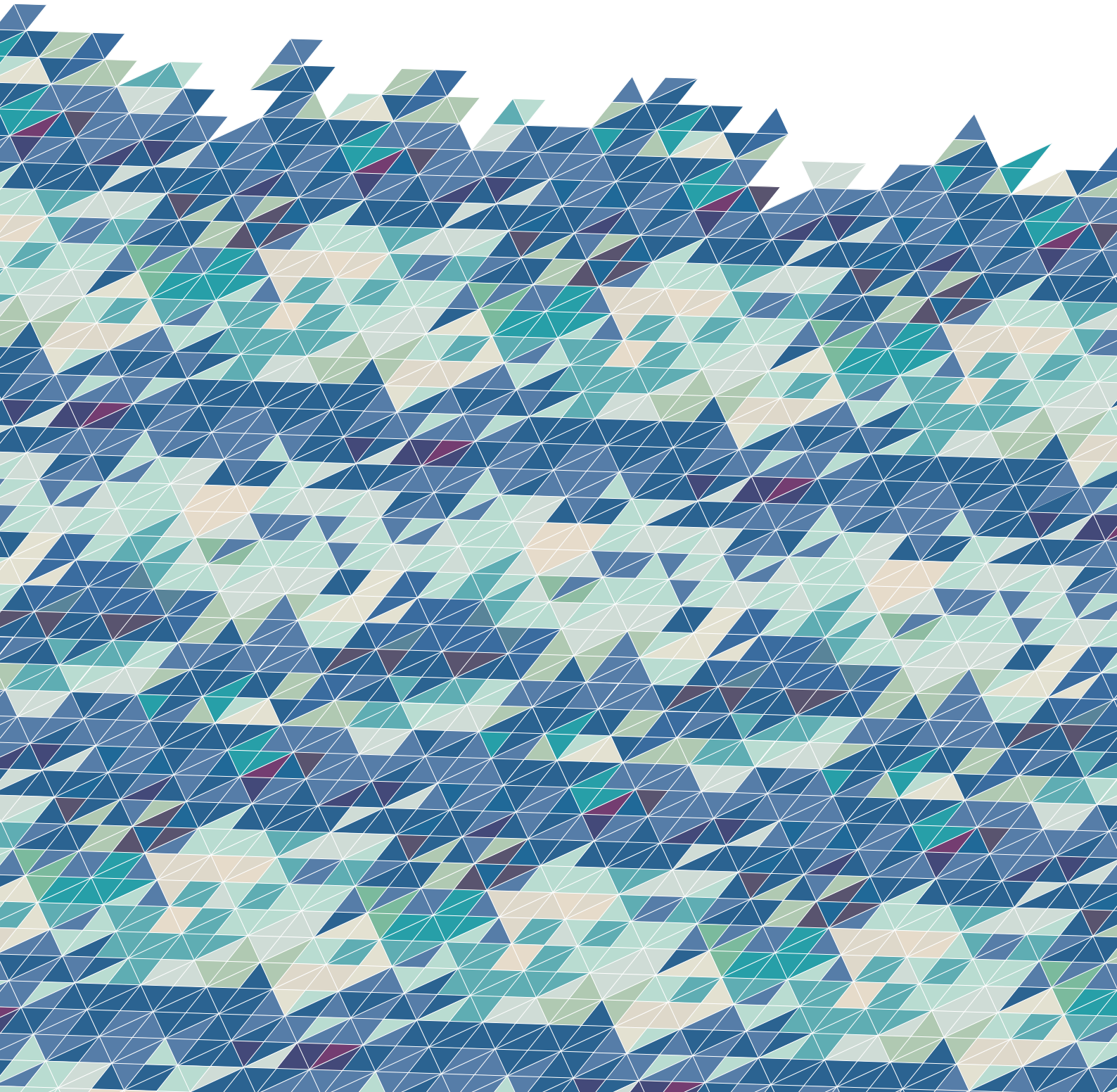
ALKIMOS COASTAL NODE

LOCAL STRUCTURE PLAN

MARCH 2016

WANN/2016/101



ALKIMOS COASTAL NODE LSP NO. 101

MARCH 2016

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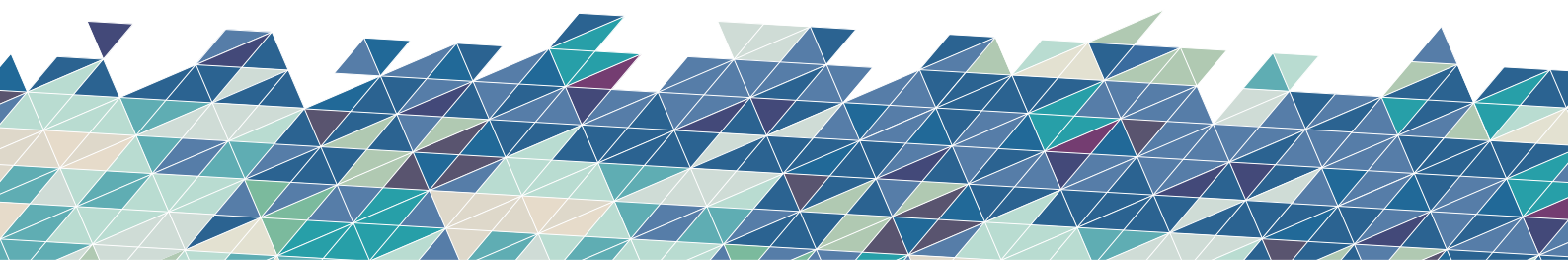
APPENDICES

ALKIMOS COASTAL NODE
LOCAL STRUCTURE PLAN

Appendix 1
Local Environmental Impact Assessment and Management Strategy



LOCAL ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT STRATEGY

Alkimos Coastal Node Local Structure Plan





LOCAL ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT STRATEGY

Alkimos Coastal Node Local Structure Plan

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SUMMARY

This report has been prepared by RPS for the Alkimos Coastal Node Local Structure Plan (ACNLSP). It provides a description of the existing environment of the ACNLSP site and a framework for the effective management of the environmental issues identified in accordance with the City of Wanneroo's (CoW) *Local Planning Policy 4.2: Structure Planning*.

The ACNLSP site covers a total area of approximately 86.76 hectares (ha). The site is currently vacant and unimproved. The ACNLSP site is owned by the Water Corporation, with LandCorp as the proponent for the development of the LSP area.

Regional Context

The ACNLSP site is located approximately 40 kilometres (km) north-west of the Perth CBD within the CoW and the north-west sub-region of the Perth metropolitan region. It is located approximately 17 km north of the Joondalup Strategic Metropolitan Centre and approximately 8 km south of the Yanchep Strategic Metropolitan Centre (Figure 1).

Local Context

The ACNLSP site directly abuts foreshore reserve and the Indian Ocean to the west. Immediately to the north, the land is designated as "Regional Open Space" (ROS) pursuant to the Metropolitan Region Scheme (MRS) and as reflected on the Alkimos Eglinton District Structure Plan (AEDSP). The land further to the north and south of the ACNLSP site is being developed for urban purposes in accordance with the AEDSP. The land to the east is reserved for "Public Purposes" (Water Authority of WA) as it contains the Alkimos Wastewater Treatment Plant (WWTP) and its associated buffer (Figure 2).

<u>Planning and Environmental Approval Background</u>

In 2006, the Environmental Protection Authority (EPA) formally assessed Metropolitan Region Scheme (MRS) Amendment 1029/33 for Alkimos–Eglinton region totalling 2,660 ha under Section 48A of the *Environmental Protection Act 1986* (EP Act).

The environmental factors assessed by the EPA included:

- vegetation
- fauna
- odour (wastewater treatment plant) – (deferred factor)
- geoheritage
- Aboriginal heritage – (deferred factor)
- risk (groundwater treatment plant).

A significant outcome of the EPA's formal assessment (defined in the Ministerial Statement No. 722) was the identification of specific areas of "regional environmental significance" which included scattered tuart trees and Carnaby's Black-Cockatoo habitat. In response, 500 ha of the identified environmentally significant area (or 20% of the Alkimos–Eglinton region) was reserved for "conservation" purposes in the MRS either as "Parks and Recreation" or "Public Purposes" (Conservation) zonings.

As a result of the formal environmental assessment and the MRS Amendment assessment process the majority of the ACNLSP site was zoned "Urban" in the MRS. The portion of the foreshore reserve that occupies the western margin of the site is zoned "Parks and Recreation" which forms part of Bush Forever Site No. 397.

Alkimos Coastal Node LSP

The EPA during its assessment of MRS Amendment 1029/33 did not identify any areas of "regional conservation significance" within the "Urban" zoned portion of the ACNLSP site.

The AEDSP articulates a "Coastal Village Activity Centre" across the southern end of the Alkimos Coastal Node site (Figure 3).

To achieve this, the ACNLSP proposes to connect the Alkimos community to the regional beach with a core activity centre located in central to the ACNLSP area characterised by high-density urban form to provide a well-defined coastal village consistent with the DSP objectives. The coastal node proposes to include in the foreshore significant community infrastructure including a surf lifesaving club.

The ACNLSP is shown in Figure 4.

Summary of the Alkimos Coastal Node Site Environment

In summary, the key outcomes from the environmental investigations for the ACNLSP site are:

- The historical land use includes stock grazing and it is currently used by unauthorised recreational vehicles.
- The site is highly undulating and ranges from 4 metres (m) Australian Height Datum (AHD) to 43 m AHD in elevation (Figure 5).
- The soil types are consistent with the Quindalup dunal system, comprising sand and limestone (Figure 6).
- Acid Sulfate Soil (ASS) risk maps classify the entire site as having no known risk of encountering ASS within 3 m of the surface.

- There is nominal potential black cockatoo habitat (3.68 ha potential foraging habitat and 44 scattered tuart trees) present within the ACNLSP (Figure 9).

- Vegetation across the site is thick coastal bush with occasional larger trees and ranges in condition from "Completely Degraded" to "Very Good–Good" (Figure 8).

- Surface water is largely retained within the site due to the high permeability of the underlying sands.

- The site is partially located within a Priority 3 Public Drinking Water Source Area (PDWSA).

Key Environmental Outcomes

The ACNLSP promotes the preparation and implementation of following key environmental management plans:

1. Conservation Area Management Plan (CAMP) to outline management recommendations for the Conservation Public Open Space (POS) on the site.

2. Foreshore Management Plan (FMP), which it is anticipated, will be a requirement of subdivision. The FMP will appropriately detail the location of community facilities such as the surf lifesaving club (and potentially other longer-term complementary uses such as cafe), open space areas for community events, possible drainage areas and access pathways.

3. Vegetation and Fauna Management Plan (Construction Phase) (VFMP).

These management plans will provide the following outcomes during the construction and post construction phases of the project:

- maintain ecological linkages between the dedicated conservation areas in the MRS

- define the Conservation POS area to preserve the vegetation and habitats and an ecological link across the site

- fences and/or flagging to be installed around areas of Conservation POS during construction phase

- undertake training program for contractors in environmental management of site

- tuarts to be retained in open space where possible with additional native trees to be planted in landscaping

- native vegetation is to be used in landscaping

- weed and dieback management

- appropriate use of cleared material in re-vegetation works (e.g. as mulch and reuse of topsoil)

- detail the location of community facilities for the initial regional beach requirements such as surf lifesaving club, open space areas for community events, possible drainage areas and access pathways and potentially longer term additional complementary community uses such as cafes

- appropriate street design to facilitate fauna movement particularly where roads intersect ecological linkages, treatment may include the use of natural road edges without curbs and the use of native vegetation in landscaping of road verges and median strips.

Pre-construction implementation, construction implementation, and post-construction implementation responsibilities will be clearly identified, together with timing and reporting requirements.

Other Key Management Measures

Separate to the above key environmental management plans a Local Water Management Strategy (LWMS) has been finalised for the ACNLSP. The LWMS details the water management approach to support the ACNLSP including management of stormwater run-off to avoid flooding and protect the environment. The LWMS provides the framework for actions and measures to achieve the desired outcomes at subdivision and development stages.

Table 1 summarises the key environmental issues and the proposed management strategy.

Table 1: Local Environmental Impact Assessment and Management Strategy

Issue/ Parameter	Description/Location	Pre-construction Implementation	Construction Implementation	Post-construction Implementation	Relevant Management Plan	Responsibility
Fencing and flagging of vegetation	Fencing off the conservation and areas to prevent unauthorised access.	▪ Through appropriate surveying techniques, locate the boundaries around areas of native vegetation to be retained in conservation areas. Place flagging, fencing or cleared brush around the edges of the areas to be retained as appropriate to prevent unauthorised access. ▪ Use fauna permeable fencing to allow fauna to relocate into the conservation areas.	▪ Regularly inspect fences, flagging and brush and repair or reinstate as required.	▪ Ensure that flagging is removed and appropriately disposed of. ▪ Remove fencing around the site, and dispose appropriately. ▪ Replace fencing around Conservation POS areas with appropriate long-term fencing.	CAMP FMP VFMP	Construction Supervisor
Signage	Provide appropriate signage regarding trespassing fines.	▪ Place appropriate signage around the development boundary indicating that it is private property and unauthorised access is not permitted.	▪ Regularly inspect signage. Replace signage if vandalised or removed.	▪ Ensure that signs are removed and appropriately disposed of if appropriate.	VFMP	Construction Supervisor
	Provide appropriate signage to indicate conservation areas.	▪ Delineate boundaries around areas of native vegetation to be retained in conservation areas, use appropriate signage to advise of areas conservation status.	▪ Regularly inspect signage. Replace signage if vandalised or removed.	▪ Place appropriate signs to the satisfaction of the City at entry points to Conservation POS areas, advising pedestrians that they are entering a conservation area. Signs should advise the following – Keep to the paths provided. – Do not litter. – Do not damage the environment or wildlife.	CAMP FMP	Landowner/local government authority (after POS is ceded).
Conservation POS Areas	Consider developing individual management plans for Conservation POS areas being retained as part of the development during the detailed area planning phase for the development cells that include or are adjacent to an area of Conservation POS.	▪ Conservation Area POS management should include but not be limited to – weed and plant pathogen management – access management – fire management – drainage – community education.	▪ Implement Conservation Area POS Management Plan (CAMP)	▪ Continue ongoing management of Conservation POS areas as appropriate.	CAMP	Landowner/local government authority (after POS is ceded).
Conservation POS Management *Weed Management*	Control the spread of weeds within areas of native vegetation to be retained in Conservation POS.	▪ Areas of vegetation to be retained in Conservation POS should be assessed for weed abundance, and where possible treated and rehabilitated with local provenance species. ▪ Ensure hard edges between the lawn turf areas and native areas to prevent grass from invading the conservation areas.	▪ Implement CAMP ▪ Ongoing monitoring and maintenance of Conservation POS areas will be undertaken to prevent the spread of weeds, in accordance with the CAMP	▪ Undertake ongoing weed management (i.e. spraying) of the Conservation POS areas as required by the management plan.	CAMP	Landowner/local government authority (after POS is ceded).
Conservation POS Management *Plant Pathogen Management*	Control and manage plant pathogen spread in and around the development area.	▪ Standard management procedures should be implemented; this should include the provision of a wash down facility for machinery entering the site. ▪ If necessary or appropriate, tuart trees on the site can be treated with phosphate and nutrient implants to prevent Dieback infection.	▪ If dieback is not identified on the site, hygiene measures to prevent the spread of dieback on to the site should be implemented.	▪ Should groups of trees show signs of decline as a result of dieback, a contingency plan should be prepared and implemented.	VFMP CAMP	Landowner/local government authority (after POS is ceded).
	Control and manage plant pathogen spread in and around the development area.	▪ If dieback is found to occur on the site, a dieback management strategy will be developed. The management plan should include but not be limited to – implementation of appropriate hygiene measures including wash down and brush down facilities – water management during construction – delineation of dieback affected areas on site plans – site inductions that include information for site staff about dieback locations on site, and how to prevent the spread of dieback – contingency for the treatment of dieback if it is introduced to tuart trees and other susceptible species on the site.	▪ If dieback is present, a dieback management plan will be implemented.	▪ If dieback occurs within POS areas signage will be erected to inform people about the dieback risks.	VFMP CAMP	Landowner/local government authority (after POS is ceded).

Issue/ Parameter	Description/Location	Pre-construction Implementation	Construction Implementation	Post-construction Implementation	Relevant Management Plan	Responsibility
Conservation POS Management *Fire Management*	Prevent changes in fire regimes, particularly in Conservation POS areas of native vegetation to be retained as POS.	▪ Fire management strategies include, but not be limited to – appropriate access for fire control vehicles through Conservation POS areas – access to firefighting equipment where necessary. ▪ Implement planning to determine areas where vehicles can be parked safely, away from vegetation during construction. ▪ Where appropriate, firebreaks should be cut (if they do not exist already), to ensure there is adequate access for emergency vehicles across the site.	▪ Fire suppression equipment will be present on site during the clearing and construction phases of the development.	▪ Implement the approved Fire Management Plan for the LSP (Strategen 2016)	Fire Management Plan CAMP	Landowner/local government authority (after POS is ceded).
Conservation POS Management *Access*	Control pedestrian access in Conservation areas	▪ Develop plans for the provision of appropriate public access to Conservation POS areas to the satisfaction of the City. This should include, but not be limited to – type of fencing – types of paths, including construction material, width of paths, location of entry points to the POS area – location of paths for pedestrian access – signage around the area and location and number of rubbish disposal facilities – designated parking areas.	▪ Implement Conservation Area POS Management Plan ▪ Conservation POS areas should be appropriately fenced	▪ Define the community infrastructure including surf lifesaving club area and open space for community events / possible drainage in the foreshore ▪ Access paths should be constructed and Conservation POS areas fenced in accordance with the Management Plan.	CAMP FMP	Landowner/local government authority (after POS is ceded).
Clearing of designated areas	Undertake clearing works in a controlled and sensitive manner to minimise the environmental impact.	▪ A Staged Clearing Plan should be developed so that areas are cleared just prior to construction. This plan should include – clearing towards areas of bush to be retained – sound horns prior to commencing clearing works – have a fauna handler on site during clearing works – trap for quenda prior to commencing clearing works – leave cleared material in situ overnight to allow for animals to escape. ▪ Areas of native vegetation to be retained as Conservation POS should be clearly marked on drawings and flagged or fenced on site. ▪ Retention (where practical) within POS areas and/or transplanting of zamia palms and grass trees from areas to be cleared (if practical).	▪ Implement Staged Clearing Plan.		VFMP	Construction Supervisor
Death or Injury of Fauna	Prevent or reduce the number of fauna deaths or injuries on the development site.	▪ Inform site workers about the fauna expected to be on site. ▪ Liaise with the local DPaW wildlife officer. ▪ Ensure that site workers are aware that they are not permitted to handle fauna without a permit. ▪ Conduct fauna trapping prior to commencing ground-disturbing works.	▪ Provide site workers with the DPaW phone number. ▪ Injured, abandoned or otherwise visibly distressed fauna are to be handed over to a DPaW Sound air horns prior to commencing ground-disturbing works.	▪ Ensure that designated Conservation POS areas are fenced off to restrict access and to provide a refuge for native fauna.	VFMP	Landowner until the land is ceded to the local government authority.
Loss of Habitat/Habitat Fragmentation	▪ Minimise the loss of habitat on the site as much as practicable ▪ Reduce the impact of lost habitat ▪ Create ecological corridors for fauna to move through the development area	▪ When planning the development, target areas that are degraded for development and where practicable, retain areas of good or better quality vegetation. ▪ Fauna permeable fences and flagging to delineate areas of native vegetation to be retained. ▪ Use appropriate road treatments (no curbing) for roads in or near an ecological linkage. ▪ Design roads within or adjacent conservation areas to facilitate slower traffic speeds. ▪ Installation of a fauna underpass, connecting POS areas A and B as presented in Figure 2.	▪ Stockpile in already cleared areas. ▪ Incidents of over-clearing to be reported as an environmental incident using the Site Environmental Health and Safety reporting system.	▪ Ensure that designated Conservation POS areas are fenced off to restrict third party access to ensure that the Conservation POS areas remain as refuges for native fauna. ▪ Maintain the condition of Conservation POS areas, this will include, but not be limited to – access management – weed removal – fire management – plant pathogen management – introduced species management.	VFMP CAMP	Landowner until the land is ceded to the local government authority.
Site Inductions/ Toolbox Meetings	All staff and contractors to be inducted on project/site specific environmental issues.	▪ All site staff should participate in site inductions informing them about the Environment, Health and safety aspects of the site. The induction should include, but not be limited to – information about *Phytophthora* dieback – significant flora species on the site – significant fauna species on the site – reporting procedures for environmental incidents – information about Aboriginal archaeological sites. • An induction program should be developed for visitors to the site.	▪ Any new site staff should be inducted. ▪ A register should be kept of staff that have been inducted. ▪ The induction process should be reviewed every two years, at a minimum, and updated as necessary.		VFMP	Construction Supervisor

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APPENDICES

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1.0 INTRODUCTION

This report has been prepared by RPS for the Alkimos Coastal Node Local Structure Plan (ACNLSP). It provides a description of the existing environment of the ACNLSP site and a framework for the effective management of the environmental issues identified in accordance with the City of Wanneroo's (CoW) Local Planning Policy 4.2: Structure Planning.

1.1 Regional Context

The ACNLSP site is located approximately 40 kilometres (km) north-west of the Perth CBD within the CoW and the north-west sub-region of the Perth metropolitan region. It is located approximately 17 km north of the Joondalup Strategic Metropolitan Centre and approximately 8 km south of the Yanchep Strategic Metropolitan Centre (Figure 1).

1.2 District Context

The ACNLSP site is located in the western area of the Alkimos locality, directly abutting the coast. It is situated approximately 1.5 km west of the future Alkimos Secondary Activity Centre and Marmion Avenue.

1.3 Local Context

The ACNLSP site directly abuts foreshore reserve and the Indian Ocean to the west. Immediately to the north, the land is designated as "Regional Open Space" (ROS) pursuant to the Metropolitan Region Scheme (MRS) and as reflected on the Alkimos Eglinton District Structure Plan (AEDSP) (Figure 2).

The land further to the north and south of the ACNLSP site is being developed for urban purposes in accordance with the MRS zoning and the AEDSP. The land to the east is reserved for "Public Purposes" as it contains the Alkimos Wastewater Treatment Plant (WWTP) and its associated buffer.

1.4 Zoning

The majority of the ACNLSP site is zoned "Urban" under the MRS and "Urban Development" under the City of Wanneroo District Planning Scheme No. 2. An area of land within the ACNLSP site is reserved for "Public Purposes" (Water Authority of WA) under the MRS for the Alkimos WWTP ocean outfall site. In addition, the foreshore area and a portion of the site to the north-east are reserved for "Parks and Recreation" (Figure 2).

1.5 District Structure Planning

The ACNLSP site is located within the south-west part of the Alkimos Eglinton District Structure Plan (AEDSP) area (Figure 3).

The agreed AEDSP was approved by the CoW and endorsed by the Western Australian Planning Commission (WAPC) in 2010. The agreed AEDSP nominates a mix of "Urban" and "Coastal Village Activity Centre" uses over the site and reflects the "Regional Open Space" and "Public Purpose" reserves in accordance with the MRS. The AEDSP also identifies a "Secondary Public Transport System" traversing the centre of the site in a north to south direction (Figure 3).

1.6 Area and Land Use

The ACNLSP site covers a total area of approximately 86.76 hectares (ha). The site is currently vacant and unimproved.

1.7 Legal Description and Ownership

The ACNLSP site comprises the following properties:

Table 2: Property Ownership

Lot Number	Owner	Certificate of Title
9001	Water Corporation	Plan 69492 Volume 2771; Folio 785
Portion of 9010	Western Australian Land Authority	Plan 401026 Volume 2832 ; Folio 494
Portion of 9012	Peet Alkimos Pty Ltd	Plan 76574 Volume 2824 ; Folio 171
Portion of 9501	Western Australian Land Authority	Plan 400279 Volume 2819; Folio 691

1.8 Alkimos Coastal Node Local Structure Plan

The ACLSP includes the following land uses (Figure 4):

- Parks and Recreation Reserve (Regional Open Space (ROS) – coastal foreshore)
- Public Purpose Reserve
- Conservation Public Open Space
- Strategic Open Space
- Commercial development
- Mixed use development
- Residential development
- Drainage areas.

The AEDSP acknowledges the broader vision for the northern growth corridor within which the ACNLSP site is located. It articulates a "Coastal Village Activity Centre" across the southern coastal end of the Alkimos Coastal Node site (Figure 3).

It is envisioned in the AEDSP for the Alkimos Coastal Node to provide an important coastal focal point for the community providing an intensive lifestyle and recreational node, incorporating regional beach facilities. The coastal node proposes to include significant community infrastructure in the foreshore including a surf lifesaving club, open space for community events and possible drainage.

The core of the activity centre will be located in the north of the ACNLSP area and will be characterised by high density urban form to provide a well-defined coastal village consistent with the DSP objectives.

1.8.1 Engineering Fill Requirements

The Water Corporation constructed the Alkimos WWTP directly east of the Alkimos Coastal Node. As part of the site works for the Alkimos WWTP, an estimated 1,800,000 m^3 of excavated sand was removed and stockpiled within Part Lot 1004 Alkimos (or the Lend Lease Alkimos Beach site).

This sand was moved back into the Alkimos Coastal Node site in 2015 to be used as engineering fill. Due to the undulating nature of the site, considerable fill and earthworks will be required in the "Urban" zoned area. Engineering earthworks plan and the proposed finished floor levels fill for the Alkimos Coastal Node site are outlined in the Alkimos Coastal Node engineering report (Cossill and Webley 2015).

1.9 Purpose and Scope of this Report

The purpose of this report is to outline how the ACNLSP addresses and implements the environmental objectives considered relevant to the site in accordance with the CoW draft Local Planning Policy (Policy No. 4.2): Structure Planning.

This report provides a description of the existing environment of the ACNLSP site and provides a framework for the effective management of any significant environmental issues identified for the site.

1.10 Relevant Documents

Planning for the Alkimos–Eglinton project commenced in the 1990s involving extensive background studies over a range of issues, most of which were completed prior to MRS Amendment 1029/33.

The following sources of information were used to provide the regional and local environmental and planning context for the site:

- *Alkimos–Eglinton Metropolitan Region Scheme Amendment No. 1029/33: Bulletin 1207* (EPA 2005)
- *Alkimos Eglinton District Structure Plan* (City of Wanneroo 2010)
- *Environmental Assessment of the Alkimos–Eglinton District Structure Plan* (RPS Bowman Bishaw Gorham 2006)
- *Metropolitan Region Scheme Amendment 1029/33: Alkimos–Eglinton Flora, Vegetation and Fauna Baseline Information* (ATA Environmental 2005)
- *Alkimos–Eglinton Environmental Review* (ATA Environmental 2003)
- *Alkimos–Eglinton Environmental Report* (Alan Tingay and Associates 1997)
- *Alkimos–Eglinton Vertebrate Fauna Survey* (Alan Tingay and Associates 1996)
- *Vegetation Condition and Conservation Values Lots 8 and 11 Eglinton, City of Wanneroo* (Armstrong 1996)
- *Eglinton Beach Resort: Report and Recommendations of the Environmental Protection Authority: Bulletin 500* (EPA 1991)
- *A Report on the Flora and Vegetation of the Alkimos Area and Conservation Issues Affecting It* (Trudgen and Keighery 1990). Unpublished report for LandCorp
- *A Report on the Flora and Vegetation of the Ningana Area and Conservation Issues Affecting It* (Trudgen and Keighery 1990). Unpublished report for LandCorp
- *Eglinton Beach Resort an appraisal of the vertebrate fauna* (Ninox Wildlife Consulting 1990).
- *Alkimos Coastal Node – Coastal Hazard Risk Management and Adaptation Plan* (Essential Environmental 2014).

1.11 Policy Framework

There are a number of state and local government policies of relevance to the Alkimos Coastal Node site. These policies include:

- Guidance Statement No. 33: Environmental Guidance for Planning and Development (EPA 2008)
- Liveable Neighbourhoods Edition 4 (WAPC 2007)
- State Planning Policy No. 2.6: State Coastal Planning Policy (WAPC 2013)
- Planning Bulletin No. 64: Acid Sulfate Soils (WAPC 2009)
- State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan Region (WAPC 2010)
- City of Wanneroo Local Biodiversity Strategy 2011-2016 (CoW 2011).

1.12 Definitions

Term	Definition
Declared Rare Flora	Those flora species protected under the *Wildlife Conservation Act 1950*, as identified in the current listing.
Biodiversity	The variety of all life forms. The different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part. Biodiversity has two key aspects: ▪ its intrinsic value at the genetic level, individual species level, and species assemblages levels ▪ its functional value at the ecosystem level. Two species assemblages may have different intrinsic values but still have the same functional value in terms of the part they play in maintaining ecosystem processes.
Bush Forever	A 10 year strategic plan to protect some 51,200 ha of regionally significant bushland, representing, where achievable, a target of protecting at least 10% of each of the original 26 vegetation complexes on the Swan Coastal Plain portion of the Perth Metropolitan Region.
Ecological Linkages	Non-contiguous natural areas that connect larger natural areas by forming stepping stones that allow the movement over time of organisms between these larger areas.
Habitat Fragmentation	The process of isolating (usually by land clearing) a once continuous habitat into smaller isolated natural areas.
Priority Flora	Plant taxa that are under consideration as threatened flora, but need further survey to adequately determine their status, or are adequately known but require monitoring to ensure that their security does not decline. Priority Flora lists are maintained by the Department of Conservation and Land Management (CALM).
Priority Fauna	"Conservation significant" animal species listed by CALM's Threatened Species Consultative Committee but which are not currently listed under Section 14(2)(ba) of the *Wildlife Conservation Act 1950* as Specially Protected Fauna.
Specially Protected Fauna	Species protected under the *Wildlife Conservation Act 1950*.
Threatened Ecological Community	An ecological community that has been assessed through a procedure (coordinated by CALM) and assigned to a category related to the status of the threat to the community.

Term	Definition
Threatened Flora	Plant species likely to become extinct or which are rare, and declared so, under Section 23F of the *Wildlife Conservation Act 1950*. See Declared Rare Flora.
Threatened Fauna	Animal species likely to become extinct or which are rare, and declared so, under Section 14(2)(ba) of the *Wildlife Conservation Act 1950*. See Specially Protected Fauna.

1.13 Acronyms and Abbreviations

Acronym/Abbreviation	In Full
ANZECC	Australia and New Zealand Environment and Conservation Council
CoW	City of Wanneroo
DER	Department of Environment Regulation
DPAW	Department of Parks and Wildlife
DSP	District Structure Plan
DoW	Department of Water
DPS 2	City of Wanneroo District Planning Scheme No. 2
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FCT	Floristic Community Type
ha	Hectares
km	Kilometre
LSP	Local Structure Plan
m	Metre
MRS	Metropolitan Regional Scheme
PEC	Priority Ecological Community
POS	Public Open Space
ROS	Regional Open Space
TEC	Threatened Ecological Community
TPS	Town Planning Scheme
UXO	Unexploded ordinance
WAPC	Western Australian Planning Commission
WWTP	Wastewater Treatment Plant

2.0 ALKIMOS COASTAL NODE PLANNING AND ENVIRONMENT BACKGROUND AND CONTEXT

The Alkimos Coastal Node site was purchased by the Water Corporation in the 1970s as a future site for a wastewater treatment plant for the north-west development corridor of Perth.

Regional planning for Alkimos–Eglinton region substantially commenced in the 1990s led by the major landowners, LandCorp and Eglinton Estates. The early district level planning identified the final location of the Alkimos WWTP and issues such as the protection of regionally significant environmental values needed to be investigated and resolved. The location of the Alkimos WWTP was the catalyst for the development of AEDSP and the initiating of the Alkimos–Eglinton MRS Amendment, which proposes a number of significant changes to the location, and area set aside for major land uses.

A core objective of the AEDSP was the relocating the WWTP facilities further inland to facilitate coastal development and access to the coast.

2.1 Alkimos Eglinton MRS Amendment

The AEDSP defined the land use and environmental management against the zonings proposed in the MRS Amendment. The AEDSP for Alkimos–Eglinton region outlined the following land uses (Figure 3):

- approximately 22,300 residential dwellings
- two town centres and two to three associated rail stations
- three coastal nodes and a possible marina
- a wastewater treatment plant and a groundwater treatment plant
- nine primary schools, two high schools and two private schools
- a surf lifesaving club.

Amendment 1029/33 to the MRS was referred to the EPA by the WAPC in December 2000. The EPA decided that Amendment 1029/33 should be formally assessed in accordance with Part IV of the *Environmental Protection Act 1986* (EP Act) because the proposed land use changes may have potentially significant impacts on a number of environmental factors.

The EPA assessed a range of relevant environmental factors during the Environmental Review of MRS Amendment 1029/33 including:

- vegetation and flora
- fauna (including black cockatoos)
- odour (wastewater treatment plant) (deferred factor)
- geoheritage

- Aboriginal heritage (deferred factor)
- risk (groundwater treatment plant).

2.1.1 EPA Assessment of MRS Amendment 1029/33 and Key Outcomes

The EPA's assessment of Amendment 1029/33 was based on a consideration of the AEDSP (2003) and the environmental values across the entire Alkimos–Eglinton 2,660 ha site.

In its assessment, the EPA identified specific areas of "regional environmental significance", as outlined in Bulletin 1207 (EPA 2005). The natural attributes of that contributed to meeting the EPA criteria for being "regionally environmentally significant" are listed below:

- representation of ecological communities
  - intact vegetated parabolic Quindalup Dunes
  - representative area of natural vegetation in "Very Good" to "Good" condition of the Quindalup Vegetation Complex
- diversity
  - a highly diverse area with respect to diversity of Quindalup Dunes, upland vegetation units and habitat
- rarity
  - location for three significant flora taxa including populations of *Eucalyptus gomphocephala* (tuart) mallee
  - location for five bird species listed in Bush Forever as conservation significant species on the Swan Coastal Plain
- maintaining ecological processes and natural systems
  - part of a regional ecological linkage: Yanchep National Park to the coast (east-west)
  - general criteria for the protection of wetlands.

The areas identified as being of "regional environmental significance" by the EPA were subsequently reserved for "Parks and Recreation" and "Public Purposes" in the MRS. The total area reserved for "conservation" purposes in the MRS occupies approximately 500 ha or 20% of the entire Alkimos–Eglinton site. The conservation areas were deliberately established by the EPA (and supported by the Minister for the Environment) for the following purpose:

1. Adequate representation of all phases of the Alkimos parabolic dunes that are recognised to be of national and international significance.

2. Conservation of four significant flora that were otherwise not protected, including several populations of tuarts (*Eucalyptus gomphocephala*).

3. Conservation of several occurrences of a threatened ecological community, *Melaleuca huegelii – Melaleuca acerosa* shrublands on limestone ridges.

4. Adequate protection of critical feeding habitat for Carnaby's Black-Cockatoo which is listed as Endangered in the *Environmental Protection and Biodiversity Conservation Act 1999* and as Rare or likely to become extinct under the *Wildlife Conservation Act 1950*.

5. Adequate protection of a regional ecological linkage(s) between the coastal foreshore reserve and regional conservation areas to the east, including Yanchep National Park and Neerabup National Park, via Bush Forever Sites 129 and 130. This linkage is a unique bushland link that connects areas of regional and local importance, provides a cross-section of the vegetation, habitats and landforms from the coast inland, and the northern arm of the largest parabolic dune of the Alkimos dunes.

In Ministerial Statement No. 722, the Minister for the Environment formally established the conservation areas and key environmental management conditions for the Alkimos-Eglinton MRS Amendment.

The Minister for Environment's Statement No. 722 is presented in Appendix 1.

2.2 Alkimos-Eglinton MRS and the Alkimos Coastal Node Site

The Alkimos-Eglinton MRS Amendment proposed to reduce the coastal foreshore "Parks and Recreation" reservations, at the Alkimos Coastal Node site to provide better access to the regional beach and facilitate the establishment of a coastal node.

The approved AEDSP identified a "Regional Beach" and identified a "Coastal Village" at the southern end of the Alkimos Coastal Node site. The proposed Alkimos Coastal Node (as provided for in the MRS Amendment and AEDSP) presents a range of public and private facilities including a mix of residential developments adjacent to the district's best regional beach. The community facilities in the foreshore include a regional surf lifesaving club, community space for events and potential drainage, and regional and local beach access pathways.

The WAPC in 2005 as part of the MRS Amendment advised the EPA the reduction in the width of the foreshore reserve at the ACNLSP site proposed by the Amendment was supported because of the "overall sustainability benefits that will arise from a well-designed coastal village, providing amenity to the Alkimos regional beach and well connected by public transport to the proposed Alkimos train station" (EPA 2005).

The EPA in its assessment of the Alkimos Eglinton MRS Amendment acknowledged the location of the proposed coastal village within the ACNLSP site and determined the environmental assets within the foreshore at this location are protected elsewhere within the Alkimos–Eglinton region. Therefore, the foreshore and urban boundary (noting the aspiration for a coastal node in this location) as proposed by the WAPC in the MRS Amendment was supported by the EPA. The context of the EPA's assessment and the Bush Forever boundary is discussed below.

Alkimos–Eglinton MRS Amendment 1029/33 was approved by the Minister for the Environment in April 2006 and gazetted in 23 June 2006.

2.2.1 Bush Forever Boundary Amendment

Bush Forever Site No. 397 was included in the original WAPC Bush Forever Assessment in 2000. The EPA's formal assessment of the site determined that area "7a" of Bush Forever Site 397 (which traversed parallel to the existing foreshore reserve) was no longer considered regionally significant as its environmental values were protected elsewhere over the MRS Amendment area (EPA Bulletin 1207). Therefore, the EPA recommended that areas "7a" not be reserved "Parks and Recreation".

On this basis this "7a" area was removed from the final "Parks and Recreation" boundary and was zoned "Urban". This represents the area of Bush Forever within the western portion of the site, which is currently zoned "Urban". Figure A illustrates the "7a" area within "Urban" zoned landholdings.

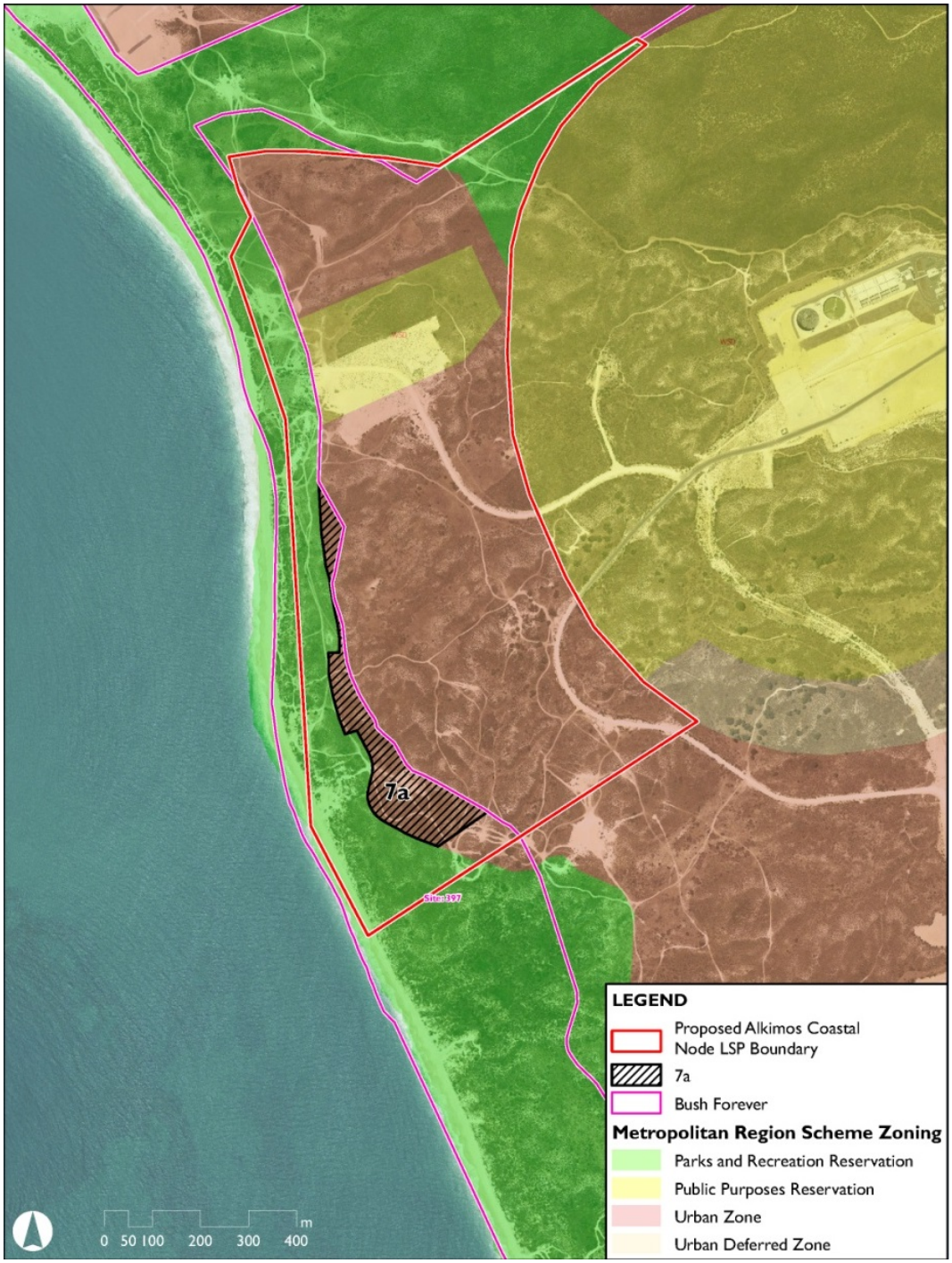

Figure A: Bush Forever Area 7a Boundary Anomaly

The Department of Planning (DoP) has confirmed that area "7a" can support residential development (including drainage) uses consistent with the MRS "Urban" zoning and although the area is delegated under the MRS as Bush Forever. The Department recognises this anomaly and have confirmed that Bush Forever boundaries will be updated later to be consistent with the foreshore "Parks and Recreation" reservation.

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3.0 EXISTING ENVIRONMENT

3.1 Topography, Geology and Soils

3.1.1 Topography

The landscape is undulating, dominated by consolidated Quindalup dune formations generally aligned in a south-west to north-east orientation, with swales between dune ridges.

Topography of the ACNLSP site varies significantly over relatively short distance, from 43 m Australian Height Datum (AHD) at the dune peaks in the south-east of the site to 4 m AHD in the inter-dunal depressions within the foreshore reserve. The topography is shown in Figure 5.

Acknowledging the topography particularly within the "Urban" zoned landholdings to deliver safe roads and infrastructure considerable earthworks will be required.

3.1.2 Geomorphology

Soil mapping by McArthur and Bartle (1980) shows the ACNLSP area primarily containing Quindalup dune formations (Figure 6). Quindalup dunes are composed of unconsolidated sand (quartz grains) and shell fragments. The shell fragments are mostly calcium carbonate and the sands are alkaline. The surface layers on the older dunes are darker due to organic matter accumulating over time.

3.1.3 Surface Geology

Geology of the site varies from Safety Bay Sands in the west to calcarenite and kankar in the east, both of which are described below:

- Safety Bay Sands – eolian and beach lime sand, slightly lithified. Safety Bay sands have an of average calcium carbonate content of over 50% and are made up of shell fragments (mainly foraminifera and molluscs) with variable amounts of quartz and minor feldspar. This poorly to moderately consolidated sand can be weakly cemented below the dune surfaces (Playford et al. 1976).

- Calcarenite and kankar – a limestone of coral or shell sand or sand derived from the erosion of older limestones, with sand sized particles. Calcarenite is generally formed by evaporation of lime-bearing waters drawn to the surface by capillary action (IGU 2008).

3.1.4 Soils

The soils of the site were mapped by McArthur and Bartle (1980). Twelve mapping units were described based on geology, landform and soils. The dominant soil type on the Alkimos Coastal Node site is Quindalup (Q3). The following soil types are found on the site:

- Quindalup (Q3). Loose, calcareous sand with some organic matter in the first 10 cm and incipient cementation at depth
- Quindalup (Qp): Quindalup Deep sand flat phase – dark grey–brown sand to about 50 cm and then pale brown sand
- Quindalup Shallow sand flat phase (Qs): Shallow calcareous sands over limestone
- Karrakatta Shallow Soils Phase (Kls): Bare rock, yellow/brown shallow sands and stony soils.

3.1.4.1 Acid Sulfate Soils

Acid Sulfate Soils (ASS) are naturally-occurring soils and sediments that contain sulfide minerals, predominately pyrite (an iron sulfide). In an undisturbed state below the water table, these soils are benign and non-acidic. However, if the soils are exposed to the atmosphere by drainage, excavation or lowering of the water table, the sulfides may react with oxygen to form sulfuric acid.

Consistent with the mapped soil units the ASS mapping indicates there is no risk of ASS occurring generally at depths of greater than 3 m (DPaW 2010).

3.1.5 Desktop Karst Survey

Karst features are formed when areas of Tamala limestone formations, are worn away by slightly acidic rainwater or groundwater, which circulates within the cracks and pores in the limestone rocks. This process is known as karst weathering and can produce a number of landform features including sinkholes, caves, dry valleys, tube structures and vaults (Geoscience Australia 2003).

The CoW contains a belt of karst formations, running in a north to south direction (parallel with the coast) approximately 5 km inland from the coast. On this basis, a desktop search of the ACNLSP site indicates that karst features are not likely to be located within the site area.

3.2 Vegetation and Flora

3.2.1 Previous Investigations

Vegetation and flora of the Alkimos–Eglinton region has been comprehensively investigated during the planning for the site over the last two decades. Detailed vegetation and condition mapping over Alkimos–Eglinton region was produced in 2004 to support the formal EPA assessment of MRS Amendment 1029/33. The results of the 2004 survey are reproduced in this report for the ACNLSP site.

3.2.2 Vegetation

The ACNLSP area predominantly supports Quindalup vegetation complex. The Quindalup Complex is represented as a coastal dune complex consisting mainly of two alliances – the strand and fore-dune alliance and the mobile and stable dune alliance.

Local vegetation mapped across the coastal dune complex includes the low closed forest of *M. lanceolata – Callitris preissii* and the closed scrub of *Acacia rostellifera*.

The remnant dune vegetation is dominated by *Melaleuca systena* and *Lomandra maritima*. The only trees on the site are scattered tuart trees (*Eucalyptus gomphocephala),* which generally occur in on the peaks of the dune near the WWTP buffer and the foreshore reserve. Other plant species located on portions of the site include zamia palms and grass trees.

Plate 1: Coastal Heath – Quindalup Dunes

3.2.2.1 Vegetation Associations

The vegetation associations mapped across the site are summarised below and are shown in Figure 7.

MsLm	*Melaleuca systena, Lomandra maritima* Low Open Heath
Ac	*Acacia cochlearis* Closed Heath
Ar	*Acacia rostellifera* Low Closed Forest
Eg	*Eucalyptus gomphocephala* Open Woodland to Woodland over *Banksia attenuata, Acacia saligna* and *Xanthorrhoea preissii*
EgMs	*Eucalyptus gomphocephala* Open Woodland to Woodland of *Melaleuca systena* Heath

3.2.2.2 Vegetation Condition

Historically, the site has been used for agricultural purposes (specifically grazing), the effects of which are most prevalent in the relatively level inter-dunal basins, where there is now a high percentage of weed species. The majority of better quality vegetation on the site is located on the dune ridges that were not grazed as intensively. According to ATA Environmental (2005), the condition of the vegetation that remains on the site varies from "Completely Degraded" to "Very Good–Good" (Figure 8).

There are significant areas that predominantly support weeds as the result of the historical grazing land use.

Access roads between the Alkimos WWTP, the ocean outfall and the fill stockpile area have caused some localised disturbance to vegetation on the ACNLSP site.

3.2.2.3 *Phytophthora* Dieback

The Department of Parks and Wildlife's *Phytophthora* Dieback Atlas does not indicate infestation in the Alkimos area. The nearest known infestations are located near Lake Carabooda and north of Jandabup Lake.

The risk of *P. cinnamomi* infestation on the subject site is low due to the predominantly calcareous soils on the site. Alkaline soils are not suitable for growth and spread of *P. cinnamomi*, therefore the risk of the spread of P. cinnamomi in this area is minimal.

3.2.3 Flora

3.2.3.1 Rare and Priority Flora

No Declared Rare or Priority Flora species have been recorded on the ACNLSP site during past vegetation and flora surveys.

3.2.4 Significant Tree Assessment

An aboriculturalist assessed the condition of 59 tuart trees, 44 of which are located within the ACNLSP site. Due to the exposed location of the site on dune ridges, most of the trees are generally in poor condition and their growth has been stunted (Banks 2008). Figure 9 illustrates the location of the tuart trees within the ACNLSP site.

The trees identified were either small to very small and were mostly young to semi-mature in age (Banks 2008). The structural integrity was also ranked for each tree, based on the trees overall health and likelihood of the tree being a hazard to people (ranked between "1" being structurally sound and "5" being extremely hazardous). The majority of trees were ranked within the 2 to 3 range, indicating most of the trees retain a reasonably sound structure with some containing a degree of structural risk (i.e. falling limbs).

The majority of the good quality tuart trees were assessed by the EPA as part of the MRS Amendment. The "Parks and Recreation" boundary was deliberately amended to accommodate populations of tuart trees including within the adjacent WWTP site and foreshore reserve areas.

It is proposed in the ACNLSP landscape strategy to replant native trees (including tuarts) in designated POS areas. A proportion of the tuarts will be preserved within the Conservation POS. Preserved tuarts will be augmented with plantings of additional tuart trees within the Conservation POS and other areas in accordance with the CoW's Local Planning Policy 4.8 – Tree Preservation Policy.

3.3 Fauna

A number of fauna surveys have been completed in the Alkimos region over the last 20 years. These surveys have been conducted using a range of trapping programs and opportunistic surveys. Information on the fauna likely to occur on the LSP site has been drawn from the following sources:

- *Alkimos Proposed Waste Water Treatment Plant: Fauna Assessment (*Bamford and Davies 2005). This report was commissioned by the Alkimos Water Alliance. This document was prepared to fulfil the requirements of Condition 10-1, Ministerial Statement 755 for the Alkimos WWTP.

- *Terrestrial vertebrate fauna species likely to be found in the Alkimos–Eglinton area, with a comment on significant fauna species and the impacts of the proposed disturbance* (Thompson, G. 2005). This report was commissioned by ATA Environmental as part of a series of environmental studies that were undertaken for the MRS Amendment 1029/33. It contains a review of existing literature relating to fauna and opportunistic fauna sightings.

- *Alkimos–Eglinton Vertebrate Fauna Survey* (Alan Tingay and Associates 1996). A comprehensive fauna investigation that included fauna trapping was undertaken as part of a series of environmental studies commissioned by LandCorp and Eglinton Estates Pty Ltd to assist the development of planning strategies for the Alkimos–Eglinton region.

Based on the results of the above fauna studies, the habitats within ACNLSP area can be broadly separated into the following habitat types:

- Quindalup heath and tuart trees
- cleared pasture/grassland.

Dr Mike Bamford (Bamford Consulting Ecologists) was consulted during October 2008 to review the existing fauna lists for the area from Alan Tingay and Associates (1996), Thompson (2005) and Bamford and Davies (2005). Based on his extensive experience in the general area, including the Alkimos WWTP site, directly adjacent to the LSP area, Dr Bamford determined the fauna species most likely to occur in the ACNLSP area. These are presented in Table 3. Appendix 2 presents the consolidated list of fauna that may occur on the site.

Table 3: Significant Fauna Species that Could Potentially Occur on Site

Species	Common Name	EPBC Act 1999	*Wildlife Conservation Act 1950*	Specially Protected
Reptiles				
Ctenotus catenifer				CS3
Ctenotus gemmula	Jewelled ctenotus			CS3
Neelaps calonotos	Black-striped snake		CS2, Priority 3	
Mammals				
Isoodon obesulus fusciventer	Quenda or southern brown bandicoot		CS2, Priority 5	
Trichosurus vulpecula	Brush-tailed possum			CS3
Rattus fuscipes	Moodit or bush-rat			CS3
Birds				
Calyptorhynchus latirostris	Short-billed (Carnaby's) Black-Cockatoo	CS1 – Schedule 1		
Neophema petrophila	Rock parrot			CS3
Platycercus icterotis	Western rosella			CS3
Malurus splendens	Splendid fairy-wren			CS3
Malurus leucopterus	White-winged fairy-wren			CS3
Sericornis frontalis	White-browned scrubwren			CS3
Anthochaera lunulata	Western wattlebird			CS3

Species	Common Name	EPBC Act 1999	*Wildlife Conservation Act 1950*	Specially Protected
Phylidonyris nigra	White-cheeked honeyeater			CS3
Phylidonyris novaehollandiae	New Holland honeyeater			CS3
Phylidonyris melanops	Tawny-crowned honeyeater			CS3
Acanthorhynchus superciliosus	Western spinebill			CS3
Petroica multicolor	Scarlet robin			CS3
Melandodryas cucullata	Hooded robin			CS3
Eopsaltria georgiana	White-breasted robin			CS3
Artamus cinereus	Black-faced woodswallow			CS3
Insects				
Synoemon gratiosa	Graceful Sun Moth		CS2, Priority 4	

Conservation Significance (CS) 1: Species listed under state or Commonwealth Acts.
Conservation Significance (CS) 2: Species not listed under state or Commonwealth Acts, but listed in publications on Threatened Fauna or as Priority species by DEC.
Conservation Significance (CS) 3: Species not listed under Acts or in publications, but considered of at least local significance because of their pattern of distribution.

3.3.1.1 Significant Species

Of the significant species listed in Table 3, only *Calyptorhynchus latirostris* (Carnaby's Black-Cockatoo) is considered to be relevant to the site. Carnaby's Black-Cockatoo is listed as "Schedule 1" fauna under the *Wildlife Conservation Act 1950* and "Endangered" under the EPBC Act.

A review of the known black cockatoo foraging habitat within the "Urban" zoned area of the ACNLSP site identified marginal foraging habitat available for Carnaby's Black-Cockatoo. Figure 9 illustrates a very small area (3.68 ha) of potential foraging habitat within the ACNLSP. The proposed ACNLSP design retains approximately 2.25 ha of the existing black cockatoo foraging habitat.

The coastal tuart trees present on site were identified to be in poor condition during a survey in 2008 and therefore are unlikely to provide any breeding or significant foraging habitat. Of those approximately five trees will be retained within POS and Public Purpose areas. There is no evidence roosting or breeding by Carnaby's Black-Cockatoo within the site.

In is noted in regards to black cockatoo foraging and roosting habitat, there is quality foraging and roosting habitat locally (i.e. within 500 m from the ACNLSP) in the immediately adjacent WWTP buffer and the dedicated "Parks and Recreation" (Regional Open Space) which was a direct outcome of the EPA assessment of the Alkimos-Eglinton MRS Amendment and resulted in 500 ha of conservation area within the Alkimos-Eglinton region.

Within 5 km to 10 km of the Alkimos Coastal Node site, there is Neerabup National Park, Yanchep National Park and Gnangara-Moore River State Forrest (comprising approximately 70,000 ha). These areas have known roosting sites and foraging habitat for black cockatoos particularly in the tuart woodlands of Yanchep National Park and Neerabup National Park.

Other species listed in Table 2 that may be relevant to the site include:

- *Isoodon obesulus fusciventer* (quenda or southern brown bandicoot) a Priority 5 Species protected under the *Wildlife Conservation Act 1950* and *Neelaps calonotos* (black-striped snake) a Priority 3 Species protected under the *Wildlife Conservation Act 1950* are unlikely to be permanent residents within the site. If they are present on the site, they would most likely reside in the areas of better quality vegetation in the adjacent reserves.

- *Rattus fuscipes* (moodit or bush rat) may also be located on the site although it would be most likely to occur around Karli Spring, which is located in the foreshore reserve (Bush Forever Site 397) to the south of the LSP. This species is not protected by federal or state legislation.

3.4 Areas of Regional Conservation Significance

The ACNLSP site includes foreshore reserve along its western margin. This area is part of Bush Forever Site No. 397 (coastal strip from Wilbinga to Mindarie) which forms part of a semi-contiguous north to south vegetated coastal ecological link.

The LSP also abuts the east to west conservation linkage associated with the Alkimos WWTP buffer on the northern margin. This area is zoned for "Parks and Recreation" and Public Purposes" (Conservation) in the MRS.

The majority of the site is zoned "Urban" in the MRS. According to the EPA (2005), there are no known areas of regional conservation significance within the "Urban" zoned portion in the site. However, the LSP allocates a portion of site zoned for 'urban development' to be set aside for Conservation POS (Figure 4).

This Conservation POS has been retained as it provides an additional linkage from the coastal Bush Forever Site around the eastern and southern side of the Alkimos WWTP. Subject to further detailed engineering design, road batters and drainage may need to be accommodated within edges of the Conservation POS. It is proposed that these areas will be revegetated post construction.

3.4.1 Surface Water and Groundwater

No wetlands are recorded within the ACNLSP area.

Information on groundwater from the DoW's "Online Water Register" indicates that groundwater beneath the site is a multi-layered system comprised of the following:

- Perth – Superficial Swan unconfined aquifer
- Perth – Leederville confined aquifer
- Perth – Yarragadee confined aquifer.

Groundwater data from the Perth Groundwater Atlas (DoW 2012) show that groundwater levels across the site are less than 1 m AHD with groundwater flowing in a westerly direction. Depth to groundwater is highly variable due to the undulating topography of the site (Emerge 2014).

The Local Water Management Strategy (LWMS) (Emerge 2016) has identified the Alkimos Coastal Node site is partially located within a Priority 3 Public Drinking Water Source Area (PDWSA) (DoW 2009b), and is therefore subject to restricted land uses. Priority 3 (P3) classification areas are defined to "manage the risk of pollution" to the water source from catchment activities. Protection of P3 areas is achieved through guided or regulated environmental risk management for land use activities. Land uses considered to have significant pollution potential are opposed or constrained (DoE 2004). All of the land uses proposed under the Alkimos Coastal Node development are classified as "Acceptable" within P3 areas (Emerge 2014).

3.5 Bush Fire

The vegetation within much of the ACNLSP site is degraded or cleared reducing the risk of a possible bushfire, there is some risk from the remnant vegetation within and adjacent to the ACNLSP area.

Changes in fire regimes may result in loss of biodiversity through changes in species abundance (particularly the spread of weeds), damage to property and equipment, and loss of fauna and fauna habitat.

A Bushfire Management Plan (BMP) has been prepared in accordance with the WAPC's Planning for Bushfire Protection Guidelines (2015). The BMP will consider the bush fire hazard level when the Alkimos Coastal Node is implemented and the area is developed.

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4.0 ALKIMOS COASTAL NODE LOCAL STRUCTURE PLAN

The ACNLSP has been developed to guide the subdivision and development of 86.76 ha of undeveloped land. The ACNLSP presents a significant opportunity within the Alkimos Eglinton district to capitalise on natural coastal attributes, the potential for service links to nearby regional centre and the prime ocean front location.

4.1 Environmental Aspects of LSP Design

4.1.1 Alkimos Coastal Node LSP Coastal Hazard Risk Management and Adaptation Plan

Essential Environmental (2014) prepared a Coastal Hazard Risk Management and Adaptation Plan (CHRMAP) for ACNLSP. The purpose of this document was to support and inform the development of the LSP, with key objectives outlined below:

- Provide and protect a quality regional beach destination.
- Provide and protect quality tourism accommodation.
- Provide and protect a thriving coastal community.
- Maintain functions of the coastal dunes.
- Manage public safety and protect public infrastructure.

The CHRMAP identified the services and values required to be accommodated within the ACNLSP foreshore reserve as:

- Recreation and safety – Provided through development of a surf lifesaving club and associated facilities as well as other public recreation facilities such as landscaped areas, shelters, seating, tables, barbeques and a playground.

- Public access to the beach – A high level of access is required to support outcomes of the District Structure Plan, which sought to protect environmental values of the foreshore reserve in other areas of the coast by focussing recreational activity at this location.

The risk assessment determined the proposed land uses and services as proposed in the LSP could be adequately provided for within the area considered to be at risk from coastal processes within the 100-year planning time frame. However, it was identified that high value infrastructure such as the surf life-saving club should be accommodated within the ACNLSP area, outside of the area considered to be at risk from coastal processes. The foreshore reserve has been widened at key locations to accommodate this infrastructure.

Key outcomes identified in the CHRMAP that have been incorporated into the ACNLSP include:

- establishment of a foreshore reserve which will ensure that the area can continue to provide the values, functions and uses required if coastal hazards are realised over the planning time frame

- permanent locations for infrastructure critical to the functioning of the regional beach (initially a car parking and a surf lifesaving club house and potentially longer term additional complementary community uses such as cafes) have been identified within or adjacent to the foreshore reserve.

The CHRMAP identified the following actions that may need to be undertaken in the future:

- preparation of a FMP to formally establish and identify the future management requirements of the full extent of the foreshore reserve

- design of permanent infrastructure (e.g. roads) and private property set back beyond the landward extent of possible erosion at the 100 year planning horizon as identified by the coastal processes assessment

- design of temporary infrastructure (e.g. landscape assets) set back beyond the landward extent of possible erosion at the planning horizon appropriate to the design life of the asset as identified by the coastal processes assessment

- relocation of temporary infrastructure (e.g. landscape assets) to alternative locations when required

- monitoring and maintenance of natural and built assets

- review of the coastal processes assessment and foreshore management plan will be required periodically to refine relocation requirements for temporary assets and to update asset management actions. The first of these staged reviews should be undertaken in approximately 10 years' time

- community consultation and communication of actions undertaken to manage public safety within the foreshore including relocation of assets where required.

4.1.2 Regional Open Space – Foreshore Reserve

The foreshore reserve is zoned "Parks and Recreation" in the MRS and is part of Bush Forever Site No. 397. This Bush Forever Site "Coastal Strip from Wilbinga to Mindarie" is part of a large coastal foreshore reserve, extending from Mindarie to Eglinton and was identified by the EPA as a key ecological link.

A key environmental feature of the ACNLSP is managing and linking the foreshore reserve with the WWTP buffer (which is zoned as "Public Purposes" for the purpose of Conservation) in the MRS through a dedicated Conservation POS.

4.1.3 ACNLSP Public Open Space

The ACNLSP provides for the following two forms of POS (Figure 10):

1. General Open Space.
2. Conservation POS.

4.1.3.1 General POS Areas

The considerations and issues that informed the design of the General POS within the ACNLSP included:

- "Green" open space cannot be large in area due to limitation on groundwater availability.
- A high proportion of the total tree count will be native tree species to enhance the establishment of a place-specific, informal character.

There are a number of environmental objectives that underpin the General POS design within the LSP these are to:

- Create a functional and integrated open space network.
- Integrate drainage areas.
- Respect the landscape and topography of the wider area.
- Ensure a relationship with the outfall land (to be used for open space) and the Coastal Village.

Areas of POS in the LSP have been developed to provide the necessary active recreation opportunities for the future residents of the area whilst also preserving as many ecological values as practicable on "Urban" zoned land.

4.1.3.2 Conservation POS

A key ecological linkage within the "Urban" zoned portion of the LSP will be established and reserved as Conservation POS. This conservation area is located over both the Lend Lease Alkimos Beach LSP (approximately 6.4 ha) and Alkimos Coastal Node LSP (3.75 ha) to the south. The overall width of this linkage ranges between approximately 160 m to 280 m. The proposed conservation POS area for the Alkimos Coastal Node LSP is shown in Figure 10.

This Conservation POS is consistent with the City's conservation objectives and complements the EPA's Parks and Recreation advice in the MRS Amendment through providing an additional strategic link between the foreshore reserve and the WWTP buffer area zoned as "Public Purposes" (for the purpose of "Conservation") (Figure 10).

The strategic location of Conservation POS in this area provides an alternative linkage around the eastern and southern side of the Alkimos WWTP. This linkage is important for the retention of biodiversity in the local area following the development of the site for residential proposes.

Following the development of the site, it is anticipated that activity will be concentrated at the proposed "regional coastal node". Consequently, this Conservation POS provided, can be used as an alternative linkage as the regional beach node is developed over time.

In accordance with the requirements of the CoW's Local Biodiversity Strategy, all areas of protected native vegetation in the locality are within 500 m to 1000 m of this linkage:

- The foreshore reserve provides a north to south linkage and is directly connected to the conservation POS.

- The south-east linkage directly to the north of the LSP, shown as "Parks and Recreation" in Figure 1, is 1.1 km from the Conservation POS, but is connected directly to the foreshore reserve and conservation significant vegetation within the WWTP buffer.

The landform retained in the Conservation POS is a relatively intact Q3 dune. According to ATA Environmental (2005), the vegetation condition ranges from "Very Good" to "Completely Degraded", with areas of localised disturbance. This POS was also located in this area to enable the retention of tuart trees. It is proposed that the primary function of this POS will be conserving the environment and providing an additional ecological linkage while providing controlled access for passive recreation.

Due to its strategic function, this area of Conservation POS will have minimal built structures. The treatment of roads that intersect this POS should reflect its strategic linkage value by slowing speeds and allowing roads verges to be as natural as possible (e.g. no curbs, or flush curbs). Landscaping in this area should be with endemic species to enhance the value of the area to fauna.

Portions of the Conservation POS may need to accommodate in the future, subject to detailed engineering design, road batters and drainage. It is proposed that these disturbed areas (e.g. drainage/batters) will be revegetated after construction.

4.2 Local Structure Plan Environmental Management Framework

The environmental impact assessment of Alkimos–Eglinton has led to the development of numerous environmental management and mitigation measures covering key aspects of development at the Alkimos Coastal Node. The key management outcome is detailed below:

- Prepare an Environmental Management Plan in accordance with the Ministerial Statement No. 722 for proposals that will have an impact on the areas of "Parks and Recreation" and "Public Purposes" that are identified in the MRS.

The relevant environmental management area (foreshore) is presented in Figure 11 and is referred to as the Foreshore Management Plan.

In addition to the Foreshore Management Plan, the following management plans are proposed:

1. Conservation Area Management Plan (CAMP) to outline management recommendations for the Conservation POS on the site.

2. Vegetation and Fauna Management Plan (Construction Phase) (VFMP).

The management plan areas for the Alkimos Coastal Node site are illustrated spatially in Figure 11. The environmental management framework and management plans are discussed in detail in Section 4.

4.2.1 Other Key Management Measures

Separate to the above key environmental management plans a LWMS has been finalised for the ACNLSP. The LWMS details the water management approach to support the ACNLSP including management of stormwater run-off to avoid flooding and protect the environment. The LWMS provides the framework for actions and measures to achieve the desired outcomes at subdivision and development stages.

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5.0 LOCAL ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT STRATEGY

This section describes the potential impacts and management responses associated with each of the environmental factors identified in the previous sections.

5.1 Performance Requirements

Performance requirements for the management of potential environmental impacts within the LSP include:

- maintain ecological linkages between the dedicated conservation areas in the MRS
- define the Conservation POS area to preserve the quality of vegetation and habitats and to preserve a range of existing vegetation types and ecological links across the site
- fences and/or flagging to be installed around areas of Conservation POS during construction phase
- undertake training program for contractors in environmental management of site
- tuarts to be retained in open space where possible with additional native trees to be planted in landscaping
- native vegetation is to be used in landscaping
- weed and dieback management
- appropriate use of cleared material in re-vegetation works (e.g. as mulch and reuse of topsoil)
- appropriate street design to facilitate fauna movement particularly where roads intersect ecological linkages, treatment may include the use of natural road edges without curbs and the use of native vegetation in landscaping of road verges and median strips.

5.2 Vegetation, Flora and Significant Trees

5.2.1 Overview

The vegetation within the site belongs to the Quindalup vegetation complex. The remnant dune vegetation is dominated by *Melaleuca systena* and *Lomandra maritima*. The only trees on the site are scattered tuarts (Figure 9).

Historically, the site has been used for agricultural purposes, specifically sheep grazing. The effects of this activity are most prevalent in the inter-dunal basins, where there is now a high percentage of weed species. The majority of better quality vegetation on the site is located on the dune ridges, which were not intensively grazed.

An aboriculturalist assessed the condition of 59 tuart trees located on or adjacent to the Alkimos LSP site. Due to the exposed location of the dune ridge where most of the trees are located the tuart trees were assessed as being in generally poor condition, their growth stunted and were not considered to be of outstanding appearance (Banks 2008).

The CoW's Tree Preservation Policy (LPP 4.8) requires that structure plan design locates future public open space areas to accommodate significant groups of trees. Due to the undulating topography of the site, it will not be possible to retain many of these trees. However, there are a number of tuart trees within the WWTP buffer area retained for conservation.

The trees identified for retention within POS areas will be managed in conjunction with the remnant vegetation across the LSP as outlined below.

5.2.2 Potential Impacts

Development of the site for residential proposes will result in additional clearing of remnant vegetation on the site, with the exception of those areas to be retained in designated POS areas.

Potential impacts include, but are not limited to:

- loss or changes in vegetation and fauna community structure, biodiversity and fauna habitats
- fragmentation of existing habitats
- spread of weeds and pathogens (e.g. *Phytophthora* dieback)
- degradation of retained areas from unauthorised third party access and changes in fire regimes.

5.2.3 Management Objectives

The key management objectives are:

1. Retain vegetation to minimise the impacts of the development on biodiversity and fauna habitat where practicable.

2. Maximise the use of local native vegetation species in revegetation and landscaping to increase biodiversity and minimise irrigation requirements, including the retention of and/or transplanting of native species e.g. zamia palms, grass trees (where practical). Preserved tuarts will be augmented with plantings of additional tuart trees to compensate for those trees removed and enhance the Conservation POS in accordance with the CoW's Local Planning Policy 4.8 – Tree Preservation Policy.

3. Maximise the use of native habitat species for significant fauna species in revegetation and landscaping.

4. Minimise incremental degradation of vegetation in POS areas by providing appropriate and managed public access.

5. Discourage inappropriate use of conservation areas through appropriate design responses and passive surveillance.

5.2.4 Management Measures

5.2.4.1 Before Construction

- Fence the POS Conservation areas during the construction phase to prevent accidental clearing.

- Retain in POS grass trees and zamia palms (where practical) and transplant from areas to be cleared (as practicable).

5.2.4.2 During Construction

- Stage clearing works and implement clearing methods designed to maximise the survival of fauna individuals on the site (e.g. clear vegetation in the direction of areas that are to be retained at a slow pace).

- Install appropriate fauna-permeable fencing along access paths through conservation areas to provide controlled access and prevent unauthorised third party access.

- Where possible provide natural road edge treatments adjacent to conservation areas, particularly where roads intersect fauna linkages, to allow for fauna movement across roads.

5.2.4.3 After Construction

- Use where practical local native species in POS areas and road reserves / drainage swales following construction.

- Revegetate areas of POS with native tree species to enhance the establishment of a place-specific, informal character.

5.3 Fauna

5.3.1 Overview

A number of fauna surveys have been completed in the Alkimos region over the last 20 years. These surveys have been conducted using a range of trapping programs (using Elliot, pit fall and cage traps) and opportunistic surveys.

The LSP area contains some of the most degraded areas on the Alkimos–Eglinton site, ranging from "Good" to "Completely Degraded". This is due to historic agricultural land use and recent activity associated with the construction of the Alkimos WWTP. The habitats in the LSP area generally comprise:

- cleared pasture/grassland
- Quindalup heath
- tuart trees.

The site contains limited (3.68 ha) foraging habitat for Carnaby's Black-Cockatoo, noting approximately 2.25 ha of this foraging habitat is proposed to be retained.

5.3.2 Potential Impacts

Land clearing and construction activities may potentially lead to the death or injury of fauna because of collisions with cars, trucks and other clearing and construction machinery present on site.

Clearing and fragmentation of habitats may lead to:

- increased vulnerability of fauna to drought
- potential inbreeding and breeding irregularities
- local habitat changes over time
- poor dispersal of local population booms
- lack of source of recruitment following a disaster (e.g. fire, drought).

Remnant vegetation areas may be vulnerable to edge effects that lead to incremental degradation. Due to the proximity to urban land, retained natural areas may attract new species (including predators) leading to changes in the species composition.

5.3.3 Management Objectives

The key management objective is:

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

5.3.4 Management Measures

Proposed management to maximise the retention of fauna and habitats on the site include, but are not limited to, the following measures:

- ACNLSP design to minimise impacts on fauna through habitat loss and fragmentation through the provision of a Conservation POS area that is 3.75 ha in size. This additional Conservation area provides strategic ecological corridors and retains vegetation through the site
- during construction, the extent of authorised clearing will be clearly defined and demarcated, and appropriate fencing will be installed to avoid accidental clearing
- development will be staged to enable wildlife populations to gradually move and encourage colonisation in conservation areas. Clearing works will where practical occur towards a conservation area where possible to allow animals time to escape
- loud noises (e.g. air horns) will be made just prior to commencement of clearing
- long-term fencing for conservation POS area will be permeable to most species of fauna with a 30 cm gap between ground level and the first rail/wire
- use of appropriate signage in conservation areas to influence behaviour of visitors to the area
- road treatments in and near conservation areas will reflect the sensitivity of the area by slowing speeds, using traffic calming devices such as grade changes, incorporating natural road edges such as no curbing or sloping curbing and use appropriate signage for fauna crossings
- where possible, local native species will be planted along road verges and median strips in and near conservation areas and strategic ecological linkages to enhance the value of the linkage to fauna

- a proportion of the tuarts will be preserved within the Conservation POS. Preserved tuarts will be augmented with plantings of additional tuart trees to compensate for those trees removed and enhance the Conservation POS in accordance with the CoW's Local Planning Policy 4.8 – Tree Preservation Policy

- native coastal groundcovers and grasses rather than turf in the verges are proposed, as these are particularly appropriate in the less formal, local streets. Shrubs will be selected to provide seasonal vibrant colours. Approximately 50% of shrubs and groundcover species will be selected that are from DPaW's Carnaby's Black-Cockatoo foraging species list (www.dec.wa.gov.au/plantsforcarnabys) including parrot bush, hakeas and Banksias.

5.4 Conservation Public Open Space

5.4.1 Overview

The retention of landform, native vegetation and the preservation of key landscape features is one of the driving elements of the ACNLSP design.

The key issues for the long-term management of conservation areas in an urban setting include, but are not limited to the following:

- avoiding incremental degradation through ongoing appropriate management such as preventing unauthorised access, weed management, plant pathogen management

- providing appropriate access to encourage responsible use of the conservation area without affecting biodiversity and fauna populations

- fostering community awareness and involvement.

These issues are addressed below in the following sections of the report.

5.4.2 Conservation POS – Access

5.4.2.1 Management Objectives

The key management objective is:

1. Prevent unauthorised third party access on the development site during the clearing and development phases of the project.

2. Prevent unauthorised third party access to Conservation POS areas after the clearing and development of the site is complete.

3. Provide appropriate access to Conservation POS areas for recreation and fire management.

5.4.2.2 Potential Impacts

During the construction phase, third party access could lead to further degradation of areas that are proposed to be incorporated into conservation areas in the future development. Inappropriate third party access to Conservation POS areas could result in localised disturbance, which can lead to an increased susceptibility to wind erosion, the spread of weeds and pathogens, deliberate destruction of vegetation, littering, loss of species diversity and changes in fire regimes.

5.4.2.3 Proposed Management

Proposed management measures during construction and development phases of the site include, but are not limited to:

- Access shall be maintained to appropriate standards during clearing and development.
- Fencing shall be installed and maintained around the construction site to prevent unauthorised access.
- Signage will be placed on the fences to inform that the area is a construction site and the public are not authorised to enter the site.
- Parking shall be restricted to designated areas.
- Following construction, long-term fencing around Conservation POS areas will be erected to manage access.
- Paths through Conservation POS areas will be designed to provide access along desire lines for pedestrian travel (e.g. between schools, shopping areas and beaches).

5.4.3 Weed Management

5.4.3.1 Management Objectives

The key management objective is:

1. Avoid/reduce/mitigate the potential spread of weeds during the construction and development of the site.

5.4.3.2 Potential Impacts

Weeds can result in a loss of floristic diversity through completing with native vegetation, which impacts on food availability for native fauna and results in changes in vegetation community structures. Weeds can be spread through the following methods:

- changes in fire regimes
- soil disturbance
- poor hygiene controls
- re-infestation from external sources.

5.4.3.3 Proposed Management

Weed management for the prevention or spread of weeds on the site will focus on controlling, reducing or eliminating disturbance factors that increase ecosystem vulnerability. This will include but not be limited to, the following management measures:

- Control access through conservation areas and rehabilitate superfluous tracks.
- Where possible, control processes that increase ecosystem vulnerability to weeds including soil disturbance and changes to fire regimes.
- Monitor the presence of new weed populations.
- Implement early detection and eradication of new weed populations.
- Apply herbicide to weeds where deemed appropriate and safe.
- Use biological control where appropriate.
- Educate residents to prevent garden waste disposal to sensitive areas.

5.4.4 Phytophthora Dieback Management

5.4.4.1 Management Objectives

The key management objective is:

1. Avoid/reduce/mitigate the spread of *Phytophthora* dieback on the site.

5.4.4.2 Potential Impacts

The development of the site may result in the introduction or spread of *Phytophthora* dieback, which may result in the death of a number native and ornamental flowering trees and shrubs. Introduction or spread of this pathogen may cause a reduction in species diversity of both flora and fauna as a result of changes to the vegetation community structures and food availability for native fauna.

5.4.4.3 Proposed Management

The number of new *Phytophthora* dieback infestations can be reduced by modifying activities that spread the pathogen, or by controlling access to high priority areas. Management measures will include, but not be limited to the following:

- Contractors will not enter conservation areas unless necessary.

- Employ hygienic practices if moving into bushland areas on foot, footwear is to be free of mud and soil, and vehicles, machinery and equipment to be free of mud and soil when arriving at a site.

- There is a reduced need for cleaning if operations are completed in dry soil conditions. Cleaning will also be easier, and have a lower risk of spreading *Phytophthora* Dieback if it is completed at a depot. However, if clean-down is to occur on the site, the following management should be employed
  - If possible, wash-down should occur in the area where operating or select a hard, well-drained surface, e.g. a road well away from remnant vegetation.
  - Minimise the use of water, and attempt to remove mud and soil with a brush or stick.
  - Park vehicles and machinery on cleared land.
  - Water draining from the site is not to enter bushland.
  - Use of water during construction should be minimised, when water is necessary, it should be from scheme, bore supply or sterilised.
  - Staff and contractors involved in road and drain construction and maintenance activities to receive training in phytophthora dieback management.
  - *Phytophthora* dieback information to be included in field staff induction process.

5.4.5 Fire Prevention

5.4.5.1 Management Objectives

The key management objective is:

1. Avoid/reduce/mitigate the potential ignition of fires during development.

5.4.5.2 Potential Impacts

Potential bushfire ignition sources associated with the land development include:

- construction equipment and machinery
- stockpiles of cleared vegetation
- litter (particularly cigarette butts)
- deliberately lit fires due to unauthorised third party access.

Changes in fire regimes may result in loss of biodiversity through changes in species abundance (particularly the spread of weeds), damage to property and equipment, and loss of fauna and fauna habitat.

5.4.5.3 Proposed Management

Fire prevention and response measures during clearing and development will include, but not be limited to the following.

Construction Phase

- All flammable materials will be removed from around potential ignition sources.
- Maintenance of all machinery to comply with relevant fire safety standards.
- Construction sites include appropriate fire-fighting equipment in accordance with the requirements of the Western Australian Fire Protection Regulations.
- Where possible, clearing work should be avoided during high fire risk conditions, if work operations occur in high fire risk areas and conditions, appropriate equipment, such as earthmoving machinery and water trucks will be on standby for fire control if required.
- Site supervisors shall be aware of contact details for the nearest emergency services, including fire, ambulance and police.
- Bushfire education and training detailing fire prevention and safety, personnel responsibilities and basic fire suppression shall be undertaken as appropriate.
- POS areas and neighbouring conservation areas will contain appropriate access paths for fire control vehicles.

5.4.6 Introduced Species

5.4.6.1 Management Objectives

The key management objective is:

1. Prevent the introduction and spread of invasive fauna species.

5.4.6.2 Potential Impacts

Clearing of vegetation resulting in changes in community structure may result in an increase in the abundance of introduced species, particularly cats. Based on the fauna investigations conducted by Thompson (2005) and Bamford and Davies (2005), the introduced species recorded in, or are likely to occur at Alkimos are presented in Table 4.

Table 4: Introduced Species Recorded or Likely to Occur at Alkimos

Species	Common Name	Source
Rats and Mice		
Mus musculus	House mouse	Thompson 2005, Bamford and Davies 2005
Rattus rattus	Black rat	Thompson 2005, Bamford and Davies 2005
Rabbits and Hares		
Oryctolagus cuniculus		Thompson 2005, Bamford and Davies 2005
Foxes and dogs		
Vulpes vulpes	European red fox	Thompson 2005, Bamford and Davies 2005
Cats		
Felis catus	Feral cat	Thompson 2005, Bamford and Davies 2005
Pigeons and Doves		
Columba livia	Rock dove (domestic pigeon)	Thompson 2005, Bamford and Davies 2005
Streptopelia senegalensis	Laughing turtle-dove	Thompson 2005, Bamford and Davies 2005
Cockatoos		
Catcatua sanguinea	Little corella	Bamford and Davies 2005
Lorikeets and Parrots		
Trichoglossus haematodus	Rainbow lorikeet	Thompson 2005, Bamford and Davies 2005
Forest Kingfishers		
Dacelo novaeguineae	Laughing kookaburra	Thompson 2005, Bamford and Davies 2005

5.4.6.3 Proposed Management

Invasive species management measures will include, but not be limited to the following:

- The LSP design includes ecological corridors to facilitate fauna movement across the site.
- During the construction phase, feral animal trapping and baiting programs may be implemented to control existing populations prior to settlement of the area.
- An information package on cat management will be provided to landowners when lots are purchased. In addition to this, signage regarding the impact of domestic cats within conservation areas will be located in appropriate points in Conservation POS areas.

5.5 Other Management Issues

5.5.1 Water Management

Separate to the above key environmental management plans a LWMS has been finalised for the ACNLSP. The LWMS details the water management approach to support the ACNLSP including management of stormwater run-off to avoid flooding and protect the environment. The LWMS provides the framework for actions and measures to achieve the desired outcomes at subdivision and development stages via Urban Water Management Plan(s).

5.5.2 Littering/Illegal Rubbish Disposal

The Local Biodiversity Strategy (CoW 2008) highlights the importance of preventing illegal dumping or rubbish in natural areas. A number of management measures to prevent littering or illegal rubbish dumping in conservation areas include, but are not be limited to, the following:

- Place signage on the fence at regular intervals informing the public that littering is illegal and detailing relevant fines.
- Locate rubbish bins at regular intervals along access paths (determine appropriate locations for rubbish bins in consultation with CoW).
- Place fencing around conservation areas that is permeable to most fauna, but restricts human and the majority of pet dog access to conservation areas.

5.5.3 Unexploded Ordnance

There is a potential that Unexploded Ordnance (UXO) exists on the site. Prior to any ground disturbing activities occurring on site, the proponent will be required to conduct a UXO search. In order to complete the UXO search, a portion of the vegetation must be slashed to the ground. In order to preserve the environmental values of conservation areas, UXO searching should not be conducted in these areas except the areas where public access will be provided (e.g. access paths). Signage about UXO risks should be provided discouraging the public from entering the unsearched, fenced conservation areas.

5.6 Monitoring and Reporting

Table 5 below presents the environmental management implementation framework for the ACNLSP.

Table 5: Environmental Management Strategy Implementation Framework

Environmental Commitment	Relevant Areas	Timing	Relevant Authority
Environmental Management Plan (EMP)(Foreshore)	Foreshore Conservation Zone (Figure 11)	Triggered prior to subdivision	WAPC, and City of Wanneroo (on DPAW advice)
Vegetation and Fauna Management Plan VFMP)	All areas not requiring an EMP or CAMP where some vegetation will be disturbed (Figure 11)	Triggered prior to subdivision	City of Wanneroo
Conservation Area Management Plan	Conservation POS (Figure 11)	Triggered prior to subdivision	City of Wanneroo

The specific implementation of environmental management procedures for before, during, and after construction (which will be applicable specifically for the VFMP) of the ACNLSP phases are detailed in Table 6.

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Table 6: Local Environmental Impact Assessment and Management Strategy

Issue/ Parameter	Description/Location	Pre-construction Implementation	Construction Implementation	Post-construction Implementation	Relevant Management Plan	Responsibility
Fencing and flagging of vegetation	Fencing off the conservation and areas to prevent unauthorised access.	▪ Through appropriate surveying techniques, locate the boundaries around areas of native vegetation to be retained in conservation areas. Place flagging, fencing or cleared brush around the edges of the areas to be retained as appropriate to prevent unauthorised access. ▪ Use fauna permeable fencing to allow fauna to relocate into the conservation areas.	▪ Regularly inspect fences, flagging and brush and repair or reinstate as required.	▪ Ensure that flagging is removed and appropriately disposed of. ▪ Remove fencing around the site, and dispose appropriately. ▪ Replace fencing around Conservation POS areas with appropriate long-term fencing.	CAMP FMP VFMP	Construction Supervisor
Signage	Provide appropriate signage regarding trespassing fines.	▪ Place appropriate signage around the development boundary indicating that it is private property and unauthorised access is not permitted.	▪ Regularly inspect signage. Replace signage if vandalised or removed.	▪ Ensure that signs are removed and appropriately disposed of if appropriate.	VFMP	Construction Supervisor
	Provide appropriate signage to indicate conservation areas.	▪ Delineate boundaries around areas of native vegetation to be retained in conservation areas, use appropriate signage to advise of areas conservation status.	▪ Regularly inspect signage. Replace signage if vandalised or removed.	▪ Place appropriate signs to the satisfaction of the City at entry points to Conservation POS areas, advising pedestrians that they are entering a conservation area. Signs should advise the following – Keep to the paths provided. – Do not litter. – Do not damage the environment or wildlife.	CAMP FMP	Landowner/local government authority (after POS is ceded).
Conservation POS Areas	Consider developing individual management plans for Conservation POS areas being retained as part of the development during the detailed area planning phase for the development cells that include or are adjacent to an area of Conservation POS.	▪ Conservation Area POS management should include but not be limited to – weed and plant pathogen management – access management – fire management – drainage – community education.	▪ Implement Conservation Area POS Management Plan (CAMP)	▪ Continue ongoing management of Conservation POS areas as appropriate.	CAMP	Landowner/local government authority (after POS is ceded).
Conservation POS Management *Weed Management*	Control the spread of weeds within areas of native vegetation to be retained in Conservation POS.	▪ Areas of vegetation to be retained in Conservation POS should be assessed for weed abundance, and where possible treated and rehabilitated with local provenance species. ▪ Ensure hard edges between the lawn turf areas and native areas to prevent grass from invading the conservation areas.	▪ Implement CAMP ▪ Ongoing monitoring and maintenance of Conservation POS areas will be undertaken to prevent the spread of weeds, in accordance with the CAMP	▪ Undertake ongoing weed management (i.e. spraying) of the Conservation POS areas as required by the management plan.	CAMP	Landowner/local government authority (after POS is ceded).
Conservation POS Management *Plant Pathogen Management*	Control and manage plant pathogen spread in and around the development area.	▪ Standard management procedures should be implemented; this should include the provision of a wash down facility for machinery entering the site. ▪ If necessary or appropriate, tuart trees on the site can be treated with phosphate and nutrient implants to prevent Dieback infection.	▪ If dieback is not identified on the site, hygiene measures to prevent the spread of dieback on to the site should be implemented.	▪ Should groups of trees show signs of decline as a result of dieback, a contingency plan should be prepared and implemented.	VFMP CAMP	Landowner/local government authority (after POS is ceded).
	Control and manage plant pathogen spread in and around the development area.	▪ If dieback is found to occur on the site, a dieback management strategy will be developed. The management plan should include but not be limited to – implementation of appropriate hygiene measures including wash down and brush down facilities – water management during construction – delineation of dieback affected areas on site plans – site inductions that include information for site staff about dieback locations on site, and how to prevent the spread of dieback – contingency for the treatment of dieback if it is introduced to tuart trees and other susceptible species on the site.	▪ If dieback is present, a dieback management plan will be implemented.	▪ If dieback occurs within POS areas signage will be erected to inform people about the dieback risks.	VFMP CAMP	Landowner/local government authority (after POS is ceded).

Issue/ Parameter	Description/Location	Pre-construction Implementation	Construction Implementation	Post-construction Implementation	Relevant Management Plan	Responsibility
Conservation POS Management *Fire Management*	Prevent changes in fire regimes, particularly in Conservation POS areas of native vegetation to be retained as POS.	▪ Fire management strategies include, but not be limited to – appropriate access for fire control vehicles through Conservation POS areas – access to firefighting equipment where necessary. ▪ Implement planning to determine areas where vehicles can be parked safely, away from vegetation during construction. ▪ Where appropriate, firebreaks should be cut (if they do not exist already), to ensure there is adequate access for emergency vehicles across the site.	▪ Fire suppression equipment will be present on site during the clearing and construction phases of the development.	▪ Implement the approved Fire Management Plan for the LSP (Strategen 2016)	Fire Management Plan CAMP	Landowner/local government authority (after POS is ceded).
Conservation POS Management *Access*	Control pedestrian access in Conservation areas	▪ Develop plans for the provision of appropriate public access to Conservation POS areas to the satisfaction of the City. This should include, but not be limited to – type of fencing – types of paths, including construction material, width of paths, location of entry points to the POS area – location of paths for pedestrian access – signage around the area and location and number of rubbish disposal facilities – designated parking areas.	▪ Implement Conservation Area POS Management Plan ▪ Conservation POS areas should be appropriately fenced	▪ Define the community infrastructure including surf lifesaving club area and open space for community events / possible drainage in the foreshore ▪ Access paths should be constructed and Conservation POS areas fenced in accordance with the Management Plan.	CAMP FMP	Landowner/local government authority (after POS is ceded).
Clearing of designated areas	Undertake clearing works in a controlled and sensitive manner to minimise the environmental impact.	▪ A Staged Clearing Plan should be developed so that areas are cleared just prior to construction. This plan should include – clearing towards areas of bush to be retained – sound horns prior to commencing clearing works – have a fauna handler on site during clearing works – trap for quenda prior to commencing clearing works – leave cleared material in situ overnight to allow for animals to escape. ▪ Areas of native vegetation to be retained as Conservation POS should be clearly marked on drawings and flagged or fenced on site. ▪ Retention (where practical) within POS areas and/or transplanting of zamia palms and grass trees from areas to be cleared (if practical).	▪ Implement Staged Clearing Plan.		VFMP	Construction Supervisor
Death or Injury of Fauna	Prevent or reduce the number of fauna deaths or injuries on the development site.	▪ Inform site workers about the fauna expected to be on site. ▪ Liaise with the local DPaW wildlife officer. ▪ Ensure that site workers are aware that they are not permitted to handle fauna without a permit. ▪ Conduct fauna trapping prior to commencing ground-disturbing works.	▪ Provide site workers with the DPaW phone number. ▪ Injured, abandoned or otherwise visibly distressed fauna are to be handed over to a DPaW Sound air horns prior to commencing ground-disturbing works.	▪ Ensure that designated Conservation POS areas are fenced off to restrict access and to provide a refuge for native fauna.	VFMP	Landowner until the land is ceded to the local government authority.
Loss of Habitat/Habitat Fragmentation	▪ Minimise the loss of habitat on the site as much as practicable ▪ Reduce the impact of lost habitat ▪ Create ecological corridors for fauna to move through the development area	▪ When planning the development, target areas that are degraded for development and where practicable, retain areas of good or better quality vegetation. ▪ Fauna permeable fences and flagging to delineate areas of native vegetation to be retained. ▪ Use appropriate road treatments (no curbing) for roads in or near an ecological linkage. ▪ Design roads within or adjacent conservation areas to facilitate slower traffic speeds. ▪ Installation of a fauna underpass, connecting POS areas A and B as presented in Figure 2.	▪ Stockpile in already cleared areas. ▪ Incidents of over-clearing to be reported as an environmental incident using the Site Environmental Health and Safety reporting system.	▪ Ensure that designated Conservation POS areas are fenced off to restrict third party access to ensure that the Conservation POS areas remain as refuges for native fauna. ▪ Maintain the condition of Conservation POS areas, this will include, but not be limited to – access management – weed removal – fire management – plant pathogen management – introduced species management.	VFMP CAMP	Landowner until the land is ceded to the local government authority.
Site Inductions/ Toolbox Meetings	All staff and contractors to be inducted on project/site specific environmental issues.	▪ All site staff should participate in site inductions informing them about the Environment, Health and safety aspects of the site. The induction should include, but not be limited to – information about *Phytophthora* dieback – significant flora species on the site – significant fauna species on the site – reporting procedures for environmental incidents – information about Aboriginal archaeological sites. • An induction program should be developed for visitors to the site.	▪ Any new site staff should be inducted. ▪ A register should be kept of staff who have been inducted. ▪ The induction process should be reviewed every two years, at a minimum, and updated as necessary.		VFMP	Construction Supervisor

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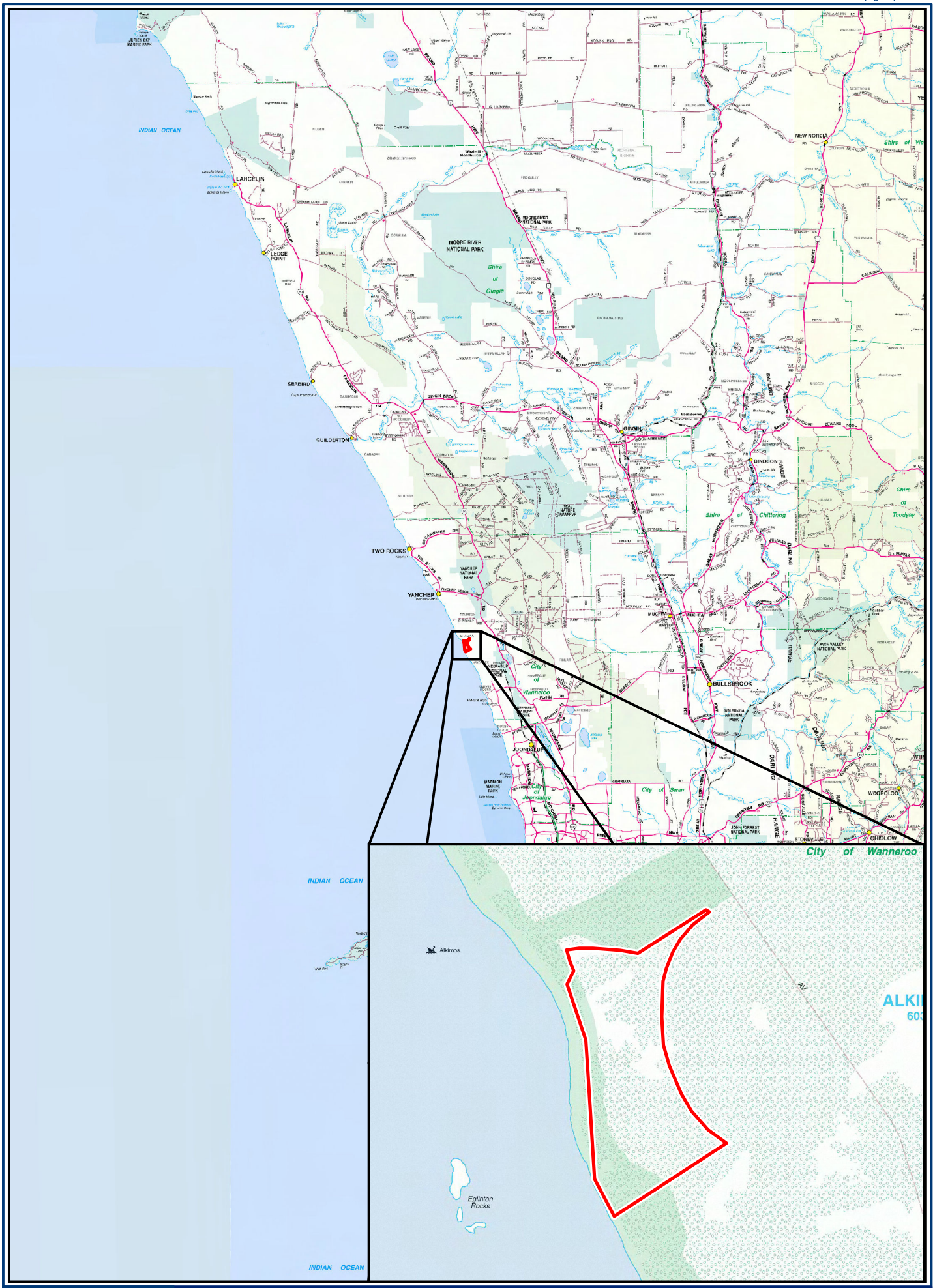
FIGURES

290 Churchhill Ave Subiaco | T +61 8 93824744 | F +61 8 93821177 | www.rpsgroup.com.au



RPS

Job Number: L10298
Date: 14.05.14
Revision: A
Scale: 1:500000 @ A4
Drafted by: MR
Source: Landgate, 2008

Figure 1

Alkimos Coastal Node Site Location

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LEGEND

Proposed Alkimos Coastal Node LSP Boundary

Cadastre

Metropolitan Region Scheme Zoning

Parks and Recreation Reservation

Public Purposes Reservation

Central City Area Zone

Urban Zone

Urban Deferred Zone

WSD

WSD

RPS

Job Number: L12098 Alkimos Coastal Node
Doc Number: ACN-001
Date: 15.10.13
Scale: 1:7,000 @ A3
Created by: MA
Source: MRS, Cadastre, Orthophoto - Landgate, 2013 Alkimos Masterplan- David Lock, 24.09.13 Alkimos Coastal Node LSP Boundary - DPS, 05.09.2013

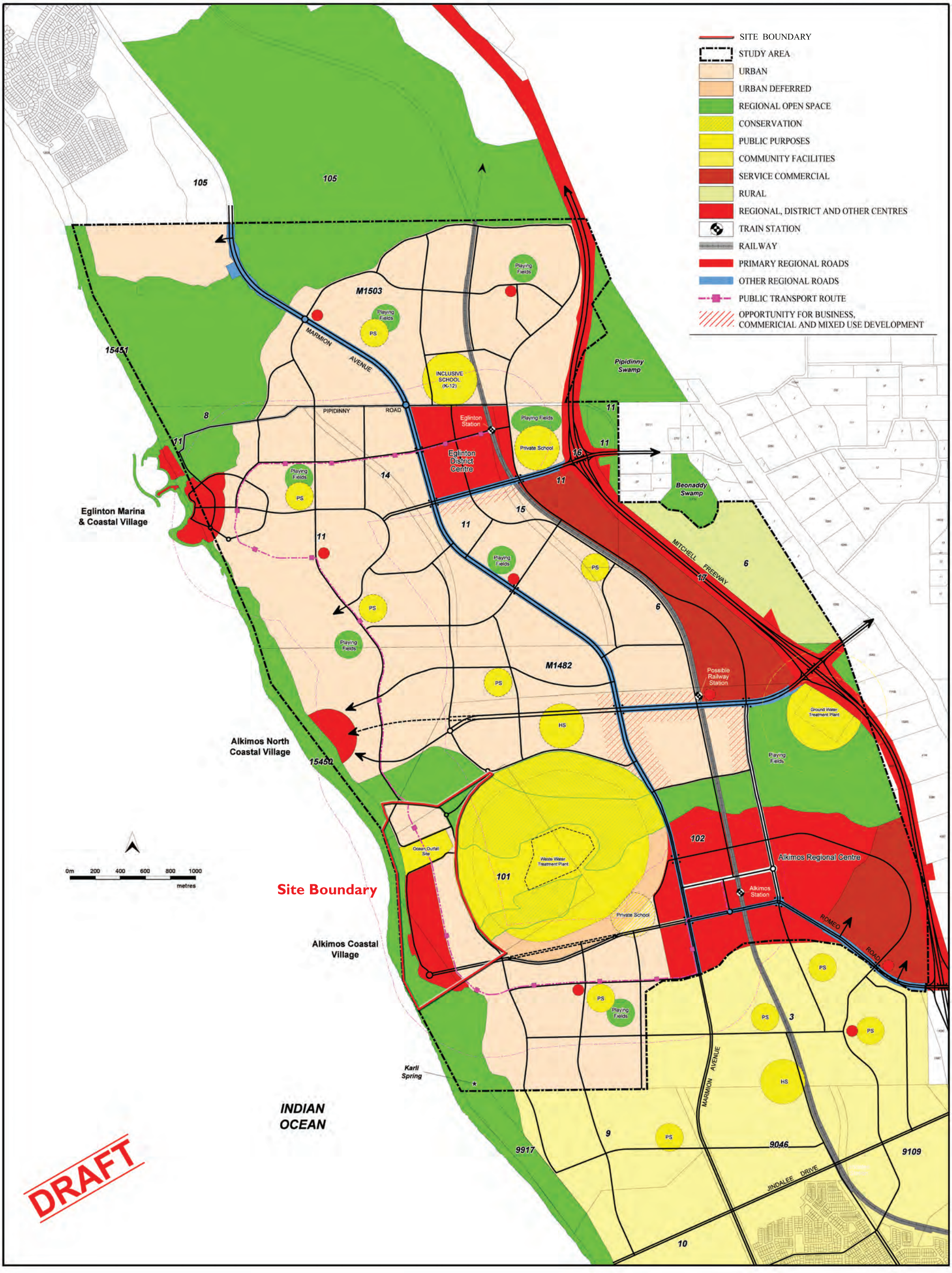
GDA 1994 MGA Zone 50

0 50 100 200 300 400 m

Figure 2

Alkimos Coastal Node Metropolitan Region Scheme

38 Station Street, Subiaco | T +61 8 92111111 | F +61 8 92111122 | www.rpsgroup.com.au



RPS

Job Number: L12098 Alkimos Coastal Node
Doc Number: ACV-003
Date: 14.05.14
Scale: Not to Scale @ A3
Drafted by: MR
Source: DPS, 28.09.06, RPS 2014

Figure 3

District Structure Plan

38 Station Street, Subiaco | T +61 8 9211 1111 | F +61 8 9211 1122 | www.rpsgroup.com.au

LEGEND

Structure Plan Boundary

ZONES

- Commercial
- Residential
- Mixed Use

RESERVES

- Parks and Recreation
- Public Purpose (Subject to Further Planning)

MOVEMENT

- Integrator Arterial (B)
- Neighbourhood Connector
- Coastal Road
- Secondary Transit System (STS Route)
- Pedestrian and Cyclist Route
- Regional Foreshore Shared Path

OTHER

- Public Open Space (Conservation)
- Strategic Open Space (Indicative Location)
- RMD 25 — R-Codes Residential Density
- Areas Subject to Future MRS Amendment
- Indicative Surf Lifesaving Club
- 100 Year Coastal Process Line (as per digital data from MP Rogers)
- Indicative Waste Water Pumping Station location
- 30m Waste Water Pumping Station Buffer
- Indicative Future Marina Layout

(1) To rezone from MRS 'Urban' Zone to 'Public Purpose' Reserve.

(2) To rezone from MRS 'Parks and Recreation' Reserve to 'Urban' Zone.

(3) To rezone from MRS 'Urban' Zone to 'Parks and Recreation' Reserve.

9016
9501
RMD 25-40
RMD 25-40
1012
Alkimos Waste Wate
Treatment Plant
R-AC1
RMD 25-40
9001
R-AC1
R-AC1
RMD 60-80
RMD 25-40
9018
RMD 40
Indian Ocean
9019
15450

Job Number: L12098 Alkimos Coastal Node
Doc Number: ACV-004
Date: 18.02.16
Scale: Not to Scale
Created by: MR
Source: LCPAC-2-007A Local Structure Plan (17.02.16) - Creative Design + Planning

Perth Coastal Grid 1994
0 50 100 150 200 m

Figure 4

Alkimos Coastal Node Local Structure Plan

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LEGEND

- Contour (mAHD)
- Proposed Alkimos Coastal Node LSP Boundary
- Cadastre

Elevation (mAHD)

- High : 226
- Low : 26

RPS

Job Number: L12098 Alkimos Coastal Node
Doc Number: ACV-005
Date: 14.05.14
Scale: 1:7,000 @ A3
Created by: MR
Source: Topography, Cadastre, Orthophoto - Landgate, 2013 Alkimos Masterplan- David Lock, 24.09.13 Alkimos Coastal Node LSP Boundary - DPS, 05.09.2013

GDA 1994 MGA Zone 50

0 50 100 200 300 400 m

Figure 5

Topography

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LEGEND

- Proposed Alkimos Coastal Node LSP Boundary
- Cadastre

LANDFORM / SOILS LEGEND

- **KIs** — Karrakatta Shallow Soils Phase: Bare rock, Yellow/brown shallow sands and Stony soils
- **Ky** — Karrakatta Sand Yellow Phase: Yellow deep sands
- **Q1** — Quindalup Oldest Dune Phase: Calcareous sands with organic staining to about 30cm, overlying pale brown sand with definite cementation below 1m
- **Q2** — Quindalup Second Dune Phase: Calcareous sands with organic staining to about 20cm, passing into pale brown sand; some cementation below 1m
- **Q3** — Quindalup Third Dune Phase: Loose calcareous sand with little surface organic staining and incipient cementation at depth
- **Q4** — Quindalup Youngest Dune Phase: Loose pale brown calcareous sand with no soil profile development
- **Qp** — Quindalup Deep Sand Flat Phase: Dark grey-brown sand to about 50 cm and then pale brown sand
- **Qs** — Quindalup Shallow Sand Flat Phase: Shallow calcareous sands over limestone
- **Qu** — Quindalup Unstable Sand Phase: Calcareous sand
- **Sp** — Spearwood System: Brown deep sands and Yellow deep sands

RPS

Job Number: L12098 Alkimos Coastal Node
Doc Number: ACV-006
Date: 14.05.14
Scale: 1:7,000 @ A3
Created by: MR

GDA 1994 MGA Zone 50

0 50 100 200 300 400 m

Source: Cadastre, Orthophoto - Landgate, 2013 Alkimos Masterplan- David Lock, 24.09.13 Alkimos Coastal Node LSP Boundary - DPS, 05.09.2013 Soil and Landform - Dept. of Agriculture

Figure 6

Soils and Landform

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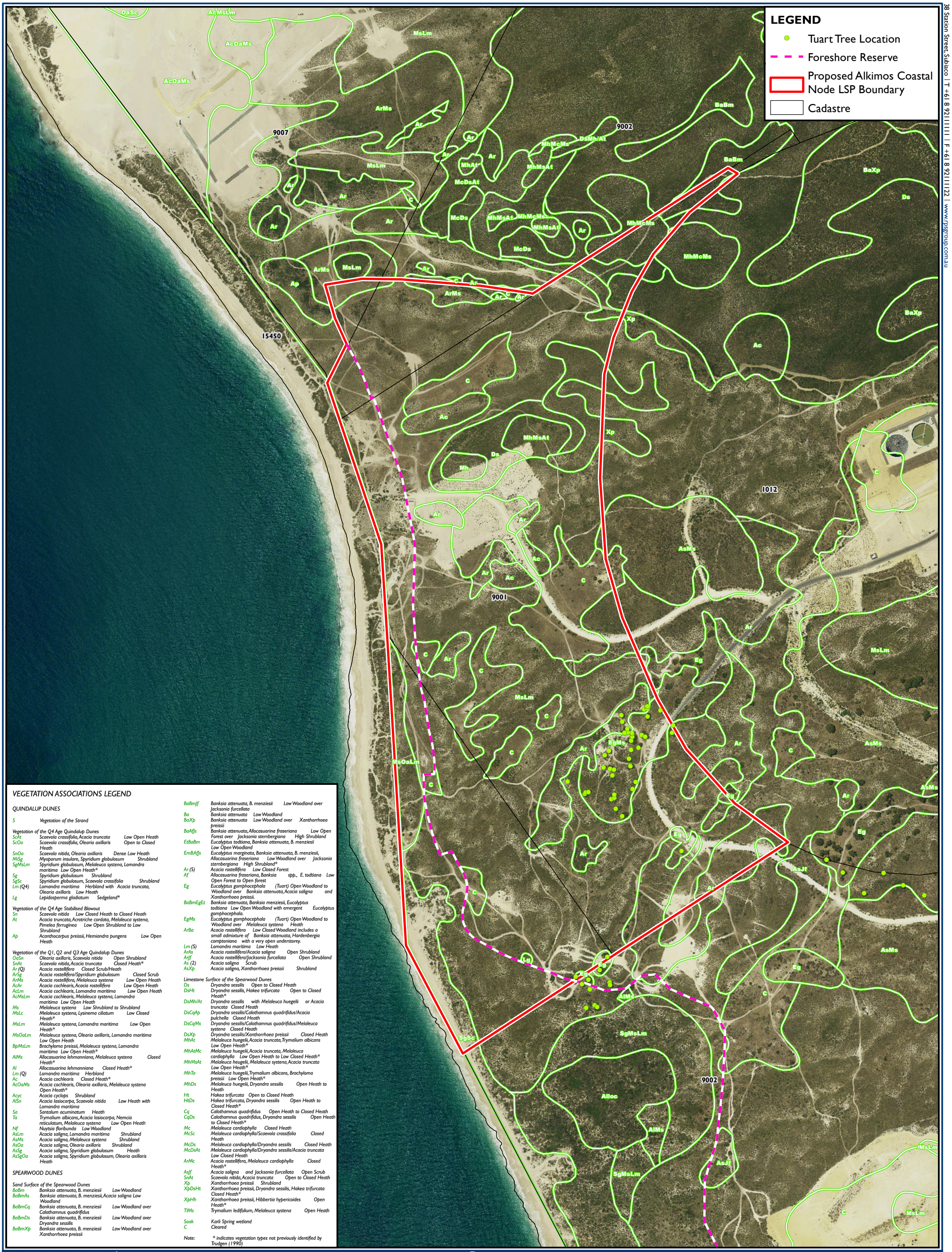


VEGETATION ASSOCIATIONS LEGEND

QUINDALUP DUNES

S	*Vegetation of the Strand*
	Vegetation of the Q4 Age Quindalup Dunes
ScAt	*Scaevola crassifolia, Acacia truncata* Low Open Heath
ScOa	*Scaevola crassifolia, Olearia axillaris* Open to Closed Heath
SnOa	*Scaevola nitida, Olearia axillaris* Dense Low Heath
MiSg	*Myoporum insulare, Spyridium globulosum* Shrubland
SgMsLm	*Spyridium globulosum, Melaleuca systena, Lomandra maritima* Low Open Heath*
Sg	*Spyridium globulosum* Shrubland
SgSc	*Spyridium globulosum, Scaevola crassifolia* Shrubland
Lm (Q4)	*Lomandra maritima* Herbland with *Acacia truncata, Olearia axillaris* Low Heath
Lg	*Lepidosperma gladiatum* Sedgeland*
	Vegetation of the Q4 Age Stabilised Blowout
Sn	*Scaevola nitida* Low Closed Heath to Closed Heath
At	*Acacia truncata, Acrotriche cordata, Melaleuca systena, Pimelea ferruginea* Low Open Shrubland to Low Shrubland
Ap	*Acanthocarpus preissii, Hemiandra pungens* Low Open Heath
	Vegetation of the Q1, Q2 and Q3 Age Quindalup Dunes
OaSn	*Olearia axillaris, Scaevola nitida* Open Shrubland
SnAt	*Scaevola nitida, Acacia truncata* Closed Heath*
Ar (Q)	*Acacia rostellifera* Closed Scrub/Heath
ArSg	*Acacia rostellifera/Spyridium globulosum* Closed Scrub
ArMs	*Acacia rostellifera, Melaleuca systena* Low Open Heath
AcAr	*Acacia cochlearis, Acacia rostellifera* Low Open Heath
AcLm	*Acacia cochlearis, Lomandra maritima* Low Open Heath
AcMsLm	*Acacia cochlearis, Melaleuca systena, Lomandra maritima* Low Open Heath
Ms	*Melaleuca systena* Low Shrubland to Shrubland
MsLc	*Melaleuca systena, Lysinema ciliatum* Low Closed Heath*
MsLm	*Melaleuca systena, Lomandra maritima* Low Open Heath*
MsOaLm	*Melaleuca systena, Olearia axillaris, Lomandra maritima* Low Open Heath
BpMsLm	*Brachyloma preissii, Melaleuca systena, Lomandra maritima* Low Open Heath*
AlMs	*Allocasuarina lehmanniana, Melaleuca systena* Closed Heath*
Al	*Allocasuarina lehmanniana* Closed Heath*
Lm (Q)	*Lomandra maritima* Herbland
Ac	*Acacia cochlearis* Closed Heath*
AcOaMs	*Acacia cochlearis, Olearia axillaris, Melaleuca systena* Open Heath*
Acyc	*Acacia cyclops* Shrubland
AlSn	*Acacia lasiocarpa, Scaevola nitida* Low Heath with *Lomandra maritima*
Sa	*Santalum acuminatum* Heath
Ta	*Trymalium albicans, Acacia lasiocarpa, Nemcia reticulatum, Melaleuca systena* Low Open Heath
Nf	*Nuytsia floribunda* Low Woodland
AsLm	*Acacia saligna, Lomandra maritima* Shrubland
AsMs	*Acacia saligna, Melaleuca systena* Shrubland
AsOa	*Acacia saligna, Olearia axillaris* Shrubland
AsSg	*Acacia saligna, Spyridium globulosum* Heath
AsSgOa	*Acacia saligna, Spyridium globulosum, Olearia axillaris* Heath

SPEARWOOD DUNES

	Sand Surface of the Spearwood Dunes
BaBm	*Banksia attenuata, B. menziesii* Low Woodland
BaBmAs	*Banksia attenuata, B. menziesii, Acacia saligna* Low Woodland
BaBmCq	*Banksia attenuata, B. menziesii* Low Woodland over *Calothamnus quadrifidus*
BaBmDs	*Banksia attenuata, B. menziesii* Low Woodland over *Dryandra sessilis*
BaBmXp	*Banksia attenuata, B. menziesii* Low Woodland over *Xanthorrhoea preissii*
BaBmJf	*Banksia attenuata, B. menziesii* Low Woodland over *Jacksonia furcellata*
Ba	*Banksia attenuata* Low Woodland
BaXp	*Banksia attenuata* Low Woodland over *Xanthorrhoea preissii*
BaAfJs	*Banksia attenuata, Allocasuarina fraseriana* Low Open Forest over *Jacksonia sternbergiana* High Shrubland
EtBaBm	*Eucalyptus todtiana, Banksia attenuata, B. menziesii* Low Open Woodland
EmBAfJs	*Eucalyptus marginata, Banksia attenuata, B. menziesii, Allocasuarina fraseriana* Low Woodland over *Jacksonia sternbergiana* High Shrubland*
Ar (S)	*Acacia rostellifera* Low Closed Forest
Af	*Allocasuarina fraseriana, Banksia* spp., *E. todtiana* Low Open Forest to Open forest
Eg	*Eucalyptus gomphocephala* (Tuart) Open Woodland to Woodland over *Banksia attenuata, Acacia saligna* and *Xanthorrhoea preissii.*
BaBmEgEt	*Banksia attenuata, Banksia menziesii, Eucalyptus todtiana* Low Open Woodland with emergent *Eucalyptus gomphocephala.*
EgMs	*Eucalyptus gomphocephala* (Tuart) Open Woodland to Woodland over *Melaleuca systena* Heath
ArBa	*Acacia rostellifera* Low Closed Woodland includes a small admixture of *Banksia attenuata, Hardenbergia comptoniana* with a very open understorey.
Lm (S)	*Lomandra maritima* Low Heath
ArAs	*Acacia rostellifera/Acacia saligna* Open Shrubland
ArJf	*Acacia rostellifera/Jacksonia furcellata* Open Shrubland
As (2)	*Acacia saligna* Scrub
AsXp	*Acacia saligna, Xanthorrhoea preissii* Shrubland
	Limestone Surface of the Spearwood Dunes
Ds	*Dryandra sessilis* Open to Closed Heath
DsHt	*Dryandra sessilis, Hakea trifurcata* Open to Closed Heath*
DsMh/At	*Dryandra sessilis* with *Melaleuca huegelii* or *Acacia truncata* Closed Heath
DsCqAp	*Dryandra sessilis/Calothamnus quadrifidus/Acacia pulchella* Closed Heath
DsCqMs	*Dryandra sessilis/Calothamnus quadrifidus/Melaleuca systena* Closed Heath
DsXp	*Dryandra sessilis/Xanthorrhoea preissii* Closed Heath
MhAt	*Melaleuca huegelii, Acacia truncata, Trymalium albicans* Low Open Heath*
MhAtMc	*Melaleuca huegelii, Acacia truncata, Melaleuca cardiophylla* Low Open Heath to Low Closed Heath*
MhMsAt	*Melaleuca heugelii, Melaleuca systena, Acacia truncata* Low Open Heath*
MhTa	*Melaleuca huegelii, Trymalium albicans, Brachyloma preissii* Low Open Heath*
MhDs	*Melaleuca huegelii, Dryandra sessilis* Open Heath to Heath
Ht	*Hakea trifurcata* Open to Closed Heath
HtDs	*Hakea trifurcata, Dryandra sessilis* Open Heath to Closed Heath*
Cq	*Calothamnus quadrifidus* Open Heath to Closed Heath
CqDs	*Calothamnus quadrifidus, Dryandra sessilis* Open Heath to Closed Heath*
Mc	*Melaleuca cardiophylla* Closed Heath
McSc	*Melaleuca cardiophylla/Scaevola crassifolia* Closed Heath
McDs	*Melaleuca cardiophylla/Dryandra sessilis* Closed Heath
McDsAt	*Melaleuca cardiophylla/Dryandra sessilis/Acacia truncata* Low Closed Heath
ArMc	*Acacia rostellifera, Melaleuca cardiophylla* Closed Heath*
AsJf	*Acacia saligna and Jacksonia furcellata* Open Scrub
SnAt	*Scaevola nitida, Acacia truncata* Open to Closed Heath
Xp	*Xanthorrhoea preissii* Shrubland
XpDsHt	*Xanthorrhoea preissii, Dryandra sessilis, Hakea trifurcata* Closed Heath*
XpHh	*Xanthorrhoea preissii, Hibbertia hypericoides* Open Heath*
TlMs	*Trymalium ledifolium, Melaleuca systena* Open Heath
Soak	*Karli Spring wetland*
C	*Cleared*

Note: * *indicates vegetation types not previously identified by Trudgen (1990)*

RPS

Job Number: L12098 Alkimos Coastal Node
Doc Number: ACV-007
Date: 14.04.14
Scale: 1:7,000 @ A3
Created by: MR

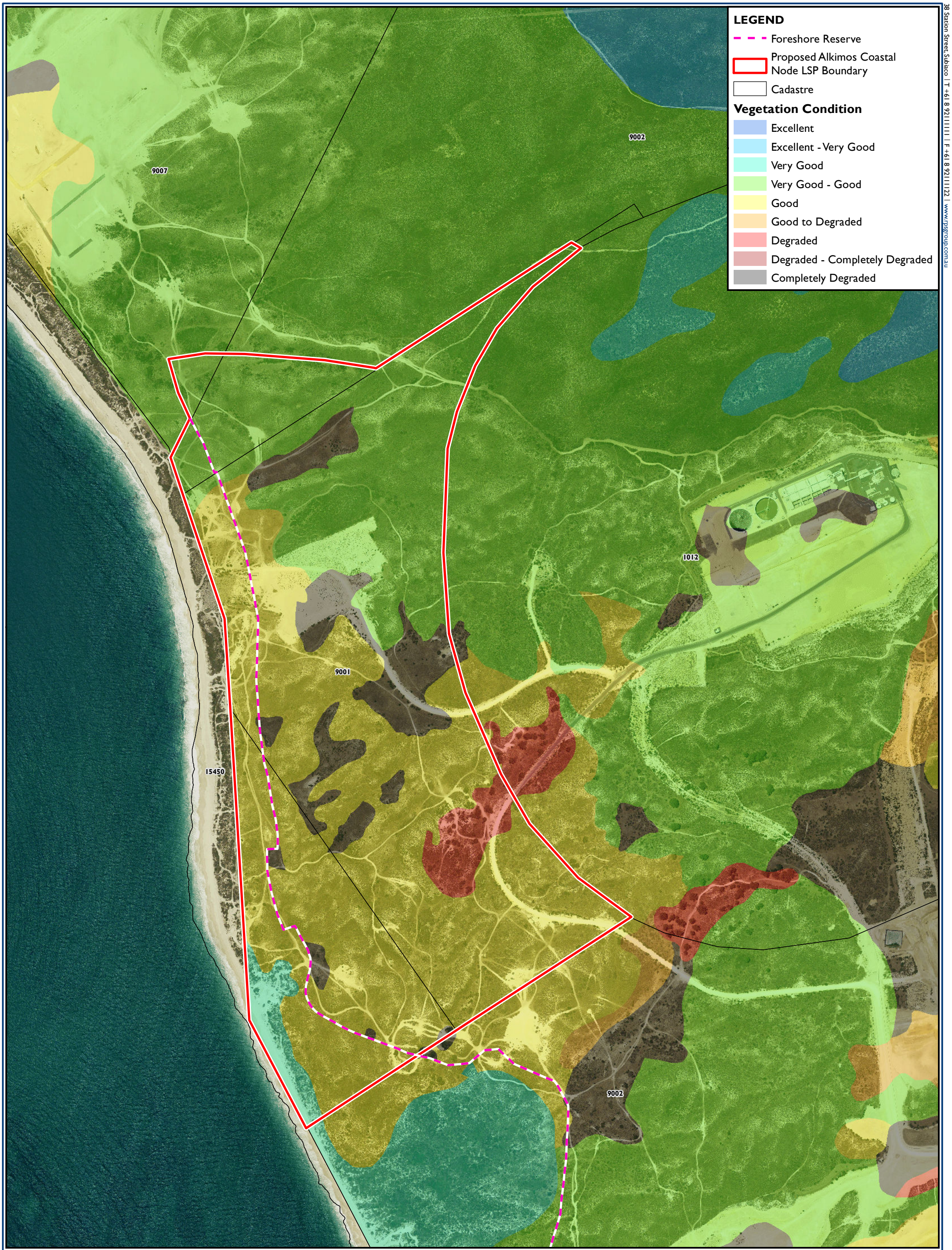
GDA 1994 MGA Zone 50

0 50 100 200 300 400 m

Source: Cadastre, Orthophoto - Landgate, 2013 Alkimos Masterplan- David Lock, 24.09.13 Alkimos Coastal Node LSP Boundary - DPS, 05.09.2013 Vegetation Data - ATA Environmental, 2005

Figure 7

Vegetation Associations



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Job Number: L12098 Alkimos Coastal Node
Doc Number: ACV-008
Date: 14.05.14
Scale: 1:7,000 @ A3
Created by: MR
Source: Cadastre, Orthophoto - Landgate, 2013 Alkimos Masterplan- David Lock, 24.09.13 Vegetation Data - ATA Environmental, 2005

GDA 1994 MGA Zone 50

0 50 100 200 300 400 m

Figure 8

Vegetation Condition

LEGEND

- Site Boundary
- Cadastre

Local Structure Plan

- Public Purposes
- Strategic Open Space
- Public Open Space (Conservation)

Potential Carnaby's Black Cockatoo Foraging Habitat

- *Banksia attenuata, B. menziesii* Low Woodland- BaBm
- *Dryandra sessilis* Open to Closed Heath- Ds
- *Eucalyptus gomphocephala* (Tuart) Open Woodland to Woodland over *Banksia attenuata, Acacia saligna* and *Xanthorrhoea preissii*- Eg
- *Melaleuca cardiophylla/Dryandra sessilis* Closed Heath- McDs

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RPS

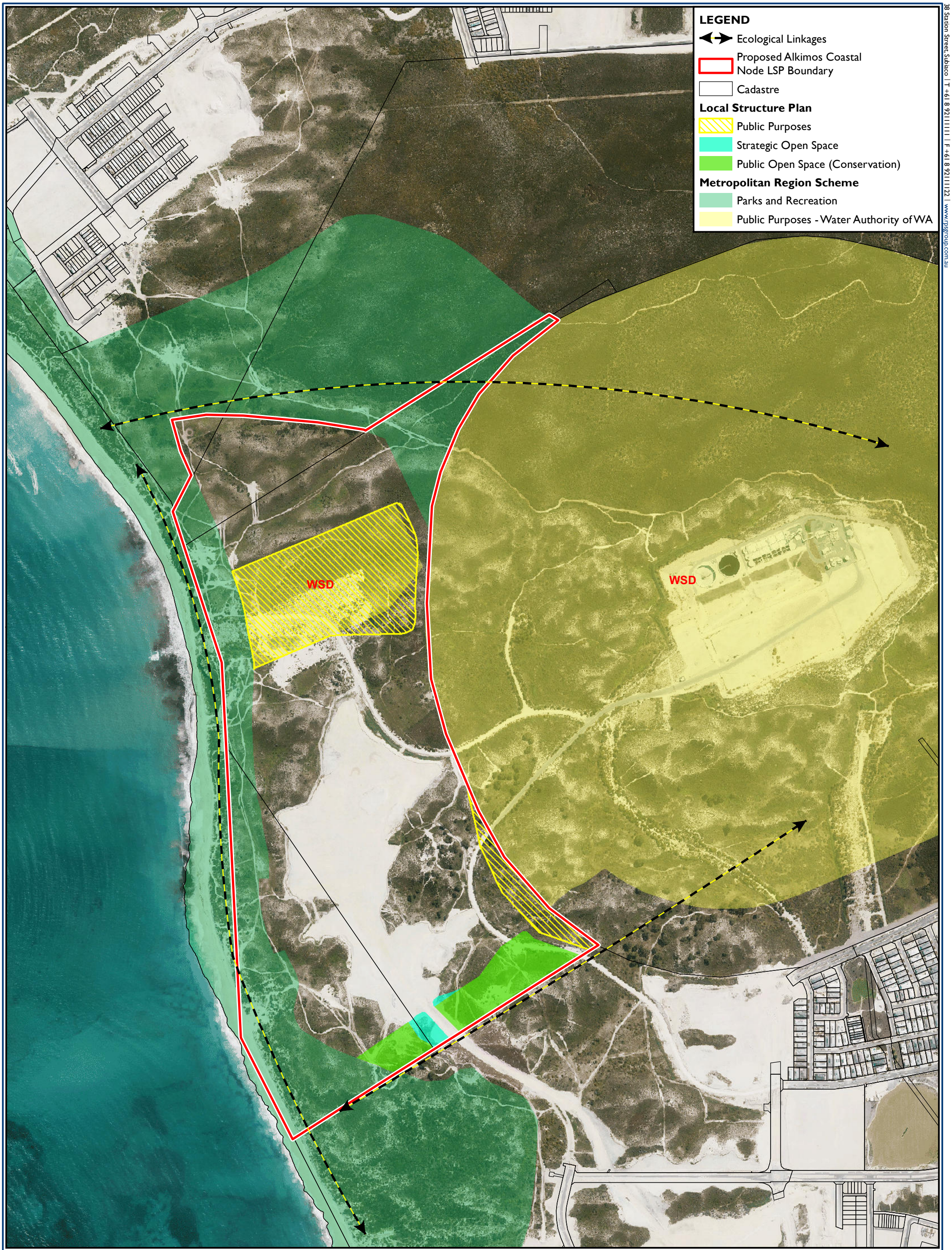
Job Number: L12098 Alkimos Coastal Node
Doc Number: ACV-009
Date: 19.02.16
Scale: 1:6,000 @ A3
Created by: MA
Source: Cadastre, Orthophoto - Landgate, 2013 Alkimos Structure Plan Creative Design LCPAC-2-007A 17.02.16 Alkimos Coastal Node LSP Boundary - DPS, 05.09.2013

GDA 1994 MGA Zone 50

0 40 80 160 240 320 m

Figure 9

Potential Black Cockatoo Habitat



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RPS

Job Number: L12098 Alkimos Coastal Node
Doc Number: ACV-010
Date: 19.02.16
Scale: 1:7,500 @ A3
Created by: MA
Source: Cadastre, Orthophoto - Landgate, 2015 Alkimos Structure Plan Creative Design LCPAC-2-007A 17.02.16 Alkimos Coastal Node LSP Boundary - DPS, 05.09.13 MRS - Landgate, Feb 2016

GDA 1994 Perth Coastal Grid 1994

0 50 100 200 300 400 m

Figure 10

Public Open Space Areas and Ecological Linkages

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LEGEND

- Proposed Alkimos Coastal Node LSP Boundary
- Conservation Area Management Plan (3.58 ha)
- Foreshore Management Plan
- Cadastre

RPS

Job Number: L12098 Alkimos Coastal Node
Doc Number: ACV-011
Date: 27.03.15
Scale: 1:6,000 @ A3
Created by: RA
Source: Cadastre, Orthophoto - Landgate, 2013 Alkimos Structure Plan C D + P 23.12.14 Alkimos Coastal Node LSP Boundary - DPS, 05.09.2013

GDA 1994 MGA Zone 50

0 40 80 160 240 320 m

Figure 11

Areas Relevant to Management Plans

RPS

APPENDIX I

Minister for Environment's Statement 722

file copy.

(AH)

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APPEALS CONVENOR
ENVIRONMENTAL PROTECTION ACT 1986

GENERAL MANAGER
LANDCORP

ALKIMOS-EGLINTON MRS AMENDMENT No. 1029/33
(Assessment No. 1365)

The Minister for the Environment has issued a statement setting out the environmental conditions to which the above planning scheme should be subject if it is to be implemented.

As required under section 48F(2) of the *Environmental Protection Act 1986* and at the request of the Minister for the Environment, I now provide you with a copy of that statement.

Darren Walsh
APPEALS CONVENOR

Att

24 APR 2006

13th FLOOR, ALLENDALE SQUARE, 77 ST. GEORGE'S TERRACE, PERTH WA 6000
TEL: (08) 9221 8711 FAX: (08) 9221 8244
Email: appeals@environment.wa.gov.au Website: www.appealsconvenor.wa.gov.au

Hon Mark McGowan MLA
Minister for the Environment;
Racing and Gaming

197 St George's Terrace, Perth WESTERN AUSTRALIA 6000
Telephone: (+61 8) 9222 9111 Facsimile: (+61 8) 9222 9410
Email: mark.mcgowan@dpc.wa.gov.au • Website: www.ministers.wa.gov.au/mcgowan/

Statement No.

STATEMENT THAT A SCHEME MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF DIVISION 3 OF PART IV OF THE ENVIRONMENTAL PROTECTION ACT 1986)

ALKIMOS-EGLINTON METROPOLITAN REGION SCHEME AMENDMENT 1029/33

Scheme Purpose: To amend reservations and zonings in the Metropolitan Region Scheme consistent with the Alkimos-Eglinton Structure Plan.

Responsible Authority: Western Australian Planning Commission

Responsible Authority Address: 469 Wellington Street, PERTH WA 6000

Assessment Number: 1365

Report of the Environmental Protection Authority: Bulletin 1207

Subject to the following conditions, there is no known environmental reason why the amendment to the Metropolitan Region Scheme to which the above report of the Environmental Protection Authority relates should not be implemented:

1 **Additional Land to be Reserved**

1-1 All or portions of the following sites shall be reserved, in accordance with the requirements set out in Attachment 1 of the Minister for the Environment's "Statement that a Scheme may be Implemented" No. (insert number) published on (date):

1) Public Purpose reserve surrounding the Wastewater Treatment Plant;
2) Parks and Recreation Reserve north of Ningana Bushland;
3) Parks and Recreation Reserves south of Ningana Bushland;

Published on

24 APR 2006

4) Parks and Recreation Reserve north of the Waste Water Treatment Plant;
5) Town park immediately north of the Alkimos Regional Centre;
6) Rationalisation and reductions to the coastal foreshore Regional Open Space reservation; and,
7) East-west parabolic dune linkage.

2 Environmental Management Plans

2-1 Prior to approving subdivision or development applications (whichever is sooner) for infrastructure proposals, the Western Australian Planning Commission or local government, as the case requires, may require an Environmental Management Plan to be prepared and implemented to achieve the objective of managing the potential impacts of the proposed subdivision, development or infrastructure on the following:

1) land which is reserved as Regional Open Space in the Scheme; and,

2) bushland or land that may be part of an ecological linkage.

The Environmental Management Plan shall include:

1) a description of existing environmental values, and the identification of the environmental outcome to be achieved through the implementation of this plan;

2) clear delineation of boundaries or significant areas to be protected;

3) management of construction, access and rehabilitation;

4) vegetation mitigation strategies;

5) allocation of responsibilities and identification of timing and duration of implementation;

6) provision for routine monitoring and environmental values; and

7) provision of details of contingency plans in the event that the monitoring surveys indicate that the development is having or has had an adverse impact upon environmental values.

2-2 An Environmental Management Plan prepared pursuant to condition 2-1 shall be prepared to the satisfaction of the WAPC or the local authority as required, having due regard for advice from relevant government agencies and shall be implemented in accordance with a program defined in the Environmental Management Plan.

3 **Areas of Public Purpose Reservation to be protected for conservation purposes**

3-1 Portions of the Public Purpose reservation for the Wastewater Treatment Plant shall be set aside and managed for conservation purposes in accordance with the requirements set out in Attachment 1 of the Minister for the Environment's "Statement that a Scheme may be implemented" No. (insert number) published on (date):

4 **Lifting of Urban Deferment – Wastewater Treatment Plant Buffer**

4-1 Lifting of Urban Deferment within the southern portion of the Wastewater Treatment Plant Buffer shall not occur unless it is demonstrated to the requirements of the Environmental Protection Authority that the area within which Urban Deferment is to be lifted is not subject to odour at a level likely to cause adverse impacts on the amenity of odour sensitive land uses.

5 **Development within areas reserved for Parks and Recreation**

5-1 With the exception of the areas specified in condition 5-2, all land reserved for Parks and Recreation shall be managed to protect the integrity, function and environmental values of the bushland and landforms to the requirements of the Western Australian Planning Commission on the advice of the Environmental Protection Authority and shall only be used for conservation, landscape and complimentary purposes.

5-2 A maximum of 25 percent of the area of the land to be reserved for Parks and Recreation identified as Areas 6a and 6b on the attached Figure may be developed for Parks and Recreation purposes in accordance with an Environmental Management Plan prepared to the requirements of the Environmental Protection Authority.

HON MARK McGOWAN MLA
MINISTER FOR THE ENVIRONMENT;
RACING AND GAMING

24 APR 2006

STATEMENT THAT A SCHEME MAY BE IMPLEMENTED – METROPOLITAN REGION SCHEME AMENDMENT 1029/33

SPECIFICATIONS FOR RESERVATION FOR THE WASTE WATER TREATMENT PLANT AND ADDITIONAL LAND TO BE RESERVED

1 Additional Land to be Reserved

Prior to finalisation of the scheme the following land shall be reserved:

1-1 Public Purpose Reserve surrounding the Wastewater Treatment Plant

Land surrounding the Wastewater Treatment Plant as detailed in the attached Figure shall be reserved for Public Purposes to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for complementary purposes.

1-2 Parks and Recreation Reserve north of Ningana Bushland

A portion of Lot M1503 (Area 1b as detailed in the attached Figure), Eglinton shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

1-3 Parks and Recreation Reserve south of Ningana Bushland

A portion of Lot M1503, Eglinton (Area 2b as detailed in the attached Figure) shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

1-4 Parks and Recreation Reserve south of Ningana Bushland

A portion of Lots M1503 and 11, Eglinton (Area 3a as detailed in attached Figure) shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

1-5 Parks and Recreation Reserve north of the Waste Water Treatment Plant

A portion of Lots M1482 and 102, Alkimos (Areas 5a and 5d as detailed in attached Figure) shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the

Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

1-6 **Town Park immediately north of the Alkimos Regional Centre**

A portion of Lot 102, Alkimos (Areas 6b and 6c as detailed in attached Figure) shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

1-7 **Rationalisation and reductions to the coastal foreshore Regional Open Space reservation**

A portion of Lot 102, Alkimos (Area 7c as detailed in attached Figure) shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

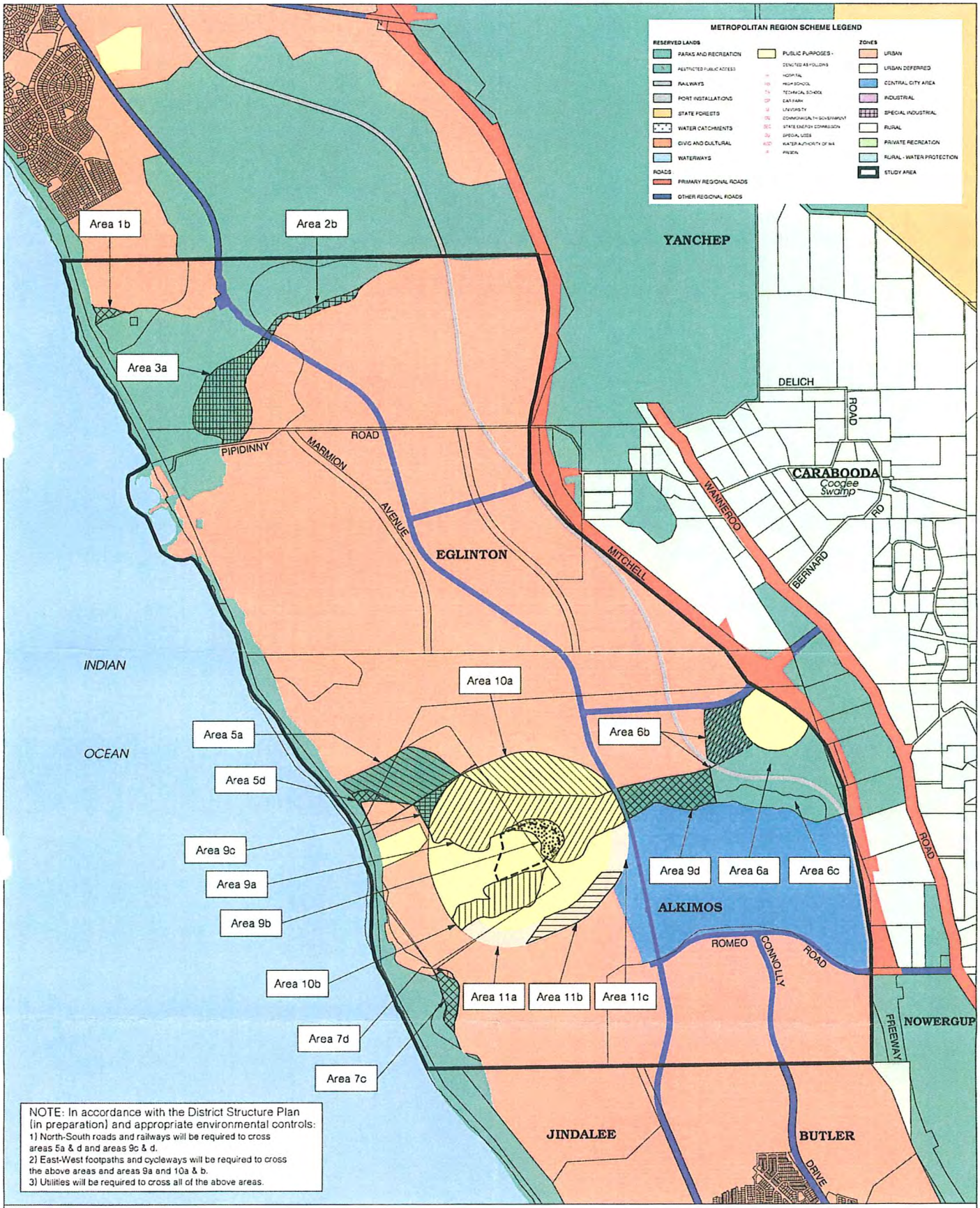
1-8 **East-west parabolic dune linkage**

A portion of Lots 101 and 102, Alkimos (Areas 9c and 9d as detailed in attached Figure) shall be reserved for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes.

2 **Areas of Public Purpose reservation to be protected for conservation purposes**

2-1 **Portions of Lots 101 & 102, Alkimos to be reserved for Public Purposes**

(Areas 9a, 10a and 10b in the attached Figure) shall be protected and managed for conservation purposes to protect the integrity, function and environmental value of the bushland to the requirements of the Western Australian Planning Commission on advice of the Environmental Protection Authority, and shall only be used for conservation, landscape and complementary purposes. Minor infrastructure may be installed within these areas, providing the work is undertaken in accordance with a Management Plan approved by the Environmental Protection Authority



Western Australian Planning Commission

GDA

MRS AMENDMENT 1029/33 ALKIMOS-EGLINTON
As determined by Minister for the Environment

N

1.5 km 0 1.5 km

SCALE 1:30000

Base information supplied by DLI PA 23-2003
mindeterm.dgn
20 Apr 2006
Produced by Statutory Mapping Section, Spatial Information & Research - Mapping & GeoSpatial Data,
Department for Planning and Infrastructure, on behalf of the Western Australian Planning Commission, Perth WA