ALKIMOS BEACH COMMONWEALTH FORESHORE MANAGEMENT PLAN

Environment Protection Biodiversity and Conservation Act 1999
(EPBC 2011/5902)

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Alkimos Beach Commonwealth Foreshore Management Plan
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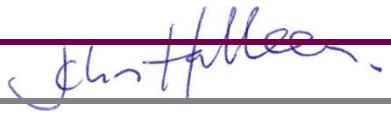
John Halleen  19 September 2019

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1 SUMMARY

1.1 Background

The Alkimos Beach Foreshore Management Plan (FMP) has been prepared to guide the ongoing management of the existing and proposed rehabilitation of Carnaby's Black-Cockatoo habitat. The FMP area is an approximate 41.93 hectare (ha) area of Regional Open Space (ROS) bounded by the "Urban" zoned portion of the Alkimos Beach to the east and the Conservation Public Open Space (CPOS) (or the Conservation Area Management Plan (CAMP) area) is immediately adjacent to the FMP boundary (Figures A and B). The focus of this management plan is to detail the supplementary planting and weed control equivalent to 1 ha of Carnaby's Black-Cockatoo foraging habitat within the FMP and the contribution to the 1 ha supplementary planting of Carnaby's Black-Cockatoo foraging habitat which has been undertaken across the Conservation POS (or the CAMP) and adjacent FMP areas.

This management plan has been prepared to meet the requirements of the South Alkimos *Environment Protection Biodiversity and Conservation Act 1999* (EPBC Act) (EPBC 2011/5902) approval decision.

1.1.1 Foreshore Management Plan – site context

Alkimos Beach (formerly known as "South Alkimos") is an approved master planned residential development located approximately 40 kilometres (km) north-west of Perth's Central Business District within the City of Wanneroo (Figure A).

The Commonwealth approved Alkimos Beach project area is 224 hectare (ha), located adjacent to 1.7 km of coastal foreshore and 41.93 ha of coastal foreshore reserve. Figure B shows the Local Structure Plan (LSP) for Alkimos Beach project area.

The Alkimos Beach residential project is being developed by Lendlease in partnership with LandCorp.

1.1.2 Alkimos Beach Foreshore Management Plan – study area

The FMP study area is centred on the foreshore reserve bounded by the "Urban" zoned portion of the Alkimos Beach to the east and the Indian Ocean to the west, the foreshore reserve continues to the north and south of the area (Figure C).

The foreshore area totals approximately 41.93 ha and is approximately 1.7 km in length. The foreshore width varies from between 50 metres (m) wide and 400 m.

1.1.3 Alkimos Beach foreshore concept plan

Lendlease have developed a Foreshore Concept Plan (Figure D) in response to regional and local demand for beach access as well as providing important infrastructure such as fire and emergency access paths. Key elements of the Foreshore Concept Plan are summarised below:

- Fenced "southern" pedestrian pathway (3.0 m wide, compacted limestone) providing residents with walkable access (and emergency vehicle access) to the beach. Fencing, to the City of Wanneroo specification, will be installed either side of the path. Lockable bollards are positioned at the entry points of the path to prevent public vehicle access.

- North to south dual use path (3.0 m wide, red asphalt). This path will be fenced to the City's specifications adjacent to the foreshore reserve.

- A fenced public vehicle access asphalt road (6.0 m wide with a 2.4 m wide concrete pedestrian path to one side), located centrally in the foreshore reserve and providing convenient visitor access to the car park has been constructed. Fencing, to the City of Wanneroo specification, will be installed either side of the road / pedestrian path. Key services such as street lighting, power, communications and water have will be installed and follow this road alignment.

- A limestone path and a coastal lookout located approximately 25 m west of the car park.

- Pedestrian and surf lifesaving vehicle access on a 3.0 m wide emulsion stabilised limestone path which will be ramped to the beach from the car park to allow surf lifesaving/emergency vehicles access to the beach has been constructed. Lockable bollards have been installed to prevent public vehicle access but allow access for maintenance and/or surf lifesaving vehicles from the interim facility for mobile beach patrols. Conservation fencing will be installed to the City of Wanneroo specification, either side of the pedestrian path.

- A facility for mobile beach patrols for Surf Life Saving WA at Alkimos Regional Beach will be constructed adjacent to the car park area.

- The single car parking area (located behind the modelled 50-year coastal processes line) providing approximately 30 standard bays that includes ACROD and a single bus parking bays has been constructed.

- The dual use paths at the north and south of the Alkimos Beach FMP will be relocated to be outside of the coastal reserve. The paths will be located adjacent to the foreshore reserve in areas of either Public Open Space or road reserve. The amended network maintains a continuous north – south path linking the neighbouring developments.

1.2 Purpose of the Foreshore Management Plan

The purpose of this Alkimos Beach FMP is to establish a management framework that responds specifically to Conditions 11 and 10(b) of the South Alkimos EPBC Act (EPBC 2011/5902) approval decision which focuses on the management of the rehabilitation of 1 ha within the coastal foreshore area (or FMP boundary) and a portion of the supplementary plantings (at least 1 ha) of Carnaby's Black Cockatoo foraging habitat which is located within the Conservation POS (CAMP) area) and the FMP area.

The Commonwealth EPBC Act approval conditions for the Alkimos Beach development is provided in Appendix 1.

A summary of the Ministerial Conditions and Carnaby's Black-Cockatoo rehabilitation areas is presented below:

- Condition 10(a) – requires 2 ha of Carnaby's Black-Cockatoo foraging habitat rehabilitation.

- Condition 10(b) – requires 1 ha of Carnaby's Black-Cockatoo foraging habitat supplementary planting (spread within the Conservation POS ROS (which is the Alkimos coastal foreshore) areas).

- Condition 11(a) – requires 1 ha of Carnaby's Black-Cockatoo foraging habitat supplementary planting.

In November 2018 a variation to the EPBC Act Conditions 2011/5902 was approved. The variation to the Conditions 10, 11 and 12 was approved to specifically facilitate the handover of the Conservation POS (CAMP area) and also the Foreshore Management Plan (FMP) and the Precinct Landscape and Revegetation Plan areas. The variations to the conditions are included in Appendix A.

The 1 ha of supplementary planting of Carnaby's Black Cockatoo foraging habitat is addressed in both this CAMP and in the coastal foreshore reserve which is addressed in the FMP.

Figure 1 demonstrates the proposed Carnaby's Black-Cockatoo revegetation areas within the CAMP, the FMP (or ROS area) and the additional supplementary planting area located across the CAMP and FMP area against the required Ministerial Condition areas. In summary, the proposed revegetation areas demonstrate the following:

1. Ministerial Condition 10a – (2 ha Carnaby's Black-Cockatoo revegetation requirement). The CAMP will deliver a 2 ha revegetation area.

2. Ministerial Condition 10b – (1 ha supplementary Carnaby's Black-Cockatoo revegetation requirement). The CAMP and the FMP will deliver a 1 ha Carnaby's Black-Cockatoo revegetation area. The proposed Carnaby's Black-Cockatoo revegetation area is estimated at 1.34 ha.

3. Ministerial Condition 11a - (1 ha supplementary Carnaby's Black-Cockatoo revegetation requirement). The FMP will deliver Carnaby's Black-Cockatoo revegetation area of 1 ha. The proposed Carnaby's Black-Cockatoo revegetation area in the FMP is estimated at 1.22 ha.

In accordance with Ministerial Condition 2 Lendlease will provide the Commonwealth annual reports on the Carnaby's Black-Cockatoo revegetation area, and compliance with Conditions 10a, 10b and 11a.

Ministerial Condition	Required Carnaby's black cockatoo habitat revegetation areas	Proposed Carnaby's black cockatoo habitat revegetation areas
Ministerial condition 10a	2 ha	2.08 ha
Ministerial condition 10b (within both the FMP (regional open space area) and CAMP (conservation public open space area) boundaries)	1 ha	1.34 ha
Ministerial condition 11a	1 ha	1.22 ha
Total area	4 ha	4.64 ha

Figure 1: Alkimos Beach EPBC Act 2011/5902 – Re uired and actual Carnaby's black cockatoo revegetation areas within the CAMP and the coastal foreshore (or ROS)

Tranen has prepared both CAMP and FMP Revegetation Management Plans. The FMP Revegetation Management Plan is provided in Appendix B.

The FMP Revegetation Plan (for the Conservation POS) addresses the Carnaby's Black-Cockatoo rehabilitation components of the FMP, which includes:

- Delineating the rehabilitation areas within the FMP site
- Providing specific details of the rehabilitation program including seedling propagation, site preparation and erosion control, weed and rabbit management
- Planting densities, completion criteria, rehabilitation monitoring and corrective measures.

1.2.1 Amendment to the Matters of National Environmental Significant (MNES)

In May 2013, the Graceful Sun Moth was removed from the Commonwealth's threatened species list and is therefore no longer a species of Matter of National Environmental Significance (MNES) under the EPBC Act. The then Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) now the Department of Environment and Energy (DEE)) confirmed in a letter dated 13 June 2013 the key EPBC Act approval conditions relating to the Graceful Sun Moth were no longer applicable to the Alkimos Beach project (EPBC 2011/5902). The relevant MNES to this FMP specifically relates to Carnaby's Black-Cockatoo foraging habitat.

This Alkimos Beach FMP responds to the amended Condition 11 in the EPBC Act approval (June 2013), regarding the protection and management of foraging habitat for Carnaby's Black-Cockatoo.

1.2.2 Key performance indicator

The key performance indicators for this management plan is the successful rehabilitation of at least 1 ha of Carnaby's Black-Cockatoo foraging habitat (within areas of the Conservation POS), and to contribute (at least 0.93 ha) to the additional 1 ha of supplementary Carnaby's Black-Cockatoo planting over a five-year period.

1.2.3 Key management measure

Table 1 provides the key actions, contingency measures and monitoring actions for the Alkimos Beach Carnaby's Black-Cockatoo revegetation area in the foreshore reserve.

1.2.4 Responsibility

Responsibility for the Carnaby's Black-Cockatoo rehabilitation program and associated management actions will be with Lendlease for five years following the commencement of the rehabilitation program and until achievement of rehabilitation and revegetation completion criteria. For this purpose, Lendlease contractors and staff will act under the direction of Lendlease.

Lendlease will hand over management of the foreshore ROS area, inclusive of the Carnaby's Black-Cockatoo rehabilitation areas, to the City of Wanneroo.

Table 1: Alkimos Beach Foreshore Management Plan implementation schedule

Activity	Management objective	Key actions	Key performance indicator/s	Corrective measures	Monitoring	Timing
FMP Carnaby's Black-Cockatoo Foraging Habitat Rehabilitation and Weed Management Program						
Rehabilitation	The objective of the rehabilitation program is to: • Rehabilitate at least 1 ha of Carnaby's Black-Cockatoo foraging habitat species within the FMP area. • Contribute to supplementary planting equivalent to at least 1 ha of Carnaby's Black-Cockatoo foraging habitat across conservation POS and ROS. • Minimise the impact of activities that could degrade Carnaby's Black-Cockatoo habitat.	• Prepare and implement the CAMP Revegetation Management Plan (Tranen 2015) • Rehabilitate at least 1 ha of Carnaby's Black-Cockatoo foraging habitat. This will be undertaken in various locations within the FMP area. • Tube stock will be planted at an average density of two plants per m2 (range from 1.7 m2 to 2 m2) dependent on the specific plant species used. • Conduct a proportion of the rehabilitation works on old vehicle access tracks. Unused vehicle tracks will be blocked at both ends to prevent future vehicle access in these areas. • Weed spraying undertaken, rubbish and debris removed and disposed of appropriately • Brushing and / or mulching will be used to stabilise actively eroding and erosion prone locations to assist the planting of seedlings in the degraded areas of the primary dune.	Within the Carnaby's Black-Cockatoo rehabilitation areas (post 5 years of management and monitoring) the completion criteria are: • 70% survival post 2 years • 50% plant coverage (% area of visual ground cover measured by a botanist/ revegetation consultant) • 10% or less weed cover. Closure of all old vehicle access tracks for rehabilitation.	• Undertake additional rehabilitation works to meet the 1 ha rehabilitation requirements outlined in Conditions 11 and 10(b) of the EPBC Act approval in accordance with the rehabilitation completion criteria. Undertake additional weed management i.e. herbicide treatments within the rehabilitation areas • Undertake other general maintenance activities such as further rabbit control or brushing for erosion control • Undertake additional rehabilitation and/or weed monitoring	• A monitoring plot of 2.5 m × 5 m will be established per rehabilitation area as well as one permanent photograph reference point at each monitoring plot. • The rehabilitation monitoring will occur bi-annually (includes weed monitoring) each spring and autumn and maintained for a five-year period after seeding/planting within each site. • A monitoring report will be undertaken biannually (spring and autumn) to assess if there are any issues requiring attention. The outcomes will be recorded in the Alkimos Beach compliance report	Rehabilitation program is ongoing (commenced in 2015 and will continue until the completion criteria are achieved)

Activity	Management objective	Key actions	Key performance indicator/s	Corrective measures	Monitoring	Timing
Weed management	• Minimise the impact from weeds that could degrade Carnaby's Black-Cockatoo existing and revegetated foraging habitat.	• Weed control events will take place in spring of the year prior to the rehabilitation. Post the rehabilitation planting weed control will be undertaken each spring and autumn to reduce competition and optimise seedling establishment rates.	• 10% or less weed cover	• Undertake additional weed management i.e. herbicide treatments. • Undertake additional rehabilitation works to meet the 1 ha rehabilitation and a portion of the supplementary planting requirements outlined in Conditions 11 and 10(b) of the EPBC Act approval in accordance with the rehabilitation completion criteria.	• A monitoring plot of 2.5 m × 5 m will be established per revegetation area as well as one permanent photograph reference point at each monitoring plot. • The revegetation monitoring includes weed monitoring each spring and autumn and maintained for a five-year period after seeding/planting within each site.	The weed management program is ongoing (commenced in 2015).
Feral Pest						
Pest management, particularly rabbits, will contribute to the improved habitat quality for Carnaby's Black-Cockatoos.	• Control rabbits to a level where they do not prejudice the Carnaby's Black-Cockatoo revegetation completion criteria	• A combination of rabbit exclusion fencing, tree guards, and targeted rabbit control will be employed over a five year period. • A rabbit control program will also be initiated in advance of site works to provide longer term protection to seedlings. This will include a combination of warren destruction, rabbit haemorrhagic disease virus (RHDV) release, and Pindone baiting.	• Within the Carnaby's Black-Cockatoo revegetation areas there are measurable targets of: • 70% survival post 2 years • 50% plant coverage (% area of visual ground cover measured by a botanist/ revegetation consultant) • Installation of rabbit exclusion fencing • Where appropriate tube stock will be fitted with a plastic guard.	• Implement additional rabbit control measures including further fencing or biological controls based on the following observations: • Presence of rabbits – visual observation • Evidence of rabbits eating the planted seedlings and destroying the tree guards • Rabbit warrens • Re-plant seedlings / revegetate areas impacted by rabbits to meet the EPBC Act Ministerial conditions 11 and 10(b) which is to provide a minimum	• Monitoring will occur as part of the Carnaby's Black-Cockatoo existing and rehabilitation habitat areas biannual monitoring program (occurring in spring and autumn) and maintained for a five-year period. • The key monitoring points will focus on the impacts to planted Carnaby's Black-Cockatoo habitat seedlings, tree guards and ensuring the rabbit fence remains intact. The monitoring program occurs for a five-year period	Pest management is ongoing (commenced in 2015).

Activity	Management objective	Key actions	Key performance indicator/s	Corrective measures	Monitoring	Timing
				1 ha and a portion of the supplementary planting rehabilitation requirements outlined in Conditions 11 and 10(b) of the EPBC Act approval in accordance with the rehabilitation completion criteria. • Repair rabbit fencing and replace damaged tree guards as required	• Evidence of the presence of rabbits such as visual observations of the seedlings being eaten, rabbit warrens in the local area and opportunistically foxes and feral cats will also be monitored and reported as part of the rehabilitation monitoring program. • The monitoring report will be submitted to Lendlease following each formal monitoring event. The outcomes will be recorded in the Alkimos Beach compliance report	
Bushfire						
Bushfire management	• Protect the ecological integrity and biological values of the Carnaby's Black-Cockatoo existing and rehabilitated areas.	• No rubbish or vegetation will be burnt on site • Construct the perimeter roads and pathways between the CAMP and residential areas to act as the key firebreak(s) • During construction works semi-permanent fencing will be installed around the CAMP / Conservation POS boundary interface with the road and urban development (subdivision) works to prevent access into the revegetated areas and the broader CAMP area.	• Within the Carnaby's Black-Cockatoo rehabilitation areas there are measurable targets of: – 70% survival post 2 years – 50% plant coverage (% area of visual ground cover measured by a botanist/ revegetation consultant)	• If fire occurs within the existing and rehabilitation areas – re-planting of Carnaby's Black-Cockatoo habitat will be required to fulfil the EPBC Act Ministerial conditions 11 and 10(b) which is to provide a minimum 1 ha and a portion of the supplementary planting rehabilitation requirements outlined in Conditions 11 and 10(b) of the EPBC Act	• Any bushfire event in the foreshore will be reported to DFES and the City of Wanneroo. • The annual monitoring report of the rehabilitation area will also include details (e.g. dates, time, location and duration) of any fire events. • The monitoring of the Carnaby's Black-Cockatoo existing and rehabilitation foraging areas will be undertaken bi-annually	Bushfire management is ongoing (commenced in 2016).

Activity	Management objective	Key actions	Key performance indicator/s	Corrective measures	Monitoring	Timing
			• Provide records of any fires in the CAMP area to the City of Wanneroo / Department of Fire and Emergency Services (DFES). • Evidence of a semi-permanent fencing installed along the perimeter of the CAMP area adjacent to the constructed road and urban development.	approval in accordance with the rehabilitation completion criteria. • Repair damage to the fence as required.	each spring and autumn and maintained for a five-year period.	
Erosion Control						
Erosion management People management	• Protect the ecological integrity and biological values of the Carnaby's Black-Cockatoo existing and rehabilitation areas.	• Undertake rehabilitation of bare/open areas in accordance with the CAMP Revegetation Management Plan (Tranen 2015). • During construction works a semi-permanent fencing will be installed around the CAMP / Conservation POS boundary interface with the road and urban development (subdivision) works to prevent access into the revegetated areas and the broader CAMP area. • Conservation fencing to the City of Wanneroo's requirements will be installed along the borders of the Conservation POS which is adjacent to the Alkimos Beach subdivision and the eastern and western roads which bound the Conservation POS prior to	• Within the Carnaby's Black-Cockatoo rehabilitation areas there are measurable targets of: – 70% survival post 2 years – 50% plant coverage (% area of visual ground cover measured by a botanist/ revegetation consultant) • Evidence of a semi-permanent fencing installed along the perimeter of the CAMP area adjacent to the constructed road and urban development. • Closure of old vehicle access tracks for rehabilitation in accordance with the	• Undertake additional brush / mulch as required over rehabilitation areas as required. • Undertake additional rehabilitation in areas impacted by erosion to meet the EPBC Act Ministerial conditions 11 and 10(b) which is to provide a minimum 1 ha and a portion of the supplementary planting rehabilitation requirements outlined in Conditions 11 and 10(b) of the EPBC Act approval in accordance with the rehabilitation completion criteria. • Damaged fencing will be repaired or replaced	• Monitoring for erosion will occur as part of the Carnaby's Black-Cockatoo existing and rehabilitation foraging areas bi-annual monitoring program (occurring in spring and autumn). The monitoring program occurs for a five-year period. • The monitoring report will be submitted to Lendlease following each formal monitoring event, to assess if there are any erosion issue(s) requiring attention.	Erosion management is ongoing (commenced in 2015).

Activity	Management objective	Key actions	Key performance indicator/s	Corrective measures	Monitoring	Timing
		handover to the City of Wanneroo. • A proportion of the rehabilitation works will be undertaken on old vehicle access tracks. These tracks are to be blocked at both ends to prevent future vehicle access in these areas	CAMP Revegetation Management Plan (Tranen 2015)			
Access Management						
People management	• Provide an appropriate level of access while protecting and enhancing the ecological values of the Carnaby's Black Cockatoo existing foraging habitat and the rehabilitation areas	• Closure of old vehicle access tracks for rehabilitation in accordance with the FMP Revegetation Management Plan (Tranen 2015). • During construction works a semi-permanent fencing will be installed around the CAMP / Conservation POS boundary interface with the road and urban development (subdivision) works to prevent access into the revegetated areas and the broader CAMP area. • Conservation fencing to the City of Wanneroo's requirements will be installed along the borders of the Conservation POS which is adjacent to the Alkimos Beach subdivision and the eastern and western roads which bound the Conservation POS prior to handover to the City of Wanneroo.	• Within the Carnaby's Black-Cockatoo rehabilitation areas there are measurable targets of: – 70% survival post 2 years – 50% plant coverage (% area of visual ground cover measured by a botanist/ revegetation consultant) • Closure and rehabilitation of tracks not required for pedestrian access. Installation of temporary fencing in/around the rehabilitation areas. • Evidence of a semi-permanent fencing installed along the perimeter of the CAMP area adjacent to the constructed road and urban development. • Conservation fencing installed along the	• Undertake additional rehabilitation work of areas impacted from any unauthorised access to meet the EPBC Act Ministerial conditions 11 and 10(b) which is to provide a minimum 1 ha and a portion of the supplementary planting rehabilitation requirements outlined in Conditions 11 and 10(b) of the EPBC Act approval in accordance with the rehabilitation completion criteria. • Undertake additional weed management if the monitoring determines the weed cover is above the 10% cover • Ensure the fences if damaged are repaired or replaced.	• Monitoring for unauthorised access will occur as part of the rehabilitation monitoring (bi-annually spring and autumn) which will be occur for a five-year period. • The monitoring report will be submitted to Lendlease following each formal monitoring event, to assess if there are any erosion issue(s) requiring attention.	People / access management is ongoing (commenced in 2015).

Activity	Management objective	Key actions	Key performance indicator/s	Corrective measures	Monitoring	Timing
			borders of the Conservation POS which is adjacent to the Alkimos Beach subdivision and the eastern and western roads which bound the Conservation POS			

2 INTRODUCTION

Alkimos Beach (formerly known as “South Alkimos”) is an approved master-planned residential development located approximately 40 kilometres (km) north-west of Perth’s Central Business District within the City of Wanneroo (Figure A). The Commonwealth approved Alkimos Beach project area is 224 hectare (ha).

An outcome of the Commonwealth approvals process requires a Foreshore Management Plan (FMP) to be prepared and implemented. The FMP area is an approximate 41.93 hectare (ha) area of Regional Open Space (ROS) which is bounded by the “Urban” zoned portion of the Alkimos Beach to the east and the conservation public open space (CPOS or CAMP) area (Figure B).

The Alkimos Beach residential project is being developed by Lendlease in partnership with LandCorp.

An outcome of the Commonwealth approvals process requires a Foreshore Management Plan (FMP) to be prepared and implemented.

2.1 Alkimos Beach foreshore concept plan

Lendlease have developed a Foreshore Concept Plan in response to regional and local demand for beach access as well as providing important infrastructure such as fire and emergency access paths. Key elements of the Foreshore Concept Plan are summarised below and provided in Figure D:

- Fenced “southern” pedestrian pathway (3.0 m wide, compacted limestone) providing residents with walkable access (and emergency vehicle access) to the beach. Fencing, to the City of Wanneroo specification, will be installed either side of the path. Lockable bollards are positioned at the entry points of the path to prevent public vehicle access.

- North to south dual use path (3.0 m wide, red asphalt). This path will be fenced to the City’s specifications adjacent to the foreshore reserve.

- A fenced public vehicle access asphalt road (6.0 m wide with a 2.4 m wide concrete pedestrian path to one side), located centrally in the foreshore reserve and providing convenient visitor access to the car park has been constructed. Fencing, to the City of Wanneroo specification, will be installed either side of the road / pedestrian path. Key services such as street lighting, power, communications and water have will be installed and follow this road alignment.

- A limestone path and a coastal lookout located approximately 25 m west of the car park.

- Pedestrian and surf lifesaving vehicle access on a 3.0 m wide emulsion stabilised limestone path which will be ramped to the beach from the car park to allow surf lifesaving/emergency vehicles access to the beach has been constructed. Lockable bollards have been installed to prevent public vehicle access but allow access for maintenance and/or surf lifesaving vehicles from the interim facility for mobile beach patrols. Conservation fencing will be installed to the City of Wanneroo specification, either side of the pedestrian path.

- A facility for mobile beach patrols for Surf Life Saving WA at Alkimos Regional Beach will be constructed adjacent to the car park area.

- The single car parking area (located behind the modelled 50-year coastal processes line) providing approximately 30 standard bays that includes ACROD and a single bus parking bays has been constructed.

- The dual use paths at the north and south of the Alkimos Beach FMP will be relocated to be outside of the coastal reserve. The paths will be located adjacent to the foreshore reserve in areas of either Public Open Space or road reserve. The amended network maintains a continuous north – south path linking the neighbouring developments.

As discussed above, the Foreshore Concept Plan outlines low intensity, local access to the beach area for passive recreation purposes. The infrastructure and uses within the foreshore reserve was endorsed by the City of Wanneroo in the Alkimos Beach Local Structure Plan (Section 2).

2.2 Alkimos Beach FMP objective and scope

The objective for the Alkimos Beach Foreshore Management Plan is to develop a management framework that responds specifically to Condition 11 of the Alkimos Beach *Environment Protection Biodiversity and Conservation Act 1999* (EPBC Act) (EPBC Act reference 2011/5902) approval document which states:

> *To protect habitat for listed threatened species, the person taking the action must prepare and submit a Foreshore Management Plan (FMP) detailing management of Regional Open Space (ROS) on the project area (designated Regional Parks and Recreation at Attachment A), for approval by the Minister. The FMP must include:*
>
> *(a) Details of supplementary planting and weed control equivalent to at least 1 ha of Carnaby's Black-Cockatoo foraging habitat on the project area (to be spread across POS and ROS), including timeframes and survival targets proposed for plantings.*
>
> *(b) Details of funding to be provided for long term conservation management of ROS and details of the entity who will be responsible for management of ROS.*
>
> *(c) Measures to manage weed and feral pests*
>
> *(d) Bushfire prevention and management measures*
>
> *(e) Erosion control measures*
>
> *(f) Access management (including visitor facilities, boardwalks, pathways, signage and fencing)*
>
> *(g) Performance indicators and corrective measures*
>
> *(h) Monitoring and reporting measures*
>
> *(i) Roles and responsibilities of contractors, staff and the person taking the action,*
>
> (j) *Timeframes for the implementation and management of the above measures*.

As outlined in the above Condition 11, this Alkimos Beach FMP primarily addresses the only matter of National Environmental Significance (NES) detailed in the EPBC Act approval documentation, the Carnaby's Black-Cockatoo.

The key purpose for this FMP is to define the management actions to rehabilitate at least 1 ha of Carnaby's Black-Cockatoo foraging habitat and contribute to at least 1 ha of supplementary planting equivalent to at least 0.93 ha with the remaining 0.08 ha will be undertaken in the adjacent Conservation POS (or the Conservation Area Management Plan area). The key management measures addressed the identified threats including weeds, feral pests, bushfires, erosion and access.

2.3 Report structure

To address the outlined above objectives and scope, the FMP has been divided into the following key sections:

1. Introduction.
2. Planning Approval and Land Use oning Context.
3. Environmental Context.

4. Matter of National Environmental Significance.
5. Alkimos Beach Foreshore Area Management Measures.
6. Monitoring and Reporting Program.
7. References.

3 PLANNING APPROVAL AND LAND USE ZONING CONTE T

The Alkimos Beach project (included as part of the broader Alkimos–Eglinton site) was subject to a Metropolitan Region Scheme (MRS) Amendment 1029/33. MRS Amendment 1029/33 was formally assessed as an "Environmental Review" under Section 48A of the *Environmental Protection Act 1986* by the Environmental Protection Authority (EPA). The EPA approved the re-zoning proposed in MRS Amendment 1029/33 in 2005 (Bulletin 1207).

The Alkimos Beach FMP in accordance with the MRS zoning is currently zoned for "Parks and Recreation" and adjoins coastal vegetation and ecological linkages to the north, south and east.

3.1 Alkimos coastal planning context

3.1.1 Alkimos–Eglinton district structure plan

The Alkimos–Eglinton District Structure Plan (DSP) was prepared in 2009–2010 to provide further definition for the future land use, urban design and environmental management against the zonings set out in the MRS.

The Alkimos–Eglinton District Coastal Strategy was developed to complement the proposed land uses within the DSP earmarked a "Regional" recreational node adjacent to the Alkimos Beach foreshore reserve. The DSP was adopted by the City of Wanneroo and approved by the Western Australian Planning Commission (WAPC) in March 2011.

3.1.2 South Alkimos local structure plan

The South Alkimos (now known as Alkimos Beach) Local Structure Plan (LSP) provides the next level of detailed planning for the 224 ha parcel of land, located in the south-west of the Alkimos–Eglinton DSP area (Figure B).

A number of environmental opportunities have been identified for the Alkimos LSP site, including the following:

- Retaining good examples of consolidated Quindalup dunes in Conservation Public Open Space (POS) to preserve elements of the natural landscape character and vegetation of the Alkimos LSP site
- Maintain ecological linkages across the site through the retention of strategic areas of remnant vegetation in the foreshore reserve and the Conservation POS.

The LSP also anticipates a variety of uses of the foreshore area and beach, these include:

- Pathways being used for direct access to the beach
- Recreational walks
- Exercise area (running)
- Pathways being used for access to recreational node (adjacent to foreshore area)
- Bird watching.

3.2 Commonwealth approval and ministerial conditions

The Alkimos Beach LSP area supports habitat for the Graceful Sun Moth and Carnaby's Black-Cockatoo which were both protected under the EPBC Act at the time of original 2011 Commonwealth referral. The South Alkimos LSP was referred to the Commonwealth Minister for the Environment for assessment under

the EPBC Act in March 2011. The project was assessed by the then DSEWPC as a “Controlled Action” in May 2011 due to the potential impacts on the Graceful Sun Moth and Carnaby’s Black-Cockatoo. The project was approved subject to Ministerial conditions on 30 June 2012.

3.3 Amendment to the Matters of National Environmental Significant (MNES)

In May 2013, the Graceful Sun Moth was removed from the Commonwealth’s threatened species list and is therefore no longer a species of MNES under the EPBC Act. DSEWPC confirmed in a letter dated 13 June 2013 the key EPBC Act approval conditions relating to the Graceful Sun Moth were no longer applicable to the Alkimos Beach project (EPBC 2011/5902).

The relevant MNES to this FMP now only specifically relates to Carnaby’s Black-Cockatoo foraging habitat.

The original and revised EPBC Act Approval and Conditions is provided in Appendix 1.

3.4 Relevant documents

3.4.1 Alkimos Beach conservation area management plan (CAMP)

The conservation POS (which is a dedicated conservation area) abuts the Alkimos Beach FMP area (Figure C).

The Alkimos Beach FMP responds specifically to Condition 11 of the Alkimos Beach EPBC Act (EPBC 2011/5902). The Alkimos Beach CAMP details on the 2 ha of revegetation of Carnaby’s Black-Cockatoo foraging habitat including time frames and survival rates proposed for plantings.

4 ENVIRONMENTAL CONTE T

To appropriately plan and manage the Alkimos Beach foreshore area particularly in the context of the adjacent Alkimos Beach residential development and a regional coastal node (which will attract a large number of visitors to the foreshore area and beach) it is important to detail and understand the receiving environment. This section details the key environmental features, in particular for Carnaby's Black-Cockatoo habitat, within the FMP study area.

4.1 Flora and vegetation

A vegetation and flora survey was undertaken by Bennett in 2004 for ATA Environmental and the following vegetation associations were identified with the foreshore reserve:

MsLm	*Melaleuca systena* and *Lomandra maritima* Low Open Heath
MsOaLm	*Melaleuca systena, Olearia axillaris, Lomandra maritima* Low Open Heath
SgSc	*Spyridium globulosum, Scaevola crassifolia* shrubland
SgMsLm	*Spyridium globulosum, Melaleuca systena, Lomandra maritima* Low Open Heath
AIMs	*Allocasuarina lehmanniana, Melaleauca systena* Closed Heath
Alloc	*Allocasuarina lehmanniana* Closed Heath
C	Cleared
Soak	Karli Spring Wetland.

The foreshore reserve is dominated by low-lying *Lomandra maritima.* The only trees as relevant to Carnaby's Black-Cockatoo outlined in the EPBC Act referral and the subsequent Commonwealth approval within the foreshore reserve are scattered tuart (*Eucalyptus gomphocephala).* The tuart trees were generally located in at the base of the sand dunes, sheltered from the prevailing winds.

4.2 Fauna

4.2.1 Carnaby's Black-Cockatoo

4.2.1.1 Overview

Calyptorhynchus latirostris (Carnaby's Black-Cockatoo), is listed as "Schedule 1" fauna under the *Wildlife Conservation Act 1950* and "Endangered" under the EPBC Act. It is likely to fly regularly over the area due to the good quality foraging habitat that exists nearby. There is very limited foraging habitat (e.g. *Banksia sessilis*) available for the cockatoo on the Alkimos LSP site which may occasionally be used by the cockatoo for foraging however the site does not contain a significant food resource for this species compared to other areas in Alkimos–Eglinton and surrounds. The mapped Carnaby's Black-Cockatoo foraging habitat within the FMP study area is shown in Figure E.

4.2.1.1.1 Alkimos Beach Carnaby's Black-Cockatoo habitat mapping

The conservation area contains limited areas (0.15 ha) of Carnaby's Black-Cockatoo foraging habitat (Tuart trees). The key foraging / roosting habitat identified was tuart trees (*Eucalyptus gomphocephala)*. The observed / recorded Carnaby's Black-Cockatoo foraging habitat area within the CAMP study area is shown in Figure E.

4.2.1.2 Identified threats to Carnaby's Black-Cockatoo within the FMP area

The Carnaby's Black-Cockatoo habitat located in the Alkimos Beach FMP study area faces potential impacts from foreshore area recreation users. While the Carnaby's Black-Cockatoo habitat will be retained in the foreshore area, beach going user(s) may traverse the foreshore outside of the provided pathways. This may impact the Carnaby's Black-Cockatoo habitat through habitat loss / degradation through trampling / physical removal. Other potential threats to Carnaby's Black-Cockatoo habitat in the FMP area include littering, fire and spreading of weeds.

4.2.1.3 Carnaby's Black-Cockatoo conservation advice

The then Department of Environment and Conservation (DEC) released the Carnaby's Cockatoo Recovery Plan (DEC 2012). This Recovery Plan details recovery action(s) required to prevent further decline in Carnaby's Black-Cockatoo numbers. The specific management actions detailed below are relevant for private landholders.

- Protect and manage important habitat: The protection and management of important habitat is essential to minimise habitat loss. Planting of species that support Carnaby's Black-Cockatoo is effective over long-term, protection and regeneration of existing habitat is more effective

- Management of breeding habitat and associated feeding habitat: Ensure protection of existing and potential breeding habitat through the protection from grazing, clearing, management of fire and maintain water sources

- Management of other factors: Monitor patterns, trends and impacts of people such as motor vehicles, collisions and illegal activities.

The above management measures in particular the protection and management of important habitat and management of others have been adopted in this FMP.

4.2.1.4 Ecological links

The Alkimos LSP site includes the majority of the foreshore reserve along its western margin. This area is part of Bush Forever Site No. 397 which forms part of a semi-contiguous north–south vegetated coastal strip. The recommendations pertinent to the FMP study area in the EPA report, Alkimos–Eglinton Metropolitan Region Scheme Amendment No. 1029/33 (EPA, 2005) centred on increasing the size of the foreshore reserve around Karli Spring to include additional areas of consolidated Quindalup Dunes to protect Aboriginal Heritage values and approximately 2.8 ha area of *Allocasurina lehmanniana* (dune sheaok). The dune sheoaks may be used as foraging habitat by Carnaby's Black-Cockatoo and other bird species.

The LSP site also abuts the east–west conservation linkage associated with the Alkimos Waste Water Treatment Plant buffer on the northern margin (Figure B). This area is not a Bush Forever site, however it is zoned for "Parks and Recreation" and "Public Purposes" (Conservation) in the MRS.

5 ALKIMOS BEACH FORESHORE AREA MANAGEMENT MEASURES

5.1 Introduction

This Alkimos Beach FMP provides a set of management actions to assist in the long-term conservation of the environmental and biodiversity values of Carnaby's Black-Cockatoo populations within the foreshore area.

The key management measures in accordance with the Commonwealth EPBC Act approval conditions are:

- The retention of 0.15 ha of Carnaby's Black-Cockatoo vegetation (tuart trees) in the conservation POS (subject to the CAMP) and the foreshore reserve (subject to this plan)
- Supplementary planting (revegetation) and weed control (to at least 1 ha) of Carnaby's Black-Cockatoo habitat. Details of supplementary planting equivalent to at least 1 ha of Carnaby's Black-Cockatoo foraging habitat (spread across POS and ROS) including timeframes and survival rates proposed for plantings. This FMP and the CAMP detail the additional 1 ha supplementary planting including time frames and survival rates proposed for plantings. The identified revegetation area is outlined in Figure F
- Funding for the conservation management and responsibilities
- Measures to manage weed and feral pests
- Bushfire prevention and management measures
- Erosion control measures
- Access management (including visitor facilities, boardwalks, pathways, signage and fencing).

5.2 FMP revegetation and monitoring program

This section outlines, in accordance with the EPBC Act conditions, the revegetation program and includes time frames and survival targets proposed for the plantings. The key management actions in this FMP respond to the revegetation and management of Carnaby's Black-Cockatoo habitat within the foreshore reserve area against key identified threats such as weeds, feral pests, bushfires, erosion and foreshore access. The identified revegetation area(s) are shown in Figure F.

5.2.1 Objective

The objective of the rehabilitation program within the FMP is to:

- Rehabilitate at least 1 ha of Carnaby's Black-Cockatoo foraging habitat species within the FMP area.
- Protect and complement the existing 0.15 ha of Carnaby's Black-Cockatoo habitat (tuart trees - *Eucalyptus gomphocephala*) within the CAMP area.
- Minimise the impact of activities that could degrade Carnaby's Black-Cockatoo habitat.

5.3 FMP rehabilitation and monitoring program

The FMP area totals approximately 41.93 ha, the proposed rehabilitation (and associated management actions) will occur in specific areas across the FMP management area as shown in Figure F.

5.3.1 Carnaby's Black-Cockatoo habitat – revegetation species

This section provides a summary of the key rehabilitation actions. The actions are based upon the Tranen's Revegetation Management Plan, which is provided in Appendix B.

The FMP area has a limited range of Carnaby's Black-Cockatoo foraging habitat. The rehabilitation program will both complement the existing tuart trees (*Eucalyptus gomphocephala*) with an additional 1 ha and a portion (at least 0.93 ha) of the 1 ha supplementary planting of Carnaby's Black-Cockatoo foraging habitat. The species to be used in the rehabilitation program (which occur within locally within the primary coastal dune system) include:

- *Acacia saligna*
- *Allocasuarina lehmanniana*
- *Eucalyptus gomphocephala*.

5.4 Black cockatoo foraging habitat rehabilitation methodology

5.4.1 Plant propagation

A seed bank has been established for Alkimos Beach, and there are significant quantities of local provenance seed available of a wide range of species for use in the rehabilitation program. Where possible seedlings will be propagated from the seed bank. Where seed is not available of desired species, seed and seedlings will be sourced from the nearest available provenance. Some species are grown from cuttings and where possible these will also be sourced from on site.

5.4.1.1 Seedling propagation

Due to the site conditions, the recommended pot for all seedlings is a 50 mm x 50 mm x 125 mm forestry tube with root trainers. These pots produce seedlings of good root ball size and transfer well from pot to final environment, maximising survival rates. Should plants of this size not be available for any reason at the time of planting, the next closest available tubestock size will be used.

Plant orders will be ideally placed in winter the year before planting to ensure sufficient seedlings are available (subject to seed availability and species propagation timing). Seedlings will be grown by nurseries that are accredited by the Nursery Industry Accreditation Scheme of Australia (NIASA) which will guarantee the quality of supplied material.

5.4.2 Site protection – prior to rehabilitation

A proportion of the 1 ha and supplementary planting of Carnaby's Black-Cockatoo habitat rehabilitation works will be undertaken on old vehicle access tracks. These tracks are to be blocked at both ends to prevent future vehicle access in these areas. They will be blocked by pushing up soil and placing large objects such as limestone boulders or large logs in front of the mounds. Some tracks will be left open to allow vehicles access through the area, to discourage vehicles from creating new accesses.

Another potential factor affecting the rehabilitation success outcomes is rabbit herbivory. To mitigate the potential impacts a combination of rabbit exclusion fencing, tree guards, and targeted rabbit control will be employed. Larger completely degraded areas without existing vegetation that could potentially hide burrows will be protected by the exclusion fencing. Where appropriate, seedlings located outside of these areas will be protected with tree guards. Once the plants are large enough to survive without the guards they will be removed.

A rabbit control program will also be initiated in advance of site works to provide longer term protection to seedlings. This will include a combination of warren destruction, rabbit haemorrhagic disease virus (RHDV) release, and Pindone baiting. Baiting and virus release will only be undertaken during certain times of year relating to weather and animal growth stages where these treatments are effective. Warren destruction will be employed between these periods.

To avoid accidental impacts from construction activities and prevent unauthorised access to the Carnaby's Black-Cockatoo rehabilitation areas the following actions will be undertaken:

- Semi-permanent fencing adjacent to roads and urban subdivision areas during the construction phase

- All construction activities will be restricted to the subdivision areas and will avoid the rehabilitation area
- Historical tracks within the rehabilitation areas will be physically blocked off, therefore, preventing access to construction equipment, four-wheel drivers and the public.

5.4.3 Rehabilitation site preparation

To maximise the potential for rehabilitation success, the areas that are subject to rehabilitation will be prepared in the following manner:

- Weed spraying undertaken, rubbish and debris removed and disposed of appropriately
- Brushing and / or mulching will be used to stabilise actively eroding and erosion prone locations as required.

5.4.4 Rehabilitation method

Planting and seeding are the key rehabilitation methods to be employed in the rehabilitation works. Species selection is the key to reaching a successful outcome for the project in a coastal setting. Species must be carefully selected based on the surrounding floristic community type(s), topography and hydrology to ensure species are in the areas in which they are most likely to survive in both short and long-term.

Tube stock used in the rehabilitation program will be sourced from local accredited nurseries.

Planting will be carried out in winter; around June–July when the soil moisture content is optimal for seedling growth without irrigation and after the existing weeds have germinated and have been sprayed. Where appropriate, tube stock will be planted with a plastic guard to prevent rabbits feeding on plant stock and to protect plantings from strong winds.

Tube stock will be planted at an average density of two plants per m^2 dependent on the specific plant species used i.e. acacia and tuart trees are of sprawling form and grow quite large and therefore require more space between seedlings. The planting density can range from 1.7 m^2 to 2 m^2.

Rabbit guards will be used with tube stocks in the rehabilitation areas.

5.4.5 Watering

Some tube stock will be planted with tablets / water crystals during planting to help improve survival rates. The plant species to be used in the rehabilitation of the FMP study area will be drought tolerant and therefore it is not anticipated these natives will be required irrigation or extensive hand watering.

5.4.6 Seedling planting

Seedlings will be directly planted using planting tubes, which negates the need for repeated bending for excavation of planting holes. Seedlings will be watered before delivery to site on the day of planting to reduce the potential for transplant shock, and provided the soil is moist no other watering is considered necessary.

5.4.7 Seed treatment and direct seeding

All seed to be utilised will be pre-treated prior to seeding to break dormancy factors. This will include aerosol smoke treatment, mechanical scarification, or hot water treatment as appropriate to individual species. Seed will then be combined with a bulking agent to facilitate even distribution across the site. Clean yellow sand provides good mixing and distribution properties for this purpose. Hand broadcasting will be the application technique as this will permit even dispersal of all seed sizes, which can be an issue with some types of mechanical spreaders.

5.4.8 Signage

To assist in preventing unauthorised access and trampling of rehabilitation efforts, signage where appropriate will be installed. This signage (as required) will inform residents and visitors to Alkimos Beach of the rehabilitation works. Plate 1 below shows an example of a public awareness signage.

Plate 1: Rehabilitation signage

5.5 Rehabilitation Strategy

The key management measures in accordance with the EPBC Act approval conditions are shown in Table 2.

Table 2: Key measures and general management strategies

Measure	Management strategy
The retention of 0.15 ha of Carnaby's Black-Cockatoo vegetation (tuart trees) in the CAMP	The 0.15 ha of retained Carnaby's Black-Cockatoo vegetation. Weed control will be undertaken within these areas.
Rehabilitation of at least 1 ha of Carnaby's Black-Cockatoo habitat. This includes time frames and survival targets for the plantings	Planting and weed control will be undertaken in over an approximate 2 ha in various locations within the FMP area (Figure 1).
Details of supplementary planting equivalent to at least 1 ha of Carnaby's Black-Cockatoo foraging habitat (spread across POS and ROS)	A portion (approximately 0.08 ha) of the rehabilitation within the CAMP contributes to the supplementary planting as required under Condition 10(b) of the EPBC Act approval. The remainder of the supplementary planting works (at least 0.93 ha) is within the ROS and is subject to this FMP and the Foreshore Management Plan Revegetation Plan (Tranen, 2015)

Tranen's FMP Revegetation Management Plan (Appendix B has broken up the rehabilitation areas into separate areas. Table 3 details the treatment methods and area sizes within the FMP for each of the rehabilitation zones.

Table 3: Rehabilitation zone and Carnaby's Black-Cockatoo area calculations

Zone name	Area (m^2)	Carnaby's Black-Cockatoo approx. rehabilitation area (m^2)
Dune blowout	1,631	0
North 1	690	690
North 2	688	688
South track closure	2,246	2,246
Northern access road	15,854	15,854
Carpark beach access batters	3,339	0
Southern access track	10,175	10,175
Total	**24,623**	**19,653**

Re-profiling of the degraded areas of the coastal dunes will occur in all areas where scour from vehicle activity and wind funnelling has contributed to the existing alteration in the soil profiles. Once areas of the dune where rehabilitation is to occur is stabilised, the degraded parts of the site will be revegetated with Carnaby's Black-Cockatoo foraging habitat.

The 'Completely Degraded' areas will be planted at an average density of 1.8 plants / m^2 (the density planting can range from 1.7 m^2 to 2m^2) dependent on the Carnaby's Black-Cockatoo foraging habitat species plant as some plants, i.e. Tuart trees and *Acacia saligna* which require more space to effectively grow and survive. Based on the coastal setting the Carnaby's Black-Cockatoo foraging habitat species will primarily be *Allocasuarina lehmanniana*, *Acacia saligna* and *Eucalyptus gomphocephala*.

The Carnaby's Black-Cockatoo foraging plants will be concentrated mostly in the valleys and adjacent to the retained trees of the same species. Weed control will be undertaken each spring and autumn to reduce competition and optimise seedling establishment rates.

Tranen's FMP revegetation areas are illustrated in Figure F.

5.5.1 Weed management

If weeds are considered an issue within the rehabilitation area, a weed spraying program to control weed species, prior to installation of seeds and seedlings will be implemented.

Weed control events will take place in spring of the year prior to the rehabilitation. Post the rehabilitation planting weed control will be undertaken each spring and autumn to reduce competition and optimise seedling establishment rates.

Weed management is an important component for the establishment of native vegetation within the FMP. Weed control will be achieved primarily through herbicide application. Herbicides will be selected for the target species, considering the surrounding coastal environment and the constraints this presence. Amongst the existing remnant native vegetation, selective herbicides (i.e. grass or broadleaf-specific) will be favoured over general knockdown herbicides, to keep off-target damage to a minimum. To ensure that off-target damage is minimised, herbicide spraying operators will only be engaged if they:

- Are appropriately qualified and licensed in herbicide application
- Have demonstrated experience in the ability to identify, and distinguish between, native and weed species
- Are familiar with the most appropriate control measures, timing, herbicides, and application rates for the target species.

Table 4 details the herbicide application at the optimum application rate according to the manufacturer's guidelines and seasonal timing for specific weed species. The Tranen weed control timing (spring and autumn) addresses the weed management seasonal timing.

Table 4: Weed species list

Weed species	Weed control method	Timing
Avena barbata	Cut out plants, ensure rhizomes are removed; spray with grass-selective herbicide in winter/spring. Follow-up with seedling control.	June to September
Briza maxima	Prevent seed set; hand pull or spray at 3–5 leaf stage with Fusilade 10 mL/10 L (500 mL/ha) wetting agent; repeat for 2–3 years.	Year-round
Briza minor	Prevent seed set - hand pull or spray at 3–5 leaf stage with Fusilade 10 mL/10 L (500 mL/ha) wetting agent; repeat for 2–3 years.	Year-round
Carpobrotus edulis	Roll up large mats removing all roots (shallow-rooted) and stem fragments. Follow up with removal of any germinating plants. Spray with glyphosate at label rates.	August to November
Euphorbia terracina	Remove by hand small isolated infestations. Long tap root. Consider possible dune erosion.	June to September
Hypochaeris glabra	Spray grazing with 2,4-D amine provides partial control.	May to September
Lagurus ovatus	Prevent seed set; spray with 10 mL/10 L (500 mL/ ha) Fusilade spray oil at 2–8 leaf stage before stem elongation.	July to December
Lolium rigidum	Prevent seed set; hand-pull or spray with grass-selective herbicide 4–6 weeks after opening rains.	
Lupinus cosentinii	Remove by hand scattered plants. Spray dense infestations metsulfuron-methyl 0.1 g/15 L (2–3 g/ha) wetting agent.	August to November
Orobanche minor	Pre-emergence imazethapyr and chlorsulfuron provide good control. Pre-emergence imazaquin, triasulfuron, primisulfuron, acetochlor and metazachlor provide suppression. Post-emergence glyphosate at low rates around 100 mL/ha of Roundup CT is useful in some crops and pastures.	
Pelargonium capitatum	Remove by hand isolated plants, taking care to remove entire stem – will reshoot from below ground level. Spot spray metsulfuron methyl 5 g/ha Pulse. Easy target after fire.	June to October
Romulea rosea	Spot spray metsulfuron methyl 0.2 g/15 L Pulse .	July to August
Sonchus oleraceus	Slashing often ineffective as flowers continue to be produced. Rosette stage preferred time for effective chemical control. Lontrel at 10 mL in 10 L of water 25 mL wetting agent.	June to August
Trachyandra divaricate	Wipe with 50% glyphosate solution before flowering. Dense infestations in degraded areas spot spray 0.4 g chlorosulfuron plus 25 mL wetting agent in 10 L of water when plants actively growing.	June to August

Sources: Brown and Brooks (2002), Herbiguide (2010) and Florabase (2010) NA Not Available

5.6 Post-rehabilitation management

To ensure longer-term success of the 1 ha rehabilitation and supplementary planting areas, the rehabilitation areas will be monitored and maintained for five years following initial seedling installation, to ensure the completion targets are met and will continue to be met in the future.

5.6.1 Completion criteria

The completion criteria to demonstrate effective management of the FMP area are specified in Table 5.

If the completion criteria are not met, further infill planting and/or weed control will be undertaken until the completion criteria are demonstrated to have been achieved over two consecutive monitoring events.

Table 5: Rehabilitation and weed management completion criteria

Year after planting	Year 1	Year 2
Survival (established plant density – both planting and seeding)	90%	70%
Average planting density (plants/m^2)	1.8 to 2.7	1.8 to 2.7
Plant coverage (% area of visual ground cover measured by a botanist/revegetation consultant)	25%	50%
Weeds coverage	No greater than 10% cover	No greater than 10% cover

5.7 Rehabilitation and weed monitoring and performance criteria

At the end of rehabilitation activities, a report will be provided detailing the quantities of seedlings used and seed broadcast, and any variations from the Tranen revegetation plan. This will be used as baseline data for comparison in future monitoring assessments.

The rehabilitation areas will be formally monitored bi-annually (includes weed monitoring) each spring and autumn, for a five-year period after installation. A monitoring report will be undertaken following each formal monitoring event, to assess if corrective measures are required.

The season has been nominated rather than a specific month, as the timing of these assessments are related to plant growth cycles, which is influenced by the weather conditions.

One monitoring plot of 2.5 m × 5 m will be established per rehabilitation area as well as one permanent photograph reference point at each monitoring plot. Photographic records will be captured prior to construction and annually to qualitatively assess density, diversity and weed cover.

The first assessment in spring will assess the developing threats, the stabilisation of each rehabilitation area and the short-term survival of the seedlings and weed cover. Any problems will be identified early so that comprehensive treatment(s) of the issue can be undertaken, and additional seedlings propagated if required.

The second assessment in the following spring. This assessment will determine if there are any losses over the dry summer period, and this will form the basis for the maintenance winter program. The first summer is the expected period of greatest mortality, and plants that survive this period are generally hardy and more likely to survive in the longer term. The emergence of summer weeds will also be assessed, so that control can be scheduled as required.

The third and subsequent rehabilitation assessments will occur in autumn and then the subsequent spring. The long-term success of the rehabilitation operation will be indicated, and this will determine whether any further remedial works are required. This may include:

- Additional revegetation works
- Weed management
- Other general maintenance activities such as rabbit control
- Additional monitoring requirements.

The monitoring of weeds will be undertaken biannually each spring and autumn and maintained for a five-year period. The monitoring report will be undertaken to assess if further weed management is required.

5.7.1 Corrective measures

If the plant survival success falls below 70% of original numbers in two consecutive monitoring events, corrective measures will be implemented to ensure the success of the rehabilitation program. The monitoring program will identify risks to planting success rates so they can be dealt with in an appropriate and timely manner. Corrective measures may include:

- Re-brushing or re-mulching areas
- Additional weed control
- Additional plantings
- Tree guard repair / replacement
- Fence and sign maintenance.

Where the % weed species, cover exceeds the 10% cover limit, additional weed spraying will be undertaken to reduce the abundance and spread of weed species into and within the FMP area.

All the contingency measures listed in Table 6 will be implemented if the target seedling survival completion criteria fall below 70% in two consecutive events.

Table 6: Rehabilitation and weed management contingency measures

Item	Issue	Contingency action
Plants	Plant death Storm / wind damage Vandalism	Plant additional tube stock in subsequent plantings
Weeds	Excessive weeds in rehabilitation areas	Undertake additional weed control measures e.g. weed spraying
Erosion	Erosion Storm damage	Apply brushing, hydro-mulch (with no seed) or matting over the surface of any eroded areas
Revegetation	Plant survival does not meet completion criteria	• Replant seedlings and care for them for an additional two years • Replace plant guards

5.8 Feral pests

Pest management, particularly for rabbits, will contribute to achieving the rehabilitation completion criteria.

5.8.1 Objective

The objective of feral pest management in the rehabilitation area is to:

- control rabbits, to a level where do not prejudice the Carnaby's Black-Cockatoo rehabilitation completion criteria.

5.8.2 Key threats

Rabbits pose the highest threat to the rehabilitation area and supplementary plantings in the FMP area.

5.8.3 Management overview

There are a number of control techniques that can be utilised to manage rabbits in the FMP area.

Conventional control techniques are the most appropriate for natural areas near human settlement. These include the following:

- Temporary fencing
- Tree guards – where appropriate
- Biological control
- Rabbit warren destruction
- Baiting / poisons.

5.8.3.1 Rabbits

Rabbits pose the highest risk to the success of the Carnaby's Black-Cockatoo foraging habitat rehabilitation works.

To mitigate the potential impacts a combination of rabbit exclusion fencing, tree guards, and targeted rabbit control will be employed over a five year period. Larger completely degraded areas without existing vegetation that could potentially hide burrows will be protected by the exclusion fencing. Where appropriate, seedlings located outside of these areas will be protected with tree guards. The guards will be rigid corflute held in place with hardwood stakes.

Once the plants are large enough to survive without the guards they will be removed. A rabbit control program will also be initiated in advance of site works to provide longer term protection to seedlings. This will include a combination of warren destruction, rabbit haemorrhagic disease virus (RHDV) release, and Pindone baiting. Baiting and virus release will only be undertaken during certain times of year relating to weather and animal growth stages where these treatments are effective. Warren destruction will be employed between these periods.

5.8.4 Key actions

The key action for feral pest management in the rehabilitation areas are outlined in Table 7.

Table 7: Feral pest key actions

No.	Key action
1.	A combination of rabbit exclusion fencing, tree guards, and targeted rabbit control will be employed over a five year period
2.	Where appropriate, seedlings located outside of these areas will be protected with tree guards. The guards will be rigid corflute held in place with hardwood stakes
3.	A rabbit control program will also be initiated in advance of site works to provide longer term protection to seedlings. This will include a combination of warren destruction, rabbit haemorrhagic disease virus (RHDV) release, and Pindone baiting.
4.	Each tube stock will be planted with a plastic guard to prevent rabbits feeding.

5.8.5 Corrective measures

The key corrective measures for feral pests are outlined in Table 8.

Table 8: Feral pest corrective measures

No.	Key action
1.	Implement additional rabbit control measures including further fencing or biological controls based on the following observations undertaken during the bi-annual rehabilitation monitoring program: presence of rabbits – visual observation evidence of rabbits eating the planted seedlings and destroying the tree guards rabbit warrens fox and cat sightings
2.	Re-plant seedlings / revegetate areas impacted by rabbits to meet the 1 ha and a portion of the supplementary planting rehabilitation requirements outlined in Conditions 10(a) and (b) of the EPBC Act approval in accordance with the rehabilitation completion criteria.
3.	Repair rabbit exclusion fencing and replace damaged tree guards.

5.8.6 Monitoring and reporting

Feral pest, particularly the potential impacts from rabbits on the rehabilitation works will be monitored biannually each spring and autumn and maintained for a five-year period. The key monitoring and reporting for feral pest management is summarised below:

Monitoring will occur as part of the Carnaby's Black-Cockatoo existing and rehabilitation habitat areas biannual monitoring program (occurring in spring and autumn) and maintained for a five-year period.

The key monitoring points will focus on the impacts to planted Carnaby's Black-Cockatoo habitat seedlings, tree guards and ensuring the rabbit fence remains intact. The monitoring program occurs for a five-year period.

Evidence of the presence of rabbits such as visual observations of the seedlings being eaten, rabbit warrens in the local area and opportunistically foxes and feral cats will also be monitored and reported as part of the rehabilitation monitoring program.

The monitoring report will be submitted to Lendlease following each formal monitoring event. The outcomes will be recorded in the Alkimos Beach compliance report points will focus on the impacts to planted seedlings, tree guards and ensuring the rabbit fence remains intact.

5.9 Bushfire

5.9.1 Objective

The objective of bushfire management is to:

- Protect the ecological integrity and biological values of the Carnaby's Black-Cockatoo existing and rehabilitation areas.

5.9.2 Key threats

Fire has the potential to destroy the Carnaby's Black-Cockatoo existing habitat and rehabilitation works within the FMP area.

5.9.3 Management overview

The Alkimos Beach LSP has deliberately positioned roads / path infrastructure adjacent to the CAMP and FMP areas. These designated roads / paths act as key firebreak(s) between the FMP area (and therefore the rehabilitation areas) and the adjacent residential area.

Alkimos Beach is a gazetted fire district and as such is under control of the Fire and Emergency Services Authority (FESA). The primary response team for fires within Alkimos Beach area is the Joondalup Fire and Rescue Station.

Property owners in the City of Wanneroo are required to clear firebreaks by November of each year and maintain them until the following April. The City of Wanneroo's Rangers / Fire Control Officers conduct firebreak inspections on all vacant land.

To reduce the risk of fire the following key elements have been adopted in the bushfire management response:

- Hazard reduction
- Fire buffer management.

5.9.4 Key actions

The key actions for bushfire management in the rehabilitation area are outlined in Table 9.

Table 9: Bushfire management key actions

No.	Key action
1.	No rubbish or vegetation will be burnt on the project site
2.	Construct perimeter roads and pathways between the FMP and residential areas where possible to act as the key firebreak(s)
3.	During construction works a semi-permanent fencing will be installed around the FMP boundary interface with the urban development (subdivision) works to prevent access into the revegetated areas and the broader FMP area.

5.9.5 Corrective measures

The key corrective measures for bushfire management are outlined in Table 10.

Table 10: Bushfire management corrective measures

No.	Key action
1.	If fire occurs within the existing and rehabilitation areas – re-planting of Carnaby's Black-Cockatoo habitat will be required to fulfil the EPBC Act Ministerial condition 10 which is to provide a minimum 1 ha and a portion of the supplementary planting rehabilitation requirements outlined in Conditions 10(a) and (b) of the EPBC Act approval in accordance with the rehabilitation completion criteria.
2.	Repair damage to the fence as required

5.9.6 Monitoring and reporting

The monitoring of the Carnaby's Black-Cockatoo existing and rehabilitation foraging areas will be undertaken biannually each spring and autumn and maintained for a five-year period. The key monitoring requirements and reporting for bushfire management is summarised below:

- Any bushfire event in the foreshore will be reported to DFES and the City of Wanneroo.
- The annual monitoring report of the rehabilitation area will also include details (e.g. dates, time, location and duration) of any fire events.

The monitoring of the Carnaby's Black-Cockatoo existing and rehabilitation foraging areas will be undertaken biannually each spring and autumn and maintained for a five-year period.

5.10 Erosion

5.10.1 Objective

The objective of erosion management is to:

- Protect the ecological integrity and biological values of the Carnaby's Black-Cockatoo existing and rehabilitation areas.

5.10.2 Key threats

Erosion has a number of possible impacts on the environment such as:

- loss of the Carnaby's Black-Cockatoo existing habitat and rehabilitation works vegetation from erosion damage.

5.10.3 Management overview

In the FMP, informal pathways and tracks have been rehabilitated. Access to the beach is restricted to pathways through the FMP area as shown in Figure D.

In the Carnaby's Black-Cockatoo foraging habitat rehabilitation areas, the key management response will be the placement of brush / mulch to prevent erosion. Brush will be spread over the steeper sections of the tracks, and mulch spread to a depth of 50 mm to stabilise over the balance of the sand to prevent the loss of further soil from wind erosion.

All vehicle tracks, apart from the fenced vehicle access road and emergency vehicle access road, will be blocked at both ends using large boulders or logs to prevent further vehicle access.

5.10.4 Key actions

There are a number of management measures that can be implemented to reduce the likelihood of erosion. The actions for erosion control are outlined in Table 11.

Table 11: Erosion control key actions

No.	Key action
1.	Undertake rehabilitation of bare/open areas in accordance with the FMP Revegetation Management Plan (Tranen 2015).
2.	During construction works a semi-permanent fencing will be installed around the FMP boundary interface with the road and urban development (subdivision) works to prevent access into the revegetated areas and the broader FMP area.
3.	Conservation fencing to the City of Wanneroo's requirements will be installed along the borders of the FMP which is adjacent to the Alkimos Beach subdivision prior to handover to the City of Wanneroo.
4.	A proportion of the rehabilitation works will be undertaken on old vehicle access tracks. These tracks are to be blocked at both ends to prevent future vehicle access in these areas

5.10.5 Corrective measures

The key corrective measures for erosion are outlined in Table 12.

Table 12: Erosion control corrective measures

No.	Key action
1.	Undertake additional brush / mulch as required over rehabilitation areas as required
2.	Undertake additional rehabilitation in areas impacted by erosion to meet 1 ha and a portion of the supplementary planting rehabilitation requirements outlined in Conditions 10(a) and (b) of the EPBC Act approval in accordance with the rehabilitation completion criteria.
3.	Damaged fencing will be repaired or replaced

5.10.6 Monitoring and reporting

The key monitoring and reporting for erosion control is summarised below:

- Monitoring for erosion will occur as part of the Carnaby's Black-Cockatoo existing and rehabilitation foraging areas biannual monitoring program (occurring in spring and autumn). The monitoring program occurs for a five-year period.
- The monitoring report will be submitted to Lendlease following each formal monitoring event, to assess if there are any erosion issue(s) requiring attention.

5.11 Access management

5.11.1 Objective

The objective of access management is to:

- Provide an appropriate level of access while preserving and enhancing the ecological values of the Carnaby's Black-Cockatoo existing foraging habitat and the rehabilitation areas.

5.11.2 Key threats

A risk for the Alkimos Beach FMP rehabilitation areas is inappropriate pedestrian access which could result in direct damage to the planted seedlings, exacerbate erosion areas and create the opportunity for weed invasion.

5.11.3 Management overview

Access to the conservation area for passive recreation use is of high importance for the Alkimos community and visitors. However, it is acknowledged this must be managed to protect Carnaby's Black-Cockatoo existing habitat and the 1 ha (and a portion of the supplementary planting) rehabilitation and improved the ecological integrity.

Access will be managed through restricting access to the Carnaby's Black-Cockatoo existing habitat and rehabilitation works. The access pathways will be located adjacent to the FMP area outside of the existing Carnaby's Black-Cockatoo and rehabilitation areas.

Figure D shows the proposed location of the proposed access through the FMP.

5.11.3.1 Fencing

During construction works, semi-permanent fencing will be installed around the FMP boundary interface with the road and urban development (subdivision) works to prevent access into the revegetated areas and the broader FMP area.

Post construction works and prior to handing over the FMP area to the City of Wanneroo, conservation fencing will be installed along the perimeter of the FMP area adjacent to the either the roads and/or the residential development. This fencing will clearly demarcate the boundary of the FMP area.

5.11.4 Key action

The key actions for access management are outlined in Table 13.

Table 13: Access management key actions

No.	Key action
1.	Closure of old path and vehicle access tracks for rehabilitation in accordance with the FMP Revegetation Management Plan (Tranen 2015).
2.	During construction works a semi-permanent fencing will be installed around the FMP boundary interface with the road and urban development (subdivision) works to prevent access into the revegetated areas and the broader FMP area.
3.	Conservation fencing to the City of Wanneroo's requirements will be installed along the borders of the FMP area which is adjacent to the Alkimos Beach subdivision prior to handover to the City of Wanneroo.

5.11.5 Corrective measures

The key corrective measures for access management are outlined in Table 14.

Table 14: Access management corrective measures

No.	Key action
1.	The temporary fence if damaged will be repaired / replaced.
2.	The signage if damaged will be repaired or replaced – only for the proposed paths that go through or near the rehabilitation areas

5.11.6 Monitoring and reporting

Lendlease will monitor annually the integrity of the fencing and signage until the FMP area is handed over to the City of Wanneroo. The key monitoring requirements and reporting for access management is summarised below:

- Monitoring for unauthorised access will occur as part of the rehabilitation monitoring (biannually spring and autumn) which will be occur for a five-year period.

The monitoring report will be submitted to Lendlease following each formal monitoring event, to assess if there are any erosion issue(s) requiring attention

6 COMPLIANCE REPORTING

To satisfy Condition 3 of the EPBC Act approval, Lendlease will publish a compliance report every 12 months from the commencement of the construction works.

The compliance report will contain an FMP area Carnaby's Black-Cockatoo habitat rehabilitation section which will include the following:

- Rehabilitation completion criteria and weed monitoring
- Revegetation and weed contingency actions if required
- Erosion monitoring within the rehabilitation area
- Observations of feral pests
- Temporary fencing and signage of the rehabilitation area
- Fire incidences and the response.

The management actions with corrective measures (if required) are outlined in Table 1.

6.1 Land ownership and funding

All infrastructure proposed for the FMP study area and rehabilitation (including weed management) efforts will be implemented by Lendlease within the first five years, prior to hand over to the City of Wanneroo.

Lendlease will provide initial infrastructure within the rehabilitation area, such as fencing, in consultation with the City of Wanneroo. The long-term management and responsibility of the Alkimos Beach FMP study area will be the City of Wanneroo.

7 CITY OF WANNEROO HANDOVER AND LONG-TERM MANAGEMENT

7.1 EPBC Act 2011/5902 approval context

Lendlease is responsible for the management measures defined in this FMP and the overall implementation of the FMP under their EPBC Act approval 2011/5902 inclusive of the approved variations (November 2018).

As outlined in the November 2018 approved variation for Condition 12A[1], Lendlease (the person taking the action) may, with written agreement of the Minister, cease to implement the FMP. If Lendlease wishes to cease implementing this FMP, they must submit a request to the Minister which:

- Includes a report demonstrating that the outcomes and performance indicators of the approved FMP have been achieved
- Specifies the entity that will implement the FMP in the future
- Includes written agreement from the entity to implementing the approved FMP
- Sets out the entity's capacity to implement the FMP.

Once Lendlease submits the required information and the Minister agrees to the request, the person taking the action (Lendlease) may cease to implement the FMP, to maintain associated records (Condition 2) and/or report on implementation of the FMP (Condition 3).

7.2 Post-handover implementation

Key management actions defined in this FMP are the responsibility of Lendlease for a period of five years or until the area or parts thereof are handed over to the City of Wanneroo. Post the fifth year and once Lendlease is in a position to hand over the area or parts thereof to the City, an audit report demonstrating compliance with the FMP management actions will be provided to the Commonwealth Department of Environment and Energy and the City of Wanneroo.

The Commonwealth and the Alkimos Beach community hold an expectation that the management actions implemented through this FMP will be maintained in the long term. As the long-term land managers, the City of Wanneroo plays an important role in the protection and conservation of biodiversity and in engaging and educating the community in the value of local biodiversity assets.

Specifically, regarding this FMP the key management actions outlined in this plan and below would have been implemented to the satisfaction of both the Commonwealth and the City:

- Carnaby's Black Cockatoo revegetation and weed management
- Fencing and signage installed
- Feral pest management implemented
- Bushfire, erosion and access management implemented.

The long-term management objective (post Lendlease handover to the City of Wanneroo) for the key MNES (Carnaby's Black Cockatoo), is therefore focused on managing the revegetated CBC habitat areas.

[1] It is noted that Condition 12A refers to all three management plans, the CAMP, the FMP and the PLRP. In the context of this document, reference has been made to the FMP only.

The City of Wanneroo is strongly committed to maintaining and improving the conservation of the local biodiversity and has matched this commitment through the City's endorsed Local Biodiversity Plan 2018/19 – 2023/24 (City of Wanneroo 2018).

The City's Local Biodiversity Plan identified the Alkimos Beach Regional Open Space (ROS) as an area that would meet the following Local Natural Area criteria. Local Natural Areas are defined as unprotected natural areas over which the City can exercise the most control through its decision-making powers, policies and reserve management.

Local Natural Areas include:

- Natural areas located on private property, which the City has some control over through Policy and decision making (such as planning approvals) – this is not applicable to the FMP area
- Natural areas located in public or regional open space, managed by the City of Wanneroo but not fully recognised as being managed for the purpose of conservation – applicable to the FMP area
- State Government freehold land not zoned Parks and Recreation under the Metropolitan Region Scheme (MRS) – applicable to the FMP area.

In adopting the Local Biodiversity Plan 2018/19 – 2023/24 the City has agreed to the following strategy for biodiversity protection applicable to the long-term management of the FMP area. The implementation of this strategy is focused on the protection, retention and management of biodiversity values within the City of Wanneroo.

The City is committed to developing and implementing a Natural Areas Asset Class Plan (NAACP). The NAACP would provide context, technical and policy framework for the management of all natural areas reserves within the City of Wanneroo (City of Wanneroo 2018), including the Alkimos Beach FMP area.

The NAACP would establish a consistent, holistic planning methodology to achieve and maintain a cohesive approach to the management of all natural areas across the City of Wanneroo. It would act as an overarching management document to individual management plans that relate to specific site conditions of reserves.

Based on the City's long-term natural area strategy, the Alkimos Beach FMP area would be subject to a specific NAACP.

The implementation of the City of Wanneroo's Local Biodiversity Plan is supported by the municipal rates. The City in 2018/19 has allocated 24 million towards parks and conservation area management and 6.7 million for beach management. The City has staff engaged dedicated to the management of parks, natural bushland and foreshore reserve areas.

7.3 City of Wanneroo proposed management

The City's long-term management action will be focused on maintaining the 41.93 ha FMP area inclusive of the revegetated areas of Carnaby's Black-Cockatoo foraging habitat (Condition 10b and 11a) at handover from Lendlease.

The core management focus to prevent impacts to the revegetated Carnaby's Black-Cockatoo foraging areas is on the following:

- Managing weeds
- Controlling access / erosion
- Managing feral animals
- Maintaining existing bushfire risk.

The City will undertake the ongoing management measures following handover as detailed below in line with its adopted maintenance standards and practises for natural bushland and coastal reserve areas.

7.3.1 Key long term management action

Table 15 summarises general long term (post-handover) management actions for the FMP area. The management actions represent the general standard actions undertaken by the City in managing natural bushland and coastal reserve areas and consistent with the local community's expectations.

It must be noted that following post-handover to the City, the City will not be responsible for any further reporting or audit actions. The ongoing management of the FMP will be in line with the City's conservation maintenance schedule for bushland areas as outlined in Table 15.

Table 15: Summary of management actions

Issue	Aim	Long term management
Fencing, access points and signage	To manage access into the FMP area (for maintenance purposes) and to limit damage to the revegetation areas	Maintain gates, locks and fences in good repair and working order. If required organise repairs by the fencing contractor. Ensure all signs are visible and well maintained. Replace signs if required.
Rubbish removal	To monitor and limit the amount of rubbish in the FMP area to prevent bushfires and water contamination	Remove any additional rubbish on an as needed basis.
Weed Control	Maintain the handover level weed density in the FMP area as per seasonal requirements	Spraying of weeds in the FMP in accordance with identified optimal control periods and industry best practise.
Native Vegetation	To maintain the existing native vegetation in the FMP area	Retain and monitor all native vegetation and revegetated areas in the FMP except that on designated firebreaks. Retain all vegetation that is critical to Carnaby's Black Cockatoo.
Bushfire Management	To protect the FMP and surrounds from bushfire	Maintain firebreaks around the FMP area and keep area clear of fire prone weeds and rubbish. Carry out seasonally programmed fire mitigation in conjunction with FESA and relevant State Fire regulations.

7.3.2 Monitoring

Table 16 summarises the long term monitoring actions to be undertaken to monitor the management of the FMP. There is no reporting or compliance requirements on the City of Wanneroo.

Table 16: Summary of monitoring actions

Factor	Type of monitoring	Fre uency	Timing
Fencing and signage	Drive / walk on the perimeter of the FMP and check signs for damage. Review installed signs	Annually Once at handover	Initial site assessment at handover from Lendlease and then every 12 months
Rubbish	Inspection of the FMP area	Annually	Ongoing
Weed Control	Monitor weed density and weed types to ensure low density of priority weeds	Annually	Initial site assessment at handover from Lendlease and then every 12 months
Existing native vegetation	Visual assessment of vegetation health	Annually	Initial site assessment at handover from Lendlease and then every 12 months
Carnaby's Black Cockatoo Revegetation Areas	Visual assessment of revegetation area health / density and weed density	Annually	Initial site assessment at handover from Lendlease and then every 12 months

Factor	Type of monitoring	Fre uency	Timing
Pest fauna	Visual assessment for rabbit activity (burrows, scat, diggings)	Annually	Post-handover from Lendlease
Bushfire Management	Driving inspection around the perimeter and along designated fire tracks	Annually	Post-handover from Lendlease

8 REFERENCES

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RPS 2009b. Alkimos Construction Environmental Management Plan. Prepared for Lendlease.

Saunders, D.A. (1990). Problems of survival in an extensively cultivated landscape: the case of Carnaby's cockatoo *Calyptorhynchus funereus latirostris*. *Biological Conservation*. 54: 277-290.

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FIGURES

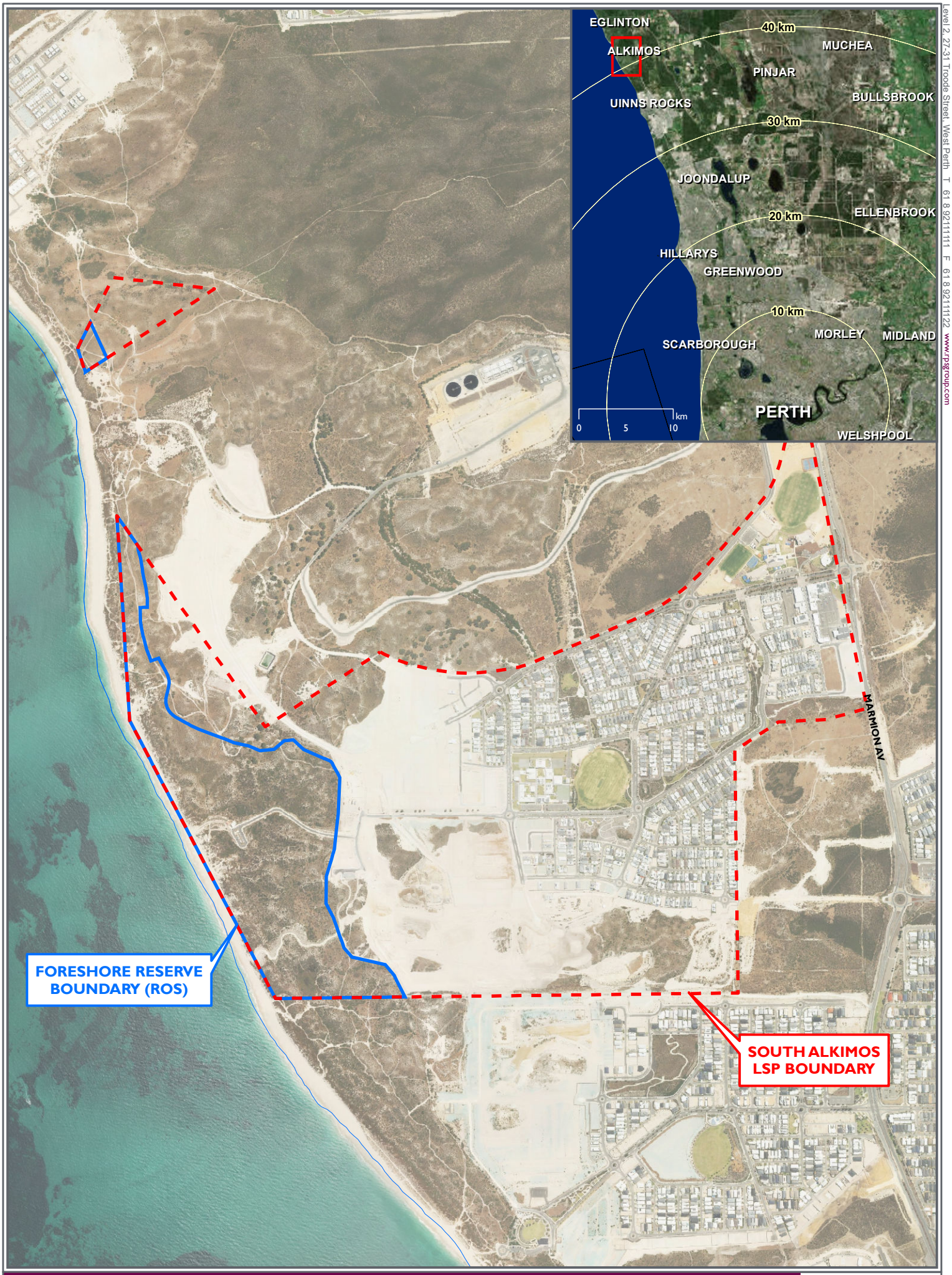

Figure A

Site location

GDA 1994 MGA one 50

0 125 250 500 m

Job Number: L12347-001 FMP
Doc Number: 001
Date: 20.06.19
Scale: Map 1:15,000 Overview 1:500,000 A4
Created by: MA
Source: Imagery - Landgate

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Legend

- Structure Plan Area
- Village 1 Boundary

Reserves

- Public Use - (PS) Primary School
- Regional Parks & Recreation (Foreshore Reserve)
- Conservation POS
- Active POS

Zones

- Residential
- Commercial
- Mixed Use
- Conservation Area Management Boundary
- Foreshore Reserve

Other

- Indicative STS Route
- Precinct Boundary
- Social / Pedestrian / Cycle Linkage
- Indicative Foreshore Pedestrian and Cycle Link (as per Alkimos-Eglinton District Structure Plan)

Precincts

- (1) Gateway
- (2) Central Village
- (3) Residential
- (A) Strategic Public Open Space - Refer to Table 3 of Part 1 - Statutory Section

AREA SUBJECT TO FURTHER PLANNING

ROAD CONNECTION TO LOT 9001

ROAD CONNECTION TO LOT 9001

ROAD CONNECTION TO LOT 9001

AREA SUBJECT TO FURTHER PLANNING

1012

9001

1002

Left in/ left out intersectin in accordance with Figure 1 - Road Hierachy and Arterial Access of Attacment D.

Full access T-intersection is permitted until such time that either of the four-way intersections to the south or north are constructed to provide suitable access to the LSP area.

ROMEO ROAD

NORTHERN SUBURBS RAILWAY

CONNECTION TO TRINITY

AVENUE

CONNECTION TO TRINITY

MARMION

CONNECTION TO TRINITY

HIGH SCHOOL / DISTRICT OPEN SPACE

DESIGN CONCEPT SUBJECT TO REVIEW

ROAD CONNECTION ON TO LOT 9

ROAD CONNECTION ON TO LOT 9

ROAD CONNECTION ON TO LOT 9

INDIAN OCEAN

PS

A

B

C

D

1

2

3

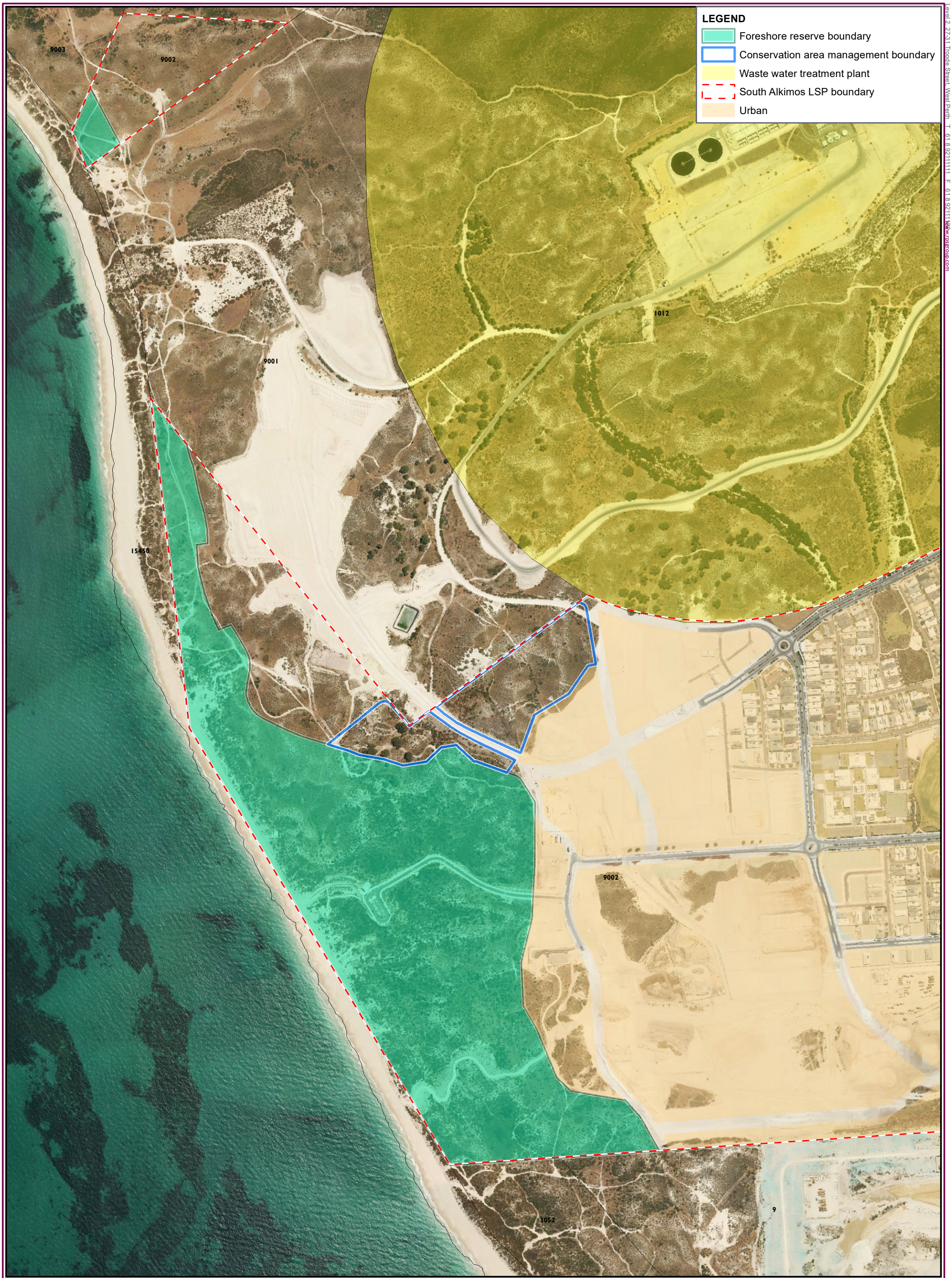

Figure C

Foreshore reserve boundary

GDA 1994 MGA one 51

0 62.5 125 250 m

Job Number: L1234701 FMP
Date: 12.09.19
Scale: 1: 4,000 A3
Revision: A
Drafted by: MA

Source: Cadastre, Relief Orthophoto - Landgate, 2012. Lomandra - RPS 2012.

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Document Path: G: Jobs L Jobs L12347 - Alkimos FMP amd CAMP proposal for Federal process Figures FMP L1234701 G FMP FigC Foreshore Reserve Boundary 190912.mxd

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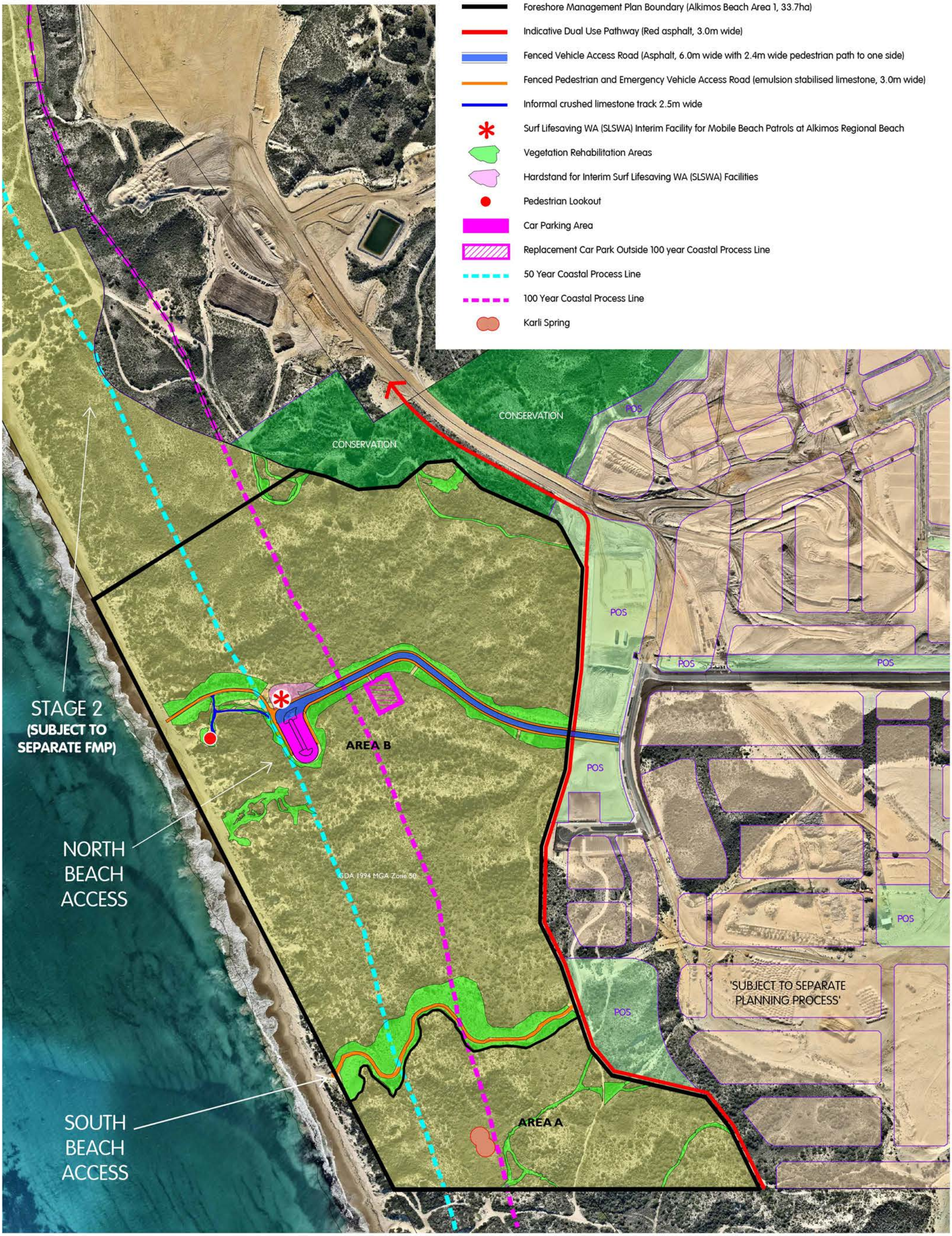

Figure D

Foreshore concept plan

Job Number: L12347-001 FMP
Doc Number: 004
Date: 14.06.19
Scale: NTS @ A3
Created by: MA
Source: Foreshore Management Plan Concept Plan - Landcorp - 18.08.15

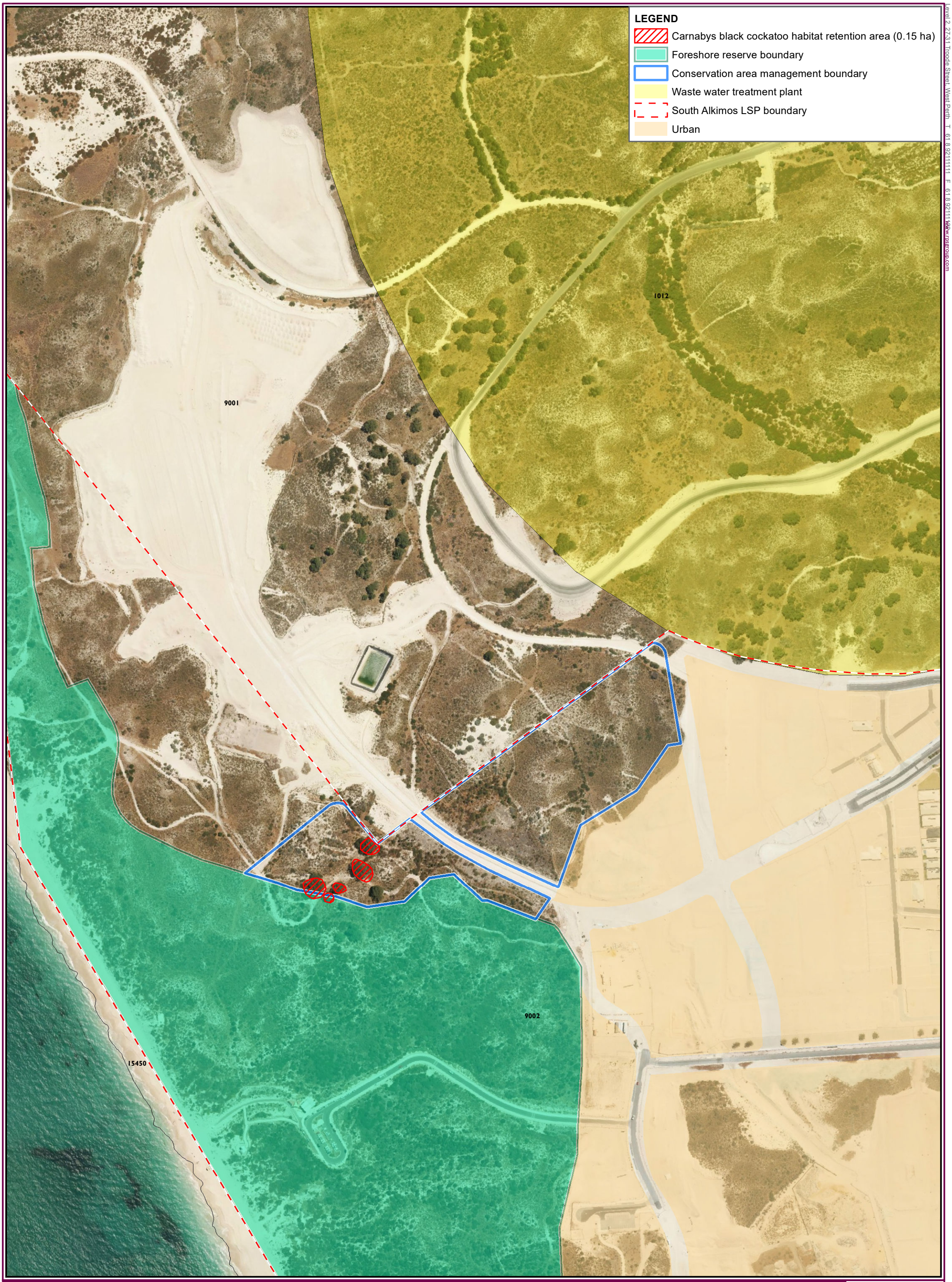

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Figure E

Carnaby's black-cockatoo habitat

GDA 1994 MGA one 51

0 25 50 100 m

Job Number: L1234701 FMP
Date: 12.09.19
Doc no: 005
Scale: 1: 4,000 A3
Drafted by: MA

Source: Cadastre, Relief Orthophoto - Landgate, 2012. Lomandra - RPS 2012.

Document Path: G: Jobs L Jobs L12347 - Alkimos FMP amd CAMP proposal for Federal process Figures FMP L1234701 G FMP FigE CBC Habitat 190912.mxd

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Figure F

FMP Proposed revegetation areas

GDA 1994 MGA one 50

0 20 40 80 m

Job Number: L1234701 FMP
Date: 20.06.19
Scale: 1: 4,000 A3
Revision: A
Drafted by: MA

Source: Cadastre, Relief Orthophoto - Landgate, 2012. Lomandra - RPS 2012.

Document Path: G: Jobs L Jobs L12347 - Alkimos FMP amd CAMP proposal for Federal process Figures FMP L1234701 G FMP FigF FMP Proposed revegetation 190620.mxd

Ministerial Condition	Required Carnaby's black cockatoo habitat revegetation areas	Proposed Carnaby's black cockatoo habitat revegetation areas
Ministerial condition 10a	2 ha	2.08 ha
Ministerial condition 10b (within both the FMP (regional open space area) and CAMP (conservation public open space area) boundaries)	1 ha	1.34 ha
Ministerial condition 11a	1 ha	1.22 ha
Total area	4 ha	4.64 ha

Appendix A

South Alkimos EPBC 2011/5902 Conditions and the November 2018 amendments

Australian Government
Department of the Environment and Energy

Ms Nadja Kampfhenkel
Sustainability Manager
Lendlease Communities Australia
Level 2, 10 Ord Street
WEST PERTH WA 6005

EPBC 2011/5902: Urban Development – Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos: variation to conditions of approval.

Dear Ms Kampfhenkel,

Thank you for contacting the Department regarding future management of public open space required under the *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) conditions of approval for EPBC 2011/5902. I understand the Department recommended the conditions of approval be varied, and that you agreed to the Department's draft variation on 21 November 2018.

Officers of this Department have advised me on the proposed variation. As a delegate of the Minister for the Environment and Energy, I have decided to vary the conditions of approval so that Lendlease may seek agreement from the Minister to transfer implementation of plans specified under Conditions 10, 11 and 12 to, for example, the City of Wanneroo. If agreed, Lendlease would no longer be obliged to maintain relevant records and to report on plan implementation. I have also varied the conditions of approval so that:

- Lendlease may request to the Minister that Lendlease no longer publish and report on compliance with the conditions of approval (Condition 3). This provision may be especially relevant following transfer of all management plans; and

- the Minister no longer has the power to require changes to approved management plans. I have revoked Condition 5 as this power is no longer appropriate with the management plans transferred to an entity that is not a holder of the approval.

Please refer to the attached variation notice that specifies the varied conditions of approval, and note that the variation will soon be published on the Department's referral notices webpage.

Should you require any further information regarding the variation please contact Vaughn Cox on (02) 6274 2005 or by email to postapproval@environment.gov.au.

Yours sincerely

Gregory Manning
Assistant Secretary
Assessment (WA, SA, NT) & Post Approvals Branch
Environment Standards Division

30 November 2018

Attach: Variation to conditions of approval for EPBC 2011/5902.

Australian Government
Department of the Environment and Energy

VARIATION TO CONDITIONS ATTACHED TO APPROVAL

Urban Development – Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, Western Australia (EPBC 2011/5902)

This decision to vary a condition of approval is made under section 143 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Person to whom the approval is granted	Lend Lease Communities (Alkimos) Pty Limited ABN: 145 185 468
Approved action	The clearing of approximately 97 ha of native vegetation for urban development at Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, WA [See EPBC Act referral 2011/5902].

Variation

Variation of conditions of approval	The variation is: Revoke Condition 5 attached the approval. Delete Condition 3 attached to the approval and substitute with Condition 3 specified in the table below. Add condition 12A to the approval as specified in the table below.
Date of effect	This variation has effect on the date the instrument is signed.

Person authorised to make decision

Name and position	Gregory Manning Assistant Secretary Assessment (WA, SA, NT) & Post Approvals Branch
Signature	
Date of decision	30 November 2018

Date of decision	Conditions attached to approval
Original dated 30/06/2012	**1.** Within 30 days after the commencement of **construction**, the person taking the action must advise **the Department** in writing of the actual date of commencement.
Original dated 30/06/2012	**2.** The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the management plans required by this approval, and make them available upon request to **the Department**. Such records may be subject to audit by **the Department** or an independent auditor in accordance with section 458 of the **EPBC Act**, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on **the Department**'s website. The results of audits may also be publicised through the general media.
As varied on the date this instrument was signed	**3.** Unless otherwise agreed to in writing by the **Minister**, the person taking the action must, within three months of every 12 month anniversary of the commencement of the action: a) publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of any management plans as specified in the conditions; and b) provide to the Department documentary evidence of the date of publication and non-compliance with any of the conditions of this approval.
Variation dated 19/08/2016	**4.** a) The person taking the action may choose to revise the CAMP, FMP and PLRP approved by the **Minister** under conditions 10, 11 and 12 without submitting it for approval (including approval under section 143A of the **EPBC Act**), if the taking of the action in accordance with the revised plan would not be likely to have a **new or increased impact**. If the person taking the action makes this choice they must: i. Notify **the Department** in writing that the approved plan has been revised and provide **the Department** with: • an electronic copy of the revised plan; • an explanation of the differences between the revised plan and the approved plan; and • the reasons the person taking the action considers that taking the action in accordance with the revised plan would not be likely to have a **new or increased impact**. ii. Declare in writing a date on which the revised plan will first be implemented by the person taking the action. That date of initial implementation must be at least 28 days after the revised plan is submitted. b) The person taking the action may revoke their choice under condition 4.a) at any time by giving written notice to **the Department**, in which case from the following day the person taking the action must implement the approved plan. c) If the **Minister** gives a notice to the person taking the action that the **Minister** is satisfied that the taking of the action in accordance with the revised plan would be likely to have a **new or increased impact**, then: i. Condition 4.a) does not apply, or ceases to apply, in relation to the revised plan; and ii. The person taking the action must implement the approved plan.

Date of decision	Conditions attached to approval
	To avoid any doubt, this condition does not affect any operation of conditions 4.a) and 4.b) in the period before the day the notice is given. At the time of giving the notice the **Minister** may also notify that for a specified period of time condition 4.a) does not apply for one or more specified plans required under the approval. Note: This condition is not intended to limit the operation of section 143A of the **EPBC Act** which allows the person taking the action to submit a revised action management plan to the **Minister** for approval.
As varied on the date this instrument was signed	**5. Revoked**
Original dated 30/06/2012	**6.** If, at any time after five years from the date of this approval, the person taking the action has not substantially commenced the action, then the person taking the action must not substantially commence the action without the written agreement of the **Minister.**
Original dated 30/06/2012	**7.** Unless otherwise agreed to in writing by the **Minister**, the person taking the action must publish all management plans referred to in these conditions of approval on their website. Each management plan must be published on the website within 1 month of being approved and must remain on the website for the life of the project.
Original dated 30/06/2012	**8.** The person taking the action must not clear more than 21.1ha of **Carnaby's Black-Cockatoo** foraging habitat from Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, Western Australia.
Variation dated 13/06/2013	**9. Revoked**
Variation dated 13/06/2013	**10.** To protect habitat for listed threatened species, the person taking the action must prepare and submit a Conservation Area Management Plan (CAMP) detailing management of **POS** (designated Conservation **POS** at Attachment A), for approval by the **Minister**. The CAMP must include: (a) at least 2ha of **Carnaby's Black-Cockatoo** foraging habitat to be retained and rehabilitated in **POS** on the **project area**, as shown in Attachment A, to be managed for habitat recovery, protection and conservation; (b) details of supplementary planting equivalent to at least 1ha of **Carnaby's Black-Cockatoo** foraging habitat on the **project area** (to be spread across conservation **POS** and **ROS**), including timeframes and survival targets proposed for plantings; (c) measures to manage weeds and feral pests; (d) bushfire prevention and management measures; (e) erosion control measures; (f) access management (including boardwalks, pathways, signage and fencing); (g) performance indicators and corrective measures; (h) monitoring and reporting measures; (i) roles and responsibilities of contractors, staff and the person taking the action; and (j) time frames for the implementation and management of the above measures. The CAMP must be submitted to **the Department** within 12 months of the date of approval. If the **Minister** approves the CAMP, the approved plans must be implemented. No **construction** can commence in the area shown as the No Clearing area on Attachment C until the CAMP is approved by the **Minister.**

Date of decision	Conditions attached to approval
Variation dated 13/06/2013	**11.** To protect habitat for listed threatened species, the person taking the action must prepare and submit a Foreshore Management Plan (FMP) detailing management of **ROS** on the **project area** (designated Regional Parks and Recreation at Attachment A), for approval by the **Minister**. The FMP must include: (a) details of supplementary planting and weed control equivalent to at least 1ha of **Carnaby's Black-Cockatoo** foraging habitat on the **project area**, (to be spread across conservation **POS** and **ROS)**, including timeframes and survival targets proposed for plantings; (b) details of funding to be provided for long-term conservation management of **ROS** and details of the entity who will be responsible for management of **ROS**; (c) measures to manage weed and feral pests; (d) bushfire prevention and management measures; (e) erosion control measures; (f) access management (including visitor facilities, boardwalks, pathways, signage and fencing); (g) performance indicators and corrective measures; (h) monitoring and reporting measures; (i) roles and responsibilities of contractors, staff and the person taking the action; and (j) time frames for the implementation and management of the above measures. The FMP must be submitted to **the Department** within 12 months of the date of approval. If the **Minister** approves the FMP, the approved plans must be implemented. No **construction** can commence in the area illustrated shown as No Clearing on Attachment C until the FMP is approved by the **Minister.**
Original dated 30/06/2012	**12.** To protect habitat for listed threatened species the person taking the action must prepare and submit a Precinct Landscape and Revegetation Plan (PLRP) for the **project area**, for approval by the **Minister**. The PLRP must include: a) measures to establish the equivalent of at least 5ha of **Carnaby's Black-Cockatoo** habitat on the **project area**, through streetscape and landscape planting; b) at least 50% of plantings of trees and shrubs in streetscape and landscape planting must consist of plant species known to be **primary feeding plants** for **Carnaby's Black-Cockatoo**; c) timeframes and survival targets proposed for plantings; d) contingency measures if survival targets are not achieved; e) monitoring and reporting measures; f) roles and responsibilities of contractors, staff and the person taking the action; and g) time frames for the implementation and management of the above measures. The PLRP must be submitted to **the Department** for approval by the **Minister** within 12 months of the date of approval. If the **Minister** approves the PLRP, the approved plan must be implemented. No **construction** can commence in the area shown as the No Clearing area on Attachment C until the PLRP is approved by the **Minister**.
As varied on the date this instrument was signed	**12A.** The person taking the action may, with written agreement of the **Minister**, cease to implement the CAMP, FMP and/or PRLP. If the person taking the

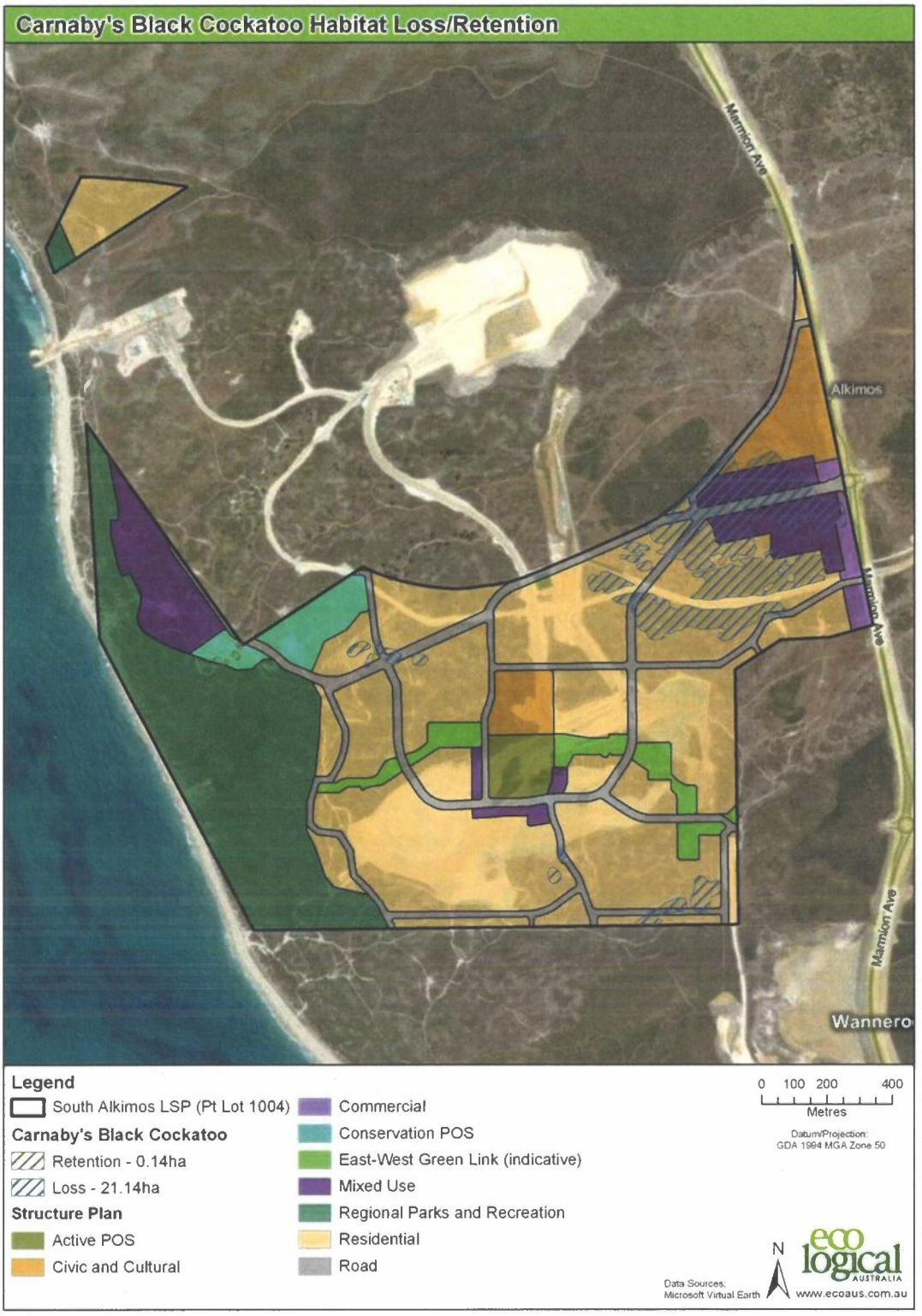
Date of decision	Conditions attached to approval
	action wishes to cease implementing the CAMP, FMP and/or PRLP, the person taking the action must submit a request to the **Minister** which: a) includes a report demonstrating that the outcomes and performance indicators of the approved CAMP, FMP and/or PRLP have been achieved; b) specifies the entity that will implement the CAMP, FMP and/or PRLP in the future; c) includes written agreement from the entity to implementing the approved CAMP, FMP and/or PRLP; and d) sets out the entity's capacity to implement the CAMP, FMP and/or PRLP. If the **Minister** agrees to the request, the person taking the action may cease to implement the CAMP, FMP and/or PRLP, to maintain associated records (Condition 2) and/or report on implementation of the CAMP, FMP and/or PRLP (Condition 3).
Original dated 30/06/2012	**13.** To offset the loss of habitat for **Carnaby's Black-Cockatoo**, the person taking the action must, within 12 months of the commencement of **construction**, provide funds to **WA DEC** for the acquisition, and a contribution to management of the offset described in *Alkimos Lot 1004 Residential Development Mitigation and Offsets Strategy for Matters of National Environmental Significance* (Eco Logical Australia, January 2012). The offset land must be at least 126ha of freehold land in the Gingin area and contain vegetation that has equivalent or better foraging habitat for **Carnaby's Black-Cockatoo**, including *Banksia* woodland/shrubland. Within 4 weeks of the funding being provided to the **WA DEC**, the person taking the action must provide written evidence to **the Department** of the payment.
Variation dated 24/08/2012	**14.** Within 12 months of the commencement of **construction**, the person taking the action must provide **the Department** with a description and map clearly defining the location and boundaries of the offset property described at Condition 13, which must be accompanied with the **offset attributes** and a **shapefile.**
Variation dated 13/06/2013	**15. Revoked**.
Variation dated 13/06/2013	**16. Revoked**.
Variation dated 13/06/2013	**17. Revoked**.

Date of decision	Definitions attached to approval
Variations dated 13/06/2013, 19/08/2016	**Carnaby's Black Cockatoo** (*Calyptorhynchus latirostris*) is an endangered large brownish-black cockatoo. **Construction** includes any preparatory works required to be undertaken including clearing vegetation, the erection of any fences, signage or on-site temporary structures and the use of construction or excavation equipment on site for the purpose of breaking the ground for buildings or infrastructure. **EPBC Act** is the *Environment Protection and Biodiversity Conservation Act 1999.* **Minister** is the Minister administering the *Environment Protection and Biodiversity Conservation Act 1999* and includes a delegate of the Minister.

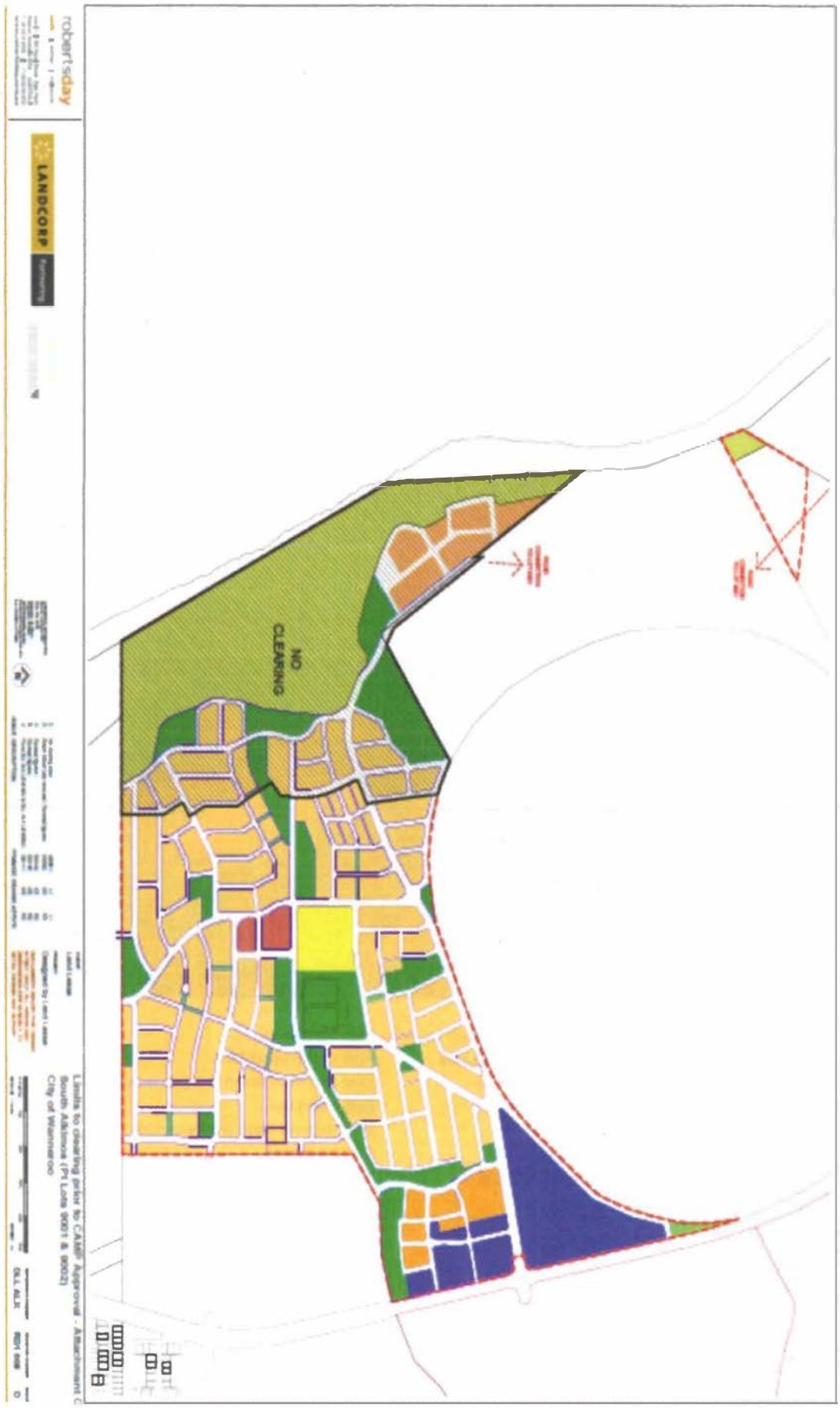
Date of decision	Definitions attached to approval
	New or increased impact is a new or increased impact on any matter protected by the controlling provisions for the action, when compared to the net impact resulting from implementing the plan that has been approved by the Minister. **Offset attributes** means an '.xls' file capturing relevant attributes of the Offset Area, including the EPBC reference ID number, the physical address of the offset site, coordinates of the boundary points in decimal degrees, the EPBC protected matters that the offset compensates for, any additional EPBC protected matters that are benefiting from the offset, and the size of the offset in hectares. **POS** is Public Open Space set aside in the Alkimos Local Structure Plan for recreation. **Primary feeding plants** for Carnaby's Black Cockatoo include: any Banksia sp., any plants identified in a search of the WA DEC's Plants for Carnaby's Search Tool (at http://www.dec.wa.gov.au/content/view/5983/1556/), or other plants approved in writing by the Department. **Project area** is Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, Western Australia. **ROS** is Regional Open Space areas set aside in the Alkimos Local Structure Plan for conservation. **Shapefile** means an ESRI Shapefile containing '.shp', '.shx' and '.dbf' files and other files capturing attributes of the Offset Area, including the shape, EPBC reference ID number and EPBC protected matters present at the relevant site. Attributes should also be captured in '.xls' format. **The Department** is the Australian Government Department administering the *Environme Protection and Biodiversity Conservation Act 1999.* **WA DEC** is Western Australia Government's Department of Environment and Conservation (or equivalent agency).

Variation dated 19/08/2016

Attachment A



Original dated 30/06/2012



Approval

Urban Development – Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, WA (EPBC 2011/5902)

This decision is made under sections 130(1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999*.

Proposed action

person to whom the approval is granted	Lend Lease Communities (Alkimos) Pty Limited
proponent's ACN (if applicable)	ACN: 145 185 468
proposed action	The clearing of approximately 97 ha of native vegetation for urban development at Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, WA [See EPBC Act referral 2011/5902].

Approval decision

Controlling Provision	Decision
Listed threatened species and communities (sections 18 & 18A)	Approved

conditions of approval

This approval is subject to the conditions specified below.

expiry date of approval

This approval has effect until 31 December 2037

Decision-maker

name and position	Barbara Jones Assistant Secretary Environment Assessment Branch
signature	
date of decision	30 June 2012

Conditions attached to the approval

1. Within 30 days after the commencement of **construction**, the person taking the action must advise **the Department** in writing of the actual date of commencement.

2. The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the management plans required by this approval, and make them available upon request to **the Department**. Such records may be subject to audit by **the Department** or an independent auditor in accordance with section 458 of the **EPBC Act**, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on **the Department**'s website. The results of audits may also be publicised through the general media.

3. Within three months of every 12 month anniversary of the commencement of the action, the person taking the action must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of any management plans as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the **Department** at the same time as the compliance report is published. Each management plan must be published on the website for the length of the approval.

4. If the person taking the action wishes to carry out any activity otherwise than in accordance with the management plans as specified in the conditions, the person taking the action must submit to the **Department** for the **Minister's** written approval a revised version of that management plan. The varied activity shall not commence until the **Minister** has approved the varied management plan in writing. The **Minister** will not approve a varied management plan unless the revised management plan would result in an equivalent or improved environmental outcome over time. If the **Minister** approves the revised management plan that management plan must be implemented in place of the management plan originally approved.

5. If the **Minister** believes that it is necessary or convenient for the better protection of Listed threatened species and communities (sections 18 & 18A) to do so, the **Minister** may request that the person taking the action make specified revisions to the management plan specified in the conditions and submit the revised management plan for the **Minister's** written approval. The person taking the action must comply with any such request. The revised approved management plan must be implemented. Unless the **Minister** has approved the revised management plan then the person taking the action must continue to implement the management plan originally approved, as specified in the conditions.

6. If, at any time after five years from the date of this approval, the person taking the action has not substantially commenced the action, then the person taking the action must not substantially commence the action without the written agreement of the **Minister**.

7. Unless otherwise agreed to in writing by the **Minister**, the person taking the action must publish all management plans referred to in these conditions of approval on their website. Each management plan must be published on the website within 1 month of being approved and must remain on the website for the life of the project.

8. The person taking the action must not clear more than 21.1ha of **Carnaby's Black Cockatoo** foraging habitat from Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, Western Australia.

9. The person taking the action must not clear more than 75.2ha of **Graceful Sun Moth** habitat from Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, Western Australia.

10. To protect habitat for listed threatened species, the person taking the action must prepare and submit a Conservation Area Management Plan (CAMP) detailing management of **POS** (designated Conservation **POS** at Attachment A), for approval by the **Minister**. The CAMP must include:

    (a) at least 2ha of **Carnaby's Black-Cockatoo** foraging habitat to be retained and rehabilitated in **POS** on the **project area**, as shown in Attachment A, to be managed for habitat recovery, protection and conservation;
    (b) retention of 4.5ha on the **project area**, as shown in Attachment B, for the purposes of **Graceful Sun Moth** habitat recovery, protection and conservation;
    (c) details of supplementary planting equivalent to at least 1ha of **Carnaby's Black-Cockatoo** foraging habitat on the project area (to be spread across conservation **POS** and **ROS**), including timeframes and survival targets proposed for plantings;
    (d) details of a program of annual, appropriately timed, monitoring of **Graceful Sun Moth** populations in **POS**;
    (e) details of a program of annual monitoring of the health and condition of *Lomandra maritima* in **POS**;
    (f) measures to manage weeds and feral pests;
    (g) bushfire prevention and management measures;
    (h) erosion control measures;
    (i) access management (including boardwalks, pathways, signage and fencing);
    (j) performance indicators and corrective measures;
    (k) monitoring and reporting measures;
    (l) roles and responsibilities of contractors, staff and the person taking the action; and
    (m) time frames for the implementation and management of the above measures.

    The CAMP must be submitted to **the Department** within 12 months of the date of approval. If the **Minister** approves the CAMP, the approved plans must be implemented. No **construction** can commence in the area shown as the No Clearing area on Attachment C until the CAMP is approved by the **Minister.**

11. To protect habitat for listed threatened species, the person taking the action must prepare and submit a Foreshore Management Plan (FMP) detailing management of **ROS** on the **project area** (designated Regional Parks and Recreation at Attachment A), for approval by the **Minister**. The FMP must include:

    (a) retention of 16.1ha of **ROS** on the **project area**, as shown in Attachment B, for the purposes of **Graceful Sun Moth** habitat recovery, protection and conservation;
    (b) details of supplementary planting and weed control equivalent to at least 1ha of **Carnaby's Black-Cockatoo** foraging habitat on the **project area**, (to be spread across conservation **POS** and **ROS)**, including timeframes and survival targets proposed for plantings;
    (c) details of funding to be provided for long-term conservation management of **ROS** and details of the entity who will be responsible for management of **ROS**;
    (d) details of a program of annual monitoring of the health and condition of *Lomandra maritima* in **ROS**;
    (e) measures to manage weed and feral pests;
    (f) bushfire prevention and management measures;
    (g) erosion control measures;
    (h) access management (including visitor facilities, boardwalks, pathways, signage and fencing);
    (i) performance indicators and corrective measures;
    (j) monitoring and reporting measures;
    (k) roles and responsibilities of contractors, staff and the person taking the action; and
    (l) time frames for the implementation and management of the above measures.

    The FMP must be submitted to **the Department** within 12 months of the date of approval. If the **Minister** approves the FMP, the approved plans must be implemented. No **construction** can commence in the area illustrated shown as No Clearing on Attachment C until the FMP is approved by the **Minister.**

12. To protect habitat for listed threatened species the person taking the action must prepare and submit a Precinct Landscape and Revegetation Plan (PLRP) for the **project area**, for approval by the **Minister**. The PLRP must include:

    (a) measures to establish the equivalent of at least 5ha of **Carnaby's Black-Cockatoo** habitat on the **project area**, through streetscape and landscape planting;
    (b) at least 50% of plantings of trees and shrubs in streetscape and landscape planting must consist of plant species known to be **primary feeding plants** for **Carnaby's Black-Cockatoo**;
    (c) timeframes and survival targets proposed for plantings;
    (d) contingency measures if survival targets are not achieved;
    (e) monitoring and reporting measures;
    (f) roles and responsibilities of contractors, staff and the person taking the action; and
    (g) time frames for the implementation and management of the above measures.

    The PLRP must be submitted to **the Department** for approval by the **Minister** within 12 months of the date of approval. If the **Minister** approves the PLRP, the approved plan must be implemented. No **construction** can commence in the area shown as the No Clearing area on Attachment C until the PLRP is approved by the **Minister.**

13. To offset the loss of habitat for **Carnaby's Black-Cockatoo**, the person taking the action must, within 12 months of the commencement of **construction**, provide funds to **WA DEC** for the acquisition, and a contribution to management of the offset described in *Alkimos Lot 1004 Residential Development Mitigation and Offsets Strategy for Matters of National Environmental Significance* (Eco Logical Australia, January 2012). The offset land must be at least 126ha of freehold land in the Gingin area and contain vegetation that has equivalent or better foraging habitat for **Carnaby's Black-Cockatoo**, including *Banksia* woodland/shrubland. Within 4 weeks of the funding being provided to the **WA DEC**, the person taking the action must provide written evidence to **the Department** of the payment.

14. Before the commencement of **construction**, the person taking the action must provide to **the Department** with a description and map clearly defining the location and boundaries of the offset property described at Condition 13, which must be accompanied with the **offset attributes** and a **shapefile.**

15. Within 12 months of the commencement of **construction**, the person taking the action must provide written evidence of payment of $250 000 to **WA DEC** for the purposes of funding the preparation and implementation of an operational management plan for the management of a minimum of 400ha of *Lomandra maritima* in Wilbinga Conservation Park, approximately 20km north of the **project area**.

16. Within 12 months of the commencement of **construction**, the person taking the action must provide written evidence of payment of $90 000 to **WA DEC** for the purpose of funding future **Graceful Sun Moth** surveys in priority areas of Crown Reserve, Nature Reserve or Unallocated Crown Land, to be determined by **WA DEC**.

17. Within 12 months of the commencement of **construction**, the person taking the action must, in consultation with **WA DEC**, enter into an agreement with a recognised **research body** to fund a **research project** that will aid in the future persistence of the **Graceful Sun Moth** through the propagation and translocation of *Lomandra sp.*

    (a) The person taking the action must provide written evidence to **the Department** that the agreement, has been entered into within 12 months of commencement of **construction**.

    (b) Prior to the commencement of the **research project**, the person taking the action must submit to **the Department** for approval, a document detailing the full scope of the **research project**, including:

    - objectives of the project;
    - specifics of trial design;

- methodologies for translocation and propagation actions;
- timing and approach for implementation of research trials;
- parameters and timing of monitoring;
- criteria against which to assess trial outcomes;
- timing and scope of reporting; and
- a copy of the research agreement with the recognised **research body**.

(c) The person taking the action must provide the sum of $190 000 to a recognised **research body** for a **research project**, in accordance with the research agreement. Within 4 weeks of the payment being made, the person taking the action must provide written evidence to **the Department**.

Definitions:

Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) is an endangered large brownish-black cockatoo.

Construction includes any preparatory works required to be undertaken including clearing vegetation, the erection of any fences, signage or on-site temporary structures and the use of construction or excavation equipment on site for the purpose of breaking the ground for buildings or infrastructure.

EPBC Act is the *Environment Protection and Biodiversity Conservation Act 1999.*

Graceful Sun Moth (*Synemon gratiosa)* is a medium sized diurnal flying sun moth that is similar in appearance to a butterfly.

Minister is the Minister administering the *Environment Protection and Biodiversity Conservation Act 1999* and includes a delegate of the Minister.

Offset attributes means an '.xls' file capturing relevant attributes of the Offset Area, including the EPBC reference ID number, the physical address of the offset site, coordinates of the boundary points in decimal degrees, the EPBC protected matters that the offset compensates for, any additional EPBC protected matters that are benefiting from the offset, and the size of the offset in hectares.

POS is Public Open Space set aside in the Alkimos Local Structure Plan for recreation.

Primary feeding plants for Carnaby's Black Cockatoo include: any Banksia sp., any plants identified in a search of the WA DEC's Plants for Carnaby's Search Tool (at http://www.dec.wa.gov.au/content/view/5983/1556/), or other plants approved in writing by the Department.

Project area is Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, Western Australia.

Research body is an organisation, university or entity with the capacity to scientifically and accurately undertake research, prepare and finalise a scientific document, have the document peer reviewed and published in an academic journal.

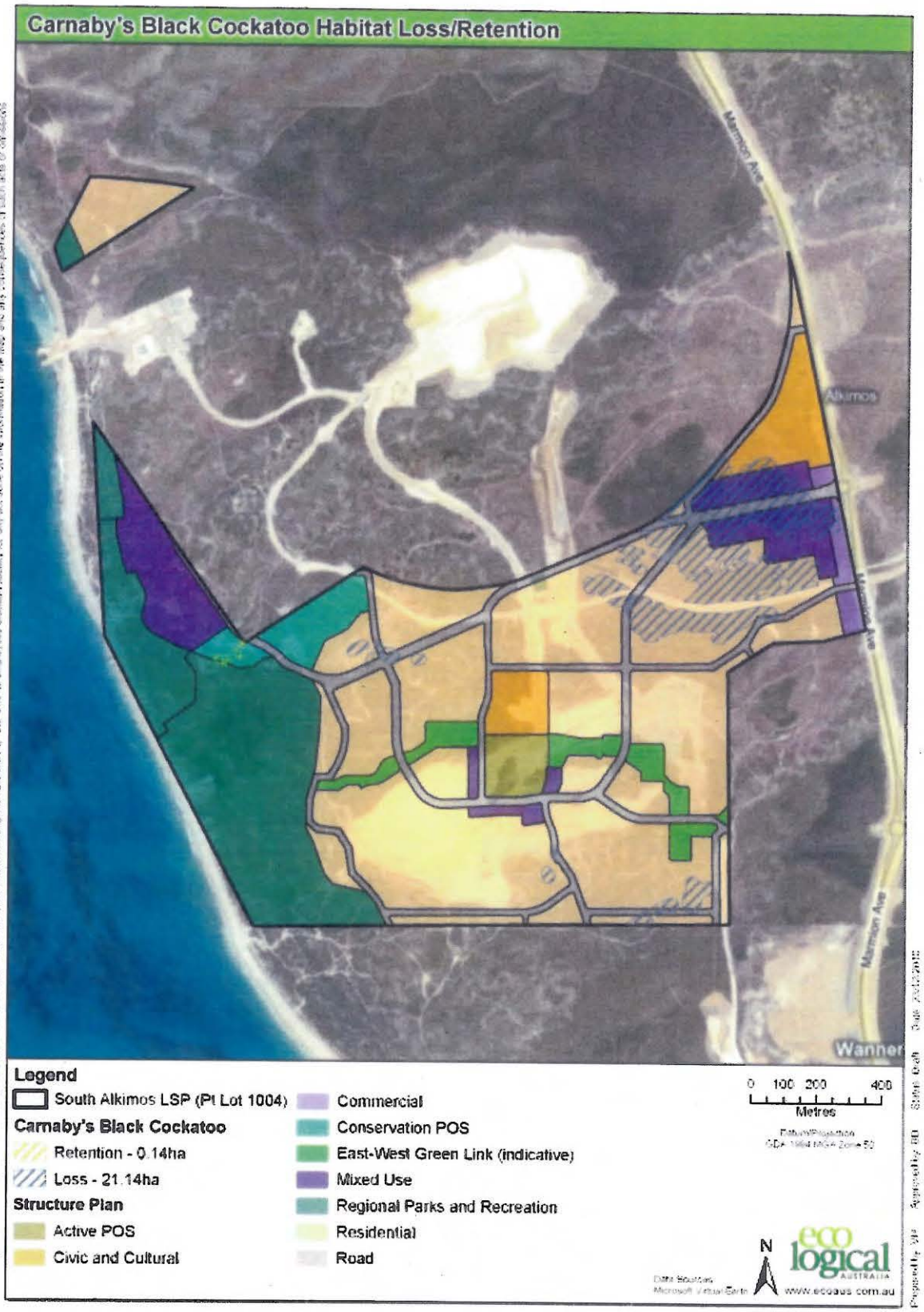
Research project is a project that will aid in the future persistence of the Graceful Sun Moth in Western Australia.

ROS is Regional Open Space areas set aside in the Alkimos Local Structure Plan for conservation.

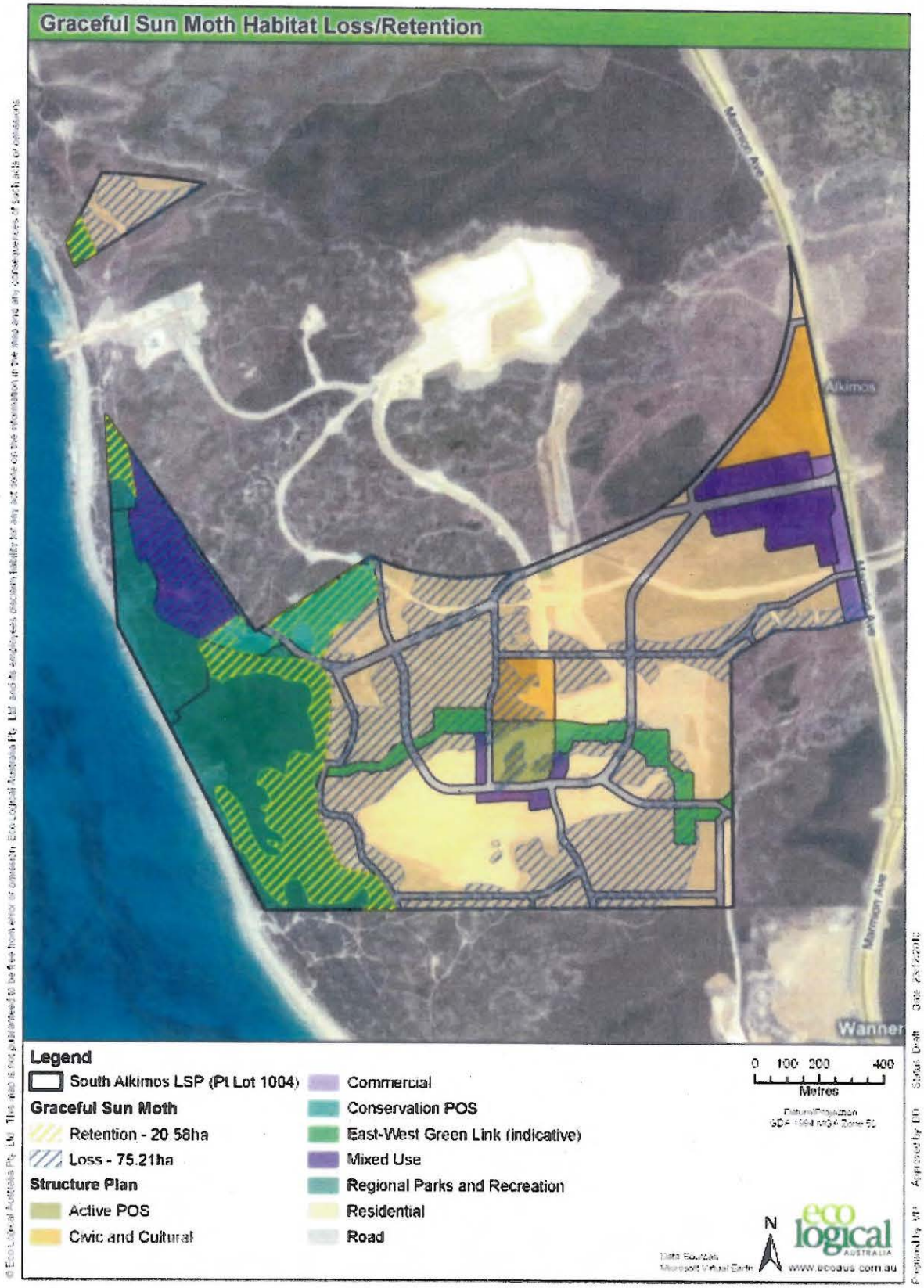
Shapefile means an ESRI Shapefile containing '.shp', '.shx' and '.dbf' files and other files capturing attributes of the Offset Area, including the shape, EPBC reference ID number and EPBC protected matters present at the relevant site. Attributes should also be captured in '.xls' format.

The Department is the Australian Government Department administering the *Environment Protection and Biodiversity Conservation Act 1999.*

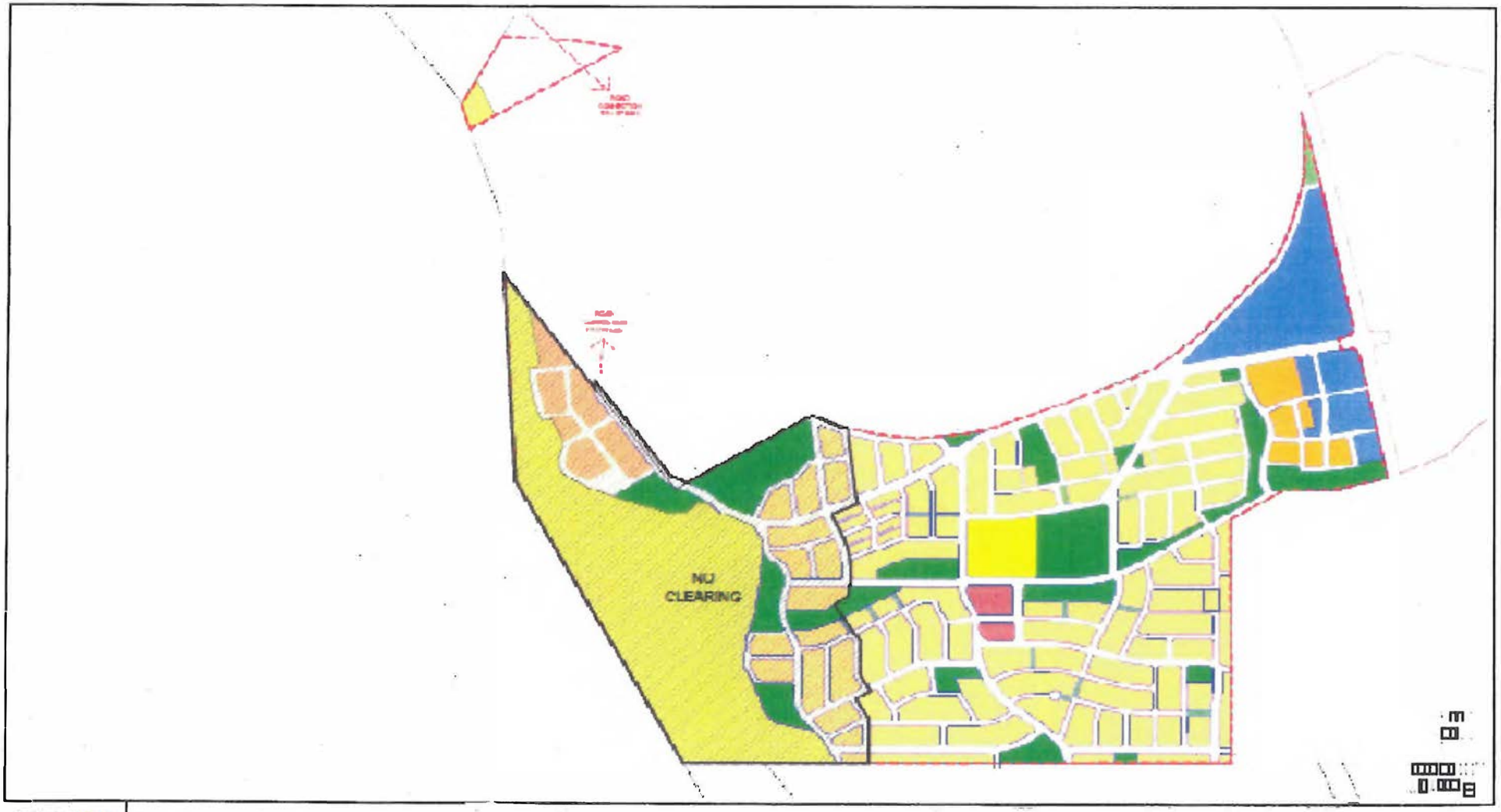
WA DEC is Western Australia Government's Department of Environment and Conservation (or equivalent agency).



Attachment A



Attachment B



LANDCORP

Attachment C

Australian Government

Department of Sustainability, Environment, Water, Population and Communities

VARIATION TO CONDITIONS ATTACHED TO APPROVAL

Urban Development – Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, WA (EPBC 2011/5902)

This decision to vary a condition of approval is made under section 143 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Approved action

Person to whom the approval is granted	Lend Lease Communities (Alkimos) Pty Limited ACN: 145 185 468
Approved action	The clearing of approximately 97 ha of native vegetation for urban development at Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, WA [See EPBC Act referral 2011/5902]

Variation

Variation of conditions of approval	The variation is: Delete condition **9**, **10**, **11**, **15**, **16**, **17**, **Attachment B** and definitions '**Graceful Sun Moth**', '**Research body**' and '**Research project**' attached to the approval dated 30 June 2012 and substitute condition 10 and 11 specified below.
Date of effect	This variation has effect on the date the instrument is signed

Person authorised to make decision

name and position	**Shane Gaddes** A/g Assistant Secretary Compliance & Enforcement Branch
Signature	S. Gaddes
Date of decision	13 June 2013

Conditions attached to the approval

10. To protect habitat for listed threatened species, the person taking the action must prepare and submit a Conservation Area Management Plan (CAMP) detailing management of **POS** (designated Conservation **POS** at Attachment A), for approval by the **Minister**. The CAMP must include:

(a) at least 2ha of **Carnaby's Black-Cockatoo** foraging habitat to be retained and rehabilitated in **POS** on the **project area**, as shown in Attachment A, to be managed for habitat recovery, protection and conservation;
(b) details of supplementary planting equivalent to at least 1ha of **Carnaby's Black-Cockatoo** foraging habitat on the project area (to be spread across conservation **POS** and **ROS**), including timeframes and survival targets proposed for plantings;
(c) measures to manage weeds and feral pests;
(d) bushfire prevention and management measures;
(e) erosion control measures;
(f) access management (including boardwalks, pathways, signage and fencing);
(g) performance indicators and corrective measures;
(h) monitoring and reporting measures;
(i) roles and responsibilities of contractors, staff and the person taking the action; and
(j) time frames for the implementation and management of the above measures.

The CAMP must be submitted to **the Department** within 12 months of the date of approval. If the **Minister** approves the CAMP, the approved plans must be implemented. No **construction** can commence in the area shown as the No Clearing area on Attachment C until the CAMP is approved by the **Minister.**

11. To protect habitat for listed threatened species, the person taking the action must prepare and submit a Foreshore Management Plan (FMP) detailing management of **ROS** on the **project area** (designated Regional Parks and Recreation at Attachment A), for approval by the **Minister**. The FMP must include:

(a) details of supplementary planting and weed control equivalent to at least 1ha of **Carnaby's Black-Cockatoo** foraging habitat on the **project area**, (to be spread across conservation **POS** and **ROS)**, including timeframes and survival targets proposed for plantings;
(b) details of funding to be provided for long-term conservation management of **ROS** and details of the entity who will be responsible for management of **ROS**;
(c) measures to manage weed and feral pests;
(d) bushfire prevention and management measures;
(e) erosion control measures;
(f) access management (including visitor facilities, boardwalks, pathways, signage and fencing);
(g) performance indicators and corrective measures;
(h) monitoring and reporting measures;
(i) roles and responsibilities of contractors, staff and the person taking the action; and
(j) time frames for the implementation and management of the above measures.

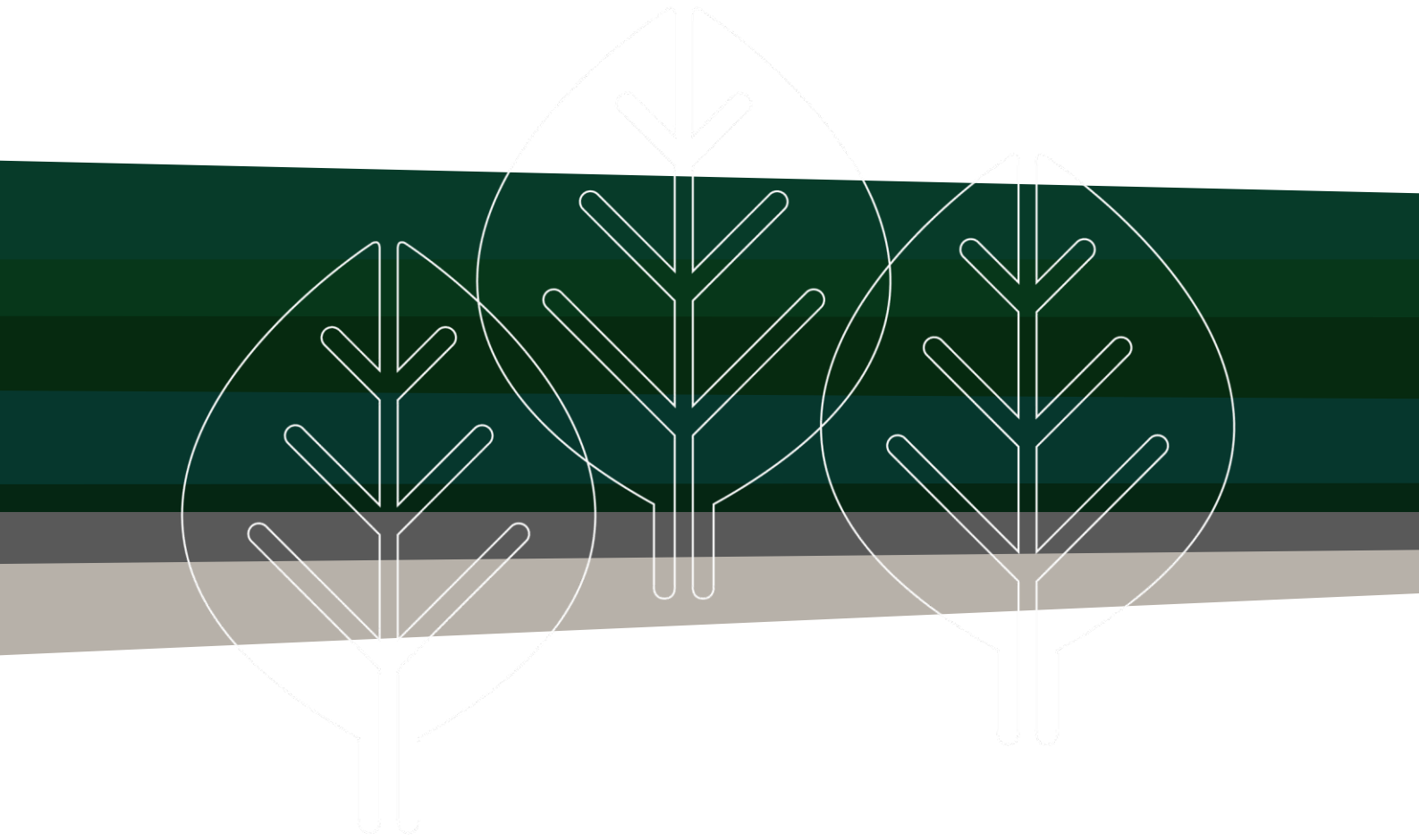
The FMP must be submitted to **the Department** within 12 months of the date of approval. If the **Minister** approves the FMP, the approved plans must be implemented. No **construction** can commence in the area illustrated shown as No Clearing on Attachment C until the FMP is approved by the **Minister.**

Appendix B

FMP revegetation management plan (Tranen 2015)

revegetating
rehabilitating
restoring

tranen
revegetation systems



P521E Alkimos Beach
Foreshore Management Plan (FMP)
Revegetation Plan

Lend Lease Communities

P521E-01-Rev4

November 2015

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3	24/8/15	Updated to show revised access path alignment	DG	
4	16/11/15	Updated Appendix 3, Foreshore Concept Plan	PJG	

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1 INTRODUCTION AND BACKGROUND

In October 2014 Tranen Revegetation Systems was commissioned by Lend Lease Communities (Alkimos) Pty Ltd (Lend Lease) to prepare a revegetation plan for the foreshore reserve at Alkimos Beach. The foreshore area totals approximately 41.93 hectares (ha) in area. Two Foreshore Management Plans (FMP) have been prepared for the site to separately address Commonwealth and State requirements. The Commonwealth FMP (RPS, 2014) has already been approved by the Department of the Environment in April 2014. The State FMP (RPS, 2015) is currently being finalised for submission. The FMP's are both strategic documents, and this revegetation plan has been developed to provide the specific details of how the revegetation requirements of both FMP's will be concurrently achieved. Should there be changes to the final issue of the State FMP, this revegetation plan will be updated to incorporate the changes.

1.1 Background

The Alkimos Beach residential project is being developed by Lend Lease in partnership with LandCorp. Alkimos Beach (formerly known as "South Alkimos") is an approved master planned residential development located approximately 40 kilometres (km) north-west of Perth's Central Business District within the City of Wanneroo (see Appendix 1).

The Foreshore Management Plan (FMP) study area is centred on the foreshore reserve bounded by the "Urban" zoned portion of the Alkimos Beach to the east and the Indian Ocean to the west. The foreshore reserve continues to the north and south of the area (see Appendix 2).

Lend Lease has developed a Foreshore Concept Plan in response to regional and local demand for beach access as well as providing important infrastructure such as fire and emergency access paths. Key elements of the Foreshore Concept Plan are summarised below and provided in Appendix 3:

- The majority of the foreshore reserve is retained for conservation and rehabilitation (including black cockatoo habitat rehabilitation areas), with the only other activities proposed within the foreshore being for low level (local) beach access and maintenance/safety. Rehabilitation works will be focused on priority areas including the road and path batters, dune blow out and four wheel drive paths.
- Fenced 'southern' pedestrian pathway (3.0 m wide, compacted limestone) providing residents with walkable access (and emergency vehicle access) to the beach. Coastal fencing to the CoW specification will be provided either side of the path. Lockable bollards will positioned at the entry points of the path to prevent public vehicle access.
- A dual use path (3.0 m wide, red asphalt) providing a continuous north-south linkage along the perimeter of the foreshore reserve, connecting into adjacent foreshore areas to the north and south (Eden Beach). This path will be fenced adjacent to the foreshore reserve. The path also provides a shared maintenance/emergency vehicle access role in the northern portions of the site where there is no nearby public road frontage. The final location of this dual use path is subject to engineering review.
- A fenced emergency vehicle maintenance and access track (compacted crushed limestone, 3 m wide with 5 m wide passing nodes at regular intervals)

traversing only the widest portion of the foreshore area in a north-south direction. This track will be restricted to emergency/ maintenance vehicles, but also serve as a pedestrian access path. The final location of this emergency vehicle maintenance and access track is subject to engineering review.

- Fenced public vehicle access asphalt road (6.0 m wide with a 2.4 m wide concrete pedestrian path to one side), located centrally in the foreshore reserve and providing convenient visitor access to the car park. The road has been designed to accommodate informal 'overflow' car parking on the edge of the road if required. Coastal fencing to the CoW specification will be provided either side of the road / pedestrian path. Key services such as street lighting, power, communications and water will follow the road alignment.
- Pedestrian and surf life saving vehicle access on a 3.0 m wide emulsion stabilised limestone path which will be ramped to the beach from the car park to allow surf life saving / emergency vehicles access to the beach. Lockable bollards will prevent public vehicle access, but allow access for maintenance and/or surf life saving vehicles from the interim facility for mobile beach patrols. Coastal fencing to the CoW specification will be provided either side of the pedestrian path.
- A small site adjacent to the car park has been allocated for an interim facility for mobile beach patrols for SLSWA at Alkimos Regional Beach. The interim (and relocatable) facility comprises a modular structure capable of storage for surf life saving but also hosting a variety of flexible community functions such as a community meeting space, fundraising events, etc.
- A single car parking area, accessed via the public vehicle access road, (located behind the modelled 50 year coastal processes line) and providing approximately 30 standard bays which includes ACROD and a single bus parking bays.
- An approximate 400 m dog walking beach (to be registered with the CoW), running southward from the access path.

The foreshore is planned to operate as a low intensity, passive recreational area providing local beach access for current and future residents. This is a direct response to both the conservation values of the area and the wider coastal context, where higher intensity coastal development and access is planned to be provided further north at the future Coastal Village site.

1.2 Approvals and Conditions

The requirement to prepare and implement an approved FMP is established by the following statutory mechanisms:

- Ministerial Statement No. 722 on Metropolitan Region Scheme Amendment No.1029/33;
- South Alkimos LSP 72; and
- Condition 11 of the Environment Protection and Biodiversity Act 1999 (EPBC Act) Commonwealth approval required an FMP.

The FMP (RPS, 2015) responds to the Ministerial Statement No. 722 and Clause 6.6 of Part 1 of the South Alkimos LSP No. 72, and provides the state level requirements for revegetation through:

1. Describing the existing foreshore environment.
2. Setting clear boundaries of the areas to be protected and managed.

3. Outlining the management of access to the beach, construction and revegetation.
4. Allocating construction and management responsibilities including routine monitoring of the environmental values, maintenance and contingencies.

Condition 11 of the Commonwealth approval requires a FMP (for the same area of foreshore reserve) to be prepared to the satisfaction of the Commonwealth Minister for the Environment. Specifically, the key management actions required by the Commonwealth are concerned with the revegetation to at least 1 ha, and management of Carnaby's Black-Cockatoo habitat within the foreshore reserve area against identified threats such as weeds, feral pests, bushfires, erosion and foreshore access.

1.3 Documentation

This report is based on the following information provided by Lend Lease:

- Foreshore Management Plan (Commonwealth) Alkimos Beach, prepared by RPS (Document No: L1234701 Rev 3, March 2014);
- Foreshore Management Plan (State) Alkimos Beach, prepared by RPS (Document No: L12036 R Rev 2, August 2015; and
- Approval, Urban Development – Lot 1003, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, WA (EPBC 2011/5902) - Department of Sustainability, Environment, Water, Population and Communities.

1.4 Objectives

The primary objective of this revegetation plan is to convert the revegetation components in the strategy of the FMP into an actionable management plan that:

- delineates the areas where the works will take place within the site;
- provides specific details of what those works will be; and
- outlines the indicative project implementation schedule for these works.

2 SITE DESCRIPTION

2.1 Site Location and Size

Alkimos Beach is an approved master planned residential development located approximately 40 km north-west of Perth's Central Business District within the City of Wanneroo.

The Commonwealth approved the Alkimos Beach project area is 224 ha, located adjacent to 1.7 km of coastal foreshore and 41.93 ha of coastal foreshore reserve which is designated Regional Open Space (ROS). Appendix 2 shows the Local Structure Plan for the Alkimos Beach project area and delineates these areas.

2.2 Land Form and Soils

Topography of the site varies from 45 m above sea level (AHD) in the east of the site to less than 5 m AHD to the west in the foreshore reserve. The landscape is undulating, dominated by consolidated Quindalup dune formations with swales between dune phases.

The dominant soil type on the LSP site is Quindalup (Q3) which is classified as loose, calcareous sand with some organic matter in the first 10 cm and incipient cementation at depth (RPS, 2011).

2.3 Vegetation Assessment

A vegetation and flora survey was undertaken by Bennett in 2004 for ATA Environmental and the following vegetation associations were identified within the foreshore reserve:

MsLm	*Melaleuca systena* and *Lomandra maritima* Low Open Heath
MsOaLm	*Melaleuca systena, Olearia axillaris, Lomandra maritima* Low Open Heath
SgSc	*Spyridium globulosum, Scaevola crassifolia* shrubland
SgMsLm	*Spyridium globulosum, Melaleuca systena, Lomandra maritima* Low Open Heath
AlMs	*Allocasuarina lehmanniana, Melaleuca systena* Closed Heath
Alloc	*Allocasuarina lehmanniana* Closed Heath
C	Cleared
Soak	Karli Spring Wetland

The majority of the ROS is in very good to excellent condition (see Appendix 4). The exception are a few vehicle tracks created by off-road vehicles in the north and south-east parts of the site. There is also one relatively small blowout in the middle of the ROS adjacent to the beach.

2.4 Site Stability

The degraded sections of the site are relatively stable, due to the undulation of the dunes. The relatively tall dunes provide some protection from the prevailing south-westerly and easterly winds to the lower lying inland sections, where most of the vehicle tracks / disturbance is located. The exception is the small blowout near the beach in the middle of the ROS which is exposed to westerly winds. As this site is degraded it is considered the most appropriate location for the placement of the planned carpark and recreation node.

2.5 Fauna

Calyptorhynchus latirostris (Carnaby's Black-Cockatoo (CBC)), is listed as "Schedule 1" fauna under the *Wildlife Conservation Act 1950* and "Endangered" under the EPBC Act. It is likely to fly regularly over the area due to the good quality foraging habitat that exists nearby. There is very limited foraging habitat (e.g. *Banksia sessilis*) available for the cockatoo on the Alkimos LSP site which may occasionally be used by the cockatoo for foraging; however, the site does not contain a significant food resource for this species compared to other areas in Alkimos–Eglinton and surrounds.

The federal approval conditions require details of supplementary planting and weed control equivalent to at least 1 ha of Carnaby's Black-Cockatoo foraging habitat on the project area (to be spread between ROS and POS) (DSEWPaC, 2012). As detailed in the FMP the EPBC referral identified a very limited range of Carnaby's Black-Cockatoo habitat in the foreshore. A core aim is to complement the existing tuart trees (*Eucalyptus gomphocephala*) in the FMP study area in accordance with the EPBC Act referral and subsequent conditions. The key Carnaby's Black-Cockatoo foraging habitat species likely to be used in the revegetation program include:

- *Acacia saligna*;
- *Allocasuarina lehmanniana*; and
- *Eucalyptus gomphocephala*.

2.6 Conservation Value

The Alkimos LSP site includes the majority of the foreshore reserve along its western margin. This area is part of Bush Forever site 397 which forms part of a semi-contiguous north–south vegetated coastal strip. The recommendations pertinent to the FMP study area in the EPA report, Alkimos–Eglinton Metropolitan Region Scheme Amendment No. 1029/33 (EPA, 2005) centred on increasing the size of the foreshore reserve around Karli Spring to include additional areas of consolidated Quindalup Dunes to protect Aboriginal Heritage values and approximately 2.8 ha area of *Allocasuarina lehmanniana* (dune sheoak). The dune sheoaks may be used as foraging habitat by Carnaby's Black-Cockatoo and other bird species (RPS, 2014).

The LSP site also abuts the east–west conservation linkage associated with the Alkimos Waste Water Treatment Plant buffer on the northern margin. This area is not a Bush Forever site, however it is zoned for "Parks and Recreation" and "Public Purposes" (Conservation) in the MRS.

2.7 Existing Uses

The majority of the site is undisturbed and currently has no special purpose. Vehicle tracks in the north and south-east have been created by unauthorised recreational 4WD vehicles that are primarily used as access routes to areas of easier beach access.

Karli spring in the south of the ROS has Aboriginal Heritage values.

3 FMP MANAGEMENT MEASURES

The following approved measures extracted from the Commonwealth and State FMPs (RPS, 2014) have been used to guide the revegetation strategy for each of the areas as detailed in the next section.

3.1 Carnaby's Black-Cockatoo Species to be Used

A range of native plant species will be used in this revegetation program for the foreshore area. Various overstorey and understorey species will be planted in order to provide diversity to the vegetation structure and fauna habitat. The EPBC Act referral identified a very limited range of Carnaby's Black-Cockatoo habitat in the foreshore. A core aim is to complement the existing tuart trees (*Eucalyptus gomphocephala*) in the FMP study area in accordance with the referral and subsequent conditions.

The key Carnaby's Black-Cockatoo foraging habitat species that grow naturally in the local coastal dune environment, and will be used in the revegetation program include:

- *Acacia saligna*
- *Allocasuarina lehmanniana*
- *Eucalyptus gomphocephala.*

3.2 Revegetation Methodology

3.2.1 Site Protection – Prior to Revegetation

In order to avoid accidental clearing from construction activities and prevent unauthorised access, a temporary fence will be positioned around the retained Carnaby's Black-Cockatoo habitat and revegetation area (1 ha). All construction activities will be restricted to the subdivision areas and will avoid this foreshore area.

To assist in preventing unauthorised access and trampling of revegetation efforts, additional signage may be installed. This signage aims to inform the resident / visitors to Alkimos Beach of the revegetation works and importance of the area.

3.2.2 Revegetation Site Preparation

To maximise the potential for revegetation success, the area(s) that are subject to revegetation will be prepared in the following manner:

- weed spraying commenced, rubbish and debris will be removed and disposed of appropriately if required; and
- brushing and / or mulching if required may be used to assist stabilising soil in erosion prone locations as required.

3.2.3 Revegetation Method

Planting and seeding are the key methods to be employed in the revegetation areas within the foreshore reserve. Species selection is the key to reaching a successful outcome for the project. Species must be carefully selected based on the surrounding floristic community type(s), topography and hydrology to ensure species are located in the areas in which they are most likely to survive in both short and long-term.

Species selected will take into account existing and identified use of the area. Revegetation species will be subdivided into four categories:

1. Beach grasses and herbaceous species adopted for the most exposed locations.
2. Semi-stable dune colonisers adapted to partially protected areas.
3. Plants of protected dunal situations.
4. Plants of protected well stabilised and vegetated areas.

Tuart trees – the identified Carnaby's Black-Cockatoo habitat species to be retained in the foreshore – are located in Category 3 and 4 areas.

3.2.4 Scheduling

Tube stock used in the revegetation program will be sourced from local accredited nurseries.

Planting will be carried out in winter; around June–July when the soil moisture content is high enough for optimum seedling growth without irrigation and after the existing weeds have germinated and have been sprayed. Each tube stock will be planted with a plastic guard to prevent rabbits feeding on plant stock and to protect from strong winds. Tube stock will mostly be planted at a density of 2 plants / m^2 (as a minimum, species dependent) for rehabilitation.

Rabbit guards will be used (if required) for tube stock in the revegetation areas.

3.2.5 Watering

Some tube stock will be planted with tablets / water crystals during planting to help improve survival rates. The coastal plant species to be used in the revegetation of the foreshore area are typically drought tolerant and therefore it is not anticipated these coastal natives will require irrigation or extensive hand watering.

4 REVEGETATION STRATEGY

As the majority of the site is in very good to excellent condition, the focus of the revegetation efforts is protection of the existing vegetation by closing former access tracks, stabilisation of blowouts, and creation / protection of CBC foraging habitat.

The overall site is to be broken up into separate parcels each with its own management strategy as delineated in Appendix 5. The requirement is for "supplementary planting and weed control equivalent to at least 1 ha of Carnaby's Black-Cockatoo foraging habitat on the project area". Table 1 details the treatment methods and area sizes for each of the zones delineated in Appendix 5, and shows that supplementary planting and weed control will be undertaken on over 1.9 ha of CBC foraging habitat within the project area.

Table 1 Revegetation Zones and CBC Foraging Area Calculations

Zone Name	Area (m^2)	CBC Species Revegetation Zone	CBC Revegetation Area (m^2)
Dune Blowout	1,631	N	-
North 1	690	Y	690
North 2	688	Y	688
South Track Closures	2,246	Y	2,246
Northern Access Rd and Carpark Batters	5,854	Y	5,854
Carpark Beach Access Batters	3,339	N	-
Southern Access Track	10,175	Y	10,175
Total	**24,623**		**19,653**

Descriptions of the revegetation zones and their proposed treatment strategies are provided in the remainder of this section. The specific techniques and methodologies that will be employed to satisfy the objectives are detailed further in later sections.

At some time in the future, additional pedestrian and vehicle access tracks will be constructed as per the Foreshore Concept Plan. These areas will be the subject of future detailed engineering designs, and therefore are not included in this plan. Areas disturbed as part of these works that are not required for permanent infrastructure will be rehabilitated using the same concepts and techniques, to ensure consistency across the foreshore reserve.

4.1 Dune Blowout

Figure 1 Dune Blowout

The Dune Blowout is a degraded section of the foredune covering 1,631 m^2 that was originally created by vehicles but has expanded in size due to the strong prevailing winds. It is called the Dune Blowout as the originally proposed primary public access and carpark is to be located to the immediate north-east of this dune. This is a priority area for rehabilitation to prevent future degradation by vehicles, as well as the potential for foot traffic once the carpark is constructed. The majority of the blowout faces west, and sand has accumulated on the top / east facing parts of the dune.

In order for rehabilitation efforts to be successful in this area the site first needs to be stabilised with physical measures to prevent further erosion, and complemented with a high density of native planting to provide long term stabilisation. Physical barriers will also be required to prevent further vehicle access to the area. Foredunes do not naturally support CBC foraging or habitat species, and therefore species selection will not include those species, only those that are found in the foredune areas and are capable of providing long-term stabilisation.

Stabilisation works will involve the placement of open weave coir netting on disturbed areas, fixed in place with steel U-pins. The only entry to the site is from the beach and once works are finished the access will be closed by fencing, with revegetation in progress signage attached. Seedling planting will be undertaken at 3 plants / m^2, which is a higher rate than required, as well as direct seeded at 3 kg / ha, to provide rapid establishment of stabilising ground cover in this highly erodible area.

Several introduced plant species occur in the vicinity of the blowout (e.g. *Cakile maritima* (Sea Rocket), *Ammophila arenaria* (Marram Grass), and *Tetragonia decumbens* (Sea Spinach). These species are all common dune species in the area and some are naturalised. The intent is to keep these weed species in place and to not target them for control in the initial stages, as they are providing a stabilisation function to the dune. Once the infill planted vegetation has established then these species may be controlled if they are inhibiting further development of the desired native species.

4.2 North 1 and North 2

Figure 2 North 1

Figure 3 North 2

The areas designated North 1 (690 m^2) and North 2 (688 m^2) are very similar in condition that connect to the Conservation POS. They are both areas that have been disturbed by frequent vehicle access. Wind erosion has expanded the area of disturbance, providing avenues for opportunistic weed species to establish.

As can been seen in Figure 2 , the tracks are amongst established *Eucalyptus gomphocephala*, a key CBC foraging and habitat species in the area. This species will be planted in the lower lying sections of these areas where there is shelter from the winds. The other approved CBC species *Acacia saligna* and *Allocasuarina lehmanniana* are more suited to, and will be planted in, the less sheltered parts. CBC species will not be the only species planted in these zones. Other coastal species that typically grow in conjunction with these species will also be planted.

The aim for this area is to have a least 2 plants / m^2 established in these sections, with 1 CBC species / 10 m^2. Completely degraded areas will be planted at the full target density, and the partially disturbed areas will be planted at half this density. Direct seeding will also be conducted at a rate of 3 kg / ha using seed stored in the Alkimos Beach seed bank. The tracks have been compacted by repeated vehicle use. Prior to planting these sites will be ripped to break this compaction which will promote greater water infiltration rates, and make it easier for plant roots to establish. Brush will also be placed on the tracks to both stabilise the site, and make it more difficult for vehicles to continue to access the area.

Part of North 1 requires a 3 m wide vehicle access track to be established (see Appendix 5). This track will be formalised sometime in the future. Revegetation works will commence before the track is constructed so this area will be delineated and left unplanted. To prevent vehicles from accessing the adjacent rehabilitation areas and

potentially causing damage, tracks feeding off this main track will be blocked off using limestone boulders, and later fencing to physically restrict access.

4.3 South Track Closures

Figure 4 South Tracks

The south tracks are a series of interconnected tracks in the south-east of the ROS. One of the central tracks will be formalised as a vehicle access track for emergency access and maintenance. The remainder serve no future purpose, and therefore will be closed off and rehabilitated. The tracks to be closed off cover an area of 2,246 m^2.

The tracks are mostly located in the valleys and lower lying sections between dunes and are relatively sheltered from the winds. This makes them suitable for revegetation using CBC species. *Allocasuarina lehmanniana* and *Acacia saligna* are the two CBC species that will be planted in this zone, along with other native, non-CBC species.

Seedling planting will be at the rate of 2 plants / m^2, with 1 CBC species / 10 m^2. Direct seeding will also be conducted at a rate of 3 kg / ha using seed stored in the Alkimos Beach seed bank. Prior to planting a weed control program will be undertaken with the tracks and disturbed edges to be targeted. As the tracks have been compacted by repeated vehicle use they will be ripped prior to planting to optimise plant establishment and survival rates.

All of the tracks will be physically blocked to prevent vehicles from continuing to access the site and potentially damaging the revegetation efforts. Tracks will be blocked off at each end using large limestone boulders to physically restrict access. The track that

will eventually be formalised as a vehicle track will not be blocked, so that there is at least one access for vehicles (emergency, maintenance, or otherwise) through the area until such time as it is formally constructed.

4.4 Northern Access Road and Carpark

An access road and carpark are to be constructed to provide formalised public access to the beach. As no existing tracks currently provide this access, a new route will be created. The undulating topography requires disturbance of some secondary dunes through cut and fill. All of the road batters totalling 5,854 m^2 will be stabilised and revegetated post-construction. Initial works are likely to commence late 2015, so revegetation of this area will be undertaken in 2016.

Revegetation in this area will incorporate both CBC and general dune species. *Allocasuarina lehmanniana* and *Acacia saligna* are the two CBC species that will be planted in this zone, along with other native, non-CBC species.

The batters will be mulched once construction is complete, to stabilise the site until winter 2016 when it can be planted. Seedling planting will be at the rate of 2 plants / m^2, with 1 CBC species / 10 m^2. Direct seeding will also be conducted at a rate of 3 kg / ha using seed stored in the Alkimos Beach seed bank. Prior to planting a weed control program will be undertaken.

4.5 Carpark Beach Access Path

Access to the beach will be formalised from the new carpark, and due to the topography the dunes will need to be cut through to provide accessibility to all users. However, due to the proximity to the coast and exposure to high winds, it will require more extensive stabilisation measures than the road batters, and it is unlikely that CBC species will establish successfully in this zone. Therefore it will be managed differently to the northern access road and carpark, but stabilisation and planting works will be conducted concurrently. The total disturbance and revegetation area is 3,339 m^2.

Species to be used in the area will be foredune and secondary dune species that are more tolerant of mobile sands. Seedling planting will be undertaken at 3 plants / m^2, which is a higher rate than required, as well as direct seeded at 3 kg / ha, to provide rapid establishment of stabilising ground cover in this highly erodible area.

Stabilisation works will involve the placement of brush material in an overlapping and interlocked formation generally perpendicular to the prevailing winds. This has proven to be a successful stabilisation technique in similar situations on nearby developments in the Alkimos area (see Figure 5), promoting more rapid plant cover than other stabilisation techniques such as mulching.

Figure 5 Successful Foredune Stabilisation Using Brushing at Nearby Alkimos Location

4.6 Southern Access Track

In the south of the ROS, another new track will be created providing access for pedestrians, and emergency vehicles to the beach. No such access presently exists, so it will be created by cutting through existing dunes and vegetation. Cut and fill batters will be rehabilitated post-construction, requiring 10,175 m2 of revegetation. Construction is expected late-2015, so revegetation will take place in winter 2016.

Revegetation in this area will incorporate both CBC and general dune species. *Allocasuarina lehmanniana* and *Acacia saligna* are the two CBC species that will be planted in this zone, along with other native, non-CBC species.

The batters will be mulched once construction is complete, to stabilise the site until winter 2016 when it can be planted. Seedling planting will be at the rate of 2 plants / m^2, with 1 CBC species / 10 m^2. Direct seeding will also be conducted at a rate of 3 kg / ha using seed stored in the Alkimos Beach seed bank. Prior to planting a weed control program will be undertaken.

5 IMPLEMENTATION METHODOLOGY

5.1 Scheduling

Preparatory works have commenced in advance of revegetation, including fencing and track closures (see Appendix 7). The existing tracks to be closed, and Dune Blowout will be revegetated in winter 2015. The northern access road and carpark, and southern access track will be constructed late-2015, and revegetation of these areas will take place in winter 2016. Post-construction activities such as mulching will be undertaken as soon as possible following the completion of civil works. As per the approved FMP the site will then be monitored and maintained for a further five years to ensure that the revegetation objectives are achieved in the longer term.

5.2 Weed Management

Weed management is an important component for the establishment of native vegetation. However, in some locations (i.e. Dune Blowout) weeds are also providing stabilisation functions, and selective management will be required to balance site stability with revegetation. In other sections, weed control will be achieved through herbicide application.

Herbicides will be selected for the target species, taking into account the surrounding environment and the constraints this may present. Amongst remnant native vegetation, selective herbicides (i.e. grass or broadleaf-specific) will be favoured over general knockdown herbicides, to keep off-target damage to a minimum.

To ensure that off-target damage is minimised, herbicide spraying operators will only be engaged if they:

- are appropriately qualified and licensed in herbicide application;
- have demonstrated experience in the ability to identify, and distinguish between, native and weed species; and
- are familiar with the most appropriate control measures, timing, herbicides, and application rates for the target species.

5.3 Surface Stabilisation

Surface stabilisation measures will be undertaken in all areas, except the southern track closures to prevent further movement, and protect against further vehicle damage. In North 1 and North 2 this will be achieved through the use of brush wood. In the Dune Blowout, access is restricted and it is not possible to get brush material to the site, so coir netting will be used instead. All road and access track batters will be stabilised with mulch.

Brush materials will be sourced from suitable dieback-free locations external to the site. In Tranen's experience the best material for brushing in dune environments is Spearwood (*Kunzea glabrescens*). Brush material will be placed in an interlocking formation and placed roughly parallel to the contours and perpendicular to the prevailing wind direction.

5.4 Surface Preparation

Compacted vehicle tracks will be ripped to a depth of 40 cm to loosen the soil. This will optimise moisture infiltration rates, and allow for faster and easier root development of planted seedlings.

5.5 Species Selection and Plant Allocations

All species have been selected based on observations made during Tranen site assessments and seed collection activities throughout the Alkimos Beach development and the greater Alkimos area. Appendix 6 contains the detailed breakdown of species and plant numbers allocated to each area. Numbers are indicative only, as supply may not be possible at the time of order or delivery. Should desired quantities of species not be available, substitutions may occur within the included species lists. Should species not included in the list be available as suitable substitutes, these will be proposed for approval to the relevant authorities prior to inclusion.

5.6 Alkimos Beach Local Provenance Seed Bank

A seed bank has been established for Alkimos Beach, and there are significant quantities of local provenance seed available of a wide range of species for use in the revegetation program. Where possible seedlings will be propagated from the seed bank. Where seed is not available of desired species, seed and seedlings will be sourced from the nearest available provenance. Some species are grown from cuttings and where possible these will also be sourced from on site.

5.7 Seedling Propagation

Due to the site conditions, the recommended pot for all seedlings is a 50 mm x 50 mm x 125 mm forestry tube with root trainers. These pots produce seedlings of good root ball size and transfer well from pot to final environment, maximising survival rates. Should plants of this size not be available for any reason at the time of planting, the next closest available tubestock size will be used.

Plant orders will be ideally placed in winter the year before planting to ensure sufficient seedlings are available (subject to seed availability and species propagation timing). Seedlings will be grown by nurseries that are accredited by the Nursery Industry Accreditation Scheme of Australia (NIASA) which will guarantee the quality of supplied material.

Seedlings will be supplied true to industry standards:

- Soil in containers at the time of delivery will be free of weeds, insects and disease (e.g. dieback);
- All plants will be true to species name, well-formed and hardened off nursery stock;
- The root system will be fibrous and firmly established but not root bound and with no large roots growing out of the container; and
- Leaves to be of normal size, colour and texture for the specified species.

5.8 Seedling Planting

Seedlings will be directly planted using planting tubes, which negates the need for repeated bending for excavation of planting holes. Seedlings will be watered before delivery to site on the day of planting to reduce the potential for transplant shock, and provided the soil is moist no other watering is considered necessary.

A 10 g native fertiliser tablet (low in P) will be buried adjacent to each seedling (except in the base of the swale) to promote faster root and foliage development in the stages following initial transplant. Tranen research has shown this to have a significant impact on plant development and survival rates.

5.9 Seed Treatment and Direct Seeding

All seed to be utilised will be pre-treated prior to seeding to break dormancy factors. This will include aerosol smoke treatment, mechanical scarification, or hot water treatment as appropriate to individual species. Seed will then be combined with a bulking agent to facilitate even distribution across the site. Clean yellow sand provides good mixing and distribution properties for this purpose. Hand broadcasting will be the application technique as this will permit even dispersal of all seed sizes, which can be an issue with some types of mechanical spreaders.

5.10 Site and Plant Protection

All planted seedlings will be initially protected with corflute tree guards held in place with hardwood stakes. Once the plants are large enough to survive without the guards, they will be removed.

A rabbit control program will also be initiated to provide longer term protection to seedlings. This will include a combination of warren destruction, rabbit haemorrhagic disease virus (RHDV) release, and Pindone baiting. Baiting and virus release will only be undertaken during certain times of year relating to weather and animal growth stages where these treatments are effective. Warren destruction will be employed between these periods.

A proportion of the revegetation works will be undertaken on current vehicle access tracks. These tracks are to be blocked at both ends to prevent future vehicle access in these areas. They will be blocked by pushing up soil and placing large objects such as limestone boulders or large logs in front of the mounds. Some tracks will be left open to allow vehicles access through the area, to discourage vehicles from creating new accesses.

The FMP states that “a temporary fence will be positioned around the retained Carnaby’s Black-Cockatoo habitat and revegetation area (1 ha). All construction activities will be restricted to the subdivision areas and will avoid this foreshore area”. The habitat areas within the ROS are separated from other areas and once tracks have been blocked off those areas will not be accessible. It is therefore not considered necessary for a temporary fence to be placed around the revegetation areas as they will already be suitably protected.

6 POST-INSTALLATION MANAGEMENT

To ensure longer-term project success, the site will be monitored and maintained for five years following initial seedling installation, to ensure the completion targets are met and will continue to be met in the future. At the end of the maintenance period, assuming all targets have been achieved, the site will be handed to the City of Wanneroo for ongoing management.

6.1 Completion Criteria and Success Targets

The key actions / target completion criteria to monitor the success of the revegetation efforts are specified in Table 2 . Revegetation efforts will be undertaken and monitored for a period of five years from the commencement of the revegetation plantings. If the completion criteria are not met, further action will be undertaken to improve the condition to the required standards.

Table 2 Revegetation and Weed Management Key Actions (RPS, 2014)

Year After Planting	Year 1	Year 2	Responsibility for Five Years Post-Commencement of Works
Survival of planted seedlings	90%	90%	Lend Lease
Minimum plant diversity (% of original number of planted species in project area that have survived)	70%	70%	Lend Lease
Plant coverage (% area of visual ground cover measured by a botanist/ revegetation consultant)	25%	50%	Lend Lease
Weeds coverage	10% cover	10% cover	Lend Lease

6.2 Vegetation Monitoring and Performance Criteria

At the end of the installation, a report will be provided detailing the actual quantities of seedlings installed and seed broadcast, and any variations from the original revegetation plan. This will be used as baseline data for comparison in future monitoring assessments.

The revegetation areas will be formally monitored biannually (includes weed monitoring) each spring and autumn, for a five-year period after installation. A monitoring report will be submitted to Lend Lease following each formal monitoring event, to assess if there are any issues requiring attention.

The season has been nominated rather than a specific month, as the timing of these assessments should be related to plant growth cycles, which in turn is influenced by the weather conditions at the time.

One monitoring plot of 5 m × 5 m will be established per revegetation area as well as one permanent photograph reference point at each monitoring plot. Photographic

records will be captured prior to construction and annually to qualitatively assess density, diversity and weed cover.

The first assessment in spring will assess the developing threats, the stabilisation of each area and the short-term survival of the seedlings and weed cover. Any problems will be identified early so that comprehensive treatment(s) of the issue can be undertaken and additional seedlings propagated if required.

The second assessment in the following autumn will determine if there are any losses over the dry summer period, and this will form the basis for the maintenance winter program. The first summer is the expected period of greatest mortality, and plants that survive this period are generally hardy and more likely to survive in the longer term. The emergence of summer weeds will also be assessed, so that control can be scheduled as required.

After the third and subsequent assessments, the long term success of the revegetation operation will be indicated. This will determine whether any further remedial works are required. This may include:

- Additional revegetation works;
- Weed management;
- Other general maintenance activities; and
- Additional monitoring requirements.

Informal assessments will also be undertaken between formal assessments. The purpose of these assessments is to visually monitor progress, and to identify and counter emerging issues before they have a chance to become significant. Timing of the assessments will be adjusted to the appropriate stages of plant growth, which are influenced by annual weather conditions. The results of each monitoring assessment will be compared to determine germination and establishment rates, and provide a quantitative measure of progress.

6.3 Site Maintenance

If planting success falls below 90% of original numbers in two consecutive monitoring events, contingency measures will be implemented to increase the success of the revegetation program. The monitoring program will identify issues to any plant success rates so they can be dealt with in an appropriate and timely manner.

Maintenance activities may include:

- re-brushing;
- ongoing weed management;
- re-planting in areas;
- tree guard repair / replacement; and / or
- undertake fence, sign and pathway maintenance as required.

All the contingency measures listed in Table 3 below will be reviewed if the target completion criteria fall below 90% in two consecutive events.

Table 3 Revegetation and Weed Management Contingency Measures (RPS, 2014)

Item	Issue	Contingency Action	Responsibility for Five Years Post-commencement of Works
Plants	Plant death. Storm/wind damage Vandalism	Plant additional tube stock in subsequent plantings.	Lend Lease
Weeds	Excessive weeds in revegetation areas.	Undertake weed control measures e.g. weed spraying.	Lend Lease
Erosion	Erosion Storm damage	Apply brushing, hydromulch (with no seed) and/or matting over the surface of any eroded areas.	Lend Lease
Revegetation Success	Plant survival does not meet completion criteria	Replant seedlings and replace plant guards.	Lend Lease

7 REFERENCES

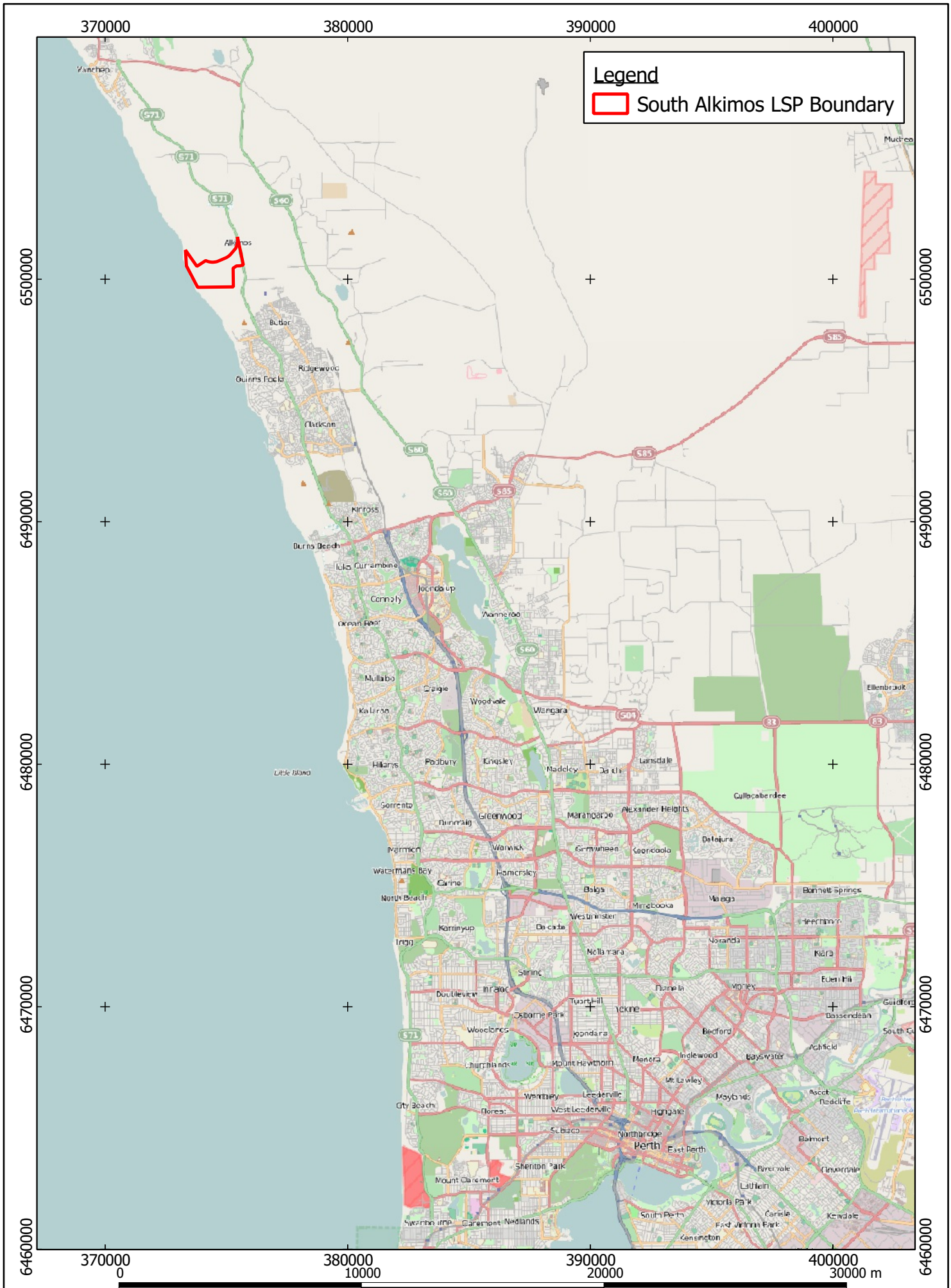
DSEWPaC, 2013. Variation to Conditions Attached to Approval, Urban Development – Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, WA (EPBC 2011/5902). Department of Sustainability, Environment, Water, Population, and Communities. 13 June 2013.

RPS, 2011. Local Environmental Impact Assessment and Management Strategy – Part Lot 1004 Alkimos, South Alkimos Local Structure Plan. Prepared by RPS. Report No: L10354 Rev 1. June 2011.

RPS, 2014. Foreshore Management Plan (Commonwealth) – Alkimos Beach. Prepared by RPS. Report No: L12347 01 Rev 3. March 2013.

RPS, 2015. Foreshore Management Plan (State) - Alkimos Beach. Prepared by RPS. Report No: L12036 R Rev 2, August 2015.

Appendix 1 Site Location



tranen revegetation systems

Project: South Alkimos
Project Number: P521
Client: Lend Lease

Drawing: Site Location Map
Drawing Number: P521-02
Revision: 0

Date: 21/8/12
Drawn By: DG

N

Appendix 2 Local Structure Plan

Legend

Structure Plan Area

Reserves
- Public Use - (PS) Primary School
- Regional Parks & Recreation (Foreshore Reserve)
- Conservation POS
- Active POS

Zones
- Residential
- Commercial
- Mixed Use
- Private Clubs/Recreation

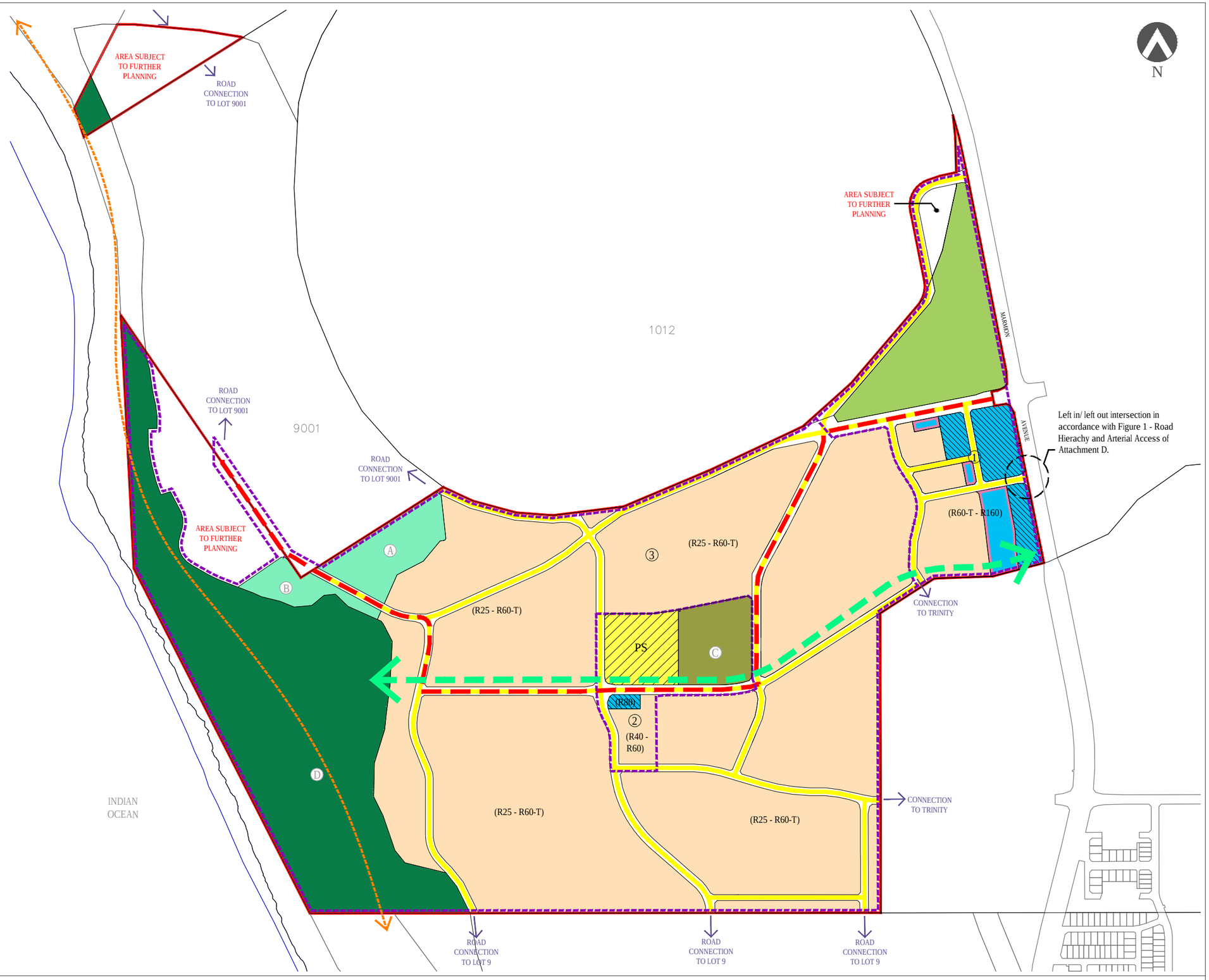
Other
- Indicative STS Route
- Neighbourhood Connector
- Precinct Boundary
- Social / Pedestrian / Cycle Linkage
- Indicative Foreshore Pedestrian and Cycle Link (as per Alkimos-Eglinton District Structure Plan)

Precincts
- ① Gateway
- ② Central Village
- ③ Residential
- Ⓐ Strategic Public Open Space - Refer to Table 3 of Part 1 - Statutory Section

NOTES:

1. Areas identified as being of National Environmental Significance under the Environmental Protection and Biodiversity Conservation Act 1999 may be subject to assessment by the Federal Department of Sustainability, Environment, Water, Population and Communities, in accordance with this Act. The outcome of any such assessment may require either a modification to the LSP or minor variations from the LSP at the subdivision and/or development stage.

2. The clearing of habitat such as Lomandra hermaphrodita and Maritima that includes the taking of individual Graceful Sun Moths requires the permission of the Minister for Environment, or their delegate, pursuant to the Wildlife Conservation Act 1950. Evidence is to be provided to the WAPC at the time of subdivision that the licence (if required) has been issued by the Department of Environment and Conservation.



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LOCAL STRUCTURE PLAN No.72 (AMENDMENT No.04)

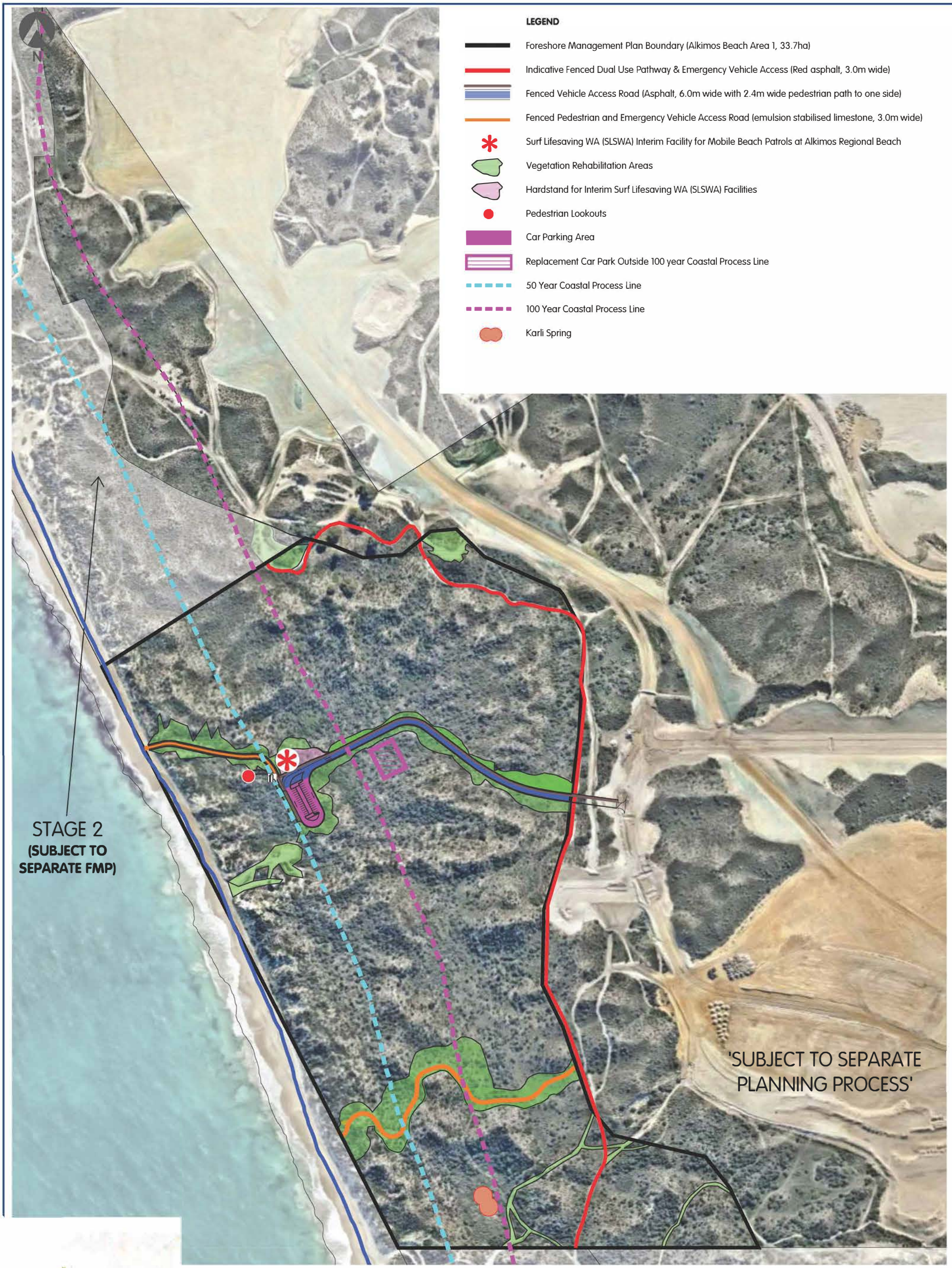
Alkimos Beach, South Alkimos

City of Wanneroo

REF NO.	DRAW NO.	REV.
DLL ALK	**RD1 008**	**M**

DISCLAIMER: ISSUED FOR DESIGN INTENT ONLY. ALL AREAS AND DIMENSIONS ARE SUBJECT TO DETAIL DESIGN AND SURVEY

Appendix 3 Foreshore Concept Plan (From FMP)



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Job Number: L12036
Doc Number: 025 - Figures L12036
Date: 27.10.15
Scale: 1: NTS @ A3
Created by: MR
Source: Concept Plan - DLL ALK RD1 177G (RD 2015).

Figure 3

Foreshore Concept Plan

Appendix 4 Vegetation Condition

Condition	Area m2
Very Good to Excellent	329138
Degraded to Good	1837
Completely Degraded	6731

tranen revegetation systems

Project: Alkimos Beach
Project Number: P521D
Client: Lend Lease Communities

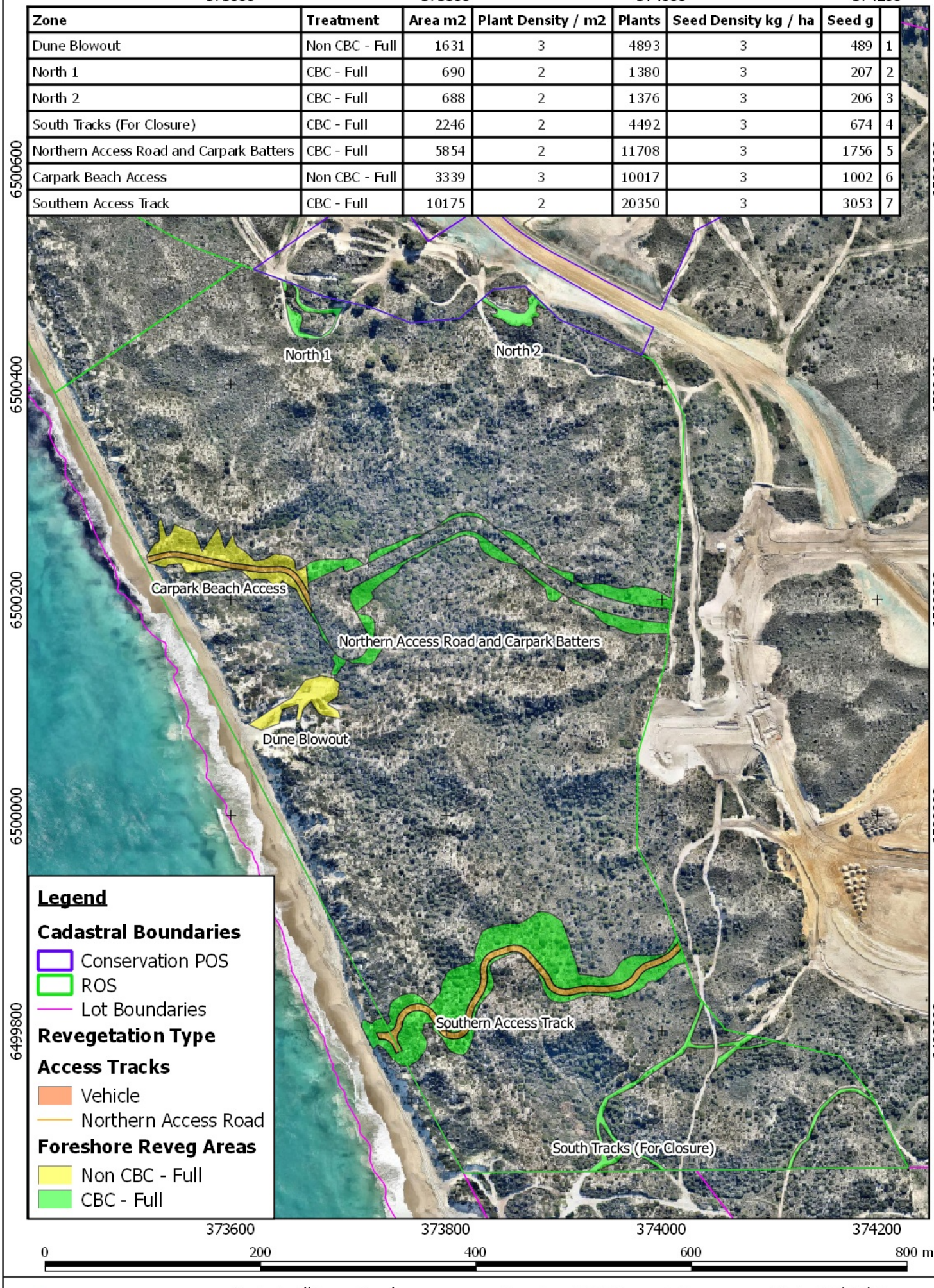
Drawing: FMP Vegetation Condition
Drawing Number: P521D-01
Revision: 0

Date: 23/10/14
Drawn By: DG

N

Appendix 5 Rehabilitation Zones

Zone	Treatment	Area m2	Plant Density / m2	Plants	Seed Density kg / ha	Seed g	
Dune Blowout	Non CBC - Full	1631	3	4893	3	489	1
North 1	CBC - Full	690	2	1380	3	207	2
North 2	CBC - Full	688	2	1376	3	206	3
South Tracks (For Closure)	CBC - Full	2246	2	4492	3	674	4
Northern Access Road and Carpark Batters	CBC - Full	5854	2	11708	3	1756	5
Carpark Beach Access	Non CBC - Full	3339	3	10017	3	1002	6
Southern Access Track	CBC - Full	10175	2	20350	3	3053	7



tranen revegetation systems

Project: Alkimos Beach
Project Number: P521F
Client: Lend Lease Communities

Drawing: FMP Revegetation Zones
Drawing Number: P521F-06
Revision: 3

Date: 24/08/15
Drawn By: DG

N

Appendix 6 Species List and Allocations

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Alkimos Beach FMP
Seed and Tubestock Allocations

Location Name			Dune Blowout		North 1 Full Density		North 2 Full Density		South Track Closures		Northern Access Road and Carpark Batters		Carpark Beach Access Path		Southern Access Track Batters		Overall Total	
Area (m2)			1,631		690		688		2,246		5,854		3,339		10,175		**24,623**	
Treatment			**Seedlings**	**Seed (kg)**	**Seedlings**	**Seed (kg)**	**Seedlings**	**Seed (kg)**	**Seedlings**	**Seed (kg)**	**Seedlings**	**Seed (kg)**	**Seedlings**	**Seed (kg)**	**Seedlings**	**Seed (kg)**	**Seedlings**	**Seed (kg)**
Density (plants/m2 or kg/ha)			3.0	3.0	2.0	3.0	2.0	3.0	2.0	3.0	2.0	3.0	3.0	3.0	2.0	3.0		
Total			**4,893**	**0.489**	**1,380**	**0.207**	**1,376**	**0.206**	**4,492**	**0.674**	**11,708**	**1.756**	**10,017**	**1.002**	**20,350**	**3.053**	**54,216**	**7.387**
Species		**Seed Bank Stock On Hand (kg)**																
Acacia cyclops	Large shrub	**1.310**			33	0.008	33	0.008	107	0.045	279	0.117			485	0.204	**937**	**0.382**
Acacia lasiocarpa	Shrub	**1.651**			66	0.010	66	0.010	214	0.020	557	0.162			969	0.300	**1,872**	**0.502**
Acacia saligna*	Large shrub	3.303			23	0.008	23	0.008	113	0.045	295	0.117			512	0.300	**966**	**0.478**
Acacia truncata	Shrub	**0.459**			66	0.010	62	0.010	214	0.020	557	0.052			969	0.091	**1,868**	**0.183**
Acanthocarpus preissii	Shrub	**0.998**			66	0.010	66	0.010	214	0.020	557	0.052			969	0.091	**1,872**	**0.183**
Allocasuarina lehmanniana*	Large shrub	0.350			23	0.008	23	0.008	113	0.045	295	0.117			512	0.100	**966**	**0.278**
Atriplex isatidea	Shrub	**0.570**	450	0.050									921	0.115			**1,371**	**0.165**
Calothamnus quadrifidus	Shrub	**0.286**			66	0.010	66	0.010	214	0.020	557	0.052			969	0.091	**1,872**	**0.183**
Carpobrotus virescens	Groundcover	**0.733**	450	0.050	44	0.012	44	0.012	142	0.037	370	0.097	921	0.113	643	0.200	**2,614**	**0.521**
Conostylis candicans	Groundcover	**0.000**			44		44		142		370				643		**1,243**	**0.000**
Eremophila glabra	Groundcover	**0.185**			44	0.012	44	0.012	142	0.037	370				643		**1,243**	**0.061**
Eucalyptus gomphocephala*	Tree	1.315			23		23										**46**	**0.000**
Ficinia nodosa	Groundcover	**0.735**	450	0.030	44	0.012	44	0.011	142	0.037	370	0.097	921	0.098	643	0.200	**2,614**	**0.485**
Gompholobium tomentosum	Shrub	**0.199**			66	0.010	66	0.010	214	0.020	557	0.052			969	0.091	**1,872**	**0.183**
Hardenbergia comptoniana	Groundcover	**2.573**			44	0.012	44	0.012	142	0.037	370	0.208			643	0.300	**1,243**	**0.569**
Hemiandra pungens	Groundcover	**0.098**	250	0.021	44		44		142		370		921	0.043	643		**2,414**	**0.064**
Kennedia prostrata	Groundcover	**0.011**			44		44		142	0.011	370				643		**1,243**	**0.011**
Lepidosperma gladiatum	Groundcover	**0.000**	390		44		44		142		370		354		643		**1,987**	**0.000**
Leucophyta brownii	Groundcover	**0.608**	400	0.050	44	0.012	44	0.012	142	0.037	370	0.097	921	0.102	643	0.168	**2,564**	**0.478**
Melaleuca cardiophylla	Large shrub	**0.266**			30	0.008	30	0.008	106	0.045	276	0.052			480	0.050	**922**	**0.163**
Melaleuca huegelii	Large shrub	**1.623**			30	0.008	30	0.008	107	0.045	279	0.117			485	0.204	**931**	**0.382**
Melaleuca systena	Shrub	**0.303**			66	0.010	66	0.010	213	0.020	555	0.052			965	0.091	**1,865**	**0.183**
Olearia axillaris	Shrub	**0.000**	450		66		66		213		555		921		965		**3,236**	**0.000**
Phyllanthus calycinus	Shrub	**0.501**			66	0.010	66	0.010	213	0.020	555	0.052			965	0.091	**1,865**	**0.183**
Pithocarpa cordata	Shrub	**0.000**			66		66		213		555				965		**1,865**	**0.000**
Rhagodia baccata	Shrub	**1.268**	450	0.079	66	0.010	66	0.010	213	0.025	555	0.156	921	0.283	965	0.250	**3,236**	**0.813**
Scaevola crassifolia	Shrub	**0.724**	450	0.080	66	0.010	66	0.010	213	0.021	555	0.055	921	0.213	965	0.181	**3,236**	**0.570**
Scaevola nitida	Shrub	**0.041**			66	0.009	66	0.009	213	0.022	555				965		**1,865**	**0.040**
Spinifex longifolius	Groundcover	**10.850**	338										708				**1,046**	**0.000**
Spyridium globulosum	Large shrub	**0.305**	255	0.050	30	0.008	30	0.008	107	0.045	284	0.052	708	0.035	489	0.050	**1,903**	**0.248**
Threlkeldia diffusa	Groundcover	**0.079**	560	0.079									879				**1,439**	**0.079**
TOTAL			**4,893**	**0.489**	**1,380**	**0.207**	**1,376**	**0.206**	**4,492**	**0.674**	**11,708**	**1.756**	**10,017**	**1.002**	**20,350**	**3.053**	**54,216**	**7.387**

*CBC species

Appendix 7 Implementation Schedule

tranen revegetation systems

Alkimos Beach FMP
Implementation Schedule

Year	2015				2016				2017				2018				2019				2020				2021			
Season	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn	Winter	Spring
Activity																												
Installation 2015 - Dune Blowout, North 1, North 2, Southern Track Closures																												
Seedling propagation																												
Weed control																												
Brush installation																												
Ripping																												
Tubestock planting																												
Track closures																												
Rabbit control																												
Installation Northern Access Road and Carpark Batters, Carpark Beach Access Path, Southern Access Track Batters																												
Construction																												
Mulching																												
Seedling propagation																												
Weed control																												
Tubestock planting																												
Completion of installation program																												
Maintenance																												
Monitoring																												
Weed control																												
Seedling propagation																												
Tubestock planting																												
Rabbit control																												
Completion of maintenance period																												