Soils • Australian Drinking Water Guidelines 2004.	Disturbance of ASS could also result in the study area becoming classified as contaminated as per the *Contaminated Sites Act 2003*.	• A site visit to ground truth existing mapping and determine and significant indications of ASS; and	

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
			• Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy, October 2000, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000a) • Australian Guidelines for Water Quality Monitoring and Reporting, National Water Quality Management Strategy, October 2000, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000b)		• An "Acid Test", used to determine the ASS risk for the site according to methodology outlined in WAPC Planning Bulletin 64 (WAPC, 2003). Information from the preliminary investigations will be used to determine whether further investigations will be required during later stages of the development process. Recommendations for future work will be made within the SEA document	

TABLE 2

RELEVANT ENVIRONMENTAL FACTORS

Environmental Factor	Relevant Area	Environmental Objective	Applicable Standards	Potential Impacts	Additional Investigations	Potential Management
Social Surroundings						
Aboriginal Heritage	Project area (~191.5ha)	To ensure that changes to the biophysical environment do not adversely affect Aboriginal heritage sites and/or cultural associations within the area and comply with the requirements of relevant Aboriginal and heritage legislation.	• Aboriginal Heritage Act 1972 • Native Title Act 1993 • Aboriginal and Torres Strait Islander Heritage Protection Act 1984 • Environmental Protection Authority (2004e) Assessment of Aboriginal Heritage Guidance Statement No. 41	Development may impact an Aboriginal sites present within the site.	Heritage Assessment completed in January 2007 No further investigations required.	An application to the Aboriginal Cultural Materials Committee under Section 18 of *the Aboriginal Heritage Act 1972-1980* for Ministerial consent to disturb a site will be submitted for approval. Any conditions imposed on the approval of the Section 18 will be followed to ensure compliance with the Act.

TABLE 3

PRINCIPLES OF ENVIRONMENTAL PROTECTION AS APPLIED TO THE PROPOSED DEVELOPMENT

PRINCIPLE	Relevant Yes/No	If Yes, consideration
1. The precautionary principle Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by: (a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and (b) an assessment of the risk-weighted consequences of various options.	Yes	There is sufficient knowledge to address potential environmental impacts. Specialist studies (e.g. flora, fauna, groundwater) will been undertaken if existing studies are not sufficient. These studies will assess the environment and potential impacts, and will be applied to factors including vegetation, wetlands, hydrology and fauna.
2. The principle of intergenerational equity The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.	Yes	The Plan for Development reflects the initial requirements of the 2001 BHODP, and also incorporates significant environmental improvements to the 2001 BHODP. The consolidated areas of POS will enable retention of significant wetland s and upland vegetation and a more sustainable and environmentally appropriate water management solution.
3. The principle of conservation of biological diversity and ecological integrity Conservation of biological diversity and ecological integrity should be a fundamental consideration.	Yes	Investigations undertaken for flora (remnant vegetation, DRF and PEC/TEC) and fauna (priority and scheduled species) have been and will further be undertaken in accordance with the EPA's relevant guidance statements. The findings will form the basis of a Vegetation, Flora and Fauna Management Plan to be prepared for the project area.

TABLE 3

PRINCIPLES OF ENVIRONMENTAL PROTECTION AS APPLIED TO THE PROPOSED DEVELOPMENT

PRINCIPLE	Relevant Yes/No	If Yes, consideration
4. Principles relating to improved valuation, pricing and incentive mechanisms • Environmental factors should be included in the valuation of assets and services. • The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement. • The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and ultimate disposal of any waste. • Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solution and responses to environmental problems.	No	
5. The principle of waste minimisation All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	Yes	Management Plans will be prepared for the proposed development to minimise the clearing of significant native vegetation, the conservation and reuse of water and the management of building materials during construction. The preferred management options for waste management are to avoid, reduce, reuse, recycle and recover waste.

8 PREVIOUS AND PROPOSED STUDIES AND INVESTIGATIONS

8.1 Native Terrestrial Vegetation

EPA's Objective

To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

Applicable Legislation, Criterion or Guidance

- EPA (2004b) Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessments in Western Australia;
- *Environment Protection and Biodiversity Conservation Act 1999;*
- *Wildlife Conservation Act 1950;*
- Commonwealth of Australia (2001) National Targets and Objectives for Biodiversity Conservation 2001-2005;
- Commonwealth of Australia (1996) National Strategy for the Conservation of Australia's Biological Diversity; and
- City of Albany Town Planning Scheme No. 3.

8.1.1 Vegetation Communities and Flora

Background

A regional level vegetation survey of the Albany Hinterland was undertaken by Steve Connell in 2001 with assistance from ATA Environmental in presenting and interpreting the data. The work resulted in the mapping of a very large number of vegetation complexes within the Albany Hinterland area. The vegetation complexes were determined based on the initial vegetation mapping of the region by Beard as well as consideration of soil types and landform. The vegetation complex level of describing regional vegetation was used by Heddle *et al.* to describe vegetation in the System 6 area including the Perth Metropolitan Region. The Heddle *et al.* vegetation complexes were primarily based on soil mapping. The vegetation complex is the basic unit used to determine the percentage of vegetation remaining in the southern Swan Coastal Plain compared to pre European estimates. While other criteria are also used, the simple calculation of the percentage of each vegetation complex remaining is the first step in determining vegetation significance. Other criteria including size, geographic location, presence of rare flora and fauna are also used to determine significance, including floristic analysis to determine the vegetation community types and their significance.

For the purposes of determining the regional context of vegetation within the Albany region preliminary discussions with the DEC indicate that the Connell vegetation complexes require refinement based on the results of additional regional investigations. Further refinement of the Connell vegetation complex description and mapping would be required as a result of regional investigations.

As with the Heddle *et al.* vegetation complexes, the Connell vegetation complexes in Albany are a broad mapping unit with each complex potentially containing many different floristic community types.

It is important to understand the floristic community type variation within vegetation complexes in order to properly use the vegetation complex unit as the initial criterion for assessing the significance of the vegetation in the Albany region. Assessment of the regional distribution and variation of vegetation types present within the land in question will enable the conservation status of those units to be determined in a regional context.

Additional Investigations - Regional

Additional investigations will be required to build on existing vegetation complex mapping for the Albany region. Floristic quadrat data collected from specific sites will provide more detailed information regarding the diversity of vegetation types within relevant vegetation complexes and representation of vegetation units in reserved land within the Albany area.

The following methodology has been determined as being appropriate for the assessment of significance of relevant vegetation types in a regional context following consultation with the DEC:

1. Determine the vegetation complexes present in the Bayonet Head and Yakamia Structure Plan areas and Lots 1512 and 1523, Emu Point as mapped by Connell and ATA Environmental in 2001;
2. Identify reserved areas between Denmark and Two Peoples Bay that contain the same vegetation complexes and map these areas on an aerial photograph including reserve boundaries and purposes (that is, whether the areas have been reserved for conservation, public purpose or recreation);
3. Identify target areas in reserves for surveying from 10m x 10m quadrats. This task will be aided by discussions with local DEC officers to determine where specific vegetation types are likely to occur;
4. Placement of permanent 10m x 10m plots in as many different vegetation types as possible within each vegetation complex within reserved areas. Plots will predominantly be established in dieback free areas but if time and resources permit, some plots will be established in dieback affected areas as well. We have anticipated surveying up to 80 quadrats in reserves;
5. Voucher specimens will be retained and lodged with the Western Australian herbarium;
6. Additional information to be recorded for each plot will include soil type, aspect, slope, condition (including likely presence of dieback) and time since last fire;
7. Where necessary, survey extra quadrats within the lots to provide additional information regarding vegetation types;
8. Computer analysis of all quadrat data including data collected previously by ENV, Ellen Hickman and by ATA Environmental. Analysis will be undertaken by a subcontractor specialising in floristic data analysis using PATN. During the data analysis stage it is likely that the data will need to be filtered and re-analysed to avoid error due to species identification and the presence of Dieback disease within quadrats;
9. Assessment of the computer results, including the identification of floristic groups;

10. Determine the extent of each floristic group within the Albany region initially within the reserves surveyed, and where necessary by examining other reserves with similar vegetation complexes or soil types. The results will not calculate the area extent of each group but will identify the number of reserves in which each group has been recorded and where possible, a qualitative assessment of the extent of each group in each reserve;
11. Consider the information and data from the Albany Regional Vegetation Survey (DEC, in prep), if it is finalised and available for use;
12. Assess the conservation status of each floristic group using the results of item 10 above; and
13. Prepare a report with the results of the study.

The survey method complies with the EPA's guidelines for flora surveys as outlined in *Guidance Statement No. 51 Terrestrial Flora and Vegetation Survey for Environmental Impact Assessment in Western Australia* and *Position Statement No. 3 General requirements for Terrestrial Biological Surveys.*

Permission to enter and survey reserves will be requested from the DEC Licensing Branch, the City of Albany and Shire of Denmark as appropriate.

It is expected that the Vegetation Complex mapping will be refined during the survey process and that further reconnaissance surveys may be required to provide more information on rare or poorly reserved vegetation types following quadrat data analysis.

The results of the survey will be discussed with the EPASU and local DEC officers during the survey itself and during the assessment of the data. Local DEC officers experienced in identifying local flora will be contacted for input during the identification and data analysis process.

Additional Investigations – Local

The following will be undertaken in order to clarify existing vegetation and flora information;

- Ground truthing of existing vegetation mapping to clarify mapping boundaries including description of vegetation units in accordance with the National Vegetation Information System (NVIS) Level 5. A supporting matrix listing the species present in each vegetation unit will be included in the report.
- Additional investigations to determine whether the Priority 1 Ecological Community (Open Low *Allocasuarina fraseriana – Eucalyptus staeri* woodland in association with *Banksia coccinea* thicket) occurs within the site, including boundary and condition mapping and analysis of quadrat data if necessary.
- Compilation of a current and comprehensive flora list for the Plan for Development area.

In addition, the presence of dieback (*Phytophthora sp.)* in association with the Priority 1 Ecological Community (Open Low *Allocasuarina fraseriana – Eucalyptus staeri* woodland in association with *Banksia coccinea* thicket) will be assessed. The study area for the assessment of dieback will comprise Lot 1000 and Lot 1001 Lower King Road. The following dieback assessment methodology is proposed;

- Soil and tissue sampling in accordance with the DEC guidelines *Collection of Samples to Test for Phytophthora,* (2007).

- Field survey and mapping of any identified Pc infestations by accredited Disease Interpreters to prepare *Phytophthora cinnamomi* Occurrence Maps based on three categories – Infested with *Phytophthora cinnamomi*, Uninfested and Uninterpretable.
- Use accredited Disease Interpreters and managers to identify 'protectable' areas and rationalise their management boundaries. The steps accredited Disease Interpreters use in determining 'protectable' areas on land managed by the DEC are fully described in *Volume II –Guidelines for Detection, Diagnosis and Mapping of Disease caused by Phytophthora cinnamomi.*
- Assessment of survey findings including development of management objectives and actions to prevent the spread of Pc into areas deemed to be protectable as per the specification detailed in *Volume II – Guidelines for Detection, Diagnosis and Mapping of Disease caused by Phytophthora cinnamomi.*

8.1.2 Declared Rare and Priority Flora and Other Significant Flora (including threatened ecological communities)

Background

A flora and vegetation assessment of the study area has been conducted by Ms Cassyanna Gray (ATA Environmental in October 2005) while a supplementary quadrat survey of Lots 1000 and 1001 Lower King Road was conducted by Ms Cassyanna Gray and Ms Edith O'Shea from Coffey Environments in October 2007. A targeted survey was undertaken in July 2005 by Dr Paul van der Moezel from ATA Environmental to determine if the Priority 4 species *Laxmannia jamesii* is present within the study area. An additional targeted survey for the Declared Rare Flora species *Microtis globula* (Globular Mignonette Orchid) was undertaken by Ms Cassyanna Gray in January 2006 following a fire in the northern portion of Pt Lot 1 Yatana Road.

The assessments were conducted in accordance with ATA Environmental's and Coffey Environments' interpretation of the Environmental Protection Agency (EPA) Guidance Statement 51: *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia.* The flora and vegetation assessment consisted of two components:

1. Desktop study including a literature review and search of Department of Environment and Conservation (DEC) Declared Rare and Priority species databases and Threatened Ecological Communities (TEC) database; and
2. Field survey of the study area to search for conservation significant species, categorise vegetation units and compose a species list of vegetation types.

The study area was accessed in part by vehicle and traversed by foot. The major vegetation types and associated flora were surveyed and delineated using a colour aerial photograph. A total of 41 quadrats 10m x 10m in dimension located within representative vegetation units were surveyed.

Quadrats of 10m x 10m dimension were chosen, as this size is considered to give good sample of flora presence in the South West of Western Australia. The quadrats surveyed by ATA Environmental in 2005 were temporarily marked using steel fence droppers in the northwest corner of the quadrat. The quadrats surveyed by Coffey Environments were permanently marked using steel fence droppers in the northwest corner of the quadrat.

Additional Investigations

No additional investigations are proposed at this stage.

8.2 Faunal Assemblages Including Specially Protected (threatened fauna), Priority Fauna and Other Fauna of Conservation Significance

EPA's Objective

To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

Applicable Legislation, Criterion or Guidance

- *Wildlife Conservation Act 1950;*
- *Environment Protection and Biodiversity Conservation Act 1999;*
- EPA (2004c) Guidance No. 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia; and
- City of Albany Town Planning Scheme No. 3.

Background

Albany is in the southeast section of the Southern Jarrah Forest subregion (McKenzie *et al.* 2003). The Southern Jarrah Forest subregion comprises 3,160,122ha and extends from north of Perth south to the coast near Albany. Vegetation comprises Jarrah/Marri forest in the west grading to Marri and Wandoo woodlands in the east. There are extensive areas of swamp vegetation in the southeast, dominated by Paperbarks and Swamp Yate.

No systematic fauna surveys (vertebrate or invertebrate) have been conducted across the bioregion and any available data is sparse and patchy. Most reserves do not have long-term survey data on species presence or absence for vertebrates and systematic vertebrate survey data are not available for 95% of the subregion with most confined to the Perup and Kingston areas (McKenzie *et al.* 2003).

A Level 1 fauna assessment for the Bayonet Head Outline Development Plan area was conducted by ATA Environmental in October 2005.

Prior to the commencement of a Level 2 fauna survey, Coffey Environments met with officers from the EPA Service Unit (EPASU) on 10 October 2006 to discuss the scope of works and objectives of the Bayonet Head fauna assessment. A bi-seasonal survey in accordance with EPA Guidance Statement No 56 (EPA, 2004c) was agreed on with the EPASU. Albany DEC staff were satisfied with the approach agreed on with the EPASUA.

On this basis, a Level 2 fauna survey has been carried out for Lots 1000 and 1001 Lower King Road, Part Lot 1 Yatana Road and Lot 476 Sibbald Road (referred to as 'Southern Bayonet Head Study Area' in this document) by Coffey Environments in December 2006 and March 2007 (Coffey Environments, in prep. Figure 8). The surveys included two trapping programs of seven nights bi- seasonally.

The methodology for the Level 2 survey of the Southern Bayonet Head Study Area was as follows:

- A review of the Western Australian Museum database (*FaunaBase*) to identify potential vertebrate fauna within the area;

- A search of the DEC's Threatened and Priority Species database to identify potential scheduled and threatened species within the region;
- A review of the Birds Australia on line database;
- A search of the Commonwealth's government database of fauna of national environmental significance to identify species potentially occurring within the area that are protected under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* or international migratory bird agreements (JAMBA/CAMBA);
- A review of previous fauna surveys conducted on site and for the region;
- Defining the fauna habitats on site and identifying any areas of high conservation interest for fauna;
- A detailed trapping assessment in two seasons to collect information on the vertebrate fauna assemblages on the site;
- Vouchering of specimens with the Western Australian Museum to confirm identifications will only occur if requested by the Museum;
- Identification of potential impacts/risks to fauna from proposed vegetation clearing and construction of facilities;
- Recommendations on management measures to minimise or prevent impacts on significant fauna and fauna habitat, including specially protected fauna; and
- Assessment of any proposed linkage corridors in terms of ecological value and functions including fauna migration.

Vertebrate trapping sites were designed to adequately sample each of the available habitat types in accordance with *General Requirements for Terrestrial Biological Surveys Position Statement No. 3* (2002) and Coffey Environments interpretation of the EPA's *Guidance for the Assessment of Environmental Factors No 56: Terrestrial Surveys for Environmental Impact Assessment* (2004c). It is acknowledged that there can be differences in the faunal assemblage between similar habitat types, however, these differences are unlikely to affect the data required to collect baseline faunal assemblage information.

Trapping Methodology

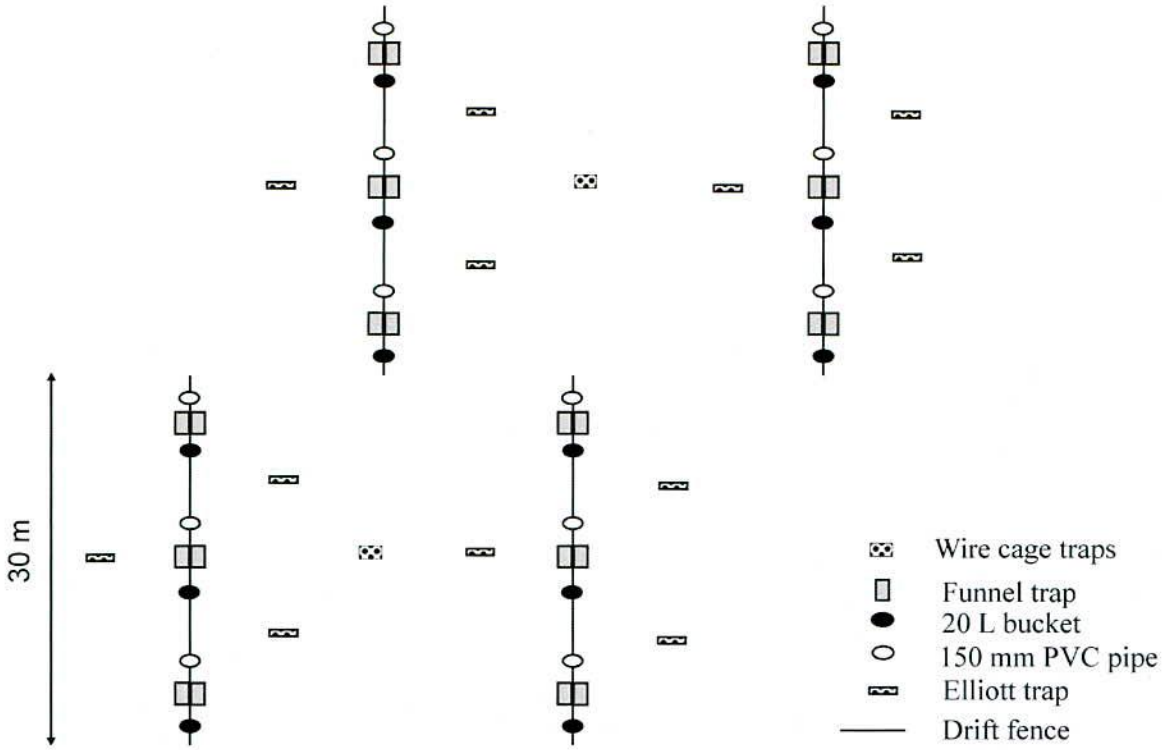
The EPA's *Guidance for the Assessment of Environmental Factors No. 56 Terrestrial Fauna Surveys for Environmental Impact Assessment* suggests that a survey in the season that follows the season of maximum rainfall is generally the most productive and important survey time. Trapping was conducted in late spring/ early summer with a second round of data collection conducted in late summer. This timing is in accordance with the EPA's *Position Statement 3*, *Guidance Statement 56* and published literature on the most appropriate time for vertebrate fauna surveys.

Coffey Environments carried out its trapping program in each of the habitat types available on-site and in the region (Yakamia & Emu Point). Fourteen trapping sites were located in the Bayonet Head project area in three habitat types. The three habitat types were Jarrah/Sheoak Woodland (JSW), Heath Shrubland (HS) and Wetland Mosaic (WM). The number of trapping sites varied among the habitat types, but were proportional to the extent of each available habitat type in the project area.

Nine trapping sites were located in the Jarrah/Sheoak Woodland (JSW) habitat, four sites in the Heath Shrubland (HS) habitat and one site in the Wetland (WM) habitat.

Each site contained four trap lines. Each trap line contained three PVC buckets, three PVC pipes as pit traps (150mm by 500 mm deep) and six funnel traps spread along a 30m, 250-300mm high fly-wire drift fence. In addition, there were three Elliott traps adjacent to each drift fence. Two wire cage traps were placed at each site.

DIAGRAM 1: TRAP LAYOUT AT EACH SITE



All traps were opened and closed on the same day and left open for a period of seven nights during each of the survey periods. The trapping effort for the project area is shown in Table 4.

TABLE 4:
FAUNA TRAPPING EFFORT (TRAP NIGHTS) IN THE PROJECT AREA

		Trap Type				
Habitat Type	**Site- Bayonet Head**	**Bucket pit-trap nights**	**Pipe pit-trap nights**	**Funnel trap nights**	**Elliott trap nights**	**Cage trap nights**
Jarrah/Sheoak Woodland - JSW	BH1, BH2, BH6, BH7, BH10 BH11,BH12, BH13, BH14,	1,512	1,512	3,024	1,512	252
Heath Shrubland - HS	BH3, BH4, BH8, BH9	672	672	1,344	672	112
Wetland Mosaic - WM	BH5	168	168	336	168	28
TOTAL	**12,152**	**2,352**	**2,352**	**4,704**	**2,352**	**392**

Yakamia and Emu Point

Trapping was also conducted simultaneously at Emu Point and Yakamia to provide a regional comparison. At Yakamia there were 12 separate survey sites, at Emu Point there were five separate survey sites. Each trapping site used the same trapping protocol as described above and was surveyed during the same time as Bayonet Head.

The trapping effort for Emu Point and Yakamia undertaken for comparison purposes is shown in Table 5.

TABLE 5:
FAUNA TRAPPING EFFORT (TRAP NIGHTS) IN REGIONAL COMPARATIVE SURVEY SITES

Habitat Type	Location	Site	No. of Sites	Trap Type				
				Bucket pit-trap nights	Pipe pit-trap nights	Funnel trap nights	Elliott trap nights	Cage trap nights
Jarrah/ Sheoak Woodland - JSW	Yakamia	YK1, YK2, YK3, YK4, YK9, YK10, YK11	7	1,176	1,176	2,352	1,176	196
Wetland Mosaic - WM	Yakamia	YK5	1	168	168	336	168	28
Blackbutt and Jarrah Woodland - JABW	Yakamia	YK6, YK7	2	336	336	672	336	56
Degraded Shrublands – DS	Yakamia	YK8, YK12	2	336	336	672	336	56
Sheoak/*Banksia* Woodland - SBW	Emu Point	EP1	1	168	168	336	168	28
Peppermint Open Woodland - PW	Emu Point	EP2, EP5	2	336	336	672	336	56
Peppermint Closed Thicket - PT	Emu Point	EP3, EP4	2	336	336	672	336	56
TOTAL		**14773**	**17**	**2,856**	**2,856**	**5,712**	**2,856**	**476**

Coffey Environments have used replicated sampling within the project area, in adjacent habitats and in regional comparison sites which produced a robust and directly comparable data set for both species richness and assemblage composition. The survey effort is believed to be equal to or superior to other surveys that have been approved by the EPA over the last five years.

The survey effort employed in this study exceeded the survey intensity of another survey conducted in the Albany bioregion in 2005-2006 (Ecologia, 2007) and other surveys in the State during 2006 or 2007 (e.g. Outback Ecology Services, 2006). Table 6 provides comparative data for the terrestrial vertebrate

fauna assessment conducted for the Southdown Magnetite Proposal which was considered adequate by the EPA (ecologia, 2007). The Coffey Environments survey design and trapping effort for Bayonet Head is therefore considered appropriate and adequate.

TABLE 6
COMPARATIVE TRAPPING EFFORT FOR SURVEYS CONDUCTED IN THE ALBANY BIOREGION SINCE 2005

			Trap Type					
Study	**Site**	**Number of Habitats**	**Bucket pit-trap nights**	**Pipe pit-trap nights**	**Funnel trap nights**	**Elliott trap nights**	**Cage trap nights**	**Total**
ecologia Environment (2007)	Mine site – autumn	3 habitats; 438.2ha of vegetation	Combined 450		420	Large and small 920	140	**1,930**
ecologia Environment (2007)	Mine site – January and February summer surveys	3 habitats; 438.2ha of vegetation	Combined 880		1,706	1340	395	**4,321**
ecologia Environment (2007)	Pipeline – autumn	104km; 220ha but only 5ha of vegetation	Combined 142		245	Combin ed 595	98	**1,080**
ecologia Environment (2007)	Pipeline - spring	104km; 220ha but only 5ha of vegetation	Combined 320		640	640	331	**1,931**
Dec and March surveys	Yakamia	4 habitats; approx. 140ha	2,016	2,016	4,032	2016	336	**10,416**
Dec and March surveys	Emu Point	3 habitats, 32ha	840	840	1,680	840	140	**4,340**
Dec and March surveys	Bayonet Head	3 habitat types approx. 140ha	2,352	2,352	4,704	2352	364	**12,124**

Survey Effort and Configuration

The EPASU has previously raised a concern that more than two cage traps should be included for each habitat. Each site contained two cage traps, so there were:

- Nine sites for Jarrah Sheoak Woodland (i.e. 18 cages for that habitat type)
- Four sites in Heath Shrubland (i.e. eight cage traps in that habitat type); and,
- One site in the Wetland Mosaic (i.e. two cage traps in that habitat type).

It is considered that this configuration of cage traps is adequate to indicate the relative density of the species captured.

There were also concerns that Quenda may fill cage traps to the exclusion of other species such as possums or Chudich, which could lead to an underrepresentation of species recorded in the area. However, Coffey Environments recorded only one individual Quenda in the Jarrah/Sheoak Woodland habitat and two individuals in the Heath Shrubland habitat during the whole trapping program. It is therefore likely that the Quenda occurs at low densities in the project area. Including all the trapping

conducted regionally, only 7 Quenda were recorded. Given that only 7 Quenda were caught in total over 840 trap nights, it is highly unlikely that other species would have been missed because traps were filled. Also, the trapping program indicated that densities of species caught are likely to be low.

The EPA has also raised the concern that fauna survey may need to be extended to ensure that the Brush-tailed Phascogale could be detected if present. However, no Phascogales were caught in the Albany region at any of the sites in December 2006 or March 2007, despite extensive trapping effort using Elliott traps (5208 trap nights). Elliott traps are a common method for capturing Phasocogales and if they were present, at least one individual would have been spotlighted, trapped or been listed on the results of a DEC request for Threatened and Priority species. This will be discussed in the SEA report.

Evening spotlight searches for frogs, reptiles and terrestrial mammals and ultrasonic recordings of bats was undertaken over two nights in each habitat type. Spotlighting targets a particular suite of fauna, such as nocturnal reptiles and mammals that are not readily caught by other means (e.g. pythons, kangaroos, etc). Frogs were identified and located by their calls soon after dusk.

Western Ringtail Possums (WRP) are not likely to be caught in cage traps. Wayne, *et al.,* (2005) caught on average 0.01 Western Ringtail Possums per ground trap night during a survey in the Southern Jarrah Forest area that had a known WRP population. In comparison between 1-26 (mean 9.1) WRP were recorded per spotlighting transect. This demonstrates that spotlighting is more appropriate for surveying Western Ringtail Possums when compared to trapping. Common Brush-tail Possums are quite frequently caught in cage traps, however are not listed as being of conservation significance at State or Federal level. In addition to the general spotlighting a targeted survey for the Western Ringtail Possum was conducted. This included:

- Daytime searches and mapping (using hand-held GPS) of trees for possum dreys and suitable hollows and scats; and
- Spotlighting was undertaken (seven nights over two trapping periods) to confirm the presence and abundance of possums within the area.

Hand foraging has limited usefulness in baseline surveys for vertebrate fauna as it cannot be replicated or repeated systematically on multiple occasions. It can also be quite destructive to the fauna habitat. However, hand foraging, can be useful for supplementing lists of species that are not regularly caught by trapping. Hand foraging was conducted throughout the survey area to target threatened and priority species predicted to be in the area. Hand searching involved digging out holes, removing bark from logs and trees, turning over rocks and sorting through leaf litter with rakes.

As part of the fauna habitat mapping, an assessment of significant trees for Black-Cockatoos was undertaken. This included:

- A review of all trees on the site to determine significance for habitat, breeding or feeding potential for the three species of Black-Cockatoos that have potential to be in the region;
- Mapping of trees which may have a high degree of significance for Black-Cockatoos; and
- A review of the significance of the site for Black Cockatoos in a regional context.

Short-Range Endemic Invertebrates

Short Range Endemic (SRE) invertebrates are found throughout the Albany area in a variety of habitats. Potential terrestrial SRE taxa in the region include millipedes, snails, onychophorans, trap-door spiders and pseudoscorpions. Due to the high rainfall of the region, pitfall traps utilising ethylene glycol are not

suitable, due to dilution of the traps after rain and the prevalence of frogs and other terrestrial vertebrates likely to fall into the traps. A detailed collecting program based upon dry pits (checked daily) and intensive hand foraging of selected sites, including digging trapdoor spiders from their burrows was suggested by Dr Mark Harvey from the Western Australian Museum.

Invertebrate samples were collected during the March 2007 survey and delivered to Dr Mark Harvey at the Western Australian Museum for sorting and identification by relevant experts. A total of ten people hours was spent on this sampling.

Vouchering Specimens

Prior to the field survey, Dr Ric How, Dr Paul Doughty and Mr Brad Maryan from the Western Australian Museum (WAM) were contacted to determine whether there were any species in the region that WAM would require as vouchered specimens. A number of individuals were vouchered with the WAM to confirm identifications. Most individuals were temporarily held in calico bags or plastic tubs and delivered live to the Museum. Where specimens were dead and still in good condition they were frozen and passed onto the Museum.

Additional Investigations

It is proposed to carry out a Level 1 Fauna assessment with reconnaissance for Western Ringtail Possums and White-tailed Black-Cockatoos (Carnaby's and Baudin's) for Lot 286 Alison Parade, Lot 3. Alison Parade and Lots 37, 38, and 39 Elizabeth Street. This is considered to be adequate as the better quality fauna habitat in these areas will be retained and areas proposed to be removed are relatively degraded or not suitable for Western Ringtail Possums and Black-Cockatoos.

The values and functions of the existing (pre-development) ecological linkage will be stated, together with the potential impacts on fauna migration of a reduced east-west ecological linkage, and how any impacts will be managed. This will include consideration of vegetation linkages surrounding the Bayonet Head study area in light of the land uses proposed in the Draft Albany Local Planning Strategy (City of Albany, 2006).

8.3 Coastal Foreshore

EPA's Objective

To maintain the integrity of the coastal foreshore by maintaining its ecological functions and environmental values.

Applicable Legislation, Criterion or Guidance

- Western Australian Planning Commission (2003a) State Planning Policy No. 2 Environment and Natural Resources Policy.
- *Planning and Development Act 2005.*
- Western Australian Planning Commission (2003) State Planning Policy 2.6 State Coastal Planning Policy.

Additional Investigations

The Plan for Development proposes to augment the existing Foreshore Reserve and not remove native vegetation from the Foreshore area. Therefore it is unlikely that the visual amenity of the area will change from strategic view points around Oyster Harbour. In addition, the scarp is a rocky (lateritic), stable environment which is not prone to erosion; and due to its height above sea level, the area is not susceptible to risks associated with sea level rise.

The SEA will consider factors for calculating coastal process setbacks in accordance with WAPC State Planning Policy 2.6 State Coastal Planning Policy:

- (S1) Distance for absorbing Acute Erosion (Extreme Storm Sequence);
- (S2) Distance to allow for Historic Trend (Chronic Erosion or Accretion);
- (S3) Distance to allow for Sea Level Change; and,
- If the proposed minimum setback in less than 50m, a geotechnical survey will be undertaken.

In addition, the area will be assessed to allow for ecological values and public access, so that these factors can be taken into account for the foreshore reserve.

8.4 Wetlands

EPA's Objective

To maintain the integrity, ecological functions and environmental values of wetlands.

Applicable Legislation, Criterion or Guidance

- Government of Western Australia (1997) Wetlands Conservation Policy for Western Australia.
- DEC (2007) Framework of Mapping, Classification and Evaluation for Wetlands in Western Australia.
- Department of Water (2007) *The South Coast Wetland Mapping, Classification and Evaluation Project.*
- EPA (2004d) Position Statement No. 4 - Environmental Protection of Wetlands.
- EPA (2005) Draft Guidance Statement 33 – Environmental Guidance for Planning and Development and its references, including;
- Hill, A.L., Semeniuk, C. A., Semeniuk, V. & Del Marco, A. 1996a and b *Wetlands of the Swan Coastal Plain Volumes 2a and 2b Wetland Mapping, Classification and Evaluation* Department of Environmental protection (DEP) and Water and Rivers Commission (WRC), Perth
- Semeniuk, V & C Research Group 1998b *Preliminary Delineation of Consanguineous Wetland Suites between Walpole and Fitzgerald Inlet, Southern Western Australia* unpublished report prepared for WRC, Perth
- A Directory of Important Wetlands in Australia (Environment Australia, 2001b)
- Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998 (Government of Western Australia 1998b).

- WAPC (2006) State Planning Policy 2.9 - Water Resources.
- WRC (2001) Water and Rivers Commission Position Statement: Wetlands.

Background

Assessment of wetlands has been carried out for the Plan for Development area, following the methodology described by DoW (2007). The methodology described and implemented by DoW as part of the South Coast Wetland Mapping Classification and Evaluation Project is intended to be endorsed by the State Wetlands Coordinating Committee. Once endorsed the methodology will sit within the Framework for Mapping, Classification and Evaluation of Wetlands in Western Australia (currently in Draft) (Department of Environment and Conservation, 2006). The methodology had not been endorsed at the time of writing this report (November 2008).

The Draft Framework acknowledges that wetland values need to be interpreted within a regional context and as such Coffey Environments considers that the methodology described by DoW is the most appropriate methodology available for the assessment of the Plan for Development area.

Evaluation

As discussed by DoW (2007) there are significant limitations to applying previous evaluation methodology to South Coast wetlands particularly in assigning management categories to wetlands. The South Coast Wetland Evaluation Methodology proposes a scoring system which results in a wetland evaluation category being assigned while acknowledging that actual management responses need to be based on the full consideration of threats and feasibility. In order to relate to existing methodologies the terms Conservation (C), Resource Enhancement (R) and Multiple Use (M) as evaluation categories are used. In addition the evaluation distinguishes where the "higher" category is based primarily on social or cultural criteria. As well as scored criteria the Methodology includes 'Quick Assessment Criteria' as described in DoW (2007).

Eleven wetlands (Figure 9) are present in the Bayonet Head Outline Development Plan study area (Coffey Environments, 2008). The wetlands within the Bayonet Head Outline Development Area comprise the Bayonet Head and Oyster Harbour suites (DoW, 2007). The wetland types include the following: one lake (wetland ID # 14), two sumplands (wetland ID # 44, wetland ID # 63), one dampland (wetland ID # 62), seven paluslopes (wetland ID #'s, 8, 29, 31, 40, 41, 57 and Lot 1 Yatana Road wetland). The wetland on Lot 1 Yatana Road was not previously identified by DoW.

A wetland assessment has clarified the nature and extent of wetland areas within the Plan for Development area and assisted in determining how the ecological and hydrological functions and human use values may be impacted by the proposed development of the Plan for Development area. The following investigations have been undertaken:

- Refinement of wetland mapping to determine the extent of additional wetland areas within and adjacent to the Plan for Development area with reference to methodology and assessments undertaken by DoW (2007);
- Mapping and classification of the wetlands in accordance with Framework for Mapping, Classification and Evaluation for Wetlands in Western Australia (DEC, 2007);
- Identification and assessment of the function and significance of the wetlands in a local, regional and state context;

- Identification of wetland hydrological processes including determination of whether wetlands are groundwater dependant or perched (refer to section 8.5 for wetland/hydrology relationships);
- Description and assessment of the potential direct and indirect impacts including clearing of wetland vegetation arising from the proposed development on wetlands;
- Description and assessment of potential direct and indirect impacts upon any wetlands in the Plan for Development area as a result of any changes to the local hydrology arising from the proposed development;
- Description of appropriate management mechanisms that may be implemented to ensure the integrity, functions, environmental values and long term viability of significant wetlands in the event that they may be impacted by the proposed development. These mechanisms may include but are not limited to buffer requirements and setbacks, stormwater management, drainage, effluent management, rehabilitation and restoration, access and use, fencing and management plans;
- Description of appropriate contingency plans which may include (but are not limited to) further investigations and monitoring, consultation with DEC and DoW officers and changes to mitigation and management regimes; and.
- Liaison with Albany DoW officers.

Additional Investigations

No additional investigations are proposed.

8.5 Surface and Groundwater Quantity and Quality

EPA's Objective

To maintain the quantity of water (surface and ground) so that existing and potential environmental values, including ecosystem maintenance, are protected.

To ensure that the quality of water emissions (surface, ground, and marine) does not adversely affect environmental values or the health, welfare and amenity of people and land uses, and meets statutory requirements and acceptable standards.

Applicable Legislation, Criterion or Guidance

Latest updates of the following:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy, October 2000, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000a);
- Australian Guidelines for Water Quality Monitoring and Reporting, National Water Quality Management Strategy, October 2000, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000b);
- Australian Guidelines for Urban Stormwater Management, National Water Quality Management Strategy, 2000, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000c);

- Department of Water (2004 - 2007) Stormwater Management Manual for Western Australia, 2004 - 2007;
- Department of Environment (2005) Decision Process for Stormwater Management in W.A.;
- EPA (2008) Guidance Statement 33 – Environmental Guidance for Planning and Development;
- Australian Drinking water Guidelines (2004);
- Metropolitan Water Supply, Sewerage and Drainage Act, 1909, or Country Towns Sewerage Act, 1914;
- WAPC (2003) State Planning Policy 2 - Environment and Natural Resources Policy;
- WAPC (2006) State Planning Policy 2.9 - Water Resources; and
- Department of Water (2008) Urban Water Management Plans.

Background

A drainage study was undertaken for the Bayonet Head area by Wood and Grieve Engineers in 1999 and a Flood Management Plan was subsequently prepared by PPK Environment and Infrastructure in 2000. These studies analysed the catchments and subcatchments in the BHODP area and calculated requirements in terms of stormwater and floodway management.

A hydrogeological investigation has been undertaken for the southern half of the Plan for Development area, specifically to determine ground water levels and quality in relation to the Conservation Category Wetlands. The following was identified:

- Water table contours (piezometric surface) within the shallow sand aquifer on the flanks of the plateau area;
- Possible hydrogeological linkages between paluslope wetlands and linkages between paluslope wetlands and surface drainages / creek lines;
- Responses of groundwater levels to rainfall events;
- The nature and depth of any impervious layers within the soil profiles and possible perching of groundwater within shallow soils;
- Analysis of data to determine a conceptual model which can be used to assess potential impacts of land development for housing on the site, and to determine possible land management practices which minimise impacts and protect vulnerable paluslope wetland areas.
- A network of 20 monitoring bores (50mm diameter piezometer tubes) were emplaced at the site in May 2008 for monitoring of groundwater levels over time at the site. Bores included:
    - Four sets of two nested bores within each paluslope wetlands 31/40, 41, 8/57 and the wetland on Part Lot 1 Yatana Road, and one deeper bore in wetland 29 for monitoring water level changes beneath the wetlands. Bore screens were set approximately 2-3m below surface in shallow bores for identifying and monitoring "perched" groundwater close to the surface above any clay or low permeability horizon. Deeper bores (including the one bore at wetland 29) were drilled to identify and monitor any deeper groundwater;

- Eleven additional 50mm bores were emplaced mostly outside of the paluslope wetlands with screens set at 2-3m bgl or as appropriate to below groundwater level outside of the identified paluslope wetland areas, for assessment of the extent of any perched groundwater around the wetlands;
- Two of the above deeper bores at paluslope wetlands 29 and D were fitted with automatic water level recorders and loggers for assessment of response of groundwater levels to rainfall events (i.e. to determine how rapidly infiltration of water takes place);

- "Slug" tests were carried out on bores at wetland 29 and the wetland on Part Lot 1 Yatana Road to assess hydraulic conductivities of soils in the area, using the water level probes and loggers to determine groundwater level recoveries over time after introducing a "slug" of water to raise water levels in each bore. Slug test data analysis was carried out using Hvorslev method (Freeze and Cherry, 1979).

Groundwater levels were measured manually using a water level dipper (electric contact gauge) monthly where groundwater was found to be present, and all bores were surveyed in to top-of-casing to allow determination of water table contours across the site. The latter period of monitoring, essentially from early to late winter, was used to develop a conceptual hydrogeological model for the site, and to provide baseline data on development of perched groundwater associated or otherwise with wetlands at the site. In addition, summer and autumn data for ground water levels has been collected for further analysis.

Sampling of ground water quality was carried out to determine base line levels for:

- Total Aluminium,
- Dissolved Aluminium,
- Dissolved Arsenic,
- Dissolved Cadmium,
- Dissolved Chromium,
- Dissolved Copper,
- Total Iron,
- Dissolved Iron,
- Dissolved Manganese,
- Dissolved Nickel,
- Dissolved Selenium,
- Dissolved Zinc,
- Sodium,
- Calcium,
- Magnesium,
- Potassium,
- Ammonia – N
- Total Kjeldahl Nitrogen,
- Nox – N
- Total Nitrogen
- Reactive Phosphorus,
- Total Phosphorus,
- pH
- Conductivity,
- Alkalinity,
- Bicarbonate,
- Carbonate,
- Hydroxide,
- Total Acidity,
- Dissolved Oxygen,
- Chloride,
- Hydrogen Sulfide,
- Sulfate,
- Total Dissolved Solids,
- Redox Potential,
- Sulfate to Chloride Ratio,
- Alkalinity to Sulfate Ratio.

These parameters were measured in over summer and winter to give a seasonal perspective of water quality.

Information collected will be used to predict any potential impacts from the proposed development in the Plan for Development area on surface and groundwater systems. The data will also be used to predict any potential impacts from the proposed development of the Plan for Development area on Oyster Harbour and Yakamia Creek.

Additional Investigations

The following will also be undertaken:

- Desktop review of studies and plans previously prepared for drainage management;
- Assessment of drainage management to ensure proposal is consistent with current planning policy and current best practice stormwater management techniques;
- Modification as needed to ensure proposed drainage management is consistent with current best practice management techniques; and
- Inclusion of summer and autumn Groundwater level data in hydrological analysis (so that it is based on year round information).

8.6 Acid Sulphate Soils

EPA's Objective

To minimise the risk to the environment resulting from Acid Sulphate Soils, to be achieved by implementing appropriate detection and management strategies.

Applicable Legislation, Criterion or Guidance

- *Contaminated Sites Act 2003*
- DoE (2003-2006) Department of Environment Draft Identification and Investigation of Acid Sulphate Soils - Acid Sulphate Soils Guideline Series:
- DoE (2003) Preparation of Acid Sulphate Soil Management Plan
- DoE (2003) General guidance on managing Acid Sulphate Soils
- DoE (2004) Guidance for groundwater management in urban areas on acid sulfate soils
- DoE (2004) Is my house built on Acid Sulfate Soils (Draft)
- DoE (2004) Proposed Framework for Managing Acid Sulphate Soils
- DoE (2004) Treatment and management of disturbed acid sulfate soils
- DoE (2006) Draft Identification and Investigation of Acid Sulfate Soils
- DEC (2006) Policy Position Acid Sulphate Soils and the *Contaminated Sites Act 2003*
- WAPC (2009) *Planning Bulleting No. 64: Acid Sulphate Soils*

Latest updates of the following:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy, October 2000, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000a);
- Australian Guidelines for Water Quality Monitoring and Reporting, National Water Quality Management Strategy, October 2000, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000b); and

- Australian Guidelines for Urban Stormwater Management, National Water Quality Management Strategy, 2000, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000c).

Background

The presence of Acid Sulphate Soils (ASS) has been a recognised issue of concern in Western Australia since 2003. The DEC and the WAPC have released guidance notes on ASS, covering the requirement for assessing sites and the management of sites where ASS are identified.

ASS investigations are commonly required as part of the conditions of subdivision and development, or as a requirement for a dewatering license application. Proponents of developments that involve the disturbance of soil or the change of groundwater levels in areas susceptible to ASS are required to conduct desktop and field based investigations. The objective of these investigations is to determine the extent and magnitude of ASS at the site. Adequate investigations are required prior to soil disturbance to determine the potential risks and to allow for the formulation of appropriate management strategies.

A preliminary desktop investigation for ASS has been carried out for the Plan for Development area (Figure 10), including:

- Review of published ASS risk information pertaining to the study area;
- Review of geological information pertaining to the study area; and
- A site visit to ground truth existing mapping and determine and significant indications of ASS.

WAPC Planning Bulletin 64 identifies the southern and eastern portion of study area as having 'no known risk of ASS occurring within 3m of natural soil surface (or deeper)' (WAPC, 2003). However, Lots 37, 38 and 39 Elizabeth Street, Lot 15 Hooper Road, and parts of Lots 3 and 286 Alison Parade may have a 'high risk of actual acid sulfate soil and potential acid sulfate soil less that 3m from the ground surface' (Figure 10).

Additional Investigations

An "Acid Test", used to determine the ASS risk for the site according to methodology outlined in WAPC Planning Bulletin 64 (WAPC, 2009) has not been carried out for the site. This is because the boundaries of areas to be disturbed have not been finalised. However it is recognised that where dewatering or extensive earthworks are proposed, further assessment will be required prior to development. This will be completed prior to subdivision.

8.7 Heritage

8.7.1 Aboriginal Heritage

EPA's Objective

To ensure changes to the biophysical environment resulting from the proposal does not adversely affect Aboriginal heritage sites and/or and cultural associations within the area and comply with the requirements of relevant Aboriginal and heritage legislation.

Applicable Legislation, Criterion or Guidance

- Aboriginal Heritage Act 1972;
- *Native Title Act 1993*;
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984; and*
- EPA (2004e*) Assessment of Aboriginal Heritage Guidance Statement No. 41.*

Background

The *Aboriginal Heritage Act 1972* defines Aboriginal sites and provides for the preservation of places and objects customarily used by or traditionally important to Aborigines, and prohibits the concealment, destruction or alteration of any Aboriginal sites.

An Aboriginal heritage survey of the property was undertaken by Goode and Associates in January 2007 to ensure that important archaeological and ethnographic sites are not disturbed as a consequence of the development. The survey involved a review of records describing known sites, a survey of the property, and consultations with local Aboriginal people to determine whether any ethnographic sites were present. Sites are shown in Figure 11.

The survey noted one previously recorded archaeological site (Site ID 5524 – Kylie Site) located in the south western portion of Lot 1000 Lower King Road.

Site ID 5524 – Kylie Site was reported by W. Ferguson in 1978 as a result of a survey conducted on behalf of the West Australian Museum and consists of a boomerang located among European debris as well as quartz and chert artefacts (Good and Associates, 2007). The site has been extensively disturbed by motorcycle riding and building activities and the majority of materials were collected at the time that the site was first recorded (Good and Associates, 2007).

The site is listed on the 'Interim Register' under Section 5(a) of the *Aboriginal Heritage Act 1972*. As required under the Act and in accordance with recommendations made by Goode and Associates as a result of consultation with the Aboriginal community, approval has been sought and granted to use the land for urban purposes under Section 18 of the *Aboriginal Heritage Act 1972*.

Additional Investigations

No further investigations are proposed.

9 APPLICABLE LEGISLATION

Legislation relevant to the proposed development of the Plan for Development area includes:

- *Environmental Protection Act 1986;*
- *Wildlife Conservation Act 1950;*
- *Aboriginal Heritage Act 1972;*
- *Conservation and Land Management Act 1984;*
- *Environmental Protection (Noise) Regulations 1997;*
- *Contaminated Sites Act 2003;*
- *Health Act 1911-1979 and Regulations;*
- *Local Government Act 1995;*
- *Planning and Development Act 2005;*
- *Western Australian Planning Commission Act 1985;*
- *Native Title Act 1993;*
- *Fire and Emergency Services Authority of Western Australia Act 1998;*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984;*
- *Rights in Water and Irrigation Act 1914;*
- *Metropolitan Water Supply, Sewerage and Drainage Act 1909; and*
- *Country Towns Sewerage Act 1914.*

In addition, the following Commonwealth legislation may be relevant:

- *Environment Protection and Biodiversity Conservation Act 1999.*

Table 7 lists the authorities and agencies with responsibilities in the development of the site.

TABLE 7

AUTHORITIES AND AGENCIES WITH RESPONSIBILITIES IN THE PROPOSED DEVELOPMENT OF THE SITE

Department of Environment Water, Heritage and the Arts (Commonwealth)	• Provides protection for matters of national environmental significance. • Joint assessment may be triggered if Commonwealth has jurisdiction. • Environment Australia and Commonwealth Environment Minister administer the Act.
City of Albany	• Maintains public infrastructure including roads. • Carries out strategic and statutory planning. • Manages and maintains public open space.
Department of Environment and Conservation (Western Australia)	• Assists the Environmental Protection Authority in the process of assessing proposals that may significantly affect the environment, including planning schemes. • Administers relevant control legislation. • Manage conservation reserves vested in the crown. This includes the: a) preparation of management plans; b) implementation of the management plan; c) co-ordination with other agencies; d) implementation of education and monitoring programs; e) wildlife research and management; f) management of nature-based tourism; and g) lead role in enforcement (non-fisheries issues).
Department of Health	• Has responsibility for public health and safety issues including the provision of safe drinking water supplies and mosquitoes.
Department for Planning and Infrastructure (Western Australia)	• Manages the provision of major transport infrastructure within and around the site.
Department of Water	• Has responsibility for providing advice on wetlands, groundwater, stormwater management and drainage issues.
Fire and Emergency Services Authority of Western Australia	• Provides advice on the protection of life and property from wildfires and other emergency situations.
Environmental Protection Authority	• Assesses reports and makes recommendations on proposals that may significantly affect the environment, including planning scheme amendments.

TABLE 7

AUTHORITIES AND AGENCIES WITH RESPONSIBILITIES IN THE PROPOSED DEVELOPMENT OF THE SITE

Department of Indigenous Affairs	• Protects relics and significant areas of land from undue interference, whilst at the same time leaving traditional Aboriginal cultural rights in relation to such objects or areas unaffected, in so far as they are not inconsistent with the provisions of the *Aboriginal Heritage Act 1972*. • Administers the Act.

10 COMMUNITY AND OTHER STAKEHOLDER CONSULTATION

Consultation with relevant stakeholders will be conducted while the SEA is being prepared. Participants in the consultation process will include:

- Department for Planning and Infrastructure;
- Department of Environment and Conservation;
- Department of Water;
- Department of Environment, Water, Heritage and the Arts (Commonwealth);
- City of Albany; and
- Department of Indigenous Affairs.

11 PROJECT AND ASSESSMENT SCHEDULE

The future timing of the proposed development is dependent on successful resolution of any outstanding issues and the environmental and planning approval processes.

The indicative timeline for major elements of the environmental approvals process is as follows:

Submission of draft SEA Scoping Document to EPASU	17 February 2009
EPASU finalise review of draft Scoping Document	9 March 2009
Submission of final draft Scoping Document to EPASU	11 March 2009
Final Draft Scoping Document presented to EPA for endorsement	19 March 2009
Sign off of Final Draft Scoping Document by EPA	16 April 2009
Scoping document Public Consultation (2 weeks)	20 April to 4 May 2009
Final Scoping Document approved by EPA	18 May 2009
Draft SEA report submitted to EPASU by	1 June 2009
EPASU comments on draft SEA returned to consultant	9 July 2009
Consultant to submit final draft to EPASU by	13 July 2009
Agenda cut-off for EPA meeting	23 July 2009
Finalised SEA report endorsed for public comment by EPA	6 August 2009
SEA report released for 6 week public review period	10 August 2009
Public Review period closes	21 September 2009
Responses to submissions from public review prepared by	28 October 2009
EPA assessment and report to the Minister completed by	10 December 2009
Two week appeal period	14 to 28 December 2009
(if appeals are lodged this may add at least two months to the process)	
If no appeals – issuing of approvals and conditions	February 2010

12 PEER REVIEW

Peer review is considered unlikely to be necessary because the proponent has commissioned the use of expert consultants to undertake the specialist studies and prepare the associated documentation. The SEA document will be peer-reviewed by specialist officers of the relevant government agencies whose role it is to ensure that the information provided is technically accurate and advise the EPA accordingly.

13 STUDY TEAM

The project is managed by Mr Brian Newman of Heath Development Company. Completion of proposed investigations and preparation of associated documentation will be undertaken by suitably qualified consultants.

The study team for this project presently comprises the following:

Project Management:	Heath Development Company
Environmental:	Coffey Environments
Planning:	Chappell Lambert Everett
Engineering:	Wood and Grieve
Surveying:	Harley Survey Group
Aboriginal Heritage:	Bradley Goode and Associates
Geotechnical:	Coffey Geotechnics

Heath Development Company is the appointed project manager of the Oyster Harbour Joint Venture which encompasses land owned by Lowe Pty Ltd and the Housing Authority. Lowe Pty Ltd is the owner of the trading company Heath Development Company. Heath Development Company and Coffey Environments have been assigned responsibility to liaise with the other proponents in the preparation of the Strategic Environmental Assessment.

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15 DISCLAIMER

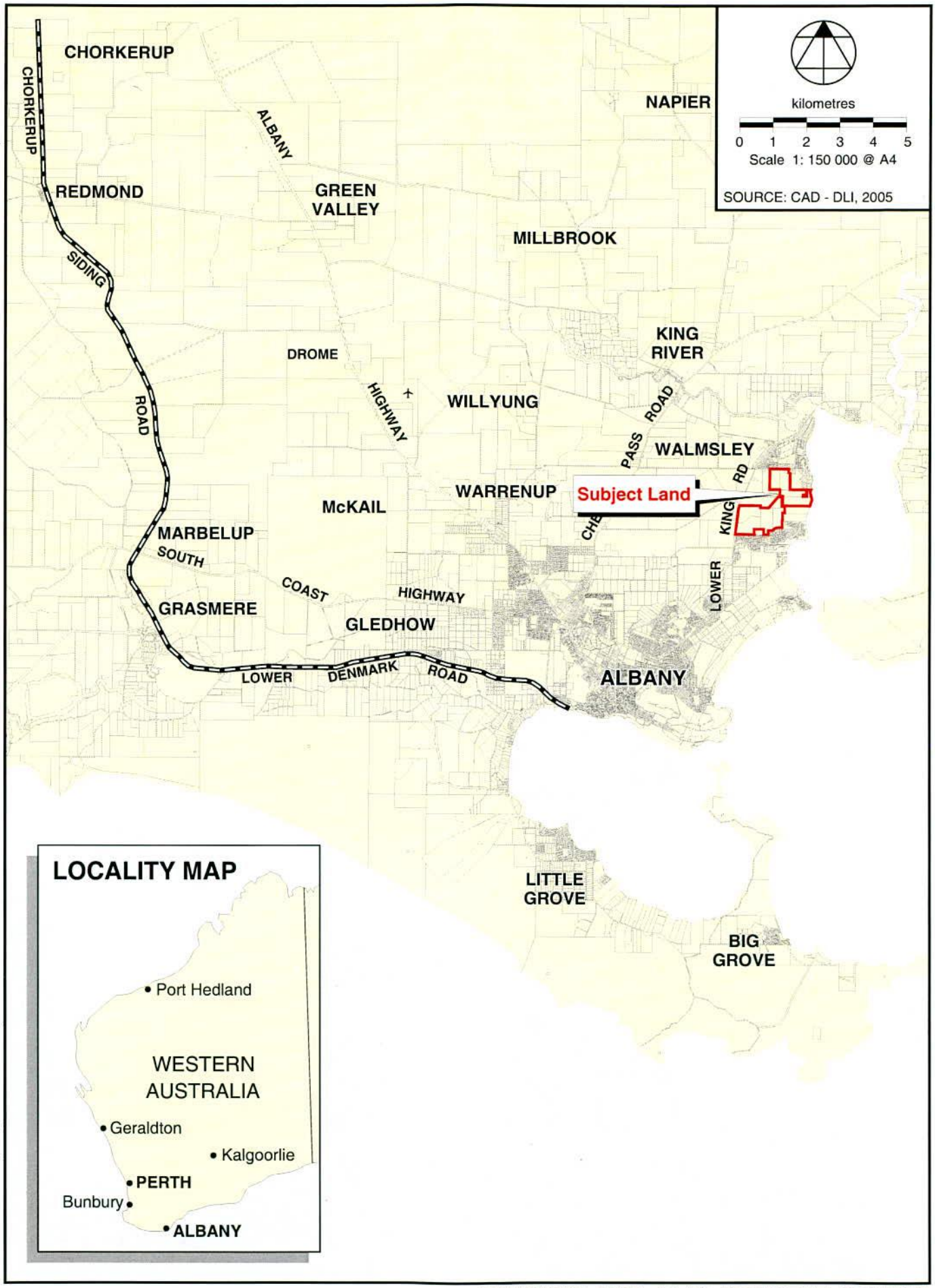
This document is published in accordance with and subject to an agreement between Coffey Environments **("Coffey")** and the client for whom it has been prepared, Heath Development Company, CAMABB Pty Ltd, Dr. M. Greer and Mr. K. Slee **("Client")** and is restricted to those issues that have been raised by the client in its engagement of Coffey and prepared using the standard of skill and care ordinarily exercised by Environmental Scientists in the preparation of such Documents.

Heath Development Company is the appointed project manager of the Oyster Harbour Joint Venture which encompasses land owned by Lowe Pty Ltd and the Housing Authority. Lowe Pty Ltd is the owner of the trading company Heath Development Company. Heath Development Company and Coffey Environments have been assigned responsibility to liaise with the other proponents in the preparation of the Strategic Environmental Assessment.

Any person or organisation that relies on or uses the document for purposes or reasons other than those agreed by Coffey and the Client without first obtaining the prior written consent of Coffey, does so entirely at their own risk and Coffey denies all liability in tort, contract or otherwise for any loss, damage or injury of any kind whatsoever (whether in negligence or otherwise) that may be suffered as a consequence of relying on this Document for any purpose other than that agreed with the Client.

Figures

Bayonet Head - Plan for Development
Strategic Environmental Assessment (EPA Assessment No. 1758).
Environmental Scoping Document



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BAYONET HEAD - PLAN FOR DEVELOPMENT
ENVIRONMENTAL SCOPING DOCUMENT

REGIONAL LOCATION

FIGURE 1

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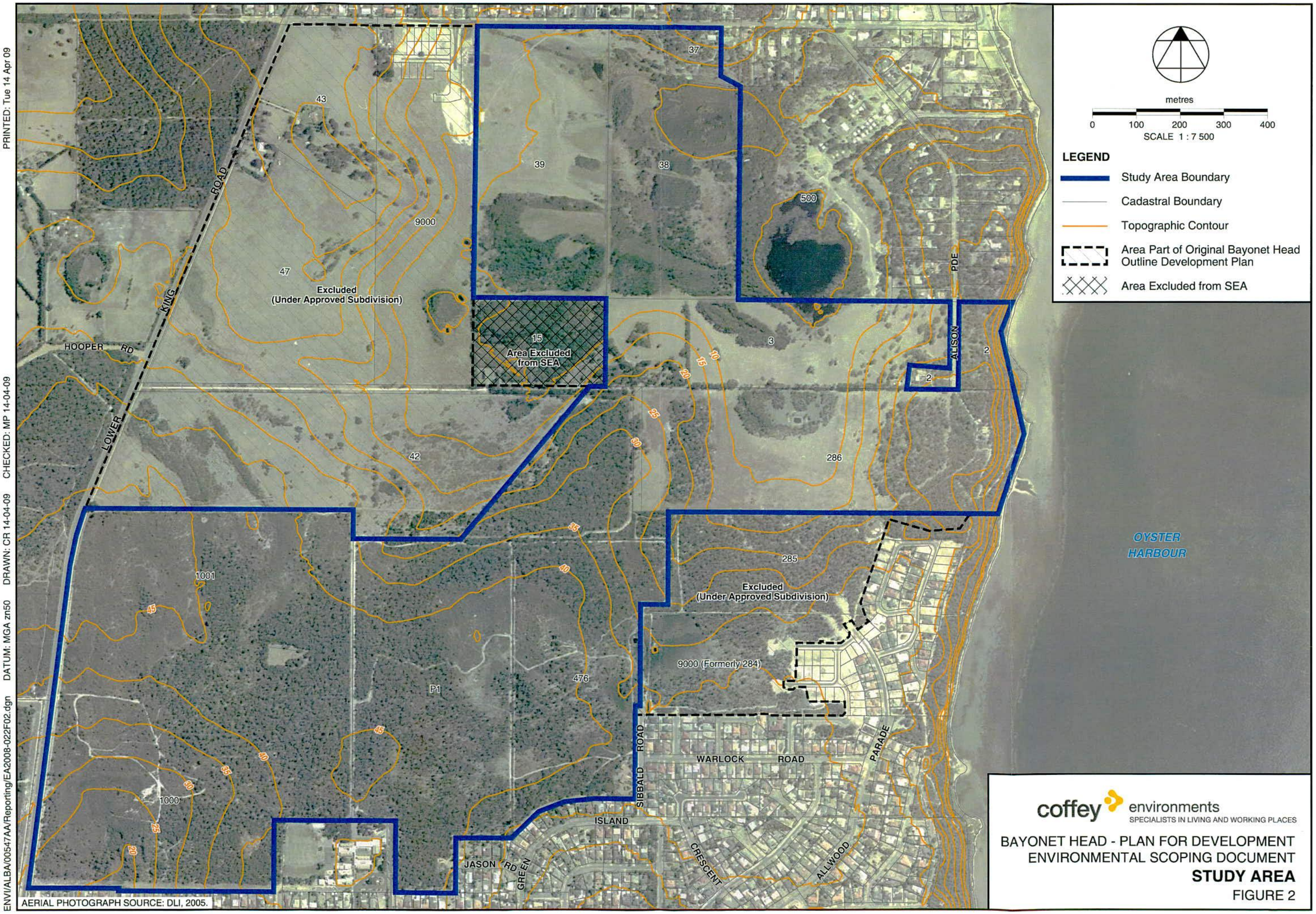

AERIAL PHOTOGRAPH SOURCE: DLI, 2005.

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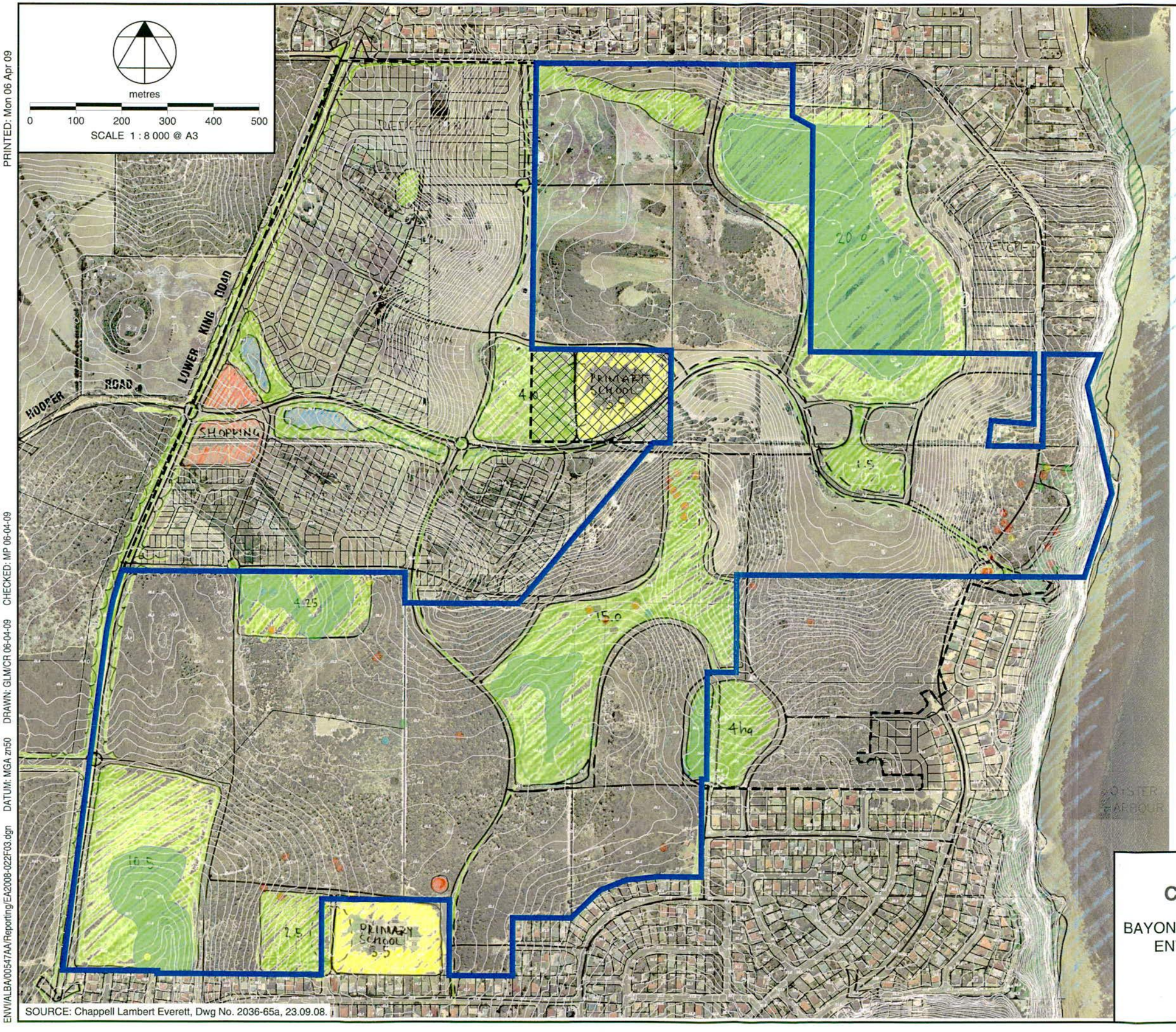
BAYONET HEAD - PLAN FOR DEVELOPMENT
ENVIRONMENTAL SCOPING DOCUMENT

STUDY AREA

FIGURE 2



LEGEND

- Cadastral Boundary
- Wetland Boundary
- 50m Buffer from Wetland Boundary

FAUNA LOCATIONS

- Western Ringtail Possum
- Drey
- Possum Hollow
- Potential Black Cockatoo Hollow
- Osprey Nest (fallen down)
- Quenda caught at trapping site

SOURCE: CAD & IMAGERY - DLI, 2005

- Study Area Boundary
- Area Part of Original Bayonet Head Outline Development Plan
- Area Excluded from SEA
- Public Open Space for Conservation and Active Recreation

NOTES:

The Environmental Protection Authority will not assess the proposed Plan for Development until the Strategic Environmental Assessment document has been prepared and submitted, and it is expected that the Plan will be informed by the studies undertaken as well as the findings of the Albany Regional Vegetation Survey.

Areas not shown as Public Open Space are proposed for urban development.

SOURCE: Chappell Lambert Everett, Dwg No. 2036-65a, 23.09.08.

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ENVIRONMENTAL SCOPING DOCUMENT

2008 BAYONET HEAD PLAN FOR DEVELOPMENT

FIGURE 3

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PRINTED: Mon 06 Apr 09

metres

0 100 200 300 400 500

SCALE 1 : 10 000 @ A3

LEGEND

Study Area Boundary

R

R

R

CVP

BAYONET HEAD OUTLINE DEVELOPMENT PLAN AREA

SRes2

ROAD

STREET

ELIZABETH

SHEPHERD ST

SLATER

STREET

BAKER

FRANCIS

STREET

AUTSON

SIMMONS STREET

GREEN ISLAND CRESCENT

JASON RD

CRESCENT

SHAPCOTT ST

BROWN ST

GOOD ST

CRESCENT

PARADE

STREET

HICKS

CRESCENT

BANDOL

ALLWOOD

MEANARUP

HIAM STREET

COURT

CLIVE ST

RANGE

LANGE ST

YATANA ROAD

TAYLOR ST

KURRANNUP ROAD

THISTLE ST

WESTAIL ST

BAYONET HEAD RD

EVANS ROAD

SINCLAIR ST

PYRODIE RD

WARRANGA

BELL CT

FRANKLIN CT

LOVIND ST

HARBOUR

SOURCE: City of Albany, Town Planning Scheme No. 3, June 2007.

LEGEND

LOCAL SCHEME RESERVES

- AERODROME
- CIVIC AND CULTURAL
- IMPORTANT REGIONAL ROADS
- MAJOR HIGHWAYS
- PARKS AND RECREATION
- PARKS AND RECREATION (DENOTED AS FOLLOWS: R RESTRICTED)
- PUBLIC PURPOSES
- RAILWAY

ZONES

- RESIDENTIAL
- RESIDENTIAL DEVELOPMENT
- SPECIAL RESIDENTIAL
- COMMERCIAL
- LOCAL SHOPPING
- MIXED BUSINESS
- M MOTEL
- SERVICE STATION
- T TAVERN
- PLACES OF PUBLIC ASSEMBLY
- SPECIAL SITES (DENOTED AS FOLLOWS: CVP CARAVAN PARK; HA HOLIDAY ACCOMMODATION; M MARINE MUSEUM; V VARIOUS (SEE SCHEME TEXT))
- SPECIAL USE
- SPECIAL USE (DENOTED AS FOLLOWS: C CHALETS)
- SPECIAL USE (DENOTED AS FOLLOWS: CVP CARAVAN PARK; FP FOOD WHOLESALING/PLANT NURSERY; MA MUSEUM & AQUACULTURE; RIB RURAL-INDUSTRY BUFFER; V VARIOUS (SEE SCHEME TEXT) ZG ZOOLOGICAL GARDEN)
- PRIVATE CLUBS AND INSTITUTIONS
- GENERAL INDUSTRY
- LIGHT INDUSTRY
- NOXIOUS INDUSTRY
- SERVICE INDUSTRY
- SPECIAL INDUSTRY
- CONSERVATION
- LANDSCAPE PROTECTION
- RURAL
- SPECIAL RURAL

OTHER

- R20 R CODES
- A1 ADDITIONAL USES
- SCHEME BOUNDARY
- LOCAL GOVERNMENT BOUNDARY
- TOWNSITE -- LAND ACT
- SR3 SPECIAL RURAL AREA (SEE SCHEME TEXT)
- SRes11 SPECIAL RESIDENTIAL AREA (SEE SCHEME TEXT)
- CA1 CONSERVATION AREA (SEE SCHEME TEXT)
- BAYONET HEAD OUTLINE DEVELOPMENT PLAN AREA
- NO ZONE

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BAYONET HEAD - PLAN FOR DEVELOPMENT
ENVIRONMENTAL SCOPING DOCUMENT

LOCAL CONTEXT AND ZONING PLAN

FIGURE 4

ENV/ALBA/00547AA/Reporting/EA2008-022F04.dgn DATUM: MGA zn50 DRAWN: GLM/CR 06-04-09 CHECKED: MP 06-04-09

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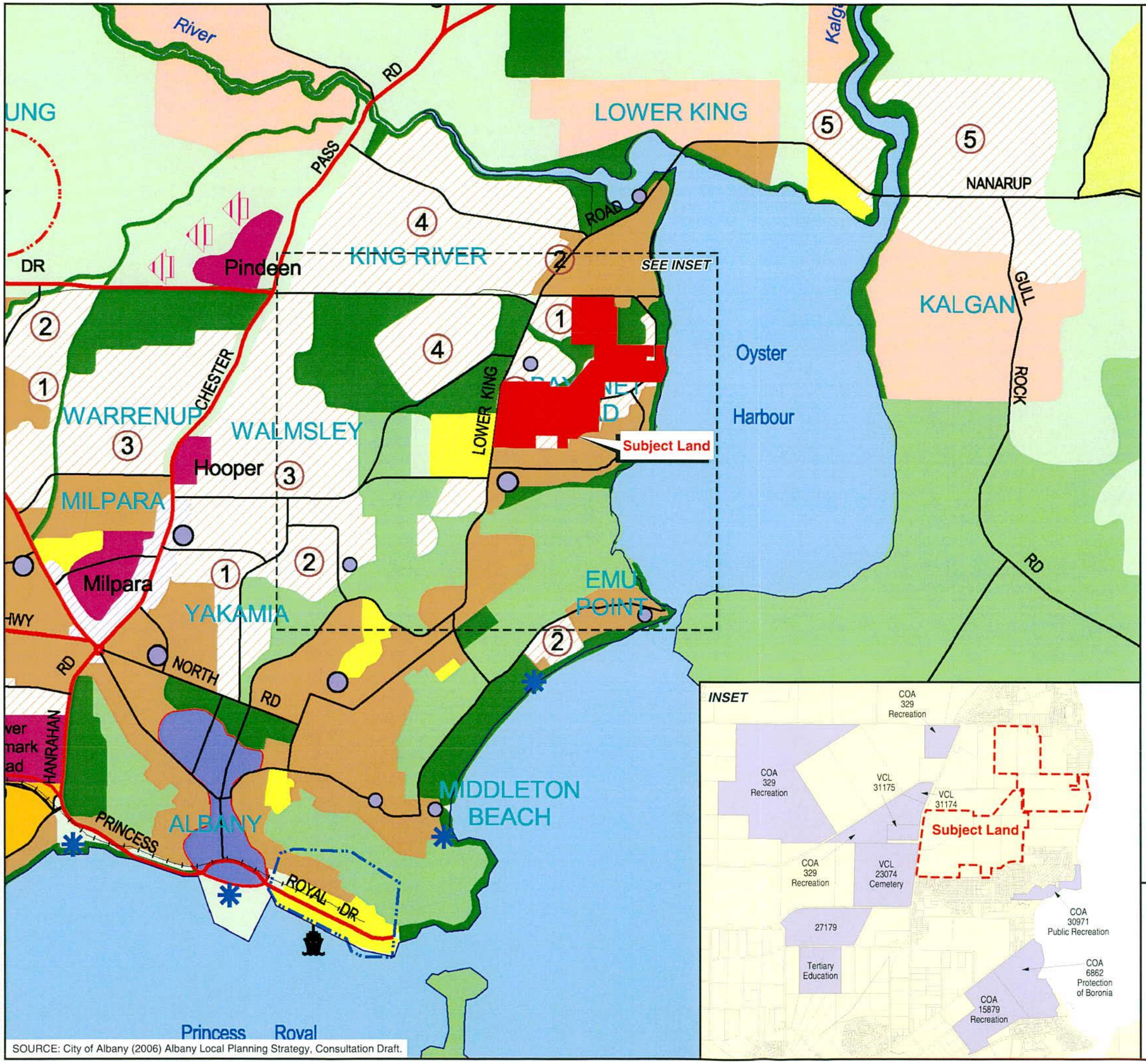

SOURCE: City of Albany (2006) Albany Local Planning Strategy, Consultation Draft.

metres

0 500 1000 1500 2000 2500

SCALE 1 : 50 000 @ A3

LEGEND

- Existing Urban
- Future Urban
- (2) Priority Development
- Regional Reserve
- Local Reserve
- Major Public Purpose Use
- Albany (Regional Centre)
- Neighbourhood Centre
- Local Centre
- Mixed Business
- Rural Residential
- Conservation
- General Agriculture
- Priority Agriculture
- Rural Small Holding
- Industry
- Future Industry
- Tourist Accommodation Node
- Airport noise buffer
- Speedway Noise Buffer
- Port Noise Buffer
- Water Treatment Plant Buffer
- Quarry Buffer
- Major Highway
- Local Distributor Road
- Railway
- Regional mine/quarry
- Albany Airport
- Albany Port
- Wind farm

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ENVIRONMENTAL SCOPING DOCUMENT

ADJACENT LAND USE AND TENURE

FIGURE 5

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DRAWN: CR 06-04-09

DATUM: MGA zn50

ENV/ALBA/00547AA/Reporting/EA2008-022F06.dgn

metres

0 100 200 300 400

SCALE 1 : 7 500

LEGEND

- Study Area Boundary
- Cadastral Boundary
- Area Part of Original Bayonet Head Outline Development Plan
- Area Excluded from SEA
- Vegetation Association Boundary

Excluded (Under Approved Subdivision)

Area Excluded from SEA

Excluded (Under Approved Subdivision)

9000 (FMR 284)

HOOPER RD

KING ROAD

LOWER KING

WARLOCK ROAD

SIBBALD ROAD

PARADE

ALTSON

PDE

ISLAND

JASON RD

GREEN

CRESCENT

ALLWOOD

AERIAL PHOTOGRAPH SOURCE: DLI, 2005.

VEGETATION ASSOCIATIONS LEGEND

AfEmOF
Open Forest of *Allocasuarina fraseriana* and *Eucalyptus marginata* over *Agonis theiformis, Xanthorrhoea brunonis, Xanthorrhoea platyphylla, Anarthria scabra, Acacia lateriticola* and *Dasypogon bromeliifolius* over *Chordifex laxus, Desmocladus fasciculatus, Hypolaena exsulca, Gompholobium knightianum, Conostylis setigera* and *Sphenotoma squarrosum.*

AfEmCF
Closed Forest of *Allocasuarina fraseriana* and *Eucalyptus marginata* over *Agonis theiformis, Bossiaea linophylla* and *Leucopogon racemulosus* over *Dasypogon bromeliifolius, Anarthria scabra* and *Anarthria prolifera.*

AfEmOCF
Open to Closed Forest of *Allocasuarina fraseriana* and *Eucalyptus marginata* over *Agonis theiformis, Beaufortia decussata* and *Astartea scopapana* over *Xanthorrhoea brunonis, Dasypogon bromeliifolius, Desmocladus fasciculatus, Lepidosperma squamatum, Anarthria scabra* and *Anarthria prolifera.*

AfEsBc
Open Woodland of *Eucalyptus staeri* and *Allocasuarina fraseriana* over *Banksia coccinea* over *Melaleuca thymoides, Leucopogon glabellus* and *Leucopogon obovatus* over *Dasypogon bromeliifolius, Lyginia imberbis, Anarthria scabra* and *Anarthria prolifera.*

AfNfEsOW
Open Woodland of *Allocasuarina fraseriana, Nuytsia floribunda* and *Eucalyptus staeri* over *Melaleuca thymoides, Agonis theiformis, Jacksonia spinosa, Leucopogon glabellus, Dasypogon bromeliifolius* and *Leucopogon unilateralis* over *Anarthria scabra, Chordifex laxus* and *Hypolaena exsulca.*

ClAf
Callistachys lanceolata to 12 metres with occasional *Agonis flexuosa* over *Pteridium esculentum.*

HfCcOH
Open Heath of *Homalospermum firmum* and *Cosmelia rubra* over Sedgeland of *Xyris lacera* and *Hypolaena exsulc.*

AfEsOW
Woodland to Open Woodland of *Eucalyptus staeri* and *Allocasuarina fraseriana* over *Banksia coccinea, Agonis theiformis, Leucopogon glabellus* and *Jacksonia sternbergiana* over *Anarthria scabra* and *Melaleucathymoides.*

EmAfOF
Open Forest of *Eucalyptus marginata* and *Allocasuarina fraseriana* with occasional *Eucalyptus staeri* over *Agonis theiformis, Astartea fascicularis, Allocasuarina humilis, Melaleuca thymoides* and *Xanthorrhoea brunonis* over *Mesomelaena tetragona* and *Anarthria scabra* over *Conostylis setigera, Anarthria prolifera, Schoenus nitens* and *Leucopogon propinquus.*

ClEm
Callistachys lanceolata and *Eucalyptus marginata* over *Melaleuca viminea* subsp. *viminea* over *Lepidosperma gladiatum, Anarthria gracilis* and *Agonis theiformis* over *Juncus pauciflorus, Chordifex laxus* and *Hypolaena exsulca.*

EmAfBgCF
Closed Forest of *Eucalyptus marginata, Allocasuarina fraseriana* and occasional *Banksia grandis* over *Agonis theiformis, Melaleuca thymoides, Petrophile heterophylla* and *Daviesia preissii* over *Lepidosperma gladiatum, squamatum* and *Xanthosia rotundifolia*

EmAfF
Forest of *Eucalyptus marginata* and *Allocasuarina fraseriana* over *Agonis theiformis, Acacia rostellifera* and *Kingia australis.* (Severely burnt).

AfEsNfOW
Open Woodland of *Eucalyptus staeri, Allocasuarina fraseriana* and *Nuytsia floribunda* over *Evandra aristata, Pericalymma ellipticum var.ellipticum, Adenanthos obovatus, Lepidosperma gladiatum, Juncus pauciflorus, Mesomelaena graciliceps, Hypolaena exsulca, Sphenotoma squarrosum* and *Darwinia vestita* over *Anarthria prolifera* and *Lomandra sonderi,* with occasional *Kingia australis.*

EmAfW
Woodland of *Eucalyptus marginata* and *Allocasuarina fraseriana* over *Jacksonia furcellata, Melaleuca thymoides* and *Leucopogon glabellus* over *Dasypogon bromeliifolius, Adenanthos obovatus, Lepidosperma gladiatum* and *Xanthosia rotundifolia* over *Chordifex laxus, Hypolaena*

MpEsW
Woodland of *Melaleuca preissiana* and *Eucalyptus staeri* over *Taxandria linearifolia, Astartea fascicularis, Acacia rostellifera, Gompholobium villosum, Dasypogon bromeliifolius, Chordifex laxus, Mesomelaena graciliceps* and *Hypolaena exsulca* over *Sphenotoma squarrosum* and *Dampiera linearis.*

AfNfBiBaOF
Open Forest of *Allocasuarina fraseriana, Nuytsia floribunda, Banksia ilicifolia* and *Banksia attenuata* over Shrubland of *Astartea scoparia* and *Agonis theiformis* over weeds.

EmAfNfOF
Open Forest of *Eucalyptus marginata, Allocasuarina fraseriana* and *Nuytsia floribunda* over Open Shrubland of *Psoralea pinnata, Acacia myrtifolia, Hibbertia cuneiformis, Xanthorrhoea platyphylla* and *Zantedescia aethiopica* over *Anthoxanthum odoratum, Sonchus oleraceus, Hypochaeris glabra.*

EmAfCF
Closed Forest of *Eucalyptus marginata* and *Allocasuarina fraseriana* over Tall Open Scrub of *Agonis theiformis* over Open Shrubland of *Leucopogon revolutus, Bossiaea linophylla* and *Xanthorrhoea platyphylla* over Open Sedgeland of *Lepidosperma gladiatum, squamatum, Anarthria prolifera, Tetraria capillaria* and *Desmocladus fascicularis* over Open Herbland of *Hibbertia cunninghamii, Tetratheca setigera, Opercularia vaginata* and *Conostylis Setigera*

MpLW
Low Woodland of *Melaleuca preissiana* over Tall Open Scrub of *Astartea scoparia* over Very Open Sedgeland of *Hypolaena exsculca.*

AsClTOS
Tall Open Scrub of *Astartea scoparia* and *Callistachys lanceolata* over Sedgeland of *Juncus krausii, Baumea articulata, Lepidosperma gladiatum* and *Hypolaena exsulca* Open Forest of *Allocasuarina fraseriana* and *Eucalyptus marginata* over *Agonis theiformis* over *Lepidosperma gladiatum, Patersonia occidentalis, Kingia australis* and *Beaufortia*

AfLCF
Low Closed Forest of *Allocasuarina fraseriana* over *Agonis theiformis, Lepidosperma gladiatum* and *Jacksonia furcellata* over *Xanthosia rotundifolia* and *Lepidsperma squamatum.*

PP
Psoralea pinnata

C/P
Cleared/Pasture

coffey environments
SPECIALISTS IN LIVING AND WORKING PLACES

BAYONET HEAD - PLAN FOR DEVELOPMENT
ENVIRONMENTAL SCOPING DOCUMENT
VEGETATION ASSOCIATIONS
FIGURE 6

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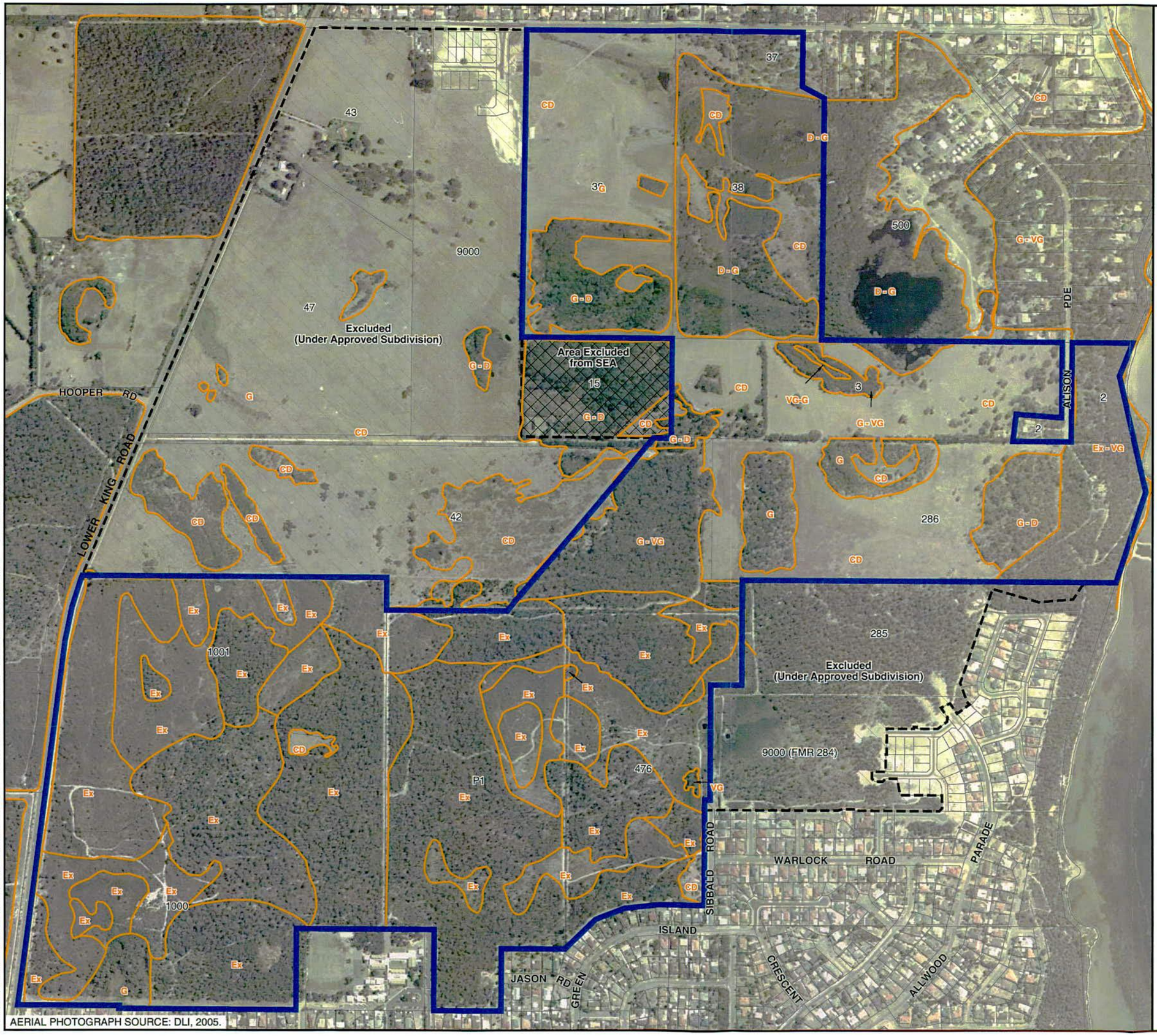
ENVI/ALBA/00547AA/Reporting/EA2008-022F07.dgn



metres
0 100 200 300 400
SCALE 1 : 7 500

LEGEND

- Study Area Boundary
- Cadastral Boundary
- Area Part of Original Bayonet Head Outline Development Plan
- Area Excluded from SEA
- Vegetation Condition Boundary

VEGETATION CONDITION
(Legend Source: BUSH FOREVER, Govt. of W.A.)

P	Pristine. (Not Applicable)
Ex	Excellent.
VG	Very Good.
G	Good.
Deg	Degraded.
CD	Completely Degraded.

NOTE: For full description see text.

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BAYONET HEAD - PLAN FOR DEVELOPMENT
ENVIRONMENTAL SCOPING DOCUMENT

VEGETATION CONDITION

FIGURE 7

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ENVI/ALBA/00547AA/Reporting/EA2008-022F08.dgn

metres
0 100 200 300 400
SCALE 1 : 7 500

LEGEND

- Study Area Boundary
- Cadastral Boundary
- Area Part of Original Bayonet Head Outline Development Plan
- Area Excluded from SEA
- Area Requiring Level 1 Assessment for Fauna
- Fauna Habitat Boundary
- Western Ringtail Possum Location
- Drey Location
- Possibly Suitable Possum Hollow
- Possibly Suitable Black-Cockatoo Hollow
- Quenda Caught at Trapping Location
- Trapping Site Location

FAUNA HABITAT TYPES

JSW
Jarrah (*Eucalyptus marginata*) and Sheoak (*Allocasuarina fraseriana*) woodland over shrubland of species such as *Agonis theiformis*, *Astartea fascicularis*, *A. humilis*, *Melaleuca thymoides* and *Xanthorrhoea brunonis* over a mixed sedgeland.

HS
Heath containing species such as *A. theiformis*, *Leucopogon glabellus*, *Lepidosperma gladiatum*, *Melaleuca thymoides*, *Melaleuca bracteosa*, *Pericalymma ellipticum var. ellipticum* and *Beaufortia decussata* with occasional Albany Blackbutt (*Eucalytpus staeri*).

WM
Wetland mosaic of Peppermint (*Agonis flexuosa*) and *Callistachys lanceolata* woodland over *Pteridium esculentum*.

AERIAL PHOTOGRAPH SOURCE: DLI, 2005.

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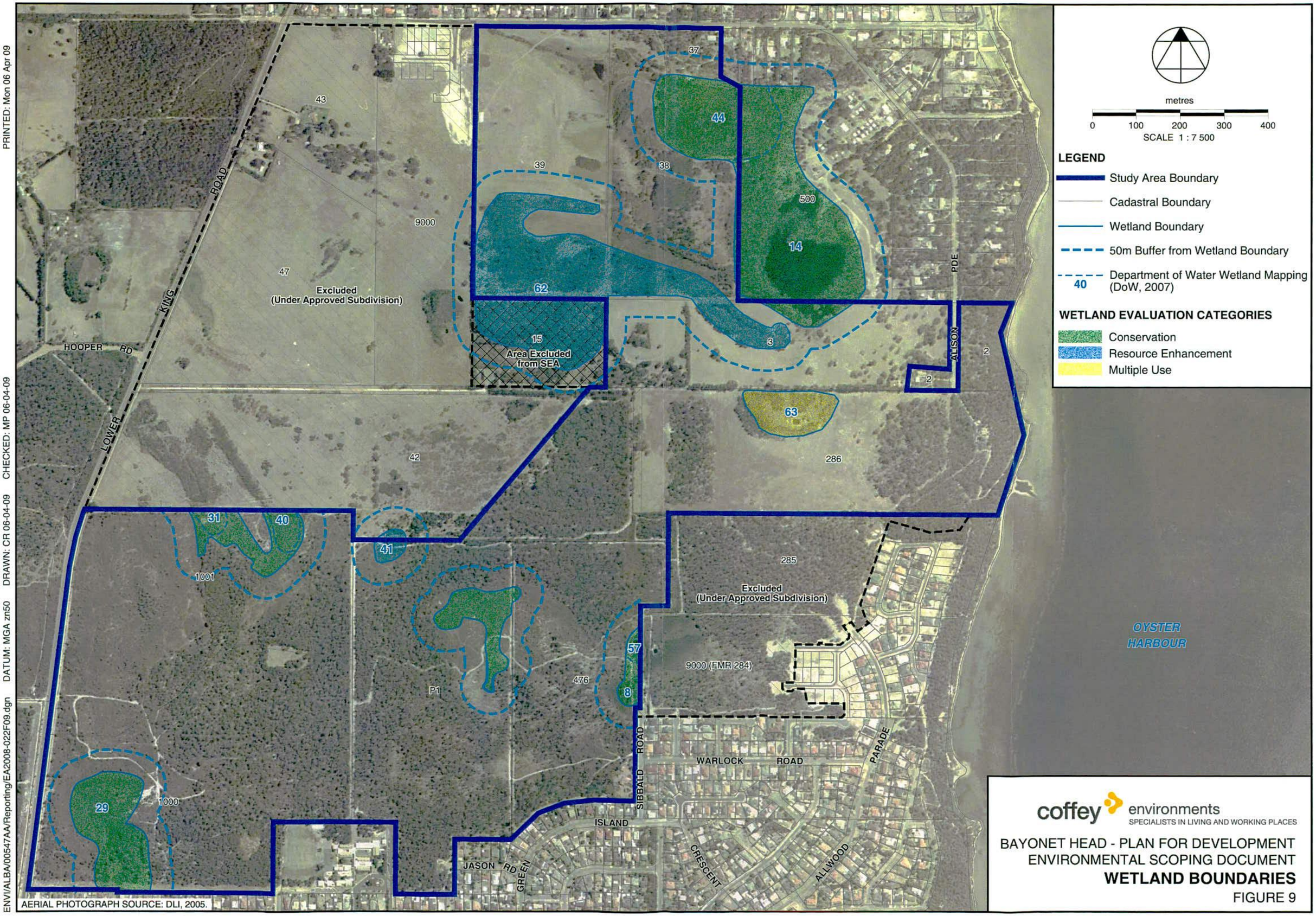
BAYONET HEAD - PLAN FOR DEVELOPMENT
ENVIRONMENTAL SCOPING DOCUMENT
FAUNA HABITAT, LOCATIONS AND TRAP SITES
FIGURE 8



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BAYONET HEAD - PLAN FOR DEVELOPMENT
ENVIRONMENTAL SCOPING DOCUMENT

WETLAND BOUNDARIES

FIGURE 9

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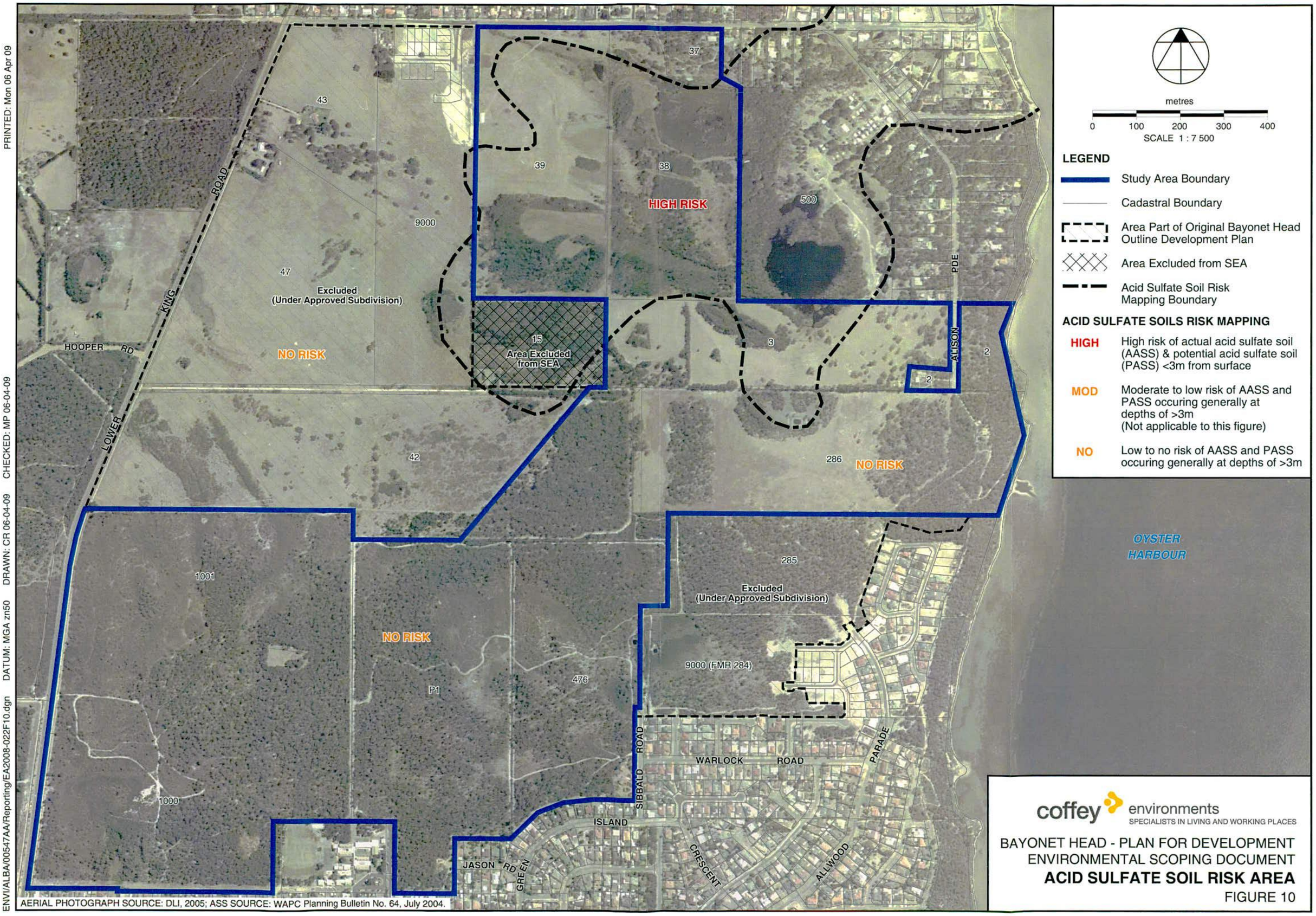

AERIAL PHOTOGRAPH SOURCE: DLI, 2005; ASS SOURCE: WAPC Planning Bulletin No. 64, July 2004.

metres
0 100 200 300 400
SCALE 1 : 7 500

LEGEND

- Study Area Boundary
- Cadastral Boundary
- Area Part of Original Bayonet Head Outline Development Plan
- Area Excluded from SEA
- Acid Sulfate Soil Risk Mapping Boundary

ACID SULFATE SOILS RISK MAPPING

HIGH	High risk of actual acid sulfate soil (AASS) & potential acid sulfate soil (PASS) <3m from surface
MOD	Moderate to low risk of AASS and PASS occuring generally at depths of >3m (Not applicable to this figure)
NO	Low to no risk of AASS and PASS occuring generally at depths of >3m

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ENVIRONMENTAL SCOPING DOCUMENT

ACID SULFATE SOIL RISK AREA

FIGURE 10

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DATUM: MGA zn50

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metres

0 100 200 300 400

SCALE 1 : 7 500

LEGEND

- Study Area Boundary
- Cadastral Boundary
- Area Part of Original Bayonet Head Outline Development Plan
- Area Excluded from SEA
- DIA Site
- Site Recorded During Field Survey

Site 22554
Alfred Knapp's
Seasonal Camp

Site 5524
Kylie Site

Site 636
Oyster Harbour
(total)

Oyster Harbour
Caravan Park Lake
(250m radius from centre of lake)

Excluded
(Under Approved Subdivision)

Excluded
(Under Approved Subdivision)

Area Excluded
from SEA

43
37
39
38
9000
47
500
15
3
2
42
286
1001
1000
P1
476
285
9000 (FMR 284)

LOWER KING ROAD
HOOPER RD
PDE
ALISON
SIBBALD ROAD
WARLOCK ROAD
PARADE
ISLAND
JASON RD
GREEN
CRESCENT
ALLWOOD

OYSTER HARBOUR

AERIAL PHOTOGRAPH SOURCE: DLI, 2005; ABORIGINAL SITES SOURCE: Brad Goode & Assoc., January 2007.

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BAYONET HEAD - PLAN FOR DEVELOPMENT
ENVIRONMENTAL SCOPING DOCUMENT

ABORIGINAL SITES

FIGURE 11

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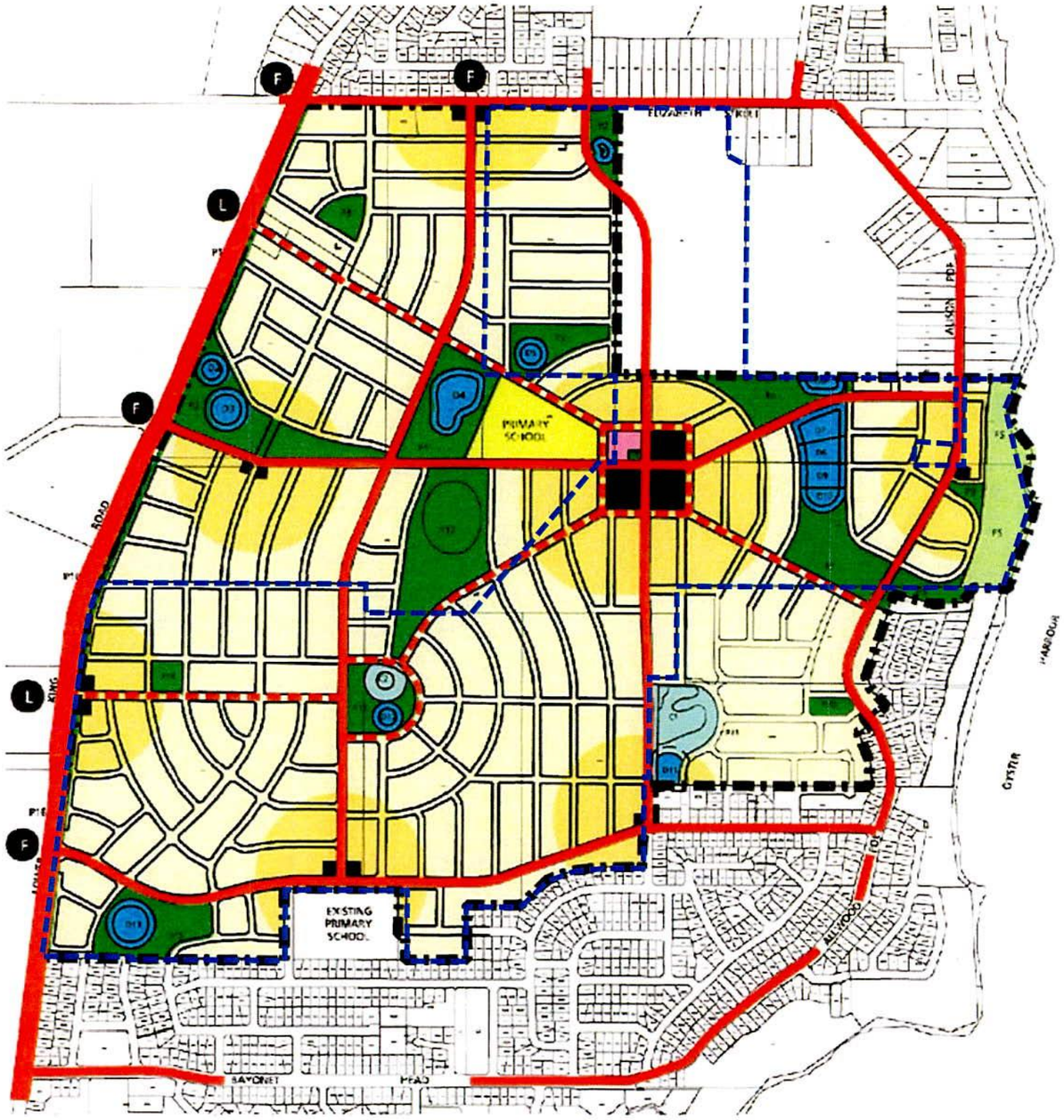
metres

0 100 200 300 400 500

SCALE 1 : 12 500 @ A3

LEGEND

Study Area Boundary



LEGEND

- CDP BOUNDARY
- INTEGRATOR ARTERIAL
- NEIGHBOURHOOD CONNECTOR (INCL.DUP)
- MAJOR ACCESS STREET (INCL.DUP)
- ACCESS STREETS
- FULL MOVEMENT INTERSECTIONS
- LIMITED MOVEMENT INTERSECTIONS
- NEIGHBOURHOOD CENTRE
- NEIGHBOURHOOD NODE
- PRIMARY SCHOOL
- COMMUNITY PURPOSE
- RESIDENTIAL (R20)
- NEIGHBOURHOOD CORE RESIDENTIAL (R40)
- PUBLIC OPEN SPACE RESERVE
- FORESHORE RESERVE (INCL.DUP)
- DRAINAGE & DRAINAGE BUFFER RESERVE
- CONSERVATION WETLAND & BUFFER RESERVE

SOURCE: TAYLOR BURRELL (2036-38A), (via CLE, March 2007).

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BAYONET HEAD - PLAN FOR DEVELOPMENT
ENVIRONMENTAL SCOPING DOCUMENT

HISTORICAL MAP - 2001 BAYONET HEAD OUTLINE DEVELOPMENT PLAN

FIGURE 12

PRINTED: Wed 01 Apr 09

metres

0 100 200 300 400 500

APPROX. SCALE 1 : 10 000 @ A3

PROPOSED OUTLINE DEVELOPMENT PLAN

Core Components

- Road Network
- Centrally located Village Centre
- Public Open Space
- Diversity of Residential Homesites

SOURCE: Chappell Lambert Everett, June 2005.

coffey environments
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BAYONET HEAD - PLAN FOR DEVELOPMENT
ENVIRONMENTAL SCOPING DOCUMENT

HISTORICAL MAP - 2005 PROPOSED OUTLINE DEVELOPMENT PLAN CONCEPT

FIGURE 13

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