

Public Agenda Briefing Forum - 12 February 2019 Attachments

10.1.1. Proposed Local Planning Policy P-DEV 62: Design Guidelines - Maddington Kenwick Strategic Employment Area.....	3
10.1.1.1. Draft Local Planning Policy P-DEV 62: Design Guidelines - Maddington Kenwick Strategic Employment Area -1.....	3
10.1.1.2. Landscaping Sections.....	29
10.1.1.3. Submitters Table.....	32
10.1.1.4. City of Kalamunda Design Advisory Committee - February 2018 - Meeting Minutes.....	39
10.1.1.5. City of Kalamunda Design Advisory Committee - November 2018 - Meeting Minutes.....	44
10.1.2. Cambridge Reserve Community Enhancement Project - Consideration of Submissions and Modifications for Final Adoption.....	56
10.1.2.1. Final Concept Plan.....	56
10.1.2.2. Technical Note.....	59
10.1.2.3. Cambridge Reserve Community Enhancement Project Summary.....	61
10.1.2.4. Submission Table.....	75
10.1.2.5. Community Engagement Outcomes Report.....	110
10.1.2.6. Previous Technical Studies and Reports.....	126
10.1.2.7. Draft Concept Plan for Public Advertising.....	500
10.1.2.8. Pre-Consultation Engagement Outcomes Report.....	503
10.2.1. Ray Owen Reserve - Proposed Carpark Concept Plan.....	522
10.2.1.1. Attch 1 Ray Owen Master Plan Feb 2015.....	522
10.2.1.2. Attch 2 Carpark Concept Plan.....	523
10.3.1. City of Kalamunda - Repeal of Local Law relating to Model By-law (Old Refrigerators and Cabinets) No. 8.....	530
10.3.1.1. Repeal Local Law - Old Refrigerators and Cabinets.....	530
10.3.2. Reconciliation Action Plan.....	531

10.3.2.1. Draft Reconciliation Action Plan 2019.....	531
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Kalamunda Wedge Industrial Area - Precinct 3A

DESIGN GUIDELINES



Draft Local Planning Policy PDEV - 062
September 2018

DOCUMENT HISTORY AND STATUS

Kalamunda Wedge Industrial Area - Precinct 3A Design Guidelines

Local Planning Policy PDEV - 062

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TABLE OF CONTENTS

1.	INTRODUCTION	1	DESIGN GUIDELINES	5
1.1	PRECINCT VISION	2	2.1	DEVELOPMENT PRECINCTS
1.2	DESIGN PRINCIPLES	2	2.2	SUBDIVISION AND AMALGAMATION
1.3	RELATIONSHIP WITH SCHEME & STRATEGY	4	2.3	BUILT FORM
1.4	APPLICATION GUIDANCE	4	2.3.1	BUILDING DESIGN & QUALITY
			2.3.2	BUILDING ORIENTATION
			2.3.3	BUILDING SETBACKS
			2.3.4	END OF TRIP FACILITIES
			2.3.5	PARKING AND ACCESS
			2.3.6	LOADING AREAS
			2.3.7	SIGNAGE
			2.3.8	EXTERNAL LIGHTING
			2.3.9	CROSSTOVS
			2.3.10	FENCING
			2.3.11	STORMWATER MANAGEMENT
			2.3.12	WASTE MANAGEMENT
			2.4	WELSHPOOL ROAD EAST INTERFACE
			2.5	LANDSCAPING
			2.5.1	ONSITE LANDSCAPING
			2.5.2	VERGE AMENITY

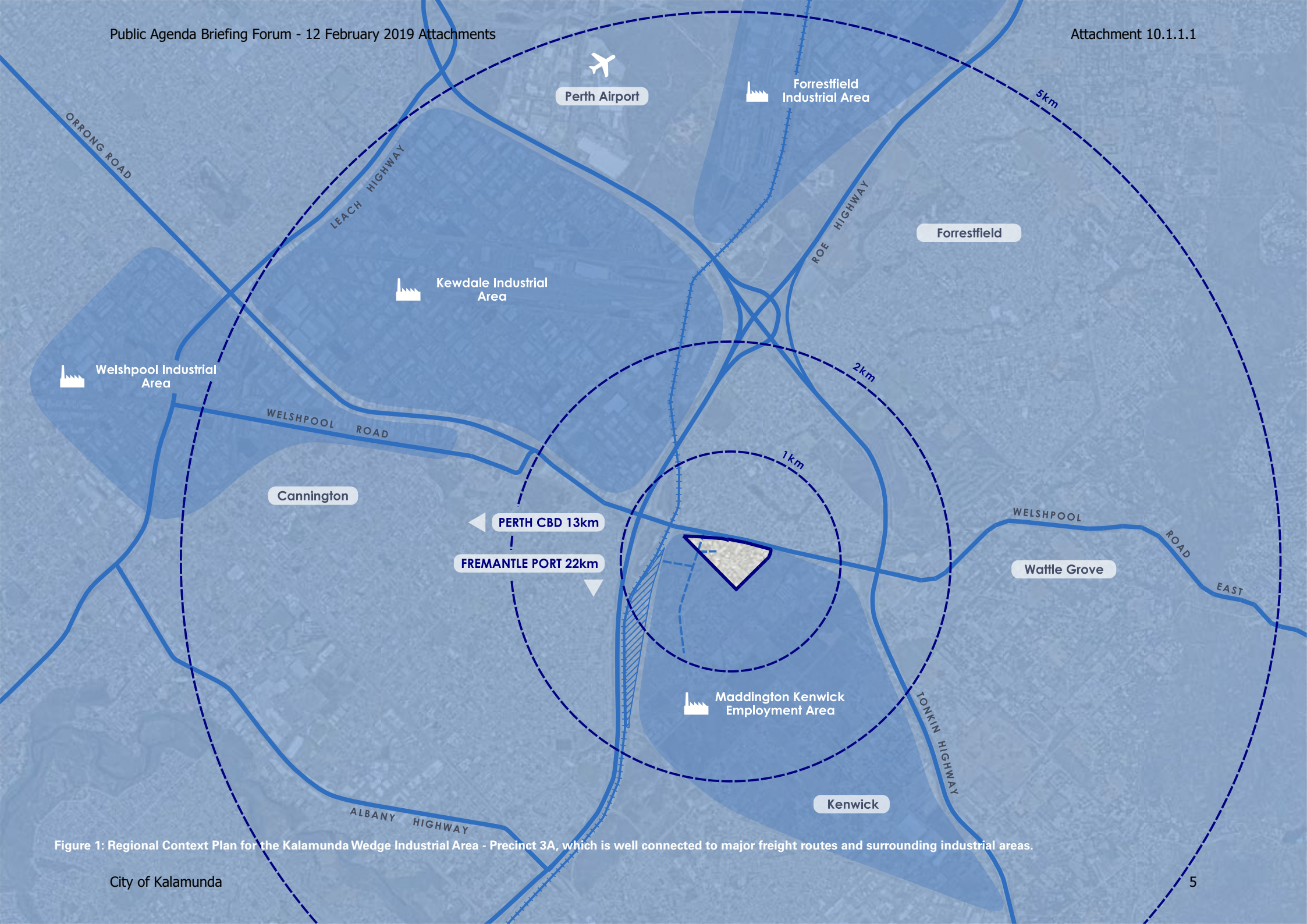


Figure 1: Regional Context Plan for the Kalamunda Wedge Industrial Area - Precinct 3A, which is well connected to major freight routes and surrounding industrial areas.

1. INTRODUCTION

These Design Guidelines apply to all land located within the Kalamunda Wedge Industrial Area - Precinct 3A ('The Precinct') within the Maddington Kenwick Strategic Employment Area ('MKSEA'), an area bound by Welshpool Road East, Bickley Road, Roe Highway and Tonkin Highway.

The precinct is located only 12 km from Perth CBD and is immediately adjacent the Primary Freight/Transport corridors of Roe Highway and Welshpool Road East and Tonkin Highway providing direct and easy access to distribution networks in all directions.

Some of the land within the Design Guidelines area has historically been subject to rural residential development. The progressive development of the area for industrial activities may lead to some short-term implications for existing residents, however, the City of Kalamunda ('the City') will endeavour to minimise any potential conflicts through the implementation of these Guidelines and the development application assessment process.

The Design Guidelines aim to provide comprehensive guidance for the design and approval of development within the precinct, and include consideration of:

- **Subdivision and amalgamation** proposals;
- **Built form design**, including orientation, bulk and scale and boundary setbacks;
- **Site design considerations**, including parking and access, landscaping and storage;
- **Building facilities**, including end of trip facilities and lighting; and
- **Interface considerations**, including screening and signage.

The Design Guidelines are intended for use by developers, assessing officers and determining authorities in their consideration of development within the precinct.

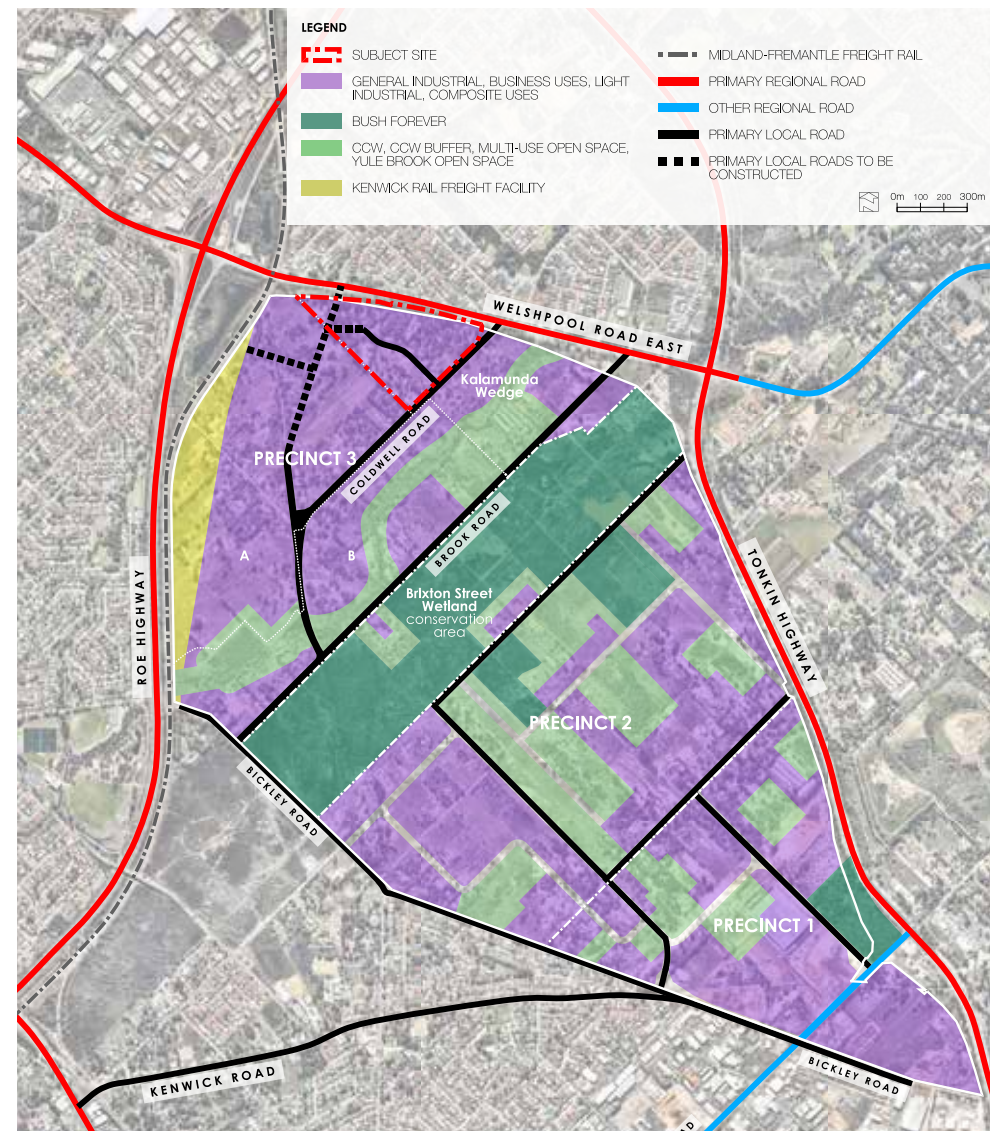


Figure 2: Sub-Regional Context Plan for the Maddington Kenwick Strategic Employment Area (MKSEA) which is to accommodate progressive industrial development over the next 10-20 years.

1.1

PRECINCT VISION

The precinct will be developed in a manner which creates an attractive, functional and sustainable industrial area which attracts a range of businesses eager to locate within the area, offering ease of access to both customers and suppliers.

These Guidelines aim to complement the attractiveness of the industrial area's geographic and strategic location, and to encourage design features, construction quality and landscaping of a high standard which will ensure the area is a sought-after location for business relocation, and a prestigious industrial address.



Figure 3: Artists impression of the style of industrial development to occur within the Kalamunda Wedge Industrial Area, representing well landscaped, high quality built form and site design.

1.2

DESIGN PRINCIPLES

The Design Guidelines are intended to provide clear and comprehensive development criteria to guide developers, assessing officers and determining authorities in their consideration of development within the precinct.

Development within the area will be guided by the following general principles:

- To encourage attractive developments that are well designed, with functional and efficient buildings and site layouts;
- To ensure that industries are environmentally compatible with surrounding zones and activities;
- To promote the development of high quality, attractive and sustainable landscaped areas and streetscapes;
- To support the street network providing permeability to the precinct for motorists, pedestrians and cyclists;
- To achieve water conservation through sustainable on-site stormwater management, water-wise landscaping and water efficient reticulation;
- To avoid unsightly and poorly planned developments; and
- To ensure proposals on the lots abutting Welshpool Road East incorporate an appropriate interface with existing residential development.

1.3

VARIATIONS TO THE POLICY

Variations to this Policy may be considered by the City but will require the applicant to provide appropriate suitable justification demonstrating how the proposed variation will not compromise the Design Principles outlined under Clause 1.2 of the Policy.



Figure 4: Local Context Plan for the Kalamunda Wedge Industrial Area, with the Roe Highway Logistics Park under development to the immediate south-west, future industrial development to the south east, established suburban residential development to the north-east and Welshpool Industrial Area to the north-west.

1.4

RELATIONSHIP WITH SCHEME & STRATEGY

These Design Guidelines have been prepared and adopted in accordance with Schedule 2, Part 2, Division 2 of the *Planning and Development (Local Planning Scheme) Regulations 2015*. The subject area is zoned 'General Industry' and 'Light Industry' under the provisions of *Local Planning Scheme No. 3*, and is subject to the requirements of the 'Development Area' outlined in clause 6.8 of the Scheme, inclusive of the requirement for the preparation of these Design Guidelines. The delineation of zoning is outlined in **Figure 5** below as at the date of preparation of these Guidelines.



Figure 5: Local Planning Scheme No. 3 zoning of the industrial area at the time of preparing these design guidelines (Note: applicants should refer to the Scheme maps to confirm the zoning and Scheme provisions applicable to the subject area).

1.5

APPLICATION GUIDANCE

These Design Guidelines have been prepared to guide the preparation and assessment of subdivision and development applications within the Kalamunda Wedge Industrial Area.

Step	Action	Reference
Step 1	Determine the zone that applies to your property, the permissibility of the proposed land use and any other matters which are required to be addressed.	Scheme Zoning Maps and Land Use Permissibility under <i>Local Planning Scheme No. 3</i> Clause 6.8 of <i>Local Planning Scheme No. 3</i> and Schedule 2, Part 9, clause 67 of the <i>Planning and Development (Local Planning Scheme) Regulations 2015</i> .
Step 2	Prepare a development concept plan and identify whether any land amalgamation or subdivision might be required.	Kalamunda Wedge Industrial Area- Precinct 3A Design Guidelines- Relevant sections of Part 2
Step 3	Meet with the City's planning team to discuss initial concept designs and key matters to be considered as part of preparing an application.	Seek advice from the City's Planning Department
Step 4	Refine concept development design for consideration of the Design Advisory Committee (optional but recommended).	Seek advice from the City's Planning Department
Step 5	Finalise development application (and necessary subdivision/amalgamation application) inclusive of all necessary supporting information to address drainage, access, landscaping, site design and built form.	Seek advice from the City's Planning Department
Step 6	Lodge application for determination by the relevant determining authority.	City for development applications to be determined by the City or by the Joint Development Assessment Panel. Western Australian Planning Commission for applications for subdivision or amalgamation of sites.

DESIGN GUIDELINES

2.1

DEVELOPMENT PRECINCTS

The following guidelines are intended to control all subdivision and development applications within the precinct.

The precinct is intended to form an interface and transition between the more traditional Roe Highway Logistics Park and Kenwick Freight Rail Facility to the south-west and the suburban residential area of Wattle Grove to the northeast.

The subject area has been divided into three distinct precincts based on the precinct plan identified in **Figure 7** and broadly described as follows:

Service/Commercial Precinct: This precinct will be focused on providing commercial services and amenity to employees and visitors of the industrial estate, in addition to providing for the surrounding residential catchment. It is anticipated that the service commercial precinct will accommodate commercial services appropriate within the broader industrial precinct, including a service station, food and beverage providers and complementary smaller commercial services.

Light Industrial Precinct: This precinct will provide an immediate transition between the established suburban area of Wattle Grove and the tree lined Welshpool Road East with the more traditional industrial activities to the south-west, and is anticipated to accommodate smaller industrial and commercial activities including warehousing, transport and logistics operations and service commercial uses.

General Industrial Precinct: This precinct will provide for more traditional industrial activities which reflect those proposed within the abutting 'General Industrial' zone within the City of Gosnells, and is anticipated to primarily accommodate larger industrial activities including freight and logistics uses, warehousing and manufacturing.



Figure 6: Artists impression of the Service/Commercial precinct within the Kalamunda Wedge Industrial Area.

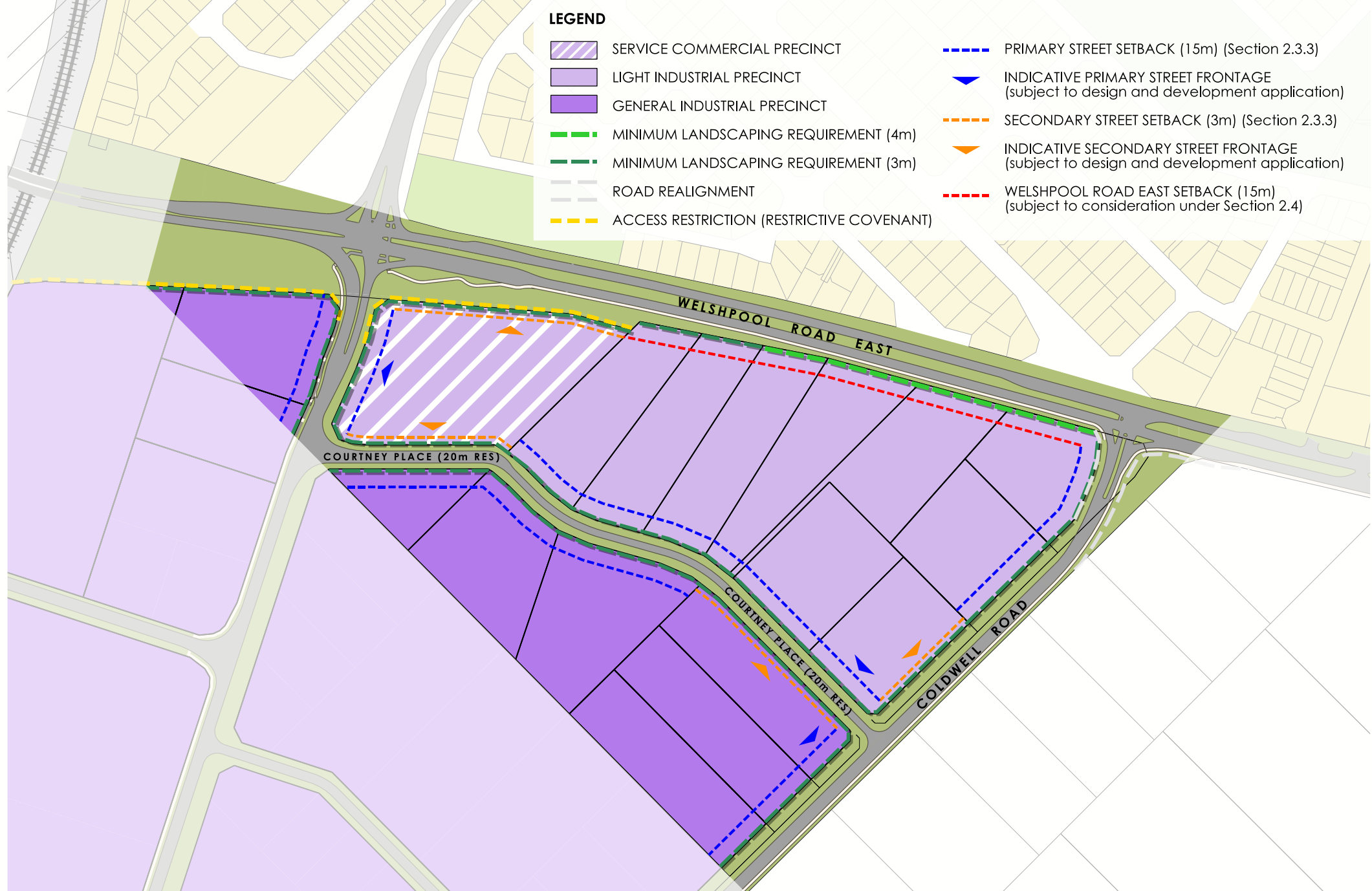


Figure 7: Precinct Plan for Kalamunda Wedge Industrial Area - Precinct 3A identifying the three distinct precincts to be developed and key design considerations for each of these precincts.

2.2

SUBDIVISION AND AMALGAMATION

Development Objectives

Alteration to the lot and public land configuration within the precinct shall be orderly and regular to facilitate a well designed industrial development.

Development Controls

- Development which necessitates the widening or creation of public land shall be conditioned to require the ceding of this land prior to occupation of the approved development.
- Development which necessitates the amalgamation or subdivision of land shall be conditioned to require the creation of the necessary lots reflective of the development approved prior to the occupation of the approved development.

Development Guidance

- Landowners should note the requirements for road reservation widening and realignment within the precinct, including:
 - Coldwell Road reservation, which is required to be widened by 10m along the north-west boundary to accommodate road and drainage upgrades in accordance with the approved Local Water Management Strategy;
 - Coldwell Road intersection with Welshpool Road East, which requires realignment of Coldwell Road and upgrade of the intersection in accordance with a future Development Contributions Plan;
 - Courtney Place reservation, which requires widening by 2m to facilitate road and drainage upgrades as an industrial standard road.

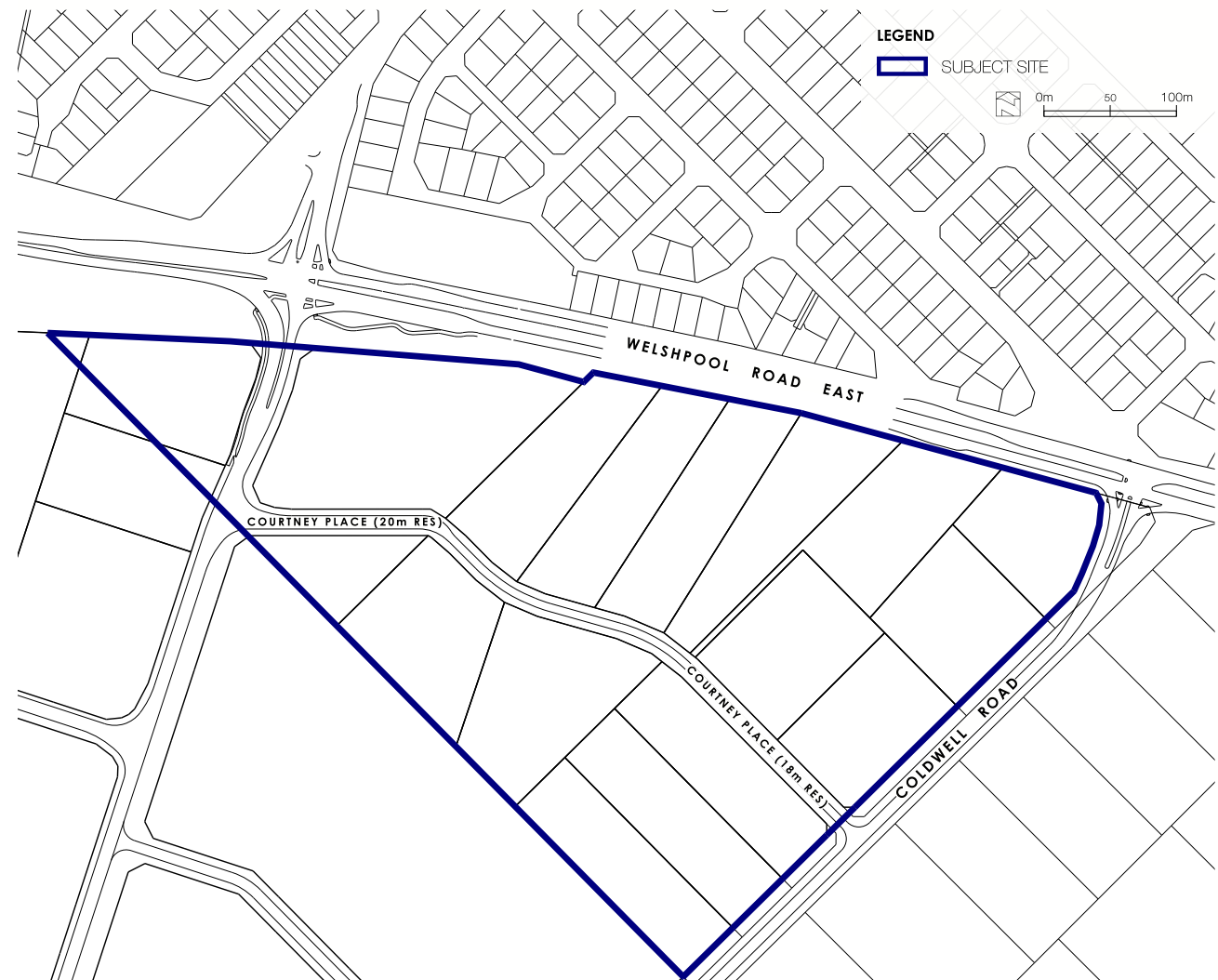


Figure 8: Lot layout within precinct.

2.3

BUILT FORM

2.3.1 BUILDING DESIGN AND QUALITY

Development Objective

The design of buildings shall promote a high quality industrial area through building articulation and presentation to the street, achieved through a diversity of building designs and materials encouraged to avoid a rigid, uniform outcome.

Development Controls

- Portions of a building which are visible from the primary or secondary streets are to incorporate:
 - Horizontal and vertical articulation to assist in breaking up the building mass through the use of recesses, columns, blades and other architectural features;
 - Variation in colours and materials with a minimum of two different colours and two different materials to be used;
 - Glazing to the street frontage, where practical, to promote surveillance of the street and/or open space;
- Areas of prefabricated concrete panels for external wall systems, i.e. 'tilt-up' visible from the primary street or secondary street frontage shall be detailed with expressed joints with a rendered and painted finish, or clad to the satisfaction of the City; and
- Building form shall use architectural features to establish visually distinct pedestrian access points. This includes the provision of legible pedestrian access points from the rear car parking areas to the rear entrance points of the building and distinctive entry doors and canopies to the street elevations.
- Plot Ratio is to be in accordance with the *Local Planning Scheme No. 3*.

Development Guidance

Contemporary industrial design style is encouraged.



Figure 9: Built form shall add to the character of the area through high quality design.

2.3.2 BUILDING ORIENTATION

Development Objective

Buildings shall be designed to be orientated to the primary street.

Development Controls

- The primary building entrance and façade shall orient to the primary street.
- For lots with multiple street frontages, the building must address both adjoining streets through orientation, design detail, materials and major opening(s).
- Where possible based on lot configuration and site design constraints, buildings shall be orientated and designed to be energy efficient through passive solar design.

Development Guidance

Passive solar design measures shall consider appropriate landscaping (trees, wall creepers etc.) to create shade in summer for car parking areas and buildings, and to allow the penetration of winter sun.



Figure 10: Buildings shall be designed to be orientated to the primary street.

2.3.3 BUILDING SETBACK

Development Objective

To achieve an attractive development outcome through individuality in building design and their relationship with the street.

Development Controls

- Buildings shall have a minimum setback of 15m to the primary street and 3m to the secondary street in accordance with the Scheme. Variations to the setback may be acceptable to the City where:
 - The variation is not considered to be detrimental to the broader streetscape;
 - The built form design for the portion of a building within the setback area is demonstrated to be of a high design quality; and
 - Additional landscaping is provided within the setback areas to mitigate the visual impact of the reduced building setback.
- Additional building setback requirements for Welshpool Road East are addressed in Section 2.4.
- Front setback areas are to be used for the purpose of access, car parking and landscaping. Other uses including stormwater drainage and storage of refuse may be undertaken in the front setback area where they are demonstrated to not be detrimental to the streetscape.
- Buildings shall have a minimum setback consistent with the Building Code of Australia for side and rear boundaries (except for buildings adjacent the Welshpool Road East boundary).

Development Guidance

Further variations to setbacks may be acceptable to the City where they are demonstrated to not have a detrimental impact on the function of the development or on the amenity or development potential of abutting properties.



Figure 11: Buildings shall be setback from the street to provide usable space between the street and building and contribute to an attractive streetscape.

2.3.4 END OF TRIP FACILITIES

Development Objective

New developments of substantial size and workforce shall provide end of trip facilities to facilitate diverse travel choices.

Development Controls

- For development with
 - NLA floorspace greater than 2000m²; and/or
 - more than 20 employees are proposed to be on site at any one time;
 there shall be allocated a minimum of one female shower and one male shower, located in separate change rooms or a minimum of two separate unisex shower and change rooms.

Development Guidance

- The showers must dispense both hot and cold water;
- The end of trip facilities shall include non-slip surfaces, hooks and/or benches for peoples belongings, adequate lighting and ventilation; and
- Secure change rooms capable of being locked.



Figure 12: End of trip facilities shall facilitate diverse travel choices for employees.

2.3.5 PARKING AND ACCESS

Development Objective

The on-site vehicular circulation and parking system shall achieve a safe, efficient, convenient, and functional movement of multiple modes of transportation.

Development Controls

- Vehicle access locations and circulation pattern shall minimize conflict with pedestrians and bicycles.
- Car parking shall be provided generally in accordance with Table 1 of the City's *Local Planning Scheme No. 3*.
- The car park area is to consist of a sealed finish such as asphalt, paving material or concrete.
- All vehicular access ways, service areas and parking areas shall be designed to enable vehicles to enter and leave in forward gear.

Development Guidance

- In accordance with the City's *Local Planning Scheme No. 3* the City may apply discretion to allow a lesser requirement for car parking than that stipulated if in its opinion the proposed use is likely to demand a lesser need for car parking bays.
- Tandem parking bays shall be accepted where the two bays are provided for the use of a single tenancy and are utilised by staff on-site.



Figure 13: Parking and access shall be designed to provide safe, efficient, convenient and functional movement of multiple modes of transportation.

2.3.6 LOADING AREAS

Development Objective

Loading areas shall be designed in a manner that minimises conflict between the delivery/ collection of goods and the access of employees and visitors to the site.

Development Controls

- Loading areas shall be designed to accommodate vehicular manoeuvring on site, including allowances for reversing so that vehicles can leave in forward gear, and shall not prohibit on-site vehicular circulation.
- Loading areas are to be screened from view of the primary and secondary streets. As an alternative the loading area should include design features to maintain a high quality presentation to the streetscape, including the use of colours and materials consistent with the broader building design to the satisfaction of the City.
- Loading and storage areas are to be screened from Welshpool Road East in accordance with Part 2.4.

Development Guidance

- Service and loading areas can be accommodated within the building area.



Figure 14: Loading areas shall be designed in a manner that minimises conflict between the delivery/ collection of goods and the access of employees and visitors to the site.

2.3.7 SIGNAGE

Development Objective

Signage within the estate shall be well designed and integrated into the building design to achieve identification of individual businesses whilst maintaining estate amenity.

Development Controls

- Signage shall be of a size and scale that reflects the surrounding environment and the need for exposure to passing trade based on the subject development.
- Signage may be internally or externally lit provided that this does not have a detrimental impact on abutting sites or on the safety of the abutting road network.

Development Guidance

- The City's *Signage on Private Property* policy (P-DEV 42) provides further guidance on the development of signs.
- Signage abutting Welshpool Road East will be assessed against the relevant Main Roads WA policy.



Figure 15: Signage within the estate shall be well designed and integrated into the building design to achieve identification of individual businesses whilst maintaining estate amenity.



2.3.8 EXTERNAL LIGHTING

Development Objective

External lighting is to be designed to provide a safe and secure environment on-site.

Development Controls

- Beacons, search lights, blinking lights, flashing or changing intensity lights will not be permitted.
- Lighting must be directed away from adjacent buildings and any public roads.
- Security lighting must be confined to entrances and pedestrian areas and must not project onto any public road.
- All car parking areas, pedestrian routes and entrances are to be well lit. Parking area lighting shall have a greater height than pedestrian area lighting, and be focussed downwards. Bollard lighting and pavement inset lighting is encouraged for pedestrian pathways.

Development Guidance

All external lighting shall be utilised in a manner which is consistent with the use for which it was designed (e.g., flood or spotlights, bollard lights, sensor lights, etc.).

2.3.9 CROSSOVERS

Development Objective

Crossovers shall compliment the streetscape and support the landscape qualities of the estate, while also meeting the requirements of safe access and egress to individual developments.

Development Controls

- Each site will be permitted to have a maximum of two (2) crossovers. Additional crossovers may also be permitted subject to City approval where the additional crossover:
 - Is considered to facilitate the safe movement of vehicles to and from the public road;
 - Is accompanied by additional verge landscaping to mitigate the impact on the streetscape.
- Crossovers are to be constructed of either concrete or block paving to the dimensions, line and level as outlined in City's specifications.
- Crossovers are to be constructed with the following dimensions:
 - Minimum width at property line – 6.0 metres;
 - Maximum width at property line – 10.0 metres or as approved; and
 - Wing dimension – To match 6.0m curve radius of crossover wing.

Development Guidance

- It is recommended that the minimum design requirement complies with the medium to heavy commercial and/or industrial traffic specifications.
- Owners and/or designers should check the pavement capacity with actual traffic loadings prior to making application to the City.

2.3.10 FENCING

Development Objective

Fencing shall compliment the visual aesthetics and overall character of the development, whilst also achieving its primary aim of providing security to businesses.

Development Controls

- Fencing located along the front lot boundary is to be black powder coated Garrison or Palisade fencing to a maximum height of 1800mm.
- Fencing shall be visually permeable to ensure passive surveillance opportunities.
- Fencing located behind the building line is to:
 - Be generally consistent with the front boundary fencing (black powder coated Garrison or Palisade fencing); or
 - Be designed to a minimum standard of 1800mm rail-less chain link or steel mesh incorporating black coloured PVC coating with black gates, posts and fittings.
- Barbed wire is generally permissible but must not be installed along a street boundary.



Figure 16: Fencing shall compliment the visual aesthetics and overall character of the development, whilst also achieving its primary aim of providing security to businesses.

2.3.11 STORMWATER MANAGEMENT

Development Objective

Achieve best practice urban water management principles through the management of storm water on each development site.

Development Controls

- Design of stormwater management on site is to be in accordance with the approved Local Water Management Strategy (LWMS).
- As per the LWMS, the lot detention areas will be required to detain flows up to the 100 year ARI event at a rate of 36 L/s/ha.
- A detention storage of 30 m³/ha is required within lots.
- Stormwater quality treatment for the first 15mm runoff needs to be addressed using WSUD treatment train approach providing bio-retention areas or suitable alternative retention measures as appropriate for the site geotechnical conditions and individual lot use.
- Onsite landscaping and potentially car park areas or other open spaces within lots can be used for the detention of stormwater with an average ponding depth of 50mm.

Development Guidance

Design of stormwater management on site is to be outlined in a drainage concept plan as a component of a development application.

2.3.12 WASTE MANAGEMENT

Development Objective

Bin storage and service facilities are to be provided on site in a manner that does not negatively impact on views from the adjacent streetscape.

Development Controls

- Outdoor storage of goods is not permitted forward of the building line, and outdoor storage areas are to be delineated in accordance with the approval of the City and are to be screened from view of the primary or secondary street in the manner approved.
- Bin storage may be undertaken internal to a building where sufficient space is identified as a component of a development application.
- A bin wash down facility shall be provided in a suitable location on site.
- Waste and recycling storage points are to be screened by solid fencing or landscaping to ensure they are not visible from public streets.
- External bin storage areas are to have a minimum site area of 10m² where located external to a building, and may be designed as a single enclosure or multiple smaller enclosures.
- Where visible from the primary or secondary street an external bin enclosure must include screening to a minimum 1.5m in height sufficient that the bins are not visible from the primary or secondary street.

2.4

WELSHPOOL ROAD EAST INTERFACE

Development Objective

Development on sites abutting Welshpool Road East (as identified in **Figure 7**) are to be designed in a manner which does not detrimentally impact upon the streetscape of Welshpool Road East.

Development Controls

- Development of land abutting Welshpool Road East is to include landscaping adjacent the lot boundary to Welshpool Road East to achieve an appropriate development interface with this road with a minimum width of:
 - 3m within the Service Commercial precinct; and
 - 6m within the Light Industrial precinct;
 as outlined in **Figure 7** and in accordance with the landscaping standards outlined in Section 2.5.
- Buildings are to be setback a minimum of 15m from the Welshpool Road East boundary. The setback requirement may be reduced to a minimum of 8m where:
 - The built form design for the portion of a building visible from Welshpool Road East is demonstrated to be of a high design quality; and
 - The 8m setback area is fully landscaped in accordance with the requirements of Section 2.5.
- Any proposed fencing or development to this road boundary shall not impact the existing tree line and vegetation located within the road reserve.
- Existing trees located in the Welshpool Road East verges are to be retained and protected during development of the adjacent property, except where specific authority has been achieved through the City for their removal or pruning.
- Direct access to Welshpool Road East is not permissible unless otherwise approved by the City and Main Roads WA.

- The design of development must ensure that all service yards and storage areas are suitably screened from Welshpool Road East to ensure that a high level of visual amenity is maintained while travelling along this road. Screening measures shall include:
 - Landscaping to a sufficient density that will screen the materials to be stored; or
 - Fencing shall be constructed of materials consistent with the adjacent approved building and in accordance with Part 2.3.10 (Fencing).
- Portions of buildings facing Welshpool Road East must be designed in a manner which makes a positive contribution to the streetscape, and shall include variations in colour and materials, architectural features and cladding of prefabricated concrete panels (in accordance with Design Guideline Criteria 2.3.1).



Figure 17: Development within the Light Industrial Precinct is to be designed in a manner which does not detrimentally impact upon the streetscape of Welshpool Road East.

2.5

LANDSCAPING

2.5.1 ON-SITE LANDSCAPING

Development Objective

All developments shall incorporate appropriate landscaping as an essential element for the enhancement of the overall aesthetics for the estate. The landscape outcomes will assist with the softening of building mass, screening of service structures and loading areas, enhance the amenity of the streetscape, define public and private areas, provide shade and climate control and filter drainage and stormwater runoff.

Development Controls

- A minimum of 5% of the total lot area is to be allocated for landscaping purposes, which includes the minimum landscaping strip provided along all street frontages outlined in **Figure 7**.
- The landscaping strip abutting street frontages is to be planted with large trees that have a minimum bag size of 100L at a spacing of 1 tree for every 10m of frontage, in addition to a variety of shrubs, as outlined in **Figure 18**.
- Trees are to be planted within uncovered car parking areas at the rate of 1 per 4 car parking spaces, as outlined in **Figure 18**.
- There are no more than 6 adjoining car bays without the area being punctuated by a tree.

Development Guidance

- The design of landscaping should take account of the approved Local Water Management Strategy and Urban Water Management Plan.
- A Landscape Intent Plan is to be provided as a component of a development application to outline the proposed on site landscaping.
- To ensure landscaping is successful, landscaped areas should be irrigated with an appropriate reticulated watering system. Land owners should:
 - Install a low flow trickle irrigation system;
 - Install a programmable water controller/timer system; and
 - Direct rainwater runoff from buildings and hardstand areas to the landscaped areas.

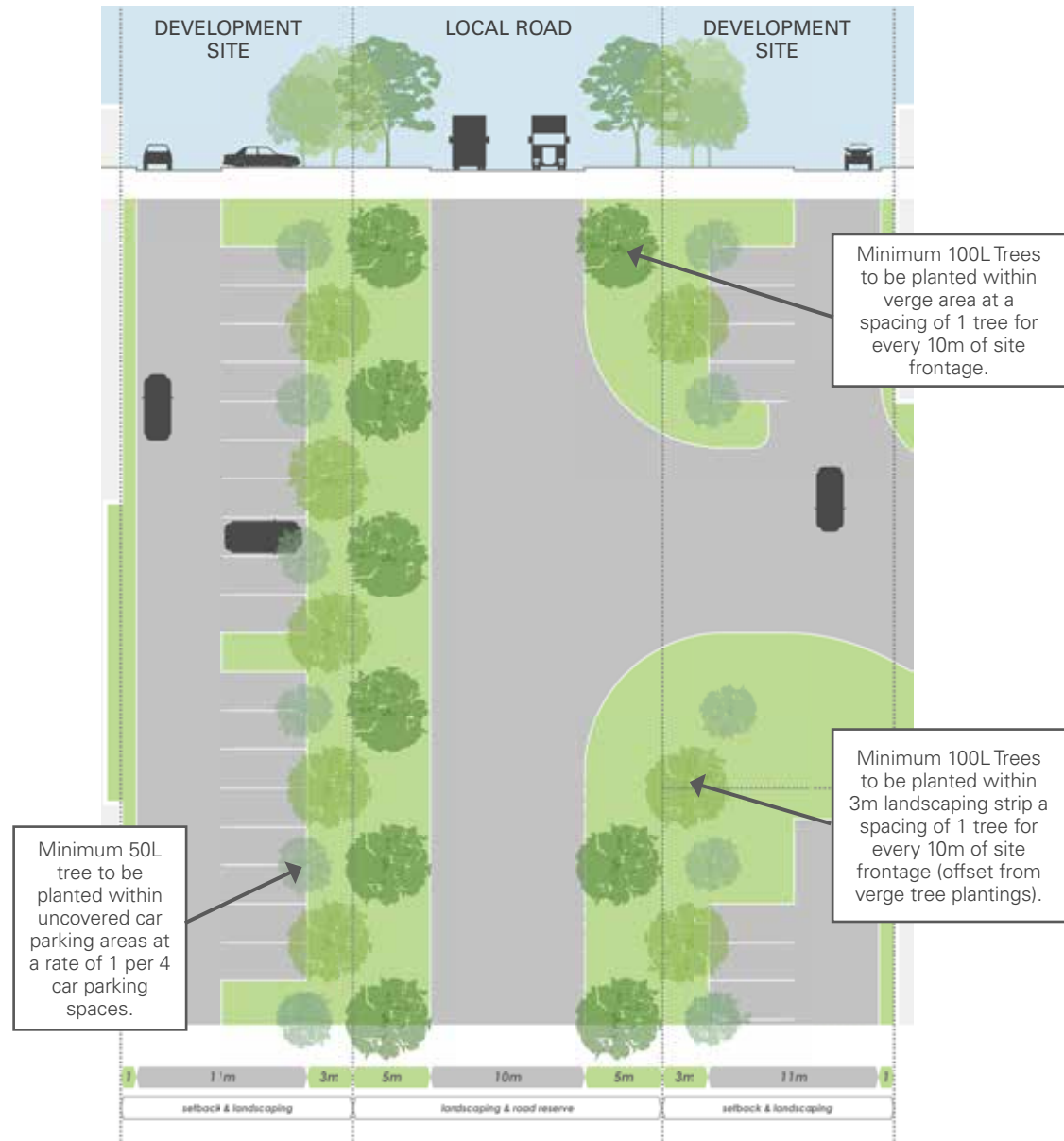


Figure 18: Cross section outlining the primary street frontage landscaping requirements within front setback area and road verge in accordance with the development controls under section 2.5.1 and 2.5.2.

2.5.2 VERGE AMENITY

Development Objective

Development will contribute to a high amenity and cohesive public realm streetscape to establish the Estate character and vision.

Development Controls

- Street verges shall be kept in a tidy and visually appealing manner at all times and maintained by abutting landowners.
- Development is to provide a minimum of one verge tree for every 10m of street frontage (**Figure 18**) and onsite reticulation shall be extended to the verge landscaping and maintained by the landowner.
- Verges are not permitted to be used for the display of goods or the informal parking of vehicles without the approval of the City.
- Verges abutting each property are required to be maintained by the abutting landowner, including the maintenance of turf and removal of hazards (including fire hazards) where applicable.
- Verge design shall be maintained to facilitate ease of pedestrian movement, particularly into the precinct from Welshpool Road East.

Development Guidance

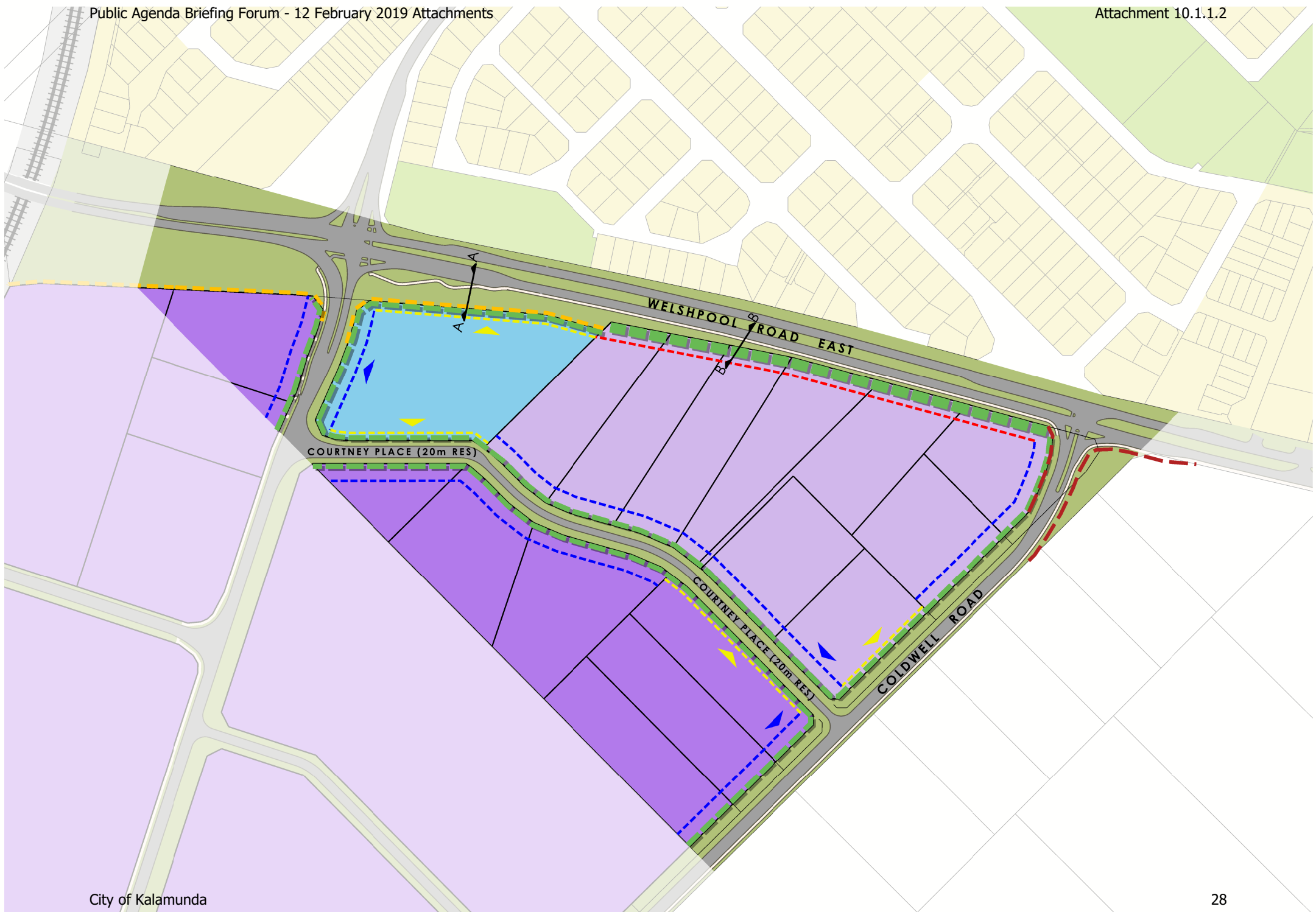
- Manicured grass verges are accepted as they are visually appealing, generally low in maintenance and can provide a consistent street aesthetic.
- Sustainable waterwise verge landscaping is permitted in lieu of turf where the plant species are supported by the City and plants are regularly maintained by the adjacent land owner.
- On request, the City will undertake street tree pruning and slash verges that present a fire hazard. All other verge improvements are the responsibility of the owner.
- Any works proposed within the street verge shall be clearly indicated on plans when lodging for a Development Approval from the City.

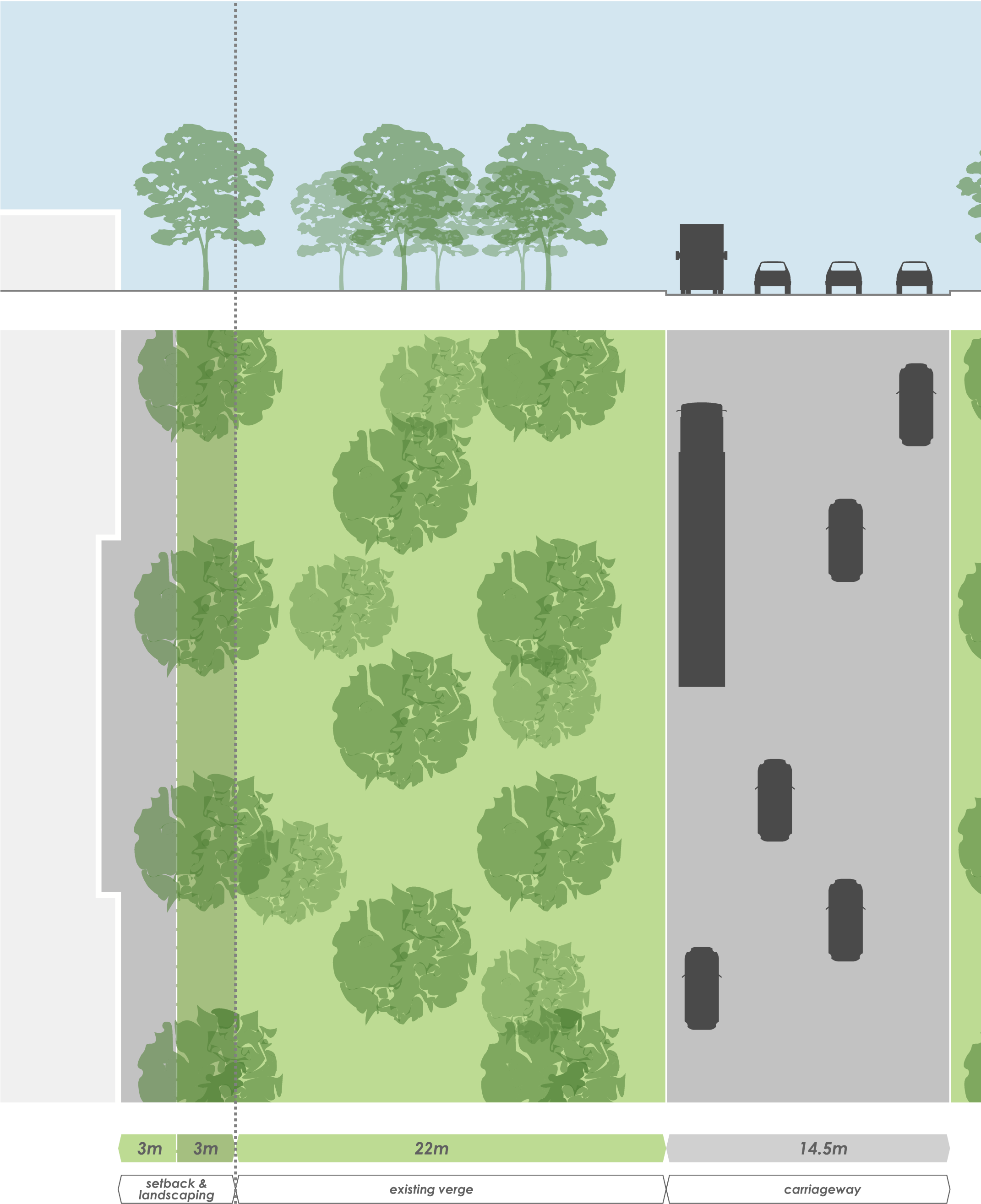
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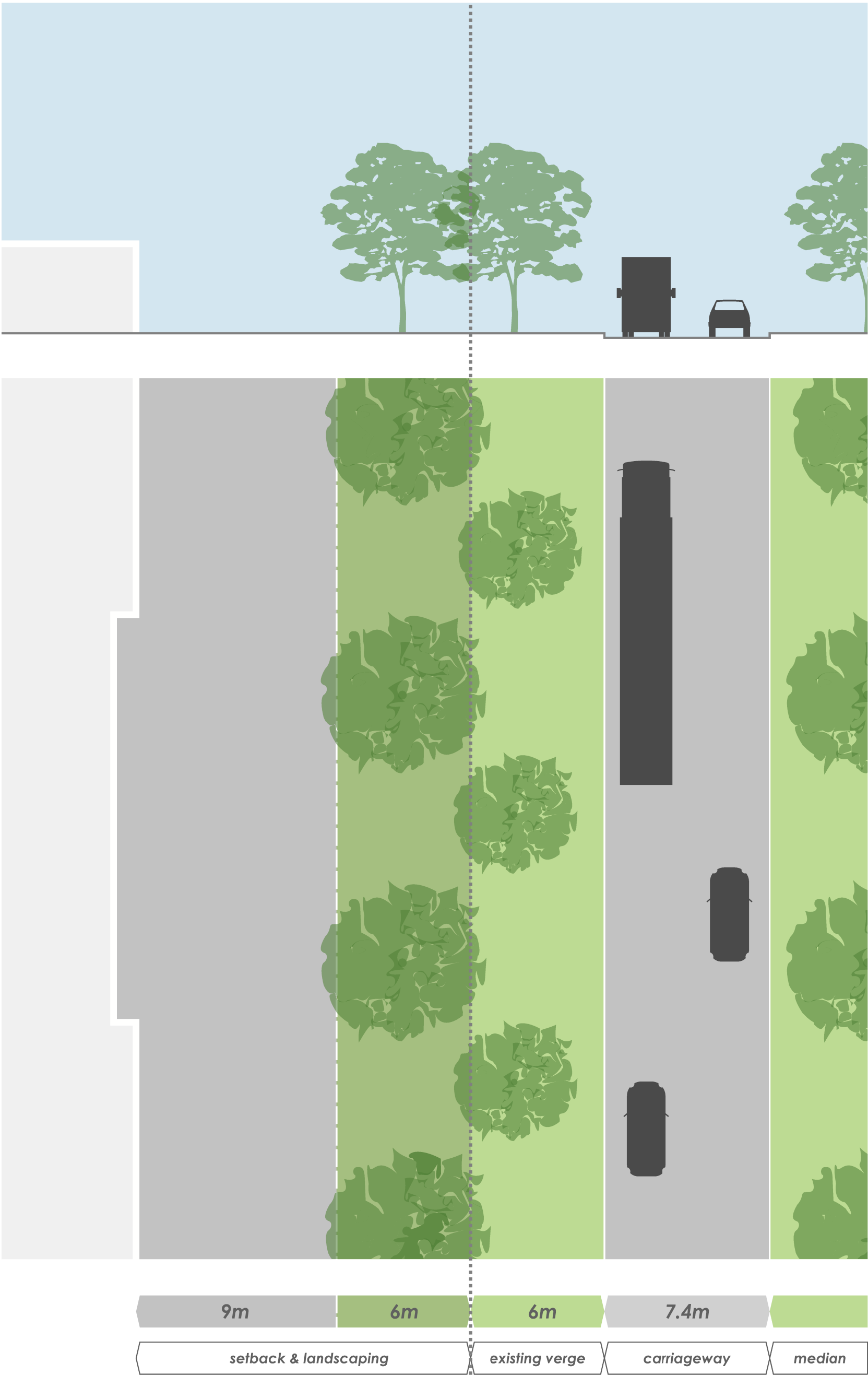


Figure 19: Development will contribute to a high amenity and cohesive public realm streetscape to establish the Estate character and vision.









Summary of Submissions
Local Planning Policy P-DEV 62: Maddington Kenwick Strategic Employment Area

Submitter No.	Nature of Submission	City of Kalamunda Response/ Recommended Modifications
1	<p>1. The information provided is entirely inadequate for the purpose of community consultation on future Planning.-</p> <ul style="list-style-type: none"> a) It does not explain the previous Planning Context of MKSEA, the extent of area embraced by that Planning; dates and current standing of Planning Approval for it; or the input was made to that by the (Shire) City of Kalamunda. b) The intention from work that can be seen already commenced on-site is clearly revealed as being to extend the recently placed 1.5m+ deep sand covering over this area within City of Kalamunda boundary herein latterly termed Precinct 3 (A). c) In fact the land area embraced is extremely environmentally sensitive. Firstly in that the natural surface hydrology of it drains into Yule Brook and will impact upon the immediately adjacent biodiverse area of Greater Brixton Street Wetlands (at least 558 native plant species). The development lots (not numbered) are part of a landscape that contains globally - significant biodiversity including rare and threatened species and communities of national significance in accordance with the Commonwealth EPBC Act. d) The area has significant mature tree cover, that by implication of Planning Draft PPDev -062 will be cleared completely save for a narrow 6m strip alongside Welshpool Road East, (barely the root-spread of a single tree.) <p>Each of the above obviously invalidates the leading statement in the draft that "The Policy was written with the intent of protecting the amenity of the locality and that of the surrounding landowners" ...</p> <p>2. Presentation of this as a 'draft Local Planning Policy' for public comment is also inadequate and substantially misleading in its present form (the many photographs included are not of actual proposals, but for design-guide illustrative purposes and selected by Consultants working for commercial Developers, not by City Planning staff.</p>	<ul style="list-style-type: none"> a) The intent of the Design Guidelines is to provide clear and comprehensive development criteria to guide developers, Council and the City on development in the precinct. There is no requirement for the Design Guidelines to provide background planning context. This has been addressed in the report to Council. b) Noted. c) The area subject to the Policy forms part of the Maddington Kenwick Strategic Employment Area (MKSEA) which has been rezoned under the Metropolitan Regional Scheme zone from Rural to Industry (1300/57) and subsequently rezoned under the Local Planning Scheme zone from Special Rural to General Industry and Light Industry (PG-LPS-003/089). Pursuant to Section 81 of the <i>Planning and Development Act 2005</i> and the requirements of the <i>Planning and Development Regulations (Local Planning Schemes) 2015</i>, the amendment was referred to the Environmental Protection Authority for consideration against Section 48A of the Environmental Protection Act 1986. It is noted that the Environmental Protection Authority did not require an assessment. However, it is important to note that Clause 6.8.1(c) of Local Planning Scheme No. 3 requires all subdivision and/or development applications to be supported by investigations to determine if any significant vegetation, flora or fauna habitat occurs within the proposed area. Furthermore, the approved MKSEA Precinct 3A District Water Management Strategy (DWMS) and Local Water Management Strategy (LWMS) models groundwater flow for the precinct and confirms that the area subject to the Policy guidelines is located in a south The DWMS and LWMS also models the pre-development surface water flow, which is also in a south westerly direction (as would be expected as the land also generally slopes in this direction), before discharging to the Yule Brook close to the Roe Highway culverts. This drainage pattern has been maintained in the post-development scenario, as is evidenced by the overland drainage swales which discharge to a large drainage treatment basin at the south west of the development (within the City of Gosnells)westerly direction and away from the Brixton Street wetlands. d) The City will be encouraging developers to give consideration to the retention of vegetation on site at the development application stage of the planning process. <p>Noted.</p>

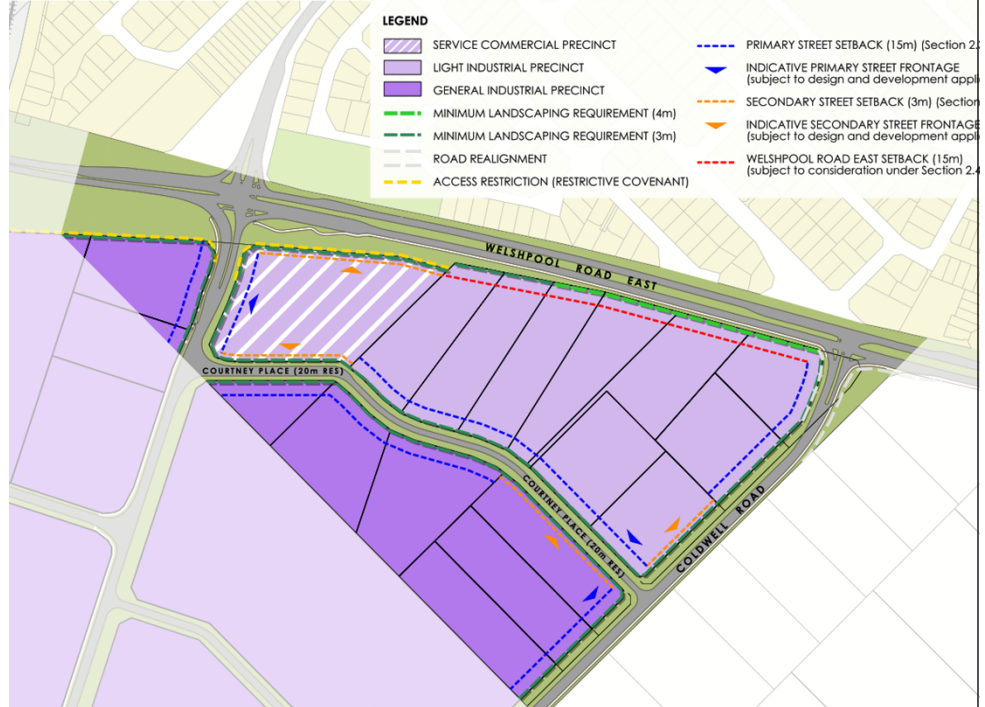
Summary of Submissions
Local Planning Policy P-DEV 62: Maddington Kenwick Strategic Employment Area

	<p>'Built form' for instanced does not specify relative scale, heights and limitations on vertical surfaces; or specifying how roof treatments could make any contribution to limiting the 'Heat Island' (+9Cdeg.) effect of removing mature vegetation as proposed; that will certainly affect neighbouring domestic properties, noting particularly that this locality has the highest summer temperatures in the region – lacking penetration of afternoon sea breeze.</p>	
	<p>While Council agreed to release this Draft for public comment at the 25th September OCM members then made no public comment on it. I asked Council to note the (avoidable) environmental destruction; note the damaging effect on local site hydrology and pointed out that the whole of the MKSEA was/is marginally wetland – (as apparently discovered recently by the Developers, after recent heavy rainfall flooding) – who are now busy re- excavating the tens of thousands of tonnes of sand imported from off-site to place precast concrete drainage culverts !</p>	<p>The area subject to the Policy forms part of MKSEA which has been rezoned under the Metropolitan Regional Scheme zone from Rural to Industry (1300/57) and subsequently rezoned under the Local Planning Scheme zone from Special Rural to General Industry and Light Industry (PG-LPS-003/089). Pursuant to Section 81 of the Planning and Development Act 2005 and the requirements of the Planning and Development Regulations (Local Planning Schemes) 2015, the amendment was referred to the Environmental Protection Authority for consideration against Section 48A of the Environmental Protection Act 1986. It is noted that the Environmental Protection Authority did not require an assessment. However, it is important to note that Clause 6.8.1(c) of Local Planning Scheme No. 3 requires all subdivision and/or development applications are to be supported by investigations to determine if any significant vegetation, flora or fauna habitat occurs within the proposed area. Furthermore, the approved MKSEA Precinct 3A District Water Management Strategy (DWMS) and Local Water Management Strategy (LWMS) models groundwater flow for the precinct and confirms that the area subject to the Policy guidelines is located in a south The DWMS and LWMS also models the pre-development surface water flow, which is also in a south westerly direction (as would be expected as the land also generally slopes in this direction), before discharging to the Yule Brook close to the Roe Highway culverts. This drainage pattern has been maintained in the post-development scenario, as is evidenced by the overland drainage swales which discharge to a large drainage treatment basin at the south west of the development (within the City of Gosnells) westerly direction and away from the Brixton Street wetlands.</p>
	<p>Council should also be asked to note that both Community and State Government awareness of environmental issues and sustainability have changed substantially since this MKSEA area was first designated many years ago. They will be expected to reflect that change in their approach to Planning Approvals - especially where known threats arise from large scale development. (Council will certainly be subject <u>to community criticism if it accepts this further and blatantly anti-sustainable activity</u>).</p>	<p>The City will encourage the retention of vegetation where practicable at the Development Application stage of development. Clause 6.8.1(c) of Local Planning Scheme No. 3 requires all subdivision and/or development applications to be supported by investigations to determine if any significant vegetation, flora or fauna habitat occurs within the proposed area.</p>
	<p>Council should also be asked to reflect on the high level of detail they have been guided to impose on small domestic projects; and why that level of detailed scrutiny of form, spatial assembly and surface textures should not be extended to each and every industrial building?</p>	<p>Noted.</p>
	<p>Some Alternative proposals.-</p> <ul style="list-style-type: none"> a) The existing largely level ground throughout the Precinct 3A should be maintained without surface overfill. b) All mature trees existing on-site with a bole diameter of 30cm or over remain in place and be protected during development (with a map-located Preservation Order) and 	<ul style="list-style-type: none"> a) Any modifications to ground levels will be determined by the requirements of the Local Water Management Strategy and will be assessed at the Development Application and/or subdivision stage. b) The City does not currently have any statutory mechanism to require the retention of vegetation on private properties, unless the

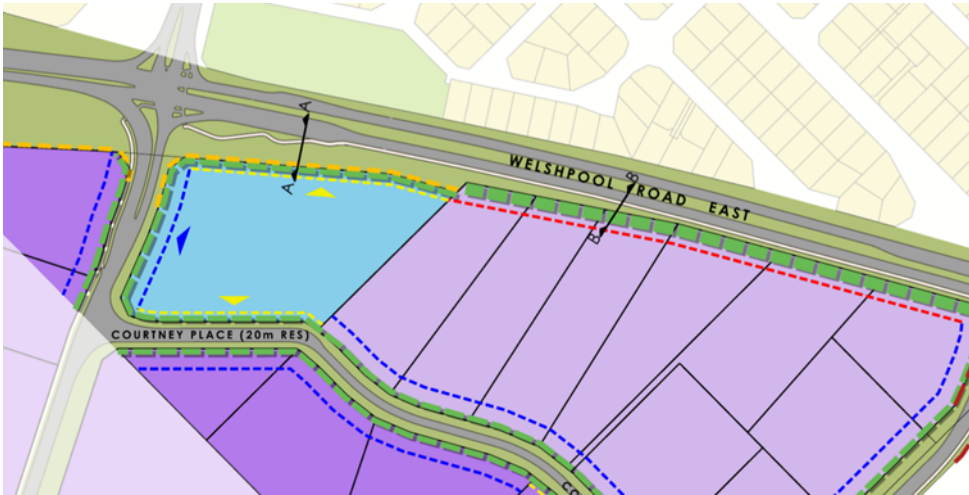
Summary of Submissions
Local Planning Policy P-DEV 62: Maddington Kenwick Strategic Employment Area

	<p>c) That instead of 6m (barely the root spread of a single tree) a minimum 40m visual buffer of existing trees/ground vegetation remain along the whole of the combined sites frontage to Welshpool Road East. (To allow some managed long term natural self-regeneration under them).</p> <p>d) Council should also seriously consider the inevitable further slowing of currently increasing vehicle movement along westerly metro-bound Welshpool Road East by the implied introduction of much more major heavy vehicle traffic entering and leaving Coldwell Road. Therefore slightly lengthen central turn-off lanes on this dual carriageway but definitely oppose traffic lights at that junction.-This section of dual carriageway, the main traffic route from the Hills to central Perth is already subject to 1km westbound tail-back congestion at peak hours, as well as being already a designated route for north-westward bound heavy multi-trailer heavy freight vehicles from Brookton Hwy via Canning Mills.</p>	<p>vegetation is protected by state or federal legislation. Nonetheless, the City will encourage the retention of vegetation where practicable at the Development Application stage of development.</p> <p>c) Refer comments to b).</p> <p>d) Vehicle movements on Welshpool Road East are not a consideration of the Local Planning Policy. Nonetheless as a Primary Regional Road, vehicle movements are a consideration for MRWA.</p>
2	<p>I refer to the City's letter of 17 October 2018 advertising the Kalamunda Wedge Industrial Area – Precinct 3A Design Guidelines, September 2018, for public comment. We submit our comments as land owners in the wedge area.</p> <p>The design guidelines are clear on what is intended for the area as a light industrial and general industrial area as far as site design, building design and facilities for the lots. The photographs and artists' impressions show traditional industrial estate ambience from all aspects. However the City's proposal for the Welshpool Road Interface is inconsistent with this.</p> <p>The City rezoned our land, clearly voted to sell out our Special Rural zoning, and made our land Light Industrial. Now the City is seeking to retain it as "Rural Looking". We are very disappointed that the City of Kalamunda has uprooted our rural lifestyle, damaged a wonderful 'green belt' at the bottom of the scarp ... but now wants to pretend to the rest of the world that our properties are still rural. A façade only.</p> <p>We have serious doubts from a natural environment perspective of the existing trees surviving along the Welshpool Road East verge and future plantings within this 6 metre nature strip proposed. The existing trees have grown and been conditioned in a rural setting with adjoining land areas having tall trees and other vegetation. Their roots and growth is according to the existing water sources, wind and weather protection of surrounding trees and vegetation.</p> <p>An industrial estate, similar to that already developing in the area, with no large trees will cause different water channelling, wind directions and forces of Nature. These factors will not enhance the longevity of the existing trees. Changes to water run off and water entrapment in this clay soiled area, resulting for the lots being developed with industrial buildings and carparks, will also impact on the viability of the existing trees.</p> <p>In our experience, when trees become exposed due to removal of adjacent trees that previously protected them, they become prone to losing limbs and falling over. Westerly winds, until now not encountered by the existing tall gum trees on the Welshpool Road East verge, will be more likely to cause branches, and maybe the trees themselves, to fall or encroach onto Welshpool Road East.</p> <p>The verge, which the Council currently does not clear of fallen branches and fire hazard combustible materials, and a further 6 metres of nature strip will become a bigger litter trap and fire hazard. The light industrial land owners will have no interest in this land area, as they have any not true street frontage. The foliage will also provide cover for those intent on committing break-ins at the commercial premises.</p> <p>This 6 metres per lot nature strip will cumulatively create "Bush" of greater than 1 hectare. These lots and all other properties, including the residential suburb of Wattle Grove, will then need to comply with the new fire prevention legislation. The height and materials used for the buildings due to closeness to bush/tall trees will also need to be compliant with this legislation. There may also be a requirement for firebreak around this bush. If this is done on a per lot basis, then the 3 metre firebreak between lots, on each side of the adjoining boundary, will create 6 metre gaps in the bush between lots. This means the nature strip will</p>	<p>The intent of the Landscaping strip along Welshpool Road East is to mitigate the bulk and scale of any subsequent industrial development, which is common place throughout the Perth Metropolitan Area. For example, the Forrestfield/High Wycombe Industrial Area imposes a 6-8 metre wide landscaping strip.</p> <p>Noted.</p> <p>Noted.</p> <p>Noted.</p> <p>Noted.</p> <p>Noted.</p> <p>Noted. Firebreak requirements apply to individual lots greater than 2000m² in area for lots that are vacant and 4000m² for properties that are occupied. Any lots exceeding the aforementioned areas will be required to comply with the Firebreak requirements.</p>


Summary of Submissions
Local Planning Policy P-DEV 62: Maddington Kenwick Strategic Employment Area

	<p>become patches of bush with 6 metre gaps, which defeats the whole purpose of its role as a screen to hide the buildings.</p> <p>I am not sure whether this would also mean that a further 3 metre firebreak will be required on the lot adjoining this bush strip. While this may comply if used for parking or as part of a perimeter road on the lot, imposing this development control restricts property owners' design of their light industrial site.</p> <p>The proposed development controls which require landscaping of a minimum 6 metres of land adjacent to the lot boundary to Welshpool Road East effectively renders this land, and any additional firebreak areas, to restricted use and unusable for light industrial purposes or any other purpose.</p> <p>If the City proceeds with this 6 metre 'Rural/nature strip' requirement for the light industrial properties adjacent to Welshpool Road East, then we, as land owners of an affected property will be claiming compensation from the City of Kalamunda for the land they rezoned for use as Light Industrial, but can only be used as a nature strip. The City's development guidelines clearly render the 6 metre strip as unusable for industrial or any other purpose.</p> <p>Furthermore, as these lots will not be solely 'light industrial', as they will still have a minimum of 6 metre as 'special rural', then the City's annual rates should also be proportionately discounted for this restriction imposed by the City's development controls.</p> <p>We recommend that the City of Kalamunda revise their Kalamunda Wedge Design Guidelines to remove the requirement for light industrial landowners to have a 6 metre nature strip along their boundary adjacent to Welshpool Road East.</p>	<p>No compensation will be provided. The provision of landscaping to be provided as part of the development approval process represents a well-established statutory requirement with the aim of improving the level of amenity associated with the provision of high quality landscaped areas. In this instance, the intent of the landscaping strip along Welshpool Road East is to mitigate the bulk and scale of development and provide a suitable interface to existing residential development, which is common place throughout the Perth Metropolitan Area. For example, the Forrestfield/High Wycombe Industrial Area imposes a 6-8 metre wide landscaping strip.</p> <p>In light of the submissions received however, the landscaping requirements have been revised from a minimum of six metres to a minimum of three to four metres as illustrated in the below figure.</p> 
3	<p>I have read and reviewed the Planning Policy P-DEV 62 Kalamunda Wedge Industrial Area - Precinct 3A.</p> <p>I strongly object to the requirement of properties along Welshpool Road East to have an additional 6 meter setback (Minimum Landscaping requirement 6m, as shown in Figure 7)</p> <p>As a result, this area of land, in my case 333 Square Meters, will have no value.</p> <p>What compensation is in place for the loss of what is currently useable and valuable land?</p>	<p>No compensation will be provided. The provision of landscaping to be provided as part of the development approval process represents a well-established statutory requirement with the aim of improving the level of amenity associated with the provision of high quality landscaped areas. In this instance, the intent of the landscaping strip along Welshpool Road East is to mitigate the bulk and scale of development and provide a suitable interface to existing residential development, which is common place throughout the Perth Metropolitan Area. For example, the Forrestfield/High Wycombe Industrial Area imposes a 6-8 metre wide landscaping strip.</p>

Summary of Submissions
Local Planning Policy P-DEV 62: Maddington Kenwick Strategic Employment Area

	I look forward to hearing back from you.	In in light of the submissions received however, the landscaping requirements have been revised from a minimum of six metres to a minimum of three to four metres as illustrated in the above figure.														
4	Properties with the same zoning need to be treated, equitably, equally and fairly. The Commercial precinct is a manufacture of the the current developer (Linc) and Council. The zoning is still light industrial for the commercial precinct like other properties between Courtney Place and Welshpool Road. I re-iterate, that we expect to be treated in the same manner as the commercial precinct.	<p>One of the submissions raised concerns regarding the equitable application of landscape buffers. It is acknowledged that while all properties abutting Welshpool Road East are zoned Light Industry there are different landscaping buffer requirements; with the Design Guidelines requiring the majority of properties to provide a landscaping buffer of a minimum of six metres fronting Welshpool Road East, with the exception of the 'Commercial Precinct' which is required to provide a minimum of 3 metres.</p>  <p>LEGEND</p> <table><tr><td> SERVICE COMMERCIAL PRECINCT</td><td> PRIMARY STREET SETBACK (15m) (Section 2.3.3)</td></tr><tr><td> LIGHT INDUSTRIAL PRECINCT</td><td> INDICATIVE PRIMARY STREET FRONTAGE (subject to design and development applica</td></tr><tr><td> GENERAL INDUSTRIAL PRECINCT</td><td> SECONDARY STREET SETBACK (3m) (Section 2.</td></tr><tr><td> MINIMUM LANDSCAPING REQUIREMENT (6m)</td><td> INDICATIVE SECONDARY STREET FRONTAGE (subject to design and development applica</td></tr><tr><td> MINIMUM LANDSCAPING REQUIREMENT (3m)</td><td> WELSHPOOL ROAD EAST SETBACK (15m) (subject to consideration under Section 2.4)</td></tr><tr><td> ROAD REALIGNMENT</td><td></td></tr><tr><td> ACCESS RESTRICTION (RESTRICTIVE COVENANT)</td><td></td></tr></table> <p>The corresponding verge widths along Welshpool Road East also vary considerably as illustrated in the Verge Sections as at Attachment 2 and the below image.</p>	SERVICE COMMERCIAL PRECINCT	PRIMARY STREET SETBACK (15m) (Section 2.3.3)	LIGHT INDUSTRIAL PRECINCT	INDICATIVE PRIMARY STREET FRONTAGE (subject to design and development applica	GENERAL INDUSTRIAL PRECINCT	SECONDARY STREET SETBACK (3m) (Section 2.	MINIMUM LANDSCAPING REQUIREMENT (6m)	INDICATIVE SECONDARY STREET FRONTAGE (subject to design and development applica	MINIMUM LANDSCAPING REQUIREMENT (3m)	WELSHPOOL ROAD EAST SETBACK (15m) (subject to consideration under Section 2.4)	ROAD REALIGNMENT		ACCESS RESTRICTION (RESTRICTIVE COVENANT)	
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Summary of Submissions
Local Planning Policy P-DEV 62: Maddington Kenwick Strategic Employment Area

		 <p>As illustrated above, the verge widths along Welshpool Road east vary considerably from 28 metres (approximately) at its greatest extent adjacent to the Service Commercial Precinct to four metres (approximately) at its narrowest extent adjacent to Lot 17 (581) Welshpool Road East, Wattle Grove.</p> <p>More specifically as illustrated in Attachment 2:</p> <ul style="list-style-type: none">a) Cross section A (adjacent to the Service Commercial Precinct) has a verge width of approximately 22 metres and a minimum landscaping buffer of 3 metres in width which equates to a 25-metre landscaping buffer to Welshpool Road East;b) Cross section B (representative of the balance of land fronting Welshpool Road East) has a verge width of six metres and a minimum landscaping buffer of six metres which equates to a 12-metre landscaping buffer to Welshpool Road East. <p>The reduced landscaping strip for the 'Commercial Precinct' is therefore a response to the corresponding verge widths, with the varying landscaping requirements intended to ensure a visually consistent vegetation buffer when viewed from Welshpool Road East.</p>
5	<p>I refer to your letter dated 17 October 2018 in relation to advertising of the above design guidelines for public comment. The City provides the following comments:</p> <p>The City is supportive of the intent of the design guidelines to enhance the overall aesthetics of the area which will contribute overall to the creation of a quality industrial estate for the MKSEA.</p> <p>This said, the use of turf as a landscaping treatment as described in the design guidelines is questioned on the basis of its incompatibility with the surrounding conservation areas.</p> <p>Turf as a landscape treatment (on both the verge and individual properties) is not supported given the environmental significance of the surrounding Yule Brook and Greater Brixton Street Wetlands (GBSW).</p> <p>The City is seeking to achieve best environmental practice in the Maddington Kenwick Strategic Employment Area (MKSEA). Irrigated, fertilised turf should be avoided as it generally involves higher water and nutrient requirements and has the potential to become an invasive weed.</p> <p>In relation to a suitable verge treatment, the City considers an alternative to turf is to mulch to the back-of-kerb at an appropriate width to provide pedestrian access with the balance of the verge being planted with species endemic to the GBSW. The verge treatment should attempt to communicate a sense of place and biodiversity reimbursement.</p> <p>Attached are two separate lists provided by the Department of Biodiversity, Conservation and Attractions containing endemic</p>	<p>It is acknowledged that irrigated grass treatments appear in conflict with sound objectives for protection and enhancement of local biodiversity. However, the approved MKSEA Precinct 3A District Water Management Strategy (DWMS) and Local Water Management Strategy (LWMS) models groundwater flow for the precinct and confirms that the area subject to the Policy guidelines is located in a south westerly direction and away from the Brixton Street wetlands.</p> <p>The DWMS and LWMS also models the pre-development surface water flow, which is also in a south westerly direction (as would be expected as the land also generally slopes in this direction), before discharging to the Yule Brook close to the Roe Highway culverts. This drainage pattern has been maintained in the post-development scenario, as is evidenced by the overland drainage swales which discharge to a large drainage treatment basin at the south west of the development (within the City of</p>

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	<p>species.</p> <p>In relation to suitable street trees, <i>Corymbia ficifolia</i> and/or <i>Eucalyptus sideroxylon rosea</i> are deemed acceptable.</p> <p>The design guidelines (under the heading Introduction) do not address fully the subject site’s location and adjacent land use, specifically high-value conservation areas in Yule Brook and Greater Brixton Street Wetlands, which are important downstream considerations, particularly with regard to stormwater and groundwater management.</p> <p>The water-wise landscaping objective in the design guidelines (under the heading 1.2 Design Principles) is in conflict with 2.5.2 Verge Amenity (Development Guidance) where it is specified that manicured grasses are accepted as a verge treatment.</p>	<p>Gosnells). Nonetheless, landscaping treatments will be appropriately assessed at the Development Approval phase of development in respect to the approved LWMS and DWMS.</p>
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MINUTES

KALAMUNDA DESIGN ADVISORY COMMITTEE

MEETING

4pm THURSDAY 1 FEBRUARY 2018

CITY ADMINISTRATION BUILDING

1. OPENING OF MEETING – 4pm

- 1.1 Introduction – Natalie Martin Goode (5 minutes)

2. ATTENDANCE AND APOLOGIES

Chris Melsom – DAC Chair
Carmel Van Ruth - DAC Member
David Barr - DAC Member
Jurg Hunziker - DAC Member
Patrick Beale – Deputy DAC Member
Natalie Martin Goode – Director Development Services
Andrew Fowler-Tutt – Manager Approval Services

APOLOGIES

Ross Montgomery - DAC Member

3. DISCLOSURE OF INTERESTS

- 3.1 Disclosure of Conflict of Interest:
a) Members must disclose the nature of their interest in matters to be discussed at the meeting.

4. ITEMS FOR COMMITTEE CONSIDERATION – 4.05pm – 5pm

- 4.1 Proposed Local Planning Policy – Welshpool Road East Industrial Precinct – Industrial Design Guidelines. **4.10pm (20 minutes)**

Background:

- The subject area comprises approximately 48ha and is located to the south west of Welshpool Road East abutting the local government boundary with the City of Gosnells.
- The areas has been identified as an extension to and part of the Maddington Kenwick Strategic Employment Area (MKSEA) and industrial precinct falling under the City of Gosnells.
- The subject area is zoned under the City LPS 3 both Light Industry and General Industry. With the light industry zone fronting predominately Welshpool Road East.
- The land was previously zoned Special Rural and comprised lifestyle properties.

Purpose of the Design Guidelines:

- The purpose of the design guidelines is to provide clear and comprehensible development criteria with the intent to provide a high standard of development through the industrial area, and provide landowners with greater certainty on the development requirements.
- The guidelines contain principles and some mandatory requirements relating to:
 - Land Use
 - Site Development
 - Built Form (including signage)
 - Environmental Management
 - Site amenity

Objectives of the Design Guidelines:

- To encourage attractive development, well designed, with functional and efficient buildings and site layouts;
- Ensure industries are environmentally compatible with surrounding activities;
- Promote high quality development and streetscape;
- Promote sustainability through water and energy initiatives;
- Minimise impact of new development on identified sensitive areas containing bushland and waterways;
- To avoid unsightly and poorly planned and maintained developments;
- Maintain the value of existing and future business investment through quality development; and
- To ensure proposals fronting Welshpool Road East incorporate sensitive and appropriate interface treatments.

Design Guidelines:

The main elements relate to:

- Building Orientation
- Design and Form

- Setbacks
- Parking and Access
- Landscaping
- Pedestrians and Cyclists
- Fencing
- Crossovers
- Water and Energy Management
- External Service and Bin Storage
- Loading Areas
- Welshpool Road East
- External Lighting
- Signage

4.2 Presentation – Judd Dyer – Linc Properties and DAC feedback – **4.35pm (20 minutes)**

5. DAC DESIGN REVIEW ADVICE 5.10pm- 5.45pm

DESIGN PRINCIPLES	DAC COMMENT
a) Character	<ul style="list-style-type: none"> • The vision of the design guidelines is not reflected in the body of the document.
b) Continuity and Enclosure	<ul style="list-style-type: none"> • The back end of the industrial lots, typically storage areas, will present poorly to Welshpool Road East.
c) Quality of the Public Realm	<ul style="list-style-type: none"> • Guidelines should reference a statement about the role of the street, both internal and external, i.e. Welshpool Road East.
d) Ease of Movement	Ease of pedestrian movement, particularly into the site from Welshpool Road was discussed as being a priority to be addressed in the design guidelines.
e) Legibility	<ul style="list-style-type: none"> • Not discussed.
f) Adaptability	<ul style="list-style-type: none"> • Guidelines can be flexible in respect to building height and colour/texture. Design guidelines can't vary Scheme parking requirements.
g) Diversity	<ul style="list-style-type: none"> • Not discussed.
h) Response to site and context	<ul style="list-style-type: none"> • The design guidelines do not respond to the Welshpool Road Interface. • Nil setback to Welshpool Road East is not an acceptable outcome. This frontage and a consistent setback must be addressed as an important interface

	<p>to a main road and to development on the north side of Welshpool Road East.</p> <ul style="list-style-type: none"> • Conflict between 3.0m rear landscaping strip and nil building setback. • Need to consider the siting of the building with respect to both road frontages.
i) Overall Design quality and quality	<ul style="list-style-type: none"> • The Guidelines need to reflect the aspirational visions of the applicant. The applicant was encouraged to reflect the intent reflected in their presentation of other recent industrial subdivision and development projects as a starting point. The draft guidelines did not.
j) Appropriateness of materials and finishes	<ul style="list-style-type: none"> • Not discussed.
k) Resource Efficiency	<ul style="list-style-type: none"> • Retaining trees should have been considered through a tree survey and reflected in landscape plan requirements.
l) Public Art (where applicable)	<ul style="list-style-type: none"> • NA
m) Advice re structure plan/local planning policy where applicable	<ul style="list-style-type: none"> • The design guidelines would have benefited from the preparation of a master plan or structure plan to better inform the document, with particular reference to landscaping, interface to Welshpool Road East.
n) General comments	<ul style="list-style-type: none"> • The guidelines don't appear to reflect the depth of experience in high quality industrial development as presented by the applicant. • The aspirations of landscape integration is in conflict with the tree removal on the Gosnells side. • Many sections of the guidelines are irrelevant and do not inform either a proponent or an approval authority. They should contain some of the examples given in the presentation. • The applicant should utilise previous experience, good and bad, to provide inspirational guidelines. • We don't want to see an outcome similar to that of the industrial area in Malaga and the interface with Reid Highway. • No specific reference about sustainability requirements. • Motherhood statements need to be measurable. • Use of terminology needs to be clear. Avoid the use of words such as "encourage and should" etc. It's either required or not.
DESIGN ASSESSEMENT	

a) Design Strengths	<ul style="list-style-type: none"> Document has some good high level vision and good initiatives.
b) How can the proposal be improved	<ul style="list-style-type: none"> The policy document requires reworking to address the following: <ul style="list-style-type: none"> The inclusion of policy provisions which reflect the vision of the document more. Removal of provisions which are not relevant to the vision of the document, and are not enforceable, i.e. varying parking standards The Welshpool Road and internal road interface to ensure the right built form and landscaping outcome; Include the master plan process which ultimately informs the design guidelines. The inclusion of images which provide better understanding of the design elements, i.e., site context, building orientation and form, setbacks, landscaping; interface treatments, colour and texture palettes, sustainability initiatives. Recognition of existing onsite vegetation and how this can be integrated into the development.
RECOMMENDATION	<ol style="list-style-type: none"> 1. That the applicant amend the Local Planning Policy – Welshpool Road East Industrial Precinct Design Guidelines to reflect comments provide by the DAC. 2. The applicant to provide the amended Policy document to the City for further review.

6. OTHER BUSINESS MATTERS

- Nil

7. DATE OF NEXT MEETING

- To be advised.

8. CLOSURE – 5.45pm



MINUTES

KALAMUNDA DESIGN ADVISORY COMMITTEE

MEETING

3pm THURSDAY 1

NOVEMBER 2018

CITY ADMINISTRATION BUILDING

1. OPENING OF MEETING – 3pm

1.1 Introduction – Andrew Fowler-Tutt (5 minutes)

2. ATTENDANCE AND APOLOGIES

Chris Melsom – DAC Chair
David Barr - DAC Member
Jurg Hunziker - DAC Member
Carmel Van Ruth – DAC Member
Andrew Fowler-Tutt – Manager Approval Services
Ivana Music – Senior Planning Officer

APOLOGIES

Ross Montgomery – DAC Member

3. DISCLOSURE OF INTERESTS

3.1 Disclosure of Conflict of Interest:
a) Members must disclose the nature of their interest in matters to be discussed at the meeting – nil conflicts.

4. ITEMS FOR COMMITTEE CONSIDERATION – 3.05pm – 3.20pm

4.1 Proposed 10 Grouped Dwellings – Lot 4 (15) Gunbar Way, Kalamunda

Applicant: Ventura ID

Background

- The subject site is a freehold 4553m² allotment zoned R10/20 under the provisions of City of Kalamunda Local Planning Scheme No. 3.
- The lower coding of R10 will apply to the site as default (yield of 4), unless the proposal can demonstrate full compliance with Clause 5.24.1 of Local Planning Scheme No 3 (LPS3) allowing the proponent to achieve the higher coding of R20 (yield of 10).
- As the subject site complies with part a of Clause 5.24.1 of LPS3 the proposal meets the site characteristic requirements and accordingly the higher code will apply subject to the proposal demonstrating compliance with City of Kalamunda Local Planning Policy PDEV54 (Dual Density Design Guidelines). In summary, PDEV54 will require the proposed development to incorporate:
 - Each dwelling fronting Gunbar Way shall be provided with openings to habitable rooms of not less than 105m² in surface area to provide visual surveillance to and from the dwelling (Part 8.5 of PDEV54)
 - Design elements as described in Part 8.6 of PDEV54.
 - Two 200 litre street trees to be planted on the verge abutting the site (Part 10 of PDEV54).
 - A 0.50 metre wide landscaped strip to be provided alongside each side of the access way for all common property access-ways (Part 10.2 of PDEV54).
 - A minimum of 50% of the street setback area is to be developed using soft landscaping treatments (Part 10.2 of PDEV54).
 - All waste services and bin storage shall be located behind the front building line and shall be appropriately screened so as not to be seen from the street (Part 11 of PDEV54).
 - A bin pad within the verge area (Part 11 of PDEV54).
 - A 1.5kw photovoltaic solar panel system (Part 14 of PDEV 54).
 - A 3000L rain water tank (Part 14 of PDEV 54).
 - All dwellings shall demonstrate a 7 star NatHERS rating (Part 14 of PDEV 54).

4.2 Presentation – Ventura ID and DAC feedback – **3.20pm- 4.00pm (40 minutes)**

4.3 **Proposed Local Planning Policy – Welshpool Road East Industrial Precinct – Industrial Design Guidelines. 4.05pm (45 minutes)**

Background:

- The subject area (MKSEA) sits mostly within the City of Gosnells, and partly in the City's boundary at the southern end of Wattle Grove, south of Welshpool Road East. The area of land within the City's boundary is approximately 20.4 hectares.

- The subject area is zoned under the City LPS 3 both Light Industry and General Industry. With the light industry zone fronting predominately Welshpool Road East.
- The land was previously zoned Special Rural and comprised lifestyle properties.
- No Structure Plan was prepared for the Kalamunda portion around Courtney Place due to the relatively small size of the amendment area. The planning issues that would usually be addressed in a Structure Plan were considered as requirements of Scheme Amendment 89, and detailed as scheme provisions, one of which was the requirement for Design Guidelines to be prepared.
- A previous version of the draft Policy was considered by the DAC meeting in February 2018.

Purpose of the Design Guidelines:

- The proposed Policy has been drafted with the intent of protecting the amenity of surrounding landowners and providing comprehensive guidance for the design and approval of development within the precinct and to ensure consistency and transparency in decision-making. Additionally, the Policy will assist with providing quality-built form and landscaping outcomes which will protect the investment of companies locating in the industrial area.
- The Policy is intended to preserve the amenity of nearby residents through providing guidance, consistency and transparency in decision making. More specifically, part 2.4 (Welshpool Road East) of the Policy ensures high quality-built form and landscaping treatments for lots fronting Welshpool Road East which have an interface with the existing residential area in Wattle Grove Cell 9.
- The guidelines contain principles and some mandatory requirements relating to:
 - Land Use
 - Site Development
 - Built Form (including signage)
 - Environmental Management
 - Site amenity

Objectives of the Design Guidelines:

- a) Specify provisions which supplement the requirements of the Scheme;
- b) Encourage attractive developments that are well designed, with functional and efficient buildings and site layouts;
- c) Ensure that industries are environmentally compatible with surrounding zones and activities;
- d) Promote the development of high quality, attractive and sustainable landscaped areas and streetscapes;
- e) Achieve water conservation through on-site stormwater management, water-wise landscaping and water efficient reticulation;
- f) Avoid unsightly and poorly planned developments; and
- g) Ensure proposals on the lots abutting Welshpool Road East incorporate an appropriate interface with existing residential development.

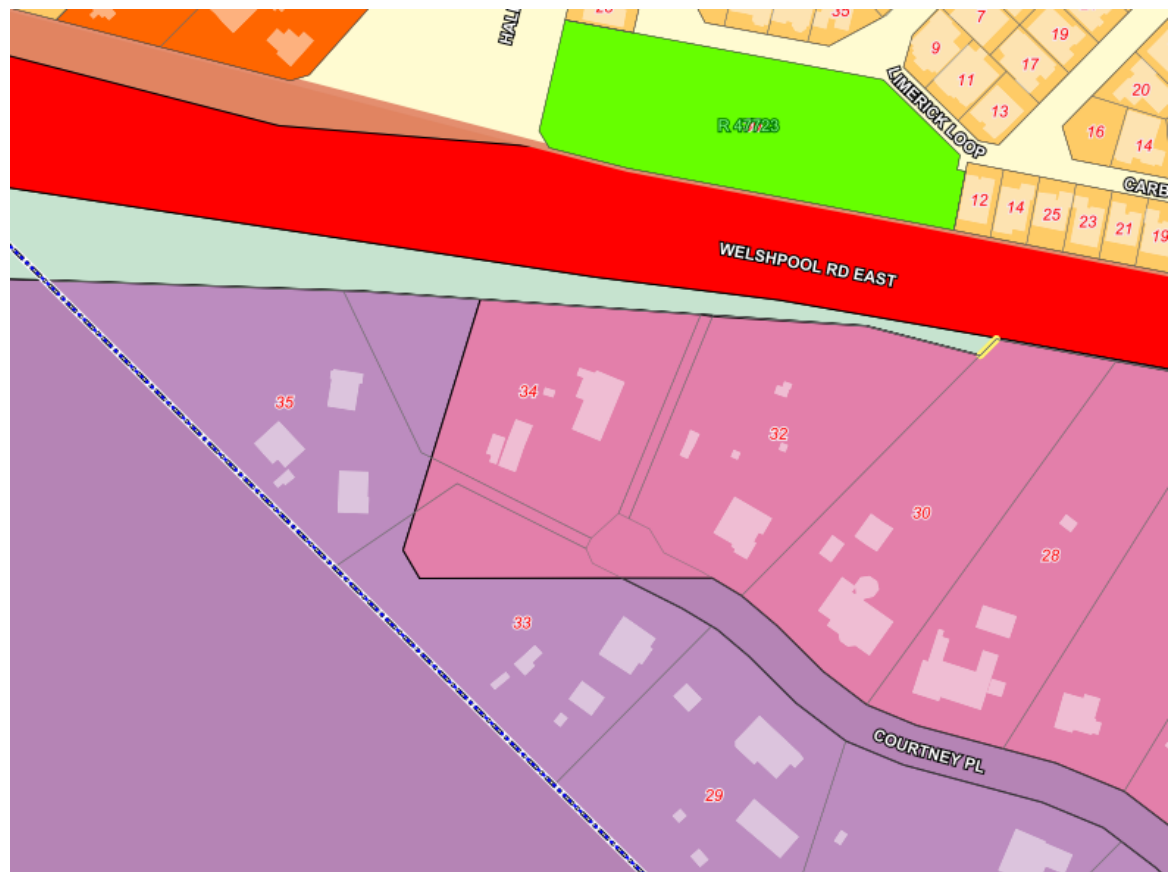
4.4 Presentation – Judd Dyer – Linc Properties and DAC feedback – **4.25pm (20 minutes)**

4.5 PRELODGE MENT REVIEW: Proposed Mix Commercial Precinct (Service Station, Civic Use, Industry – Service, Office, Restaurant, Convenience Store, Bank, Pharmacy, Car Park) 4.45pm (20 minutes)

Background:

- The subject site is located on the corner of Hale Road/Welshpool Road East/Grove Road intersection.
- The subject site is zoned under the City LPS 3 as Light Industry.





- 4.6 Presentation – Judd Dyer – Linc Properties and DAC feedback – **4.35pm (20 minutes)**

5. DAC DESIGN REVIEW ADVICE 5.25pm- 5.50pm

5.1 Design Principles:

- Proposed 10 Grouped Dwellings – Lot 4 (15) Gunbar Way, Kalamunda.

DESIGN PRINCIPLES	DAC COMMENT
a) Character	Could be significantly improved through a diversity of dwelling typology and design.
b) Continuity and Enclosure	Need to consider internal redesign of Units 1 and 10 to provide passive surveillance to Gunbar Way.
c) Quality of the Public Realm	Verge tree planting should be considered in relation to significant loss of established trees on site.
d) Ease of Movement	Pedestrian and vehicular permeability needs to be designed to ensure a clear separation and ensure the

DESIGN PRINCIPLES	DAC COMMENT
	internal common property is clearly defined and easy to manoeuvre.
e) Legibility	See point d above.
f) Adaptability	A mixture in dwelling typologies should be seriously considered. Doing so will cater to a mixed demographic and will ensure the developments adaptability and sustainability into the future.
g) Diversity	The proponent is encouraged to reconsider the design to ensure a mixture in dwelling typologies and design (i.e. variation in dwelling sizes, both two storey and single storey, both gable and skillion roofs etc).
h) Response to site and context	The proponent is encouraged to reconsider the amount of fill required and the loss of mature vegetation. It is acknowledged by the DAC that the site is improved by significant vegetation, the loss of which would have a detrimental impact on the surrounding amenity.
i) Overall Design quality and quality	The proponent is encouraged to redesign the proposal to ensure a mixture in dwelling typology and design (i.e. variation in dwelling sizes, both two storey and single storey, both gable and skillion roofs etc). Reducing the ground floor footprint of some units may enable the retention of exiting trees in sme locations.
j) Appropriateness of materials and finishes	The proponent is encouraged to provide a variety of materials and finishes – see point i above.
k) Resource Efficiency	All units should be redesigned for optimum access to northern light. The DAC recommends a 7 star energy efficiency report is provided to the City prior to a decision.

DESIGN PRINCIPLES	DAC COMMENT
l) Public Art (where applicable)	Not applicable.
m) Advice re structure plan/local planning policy where applicable	Not discussed.
n) General comments	See section 5.2 below.

- Proposed Local Planning Policy – Welshpool Road East Industrial Precinct – Industrial Design Guidelines.

DESIGN PRINCIPLES	DAC COMMENT
a) Character	The vision of the design guidelines is now well established throughout the body of the document.
b) Continuity and Enclosure	Not discussed.
c) Quality of the Public Realm	Not discussed.
d) Ease of Movement	Not discussed.
e) Legibility	Not discussed.
f) Adaptability	Not discussed.
g) Diversity	Not discussed.
h) Response to site and context	Commendable improvement on the protection of the interface with Welshpool Road East. Need to consider opportunities for retention of mature vegetation by reducing the amount of fill and incorporating drainage solution (swales) located between buildings. Use of cross sections to demonstrate how this could work.
i) Overall Design quality and quality	Need to reinforce in sec 2.4 what high quality design entails.
j) Appropriateness of materials and finishes	Not discussed.
k) Resource Efficiency	Reference should be made to the retention of existing mature vegetation within the proposed landscaping strips. It is recommended that the proponent use the tree recommendations in Design WA as a reference point.
l) Public Art (where applicable)	Not applicable.

DESIGN PRINCIPLES	DAC COMMENT
m) Advice re structure plan/local planning policy where applicable	Not discussed.
n) General comments	See section 5.2 below.

- **PRE-LODGEMENT REVIEW:** Proposed Mix Commercial Precinct (Service Station, Civic Use, Industry – Service, Office, Restaurant, Convenience Store, Bank, Pharmacy, Car Park).

DESIGN PRINCIPLES	DAC COMMENT
a) Character	Unique character – DAC complements the circular geometry and flexibility of form.
b) Continuity and Enclosure	Not discussed.
c) Quality of the Public Realm	The proponent is encouraged to redesign to provide for the opportunity of outdoor alfresco dining.
d) Ease of Movement	The egress and internal movement corridors should be designed and constructed to ensure ease of movement and a clear distinction between light and heavy vehicles.
e) Legibility	See point d above.
f) Adaptability	The car stacker should be designed and built to ensure adaptability into the future. As per the current design the levels do not have the necessary clearance to allow the stacker to be converted into a commercial building.
g) Diversity	The proponent is commended on the variety of land uses.
h) Response to site and context	The treatment of the façade with an interface to Welshpool Road East should be well designed and articulated. Opportunities to orientate office area with external views.
i) Overall Design quality and quality	See section 5.2 below.

DESIGN PRINCIPLES	DAC COMMENT
j) Appropriateness of materials and finishes	See point f above.
k) Resource Efficiency	Orientation of the building due west with use of extensive glazing with resulting heat effect.
l) Public Art (where applicable)	Not discussed.
m) Advice re structure plan/local planning policy where applicable	The proposal will need to be designed in compliance with the final MKSEA Design Guidelines.
n) General comments	See section 5.2 below.

5.2 Design Assessment:

- Proposed 10 Grouped Dwellings – Lot 4 (15) Gunbar Way, Kalamunda.

DESIGN ASSESSEMENT	DAC COMMENT
a) Design Strengths	Development site offers opportunities for retention of trees through innovated design solutions.
b) How can the proposal be improved	The proponent is encouraged to reconsider the amount of fill required and the loss of mature vegetation. The retention of some vegetation and if not practicable, the inclusion of additional landscaping throughout the development.
	Reducing the density would allow for the retention of vegetation and a mixture of dwelling typology.
	Offsetting the loss of mature trees through the planting of mature trees throughout the development site.
	A mixture in dwelling typologies and design (i.e. variation in dwelling sizes, both two storey and single storey, both gable and skillion roofs etc). The inclusion of two storey dwellings will reduce the site coverage and therefore provide more area for the retention of vegetation and/or the provision for additional landscaping.

	The proposal needs to address the street to ensure activation. Units 1 and 10 need to be redesigned to present to Gunbar Way and achieve street surveillance.
	All units should be redesigned for optimum access to northern light.

- Proposed Local Planning Policy – Welshpool Road East Industrial Precinct – Industrial Design Guidelines.

DESIGN ASSESSEMENT	DAC COMMENT
a) Design Strengths	Commendable improvement on the first draft.
	Nice to see the comments from DAC's consideration of the first draft have been embraced.
b) How can the proposal be improved	Reference should be made to the retention of existing mature vegetation within the proposed landscaping strips. It is recommended that the proponent use the tree recommendations in Design WA as a reference point.
	References are made throughout the document to 'high design quality', this needs to be defined within the document.
	Clause 2.3.2, point two needs to be reinforced in Clause 2.4 to ensure the protection of the interface to Welshpool Road East.
	Cross sections should be provided in respect to drainage, landscaping and tree retention.
	Inclusion of a reference in the guidelines to ensure a trigger to the DAC for any subsequent development application on the site.

- PREODGEMENT REVIEW: Proposed Mix Commercial Precinct (Service Station, Civic Use, Industry – Service, Office, Restaurant, Convenience Store, Bank, Pharmacy, Car Park)

DESIGN ASSESSEMENT	DAC COMMENT
a) Design Strengths	Innovative design.
	Compliment the circular geometry and flexibility of form.
	Diversity of land uses.
b) How can the proposal be improved	The opportunity for outdoor alfresco dining should be explored.
	The egress should be designed to ensure there is a clear distinction between what is the street and what is a driveway.
	The development needs to be designed to ensure legibility and adaptability of tenancies in the future.
	Internal division of tenancies and access to sunlight/ventilation should be reconsidered.
	Innovative and sustainable façade treatment of the car stacker would be expected.
	Concern raised for the future intent for the car stacker (i.e. large format LED signage) need to be clear on its intended use.

5.3 Recommendations of DAC:

The proponents are requested to consider a review of the proposals, having regard to the recommendations raised in point b of the Design Assessment.

6. OTHER BUSINESS MATTERS

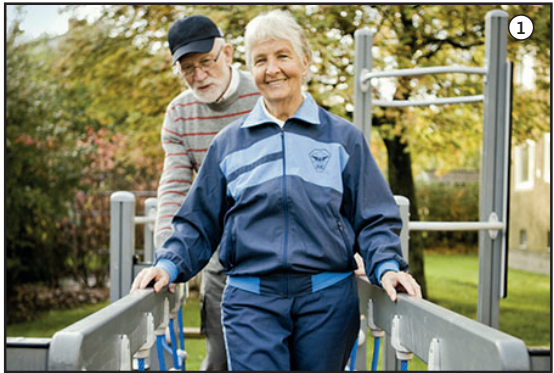
7. DATE OF NEXT MEETING

- 6 December 2018 (tentative)

8. CLOSURE – 5.50pm



- LEGEND:**
- ① ACTIVITY HUB - YOUTH & AGED NATURE PLAYGROUND
 - ② STORMWATER CATCHMENT
 - ③ FENCED 'GOOD' BUSHLAND
 - ④ SHADE STRUCTURE & SEATING NODE
 - ⑤ BOARD-WALK / WETLAND
 - ⑥ EXISTING DRAIN - PIPE AND DAYLIGHT
 - ⑦ OPEN MANAGED PARKLAND
 - ⑧ FENCED BUSHLAND REVEG
 - ⑨ PEDESTRIAN PATH NETWORK
 - ⑩ BUSH RE-VEGETATION
 - ⑪ EXISTING PAW
 - ⑫ EXISTING LOTS
 - ⑬ FIRST FLUSH STORMWATER CATCHMENT
 - ⑭ PARKING
 - ⑮ RELOCATED BUS STOP
 - ⑯ INDICATIVE RESIDENTIAL LOT LAYOUT
- NOTES:**
- 1. Concept is indicative only and subject to detailed design.
 - 2. Extent of lighting is to be determined during detailed design.
 - 3. Edges of existing drainage basin to be treated / graded in order to 'make safe'.
 - 4. Revegetation is to be carried out using endemic and / or native species.
 - 5. Extent of all revegetation works are subject to Bushfire assessment and requirements.
 - 6. Irrigation is to be limited to high use areas around activities nodes and play areas.
 - 7. Path network will include cycle path connections, pedestrian paths as well as informal path networks within areas of revegetation.
 - 8. Parking locations and quantities are indicative only and subject to technical advice.





LEGEND:

- 1 ACTIVITY HUB - YOUTH & AGED NATURE PLAYGROUND
- 2 STORMWATER CATCHMENT
- 3 FENCED 'GOOD' BUSHLAND
- 4 SHADE STRUCTURE & SEATING NODE
- 5 BOARD-WALK / WETLAND
- 6 EXISTING DRAIN - PIPE AND DAYLIGHT
- 7 OPEN MANAGED PARKLAND
- 8 FENCED BUSHLAND REVEG
- 9 PEDESTRIAN PATH NETWORK
- 10 BUSH RE-VEGETATION
- 11 EXISTING PAW
- 12 EXISTING LOTS
- 13 FIRST FLUSH STORMWATER CATCHMENT
- 14 PARKING
- 15 INDICATIVE RESIDENTIAL LOT LAYOUT

NOTES:

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URBIS CAMBRIDGE RESERVE
LANDSCAPE CONCEPT PLAN - WESTERN PORTION

City of Kalamunda

DISCLAIMER
This plan is conceptual and is for discussion purposes only.
Subject to further detail study, Council approval, engineering input and survey.
Cadastral boundaries, areas and dimensions are approximate only.
Figured dimensions shall to preference to scaled dimensions.
No relevance should be placed on this plan for any financial detailing of the land.

1:500 @ A1
DATE: 07.01.19
JOB NO: ND1980
DWG NO: AR-CD04
REV: 8



- LEGEND:**
- ① ACTIVITY HUB - YOUTH & AGED NATURE PLAYGROUND
 - ② STORMWATER CATCHMENT
 - ③ FENCED 'GOOD' BUSHLAND
 - ④ SHADE STRUCTURE & SEATING NODE
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- NOTES:**
1. Concept is indicative only and subject to detailed design.
 2. Extent of lighting is to be determined during detailed design.
 3. Edges of existing drainage basin to be treated / graded in order to 'make safe'.
 4. Revegetation is to be carried out using endemic and / or native species.
 5. Extent of all revegetation works are subject to Bushfire assessment and requirements.
 6. Irrigation is to be limited to high use areas around activities nodes and play areas.
 7. Path network will include cycle path connections, pedestrian paths as well as informal path networks within areas of revegetation.
 8. Parking locations and quantities are indicative only and subject to technical advice.



CAMBRIDGE RESERVE
LANDSCAPE CONCEPT PLAN EASTERN PORTION

City of Kalamunda

DISCLAIMER
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Subject to further detail study, Council approval, engineering input and survey.
Cadastral boundaries, areas and dimensions are approximate only.
Figured dimensions shall to preference to scaled dimensions.
No relevance should be placed on this plan for any financial detailing of the land.

1:500 @ A1
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

DATE: 07.01.19
JOB NO: ND1980
DWG NO: AR-CD05
REV: 8

CAMBRIDGE RESERVE TECHNICAL NOTE:

Community views of the existing Cambridge reserve:

TOP TEN LIKES

1. Bushland / Natural Feel
2. Walking / Trails
3. Nothing
4. Waterbody / Lake
5. Quietness
6. Proximity to Home
7. Size
8. Dog Walking
9. Family Orientated
10. Playground

MOST WANTED IMPROVEMENTS

1. Seating
2. Play Equipment
3. Shade / Shelter
4. BBQs
5. Toilets

BENCHES / SEATING

Is the quantity acceptable?



Is the quality acceptable?



PLAY EQUIPMENT

Is the quantity acceptable?



Is the quality acceptable?



IS CAMBRIDGE RESERVE IS A HIGH QUALITY OPEN SPACE THAT EVERYONE CAN ENJOY?



Source: City of Kalamunda

DESIGN RATIONALE AND PHILOSOPHY

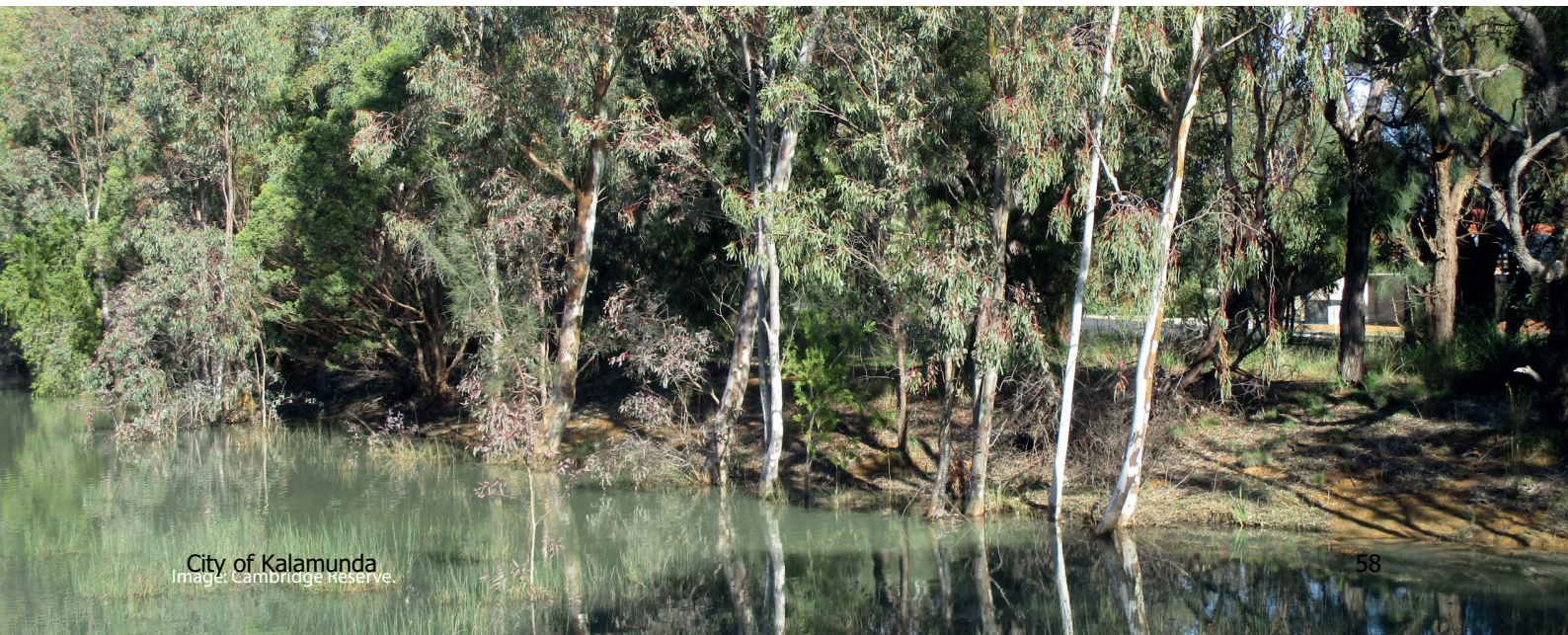
The decision to provide housing on open space is not one that is taken lightly, but one that in this case is justified given the current limited functional use of the site and the demand for aged housing in the vicinity. The following technical note outlines the approach undertaken in the design of the site in response to community feedback and provides a rationale behind the design decisions made.

Aged Accommodation Demand – The City of Kalamunda commissioned Macro Plan Dimasi to prepare an Aged Accommodation Strategy Report 2016 that identified a demand for Affordable Housing in the City. This report identified a growing demographic in the 65-84 age bracket and recommended the use of government sites as an opportunity to encourage retirement living and aged care developments in the local area. This has been a core focus of this plan on how to provide for this demographic.

An 1.28 HA aged care site/ over 55 housing site has been located in the centre of the site to address this demographic. This site is generally flat and largely cleared and offers good view lines across the basin area offering both surveillance and amenity. The site is separated from the adjacent retained bushland by a managed parkland strip and is a short walk to the activity hub/ playground.

This site has been consolidated to provide a distinct separation from surrounding residences. This forms a mini aged care precinct within the site. This could be further enhanced or acknowledged through a change in pavement type or a coordinated street interface.

Additional Housing – Additional housing sites have been identified along the rear fence of Mallow Way and in the degraded bushland adjacent. These housing sites provide additional surveillance opportunities of the retained bushland and aim to minimise antisocial behaviours that were occurring as a result of the open space backing onto rear fences. The associated road network has been designed to double as a firebreak from the retained bushland and ties in with the existing neighbourhood grid.





A final development site has been located along the western edge of the site. Access to these sites will be provided by the access spine running along the park edge. This road will also provide parallel parking opportunities for visitors. It is anticipated that structures on these lots will be two storeys to provide passive surveillance over the park.

Retained Bushland – A site assessment identified a central core area with retained local bushland of a good quality and a strip along York Street with similar qualities. The remainder of the site consisted of cleared land or degraded bushland containing non-native and invasive species. Based on this information, the retention of the quality bushland formed the focus of the design approach. Minimising impacts to this bushland through clear demarcation and the establishment of a fire buffer began to inform the remainder of the design parameters. Much of this fire buffer has been put in place through the careful placement of streets serving as access and separation. Managed parkland areas with an extensive pathway network make up the remainder of the buffer area providing additional separation between existing housing and the retained bushland. The network of pathways also intersects the bushland area offering a balance of access and preservation.

Detention Basin - The site also serves as a detention basin during large storm events. Water is brought to the site from the hills and collects in the basin along the western edge. This feature is often wet during winter months but dry during the summer period. The design approach to this feature needs to preserve the capacity of the basin but also ensure that this is also pleasant and appealing in both its states. A small retention area has been identified to replicate a wetland feature. This wetland features a boardwalk and weir that overflows to the larger basin providing an indication of function of the basin year round. Seating and shaded areas have been located around this feature in line with community feedback offering places

of quiet respite or opportunities for viewing wildlife. This has been located adjacent to the aged care group housing site to provide surveillance and amenity for the future aged population.

The existing drainage channels directing water to the site will be formalised minimising erosion issues and offering the opportunity to introduce a living stream element to assist in water filtration. The stream can be located to provide a natural border to the retained bushland area and serve as a feature for the site.

Activity Hub/ Youth and Aged Nature Playground – Linked to the development of the site is an opportunity to upgrade the existing playground and parkland to provide a feature that has more accessibility and function for the surrounding residents. Informed by the community workshop this hub can feature an upgraded playground, half-court basketball, a barbeque area and associated seating and shelters set amongst native planting. This site has good surveillance from the existing neighbourhood and from the proposed new housing sites and aged care site.

Open Managed Parkland and Managed Bushland – The remainder of the site will operate as open managed parkland or managed bushland providing a buffer to the retained bushland and offering a more formal environment in which to recreate and enjoy Cambridge Reserve. Pathway networks are located across the site to link to existing access ways and ensure this resource is accessible to the surrounding community. Benches and seating is located at key sites along these pathways to provide respite opportunities.

URBIS

CAMBRIDGE RESERVE

COMMUNITY ENHANCEMENT

PREPARED FOR
CITY OF KALAMUNDA
JANUARY 2019
FINAL VERSION



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1.0 PROJECT OUTLINE

Urbis was engaged by the City of Kalamunda to develop a concept plan that investigated the potential reuse and improvement of Cambridge Reserve. This site had been identified by the City as having potential to improve this community asset and to provide additional housing opportunities for the local area, including an aged care/ assisted living facility in line with the *City's Aged Accommodation Strategy 2016*.

The following outlines an opportunity to enhance the site, make use of underutilised land and offset the cost of improvement through the development of the site. The development area was primarily focused along the western edge of the reserve. This part of the site was generally flat, primarily contained introduced species and displayed the most antisocial behaviours as a result of limited surveillance of the Reserve.

A draft version of the plan was provided to the community for review and feedback. An initial community Pre-Consultation was undertaken in February – March 2018 including a workshop and survey. The outputs from this consultation influenced the concept designs and a draft plan was presented to the community through a workshop and survey in July-August 2018. The plans were generally well received, and the community identified additional features that were included in the final plan including additional seating, modified activity hub, additional shade and expanded bushland re-vegetation.

2.0 SITE UNDERSTANDING

Some of the key issues identified to engage and make best use of the site are as follows:

- **Retention of natural bushland and resolution of bushfire policy requirement** – A Preliminary Opportunities and Constraints Report was prepared by Strategen in 2012 that identified some broad bushland zones. These were further surveyed in 2017 by Eco-logical in their Australian Flora, Vegetation and Fauna Survey of Anderson Road Reserve. A key output from these reports was the identification of an expanse of natural bushland. Additionally, the reports identified several significant remnant trees that could be retained across the site. The concept design works with the site to preserve the bushland and retain trees where appropriate to ensure they become an asset for the site. The site design considers the interface with retained bushland in line with bushfire policy requirement State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP3.7), and particularly in light of the addition of vulnerable elderly users.
- **Integration of the drainage basin** - The drainage basin on site provides a necessary function retaining water and run-off from the surrounding neighbourhood but in its current format is unsightly. With careful consideration in the design phase this basin could be converted into wetlands and living streams providing not only visual amenity for the existing and new residents but also helping to re-establish habitat for the natural flora and fauna.
- **Interface with the existing overhead power-line and easement** – The overhead power-line and associated easement running alongside Anderson Road is a visual impediment and serves to disconnect this edge of the site from the surrounding neighbourhood. Given that there is limited control over what can occur in this easement it is important that the site adequately addresses this interface and identifies a solution that creates an improved outcome not just for this site but helps to stitch it back into the wider community.
- **Provide safe and legible access to alternate movement systems** – A limitation on the elderly is reduction in independent mobility. It is important that alternative modes of transportation such as buses are available and within close proximity of housing. This includes not just the provision of bus stops, but clear, legible and safe connections between transit nodes and residences. Working with the topography of the site and ensuring that connections are well lit and have opportunity for natural surveillance will be critical to the sites success as a retirement or aged care use.

- **Integration into the existing neighbourhood** – Traditionally aged care and retirement villages were separated from the surrounding community in an effort to provide a safe environment for the elderly. Recent learnings have identified that whilst providing a safe and secure environment is important there is also significant benefit in establishing strong connections with the surrounding community. The concept design will need to establish a balance between these two objectives to ensure that the elderly are not isolated and provide opportunity for the community to benefit from the knowledge, presence and engagement of its elderly population.

3.0 VISION

Cambridge Reserve will be a transformative project that re-engages with this wonderful community asset and formalises many of the existing activities on the site. The inclusion of an over 55's, aged care or retirement living on the site will provide additional activation and uplift as well as provide much needed housing opportunities for this sector of the community. The clear delineation and retention of established native vegetation and the adaption of the detention basin on site will provide a manageable asset for the community both existing and future.





4.0 DESIGN PRINCIPLES

From the analysis of the site some clear design principles have been established that will inform the concept moving forward.

Improve safety – Much of the site is located at the rear of the housing stock with rear fencing fronting onto Cambridge Reserve. Positioning of housing to the street edges will enable passive surveillance. The anticipated outcome is that this will have a reduction in antisocial behaviour.

Utilise site assets – the detention basin as currently sited provides a large and underutilised piece of land for much of the year. However, during wet periods, it becomes an important part of the natural ecosystem and a natural asset for the site. Through design intervention we hope to transform this feature into a site asset.

Engage with the amenity – the site is located at the foot of the hills and provides a great view. Through orientation of the streets we hope to utilise this asset as a way-finding device and also add to the natural beauty of the site.

Celebrate the bushland – There is an expanse of bushland that provides a natural habitat and serves as an asset for the site. By formalising the perimeter of this bushland we hope to contain this asset and quarantine it from degradation.

Formalising site activation – The park already has a wide range of users and activity but many of the trails are informal and not always accessible to all. By designating trails we can provide formal routes through the site and protect the natural areas. We have observed a large amount of foot traffic (particular dog walkers) using the site and will investigate opportunities for a dog park or the like to further encourage this community activation.

Providing new housing opportunities – The community can be expanded bringing additional activation and life through the careful siting of new housing opportunities including over 55's, aged and retirement living to cater for this population.





5.0 DESIGN CONCEPT

The design concept has been produced to meet the established principles and deliver a housing return in an order of magnitude to make the project feasible. A range of options were examined balancing the provision of natural assets on site, the highest and best return of land and the utilisation or enhancement of existing site features to ensure the best outcome.

Some of the key features of the proposal include:

- A connection to Mallow Way has been identified serving as an extension of the existing street network. This street would serve a limited number of properties it provides a natural link to the existing street network and maintains and enhances existing pedestrian connections.
- The drainage basin has been utilised as a feature of the site. During the winter months this forms a 'lake frontage' setting water feature' style setting and serves as an asset for the site.
- The northern and eastern edges of the site include a managed parkland and combine with an upgrade of the existing playground serving both the new and existing communities.
- Footpaths prescribe a boundary to the detention basin including a new pre-filtering area contained by a board-walk located adjacent to the aged care/ assisted living facility. By retaining water here this feature could provide a year round amenity.
- The southern edge of the basin retains the natural bushland and allows the continuation of the existing informal pathway.
- Connections to the detention basin have been identified for upgrade, channelling overland drainage into Water Sensitive Urban Design channels or through formal drainage networks across the site.
- Natural bushland has been preserved on the site and has been fenced to offer additional protection. These fenced

- areas contain the most significant local vegetation with dense undergrowth and represent the best local habitat on site. Setbacks to new properties from this retained vegetation have been provided in accordance with SPP3.7 requirements.
- Pathways have been provided across the site. The pathways correlate with and formalise existing movement patterns. Along the southern boundary the footpaths also serve as a fire-break between properties and the retained natural vegetation.
- An activity hub and youth and aged nature playground area has been located adjacent to the water feature and has immediate passive surveillance from new residences adjacent.
- New residences have been oriented to ensure that they front onto the public open space to assist in the provision of passive surveillance.
- New streets have been aligned to take advantage of views to the hills and to provide a natural extension of the existing street network.
- The design of the new streets incorporates fire separation requirements and provides a managed edge to the retained bushland.
- The site has also been designed with flexibility in mind with the block structure adaptable to changing market conditions.

DESIGN TESTING

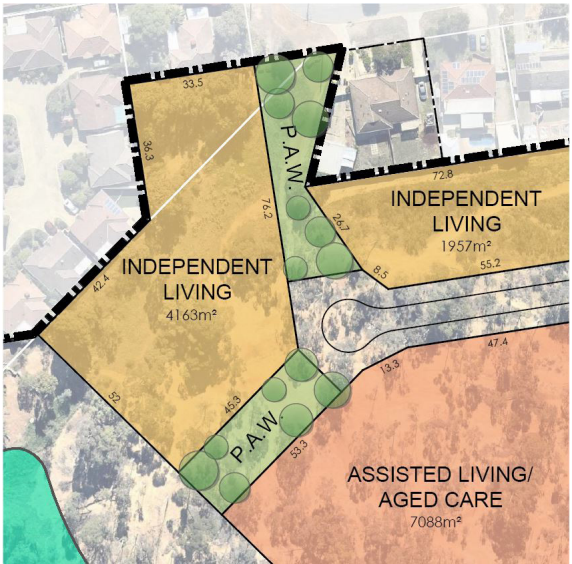
An alternate access opportunity was identified during design testing that allowed for the integration of the adjacent Department of Communities property.



Alternate: Partnership with Department of Communities land

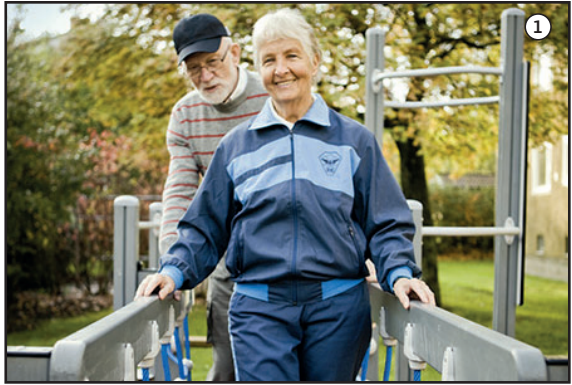


Alternate: maintaining existing drainage line from York Street



Alternate: Increasing retirement living component

An alternate option was examined that explored a re-cut of the lots to provide for additional retirement or aged care / assisted living.



6.0 SUBDIVISION, STAGING AND DELIVERY

Subdivision of the site has been arranged to provide a range of housing opportunities. The subdivision plan features:

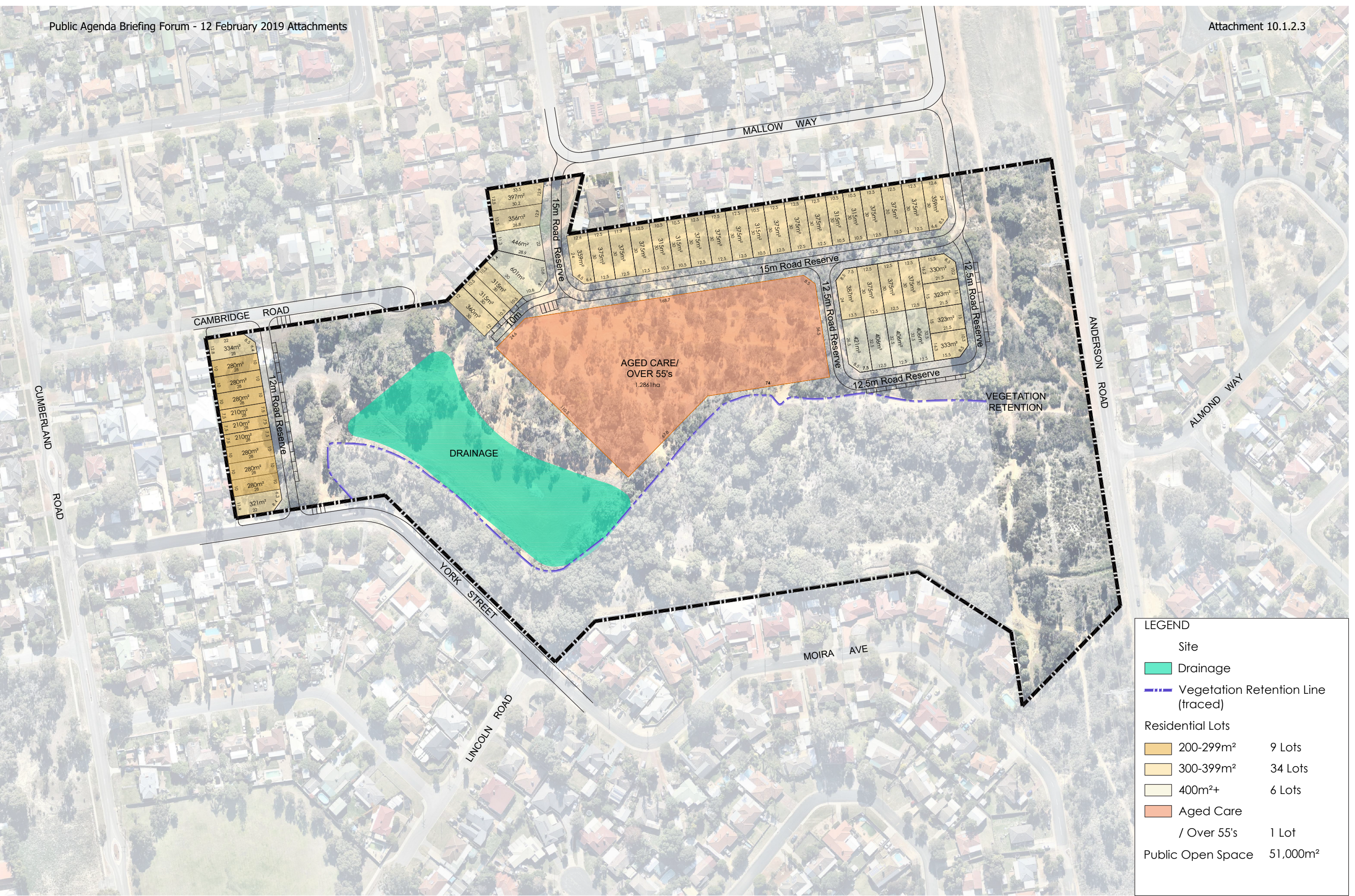
- Connections to the detention basin have been identified for upgrade, channelling overland drainage into Water Sensitive Urban Design channels or through a formal drainage network across the site.
- Standardised lot frontages and depths with a variety in products provided;
- Typical road reserve widths including 15m for standard roads, 12.5m for roads adjacent to Public Open Space. Movement priorities reflect this arrangement.
- The width of the nib road has been reduced and includes visitors parking.
- A regular shaped Aged Care/ Over 55's site has been provided to offer flexibility in layout and suitability for the market.
- A centrally located Over 55's site has been identified that ties into the aged care site and provides additional surveillance and engagement with the adjacent bushland.
- A road along the western edge connects Cambridge Road to York Street. This provides access to new lots and opportunity for parking bays. Buildings on these new lots are anticipated to be 2 storeys to provide passive surveillance of the park and playground.
- Lots opposite the vegetation retention area have been afforded extra depth to ensure a minimum 20m building zone.

LOT TYPE	YIELD
200-299m ²	9 Lots
300-399m ²	34 Lots
400m ² +	7 Lots
Aged Care/ Over 55's	1 Lot

USE	apx AREA
Total Site Area	9.0ha
Public Open Space	5.1 ha
- Drainage	(0.84ha)
- Retained Vegetation	(3.1ha)
Total Development Area (Including Roads)	3.9 ha
- Aged Care/ Over 55's	1.3 ha

The site and proposed layout present a range of staging and delivery opportunities. We anticipate the staging and delivery of the site as follows.

- The properties along the western edge can be released independently of the remainder of the site. Subject to the cash flow for the site these lots can be released first to generate income for improvements across the remainder of the site. Alternatively, these lots may be released as the final stage once the site has been redeveloped and improvements have already been made, to ensure the highest return.
- It is anticipated the remainder of the site would be released as a single stage and the central new road installed to initially provide access to the aged care/ over 55's site. The new road on the perimeter would be established early and double as a fire-break between the retained bushland and the housing site.



LEGEND

Site

Drainage

Vegetation Retention Line (traced)

Residential Lots

200-299m²	9 Lots
300-399m²	34 Lots
400m²+	6 Lots
Aged Care / Over 55's	1 Lot
Public Open Space	51,000m²



CONCEPT PLAN A - PRELIMINARY
CAMBRIDGE RESERVE COMMUNITY ENHANCEMENT

Level 14, The Quadrant, 1 William Street | Perth WA 6000 Australia | +61 8 9346 0500 | URBIS Pty Ltd | ABN 50 105 256 228

City of Kalamunda

DATA SOURCE
LANDGATE
PROJECTION
MGA94, Zone 50

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CLIENT
City of Kalamunda

1:2000 @ A3
0 20 40m

PROJECT NO.
ND P0002785
DRAWING NO.
02
DATE
10.01.19
REVISION
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7.0 STATUTORY PROCESS

Cambridge Reserve Approach to Disposal and future planning.

The Crown Land Administration Practice Manual 2013 provides guidance to local authorities on the disposal of local reserves. In summary, in making a request to the Ministers responsible for Planning and Lands to dispose of a portion of Cambridge Reserve in order to fund redevelopment of the balance portions of the open space, the City will need to provide the following:

- Provide a summary for the reasons for disposal including evidence of sufficient open space in the locality.
- Identification of land involved and the proposed end use for these portions of land.
- Details of community consultation on the matter.

In the context of Cambridge Reserve, the Urbis prepared subdivision concept and landscape masterplan for the balance portion of the reserve will be critical. The narrative around the reasons for redeveloping a portion of the site to fund open space improvements elsewhere will be important in engaging the community. Preliminary estimates on income generated from the sale of the proposed land will be essential in this community discussion.

From a planning perspective, we consider there to be 2 clear potential approaches to the disposal and redevelopment of the subject portions of Cambridge Reserve. The following table considers the “pros and cons” of each approach.

Urbis recommends Approach No.2, which involves only divesting and rezoning the portion of land to be disposed of. Overall, whilst potentially losing some design flexibility, this approach will be far more palatable and from a community and political perspective in comparison to divesting the entire Cambridge Reserve and undertaking a structure plan process

APPROACH	PROS	CONS
1- Rezone the entirety of Cambridge Reserve to Development Zone subject to a future Structure Plan Rezone.	Provides absolute flexibility in defining those portions of the reserve to be retained and those to be developed for urban purposes. Flexibility may be essential from a drainage or environmental perspective.	Divesting an entire open space reserve (albeit much will be re- vested for open space purposes) will likely raise community concern.
	Structure Plans can be readily amended if design or development drivers for the project change over time.	At the conclusion of a structure plan process, the balance open space to remain will need to be re-vested after having been purchased by the City.
2- Rezone only those initially identified portions of Cambridge Reserve required for development purposes.	Politically a more palatable approach (doesn't look like Cambridge Reserve in its entirety is being removed). Far more easily communicated to the community.	Significantly reduced flexibility. Development bound by extent of zoning.
		Requires an technical documentation and approvals to be undertaken upfront. No room for error in defining edge of open space/residential development.
		Scheme amendment requirement to amend development edges or residential coding (minimum 9- 12 month process).

8.0 COST ESTIMATE

The following cost estimate has been provided outlining the potential cost of site upgrades. This is based on the upgrades to the site as illustrated in the Landscape Concept Plan.

Note these figures are based on an anticipated initial capital cost and do not include ongoing maintenance costs. Also note that the fire break along the rear of the Moira Avenue properties is not an asset protection zone

ITEM	DESCRIPTION	TOTAL
1	SITE PREPARATION & EARTHWORKS	
1.1	Allow for minor earth works as necessary and fine grading (Note bulk earthworks by Civil contractor) - excluding bushland	\$56,760.00
1.2	Allow for clearing of weed, weed removal & spraying as required - General Works	\$14,190.00
1.3	Allow for clearing of weed, weed removal & spraying as required to revegetation areas (20% total revegetation area)	\$2,089.00
1.4	Allow for bushland weed management	\$10,500.00
1.5	Allow for structural / cosmetic pruning & making safe of existing trees as required	\$15,000.00
1.6	Allow for soil testing x 2	\$350.00
	Total Site Preparation & Earthworks	\$98,889.00
2	SOIL PREPARATION	
2.1	Allow for the supply and installation of soil conditioner to shrub beds (100mm)	\$20,317.50
2.2	Allow for the supply and installation of soil conditioner to 30/45lt Trees	\$4,500.00
2.3	Allow for the supply and installation of soil conditioner to 90/100lt Trees	\$3,500.00
2.4	Allow for the supply and installation of wetting agent to turf	\$16,260.00
	Total Soil Preparation	\$44,577.50
3	MULCH	
3.1	Allow for the supply and installation of mulch shrub beds	\$20,317.50
3.2	Allow for the supply and installation of enviro mulch to reveg area	\$104,450.00
3.3	Allow for the supply and installation of mulch rings to trees in grassed areas	\$600.00
	Total Mulch	\$125,367.50

Exclusions: Preliminaries, Building Margin, Truck watering, Mulching of existing bushland vegetation, Irrigation sleeves & bore, Dust Management, Rock breaking, Repair of theft and vandalism, Walls by Civil Contractor, Hydraulic and Electrical Connections, Signage, City of Kalamunda

ITEM	DESCRIPTION	TOTAL
4	PLANTING	
4.1	Allow for the supply and installation of 130mm shrubs	\$64,800.00
4.2	Allow for the supply and installation of tubestock / sedge stock to Bushland	\$17,500.00
4.3	Allow for the supply and installation of tubestock / sedge stock to reveg area	\$35,000.00
4.4	Allow for the supply and installation of tubestock / sedge stock to living stream	\$5,267.50
4.5	Allow for the supply and installation of 30/45 litre trees	\$27,000.00
4.6	Allow for the supply and installation of 90/100 litre trees	\$20,300.00
	Total Plantings	\$169,867.50
5	TREE STAKES	
5.1	Allow for the supply and installation of painted tree stakes	\$17,100.00
	Total Tree Stakes	\$17,100.00
6	ROOT CONTROL BARRIERS	
6.1	Allow for the supply and installation of Root-stop root control barriers (6 l/m)	\$1,800.00
	Total Root Control Barriers	\$1,800.00
7	TURF	
7.1	Allow for the supply and installation of roll-on lawn	\$135,000.00
	Total Turf	\$135,000.00
8	EDGING	
8.1	Allow for the supply and installation of 150mm concrete edging to grassed areas adjoining shrub beds and mowing edge to walls.	\$20,000.00
	Total Edging	\$20,000.00
9	PAVING AND STEPS	
9.1	Allow for the supply and installation of placed limestone boulders	\$10,000.00
9.2	Allow for the materials and construction of 1.2m coloured concrete path. Including ground preparation, compaction etc (Profile 1)	\$350,000.00
9.3	Allow for the supply and installation of stone boulders to outlet	\$2,500.00
	Total Paving and Steps	\$362,500.00
10	WALLS	
10.1	Allow for supply and installation of feature retaining walls including ground preparation, ground compaction, cladding, graffiti protection & waterproof parging (height to 1m)	\$15,000.00
10.2	Culverts & headwalls to living stream	\$20,000.00
	Total Walls	\$35,000.00

Notes: Quantities are estimates only
Rates are based on latest tender prices
All figures exclude GST
POS Estimate only

ITEM	DESCRIPTION	TOTAL
11	FURNITURE and ELEMENTS	
11.1	Allow for the supply and installation of bench seating to parkland and bushland	\$35,000.00
11.2	Allow for the supply and installation of Shade structures incl furniture	\$120,000.00
11.3	Allow for bins	\$12,000.00
11.4	Allow for BBQ	\$15,000.00
11.5	Allow for drinking fountains	\$10,000.00
11.6	Fence to bushland	\$294,000.00
11.7	Play equipment incl sand/mulch softfall	\$175,000.00
11.8	Raised boardwalk	\$138,000.00
	Total Furniture	\$799,000.00

12	LIGHTING	
12.1	Parkland lights	\$105,000.00
12.2	Lighting to Shade structures	\$4,000.00
	Total Furniture	\$109,000.00

13	IRRIGATION	
	Allow for the supply and installation of irrigation	
13.1	Connection to existing bore infrastructure	\$1,000.00
13.2	Electrical connection to existing power source	\$1,000.00
13.3	Supply & install new irrigation cabinet	\$2,000.00
13.4	Supply & install irrigation controller	\$1,500.00
13.5	Irrigation to shrub beds	\$40,635.00
13.6	Irrigation to turf areas	\$162,600.00
13.7	Bubblers to trees	\$31,250.00
13.8	As Constructed drawings	\$500.00
	Total Irrigation	\$240,485.00

	"SUB- TOTAL LUMP SUM (excluding GST & Contingency)"	\$2,158,586.50
	Contingency at 15%	\$323,787.98
	LUMP SUM TOTAL (excluding GST)	\$2,482,374.48



Submission Table

No.	Assess No.	Submission	Officer Comments
1.	A45387	<ol style="list-style-type: none"> 1. Examined the plans put out to the public and feel this is an excellent multi-faceted approach to the Reserve which will address a number of needs and will benefit all age groups. 2. I commend the Council for taking a pro-active initiative which addresses a number of community needs including but not restricted to aged care. 3. The proposal will ensure that older and elderly citizens are not isolated but carefully integrated into this planned community in an enhanced environment which looks at conservation issues as well. 4. Well done! Let's get on with it as soon as possible. 	<ol style="list-style-type: none"> 1. Noted. 2. Noted. 3. Noted. 4. Noted.
2.	NA / Mundaring Resident	<ol style="list-style-type: none"> 1) I am concerned about the type of vegetation featured in your concept plan. 2) Although it is not clear exactly what species have been used, some of the feature plants look like introduced and weedy grasses. In particular Fountain Grass, possibly Elephant Grass or African Feather Grass. 3) These three grasses were in the genus *Pennisetum, but this has been merged with *Cenchrus. 4) Further information is available in Western Weeds (Hussey et al) as *Pennisetum. The fact they are in a weed book, says it all. 5) Some years ago Landcare grant funding was obtained to control African Feather Grass at Lesmurdie Falls. 6) Fountain Grass is a highly invasive weed from Africa which is spreading at an alarming rate along the Darling Scarp. It is particularly bad at Swan View near John Forrest National Park, and at Boya along the road verges. In short, these 	<ol style="list-style-type: none"> 1. The vegetation used in the Concept Plan is simply a concept and used for design purposes. The intention for the site is to utilise species that are native and feature in the reserve specifically and to protect the existing native vegetation on site. There is no intention to use weed species. Any existing weed species will be subject to weed management. The vegetation utilised for landscaping will be subject to detailed design. 2. See comment 1 above. 3. See comment 1 above. 4. Noted. 5. See comment 1 above. 6. See comment 1 above. 7. See comment 1 above.

		<p>are highly invasive weeds, and much time and money had already been spent trying to control them. Eradication at this stage is probably not possible.</p> <p>7) In doing Landcare designs, it is better to use local native species that are not a fire hazard.</p> <p>8) For strappy leaf plants, Dianella and similar are often use.</p> <p>9) If you wish to use local native grassed, Feather Speargrass is a good choice, and has been available at Zanthorrea Nursery.</p> <p>10) A landscape design of low strappy leaf plants such as Purple Flag and low spreading shrubs and scramblers would make a heathland type garden which would be very attractive and waterwise. It would also provide shelter for bandicoots.</p> <p>11) Please do not use invasive weedy plants, grasses or otherwise, in your landscaping. There are better options. We have enough weeds.</p>	<p>8. See comment 1 above.</p> <p>9. See comment 1 above.</p> <p>10. See comment 1 above.</p> <p>11. See comment 1 above.</p>
3.	A61329	<p>1) In regards to the Cambridge redevelopment, I am all for doing more revegetation but I do not want anymore parks being developed.</p> <p>2) We don't need them there are alot of parks in Forrestfield.</p> <p>3) I am a rate payer and I don't want my rates wasted on this"</p> <p>4) I do not want anymore over 55 homes I am a rate payer and I don't want my rates wasted on this.</p> <p>5) I moved to Forrestfield because I liked the area and I don't want it ruin by more homes for elderly and over 55 or any more parks the elderly can live elsewhere.</p> <p>6) I have very shocked, disappointed and saddened by the council wanting to sell native land in Cambridge reserve to provided more houses for over 55s</p>	<p>1. The intention of the project is to transfer a portion of the reserve to fund the improvement of the reserve for recreational and conservation purposes. The Public Open Space Strategy identified Cambridge Reserve as a site of low quality. The Public Open Space Strategy 2018 aims to improve the quality of low grade POS, the project provides the opportunity to improve the quality of the reserve. The Aged Accommodation Strategy 2016 recommends looking at government assets to provide much need aged care development. The project provides the</p>

		<p>7) I currently enjoy the land as it is what is the point of building another dog facility as there is also a big dog park in Forrestfield near the Cambridge reserve.</p> <p>8) I enjoy walking and exercising in the area and I also enjoy my connection with nature if I knew about this development I wouldn't of moved to Forrestfield.</p> <p>9) I may have to consider selling and I recently bought in the near by area as a minimum council should of advised me of the attack to native land this project reminds me of the roe 8 highway construction and I hope people protests against this project.</p>	<p>opportunity to achieve the recommendations of both Strategies.</p> <p>2. See comment 1 above.</p> <p>3. The improvement of the reserve will not utilise rates funds, it will be funded by the sale of the residential/aged care portion of the site.</p> <p>4. See comment 3 above.</p> <p>5. See comment 1 above.</p> <p>6. See comment 1 above.</p> <p>7. The dog park has been removed from the final Concept Plan and has been replaced by bush re-vegetation.</p> <p>8. The ability to walk and exercise at the site will still be possible through the proposed improved pathway network in the Concept Plan.</p> <p>9. The Concept Plan was advertised to surrounding landowners and the community.</p>
4.	A48955 (Submission 1)	<p>1) I think it is an excellent proposal.</p> <p>2) The balance of building to retention of the bush is well thought out with the buildings being placed on the worst degraded areas of bushland.</p> <p>3) If it is approved as a care facility I would be in full agreement with the proposal for aged care to be situated in this area. This is a much-needed facility in the City.</p>	<p>1. Noted.</p> <p>2. Noted.</p> <p>3. Noted.</p>

5.	Rise – Great Northern Highway, Middle Swan	<ol style="list-style-type: none"> 1) Rise is a provider of aged care services to a significant number of residents within the City of Kalamunda (880 individuals) 2) Many of these aged people are experiencing memory loss and will very likely require residential aged care at some point into the future. 3) Evidence demonstrates that better outcomes are achieved when people are supported in proximity to their natural community of friends and family and therefore I applaud the City's decision to locate a Residential Aged Care facility on this site. 4) Rise operate a social centre for older people residing in the Forrestfield and surrounding community. 5) The provision of a well maintained accessible open space in such close proximity to this centre will provide significant opportunity for these local citizens to access and enjoy the reserve on a regular basis. Social contact and access to natural surroundings are two of the safeguards against depression in later life. 	<ol style="list-style-type: none"> 1. Noted. 2. Noted. 3. Noted. 4. Noted. 5. Noted.
6.	A63945 (Submission 1)	<ol style="list-style-type: none"> 1) I am writing to you to express my concerns regarding the City of Kalamunda's proposal for the development of Cambridge Street Reserve in Forrestfield. 2) Overall, I disagree with the City of Kalamunda's proposal for Cambridge Street Reserve. 3) I care for the environment and would like to see the little urban bush land remaining in Forrestfield protected. 4) As reported online and in the workshop, the initial feedback that the City of Kalamunda received from residents clearly indicated that the majority of residents value this piece of bushland and desire its preservation, with remarks including: 'don't cut down trees', 'we appreciate the quietness', 'love the bush feel'. 	<ol style="list-style-type: none"> 1. Noted. 2. Noted. 3. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.

		<p>5) Feedback also suggested that the main facilities that residents desired to see in the reserve were a BBQ, improved playground, seating and shelter. This feedback from residents has not been reflected in the proposal that the City of Kalamunda has put forward for Cambridge Street Reserve, which displays development far beyond what residents indicated they desire.</p> <p>6) The aforementioned facilities identified by residents as desirable could easily be integrated into the already cleared park land on the western side of the reserve, accessible by Cambridge Street.</p> <p>7) Furthermore, the destruction of significant amounts of the reserve to create the parkland outlined in the City of Kalamunda's proposal will fundamentally change the structure of the reserve from a bush land to a park, which completely fails to reflect the values of the local community, who have stated that they appreciate the 'bush feel'.</p> <p>8) I urge the City of Kalamunda to reconsider their proposal for Cambridge Street Reserve.</p> <p>9) Please consider an alternative location for an aged care development. I understand that there is a need for further aged care facilities within the City of Kalamunda, however I do not believe that selling off a third of Cambridge Reserve for this purpose is the best/only option.</p> <p>10). I am curious to know what other options the City of Kalamunda has considered for aged care?</p> <p>11) There are a range of other, largely cleared, though admittedly privately owned lots located throughout the City of Kalamunda. For example, the Seventh Day Adventist Church runs an accommodation centre on Kalamunda Road in Maida Vale; this facility appears to be largely unused for the majority of the year. Has the City of</p>	<p>If endorsed by Council and the Department of Planning, Lands and Heritage and the Minister for Lands, the proposed Scheme Amendment will be referred to the Department of Water and Environmental Regulation and Department of Biodiversity, Conservation and Attractions for comment.</p> <p>4. The protection of vegetation was a key value that came through community engagement, as a result the Concept Plan proposes to protect and manage bushland and to revegetate areas on the site. The proposed dog park was replaced from the final Concept Plan with bush re-vegetation to reflect the feedback received from the community.</p> <p>5. The Concept Plan includes an Activity Hub which would likely include features such as BBQs, seating, shelter and an improved playground.</p> <p>6. See comment 5 above. The proposed Activity Hub is located on the western side of the reserve.</p> <p>7. See comment 3 above.</p> <p>8. Noted.</p> <p>9. The Aged Accommodation Strategy 2016 recommends looking at government assets to provide much need aged care development. The project allows for the objectives of the Aged Accommodation Strategy 2016 to be achieved.</p> <p>10. The City has investigated multiple options for aged care and will continue to</p>
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		<p>Kalamunda considered making an offer to buy the land off of this group?</p> <p>12) Please ensure true preservation of the bushland in the areas to be retained and rehabilitated.</p> <p>13) Residents did not ask for 'managed park land', with areas of grass and paving, but indicated an appreciated for the natural bushland.</p> <p>14) The City of Kalamunda needs to make a better effort to preserve a larger area of the bushland.</p> <p>15) Please consider drawing inspiration from Kensington Bushland within the Town of Victoria Park; this reserve contains an area of previously degraded bushland that has now been fenced off and rehabilitated and contains sturdy paths that are lined with waist high fences as well as signs describing the importance of the native flora.</p> <p>16) I note that Cambridge St Reserve was previously listed as a Federal Threatened Ecological Community as well as a State Priority Ecological Community. I would be interested to know why this is no longer the case. This bushland is an important island of biodiversity within an urban area, and provides an important refuge for native plants and animals. Clearing at any level will result in a decrease in habitat for native fauna.</p> <p>17) Present within the area are a large number of jarrah and marri trees used as habitat by black cockatoos and other fauna. Significant habitat trees must be conserved within Cambridge Street Reserve.</p> <p>18) Please consider relocating the proposed dog park to Lincoln Road Reserve. Lincoln Road Reserve is situated nearby, so would service the same sector of the neighbourhood, and is a largely cleared, grassed parkland that sees little use (except for dog training groups on weekends). Locating the dog park at Lincoln Road Reserve</p>	<p>investigate further opportunities to provide for the ageing community.</p> <p>11. These are private landholdings which the City has no control over the future operation of these sites. The City often liaises with the private industry to advocate for aged care facilities.</p> <p>12. See comment 3 above.</p> <p>13. See comment 3 above. The proposed managed park land is to allow for appropriate bush fire separation, improved amenity and is generally proposed in areas where bushland is identified as degraded.</p> <p>14. See comment 3 above.</p> <p>15. See comment 3 above. The managed bushland and areas of bush re-vegetation are proposed to be fenced.</p> <p>16. See comment 3 above. If endorsed by Council and the Department of Planning, Lands and Heritage and the Minister for Lands, the proposed Scheme Amendment will be referred to the Department of Water and Environmental Regulation and Department of Biodiversity, Conservation and Attractions for comment.</p> <p>17. See comment 3 above.</p> <p>18. The proposed dog park has been replaced by bush re-vegetation in the Concept Plan. The City is investigating other sites for a fenced dog park.</p> <p>19. See comment 18 above.</p> <p>20. Noted.</p>
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		<p>would also have the added benefit of promoting the flow of business to the adjacent Forrestfield Shopping Centre, which could do with increased business and vibrancy.</p> <p>19) The land that has been set aside for the dog park in the current proposal should be rehabilitated/revegetated with local native flora. The bushland in this area is highly degraded, and the land will not be built on due to its location within the powerline easement, thus it could see high value as an area of conservation.</p> <p>20) In addition to my above comments on the City of Kalamunda's proposal for Cambridge Street Reserve, I would also like to make a few comments on the workshop itself. The staff representing the City of Kalamunda and the councillors present were overall polite, considerate, and willing to listen to the residents and encouraged them to write down their view points. It was clearly stated at the start of the workshop that the staff and councillors were not there to express their opinions, but to listen to the community and facilitate discussion- a statement that was true for the majority of staff and councillors present. However, I would like it to be known that Councillor Margaret Thomas, who was seated at our table, behaved in a way that I do not see as befitting an elected representative of the City of Kalamunda. Councillor Thomas became emotional and agitated when discussing the proposal, aggressively defending the idea of the aged care facility, including it on a 'positive list' despite other members of the table not agreeing, and even stating that my wife and I are selfish for opposing the development, as our own home was likely built on land that was once cleared for development. If Councillor Thomas cannot attend a community meeting without becoming emotional and agitated, then she should not attend. Furthermore, I note</p>	
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		that two of the Councillors present at the workshop are members of the Kalamunda Aged care Advisory Committee, while no members of the Kalamunda Environmental Advisory Committee were present.	
7.	A26533	<ol style="list-style-type: none"> 1) My interest in this project is mainly in the area where the reserve meets Anderson Road. 2) I am interested to find out why the concept plan for the reserve does not include the area along the length of Anderson Road (between Lewis Road and Holmes Road). 3) I understand that the strip along Anderson Road may be under the control of Western Power, and may not be part of the Cambridge Reserve, but it does seem sensible to consider the land use there in conjunction with the land use within the reserve. 4) In my view, the current appearance along Anderson Road leaves much to be desired, and much could be done to enhance it. Can you let me know whether any consideration has been given to extending the scope of the project in this way, or whether there are other avenues available. 	<ol style="list-style-type: none"> 1. Noted. 2. The Concept Plan does include a portion of the area along Anderson Road (the Power Easement). 3. See comment 2 above. 4. This portion of the reserve is identified for bush re-vegetation.
8.	Property not provided (Forrestfield resident)	<ol style="list-style-type: none"> 1) Please follow through with the idea of a fenced exercise area for dogs. 	<ol style="list-style-type: none"> 1. Due to a significant amount of feedback seeking greater bushland retention and revegetation, the fence dog park has been replaced by bush re-vegetation. The City is currently in the process of investigating opportunities for a fenced dog park at other locations.

9.	A66086	1) I do not think we should allow the "clear felling " of all the big trees in a development site. As many as possible of the large trees should be retained! I hope that plants and trees that will be removed, are replanted in the revegetation plan. Having an "off set" area of bush somewhere else doesn't help the local fauna, who will lose some food sources!	1. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development. The Concept Plan protects a significant portion of the vegetation rated good or very good condition.
10.	A48856	1) Please do carefully consider issues of noise, residential security and public safety. As the owner of one of the blocks backing onto this planned improvement, I hope to be very pleasantly surprised that 'locals' are happy to have this facility over the long term. I do commend the Government for the initiative and thank them for making Forrestfield a suburb we can be proud of.	1. Noise, security and safety will be taken into more detailed consideration during the subdivision stage and park detailed design utilising passive surveillance principles and crime prevention through environmental design (CPTED) principles.
11.	A166000	1) The design removes many of the current uses the land provides that are a great benefit. I like that it is a place that kids hack around on their bikes in the bush that is also close. It is a great place for dogs and walking around that has not been sanitised to within an inch of its life.	1. There is no intention to remove the ability for people to walk their dogs through the park and kids to be able to ride their bikes through the park.
12.	A56007	1) Keep it as natural as possible.	1. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil,

			seeds and vegetation from the vegetation proposed to be removed for development.
13.	A249206 (Submission 1)	1) I like almost every aspect except for the housing and the cutting down of so many trees.	1. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.
14.	A249206 Submission 2	1) I am disappointed that such a high percentage of the space has proposed property developments on it.	1. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.
15.	A244995	1) This whole process seems to have been decided before the meeting on the reserve but when I asked the question	1. The Concept Plan was developed in response to the feedback received during

		<p>on the day both the Shire staff and elected members no one would give a straight answer.</p> <p>2) Talking to other residents on the day most did not want any changes as they felt it would bring more problems to the area and play equipment there not being used anyway. Aged facility has been problem in Shire for years with many places being turned down either by shire or government.</p> <p>3) DONT RUIN THE RESERVE The grass was cut on the day for the first time in over a year so the upkeep would not be maintained. Only local residents adjacent and around the reserve should have a say.</p>	<p>the pre-consultation phase. The Concept Plan was then modified in response to community feedback during the public advertising phase.</p> <p>2. The intention of the project is to transfer a portion of the reserve to fund the improvement of the reserve for recreational and conservation purposes. The Public Open Space Strategy identified Cambridge Reserve as a site of low quality. The Public Open Space Strategy 2018 aims to improve the quality of low grade POS, the project provides the opportunity to improve the quality of the reserve. The Aged Accommodation Strategy 2016 recommends looking at government assets to provide much need aged care development. The project provides the opportunity to achieve the recommendations of both Strategies.</p> <p>3. Noted.</p>
16.	A65200	<p>1) Very rare to have a natural piece of bush land in a residential area. Local residents are happy with the way it is and it seems pointless to be spending ratepayer money on a project that is certainly not supported.</p> <p>2) The placement of fences would certainly be useful as this would reduce the use of the area by motorbikes and 4-wheel drives.</p>	<p>1. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development. The improvement of the reserve will not</p>

			<p>utilise rates funds, it will be funded by the sale of the residential/aged care portion of the site. During the public advertising period there was a majority of support from the surveys received from the community. There was a mix of opinions during the community workshop and there is slightly more submissions objecting to the project than supporting the project.</p> <p>2. Noted.</p>
17.	A166050	1) Add some exercise equipment around the park.	1. This will be considered during the detailed design phase.
18.	A63945 (Submission 2)	1) Any move to clear bush for housing should not be considered under any circumstances. The bush is a rare example of what would have be commonplace in this area. It almost looks like remnant wheatbelt vegetation. Shame on you for proposing to clear so much of this for housing.	1. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.

19.	Property not provided (Maida Vale resident)	1) Do we really need these areas in all suburbs?	1. The Public Open Space Strategy identified Cambridge Reserve as a site of low quality. The Public Open Space Strategy 2018 aims to improve the quality of low grade POS, the project provides the opportunity to improve the quality of the reserve. The Aged Accommodation Strategy 2016 recommends looking at government assets to provide much need aged care development. The project provides the opportunity to achieve the recommendations of both Strategies.
20.	Property not provided (Forrestfield resident)	1) Looks great	1. Noted.
21.	A61478	1) I'd love to see this project take place. The area is unattractive and unused. My family would benefit greatly and I'd love my daughter to enjoy the suburb she lives in. I'd like to see the shire fund something like this even if funding doesn't come from the older people's units. I think this this side of Forrestfield deserves this.	1. Noted.
22.	A51057	1) Have appreciated being able to enjoy bushland among an urban environment.	1. Noted.
23.	A56007 (Submission 1)	1) This little bit of bushland is actually a little oasis within the suburb and I urge you to keep the majority of it as that.	1. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the

			vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.
24.	Property not provided (Forrestfield resident)	1) I would recommend making this park a real draw card to the area not only for those who live local but outer area also. Such as Woodbridge Park in Guildford.	1. The intention of the project is to make the park attractive for visitors and residents whilst also protecting the environmental values on the site.
25.	A228408	1) I don't believe this land should be developed. But the money into something that really needs it like improving the facilities we already have.	1. The Public Open Space Strategy identified Cambridge Reserve as a site of low quality. The Public Open Space Strategy 2018 aims to improve the quality of low grade POS, the project provides the opportunity to improve the quality of the reserve. The Aged Accommodation Strategy 2016 recommends looking at government assets to provide much need aged care development. The project provides the opportunity to achieve the recommendations of both Strategies.
26.	A127	1) Integrated aged care development incorporated into the Cambridge Reserve Concept Design may help alleviate the chronic shortage of residential aged care in the City of Kalamunda.	1. Noted.

27.	A63945 (Submission 3)	<ol style="list-style-type: none"> 1) This reads as blackmail; a proposition to 'do up' a currently neglected park in exchange for the selling off of a community asset. Residents of Forrestfield have been starved of anything from the CoK and likely will jump at the chance for something new, without realising what they are losing. 2) Why not spend some time and money actually doing up the smaller reserves that already exist in Forrestfield that are currently neglected by the CoK? E.g Off of Palm Terrace, Blackbutt Way, Almond Way- all could use some native plantings, weed removal, seating, BBQs, shelter and maintenance. Encourage people to use facilities near them. 3) This type of development is not welcome in this area, local residents appreciate the 'natural feel' of the area in which they live, this type of development is more akin to what is taking place in the newer areas of Forrestfield (e.g. The Hales). 4) I feel that the appeal of Forrestfield is being lost. 	<ol style="list-style-type: none"> 1. The Public Open Space Strategy identified Cambridge Reserve as a site of low quality. The Public Open Space Strategy 2018 aims to improve the quality of low grade POS, the project provides the opportunity to improve the quality of the reserve. The Aged Accommodation Strategy 2016 recommends looking at government assets to provide much need aged care development. The project provides the opportunity to achieve the recommendations of both Strategies. 2. The transfer of the portion of the reserve identified for development will fund the improvements of Cambridge Reserve. Any surplus funds will be utilised on improving community facilities and other public open space reserves in the locality. 3. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development. 4. Noted.
28.	A45670	<ol style="list-style-type: none"> 1) The plan has not considered the community living close by. 	<ol style="list-style-type: none"> 1. The feedback received from the community has been used to develop the Concept Plan.

29.	A63814	<ol style="list-style-type: none"> 1) The area being developed is home to a State listed PEC (Priority 3) & a Federally listed TEC (Endangered). 2) Have the appropriate surveys and approvals been granted from relevant authorities for the lands development and for the current design? 3) Is the City, through this design, doing its best to preserve, rehabilitate and protect the conservation significant ecological communities? 4) We need to use this opportunity to ensure the design of the park and the location of any proposed aged care facilities/over 55s take into account this vegetation (regardless of its condition). 5) Conserving this vegetation as required as per any state/federal conditions and for the benefit of our environment and community should be our first priority. 	<ol style="list-style-type: none"> 1. Noted. 2. The Concept Plan has been referred to the City's environment team for comment. A 2012 and a 2017 Flora, Vegetation and Fauna Survey were utilised to inform the outcomes of the Concept Plan. At the Scheme Amendment phase the project will be referred to the Department of Water and Environmental Regulation and the Department of Biodiversity, Conservation and Attractions for comment. The Department of Planning, Lands and Heritage will determine whether the Scheme Amendment is approved. 3. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development. 4. Noted. 5. Noted.
30.	A49010	<ol style="list-style-type: none"> 1) How did a requirement for aged care (and a handful of public submissions, if that, suggesting aged care) mean over half of the reserve becoming residential and over 55s (which is just residential, btw)? 	<ol style="list-style-type: none"> 1. The Aged Accommodation Strategy 2016 recommends looking at government assets to provide much need aged care development. The project provides the opportunity to achieve the recommendations of the Strategy. In order

		<p>2) The 'Top Ten' submissions listed in the Technical Note did not include any residential, and yet a good portion of the reserve is becoming residential in some form or other.</p> <p>3) Aged care appeared to be the dominant factor mentioned for the need to develop Cambridge Reserve but there are nearly 40 standard residences included in the design, 50+ if you include the over 55s which are not aged care.</p> <p>4) Few residents advocate for more housing over parkland, unless they have a vested interest.</p> <p>5) What is the council's justification for converting so much of the reserve to non-aged care residences?</p> <p>6) And will all future monies collected from developing Cambridge Reserve be directly invested into the reserve and surrounding open space, or is it just those monies raised from the developing itself?</p>	<p>for the project to be viable for a developer, the development of residential and over 55's is required to supplement the aged care component and provide enough funds to improve the reserve and other reserves and community facilities.</p> <p>2. See comment 1 above.</p> <p>3. See comment 1 above.</p> <p>4. See comment 1 above.</p> <p>5. See comment 1 above. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.</p> <p>6. The funds raised from transferring a portion of the reserve will be utilised to improve Cambridge Reserve and any surplus funds will be utilised to improve community facilities and other public open space reserves in the locality.</p>
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31.	A166000	1) I am concerned about what this development will do to the existing flora and fauna. There is a lot of bird life (including kookaburra's), snakes and bees that live in the reserve. The existing water reservoir attracts ducks and frogs. The Shire of Kalamunda have been hosting night nature walks through the reserve yearly which shows how rich this area is in native animals. Development will bring extra traffic congestion, pollution, dogs barking and general noise.	1. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.
32.	A78861 (Submission 1)	1) DO NOT tear down our natural vegetation and make it like everywhere else. You have approved the Hales, which ruined beautiful natural vegetation already and we will be very resistant to plans to take away more of our natural vegetation in our area. We already have a family friendly space at Hartfield Park and a dog park, why do we need another park just a few blocks over? We don't. Leave it alone.	1. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.
33.	A65183	1) Remove the dead branches from the area on a regular basis.	1. Noted.

34.	A90049	<ol style="list-style-type: none"> 1) Adequate provision of residential aged care facilities in the City is essential and a vital part of ensuring provision of services for our elderly residents. 2) The City has a responsibility for facilitating development of these services and siting them in desirable environments to allow the residents to experience the open, bushland living they have chosen to enjoy in the City of Kalamunda. This project sets a good example of this ideal. 	<ol style="list-style-type: none"> 1. Noted.
35.	Property not provided (Forrestfield resident)	<ol style="list-style-type: none"> 1) Design could be a lot better. So many more things they could do. I have to look at it from my house so I have a big interest in this. 	<ol style="list-style-type: none"> 1. The design of the final Concept Plan has incorporated the feedback from the community.
36.	Property not provided (Forrestfield resident)	<ol style="list-style-type: none"> 1) A lot of Forrestfield bushland has gone you have a chance to save some before its too late. 	<ol style="list-style-type: none"> 1. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.
37.	A223971	<ol style="list-style-type: none"> 1) I for one would prefer just a clean-up of the area. 	<ol style="list-style-type: none"> 1. Noted.
38.	A61513	<ol style="list-style-type: none"> 1) Love the idea. Hope it gets the go ahead. 	<ol style="list-style-type: none"> 1. Noted.
39.	Property not provided	<ol style="list-style-type: none"> 1) I attended the local meeting about this matter (1/Aug/18) and I was very surprised at how it was run. 	<ol style="list-style-type: none"> 1. Noted. 2. The City staff contacted this submitter to discuss concerns.

	(Forrestfield resident)	<p>2) This was my first experience getting involved in the community and it will be my last!</p> <p>3) As someone who has an extreme anxiety and depression disorder it was a huge deal for me to try and get involved in the community. (One of the suggestions of the act, belong, commit advert aimed at people like myself) I and the local people of Forrestfield have never been so disrespected.</p> <p>4) That meeting was 100% pointless and I'm extremely disappointed with some of the people there who represent the council.</p> <p>5) The woman running the session was extremely rude and condescending. Forcing peoples opinions to be put on hold until the end for an open discussion. As a logical and respectful person I would have been fine with hearing their side and then opening the floor to the community. A fair discussion and open conversation of the positives and negatives of the idea. But that did not happen.</p>	<p>3. See comment 2 above.</p> <p>4. See comment 2 above.</p> <p>5. See comment 2 above. The City's staff have taken the feedback on board and will endeavour to improve community engagement sessions in the future.</p>
40.	A56007 (Submission 2)	<p>1) This is a carnbarys cockatoo nesting site and therefore valuable.</p>	<p>1. The environmental reports undertaken for the project identified cockatoo habitat on the reserve. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. These areas generally consist a high portion of the cockatoo habitat. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.</p>

			If endorsed by Council and the Department of Planning, Lands and Heritage and the Minister for Lands, the proposed Scheme Amendment will be referred to the Department of Water and Environmental Regulation and Department of Biodiversity, Conservation and Attractions for comment.
41.	A48955 (Submission 2)	1) As a business woman I understand the need to finance areas outside of the budget and find the concept of some residential areas have been placed in areas of the highest bush degradation and the retained areas are good. After 40 years living near this park I am very grateful that something is being done. Great job!"	1. Noted.
42.	Property not provided (Forrestfield resident)	1) Been here all my life and I don't feel safe in the park by myself the way it exists now.	1. Noted.
43.	A231645	1) I think go ahead with the plan. It will put a lot of smiles on children's faces. my children are not safe to go there on their own.	1. Noted.
44.	A231645 (Submission 2)	1) If the plan was to go ahead with the mini soccer pitch it will put a lot of smiles on people's faces.	1. The Concept Plan proposes half-court basketball. At the detailed design phase, a mini soccer pitch will be considered.
45.	A83070	1) Cater for youth and elderly as youth badly need suitable areas to play. I used to live on Laurel Street and the area is full of kids all trying to find things to do. Make sure the park is well lit for night use.	1. The Concept Plan caters for both youth and elderly needs. Parkland lighting will be determined during the detail design phase.

46.	A65214	<ol style="list-style-type: none"> 1) The shire has made Forrestfield super dense housing not a home in the forest as advertised. 2) Plant banksias and grevilleas as food trees for the 28 Carnaby cockatoos and black cockatoos they come to my home across the road all the time because I have a permanent water supply for them (lily ponds) and I have grevilleas for food supply. 3) Shire destroyed the land I have witnessed the steady destruction of environment (still no signage). 	<ol style="list-style-type: none"> 1. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development. 2. Re-vegetation at the reserve will only include native species, and more specifically species found at the reserve. 3. See comment 1 above.
47.	Property not provided (Forrestfield resident)	<ol style="list-style-type: none"> 1) Why do we need to change one of the last natural Bush areas of Forrestfield? Greed, thank you for not listening again. 	<ol style="list-style-type: none"> 1. The Public Open Space Strategy identified Cambridge Reserve as a site of low quality. The Public Open Space Strategy 2018 aims to improve the quality of low grade POS, the project provides the opportunity to improve the quality of the reserve. The Aged Accommodation Strategy 2016 recommends looking at government assets to provide much need aged care development. The project provides the opportunity to achieve the recommendations of both Strategies. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development

			is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.
48.	Property not provided (Forrestfield resident)	<ol style="list-style-type: none"> 1) Why was the residential / over 55 / aged care plans never discussed with residence in the surrounding streets (Cambridge / York) when invited to the open day / presentation that took place in the park in early 2018 (when Kenya Wildlife Park was present). 2) Clearly the preservation of the bushland is not a priority, as originally discussed in the above mentioned open day / presentation that took place. If you had been upfront with residences at this time you would have a very clear understanding that it is not wanted for various reasons. 3) As per your minutes, the aged care facility was rejected by Satterley, at the Hales development, it now seems that the Shire is scrambling to find any suitable land, be it Crown land, to offload this project. 4) Open and honest communication from the Shire of Kalamunda to the local residence who would be immediately effected by this "Concept" Design has been extremely disappointing and poor. 	<ol style="list-style-type: none"> 1. The workshop at Cambridge Reserve in early 2018 was pre-consultation and the City was seeking feedback on what the community wanted to see at the reserve, leaving everything open for discussion. During this phase the City received feedback on the desire for aged care at the site. 2. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development. 3. The Aged Accommodation Strategy 2016 recommends looking at government assets to provide much need aged care development. The project provides the opportunity to achieve the recommendations of the Strategy. 4. The City undertook pre-consultation in early 2018, notifying surrounding landowners and the community. In mid-2018 public

			advertisement was undertaken with surrounding landowners and the community notified.
49.	Property not provided (Forrestfield resident)	1) Add a few Crossfit stations along the path.	1. This will be considered at the detailed design phase.
50.	A26399	<ol style="list-style-type: none"> 1) Its time the Shire made an inventory of the limited open space which exists within many areas of the Shire and make a firm commitment not to diminish them in any way. 2) This is a trade-off between retaining an undeveloped public area for a much smaller unnatural, constructed and intensively managed public area which will saddle the ratepayers with costs into eternity. A one-off gain for future pain? 3) Come up with a passive development plan which enhances the environment with very little ongoing cost and the whole community will benefit. 4) This is not town planning for a communities benefit its selling out to the short sighted developers. 	<ol style="list-style-type: none"> 1. The Public Open Space Strategy 2018 audits the provision of POS throughout the City. Forrestfield has 11.12% POS, which 1.12% above the 10% requirements. The Public Open Space Strategy identified Cambridge Reserve as a site of low quality. The Public Open Space Strategy 2018 aims to improve the quality of low grade POS, the project provides the opportunity to improve the quality of the reserve. 2. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation,

			<p>revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.</p> <p>3. See comment 1 above. The Aged Accommodation Strategy 2016 recommends looking at government assets to provide much need aged care development. The project provides the opportunity to achieve the recommendations of the Strategy.</p> <p>4. See comments 1-3 above.</p>
51.	A177572	1) If you have a pet nowadays there is nowhere they can be in their natural environment. Man and dog interaction.	1. Noted.
52.	A4909 (Submission 1)	1) A lot of thought has been put into this design and I think it could and should be used elsewhere in the City.	1. Noted.
53.	A74061	1) Include interpretive plaques for plants / animals / noongar.	1. This will be considered at the detailed design phase.
54.	A4909 (Submission 2)	1) Given the poor track record within the City on developing aged care facilities, this development needs to be fast-tracked.	1. If Council endorses the Concept Plan, the City will then be required to forward the Plans and supporting documents to the Department of Planning, Lands and Heritage and the Minister for Lands for endorsement of the project. Once endorsed the City will initiate the Scheme Amendment process to rezone a portion of the site to urban development to allow for the development of residential and aged care / over 55's. Once the Scheme

			Amendment is approved the City will commence the subdivision process and associated works and subsequently the sale of land and the public open space improvements.
55.	A47949	1) The future of this area is in your hands. Please protect it, embrace it and keep it green as much as possible, it is going to make you proud one day. With the existing rate that the bush land is demolished in Perth we believe 20 years from now green and native areas will be more 'valuable' to Perth residents than any building or facility you could possibly build.	1. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.
56.	A199269	1) My main interest is in the enclosed dog exercise area so that we don't need to travel 20 to 30 minutes to a different area.	1. Due to a significant amount of feedback seeking greater bushland retention and revegetation, the fence dog park has been replaced by bush re-vegetation. The City is currently in the process of investigating opportunities for a fenced dog park at other locations.

57.	A78861 (Submission 2)	<ol style="list-style-type: none"> 1) I wish to express my objection to the development of the land in the Reserve as part of this proposal. 2) As a resident and ratepayer for the last 25 years, I have used and enjoyed this Reserve with its natural setting. To see it cut up and sold off, trees cut down and natural bush cleared would be heartbreaking. So little bush land is left for generations to come and going forward with this proposal will result in even less. 3) Manicured parks, skateparks and enclosed dog exercise areas are already available in Forrestfield; not so the natural bush areas. 4) Please don't ruin this small piece of bush area by making it even smaller and developing it into the kind of park that we just don't need." 	<ol style="list-style-type: none"> 1. Noted. 2. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development. 3. The project does not propose a skatepark. Due to a significant amount of feedback seeking greater bushland retention and revegetation, the fence dog park has been replaced by bush re-vegetation. It is important to have a variety of different scale parks servicing the community. The recreational aspects of the reserve are of a smaller scale compared to the conservation component and will likely cater for a more localise catchment. 4. See comment 2 above.
58.	A179639	<ol style="list-style-type: none"> 1) Any expose fence will be a magnet to graffiti, especially the fence behind the houses on Moira Avenue. 2) I would like to see these old, mismatched fences replaced with one that is uniform throughout the reserve. Perhaps some artwork from local school kids could be incorporated into the design to give the reserve a sense of ownership to the community. 3) Take the painted murals on the wall at the Tonkin/Dunreath interchange and the PSP underpass at 	<ol style="list-style-type: none"> 1. Anti-social behaviour concerns will be taken into more detailed consideration during the subdivision stage and park detailed design utilising passive surveillance principles and crime prevention through environmental design (CPTED) principles. With an increased population and greater usage of the park, this help will discourage anti-social behaviour.

		<p>Roe/Willeri interchange for example. Whilst other areas are targeted by graffiti, these two spots remain untouched.</p> <p>4) The community could also be involved by making tile mosaics that can then be laid into the footpaths around the reserve."</p>	<p>2. This will be considered at the detailed design phase.</p> <p>3. See comment 2 above.</p> <p>4. See comment 2 above.</p>
59.	Property not provided (Lesmurdie resident)	1) First class initiative by City of Kalamunda.	1. Noted.
60.	A54855	<p>1) I like it the way it is with historical walking paths through the area. maintain original trees (habitat of many birds) manage the existing open area for play and activities (no 7) no residential in this area.</p> <p>2) More seats around the lake (stormwater compensating basin).</p>	<p>1. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.</p> <p>2. This will be considered at the detailed design phase.</p>
61.	A55073	<p>1) I would like to see an exercise area such as the one at mills park and other parks, which will encourage people to stretch and use all their muscles.</p> <p>2) I would like it to be larger than on the smaller size so that it will be of benefit to the exercising of muscles.</p>	<p>1. This will be considered at the detailed design phase.</p> <p>2. See comment 1 above.</p>

62.	NRPG	<ol style="list-style-type: none"> 1. Since this is a concept plan and, as such, is "indicative only and subject to detailed design", this submission, on behalf of NRPG, will be brief. Should the proposal progress, we look forward to making a more detailed submission at the later stages, when more details are available. 2. In any development proposal, the main concern of NRPG is the retention and management of as much native vegetation as possible. We maintain the starting point for any development should be the existing natural assets of the location. Once these have been established, by comprehensive environmental assessments, the development should be designed around these assets. 3. Whilst this is rarely the case, comparing this indicative plan with the Google Earth image, we may see an attempt being made to incorporate portions of more vegetated areas into the plan. If this is indeed the case, we would urge the City staff and councillors to continue the process, in an attempt to retain as much as possible of the native vegetation. 4. We see the main challenge being that of accommodating so many different activities within the plan. Given the proposed inclusion of an activity hub/playground, dog park, cycle paths, pedestrian paths, over-55 independent living units and an aged care facility, this will be extremely challenging. Add to this the prospect of "option for additional parking" areas and, pressures on retention of the natural assets will only increase. In the past, a perceived need for more parking spaces has invariably resulted in the loss of natural vegetation. 5. The natural features to be retained and/or enhanced, include: bushland (fenced), bushland (managed), bush re-vegetation and, open managed parkland. Environmental 	<ol style="list-style-type: none"> 1. Noted. 2. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development. 3. See comment 2 above. 4. See comment 2 above. The City has utilised the feedback received during community consultation and the technical inputs to develop the concept plan. 5. See comment 2 above. It is envisaged the City may undertake more technical studies, such as water and environment during the Scheme Amendment phase. 6. This will be considered during detailed design phase. 7. This will be considered in greater detail during detailed design phase. Managed bushland takes into consideration bushfire separation and managed requirements, whilst also aiming to protect environmental assets. 8. See comment 2 above. 9. Noted. 10. Noted.
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		<p>features to be constructed include stormwater catchment basin and associated wetland and the "living stream". Until details of these are released for comment, we can do no more than express concerns, which will need to be addressed before the plan is finalised.</p> <p>6. Fenced Bushland - The method of fencing the bushland will need careful consideration but, since other developments within the metropolitan area have done this successfully (as the illustration used shows), this should prove no problem. Ensuring sufficient funding is made available for repair and maintenance of the chosen fencing will be essential.</p> <p>7. Managed bushland - Details of how these areas are to be "managed", is needed, before any constructive comments can be made. Ensuring adequate funding for such management is essential. Given this funding, City of Kalamunda environmental and parks staff have the capacity to carry out this task and, there is the opportunity to use groups like the Green Army to carry out some of this work (as they have done with great success in the past).</p> <p>8. Bush re-vegetation - Long-term funding will be essential for any revegetation projects. Adequate funding for preparatory and ongoing weed suppression should also be part of this. The comment "revegetation is to be carried out using endemic and/or native species" needs clarification. We would suggest the term "endemic species" or simply "native species" be used.</p> <p>9. Open managed parkland - These areas should be seen primarily, in the context of their usefulness as green linkages, wildlife corridors and ecological stepping stones and, defined accordingly. The intention to limit irrigation to certain areas is supported. South of the proposed over 55s</p>	
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		<p>site, there is a mixture of fenced bushland, managed bushland and bush re-vegetation. Whilst the landscape plan may look attractive, these areas need to be clearly defined and the reasons for their categorization stated.</p> <p>10. We see this concept plan as presenting many threats to the biodiversity of this area, unless carried out with the utmost care. Before the project proceeds, the environmental values of the area must be assessed and the potential threats to those values gauged and guarded against. Should this project receive wide community support and continue, we also see it as an opportunity for the City to produce and implement a design reflecting community environmental values.</p>	
63.	A78861 (Submission 3)	<p>1. The purpose of the workshop was to 'share more information on the concept design and to gather feedback'. Before receiving the City's flyer dated 06 July, 2018, I was unaware of the proposal to 'enhance' the Reserve so, I attended the workshop anticipating that I would gain more information about what I understood to be a proposal of change to the Reserve. However, it quickly became evident that this was not primarily a proposal of enhancing the Reserve. Rather, as it was stated at the beginning of the session, the only way that the enhancement could be funded was to reclaim a large portion of the Reserve, subdivide it and sell it off and, build an Aged Care Facility as well as an over 55's facility.</p> <p>2. It became very clear to me that the primary goal of the project was to find a location where these facilities could be built, and the 'sweetener' was the offer of upgrading the Reserve and turning it into a mini Hartfield Park with skate boarding facilities, barbeques, a very small fenced dog exercise area and manicured lawns.</p>	<p>1. The City has utilised feedback from the community during pre-consultation and public advertising and technical inputs to develop the Concept Plan. The Public Open Space Strategy identified Cambridge Reserve as a site of low quality. The Public Open Space Strategy 2018 aims to improve the quality of low grade POS, the project provides the opportunity to improve the quality of the reserve. The Aged Accommodation Strategy 2016 recommends looking at government assets to provide much need aged care development. The project provides the opportunity to achieve the recommendations of both Strategies. In order to improve the reserve and for aged care to be viable, residential is required to supplement the development.</p>

		<p>3. The ability to give feedback about this proposal, was extremely limited. Sitting around a table with other Community members, we were told that we had to come to a general consensus and place stickers on a map showing what we liked and didn't like about the project. This was a patronising and condescending activity, making grown adults feel like they were back at school! It also did not give an accurate picture of the community's attitude as the responses were limited to just 3 selections and these were dominated by people who refused to allow the opinions of others to be heard. The whole process was actually embarrassing.</p> <p>4. The presenter of the workshop spoke in a condescending way when questions were asked, telling people to wait until the end of the session when there would be ample time to ask questions. In actual fact, the session ended without an open forum of discussion and time to ask the many questions that we had. Instead, we were told to go and talk to the City's representatives that were present.</p> <p>5. I was able to speak with a Planning officer who answered some of my questions to the best of his ability and was polite. Others of my family did not experience the same courtesy. One City staff member was rude and appeared completely disinterested when one of my family members tried to discuss their concerns. Overall the workshop was ineffective and added to the distraction from the real issue: the loss of natural bush land in order to build an aged care facility etc.</p> <p>6. I have no objection to such facilities being built in the City of Kalamunda. However, to reclaim what is already a small area of natural bushland in order to do so, is heartbreaking and in my opinion, unnecessary.</p>	<p>2. See comment 1 above. There is no skatepark proposed. Due to a significant amount of feedback seeking greater bushland retention and revegetation, the fence dog park has been replaced by bush re-vegetation.</p> <p>3. The City held pre-consultation in early 2018 allowing the public to comment on what they would like to see at the reserve. This included a workshop at Cambridge Reserve. The feedback received during this period assisted in developing the draft Concept Plan. The public advertising period included a workshop, survey and the ability to provide a submission. The workshop format was similar to the format used at most of the City's community engagement with the aim to give all attendees a say. The City will take the feedback on board for future engagement.</p> <p>4. See comment 3 above.</p> <p>5. See comment 3 above.</p> <p>6. See comment 1 above.</p> <p>7. See comment 1 above. The City is actively seeking opportunities for aged care throughout the City to meet the demands of an ageing community.</p> <p>8. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development</p>
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		<p>7. I have so many questions that remain unanswered. I want to know what other options there are, what other sites are available for this building project; what other sites have been proposed and rejected and why; do we even have a say as to whether or not this 'proposal' will go ahead or is it as it seems, a given that this WILL happen and if we're lucky, we might have our opinion heard just on what will be done with the remaining 'crumb' of land.</p> <p>8. I categorically reject the building, subdivision and development of this land. If it means that the area won't be enhanced at all if the development doesn't go ahead, so be it, wonderful! Once that land is reclaimed and built on, it can never be returned.</p> <p>9. I ask, as a ratepayer who has lived in the same position, close to the Cambridge Reserve for over 25 years, that the City listen to the opinions and desires of those who live here, who use the Reserve, who value the small amount of natural beauty still present and don't destroy that which it is impossible to regain.</p>	<p>is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil, seeds and vegetation from the vegetation proposed to be removed for development.</p> <p>9. Noted.</p>
64.	A98310	<p>1. Thank you for the opportunity to have a say on the future development of this site, which could impact on all sections of our community, not only residents in the Forrestfield area. This is an opportunity for the City to balance community needs with conservation expectations whilst catering for all sections of our community in a specially designed integrated development.</p> <p>2. Whilst sitting as a South West Ward Councillor, I proposed that this reserve be considered for aged care development on the eastern degraded side of the reserve together with the upgrading of the compensating basin and surrounds with gardens, barbecues and picnic seating.</p> <p>3. I still believe this is a great location for all and introduces an intergenerational site for the City and the community.</p>	<p>1. Noted. 2. Noted. 3. Noted. 4. Noted. 5. The Concept Plan proposes to protect a significant portion of the vegetation rated as good and very good. The majority of the proposed development is located where the vegetation is rated as poor, degraded or completely degraded. Where development is proposed on very good rated vegetation, revegetation is proposed in areas retained that are of a lower quality utilising the soil,</p>

		<p>This site is close to bus routes, shops and doctors and would be ideal for some form of aged care facility.</p> <ol style="list-style-type: none"> 4. I still support the upgrading of this reserve which is under-utilised, over grown with non-indigenous species extremely neglected and provides a haven for undesirable activities such as drugs, drinking etc; and provides a venue for the dumping of cars, fridges etc in the "lake" which also presents a safety water issues in winter. The area has huge potential for a City project which could offer much to all aged groups, from the very young to the very old and infirmed. 5. Conservation issues and potential issues - These could and should be addressed. Non-natives and weeds could be removed in favour of indigenous plantings in specific areas. The jarrah-marri woodland in particular can be enhanced offering more bird and native animal habitats. Barriers could be used to minimise adverse impacts to the native vegetation, should future development of the site be considered. 6. Aged Care Potentials in an Integrated Environment - Any project on land which is under the jurisdiction of the City of Kalamunda needs to include the potential for facilities for the elderly. It has been acknowledged that the City faces a crisis in aged care. The development of this reserves has the potential for such an inclusion and there is a unique opportunity here to ensure that all sections of the community are serviced. 7. This site could be designed to cater for an integrated approach, providing intergenerational activities and facilities for the community. It could include: <ol style="list-style-type: none"> a. Nature based play areas for children. b. Upgrading of the compensating basin to a lake standard with appropriate landscaping. 	<p>seeds and vegetation from the vegetation proposed to be removed for development.</p> <ol style="list-style-type: none"> 6. Noted. 7. The Concept Plan includes all these items subject to more detailed design. 8. Noted. 9. See comment 5 above. 10. Noted.
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		<ul style="list-style-type: none"> c. Barbecues and picnic areas with seating d. Specially designed walk trails and pathways through the landscape areas and the woody areas that are retained. e. A nursing home with Respite facilities <p>8. The elderly are part of our social network and their needs need to be included in any initiatives which address community needs overall. In all conscience, they cannot be left out, and in this case it is possible to address all the social/community needs on one site and to different degrees, depending on the financials.</p> <p>9. Conservation issues raised, can certainly be addressed in good faith, and the environment could then be enhanced in specific areas to the satisfaction of all.</p> <p>10. It is appreciated that the above will be a costly exercise and that the City will have to find ways of paying for these integrated community facilities. However, all options should be put on the table for consideration so that all sections of the community, including the elderly, are catered for in a well-planned initiative which will benefit everybody, and of which the City of Kalamunda will feel justly proud.</p>	
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CAMBRIDGE RESERVE COMMUNITY ENGAGEMENT OUTCOMES SUMMARY

Cambridge Reserve (Concept Design) – Engagement Workshops

Findings and Outcomes Report

Background

Cambridge Reserve is nine hectares of passive open space (recreation) which falls under Local Planning Scheme Zone: Local Open Space Planning (passive recreation reserve). The City of Kalamunda (the City) may, with approval from the Minister for Lands and Department of Planning, transfer recreation reserves for development purposes and apply the proceeds from rezoning and development to capital improvements in the general locality.

In 2012–2013, the City undertook a series of technical investigations to explore the opportunities for developing a portion of Cambridge Reserve, for the purposes of residential development and improved open space. The findings of these investigations indicated that portions of the site were suitable for urban development. Preliminary consultation with the Community found that the community was not receptive to the proposal and the Council decided not to continue with the process.

The City has since undertaken a number of further investigations, which has culminated in the development of Aged Accommodation Strategy 2016 (the Strategy). The City has identified an opportunity to action some of the recommendations of the Strategy and deliver broader community outcomes by delivering a mixture of residential, aged accommodation and improved Public Open Space (POS) on the site.

This aligns with Objective 3.1 – To plan for sustainable growth, and strategy 3.1.1 – Plan for diverse and sustainable housing, community facilities and industrial development to meet changing social and economic needs.

The Cambridge Reserve Community Enhancement Project seeks to transform Cambridge Reserve into an improved open space, which will include development of aged care housing opportunities and amenities. Community consultation was undertaken in early 2018 with surrounding residents and the broader community, to assist gathering an understanding of their vision for the area and POS improvements on the site.

The City received input from 67 community members. The process identified that the community would like to see more and improved facilities such as seating, play equipment, shelter and barbeques. The process also showed that the community values the environmental aspect of the reserve, such as its bushland feel, the walking trails, quietness and waterbody. As planned, the feedback was collated and incorporated into the Concept Design.

The Concept Design, developed in conjunction with Urbis, was released to the public for comment in early July 2018.

Community members were invited to provide their feedback in three ways; by completing the survey, writing a submission to the City or attending the community workshop. The Findings and Outcome Report summarises the finding of the community workshop.

Overview of the Workshop

The Community Workshop was held on Wednesday 1 August 2018 from 5.30pm to 7.15pm, at the Woodlupine Family and Community Centre in Forrestfield.

The workshop was promoted via newspaper advertisements, social media, letters to residents within a 2-3km radius of Cambridge Reserve, flyers at City locations (i.e. recreation centres etc.), pop-ups at the Forrestfield Library and Hawaiian's Shopping Centre, the City's website and engagement portal.

38 community members attended the workshop including Councillors Allan Morton and Margaret Thomas.

Upon arrival, attendees were invited to sit at one of the six tables set up around the room. Each table was allocated a City staff member to assist with facilitation of workshop activities.

Director of Asset Services, Peter Veralis, provided attendees with background information on the project and clarified the process involved when transferring a reserve to public open space.

Manager of Customer and Public Relations, Nicole O'Neill, provided an update on the community consultation process, highlighting the findings from the engagement undertaken in early 2018 and how that feedback had been used to develop the concept design for the reserve.

Attendees were then invited to participate in four group discussions and activities relating to the draft Concept Design:

- 1) Identify three features that would be most beneficial to you and your family;
- 2) Identify an aspect of the plan you would change if you could;
- 3) Identify an example of public open space that has been done well; and
- 4) Identify the benefits the plan will bring the community as a whole.

Attendees were able to identify more than the designated number of features should the table not be able to reach a consensus. Tables were asked to share wh

Following each activity, a spokesperson from each table shared the results with the room.

The results from each activity are detailed below.

Results

Activity 1) Identify three features that would be most beneficial to you and your family.

Feature	Number of Times Identified	Reasons Why
Managed bushland	5	<ul style="list-style-type: none"> Love the natural feel of walking through the bushland The location Natural bushland retention
Aged care	5	<ul style="list-style-type: none"> Integrating elderly with the rest of the community is excellent Help overcome aged crisis There is infrastructure and space for this use
Wetland	3	<ul style="list-style-type: none"> Will improve the attractiveness of the area during summer in particular Prevent dumping Essential for community, somewhere to go without leaving their own suburb
Activity hub	3	<ul style="list-style-type: none"> Good for local families Integration of sporting facilities Playgrounds lacking in the area
Pedestrian path	2	<ul style="list-style-type: none"> Recreation Walking/cycling Provided it is well lit and accessible
Over 55's	2	<ul style="list-style-type: none"> Provides funding Integration of aged demographics
Fenced dog area	1	<ul style="list-style-type: none"> Love the segregated dog park
Total	21	

Activity 2) Identify an aspect you would change and why.

Feature	Number of Times Identified	Reasons Why
Residential development	3	<ul style="list-style-type: none"> Urban development is removing bushland Anti-social behaviour Loss of view from Cambridge Road for existing residents
Parking	3	<ul style="list-style-type: none"> Not enough parking for dog park Not enough parking for activity hub
Aged care	1	<ul style="list-style-type: none"> Will cause loss of environmental values No buildings
Pedestrian path lighting	1	<ul style="list-style-type: none"> Provide lighting
Fenced dog area	1	<ul style="list-style-type: none"> Separating dogs from water
The whole plan	1	<ul style="list-style-type: none"> Leave the park as is Trees and vegetation are returning
Total	10	

Activity 3) Identify good examples of public open space.

Example	Reasons Why
Cambridge Reserve	<ul style="list-style-type: none"> Environmental values
Tomato Lake	<ul style="list-style-type: none"> Environmental values
	<ul style="list-style-type: none"> Café
	<ul style="list-style-type: none"> Pathways
	<ul style="list-style-type: none"> Entertainment
Moon Pool (Kings Park)	<ul style="list-style-type: none"> Water feature
	<ul style="list-style-type: none"> Well maintained
	<ul style="list-style-type: none"> Café
Cairns Waterfront	<ul style="list-style-type: none"> Waterpark
	<ul style="list-style-type: none"> Vibrant
	<ul style="list-style-type: none"> Intergenerational
	<ul style="list-style-type: none"> Artificial beach
Kings Park	<ul style="list-style-type: none"> Open space
	<ul style="list-style-type: none"> Big
	<ul style="list-style-type: none"> Multi-use
	<ul style="list-style-type: none"> Grassed areas
	<ul style="list-style-type: none"> Water feature
	<ul style="list-style-type: none"> Environmental values
	<ul style="list-style-type: none"> Parking
	<ul style="list-style-type: none"> Café
	<ul style="list-style-type: none"> Lighting
	<ul style="list-style-type: none"> Landscaping
Wendy Whitely	<ul style="list-style-type: none"> View
	<ul style="list-style-type: none"> Indigenous references
	<ul style="list-style-type: none"> Community feel
Whitegum Valley	<ul style="list-style-type: none"> Environmental values
	<ul style="list-style-type: none"> Dog friendly
	<ul style="list-style-type: none"> Family friendly
Southbank	<ul style="list-style-type: none"> Pathways
	<ul style="list-style-type: none"> Play areas
	<ul style="list-style-type: none"> Café
	<ul style="list-style-type: none"> Intergenerational
Lake Macquarie	<ul style="list-style-type: none"> Intergenerational
Garvey Park	<ul style="list-style-type: none"> Multi-use
	<ul style="list-style-type: none"> Intergenerational
Jorgensen Park	<ul style="list-style-type: none"> Carparks
	<ul style="list-style-type: none"> BBQs
	<ul style="list-style-type: none"> Playground
	<ul style="list-style-type: none"> Environmental values
China	<ul style="list-style-type: none"> Pathways
	<ul style="list-style-type: none"> Vibrant
	<ul style="list-style-type: none"> Entertainment
South Beach	<ul style="list-style-type: none"> Environmental values
	<ul style="list-style-type: none"> Accessible
Lesmurdie Falls	<ul style="list-style-type: none"> Dog friendly
	<ul style="list-style-type: none"> Environmental values
	<ul style="list-style-type: none"> Viewing platforms

Activity 4) What are the benefits or otherwise of the plan.

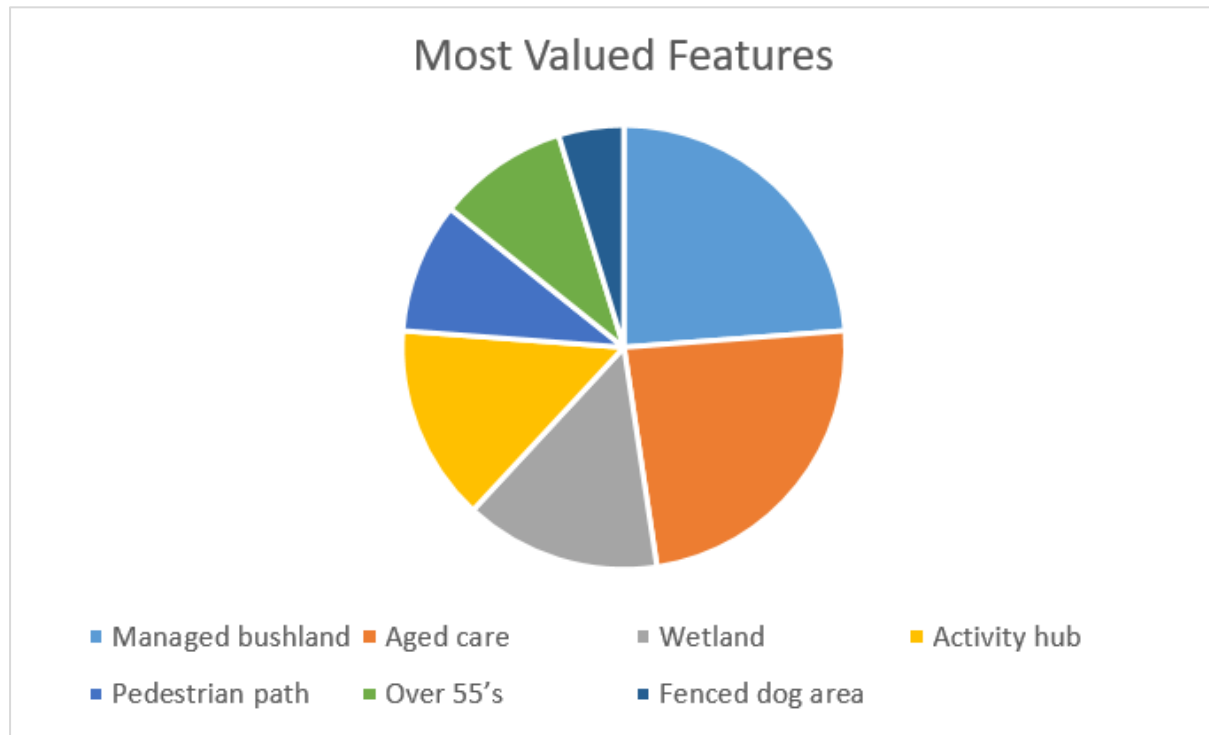
Benefits	<ul style="list-style-type: none"> • Provision of aged care in the City • Ability for aged to interact with community • Quality play areas • Fencing of bushland for protection • Park/picnics • Recreation for everyone • Enhancement of bushland • Family friendly • Intergenerational • Attractive • Improved safety • More utilisation • Established tracks • More young people • Revegetation of degraded areas • Better access • Better pathways
Otherwise	<ul style="list-style-type: none"> • Existing properties will lose their view of the park with the construction of the residential areas • Potential for anti-social behaviour • Public space reduced • Biodiversity interrupted • Traffic increase • Lack of parking • Dense housing • Not enough lighting • Loss of bushland/habitat/native flora and fauna • Dog exercise area is too small • Grassed areas replacing bushland • Potential loss of species

Comments)

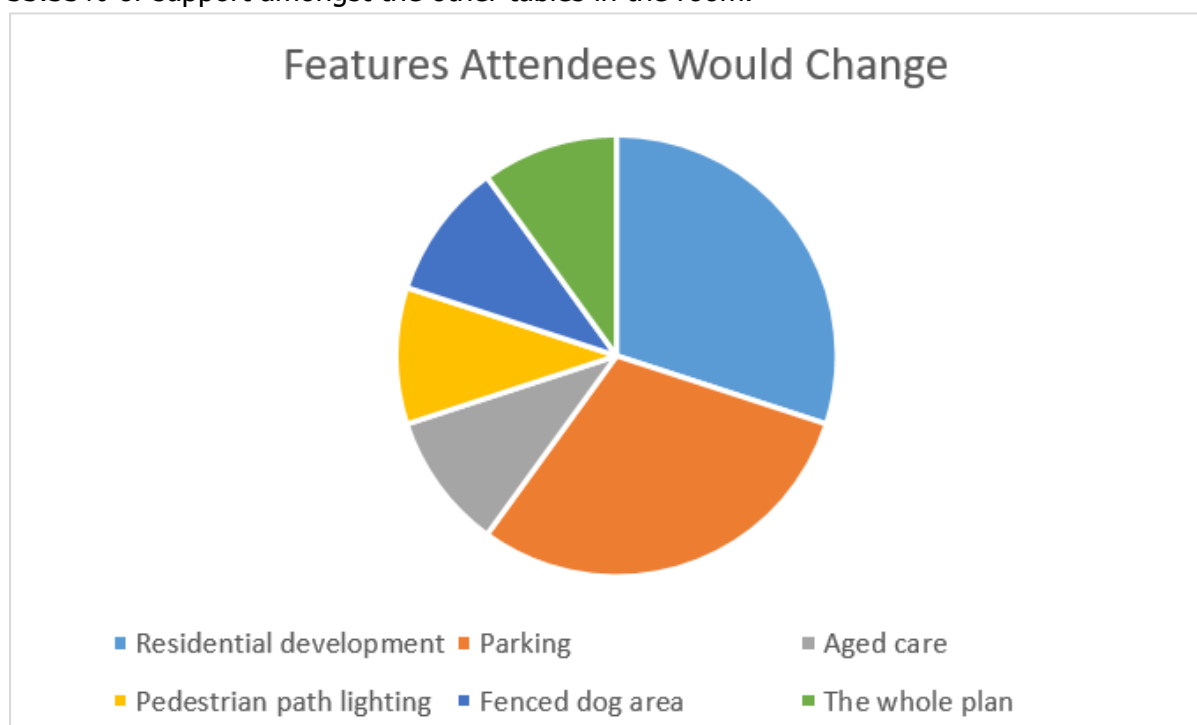
- Consider changing the half basketball court to a mini soccer pitch, or having both.
- Instead of residential, enhance the existing reserve.
- Some residents on Cumberland Drive, adjacent to the residential housing, are concerned they will lose their direct view of the park.
- Some residents are concerned about the removal of vegetation to facilitate development.

Summary

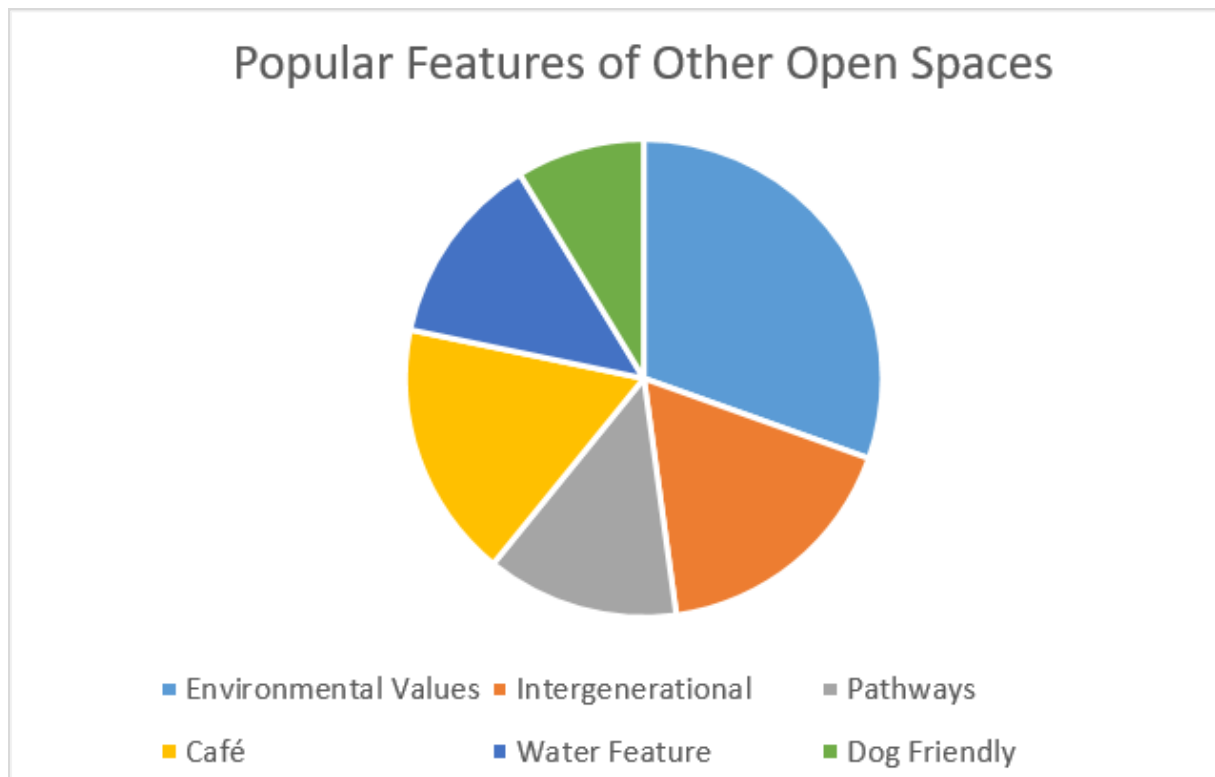
Results from Activity 1 show that the aged care facility and managed bushland were the most valued features of the plan, followed closely by the wetland/water feature and activity hub.



The feature the attendees would most like to change was a tie between the parking and the residential development, however these were not supported by the majority, receiving only 33.33% of support amongst the other tables in the room.



Identifying what the attendees believed were good examples of public open space and why has revealed some trends in features. The reason why attendees rated their spaces as a “good example” was most likely due to the space being intergenerational, holding environmental values, a water feature, pathways, café or being dog-friendly.



Activity 4 highlighted a clear divide in opinion between workshop attendees (i.e. supports the concept design vs. does not support the concept design). Those that supported the concept design were eager to see more aged care facilities in the City and a more family-friendly/intergenerational and usable space, whilst enhancing the existing bushland features.

Those that did not support the concept design appeared to be concerned about the impact on the enhancement would have on them (i.e. increased traffic in their neighbourhood, loss of their view of the park, loss of property value, anti-social behaviour in their neighbourhood) or the impact on the park’s environmental values (i.e. removal of vegetation/bushland for the purpose of development).

Overall, the workshop has highlighted that the provision of aged care and maintenance of environmental values are both equally important to the community. Looking at the concept design, lack of parking and the residential feature of the plan were the aspects that most groups would like to be considered further, though there was no clear consensus within the room on what feature of the plan was the least desirable.

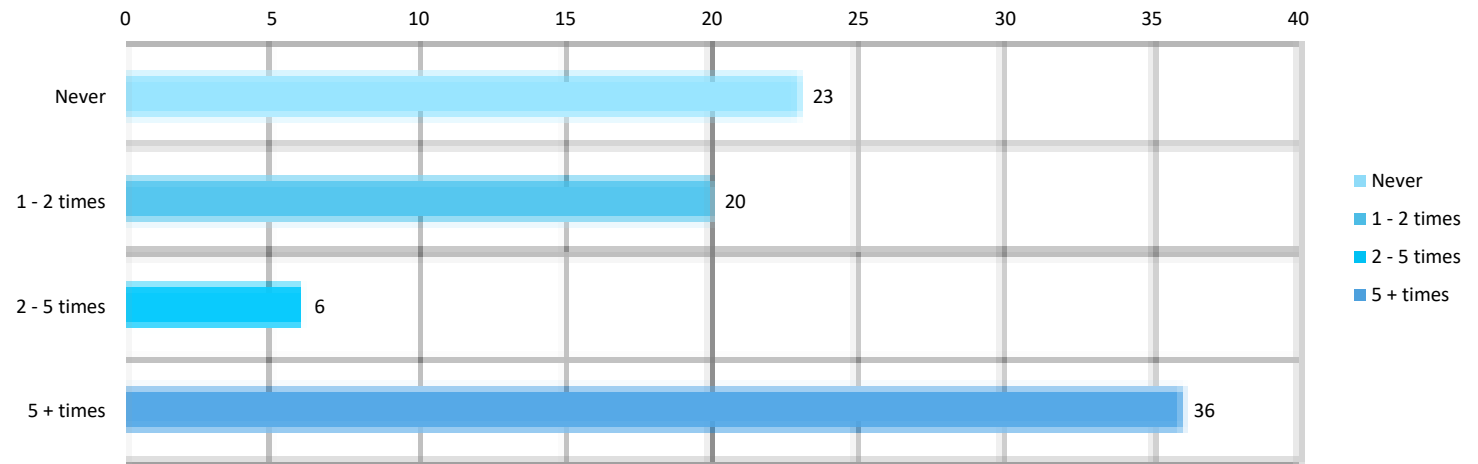
The workshop also showed that open spaces are desirable when they have strong environmental values, are intergenerational (or have something for everyone), have pathways (or provision for exercise), water features, are dog friendly or have a form of entertainment (i.e. café).

SURVEY SUMMARY

1. How many times have you visited Cambridge Reserve in the past six months? (Tick one)

Never	23
1 - 2 times	20
2 - 5 times	6
5 + times	36

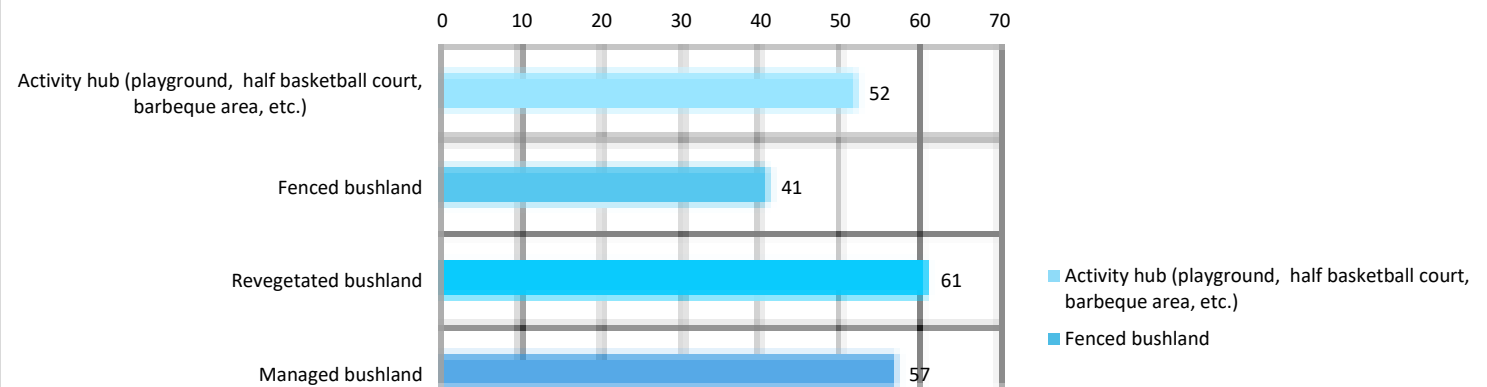
1. How many times have you visited Cambridge Reserve in the past six months? (Tick one)



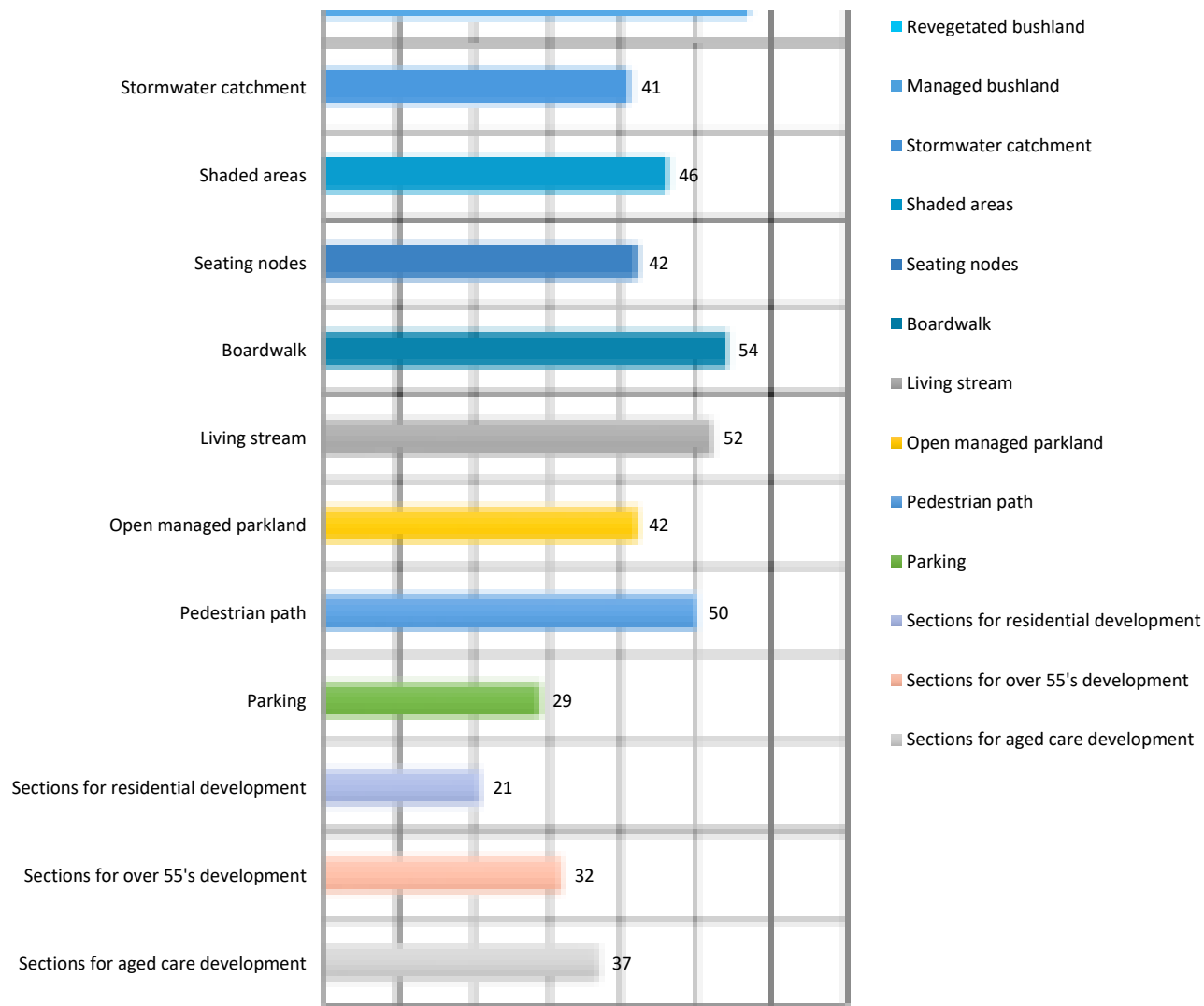
2. Which key features of the draft Concept Design for Cambridge Reserve do you like? (Select all that apply)

Activity hub (playground, half basketball court, barbeque area, etc.)	52
Fenced bushland	41
Revegetated bushland	61
Managed bushland	57

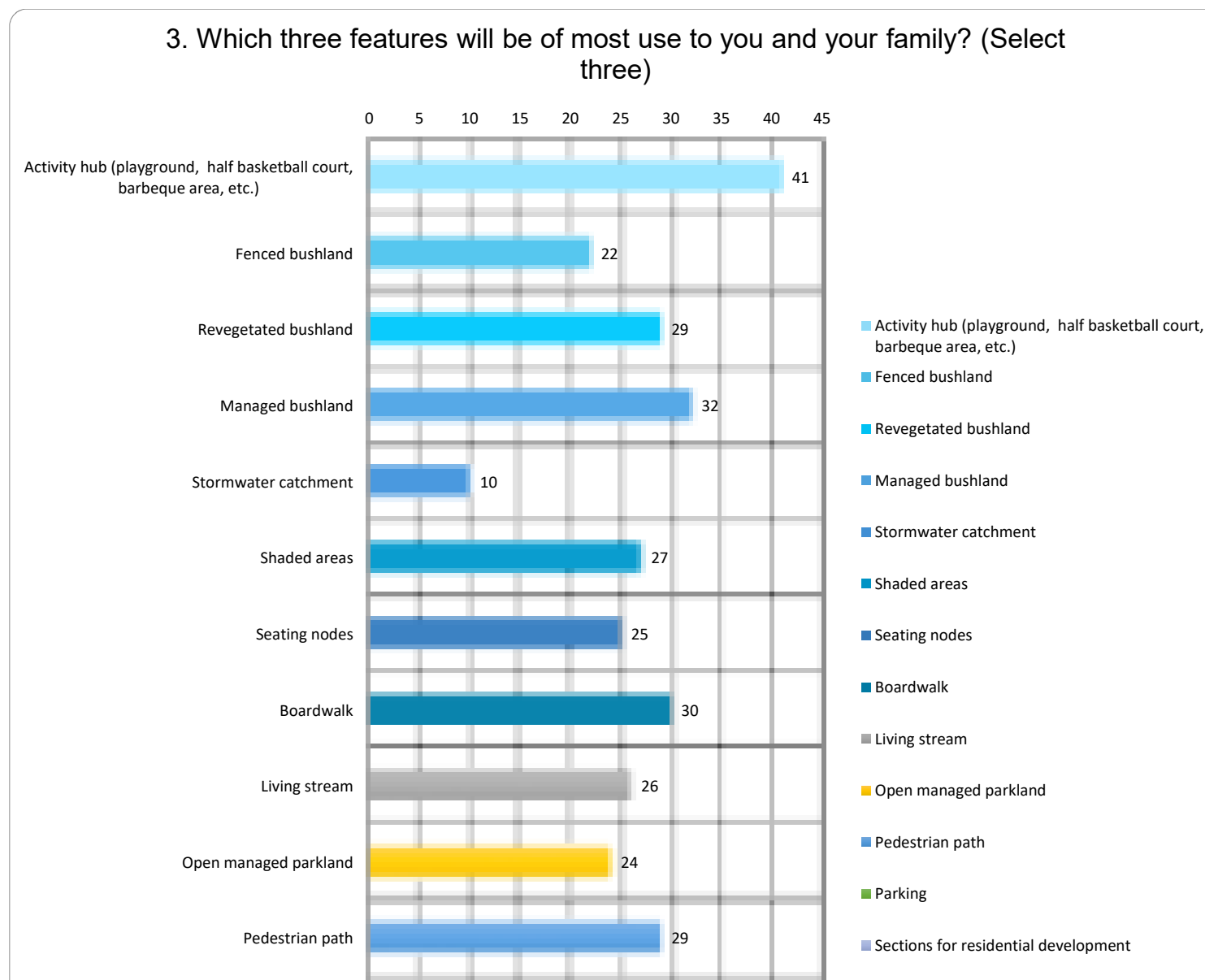
2. Which key features of the draft Concept Design for Cambridge Reserve do you like? (Select all that apply)



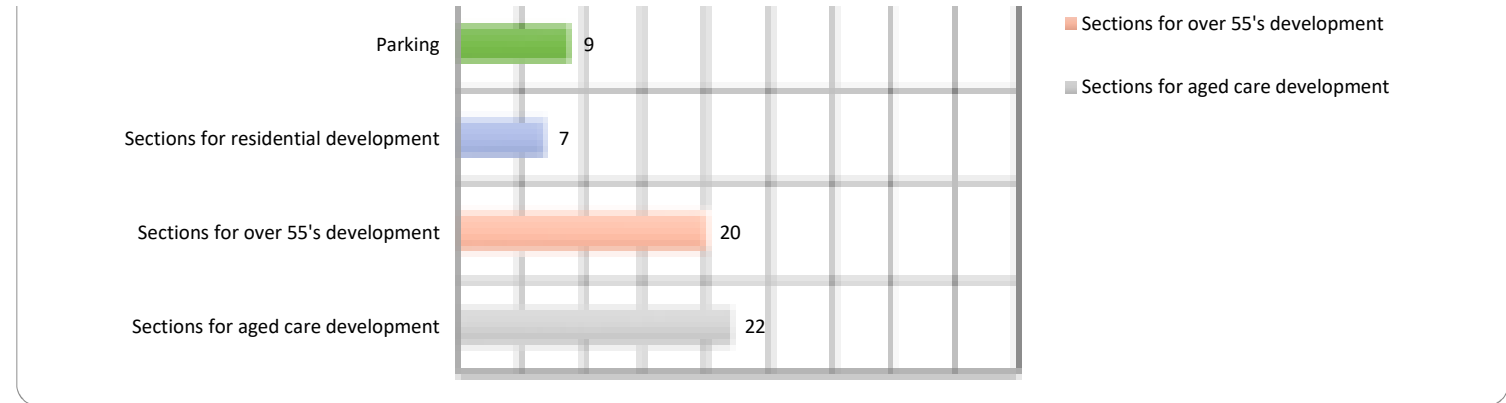
Stormwater catchment	41
Shaded areas	46
Seating nodes	42
Boardwalk	54
Living stream	52
Open managed parkland	42
Pedestrian path	50
Parking	29
Sections for residential development	21
Sections for over 55's development	32
Sections for aged care development	37



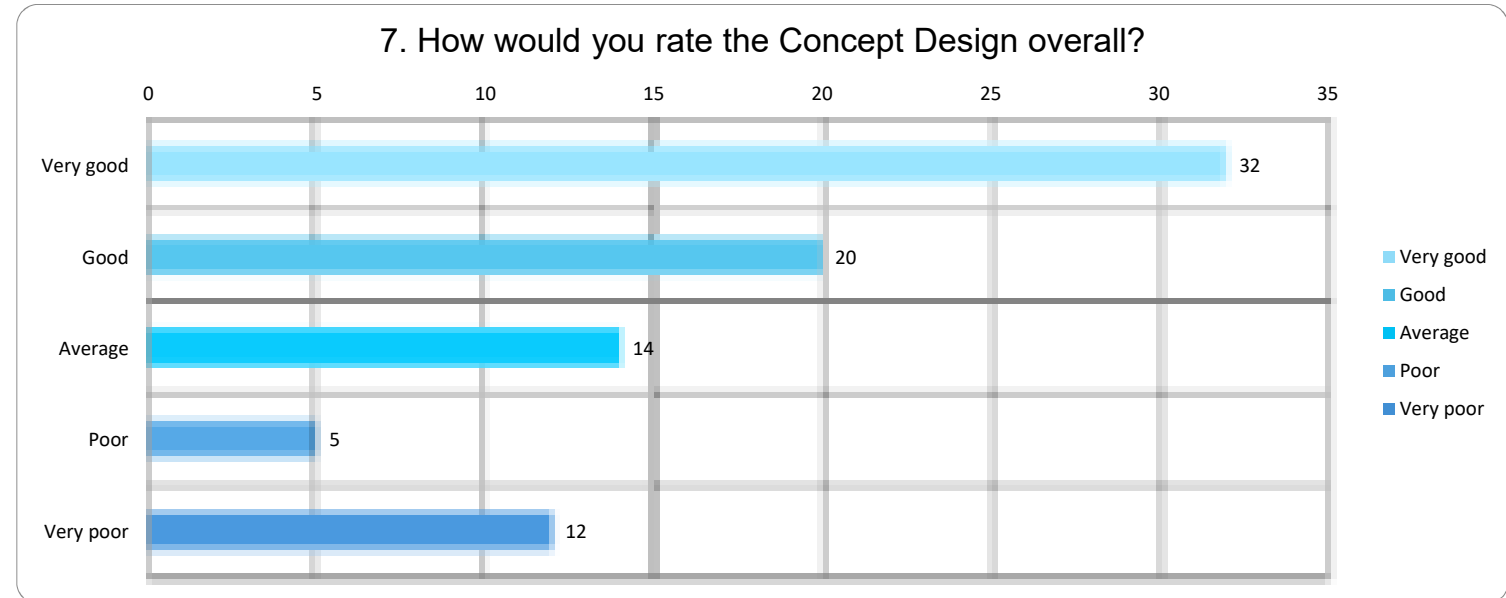
3. Which three features will be of most use to you and your family? (Select three)	
Activity hub (playground, half basketball court, barbeque area, etc.)	41
Fenced bushland	22
Revegetated bushland	29
Managed bushland	32
Stormwater catchment	10
Shaded areas	27
Seating nodes	25
Boardwalk	30
Living stream	26
Open managed parkland	24
Pedestrian path	29



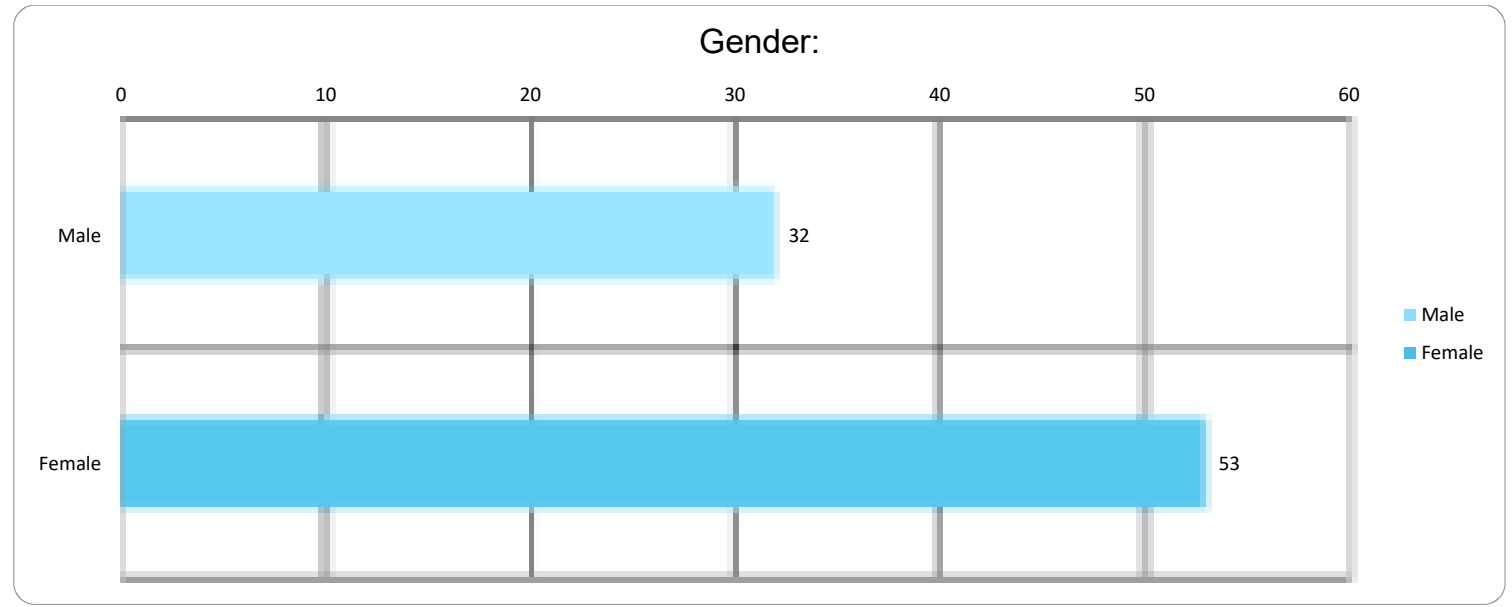
Parking	9
Sections for residential development	7
Sections for over 55's development	20
Sections for aged care development	22



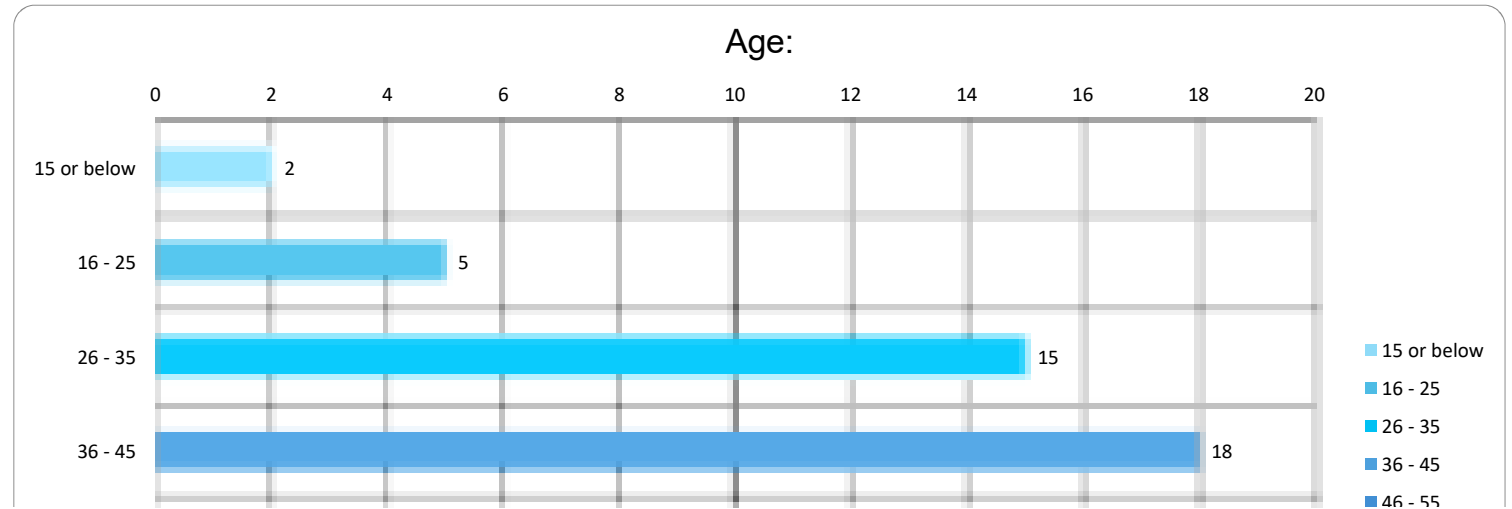
7. How would you rate the Concept Design overall?	
Very good	32
Good	20
Average	14
Poor	5
Very poor	12



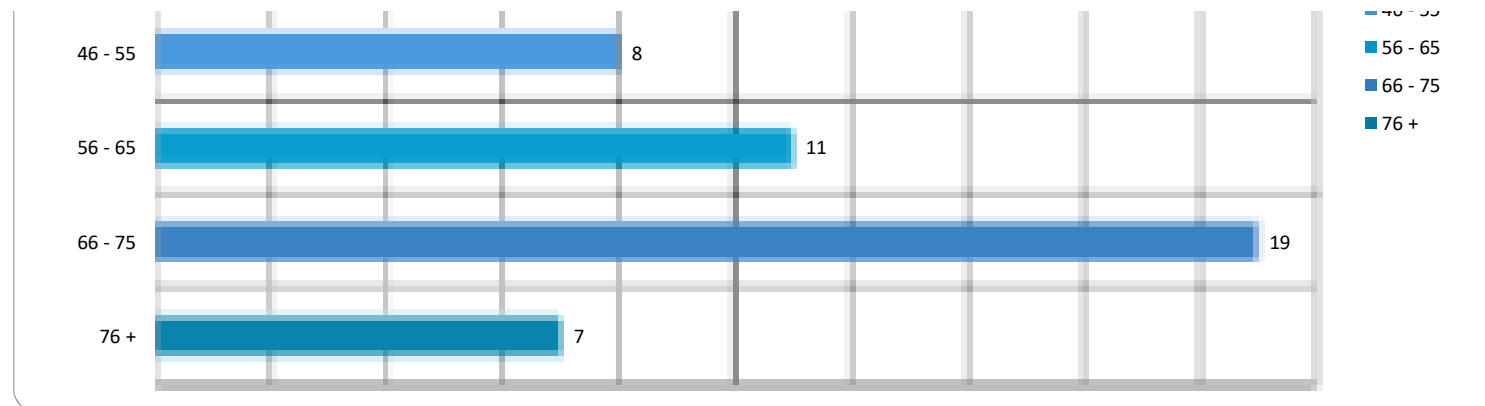
Gender:	
Male	32
Female	53



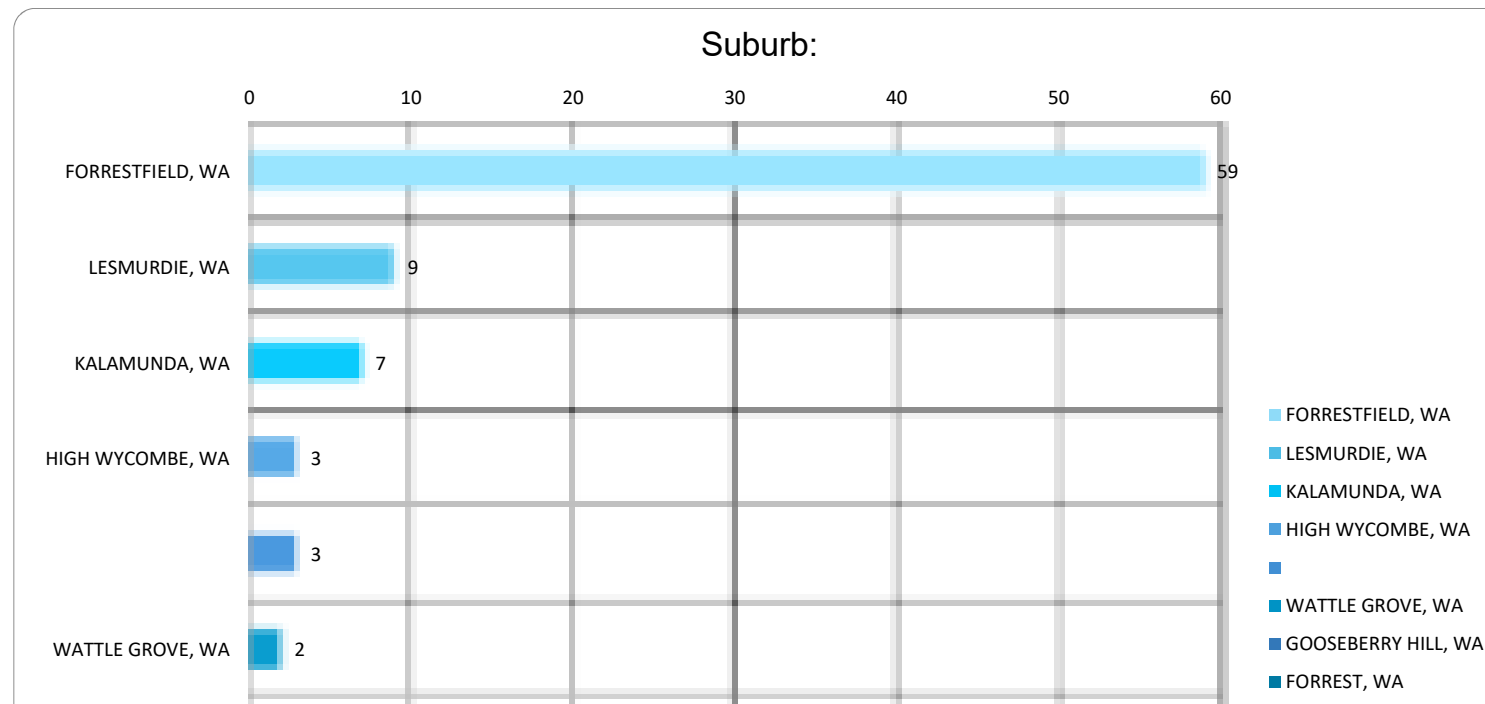
Age:	
15 or below	2
16 - 25	5
26 - 35	15
36 - 45	18



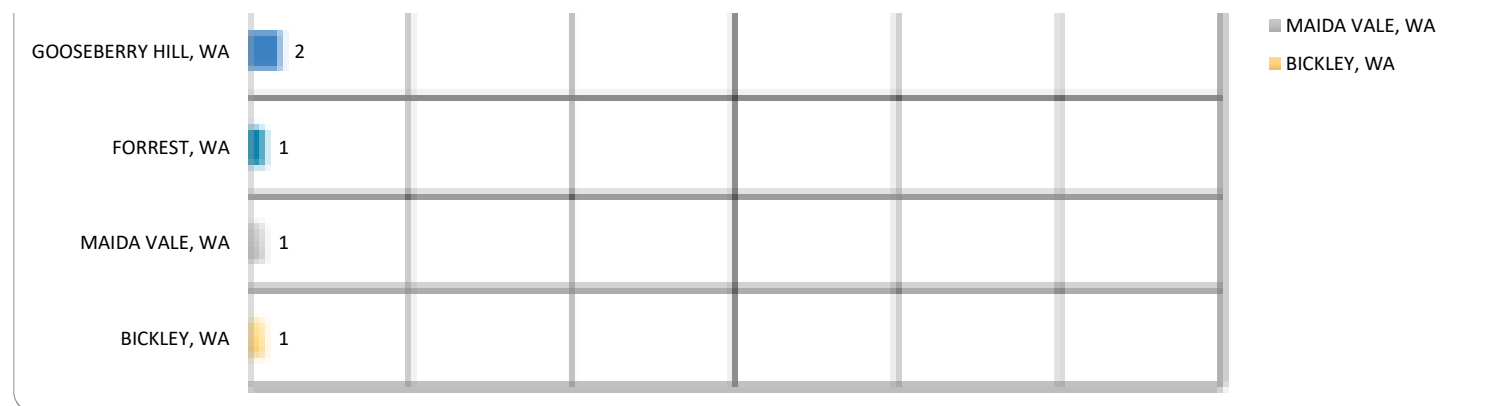
46 - 55	8
56 - 65	11
66 - 75	19
76 +	7



Suburb:	
FORRESTFIELD, WA	59
LESMURDIE, WA	9
KALAMUNDA, WA	7
HIGH WYCOMBE, WA	3
	3
WATTLE GROVE, WA	2



GOOSEBERRY HILL, WA	2
FORREST, WA	1
MAIDA VALE, WA	1
BICKLEY, WA	1





city of kalamunda

Cambridge Reserve Community Enhancement Project Previous Studies and Reports October 2017

CONTENTS

1.0	PRELIMINARY SITE ANALYSIS REPORT	3
2.0	ENVIRONMENTAL ASSESSMENT REPORTS	4
3.0	WATER MONITORING OUTCOMES SUMMARY	5
4.0	PRELIMINARY ENGINEERING SERVICES REPORT	6
5.0	DETAILED CONCEPT PLAN AND LANDSCAPE DESIGN	7

1.0 PRELIMINARY SITE ANALYSIS REPORT



CAMBRIDGE ROAD RECREATIONAL RESERVE

DUE DILIGENCE

712-359
JUNE 2012

perth
sydney

DOCUMENT CONTROL

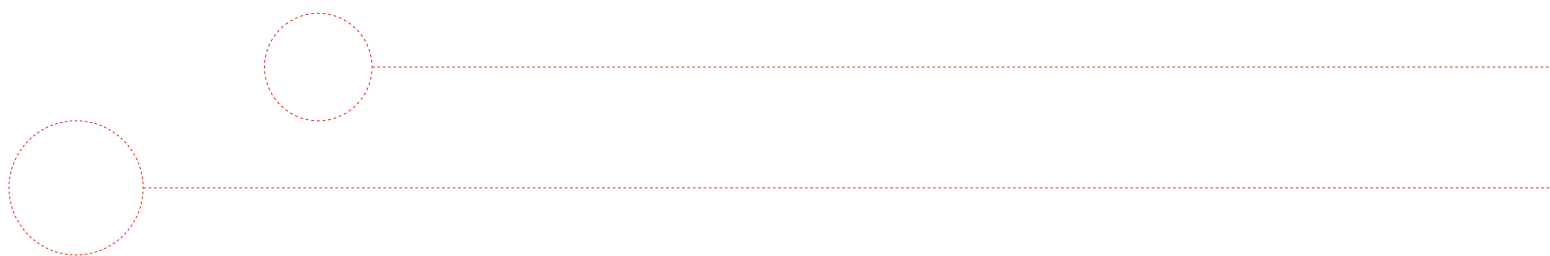
Document ID: PLANNING/PG 2012/712-359/ Draft Documents/ Draft Report/ DD Report						
Issue	Date	Status	Prepared by		Approved by	
			Name	Initials	Name	Initials
1	29.05.12	Draft	Leigh Caddy		Tony Paduano	
2	21.06.12	Draft	Leigh Caddy		Tony Paduano	
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CONTENTS

1.	INTRODUCTION	1
2.	SITE	2
2.1	Improvements	3
3.	PLANNING FRAMEWORK	4
3.1	Directions 2031 and Beyond (2010)	4
3.2	Draft Outer Metro Perth and Peel Sub-regional Strategy (2010)	4
3.3	WAPC Policy DC 2.3 Public Open Space in Residential Areas	5
3.4	Draft Shire of Kalamunda Local Planning Strategy (2010)	5
3.5	Metropolitan Region Scheme	6
3.6	Shire of Kalamunda Town Planning Scheme No. 3	6
4.	CONTEXT ANALYSIS	7
5.	EXISTING LOCAL OPEN SPACE PROVISION	8
6.	INDICATIVE SUBDIVISION CONCEPT	11
7.	SUMMARY AND CONCLUSION	12
APPENDIX 1		13
	Certificates of Title	13
APPENDIX 2		15
	Context Analysis Plan	15
APPENDIX 3		17
	POS Provision Plan	17
APPENDIX 4		19
	Cambridge Rd POS Master Plan	19



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1. INTRODUCTION

This due diligence report has been prepared by TPG Town Planning and Urban Design and Heritage on behalf of the Shire of Kalamunda in respect of the Cambridge Road recreational reserve (the 'site').

This report has been prepared to assist with preliminary investigations with regard to the potential for the site to be developed for residential purposes.

This report outlines details relating to the site, an analysis of the site's context with the surrounding area, and an analysis of the existing public open space provision within the surrounding area.

An indicative subdivision concept has been prepared which outlines how the site may be developed for residential purposes.

2. SITE

The site is situated in the locality of Forrestfield and is bound by Cambridge Road, York Street, and existing residential properties along portions of the northern, western and southern sides, and Shire of Kalamunda owned land comprising a high voltage powerline to the eastern side.

The site comprises several Crown Land lots subject of Management Orders for the purposes of recreation (Reserve 27559 and Reserve 34364) and drainage (Reserve 31348). The primary interest holder is the Shire of Kalamunda.

The site is 8.9665 hectares in area and is approximately 230 metres by 450 metres in dimension.

The following table summarise the legal particulars of the site.

Lot	Plan/Diagram	Reserve	Crown Land Title Number	Area	Primary Interest Holder
7876	P8160	R27559	LR3119-72	0.7585	Shire of Kalamunda
12366	D77413	R27559	LR3119-73	0.0117	Shire of Kalamunda
3677	D42077	R27559	LR3119-74	0.1905	Shire of Kalamunda
2850	D49338	R34364	LR3137-923	2.5050	Shire of Kalamunda
3487	D55585	R34364	LR3137-924	3.1632	Shire of Kalamunda
3059	P12494	R34364	LR3137-925	0.2081	Shire of Kalamunda
3097	P12493	R34364	LR3137-926	0.0268	Shire of Kalamunda
9835	D53851	R34364	LR3137-927	0.0880	Shire of Kalamunda
2346	P175280	R31348	LR3005-780	2.0147	Shire of Kalamunda

A copy of the current Certificates of Title are included in Appendix 1.

The existing interests held by the Shire of Kalamunda relating to the control and management of the land would need to be relinquished in order to permit the development of the site for residential purposes.

2.1 IMPROVEMENTS

The site is undeveloped, predominantly comprising scattered vegetation dissected by several man-made tracks. Adjacent to York Street is a drainage swale whilst a children's play equipment is situated to the western end adjacent to Cambridge Road.

3. PLANNING FRAMEWORK

Outlined below are the relevant state and local planning documents relevant to the site.

3.1 DIRECTIONS 2031 AND BEYOND (2010)

The *Directions 2031 and Beyond* document prepared by the Western Australian Planning Commission (WAPC), establishes a vision for the future growth of the metropolitan Perth and Peel region in which:

“By 2031, Perth and Peel people will have created a world class liveable city: green, vibrant, more compact and accessible with a unique sense of place”.

This vision is supported by several objectives based around five strategic themes:

- **Liveable:** Living in, or visiting our city should be a safe, comfortable and enjoyable experience.
- **Prosperous:** Our success as a global city will depend on building on our current prosperity.
- **Accessible:** All people should be able to easily meet their education, employment, recreation, service and consumer needs within a reasonable distance of their home.
- **Sustainable:** We should grow within the constraints placed on us by the environment we live in.
- **Responsible:** We have a responsibility to manage urban growth and make the most efficient use of available land and infrastructure.

City of Kalamunda

The WAPC's 'Directions 2031 and Beyond' document notes that the north-east sub-region of the metropolitan region, in which the site is situated, is forecast to grow to an estimated population of 258,000 by 2031, a 36 per cent increase on current population levels and equating to an additional 40,000 dwellings.

The document states that several areas around the Shire of Kalamunda including Forrestfield have potential for increased residential development to accommodate airport, freight, container and light industrial development in the area.

3.2 DRAFT OUTER METRO PERTH AND PEEL SUB-REGIONAL STRATEGY (2010)

The *Draft Outer Metropolitan Perth and Peel Subregional Strategy* forms part of the *Directions 2031 and Beyond* vision, providing detail at the local level. Under the Sub-regional Strategy, the Shire of Kalamunda forms part of the North-east Sub-region Region, together with the City of Swan and the Shire of Mundaring. The Sub-regional Strategy estimates that the population of the Sub-region will grow by 69,000 people and that an additional 40,000 dwellings will be required.

The Sub-regional Strategy identifies an additional 14,100 dwellings will be required through a combination of planned new urban areas in Maida Vale South and utilisation of capacity in existing urban areas. Of this 14,100 figure 9,700 are anticipated in infill/redevelopment areas (Forrestfield, High Wycombe and Kalamunda central).

3.3 WAPC POLICY DC 2.3 PUBLIC OPEN SPACE IN RESIDENTIAL AREAS

The WAPC's Policy DC 2.3 sets out the requirements of the Commission with regard to the provision of land for public open space and community facilities in residential areas.

The policy aims to ensure that all residential development in the State is complemented by adequate, well-located areas of public open space that will enhance the amenity of the development and provide for the recreational needs of local residents.

3.4 DRAFT SHIRE OF KALAMUNDA LOCAL PLANNING STRATEGY (2010)

The Shire of Kalamunda's *Draft Local Planning Strategy* provides the framework for long-term planning and development of the Shire and will form the basis for the review of the current Local Planning Scheme No.3. The Strategy was adopted at the Special Meeting of Council on 3 October 2011 and has been forwarded to the Western Australian Planning Commission for endorsement.

The Strategy identifies a preferred growth scenario which will accommodate an additional 25,000 people by 2025 primarily through the development of existing and proposed Greenfield areas and selected areas for residential infill development.

Whilst not specifically identifying the site, the Strategy states "there is opportunity for

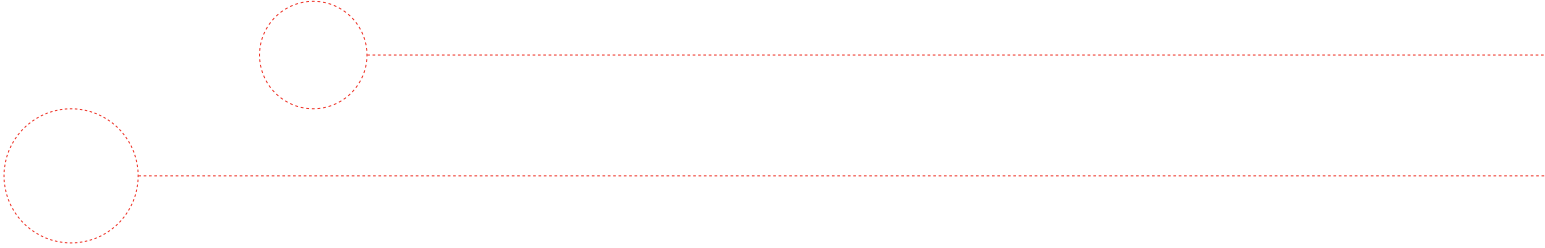
increased residential densities ranging from medium to high residential development around the Kalamunda District Centre and surrounding Forrestfield District Centre.

Opportunities also exist for increased medium density residential infill development in the older residential areas of Forrestfield, High Wycombe and Maida Vale. As these areas are connected to sewer, and within walking distance to public transport, retail provisions, medical facilities and all areas are adjacent to a community library they have a higher suitability rating.

The introduction of infill development into the older suburbs of Forrestfield, High Wycombe and Maida Vale will require existing infrastructure and services to be reviewed and potentially upgraded to accommodate the new growth.

Revitalisation of residential areas in close proximity to activity centres and services could provide a mix of housing types (town houses, apartments, single residential, and affordable housing)."

The Strategy also states that "the Shire has undertaken an independent assessment of its freehold reserves, vested reserves and state government controlled properties with a view to providing short to medium term options for redevelopment, disposal acquisition or use to deliver long term financial sustainability to its community. The assessment will also allow for the rationalisation of reserves which have no environmental value, no amenity value



and are costly to maintain, to provide greater community benefit and service delivery. Some of the freehold sites have been identified and planned for community housing including aged accommodation.”

3.5 METROPOLITAN REGION SCHEME

The *Metropolitan Region Scheme* (MRS) provides the legal basis for controls on development and land use at the regional level. Under the MRS the subject site is zoned ‘Urban’. The ‘Urban’ zone allows for residential development.

3.6 SHIRE OF KALAMUNDA TOWN PLANNING SCHEME NO. 3

Under the existing *Shire of Kalamunda Town Planning Scheme No. 3* (TPS3), the subject site is reserved ‘Local Open Space’.

To enable residential development to occur on the site, a scheme amendment will be required to identify the land within the ‘Residential’ or ‘Urban Development’ zone. Any proposal to rezone the land will likely require a Structure Plan to be prepared in accordance with the requirements of TPS3 to guide subdivision, land use and development.

4. CONTEXT ANALYSIS

The site is situated within the established residential area of Forrestfield approximately 14 kilometres from the Perth Central Business District and 11 kilometres from the Midland Strategic Regional Centre. The Kewdale-Welshpool Industrial Area is situated approximately 4 kilometres to the west of the site.

The site has excellent access to the surrounding area and broader Perth metropolitan region with access to the Tonkin Highway provided via Hale Road as well as via Welshpool Road (and Lewis Road).

The site is within close proximity to a range of local shopping and community facilities including the Forrestfield Forum District Shopping Centre approximately 400 metres to the north, Edinburgh Road Shopping Centre approximately 400 metres to the south-west and the Forrestfield Primary School approximately 250 metres to the west. Further afield approximately 1 kilometre to the south-west is the Hartfield Park Country Club and Hartfield Park Recreation Centre and associated ovals which provide district level sporting facilities.

The site is situated within close proximity to several local recreational reserves which provide passive and active recreational opportunities including the Connaught Street reserve, the Lincoln Road reserve and a relatively large reserve along Lewis Road and Anderson Road.

Within the area, housing is characterised by predominantly single storey detached dwellings on lots between 800m² and the traditional quarter acre (1012m²). Whilst the density of residential development is relatively low, the area is zoned 'Residential R25' under TPS3 which permits existing residential lots to be subdivided into two.

REFER TO APPENDIX 2 – CONTEXT ANALYSIS PLAN.

5. EXISTING LOCAL OPEN SPACE PROVISION

The Planning and Development Act 2005 requires that for residential areas, 10% of the gross subdivisible area be given up free of cost by the subdivider and vested in the Crown. This requirement has been the basis for the provision of public open space for many years and is identified under WAPC planning policy.

In examining the potential of the site to be redeveloped for residential purposes, it is important to understand the extent of public open space which currently exists and whether this requirement generally exists in the locality.

A desktop analysis was undertaken to determine the extent of public open space within the existing urban residential areas of Forrestfield. Specifically the analysis focussed on the existing Residential zoned areas within the immediate vicinity of the site which generally comprise the area bound by Berkshire Road/Wandoo Road to the north and east, Lewis Road/Hartfield Road/Hale Road to the south, and the Tonkin Highway/Dawson Avenue to the west (the 'study area'), and which amount to some 545.4016 hectares of land.

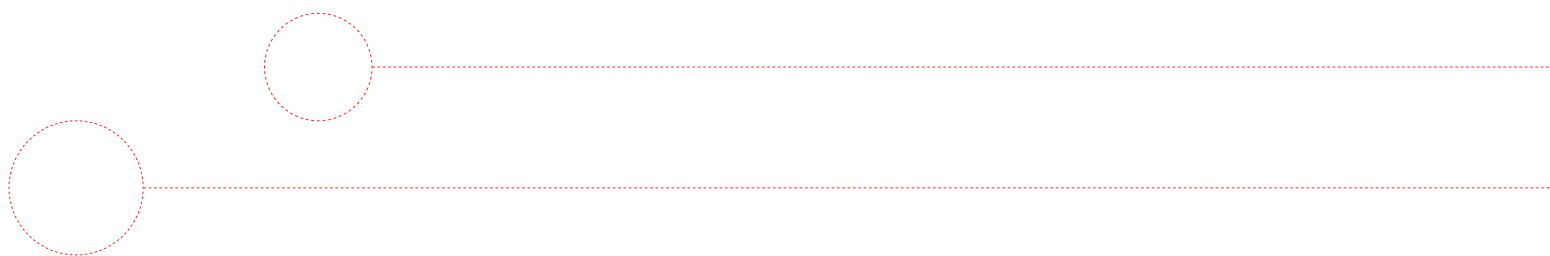
In identifying land that has been set aside for public open space, reference was made to those land parcels or portions thereof within the study area which are reserved 'Local Open Space' under TPS3. The total area of land reserved 'Local Open Space' under TPS3 comprises amounts to 62.6088 hectares.

Consideration is also given to the relevant requirements of the WAPC's Policy DC 2.3 in relation to the provision of public open space. Clause 3.1.1 of the Policy stipulates that the provision of public open space be a minimum 10% of the gross subdivisible area (being the total residential area less deductions for non residential uses such as schools, major regional roads, public utility sites, municipal use sites, or other non-residential uses).

The following table summarises land which is zoned for non-residential land uses under TPS3 within the study area:

REFER TO APPENDIX 3 – EXISTING POS PROVISION.

TPS3 Reservation / Zone		Development	Site area (hectares)	Total area of reserved / zoned land (hectares)
District Centre		Forrestfield Forum District Shopping Centre	8.9874	8.9874
Commercial Anderson Road		Edinburgh Road Shopping Centre	1.9261	2.1786
		0.2525		
Service Station BP (Cnr Hale Road & Hartfield Road)		Forrestfield Automotive (Lincoln Road)	0.1621	
		0.2289	0.3910	
Public Purpose	Aged Care	Peter Anderson Lodge / Anderson Road Community Hall	1.1994	29.5870
	Agriculture Protection Board & Conservation	Department of Agriculture Forrestfield Centre	11.8518	
	Church	St Stephen's Anglican Parish	0.3600	
	Telephone Exchange		0.2186	
	Hall / Community Centre	Woodlupine Family & Community Centre	1.8006	
		Forrestfield Hall	0.1003	
	Kindergarten	Edinburgh Road	0.2023	
	Library	Forrestfield Library	0.5064	
	Police Station	Forrestfield Police Station	0.1780	
	Primary School	Forrestfield Primary School	4.2011	
		Woodlupine Primary School	5.1040	
		Dawson Park Primary School	3.8645	
Special Use	SU1	Home Timber and Hardware / Holmes Road Centre	0.7779	7.5501
	SU2	Mead Medical Group Centre	0.1503	
	SU3	Dawson's Garden World	1.2266	
	SU4	White Star Super Deli	0.2442	
	SU9	Discovery Holiday Park	5.0699	
	SU11	Car parking (Dawson's Garden World)	0.0812	
Total				48.6941



In determining the amount of local open space in the study area, the above mentioned non-residential land uses were deducted from the Study Area to determine the gross land area from which the 10% public open space requirement would be calculated under DC Policy 2.3. The analysis revealed that based on a gross residential land area of 496.7075 hectares, the land zoned for 'Local Open Space' incorporates an additional 12.9380 hectares above the 10% minimum requirement.

The following table summarises the provision of public open space:

	Area (hectares)	%
Extent of existing 'Residential' zoned land ('Study Area')	545.4016	
Deductions (as per DC Policy 2.3)	48.6941	
Gross residential area	496.7075	
POS required @ 10%	49.6708	
Existing POS provision (land zoned 'Local Open Space')	62.6088	12.6%
Surplus local open space	12.9380	

6. INDICATIVE SUBDIVISION CONCEPT

An indicative subdivision concept has been prepared to outline how the site may be developed for residential purposes.

The concept proposes 86 single residential dwellings and proposes the retention of the western portion of the site including the existing playground and drainage swale within a new landscaped public open space area.

The concept incorporates a range of lot types and sizes with increased density around the public open space area. Lots range from laneway serviced cottage lots of approximately 300m² in area overlooking the public open space to traditional lot types of approximately 450m² in area. The average density realised under the concept equates to 15 dwellings per hectare which is consistent with the existing residential density of the surrounding area.

Lots have been arranged to front onto the public open space area thereby ensuring a high level of passive surveillance and safety of this area.

The concept is based on an interconnected grid street network with access into the site via an extension of Alder Way, as well as a new road link to Anderson Road and to York Street at Lincoln Road. The street network facilitates improved connectivity with the surrounding residential areas, and provides improved access to the Edinburgh Road Shopping Centre and Forrestfield Primary School for residents to the east of Anderson Road.

REFER TO APPENDIX 4 – INDICATIVE SUBDIVISION
CONCEPT.
City of Kalamunda

7. SUMMARY AND CONCLUSION

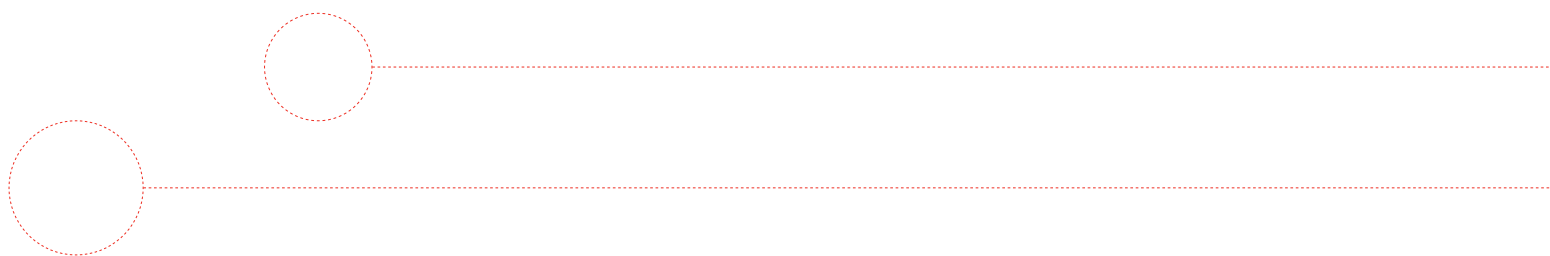
This due diligence report has been prepared by TPG Town Planning and Urban Design and Heritage on behalf of the Shire of Kalamunda in respect of the Cambridge Road recreational reserve (the 'site') to provide preliminary background information relating to the planning context and the potential of the site to be developed for residential purposes.

The following summarises the key findings contained within this report:

- The existing interests held by the Shire relating to the control and management of the land would need to be relinquished in order to permit the development of the site for residential purposes;
- The current strategic planning framework identifies a need for additional housing in the Forrestfield locality over the next 20 years to be accommodated through a combination of infill and Greenfield development;
- For the site to be developed for residential purposes, a scheme amendment to the Shire of Kalamunda Town Planning Scheme No. 3 will be required to identify the land within the 'Residential' or 'Urban Development' zone, together with a Structure Plan prior to subdivision and development;
- An analysis of land zoned for 'Local Open Space' under TPS3 within the existing residential zoned areas of Forrestfield reveal that there is a surplus of 12.9380 hectares; and
- An indicative development concept prepared for the site reveals the potential to yield 83 dwellings, including the retention of the western portion of the site as a landscaped public open space area incorporating the existing playground and drainage swale.

APPENDIX 1

CERTIFICATES OF TITLE



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REGISTER NUMBER	
2346/DP175280	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	N/A

WESTERN AUSTRALIA

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

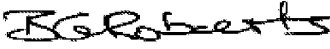
VOLUME
LR3005


FOLIO
780

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.


REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 2346 ON DEPOSITED PLAN 175280

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: SHIRE OF KALAMUNDA

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1.
- RESERVE 31348 FOR THE PURPOSE OF DRAINAGE
MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED.

Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.

(2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.

(3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: DP175280 [SHEET 1].

PREVIOUS TITLE: THIS TITLE.

PROPERTY STREET ADDRESS: 17 YORK ST, FORRESTFIELD.

LOCAL GOVERNMENT AREA: SHIRE OF KALAMUNDA.

RESPONSIBLE AGENCY: DEPARTMENT OF REGIONAL DEVELOPMENT AND LANDS (SLSD).

NOTE 1: K815566 CORRESPONDENCE FILE 02630-1971-01RO



REGISTER NUMBER	
7876/P8160	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	N/A

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

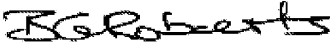
VOLUME
LR3119


FOLIO
72

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.


REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 7876 ON PLAN 8160

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: SHIRE OF KALAMUNDA OF 2 RAILWAY ROAD, KALAMUNDA
(XE H482616) REGISTERED 23 JULY 2000

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. RESERVE 27559 FOR THE PURPOSE OF PUBLIC RECREATION
H482616 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED.
REGISTERED 23.7.2000.

Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.

(2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.

(3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: LR3119-72 (7876/P8160).

PREVIOUS TITLE: LR3103-559.

PROPERTY STREET ADDRESS: 12 CAMBRIDGE RD, FORRESTFIELD.

LOCAL GOVERNMENT AREA: SHIRE OF KALAMUNDA.

RESPONSIBLE AGENCY: DEPARTMENT OF REGIONAL DEVELOPMENT AND LANDS (SLSD).

NOTE 1: A000001A CORRESPONDENCE FILE 01166-1964-01RO.

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 7876/P8160 VOLUME/FOLIO: LR3119-72 PAGE 2

NOTE 2: LAND PARCEL IDENTIFIER OF SWAN LOCATION 7876 ON SUPERSEDED PAPER
CERTIFICATE OF CROWN LAND TITLE CHANGED TO LOT 7876 ON FREEHOLD TITLE
PLAN 8160 ON 09-SEP-02 TO ENABLE ISSUE OF A DIGITAL CERTIFICATE OF TITLE.
NOTE 3: THE ABOVE NOTE MAY NOT BE SHOWN ON THE SUPERSEDED PAPER CERTIFICATE
OF TITLE.



REGISTER NUMBER 12366/D77413	
DUPLICATE EDITION N/A	DATE DUPLICATE ISSUED N/A

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

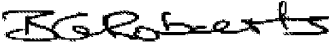
VOLUME
LR3119


FOLIO
73

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.


REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 12366 ON DIAGRAM 77413

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: SHIRE OF KALAMUNDA OF 2 RAILWAY ROAD, KALAMUNDA
(XE H482616) REGISTERED 23 JULY 2000

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. RESERVE 27559 FOR THE PURPOSE OF PUBLIC RECREATION
H482616 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED.
REGISTERED 23.7.2000.

- Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.
- (2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
- (3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: LR3119-73 (12366/D77413).

PREVIOUS TITLE: LR3103-559.

PROPERTY STREET ADDRESS: LOT 12366 YORK ST, FORRESTFIELD.

LOCAL GOVERNMENT AREA: SHIRE OF KALAMUNDA.

RESPONSIBLE AGENCY: DEPARTMENT OF REGIONAL DEVELOPMENT AND LANDS (SLSD).

NOTE 1: A000001A CORRESPONDENCE FILE 01166-1964-01RO.

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 12366/D77413 VOLUME/FOLIO: LR3119-73 PAGE 2

NOTE 2: LAND PARCEL IDENTIFIER OF SWAN LOCATION 12366 ON SUPERSEDED PAPER
CERTIFICATE OF CROWN LAND TITLE CHANGED TO LOT 12366 ON FREEHOLD
TITLE DIAGRAM 77413 ON 09-SEP-02 TO ENABLE ISSUE OF A DIGITAL CERTIFICATE
OF TITLE.

NOTE 3: THE ABOVE NOTE MAY NOT BE SHOWN ON THE SUPERSEDED PAPER CERTIFICATE
OF TITLE.



REGISTER NUMBER	
3677/D42077	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	N/A

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

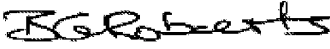
VOLUME
LR3119


FOLIO
74

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.


REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 3677 ON DIAGRAM 42077

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: SHIRE OF KALAMUNDA OF 2 RAILWAY ROAD, KALAMUNDA
(XE H482616) REGISTERED 23 JULY 2000

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. RESERVE 27559 FOR THE PURPOSE OF PUBLIC RECREATION
H482616 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED.
REGISTERED 23.7.2000.

Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.

(2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.

(3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: LR3119-74 (3677/D42077).

PREVIOUS TITLE: LR3103-559.

PROPERTY STREET ADDRESS: 12 CAMBRIDGE RD, FORRESTFIELD.

LOCAL GOVERNMENT AREA: SHIRE OF KALAMUNDA.

RESPONSIBLE AGENCY: DEPARTMENT OF REGIONAL DEVELOPMENT AND LANDS (SLSD).

NOTE 1: A000001A CORRESPONDENCE FILE 01166-1964-01RO.

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 3677/D42077

VOLUME/FOLIO: LR3119-74

PAGE 2

NOTE 2: LAND PARCEL IDENTIFIER OF CANNING LOCATION 3677 ON SUPERSEDED PAPER
CERTIFICATE OF CROWN LAND TITLE CHANGED TO LOT 3677 ON FREEHOLD TITLE
DIAGRAM 42077 ON 09-SEP-02 TO ENABLE ISSUE OF A DIGITAL CERTIFICATE OF
TITLE.

NOTE 3: THE ABOVE NOTE MAY NOT BE SHOWN ON THE SUPERSEDED PAPER CERTIFICATE
OF TITLE.



REGISTER NUMBER 2850/D49338	
DUPLICATE EDITION N/A	DATE DUPLICATE ISSUED N/A

WESTERN AUSTRALIA

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

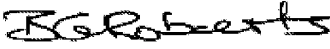
VOLUME
LR3137


FOLIO
923

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.


REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 2850 ON DIAGRAM 49338

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: SHIRE OF KALAMUNDA
(XE E221602) REGISTERED 27 OCTOBER 1989

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. E221602 PART RESERVE 34364 FOR THE PURPOSE OF PUBLIC RECREATION REGISTERED 27.10.1989.
- E221602 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED. REGISTERED 27.10.1989.

- Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.
- (2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
- (3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: D49338 [SHEET 1].

PREVIOUS TITLE: LR3000-116.

PROPERTY STREET ADDRESS: 71 MOIRA AV, FORRESTFIELD.

LOCAL GOVERNMENT AREA: SHIRE OF KALAMUNDA.

RESPONSIBLE AGENCY: DEPARTMENT OF REGIONAL DEVELOPMENT AND LANDS (SLSD).

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 2850/D49338

VOLUME/FOLIO: LR3137-923

PAGE 2

NOTE 1: J746978 CORRESPONDENCE FILE 01862-1975-01RO



REGISTER NUMBER 3487/D55585	
DUPLICATE EDITION N/A	DATE DUPLICATE ISSUED N/A

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

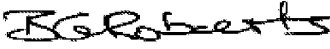
VOLUME
LR3137


FOLIO
924

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.


REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 3487 ON DIAGRAM 55585

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: SHIRE OF KALAMUNDA
(XE E221602) REGISTERED 27 OCTOBER 1989

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. E221602 PART RESERVE 34364 FOR THE PURPOSE OF PUBLIC RECREATION REGISTERED 27.10.1989.
- E221602 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED. REGISTERED 27.10.1989.

- Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.
- (2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
- (3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: D55585 [SHEET 1].

PREVIOUS TITLE: LR3000-116.

PROPERTY STREET ADDRESS: 71 MOIRA AV, FORRESTFIELD.

LOCAL GOVERNMENT AREA: SHIRE OF KALAMUNDA.

RESPONSIBLE AGENCY: DEPARTMENT OF REGIONAL DEVELOPMENT AND LANDS (SLSD).

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 3487/D55585 VOLUME/FOLIO: LR3137-924

PAGE 2

NOTE 1: J746984 CORRESPONDENCE FILE 01862-1975-01RO



REGISTER NUMBER 3059/P12494	
DUPLICATE EDITION N/A	DATE DUPLICATE ISSUED N/A

WESTERN AUSTRALIA

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

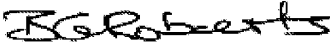
VOLUME
LR3137


FOLIO
925

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.


REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 3059 ON PLAN 12494

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: SHIRE OF KALAMUNDA
(XE E221602) REGISTERED 27 OCTOBER 1989

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. E221602 PART RESERVE 34364 FOR THE PURPOSE OF PUBLIC RECREATION REGISTERED 27.10.1989.
- E221602 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED. REGISTERED 27.10.1989.

- Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.
- (2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
- (3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: P12494 [SHEET 1].

PREVIOUS TITLE: LR3000-116.

PROPERTY STREET ADDRESS: 71 MOIRA AV, FORRESTFIELD.

LOCAL GOVERNMENT AREA: SHIRE OF KALAMUNDA.

RESPONSIBLE AGENCY: DEPARTMENT OF REGIONAL DEVELOPMENT AND LANDS (SLSD).

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 3059/P12494

VOLUME/FOLIO: LR3137-925

PAGE 2

NOTE 1: J746983 CORRESPONDENCE FILE 01862-1975-01RO



REGISTER NUMBER 3097/P12493	
DUPLICATE EDITION N/A	DATE DUPLICATE ISSUED N/A

WESTERN AUSTRALIA

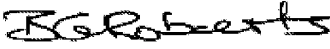
RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE


VOLUME
LR3137
FOLIO
926

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.


REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 3097 ON PLAN 12493

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: SHIRE OF KALAMUNDA
(XE E221602) REGISTERED 27 OCTOBER 1989

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. E221602 PART RESERVE 34364 FOR THE PURPOSE OF PUBLIC RECREATION REGISTERED 27.10.1989.
- E221602 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED. REGISTERED 27.10.1989.

- Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.
- (2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
- (3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: P12493 [SHEET 1].

PREVIOUS TITLE: LR3000-116.

PROPERTY STREET ADDRESS: 71 MOIRA AV, FORRESTFIELD.

LOCAL GOVERNMENT AREA: SHIRE OF KALAMUNDA.

RESPONSIBLE AGENCY: DEPARTMENT OF REGIONAL DEVELOPMENT AND LANDS (SLSD).

END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 3097/P12493

VOLUME/FOLIO: LR3137-926

PAGE 2

NOTE 1: J746980 CORRESPONDENCE FILE 01862-1975-01RO



REGISTER NUMBER	
9835/D53851	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	N/A

WESTERN AUSTRALIA

RECORD OF QUALIFIED CERTIFICATE
OF
CROWN LAND TITLE

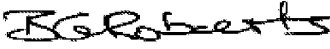
VOLUME
LR3137


FOLIO
927

UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997

NO DUPLICATE CREATED

The undermentioned land is Crown land in the name of the STATE of WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.


REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 9835 ON DIAGRAM 53851

STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)

STATUS ORDER/INTEREST: RESERVE UNDER MANAGEMENT ORDER

PRIMARY INTEREST HOLDER: SHIRE OF KALAMUNDA
(XE E221602) REGISTERED 27 OCTOBER 1989

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. E221602 PART RESERVE 34364 FOR THE PURPOSE OF PUBLIC RECREATION REGISTERED 27.10.1989.
- E221602 MANAGEMENT ORDER. CONTAINS CONDITIONS TO BE OBSERVED. REGISTERED 27.10.1989.

- Warning: (1) A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.
- (2) The land and interests etc. shown hereon may be affected by interests etc. that can be, but are not, shown on the register.
- (3) The interests etc. shown hereon may have a different priority than shown.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: D53851 [SHEET 1].

PREVIOUS TITLE: LR3000-116.

PROPERTY STREET ADDRESS: LOT 9835 MALLOW WAY, FORRESTFIELD.

LOCAL GOVERNMENT AREA: SHIRE OF KALAMUNDA.

RESPONSIBLE AGENCY: DEPARTMENT OF REGIONAL DEVELOPMENT AND LANDS (SLSD).

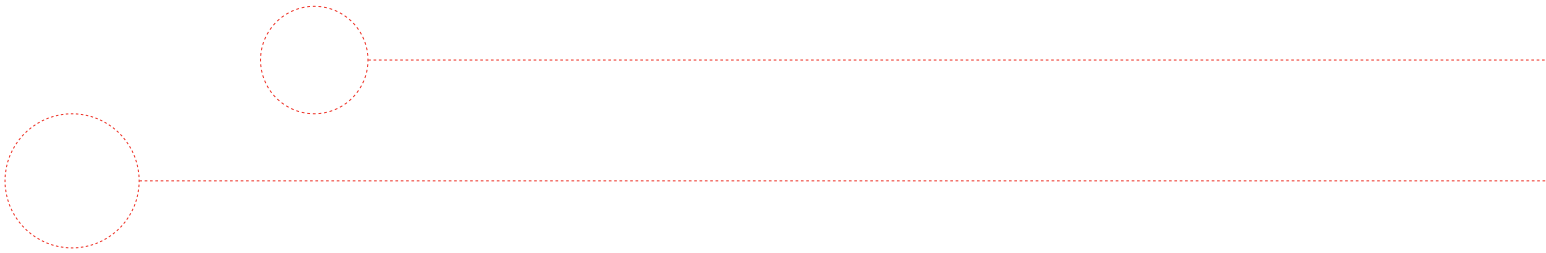
END OF PAGE 1 - CONTINUED OVER

ORIGINAL CERTIFICATE OF CROWN LAND TITLE
QUALIFIED

REGISTER NUMBER: 9835/D53851 VOLUME/FOLIO: LR3137-927

PAGE 2

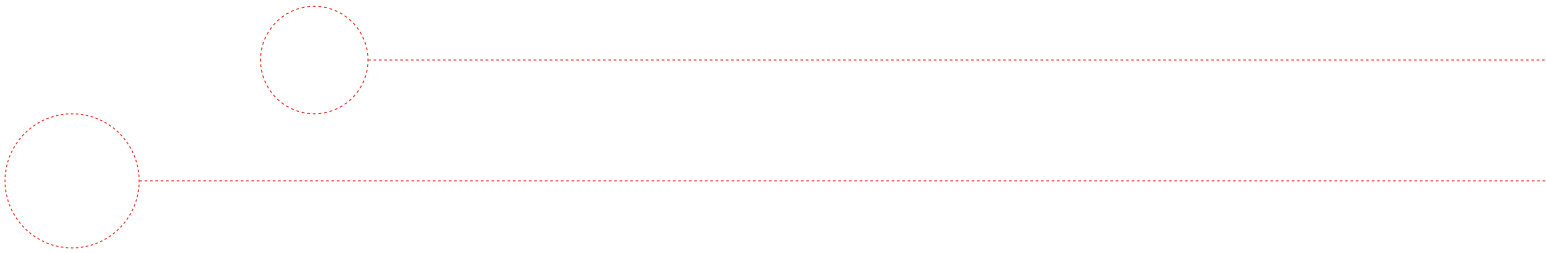
NOTE 1: J746979 CORRESPONDENCE FILE 01862-1975-01RO



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APPENDIX 2

CONTEXT ANALYSIS PLAN



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- LEGEND**
- SUBJECT SITE
 - NEIGHBOURHOOD ROAD
 - PEDESTRIAN ACCESS WAY
 - POTENTIAL ACCESS LINK
 - SHOPPING CENTRE
 - OPEN SPACE
 - SCHOOL / KINDERGARTEN
 - 400m RADIUS TO SHOPPING CENTRE
 - 132kV POWERLINE



0 500 1000m

This concept has been prepared for the purpose of meeting client specifications. The drawing does not constitute an invitation, agreement or contract (or any part thereof) of any kind whatsoever.

Although care has been taken in the compilation of this drawing by The Planning Group WA Pty Ltd, all parties associated with the proposed property development disclaim all responsibility for any errors or omissions. The right is reserved to change the plan at any time.

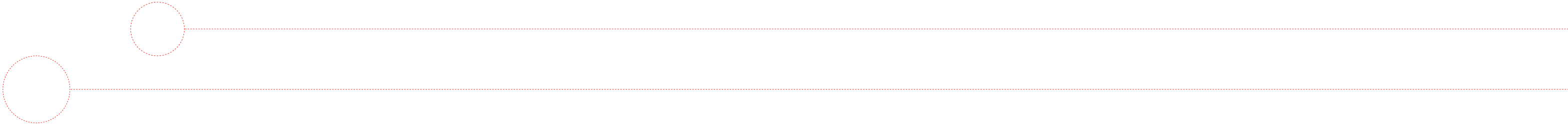
Liability is expressly disclaimed by The Planning Group WA Pty Ltd for any loss or damage which may be sustained by any person acting on any visual impression gained from this drawing.

**CONTEXT ANALYSIS
CAMBRIDGE ROAD RESERVE
SHIRE OF KALAMUNDA**

Date: 23 MAY 2012 Designer: LC
Scale: NTS @ A3 Drawn: C
Drawing No. 712.359 PL2A Context 230512.ai

**TOWN PLANNING
AND URBAN DESIGN**

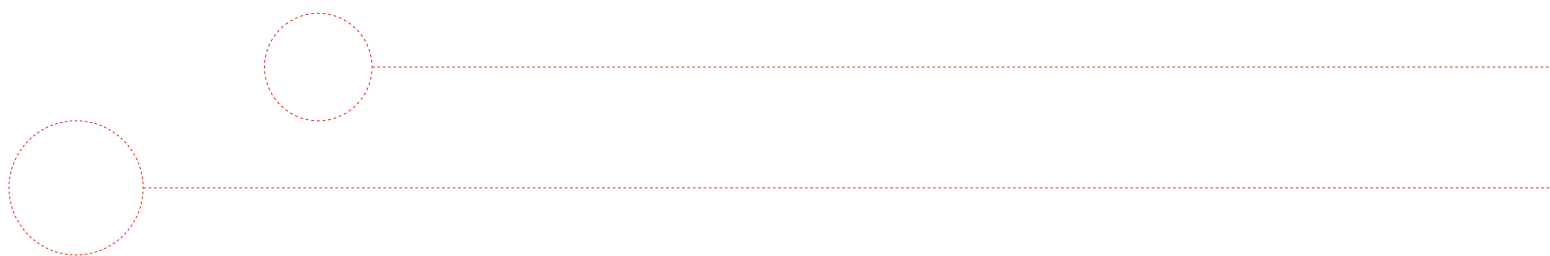




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APPENDIX 3

POS PROVISION PLAN



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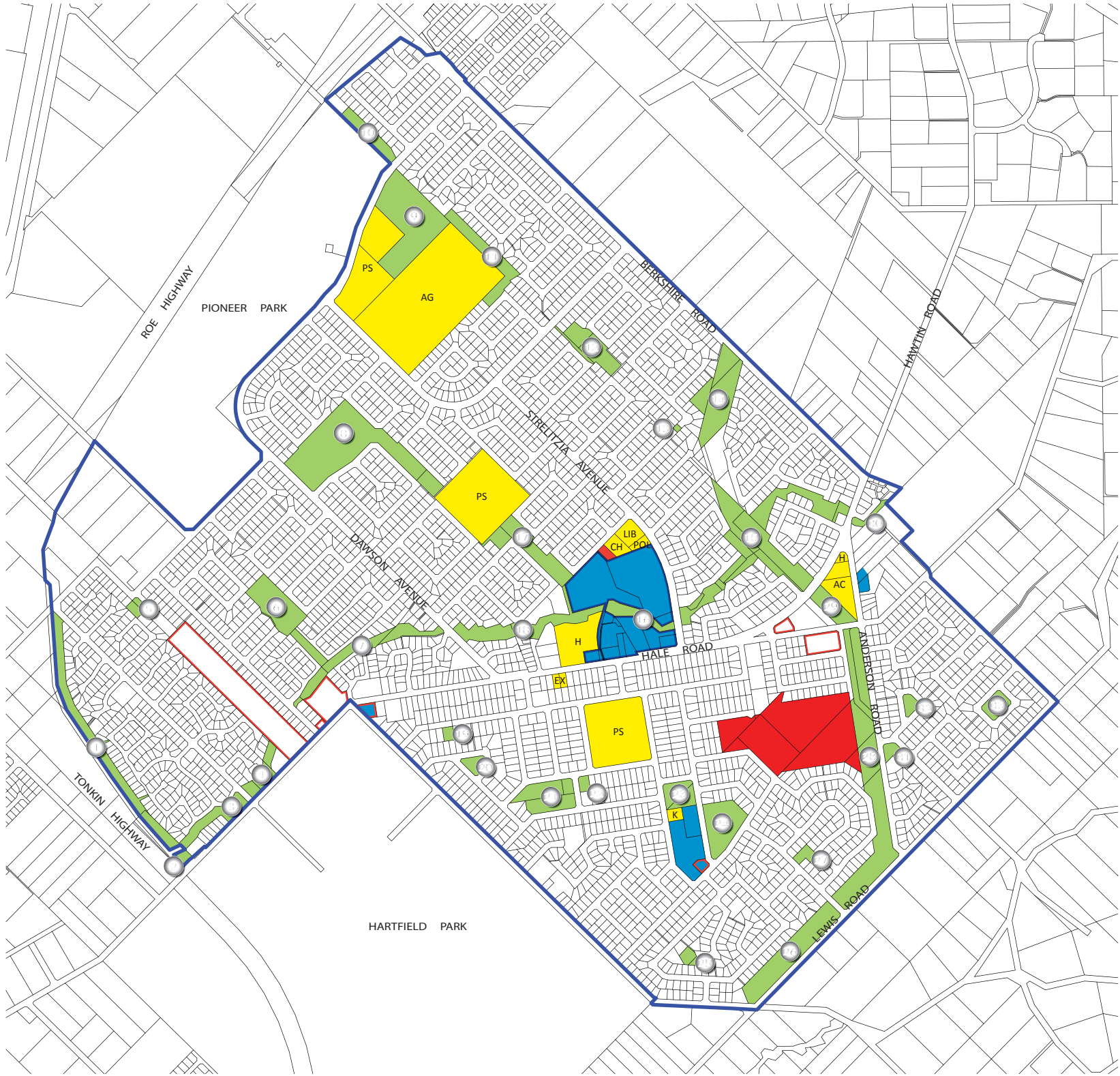
PUBLIC OPEN SPACE SCHEDULE

ID	LOT No.	RESERVE No.	LOT AREA (ha)	TOTAL AREA (ha)
Site	7876	R27559	0.7585	8.9665
	3677	R27559	0.1905	
	12366	R27559	0.0117	
	9835	R34364	0.0880	
	2346	R31348	2.0147	
	3097	R34364	0.0268	
	3487	R34364	3.1632	
	2850	R34364	2.5050	
1	3059	R34364	0.2081	2.8478
	-	R42866	2.3332	
2	23	-	0.5146	0.1745
	23	-	0.1745	
3	3803	R42573	1.0404	1.0404
4	3889	R43064	0.2054	0.6167
	3883	R43064	0.2187	
	3888	R33912	0.1926	
5	11848	R42611	0.1660	0.2384
	543	-	0.0724	
	9388	R33741	1.8861	
6	9455	R34083	0.0202	1.9063
	13601	R33912	0.4184	
7	13602	R33912	0.3622	2.1829
	13603	R33912	0.7908	
	2770	R33912	0.0479	
8	10512	R38598	0.5636	5.8982
	9639	R34706	5.5082	
	9642	R34722	0.3900	
9	9685	R35618	4.3273	4.6006
	9687	R34877	0.2733	
10	11349	R41189	0.4487	0.8772
	9686	R41189	0.4285	
11	Ptn 11858	Ptn R29815	1.4902	1.4902
12	10430	R34610	0.4324	1.4466
	9747	R35086	0.1534	
	9611	R34610	0.8608	
13	9674	R34858	0.0400	0.0400
14	9673	R34857	0.4210	2.7778
	1	-	0.5669	
15	586	-	1.7899	6.3131
	10721	R34250	0.3411	
	9972	R34250	0.0836	
	9972	R34250	0.1156	
	9972	R34250	0.0609	
	10687	R34250	0.2347	
	10032	R34250	0.0703	
	10103	R34250	0.5428	
	9524	R34250	0.1085	
	-	-	0.3300	
	101	-	0.9543	
	120	-	1.6070	
	97	-	0.3313	
	9550	R34363	1.3663	
	10222	R34363	0.1667	
16	104	-	0.7686	0.7686
17	10448	R34115	0.3373	1.7912
	9479	R34115	1.4539	
18	9120	R32912	0.8965	2.1188
	104	-	1.2223	
	8785	R31690	0.1619	
19	9127	R33000	0.3603	0.3603
21	9099	R28447	0.7681	1.7267
	8455	R28447	0.7789	
	8160	R28447	0.1797	
22	8161	R28447	0.1799	0.1799
23	7885	R27566	0.4898	0.8573
	2439	R27566	0.3675	
24	2560	R32494	1.7933	1.7933
25	3093	R35871	0.2091	0.2713
	3495	R35871	0.0622	
26	2879	R34600	2.8342	2.8342
27	3146	R36344	0.2572	0.2572
28	-	-	0.6648	5.9342
	-	-	0.8167	
	2879	R34600	2.9693	
	4	-	0.8507	
	Closed Road	-	0.6327	
29	120	-	0.8394	0.8394
30	11775	R42353	0.2460	0.2460
31	3145	R36350	0.2212	0.2212
32	2832	R34237	0.2754	0.2754
33	3018	R35230	0.2175	0.5547
	3016	R35230	0.3372	
TOTAL				62.6088

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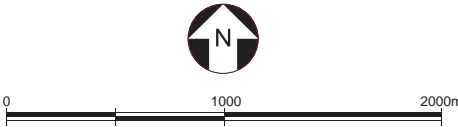
LEGEND

- █ SITE
- ▬ EXTENT OF EXISTING RESIDENTIAL ZONED LAND
- PUBLIC OPEN SPACE SITE ID

SHIRE OF KALAMUNDA TOWN PLANNING SCHEME No. 3

- LOCAL SCHEME RESERVES
- █ LOCAL OPEN SPACE
 - █ PUBLIC PURPOSES
 - AC AGED CARE
 - AG AGRICULTURE PROTECTION BOARD & CONSERVATION
 - CH CHURCH
 - EX TELEPHONE EXCHANGE
 - H HALL / COMMUNITY CENTRE
 - K KINDERGARTEN
 - LIB LIBRARY
 - POL POLICE STATION
 - PS PRIMARY SCHOOL

- ZONES
- ▬ DISTRICT CENTRE
 - ▬ COMMERCIAL
 - ▬ SERVICE STATION
 - ▬ SPECIAL USE



PUBLIC OPEN SPACE SCHEDULE

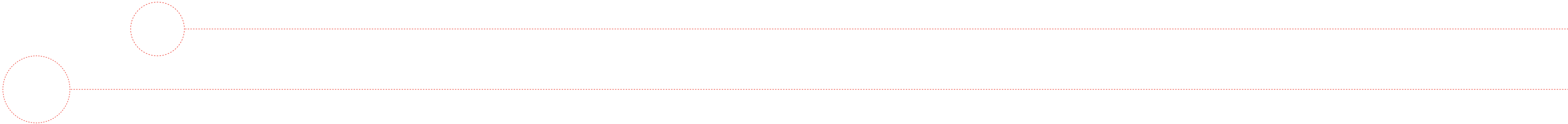
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Deductions (as per WAPC Policy DC 2.3)		
Schools/Kindergarten	13.3719	
Commercial	11.5570	
Special use	7.5501	
Other non-residential	16.2151	
Gross subdivisible area		496.7075
POS required @ 10%		49.6708
Existing POS provision		62.6088
POS surplus		12.9380

EXISTING POS PROVISION
CAMBRIDGE ROAD RESERVE
SHIRE OF KALAMUNDA

Date: 23 MAY 2012 Designer: LC
Scale: NTS @ A3 Drawn: C
Drawing No. 712.359 PL1A POS Provision 230512.ai

TOWN PLANNING
AND URBAN DESIGN

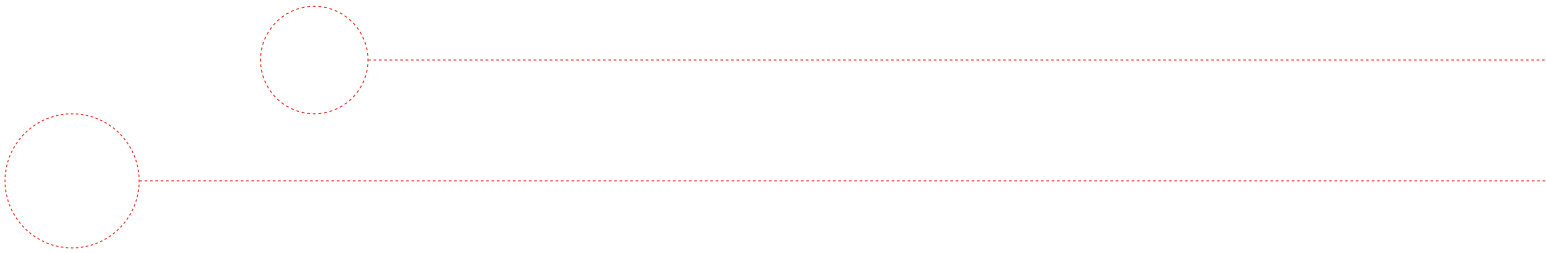




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APPENDIX 4

CAMBRIDGE RD POS MASTER PLAN



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0 20 40 80m

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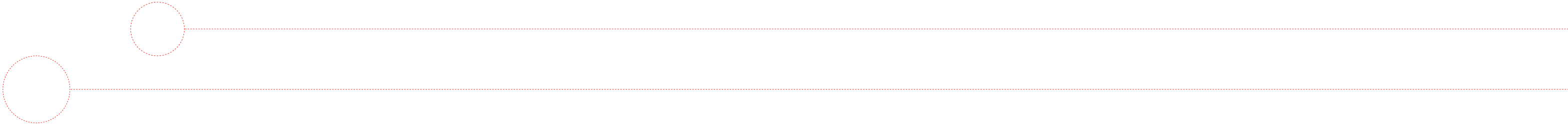
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Lot Type	15 x 28	12 x 28	10 x 28	9 x 28	7.5 x 28	TOTAL
	27	3	10	11	32	83
Percentage	33%	5%	11%	13%	38%	

Concept Plan
Cambridge Road, Forreestfield

Date: 07 June 2012 Project Manager: TP
Scale: 1:2000 @ A3 Designer: OP
Drawing No. 712-359 CP01A Drawn: OP

TOWN PLANNING
AND URBAN DESIGN





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2.0 ENVIRONMENTAL ASSESSMENT REPORTS



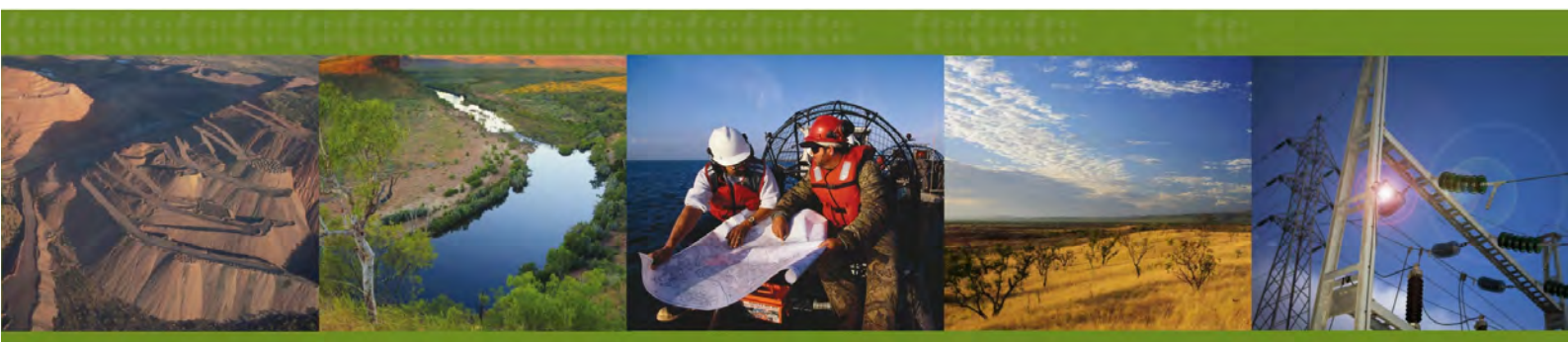
city of kalamunda

Cambridge Reserve Community Enhancement Project Environmental Reports and Studies October 2017

CONTENTS

1.0	PRELIMINARY OPPORTUNITIES AND CONSTRAINTS.....	3
2.0	LEVEL 2 FLORA AND VEGETATION SURVEY.....	4
3.0	MAPPING.....	5

1.0 PRELIMINARY OPPORTUNITIES AND CONSTRAINTS



Preliminary Opportunities and Constraints Report

York Road Reserve, Forrestfield

DRAFT

Prepared for
Shire of Kalamunda
by Strategen

May 2012



Preliminary Opportunities and Constraints Report

York Road Reserve, Forrestfield

DRAFT

Strategen is a trading name of
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Level 2, 322 Hay Street Subiaco WA
ACN: 056 190 419

May 2012

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Client: Shire of Kalamunda

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
				Form	Date
Draft Report	A0				
Final Draft Report					
Final Report					

Filename: SKA12118_01 R001 Rev A0 - 25 May 2012

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Preliminary Opportunities and Constraints Report

Table of contents

1. Introduction	2
1.1 Background	2
1.2 Desktop review	2
1.3 Site investigation	2
2. Results and discussion	5
2.1 Disturbance history	5
2.2 Topography and soils	5
2.3 Surface water	5
2.4 Flora and vegetation	7
2.4.1 Results	7
2.4.2 Discussion	8
2.5 Fauna	11
2.5.1 Results	11
2.5.2 Discussion	14
3. Conclusions and recommendations	16
4. References	17

List of tables

Table 1	Conservation significant species potentially occurring in York Street Reserve	7
Table 2	Likelihood of occurrence of flora species identified by database searches	9
Table 3	Conservation significant species potentially occurring in York Street Reserve	11
Table 4	Likelihood of occurrence of fauna species identified by database searches	12

List of figures

Figure 1	Regional location	3
Figure 2	York Street Reserve	4
Figure 3	Assessment zones	6
Figure 4	Known locations of Carnaby's black-cockatoo habitat	15

List of appendices

Appendix 1	Conservation codes
Appendix 2	Detailed zone descriptions

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Preliminary Opportunities and Constraints Report

1. Introduction

1.1 Background

The Shire of Kalamunda is currently examining opportunities to develop parts of York Street Reserve, Forrestfield. Strategen have been engaged to undertake an assessment of the site to determine whether any environmental constraints or opportunities for development are present within the Reserve.

York Street Reserve is located in Forrestfield (Figure 1), and is bounded by York Street and Moira Avenue along the southern boundary, a transmission line easement in the east, Mallow Way residences and Cambridge Road in the north, and Cumberland Road residences in the west (Figure 2). The Reserve is located less than 1 km from areas of remnant vegetation in Hartfield Park and is approximately 8.8 ha in size.

The Reserve is generally in a degraded state, having been subject to considerable disturbance in the form of trail bike use and rubbish dumping over an extended period of time.

1.2 Desktop review

Prior to visiting the site, searches were undertaken of the following databases to establish whether any conservation significant flora or fauna species could potentially occur in the Reserve:

- Naturemap (DEC 2012a) (search area encompassed a 5 km radius of an approximately central point of the Reserve)
- Environment Protection and Biodiversity Conservation Act (EPBC Act) Protected Matters Search Tool (SEWPaC 2012a) (search area encompassed the Reserve and a 1 km buffer along all boundaries).

This information was then used to inform the site investigation.

1.3 Site investigation

A general inspection of the Reserve was undertaken on 15 May 2012. During this investigation notes were taken on the following issues:

- broad site description including assessment of disturbance history
- broad description of vegetation (including dominant species observed in each area, level of weed infestation, and whether vegetation is remnant, revegetated or non-native)
- vegetation condition (rated according to the scale of Keighery [1994])
- location of any trees/stands of trees that potentially form Carnaby's black-cockatoo foraging/breeding habitat
- location of any potential graceful sun-moth habitat (*Lomandra hermaphrodita*) encountered opportunistically during the site visit
- location of any other items considered to be potential environmental constraints or opportunities.

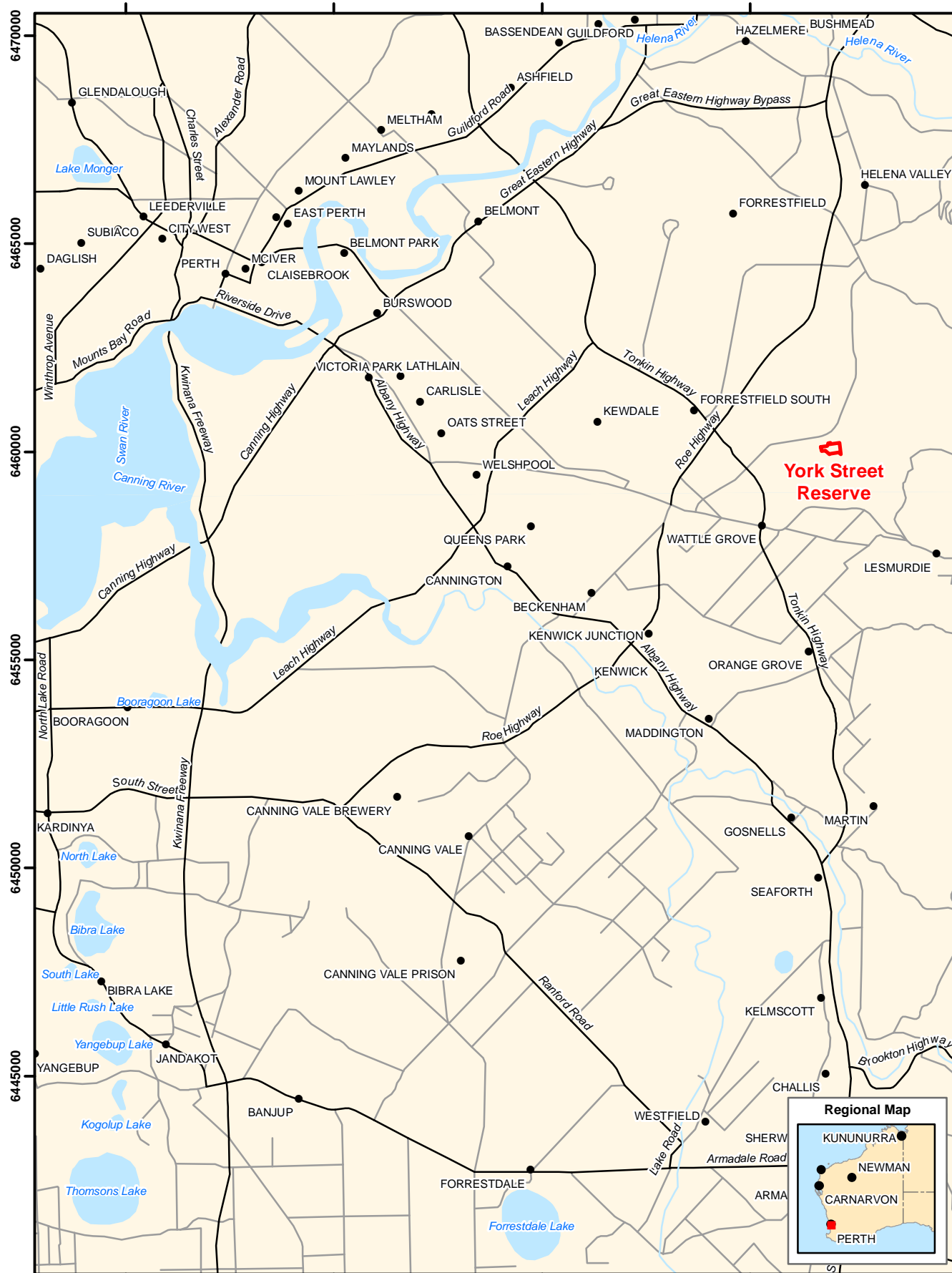


Figure 1 Regional location



STRATEGEN

info@strategen.com.au
www.strategen.com.au

Coordinate System: GDA 1994 MGA Zone 50
Date: 17/05/2012

Author: JCrute

K:\NPS\consult\2012\SKA\SKA12118.01\ArcMap_documents\R001\RevA\SKA12118_01_R001_RevA_F001.mxd

Source: Geoscience Australia 2006

Note that positional errors may occur in some areas

1:130,000
at A4

Legend

- Legend
- York Street Reserve
 - Town
 - Major road
 - Minor road
 - Major river
 - Lake



Figure 2 Project area

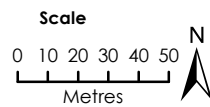
Legend

- High voltage power line
- York Street Reserve
- Sump

Cadastral boundaries



info@strategen.com.au
City of Kalamunda



Scale: 1:2,500 at A4

Coordinate System: GDA 1994 MGA Zone 50

Date: 17/05/2012

Author: jcrute

Path: Q:\GIS\Consult\2012\SKA\SKA12118.01\ArcMap_documents\R001\RevA\SKA12118_01_R001_RevA_F002.mxd

Source Aerial: Client 2012. Cadastre: SLIP Database, Landgate 2012.
Note that positional errors may occur in some areas

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Preliminary Opportunities and Constraints Report

2. Results and discussion

For the purpose of describing environmental constraints, the Reserve has been divided into eight zones, as illustrated in Figure 3. An overview is provided in the following section, with a detailed description of each individual zone provided in Appendix 2.

2.1 Disturbance history

The Reserve appears to have an extensive history of disturbance. A large portion (Zone 2) has been cleared of native vegetation altogether and revegetated with non-local eucalypt species. Weed species occur throughout the reserve, with heavier infestations in areas where historical clearing has been undertaken, or modifications such as artificial drainage channels have been constructed. It is noted that Zone 1 (Cambridge Road Reserve) is planted with lawn grasses and playground equipment is installed.

Household rubbish has been dumped throughout the Reserve, reducing the amenity of the area. In addition vehicle tracks throughout the Reserve suggest the area is highly utilised by trail bikers for recreational purposes.

No Aboriginal or Non-Aboriginal heritage sites have been identified within the Reserve.

2.2 Topography and soils

The topography of the site is generally undulating, with a local low point present in the form of a sump to the south-west of the site (Figure 2). Surface soils range from yellow-orange clayey sand to white-grey sand. In some areas, laterite gravel varying in size is present on the surface, generally consistent with the location of the drainage channels to the sump.

2.3 Surface water

Aerial photography of the Reserve has been analysed against GIS data for geomorphic wetlands as listed by the DEC as well as lakes listed under the *Environmental Protection Swan Coastal Plain Lakes Policy 1992*. No wetlands/lakes have been recorded within or near the Reserve.

It is noted the site contains a large sump, which receives drainage from the surrounding area. The sump is what is referred to as a trap low point, in that there is no drain or creek by which the water can leave the sump. The sump receives drainage from the surrounding urban areas. Following large rainfall events or wet winters, the sump will fill up and expand in area, possibly entering Zones 1 and 3. The water levels in the sump may be driven by runoff, or local groundwater, or a mixture of both.

Surface water was present in the sump on the day of inspection. It is unclear if this water was due to recent rainfall and associated run off or was an expression of the local groundwater table. The base of the sump appeared to be clay.

The maximum water level and extent of the sump will limit the area of the reserve that can be developed. In wet years and, following large rainfall events, the water may also extend into Zones 1 and 3. Hydrological modelling of runoff and groundwater is required to determine the maximum extent of the sump. This work should be undertaken early in the planning process to determine the total area of the site that can be developed.

There may be options to reduce the area impacted by the sump through the provision of a drainage outlet to the sump. Any such option would need to be proved from an engineering viewpoint and be approved by the Water Corporation and Department of Water prior to construction.



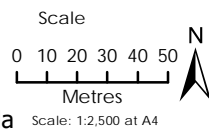
Figure 3 Assessment zones

Legend

- York Street Reserve
 Environmental constraints zone
 Zone 1
 Zone 2

- Zone 3
 Zone 4
 Zone 5

- Zone 6
 Zone 7
 Zone 8



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Preliminary Opportunities and Constraints Report

2.4 Flora and vegetation

2.4.1 Results

Table 1 provides a summary of the conservation significant flora identified as potentially occurring in the Reserve through the database searches only. Descriptions of each conservation code are available in Appendix 11.

Table 1 Conservation significant species potentially occurring in York Street Reserve

Species	Common name	Conservation status	
		WC Act/DEC listing	EPBC Act listing
<i>Acacia oncinophylla</i> subsp. <i>patulifolia</i>		P3	
<i>Andersonia gracilis</i>	Slender andersonia		Endangered
<i>Banksia mimica</i>	Summer honeypot		Endangered
<i>Boronia tenuis</i>	Blue boronia	P4	
<i>Byblis gigantea</i>	Rainbow plant	P3	
<i>Calytrix breviseta</i> subsp. <i>breviseta</i>	Swamp starflower		Endangered
<i>Centrolepis caespitosa</i>			Endangered
<i>Chamelaucium</i> sp. Gingin (N.G.Marchant 6)	Gingin wax		Endangered
<i>Conospermum undulatum</i>	Wavy-leaved smokebush	T	Vulnerable
<i>Darwinia foetida</i>	Muchea bell		Critically Endangered
<i>Eucalyptus balanites</i>	Cadda road mallee, cadda mallee		Endangered
<i>Grevillea curviloba</i> subsp. <i>incurva</i>	Narrow curved-leaf grevillea		Endangered
<i>Haemodorum loratum</i>		P3	
<i>Isopogon drummondii</i>		P3	
<i>Lasiopetalum bracteatum</i>	Helena velvet bush	P4	
<i>Lepidosperma rostratum</i>	Beaked lepidosperma		Endangered
<i>Macarthuria keigheryi</i>	Keighery's macarthuria		Endangered
<i>Pithocarpa corymbulosa</i>	Corymbose pithocarpa	P3	
<i>Senecio leucoglossus</i>		P4	
<i>Synaphea</i> sp. Fairbridge Farm (D.Papenfus 696)	Selena's synaphea		Critically Endangered
<i>Thelymitra magnifica</i>		P1	
<i>Thelymitra dedmaniarum</i> (formerly <i>T. manginii</i> K.Dixon & Batty ms)			Endangered
<i>Thelymitra stellata</i>	Star sun-orchid	T	Endangered
<i>Verticordia fimbrialepis</i> subsp. <i>fimbrialepis</i>	Shy featherflower		Endangered
<i>Villarsia calthifolia</i>	Mountain villarsia		Endangered

Source: DEC 2012a, SEWPaC 2012a

An assessment of the likelihood of each of these species actually occurring in the Reserve is provided in Table 2.

Likelihood of occurrence has been determined based on information available in the following resources:

- *Species Profile and Threats Database* (SEWPaC 2012b)
- *Florabase* (DEC 2012b)

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Preliminary Opportunities and Constraints Report

- Conservation Advice and Recovery Plans for EPBC Act listed species
- flora and fauna survey reports from Hartfield Park (Strategen 2011a and 2011b).

Where limited information was available in the above resources or it is difficult to determine due to the time of year, likelihood has been listed as “possible” if preferred habitat/soil type corresponds to that present at the Reserve. It is recommended that a spring flora survey be undertaken to confirm presence or absence of these species.

It should be noted that species identifications were made in the field based on staff members’ experience in the area, and no formal identifications were made. Further, comments regarding non-local eucalypt species pertain to a number of white and grey-stemmed eucalypts observed around the Reserve.

Identifying eucalypts involves analysis of a number of characteristics including fruit and flowers; as such, it is difficult to accurately identify eucalypt species informally, particularly where they are potentially non-local species. In this case, it is considered that where large stands of white stemmed eucalypts occur in the Reserve, they are likely to be non-local species, as eucalypts with this characteristic are relatively uncommon on the Swan Coastal Plain.

A search of the Western Australian Herbarium/DEC database has been commissioned in order to gain further certainty regarding any specific instances of Threatened or Priority Flora known within or near the Reserve.

2.4.2 Discussion

A large portion of the Reserve vegetation has been disturbed by historical clearing.

Two areas (Zones 5 and 7) contain relatively undisturbed, good quality vegetation. Despite their proximity to one another, these two areas contain distinct vegetation types, with Zone 5 being a heath of *Hakea trifurcata* over sedges and Zone 7 being a woodland of *Eucalyptus marginata* and *Corymbia calophylla* (jarrah-marri woodland) over mixed herbs and shrubs.

Zone 3 also contains remnant vegetation in reasonable condition, with a relatively diverse understorey.

Elsewhere, vegetation is limited to a mixture of native and non-native trees over a heavily disturbed understorey.

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Preliminary Opportunities and Constraints Report

Table 2 Likelihood of occurrence of flora species identified by database searches

Species	Likelihood of occurrence	Comments
<i>Acacia oncinophylla</i> subsp. <i>patulifolia</i>	Possible*	Known to occur on granitic soils, occasionally laterite (DEC 2012b).
<i>Andersonia gracilis</i>	Unlikely: no known populations near Reserve; lack of preferred habitat	Known to occur on white/grey sand, sandy clay, gravelly loam, winter-wet areas, near swamps (DEC 2012b). Currently known from the Badgingarra, Dandaragan and Kenwick areas where it is found on seasonally damp, black sandy clay flats near or on the margins of swamps, often on duplex soils supporting low open heath vegetation with species such as <i>Calothamnus hirsutus</i> , <i>Verticordia densiflora</i> and <i>Kunzea recurva</i> over sedges (Stack <i>et al.</i> 2008).
<i>Banksia mimica</i>	Possible*: recorded from the locality	Known to occur on white or grey sand over laterite, sandy loam (DEC 2012b). Recorded at a number of locations in nearby Hartfield Park (Strategen 2011a).
<i>Boronia tenuis</i>	Possible*	Known to occur on laterite, stony soils, granite (DEC 2012b).
<i>Byblis gigantea</i>	Unlikely: preferred habitat absent from the Reserve	Known to occur on sandy-peat swamps, seasonally wet areas (DEC 2012b).
<i>Calytrix breviseta</i> subsp. <i>breviseta</i>	Unlikely: only known populations situated in Kenwick, approximately 5 km from the Reserve	Known to occur on low lying, sandy clay flats, swampy flats (DEC 2012b, Luu & English 2004) among low heath of <i>Verticordia acerosa</i> , <i>Verticordia plumosa</i> , <i>Calothamnus hirsutus</i> and <i>Melaleuca uncinata</i> , over very open low sedges (Luu & English 2004). As at 2004, the taxon was thought to be confined to the Kenwick area (Luu & English 2004).
<i>Centrolepis caespitosa</i>	Unlikely: preferred habitat absent; no known populations in the vicinity of the Reserve	Populations of <i>C. caespitosa</i> have been recorded in swampy loam in low-lying winter depressions that are occasionally inundated with fresh water, amongst vegetation dominated by sedges and low shrubs (Gilfillan and Barrett 2004a). Eight known populations of <i>C. caespitosa</i> occur in the south-west of Western Australia, at the following locations: <ul style="list-style-type: none"> • South Stirling • Meelon Nature Reserve (Pemberton district) • east of Meckering • Pearce (Pemberton district) • Pinjarra • South Coast Highway (Albany district) • east of Busselton (Gilfillan & Barrett 2004a).
<i>Chamelaucium</i> sp. Gingin (N.G.Marchant 6)	Unlikely: no known populations in the vicinity of the Reserve	As at 2003, considered to be confined to a 3 km range in the Gingin/Chittering area (Stack & English 2003).
<i>Conospermum undulatum</i>	Possible*: recorded from the locality, similar soil type present at the Reserve	Known to occur on grey or yellow-orange clayey sand (DEC 2012b), often over laterite on flat or gently sloping sites between the Swan and Canning Rivers. A few records are from slightly swampy habitat (DEC 2009a). A number of records are known from the nearby Hartfield Park (Strategen 2011a).
<i>Darwinia foetida</i>	Unlikely: no known populations in the vicinity of the Reserve	Known to occur on grey-white sand on swampy, seasonally wet sites, alongside areas where water collects. The species' range is very restricted, occurring in a small area near the town of Muchea, approximately 70 km north of Perth (TSSC 2009).

SKA12118_01 R001 Rev A0

28-May-12

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Preliminary Opportunities and Constraints Report

Species	Likelihood of occurrence	Comments
<i>Eucalyptus balanites</i>	Unlikely: no known populations in the vicinity of the Reserve; preferred habitat absent	Known from two populations in Badgingarra and Armadale (Patten <i>et al.</i> 2004), occurring on sandy soils with lateritic gravel (DEC 2012b). Habitat consists of gently sloping heathlands; open mallee woodland over shrubland or heathland with emergent mallees (Patten <i>et al.</i> 2004).
<i>Grevillea curviloba</i> subsp. <i>incurva</i>	Unlikely: no known populations in the vicinity of the Reserve	Known to occur on sand, sandy loam, in heath in winter-wet areas, on sand over limestone, or over ironstone at sites with a high water table, confined to an area between Muchea and Badgingarra (Phillimore & English 2000).
<i>Haemodorum loratum</i>	Possible*	Grey or yellow sand, gravel (DEC 2012b).
<i>Isopogon drummondii</i>	Possible*	White, grey or yellow sand, often over laterite (DEC 2012b).
<i>Lasiopetalum bracteatum</i>	Possible*	Sandy clay, clay, lateritic gravel, along drainage lines, creeks, gullies, granite outcrops (DEC 2012b).
<i>Lepidosperma rostratum</i>	Unlikely: preferred habitat absent from the Reserve	Known from four populations, associated with marsh banksia (<i>Banksia telmatiaea</i>) and hairy clawflower (<i>Calothamnus hirsutus</i>), in sandy soil among low heath in winter-wet swamps (TSSC 2008a).
<i>Macarthuria keigheryi</i>	Possible*	Currently known from six populations of which two are in metropolitan Perth (Welshpool and Kewdale), where it occurs in low-lying winter-wet damp, grey/white sands and grows in open patches with low tree canopy cover among heathland, jarrah (<i>Eucalyptus marginata</i>) and <i>Allocasuarina</i> /banksia woodland (DEC 2009b).
<i>Pithocarpa corymbulosa</i>	Possible*	Known to occur on gravelly or sandy loam and amongst granite outcrops (DEC 2012b).
<i>Senecio leucoglossus</i>	Possible*	Known to occur on gravelly lateritic or granitic soils and granite outcrops or slopes (DEC 2012b).
<i>Synaphea</i> sp. Fairbridge Farm (D.Papenfus 696)	Unlikely: no known populations in the vicinity of the Reserve	Known to occur on grey, clayey sand with lateritic pebbles and near winter-wet flats, in low woodland with weedy grasses (DEC 2012b, DEC 2007). Restricted to a range of approximately 870 km ² in the Shires of Murray, Serpentine-Jarrahdale and Dardanup (DEC 2007).
<i>Thelymitra magnifica</i>	Unlikely: preferred habitat absent from the Reserve	Known to occur on stony ridges (DEC 2012b).
<i>Thelymitra dedmaniarum</i> (formerly <i>T. manginii</i> K.Dixon & Batty ms)	Unlikely: no known populations in the vicinity of the Reserve; preferred habitat absent	Known from two populations northeast of Perth, confined to open wandoo woodland on red/brown sandy loam associated with dolerite and granite outcropping, with <i>Eucalyptus wandoo</i> , <i>E. accedens</i> and <i>Corymbia calophylla</i> , over low scrub of <i>Acacia pulchella</i> , <i>A. saligna</i> , <i>Calothamnus quadrifidus</i> , <i>Melaleuca radula</i> and <i>Hakea lissocarpha</i> (Phillimore <i>et al.</i> 1999)
<i>Thelymitra stellata</i>	Possible*	Known to occur on gravelly loam among low heath and scrub in <i>Eucalyptus marginata</i> and <i>E. wandoo</i> woodland, and in low heath on lateritic hill tops (TSSC 2008b).
<i>Verticordia fimbrilepis</i> subsp. <i>fimbrilepis</i>	Unlikely: no known populations in the vicinity of the Reserve; preferred habitat absent	Distributed from southeast of Armadale to Brookton and Kojonup, occurring on low-lying shallow grey sand and yellowish-white sandy loam over gravel, sometimes with clay, in heath and shrubland and open wandoo woodland (DEC 2010a).
<i>Villarsia calthifolia</i>	Unlikely: no known populations in the vicinity of the Reserve	Restricted to Porongorup Range (Gilfillan & Barrett 2004b).

*Where likelihood of occurrence is listed as possible it is recommended that a spring flora survey be undertaken to confirm presence or absence of these species.

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Preliminary Opportunities and Constraints Report

2.5 Fauna

2.5.1 Results

Table 3 provides a summary of the conservation significant fauna identified as potentially occurring in the Reserve through the database searches only. Descriptions of each conservation code are available in Appendix 11.

Table 3 Conservation significant species potentially occurring in York Street Reserve

Species	Common name	Conservation status	
		WC Act/DEC listing	EPBC Act listing
<i>Dasyurus geoffroii</i>	Chuditch	T	
<i>Isoodon obesulus</i> subsp. <i>fusciventer</i>	Quenda	P5	
<i>Macropus irma</i>	Western brush wallaby	P4	
<i>Morelia spilota</i> subsp. <i>imbricata</i>	Carpet python	S	
<i>Neelaps calonotos</i>	Black-striped snake	P3	
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black-cockatoo		Vulnerable
<i>Calyptorhynchus baudinii</i>	Baudin's black-cockatoo, long-billed black-cockatoo		Endangered
<i>Calyptorhynchus latirostris</i>	Carnaby's black-cockatoo, short-billed black-cockatoo		
<i>Leipoa ocellata</i>	Malleefowl		Vulnerable, migratory
<i>Rostratula australis</i>	Australian painted snipe		Vulnerable
<i>Dasyurus geoffroii</i>	Chuditch, western quoll		Vulnerable
<i>Phascogale calura</i>	Red-tailed phascogale		Endangered
<i>Setonix brachyurus</i>	Quokka		Vulnerable
Migratory birds			
<i>Apus pacificus</i>	Fork-tailed swift		
<i>Ardea alba</i>	Great egret, white egret		
<i>Ardea ibis</i>	Cattle egret		
<i>Haliaeetus leucogaster</i>	White-bellied sea-eagle		
<i>Merops ornatus</i>	Rainbow bee-eater		
<i>Rostratula benghalensis</i> (sensu lato)	Painted snipe		Vulnerable

Source: DEC 2012a, SEWPaC 2012a

An assessment of the likelihood of occurrence of each species is presented in Table 4.

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Preliminary Opportunities and Constraints Report

Table 4 Likelihood of occurrence of fauna species identified by database searches

Species	Likelihood of occurrence	Comments
<i>Isoodon obesulus</i> subsp. <i>fusciventer</i> (quenda)	Likely: suitable habitat; known to persist in urban areas; recorded in Hartfield Park	Preferred habitat is dense scrubby, often swampy, vegetation with cover up to one metre high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Associated with wetlands on the Swan Coastal Plain, known to occur in disturbed areas around human settlements (SEWPaC 2012b). Evidence of this species was recorded in nearby Hartfield Park (Strategen 2011b).
<i>Macropus irma</i> (western brush wallaby)	Unlikely: sensitive to urban disturbance	Preferred habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland (DEC 2010b). Considered unlikely to occur in nearby Hartfield Park which contains a larger area of good quality remnant vegetation, due to tendency of the species to move away from urbanised areas (Strategen 2011b).
<i>Morelia spilota</i> subsp. <i>imbricata</i> (carpet python)	Unlikely: sensitive to urban disturbance	Considered as possibly occurring in long undisturbed vegetation in nearby Hartfield Park. Few records on the Swan Coastal Plain; only likely to persist in areas undisturbed for long periods (Strategen 2011b).
<i>Neelaps calonotos</i> (black-striped snake)	Unlikely: sensitive to urban disturbance	Considered as possibly occurring in long undisturbed vegetation in nearby Hartfield Park. Tends to move out of urbanised areas (Strategen 2011b).
<i>Calyptorhynchus banksii naso</i> (forest red-tailed black-cockatoo)	Likely: observed in Hartfield Park	Foraging habitat is <i>Eucalyptus marginata</i> , <i>Allocasuarina fraseriana</i> , <i>Corymbia calophylla</i> , all present in the Reserve..
<i>Calyptorhynchus baudinii</i> (Baudin's black-cockatoo, long-billed black-cockatoo)	Possible: potential habitat present in Hartfield Park	Generally restricted to forests in the south-west, the Reserve falls within the range of the species. Considered to possibly occur in nearby Hartfield Park given its distribution and preferred foraging habitat (Strategen 2011).
<i>Calyptorhynchus latirostris</i> (Carnaby's black-cockatoo, short-billed black cockatoo)	Likely: observed in Hartfield Park	Observed in nearby Hartfield Park (Strategen 2011).
<i>Leipoa ocellata</i> (malleefowl)	Unlikely: known distribution does not coincide with the Reserve; preferred habitat absent	Known from semi-arid and arid zones of temperate Australia, in shrublands and low woodlands dominated by mallee vegetation, eucalypt or <i>Callitris</i> woodlands, acacia shrublands, <i>Melaleuca uncinata</i> vegetation or coastal heathlands (SEWPaC 2012b).
<i>Rostratula australis</i> (Australian painted snipe)	Unlikely: preferred habitat absent from the Reserve	Generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands. The species has also been observed using natural or artificial water bodies and areas of inundated or waterlogged grasslands (SEWPaC 2012).
<i>Dasyurus geoffroii</i> (chuditch, western quoll)	Possible: recorded in Hartfield Park	Generally restricted to wet and dry sclerophyll forest and remnant mallee in the south-west, though evidence of species recorded from nearby Hartfield Park (Strategen 2011b).
<i>Phascogale calura</i> (red-tailed phascogale)	Unlikely: preferred habitat absent at the Reserve	Habitat is <i>Allocasuarina</i> woodlands with hollow-containing eucalypts (e.g. <i>Eucalyptus wandoo</i>) and <i>Gastrolobium</i> spp. (SEWPaC 2012b).

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Species	Likelihood of occurrence	Comments
<i>Setonix brachyurus</i> (quokka)	Unlikely: preferred habitat absent and known mainland distribution unlikely to include the Reserve	Habitat is recently burnt stands of native vegetation, particularly dense riparian vegetation; mainland populations scarce with patchy distribution due to high levels of habitat fragmentation and feral animal competition (SEWPAC 2012b).
Migratory birds		
<i>Apus pacificus</i> (fork-tailed swift)	Possible	Almost exclusively aerial (SEWPAC), may forage over the Reserve.
<i>Ardea alba</i> (great egret, white egret)	Possible	Habitat comprises a wide range of wetland habitats including artificial water bodies (SEWPAC 2012b).
<i>Ardea ibis</i> (cattle egret)	Possible	Habitat comprises a wide range of wetland habitats including artificial water bodies (SEWPAC 2012b).
<i>Haliaeetus leucogaster</i> (white-bellied sea eagle)	Possible	Generally recorded near open water but has been observed in terrestrial areas including woodland and urban areas (SEWPAC 2012b).
<i>Merops ornatus</i> (rainbow bee-eater)	Possible	Occurs in coastal dune systems amongst open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water. Regularly recorded in disturbed areas including urban and industrial areas (SEWPAC 2012b).
<i>Rostratula benghalensis</i> (sensu lato) (painted snipe)	Possible	Habitat comprises a wide range of wetland habitats including artificial water bodies (SEWPAC 2012b).

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Preliminary Opportunities and Constraints Report

2.5.2 Discussion

Fauna and fauna habitat

Zones 5 and 7 are relatively undisturbed; as such they may act as habitat islands for some fauna species. The Reserve is also likely to provide habitat for fauna species that are less sensitive to human activity, such as the quenda and a range of bird species. Common bird species such as the Australian magpie (*Gymnorhina tibicen dorsalis*), magpie-lark (*Grallina cyanoleuca*) and common bronzewing (*Phaps chalcoptera*) were observed throughout the Reserve during the site visit.

The Reserve is connected by its eastern boundary to a partially vegetated strip of land (transmission line easement) that terminates at Hartfield Road. This area may provide some connectivity for fauna movement between the Reserve, Hartfield Park and the heavily vegetated properties along Lewis Road. The Reserve is also less than 1 km from vegetated areas (including private properties) along the base of the scarp to the east.

Graceful Sun-moth

The Graceful Sun-moth (*Synemon gratiosa*) is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and often presents an environmental constraint to development on the Swan Coastal Plain. The species can occur in areas of coastal heath, on host plant *Lomandra maritima*, or in banksia woodland, using *Lomandra hermaphrodita*.

In relation to the York Street Reserve, the EPBC Protected Matters database does not identify the Graceful Sun-moth as potentially occurring in the Reserve. Corresponding with this result, banksia woodland was not observed at the Reserve nor *Lomandra hermaphrodita*. However, although *Lomandra* was not observed opportunistically during the site visit, it cannot be completely ruled out as being present, particularly in the more intact vegetation of Zones 5 and 7. Further targeted surveys could provide specific confirmation of the presence/absence of this species.

Carnaby's Black-cockatoo

Carnaby's Black cockatoo (*Calyptorhynchus latirostris*) is also listed as an Endangered threatened species under the EPBC Act and is therefore a matter of national environmental significance (NES). If a proposed development or other action is likely to have a significant impact upon a NES it must be referred for assessment under the EPBC Act.

The preliminary site assessment has identified a number of large trees in Zones 1, 3, 6, 7 and 8 which may be suitable foraging habitat for the Carnaby's black-cockatoo and/or forest red-tailed black cockatoo.

The EPBC Draft Referral Guidelines for Carnaby's cockatoo and Forest red-tailed black cockatoo (SEWPaC 2011) recommend a project be referred as 'high risk of significant impacts' if it involves clearing of more than 1 ha of quality foraging habitat. Depending on how the land is developed, it is likely that the development will involve clearing of less than 1 ha of foraging habitat; however a more detailed assessment will be required once a concept plan has been developed for the site.

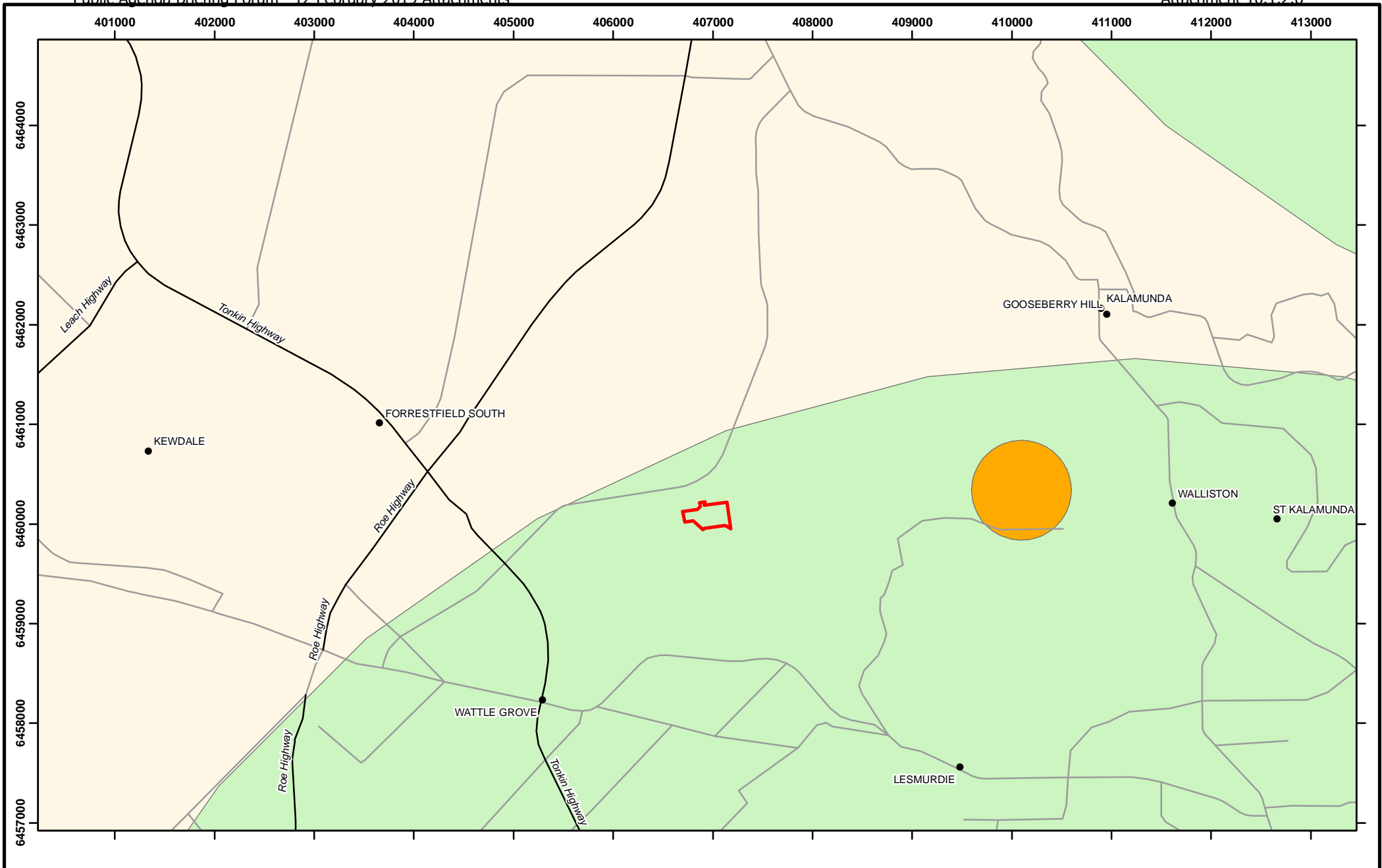


Figure 4

Locations of known Carnaby's black-cockatoo habitat areas

Coordinate System: GDA 1994 MGA Zone 50
Date: 17/05/2012

Author: jcrute

Path: Q:\GIS\Consult\2012\SKA\SKA12118.01\ArcMap_documents\R001\RevA\SKA12118_01_R001_RevA_F004.mxd

Source: Geoscience Australia 2006, Carnaby's: DEC 2011
Note that positional errors may occur in some areas

Legend

- Town
- Major road
- Minor road



York Street Reserve



Carnaby's confirmed roost areas



Carnaby's confirmed breeding areas

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Preliminary Opportunities and Constraints Report

3. Conclusions and recommendations

Overall the main constraints to development identified through this assessment are as follows:

- the location of the existing sump and uncertainty regarding the maximum extent in times of heavy rainfall
- key areas of high-quality vegetation / fauna habitat located in Zones 5 and 7
- remnant vegetation in reasonable condition located in Zone 3
- potential foraging habitat for the EPBC listed Carnaby's black-cockatoo and/or Forest red-tailed cockatoo.

It is recommended that the following additional work be undertaken to more confirm the level of constraint these issues may pose to development of the site:

- a spring flora & fauna survey to clearly assess the areas of high-quality vegetation and fauna habitat
- detailed assessment of Carnaby's black-cockatoo and/or Forest red-tailed cockatoo once a concept plan has been determined for the site.

It is noted that some potentially some of these issues listed above, such as the location of high-quality vegetation in Zones 5 and 7, could actually be perceived as an opportunity to provide for an environmentally sensitive designed development if managed correctly.

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Preliminary Opportunities and Constraints Report

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Appendix 1

Conservation codes

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Appendix 2

Detailed zone descriptions

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Zone 1

Zone 1 comprises remnant native and non-native trees over a degraded understorey. Native trees included *Allocasuarina fraseriana* (sheoak), *Eucalyptus marginata* (jarrah) and *Corymbia calophylla* (marri). Native shrubs/trees including *Nuytsia floribunda* (WA Christmas tree) and *Hakea trifurcata* (two-leaf hakea) were also observed along the boundary along the drainage channel, alongside a fence bounding a residential area.

This zone is largely cleared of native understorey, with areas of lawn in the west, and heavy weed infestations of *Oxalis* sp., *Arundo donax* (giant reed), *Eragrostis curvula* (African lovegrass) and other non-native grasses, along a drainage channel running from the corner of Mallow Way towards the sump. A small area near the corner Mallow Way retained some native understorey including shrubs such as *Xanthorrhoea preissii* (grasstree) and sedges including *Mesomelaena tetragona*. A stand of relatively young *C. calophylla* is also present, directly adjacent to the westernmost end of the sump.

Vegetation condition for this zone is Degraded – Completely Degraded.

Four large *C. calophylla* and two *E. marginata*, with diameter at breast height (DBH) of 50 cm or above, were observed in this zone. Trees with this DBH are considered by the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) to be suitably sized for potential breeding habitat for Carnaby's black-cockatoo. *C. calophylla*, *E. marginata* and *A. fraseriana* are also used as foraging habitat by Carnaby's black-cockatoo.



Plate 1 Vegetation of Zone 1, showing remnant native vegetation (right) alongside heavy weed infestation

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Plate 2 Heavy weed infestation along drainage area in Zone 1

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Zone 2

Zone 2 appears to have been completely cleared in the past, and revegetated with what appear to be non-local eucalypt species (possibly native to another bioregion of Western Australia), with occasional local native trees remaining in some parts. Vegetation in this zone is in Completely Degraded condition, due to the lack of remnant vegetation.

This zone also contains the sump, which receives drainage from the surrounding area. Further information on this sump is provided in Section 2.3.



Plate 3 Revegetation with non-native eucalypts in Zone 2



Plate 4 Standing water in sump area of Zone 2

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Zone 3

Zone 2 comprises remnant vegetation with heavy weed infestations, but with a reasonably diverse understorey of remnant native species. Vegetation comprised an overstorey of *Allocasuarina fraseriana* with *Eucalyptus marginata*. The following native understorey species were also observed (not an exhaustive list):

- *Xanthorrhoea preissii*
- *Stirlingia latifolia*
- *Banksia dallaneyi*
- *Mesomelaena tetragona*
- *Cristonia biloba*
- *Hovea trisperma*
- *Centella asiatica*
- *Bossiea eriocarpa*
- *Daviesia incrassata*
- *Daviesia nudiflora*.

Vegetation in Zone 2 is in Degraded – Good condition, with the Degraded rating applying mainly to the cleared areas (e.g. tracks) within this zone.

A large specimen of *C. calophylla* (>50 cm DBH) was observed in the southernmost corner of the Reserve. Trees with this DBH are considered by the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) to be suitably sized for potential breeding habitat for Carnaby's black-cockatoo.



Plate 5 Remnant native vegetation in Zone 3

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Zone 4

Zone 4 comprises small areas of what appear to be non-local eucalypt species and native shrubs (largely *Hakea trifurcata* and *Pericalymma ellipticum*) over weeds.

Vegetation in Zone 4 is in Degraded – Completely Degraded condition.



Plate 6 *Hakea trifurcata* heath, heavy weed infestation and disturbance in Zone 4

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Zone 5

Zone 5 comprises a heath of *Hakea trifurcata* over mixed sedges, and with occasional emergent *Banksia sessilis*, *Pericalymma ellipticum*, *Corymbia calophylla* saplings and non-local eucalypt species. Soils in this zone are clayey, with laterite gravel on the surface.

Vegetation in Zone 5 is in Good – Very Good condition, with the exception of areas cleared for tracks.



Plate 7 *Hakea trifurcata* heath in Zone 5



Plate 8 *Hakea trifurcata* heath in Zone 5

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Zone 6

Zone 6 comprises some remnant overstorey species including *Corymbia calophylla* and *Hakea trifurcata* over grassy weeds and occasional native understorey species.

Vegetation in Zone 6 is in Degraded – Completely Degraded condition.



Plate 9 Remnant trees and shrubs over weedy understorey in Zone 6

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Zone 7

Zone 7 comprises *Corymbia calophylla* and *Eucalyptus marginata* woodland over *Xanthorrhoea preissii* and mixed shrubs and herbs. This zone appeared to be quite diverse and relatively undisturbed, with weeds restricted to tracks and boundaries.

Vegetation in Zone 7 is in Very Good to Excellent condition, with the exception of tracks and small areas of localised disturbance.



Plate 10 Relatively undisturbed jarrah-marri woodland in Zone 7



Plate 11 Relatively undisturbed jarrah-marri woodland in Zone 7

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Zone 8

Zone 8 is similar in composition to Zone 1, with a mixture of remnant and non-local tree species over a heavily disturbed and weed-infested understorey.

Vegetation is in Degraded to Completely Degraded condition.



Plate 12 Mixture of native and non-native trees over disturbance and heavy weeds in Zone 8

2.0 LEVEL 2 FLORA AND VEGETATION SURVEY

York Road Reserve Forrestfield Level 2 Flora and Vegetation Survey



DECEMBER 2012



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Executive Summary

Plantecology Consulting was commissioned by Strategen to undertake a detailed spring flora and vegetation survey of the York St Reserve, Forrestfield (the site) in the Shire of Kalamunda. The purpose of the survey was to provide a detailed assessment of botanical values within the site, which could then inform the development process regarding future usage. The Reserve is located less than 1 km from areas of remnant vegetation in Hartfield Park and is approximately 8.8 ha in size.

A reconnaissance survey undertaken in May 2012 described eight vegetation zones within the reserve. Five of these zones were described as generally being in a degraded state, having been subject to considerable disturbance in the form of trail bike use and rubbish dumping over an extended period of time. Three zones of remnant vegetation were identified: Zones 3, 5 and 7. Zone 3 is a jarrah woodland in reasonable condition with Zone 7 containing similar vegetation that has less evidence of disturbance. Zone 5 is a heath of *Hakea trifurcata* over sedges.

A detailed survey of the vegetation was undertaken by a botanist from Plantecology Consulting on the 2nd November 2012. Eight sampling points, one in each vegetation type (zone) identified in the May 2012 reconnaissance survey, was used to sample the vegetation. A total of 97 native and 57 introduced (non-native) taxa were recorded within the site, representing 47 families and 115 genera. No Threatened Flora pursuant to the *Wildlife Conservation Act (1950)* nor the *EPBC Act (1999)* were recorded during the survey. Also, no Priority Flora listed by the DEC were recorded during the survey.

The vegetation types within the site largely correspond to the zones identified by Strategen (2012), except for Zones 3 and 7, which are floristically similar and have been combined into the one vegetation type (Figure 2). The seven vegetation types are:

Vegetation Type 1: Parkland of *Corymbia calophylla* and ornamental eucalypts over mixed grassland.

Vegetation Type 2: Open parkland of ornamental eucalypts over very sparse understorey on yellow sands

Vegetation Type 3/7: Open woodland of *Eucalyptus marginata* and *Allocasuarina fraseriana* over open shrubland of *Xanthorrhoea preissii* over sedgeland of *Mesomelaena tetragona*, *Mesomelaena pseudostygia* and *Dasypogon bromeliifolius*

Vegetation Type 4: Occasional trees of *Eucalyptus ?rudis* and *Eucalyptus camaldulensis* subsp. *obtusa* over open shrubland of *Hakea trifurcata* over grassland of **Ehrharta calycina* and **Pennisetum clandestinum*

Vegetation Type 5: Open heath of *Hakea trifurcata* and *Leptospermum erubescens* over sedgeland of *Mesomelaena tetragona*

Vegetation Type 6: Open woodland of *Eucalyptus wandoo* subsp. *wandoo* and ornamental eucalypts over open shrubland of *Hakea trifurcata* and *Isopogon dubius* over grassland of **Ehrharta calycina*

Vegetation Type 8: Open woodland of *Eucalyptus marginata* and *Eucalyptus camaldulensis* subsp. *obtusa* over open shrubland of *Xanthorrhoea preissii* over introduced grasses.

The results of the cluster analysis determined that both Vegetation Type 3/7 and Vegetation Type 5 belong in FCT 3c: *Corymbia calophylla* – *Xanthorrhoea preissii* woodlands and shrublands. FCT 3c is a TEC, listed as Endangered pursuant to the EPBC Act and as Critically Endangered under DEC criteria. FCT 3c is restricted to the eastern side of the Swan Coastal Plain and has been extensively cleared. According to the Department of Sustainability, Environment, Water, Population and Communities (SEWPAC), approximately 97% of the community's original extent may have been cleared, leaving only about 41 ha extant today. Among the threats to the remaining stands of this community are clearing, invasive species, and changes in hydrology and fire frequency.

In addition to listing as a TEC, the vegetation within the site is part of the Forrestfield Vegetation Complex. Only 9% of this vegetation complex remains (Government of Western Australia 2000) and is therefore considered a Critical Asset by the EPA.

Given the ecological values of the site, it is suggested that:

- Development of the site include plans or policies to improve the vegetation condition of the remnant vegetation within the York St Reserve.

Furthermore, it is recommended that:

- No clearing of Vegetation Types 3/7 and 5 be approved; and
- Any development of the site includes appropriate buffers or barriers to minimise adverse impacts to the native vegetation within the reserve.

Table of Contents

1	Introduction.....	3
1.1	Purpose	3
1.2	Location.....	3
1.3	Existing Environment	3
1.4	Climate	4
1.5	Vegetation Complexes	4
1.6	Soils.....	4
1.7	Conservation Significant Flora	4
1.8	Conservation Significant Communities.....	9
2	Methods.....	12
2.1	Field Survey	12
2.2	Data analysis and Classification	13
2.3	Study Limitations and Survey Effort.....	13
3	Results.....	15
3.1	Flora	15
3.1.1	Floristic Summary	15
3.1.2	Threatened and Priority Flora.....	15
3.2	Vegetation.....	15
3.2.1	Assignment of Plant Associations	16
3.2.2	Vegetation Condition.....	16
3.3	Weeds	16
4	Discussion.....	17
5	Summary and Recommendations	18
6	References.....	19

List of Figures

Figure 1: Locality Plan

Figure 2: Vegetation Types

Figure 3: Vegetation Condition

List of Tables

Table 1: Definitions for categories of Threatened and Priority Flora.....	5
Table 2: Categories of protection for species and communities listed under the EPBC Act.....	7
Table 3: Threatened and Priority Flora potentially occurring within the survey area.	8
Table 4: Categories and definitions of Threatened and Priority Ecological Communities (DEC 2012).....	10
Table 5: Potential limitations affecting the vegetation survey.....	14

DRAFT

1 Introduction

Plantecology Consulting was commissioned by Strategen to undertake a detailed spring flora and vegetation survey of the York St Reserve, Forrestfield (the site) in the Shire of Kalamunda (Figure 1). A reconnaissance survey of the site had already been undertaken as part of a Constraints and Opportunities study in May 2012 (Strategen 2012) for the Shire of Kalamunda, which was evaluating the development potential of the site. The reconnaissance survey found that most of the site to be disturbed and in poor condition. However, some areas of good quality native vegetation were also present and it was recommended that a more detailed assessment was required to identify the ecological values of the site.

1.1 Purpose

The purpose of the survey was to provide a detailed assessment of botanical values within the site, which could then inform the development process regarding future usage.

The objectives of the survey were to:

- Undertake a detailed spring flora and vegetation survey in accordance with the Environmental Protection Authority's (EPA) Guidance Statement No. 51 – *Terrestrial flora and vegetation survey environmental impact assessment in Western Australia* (2004).
- Undertake a desktop review by examining other local flora and vegetation reports and undertaking an on-line search of government databases;
- Identify the plant associations present and assign them to the Swan Coastal Plain Floristic Community Type classification (Gibson et al., 1994).
- Identify the presence of any Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs);
- Undertake a systematic search for all vascular flora taxa present; and
- Record the locations and numbers present of any Threatened Flora and Priority Flora.

1.2 Location

York Street Reserve is located in Forrestfield (Figure 1), and is bounded by York Street and Moira Avenue along the southern boundary, a transmission line easement in the east, Mallow Way residences and Cambridge Road in the north, and Cumberland Road residences in the west. The Reserve is located less than 1 km from areas of remnant vegetation in Hartfield Park and is approximately 8.8 ha in size.

1.3 Existing Environment

The reconnaissance survey described eight vegetation zones within the reserve. Five of these zones were described as generally being in a degraded state, having been subject to considerable disturbance in the form of trail bike use and rubbish dumping over an extended period of time. The site has been extensively cleared and used for passive recreation, with many walk trails crossing the reserve. Playground equipment has been installed in the westernmost section of the reserve (Zone 1). Zone 2 is the most extensive zone and has been planted with ornamental eucalypts with little to no understorey. It also contains a large sump. Three zones of remnant vegetation were

identified: Zones 3, 5 and 7. Zone 3 is a jarrah woodland in reasonable condition with Zone 7 containing similar vegetation that has less evidence of disturbance. Zone 5 is a heath of *Hakea trifurcata* over sedges (Strategen 2012).

1.4 Climate

The Forrestfield area experiences a dry Mediterranean climate of hot dry summers and cool wet winters. Long-term climatic averages indicate the site is located in an area of moderate to high rainfall, receiving 775.3 mm on average annually (data for Perth Airport, the nearest currently reporting station) (Bureau of Meteorology 2012) with the majority of rainfall received between June and August. The area experiences rainfall on an average of 86 days per year. Mean maximum temperatures range from 17.9 °C in July to 31.9 °C in February. Mean minimum temperatures range from 8.0 °C in July and August to 17.5 °C in February.

1.5 Vegetation Complexes

The vegetation of the site forms part of the Forrestfield Vegetation Complex, which ranges from an open forest of *Corymbia. calophylla*, *Eucalyptus wandoo* and *Eucalyptus marginata* to an open forest of *Eucalyptus marginata*, *Corymbia calophylla*, *Allocasuarina fraseriana* and *Banksia* species. A fringing woodland of *Eucalyptus. rudis* may occur in gullies within this landform (Heddle et al. 1980). Only 9% remains of the original pre-European extent of the Forrestfield Vegetation Complex (Government of Western Australia 2000). EPA Position Statement No.9 identifies vegetation complexes with less than 10% of their original extent remaining in constrained areas (such as the Perth Metropolitan Area) on the Swan Coastal Plain, to be critical assets. Any clearing of a critical asset would generally be at variance to clearing principles contained within Schedule 5 of the Environmental Protection Act 1986.

1.6 Soils

The major soil formations within the site is the Forrestfield Soil Formation, which is expressed as gently undulating spurs at the foot of the Darling Scarp and is dominated by gravelly and sandy soils (Churchward and McArthur 1980). The Atlas of Australian Soils maps the soils for the majority of the site as Map Unit Sp2, which are “hard acidic yellow soils (Dy2.61) containing ironstone gravels. Associated are brown sands (Uc4.2) often containing ironstone gravels at depth and forming a western fringe to the bench; and some (Dy3.4) soils on dissected areas” (Natural Resource Information Centre 1991). In the extreme west of the site, a small area of Map Unit Cb38, which comprises “Sandy dunes with intervening sandy and clayey swamp flats: chief soils are leached sands (Uc2.33) and (Uc2.21), sometimes with a clay D horizon below 5 ft, on the dunes and sandy swamps. Associated are various soils in the clayey swamps, such as (Ug6.4) and some (Dy) and (Dg) soils” (Natural Resource Information Centre 1991).

1.7 Conservation Significant Flora

Under the *Wildlife Conservation Act 1950* ('WC Act'), the Minister for the Environment produces a gazetted '*Wildlife Conservation (Rare Flora) Notice*' that lists Threatened (or Declared Rare) Flora under two Schedules; extant and presumed extinct. The DEC also produces a list of Priority Flora that have not been assigned statutory protection under the *WC Act* but may be under some degree of threat. The DEC recognises five Priority Flora levels. The definitions for each category of Threatened and Priority Flora are shown in Table 1.

Table 1: Definitions for categories of Threatened and Priority Flora (Department of Environment and Conservation 2012)

Category	DEC Definition
Schedule 1—Extant Flora T: Threatened Flora (Declared Rare Flora – Extant)	<p>Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the <i>Wildlife Conservation Act 1950</i>).</p> <p>Threatened Flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN Red List criteria:</p> <ul style="list-style-type: none"> ■ CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild ■ EN: Endangered – considered to be facing a very high risk of extinction in the wild ■ VU: Vulnerable – considered to be facing a high risk of extinction in the wild
Schedule 2—Extinct Flora X: Presumed Extinct Flora (Declared Rare Flora - Extinct)	<p>Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such (Schedule 2 under the <i>Wildlife Conservation Act 1950</i>).</p>
P1: Priority One: Poorly Known	<p>Species that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.</p>
P2: Priority One: Poorly Known	<p>Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.</p>
P3: Priority One: Poorly Known	<p>Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.</p>

Category	DEC Definition
P4: Priority Four: Rare, Near Threatened and other species in need of monitoring	<ul style="list-style-type: none"> a. Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. b. Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. c. Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
P5: Priority Five: Conservation Dependent Species	P5: Priority Five - Conservation Dependent Species:- Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

As well as protection under State legislation, selected flora species are also afforded statutory protection at a Federal level pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPBC Act provides for the protection of Threatened species, pursuant to Schedule 1 of the Act, and are defined as “Critically Endangered”, “Endangered”, “Vulnerable” or “Conservation Dependent” under Section 179. Definitions of these categories are shown in Table 2. Any action likely to have a significant impact on a species listed under the EPBC Act requires approval from the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities.

Database searches conducted by Strategen (2012) identified 23 taxa with the potential to occur within the site. Of these taxa, eleven were considered more likely to occur within the site due to the proximity of previous records and/or the habitat within the site. *Banksia mimica* and *Conospermum undulatum* have both been recorded from nearby Hartfield Park. *Macarthuria keigheryi* is currently known from six populations of which two are in metropolitan Perth (Welshpool and Kewdale), where it occurs in low-lying winter-wet damp, grey/white sands. *Boronia tenuis*, *Acacia oncinophylla* subsp. *patulifolia*, *Haemodorum loratum*, *Isopogon drummondii*, *Lasiopetalum bracteatum*, *Pithocarpa corymbulosa*, *Senecio leucoglossus* and *Thelymitra stellata* are known to occur in soil types that exist within the site.

Table 2: Categories of protection for species and communities listed under the EPBC Act.

EPBC Act Category	DSEWPC Definition
Extinct	A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
Extinct in the wild	A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time:
	(a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
	(b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically endangered	A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	A native species is eligible to be included in the endangered category at a particular time if, at that time
	(a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
Vulnerable	A native species is eligible to be included in the vulnerable category at a particular time if, at that time:
	(a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.
Conservation dependent	A native species is eligible to be included in the conservation dependent category at a particular time if, at that time: (a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Table 3: Threatened and Priority Flora potentially occurring within the survey area.

Taxa	DEC Rating	EPBC Act Category
<i>Acacia oncinophylla</i> subsp. <i>patulifolia</i>	P3	
<i>Andersonia gracilis</i>	T	Endangered
<i>Banksia mimica</i>	T	Endangered
<i>Boronia tenuis</i>	P4	
<i>Byblis gigantea</i>	P3	
<i>Calytrix breviseta</i> subsp. <i>breviseta</i>	T	Endangered
<i>Centrolepis caespitosa</i>	P4	Endangered
<i>Chamelaucium</i> sp. Gingin (N.G.Marchant 6)	T	Endangered
<i>Conospermum undulatum</i>	T	Vulnerable
<i>Darwinia foetida</i>	T	Critically Endangered
<i>Eucalyptus balanites</i>	T	Endangered
<i>Grevillea curviloba</i> subsp. <i>incurva</i>	T	Endangered
<i>Haemodorum loratum</i>	P3	
<i>Isopogon drummondii</i>	P3	
<i>Lasiopetalum bracteatum</i>	P4	
<i>Lepidosperma rostratum</i>	T	Endangered
<i>Macarthuria keigheryi</i>	T	Endangered
<i>Ornduffia calthifolia</i>	T	Critically Endangered
<i>Pithocarpa corymbulosa</i>	P3	
<i>Senecio leucoglossus</i>	P4	
<i>Synaphea</i> sp. Fairbridge Farm (D.Papenfus 696)	T	Critically Endangered
<i>Thelymitra magnifica</i>	P1	Endangered
<i>Thelymitra dedmaniarum</i> (formerly <i>T. manginii</i> K.Dixon & Batty ms)	T	Endangered
<i>Thelymitra stellata</i>	T	Endangered
<i>Verticordia fimbrialepis</i> subsp. <i>fimbrialepis</i>	T	Endangered

1.8 Conservation Significant Communities

The DEC defines an ecological community as “a naturally occurring assemblage that occurs in a particular type of habitat” (DEC 2012). A Threatened Ecological Community (TEC) is one that has declined in area or was originally limited in distribution. Uncommon ecological communities that do not strictly meet TEC defined criteria, or are inadequately defined, are listed by the DEC as a Priority Ecological Community (PEC). Definitions of the categories of Threatened and Priority Ecological Communities are given in Table 4.

As well as protection under State legislation, selected ecological communities are also afforded statutory protection at a Federal level pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPBC Act provides for the protection of TECs, which are listed under section 181 of the Act, and are defined as “Critically Endangered”, “Endangered” or “Vulnerable” under Section 182. Similar to flora species listed under the EPBC Act, any action likely to have a significant impact on a TEC listed under the EPBC Act requires Commonwealth approval.

Table 4: Categories and definitions of Threatened and Priority Ecological Communities (DEC 2012)

Category	DEC definition
PD: Presumed Destroyed	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.
Critically Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.
Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
Vulnerable	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.
Priority 1	Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 100 ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist.
Priority 2	Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation.

Category	DEC definition
Priority 3	<p>(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;</p> <p>(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.</p>
Priority 4	<p>Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.</p> <p>(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.</p>
Priority 5	<p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

2 Methods

2.1 Field Survey

The field survey was conducted by a botanist from Plantecology Consulting on the 2nd November 2012, using a standard phytosociological approach in accordance with EPA Guidance Statement No. 51.

A detailed survey of the vegetation was undertaken at 8 sampling points, one in each vegetation type (zone) identified in the May 2012 reconnaissance survey. In the stands of remnant native vegetation (i.e. Zones 3, 5 and 7) 400 m² relevés (quadrats) were established, selected to adequately sample the flora within a stand. Relevés were positioned to sample a representative and homogeneous (i.e. not located in transitional areas between communities) area of each community.

The location of each corner of a relevé was recorded with a hand-held GPS unit and a photograph taken looking inward to the quadrat. All vascular plant species were recorded and an estimate of the Foliage Projective Cover (FPC) percentage was made for each species. In addition, opportunistic plant taxa that were observed, but not located at a particular survey location, were also recorded throughout the course of the survey.

Environmental data recorded included topographic position, aspect, slope, soil colour and texture class, rock outcropping, litter cover as well as the degree of disturbance and an estimate of the time since the last fire event. The condition of the vegetation of the site was assessed to update the previous surveys and assist in determining the conservation values of the site. The vegetation condition was rated according to Keighery (1994), a vegetation condition scale commonly used in the Metropolitan Region. The categories are listed and defined in Table 5. Data on the vegetation structure was also recorded and included the height of the three main strata and the dominant species within each stratum. The vegetation structural description follows that of the National Vegetation Information System (Thackway *et al.* 2006).

In addition to the relevés, the vegetation of disturbed and parkland-cleared zones was sampled using mapping points (unbound plots) at one site within each zone. At each mapping point, the same environmental and vegetation structure data described previously was recorded and a search made for any Priority or Threatened flora, and an inventory of the species present taken.

All plant specimens collected during the field survey were dried, pressed and then sorted in accordance with requirements of the Western Australian Herbarium. Identification of specimens occurred through comparison with named material and through the use of taxonomic keys. Taxonomic determinations were made using reference material at the Western Australian State Herbarium. Taxa names utilise the current terminologies from FloraBase (2012). Family names utilise the revised phylogeny of the Angiosperm Phylogeny Group - APGIII (FloraBase 2012).

Table 5: Vegetation Condition Scale (Keighery 1994)

Vegetation Condition	Definition
Pristine (1)	Pristine or nearly so, no obvious signs of disturbance.
Excellent (2)	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very Good	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

2.2 Data analysis and Classification

The relevé data for each stand of remnant native vegetation was assigned a FCT using presence/absence species data so that a comparison could be made against the DEC's TEC database. The site data was reconciled with the SCP dataset of Gibson *et al.* (1994) by standardising the names of taxa with those used in the earlier study. This was necessary due to changes in nomenclature in the intervening period. Taxa that were only identified to genus level were excluded while some infra-species that have been identified since 1994 were raised to species level. The combined dataset was then analysed using a Sorenson distance measure (equivalent to the Czekanowski distance measure for presence/absence data used in the original analysis) with Group Average linkage in the analysis package PC-ORD (McCune and Mefford 2006). The analysis was first run without the addition of the York St reserve data to check for misclassifications against the original output. There were some sites misclassified, but these were considered minor as other methods that were tried produced far more misclassifications. As data from a localised study is often highly spatially correlated compared to the data from a regional study, the York St Reserve data was added to the SCP dataset and analysed for each individual sample site. This removes the influence of spatial correlation when assigning a FCT to the local plant communities.

2.3 Study Limitations and Survey Effort

Various factors can limit the effectiveness of a vegetation survey. Pursuant to *EPA Guidance Statement 51* (EPA 2004), these factors have been identified and their potential impact on the effectiveness of the survey has been assessed (Table 5).

There were no factors identified that were considered as being major impediments the effectiveness of the vegetation survey.

Table 5: Potential limitations affecting the vegetation survey

Potential limitations	Constraint	Comment
Competency and experience of the botanists undertaking the survey	No	The survey was undertaken by botanist with a comprehensive knowledge of Swan Coastal Plain vegetation, with at least 10 years experience in vegetation surveys in Western Australia.
Seasonality	Minor constraint	Rainfall was about average for September but well below average for October 2012. Rainfall therefore may be considered a minor survey constraint as the dry conditions in October could have affected the flowering of some species.
Adequate ground coverage and intensity of survey effort	No	The survey area was traversed on foot. It is considered the survey quadrats and mapping points provided adequate coverage given the degraded nature of most of the site.
Proportion of Flora identified	No	The small size of the reserve and limited number of quadrats doesn't allow for analysis of the proportion of the flora sampled. However, single visit surveys in southwestern Australia of similar intensity usually sample between 75% and 85% of the estimated total flora.
Burn Cycle	No	There were no signs of recent fires.
Resources	No	Adequate resources were available to conduct the survey.
Access restrictions	No	There were no access restrictions and all requisite areas were visited. All areas were accessible.

3 Results

3.1 Flora

3.1.1 Floristic Summary

A total of 97 native and 57 introduced (non-native) taxa were recorded within the site, representing 47 families and 115 genera. Introduced taxa included Australian native species that do not naturally occur within the local area but have been planted as ornamentals within the site. The dominant families containing mostly native taxa were Myrtaceae (13 native taxa, 9 introduced taxa), Fabaceae (12 native, 7 introduced taxa) and Proteaceae (12 native, no weed taxa). The most common genus was *Eucalyptus* spp. (10 taxa). For a complete species list and the individual site data refer to Appendix A and Appendix C, respectively.

3.1.2 Threatened and Priority Flora

No Threatened Flora pursuant to the *Wildlife Conservation Act (1950)* nor the *EPBC Act (1999)* were recorded during the survey. Also, no Priority Flora listed by the DEC were recorded during the survey.

3.2 Vegetation

The vegetation types within the site largely correspond to the zones identified by Strategen (2012), except for Zones 3 and 7, which are floristically similar and have been combined into the one vegetation type (Figure 2). The seven vegetation types are:

Vegetation Type 1: Parkland of *Corymbia calophylla* and ornamental eucalypts over mixed grassland.

Vegetation Type 2: Open parkland of ornamental eucalypts over very sparse understorey on yellow sands

Vegetation Type 3/7: Open woodland of *Eucalyptus marginata* and *Allocasuarina fraseriana* over open shrubland of *Xanthorrhoea preissii* over sedgeland of *Mesomelaena tetragona*, *Mesomelaena pseudostygia* and *Dasypogon bromeliifolius*

Vegetation Type 4: Occasional trees of *Eucalyptus ?rudis* and *Eucalyptus camaldulensis* subsp. *obtusata* over open shrubland of *Hakea trifurcata* over grassland of **Ehrharta calycina* and **Pennisetum clandestinum*

Vegetation Type 5: Open heath of *Hakea trifurcata* and *Leptospermum erubescens* over sedgeland of *Mesomelaena tetragona*

Vegetation Type 6: Open woodland of *Eucalyptus wandoo* subsp. *wandoo* and ornamental eucalypts over open shrubland of *Hakea trifurcata* and *Isopogon dubius* over grassland of **Ehrharta calycina*

Vegetation Type 8: Open woodland of *Eucalyptus marginata* and *Eucalyptus camaldulensis* subsp. *obtusata* over open shrubland of *Xanthorrhoea preissii* over introduced grasses.

In five of the described zones the vegetation has been disturbed in the past and replaced with non-native species, including ornamental eucalypts not endemic to the area. Zone 1 is at the western end of the reserve and has been parkland cleared and playground equipment installed. Zone 2 is a rehabilitated area and includes a drainage sump. The trees in this zone are mostly ornamental eucalypts such as *Angophora costata* and *Eucalyptus conferruminata*. The sump was vegetated with weed species such as *Pennisetum clandestinum* (kikuyu) and *Arundo donax*. Zones 4 and 6 were also a highly

disturbed areas with open overstories of eucalypt species and occasional native shrubs such as *Hakea trifurcata*. The groundlayer consisted of introduced grasses such kikuyu and perennial veldt grass (*Ehrharta calycina*). Zone 8 is near the southern boundary of the site and has been heavily disturbed in the past.

The two native vegetation types are Vegetation Type 3/7 and Vegetation Type 5. The lower-storeys of both vegetation types share many of the same sedge species but Vegetation Type 5 lacks the overstorey of *Eucalyptus marginata* and *Allocasuarina fraseriana*. Vegetation Type 5 is also dominated by heath of *Hakea trifurcata*.

3.2.1 Assignment of Plant Associations

The results of the cluster analysis determined that both Vegetation Type 3/7 and Vegetation Type 5 belong in FCT 3c: *Corymbia calophylla* – *Xanthorrhoea preissii* woodlands and shrublands (Appendix D). The Zone 5 quadrat was most closely associated with sites in the FCT 3c group, as was the Zone 3 quadrat. The association was not close, however, but this is often observed when adding new data to the dataset. The Zone 7 quadrat was grouped with sites belonging to FCT 6: Weed dominated wetlands on heavy soil. This is an anomalous result given the similarity between the Zone 7 and Zone 3 vegetation, but is often observed when the groundlayer contains many introduced species and/or when taxa uncommon or not included in the original SCP dataset are present at a site. It is reasonable, therefore, to infer that the vegetation within Zone 7 also belongs to FCT 3c.

3.2.2 Vegetation Condition

The majority of the site is in a “Completely Degraded” condition and retains little of its original botanical value (Figure 3). The original structure of Vegetation Types 1, 4, 6 and 8 has been extensively altered with the upper- and mid-storeys now very open. The groundlayers are dominated by mainly introduced grasses. In Zone 2, the vegetation appears to have been completely cleared and rehabilitated with ornamental eucalypts. Almost no ground- or mid-storey exists.

The native remnants in Vegetation Types 3/7 and 5 are mostly in “Very Good” condition with some areas in “Excellent” condition. Some areas in Zones 3 and 5 where there is more extensive weed invasion have been rated in “Good” condition.

3.3 Weeds

Over one third of the taxa recorded during the survey were naturalised weeds or species not endemic to the local area. Sixteen of the weed species were introduced grasses and all of the daisy species (Asteraceae spp.) recorded were weeds. A number of eucalypts not endemic to the area but commonly planted as ornamentals in the Perth region were rerecorded and included *Eucalyptus grandis*, *Eucalyptus conferuminata*, *Eucalyptus pulverulenta*, *Corymbia maculata* and *Angophora costata*.

4 Discussion

The cluster analysis determined the native vegetation of the York St Reserve to be FCT 3c. Whilst this result needs to be confirmed by the DEC's Species and Communities Branch, the result is consistent with descriptions given by Gibson *et al.* (1994). Most of the typical species listed for FCT 3c were present, including *Eucalyptus wandoo* in Zone 6, which is an occasional dominant in this community. It is likely that the original vegetation of most of the reserve belonged to FCT 3c but has now been cleared.

FCT 3c is a TEC, listed as Endangered pursuant to the EPBC Act and as Critically Endangered under DEC criteria. FCT 3c is restricted to the eastern side of the Swan Coastal Plain and has been extensively cleared. According to the Department of Sustainability, Environment, Water, Population and Communities (SEWPAC), approximately 97% of the community's original extent may have been cleared, leaving only about 41 ha extant today. Among the threats to the remaining stands of this community are clearing, invasive species, and changes in hydrology and fire frequency.

In addition to listing as a TEC, the vegetation within the site is part of the Forrestfield Vegetation Complex. Only 9% of this vegetation complex remains (Government of Western Australia 2000) and is therefore considered a Critical Asset by the EPA. Clearing of this vegetation would likely be considered as being at variance to Principle (E) of Schedule 5 of the *Environmental Protection Act 1986*.

A number of invasive weeds, mostly grasses, were recorded from the site. Whilst none are Declared Plants pursuant to the *Agricultural and Related Resources Protection Act 1976*, many are very invasive and may have a high impact on ecological processes. Grasses such as **Ehrharta calycina*, **Eragrostis curvula*, **Hyparrhenia hirta* and **Tribolium uniola* may invade disturbed sites quickly and outcompete native species. The effects of weed invasion is evident in parts of the native vegetation stands within the reserve where disturbance to the understorey has resulted in replacement to varying degrees by invasive species.

It is unlikely that clearing of the remnant vegetation within the reserve would be approved. The disturbed areas present little impediment to development but the interface with the stands of native vegetation will be very important. Buffers or barriers should be designed to minimise impacts upon the vegetation such as changes in hydrology and weed invasion.

5 Summary and Recommendations

The remnant native vegetation within the York St Reserve retains high ecological value. As part of the Forrestfield Vegetation Complex, it is considered a Critical Asset by the EPA and is afforded statutory protection pursuant to the EPBC Act and under DEC policies. Given the ecological values of the site, it is suggested that:

- Development of the site include plans or policies to improve the vegetation condition of the remnant vegetation within the York St Reserve.

Furthermore, it is recommended that:

- No clearing of Vegetation Types 3/7 and 5 be approved; and
- Any development of the site includes appropriate buffers or barriers to minimise adverse impacts to the native vegetation within the reserve.

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7 Figures

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Figure 1: Locality Plan

Figure 2: Vegetation Types

Figure 3: Vegetation Condition

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Appendix A

List of flora recorded within the survey area

NB: * indicates introduced flora

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Family	Non-native	Taxon
Colchicaceae		<i>Burchardia congesta</i>
Orchidaceae	*	<i>Disa bracteata</i>
Boryaceae		<i>Borya sphaerocephala</i>
Iridaceae	*	<i>Freesia alba x leichtlinii</i>
	*	<i>Gladiolus caryophyllaceus</i>
		<i>Patersonia juncea</i>
		<i>Patersonia occidentalis</i>
	*	<i>Romulea rosea</i>
Xanthorrhoeaceae		<i>Xanthorrhoea ?brunonis</i>
		<i>Xanthorrhoea preissii</i>
Asparagaceae		<i>Laxmannia squarrosa</i>
		<i>Lomandra hermaphrodita</i>
		<i>Lomandra sericea</i>
		<i>Thysanotus dichotomus</i>
		<i>Thysanotus thyrsoides</i>
		<i>Thysanotus triandrus</i>
Hemerocallidaceae		<i>Tricoryne elatior</i>
Haemodoraceae		<i>Anigozanthos manglesii</i> subsp. <i>manglesii</i>
		<i>Conostylis juncea</i>
		<i>Conostylis setigera</i>
		<i>Haemodorum laxum</i>
Dasypogonaceae		<i>Dasypogon bromeliifolius</i>
Juncaceae		<i>Juncus pallidus</i>
Cyperaceae		<i>Cyathochaeta avenacea</i>
		<i>Cyperus involucratus</i>
		<i>Lepidosperma leptostachyum</i>
		<i>Lepidosperma pubisquamum</i>
		<i>Leptospermum erubescens</i>
		<i>Mesomelaena pseudostygia</i>
		<i>Mesomelaena tetragona</i>
		<i>Schoenus clandestinus</i>
		<i>Schoenus grammatophylla</i>
		<i>Schoenus</i> sp.
		<i>Tetraria octandra</i>
Anarthriaceae		<i>Lyginia imberbis</i>
Restionaceae		<i>Desmocladus fasciculatus</i>
Poaceae	*	<i>Aira caryophyllea</i>
		<i>Amphipogon turbinatus</i>

Family	Non-native	Taxon
	*	<i>Arundo donax</i>
		<i>Austrostipa campylachne</i>
		<i>Austrostipa elegantissima</i>
	*	<i>Avena barbata</i>
	*	<i>Briza maxima</i>
	*	<i>Briza minor</i>
	*	<i>Bromus diandrus</i>
	*	<i>Cynodon dactylon</i>
	*	<i>Ehrharta calycina</i>
	*	<i>Eragrostis curvula</i>
	*	<i>Hyparrhenia hirta</i>
	*	<i>Lolium rigidum</i>
	*	<i>Melinis repens</i>
		<i>Neurachne alopecuroidea</i>
	*	<i>Pennisetum clandestinum</i>
	*	<i>Pentameris pallida</i>
		<i>Rytidosperma caespitosum</i>
	*	<i>Tribolium uniola</i>
	*	<i>Vulpia</i> sp.
Papaveraceae	*	<i>Fumaria capreolata</i>
Proteaceae		<i>Banksia dallanneyi</i> subsp. <i>dallanneyi</i> var.
		<i>Banksia sessilis</i>
		<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>
		<i>Hakea incrassata</i>
		<i>Hakea ruscifolia</i>
		<i>Hakea trifurcata</i>
		<i>Hakea undulata</i>
		<i>Isopogon dubius</i>
		<i>Lambertia multiflora</i> var. <i>darlingensis</i>
		<i>Petrophile macrostachya</i>
		<i>Stirlingia latifolia</i>
		<i>Synaphea petiolaris</i> subsp. <i>petiolaris</i>
Dilleniaceae		<i>Hibbertia hypericoides</i>
Crassulaceae		<i>Crassula colorata</i>
Haloragaceae		<i>Gonocarpus cordiger</i>
Fabaceae		<i>Acacia applanata</i>
	*	<i>Acacia leiophylla</i>
		<i>Acacia nervosa</i>
		<i>Acacia pulchella</i> var. <i>pulchella</i>
		<i>Acacia willdenowiana</i>
	*	<i>Chamaecytisus palmensis</i>
		<i>Cristonia biloba</i> subsp. <i>biloba</i>
		<i>Daviesia decurrens</i>
		<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>
Fabaceae		<i>Gastrolobium ebracteolatum</i>
		<i>Gompholobium confertum</i>

Family	Non-native	Taxon
		<i>Gompholobium marginatum</i>
		<i>Gompholobium tomentosum</i>
		<i>Jacksonia lehmannii</i>
	*	<i>Lotus subbiflorus</i>
	*	<i>Lupinus cosentinii</i>
	*	<i>Medicago polymorpha</i>
	*	<i>Trifolium angustifolium</i>
	*	<i>Trifolium campestre</i>
Polygalaceae		<i>Comesperma calymega</i>
Polygonaceae	*	<i>Rumex crispus</i>
Rhamnaceae		<i>Stenanthemum tridentatum</i>
Casuarinaceae		<i>Allocasuarina fraseriana</i>
		<i>Allocasuarina humilis</i>
Oxalidaceae	*	<i>Oxalis pes-caprae</i>
Euphorbiaceae	*	<i>Ricinus communis</i>
Violaceae		<i>Hybanthus calycinus</i>
Myrtaceae	*	<i>Angophora costata</i>
		<i>Baeckea camphorosmae</i>
	*	<i>Callistemon</i> sp.
		<i>Calothamnus quadrifidus</i>
		<i>Corymbia calophylla</i>
	*	<i>Corymbia maculata</i>
		<i>Eremaea pauciflora</i> var. <i>pauciflora</i>
		<i>Eucalyptus ?lane-poolei</i>
		<i>Eucalyptus ?rudis</i>
		<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>
	*	<i>Eucalyptus conferruminata</i>
	*	<i>Eucalyptus grandis</i>
		<i>Eucalyptus marginata</i>
	*	<i>Eucalyptus pulverulenta</i>
		<i>Eucalyptus rudis</i> subsp. <i>rudis</i>
	*	<i>Eucalyptus</i> sp. (juvenile)
		<i>Eucalyptus wandoo</i> subsp. <i>wandoo</i>
		<i>Kunzea glabrescens</i>
	*	<i>Leptospermum laevigatum</i>
	*	<i>Melaleuca nesophila</i>
		<i>Melaleuca seriata</i>
Anacardiaceae	*	<i>Schinus terebinthifolia</i>
Meliaceae	*	<i>Melia azedarach</i>
Thymelaeaceae		<i>Pimelea suaveolens</i> subsp. <i>suaveolens</i>
Tropaeolaceae	*	<i>Tropaeolum majus</i>

Family	Non-native	Taxon
Brassicaceae	*	<i>Raphanus raphanistrum</i>
Loranthaceae		<i>Nuytsia floribunda</i>
Droseraceae		<i>Drosera platystigma</i>
		<i>Drosera porrecta</i>
Amaranthaceae		<i>Ptilotus manglesii</i>
Ericaceae		<i>Andersonia involucrata</i>
		<i>Leucopogon</i> sp. Great Southern
Rubiaceae		<i>Opercularia vaginata</i>
Boraginaceae	*	<i>Echium plantagineum</i>
Solanaceae	*	Solanaceae sp.
		<i>Solanum nigrum</i>
Plantaginaceae	*	Plantaginaceae sp.
	*	<i>Plantago lanceolata</i>
Orobanchaceae	*	<i>Orobanche minor</i>
Campanulaceae		<i>Isotoma hypercrateriformis</i>
	*	<i>Wahlenbergia capensis</i>
Stylidiaceae		<i>Stylidium brunonianum</i>
		<i>Stylidium piliferum</i>
Goodeniaceae		<i>Lechenaultia biloba</i>
		<i>Scaevola repens</i>
Asteraceae	*	<i>Arctotheca calendula</i>
	*	<i>Dimorphotheca ecklonis</i>
	*	<i>Gazania linearis</i>
	*	<i>Hypochaeris glabra</i>
	*	<i>Sonchus oleraceus</i>
	*	<i>Ursinia anthemoides</i>
Apiaceae	*	<i>Foeniculum vulgare</i>
		<i>Pentapeltis peltigera</i>
		<i>Xanthosia huegelii</i>

Appendix B

Species presence in each recorded community within the survey area

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Taxon		Community						
		Vegetation Type 1	Vegetation Type 2	Vegetation Type 3/7	Vegetation Type 4	Vegetation Type 5	Vegetation Type 6	Vegetation Type 8
	<i>Acacia applanata</i>			X		X		
*	<i>Acacia leiophylla</i>			X				
	<i>Acacia nervosa</i>					X		
	<i>Acacia pulchella</i> var. <i>pulchella</i>	X		X				
	<i>Acacia willdenowiana</i>					X		
*	<i>Aira caryophyllea</i>	X		X				
	<i>Allocasuarina fraseriana</i>	X		X			X	
	<i>Allocasuarina humilis</i>	X		X				
	<i>Amphipogon turbinatus</i>					X		
	<i>Andersonia involucrata</i>					X		
*	<i>Angophora costata</i>		X		X		X	
	<i>Anigozanthos manglesii</i> subsp. <i>manglesii</i>			X				
*	<i>Arctotheca calendula</i>	X						
*	<i>Arundo donax</i>	X						
	<i>Austrostipa campylachne</i>	X		X			X	
	<i>Austrostipa elegantissima</i>					X		
*	<i>Avena barbata</i>	X	X		X		X	
	<i>Baeckea camphorosmae</i>			X			X	
	<i>Banksia dallanneyi</i> subsp. <i>dallanneyi</i> var.	X		X				
	<i>Banksia sessilis</i>			X	X		X	
	<i>Borya sphaerocephala</i>					X		
*	<i>Briza maxima</i>	X	X	X	X	X		X
*	<i>Briza minor</i>		X	X				
*	<i>Bromus diandrus</i>	X				X		
	<i>Burchardia congesta</i>			X				
*	<i>Callistemon</i> sp.			X				X

Taxon		Community						
		Vegetation Type 1	Vegetation Type 2	Vegetation Type 3/7	Vegetation Type 4	Vegetation Type 5	Vegetation Type 6	Vegetation Type 8
	<i>Calothamnus quadrifidus</i>				X			
*	<i>Chamaecytisus palmensis</i>	X		X	X			
	<i>Comesperma calymega</i>			X				
	<i>Conostylis juncea</i>			X				
	<i>Conostylis setigera</i>					X		
	<i>Corymbia calophylla</i>	X	X	X				
*	<i>Corymbia maculata</i>	X						
	<i>Crassula colorata</i>			X				
	<i>Cristonia biloba</i> subsp. <i>biloba</i>			X				
	<i>Cyathochaeta avenacea</i>					X		
*	<i>Cynodon dactylon</i>	X			X			
	<i>Cyperus involucratus</i>		X					
	<i>Dasypogon bromeliifolius</i>			X				
	<i>Daviesia decurrens</i>			X				
	<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>			X				
	<i>Desmocladius fasciculatus</i>			X		X		
*	<i>Dimorphotheca ecklonis</i>	X						X
*	<i>Disa bracteata</i>			X			X	
	<i>Drosera platystigma</i>					X		
	<i>Drosera porrecta</i>			X				
*	<i>Echium plantagineum</i>	X						
*	<i>Ehrharta calycina</i>	X		X	X		X	X
*	<i>Eragrostis curvula</i>	X	X	X	X	X	X	X
	<i>Eremaea pauciflora</i> var. <i>pauciflora</i>			X				
	<i>Eucalyptus ?lane-poolei</i>			X				
	<i>Eucalyptus ?rudis</i>		X					
	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusata</i>	X	X	X	X			
*	<i>Eucalyptus conferruminata</i>		X					

Taxon		Community						
		Vegetation Type 1	Vegetation Type 2	Vegetation Type 3/7	Vegetation Type 4	Vegetation Type 5	Vegetation Type 6	Vegetation Type 8
*	<i>Eucalyptus grandis</i>			X				
	<i>Eucalyptus marginata</i>	X		X				X
*	<i>Eucalyptus pulverulenta</i>	X						
	<i>Eucalyptus rudis</i> subsp. <i>rudis</i>				X		X	
*	<i>Eucalyptus</i> sp. (juvenile)						X	
	<i>Eucalyptus wandoo</i> subsp. <i>wandoo</i>						X	
*	<i>Foeniculum vulgare</i>	X						
*	<i>Freesia alba</i> x <i>leichtlinii</i>			X	X	X	X	
*	<i>Fumaria capreolata</i>							X
	<i>Gastrolobium ebracteolatum</i>			X		X	X	
*	<i>Gazania linearis</i>	X		X	X		X	
*	<i>Gladiolus caryophyllaceus</i>	X		X		X	X	X
	<i>Gompholobium confertum</i>					X		
	<i>Gompholobium marginatum</i>			X			X	
	<i>Gompholobium tomentosum</i>						X	
	<i>Gonocarpus cordiger</i>					X		
	<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>					X		
	<i>Haemodorum laxum</i>	X		X		X		
	<i>Hakea incrassata</i>	X		X				
	<i>Hakea ruscifolia</i>			X				
	<i>Hakea trifurcata</i>	X			X	X	X	
	<i>Hakea undulata</i>					X		
	<i>Hibbertia hypericoides</i>	X		X				
	<i>Hybanthus calycinus</i>			X				
*	<i>Hyparrhenia hirta</i>	X						
*	<i>Hypochaeris glabra</i>	X		X				X
	<i>Isopogon dubius</i>						X	
	<i>Isotoma hypercrateriformis</i>			X				

Taxon		Community						
		Vegetation Type 1	Vegetation Type 2	Vegetation Type 3/7	Vegetation Type 4	Vegetation Type 5	Vegetation Type 6	Vegetation Type 8
	<i>Jacksonia lehmannii</i>			X				
	<i>Juncus pallidus</i>		X					
	<i>Kunzea glabrescens</i>				X			
	<i>Lambertia multiflora</i> var. <i>darlingensis</i>			X				
	<i>Laxmannia squarrosa</i>						X	
	<i>Lechenaultia biloba</i>			X		X	X	
	<i>Lepidosperma leptostachyum</i>						X	
	<i>Lepidosperma pubisqameum</i>			X		X		
	<i>Leptospermum erubescens</i>				X	X	X	
*	<i>Leptospermum laevigatum</i>	X			X			
	<i>Leucopogon</i> sp. Great Southern					X		
*	<i>Lolium rigidum</i>		X					
	<i>Lomandra hermaphrodita</i>			X				
	<i>Lomandra sericea</i>			X				
*	<i>Lotus subbiflorus</i>	X			X			
*	<i>Lupinus cosentinii</i>	X			X		X	
	<i>Lyginia imberbis</i>			X		X		
*	<i>Medicago polymorpha</i>		X					
*	<i>Melaleuca nesophila</i>	X						
	<i>Melaleuca seriata</i>					X		
*	<i>Melia azedarach</i>	X						
*	<i>Melinis repens</i>			X			X	
	<i>Mesomelaena pseudostygia</i>			X				X
	<i>Mesomelaena tetragona</i>	X		X	X	X	X	
	<i>Neurachne alopecuroidea</i>	X		X	X	X		
	<i>Nuytsia floribunda</i>	X						
	<i>Opercularia vaginata</i>			X			X	
*	<i>Orobanche minor</i>	X						

Taxon		Community						
		Vegetation Type 1	Vegetation Type 2	Vegetation Type 3/7	Vegetation Type 4	Vegetation Type 5	Vegetation Type 6	Vegetation Type 8
*	<i>Oxalis pes-caprae</i>	X						
	<i>Patersonia juncea</i>					X		
	<i>Patersonia occidentalis</i>			X		X	X	
*	<i>Pennisetum clandestinum</i>		X		X			
*	<i>Pentameris pallida</i>	X						
	<i>Pentapeltis peltigera</i>			X				
	<i>Petrophile macrostachya</i>			X				
	<i>Pimelea suaveolens</i> subsp. <i>suaveolens</i>			X				
*	<i>Plantaginaceae</i> sp.		X					
*	<i>Plantago lanceolata</i>		X					X
	<i>Ptilotus manglesii</i>					X		
*	<i>Raphanus raphanistrum</i>		X					
*	<i>Ricinus communis</i>							X
*	<i>Romulea rosea</i>	X		X	X	X		X
*	<i>Rumex crispus</i>		X					
	<i>Rytidosperma caespitosum</i>	X				X		
	<i>Scaevola repens</i>			X			X	
*	<i>Schinus terebinthifolia</i>	X						
	<i>Schoenus clandestinus</i>			X		X		
	<i>Schoenus grammatophyllus</i>					X		
	<i>Schoenus</i> sp.					X		
*	<i>Solanaceae</i> sp.	X						
	<i>Solanum nigrum</i>							X
*	<i>Sonchus oleraceus</i>		X					
	<i>Stenanthemum tridentatum</i>					X		
	<i>Stirlingia latifolia</i>			X				
	<i>Stylidium brunonianum</i>					X		
	<i>Stylidium piliferum</i>					X	X	

Taxon		Community						
		Vegetation Type 1	Vegetation Type 2	Vegetation Type 3/7	Vegetation Type 4	Vegetation Type 5	Vegetation Type 6	Vegetation Type 8
	<i>Synaphea petiolaris</i> subsp. <i>petiolaris</i>					X		
	<i>Tetraria octandra</i>			X		X		
	<i>Thysanotus dichotomus</i>		X					
	<i>Thysanotus thyrsoideus</i>			X				
	<i>Thysanotus triandrus</i>					X		
*	<i>Tribolium uniolae</i>	X					X	
	<i>Tricoryne elatior</i>			X			X	
*	<i>Trifolium angustifolium</i>	X	X	X	X		X	X
*	<i>Trifolium campestre</i>			X				
*	<i>Tropaeolum majus</i>			X				
*	<i>Ursinia anthemoides</i>	X		X	X		X	X
*	<i>Vulpia</i> sp.	X						
*	<i>Wahlenbergia capensis</i>						X	
	<i>Xanthorrhoea ?brunonis</i>			X				
	<i>Xanthorrhoea preissii</i>	X		X				
	<i>Xanthosia huegelii</i>			X				

Appendix C

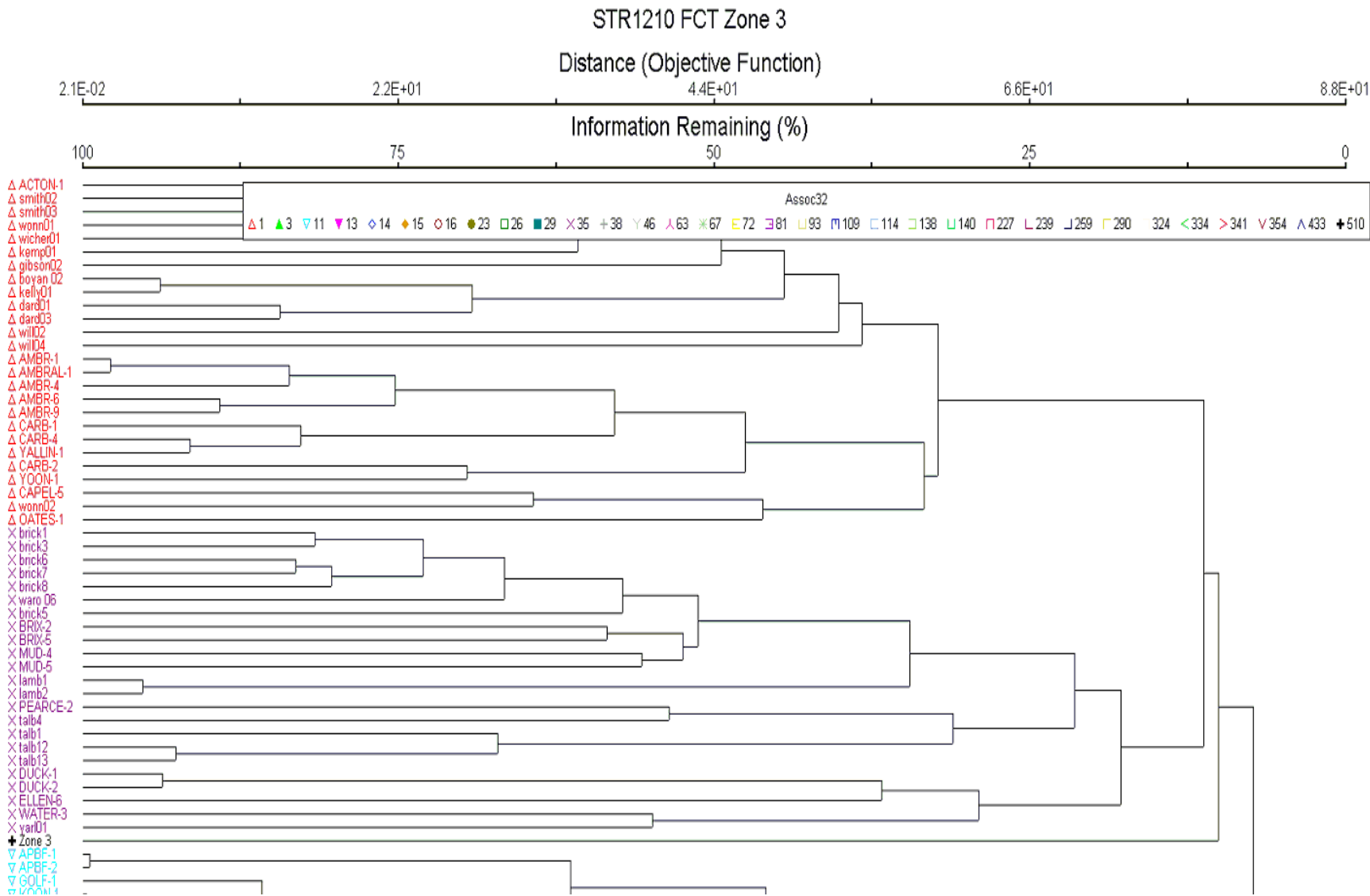
Sampling plot raw data

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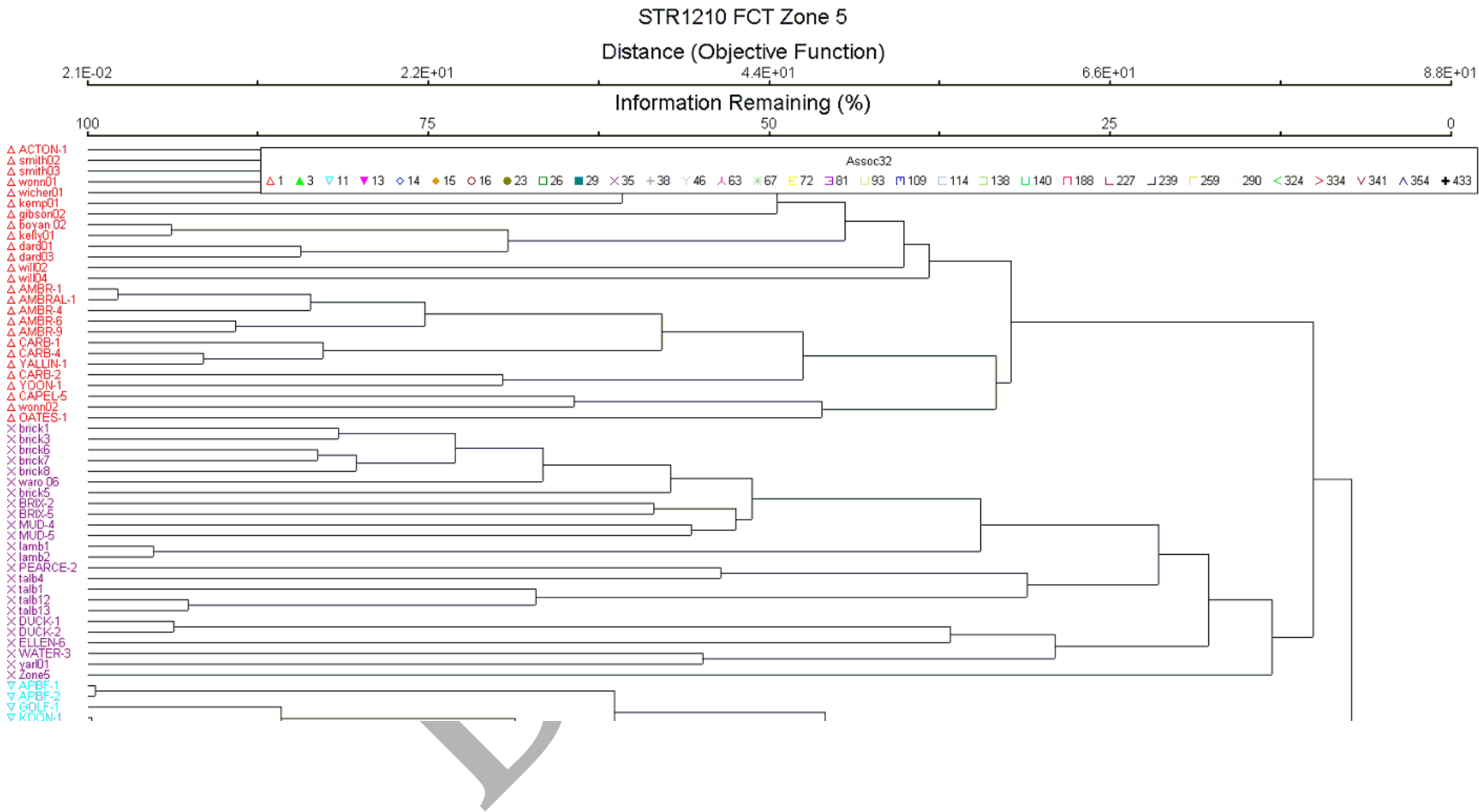
Appendix D

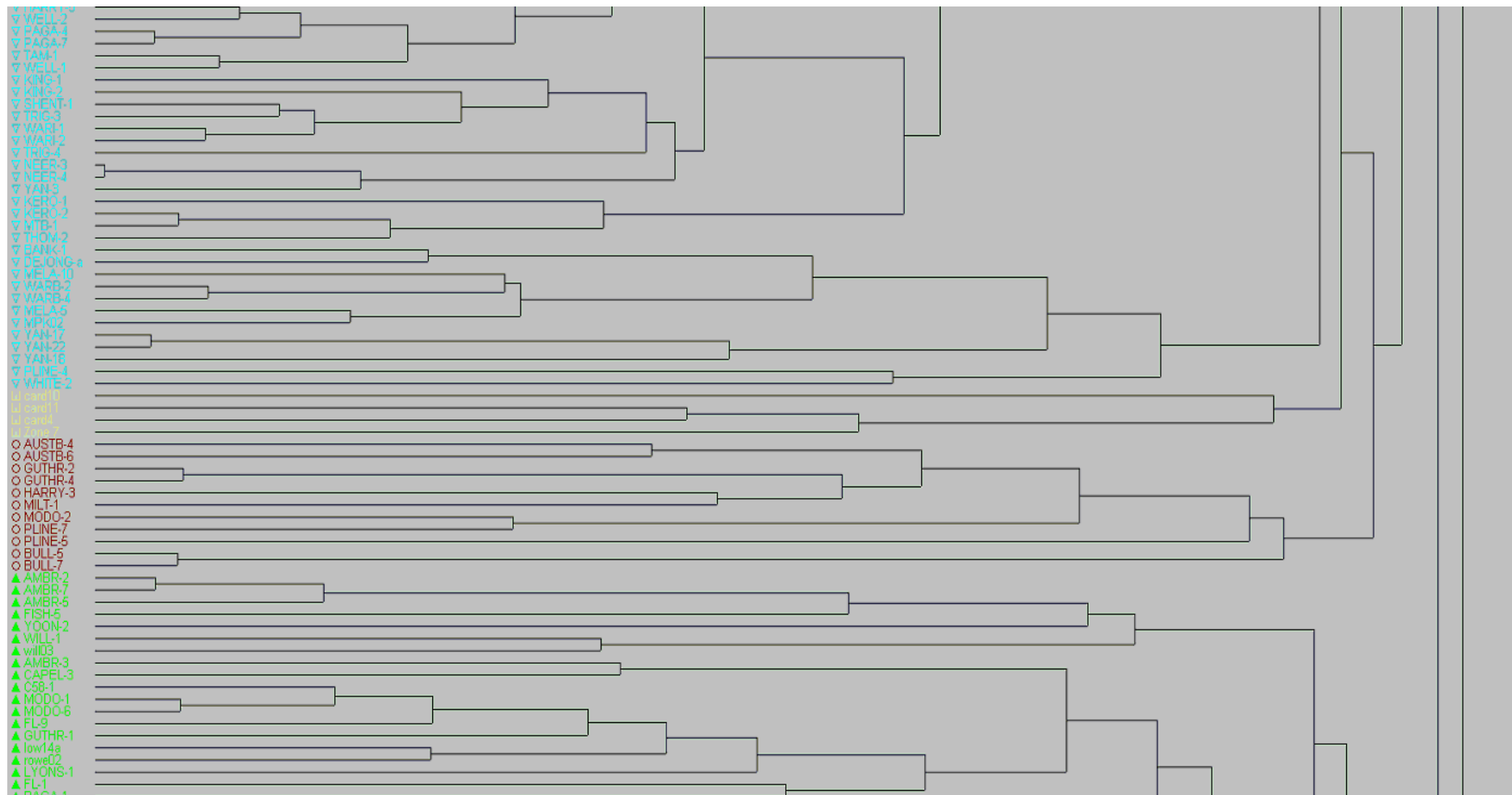
Cluster Dendrogram

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Appendix E

Matters of National Environmental Significance Report

DRAFT



Australian Government
Department of Sustainability, Environment,
Water, Population and Communities

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 07/12/12 11:18:17

[Summary](#)

[Details](#)

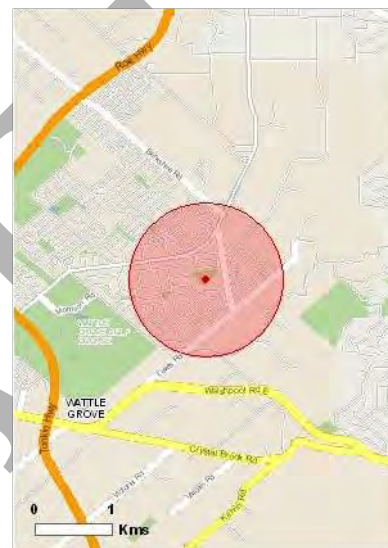
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	23
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As [heritage values](#) of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	6
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	None
State and Territory Reserves:	None
Regional Forest Agreements:	1
Invasive Species:	17
Nationally Important Wetlands:	None
Key Ecological Features (Marine):	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus baudinii Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Roosting known to occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Vulnerable	Species or species habitat may occur within area
Insects		
Synemon gratio Graceful Sun Moth [66757]	Endangered	Species or species habitat may occur within area
Mammals		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Phascogale calura Red-tailed Phascogale [316]	Endangered	Species or species habitat may occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat may occur within area
Plants		

Name	Status	Type of Presence
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Calytrix breviseta subsp. breviseta Swamp Starflower [23879]	Endangered	Species or species habitat may occur within area
Centrolepis caespitosa [6393]	Endangered	Species or species habitat likely to occur within area
Chamelaucium sp. Gingin (N.G. Marchant 6) Gingin Wax [64649]	Endangered	Species or species habitat may occur within area
Conospermum undulatum Wavy-leaved Smokebush [24435]	Vulnerable	Species or species habitat likely to occur within area
Darwinia foetida Muehea Bell [83190]	Critically Endangered	Species or species habitat likely to occur within area
Eucalyptus balanites Cadda Road Mallee, Cadda Mallee [24264]	Endangered	Species or species habitat may occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat likely to occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Thelymitra manginii K. Dixon & Batty ms. [67443]	Endangered	Species or species habitat likely to occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat likely to occur within area
Verticordia fimbriata subsp. fimbriata Shy Featherflower [24631]	Endangered	Species or species habitat may occur within area
Villarsia calthifolia Mountain Villarsia [10886]	Endangered	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Vulnerable*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Vulnerable*	Species or species habitat may occur within area

Extra Information

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Mammals		
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area

Name	Status	Type of Presence
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat may occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area

Coordinates

-31.9915 116.0156

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Department of Environment, Climate Change and Water, New South Wales](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment and Natural Resources, South Australia](#)
- [Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [Environmental and Resource Management, Queensland](#)
- [Department of Environment and Conservation, Western Australia](#)
- [Department of the Environment, Climate Change, Energy and Water](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [SA Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [State Forests of NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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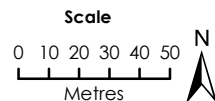
3.0 MAPPING



Figure 1 Vegetation condition



info@strategen.com.au
City of Kalamunda



Coordinate System: GDA 1994 MGA Zone 50
Date: 13/12/2012

Author: jcrute

Path: Q:\GIS\Consult\2012\SKA\SKA12118.01\ArcMap_documents\Subconsultant_Veg_survey\SKA12118.03_SubConsultant_F001.mxd

Source Aerial: Client 2012. Cadastre: SLIP Database, Landgate 2012.
Note that positional errors may occur in some areas

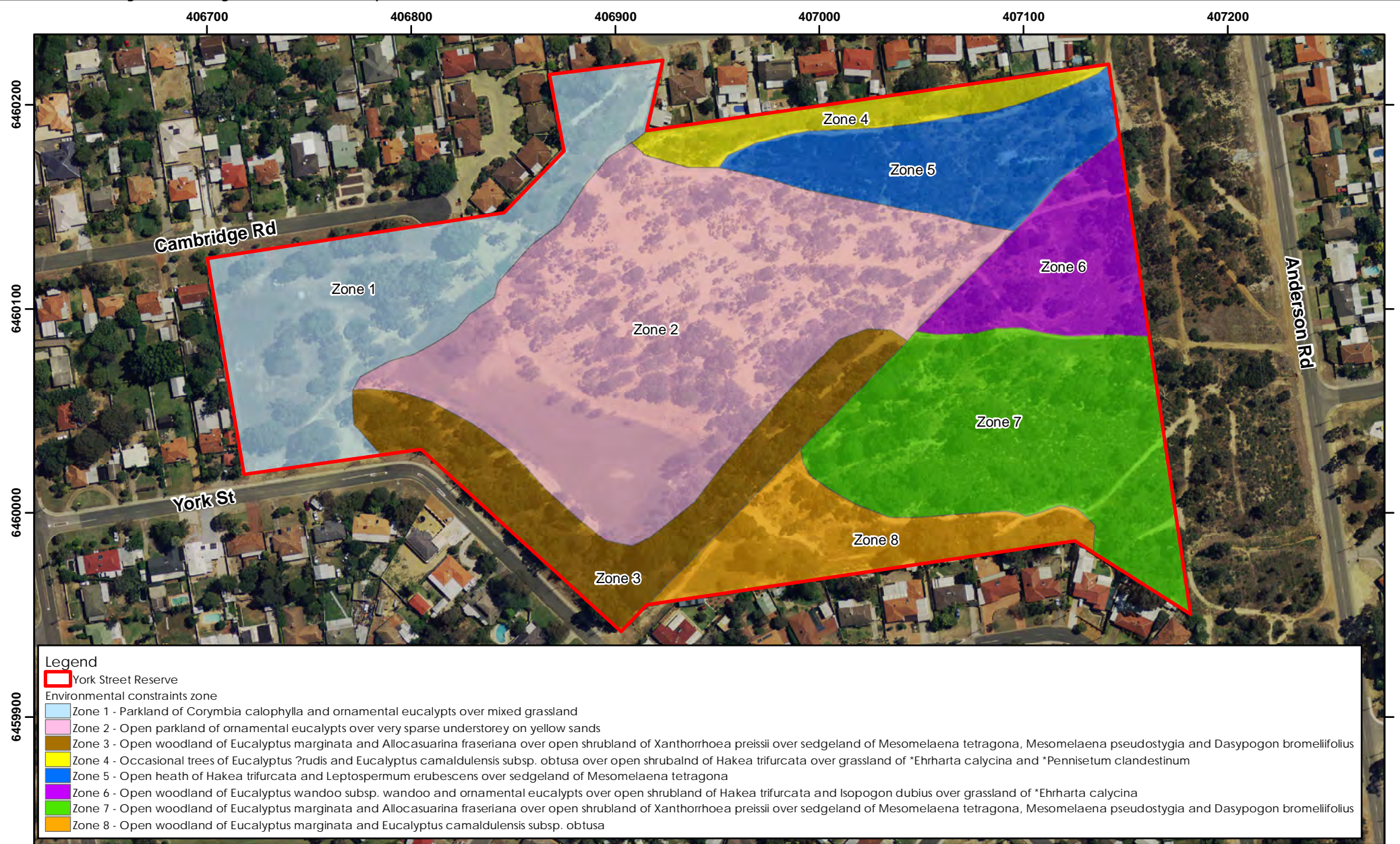


Figure 2 Vegetation types



Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Prepared for
City of Kalamunda

22 May 2017



Flora, Vegetation and Fauna Survey of Anderson Road Reserve

DOCUMENT TRACKING

Item	Detail
Project Name	Flora, Vegetation and Fauna Survey of Anderson Road Reserve
Project Number	5181
Project Manager	Katrina Zeehandelaar-Adams (08) 9227 1070 Suite 1 & 2, 49 Ord Street, West Perth WA 6005
Prepared by	Jeni Morris, Katrina Zeehandelaar-Adams, Sarah Dalglish, Joel Collins
Reviewed by	Daniel Panickar, Joel Collins
Approved by	Joel Collins
Status	FINAL
Version Number	2
Last saved on	4 October 2017
Cover photo	[Clockwise from top left] Chewed Marri nuts, <i>Isotoma hypocrateriformis</i> , nesting box, <i>Gazania linearis</i> © Eco Logical Australia

This report should be cited as 'Eco Logical Australia 2017. *Flora, Vegetation and Fauna Survey of Anderson Road Reserve*. Prepared for the City of Kalamunda.'

ACKNOWLEDGEMENTS

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Template 29/9/2015

Contents

Executive summary	vii
1 Introduction	1
1.1 Project background	1
1.2 Objectives	1
1.3 Legislative framework	2
2 Desktop assessment	4
2.1 Study area	4
2.2 Bioregion	4
2.3 Climate	4
2.4 Landform, geology and soils	4
2.5 Vegetation	5
2.6 Conservation areas and National Parks	5
2.7 Environmentally Sensitive Areas	5
2.8 Priority Ecological Communities	6
3 Methodology	7
3.1 Desktop review	7
3.1.1 Likelihood of occurrence assessment	7
3.2 Survey team and timing	9
3.2.1 Level 2 flora and vegetation survey	9
3.2.2 FCT analysis	12
3.2.3 Specimen identification and nomenclature	12
3.3 Level 1 Fauna survey	13
3.3.2 Sampling methods	13
3.3.3 Taxonomy and nomenclature	14
3.4 Survey limitations	14
4 Results	17
4.1 Flora of the study area	17
4.1.1 Conservation listed flora	17
4.1.2 Introduced flora	17
4.2 Vegetation of the study area	23
4.2.1 Vegetation types	23
4.2.2 Conservation listed ecological communities	23
4.2.3 Vegetation condition	23
4.2.4 FCT analysis	24

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

4.3	Fauna of the study area.....	27
4.3.1	Fauna habitats.....	27
4.3.2	Black Cockatoo habitat assessment	27
4.3.3	Fauna assemblages	27
4.3.4	Conservation listed fauna	27
4.3.5	Introduced fauna.....	29
5	Conclusions and recommendations	33
5.1	Flora and vegetation	33
5.2	Fauna.....	33
5.3	Recommendations.....	34
	References	35
	Appendix A Framework for conservation listed flora and fauna in Western Australia	38
	Appendix B Database search results	47
	Appendix C Flora likelihood of occurrence assessment	61
	Appendix D Fauna likelihood of occurrence assessment	66
	Appendix E Flora species list	69
	Appendix F Flora species matrix	76
	Appendix G Introduced flora (weed) species list.....	81
	Appendix H Quadrat data	85
	Appendix I Fauna species list	101
	Appendix J Black Cockatoo potential breeding trees	103
	Appendix K Fauna locations	106

List of figures

Figure 1: Study area location	3
Figure 2: Survey sampling locations	16
Figure 3: Weeds of National Significance	18
Figure 4: Bulbous weeds.....	19
Figure 5: Woody weeds.....	20

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Figure 6: Grass weeds	21
Figure 7: Other weeds	22
Figure 8: Vegetation types within the study area	25
Figure 9: Vegetation condition within the study area	26
Figure 10: Marri nuts chewed by Forest Red-tailed Black Cockatoos in the study area	28
Figure 11: Example of Quenda digging observed in the study area	29
Figure 12: Black cockatoo potential breeding / night roosting habitat.....	30
Figure 13: Conservation listed fauna recorded during the survey	31
Figure 14: Introduced fauna recorded during the survey	32

List of tables

Table 1: Survey team	9
Table 2: Keighery (1994) vegetation condition scale for natural area assessment	10
Table 3: Target weed species list.....	11
Table 4: Survey limitations of the Anderson Road Reserve flora, vegetation and fauna survey	15
Table 5: Vegetation types within the study area	23
Table 6: Vegetation condition within the study area.....	24

Abbreviations

Abbreviation	Description
BAM Act	<i>Biosecurity and Agriculture Management Act 2007</i>
BoM	Bureau of Meteorology
DAFWA	Department of Agriculture and Food Western Australia
DBH	Diameter at Breast Height
DEC	Department of Environment Conservation
DER	Department of Environment Regulation
DotEE	Department of the Environment and Energy
DRF	Declared Rare Flora

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Abbreviation	Description
ELA	Eco Logical Australia
EP Act	<i>Environmental Protection Act 1986</i>
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESA	Environmentally Sensitive Area
FCT	Floristic Community Type
ha	Hectare
IBRA	Interim Biogeographical Regionalisation for Australia
IUCN	International Union for Conservation of Nature
km	Kilometre
LED	Light Emitting Diode
m	Metre
mm	Millimetre
Parks and Wildlife	Department of Parks and Wildlife
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
RNE	Register of the National Estate
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SLIP	Shared Land Information Platform
SWA	State of Western Australia
TEC	Threatened Ecological Community
The Reserve	Anderson Road Reserve
The City	City of Kalamunda
WA	Western Australia
WAH	Western Australian Herbarium
WAM	Western Australian Museum
WC Act	<i>Wildlife Conservation Act 1950</i>
WoNS	Weed of National Significance

Executive summary

Eco Logical Australia was commissioned by the City of Kalamunda to undertake a flora, vegetation and fauna survey of Anderson Road Reserve to analyse the importance of the Reserve for a range of flora and fauna species, to assist in management and to achieve the best possible environmental outcomes.

A Level 2 flora and vegetation survey was undertaken over two phases during spring (26-27 October 2016) and autumn (4 April 2017). Vegetation communities were described through the establishment of six 10 m x 10 m quadrats. Target weed species and conservation listed flora were recorded and mapped through systematic traverses. A Level 1 fauna survey was conducted on the 26 October 2016 which included opportunistic searches, nocturnal searches, bird census, hand searches, and bat survey.

A total of 180 flora taxa were identified within the study area. This total included 114 native and 66 introduced (weed) taxa. No Threatened or Priority flora species were recorded. Of the weeds recorded, two are listed as Weeds of National Significance: **Opuntia stricta* and **Genista linifolia*. **O. stricta* is also listed as a Declared Pest under the *Biosecurity and Agriculture Management Act 2007*.

Three vegetation types were described within the study area comprising *Corymbia calophylla* open woodland, *Eucalyptus marginata* subsp. *marginata* woodland, and historical planting of *Eucalyptus wandoo* open woodland. The condition of the vegetation across the study area was mostly Very Good to Good condition, in areas of remnant vegetation, with smaller areas in Degraded and Completely Degraded condition. None of the vegetation types were considered to represent conservation listed ecological communities.

One broad fauna habitat type was mapped within the study area comprising mixed Eucalypt woodland. An ephemeral drainage line and sump was also identified as being important for many native fauna species. Black Cockatoo foraging and potential breeding/ night roosting habitat was recorded across the study area.

A total of 28 fauna species were opportunistically observed, or signs of their presence recorded, during the Level 1 fauna survey. This comprised 21 birds (15 native and six non-native), three mammals (one native and two introduced) and four reptiles. Two conservation listed fauna species were recorded: *Calyptrorhynchus banksii naso* (Forest Red-tailed Black Cockatoo; listed as Vulnerable) and *Isoodon obesulus fusciventer* (Quenda; listed as Priority 4).

The study area, while containing high diversity and densities of weeds in some areas, still contains a diverse array of native flora and represents a significant area of remnant vegetation in an otherwise built up area in the Perth metropolitan region.

1 Introduction

1.1 Project background

Anderson Road Reserve (the Reserve) is a bushland reserve located in Forrestfield, within the City of Kalamunda (the City), approximately 18 kilometres (km) east of Perth, Western Australia (**Figure 1**). The City wishes to gain a better understanding of the range of flora and fauna species present within the Reserve, particularly Threatened Black Cockatoos, mammals and reptiles, to assist in management and to achieve the best possible environmental outcomes.

The Reserve provides visual amenity between Lewis Road, Anderson Road and the adjacent housing. The vegetation within the Reserve provides screening from existing infrastructure and allows the local community to connect with the environment in an otherwise built up area. The local community currently use the Reserve to access Forrestfield Schools, shops and bus routes.

The Reserve, to date, has undergone extensive work including weed control, dieback treatment, firebreak maintenance and revegetation, undertaken by the City's environmental team. Additional work, for example installation of nesting boxes, has been made possible by external funding, grants and initiatives such as the Green Army. There is a large community engagement within the Reserve, including a volunteer friends group, that undertake weed removal and assist with revegetation programs. There are Nature Awareness events, night stalks and bird watching, held within the Reserve.

Eco Logical Australia (ELA) was commissioned to undertake a two-phase Level 2 flora survey and a Level 1 fauna survey of the Reserve to identify the ecological values present within the Reserve, as well as to assess for the presence of Threatened or Priority flora, fauna and ecological communities.

1.2 Objectives

The objectives of the flora, vegetation and fauna survey were to:

- Document, describe and map the vegetation communities and Floristic Community Types (FCTs) present, including identification of Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs).
- Provide a full species inventory, including the establishment and mapping of any *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed, *Wildlife Conservation Act 1950* (WC Act) Threatened flora, Priority or other significant flora on site.
- Assess and map vegetation structure, cover and condition, per the Environment Protection Authority (EPA) and Department of Parks and Wildlife (Parks and Wildlife) Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA and Parks and Wildlife 2015).
- Establish the extent of and map target introduced flora (weed) species.
- Establish the occurrence of native and introduced fauna species, including targeted searches for direct (vertebrate fauna seen or heard) or indirect (scats, tracks, burrows etc.) evidence of fauna.
- Describe and map native vertebrate fauna habitat, including a habitat assessment for Threatened Black Cockatoos.
- Make management recommendations to the City to achieve the best possible environmental outcomes.

1.3 Legislative framework

This survey was undertaken to meet requirements under the Western Australian (WA) *Environmental Protection Act 1986* (EP Act) and the EPBC Act. The survey was consistent with relevant WA EPA guidelines. Specifically, the survey was undertaken in accordance with the following:

- EPA and Parks and Wildlife Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA and Parks and Wildlife 2015).
- No. 51 - Terrestrial Flora Surveys for Environmental Impact Assessment in Western Australia (EPA 2004a).
- EPA Guidance Statement No. 56 - Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004b).
- EPA Guidance Statement EPA and Department of Environment and Conservation (DEC) Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA and DEC 2010).
- EPA Position Statement No. 3 - Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002).
- EPBC Act referral guidelines for three Threatened Black Cockatoo species (Department of Sustainability, Environment, Water, Population and Communities [SEWPaC] 2012).

Flora, Vegetation and Fauna Survey of Anderson Road Reserve



Figure 1: Study area location

2 Desktop assessment

2.1 Study area

Anderson Road Reserve is a small reserve located in Forrestfield, within the City of Kalamunda, approximately 18 km east of Perth, Western Australia. The Reserve is small, approximately 17 hectares (ha) in size and is an irregular shape. It comprises several land parcels along Anderson Road, and is bound by Anderson Road to the east, Lewis Road to the south, Moira Avenue to the west and housing to the north. The Reserve contains a diverse array of plants and animals, characteristic of the Forrestfield area (Shire of Kalamunda 2015).

2.2 Bioregion

The Interim Biogeographical Regionalisation for Australia (IBRA) Version 7 recognises 89 geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information. The 89 bioregions are further refined into 419 subregions which are more localised and homogenous geomorphological units in each bioregion (Department of the Environment and Energy [DotEE] 2017a).

The study area is located on the eastern edge of the Swan Coastal Plain bioregion as defined by IBRA. The Swan Coastal Plain bioregion has been further subdivided into two subregions: Dandaragan Plateau (SWA1) and Perth (SWA2). The study area falls within the Perth subregion, which is described by Mitchell et al. (2002) as:

- Colluvial and Aeolian sands, alluvial river flats, coastal limestone. Heath and/or Tuart woodlands on limestone, Banksia and Jarrah-Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials. Includes a complex series of seasonal wetlands. Rainfall ranges between 600 and 1000 mm annually and the climate is Mediterranean.

2.3 Climate

The Perth subregion experiences a warm, Mediterranean climate with hot dry summers and mild wet winters (Mitchell et al. 2002). Based on climatic data from the Bureau of Meteorology (BoM) Maida Vale weather station (station number 9182, rainfall data 1961 – current; located approximately 2.5 km north of the study area), the area receives an annual average rainfall of 804.2 millimetres (mm), with most rainfall occurring during the months of June, July and August (156.7 mm, 159.6 mm and 127.5 mm respectively) (BoM 2017). Based on climatic data from the BoM Perth Airport weather station (station number 9021; temperature data 1991 – current; located approximately 9 km to the north of the study area), mean maximum air temperatures range from 32.0 °C in February to 17.9 °C in July, and mean minimum air temperatures range from 17.5 °C in February to 8.0 °C in July/August (BoM 2017).

2.4 Landform, geology and soils

The study area is situated on the Bassendean Dune system, which is Pleistocene Aeolian heavily leached sands falling from 40 to 80 metres (m) relief in the north of the plain to almost sea level in the south. The study area has extremely low to very low relief dunes with undulating sandplains and discrete sand with deep bleached grey sands sometimes with a pale yellow or a weak iron-organic hardpan at depths generally greater than 2 m (Government of Western Australia 2000).

2.5 Vegetation

Vegetation across the Perth metropolitan area has been described by Heddle et al. (1980) as vegetation complexes. The vegetation of the study area is mapped as the Forrestfield Complex. This vegetation complex is described as predominantly vegetation ranging from open forest of *Eucalyptus calophylla*, *E. wandoo* and *E. marginata* to open forest of *E. marginata*, *E. calophylla*, *Casuarina fraseriana* and *Banksia* spp. There is also fringing woodland of *E. rudis* in the gullies that dissect this landform (by Heddle et al. 1980).

Vegetation type and extent has been mapped at a regional scale by Beard (1975) who categorised vegetation into broad vegetation associations. Based on Beard's (1975) mapping at a scale of 1:1,000,000, Department of Agriculture and Food Western Australia (DAFWA 2017a) has compiled a list of the types and extent of vegetation associations across WA (Shepherd et al. 2002).

Two broad vegetation associations occur within the study area:

- Vegetation association 3: *Eucalyptus marginata* and *Corymbia calophylla* open forest; and
- Vegetation association 1009: *Corymbia calophylla* and *Eucalyptus rudis* woodland.

The extent of vegetation association 3 remaining within the Perth subregion is 16.70% of its pre-European extent, while the extent of vegetation association 1009 remaining within the Perth subregion is 16.35% of its pre-European extent (Government of Western Australia 2016).

2.6 Conservation areas and National Parks

The study area does not occur within any conservation area or National Park. Lesmurdie Falls National Park lies less than a kilometre east of the study area, which forms part of the greater Mundy Regional Park. Based on Beard's (1975) mapping at a scale of 1:1,000,000, Department of Agriculture and Food Western Australia (DAFWA 2017a) has compiled a list of the types and extent of vegetation associations across WA (Shepherd et al. 2002).

One broad vegetation association occur within Lesmurdie Falls National Park:

- Vegetation association 4: *Corymbia calophylla* and *Eucalyptus wandoo* open woodland.

This vegetation association differs to the association that is present within in the study area.

2.7 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are defined in the Environmental Protection (Environmentally Sensitive Areas) Notice 2005 under section 51B of the EP Act. ESAs include areas declared as World Heritage, areas included on the Register of the National Estate (RNE)¹, defined wetlands, vegetation containing rare (Threatened) flora, TECs and Bush Forever sites. The study area does not occur within any ESAs and there are no TECs identified as potentially occurring within the study area.

¹ Note the RNE was closed in 2007 and is no longer a statutory list. The RNE has been replaced by the National Heritage List under the EPBC Act.

2.8 Priority Ecological Communities

Priority Ecological Communities (PECs) are biological flora or fauna communities that are recognised to be of significance, but do not meet the criteria for a TEC. There are five categories of PECs, none of which are currently protected under legislation (see **Appendix A**).

One PEC occurs within the City of Kalamunda: 'Central Northern Darling Scarp Granite Shrubland Community' (Shire of Kalamunda 2012). This PEC is listed as Priority 4 by the Department of Parks and Wildlife and is described as:

'Shrublands and heath on deeper loams and red earths on fragmented granite/quartzite'. Heath species typically consist of the taller shrubs *Xanthorrhoea acanthostachya* and *Allocasuarina humilis* over smaller proteaceous and myrtaceous shrubs, namely *Melaleuca* aff. *scabra*, *Baeckea camphorosmae* and to a lesser extent, the proteaceous shrubs *Banksia armata*, *Hakea incrassata* and *Hakea undulata*. Located in central region of the Northern Darling Scarp near Perth' (Parks and Wildlife 2015).

The closest known occurrence of this PEC is located in Lesmurdie Falls National Park, approximately 600 metres (m) east of the study area. It is considered unlikely to occur because the dominant species commonly found in association with this PEC were not present within the study area.

3 Methodology

3.1 Desktop review

The following Commonwealth and State databases were searched for information relating to conservation listed ecological communities, flora and fauna in order to compile and summarise existing data to inform the field survey:

- Parks and Wildlife databases for Threatened Flora listed under the latest WA Wildlife Conservation (Rare Flora) Notice and Priority listed flora (Parks and Wildlife 2016a)
- Parks and Wildlife and Western Australian Museum (WAM) NatureMap online flora and fauna database (Parks and Wildlife 2016b)
- Commonwealth EPBC Act Protected Matters Search Tool (PMST) for Threatened species and communities listed under the EPBC Act (DotEE 2017b).

The following databases/information sources were also used to inform the survey and likelihood of occurrence of flora, vegetation and fauna species:

- The International Union for Conservation of Nature (IUCN) red list (IUCN 2017)
- Department of Environment Regulation (DER) ESA database (DER 2017)
- BirdLife Australia (BirdLife Australia 2017)
- Western Australian Organism List (DAFWA 2017b)
- Relevant Landgate databases (Shared Land Information Platform [SLIP] portal) for TECs and PECs (State of Western Australia [SWA] 2017).

Conservation codes, categories and criteria for flora and fauna protected under the EPBC Act and WC Act are provided in **Appendix A**. Results of the NatureMap and PMST database searches are presented in **Appendix B**.

3.1.1 Likelihood of occurrence assessment

Conservation listed flora and fauna species that possibly occur within the survey area were identified from a review of key datasets and literature as described above. An assessment of the likelihood of occurrence of conservation listed flora and fauna was made using existing species records from the database searches and the results of the site inspection.

The following criteria was used to assess likelihood of occurrence:

- Known to occur: Recorded from the study area, through database search results and/or from previous surveys of the study area (<20 years).
- Likely to occur: The study area is within the species current distribution and contains suitable habitat for the species, however;
 - The species utilises seasonal habitat or has a large home range, so is not always present/visible in the study area; and/or
 - Survey limitations identified.
- Potential to occur: The study area is within the species current distribution and contains habitat, however (at least two of below);
 - The study area is located on the edge of the species range or it has a patchy distribution; and/or
 - Survey limitations identified; and/or
 - Habitat is less suitable; and/or

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

- Species is cryptic, and/or difficult to record utilising traditional survey methods.
- Unlikely to occur: The study area is within the species current distribution and contains habitat, however; the study area was adequately surveyed (including for seasonal, migratory and cryptic species and fauna species with large home ranges) and did not record the species or; the habitat is modified and not likely to support the species and survey limitations identified.
- Does not occur: The study area is within the species current distribution, and was adequately surveyed (including for seasonal, migratory and cryptic species and fauna species with large home ranges) and did not record the species; or the study area does not contain suitable habitat and there is certainty that the species is not present in the study area.

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

3.2 Survey team and timing

The Level 2 flora and vegetation survey was undertaken over two phases by Katrina Zeelandelaar-Adams (Ecologist), Sarah Dalglish (Botanist) and Jeni Morris (Graduate Ecologist). The first phase was undertaken on 26-27 October 2016 (spring survey) and the second phase on 4 April 2017 (autumn survey). The Level 1 fauna survey was conducted by Nicki Thompson (Ecologist) on the 26 October 2016. The timing of the surveys was optimal for these types of assessment. The survey team's relevant qualifications, experience and licences are provided in **Table 1**.

A total of 354 mm of rainfall was recorded in the three months prior to the fauna survey and the first phase of the flora survey (July to September 2016; BoM 2017). This is below the long-term average for the same period (375.6 mm). A total of 155.5 mm of rainfall was recorded in the three months prior to the second phase of the flora survey (January to March 2017; BoM 2017). This is above the long-term average for the same period (54.6 mm). Despite these discrepancies, the timing was still considered suitable for both surveys.

Table 1: Survey team

Name	Qualification	Relevant experience	Licence numbers
Katrina Zeelandelaar-Adams	BSc (Hons) Conservation Biology and Management	Undertaken numerous flora and fauna surveys throughout WA, with experience in the Perth region.	Flora scientific collection Licence No. SL011844 DRF collection licence No. 11-1617
Sarah Dalglish	BSc (Hons) Environmental Management	Undertaken numerous flora surveys throughout WA, with experience in the Perth region.	Flora scientific collection licence No. SL011820 Declared Rare Flora (DRF) collection licence No. 12-1617
Jeni Morris	BSc Conservation and Wildlife Biology	Undertaken numerous flora, vegetation and weed surveys and fauna surveys on the Swan Coastal Plain.	Flora scientific collection Licence No. SL011818 DRF collection licence No. 10-1617
Nicki Thompson	BSc (Hons) Zoology	Extensive fauna surveys within the Jarrah Forrest and most WA bioregions. Includes target surveys for relevant conservation listed species, baseline and Level 2 surveys.	N/A for Level 1 fauna survey

3.2.1 Level 2 flora and vegetation survey

The Level 2 flora survey was conducted in accordance with EPA and Parks and Wildlife Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA and Parks and Wildlife 2015) and EPA Guidance Statement 51: Terrestrial Flora and vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004a).

 Flora, Vegetation and Fauna Survey of Anderson Road Reserve

The number of quadrats established to describe vegetation communities was informed using aerial imagery and previous background survey reports. Dominant vegetation communities were described, including with respect to dominant species, structure and overall condition. The survey involved the use of 10 m x 10 m quadrats, relevés to supplement the data obtained from the quadrats, and opportunistic sampling of species not recorded within the quadrats to inform a species inventory of the study area. EPA and Parks and Wildlife Technical Guide states a minimum of three quadrats per vegetation type are required to be established (EPA and Parks and Wildlife 2015).

Six quadrats and one relevé were installed across the study area (**Figure 2**). Stainless steel fence droppers were used to permanently mark the north-west corner of each quadrat to repeat sampling in phase two of the flora survey. Photos were taken of each quadrat, from the north-west corner showing the marker and quadrat tape. All quadrats and their positions were recorded via an Android tablet.

The following data was recorded as part of the flora and vegetation survey:

- Vegetation structure classes, cover of all species observed in quadrats and dominant species lists for each vegetation type in accordance with Keighery (1994)
- Full species inventory (angiosperm and gymnosperm) of both native and introduced species across the study area
- Vegetation condition was assessed using the Keighery (1994) vegetation condition scale for natural assessment (**Table 2**)
- Other observational data such as landform, soils, time since fire, etc.

Table 2: Keighery (1994) vegetation condition scale for natural area assessment

Condition Rating	Explanation
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact; disturbance affecting individual species; weeds are non-aggressive species.
Very Good	Vegetation structure altered; obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires; the presence of some more aggressive weeds; dieback; logging; grazing
Good	Vegetation structure significantly altered by obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires; the presence of some very aggressive weeds at high density; partial clearing; dieback; grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires; the presence of very aggressive weeds; partial clearing; dieback; grazing.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

A targeted survey was completed within the study area for conservation listed flora, communities and weeds including:

- Threatened flora listed under the EPBC Act
- Threatened (Declared Rare) Flora listed under the latest WA Wildlife Conservation (Rare Flora) Notice
- Priority flora recognised by Parks and Wildlife
- Introduced flora (weeds) flora, including Declared Pest plants under the WA Biosecurity and Agriculture Management Act 2007 (BAM Act; Department of Agriculture and Food Western Australia [DAFWA] 2017b) and Weeds of National Significance (WoNS), and weeds of interest to the City (**Table 3**).

Table 3: Target weed species list

Scientific name	Common name	Status
* <i>Acacia dealbata</i>	Silver Wattle	
* <i>Acacia iteaphylla</i>	Flinders Range Wattle	
* <i>Acacia longifolia</i>	Sydney Golden Wattle	
* <i>Acacia podalyriifolia</i>	Queensland Silver Wattle	
* <i>Arundo donax</i>	False Bamboo	
* <i>Asparagus asparagoides</i>	Bridal Creeper	Declared Pest, WoNS
* <i>Cenchrus clandestinus</i>	Kikuyu Grass	
* <i>Chamaecytisus palmensis</i>	Tagasaste	
* <i>Chamelaucium uncinatum</i>	Geraldton Wax	
* <i>Cynodon dactylon</i>	Couch	
* <i>Ehrharta calycina</i>	Perennial Veldt Grass	
* <i>Eragrostis curvula</i>	African Love Grass	
* <i>Freesia alba x leichtlinii</i>	Freesia	
* <i>Genista linifolia</i>	Flaxleaf Broom	WoNS
* <i>Gladiolus caryophyllaceus</i>	Wild Gladiolus	
* <i>Gomphocarpus fruticosus</i>	Narrow Leaf Cotton Bush	Declared Pest
* <i>Leptospermum laevigatum</i>	Victorian Tea Tree	
* <i>Lupinus angustifolius</i>	Narrowleaf Lupin	
* <i>Lupinus cosentinii</i>	Blue Lupin	
* <i>Opuntia stricta</i>	Common Prickly Pear	Declared Pest, WoNS
* <i>Tribolium uniolae</i>	Tribolium	
* <i>Watsonia meriana</i>	Watsonia	

The survey methodology involved personnel walking meandering transects across the study area as well as outside the study area boundary if required. The location of ELA transects and survey effort are shown in **Figure 2**.

In addition to point locations, the following data were collected for any conservation listed species identified in the study area:

- Number of individuals and/or percent cover (recording a range of coordinates if necessary)
- Estimates were made for groups of individuals within a 20 m radius and for large populations to record a significant area polygon
- Reproductive phase (flowering, fruiting, etc.)
- Description of dominant vegetation unit in which the species is located
- Associated dominant species
- Photograph of the plant *in situ*.

The targeted weed survey was undertaken in conjunction with the conservation listed flora and communities survey. Focus was given to the boundaries of the study area, along tracks and other areas of increased disturbance. When encountered, mapping of weeds was undertaken using 'point' or 'density' mapping, or a combination of both. Where density mapping was used, four density categories were used: <5%, 6–30%, 31–60% and >61% cover for each species.

Except where specifically noted, the field survey was undertaken using an Android Nexus 7 tablet operating the ArcGIS Collector app. These units can have errors of 3-20 m (subject to availability of satellites on the day) with an average of 5 m.

3.2.2 FCT analysis

Species lists for each quadrat were entered into the statistical analysis package Primer (version 6.1.11). The complete dataset of Gibson et al. (1994) was entered into Primer and merged with the ELA dataset to allow comparison of all ELA quadrats against all FCT quadrats of Gibson et al. (1994). The taxonomy of each species was aligned with that used by Gibson et al. (1994) to permit direct comparison between datasets. All data were analysed using presence/absence of each species within each quadrat.

The merged dataset was analysed using hierarchical cluster analysis (Everitt 1980). The Primer routine uses hierarchical agglomerative clustering, which takes a similarity matrix and successively fuses the samples into groups and the groups into larger clusters, starting with the highest mutual similarities then gradually lowering the similarity level at which groups are formed (Clarke and Warwick 2001). The hierarchical clustering is represented by the x-axis representing the full set of samples (in this case, the quadrats sampled by ELA and Gibson et al. [1994] and the y-axis defining a similarity level at which two samples or groups are considered to have fused). The purpose of this analysis was to determine whether the quadrats sampled in the study area were similar in species composition to any of those quadrats sampled by Gibson et al. (1994) and therefore similar to a FCT assigned by Gibson et al. (1994). Hierarchical clustering was performed on similarity matrices computed using the Bray-Curtis coefficient and using the 'group average' cluster mode (Clarke and Warwick 2001).

3.2.3 Specimen identification and nomenclature

Nomenclature used for the flora species within this report follows the WA Plant Census as available on FloraBase (Western Australian Herbarium [WAH]1998-2017). Voucher specimens were collected in the field of all actual or potential conservation listed flora species. Collections were made of other species, if required, that commonly occurred in the habitat of the conservation listed species to enable correct identification. All collections were assigned a unique collecting number.

Specimen identification was undertaken by ELA Senior Botanist Joel Collins and ELA Botanist Sarah Dalglish. Species identification utilised taxonomic literature and keys with all specimens confirmed using the WAH reference collection.

3.3 Level 1 Fauna survey

The survey design was aligned with methodology outlined in EPA Guidance Statement No. 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004b), the principles outlined in EPA Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002), and the Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA and DEC 2010).

3.3.1 Fauna habitat assessment

An assessment of fauna habitat in terms of its ability to support and sustain populations of fauna, along with an assessment of the likelihood of occurrence of conservation listed fauna species was undertaken during the survey. The habitat characteristic and fauna database records used in assessing likelihood of occurrence for fauna included:

- Vegetation type, structure and condition
- Soil and landform type
- Extent and connectivity of bushland
- Fauna species habitat preferences
- Proximity of conservation listed fauna records
- Signs of species presence.

The habitat assessment included assessing habitat for its potential to support conservation listed species, such as Western Quoll (*Dasyurus geoffroii*) or Quenda (*Isodon obesulus fusciventer*). This included searches for diggings and evidence of feeding, and nocturnal searches for activity.

Black Cockatoo habitat assessment

An assessment of Black Cockatoo habitat was undertaken in accordance with the EPBC Act referral guidelines (SEWPaC 2012). This involved assessing all tree species known to support breeding for their diameter at breast height (DBH) and their potential to support hollows. Trees with a DBH over 50 cm are defined as suitable for breeding (SEWPaC 2012).

Prior to the survey, aerial imagery was studied to determine the vegetation communities present within the study area and their potential for providing foraging habitat for Black Cockatoos. These values were then ground-truthed during the survey to determine the extent of potential foraging habitat within the study area. This was undertaken in conjunction with the vegetation mapping methodology described in **Section 3.2.1**.

Observations were made of Black Cockatoo foraging activity based on feeding residue such as chewed *Banksia* and eucalypt nuts, and any Black Cockatoo individuals observed foraging within the study area. In addition, the study area was assessed for any Black Cockatoo night roosting or breeding behaviour during the nocturnal/twilight survey.

3.3.2 Sampling methods

The survey was undertaken using a variety of sampling techniques, both systematic and opportunistic. Systematic sampling refers to data methodically collected over a fixed time in a discrete habitat type or location, using an equal or standardised sampling effort across multiple sample locations. This approach provides a range of detection methods that cover the full suite of vertebrate fauna assemblages. Opportunistic sampling includes data collected non-systematically from both fixed sampling sites and as opportunistic records from chance encounters with fauna. This method generally accounts for the majority of bird species and a significant proportion of other fauna groups recorded.

Direct observation and opportunistic sightings

Direct observations over one day and evening were made. These included visual sightings of active fauna such as reptiles and birds; records of bird calls; and signs of species presence such as tracks, diggings, burrows, scats and any other signs of fauna activity. Searches were also conducted beneath leaf litter, logs and other suitable shelter sites and microhabitats.

Motion camera traps

Motion camera traps were deployed to detect species such as Quenda or introduced predators. Two traps were set over one night. Camera trap locations are shown in **Figure 2**.

Nocturnal/twilight searching

Nocturnal and twilight searching was conducted using Light Emitting Diode (LED) head torches to detect active crepuscular (dusk active) and nocturnal fauna by eye-shine. This method targets crepuscular and nocturnal mammals, owls, frogs and geckos. Searching was conducted by traversing walk tracks whilst spotlighting into adjacent bushland within the study area. The nocturnal and twilight survey occurred over a period of approximately two hours by two ecologists, from 18:30 to 20:30 hours on 26 October 2016.

Bat survey

Sampling for microchiropteran bats was undertaken during the twilight and nocturnal periods on 26 October 2016. A bat detector was deployed to record ultrasonic bat calls, an Anabat SD2®, held in the hand while traversing during nocturnal searches. This detector was operating for approximately two hours, from 18:30 to 20:30 hours. Specialised software was used to visualise ultrasonic bat echolocation calls recorded on the bat detector into a corresponding graphical representation for analysis. Most bats species have a unique call which appears as a 'fingerprint' graph output. Bat calls were analysed by comparing recorded calls with reference calls by Alicia Scanlon, an ELA ecologist specialising in bat survey and identification.

3.3.3 Taxonomy and nomenclature

Nomenclature used for the vertebrate fauna species within this report follows the WAM Checklist of the Vertebrates of Western Australia (WAM 2017). Where common names were not stated for certain species, the following references were consulted:

- Amphibians and reptiles: Bush et al. (2010);
- Reptiles: Wilson and Swan (2013);
- Birds: Simpson and Day (2010); and
- Mammals: Menkhorst and Knight (2011).

3.4 Survey limitations

EPA Guidance Statement 51 (EPA 2004a) and EPA Guidance Statement No. 56 (EPA 2004b) recommend including discussion of the constraints and limitations of the survey methods used. Constraints and limitations for the Level 2 flora and vegetation, and Level 1 fauna survey for the study area are summarised in **Table 4**.

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Table 4: Survey limitations of the Anderson Road Reserve flora, vegetation and fauna survey

Factor	Limitations
Sources of information	The Perth subregion has been relatively well surveyed. Numerous flora and fauna surveys have been undertaken in the wider area. Database searches provide adequate information about Threatened and Priority flora and fauna, TECs and PECs.
Scope of works	The scope of works provided adequate detail to achieve the survey objectives.
Completeness of survey	The survey requirements of a Level 2 flora and Level 1 fauna survey including Black Cockatoo assessment were adequately met. Transect sampling was undertaken to effectively search for Threatened and Priority flora, and flora quadrats were established to identify vegetation communities. Habitat assessment was conducted to effectively determine likelihood of occurrence of the relevant conservation listed flora and fauna species.
Intensity of survey	The survey effort was satisfactory for a Level 2 flora, Level 1 fauna and targeted flora survey, and considering the size and location of the study area as per EPA Guidance Statement No. 51 and SEWPaC (2012).
Timing, weather, season, cycle	Phase 1 of the flora survey was undertaken during spring when flora species are flowering and more easily detectable. The timing of the survey was appropriate for a targeted flora survey and in accordance with EPA and Parks and Wildlife Technical Guide and EPA Guidance Statement 51.
Disturbances	There were moderate indications of disturbances within the study area, including human activity and weeds.
Resources	The team members that completed the surveys are suitably qualified in their respective fields to identify specimens, assess habitat, and detect species.
Accessibility	All relevant areas in the study area were easily accessed and surveyed on foot.

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

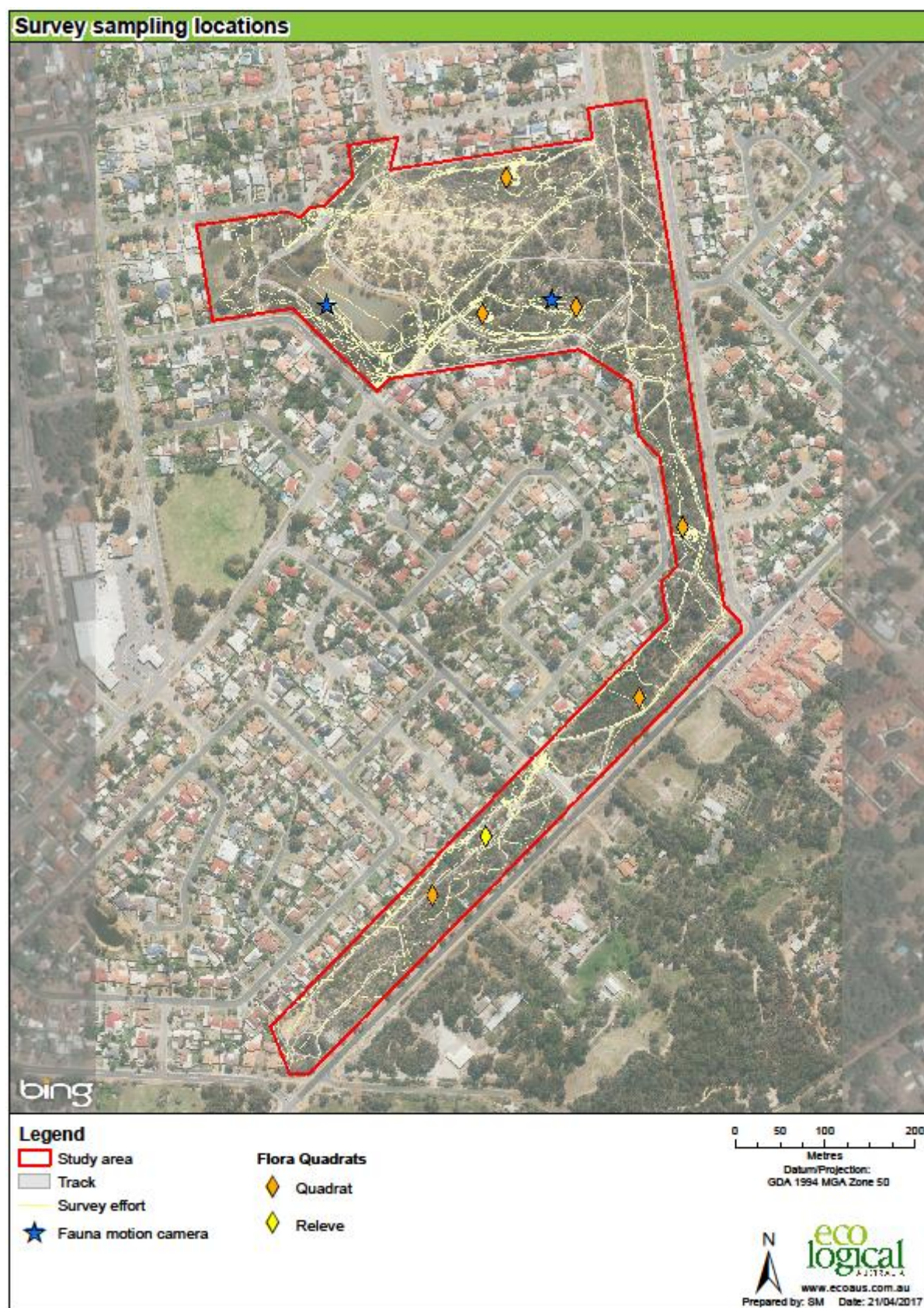


Figure 2: Survey sampling locations

4 Results

4.1 Flora of the study area

A total of 180 flora taxa were identified within the study area (**Appendix E**). This included 114 native and 66 introduced taxa. The taxa comprised 49 families and 124 genera. The most commonly occurring families were Fabaceae (29 taxa), Myrtaceae (24 taxa) and Proteaceae (19 taxa). *Acacia* (Fabaceae) was the most common genus with 9 taxa recorded in the study area.

The mean native species richness for quadrats sampled was 25.3 species per quadrat (range: 8 – 45 species per quadrat). A flora species matrix is provided in **Appendix F** and floristic quadrat data is provided in **Appendix H**.

4.1.1 Conservation listed flora

A total of 60 conservation listed flora species that possibly occur within the study area were identified from the database searches, based on records of occurrence within a 3 km radius (Parks and Wildlife 2007-2017; Parks and Wildlife 2016; DotEE 2017b). However, no Threatened or Priority listed flora was recorded during the two-phase survey. Additionally, no conservation listed flora has previously been recorded within the study area, and as such, none are considered likely to occur (**Appendix C**).

4.1.2 Introduced flora

Introduced (weed) species represented approximately 37% of the total species recorded, with a total of 66 taxa recorded. This number of weed species is typical for remnant vegetation in Perth and the surrounding metropolitan areas, with many of the species recorded in disturbed areas such as along the edge of tracks, edges of remnant vegetation and in cleared/parkland areas. A full list of weed species recorded from the study area is included in **Appendix G**.

Two weed species recorded during the field survey are listed as WoNS: **Opuntia stricta* and **Genista linifolia*. **O. stricta* is also listed as a Declared Pest under the BAM Act (DAFWA 2017b). **O. stricta* was recorded from two locations along the south-western border of the study area, and **G. linifolia* was recorded from two locations in the north of the study area (**Figure 3**).

Weed mapping of the remaining target weed species (as listed in **Table 3**) has been separated into the following:

- Bulbous weeds (**Figure 4**)
- Woody weeds (**Figure 5**)
- Grass weeds (**Figure 6**)
- Other weeds (**Figure 7**).



Figure 3: Weeds of National Significance

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

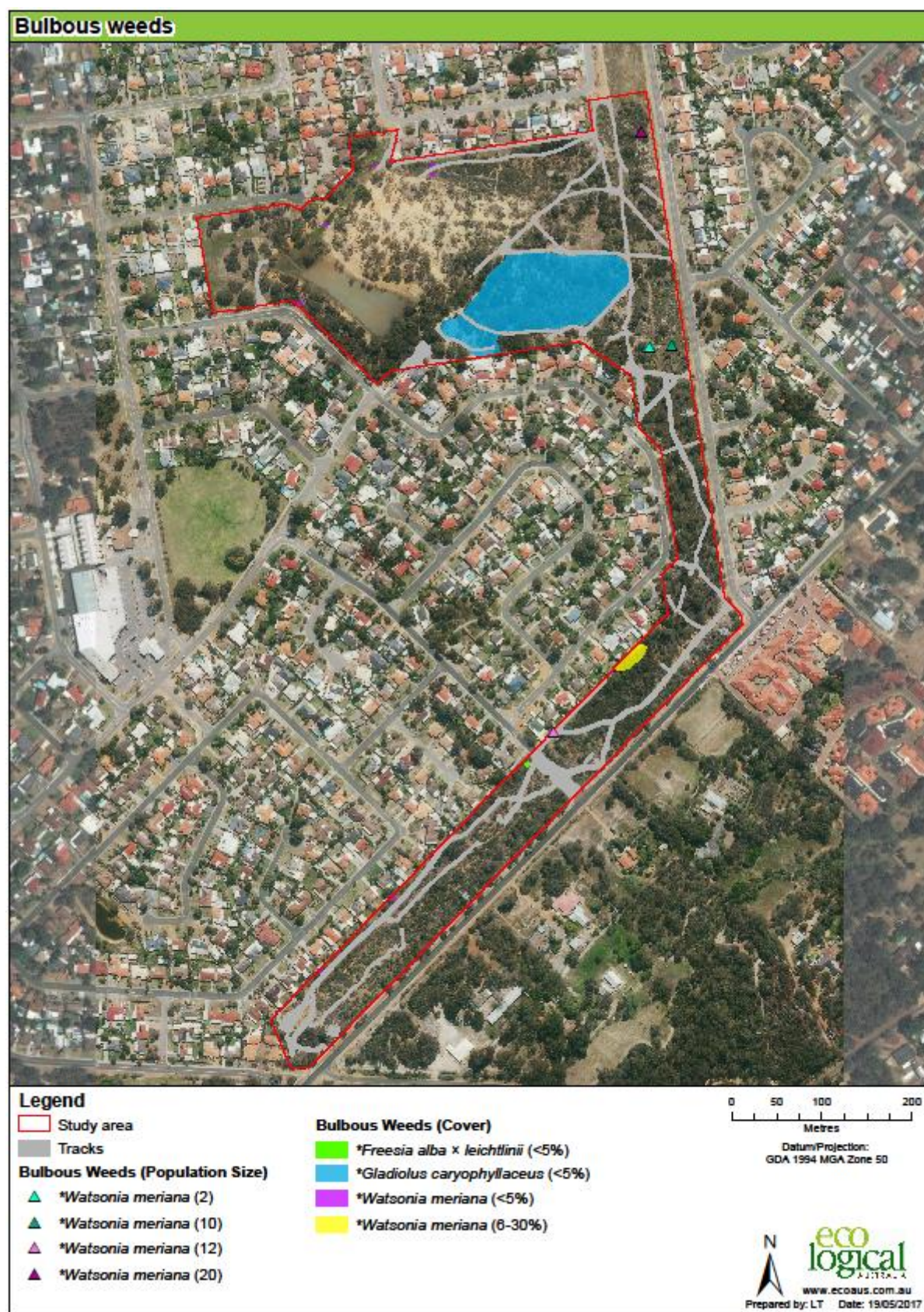


Figure 4: Bulbous weeds

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

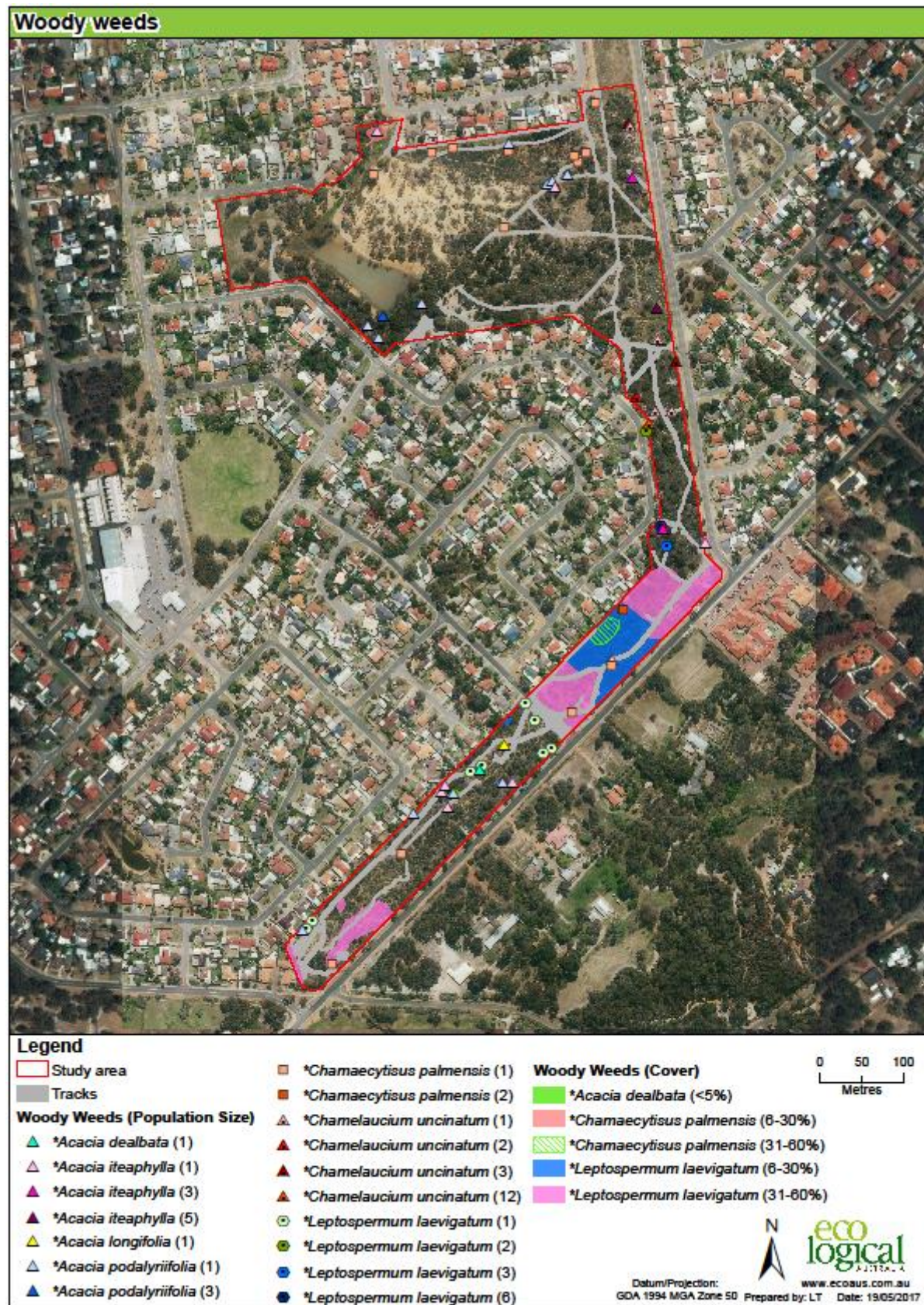


Figure 5: Woody weeds

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

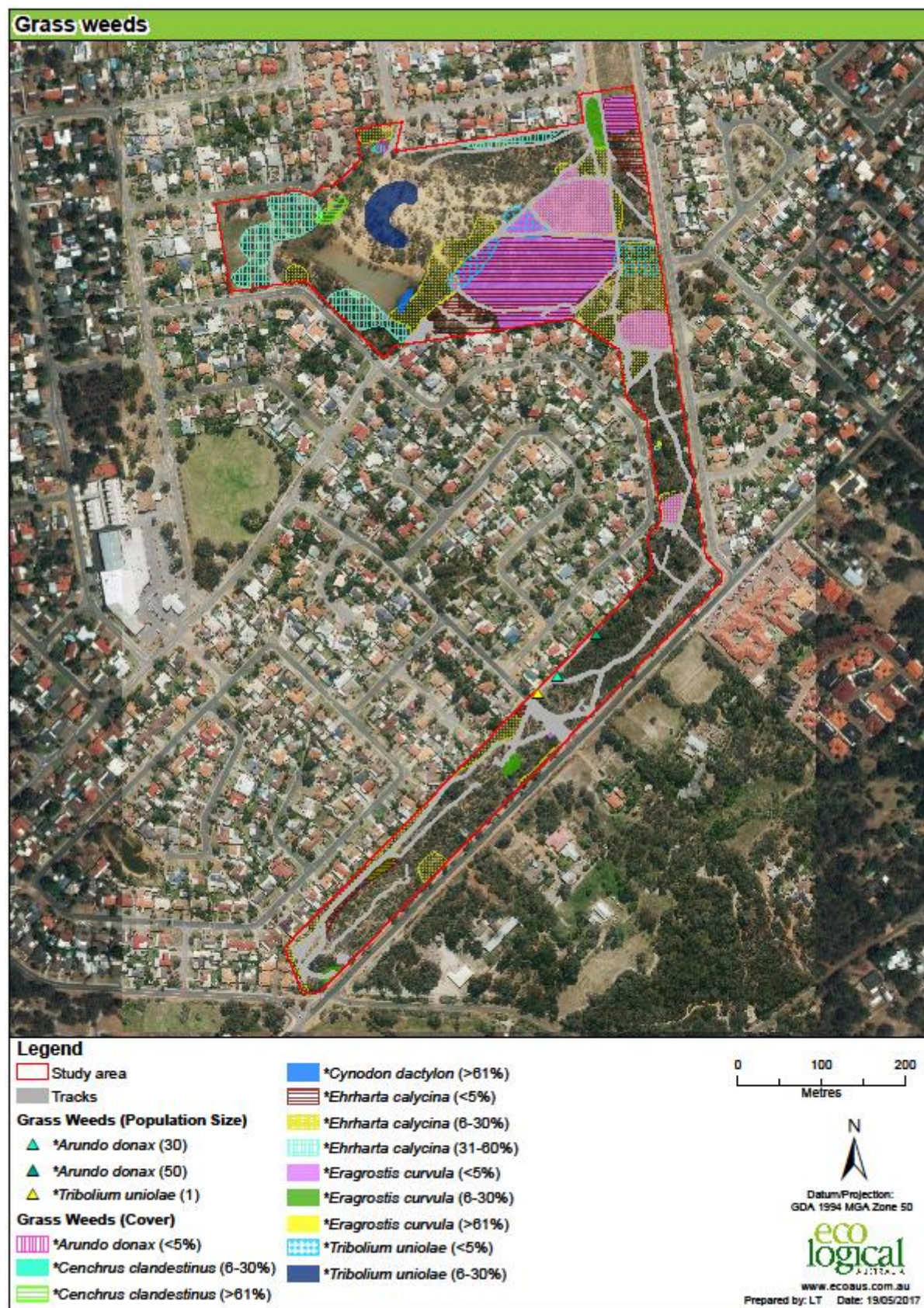


Figure 6: Grass weeds



Figure 7: Other weeds

4.2 Vegetation of the study area

4.2.1 Vegetation types

Three vegetation types were mapped in the study area (**Table 5** and **Figure 8**). Vegetation type CcOW was present throughout the southern narrow strip and a small patch in the north of the study area. Vegetation type EmW was the dominant vegetation type in the northern half of the study area, including areas of parkland that have been predominantly cleared. Vegetation type EwOW was present in one patch in the north of the study area and appeared to be historically cleared and planted with *Eucalyptus wandoo*. Recently revegetated areas were not assigned vegetation types, however, species from the Forrestfield Vegetation complex were used for revegetation.

Table 5: Vegetation types within the study area

Vegetation type	Description	ELA quadrats	Condition	Extent within study area (ha)	Portion of study area (%)
CcOW	<i>Corymbia calophylla</i> open woodland over <i>Hakea trifurcata</i> open shrubland over <i>Neurachne alopecuroidea</i> , <i>Opercularia vaginata</i> , * <i>Freesia alba</i> x <i>leichtlinii</i> isolated forbs.	ELA_01 ELA_05 ELA_06	Very Good - Degraded	5.07	29.82
EmW	<i>Eucalyptus marginata</i> subsp. <i>marginata</i> woodland over <i>Xanthorrhoea preissii</i> , <i>Allocasuarina humilis</i> and <i>Melaleuca aspalathoides</i> sparse shrubland over * <i>Briza maxima</i> and * <i>Ehrharta calycina</i> isolated grasses.	ELA_02 ELA_03 ELA_04	Very Good - Completely Degraded	6.74	39.66
EwOW	<i>Eucalyptus wandoo</i> open woodland over * <i>Briza maxima</i> and * <i>Ehrharta calycina</i> isolated grasses (historical planting).	-	Completely Degraded	2.08	12.24
Other	Tracks, revegetation, ephemeral drainage	-	-	3.11	18.29
Total				17.0	100.0

4.2.2 Conservation listed ecological communities

The vegetation communities of the study area do not represent the 'Banksia Woodlands of the Swan Coastal Plain' TEC based on the absence of key diagnostic species *Banksia attenuata* and *B. menziesii*, either as dominants or sub-dominants (DotEE 2016).

No other TECs or PECs are considered to be represented by the vegetation of the study area.

4.2.3 Vegetation condition

Vegetation condition in the study area ranged from Very Good to Completely Degraded based on the Keighery (1994) scale (**Table 6** and **Figure 9**). The majority of remnant vegetation was in Very Good and Good condition. The study area contained high numbers and densities of weeds, and several areas

 Flora, Vegetation and Fauna Survey of Anderson Road Reserve

showed obvious signs of edge effects, which is reflected in lower vegetation condition ratings along tracks and roads (**Figure 9**). Other disturbances observed across the study area affecting condition included rubbish and garden waste dumping, historical clearing and revegetation using non-native species.

Other areas such as tracks, revegetation and drainage were not considered in the assessment of vegetation condition. Two areas previously revegetated to the south of the study area were very sparse and lacking in good cover of native plants; however, weed loads in these areas were low (**Figure 9**). The revegetation to the north of the study area appeared to be older and plants were much more mature in this area, consequently vegetation cover was better.

Table 6: Vegetation condition within the study area

Vegetation condition	Total area (ha)	Portion of study area (%)
Pristine	0.0	0.0
Excellent	0.0	0.0
Very Good	4.82	28.34
Good	4.20	24.72
Degraded	2.06	12.15
Completely Degraded	2.81	16.52
Tracks/paths	2.00	11.76
Other (Drainage, revegetation)	1.11	6.52
Total	17.0	100.0

4.2.4 FCT analysis

Results of the cluster analysis indicated that the ELA quadrats established in the study area clustered together into two separate groupings with various similarities to each other. The first group contained ELA_05 and ELA_01, the most similar at 41%, and ELA_06 joined at 29%, however, they joined a much larger group of Gibson et al. (1994) quadrats at a very low similarity which did not allow a determination of the likely FCT to be made at an appropriate confidence level.

The second group contained ELA_02 and ELA_04 the most similar at 47% and ELA_03 joined at 35%. These ELA quadrats joined two Gibson et al. (1994) quadrats; Card11 and Card4 at 26% similarity, which is classed as FCT 6 'Weed dominated wetlands on heavy soils' (Gibson et al. 1994). The low similarity (26%) is not considered an appropriate confidence level and thus FCT 6 is not considered to occur in the study area.

The reason for these low similarities is most likely due to the fact that Gibson et al. (1994) did not establish any quadrats on the far eastern side of the Swan Coastal Plain where the foothills vegetation grades into the Swan Coastal Plain vegetation, where the study area is located. The absence of any Gibson et al. (1994) quadrats to compare in the statistical analysis resulted in an inconclusive result. As such, the vegetation communities of the study area have not been assigned FCTs.

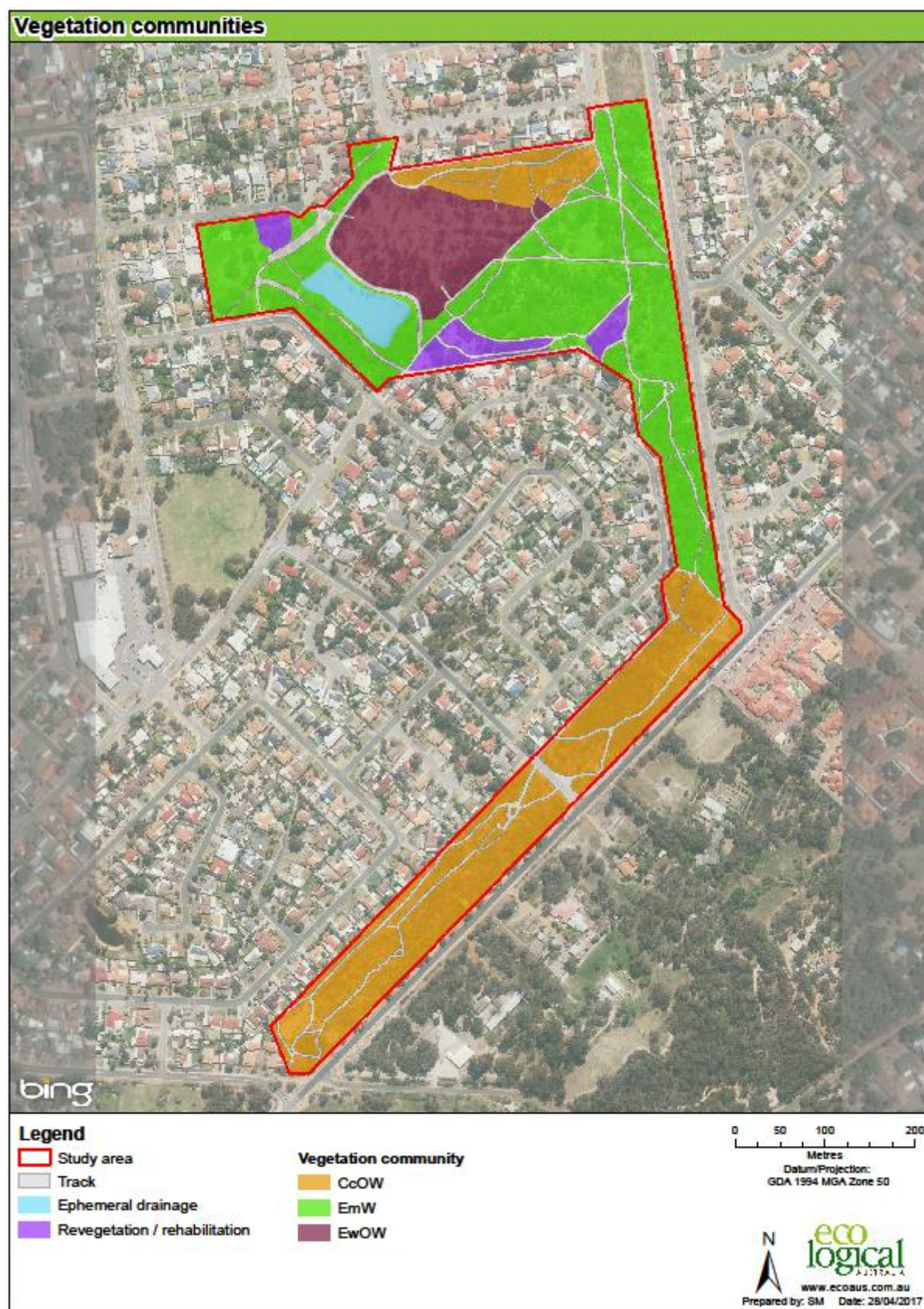


Figure 8: Vegetation types within the study area

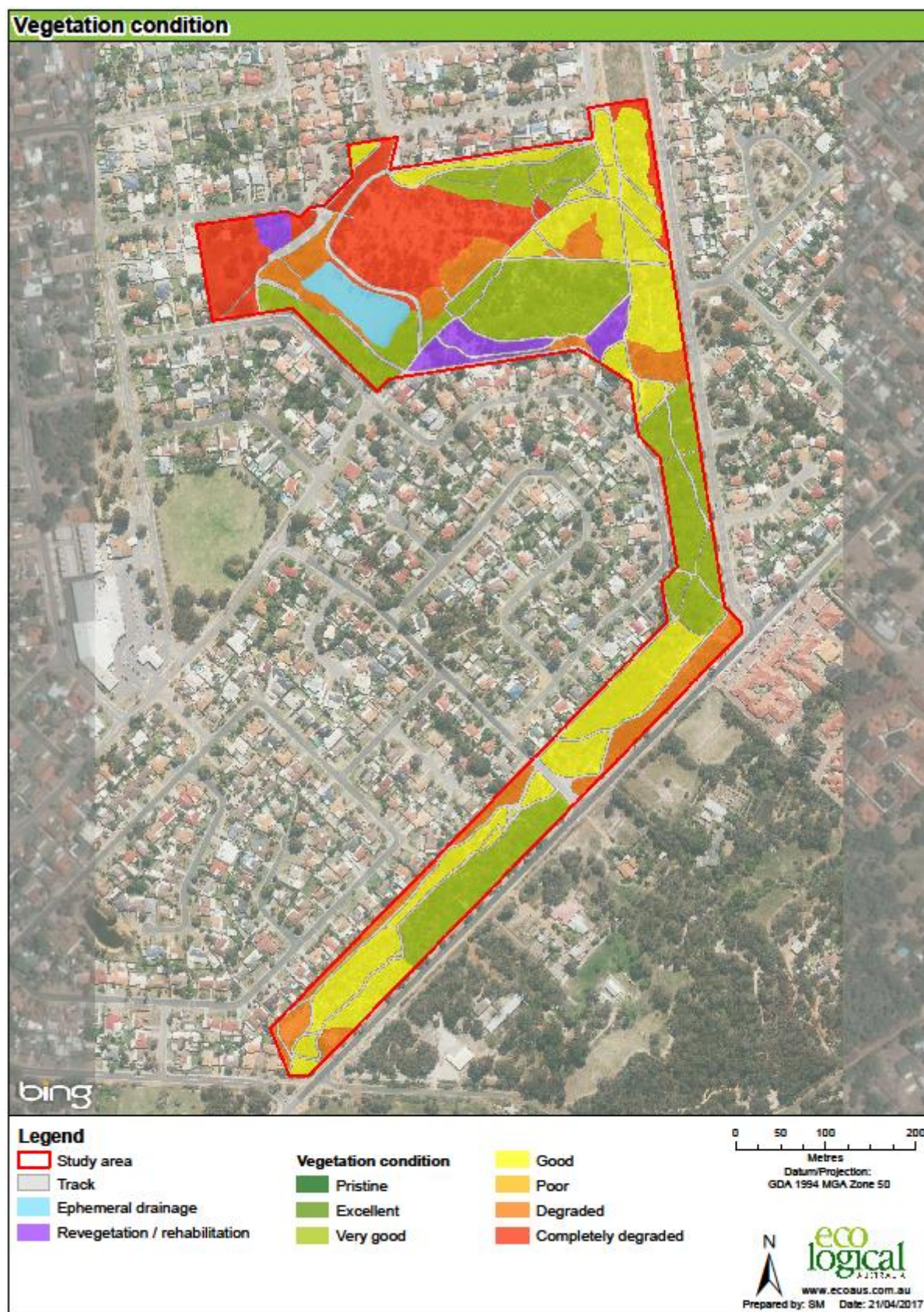


Figure 9: Vegetation condition within the study area

4.3 Fauna of the study area

4.3.1 Fauna habitats

The vegetation types identified in the study area can be classed as one broad fauna habitat type: mixed Eucalypt woodland. The Eucalypt woodland habitat provides foraging and nesting habitat for a range of shrubland birds, including honeyeaters, wrens and other insectivorous birds; a range of terrestrial and fossorial reptiles, such as skinks, snakes and geckos; and for small mammals such as Quenda. Large *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri) trees provide nesting and roosting habitat for a range of larger birds, including Black Cockatoos.

The ephemeral drainage line leading into an artificial drainage sump also provides habitat for fauna when water is present. This provides suitable habitat for a number of common frog species, as well as providing an ephemeral water source for a wide range of fauna.

4.3.2 Black Cockatoo habitat assessment

The study area provides good foraging habitat for Black Cockatoos, such as *Banksia sessilis*, Jarrah, and Marri, which were present across most of the study area. Other species such as *Callistemon* and other eucalypts also provide potential foraging habitat.

Sixty-nine mature or dead Jarrah, Marri and *Eucalyptus wandoo* (Wandoo) trees, with DBH over 50 cm, were recorded throughout the study area (**Figure 12**). These trees provide potential breeding habitat for Black Cockatoos (SEWPaC 2012). Five of these trees had visible hollows; however, it is likely that additional trees within the study area would contain hollows that were not visible from the ground. The 69 potential breeding trees also provide suitable night roosting habitat for Black Cockatoos, as would other tall trees present throughout the study area.

4.3.3 Fauna assemblages

A total of 28 fauna species were opportunistically observed, or signs of their presence recorded, during the Level 1 fauna survey. This comprised 21 birds (15 native and six non-native), three mammals (one native and two introduced) and four reptiles (**Appendix I**).

4.3.4 Conservation listed fauna

A total of 22 conservation listed fauna species that possibly occur within the study area were identified from the database searches, based on records of occurrence within a 3 km radius (Parks and Wildlife 2007-2017; Parks and Wildlife 2016; DotEE 2017b). Of these 22, two were recorded, or signs of their presence recorded, within the study area:

- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) – listed as Vulnerable under the EPBC and WC Acts.
- Quenda (*Isodon obesulus fusciventer*) – listed as Priority 4 by DPaW.

Forest Red-tailed Black Cockatoos were heard calling in the study area during the spring field survey (**Figure 13**). In addition, evidence of Black Cockatoo foraging activity on Marri nuts was recorded in the north of the study area (**Figure 10** and **Appendix K**). It is possible that Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and Baudin's Cockatoo (*C. baudinii*) would also occur in the study area based on the presence of suitable foraging, breeding and night roosting habitat (**Figure 12**). No Black Cockatoo breeding or night roosting activity was observed during the fauna survey. Environmental staff have sighted white tailed cockatoos foraging in the reserve, however these have not been identified as being either Carnaby's Cockatoo or Baudin's Cockatoo (City of Kalamunda pers comm., 26 September 2017).

Numerous Quenda diggings were observed in the north-eastern section of the study area in remnant vegetation (**Figure 11**, **Figure 13** and **Appendix K**). Majority of diggings were observed in vegetation considered to be in Very Good condition, however a few diggings were also observed in lesser quality vegetation (refer to **Figure 9** for vegetation condition). These areas still retained good coverage in the under storey, which is likely why Quenda are able to persist in the area. The presence of the ephemeral drainage in the north may also provide a water source for Quenda. Motion cameras were set up over one night during the spring survey in areas where Quenda diggings were observed, however no Quenda were recorded via motion camera.

Five additional conservation listed fauna species were considered to have the potential to occur, despite not being recorded, due to their seasonal movement patterns or their wide-ranging occurrence:

- *Apus pacificus* (Fork-tailed Swift)
- *Calyptorhynchus baudinii* (Baudin's Cockatoo)
- *Calyptorhynchus latirostris* (Carnaby's Cockatoo)
- *Dasyurus geoffroii* (Chuditch)
- *Merops ornatus* (Rainbow Bee-eater).

Environmental staff have sighted Rainbow Bee-eaters in the areas and it is known to burrow and breed in Hartfield Park in the sandy soils, adjacent to the study area. It is considered to potentially be present within the reserve. The remaining conservation listed fauna species were considered unlikely to occur either due to lack of habitat or erroneous records (**Appendix D**).



Figure 10: Marri nuts chewed by Forest Red-tailed Black Cockatoos in the study area

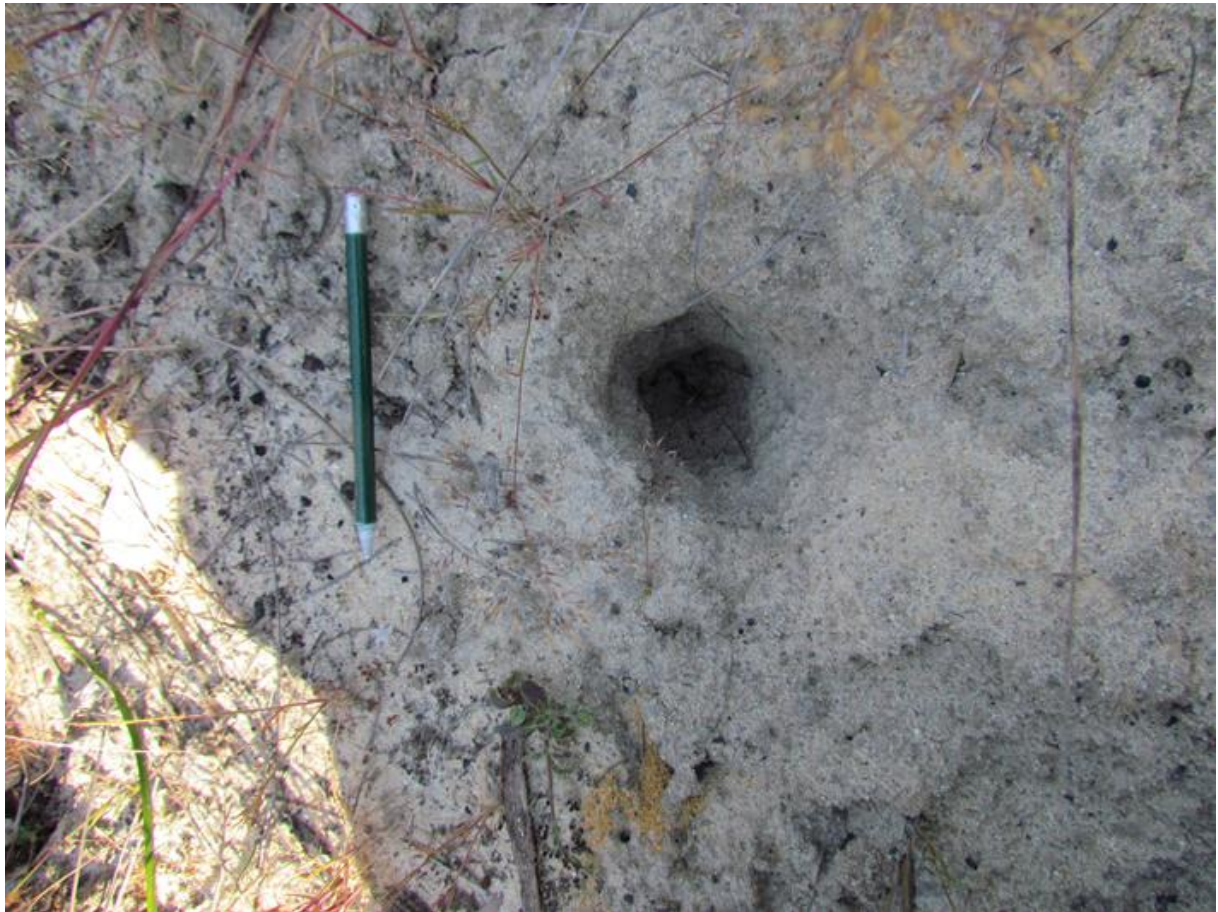


Figure 11: Example of Quenda digging observed in the study area

4.3.5 Introduced fauna

Five pest birds, one introduced bird and two introduced mammals were observed in the study area (**Appendix I**):

- Domestic Cat
- Domestic Pigeon
- European Rabbit
- Galah
- Laughing Dove
- Laughing Kookaburra
- Little Corella
- Rainbow Lorikeet

While pest birds are native to Australia, they are not native to the Perth area, and consequently create problems for native wildlife. This includes competition for nest hollows and food, predation, and the introduction and spread of disease. European Rabbits cause land degradation and competition for food, and Domestic Cats prey on numerous native fauna species.

In additional, several dog walkers were observed throughout the study area. Feral Bees (**Apis mellifera*) were also recorded in nest boxes in the north of the study area (**Figure 14**).

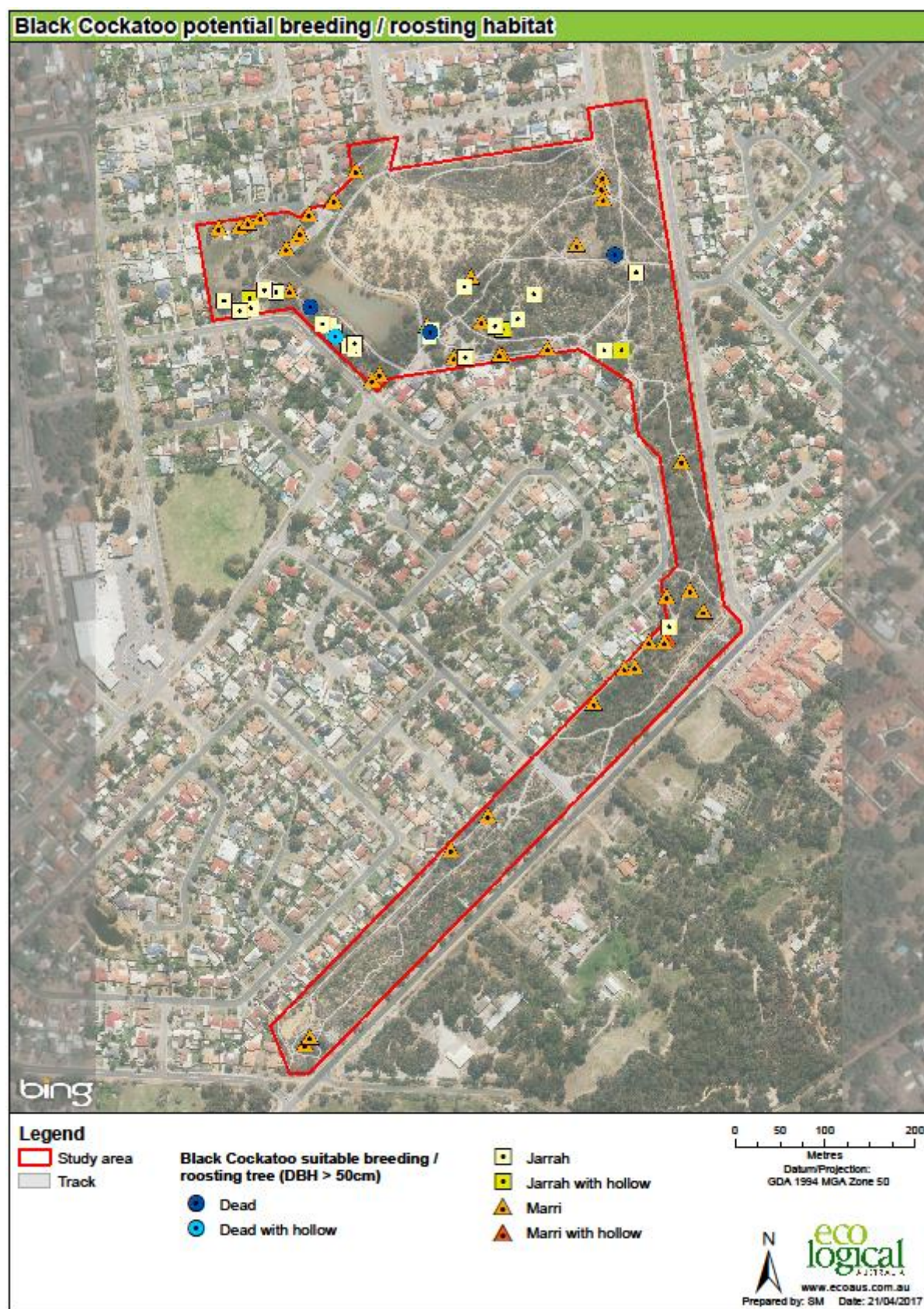


Figure 12: Black cockatoo potential breeding / night roosting habitat



Figure 13: Conservation listed fauna recorded during the survey

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

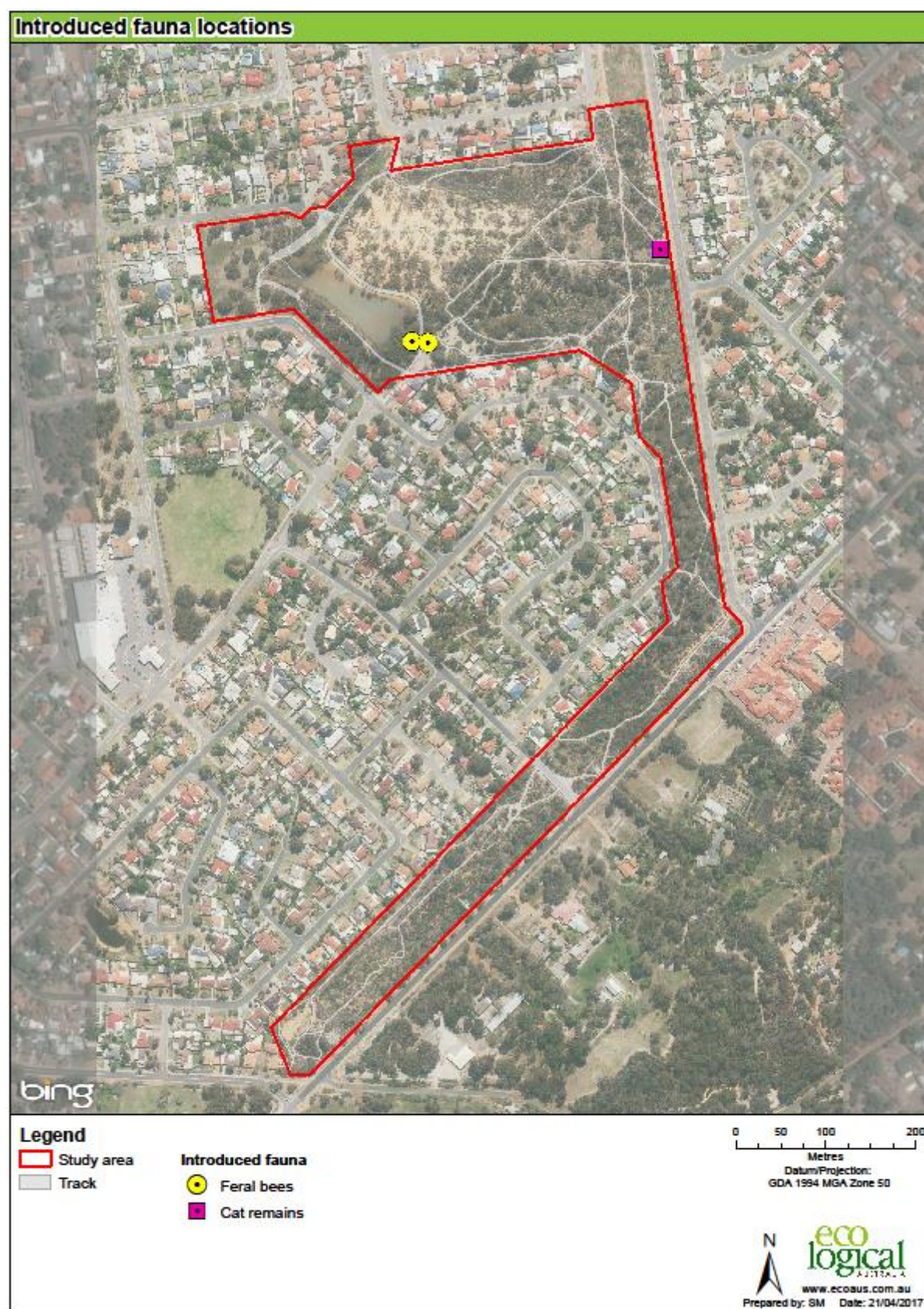


Figure 14: Introduced fauna recorded during the survey

5 Conclusions and recommendations

5.1 Flora and vegetation

The study area is comprised of three vegetation types, all of which are broadly defined as eucalypt woodlands characterised by the dominant species of eucalypt in each (i.e. Marri, Jarrah and Wandoo). Boundaries between vegetation types are generally discontinuous, with interfaces representing an admixture of multiple vegetation types. However, in some cases the boundaries are more discrete due to a change in soil profile or disturbance (e.g. tracks, firebreaks, clearing etc.). None of these vegetation types represents a conservation significant ecological community which is supported by the FCT analysis undertaken from quadrat data recorded in the study area.

A total of 180 flora taxa were identified within the study area; 114 of which are native. The study area contains a high proportion of weeds, with 66 species (i.e. 37% of the total species recorded) documented during the survey. This level of weed infestation is a significant contributing factor to vegetation condition within the study area which ranged from Very Good to Completely Degraded. Weeds are present throughout the study area; however higher concentrations occur adjacent to cleared areas and in areas which have been subject to disturbance. Two weed species recorded during the field survey are listed as WoNS: **Opuntia stricta* and **Genista linifolia*. **O. stricta* is also listed as a Declared Pest under the BAM Act and was recorded from two locations along the south-western border of the study area. **G. linifolia* was recorded from two locations in the north of the study area.

A total of 60 conservation listed flora species that possibly occur within the study area were identified from the database searches, however no Threatened or Priority listed flora was recorded during the survey. Additionally, no conservation listed flora has previously been recorded within the study area, and as such, none are considered likely to occur.

5.2 Fauna

The fauna species recorded during the survey represent a snapshot of the fauna actually occurring within the study area, and it is therefore likely that many more species occur than were observed. A total of 294 vertebrate fauna taxa (native and introduced) were identified as possibly occurring based on NatureMap database search, including 10 amphibians, 51 reptiles, 212 birds and 21 mammals (Parks and Wildlife 2007 – 2017).

The study area provides an important area of remnant fauna habitat within the City of Kalamunda. The vegetation and habitat resources it contains are likely to support a diverse and species-rich assemblage of native birds and reptiles, and the bushland is considered to have high local conservation value. Several areas of large, intact remnant native vegetation occur on the Darling Scarp: Lesmurdie Falls National Park to the east and Mundy Regional Park to the north-east. However, few areas of remnant vegetation occur in close proximity on the Swan Coastal Plain. In addition, the study area is fragmented by roads and housing, which would limit the dispersal of many reptiles, mammals and amphibians.

The study area provides habitat and connectivity for many bird species and is important for the continued presence of a range of local reptile species. The occurrence of Forest Red-tailed Black Cockatoos highlights the foraging and potential breeding value of the study area for avifauna. It is also an important site for the Priority listed Quenda, which may be locally restricted to the area given the fragmented nature of the study area.

Despite the certainty of introduced fauna preying on and competing with native fauna, the fact that Quenda are persisting in the study area is a positive indication that it represents a refuge for a range of native fauna. Feral animal control could potentially increase numbers of Quenda, other small mammals and a wide range of reptiles within the study area.

5.3 Recommendations

The following is recommended to continue to conserve and protect the environmental values of Anderson Road Reserve:

- Undertake a dieback survey to determine presence of *Phytophthora* Dieback in the reserve and to inform future management of the pathogen.
- Undertake a feasibility study to determine opportunities to create habitat linkages between Hartfield Park, Mundy Regional Park, Lesmurdie Falls and Woodlupine Brook.
- Continue weed management, particularly in areas adjacent to housing. Priorities include treatment and removal of WoNS (**Figure 3**).
- Undertake targeted weed control to minimise the spread of weeds in the areas of 'very good' vegetation condition.
- Remove dumped rubbish as soon as practicable and consider barrier or fencing options to prevent unauthorised access.
- Rationalise the existing pathways for passive recreational use.
- Undertake regular feral bee control within nest boxes and tree hollows across the study area.
- Consider infill planting and ongoing monitoring/management of revegetated areas.
- Continue implementation of *Anderson Road Reserve Action Plan 2015-2017* (Shire of Kalamunda 2015), update accordingly and recruit new volunteers.

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Appendix A Framework for conservation listed flora and fauna in Western Australia

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

CATEGORIES OF THREATENED SPECIES UNDER THE ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 (EPBC ACT)

Threatened fauna and flora may be listed in any one of the following categories as defined in Section 179 of the EPBC Act. Species listed as 'conservation dependent' and 'extinct' are not Matters of National Environmental Significance and therefore do not trigger the EPBC Act.

Category	Definition
Extinct (EX)	There is no reasonable doubt that the last member of the species has died.
Extinct in the Wild (EW)	Taxa known to survive only in captivity or as a naturalised population well outside its past range; or taxa has not been recorded in its known and/or expected habitat at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered (CE)	Taxa considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	Taxa considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	Taxa considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	Taxa has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern (LC)	Taxa has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
Data Deficient (DD)	There is inadequate information to make a direct, or indirect, assessment of taxa's risk extinction based on its distribution and/or population status.
Not Evaluated (NE)	Taxa has not yet been evaluated against the criteria.
Migratory (M)	<p>Not an IUCN category.</p> <p>Species are defined as migratory if they are listed in an international agreement approved by the Commonwealth Environment Minister, including:</p> <ul style="list-style-type: none"> • the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animal) for which Australia is a range state; • the agreement between the Government of Australian and the Government of the People's Republic of China for the Protection of Migratory Birds and their environment (CAMBA); • the agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); or • the agreement between Australia and the Republic of Korea to develop a bilateral migratory bird agreement similar to the JAMBA and CAMBA in respect to migratory bird conservation and provides a basis for collaboration on the protection of migratory shorebirds and their habitat (ROKAMBA).

CONSERVATION CODES FOR WESTERN AUSTRALIA FLORA AND FAUNA

Specially protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such.

Threatened species (T)

Published as Specially Protected under the Wildlife Conservation Act 1950, and listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

Threatened fauna is that subset of 'Specially Protected Fauna' declared to be 'likely to become extinct' pursuant to section 14(4) of the Wildlife Conservation Act.

Threatened flora is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the Wildlife Conservation Act.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

Schedule	Code	Description
Schedule 1 Critically Endangered species	S1 (CR)	Threatened species considered to be facing an extremely high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.
Schedule 2 Endangered species	S2 (EN)	Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.
Schedule 3 Vulnerable species	S3 (VU)	Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.
Schedule 4 Presumed extinct species	S4 (EX)	Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Schedule	Code	Description
Schedule 5 Migratory birds protected under an international agreement	S5 (IA)	Birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Bonn Convention, relating to the protection of migratory birds. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice.
Schedule 6 Conservation dependent fauna	S6 (CD)	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice.
Schedule 7 Other specially protected fauna	S7 (OS)	Fauna otherwise in need of special protection to ensure their conservation. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice.

Priority species (P)

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

Category	Code	Definition
Priority 1	P1	<i>Poorly-known species</i> Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2	P2	<i>Poorly-known species</i> Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Category	Code	Definition
		requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3	P3	<i>Poorly-known species</i> Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4	P4	<i>Rare, Near Threatened and other species in need of monitoring</i> (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for Vulnerable, but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

DEFINITIONS, CATEGORIES AND CRITERIA FOR THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

An Ecological Community is described as “a naturally occurring biological assemblage that occurs in a particular type of habitat”.

A threatened ecological community (TEC) is one which is found to fit into one of the following categories; “presumed totally destroyed”, “critically endangered”, “endangered” or “vulnerable”.

Possible TECs that do not meet survey criteria are added to DPaW's Priority Ecological Community Lists under Priorities 1, 2 and 3. Ecological Communities that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Definitions and Criteria for Presumed Totally Destroyed, Critically Endangered, Endangered and Vulnerable Ecological Communities

Presumed Totally Destroyed (PD)

An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies (A or B):

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats,

B) All occurrences recorded within the last 50 years have since been destroyed.

Critically Endangered (CR)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii):

i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);

ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the c

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);

ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;

iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

Endangered (EN)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):

A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii):

i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);

ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);

ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;

iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

Vulnerable (VU)

An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B or C):

A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.

B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.

C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

Definitions and Criteria for Priority Ecological Communities

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as threatened ecological communities. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly-known ecological communities

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 100 ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly-known ecological communities

Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:

(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;

(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened or that have been recently removed from the threatened list. These communities require regular monitoring.

(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.

(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.

(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Appendix B Database search results

NatureMap Species Report

Created By Guest user on 25/10/2016

Kingdom Plantae
Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116° 01' 05" E, 31° 59' 40" S
Buffer 3km

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	3219	<i>Acacia anomala</i> (Grass Wattle)		T	
2.	14131	<i>Acacia oncinophylla</i> subsp. <i>patulifolia</i>		P4	
3.	32211	<i>Banksia mimica</i> (Summer Honeypot)		T	
4.	32138	<i>Banksia pteridifolia</i> subsp. <i>vernalis</i>		P3	
5.	4444	<i>Boronia tenuis</i> (Blue Boronia)		P4	
6.	3178	<i>Byblis gigantea</i> (Rainbow Plant)		P3	
7.	13999	<i>Conospermum undulatum</i>		T	
8.	5505	<i>Darwinia apiculata</i> (Scarp Darwinia)		T	
9.	19630	<i>Grevillea bipinnatifida</i> subsp. <i>pagna</i>		P1	
10.	13439	<i>Grevillea thelemanniana</i> subsp. <i>thelmanniana</i> (Spider Net Grevillea)		T	
11.	1469	<i>Haemodorum loratum</i>		P3	
12.	5133	<i>Hibbertia helianthemoides</i>		P4	
13.	2228	<i>Isopogon drummondii</i>		P3	
14.	5025	<i>Lasiopetalum bracteatum</i> (Helena Velvet Bush)		P4	
15.	45081	<i>Lasiopetalum glutinosum</i> subsp. <i>glutinosum</i>		P3	
16.	37683	<i>Melaleuca viminalis</i>		P2	
17.	8163	<i>Pithocarpa corymbulosa</i> (Corymbose Pithocarpa)		P3	
18.	8212	<i>Senecio leucoglossus</i>		P4	
19.	7803	<i>Stylidium striatum</i> (Fan-leaved Triggerplant)		P4	
20.	8244	<i>Taraxacum cygnorum</i>		X	
21.	14333	<i>Tetratheca</i> sp. <i>Granite</i> (S. Patrick SP1224)		P3	
22.	20729	<i>Thelymitra magnifica</i> (Crystal Brook Star Orchid)		P1	
23.	10862	<i>Thelymitra stellata</i> (Star Orchid)		T	
24.	14714	<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>		P4	

Conservation Codes

T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap Species Report

Created By Guest user on 12/04/2017

Kingdom Animalia
Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116° 01' 05" E, 31° 59' 40" S
Buffer 3km

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	24162	<i>Bettongia penicillata</i> subsp. <i>ogilbyi</i> (Woylie, Brush-tailed Bettong)		T	
2.	24731	<i>Calyptorhynchus banksii</i> subsp. <i>naso</i> (Forest Red-tailed Black-Cockatoo)		T	
3.	24734	<i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo (short-billed black-cockatoo), Carnaby's Cockatoo)		T	
4.	24092	<i>Dasyurus geoffroii</i> (Chuditch, Western Quoll)		T	
5.	24215	<i>Hydromys chrysogaster</i> (Water-rat, Rakali)		P4	
6.	25478	<i>Isodon obesulus</i> (Southern Brown Bandicoot)		P4	
7.	24153	<i>Isodon obesulus</i> subsp. <i>fusciventer</i> (Quenda, Southern Brown Bandicoot)		P4	
8.	24133	<i>Macropus irma</i> (Western Brush Wallaby)		P4	
9.	24598	<i>Merops ornatus</i> (Rainbow Bee-eater)		IA	
10.	25249	<i>Neelaps calonotos</i> (Black-striped Snake)		P3	
11.	24328	<i>Oxyura australis</i> (Blue-billed Duck)		P4	

Conservation Codes

T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 20/10/16 14:15:26

[Summary](#)

[Details](#)

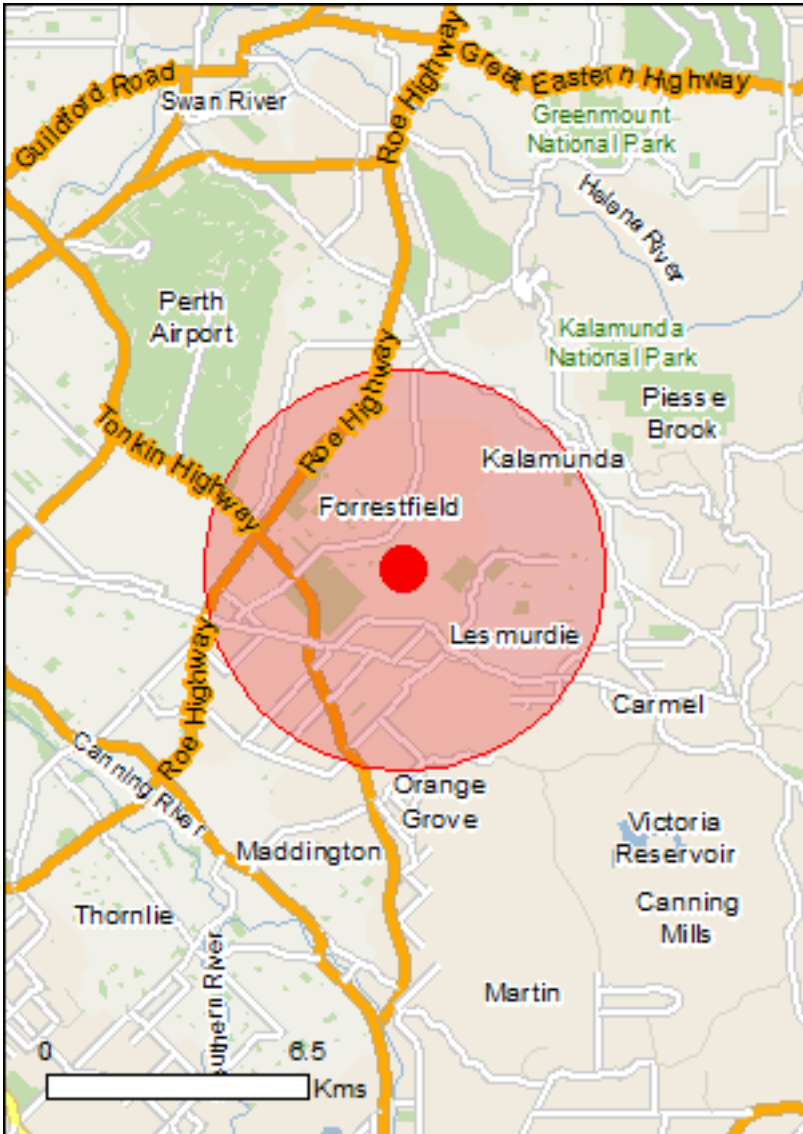
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



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[Coordinates](#)

[Buffer: 5.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	36
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	7
Regional Forest Agreements:	1
Invasive Species:	43
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain	Endangered	Community likely to occur within area
Claypans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area
Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain	Endangered	Community known to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		

Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Roosting known to occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area

Mammals

Bettongia penicillata Brush-tailed Bettong, Woylie [213]	Endangered	Species or species habitat may occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur

Public Agenda Briefing Forum - 12 February 2019 Attachments		Status	Type of Presence
			Assessment 1.2.6
			within area
Pseudocheirus occidentalis			
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]		Vulnerable	Species or species habitat may occur within area
Setonix brachyurus			
Quokka [229]		Vulnerable	Species or species habitat likely to occur within area
Plants			
Acacia anomala			
Grass Wattle, Chittering Grass Wattle [8153]		Vulnerable	Species or species habitat known to occur within area
Andersonia gracilis			
Slender Andersonia [14470]		Endangered	Species or species habitat known to occur within area
Anthocercis gracilis			
Slender Tailflower [11103]		Vulnerable	Species or species habitat likely to occur within area
Banksia mimica			
Summer Honeypot [82765]		Endangered	Species or species habitat likely to occur within area
Caladenia huegelii			
King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]		Endangered	Species or species habitat likely to occur within area
Calytrix breviseta subsp. breviseta			
Swamp Starflower [23879]		Endangered	Species or species habitat known to occur within area
Chamelaucium sp. Gingin (N.G.Marchant s.n., 4/11/1988)			
Gingin Wax [64649]		Endangered	Species or species habitat may occur within area
Conospermum undulatum			
Wavy-leaved Smokebush [24435]		Vulnerable	Species or species habitat likely to occur within area
Darwinia apiculata			
Scarp Darwinia [8763]		Endangered	Species or species habitat likely to occur within area
Diuris drummondii			
Tall Donkey Orchid [4365]		Vulnerable	Species or species habitat likely to occur within area
Diuris micrantha			
Dwarf Bee-orchid [55082]		Vulnerable	Species or species habitat likely to occur within area
Diuris purdiei			
Purdie's Donkey-orchid [12950]		Endangered	Species or species habitat known to occur within area
Drakaea elastica			
Glossy-leaved Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]		Endangered	Species or species habitat likely to occur within area
Drakaea micrantha			
Dwarf Hammer-orchid [56755]		Vulnerable	Species or species habitat may occur within area
Eleocharis keigheryi			
Keighery's Eleocharis [64893]		Vulnerable	Species or species habitat likely to occur within area
Eucalyptus balanites			
Cadda Road Mallee, Cadda Mallee [24264]		Endangered	Species or species habitat may occur within

Public Agenda Briefing Forum - 12 February 2019 Attachments		Status	Type of Presence
			Area 1.2.6
			area
Grevillea curviloba subsp. incurva			
Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area	
Lasiopetalum pterocarpum			
Wing-fruited Lasiopetalum [64922]	Endangered	Species or species habitat may occur within area	
Lepidosperma rostratum			
Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area	
Macarthuria keigheryi			
Keighery's Macarthuria [64930]	Endangered	Species or species habitat likely to occur within area	
Ptilotus pyramidatus			
Pyramid Mulla-mulla [18216]	Critically Endangered	Species or species habitat known to occur within area	
Synaphea sp. Fairbridge Farm (D.Papenfus 696)			
Selena's Synaphea [82881]	Critically Endangered	Species or species habitat likely to occur within area	
Thelymitra dedmaniarum			
Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat likely to occur within area	
Thelymitra stellata			
Star Sun-orchid [7060]	Endangered	Species or species habitat known to occur within area	

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		

Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves		[Resource Information]
Name		State
Kenwick Wetlands		WA
Korung		WA
Lesmurdie Falls		WA
Unnamed WA23076		WA
Unnamed WA24657		WA
Unnamed WA29815		WA
Unnamed WA37997		WA

Regional Forest Agreements		[Resource Information]
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Note that all areas with completed RFAs have been included.

Name		State
South West WA RFA		Western Australia

Invasive Species		[Resource Information]
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Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name		Status	Type of Presence
Birds			
Acridotheres tristis			
Common Myna, Indian Myna [387]			Species or species habitat likely to occur within area
Anas platyrhynchos			
Mallard [974]			Species or species habitat likely to occur within area
Carduelis carduelis			
European Goldfinch [403]			Species or species habitat likely to occur within area
Columba livia			
Rock Pigeon, Rock Dove, Domestic Pigeon [803]			Species or species habitat likely to occur within area
Passer domesticus			
House Sparrow [405]			Species or species habitat likely to occur within area
Passer montanus			
Eurasian Tree Sparrow [406]			Species or species habitat likely to occur within area
Streptopelia chinensis			
Spotted Turtle-Dove [780]			Species or species habitat likely to occur within area
Streptopelia senegalensis			
Laughing Turtle-dove, Laughing Dove [781]			Species or species habitat likely to occur within area
Sturnus vulgaris			
Common Starling [389]			Species or species habitat likely to occur within area
Turdus merula			
Common Blackbird, Eurasian Blackbird [596]			Species or species habitat likely to occur within area
Mammals			
Bos taurus			
Domestic Cattle [16]			Species or species habitat likely to occur within area

Public Agenda Briefing Forum - 12 February 2019 Attachments		Status	Type of Presence
Canis lupus familiaris Domestic Dog [82654]			Species or species habitat likely to occur within area
Capra hircus Goat [2]			Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]			Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]			Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]			Species or species habitat likely to occur within area
Mus musculus House Mouse [120]			Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]			Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]			Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]			Species or species habitat likely to occur within area
Sus scrofa Pig [6]			Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]			Species or species habitat likely to occur within area
Plants			
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]			Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]			Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]			Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]			Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]			Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]			Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]			Species or species habitat likely to occur within area

Public Agenda Briefing Forum - 12 February 2019 Attachments		Status	Type of Presence
Genista linifolia			Assessment 1.2.6
Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]			Species or species habitat likely to occur within area
Genista monspessulana			
Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]			Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana			
Broom [67538]			Species or species habitat may occur within area
Lantana camara			
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]			Species or species habitat likely to occur within area
Lycium ferocissimum			
African Boxthorn, Boxthorn [19235]			Species or species habitat likely to occur within area
Olea europaea			
Olive, Common Olive [9160]			Species or species habitat may occur within area
Pinus radiata			
Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]			Species or species habitat may occur within area
Rubus fruticosus aggregate			
Blackberry, European Blackberry [68406]			Species or species habitat likely to occur within area
Sagittaria platyphylla			
Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]			Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii			
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]			Species or species habitat likely to occur within area
Salvinia molesta			
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]			Species or species habitat likely to occur within area
Tamarix aphylla			
Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]			Species or species habitat likely to occur within area
Reptiles			
Hemidactylus frenatus			
Asian House Gecko [1708]			Species or species habitat likely to occur within area
Ramphotyphlops braminus			
Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]			Species or species habitat likely to occur within area
Nationally Important Wetlands			[Resource Information]
Name			State
Brixton Street Swamps			WA

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.99444 116.01806

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Parks and Wildlife Commission NT, Northern Territory Government](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Appendix C Flora likelihood of occurrence assessment

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Species	Conservation status ¹			Source ²				Likelihood assessment
	EPBC Act	WC Act	Parks and Wildlife	NatureMap	PMST	WAHerb	TPFL	
<i>Acacia anomala</i>	VU	S3	T	X	X	X	X	Unlikely
<i>Acacia aphylla</i>	VU	S3	T	-	-	X	X	Unlikely
<i>Acacia oncinophylla</i> subsp. <i>patulifolia</i>	-	-	P4	X	-	X	X	Unlikely
<i>Amanita kalamundae</i>	-	-	P3	-	-	X	-	Unlikely
<i>Andersonia gracilis</i>	EN	S3	T	-	X	X	X	Unlikely
<i>Anthocercis gracilis</i>	VU	S3	T	-	X	X	X	Unlikely
<i>Austrostipa bronwenae</i>	-	S2	T	-	-	X	X	Unlikely
<i>Babingtonia urbana</i>	-	-	P3	-	-	-	X	Unlikely
<i>Banksia mimica</i>	EN	S3	T	X	X	X	X	Unlikely
<i>Banksia pteridifolia</i> subsp. <i>vernalis</i>	-	-	P3	X	-	X	-	Unlikely
<i>Boronia humifusa</i>	-	-	P1	-	-	X	X	Unlikely
<i>Boronia tenuis</i>	-	-	P4	X	-	X	X	Unlikely
<i>Byblis gigantea</i>	-	-	P3	X	-	X	X	Unlikely
<i>Caladenia huegelii</i>	EN	S1	T	-	X	-	-	Unlikely
<i>Calandrinia</i> sp. Piawaning (A.C. Beauglehole 12257)	-	-	P1	-	-	X	-	Unlikely
<i>Calytrix breviseta</i> subsp. <i>breviseta</i>	EN	S1	T	-	X	X	X	Unlikely
<i>Centrolepis caespitosa</i>	-	-	P4	-	-	X	-	Unlikely
<i>Chamelaucium</i> sp. Gingin (N.G. Marchant 6)	EN	S3	T	-	X	-	-	Unlikely
<i>Comesperma rhadinocarpum</i>	-	-	P2	-	-	-	X	Unlikely

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Species	Conservation status ¹			Source ²				Likelihood assessment
	EPBC Act	WC Act	Parks and Wildlife	NatureMap	PMST	WAHerb	TPFL	
<i>Conospermum undulatum</i>	VU	S3	T	X	X	X	X	Unlikely
<i>Darwinia apiculata</i>	EN	S2	T	X	X	X	X	Unlikely
<i>Diuris drummondii</i>	VU	S3	T	-	X	-	-	Unlikely
<i>Diuris micrantha</i>	VU	S3	T	-	X	-	-	Unlikely
<i>Diuris purdiei</i>	EN	S2	T	-	X	-	X	Unlikely
<i>Drakaea elastica</i>	EN	S1	T	-	X	-	-	Unlikely
<i>Drakaea micrantha</i>	VU	S2	T	-	X	-	-	Unlikely
<i>Drosera occidentalis</i> subsp. <i>occidentalis</i>	-	-	P4	-	-	X	X	Unlikely
<i>Eleocharis keigheryi</i>	VU	S3	T	-	X	-	-	Unlikely
<i>Eremophila glabra</i> subsp. <i>chlorella</i>	-	S2	T	-	-	X	X	Unlikely
<i>Eucalyptus x balanites</i>	EN	S1	T	-	X	-	-	Unlikely
<i>Grevillea bipinnatifida</i> subsp. <i>pagna</i>	-	-	P1	X	-	-	-	Unlikely
<i>Grevillea curviloba</i> subsp. <i>incurva</i>	EN	S1	T	-	X	-	-	Unlikely
<i>Grevillea thelemanniana</i> subsp. <i>thelemanniana</i>	-	-	P1	X	-	X	X	Unlikely
<i>Haemodorum loratum</i>	-	-	P3	X	-	X	X	Unlikely
<i>Halgania corymbosa</i>	-	-	P4	-	-	X	-	Unlikely
<i>Hibbertia helianthemoides</i>	-	-	P4	X	-	-	-	Unlikely
<i>Hibbertia montana</i>	-	-	P4	-	-	X	-	Unlikely
<i>Hypocalymma</i> sp. <i>Cataby</i> (G.J. Keighery 5151)	-	-	P2	-	-	-	X	Unlikely

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Species	Conservation status ¹			Source ²				Likelihood assessment
	EPBC Act	WC Act	Parks and Wildlife	NatureMap	PMST	WAHerb	TPFL	
<i>Isopogon drummondii</i>	-	-	P3	X	-	X	-	Unlikely
<i>Lasiopetalum bracteatum</i>	-	-	P4	X	-	X	-	Unlikely
<i>Lasiopetalum glutinosum</i> subsp. <i>glutinosum</i>	-	-	P3	X	-	X	-	Unlikely
<i>Lasiopetalum pterocarpum</i>	EN	S1	T	-	X	-	-	Unlikely
<i>Lepidosperma rostratum</i>	EN	S2	T	-	X	X	X	Unlikely
<i>Macarthuria keigheryi</i>	EN	S2	T	-	X	X	X	Unlikely
<i>Melaleuca viminalis</i>	-	-	P2	X	-	X	-	Unlikely
<i>Myriophyllum echinatum</i>	-	-	P3	-	-	X	-	Unlikely
<i>Ornduffia submersa</i>	-	-	P4	-	-	X	-	Unlikely
<i>Pithocarpa corymbulosa</i>	-	-	P3	X	-	X	X	Unlikely
<i>Platysace ramosissima</i>	-	-	P3	-	-	X	X	Unlikely
<i>Ptilotus pyramidatus</i>	CR	S1	T	-	X	-	-	Unlikely
<i>Schoenus pennisetis</i>	-	-	P3	-	-	X	X	Unlikely
<i>Senecio leucoglossus</i>	-	-	P4	X	-	X	X	Unlikely
<i>Stylidium striatum</i>	-	-	P4	X	-	X	-	Unlikely
<i>Synaphea</i> sp. Fairbridge Farm (D. Papenfus 696)	CR	S1	T	-	X	-	X	Unlikely
<i>Tetratheca</i> sp. Granite (S. Patrick SP1224)	-	-	P3	X	-	X	X	Unlikely
<i>Thelymitra dedmaniarum</i>	EN	S1	T	-	X	-	-	Unlikely
<i>Thelymitra magnifica</i>	-	-	P1	X	-	X	X	Unlikely

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Species	Conservation status ¹			Source ²				Likelihood assessment
	EPBC Act	WC Act	Parks and Wildlife	NatureMap	PMST	WAHerb	TPFL	
<i>Thelymitra stellata</i>	EN	S2	T	X	X	X	X	Unlikely
<i>Thysanotus anceps</i>	-	-	P3	-	-	X	-	Unlikely
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	-	-	P4	X	-	X	X	Unlikely

¹CR = listed as Critically Endangered under the EPBC Act.

EN = listed as Endangered under the EPBC Act.

VU = listed as Vulnerable under the EPBC Act.

S1 = Schedule 1: Flora that are considered likely to become extinct or rare, as critically endangered flora (CR) under the WC Act.

S2 = Schedule 2: Flora that are considered likely to become extinct or rare, as endangered flora (EN) under the WC Act.

S3 = Schedule 3: Flora that are considered likely to become extinct or rare, as vulnerable flora (VU) under the WC Act.

T = Threatened species: flora that has been declared likely to become extinct or is rare, or otherwise in need of special protection, pursuant to section 23F(2) of the WC Act.

P1 = Priority 1: poorly known species that are known from one or a few locations which are potentially at risk, and are in urgent need of further survey. Listed by Department of Parks and Wildlife.

P2 = Priority 2: poorly known species known from one or a few locations, some of which are on lands managed primarily for nature conservation, and are in urgent need of further survey. Listed by Department of Parks and Wildlife.

P3 = Priority 3: poorly-known species known from several specimens or records but not under imminent threat, and need further survey. Listed by Department of Parks and Wildlife.

P4 = Priority 4: Rare, Near Threatened and other species in need of monitoring but not currently threatened; could become threatened if present circumstances change. Listed by Department of Parks and Wildlife.

²NatureMap = NatureMap database search (Parks and Wildlife 2007 - 2017); PMST = EPBC Act Protected Matters Report (DotEE 2017b); WAHerb = Western Australian Herbarium; TPFL = Threatened and Priority Flora database (Parks and Wildlife 2016a)

Appendix D Fauna likelihood of occurrence assessment

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Species	Conservation status ¹			Source ²		Likelihood assessment
	EPBC Act	Parks and Wildlife	WC Act	NatureMap	PMST	
<i>Apus pacificus</i> (Fork-tailed Swift)	M	-	S5	-	X	Potential
<i>Bettongia penicillata</i> (Brush-tailed Bettong, Woylie)	EN	-	S1	X	X	Unlikely
<i>Botaurus poiciloptilus</i> (Australasian Bittern)	EN	-	S2	-	X	Unlikely
<i>Calidris ferruginea</i> (Curlew Sandpiper)	CR, M	-	S3	-	X	Unlikely
<i>Calyptorhynchus banksii naso</i> (Forest Red-tailed Black-Cockatoo)	VU	-	S3	X	-	Known
<i>Calyptorhynchus baudinii</i> (Baudin's Cockatoo)	VU	-	S2	-	X	Potential
<i>Calyptorhynchus latirostris</i> (Carnaby's Cockatoo)	EN	-	S2	X	-	Potential
<i>Dasyurus geoffroii</i> (Chuditch)	VU	-	S3	X	-	Potential
<i>Hydromys chrysogaster</i> (Water-rat)	-	P4	-	X	-	Unlikely
<i>Isodon obesulus fusciventer</i> (Southern Brown Bandicoot, Quenda)	-	P4	-	X	-	Known
<i>Leipoa ocellata</i> (Malleefowl)	VU	-	S3	-	X	Unlikely
<i>Macropus irma</i> (Western Brush Wallaby)	-	P4	-	X	-	Unlikely
<i>Merops ornatus</i> (Rainbow Bee-eater)	M		S5	X	-	Potential
<i>Motacilla cinerea</i> (Grey Wagtail)	M	-	S5	-	X	Unlikely
<i>Neelaps calonotos</i> (Black-striped Snake)	-	P3	-	X	-	Unlikely
<i>Numenius madagascariensis</i> (Eastern Curlew)	CR	-	S3	-	X	Unlikely
<i>Oxyura australis</i> (Blue-billed Duck)	-	P4	-	X	-	Unlikely
<i>Pandion haliaetus</i> (Osprey)	M	-	S5	-	X	Unlikely

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Species	Conservation status ¹			Source ²		Likelihood assessment
	EPBC Act	Parks and Wildlife	WC Act	NatureMap	PMST	
<i>Pseudocheirus occidentalis</i> (Western Ring-tailed Possum)	VU	-	S1	-	X	Unlikely
<i>Rostratula australis</i> (Australian Painted Snipe)	EN	-	S2	-	X	Unlikely
<i>Setonix brachyurus</i> (Quokka)	VU	-	S3	-	X	Unlikely
<i>Tringa nebularia</i> (Common Greenshank)	M	-	S5	-	X	Unlikely

¹CR = listed as Critically Endangered under the EPBC Act.

EN = listed as Endangered under the EPBC Act.

VU = listed as Vulnerable under the EPBC Act.

M = listed as Migratory species under the EPBC Act.

S1 = Schedule 1: Fauna that is rare or is likely to become extinct as critically endangered fauna (CR) under the WC Act.

S2 = Schedule 2: Fauna that is rare or likely to become extinct as endangered fauna (EN) under the WC Act.

S3 = Schedule 3: Fauna that is rare or likely to become extinct as vulnerable fauna (VU) under the WC Act.

S5 = Schedule 5: Migratory birds protected under an international agreement (IA) under the WC Act.

P3 = Priority 3: poorly-known species known from several specimens or records but not under imminent threat, and need further survey. Listed by Department of Parks and Wildlife.

P4 = Priority 4: Rare, Near Threatened and other species in need of monitoring but not currently threatened; could become threatened if present circumstances change. Listed by Department of Parks and Wildlife.

²NatureMap = NatureMap database search (Parks and Wildlife 2007 - 2017); PMST = EPBC Act Protected Matters Report (DotEE 2017b).

Appendix E Flora species list

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Family	Species
Arecaceae	* <i>Washingtonia filifera</i>
Asparagaceae	* <i>Agave americana</i>
	<i>Laxmannia ramosa</i> subsp. <i>ramosa</i>
	<i>Lomandra preissii</i>
	<i>Thysanotus manglesianus</i>
	<i>Thysanotus sparteus</i>
	<i>Thysanotus tenellus</i>
Asteraceae	* <i>Arctotheca calendula</i>
	* <i>Gazania linearis</i>
	* <i>Hypochaeris glabra</i>
	* <i>Lactuca serriola</i>
	* <i>Osteospermum ecklonis</i>
	* <i>Taraxacum khatoonae</i>
	* <i>Ursinia anthemoides</i>
	<i>Pterochaeta paniculata</i>
Brassicaceae	* <i>Raphanus raphanistrum</i>
Cactaceae	* <i>Opuntia stricta</i>
Campanulaceae	* <i>Wahlenbergia capensis</i>
	<i>Isotoma hypocrateriformis</i>
Caprifoliaceae	* <i>Centranthus macrosiphon</i>
Caryophyllaceae	* <i>Silene gallica</i>
Casuarinaceae	<i>Allocasuarina huegeliana</i>
	<i>Allocasuarina humilis</i>
Colchicaceae	<i>Burchardia congesta</i>
Convolvulaceae	* <i>Ipomoea cairica</i>
Crassulaceae	<i>Crassula colorata</i> var. <i>colorata</i>
Cyperaceae	<i>Mesomelaena pseudostygia</i>
	<i>Mesomelaena tetragona</i>
	<i>Schoenus</i> sp.
Dasypogonaceae	<i>Dasypogon bromeliifolius</i>
Dilleniaceae	<i>Hibbertia hypericoides</i>
	<i>Hibbertia huegelii</i>

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Family	Species
Droseraceae	<i>Drosera</i> sp.
	<i>Drosera erythrorhiza</i>
	<i>Drosera glanduligera</i>
	<i>Drosera macrantha</i>
	<i>Drosera pallida</i>
Elaeocarpaceae	<i>Tetratheca nuda</i>
Euphorbiaceae	* <i>Euphorbia peplus</i>
Fabaceae	* <i>Acacia dealbata</i>
	* <i>Acacia iteaphylla</i>
	* <i>Acacia longifolia</i>
	* <i>Acacia podalyriifolia</i>
	* <i>Acacia</i> sp. (Eastern States)
	* <i>Chamaecytisus palmensis</i>
	* <i>Genista linifolia</i>
	* <i>Lotus angustissimus</i>
	* <i>Lotus subbiflorus</i>
	* <i>Lupinus angustifolius</i>
	* <i>Lupinus cosentinii</i>
	* <i>Trifolium campestre</i>
	* <i>Trifolium angustifolium</i>
	* <i>Trifolium arvense</i>
	* <i>Vicia sativa</i>
	<i>Acacia pulchella</i>
	<i>Acacia nervosa</i>
	<i>Acacia pulchella</i> var. <i>pulchella</i>
	<i>Acacia saligna</i>
	<i>Bossiaea eriocarpa</i>
	<i>Daviesia decurrens</i> subsp. <i>decurrens</i>
	<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>
	<i>Gastrolobium retusum</i>
	<i>Gompholobium</i> sp.
	<i>Gompholobium knightianum</i>

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Family	Species
	<i>Gompholobium marginatum</i>
	<i>Jacksonia lehmannii</i>
	<i>Kennedia prostrata</i>
	<i>Sphaerolobium linophyllum</i>
Geraniaceae	* <i>Erodium botrys</i>
Goodeniaceae	<i>Dampiera linearis</i>
	<i>Lechenaultia biloba</i>
	<i>Scaevola repens</i> var. <i>repens</i>
Haemodoraceae	<i>Anigozanthos humilis</i> subsp. <i>humilis</i>
	<i>Anigozanthos manglesii</i> subsp. <i>manglesii</i>
	<i>Conostylis candicans</i>
	<i>Conostylis setosa</i>
	<i>Haemodorum</i> sp.
	<i>Haemodorum discolor</i>
Hemerocallidaceae	<i>Agrostocrinum hirsutum</i>
	<i>Caesia micrantha</i>
	<i>Tricoryne elatior</i>
Iridaceae	* <i>Freesia alba</i> × <i>leichtlinii</i>
	* <i>Gladiolus undulatus</i>
	* <i>Gladiolus</i> ? <i>angustus</i>
	* <i>Gladiolus caryophyllaceus</i>
	* <i>Hesperantha falcata</i>
	* <i>Romulea rosea</i>
	* <i>Watsonia meriana</i>
	<i>Patersonia occidentalis</i>
	<i>Patersonia umbrosa</i> var. <i>xanthina</i>
Lamiaceae	* <i>Lavandula dentata</i>
	<i>Hemiphora bartlingii</i>
Lauraceae	<i>Cassytha racemosa</i>
Linaceae	* <i>Linum trigynum</i>
Loranthaceae	<i>Nuytsia floribunda</i>
Meliaceae	* <i>Melia azedarach</i>

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Family	Species
Myrtaceae	<i>*Angophora costata</i> subsp. <i>costata</i> (planted)
	<i>*Callistemon</i> sp. (cultivar planted)
	<i>*Chamelaucium uncinatum</i>
	<i>*Leptospermum laevigatum</i>
	<i>Babingtonia camphorosmae</i>
	<i>Beaufortia squarrosa</i>
	<i>Calothamnus quadrifidus</i>
	<i>Calothamnus torulosus</i>
	<i>Calytrix glutinosa</i>
	<i>Corymbia calophylla</i>
	<i>Eremaea pauciflora</i>
	<i>Eremaea pauciflora</i> var. <i>pauciflora</i>
	<i>Eucalyptus</i> sp. (seedling)
	<i>Eucalyptus camaldulensis</i>
	<i>Eucalyptus lane-poolei</i>
	<i>Eucalyptus marginata</i> subsp. <i>marginata</i>
	<i>Eucalyptus utilis</i>
	<i>Eucalyptus wandoo</i> subsp. <i>wandoo</i>
	<i>Kunzea glabrescens</i>
	<i>Melaleuca aspalathoides</i>
	<i>Melaleuca radula</i>
	<i>Pericalymma ellipticum</i> var. <i>ellipticum</i>
	<i>Verticordia densiflora</i> var. <i>densiflora</i>
	<i>Verticordia plumosa</i>
Onagraceae	<i>*Oenothera stricta</i>
Orchidaceae	<i>Caladenia flava</i>
	<i>Pterostylis sanguinea</i>
Orobanchaceae	<i>*Orobanche minor</i>
Oxalidaceae	<i>*Oxalis pes-caprae</i>
Papaveraceae	<i>*Fumaria capreolata</i>
Phyllanthaceae	<i>Poranthera microphylla</i>
Poaceae	<i>*Arundo donax</i>

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Family	Species
	<i>*Avena barbata</i>
	<i>*Briza maxima</i>
	<i>*Briza minor</i>
	<i>*Bromus diandrus</i>
	<i>*Bromus hordeaceus</i>
	<i>*Cenchrus clandestinus</i>
	<i>*Cynodon dactylon</i>
	<i>*Ehrharta calycina</i>
	<i>*Eragrostis curvula</i>
	<i>*Pentameris airoides</i>
	<i>*Tribolium uniola</i>
	<i>*Vulpia bromoides</i>
	<i>Austrostipa elegantissima</i>
	<i>Neurachne alopecuroides</i>
	<i>Rytidosperma setaceum</i>
	<i>Themeda triandra</i>
Primulaceae	<i>*Lysimachia arvensis</i>
Proteaceae	<i>Banksia grandis</i>
	<i>Banksia sessilis</i>
	<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>
	<i>Banksia menziesii</i>
	<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>
	<i>Grevillea preissii</i> subsp. <i>preissii</i>
	<i>Hakea trifurcata</i>
	<i>Hakea conchifolia</i>
	<i>Hakea laurina</i>
	<i>Hakea trifurcata</i>
	<i>Hakea undulata</i>
	<i>Isopogon divergens</i>
	<i>Lambertia multiflora</i>
	<i>Lambertia multiflora</i> var. <i>darlingensis</i>
	<i>Petrophile linearis</i>

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Family	Species
	<i>Petrophile striata</i>
	<i>Stirlingia latifolia</i>
	<i>Synaphea gracillima</i>
	<i>Synaphea spinulosa</i>
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>
Restionaceae	<i>Desmocladius fasciculatus</i>
Rhamnaceae	<i>Trymalium odoratissimum</i> subsp. <i>odoratissimum</i>
Rubiaceae	<i>Opercularia vaginata</i>
Rutaceae	<i>Boronia</i> sp.
	<i>Levenhookia pusilla</i>
	<i>Levenhookia stipitata</i>
Stylidiaceae	<i>Stylidium brunonianum</i>
	<i>Stylidium piliferum</i>
	<i>Stylidium repens</i>
Thymelaeaceae	<i>Pimelea imbricata</i>
	<i>Pimelea lehmanniana</i>
Tropaeolaceae	* <i>Tropaeolum majus</i>
Violaceae	<i>Hybanthus</i> sp.
Xanthorrhoeaceae	<i>Xanthorrhoea preissii</i>

Appendix F Flora species matrix

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Species	ELA01	ELA02	ELA03	ELA04	ELA05	ELA06	Releve
<i>*Arctotheca calendula</i>	0	0	1	0	0	0	0
<i>*Briza maxima</i>	1	1	1	1	1	0	0
<i>*Briza minor</i>	0	0	1	0	1	0	0
<i>*Bromus hordeaceus</i>	0	0	0	0	0	1	0
<i>*Cynodon dactylon</i>	0	0	0	1	0	0	0
<i>*Ehrharta calycina</i>	0	1	1	1	1	0	0
<i>*Eragrostis curvula</i>	0	1	0	0	0	1	0
<i>*Freesia alba x leichtlinii</i>	1	1	0	1	1	1	0
<i>*Gladiolus ?angustus</i>	0	0	0	0	0	1	0
<i>*Gladiolus caryophyllaceus</i>	0	1	0	1	0	0	0
<i>*Hypochaeris glabra</i>	0	1	0	1	0	0	0
<i>*Lactuca serriola</i>	0	0	0	0	1	0	0
<i>*Leptospermum laevigatum</i>	0	0	0	0	1	0	0
<i>*Linum trigynum</i>	0	0	0	0	0	1	0
<i>*Lysimachia arvensis</i>	0	0	1	0	0	0	0
<i>*Pentameris airoides</i>	0	0	1	0	0	0	0
<i>*Romulea rosea</i>	0	1	0	0	0	1	0
<i>*Silene gallica</i>	0	0	1	0	0	0	0
<i>*Taraxacum khatoonae</i>	0	0	1	0	0	0	0
<i>*Trifolium campestre</i>	0	0	0	0	1	0	0
<i>*Trifolium angustifolium</i>	0	0	0	0	0	1	0
<i>*Trifolium angustifolium var. angustifolium</i>	0	0	0	0	0	1	0
<i>*Trifolium campestre var. campestre</i>	1	0	0	0	0	0	0
<i>*Ursinia anthemoides</i>	1	1	1	1	0	0	0
<i>Acacia nervosa</i>	1	0	0	0	0	0	0
<i>Acacia pulchella var. pulchella</i>	0	0	0	0	0	1	0
<i>Acacia saligna</i>	0	0	1	0	0	0	0
<i>Allocasuarina huegeliana</i>	0	0	1	0	0	0	1
<i>Allocasuarina humilis</i>	0	1	1	1	0	0	0
<i>Anigozanthos humilis subsp. humilis</i>	0	1	0	0	0	0	0
<i>Austrostipa elegantissima</i>	0	0	0	1	1	1	0
<i>Babingtonia camphorosmae</i>	0	0	0	1	0	0	0

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Species	ELA01	ELA02	ELA03	ELA04	ELA05	ELA06	Releve
<i>Banksia sessilis</i>	0	0	0	0	0	1	1
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>	0	1	0	1	0	0	0
<i>Boronia</i> sp.	1	0	0	0	0	0	0
<i>Bossiaea eriocarpa</i>	0	0	0	1	0	0	0
<i>Burchardia congesta</i>	0	1	1	1	0	0	0
<i>Caesia micrantha</i>	0	0	0	1	0	0	0
<i>Calothamnus torulosus</i>	0	0	0	0	0	0	1
<i>Calytrix glutinosa</i>	0	0	0	0	0	1	0
<i>Cassytha racemosa</i>	0	0	0	1	1	0	0
<i>Conostylis candicans</i>	0	0	0	0	1	0	0
<i>Conostylis setosa</i>	0	1	0	1	0	0	0
<i>Corymbia calophylla</i>	1	0	0	1	1	1	0
<i>Crassula colorata</i> var. <i>colorata</i>	0	1	0	0	0	0	0
<i>Dampiera linearis</i>	1	0	0	1	0	0	0
<i>Dasypogon bromeliifolius</i>	0	0	1	0	0	0	0
<i>Daviesia decurrens</i> subsp. <i>decurrens</i>	0	1	0	0	1	0	0
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>	0	0	1	1	0	0	0
<i>Desmocladus fasciculatus</i>	1	0	0	0	1	0	0
<i>Drosera erythrorhiza</i>	0	0	0	1	0	0	0
<i>Drosera glanduligera</i>	0	0	1	0	0	0	0
<i>Drosera macrantha</i>	1	0	0	0	0	0	0
<i>Drosera pallida</i>	0	0	0	1	0	0	0
<i>Eremaea pauciflora</i>	0	1	0	0	0	0	0
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	0	1	0	0	0	0	0
<i>Eucalyptus</i> sp. (seedling)	1	0	0	0	0	0	0
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	0	1	0	1	0	0	0
<i>Gastrolobium retusum</i>	1	0	0	1	0	0	0
<i>Gompholobium</i> sp.	0	0	0	0	0	1	0
<i>Gompholobium knightianum</i>	0	0	0	0	1	0	0
<i>Gompholobium marginatum</i>	1	0	0	0	0	0	0
<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>	0	1	0	0	0	0	0
<i>Haemodorum</i> sp.	1	0	0	0	0	0	0

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Species	ELA01	ELA02	ELA03	ELA04	ELA05	ELA06	Releve
<i>Haemodorum discolor</i>	0	0	0	1	0	0	0
<i>Hakea trifurcata</i>	1	0	0	0	1	1	1
<i>Hakea conchifolia</i>	0	0	0	1	0	0	0
<i>Hakea laurina</i>	0	0	0	0	0	1	1
<i>Hakea trifurcata</i>	0	1	0	0	0	0	0
<i>Hibbertia hypericoides</i>	0	1	1	1	0	1	0
<i>Hibbertia huegelii</i>	0	0	0	0	1	0	0
<i>Hybanthus</i> sp.	0	0	0	0	0	1	0
<i>Isotoma hypocrateriformis</i>	0	0	1	0	0	0	0
<i>Jacksonia lehmannii</i>	0	1	0	1	0	0	0
<i>Kunzea glabrescens</i>	0	1	0	0	0	0	0
<i>Lambertia multiflora</i> var. <i>darlingensis</i>	0	0	0	1	0	0	0
<i>Lechenaultia biloba</i>	0	0	1	1	1	0	0
<i>Leptospermum laevigatum</i>	0	0	0	0	0	0	1
<i>Levenhookia pusilla</i>	0	0	0	1	0	0	0
<i>Levenhookia stipitata</i>	0	0	0	1	0	0	0
<i>Lomandra preissii</i>	0	1	0	0	0	0	0
<i>Melaleuca aspalathoides</i>	0	1	1	1	0	0	0
<i>Melaleuca radula</i>	0	0	0	0	0	0	1
<i>Mesomelaena pseudostygia</i>	0	1	0	1	0	0	0
<i>Mesomelaena tetragona</i>	1	0	0	0	0	0	0
<i>Neurachne alopecuroides</i>	1	0	0	1	1	1	0
<i>Nuytsia floribunda</i>	0	0	1	0	0	0	0
<i>Opercularia vaginata</i>	0	0	0	0	1	1	0
<i>Patersonia occidentalis</i>	0	0	1	0	0	0	0
<i>Patersonia umbrosa</i> var. <i>xanthina</i>	1	0	0	0	0	0	0
<i>Pericalymma ellipticum</i> var. <i>ellipticum</i>	1	0	0	0	0	0	0
<i>Petrophile linearis</i>	0	1	0	0	0	0	0
<i>Petrophile striata</i>	0	0	1	1	1	0	0
<i>Pimelea lehmanniana</i>	0	0	0	1	0	0	0
<i>Poranthera microphylla</i>	0	0	0	0	1	0	0
<i>Pterochaeta paniculata</i>	1	0	0	0	0	0	0

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Species	ELA01	ELA02	ELA03	ELA04	ELA05	ELA06	Releve
<i>Pterostylis sanguinea</i>	0	1	0	0	0	0	0
<i>Rytidosperma setaceum</i>	0	0	0	1	0	0	0
<i>Scaevola repens</i> var. <i>repens</i>	0	1	1	0	0	0	0
<i>Schoenus</i> sp.	0	0	1	1	1	0	1
<i>Sphaerolobium linophyllum</i>	0	0	0	1	0	0	0
<i>Stylidium brunonianum</i>	1	0	0	1	0	0	0
<i>Stylidium piliferum</i>	0	0	0	1	0	0	0
<i>Stylidium repens</i>	1	0	0	0	1	0	0
<i>Synaphea gracillima</i>	0	0	0	1	0	0	0
<i>Themeda triandra</i>	1	0	0	0	0	0	0
<i>Thysanotus sparteus</i>	0	0	0	1	0	0	0
<i>Thysanotus tenellus</i>	1	0	0	0	0	0	0
<i>Tricoryne elatior</i>	0	1	1	1	0	0	0
<i>Verticordia densiflora</i> var. <i>densiflora</i>	1	0	0	0	0	0	0
<i>Xanthorrhoea preissii</i>	0	1	1	1	0	0	0

Appendix G Introduced flora (weed) species list

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Family	Species
Arecaceae	* <i>Washingtonia filifera</i>
Asparagaceae	* <i>Agave americana</i>
Asteraceae	* <i>Arctotheca calendula</i>
	* <i>Dimorphotheca ecklonis</i>
	* <i>Gazania linearis</i>
	* <i>Hypochaeris glabra</i>
	* <i>Lactuca serriola</i>
	* <i>Osteospermum ecklonis</i>
	* <i>Taraxacum khatoonae</i>
	* <i>Ursinia anthemoides</i>
Brassicaceae	* <i>Raphanus raphanistrum</i>
Cactaceae	* <i>Opuntia stricta</i>
Campanulaceae	* <i>Wahlenbergia capensis</i>
Caprifoliaceae	* <i>Centranthus macrosiphon</i>
Caryophyllaceae	* <i>Silene gallica</i>
Convolvulaceae	* <i>Ipomoea cairica</i>
Euphorbiaceae	* <i>Euphorbia peplus</i>
Fabaceae	* <i>Acacia dealbata</i>
	* <i>Acacia iteaphylla</i>
	* <i>Acacia longifolia</i>
	* <i>Acacia podalyriifolia</i>
	* <i>Acacia</i> sp. (Eastern States)
	* <i>Chamaecytisus palmensis</i>
	* <i>Genista linifolia</i>
	* <i>Lotus angustissimus</i>
	* <i>Lotus subbiflorus</i>
	* <i>Lupinus angustifolius</i>
	* <i>Lupinus cosentinii</i>
	* <i>Trifolium campestre</i>
	* <i>Trifolium angustifolium</i>
	* <i>Trifolium arvense</i>
	* <i>Vicia sativa</i>

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Family	Species
Geraniaceae	* <i>Erodium botrys</i>
Iridaceae	* <i>Freesia alba</i> × <i>leichtlinii</i>
	* <i>Gladiolus undulatus</i>
	* <i>Gladiolus</i> ? <i>angustus</i>
	* <i>Gladiolus caryophyllaceus</i>
	* <i>Hesperantha falcata</i>
	* <i>Romulea rosea</i>
	* <i>Watsonia meriana</i>
Lamiaceae	* <i>Lavandula dentata</i>
Linaceae	* <i>Linum trigynum</i>
Meliaceae	* <i>Melia azedarach</i>
Myrtaceae	* <i>Angophora costata</i> subsp. <i>costata</i> (planted)
	* <i>Callistemon</i> sp. (cultivar planted)
	* <i>Chamelaucium uncinatum</i>
	* <i>Leptospermum laevigatum</i>
Onagraceae	* <i>Oenothera stricta</i>
Orobanchaceae	* <i>Orobanche minor</i>
Oxalidaceae	* <i>Oxalis pes-caprae</i>
Papaveraceae	* <i>Fumaria capreolata</i>
Poaceae	* <i>Arundo donax</i>
	* <i>Avena barbata</i>
	* <i>Briza maxima</i>
	* <i>Briza minor</i>
	* <i>Bromus diandrus</i>
	* <i>Bromus hordeaceus</i>
	* <i>Cenchrus clandestinus</i>
	* <i>Cynodon dactylon</i>
	* <i>Ehrharta calycina</i>
	* <i>Eragrostis curvula</i>
	* <i>Pentameris airoides</i>
	* <i>Tribolium uniola</i>
	* <i>Vulpia bromoides</i>

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Family	Species
Primulaceae	* <i>Lysimachia arvensis</i>
Tropaeolaceae	* <i>Tropaeolum majus</i>

Appendix H Quadrat data

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Site number	Date	Site type	Observer
ELA01	26/10/2016	Quadrat 10x10 m	KZA, SD & JM
Habitat description	Landform unit	Easting	Northing
Flat, foothills	Flat	407044	6460177
Rock type	Soil type	Soil texture	Soil colour
Gravelly	Clay loam	Fine	Grey-brown
Condition	Geology	Disturbance	Time since fire (years)
Very Good	Laterite	Weeds	10 – 20



Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>Corymbia calophylla</i>	8	U	Trees over 30 m
<i>Hakea trifurcata</i>	20	M	Shrubs 1 – 2 m
<i>Pericalymma ellipticum</i> var. <i>ellipticum</i>	15	M	Shrubs 1 – 2 m
<i>Verticordia densiflora</i> var. <i>densiflora</i>	1	M	Shrubs 1 – 2 m
<i>Gastrolobium retusum</i>	0.1	M	Shrubs 1 – 2 m
<i>Acacia nervosa</i>	0.1	M	Shrubs under 1 m
<i>Boronia</i> sp.	0.1	M	Shrubs under 1 m
<i>Gompholobium marginatum</i>	0.1	M	Shrubs under 1 m
<i>Eucalyptus</i> sp. (seedling)	0.1	M	Shrubs under 1 m

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>Mesomelaena tetragona</i>	15	L	Grasses
* <i>Briza maxima</i>	0.1	L	Grasses
* <i>Ursinia anthemoides</i>	0.1	L	Grasses
<i>Neurachne alopecuroidea</i>	10	L	Herbs
<i>Stylidium repens</i>	2	L	Herbs
<i>Dampiera linearis</i>	0.1	L	Herbs
<i>Desmocladius fasciculatus</i>	0.1	L	Herbs
<i>Drosera macrantha</i>	0.1	L	Herbs
* <i>Freesia alba</i> × <i>leichtlinii</i>	0.1	L	Herbs
<i>Haemodorum</i> sp.	0.1	L	Herbs
<i>Patersonia umbrosa</i> var. <i>xanthina</i>	0.1	L	Herbs
<i>Pterochaeta paniculata</i>	0.1	L	Herbs
<i>Stylidium brunonianum</i>	0.1	L	Herbs
<i>Themeda triandra</i>	0.1	L	Herbs
<i>Thysanotus tenellus</i>	0.1	L	Herbs
* <i>Trifolium campestre</i> var. <i>campestre</i>	0.1	L	Herbs

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Site number	Date	Site type	Observer
ELA02	26/10/2016	Quadrat 10x10 m	KZA, SD & JM
Habitat description	Landform unit	Easting	Northing
Flat, foothills, close to drainage	Flat	407018	6460036
Rock type	Soil type	Soil texture	Soil colour
Gravelly	Loam	Fine	Grey-yellow
Condition	Geology	Disturbance	Time since fire (years)
Good	Laterite	Weeds	1-10



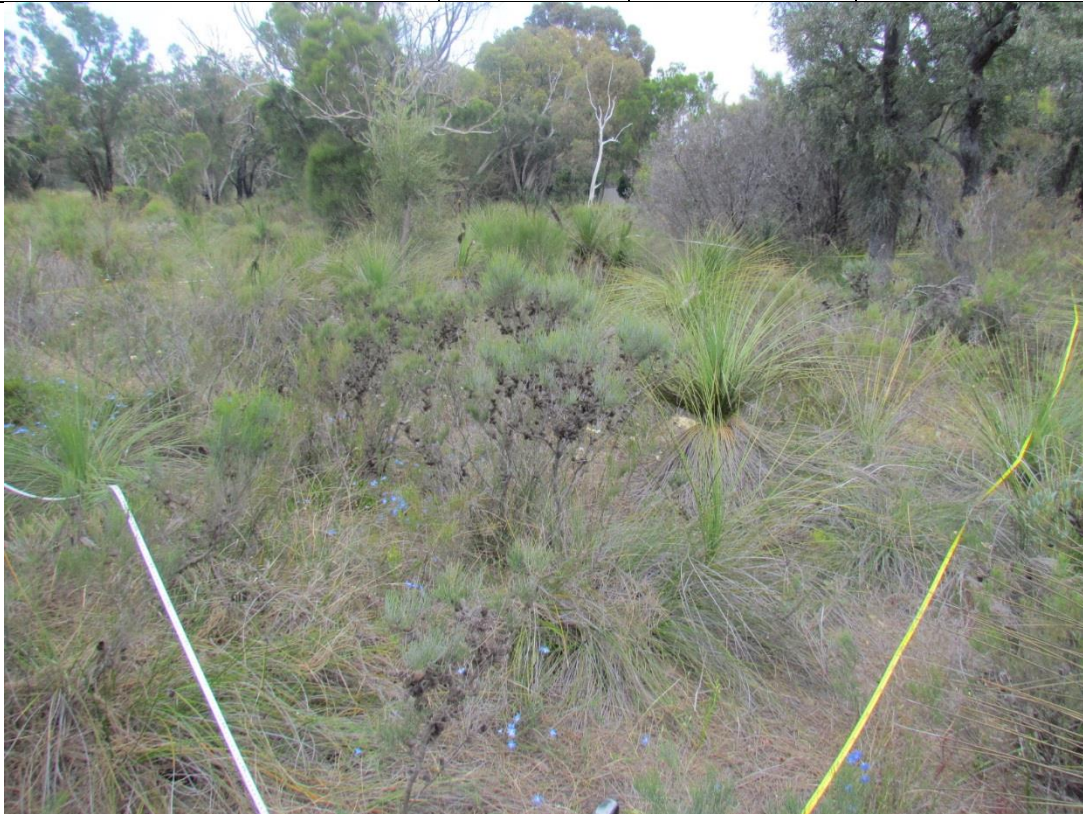
Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	5	U	Trees over 30 m
<i>Eremaea pauciflora</i> var. <i>pauciflora</i>	0.1	U	Trees 10 – 30 m
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>	0.1	U	Trees under 30 m
<i>Xanthorrhoea preissii</i>	5	M	Shrubs over 2 m
<i>Eremaea pauciflora</i>	0.1	M	Shrubs over 2 m
<i>Allocasuarina humilis</i>	10	M	Shrubs 1 – 2 m
<i>Hakea trifurcata</i>	2	M	Shrubs 1 – 2 m
<i>Kunzea glabrescens</i>	0.1	M	Shrubs 1 – 2 m
<i>Melaleuca aspalathoides</i>	0.1	M	Shrubs 1 – 2 m

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>Hibbertia hypericoides</i>	1	M	Shrubs under 1 m
<i>Daviesia decurrens</i> subsp. <i>decurrens</i>	0.1	M	Shrubs under 1 m
<i>Grevillea bipinnatifida</i> subsp. <i>bipinnatifida</i>	0.1	M	Shrubs under 1 m
<i>Jacksonia lehmannii</i>	0.1	M	Shrubs under 1 m
<i>Petrophile linearis</i>	0.1	M	Shrubs under 1 m
<i>Scaevola repens</i> var. <i>repens</i>	0.1	M	Shrubs under 1 m
* <i>Ehrharta calycina</i>	5	L	Grasses
* <i>Eragrostis curvula</i>	1	L	Grasses
* <i>Briza maxima</i>	0.1	L	Grasses
<i>Mesomelaena pseudostygia</i>	0.1	L	Grasses
<i>Lomandra preissii</i>	2	L	Herbs
<i>Anigozanthos humilis</i> subsp. <i>humilis</i>	0.1	L	Herbs
<i>Burchardia congesta</i>	0.1	L	Herbs
<i>Conostylis setosa</i>	0.1	L	Herbs
<i>Crassula colorata</i> var. <i>colorata</i>	0.1	L	Herbs
* <i>Freesia alba</i> × <i>leichtlinii</i>	0.1	L	Herbs
* <i>Gladiolus caryophyllaceus</i>	0.1	L	Herbs
* <i>Hypochaeris glabra</i>	0.1	L	Herbs
<i>Pterostylis sanguinea</i>	0.1	L	Herbs
* <i>Romulea rosea</i>	0.1	L	Herbs
<i>Tricoryne elatior</i>	0.1	L	Herbs
* <i>Ursinia anthemoides</i>	0.1	L	Herbs

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Site number	Date	Site type	Observer
ELA03	26/10/2016	Quadrat 10x10 m	KZA, SD & JM
Habitat description	Landform unit	Easting	Northing
Flat, foothills	Flat	407122	6460033
Rock type	Soil type	Soil texture	Soil colour
Gravelly	Loam	Fine	Grey-brown
Condition	Geology	Disturbance	Time since fire (years)
Very Good	Laterite	Weeds	10 – 20



Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>Nuytsia floribunda</i>	5	U	Trees under 10 m
<i>Allocasuarina huegeliana</i>	2	U	Trees under 10 m
<i>Xanthorrhoea preissii</i>	20	M	Shrubs over 2 m
<i>Acacia saligna</i>	0.1	M	Shrubs over 2 m
<i>Allocasuarina humilis</i>	15	M	Shrubs 1 – 2 m
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>	1	M	Shrubs 1 – 2 m
<i>Melaleuca aspalathoides</i>	1	M	Shrubs 1 – 2 m
<i>Lechenaultia biloba</i>	2	M	Shrubs under 1 m
<i>Hibbertia hypericoides</i>	1	M	Shrubs under 1 m

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>Isotoma hypocrateriformis</i>	0.1	M	Shrubs under 1 m
<i>Petrophile striata</i>	0.1	M	Shrubs under 1 m
<i>Scaevola repens</i> var. <i>repens</i>	0.1	M	Shrubs under 1 m
* <i>Briza maxima</i>	1	L	Grasses
* <i>Briza minor</i>	1	L	Grasses
* <i>Ehrharta calycina</i>	1	L	Grasses
* <i>Taraxacum khatoonae</i>	0.1	L	Grasses
<i>Schoenus</i> sp.	5	L	Herbs
<i>Dasypogon bromeliifolius</i>	2	L	Herbs
<i>Isotoma hypocrateriformis</i>	2	L	Herbs
<i>Patersonia occidentalis</i>	1	L	Herbs
* <i>Ursinia anthemoides</i>	1	L	Herbs
* <i>Arctotheca calendula</i>	0.1	L	Herbs
<i>Burchardia congesta</i>	0.1	L	Herbs
<i>Drosera glanduligera</i>	0.1	L	Herbs
* <i>Lysimachia arvensis</i>	0.1	L	Herbs
* <i>Pentameris airoides</i>	0.1	L	Herbs
* <i>Silene gallica</i>	0.1	L	Herbs
<i>Tricoryne elatior</i>	0.1	L	Herbs

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Site number	Date	Site type	Observer
ELA04	26/10/2016	Quadrat 10x10 m	KZA, SD & JM
Habitat description	Landform unit	Easting	Northing
Flat, foothills	Flat	407240	6459789
Rock type	Soil type	Soil texture	Soil colour
Gravelly	Sandy loam	Fine	Brown
Condition	Geology	Disturbance	Time since fire (years)
Very Good	Laterite	Weeds	10 – 20



Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>Corymbia calophylla</i>	2	U	Trees over 30 m
<i>Conostylis setosa</i>	0.1	U	Trees over 30 m
<i>Eucalyptus marginata</i> subsp. <i>marginata</i>	20	U	Trees 10 – 30 m
<i>Banksia dallanneyi</i> var. <i>dallanneyi</i>	2	U	Trees under 10 m
<i>Lechenaultia biloba</i>	0.1	U	Trees under 10 m
<i>Xanthorrhoea preissii</i>	5	M	Shrubs over 2 m
<i>Drosera pallida</i>	0.1	M	Shrubs over 2 m
<i>Allocasuarina humilis</i>	2	M	Shrubs 1 – 2 m
<i>Haemodorum discolor</i>	2	M	Shrubs 1 – 2 m

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>Lambertia multiflora</i> var. <i>darlingensis</i>	2	M	Shrubs 1 – 2 m
<i>Melaleuca aspalathoides</i>	2	M	Shrubs 1 – 2 m
<i>Hibbertia hypericoides</i>	15	M	Shrubs under 1 m
<i>Petrophile striata</i>	2	M	Shrubs under 1 m
<i>Babingtonia camphorosmae</i>	1	M	Shrubs under 1 m
<i>Gastrolobium retusum</i>	1	M	Shrubs under 1 m
<i>Lechenaultia biloba</i>	1	M	Shrubs under 1 m
<i>Synaphea gracillima</i>	1	M	Shrubs under 1 m
<i>Bossiaea eriocarpa</i>	0.1	M	Shrubs under 1 m
<i>Hakea conchifolia</i>	0.1	M	Shrubs under 1 m
<i>Jacksonia lehmannii</i>	0.1	M	Shrubs under 1 m
<i>Pimelea lehmanniana</i>	0.1	M	Shrubs under 1 m
<i>Sphaerolobium linophyllum</i>	0.1	M	Shrubs under 1 m
<i>Mesomelaena pseudostygia</i>	5	L	Grasses
* <i>Briza maxima</i>	1	L	Grasses
<i>Austrostipa elegantissima</i>	0.1	L	Grasses
* <i>Cynodon dactylon</i>	0.1	L	Grasses
* <i>Ehrharta calycina</i>	0.1	L	Grasses
<i>Schoenus</i> sp.	2	L	Herbs
<i>Burchardia congesta</i>	1	L	Herbs
<i>Dampiera linearis</i>	1	L	Herbs
<i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>	1	L	Herbs
<i>Stylidium brunonianum</i>	1	L	Herbs
<i>Tricoryne elatior</i>	1	L	Herbs
<i>Caesia micrantha</i>	0.1	L	Herbs
<i>Cassytha racemosa</i>	0.1	L	Herbs
<i>Drosera erythrorhiza</i>	0.1	L	Herbs
* <i>Freesia alba</i> x <i>leichtlinii</i>	0.1	L	Herbs
* <i>Gladiolus caryophyllaceus</i>	0.1	L	Herbs
* <i>Hypochaeris glabra</i>	0.1	L	Herbs
<i>Levenhookia pusilla</i>	0.1	L	Herbs
<i>Levenhookia stipitata</i>	0.1	L	Herbs

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>Neurachne alopecuroidea</i>	0.1	L	Herbs
<i>Rytidosperma setaceum</i>	0.1	L	Herbs
<i>Stylidium piliferum</i>	0.1	L	Herbs
<i>Thysanotus sparteus</i>	0.1	L	Herbs
<i>*Ursinia anthemoides</i>	0.1	L	Herbs

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Site number	Date	Site type	Observer
ELA05	26/10/2016	Quadrat 10x10 m	KZA, SD & JM
Habitat description	Landform unit	Easting	Northing
Flat, foothills	Flat	407192	6459599
Rock type	Soil type	Soil texture	Soil colour
Gravelly	Sandy loam	Fine	Brown
Condition	Geology	Disturbance	Time since fire (years)
Good	Laterite	Weeds, clearing	10 – 20



Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>Corymbia calophylla</i>	2	U	Trees over 30 m
* <i>Leptospermum laevigatum</i>	5	M	Shrubs over 2 m
<i>Hakea trifurcata</i>	25	M	Shrubs 1 – 2 m
<i>Daviesia decurrens</i> subsp. <i>decurrens</i>	0.1	M	Shrubs 1 – 2 m
<i>Hibbertia huegelii</i>	1	M	Shrubs under 1 m
<i>Petrophile striata</i>	1	M	Shrubs under 1 m
<i>Gompholobium knightianum</i>	0.1	M	Shrubs under 1 m
<i>Lechenaultia biloba</i>	0.1	M	Shrubs under 1 m
* <i>Briza maxima</i>	5	L	Grasses

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>*Ehrharta calycina</i>	2	L	Grasses
<i>Austrostipa elegantissima</i>	0.1	L	Grasses
<i>*Briza minor</i>	0.1	L	Grasses
<i>Schoenus</i> sp.	5	L	Herbs
<i>Conostylis candicans</i>	1	L	Herbs
<i>Desmocladius fasciculatus</i>	1	L	Herbs
<i>*Freesia alba</i> × <i>leichtlinii</i>	1	L	Herbs
<i>Neurachne alopecuroidea</i>	1	L	Herbs
<i>Opercularia vaginata</i>	1	L	Herbs
<i>Cassytha racemosa</i>	0.1	L	Herbs
<i>*Lactuca serriola</i>	0.1	L	Herbs
<i>Poranthera microphylla</i>	0.1	L	Herbs
<i>Stylidium repens</i>	0.1	L	Herbs
<i>*Trifolium campestre</i>	0.1	L	Herbs

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Site number	Date	Site type	Observer
ELA06	26/10/2016	Quadrat 10x10 m	KZA, SD & JM
Habitat description	Landform unit	Easting	Northing
Flat, foothills	Flat	406963	6459380
Rock type	Soil type	Soil texture	Soil colour
Gravelly	Loam	Fine	Brown
Condition	Geology	Disturbance	Time since fire (years)
Very Good	Laterite	Weeds	10 – 20



Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>Corymbia calophylla</i>	2	U	Trees over 30 m
<i>Banksia sessilis</i>	15	U	Trees under 10 m
<i>Hakea laurina</i>	3	U	Trees under 10 m
<i>Acacia pulchella</i> var. <i>pulchella</i>	1	M	Shrubs over 2 m
<i>Hakea trifurcata</i>	15	M	Shrubs 1 – 2 m
<i>Hybanthus</i> sp.	1	M	Shrubs 1 – 2 m
<i>Austrostipa elegantissima</i>	0.1	M	Shrubs under 1 m
<i>Gompholobium</i> sp.	0.1	M	Shrubs under 1 m
<i>Hibbertia hypericoides</i>	0.1	M	Shrubs under 1 m

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>*Eragrostis curvula</i>	2	L	Grasses
<i>*Bromus hordeaceus</i>	0.1	L	Grasses
<i>Calytrix glutinosa</i>	5	L	Herbs
<i>*Freesia alba × leichtlinii</i>	2	L	Herbs
<i>Opercularia vaginata</i>	2	L	Herbs
<i>*Gladiolus ?angustus</i>	1	L	Herbs
<i>*Trifolium angustifolium</i>	1	L	Herbs
<i>*Linum trigynum</i>	0.1	L	Herbs
<i>Neurachne alopecuroidea</i>	0.1	L	Herbs
<i>*Romulea rosea</i>	0.1	L	Herbs
<i>*Trifolium angustifolium var. angustifolium</i>	0.1	L	Herbs

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Site number	Date	Site type	Observer
Releve	26/10/2016	Quadrat 10x10 m	KZA, SD & JM
Habitat description	Landform unit	Easting	Northing
Flat, foothills	Flat	407022	6459445
Rock type	Soil type	Soil texture	Soil colour
Gravelly	Sandy gravelly loam	Fine	Grey-brown
Condition	Geology	Disturbance	Time since fire (years)
Very Good	Laterite	Weeds	10 – 20



Taxon	Cover (%)	Stratum*	Sub-Stratum
<i>Banksia sessilis</i>	15	U	Trees under 10 m
<i>Hakea laurina</i>	0.1	U	Trees under 10 m
<i>Melaleuca radula</i>	25	M	Shrubs 1 – 2 m
<i>Hakea laurina</i>	5	M	Shrubs 1 – 2 m
<i>Allocasuarina huegeliana</i>	0.1	M	Shrubs 1 – 2 m
<i>Hakea trifurcata</i>	7	M	Shrubs under 1 m
<i>Calothamnus torulosus</i>	0.1	M	Shrubs under 1 m
* <i>Leptospermum laevigatum</i>	2	L	Herbs

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

<i>Schoenus</i> sp.	1	L	Herbs
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Appendix I Fauna species list

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Common name	Species	Notes
Birds		
Australian Magpie	<i>Cracticus tibicen</i>	Observed
Australian Raven	<i>Corvus coronoides</i>	Observed
Australian Ringneck Parrot	<i>Barnardius zonarius</i>	Observed
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	Observed
Brown Honeyeater	<i>Lichmera indistincta</i>	Observed
Common Bronzewing	<i>Phaps chalcoptera</i>	Observed
Domestic Pigeon	* <i>Columba livia</i>	Observed
Galah	* <i>Eolophus roseicapilla</i>	Observed
Grey Butcherbird	<i>Cracticus torquatus</i>	Observed
Laughing Dove	* <i>Spilopelia senegalensis</i>	Observed
Laughing Kookaburra	* <i>Dacelo novaeguineae</i>	Observed
Little Corella	* <i>Cacatua sanguinea</i>	Observed
Magpie-lark	<i>Grallina cyanoleuca</i>	Observed
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>	Observed
Rainbow Lorikeet	* <i>Trichoglossus moluccanus</i>	Observed
Red Wattlebird	<i>Anthochaera carunculata</i>	Observed
Red-tailed Black Cockatoo	<i>Calyptorhynchus banksii naso</i>	Calls heard, foraging evidence
Scarlet Robin	<i>Petroica boodang</i>	Observed
Singing Honeyeater	<i>Lichenostomus virescens</i>	Observed
Weebill	<i>Smicrornis brevirostris</i>	Observed
Willie Wagtail	<i>Rhipidura leucophrys</i>	Observed
Mammals		
Domestic Cat	* <i>Felis catus</i>	Remains
European Rabbit	* <i>Oryctolagus cuniculus</i>	Diggings
Quenda	<i>Isodon obesulus fusciventer</i>	Diggings
Reptiles		
Bobtail	<i>Tiliqua rugosa rugosa</i>	Observed
Buchanan's Snake-eyed Skink	<i>Cryptoblepharus buchananii</i>	Observed
Burton's Legless Lizard	<i>Lialis burtonis</i>	Observed
Southwestern Earless Skink	<i>Hemiergis quadrilineata</i>	Observed

Appendix J Black Cockatoo potential breeding trees

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Tree species	DBH (cm)	Co-ordinates	
		Northing	Easting
Marri	86	6460137	406825.5
Marri	58	6460151	406851.1
Marri	50	6460153	406853.2
Marri	50	6460186	406877.6
Marri	85	6460179	407151.3
Marri	50	6460166	407150.1
Marri	50	6460154	407152.3
Marri	50	6460014	406956.6
Dead	50	6460006	406960.4
Jarrah	50	6460008	406962.8
Jarrah	68	6460001	406959.4
Marri (with nest box)	75	6459960	406903.6
Marri	50	6459953	406895.6
Jarrah	70	6459988	406876.2
Jarrah	90	6459990	406869.5
Jarrah	50	6459993	406876.9
Dead (hollows present)	90	6460001	406855.1
Jarrah	50	6460013	406848
Jarrah	50	6460006	406853.8
Jarrah	60	6460015	406840.6
Dead	90	6460033	406827.4
Marri	50	6460052	406804.3
Jarrah	50	6460050	406789.7
Jarrah	50	6460052	406776.5
Jarrah (hollows present)	100	6460043	406760.2
Jarrah	50	6460032	406761.3
Jarrah	55	6460029	406749.2
Jarrah	200	6460041	406731.6
Marri	60	6460122	406724.9
Marri	65	6460123	406748
Marri	70	6460128	406757.5
Marri	75	6460134	406771.4
Marri	50	6460111	406811.9
Marri	100	6460099	406799.9
Marri	50	6460116	406815.5
Jarrah	70	6460072	407189.6
Wandoo	50	6460079	407176.1
Dead	60	6460092	407165.5

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Tree species	DBH (cm)	Co-ordinates	
		Northing	Easting
Marri	60	6460103	407122.5
Marri	80	6460067	407005.3
Jarrah	60	6460056	406998.5
Marri	60	6460018	407016.8
Jarrah	70	6460012	407032.6
Jarrah (hollows present)	75	6460009	407041.1
Jarrah	70	6460020	407057.7
Jarrah	50	6460048	407076
Jarrah (hollows present)	60	6459986	407173.4
Jarrah	50	6459986	407153.8
Marri	50	6459988	407090.1
Marri	60	6459980	407041.2
Marri	50	6459981	407037.1
Wandoo	50	6459989	407028.5
Jarrah	60	6459978	406999.5
Marri	50	6459978	406986.1
Marri	60	6459863	407239
Marri	70	6459696	407263.7
marri	60	6459719	407248.9
Jarrah	50	6459678	407226
Marri (hollows present)	95	6459665	407224
Marri	90	6459469	407024.1
Marri	50	6459431	406983.1
Marri	50	6459214	406820.6
Marri	50	6459223	406826.6
Marri	50	6459594	407141.8
Marri	180	6459632	407175.7
Marri	50	6459634	407187.5
Marri	70	6459662	407203
Marri	85	6459662	407220
Marri	80	6459712	407222.6

Appendix K Fauna locations

Flora, Vegetation and Fauna Survey of Anderson Road Reserve

Fauna locations	Northing	Easting
Conservation significant fauna locations		
Quenda digging	6460114	407197
Quenda digging	6460008	407046
Quenda digging	6460042	407074
Quenda digging	6460040	407082
Quenda digging	6460036	407132
Forest Red-tailed Black Cockatoo foraging evidence	6460019	406972
Forest Red-tailed Black Cockatoos heard calling	6460050	406931
Forest Red-tailed Black Cockatoos heard calling	6459318	406876
Introduced fauna locations		
Feral Bee hive	406957	6459995
Feral Bee hive	406939	6459997
Cat remains observed	407215	6460098

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3.0 WATER MONITORING OUTCOMES SUMMARY



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Results of groundwater and surface water monitoring, Moira Avenue, Forrestfield

In 2012, Shire of Kalamunda (SoK) proposed to develop an 8.8 ha (approx.) reserve in Moira Avenue, Forrestfield, also known as York Street Reserve (the site), for residential purposes. Development of this site will require the preparation of a Local Water Management Strategy (LWMS) to support a Local Structure Plan. Department of Water (DoW) generally requires groundwater and surface water monitoring over an 18 month period including two winter peaks (September/October) to be undertaken to support the LWMS. To meet this requirement, Strategen was commissioned by SoK to undertake groundwater and surface water monitoring of the site between May 2012 and November 2013. This memo presents the findings of the monitoring.

Site description

The site generally slopes in a northwesterly direction, with a local low point present in the form of a sump to the south-west of the site. The site varies from approximately 52 metres Australian Height Datum (mAHD) in the east to 40 m AHD at the sump (DoE 2004). Drainage network mapping provided by SoK indicates that the sump receives stormwater from the residential areas to the south. Inspection by Strategen indicates that there is no drain or creek enabling water to leave the sump as surface water.

Surface soils range from yellow-orange clayey sand to white-grey sand (Strategen 2012). In some areas, laterite gravel varying in size is present on the surface, generally around the drainage channels leading to the sump (Strategen 2012).

The Perth Groundwater Atlas (2nd edition) indicates a depth to the regional summer groundwater levels of at least 20 m (DoE 2004). The site is located at the eastern edge of the groundwater contouring presented by the Atlas. In the experience of Strategen, groundwater levels near the edge of the Atlas do not always accurately represent of local groundwater levels. Discussion with SoK indicated that the sump may contain water for several months of the year. This indicates that a local perched watertable may be present as seasonal regional watertable level variations are of the order of several metres, and consequently insufficient to enable a watertable at 20 m depth to present at the sump base. On the basis of this information, it was decided that groundwater and surface water monitoring was required to assess the hydrology of the site.

Methodology

The scope of works was based on the draft *Water Monitoring Guidelines for Better Urban Water Management Strategies/Plans* (DoW 2011). The scope of works included:

- installation of five bores on the site to a depth of six metres, unless a clayey perching layer was found before this depth was reached
- geological logging of the bores
- installation of three surface water monitoring locations (at the entrances of the drain on the site to the basin and in the compensating basin)
- monitoring of water levels at each location for 18 months

Results of groundwater and surface water monitoring, Moira Avenue, Forrestfield DRAFT

- quarterly sampling of physical parameters and nutrients (pH, electrical conductivity, total dissolved solids, total nitrogen, nitrate/nitrite, ammonia, Kjeldahl nitrogen, total phosphorus and phosphate)
- sampling of eight heavy metals on two occasions (arsenic, cadmium, chromium, copper, lead, zinc, nickel and mercury)
- preparation of a report outlining the results at the end of the monitoring period.

The depth of 6 m was selected on the basis that if groundwater was deeper than 6 m, it would not be anticipated to require management if the site was developed for residential purposes.

Bore installation

Bores were installed on 30 May 2012 using a hollow flight auger drill at the locations shown in Figure 1. No groundwater was observed during the drilling process. All bores were installed to a depth of 6 m, except SK01. At SK01, a potential perching layer of silty clay was observed at a depth of 4.25 m. Drilling was stopped at this depth to prevent the perching layer being disturbed, which may cause inaccuracies in groundwater level readings.

Geology on the site was variable. SK01, SK02 and SK03 in the north consisted of sandy silts. At SK03, this changed to silt at a depth of 5.5 m below ground level (mbgl). SK04 recorded yellow sands to a depth of 6 m. The geology of SK05 was more variable, with 0.75 m of sand on top of layers of clayey and sandy silt to a depth of 6.75 m. At this depth, fragments of weathered dolerite and granite were observed at SK05, indicating that rock may be present at depth. Bore logs are presented in Attachment A.

Locations of this equipment are displayed in Figure 1.

Bores were installed in steel risers and the risers were locked to prevent damage, as per standard precautions for bore installation. Bore logs are presented in Attachment A.

Surface water monitoring

Surface water stakes to measure surface water levels were installed in three locations, two near inlets to the sump (Figure 2).

Management of monitoring infrastructure

The site was subject to extensive vandalism that resulted in regular interference and destruction of monitoring infrastructure, as outlined below. Strategen kept SoK project managers informed of the incidents. SoK was involved in decision-making in relation to incident response and site management.

Bore SK01 was destroyed prior to the first sampling event (Table 1). Following this event, it was agreed to undertake surveying after the bore was reinstalled. Surveying of bores is required to convert groundwater levels into metres Australian Height Datum (mAHD) to allow these levels to be used in design of lot levels and drainage infrastructure.

The bore was reinstalled prior to the second sampling event in July 2012. Between the July and August 2012 sampling events, the surface water stakes were removed and four of the five sampling bores had been tampered with (Table 1). This continued for the remainder of the sampling period (Table 1). SoK was advised of all damage when it was observed by Strategen.

Results of groundwater and surface water monitoring, Moira Avenue, Forrestfield DRAFT

Figure 1: Groundwater monitoring locations



Figure 2: Surface water monitoring locations



Results of groundwater and surface water monitoring, Moira Avenue, Forrestfield DRAFT

Table 1: Monitoring infrastructure incidents

Sampling event	Groundwater	Surface water
May 2012	Monitoring wells installed	
June 2012	SK01 Monitoring bore SK01 had been destroyed	
July 2012	SK01 re-installed	Surface water monitoring stakes installed
August 2012	SK02 Lock on bore SK02 had been cut. Bore operational. SK03 Lock on bore SK03 had been cut. Bore operational. SK04 Lock on bore SK04 had been damaged. Bore operational. SK05 Monitoring bore SK05 has been spray painted. Bore operational.	Surface water monitoring stakes had been removed. Surface water samples taken.
September 2012	SK02 Lock on bore SK02 has been cut off. Bore operational although damaged. SK04 Lock on bore SK04 damaged but bore still operational.	Surface water stakes had been removed. Surface water monitoring stakes have not been replaced due to the amount of surface water inhibiting adequate fixation of the stakes to the surface of the ground.
October 2012	SK02 Bore had been interfered with. Bore smelled of hydrocarbons and an empty jerry can was found near the bore. SK05 Monitoring bore SK05 has been completely destroyed. Bore upright pipe and metal stand pipe missing, no bailer or lock etc.	All surface water monitoring stakes replaced using a stake driver to drive stakes at least 0.8 m into the ground. These stakes were hammered into the ground below the surface water expression while the area was dry.
April 2013	SK02 Monitoring bore destroyed. Metal stand pipe on ground near bore, no bailer or lock.	No change.
August 2013	No change	SW02 and SW03 had been removed.

It was initially agreed that Shire of Kalamunda (SoK) would provide survey levels of top and casing and ground levels to minimise the cost of the project. The initial survey was planned for July 2012, but destruction of SK01 resulted in this being delayed until the bore was replaced. The survey was delayed again following removal of the monitoring stakes in September 2012. Due to decreasing interest from the client in developing the site, Strategen and SoK agreed that survey would be undertaken by SoK at completion of monitoring.

At the time of survey, the infrastructure that remained was:

- SW01
- SK01, SK02, SK03 and SK04.

Top of casing/top of stake and ground levels for these items are presented in the results in Attachment B.

Water levels

Groundwater bores on the site remained dry throughout the 18 month monitoring period. Groundwater did not occur within 4.25 m of the surface at SK01 or within 6 m of the surface at the other bores during the monitoring period. This is consistent with the DoE Atlas indicating the regional watertable to be at depth. No perched groundwater was evident during the drilling. Consequently, groundwater levels are unlikely to constrain development of this site.

Results of groundwater and surface water monitoring, Moira Avenue, Forrestfield DRAFT

Surface water was present in the sump between July and September 2012 and in March, June and July 2013. Water was present in October 2013 but water levels were below the level of the stakes. Due to destruction of the surface water stakes prior to surveying, water levels in m AHD are only known at SW01. At SW01 water levels were recorded as:

- 41.151 mAHD in March 2013 (0.3 m above natural surface)
- 40.901 mAHD in June 2013 (0.05 m above natural surface)
- 41.201 mAHD in July 2013 (0.35 m above natural surface).

Water quality analysis

One round of water quality sampling and analysis was conducted for the surface water located on-site. Sampling was conducted on the 23 August 2012 and the results are presented in Table 2 and Attachment B. In summary:

- water was generally slightly acidic, with pH between 6.1 and 6.2
- water quality was fresh with electrical conductivity less than 100 $\mu\text{S}/\text{cm}$ (salinity less than 550 mg/L Total Dissolved Solids)
- total nitrogen concentrations were between 0.43 and 1.40 mg/L, below the ANZECC and ARMCANZ (2000) trigger values for slightly disturbed wetlands in South West Australia of 1.5 mg/L
- total phosphorus concentrations were between 0.09 and 0.36 mg/L, slightly exceeding the ANZECC and ARMCANZ (2000) trigger value of 0.06 mg/L.

Table 2: Surface water quality (August 2012)

Sample Identification Number	Sample Date	Nutrients							Physiochemical	
		Ammonia as N	Nitrite as N	Nitrate as N	Total Kjeldahl Nitrogen as N	Total Nitrogen	Total Phosphorus	Reactive Phosphorus as P	pH	Conductivity (µS/cm)
ANZECC & ARMCANZ (2000) guidelines for slightly disturbed ecosystems in South West Australia (Wetlands)		0.04	0.1	0.1	N/A	1.5	0.06	0.03	7 - 8.5	
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH units	µS/cm
SW01	23/08/2012	0.047	<0.05	<0.05	0.43	0.44	0.09	0.002	6.20	75
SW02	23/08/2012	0.013	<0.05	<0.05	0.79	0.79	0.36	0.002	6.10	73
SW03	23/08/2012	0.036	<0.05	<0.05	1.40	1.40	0.12	0.004	6.10	71

Conclusions

Groundwater was not encountered during the program and is consequently not considered a constraint to development of the site.

The sump appears to be dry, except after rainfall events when rainfall and stormwater from the surrounding catchment will enter the sump. Stormwater collecting in the sump will be removed by evaporation and possibly infiltration. Development of the site would require modelling of the response of the sump to rainfall events in order to ensure that roads and houses are not installed in potentially flooded areas. A pump system may be required to control water levels in the sump following rainfall events. Pumped water may then be discharged to a local drain or stream. Any such system would need to be approved by the Water Corporation and Department of Water through the preparation of a Local Water Management Strategy or Urban Water Management Plan.

Results of groundwater and surface water monitoring, Moira Avenue, Forrestfield DRAFT

If you have further questions or queries regarding the monitoring information please don't hesitate to contact me.

Regards

Yours sincerely



Margaret Dunlop

SENIOR CONSULTANT

19 May 2014

Enclosures: (2)

Attachment A: Bore logs

Attachment B: Monitoring results

Attachment C: Laboratory reports

References

Australian and New Zealand Environment and Conservation Council [ANZECC] and Agriculture and Resource Management Council of Australia and New Zealand [ARMCANZ] 2000, *National Water Quality Management Strategy – Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Department of the Environment [Online], Available from
<<http://www.environment.gov.au/water/publications/quality/nwqms-guidelines-4-vol1.html>>, [15/5/13].

Department of Environment 2004, *Perth Groundwater Atlas (Second Edition)*, Government of Western Australia, Perth.

Strategen 2012, *Preliminary Opportunities and Constraints Report York Road Reserve, Forrestfield*, unpublished draft report to Shire of Kalamunda, May 2012.

Attachment A

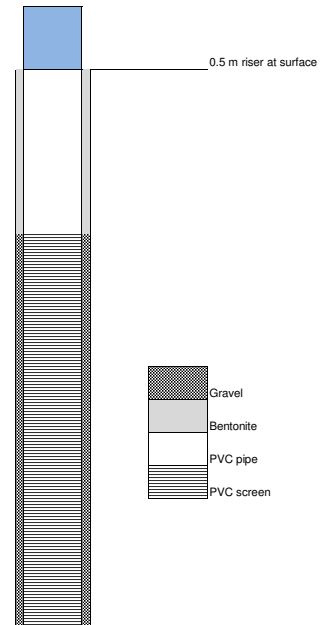
Bore logs

Soil Log

Page No:		Drill method:	Strataprobe drill rig
Job Number:	SKA11210.01	Hole diameter:	50mm
Project:	Moirav Av	Groundwater at:	N/A
Date of works:	30/05/2012	End of hole:	Not Encountered
Borehole ID:	SK01	GPS:	31° 59' 25.5" S
Logged by:	Jesse Shepherd		116° 01' 00.9" E

Depth (m)	Graphic log	Description of soil type	Additional observations
0		SANDY SILT - Pale orange brown topsoil, 7.5YR 5/6, organics matter and dolerite fragments visible,	Munsell color system used for soil colour identification
0.25		consistent sorting, weathered rock and silica, inconsistent hardness.	
0.5		SANDY SILT - Pale orange/ brown, 7.5 YR 5/6, consistent sorting, angular, dolerite fragments visible	
0.75		weathered rock and silica, inconsistent hardness.	
1			
1.25			
1.5			
1.75		Becoming darker, Dark orange/ brown, 7.5 YR 5/8	
2			
2.25			
2.5			
2.75			
3			
3.25		Fragments of ferrous rock and weathered granite visible	
3.5			
3.75			
4		CLAYEY SILT - Blackish grey, moist, plastic, very fine grained, possible perching layer	
4.25		END OF BORE HOLE	
4.5			
4.75			
5			
5.25			
5.5			
5.75			
6			
6.25			
6.5			
6.75			
7			
7.25			

	CLAYEY SILT
	SANDY SILT

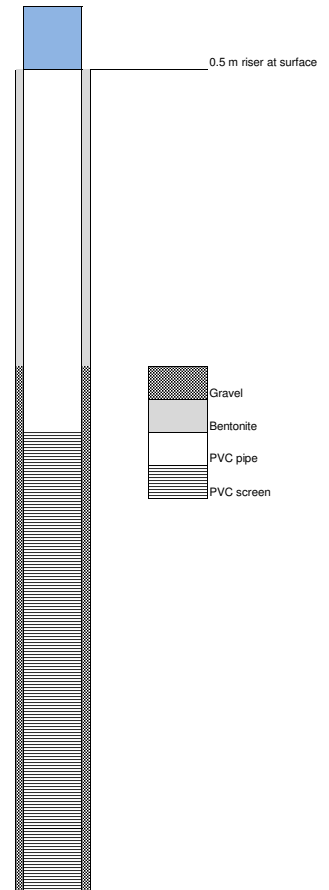


Soil Log

Page No:		Drill method:	Auger / drill Strataprobe
Job Number:	SKA11210.01	Hole diameter:	50 mm
Project:	Moirav Av	Groundwater at:	Not Encountered
Date of works:	30/05/2012	End of hole:	6.5m
Borehole ID:	SK02	GPS:	31° 59' 26.7" S
Logged by:	Jesse Shepherd		116° 00' 52.6" E

Depth (m)	Graphic log	Description of soil type	Additional observations
0		SANDY SILT - Pale orange brown, top soil, 7.5YR 5/8, organics and dolerite fragments visible,	Munsell color system used for soil colour identification
0.25		consistent sorting, weathered rock and silica, inconsistent hardness.	
0.5			
0.75		SANDY SILT - orange/darker brown, 7/8 7.5YR, variable hardness, friable pieces,	
1		weathered dolerite and granite visible	
1.25			
1.5		Becoming darker	
1.75			
2			
2.25			
2.5			
2.75			
3		SANDY SILT - significant colour change - Red/ Brown, 5YR 6/8, ferrous in nature,	
3.25		dolerite and granite fragments, pieces of weathered haematite, hardness increased	
3.5			
3.75			
4			
4.25			
4.5			
4.75			
5			
5.25		SANDY SILT - Dark Blood Red/ Brown, 5YR 4/8, ferrous in nature, very fine grained	
5.5		dolerite and granite fragments, pieces of visible weathered haematite, hardness stabilised	
5.75			
6			
6.25		END OF BORE HOLE	
6.5			
6.75			



 SANDY SILT

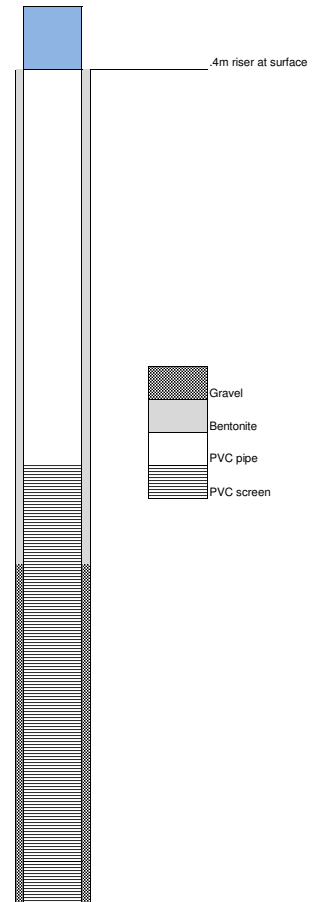


Soil Log

Page No:		Drill method:	Auger / drill Strataprobe
Job Number:	SKA11210.01	Hole diameter:	50 mm
Project:	Moirav Av	Groundwater at:	Not Encountered
Date of works:	30/05/2012	End of hole:	6 m
Borehole ID:	SK03	GPS:	31° 59' 28.4" S
Logged by:	Jesse Shepherd		116° 00' 45.5" E

Depth (m)	Graphic log	Description of soil type	Additional observations
0		SANDY SILT - Pale orange brown, topsoil, 7.5YR 5/8, organics and dolerite fragments visible,	Munsell color system used for soil colour identification
0.25		consistent sorting, weathered rock and silica, inconsistent hardness.	
0.5		SANDY SILT - orange/darker brown, 7/8 7.5YR, variable hardness, friable pieces,	
0.75		weathered dolerite and granite visible, some larger pieces, poorly sorted	
1			
1.25			
1.5			
1.75			
2			
2.25			
2.5			
2.75			
3		SANDY SILT - significant colour change - Red/ Brown, 5YR 6/8, ferrous in nature,	
3.25		dolerite and granite fragments, pieces of weathered haematite, hardness increased	
3.5		angular in nature, high iron content (Visible), lateritic properties	
3.75			
4			
4.25			
4.5			
4.75		SANDY SILT - Dark Red/ Brown, 5YR 4/8, ferrous in nature, very fine grained	
5		dolerite and granite fragments, pieces of weathered haematite, hardness increased	
5.25			
5.5		SILT - Dark Red/ Brown, 5YR 4/8, ferrous in nature, very fine grained, some quartz available	
5.75		dolerite and granite fragments, pieces of weathered haematite, hardness increased	
6		END OF BORE	
6.25			
6.5			
6.75			
7			
7.25			

 SANDY SILT
 SILT

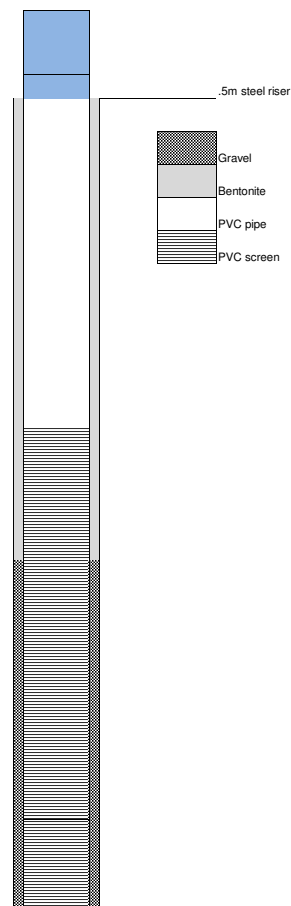


Soil Log

Page No:		Drill method:	Auger / drill Strataprobe
Job Number:	SKA11210.01	Hole diameter:	50 mm
Project:	Moirav Av	Groundwater at:	Not Encountered
Date of works:	30/05/2012	End of hole:	6 m
Borehole ID:	SK04	GPS:	31° 59' 33.6" S
Logged by:	Jesse Shepherd		116° 00' 52.8" E

Depth (m)	Graphic log	Description of soil type	Additional observations
0		SAND, non plastic, medium subrounded grain, yellow/black, well sorted/poorly graded,	organics present
0.25		SAND, non plastic, medium subrounded grain, yellow, well sorted/poorly graded,	
0.5			
0.75			
1			
1.25			
1.5			
1.75			
2			
2.25			
2.5			
2.75			
3			
3.25			
3.5			
3.75			
4			
4.25			
4.5			
4.75		*colour getting darker, darker yellow	
5			
5.25			
5.5			
5.75			
6			
6.25		END OF BORE HOLE	
6.5			
6.75			
7			
7.25			

 : SAND

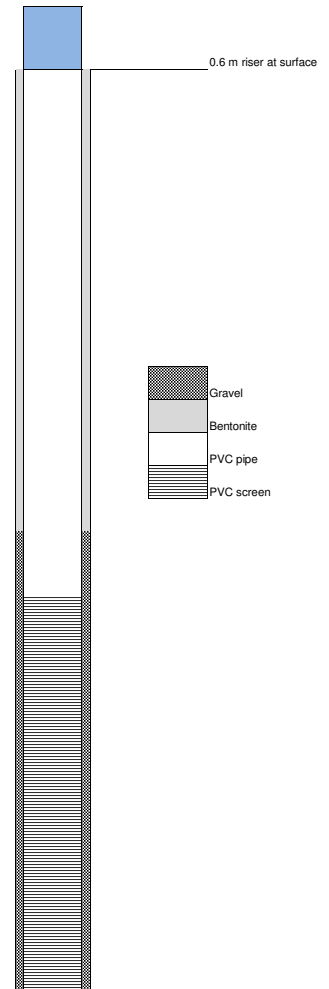


Soil Log

Page No:		Drill method:	Auger / drill Strataprobe
Job Number:	SKA11210.01	Hole diameter:	50 mm
Project:	Moirav Av	Groundwater at:	Not Encountered
Date of works:	30/05/2012	End of hole:	6.0 m
Borehole ID:	SK05	GPS:	39° 59' 33.2" S
Logged by:	Jesse Shepherd		116° 01' 03.1" E

Depth (m)	Graphic log	Description of soil type	Additional observations
0		SAND, sandy, non plastic, medium subangular grain, yellow brown, well sorted/poorly graded,	no smell
0.25		organics present.	
0.5			
0.75		CLAYEY SILT, Dark yellow, compact, clumps together easily, minimal organics,	* Damp
1		ferrous material present, weathered haematite present	
1.25			
1.5		SANDY SILT, orange - brown, ferrous in nature, well sorted, consistent structure	
1.75		larger fragments noticed among generally small particles	
2			
2.25			
2.5		SANDY SILT, orange - brown, ferrous in nature, well sorted, consistent structure	
2.75		larger fragments noticed among generally small particles	
3			
3.25		SANDY SILT, orange - brown, ferrous in nature, well sorted, consistent structure	
3.5		larger fragments noticed among generally small particles, larger chunks becoming more friable	
3.75			
4			
4.25			
4.5		SANDY SILT, orange - brown, ferrous in nature, well sorted, consistent structure	
4.75		larger fragments noticed among generally small particles, larger chunks becoming more friable	
5			
5.25			
5.5		CLAYEY SILT, red-brown, ferrous in nature, with larger particles of weathered granite and dolerite, possibly kaolinite	
5.75		damp, harder particles, very friable, angular, poorly sorted	
6			
6.25		* harder layer encountered by drilling rig, not as hard as SK04, possible perching layer	
6.5			
6.75			

	: SAND
	: SANDY SILT
	: CLAYEY SILT



Attachment B Results

Sample Identification Number	Sample Date	Depth to groundwater (mbtoc)	Groundwater level (m AHD)	Comments
Units				
SK01	Top of casing = 50.292 m AHD			
June	22/06/2012	-	-	Bore is destroyed, replacement has occurred
July	24/07/2012	-	-	Bore is dry
August	23/08/2012	-	-	Bore is dry
September	26/09/2012	-	-	Bore is dry
October	24/10/2012	-	-	Bore is dry
November	21/11/2012	-	-	Bore is dry
December	20/12/2012	-	-	Bore is dry
January	23/01/2013	-	-	Bore is dry
February	18/02/2013	-	-	Bore is dry
March	19/03/2013	-	-	Bore is dry
April	16/04/2013	-	-	Bore is dry
May	15/05/2013	-	-	Bore is dry
June	13/06/2013	-	-	Bore is dry
July	11/07/2013	-	-	Bore is dry
August	14/08/2013	-	-	Bore is dry
September	13/09/2013	-	-	Bore is dry
October	3/10/2013	-	-	Bore is dry
November	1/11/2013	-	-	Bore is dry
December				
SK02	Top of casing = 45.382 m AHD			
June	22/06/2012	-	-	Bore is dry
July	24/07/2012	-	-	Bore is dry
August	23/08/2012	-	-	Bore is dry
September	26/09/2012	-	-	Bore is dry, bore equipment removed (bailer and lock)
October	24/10/2012	-	-	Bore is dry, equipment reattached
November	21/11/2012	-	-	Bore is dry
December	20/12/2012	-	-	Bore is dry
January	23/01/2013	-	-	Bore is dry
February	18/02/2013	-	-	Bore is dry, bore equipment removed (bailer, riser and lock)
March	19/03/2013	-	-	Bore is dry
April	16/04/2013	-	-	Bore is dry
May	15/05/2013	-	-	Bore is dry
June	13/06/2013	-	-	Bore is dry
July	11/07/2013	-	-	Bore is dry
August	14/08/2013	-	-	Bore is dry
September	13/09/2013	-	-	Bore is dry
October	3/10/2013	-	-	Bore is dry
November	1/11/2013	-	-	Bore is dry
December				
SK03	Top of casing = 41.828 m AHD			
June	22/06/2012	-	-	Bore is dry
July	24/07/2012	-	-	Bore is dry
August	23/08/2012	-	-	Bore is dry
September	26/09/2012	-	-	Bore is dry
October	24/10/2012	-	-	Bore is dry
November	21/11/2012	-	-	Bore is dry
December	20/12/2012	-	-	Bore is dry
January	23/01/2013	-	-	Bore is dry
February	18/02/2013	-	-	Bore is dry
March	19/03/2013	-	-	Bore is dry
April	16/04/2013	-	-	Bore is dry
May	15/05/2013	-	-	Bore is dry
June	13/06/2013	-	-	Bore is dry
July	11/07/2013	-	-	Bore is dry
August	14/08/2013	-	-	Bore is dry
September	13/09/2013	-	-	Bore is dry
October	3/10/2013	-	-	Bore is dry
November	1/11/2013	-	-	Bore is dry
December				

SK04	Top of casing = 43.877 m AHD			
June	22/06/2012	-	-	Bore is dry
July	24/07/2012	-	-	Bore is dry
August	23/08/2012	-	-	Bore is dry
September	26/09/2012	-	-	Bore is dry
October	24/10/2012	-	-	Bore is dry
November	21/11/2012	-	-	Bore is dry
December	20/12/2012	-	-	Bore is dry
January	23/01/2013	-	-	Bore is dry
February	18/02/2013	-	-	Bore is dry
March	19/03/2013	-	-	Bore is dry
April	16/04/2013	-	-	Bore is dry
May	15/05/2013	-	-	Bore is dry
June	13/06/2013	-	-	Bore is dry
July	11/07/2013	-	-	Bore is dry
August	14/08/2013	-	-	Bore is dry
September	13/09/2013	-	-	Bore is dry
October	3/10/2013	-	-	Bore is dry
November	1/11/2013	-	-	Bore is dry
December				
SK05	Top of casing = NA			
June	22/06/2012	-	-	Bore is dry
July	24/07/2012	-	-	Bore is dry
August	23/08/2012	-	-	Bore is dry
September	26/09/2012	-	-	Bore is dry
October	24/10/2012	-	-	Bore is dry, bore has been demolished
November	21/11/2012	-	-	Bore is dry and demolished
December	20/12/2012	-	-	Bore is dry and demolished
January	23/01/2013	-	-	Bore is dry and demolished
February	18/02/2013	-	-	Bore is dry and demolished
March	19/03/2013	-	-	Bore is dry and demolished
April	16/04/2013	-	-	Bore is dry and demolished
May	15/05/2013	-	-	Bore is dry and demolished
June	13/06/2013	-	-	Bore is dry and demolished
July	11/07/2013	-	-	Bore is dry and demolished
August	14/08/2013	-	-	Bore is dry and demolished
September	13/09/2013	-	-	Bore is dry and demolished
October	3/10/2013	-	-	Bore is dry and demolished
November	1/11/2013	-	-	Bore is dry and demolished
December				

Sample Identification Number	Sample Date	Depth from surface (meters above ground level)	Groundwater level (m AHD)	Comments	Level mAHD
SW01	GL=40.851	m			
June	22/06/2012	-	-	Lake bed dry	-
July	24/07/2012	-	-	Lake bed inundated	-
August	23/08/2012	-	-	Lake bed inundated, surface water stake removed	-
September	26/09/2012	-	-	Lake bed inundated	-
October	24/10/2012	-	-	Lake bed dry, stakes installed	-
November	21/11/2012	-	-	Lake bed dry	-
December	20/12/2012	-	-	Lake bed dry	-
January	23/01/2013	-	-	Lake bed dry	-
February	18/02/2013	-	-	Lake bed dry	-
March	19/03/2013	0.300	-		41.151
April	16/04/2013	-	-	Lake bed dry	-
May	15/05/2013	-	-	Lake bed dry	-
June	13/06/2013	0.050	-		40.901
July	11/07/2013	0.350	-		41.201
August	14/08/2013	-	-	Lake bed dry	-
September	13/09/2013	-	-	Lake bed dry	-
October	3/10/2013	-	-	Lake bed nearly dry	-
November	1/11/2013	-	-	Lake bed dry	-
December					-
SW02	GL not measured, destroyed	not measured			
June	22/06/2012	-	-	Lake bed dry	
July	24/07/2012	-	-	Lake bed inundated	
August	23/08/2012	-	-	Lake bed inundated, surface water stake removed	
September	26/09/2012	-	-	Lake bed inundated	
October	24/10/2012	-	-	Lake bed dry, stakes installed	
November	21/11/2012	-	-	Lake bed dry	
December	20/12/2012	-	-	Lake bed dry	
January	23/01/2013	-	-	Lake bed dry	
February	18/02/2013	-	-	Lake bed dry	
March	19/03/2013	0.250	-		
April	16/04/2013	-	-	Lake bed dry	
May	15/05/2013	-	-	Lake bed dry	
June	13/06/2013	0.150	-		
July	11/07/2013	-	-	Monitoring stake not visible	
August	14/08/2013	-	-	Lake bed dry	
September	13/09/2013	-	-	Lake bed dry	
October	3/10/2013	-	-	Lake bed nearly dry	
November	1/11/2013	-	-	Lake bed dry	
December					
SW03	GL not measured, destroyed				
June	22/06/2012	-	-	Lake bed dry	
July	24/07/2012	-	-	Lake bed inundated	
August	23/08/2012	-	-	Lake bed inundated, surface water stake removed	
September	26/09/2012	-	-	Lake bed inundated	
October	24/10/2012	-	-	Lake bed dry, stakes installed	
November	21/11/2012	-	-	Lake bed dry	
December	20/12/2012	-	-	Lake bed dry	
January	23/01/2013	-	-	Lake bed dry	
February	18/02/2013	-	-	Lake bed dry	
March	19/03/2013	0.300	-		
April	16/04/2013	-	-	Lake bed dry	
May	15/05/2013	-	-	Lake bed dry	
June	13/06/2013	0.350	-		
July	11/07/2013	0.400	-		
August	14/08/2013	-	-	Lake bed dry	
September	13/09/2013	-	-	Lake bed dry	
October	3/10/2013	-	-	Lake bed nearly dry	
November	1/11/2013	-	-	Lake bed dry	
December					

GROUNDWATER LABORATORY

ANALYTICAL RESULTS

Sample Identification Number	Sample Date	Metals and Metalloids								Nutrients							Physio-Chem	
		Arsenic	Cadmium	Copper	Chromium	Nickel	Lead	Zinc	Mercury	Ammonia as N	Nitrite as N	Nitrate as N	Total Kjeldahl Nitrogen as N	Total N	Total P	Reactive Phosphorus as P	pH	Conductivity and TDS by Calculation
ANZECC & ARMCANZ (2000) guidelines for fresh and marine water quality - 95% trigger value (Freshwater)		13	0.2	1.4	1	11	3.4	8	0.6									
ANZECC & ARMCANZ (2000) guidelines for slightly disturbed ecosystems in South West Australia (Wetlands)										0.04	0.1	0.1	N/A	1.5	0.06	0.03	7 - 8.5	
Units		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH units	µS/cm
SK01	24/07/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	24/10/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23/01/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16/04/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11/07/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3/10/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SK02	24/07/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	24/10/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23/01/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16/04/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11/07/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3/10/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SK03	24/07/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	24/10/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23/01/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16/04/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11/07/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3/10/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SK04	24/07/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	24/10/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23/01/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16/04/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11/07/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3/10/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SK05	24/07/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	24/10/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23/01/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16/04/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11/07/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3/10/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW01	24/07/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23/08/2012	-	-	-	-	-	-	-	-	0.047	<0.05	<0.05	0.43	0.44	0.09	0.002	6.20	75.00
	24/10/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23/01/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16/04/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11/07/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3/10/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW02	24/07/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23/08/2012	-	-	-	-	-	-	-	-	0.013	<0.05	<0.05	0.79	0.79	0.36	0.002	6.10	73.00
	24/10/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23/01/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16/04/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11/07/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3/10/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW03	24/07/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23/08/2012	-	-	-	-	-	-	-	-	0.036	<0.05	<0.05	1.40	1.40	0.12	0.004	6.10	71.00
	24/10/2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23/01/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16/04/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11/07/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3/10/2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* - Indicates that no sample was analysed



Survey results 5 February 2014

Location	ID	Description	GDA94 (MGA50)			Horizontal Accuracy (m)	Ellipsoidal Height (m)	Vertical Accuracy (m)	n Value (m)	AHD71		Surface Elevation (m)	SWL (m)	RWL (m)	Notes
			Easting (m)	Accuracy (m)	Northing (m)					AHD (m) T.O.C.	Height Pipe A.G.L. (m)				
Forrestfield	SK01	Piezometer	407129.653	0.010	6460205.056	0.010	19.559	0.010	-30.733	50.292	0.450	49.842	Dry	dry	Steel Riser Lid Broken
Forrestfield	SK02	Piezometer	406902.262	0.010	6460165.723	0.010	14.612	0.010	-30.770	45.382	0.530	44.852	Dry	dry	No Steel Riser
Forrestfield	SK03	Piezometer	406720.896	0.010	6460118.774	0.010	11.028	0.010	-30.800	41.828	0.600	41.228	Dry	dry	
Forrestfield	SK04	Piezometer	406915.340	0.010	6459956.933	0.010	13.109	0.010	-30.768	43.877	0.4	43.477	Dry	dry	
Forrestfield	SK05	Piezometer													Destroyed
Forrestfield	SW01	Surface Water Stake	406919.946	0.010	6460024.701	0.010	10.978	0.010	-30.765	41.743	0.892	40.851	Dry	dry	Destroyed
Forrestfield	SW02	Surface Water Stake													Destroyed
Forrestfield	SW03	Surface Water Stake													Destroyed

Sample Identification Number	Sample Date	Nutrients							Physiochemical	
		Ammonia as N	Nitrite as N	Nitrate as N	Total Kjeldahl Nitrogen as N	Total Nitrogen	Total Phosphorus	Reactive Phosphorus as P	pH	Conductivity (uS/cm)
ANZECC & ARMCANZ (2000) guidelines for slightly disturbed ecosystems in South West Australia (Wetlands)		0.04	0.1	0.1	N/A	1.5	0.06	0.03	7 - 8.5	
Units		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pH units	μS/cm
SW01	23/08/2012	0.047	<0.05	<0.05	0.43	0.44	0.09	0.002	6.20	75
SW02	23/08/2012	0.013	<0.05	<0.05	0.79	0.79	0.36	0.002	6.10	73
SW03	23/08/2012	0.036	<0.05	<0.05	1.40	1.40	0.12	0.004	6.10	71

Attachment C

Laboratory report



ANALYTICAL REPORT



CLIENT DETAILS

Contact Margaret Dunlop
 Client Strategen
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 Subiaco
 WA 6904

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 Facsimile 08 9380 4606
 Email m.dunlop@strategen.com.au

 Project (Not specified)
 Order Number (Not specified)
 Samples 3

LABORATORY DETAILS

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 Laboratory SGS Newburn Environmental
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 SGS Reference **PE070035 R0**
 Report Number 0000045704
 Date Reported 04 Sep 2012
 Date Received 23 Aug 2012

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(898/20210).

SIGNATORIES

Leanne Orsmond

Michael McKay
Inorganic Team Leader - Waters

Murray O'Neill
Laboratory Technician

Ros Ma
Laboratory Assistant Manager



ANALYTICAL REPORT

PE070035 R0

Parameter	Units	LOR	Sample Number	PE070035.001	PE070035.002	PE070035.003
			Sample Matrix	Water	Water	Water
			Sample Date	23 Aug 2012	23 Aug 2012	23 Aug 2012
			Sample Name	SW01	SW02	SW03

pH in water Method: AN101

pH	pH Units	0.1	6.2	6.1	6.1
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Conductivity and TDS by Calculation - Water Method: AN106

Conductivity @ 25 C	µS/cm	2	75	73	71
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Total Dissolved Solids (TDS) in water Method: AN113

Total Dissolved Solids Dried at 180°C	mg/L	10	42	51	45
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Nitrate Nitrogen and Nitrite Nitrogen (NOx) by FIA Method: AN258

Nitrate, NO ₃ as NO ₃	mg/L	0.05	0.06	<0.05	0.07
Nitrite, NO ₂ as NO ₂	mg/L	0.05	<0.05	<0.05	<0.05

Low Level Ammonia Nitrogen by FIA Method: AN261

Ammonia Nitrogen, NH ₃ as N	mg/L	0.005	0.047	0.013	0.036
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TKN Kjeldahl Digestion by Discrete Analyser Method: AN281

Total Kjeldahl Nitrogen	mg/L	0.05	0.43	0.79	1.4
Total Nitrogen (calc)	mg/L	0.05	0.44	0.79	1.4

Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293

Total Phosphorus (Kjeldahl Digestion)	mg/L	0.01	0.09	0.36	0.12
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Filterable Reactive Phosphorus (FRP) Method: AN278

Filterable Reactive Phosphorus	mg/L	0.002	0.004	0.002	0.002
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QC SUMMARY

PE070035 R0

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula: *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA', the results are less than the LOR and thus the RPD is not applicable.

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity @ 25 C	LB047925	µS/cm	2	<2	0 - 2%	97 - 101%

Filterable Reactive Phosphorus (FRP) Method: ME-(AU)-[ENV]AN278

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Filterable Reactive Phosphorus	LB048542	mg/L	0.002	<0.002	1 - 35%	117 - 118%	118 - 124%

Low Level Ammonia Nitrogen by FIA Method: ME-(AU)-[ENV]AN261

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Ammonia Nitrogen, NH ₃ as N	LB047951	mg/L	0.005	<0.005	0 - 32%	105 - 106%

Nitrate Nitrogen and Nitrite Nitrogen (NO_x) by FIA Method: ME-(AU)-[ENV]AN258

Parameter	QC Reference	Units	LOR	MB
Nitrate, NO ₃ as NO ₃	LB047951	mg/L	0.05	<0.05
Nitrite, NO ₂ as NO ₂	LB047951	mg/L	0.05	<0.05

pH in water Method: ME-(AU)-[ENV]AN101

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH	LB047925	pH Units	0.1	5.2 - 7.3	0 - 2%	100%

TKN Kjeldahl Digestion by Discrete Analyser Method: ME-(AU)-[ENV]AN281

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Kjeldahl Nitrogen	LB047929	mg/L	0.05	<0.05	0 - 7%	96%
Total Nitrogen (calc)	LB047929	mg/L	0.05		0 - 4%	



QC SUMMARY

PE070035 R0

MB blank results are compared to the Limit of Reporting

LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.

DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula: *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Dissolved Solids (TDS) in water Method: ME-(AU)-[ENV]AN113

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery	MSD %RPD
Total Dissolved Solids Dried at 180°C	LB048279	mg/L	10	<10	3%	102%	88%	7%

Total Phosphorus by Kjeldahl Digestion DA in Water Method: ME-(AU)-[ENV]AN279/AN293

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Phosphorus (Kjeldahl Digestion)	LB047929	mg/L	0.01	<0.01	7 - 16%	93%



METHOD SUMMARY

PE070035 R0

METHOD

METHODOLOGY SUMMARY

AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as $\mu\text{mhos/cm}$ or $\mu\text{S/cm}$ @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2520 B.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
AN258	Nitrate and Nitrite by FIA: In an acidic medium, nitrate is reduced quantitatively to nitrite by cadmium metal. This nitrite plus any original nitrite is determined as an intense red-pink azo dye at 540 nm following diazotisation with sulphanilamide and subsequent coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. Without the cadmium reduction only the original nitrite is determined. Reference APHA 4500-NO ₃ - F.
AN261	Ammonia by Continuous Flow Analyser: Ammonium in a basic medium forms ammonia gas, which is separated from the sample matrix by diffusion through a polypropylene membrane. The ammonia is reacted with phenol and hypochlorite to form indophenol blue at an intensity proportional to the ammonia concentration. The blue colour is intensified with sodium nitroprusside and the absorbance measured at 630 nm. The sensitivity of the automated method is 10-20 times that of the macro method. Reference APHA 4500-NH ₃ H.
AN278	Reactive Phosphorus by DA: Orthophosphate reacts with ammonium molybdate (Mo VI) and potassium antimonyl tartrate (Sb III) in acid medium to form an antimony-phosphomolybdate complex. This complex is subsequently reduced with ascorbic acid to form a blue colour and the absorbance is read at 880 nm. The sensitivity of the automated method is 10-20 times that of the macro method. Reference APHA 4500-P F
AN279/AN293	The sample is digested with Sulphuric acid, K ₂ SO ₄ and CuSO ₄ . All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN281	An unfiltered water or soil sample is first digested in a block digester with sulphuric acid, K ₂ SO ₄ and CuSO ₄ . The ammonia produced following digestion is then measured colourimetrically using the Aquakem 250 Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.



PE070035 R0

FOOTNOTES

IS	Insufficient sample for analysis.	QFH	QC result is above the upper tolerance
LNR	Sample listed, but not received.	QFL	QC result is below the lower tolerance
*	This analysis is not covered by the scope of accreditation.	-	The sample was not analysed for this analyte
^	Performed by outside laboratory.	NVL	Not Validated
LOR	Limit of Reporting		
↑↓	Raised or Lowered Limit of Reporting		

Samples analysed as received.

Solid samples expressed on a dry weight basis.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here:
<http://www.sgs.com.au/pv.sgs.v3/~media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf>

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SGS Environmental Services
10 Reid Road,
Perth International Airport,
Newburn WA 6105
Tel: 08 9373 3500 Fax: 08 9373
3668

ATTN: Kelly Mahar
Email: Kelly.mahar@sgs.com

CHAIN OF CUSTODY & ANALYSIS REQUEST

Page 1 of 1

Lab ID Number: 16070035 (please quote on all correspondence)

Company Name: Strategen

Project Name/No: Forrestfield, Moira av

Address: Level 1, 322 Hay Street, Subiaco,

Purchase Order No:

WA, 6008

Results Required Date: asap

Telephone: 08 9380 3100

Fax: 08 9380 4606

Contact Name: Margaret Dunlop

Email Results to:

J.shepherd@strategen.com.au

Laboratory
Quotation No:

m.dunlop@strategen.com.au

SGS ID	Client Sample ID	Sampling Date/Time (field record sheet number)	Tick as Appropriate			PRESERVATIVE	NO. OF ITEMS	ANALYSIS REQUESTED. SPECIFY & TICK AS APPROPRIATE										Notes/Guidelines/LOR/ Special instructions
			Solid Sample	Liquid Sample	Gas/Air Sample			Nutrients (TKN, NH3, NO2, NO3, TN, TP, PO4	pH, electrical conductivity, total dissolved solids (TDS)									
1	SW01	23/08/2012 8:30 am		X			1	X	X									
2	SW02	23/08/2012 9:30 am		X			1	X	X									
3	SW03	23/08/2012 10:30 am		X			1	X	X									

Relinquished By: JESSE SHEPHERD

Date/Time: 23/8/12 11:30am

Received By: HR

Date/Time:

Relinquished By:

Date/Time:

Received By:

Date/Time:

Samples Intact: Yes / No

Temperature: Ambient / Chilled / NA

Sample Security Sealed: Yes / No

Comments / Subcontracting details:

Quarantine: Yes / No

i.e. samples subcontracted to SGS Sydney due to TAT requested
City of Kalamunda

Hazards: e.g. may contain Asbestos

415

SGS

AUSTRALIA-ENVIRONMENTAL-PERTH AIRPORT- PROFORMA -QU101

REGISTRATION DETAILS

APPROVED BY: R. MA

<input checked="" type="checkbox"/> Bottle Map	1L Plastic	500mL Plastic	500mL Plastic	250mL Plastic	125mL Plastic	1L Amber	500mL Amber	100mL Amber	40mL Glass Vial	500mL Plastic	250mL Plastic	125mL Plastic	250mL Glass Jar	125mL Glass Jar	Other Lab	Ziplock Bag/ Other	Job Number:
Sample Numbers:	Green	Green	Purple	Green	Red	Green	Orange	Green	White	Blue	Orange	Brown					P607003S
1-73		3															
																	# of Eskies:
																	1
																	IB / ICE / None
																	Temp: 10.5
																	Tray Numbers:
																	W-073

Registration comments:

Action Taken:

Registered By:

AR 23/8/12



SAMPLE RECEIPT ADVICE

PE070035

CLIENT DETAILS

Contact Margaret Dunlop
 Client Strategen
 Address PO BOX 243
 Subiaco
 WA 6904

Telephone 08 9380 3100
 Facsimile 08 9380 4606
 Email m.dunlop@strategen.com.au

Project (Not specified)
 Order Number (Not specified)
 Samples 3

LABORATORY DETAILS

Manager Ros Ma
 Laboratory SGS Newburn Environmental
 Address 10 Reid Rd
 Newburn WA 6105

Telephone (08) 9373 3500
 Facsimile (08) 9373 3556
 Email au.environmental.perth@sgs.com

Samples Received Thu 23/8/2012
 Report Due Thu 30/8/2012
 SGS Reference **PE070035**

SUBMISSION DETAILS

This is to confirm that 3 samples were received on Thursday 23/8/2012. Results are expected to be ready by Thursday 30/8/2012. Please quote SGS reference PE070035 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	3 Waters	Type of documentation received	COC
Date documentation received	23/8/2012	Samples received in good order	Yes
Samples received without headspace	N/A	Sample temperature upon receipt	10.5°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes	Number of eskies/boxes received	1

Samples will be held for one month for water samples and two months for soil samples from date of report, unless otherwise instructed.

COMMENTS

To the extent not inconsistent with the other provisions of this document and unless specifically agreed otherwise in writing by SGS, all SGS services are rendered in accordance with the applicable SGS General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm as at the date of this document. Attention is drawn to the limitations of liability and to the clauses of indemnification.



SAMPLE RECEIPT ADVICE

PE070035

CLIENT DETAILS

Client

Strategen

Project

(Not specified)

SUMMARY OF ANALYSIS

No.	Sample ID	Conductivity and TDS by Calculation - Water	Filterable Reactive Phosphorus (FRP)	Low Level Ammonia Nitrogen by FIA	Nitrate Nitrogen and Nitrite Nitrogen (NOx) by FIA	pH in water	TKN Kjeldahl Digestion by Discrete Analyser	Total Dissolved Solids (TDS) in water	Total Phosphorus by Kjeldahl Digestion DA in
001	SW01	1	1	1	2	1	2	1	1
002	SW02	1	1	1	2	1	2	1	1
003	SW03	1	1	1	2	1	2	1	1

The above table represents SGS Environmental Services' interpretation of the client-supplied Chain Of Custody document.

The numbers shown in the table indicate the number of results requested in each package.

Please indicate as soon as possible should your request differ from these details.

Testing as per this table shall commence immediately unless the client intervenes with a correction.

City of Kalamunda

4.0 PRELIMINARY ENGINEERING SERVICES REPORT



Job No: 12-205

Cambridge Road, FORRESTFIELD

On behalf of

The Shire of Kalamunda

Engineering Opportunity and Constraints Report

for

Proposed Residential Development

September 2012

PRITCHARD FRANCIS PTY LTD
Civil and Structural Engineering Consultants

Level 1, 430 Roberts Road
SUBIACO WA 6904
Telephone: 9382 5111 Fax: 9388 5199

CONTENTS

1	INTRODUCTION	1
2	SITE CONDITIONS.....	2
2.1	Existing Infrastructure	2
2.2	Geology	2
2.3	Topography	2
2.4	Groundwater Levels	3
2.5	Earthworks and Retaining Walls	3
3	INFRASTRUCTURE.....	4
3.1	Stormwater Drainage	4
3.2	Sewer Reticulation	4
3.3	Water Reticulation	5
3.4	Gas Supply.....	5
3.5	Electrical Supply	5
3.6	Communications	5
4	COST ESTIMATE.....	6
5	CONCLUSION.....	6
	APPENDIX A - CONCEPTUAL LOT SETOUT	7
	APPENDIX B – WATER CORPORATION REPROGRAPHICS	8
	APPENDIX C – STRATEGEN PRELIMINARY OPPORTUNITY AND CONSTRAINTS REPORT	9
	APPENDIX D – DOW GROUNDWATER	10
	APPENDIX E - EXISTING SEWER INFRASTRUCTURE	11
	APPENDIX F - EXISTING WATER INFRASTRUCTURE	12
	APPENDIX G - EXISTING ATCO GAS INFRASTRUCTURE	13
	APPENDIX H - EXISTING WESTERN POWER INFRASTRUCTURE	14
	APPENDIX I – PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATE	15

**Cambridge Road, Forrestfield
Engineering Services Report**

1 INTRODUCTION

At the request of Ryan Uszko of The Shire of Kalamunda, Pritchard Francis Pty Ltd has prepared this report on the existing services and authority conditions expected to be required to serve the proposed development.

The landholding has an area of approximately nine hectares and is bound by existing development fronting Mallow Way as well as Cambridge Road to the north, York Street and existing development fronting Moira Avenue to the south. To the east of the landholding is a power easement.

Preliminary lot layouts have been provided by the Shire of Kalamunda, namely TPG Plan 712-359 dated 7 June 2012, attached in Appendix A. The plan details 83 lots ranging from R20 to R50, retained vegetation and significant drainage basin to the south west as well as enhanced landscaped public open space to the south east.

The following pages outline the expected earthworks, retaining walls, stormwater drainage, water reticulation, sewer reticulation, gas, electrical infrastructure and anticipated engineering conditions required to serve the proposed development.



Figure 1.1 – Aerial photograph of the site

2 SITE CONDITIONS

2.1 Existing Infrastructure

The current site consists of mature trees and vegetation, some of which will have to be removed to allow for the proposed development. Costs associated with the clearing of existing vegetation have been allowed for in the attached Preliminary Order of Magnitude Cost Estimate.

The landholding site contains a large sump (approximately 1.3 hectares in plan area), which receives drainage from the surrounding area. Immediately to the east of the site is a Western Power easement, with 330 kV transmission line running parallel to Anderson Road.

2.2 Geology

A review of the 1:50 000 Environmental Geology Series maps of Perth classifies the soils as thin Bassendean sand over Guildford formation. The sand layer is likely to be of high permeability, high ease of excavation, low slope stability, medium to high bearing capacity and suitable for roads and urbanisation. However, it is noted that the sand is of variable thickness, and sands physical properties are modified by the underlying material.

The Shire of Kalamunda has provided a Preliminary Opportunity and Constraints Report completed by Strategen attached in Appendix B of this report. They note in this report that the base of the sump appears to be clay. Furthermore, a site inspection was completed by Pritchard Francis on the 9 September. Upon inspection in areas of the site the surface material appears to be clayey material. As such, it is possible that lot connection pits will need to be provided as insitu infiltration may not be suitable. This will need to be confirmed by a geotechnical engineer following a geotechnical investigation of the site.

We note that a site specific geotechnical investigation would need to be undertaken by a certified geotechnical engineer prior to construction to confirm the site conditions and geological development constraints. Infiltration testing should be undertaken with this study to assist with drainage modelling.

2.3 Topography

Reprographics obtained from the Water Corporation indicate that the landholding falls from east to west with the site at approximately RL 50.0m on the eastern side and RL 41.0 on the western side, as part of a drainage sump. Design levels on the site are constrained by the existing developments to the north and west as well as the existing road levels along Mallow Way, to which the proposed subdivision is to tie into. Please refer to Appendix C which illustrates the topography of the site.

We note that a site specific survey would need to be undertaken by a certified surveyor prior to construction to confirm the site levels, as well as the existing levels surrounding the site and at tie in points.

2.4 Groundwater Levels

The Department of Water's website indicates that the water table sits at RL 17.0m (based on May 2003, Groundwater Contours). This level is likely to fluctuate by 3 metres due to seasonal variations, but will be in the vicinity of 21 to 30 metres below natural surface level. Please refer to Appendix D for the DoW's groundwater contours.

Based on the above information, we would not expect any development constraints would result due to the groundwater table. Pritchard Francis recommends that site conditions be confirmed by a geotechnical engineer prior to any detailed design.

2.5 Earthworks and Retaining Walls

Design levels of the lots adjacent to the sump are to be set with an appropriate clearance between flood levels. To integrate the elevated design levels of these lots, with the level of the existing sump retaining it is anticipated that retaining walls will be required along the western boundary of the site, and have been allowed for in the attached cost estimate. Retaining walls will also be required to create flat stepping pads for the lots, with appropriate allowance being made in the attached Preliminary Order of Magnitude Cost Estimate.

Importation of fill will be required to create a site suitable for development and allowances have been made in the attached Preliminary Order of Magnitude Cost Estimate. Final import quantities will be determined following a survey and geotechnical investigation of the site.

3 INFRASTRUCTURE

3.1 Stormwater Drainage

In line with the Shire of Kalamunda's requirements all stormwater shall be detained within site for a 1 in 100 year ARI storm event. The attached TPG Plan (Appendix A) details a drainage basin located on the south west portion of the site as well as a swale (adjacent to the proposed road interconnecting with Mallow Way) transmitting water south to the basin.

Stormwater management for the proposed subdivision is likely to include the provision of a pit and pipe system that ultimately discharges the water to the drainage basin. In line with the Shire of Kalamunda's requirements this pit and pipe system will be sized to facilitate a 1 in 5 year ARI storm event. The attached Preliminary Order of Magnitude Cost Estimate includes the provision of lot connection pits which may need to be provided as insitu infiltration may not be suitable.

Preliminary stormwater calculations show that for approximately 4000 m³ of additional volume shall be provided to compensate the post development stormwater runoff. It is anticipated that following that this volume of water will be facilitated by the reshaping of the existing stormwater basin to allow for the extra storage capacity required post development. Allowances have been made for in the attached cost estimate for the reshaping of the existing sump. No allowances have been made for landscaping or environmental costs.

Pritchard Francis recommends that further modelling is undertaken to further develop a stormwater management strategy for the site. The stormwater strategy will be dependent on the geological conditions on the site as well as the contributing catchment to the drainage sump located onsite. In the detailed design stage of the development consideration should be given to Water Sensitive Urban Sensitive Design (WSUD) and further investigation into methods of treatment of stormwater at source. Any stormwater drainage employed on site shall also manage flood and inundation risks by providing adequate clearance from 1 in 100 ARI flood levels.

3.2 Sewer Reticulation

The Water Corporation reprographics show that there is an existing an 150mm VC sewer main along Mallow Way to the north of the proposed development, 150mm VC sewer main to the south as well as 150mm PVC sewer along Cambridge Road to the east of the landholding. It is anticipated that sewer will be provided to the proposed development by the extension of the existing sewer along Cambridge Road.

Pritchard Francis has been in contact with the Water Corporation with their preliminary advice indicating that there is no Water Corporation planning for the area. It is anticipated that the existing catchment will be able to facilitate increased flows, with the Water Corporation utilising head works to undertake any upgrades required to their existing downstream sewage infrastructure. Further liaison will be required with the Water Corporation in the detailed design stage.

Please refer to Appendix E which illustrates the current sewer infrastructure.

**Cambridge Road, Forrestfield
Engineering Services Report****3.3 Water Reticulation**

The reprographics obtained from the Water Corporation show that there is an existing 100mm water main along Cambridge Road, as well as a 100mm main along Mallow Way. A 150mm main is located along Moira Way to the south of the land holding. It is anticipated that water will be provided to the proposed subdivision via the interconnection of the existing 100mm mains on Cambridge Road and Mallow Way.

Pritchard Francis has not been able to confirm whether the existing infrastructure is capable of supporting the proposed development. The design engineer at the time will require confirmation from the Water Corporation of the water reticulation supply; however we would assume that the existing 100mm mains have sufficient capacity.

Please refer to Appendix F which illustrates the existing water infrastructure surrounding the development.

3.4 Gas Supply

Dial Before You Dig Plans have been received from ATCO Gas and show existing gas reticulation surrounding the development with a 50mm main along Cambridge Road and Mallow Way. We would presume that this main has sufficient capacity to serve the proposed development, however further consultation with ATCO will be required in the design phase.

Please refer to Appendix G for the received Dial Before You Dig data Plan.

3.5 Electrical Supply

Western Power's Dial Before You Dig Plans have been obtained and are attached in Appendix H of this report. Existing developments in the area are served by connections into overhead power lines. Western Power's Network Capacity Mapping indicates that there is capacity available in the area. We anticipate that as part of the development additional switchgears and transformers will be required to reinforce the network to allow for the expansion of 83 lots. Associated costs have been allowed for in the attached Preliminary Order of Magnitude Cost Estimate. This should be confirmed with an application to Western Power for a Design Information Package (DIP).

3.6 Communications

Given the site is less than 100 lots and an infill development NBN is expected to reject any proposal to service the site and subsequently Telstra will be the provider of communications infrastructure by extending existing infrastructure internally to serve the proposed lots. A contract will need to be entered into with Telstra for the design of this infrastructure.

4 COST ESTIMATE

A Preliminary Order of Magnitude Cost Estimate (attached in Appendix I) has been prepared in accordance with the TPG's 83 lot subdivisional plan received from The Shire of Kalamunda. The cost estimate is based on the assumption that all works are carried out in one stage and should be read in conjunction with the notes which detail any assumptions and allowances that have been made in the estimate.

5 CONCLUSION

This report confirms that the proposed development should be capable of being served with all of the essential services. Based on the information available at the time of this report, geological conditions of the site should not present any constraints to the development.

Confirmation will be required from service authorities at the detailed design stage on the actual capacities of existing infrastructure and any upgrades that may be required to serve the proposed subdivision. Further surveys, geotechnical and environmental investigations will be required prior to any detailed design.

We recommend that further flood analysis is carried out to ascertain the impact of the proposed development on the existing sump in the area as well as required clearances from flood levels. Following this and confirmation of the geological conditions onsite a stormwater management strategy can be formulated for the site in line with water sensitive urban design methodologies.

APPENDIX A - CONCEPTUAL LOT SETOUT



0 20 40 80m

This concept has been prepared for the purpose of meeting client specifications. The drawing does not constitute an invitation, agreement or contract (or any part thereof) of any kind whatsoever.

Although care has been taken in the compilation of this drawing by The Planning Group WA Pty Ltd, all parties associated with the proposed property development disclaim all responsibility for any errors or omissions. The right is reserved to change the plan at any time.

Liability is expressly disclaimed by The Planning Group WA Pty Ltd for any loss or damage which may be sustained by any person acting on any visual impression gained from this drawing.

Yield Summary						
Lot Type	15 x 28	12 x 28	10 x 28	9 x 28	7.5 x 28	TOTAL
	27	3	10	11	32	83
Percentage	33%	5%	11%	13%	38%	

Concept Plan
Cambridge Road, Forrestfield

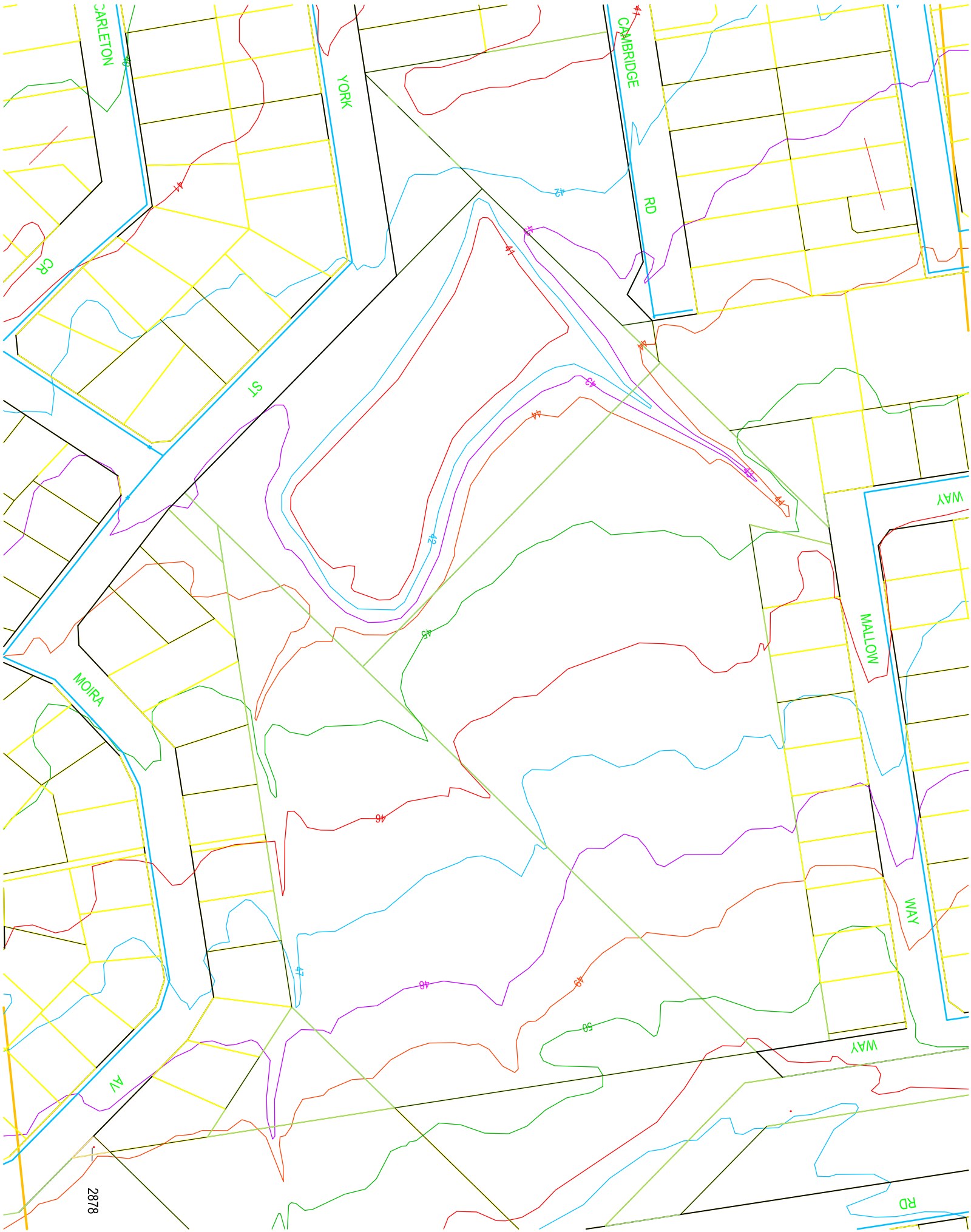
Date: 07 June 2012 Project Manager: TP
Scale: 1:2000 @ A3 Designer: OP
Drawing No. 712-359 CP01A Drawn: OP

TOWN PLANNING
AND URBAN DESIGN

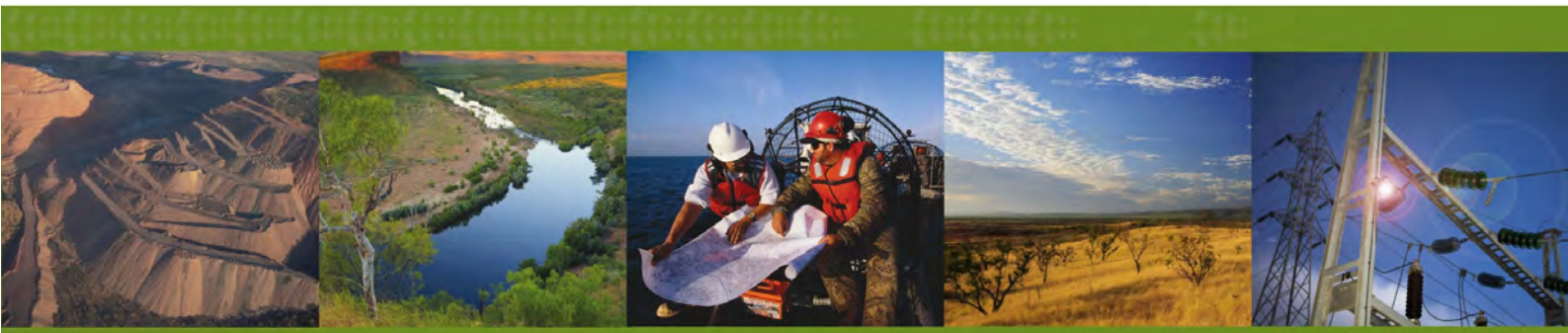
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APPENDIX B – WATER CORPORATION REPROGRAPHICS



APPENDIX C – STRATEGEN PRELIMINARY OPPORTUNITY AND CONSTRAINTS REPORT



Preliminary Opportunities and Constraints Report

York Road Reserve, Forrestfield

DRAFT

Prepared for
Shire of Kalamunda
by Strategen

May 2012



Preliminary Opportunities and Constraints Report

York Road Reserve, Forrestfield

DRAFT

Strategen is a trading name of
Strategen Environmental Consultants Pty Ltd
Level 2, 322 Hay Street Subiaco WA
ACN: 056 190 419

May 2012

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Strategen has not attempted to verify the accuracy or completeness of the information supplied by the Client.

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Client: Shire of Kalamunda

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
				Form	Date
Draft Report	A0				
Final Draft Report					
Final Report					

Filename: SKA12118_01 R001 Rev A0 - 25 May 2012

DRAFT

Preliminary Opportunities and Constraints Report

Table of contents

1. Introduction	2
1.1 Background	2
1.2 Desktop review	2
1.3 Site investigation	2
2. Results and discussion	5
2.1 Disturbance history	5
2.2 Topography and soils	5
2.3 Surface water	5
2.4 Flora and vegetation	7
2.4.1 Results	7
2.4.2 Discussion	8
2.5 Fauna	11
2.5.1 Results	11
2.5.2 Discussion	14
3. Conclusions and recommendations	16
4. References	17

List of tables

Table 1	Conservation significant species potentially occurring in York Street Reserve	7
Table 2	Likelihood of occurrence of flora species identified by database searches	9
Table 3	Conservation significant species potentially occurring in York Street Reserve	11
Table 4	Likelihood of occurrence of fauna species identified by database searches	12

List of figures

Figure 1	Regional location	3
Figure 2	York Street Reserve	4
Figure 3	Assessment zones	6
Figure 4	Known locations of Carnaby's black-cockatoo habitat	15

List of appendices

Appendix 1	Conservation codes
Appendix 2	Detailed zone descriptions

DRAFT

Preliminary Opportunities and Constraints Report

1. Introduction

1.1 Background

The Shire of Kalamunda is currently examining opportunities to develop parts of York Street Reserve, Forrestfield. Strategen have been engaged to undertake an assessment of the site to determine whether any environmental constraints or opportunities for development are present within the Reserve.

York Street Reserve is located in Forrestfield (Figure 1), and is bounded by York Street and Moira Avenue along the southern boundary, a transmission line easement in the east, Mallow Way residences and Cambridge Road in the north, and Cumberland Road residences in the west (Figure 2). The Reserve is located less than 1 km from areas of remnant vegetation in Hartfield Park and is approximately 8.8 ha in size.

The Reserve is generally in a degraded state, having been subject to considerable disturbance in the form of trail bike use and rubbish dumping over an extended period of time.

1.2 Desktop review

Prior to visiting the site, searches were undertaken of the following databases to establish whether any conservation significant flora or fauna species could potentially occur in the Reserve:

- Naturemap (DEC 2012a) (search area encompassed a 5 km radius of an approximately central point of the Reserve)
- Environment Protection and Biodiversity Conservation Act (EPBC Act) Protected Matters Search Tool (SEWPaC 2012a) (search area encompassed the Reserve and a 1 km buffer along all boundaries).

This information was then used to inform the site investigation.

1.3 Site investigation

A general inspection of the Reserve was undertaken on 15 May 2012. During this investigation notes were taken on the following issues:

- broad site description including assessment of disturbance history
- broad description of vegetation (including dominant species observed in each area, level of weed infestation, and whether vegetation is remnant, revegetated or non-native)
- vegetation condition (rated according to the scale of Keighery [1994])
- location of any trees/stands of trees that potentially form Carnaby's black-cockatoo foraging/breeding habitat
- location of any potential graceful sun-moth habitat (*Lomandra hermaphrodita*) encountered opportunistically during the site visit
- location of any other items considered to be potential environmental constraints or opportunities.

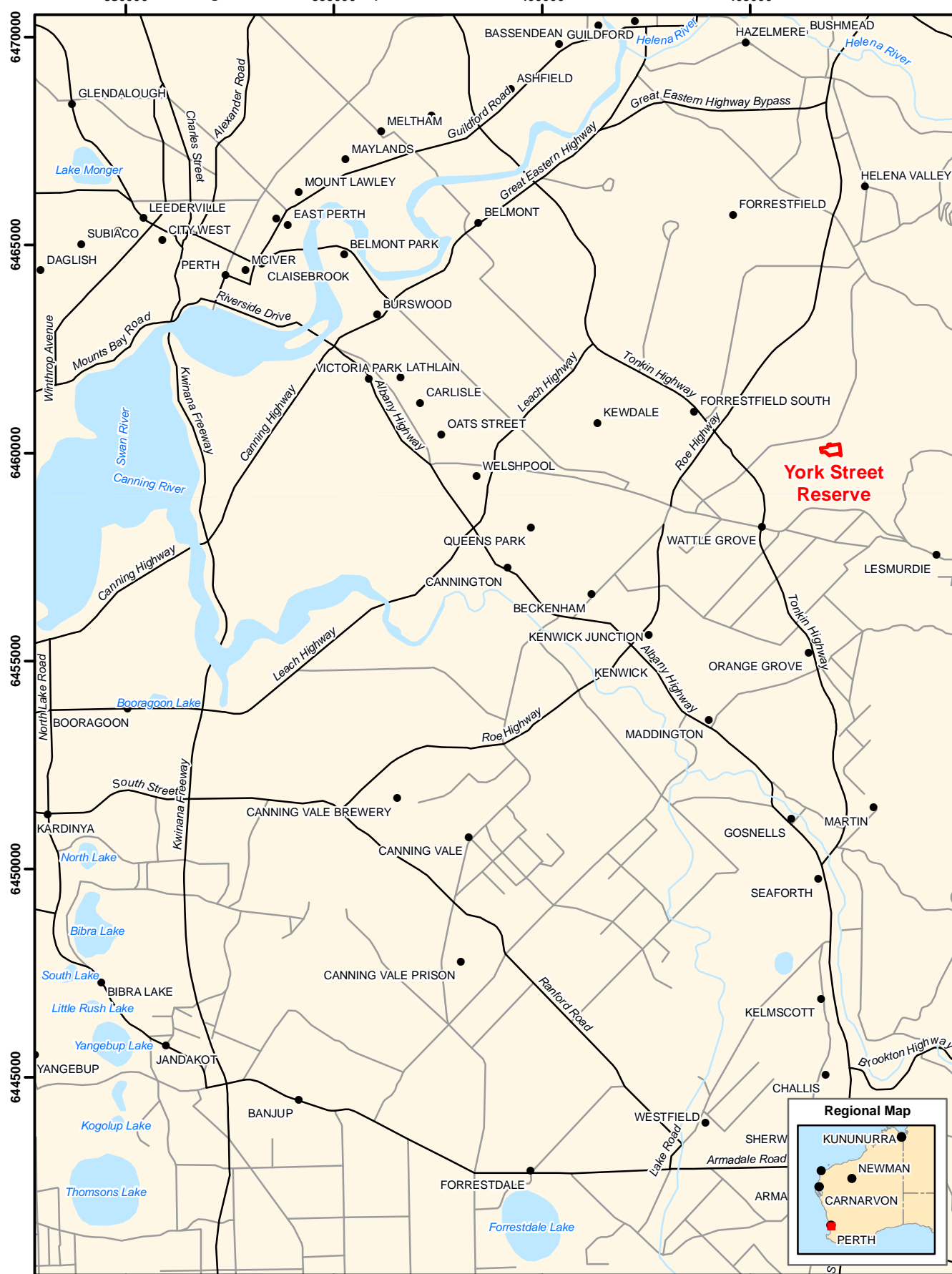


Figure 1 Regional location



STRATEGEN

info@strategen.com.au
www.strategen.com.au

Coordinate System: GDA 1994 MGA Zone 50
Date: 17/05/2012

Author: JCrute

K:\NPS\consult\2012\SKA\SKA12118.01\ArcMap_documents\R001\RevA\SKA12118_01_R001_RevA_F001.mxd

Source: Geoscience Australia 2006

Note that positional errors may occur in some areas

1:130,000
at A4

Legend







- Legend
-  York Street Reserve
 -  Town
 -  Major road
 -  Minor road
 -  Major river
 -  Lake



Figure 2 Project area

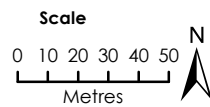
Legend

- High voltage power line
- York Street Reserve
- Sump

Cadastral boundaries



info@strategen.com.au
City of Kalamunda



Scale: 1:2,500 at A4

Coordinate System: GDA 1994 MGA Zone 50

Date: 17/05/2012

Author: jcrute

Path: Q:\GIS\Consult\2012\SKA\SKA12118.01\ArcMap_documents\R001\RevA\SKA12118_01_R001_RevA_F002.mxd

Source Aerial: Client 2012. Cadastre: SLIP Database, Landgate 2012.
Note that positional errors may occur in some areas

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Preliminary Opportunities and Constraints Report

2. Results and discussion

For the purpose of describing environmental constraints, the Reserve has been divided into eight zones, as illustrated in Figure 3. An overview is provided in the following section, with a detailed description of each individual zone provided in Appendix 2.

2.1 Disturbance history

The Reserve appears to have an extensive history of disturbance. A large portion (Zone 2) has been cleared of native vegetation altogether and revegetated with non-local eucalypt species. Weed species occur throughout the reserve, with heavier infestations in areas where historical clearing has been undertaken, or modifications such as artificial drainage channels have been constructed. It is noted that Zone 1 (Cambridge Road Reserve) is planted with lawn grasses and playground equipment is installed.

Household rubbish has been dumped throughout the Reserve, reducing the amenity of the area. In addition vehicle tracks throughout the Reserve suggest the area is highly utilised by trail bikers for recreational purposes.

No Aboriginal or Non-Aboriginal heritage sites have been identified within the Reserve.

2.2 Topography and soils

The topography of the site is generally undulating, with a local low point present in the form of a sump to the south-west of the site (Figure 2). Surface soils range from yellow-orange clayey sand to white-grey sand. In some areas, laterite gravel varying in size is present on the surface, generally consistent with the location of the drainage channels to the sump.

2.3 Surface water

Aerial photography of the Reserve has been analysed against GIS data for geomorphic wetlands as listed by the DEC as well as lakes listed under the *Environmental Protection Swan Coastal Plain Lakes Policy 1992*. No wetlands/lakes have been recorded within or near the Reserve.

It is noted the site contains a large sump, which receives drainage from the surrounding area. The sump is what is referred to as a trap low point, in that there is no drain or creek by which the water can leave the sump. The sump receives drainage from the surrounding urban areas. Following large rainfall events or wet winters, the sump will fill up and expand in area, possibly entering Zones 1 and 3. The water levels in the sump may be driven by runoff, or local groundwater, or a mixture of both.

Surface water was present in the sump on the day of inspection. It is unclear if this water was due to recent rainfall and associated run off or was an expression of the local groundwater table. The base of the sump appeared to be clay.

The maximum water level and extent of the sump will limit the area of the reserve that can be developed. In wet years and, following large rainfall events, the water may also extend into Zones 1 and 3. Hydrological modelling of runoff and groundwater is required to determine the maximum extent of the sump. This work should be undertaken early in the planning process to determine the total area of the site that can be developed.

There may be options to reduce the area impacted by the sump through the provision of a drainage outlet to the sump. Any such option would need to be proved from an engineering viewpoint and be approved by the Water Corporation and Department of Water prior to construction.



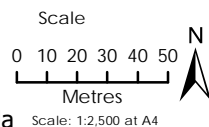
Figure 3 Assessment zones

Legend

- York Street Reserve
- Environmental constraints zone
- Zone 1
- Zone 2

- Zone 3
- Zone 4
- Zone 5

- Zone 6
- Zone 7
- Zone 8



Coordinate System: GDA 1994 MGA Zone 50

Date: 25/05/2012

Author: jcrute

Path: Q:\GIS\Consult\2012\SKA\SKA12118.01\ArcMap_documents\R001\RevA\SKA12118.01_R001_RevA_F003.mxd

Source Aerial: Client 2012.

Note that positional errors may occur in some areas

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Preliminary Opportunities and Constraints Report

2.4 Flora and vegetation

2.4.1 Results

Table 1 provides a summary of the conservation significant flora identified as potentially occurring in the Reserve through the database searches only. Descriptions of each conservation code are available in Appendix 11.

Table 1 Conservation significant species potentially occurring in York Street Reserve

Species	Common name	Conservation status	
		WC Act/DEC listing	EPBC Act listing
<i>Acacia oncinophylla</i> subsp. <i>patulifolia</i>		P3	
<i>Andersonia gracilis</i>	Slender andersonia		Endangered
<i>Banksia mimica</i>	Summer honeypot		Endangered
<i>Boronia tenuis</i>	Blue boronia	P4	
<i>Byblis gigantea</i>	Rainbow plant	P3	
<i>Calytrix breviseta</i> subsp. <i>breviseta</i>	Swamp starflower		Endangered
<i>Centrolepis caespitosa</i>			Endangered
<i>Chamelaucium</i> sp. Gingin (N.G.Marchant 6)	Gingin wax		Endangered
<i>Conospermum undulatum</i>	Wavy-leaved smokebush	T	Vulnerable
<i>Darwinia foetida</i>	Muchea bell		Critically Endangered
<i>Eucalyptus balanites</i>	Cadda road mallee, cadda mallee		Endangered
<i>Grevillea curviloba</i> subsp. <i>incurva</i>	Narrow curved-leaf grevillea		Endangered
<i>Haemodorum loratum</i>		P3	
<i>Isopogon drummondii</i>		P3	
<i>Lasiopetalum bracteatum</i>	Helena velvet bush	P4	
<i>Lepidosperma rostratum</i>	Beaked lepidosperma		Endangered
<i>Macarthuria keigheryi</i>	Keighery's macarthuria		Endangered
<i>Pithocarpa corymbulosa</i>	Corymbose pithocarpa	P3	
<i>Senecio leucoglossus</i>		P4	
<i>Synaphea</i> sp. Fairbridge Farm (D.Papenfus 696)	Selena's synaphea		Critically Endangered
<i>Thelymitra magnifica</i>		P1	
<i>Thelymitra dedmaniarum</i> (formerly <i>T. manginii</i> K.Dixon & Batty ms)			Endangered
<i>Thelymitra stellata</i>	Star sun-orchid	T	Endangered
<i>Verticordia fimbrialepis</i> subsp. <i>fimbrialepis</i>	Shy featherflower		Endangered
<i>Villarsia calthifolia</i>	Mountain villarsia		Endangered

Source: DEC 2012a, SEWPaC 2012a

An assessment of the likelihood of each of these species actually occurring in the Reserve is provided in Table 2.

Likelihood of occurrence has been determined based on information available in the following resources:

- *Species Profile and Threats Database* (SEWPaC 2012b)
- *Florabase* (DEC 2012b)

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Preliminary Opportunities and Constraints Report

- Conservation Advice and Recovery Plans for EPBC Act listed species
- flora and fauna survey reports from Hartfield Park (Strategen 2011a and 2011b).

Where limited information was available in the above resources or it is difficult to determine due to the time of year, likelihood has been listed as “possible” if preferred habitat/soil type corresponds to that present at the Reserve. It is recommended that a spring flora survey be undertaken to confirm presence or absence of these species.

It should be noted that species identifications were made in the field based on staff members’ experience in the area, and no formal identifications were made. Further, comments regarding non-local eucalypt species pertain to a number of white and grey-stemmed eucalypts observed around the Reserve.

Identifying eucalypts involves analysis of a number of characteristics including fruit and flowers; as such, it is difficult to accurately identify eucalypt species informally, particularly where they are potentially non-local species. In this case, it is considered that where large stands of white stemmed eucalypts occur in the Reserve, they are likely to be non-local species, as eucalypts with this characteristic are relatively uncommon on the Swan Coastal Plain.

A search of the Western Australian Herbarium/DEC database has been commissioned in order to gain further certainty regarding any specific instances of Threatened or Priority Flora known within or near the Reserve.

2.4.2 Discussion

A large portion of the Reserve vegetation has been disturbed by historical clearing.

Two areas (Zones 5 and 7) contain relatively undisturbed, good quality vegetation. Despite their proximity to one another, these two areas contain distinct vegetation types, with Zone 5 being a heath of *Hakea trifurcata* over sedges and Zone 7 being a woodland of *Eucalyptus marginata* and *Corymbia calophylla* (jarrah-marri woodland) over mixed herbs and shrubs.

Zone 3 also contains remnant vegetation in reasonable condition, with a relatively diverse understorey.

Elsewhere, vegetation is limited to a mixture of native and non-native trees over a heavily disturbed understorey.

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Preliminary Opportunities and Constraints Report

Table 2 Likelihood of occurrence of flora species identified by database searches

Species	Likelihood of occurrence	Comments
<i>Acacia oncinophylla</i> subsp. <i>patulifolia</i>	Possible*	Known to occur on granitic soils, occasionally laterite (DEC 2012b).
<i>Andersonia gracilis</i>	Unlikely: no known populations near Reserve; lack of preferred habitat	Known to occur on white/grey sand, sandy clay, gravelly loam, winter-wet areas, near swamps (DEC 2012b). Currently known from the Badgingarra, Dandaragan and Kenwick areas where it is found on seasonally damp, black sandy clay flats near or on the margins of swamps, often on duplex soils supporting low open heath vegetation with species such as <i>Calothamnus hirsutus</i> , <i>Verticordia densiflora</i> and <i>Kunzea recurva</i> over sedges (Stack <i>et al.</i> 2008).
<i>Banksia mimica</i>	Possible*: recorded from the locality	Known to occur on white or grey sand over laterite, sandy loam (DEC 2012b). Recorded at a number of locations in nearby Hartfield Park (Strategen 2011a).
<i>Boronia tenuis</i>	Possible*	Known to occur on laterite, stony soils, granite (DEC 2012b).
<i>Byblis gigantea</i>	Unlikely: preferred habitat absent from the Reserve	Known to occur on sandy-peat swamps, seasonally wet areas (DEC 2012b).
<i>Calytrix breviseta</i> subsp. <i>breviseta</i>	Unlikely: only known populations situated in Kenwick, approximately 5 km from the Reserve	Known to occur on low lying, sandy clay flats, swampy flats (DEC 2012b, Luu & English 2004) among low heath of <i>Verticordia acerosa</i> , <i>Verticordia plumosa</i> , <i>Calothamnus hirsutus</i> and <i>Melaleuca uncinata</i> , over very open low sedges (Luu & English 2004). As at 2004, the taxon was thought to be confined to the Kenwick area (Luu & English 2004).
<i>Centrolepis caespitosa</i>	Unlikely: preferred habitat absent; no known populations in the vicinity of the Reserve	Populations of <i>C. caespitosa</i> have been recorded in swampy loam in low-lying winter depressions that are occasionally inundated with fresh water, amongst vegetation dominated by sedges and low shrubs (Gilfillan and Barrett 2004a). Eight known populations of <i>C. caespitosa</i> occur in the south-west of Western Australia, at the following locations: <ul style="list-style-type: none"> • South Stirling • Meelon Nature Reserve (Pemberton district) • east of Meckering • Pearce (Pemberton district) • Pinjarra • South Coast Highway (Albany district) • east of Busselton (Gilfillan & Barrett 2004a).
<i>Chamelaucium</i> sp. Gingin (N.G.Marchant 6)	Unlikely: no known populations in the vicinity of the Reserve	As at 2003, considered to be confined to a 3 km range in the Gingin/Chittering area (Stack & English 2003).
<i>Conospermum undulatum</i>	Possible*: recorded from the locality, similar soil type present at the Reserve	Known to occur on grey or yellow-orange clayey sand (DEC 2012b), often over laterite on flat or gently sloping sites between the Swan and Canning Rivers. A few records are from slightly swampy habitat (DEC 2009a). A number of records are known from the nearby Hartfield Park (Strategen 2011a).
<i>Darwinia foetida</i>	Unlikely: no known populations in the vicinity of the Reserve	Known to occur on grey-white sand on swampy, seasonally wet sites, alongside areas where water collects. The species' range is very restricted, occurring in a small area near the town of Muchea, approximately 70 km north of Perth (TSSC 2009).

SKA12118_01 R001 Rev A0

28-May-12

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Preliminary Opportunities and Constraints Report

Species	Likelihood of occurrence	Comments
<i>Eucalyptus balanites</i>	Unlikely: no known populations in the vicinity of the Reserve; preferred habitat absent	Known from two populations in Badgingarra and Armadale (Patten <i>et al.</i> 2004), occurring on sandy soils with lateritic gravel (DEC 2012b). Habitat consists of gently sloping heathlands; open mallee woodland over shrubland or heathland with emergent mallees (Patten <i>et al.</i> 2004).
<i>Grevillea curviloba</i> subsp. <i>incurva</i>	Unlikely: no known populations in the vicinity of the Reserve	Known to occur on sand, sandy loam, in heath in winter-wet areas, on sand over limestone, or over ironstone at sites with a high water table, confined to an area between Muchea and Badgingarra (Phillimore & English 2000).
<i>Haemodorum loratum</i>	Possible*	Grey or yellow sand, gravel (DEC 2012b).
<i>Isopogon drummondii</i>	Possible*	White, grey or yellow sand, often over laterite (DEC 2012b).
<i>Lasiopetalum bracteatum</i>	Possible*	Sandy clay, clay, lateritic gravel, along drainage lines, creeks, gullies, granite outcrops (DEC 2012b).
<i>Lepidosperma rostratum</i>	Unlikely: preferred habitat absent from the Reserve	Known from four populations, associated with marsh banksia (<i>Banksia telmatiaea</i>) and hairy clawflower (<i>Calothamnus hirsutus</i>), in sandy soil among low heath in winter-wet swamps (TSSC 2008a).
<i>Macarthuria keigheryi</i>	Possible*	Currently known from six populations of which two are in metropolitan Perth (Welshpool and Kewdale), where it occurs in low-lying winter-wet damp, grey/white sands and grows in open patches with low tree canopy cover among heathland, jarrah (<i>Eucalyptus marginata</i>) and <i>Allocasuarina</i> /banksia woodland (DEC 2009b).
<i>Pithocarpa corymbulosa</i>	Possible*	Known to occur on gravelly or sandy loam and amongst granite outcrops (DEC 2012b).
<i>Senecio leucoglossus</i>	Possible*	Known to occur on gravelly lateritic or granitic soils and granite outcrops or slopes (DEC 2012b).
<i>Synaphea</i> sp. Fairbridge Farm (D.Papenfus 696)	Unlikely: no known populations in the vicinity of the Reserve	Known to occur on grey, clayey sand with lateritic pebbles and near winter-wet flats, in low woodland with weedy grasses (DEC 2012b, DEC 2007). Restricted to a range of approximately 870 km ² in the Shires of Murray, Serpentine-Jarrahdale and Dardanup (DEC 2007).
<i>Thelymitra magnifica</i>	Unlikely: preferred habitat absent from the Reserve	Known to occur on stony ridges (DEC 2012b).
<i>Thelymitra dedmaniarum</i> (formerly <i>T. manginii</i> K.Dixon & Batty ms)	Unlikely: no known populations in the vicinity of the Reserve; preferred habitat absent	Known from two populations northeast of Perth, confined to open wandoo woodland on red/brown sandy loam associated with dolerite and granite outcropping, with <i>Eucalyptus wandoo</i> , <i>E. accedens</i> and <i>Corymbia calophylla</i> , over low scrub of <i>Acacia pulchella</i> , <i>A. saligna</i> , <i>Calothamnus quadrifidus</i> , <i>Melaleuca radula</i> and <i>Hakea lissocarpha</i> (Phillimore <i>et al.</i> 1999)
<i>Thelymitra stellata</i>	Possible*	Known to occur on gravelly loam among low heath and scrub in <i>Eucalyptus marginata</i> and <i>E. wandoo</i> woodland, and in low heath on lateritic hill tops (TSSC 2008b).
<i>Verticordia fimbrilepis</i> subsp. <i>fimbrilepis</i>	Unlikely: no known populations in the vicinity of the Reserve; preferred habitat absent	Distributed from southeast of Armadale to Brookton and Kojonup, occurring on low-lying shallow grey sand and yellowish-white sandy loam over gravel, sometimes with clay, in heath and shrubland and open wandoo woodland (DEC 2010a).
<i>Villarsia calthifolia</i>	Unlikely: no known populations in the vicinity of the Reserve	Restricted to Porongorup Range (Gilfillan & Barrett 2004b).

*Where likelihood of occurrence is listed as possible it is recommended that a spring flora survey be undertaken to confirm presence or absence of these species.

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Preliminary Opportunities and Constraints Report

2.5 Fauna

2.5.1 Results

Table 3 provides a summary of the conservation significant fauna identified as potentially occurring in the Reserve through the database searches only. Descriptions of each conservation code are available in Appendix 11.

Table 3 Conservation significant species potentially occurring in York Street Reserve

Species	Common name	Conservation status	
		WC Act/DEC listing	EPBC Act listing
<i>Dasyurus geoffroii</i>	Chuditch	T	
<i>Isoodon obesulus</i> subsp. <i>fusciventer</i>	Quenda	P5	
<i>Macropus irma</i>	Western brush wallaby	P4	
<i>Morelia spilota</i> subsp. <i>imbricata</i>	Carpet python	S	
<i>Neelaps calonotos</i>	Black-striped snake	P3	
<i>Calyptorhynchus banksii naso</i>	Forest Red-tailed Black-cockatoo		Vulnerable
<i>Calyptorhynchus baudinii</i>	Baudin's black-cockatoo, long-billed black-cockatoo		Endangered
<i>Calyptorhynchus latirostris</i>	Carnaby's black-cockatoo, short-billed black-cockatoo		
<i>Leipoa ocellata</i>	Malleefowl		Vulnerable, migratory
<i>Rostratula australis</i>	Australian painted snipe		Vulnerable
<i>Dasyurus geoffroii</i>	Chuditch, western quoll		Vulnerable
<i>Phascogale calura</i>	Red-tailed phascogale		Endangered
<i>Setonix brachyurus</i>	Quokka		Vulnerable
Migratory birds			
<i>Apus pacificus</i>	Fork-tailed swift		
<i>Ardea alba</i>	Great egret, white egret		
<i>Ardea ibis</i>	Cattle egret		
<i>Haliaeetus leucogaster</i>	White-bellied sea-eagle		
<i>Merops ornatus</i>	Rainbow bee-eater		
<i>Rostratula benghalensis</i> (sensu lato)	Painted snipe		Vulnerable

Source: DEC 2012a, SEWPaC 2012a

An assessment of the likelihood of occurrence of each species is presented in Table 4.

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Preliminary Opportunities and Constraints Report

Table 4 Likelihood of occurrence of fauna species identified by database searches

Species	Likelihood of occurrence	Comments
<i>Isoodon obesulus</i> subsp. <i>fusciventer</i> (quenda)	Likely: suitable habitat; known to persist in urban areas; recorded in Hartfield Park	Preferred habitat is dense scrubby, often swampy, vegetation with cover up to one metre high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Associated with wetlands on the Swan Coastal Plain, known to occur in disturbed areas around human settlements (SEWPaC 2012b). Evidence of this species was recorded in nearby Hartfield Park (Strategen 2011b).
<i>Macropus irma</i> (western brush wallaby)	Unlikely: sensitive to urban disturbance	Preferred habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland (DEC 2010b). Considered unlikely to occur in nearby Hartfield Park which contains a larger area of good quality remnant vegetation, due to tendency of the species to move away from urbanised areas (Strategen 2011b).
<i>Morelia spilota</i> subsp. <i>imbricata</i> (carpet python)	Unlikely: sensitive to urban disturbance	Considered as possibly occurring in long undisturbed vegetation in nearby Hartfield Park. Few records on the Swan Coastal Plain; only likely to persist in areas undisturbed for long periods (Strategen 2011b).
<i>Neelaps calonotos</i> (black-striped snake)	Unlikely: sensitive to urban disturbance	Considered as possibly occurring in long undisturbed vegetation in nearby Hartfield Park. Tends to move out of urbanised areas (Strategen 2011b).
<i>Calyptorhynchus banksii naso</i> (forest red-tailed black-cockatoo)	Likely: observed in Hartfield Park	Foraging habitat is <i>Eucalyptus marginata</i> , <i>Allocasuarina fraseriana</i> , <i>Corymbia calophylla</i> , all present in the Reserve..
<i>Calyptorhynchus baudinii</i> (Baudin's black-cockatoo, long-billed black-cockatoo)	Possible: potential habitat present in Hartfield Park	Generally restricted to forests in the south-west, the Reserve falls within the range of the species. Considered to possibly occur in nearby Hartfield Park given its distribution and preferred foraging habitat (Strategen 2011).
<i>Calyptorhynchus latirostris</i> (Carnaby's black-cockatoo, short-billed black cockatoo)	Likely: observed in Hartfield Park	Observed in nearby Hartfield Park (Strategen 2011).
<i>Leipoa ocellata</i> (malleefowl)	Unlikely: known distribution does not coincide with the Reserve; preferred habitat absent	Known from semi-arid and arid zones of temperate Australia, in shrublands and low woodlands dominated by mallee vegetation, eucalypt or <i>Callitris</i> woodlands, acacia shrublands, <i>Melaleuca uncinata</i> vegetation or coastal heathlands (SEWPaC 2012b).
<i>Rostratula australis</i> (Australian painted snipe)	Unlikely: preferred habitat absent from the Reserve	Generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands. The species has also been observed using natural or artificial water bodies and areas of inundated or waterlogged grasslands (SEWPaC 2012).
<i>Dasyurus geoffroii</i> (chuditch, western quoll)	Possible: recorded in Hartfield Park	Generally restricted to wet and dry sclerophyll forest and remnant mallee in the south-west, though evidence of species recorded from nearby Hartfield Park (Strategen 2011b).
<i>Phascogale calura</i> (red-tailed phascogale)	Unlikely: preferred habitat absent at the Reserve	Habitat is <i>Allocasuarina</i> woodlands with hollow-containing eucalypts (e.g. <i>Eucalyptus wandoo</i>) and <i>Gastrolobium</i> spp. (SEWPaC 2012b).

DRAFT

Preliminary Opportunities and Constraints Report

Species	Likelihood of occurrence	Comments
<i>Setonix brachyurus</i> (quokka)	Unlikely: preferred habitat absent and known mainland distribution unlikely to include the Reserve	Habitat is recently burnt stands of native vegetation, particularly dense riparian vegetation; mainland populations scarce with patchy distribution due to high levels of habitat fragmentation and feral animal competition (SEWPAC 2012b).
Migratory birds		
<i>Apus pacificus</i> (fork-tailed swift)	Possible	Almost exclusively aerial (SEWPAC), may forage over the Reserve.
<i>Ardea alba</i> (great egret, white egret)	Possible	Habitat comprises a wide range of wetland habitats including artificial water bodies (SEWPAC 2012b).
<i>Ardea ibis</i> (cattle egret)	Possible	Habitat comprises a wide range of wetland habitats including artificial water bodies (SEWPAC 2012b).
<i>Haliaeetus leucogaster</i> (white-bellied sea eagle)	Possible	Generally recorded near open water but has been observed in terrestrial areas including woodland and urban areas (SEWPAC 2012b).
<i>Merops ornatus</i> (rainbow bee-eater)	Possible	Occurs in coastal dune systems amongst open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water. Regularly recorded in disturbed areas including urban and industrial areas (SEWPAC 2012b).
<i>Rostratula benghalensis</i> (sensu lato) (painted snipe)	Possible	Habitat comprises a wide range of wetland habitats including artificial water bodies (SEWPAC 2012b).

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Preliminary Opportunities and Constraints Report

2.5.2 Discussion

Fauna and fauna habitat

Zones 5 and 7 are relatively undisturbed; as such they may act as habitat islands for some fauna species. The Reserve is also likely to provide habitat for fauna species that are less sensitive to human activity, such as the quenda and a range of bird species. Common bird species such as the Australian magpie (*Gymnorhina tibicen dorsalis*), magpie-lark (*Grallina cyanoleuca*) and common bronzewing (*Phaps chalcoptera*) were observed throughout the Reserve during the site visit.

The Reserve is connected by its eastern boundary to a partially vegetated strip of land (transmission line easement) that terminates at Hartfield Road. This area may provide some connectivity for fauna movement between the Reserve, Hartfield Park and the heavily vegetated properties along Lewis Road. The Reserve is also less than 1 km from vegetated areas (including private properties) along the base of the scarp to the east.

Graceful Sun-moth

The Graceful Sun-moth (*Synemon gratiosa*) is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and often presents an environmental constraint to development on the Swan Coastal Plain. The species can occur in areas of coastal heath, on host plant *Lomandra maritima*, or in banksia woodland, using *Lomandra hermaphrodita*.

In relation to the York Street Reserve, the EPBC Protected Matters database does not identify the Graceful Sun-moth as potentially occurring in the Reserve. Corresponding with this result, banksia woodland was not observed at the Reserve nor *Lomandra hermaphrodita*. However, although *Lomandra* was not observed opportunistically during the site visit, it cannot be completely ruled out as being present, particularly in the more intact vegetation of Zones 5 and 7. Further targeted surveys could provide specific confirmation of the presence/absence of this species.

Carnaby's Black-cockatoo

Carnaby's Black cockatoo (*Calyptorhynchus latirostris*) is also listed as an Endangered threatened species under the EPBC Act and is therefore a matter of national environmental significance (NES). If a proposed development or other action is likely to have a significant impact upon a NES it must be referred for assessment under the EPBC Act.

The preliminary site assessment has identified a number of large trees in Zones 1, 3, 6, 7 and 8 which may be suitable foraging habitat for the Carnaby's black-cockatoo and/or forest red-tailed black cockatoo.

The EPBC Draft Referral Guidelines for Carnaby's cockatoo and Forest red-tailed black cockatoo (SEWPaC 2011) recommend a project be referred as 'high risk of significant impacts' if it involves clearing of more than 1 ha of quality foraging habitat. Depending on how the land is developed, it is likely that the development will involve clearing of less than 1 ha of foraging habitat; however a more detailed assessment will be required once a concept plan has been developed for the site.

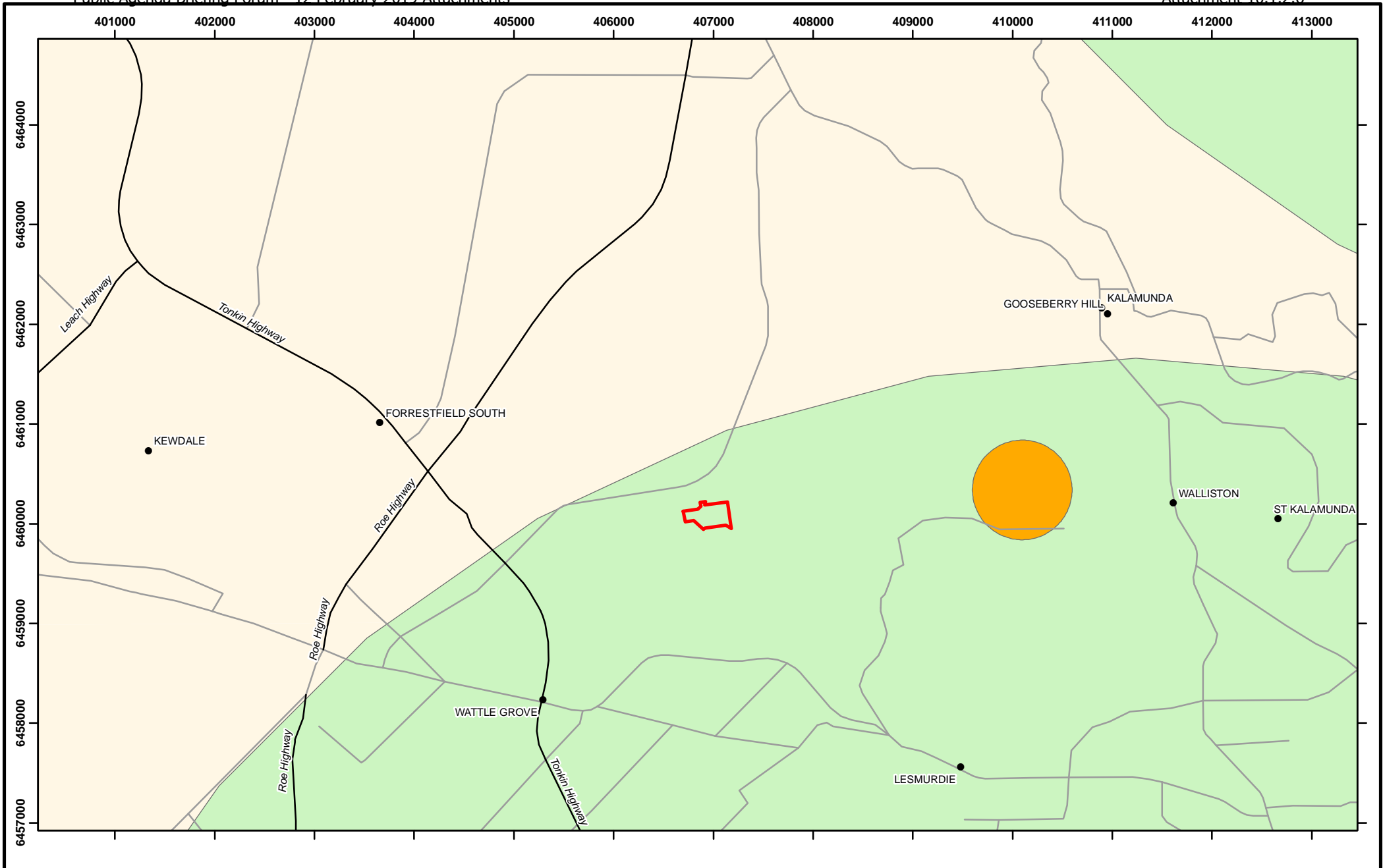


Figure 4

Locations of known Carnaby's black-cockatoo habitat areas

Coordinate System: GDA 1994 MGA Zone 50
Date: 17/05/2012

Author: jcrute

Path: Q:\GIS\Consult\2012\SKA\SKA12118.01\ArcMap_documents\R001\RevA\SKA12118_01_R001_RevA_F004.mxd

Source: Geoscience Australia 2006, Carnaby's: DEC 2011
Note that positional errors may occur in some areas

Legend

- Town
- Major road
- Minor road



York Street Reserve



Carnaby's confirmed roost areas



Carnaby's confirmed breeding areas

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Preliminary Opportunities and Constraints Report

3. Conclusions and recommendations

Overall the main constraints to development identified through this assessment are as follows:

- the location of the existing sump and uncertainty regarding the maximum extent in times of heavy rainfall
- key areas of high-quality vegetation / fauna habitat located in Zones 5 and 7
- remnant vegetation in reasonable condition located in Zone 3
- potential foraging habitat for the EPBC listed Carnaby's black-cockatoo and/or Forest red-tailed cockatoo.

It is recommended that the following additional work be undertaken to more confirm the level of constraint these issues may pose to development of the site:

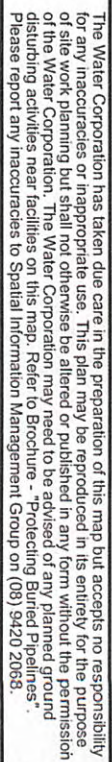
- a spring flora & fauna survey to clearly assess the areas of high-quality vegetation and fauna habitat
- detailed assessment of Carnaby's black-cockatoo and/or Forest red-tailed cockatoo once a concept plan has been determined for the site.

It is noted that some potentially some of these issues listed above, such as the location of high-quality vegetation in Zones 5 and 7, could actually be perceived as an opportunity to provide for an environmentally sensitive designed development if managed correctly.

APPENDIX D – DOW GROUNDWATER



APPENDIX E - EXISTING SEWER INFRASTRUCTURE

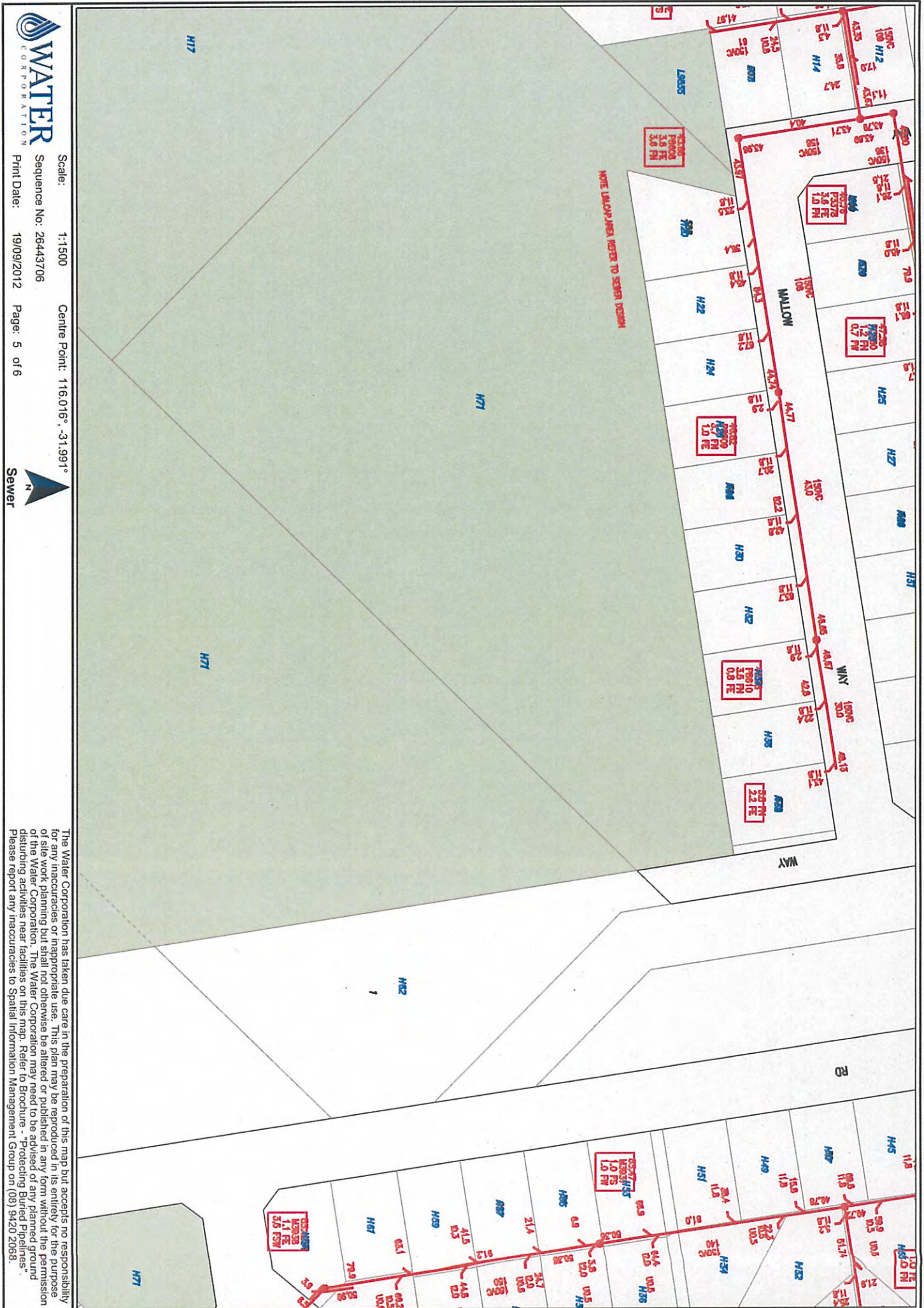


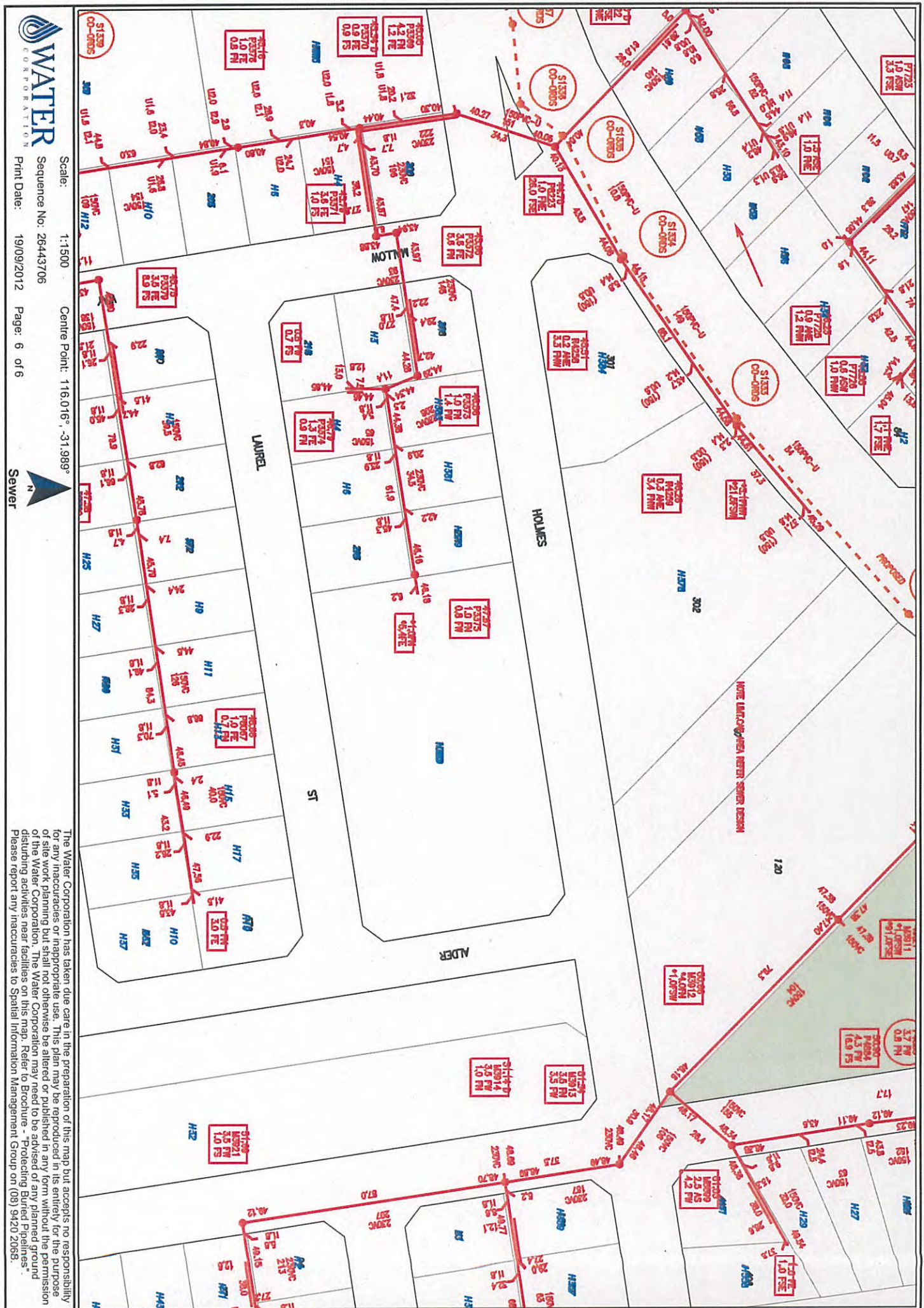
This is a detailed street map of a residential neighborhood. The map features a grid-like pattern of streets with several larger green areas representing parks or undeveloped land. The map is overlaid with a red grid that divides it into six rectangular sections, each labeled with a page number: Page 2 (top left), Page 3 (top middle), Page 4 (bottom left), Page 5 (center, covering a large green area), Page 6 (middle right), and Page 7 (bottom right). Numerous street names are visible, including SUSSEX RD, HANOVER ST, EDINBURGH ST, CUMBERLAND ST, ROTHESAY ST, CARLETON CR, YORK ST, COBURG ST, MAJOR HWY, LAUREL ST, ALDER ST, HOLMES ST, MALLOW WAY, ANDERSON RD, ANNA CT, ANNATO PL, PALM DR, CANTIA DR, ALMOND WAY, ALMOND WAY, APALIA WAY, COOLIDGE DR, MORRIS CT, HALE ST, and CASTLE CT. The map also shows smaller roads like ROTHESAY ST, CARLETON CR, and YORK ST.



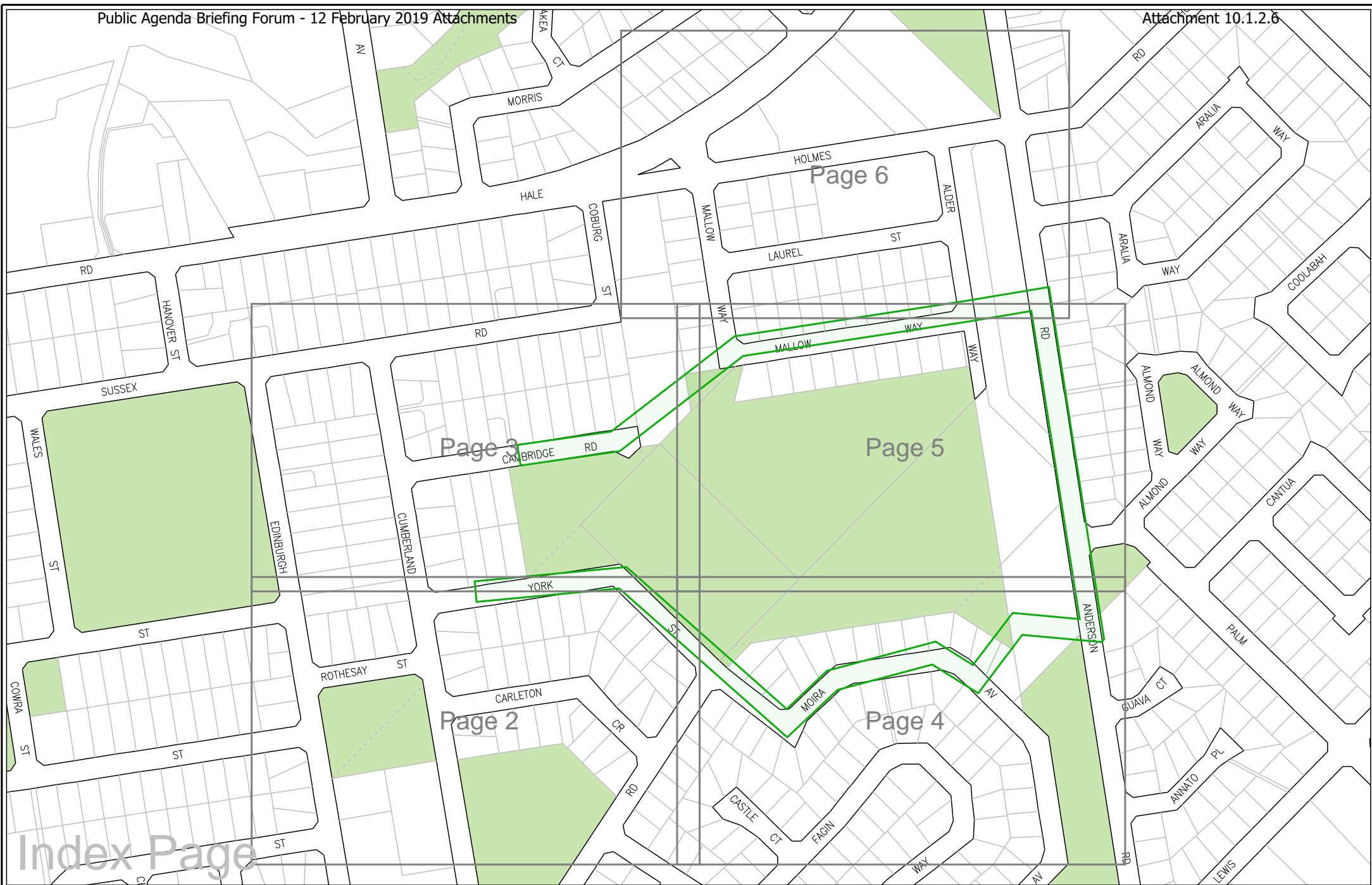


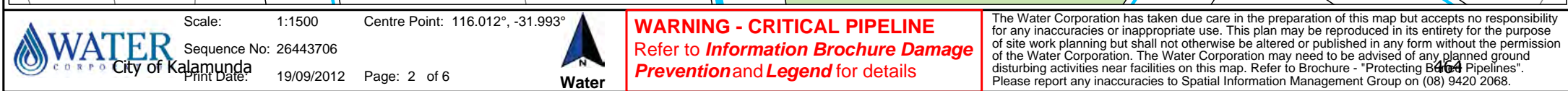




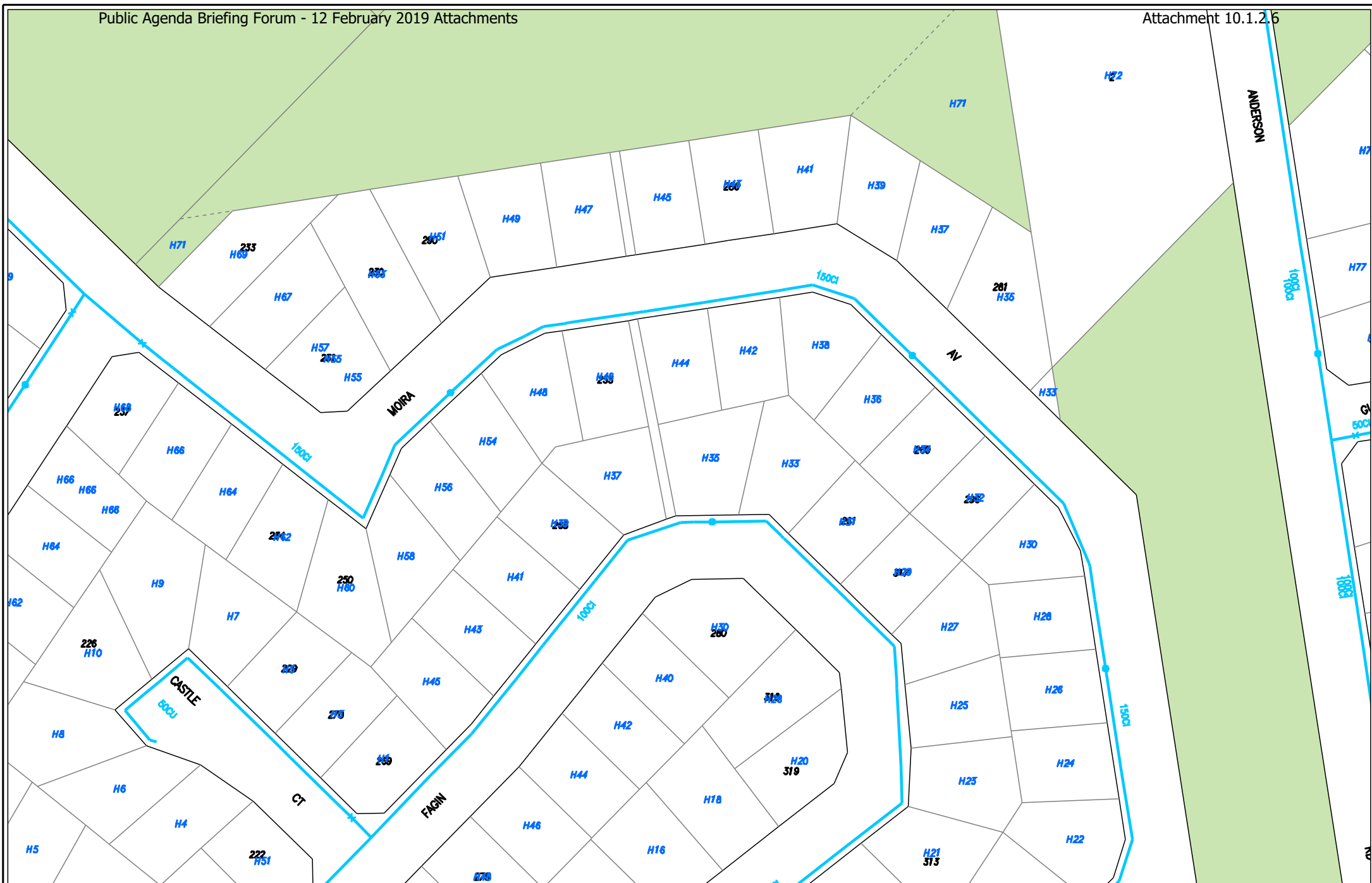


APPENDIX F - EXISTING WATER INFRASTRUCTURE









Scale: 1:1500

Centre Point: 116.016°, -31.993°

Sequence No: 26443706

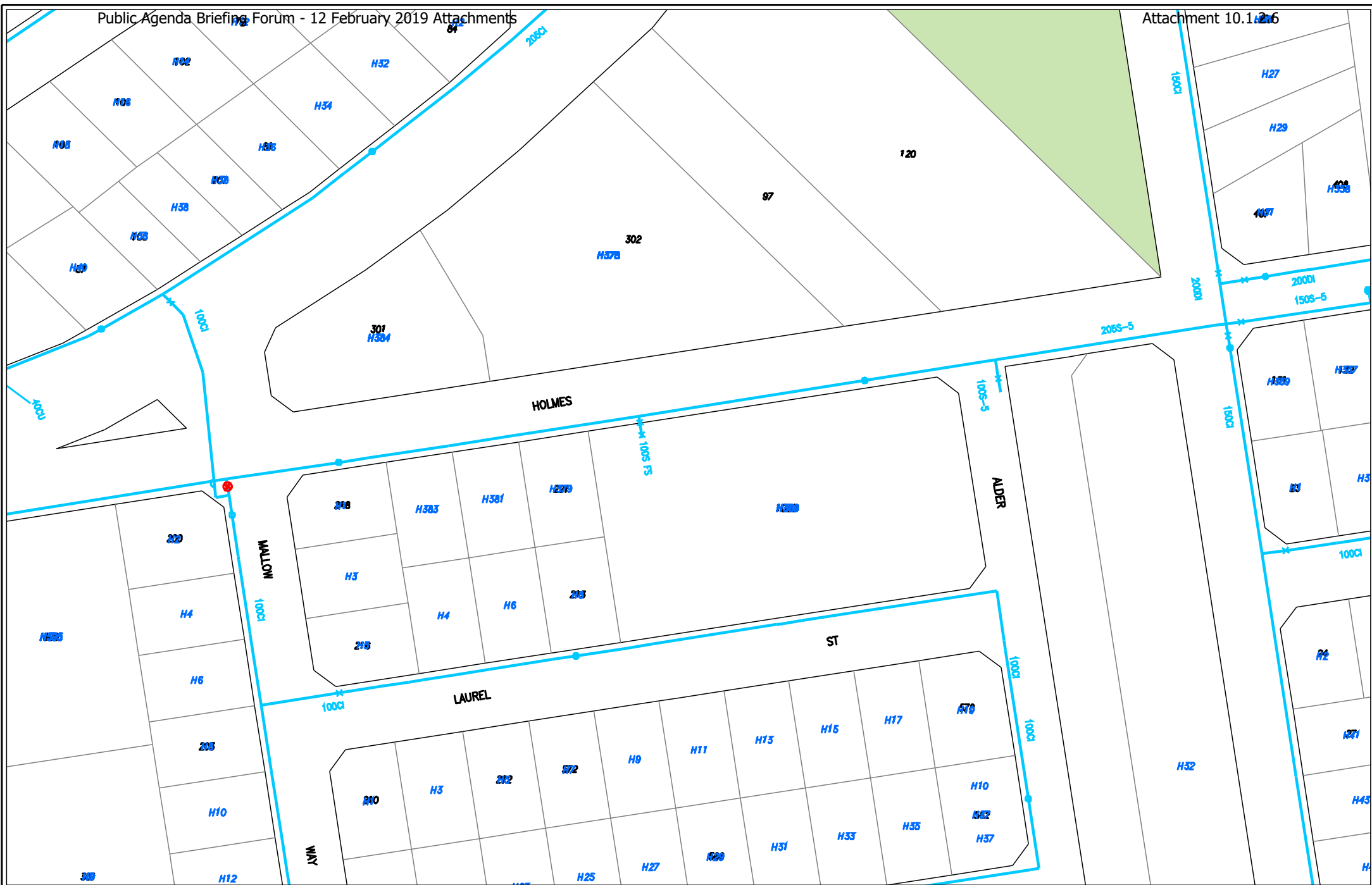
Print Date: 19/09/2012 Page: 4 of 6



WARNING - CRITICAL PIPELINE
 Refer to **Information Brochure Damage Prevention and Legend** for details

The Water Corporation has taken due care in the preparation of this map but accepts no responsibility for any inaccuracies or inappropriate use. This plan may be reproduced in its entirety for the purpose of site work planning but shall not otherwise be altered or published in any form without the permission of the Water Corporation. The Water Corporation may need to be advised of any planned ground disturbing activities near facilities on this map. Refer to Brochure - "Protecting B400 Pipelines". Please report any inaccuracies to Spatial Information Management Group on (08) 9420 2068.



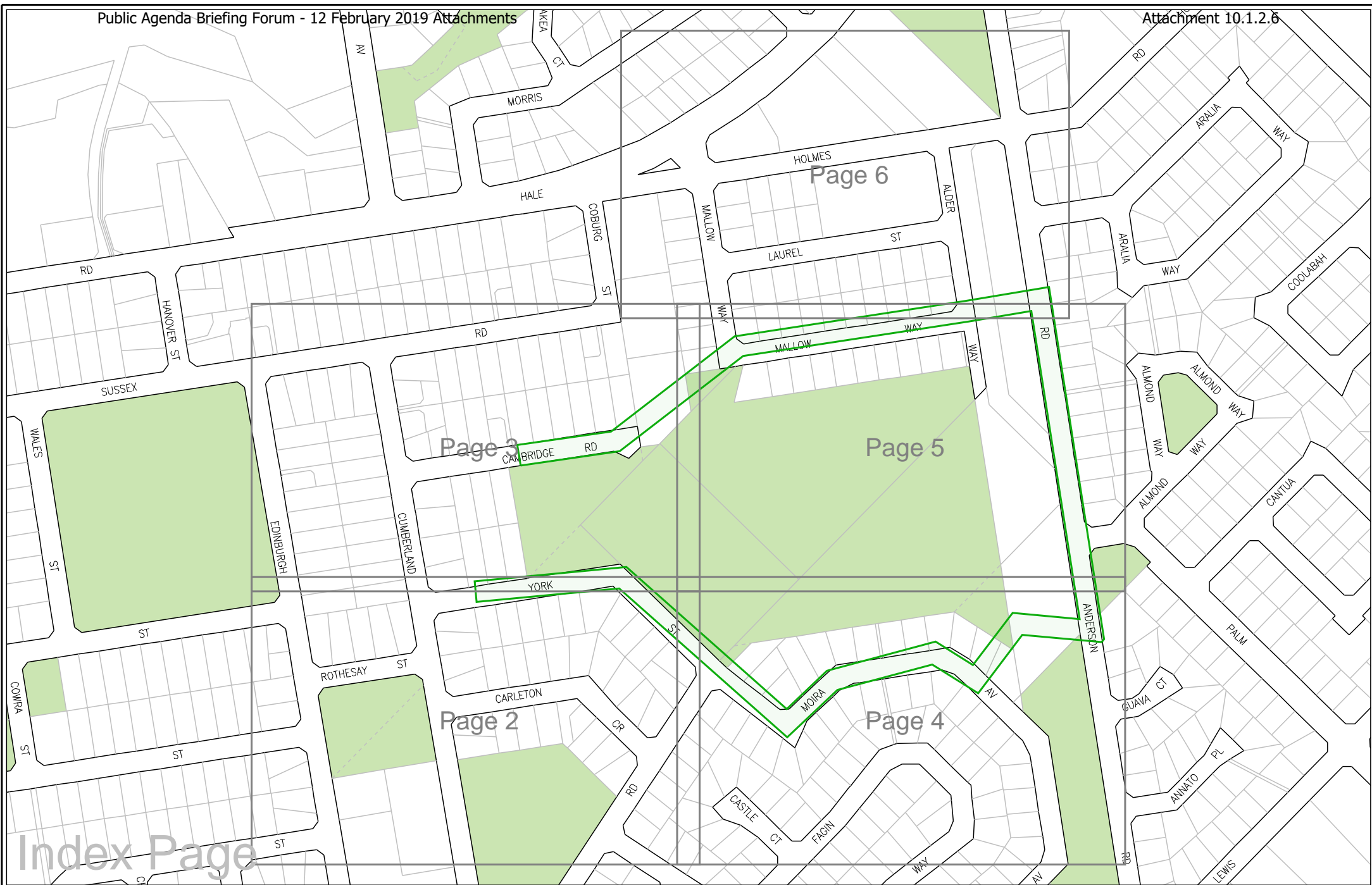


Scale: 1:1500

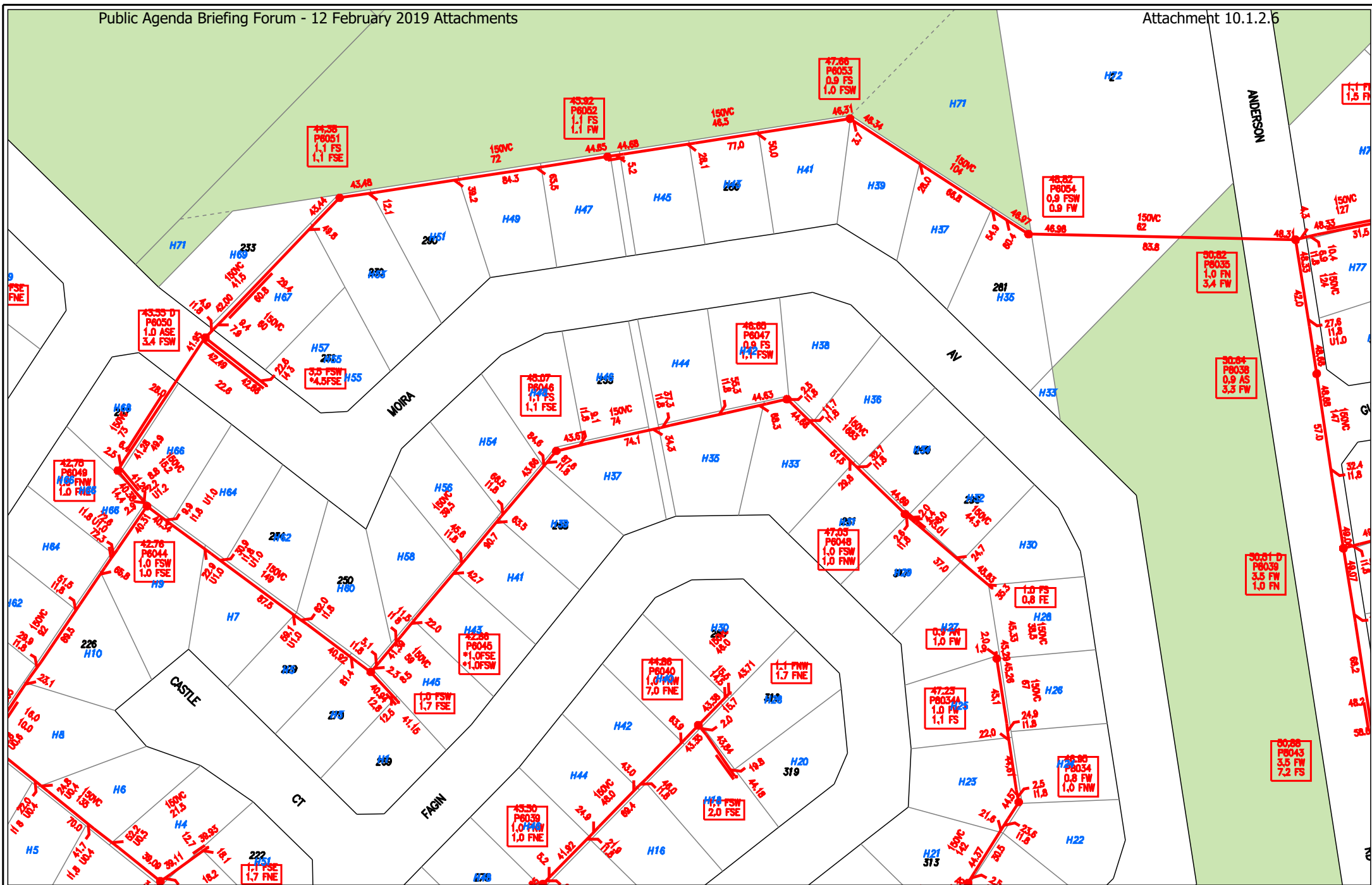
Centre Point: 116.016°, -31.989°

Sequence No: 26443706

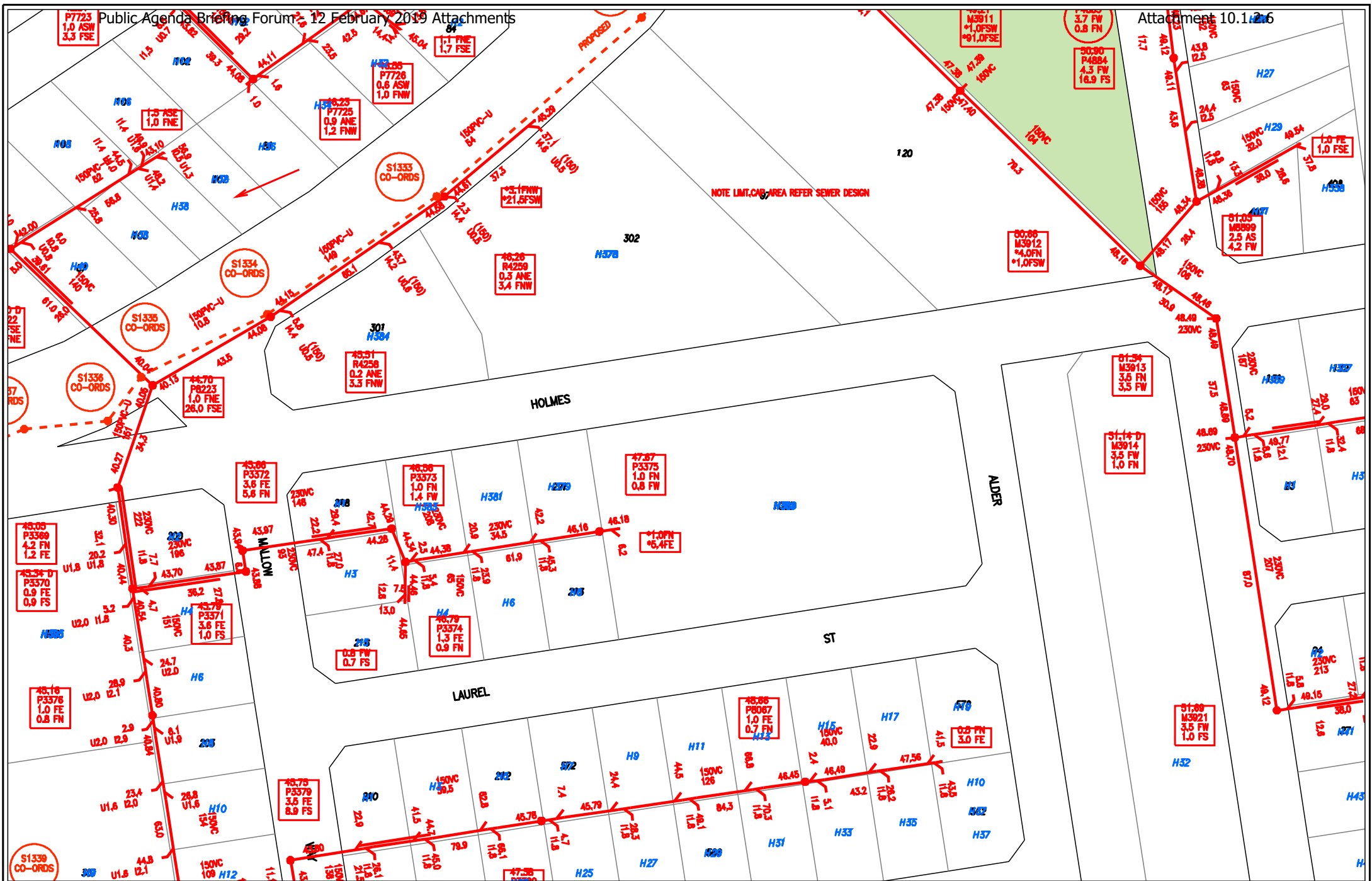
Print Date: 19/09/2012 Page: 6 of 6









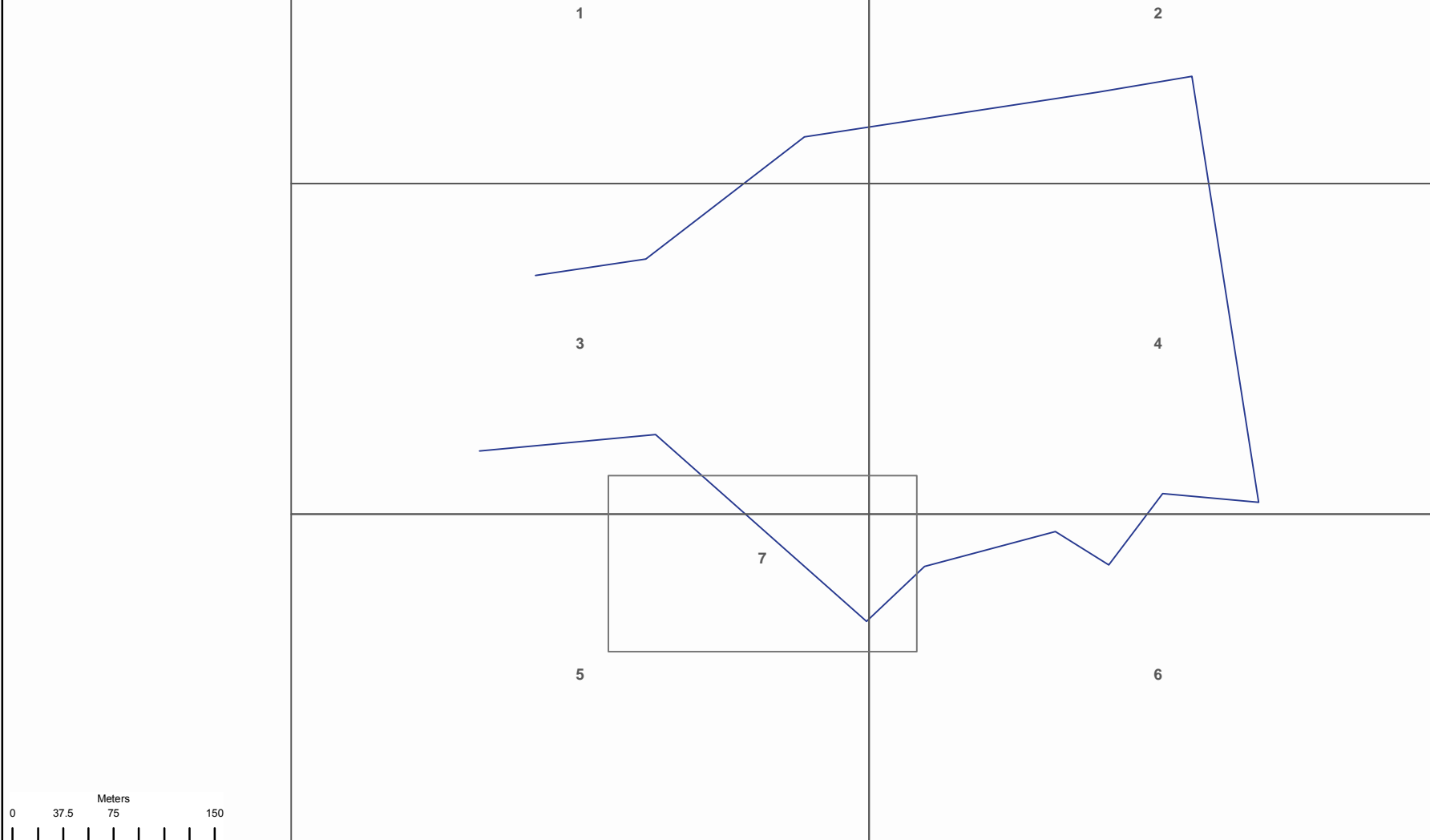


Scale: 1:1500 Centre Point: 116.016°, -31.989°



APPENDIX G - EXISTING ATCO GAS INFRASTRUCTURE

Overview Map Only



Sequence No: 26443705

Map Tile: Overview

Scale: 1:4,501

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Job No: 5767084

Date: 19/09/2012

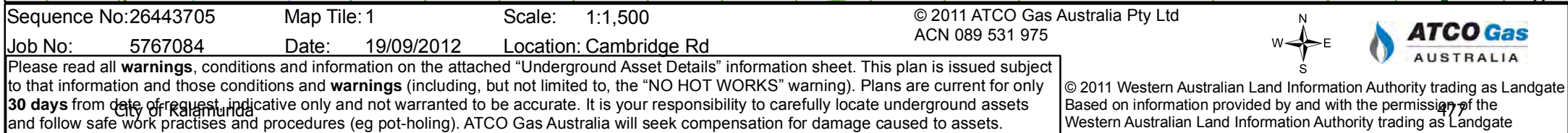
Location: Cambridge Rd

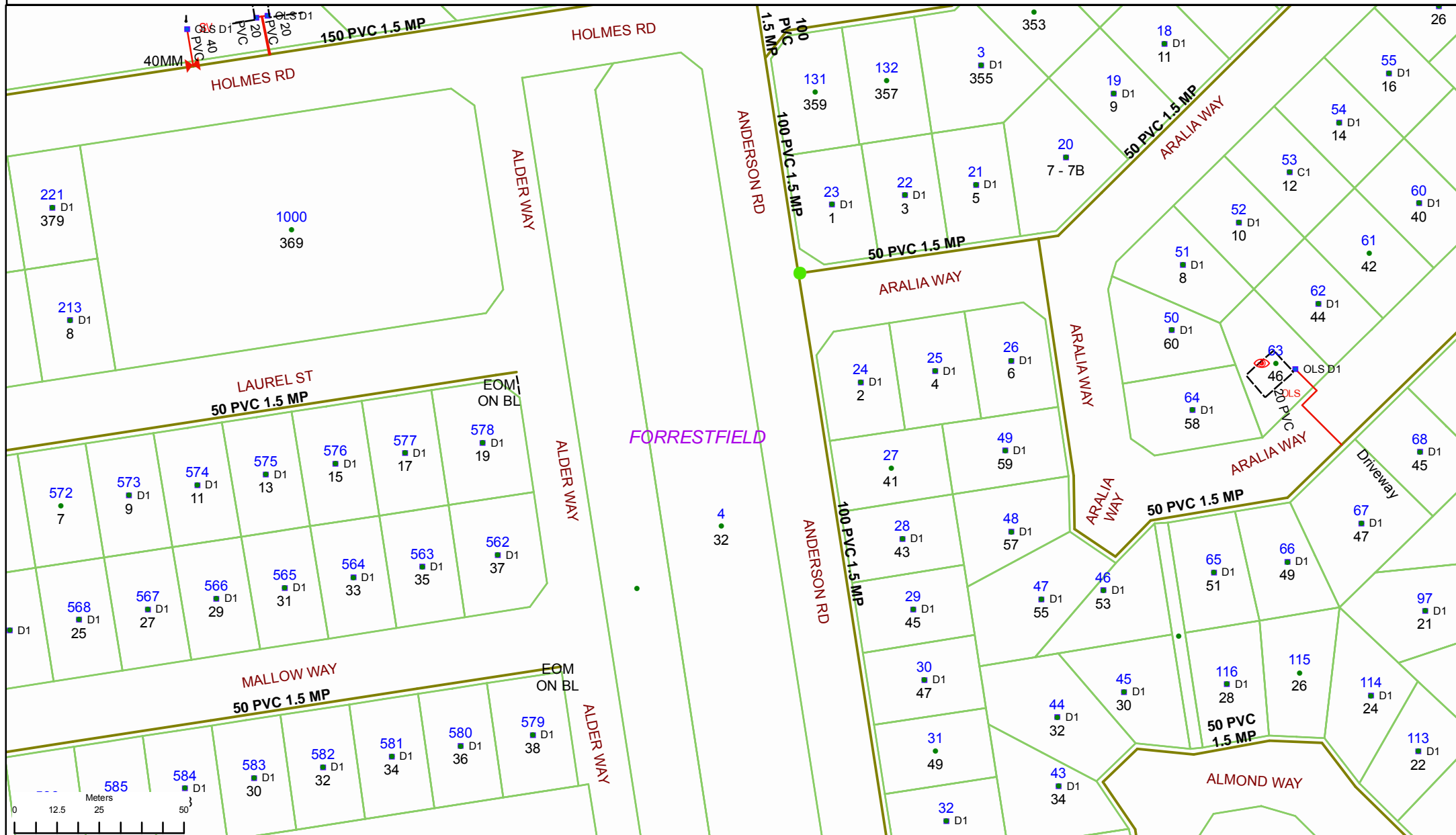
ACN 089 531 975



Please read all **warnings**, conditions and information on the attached "Underground Asset Details" information sheet. This plan is issued subject to that information and those conditions and **warnings** (including, but not limited to, the "NO HOT WORKS" warning). Plans are current for only **30 days** from date of request, indicative only and not warranted to be accurate. It is your responsibility to carefully locate underground assets and follow safe work practises and procedures (eg pot-holing). ATCO Gas Australia will seek compensation for damage caused to assets.

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Sequence No: 26443705

Map Tile: 2

Scale: 1:1,500

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ACN 089 531 975

Job No: 5767084

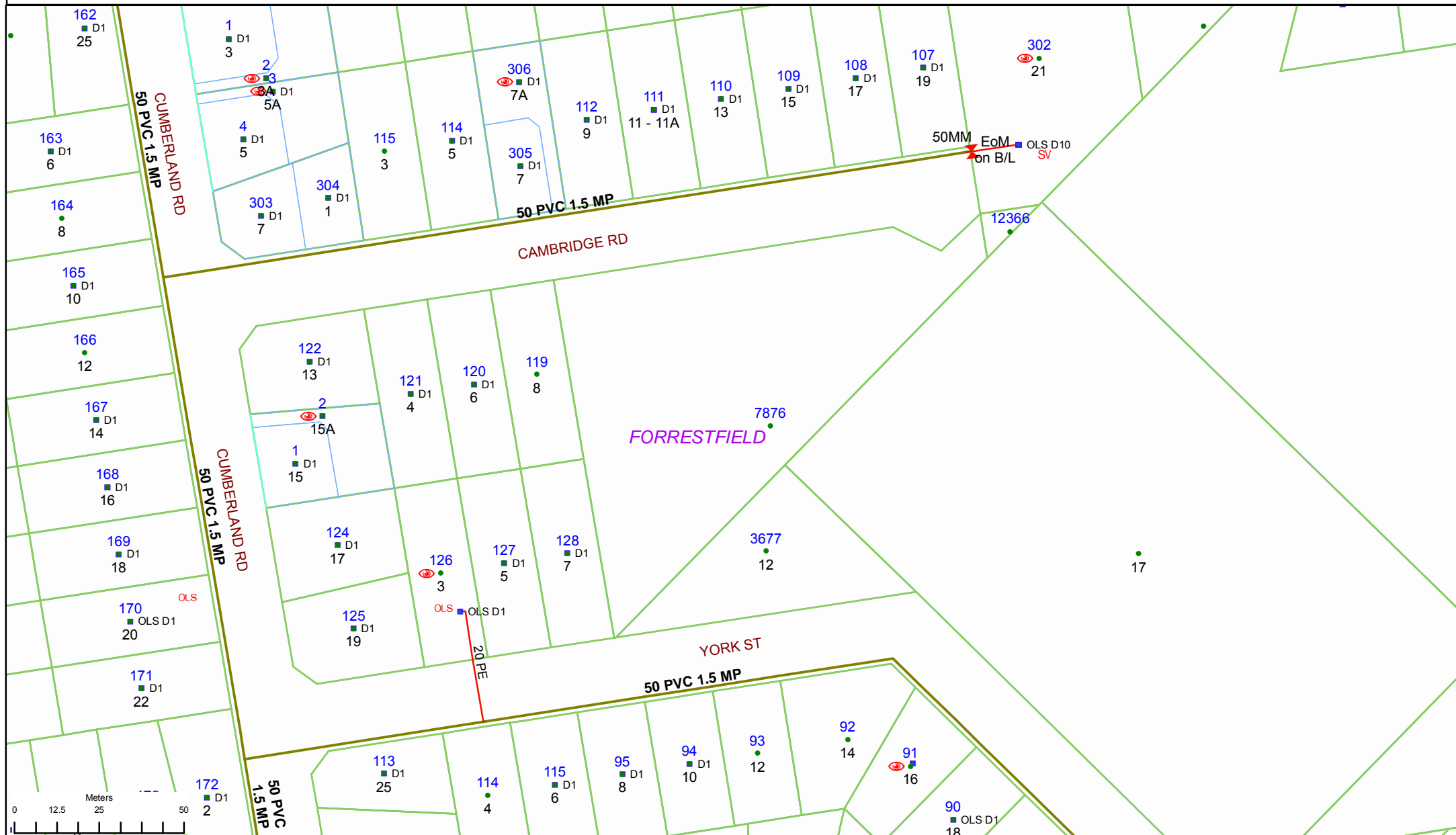
Date: 19/09/2012

Location: Cambridge Rd

Please read all **warnings**, conditions and information on the attached "Underground Asset Details" information sheet. This plan is issued subject to that information and those conditions and **warnings** (including, but not limited to, the "NO HOT WORKS" warning). Plans are current for only **30 days** from date of request, indicative only and not warranted to be accurate. It is your responsibility to carefully locate underground assets and follow safe work practises and procedures (eg pot-holing). ATCO Gas Australia will seek compensation for damage caused to assets.



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Sequence No: 26443705

Map Tile: 3

Scale: 1:1,500

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Job No: 5767084

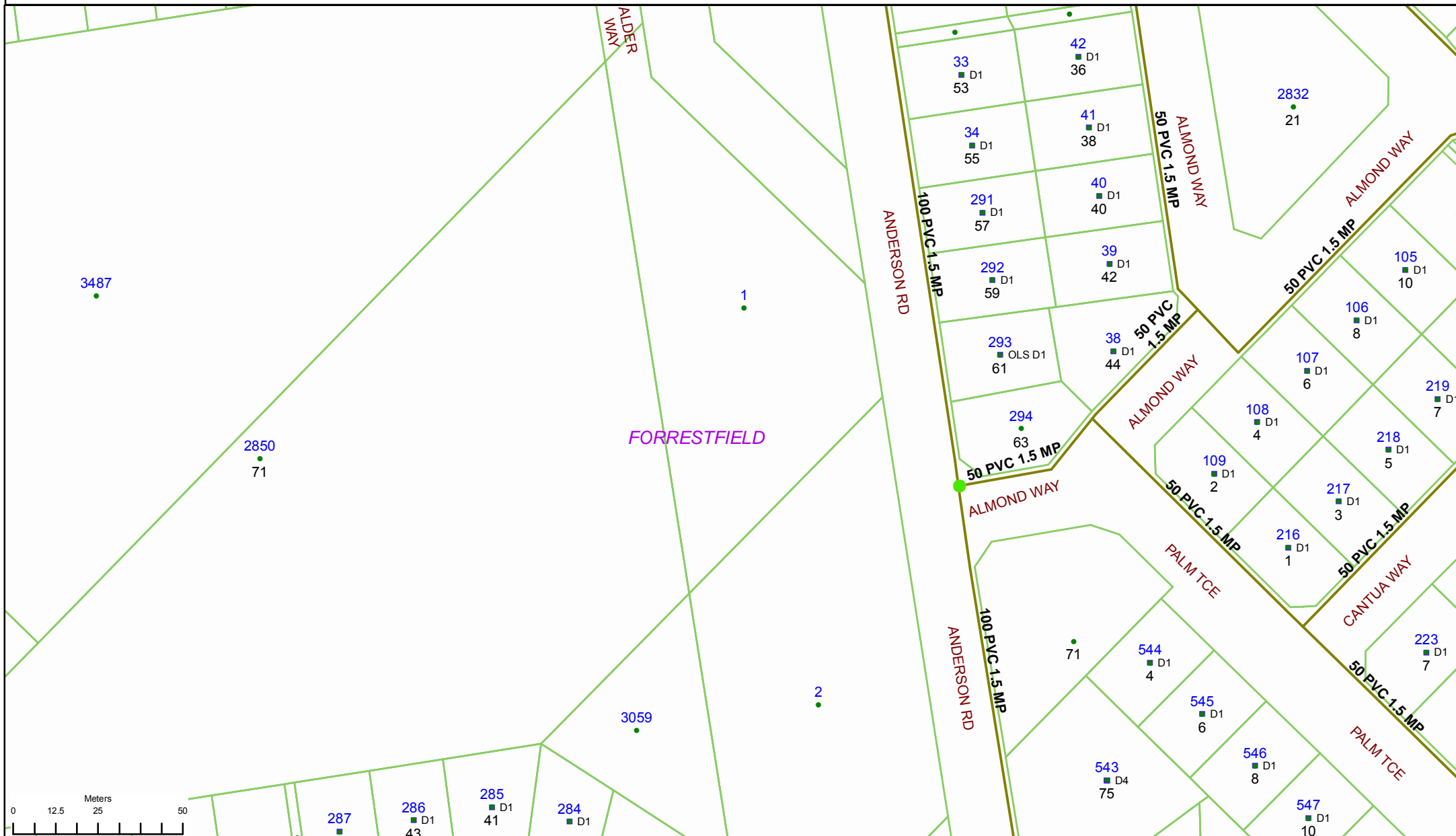
Date: 19/09/2012

Location: Cambridge Rd



Please read all **warnings**, conditions and information on the attached "Underground Asset Details" information sheet. This plan is issued subject to that information and those conditions and **warnings** (including, but not limited to, the "NO HOT WORKS" warning). Plans are current for only **30 days** from date of request, indicative only and not warranted to be accurate. It is your responsibility to carefully locate underground assets and follow safe work practises and procedures (eg pot-holing). ATCO Gas Australia will seek compensation for damage caused to assets.

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Sequence No: 26443705

Map Tile: 4

Scale: 1:1,500

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Job No: 5767084

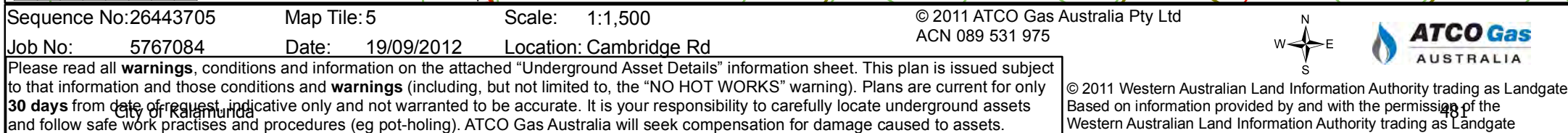
Date: 19/09/2012

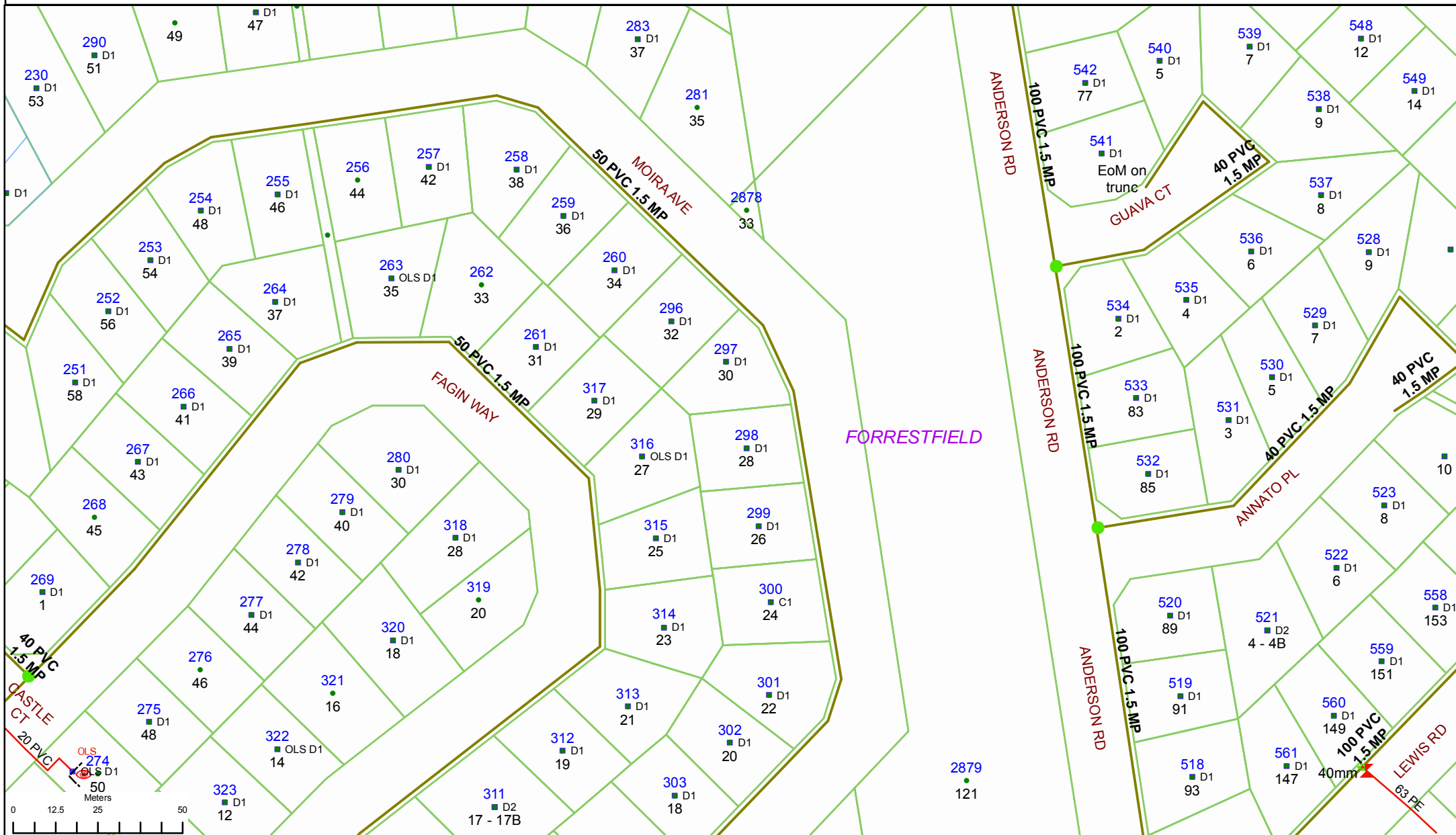
Location: Cambridge Rd



Please read all **warnings**, conditions and information on the attached "Underground Asset Details" information sheet. This plan is issued subject to that information and those conditions and **warnings** (including, but not limited to, the "NO HOT WORKS" warning). Plans are current for only **30 days** from date of request, indicative only and not warranted to be accurate. It is your responsibility to carefully locate underground assets and follow safe work practises and procedures (eg pot-holing). ATCO Gas Australia will seek compensation for damage caused to assets.

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Sequence No: 26443705

Map Tile: 6

Scale: 1:1,500

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Job No: 5767084

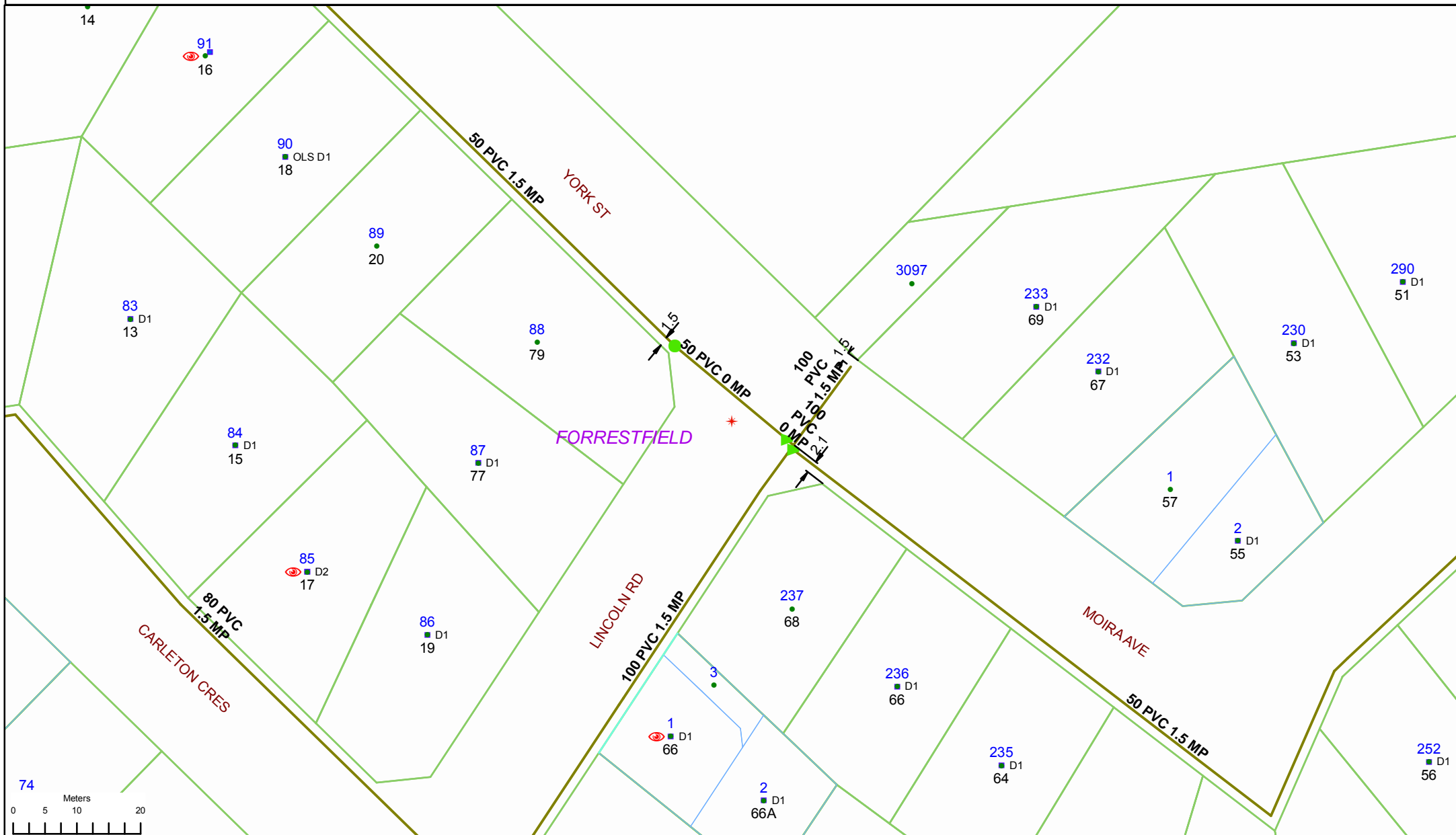
Date: 19/09/2012

Location: Cambridge Rd



Please read all **warnings**, conditions and information on the attached "Underground Asset Details" information sheet. This plan is issued subject to that information and those conditions and **warnings** (including, but not limited to, the "NO HOT WORKS" warning). Plans are current for only **30 days** from date of request, indicative only and not warranted to be accurate. It is your responsibility to carefully locate underground assets and follow safe work practises and procedures (eg pot-holing). ATCO Gas Australia will seek compensation for damage caused to assets.

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Sequence No: 26443705

Map Tile: 7

Scale: 1:800

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ACN 089 531 975

Job No: 5767084

Date: 19/09/2012

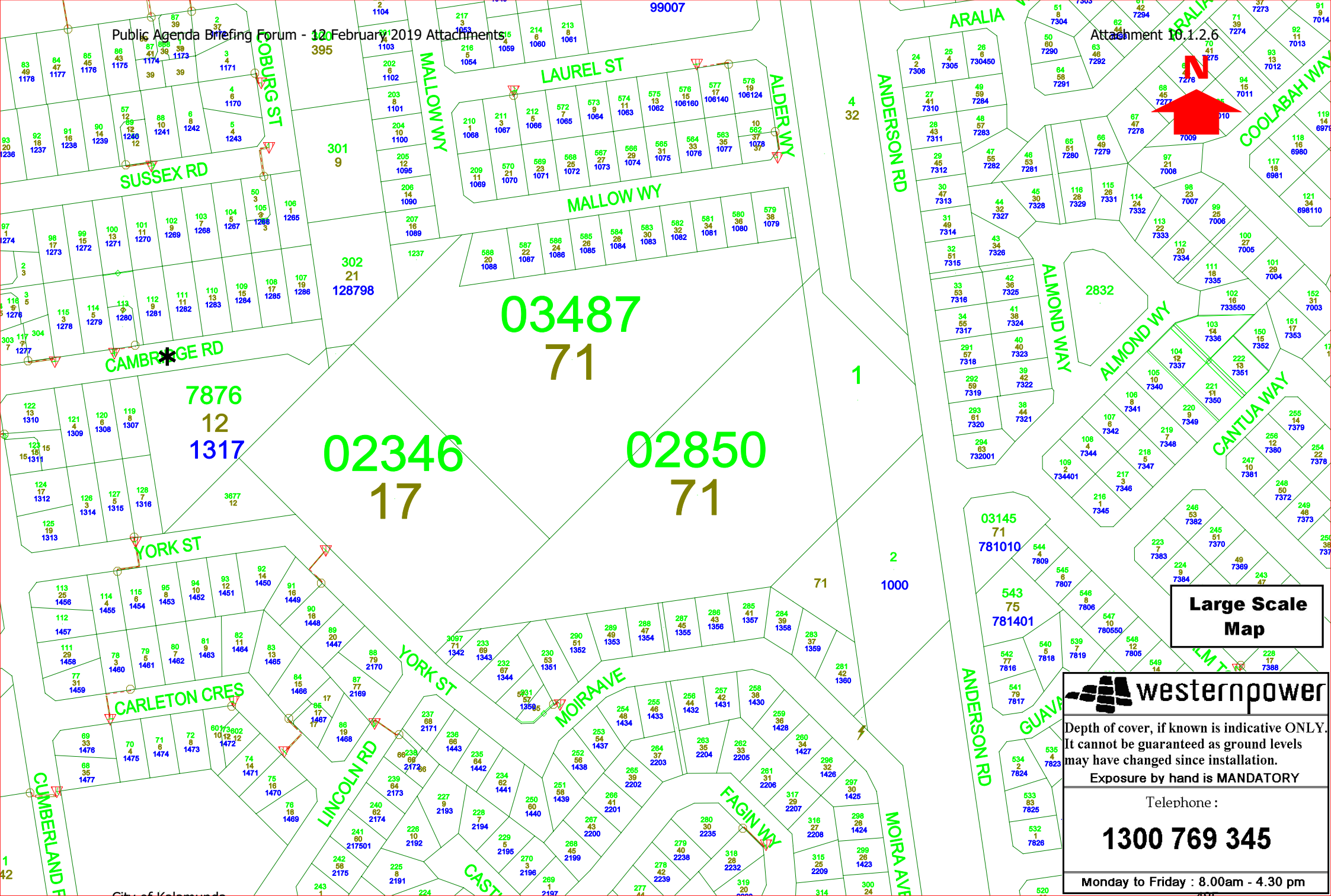
Location: Cambridge Rd



Please read all **warnings**, conditions and information on the attached "Underground Asset Details" information sheet. This plan is issued subject to that information and those conditions and **warnings** (including, but not limited to, the "NO HOT WORKS" warning). Plans are current for only **30 days** from date of request, indicative only and not warranted to be accurate. It is your responsibility to carefully locate underground assets and follow safe work practises and procedures (eg pot-holing). ATCO Gas Australia will seek compensation for damage caused to assets.

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APPENDIX H - EXISTING WESTERN POWER INFRASTRUCTURE





















































Large Scale Map














westernpower

Depth of cover, if known is indicative ONLY.
It cannot be guaranteed as ground levels may have changed since installation.
Exposure by hand is MANDATORY

Telephone :
1300 769 345

Monday to Friday : 8.00am - 4.30 pm

	Cable Joint
	Join Underground
	Join
	Tee Junction
	Carrier Approximation
	Data Overhead
	Data Underground
	Kiosk
	L. V. Distribution Frame
	Pillar
	Ring Main Unit
	Substation
	Underground Crossing
	St. Lt. Pilot, Overhead
	St. Lt. Pilot, Underground
	Fuse Disconnecter, Overhead
	St. Lt. Circuit, Overhead
	St. Lt. Circuit, Underground
	Distribution Pipe
	Link Pipe
	Trunk Pipe
	Bright Conduit Ug Carrier
	Perth Fibre Conduit Ug Carrier
	Communication Pit
	66kv Underground
	66kv Termination
	132kv Underground
	132kv Termination
	330kv Underground
	High Voltage Busbar
	H. V. Underground
	High Volt Single Phase
	Single Phase Underground
	Capacitor Bank
	Circuit Breaker
	Disconnecter
	Fuse Switch
	Hv Cable Pole Termination
	Metering Unit
	Non Load Break Connector
	Reactor
	Surge Divertor
	Switch Disconnecter
	Low Voltage Busbar
	L. V. Underground
	Circuit Breaker Disconnecter
	Disconnecter, Underground
	Fuse Disconnecter, Underground
	Lamp
	Lv Cable Pole Termination
	Building Lines To 1000
	Building Lines To 10000
	Building Lines To 5000

	Ces Scheme
	Easements
	Water Feature
	Obstacle
	Oil Pipe
	Otc Underground Cable
	Lodged Centroids
	Planned Subdivisions
	Turquoise Precalc Centroids
	Turquoise Precalc Int Lot Boun
	Turquoise Precalc Road Front
	Green Legal Centroids
	Obsolete Centroids

APPENDIX I – PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATE



Level 1
430 Roberts Road
PO Box 2150
Subiaco WA 6904

Telephone: (08) 9382 5111
Facsimile: (08) 9382 5199
admin@pfeng.com.au

PROJECT	Cambridge Road, Forrestfield	
CLIENT	The Shire of Kalamunda	
JOB NO.	12-205	REF. NO. 5
REVISION	1	
SENDER	AT	
DATE	24-Sep-12	

PRELIMINARY ORDER OF MAGNITUDE COST ESTIMATE
(Based on TPG Plan 712-359 7 June 2012)

NUMBER OF LOTS			83	
COST SUMMARY			COST PER LOT	TOTAL COST
A CONSTRUCTION COSTS				
1	General and Establishment		\$2,361	\$196,000
2	Earthworks	(Refer to Note 5 & 6)	\$16,566	\$1,375,000
3	Retaining Walls and Fencing	(Refer to Note 7)	\$3,964	\$329,000
4	Road Works		\$6,867	\$570,000
5	Stormwater Drainage and Lot Connection Pits	(Refer to Note 8)	\$6,482	\$538,000
6	Sewerage Reticulation		\$3,048	\$253,000
7	Water Supply Reticulation		\$1,494	\$124,000
8	Underground Power and Street Lighting	(Refer to Note 9)	\$6,500	\$539,500
9	Communication Services	(Refer to Note 10)	\$1,250	\$103,750
10	Gas	(Refer to Note 11)	\$850	\$70,550
SUB TOTAL CONSTRUCTION			\$49,383	\$4,098,800
B EXTERNAL WORKS				
11	External Road Upgrades	(Refer to Note 12)	No allowance	No allowance
12	Development and Rehabilitation of Sump	(Allowance Only - Refer to Note 14)	\$1,205	\$100,000
SUB TOTAL EXTERNAL WORKS			\$1,205	\$100,000
C HEADWORKS				
13	Water Corporation - Water (1 July 2012 - 30 June 2013)	(Refer to Note 15)	\$4,015	\$333,245
14	Water Corporation - Sewer (1 July 2012 - 30 June 2013)	(Refer to Note 15)	\$1,347	\$111,801
15	Western Power Energisation Fees	(Allowance Only Refer to Note - 16)	\$2,500	\$207,500
SUB TOTAL HEADWORKS			\$7,862	\$652,546
D PROFESSIONAL FEES				
16	Survey	(Allowance Only - Refer to Note 17)	\$1,500	\$125,000
17	Engineering Fees		\$3,289	\$273,000
18	Geotechnical Fees	(Allowance Only - Refer to Note 18 & 19)	\$422	\$35,000
19	Electrical Fees	(Allowance Only - Refer to Note 20)	\$400	\$33,200
20	Local Authority Supervision Fees		\$253	\$21,000
SUB TOTAL FEES			\$5,864	\$487,200
TOTAL COSTS (EXCL. GST) SUBDIVISION ONLY			\$64,314	\$5,338,546
CONTINGENCY (A+B) 15%			\$7,588	\$629,820
GST (A+B+D)			\$5,645	\$468,600
TOTAL COST (inc. GST, CONTINGENCY)			\$77,547	\$6,436,966

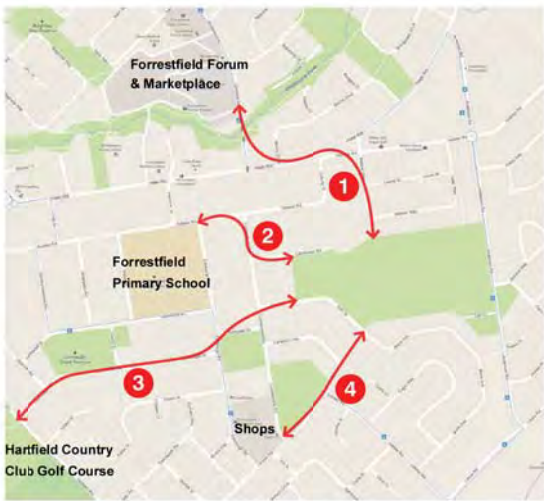
Notes:

- 1 The Preliminary Order of Magnitude Cost Estimate (POMCE) is based upon TPG Plan 712-359 dated 7 June 2012
- 2 The POMCE detailed above shall be read in conjunction with the explanatory notes.
- 3 All costs are based on standard construction methods and anticipated WAPC conditions.
- 4 The POMCE is valid for a period of 3 months from the date of preparation noted above.
- 5 The POMCE allows for 100mm of topsoil to be stripped and respread in POS areas. This should be confirmed by a geotechnical engineer onsite.
- 6 An allowance to hydromulch the construction area twice during the construction programme has been made.
- 7 A higher aesthetic treatment on the (infill panels and piers) has been allowed for on the western retaining wall.
- 8 It has been assumed that a 1:100 year 24 hour event will be retained in the existing sump, with an appropriate increase in the capacity of the sump been made.
- 9 Underground Power has been assumed to be \$6,500 per lot from current market rates for similar developments.
- 10 Communications has been assumed to be \$1,250 per lot from current market rates for similar developments.
- 11 Atco Gas costs have been assumed to be \$850 per lot from current market rates for similar developments.
- 12 No Allowance has been made for the upgrade of surrounding roads.
- 13 No council or drainage scheme costs have been allowed for.
- 14 An allowance has been made for the shaping of the existing sump to accommodate the development. Landscaping costs for the sump have not been allowed for.
- 15 Headworks charges are based upon current Water Corporation rates and are subject to change every 12 months.
- 16 Western Power Energisation fees have been assumed to be \$2,500 per lot from current market rates for similar developments.
- 17 Survey fees have been assumed to be \$1,500 per lot based on current market rates for similar developments
- 18 Geotechnical fees are assumed to be 2% of the earthworks and retaining walls construction costs.
- 19 No allowance has been made for geotechnical improvement other than removal of topsoil/uncontrolled fill and placement of clean fill.
- 20 Electrical engineering fees have been assumed to be \$400 per lot based on current market rates for similar developments
- 21 No allowance has been made for project management fees, environmental fees, planning fees, land acquisition, marketing, selling costs, irrigation or landscaping costs.

5.0 DETAILED CONCEPT PLAN AND LANDSCAPE DESIGN



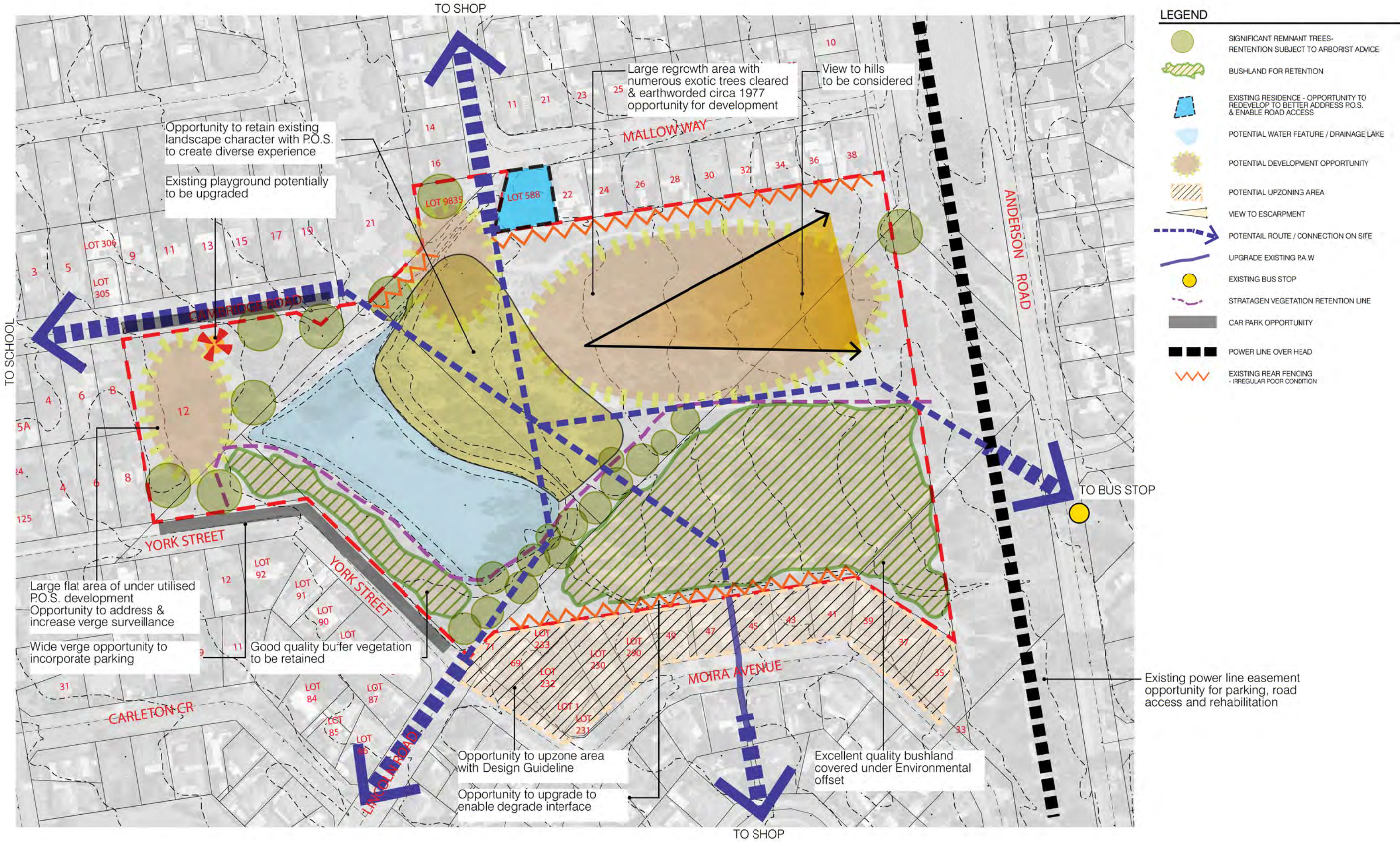
ANDERSON ROAD RESERVE REDEVELOPMENT

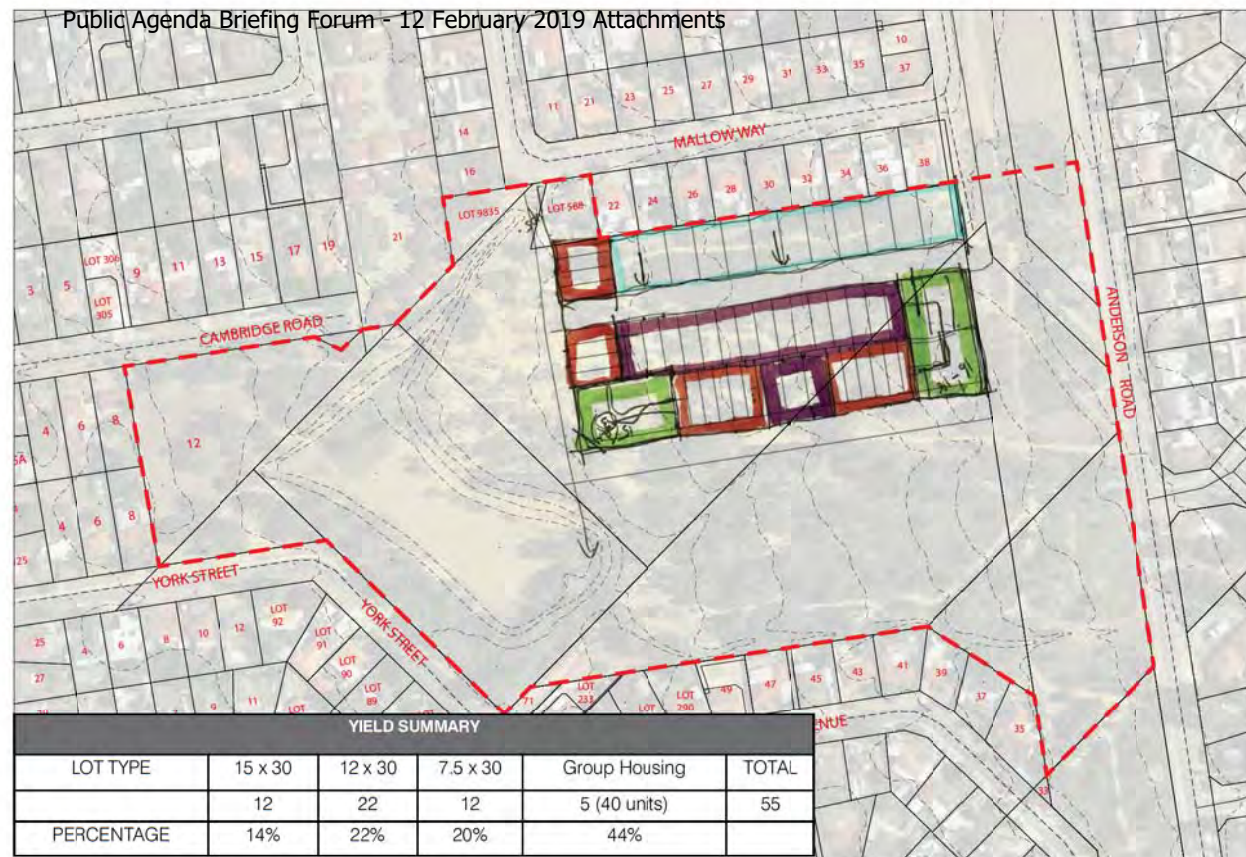


SITE ASSESSMENT

ANDERSON ROAD
City of Kalamunda







LOW IMPACT CONCEPT PLAN



MEDIUM IMPACT CONCEPT PLAN



HIGH IMPACT CONCEPT PLAN OPTION 1



HIGH IMPACT CONCEPT PLAN OPTION 2

- 7.5m (225m² approx.)
- 12m (360m² approx.)
- 15m (450m² approx.)
- GROUP HOUSING
- STUDY BOUNDARY

CONCEPT PLAN

Anderson Road
City of Kalamunda

DATE 07.05.2013

DWG NO 003

REV A

SCALE 1:1000@A1

Level 1, 55 St Georges Tce,
Perth, WA 6000 AustraliaTel +618 9346 0500
Fax +618 9221 1779info@urbis.com.au
www.urbis.com.auUrbis Pty Ltd ABN 50 105 256 288
Australia . Asia . Middle East

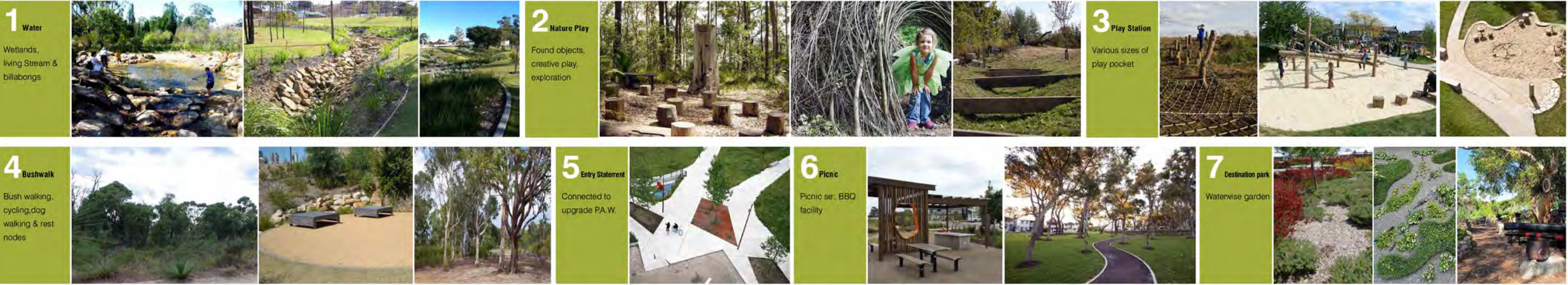
LEGEND

- CONCRETE FOOTPATH
- COMPACTED GRAVEL
- SHELTER
- WATERWISE GARDEN
- WETLAND
- LIVING STREAM
- BILLABONGS
- PLAY STATION
- DECK TO PROVIDE INFORMAL SEATING
- BUSHLAND FOR RETENTION
- BOARDWALK
- REVEGETATION AREA

LOT TYPE

- 15m (450m² approx.)
- 12m (360m² approx.)
- 7.5m (225m² approx.)
- GROUP HOUSING

YIELD SUMMARY					
LOT TYPE	15 x 30	12 x 30	7.5 x 30	Group Housing	TOTAL
	12	22	12	5 (40 units)	55
PERCENTAGE	14%	22%	20%	44%	



LOW IMPACT LANDSCAPE CONCEPT PLAN

LEGEND

- CONCRETE FOOTPATH
- COMPACTED GRAVEL
- SHELTER
- WATERWISE GARDEN
- WETLAND
- LIVE STREAM
- BILLABONGS
- PLAY STATION
- FITNESS STATION
- DECK TO PROVIDE INFORMAL SEATING
- BUSHLAND FOR RETENTION
- BOARDWALK
- REVEGETATION AREA

LOT TYPE

- 15m (450m² approx.)
- 12m (360m² approx.)
- 7.5m (225m² approx.)
- GROUP HOUSING

YIELD SUMMARY

LOT TYPE	15 x 30	12 x 30	7.5 x 30	Group Housing	TOTAL
	12	29	23	3 (58 units)	64
PERCENTAGE	14%	22%	20%	52%	



MEDIUM IMPACT LANDSCAPE CONCEPT PLAN

ANDERSON ROAD
City of Kalamunda

LEGEND

- CONCRETE FOOTPATH
- COMPACTED GRAVEL
- SHELTER
- WATERWISE GARDEN WITH BECH SEATS
- WETLAND
- ARTIFICIAL LAKE
- LIVE STREAM
- BILLABONGS
- PLAY STATION
- FITNESS STATION
- WATER PLAY STATION
- DECK TO PROVIDE INFORMAL SEATING
- BUSHLAND FOR RETENTION
- BOARDWALK
- REVEGETATION AREA

LOT TYPE

- 15m (450m² approx.)
- 12m (360m² approx.)
- 7.5m (225m² approx.)
- GROUP HOUSING

YIELD SUMMARY					
LOT TYPE	15 x 30	12 x 30	7.5 x 30	Group Housing	TOTAL
	12	44	23	3(58 units)	82
PERCENTAGE	10%	18%	20%	52%	



HIGH IMPACT LANDSCAPE CONCEPT PLAN

GENERAL	HIGH IMPACT CONCEPT PLAN LOT YIELD Summary Total Lot Yield = 82 Total Dwelling Number=108-113							MEDIUM IMPACT CONCEPT PLAN LOT YIELD Summary Total Lot Yield = 64 Total Dwelling Number=90			LOW IMPACT CONCEPT PLAN LOT YIELD Summary Total Lot Yield = 55 Total Dwelling Number=72		
	Total Cost ~ 8.3M (\$ 100,000/Lot Yield)							~ Total Cost 6.5M			~ Total Cost 5.6M		
	ITEM	DESCRIPTION	UNIT	RATE	QTY	TOTAL	NOTE	QTY	TOTAL	NOTE	QTY	TOTAL	NOTE
	1	GENERAL ITEM											
	1.1	Include all costs for complying with the Specification and General Conditions of Contract including insurances.	item		1	\$ 160,000.00		1	\$ 120,000.00		1	\$ 100,000.00	
	1.2	Allow for survey works	item	\$ 5,000.00	1	\$ 5,000.00		1	\$ 5,000.00		1	\$ 5,000.00	
	1.3	Allow for protective fencing around existing trees	item	\$ 20,000.00	1	\$ 20,000.00		1	\$ 20,000.00		1	\$ 20,000.00	
	1.4	Allow for Arborist advice	item	\$ 7,500.00	1	\$ 7,500.00		1	\$ 7,500.00		1	\$ 7,500.00	
	1.5	Allow for tree pruning to all existing trees	item	\$ 50,000.00	1	\$ 50,000.00		1	\$ 50,000.00		1	\$ 50,000.00	
	1.6	Allow for pruning to undergrowth and weed control	item	\$ 6,500.00	1	\$ 20,000.00		1	\$ 20,000.00		1	\$ 20,000.00	
	1.7	Allow for 'As Constructed Drawings' of irrigation works	item	\$ 2,500.00	1	\$ 5,000.00		1	\$ 5,000.00		1	\$ 5,000.00	
	1.8	Allow for supply and installation of bore and pump	item	\$ 40,000.00	1	\$ 40,000.00		1	\$ 40,000.00		1	\$ 40,000.00	
	TOTAL GENERAL SUMS					\$ 307,500.00			\$ 267,500.00			\$ 247,500.00	
	2	PROVISIONAL SUMS											
	2.1	Hard Digging	item	\$ 30,000.00	1	\$ 30,000.00		1	\$ 30,000.00		1	\$ 30,000.00	
	2.2	Supply and installation of Lighting (Solar)	item	\$ 100,000.00	1	\$ 150,000.00		1	\$ 100,000.00		1	\$ 100,000.00	
	2.3	Public Art	item	\$ 200,000.00	1	\$ 200,000.00		1	\$ 200,000.00		1	\$ 200,000.00	
	2.4	Contingency (20% of Landscape Budget)	%	\$1,324,300.00	-	\$ 1,324,300.00		\$997,655.00	\$ 997,655.00		\$874,087.48	\$874,087.48	
	TOTAL PROVISIONAL SUMS					\$ 1,704,300.00			\$ 1,327,655.00			\$ 1,204,087.48	
	3	SITE PREPARATION & EARTH WORK											
	3.1	Allow for earth works as necessary and fine grading	sq.m	\$ 1.50	51500	\$ 77,250.00		56550	\$ 84,825.00		59310	\$ 88,965.00	
	3.2	Allow for soil testing x 4	item	\$ 175.00	4	\$ 700.00		4	\$ 700.00		4	\$ 700.00	
	3.3	Allow for traffic and dust management as required	item	\$ 5,000.00	1	\$ 5,000.00		1	\$ 5,000.00		1	\$ 5,000.00	
	TOTAL PREPARATION & EARTH WORK					\$ 82,950.00			\$ 90,525.00			\$ 94,665.00	
	4	SOIL PREPARATION											
	4.1	Allow for the supply and installation of Terracottem to shrub and trees	sq.m	\$ 1.00	15000	\$ 15,000.00		17500	\$ 17,500.00		18328	\$ 18,328.00	
	4.2	Allow for the supply and installation of wetting agent to tur	sq.m	\$ 0.20	7000	\$ 1,400.00		10500	\$ 2,100.00		12432	\$ 2,486.40	
	TOTAL SOIL PREPARATION					\$ 16,400.00			\$ 19,600.00			\$ 20,814.40	
	5	PLANTING											
	5.1	Allow for the supply and installation of 130mm shrubs (2/sqm)	sq.m	\$ 30.00	15000	\$ 450,000.00	assume 40% of landscape area	17500	\$ 525,000.00		18328	\$ 549,840.00	
	5.2	Allow for the supply and installation of mulch	sq.m	\$ 6.00	15000	\$ 90,000.00		17500	\$ 105,000.00		18328	\$ 109,968.00	
	5.3	Allow for the supply and installation of 45 litre trees	No.	\$ 110.00	150	\$ 16,500.00		160	\$ 17,600.00		160	\$ 17,600.00	
	5.4	Allow for the supply and installation of 100 litre trees	No.	\$ 240.00	100	\$ 24,000.00		110	\$ 26,400.00		110	\$ 26,400.00	
	5.4	Supply and installation of mature trees	No.	\$ 5,000.00	20	\$ 100,000.00		20	\$ 100,000.00		10	\$ 50,000.00	
	TOTAL PLANTING					\$ 680,500.00			\$ 774,000.00			\$ 753,808.00	
	6	FOOTPATH											
	6.1	Allow for the supply and installation of insitu grey concrete path. Including ground preparation, compaction etc	sq.m	\$ 75.00	3500	\$ 262,500.00		3920	\$ 294,000.00		4000	\$ 300,000.00	
	TOTAL PAVING & STEPS					\$ 262,500.00			\$ 294,000.00			\$ 300,000.00	
	7	EDGING											
	7.1	Allow for the supply and installation of 200mm concrete edging to grassed areas adjoining shrub beds and mowing edge to walls.	lin.m	\$ 35.00	250	\$ 8,750.00		250	\$ 8,750.00		250	\$ 8,750.00	
	TOTAL EDGING & ANTI - SKATE DEVICES					\$ 8,750.00			\$ 8,750.00			\$ 8,750.00	
	8	IRRIGATION											
	8.1	Allow for the supply and installation of irrigation (refer to irrigation schedules for further breakdown.)	item	\$ 60,000.00	1	\$ 80,000.00		1	\$ 80,000.00		1	\$ 80,000.00	
	TOTAL IRRIGATION					\$ 80,000.00			\$ 80,000.00			\$ 80,000.00	
	9	POTENTIAL FURNITURE & ELEMENTS											
	Play Station (large)	Allow for supply and installation of large play station incl. tree house	Item	\$ 450,000.00	2	\$ 900,000.00	assume themed play modules, swings, slide, a tree house, space net and climbing frames	1	\$ 450,000.00		1	\$ 450,000.00	
	Play Station (medium)	Allow for supply and installation of medium play station	Item	\$ 150,000.00	1	\$ 150,000.00	assume mud kitchen / hill slide/ willow hub	1	\$ 150,000.00		1	\$ 150,000.00	
	Play Station (small)	Allow for supply and installation of small play station incl. sand pit with wooden play items	Item	\$ 50,000.00	0	\$ -		4	\$ 200,000.00		3	\$ 150,000.00	
	Ball Kicking Area	Allow for the supply and installation of roll-on lawn	sqm	\$ 7.00	5000	\$ 35,000.00		5000	\$ 35,000.00		5500	\$ 38,500.00	
	Water Play station	Allow for supply and installation of water play equipment	Item	\$ 500,000.00	1	\$ 500,000.00		0	\$ -	no water play station	0	\$ -	no water play station
	Fitness Station	Allow for supply and installation of fitness equipment	Item	\$ 50,000.00	1	\$ 50,000.00		0	\$ -	no fitness station	0	\$ -	no fitness station
	Bins	Allow for the supply and installation of bins	item	\$ 3,500.00	10	\$ 35,000.00		5	\$ 17,500.00		2	\$ 7,000.00	
	Drinking Fountain	Allow for supply and installation of drinking fountain (from mains supply)	Item	\$ 5,500.00	3	\$ 16,500.00		2	\$ 11,000.00		1	\$ 5,500.00	
	Interpretive signage	Supply and installation of interpretive signage	Item	\$ 1,000.00	10	\$ 10,000.00		10	\$ 10,000.00		2	\$ 2,000.00	
	TOTAL FURNITURE & ELEMENTS					\$ 1,696,500.00			\$ 873,500.00			\$ 803,000.00	

DESTINATION/HUB	Compacated Gravel	Allow for the supply and installation of compacted gravel	sq.m	\$ 60.00	190	\$ 11,400.00	assume gravel pavement for destination park area	190	\$ 11,400.00		190	\$ 11,400.00		
	Bench seating	Allow for the supply and installation of standard bench seating	Item	\$ 2,500.00	20	\$ 50,000.00		15	\$ 37,500.00		10	\$ 25,000.00		
	Picnic Set	Allow for the supply and installation of picnic tables (table + 2 bench seats)	Item	\$ 6,000.00	15	\$ 90,000.00		10	\$ 60,000.00		5	\$ 30,000.00		
	Orchard	Allow for the supply and installation of fruit trees	Item	\$ 50,000.00	1	\$ 50,000.00	assume 30 x low maintenance fruit trees (25/100sqm)(about 120sqm)	1	\$ 50,000.00		0	\$ -	no orchard	
	Waterwise Demonstration Garden	Allow for the supply and installation of waterwise demonstration garden	Item	\$ 5,000.00	1	\$ 5,000.00	assume 130mm shrub planting (2/sqm) (about 40sqm)	1	\$ 5,000.00		1	\$ 5,000.00	assume 130mm shrub planting (2/sqm) (about 40sqm)	
	Performance Space (gazebo)	Allow for the supply and installation of paving / concrete pad to performance space	Item	\$ 50,000.00	1	\$ 50,000.00	Infrastructure upgrade (about 280sqm)	1	\$ 50,000.00		1	\$ 50,000.00	Infrastructure upgrade (about 280sqm)	
	Amphitheatre	Allow for the supply and installtion of paving / concrete base to amphitreatre steps	Item	\$ 100,000.00	1	\$ 100,000.00	assume amphitreatre steps associated with performance space (about 240 lin.m)	0	\$ -		no amphitheatre	0	\$ -	no amphitheatre
	BBQ	Allow for the supply and installation of BBQ	Item	\$ 16,000.00	4	\$ 64,000.00	assume 3 BBQ Facility	3	\$ 48,000.00		1	\$ 16,000.00	assume 1 BBQ Facility	
	Shelter	Allow for the supply and installation of shelter	Item	\$ 60,000.00	6	\$ 360,000.00	assume 2 Picnic Shelter (Solar)	6	\$ 360,000.00		3	\$ 180,000.00	5 for picnic node one for gazebo	
	Hardcourt	Allow for the supply and installation of hardcourts	Item	\$ 20,000.00	1	\$ 20,000.00	assume 1 Half-court basketball	1	\$ 20,000.00		1	\$ 20,000.00		
	Bins	Allow for the supply and installation of bins	Item	\$ 3,500.00	4	\$ 14,000.00		3	\$ 10,500.00		2	\$ 7,000.00		
	Drinking Fountain	Allow supply and installation of drinking fountain (from mains supply)	Item	\$ 5,500.00	3	\$ 16,500.00		2	\$ 11,000.00		1	\$ 5,500.00		
	Interpretive signage	Supply and installation of interpretive signage	Item	\$ 1,000.00	3	\$ 3,000.00		1	\$ 1,000.00		1	\$ 1,000.00		
	Bike rack	Allow for the supply and installation of bike rack	Item	\$ 2,000.00	10	\$ 20,000.00		5	\$ 10,000.00		10	\$ 20,000.00		
	Toilet		Item	\$ 50,000.00	1	\$ 50,000.00	Infrastructure upgrade	1	\$ 50,000.00		Infrastructure upgrade	0	\$ -	no toilet
	TOTAL FURNITURE & ELEMENTS						\$ 903,900.00		\$ 724,400.00				\$ 370,900.00	
WETLAND	Irrigation lake		Item	\$ 600,000.00	1	\$ 600,000.00		1	\$ 600,000.00		1	\$ 600,000.00		
	Water feature (Artificial lake/Frog pond)	Allow for supply & install Water fountain incl. pumps & hydraulics	Item	\$ 100,000.00	1	\$ 100,000.00	assume permannent water body conected with water play station and irrigation lake	0	\$ -	No artificial lake	0	\$ -	No artificial lake	
	Timber decking	Allow for supply and installation of timber decking	sq.m	\$ 600.00	400	\$ 240,000.00		400	\$ 240,000.00		400	\$ 240,000.00		
	Bridge	Allow for supply and installation Timber boardwalk (2500mm wide)	lin.m	\$ 1,000.00	125	\$ 125,000.00		125	\$ 125,000.00		125	\$ 125,000.00		
	Play Station (large)	Allow for supply and installation of large play station incl. tree house	Item	\$ 150,000.00	1	\$ 150,000.00	assume themed play modules, swings, silde, a tree house, space net and climbing frames	0	\$ -		0	\$ -		
	Play Station (medium)	Allow for supply and installation of medium play station	Item	\$ 80,000.00	1	\$ 80,000.00	assume mud kitchen / hill slide/ willow hub	2	\$ 160,000.00		2	\$ 160,000.00		
	Play Station (small)	Allow for supply and installation of small play station incl. sand pit with wooden play items	Item	\$ 50,000.00	1	\$ 50,000.00	assume 10 x wooden steep blocks / 2 x seats 1 bridge	1	\$ 50,000.00		1	\$ 50,000.00		
	Limestone boulder	Allow for the supply and installation of limestone boulder	Item	\$ 200.00	50	\$ 10,000.00		50	\$ 10,000.00		50	\$ 10,000.00		
	Bins	Allow for the supply and installation of bins	Item	\$ 3,500.00	3	\$ 10,500.00		2	\$ 7,000.00		2	\$ 7,000.00		
	TOTAL FURNITURE & ELEMENTS						\$ 1,365,500.00		\$ 1,192,000.00			\$ 1,192,000.00		
BUSHLAND	Timber decking	Allow for the supply and installation of timber decking	sq.m	\$ 600.00	200	\$ 120,000.00		100	\$ 60,000.00		100	\$ 60,000.00		
	Boardwalk	Allow for the supply and installation of Steel boardwalk (2500mm wide)	lin.m	\$ 1,500.00	365	\$ 547,500.00	assume boardwalk for bush walking/dog walking	113	\$ 169,500.00		113	\$ 169,500.00		
	Turf nodes	Allow for the supply and installation of turf nodes	sqm	\$ 10.00	2000	\$ 20,000.00		5500	\$ 55,000.00		5500	\$ 55,000.00		
	Living stream	Allow for the supply and installation of living stream	Item	\$ 100,000.00	1	\$ 100,000.00	assume moving/dry stram with rocks/revegetation & water story nodes	1	\$ 100,000.00		1	\$ 100,000.00		
	Play Station (medium)	Allow for supply and installation of medium play station	Item	\$ 80,000.00	1	\$ 80,000.00	assume mud kitchen / hill slide/ willow hub	1	\$ 80,000.00		0	\$ -		
	Fitness Station	Allow for supply and installation of fitness equipment	Item	\$ 25,000.00	10	\$ 250,000.00		4	\$ 100,000.00		0	\$ -		
	Shelter	Allow for the supply and installation of shelter	Item	\$ 60,000.00	1	\$ 60,000.00	assume 1 Shelter (Solar)	1	\$ 60,000.00		1	\$ 60,000.00		
	Feature Paving	Allow for the supply and installation of feature paving	sq.m	\$ 100.00	265	\$ 26,500.00		265	\$ 26,500.00		265	\$ 26,500.00		
	Bench seating	Allow for the supply and installation of standard bench seating	Item	\$ 2,500.00	2	\$ 5,000.00		2	\$ 5,000.00		8	\$ 20,000.00		
	Interpretive signage	Supply and installation of interpretive signage	Item	\$ 1,000.00	1	\$ 1,000.00		1	\$ 1,000.00		1	\$ 1,000.00		
	Bins	Allow for the supply and installation of bins	Item	\$ 3,500.00	2	\$ 7,000.00		2	\$ 7,000.00		2	\$ 7,000.00		
	TOTAL FURNITURE & ELEMENTS						\$ 1,217,000.00		\$ 664,000.00				\$ 499,000.00	
LUMP SUM TOTAL (excluding GST)						\$ 8,325,800.00		\$ 6,315,930.00			\$ 5,574,524.88			



- LEGEND:**
- ① ACTIVITY HUB / PLAYGROUND
 - ② STORMWATER CATCHMENT
 - ③ FENCED BUSHLAND
 - ④ SHADE STRUCTURE & SEATING NODE
 - ⑤ BOARD-WALK / WETLAND
 - ⑥ LIVING STREAM - REALIGNED DRAIN
 - ⑦ OPEN MANAGED PARKLAND
 - ⑧ FENCED DOG PARK
 - ⑨ PEDESTRIAN PATH NETWORK
 - ⑩ BUSH RE-VEGETATION
 - ⑪ EXISTING PAW
 - ⑫ EXISTING LOTS
 - ⑬ MANAGED BUSHLAND
 - ⑭ OPTION FOR ADDITIONAL PARKING

- NOTES:**
- 1. Concept is indicative only and subject to detailed design.
 - 2. Extent of lighting is to be determined during detailed design.
 - 3. Edges of existing drainage basin is to be treated / graded in order to 'make safe'.
 - 4. Revegetation is to be carried out using endemic and / or native species.
 - 5. Irrigation is to be limited to high use areas around activities nodes and play areas.
 - 6. Path network will include cycle path connections, pedestrian paths as well as informal path networks within areas of revegetation.
 - 7. Parking locations and quantities are indicative only and subject to technical advice.



CAMBRIDGE RESERVE LANDSCAPE CONCEPT PLAN

DISCLAIMER
This plan is conceptual and is for discussion purposes only.
Subject to further detail study, Council approval, engineering input and survey.
Cadastral boundaries, areas and dimensions are approximate only.
Figured dimensions shall, to preference to scaled dimensions.
No relevance should be placed on this plan for any financial detailing of the land.

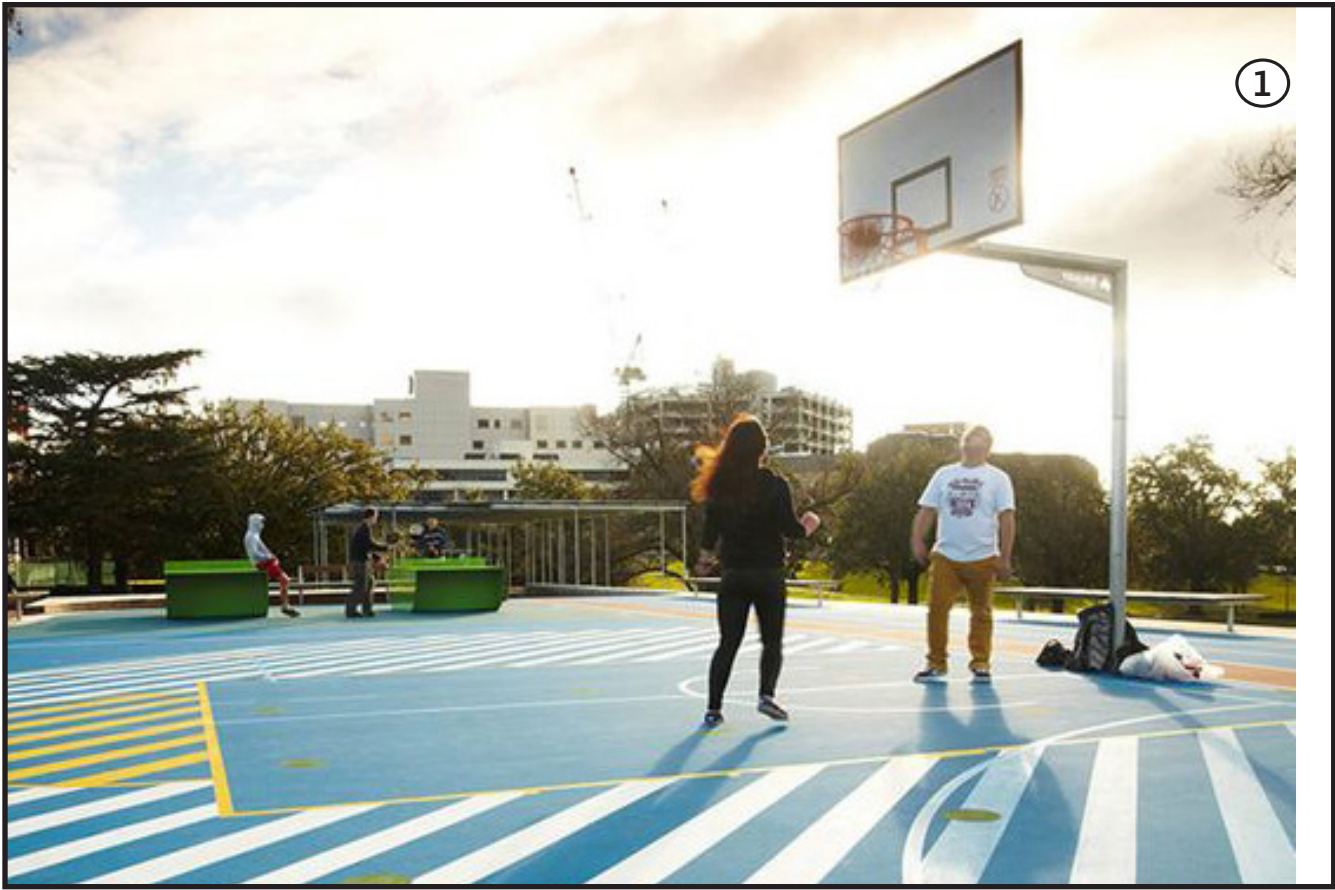
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0 10 20 30 40 50

DATE: 08.06.18
JOB NO: ND1980
DWG NO: AR-CD02
REV: B



LEGEND:	
①	ACTIVITY HUB / PLAYGROUND
②	STORMWATER CATCHMENT
③	FENCED BUSHLAND
④	SHADE STRUCTURE & SEATING NODE
⑤	BOARD-WALK / WETLAND
⑥	LIVING STREAM - REALIGNED DRAIN
⑦	OPEN MANAGED PARKLAND
⑧	FENCED DOG PARK
⑨	PEDESTRIAN PATH NETWORK
⑩	BUSH RE-VEGETATION
⑪	EXISTING PAW
⑫	EXISTING LOTS
⑬	MANAGED BUSHLAND
⑭	OPTION FOR ADDITIONAL PARKING

NOTES:	
1. Concept is indicative only and subject to detailed design.	2. Extent of lighting is to be determined during detailed design.
3. Edges of existing drainage basin to be treated / graded in order to 'make safe'.	4. Revegetation is to be carried out using endemic and / or native species.
5. Irrigation is to be limited to high use areas around activities nodes and play areas.	6. Path network will include cycle path connections, pedestrian paths as well as informal path networks within areas of revegetation.
7. Parking locations and quantities are indicative only and subject to technical advice.	



CAMBRIDGE RESERVE
LANDSCAPE CONCEPT PLAN - WESTERN PORTION

DISCLAIMER
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Figured dimensions shall, to preference to scaled dimensions.
No relevance should be placed on this plan for any financial detailing of the land.



DATE: 08.06.18
JOB NO: ND1980
DWG NO: AR-CD04
REV: A



- LEGEND:**
- ① ACTIVITY HUB / PLAYGROUND
 - ② STORMWATER CATCHMENT
 - ③ FENCED BUSHLAND
 - ④ SHADE STRUCTURE & SEATING NODE
 - ⑤ BOARD-WALK / WETLAND
 - ⑥ LIVING STREAM - REALIGNED DRAIN
 - ⑦ OPEN MANAGED PARKLAND
 - ⑧ FENCED DOG PARK
 - ⑨ PEDESTRIAN PATH NETWORK
 - ⑩ BUSH RE-VEGETATION
 - ⑪ EXISTING PAW
 - ⑫ EXISTING LOTS
 - ⑬ MANAGED BUSHLAND
 - ⑭ OPTION FOR ADDITIONAL PARKING

- NOTES:**
1. Concept is indicative only and subject to detailed design.
 2. Extent of lighting is to be determined during detailed design.
 3. Edges of existing drainage basin to be treated / graded in order to 'make safe'.
 4. Revegetation is to be carried out using endemic and / or native species.
 5. Irrigation is to be limited to high use areas around activities nodes and play areas.
 6. Path network will include cycle path connections, pedestrian paths as well as informal path networks within areas of revegetation.
 7. Parking locations and quantities are indicative only and subject to technical advice.



CAMBRIDGE RESERVE LANDSCAPE CONCEPT PLAN EASTERN PORTION

DISCLAIMER
This plan is conceptual and is for discussion purposes only.
Subject to further detail study, Council approval, engineering input and survey.
Cadastral boundaries, areas and dimensions are approximate only.
Figured dimensions shall, to preference to scaled dimensions.
No relevance should be placed on this plan for any financial detailing of the land.

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0 5 10 15 20 25

DATE: 08.06.18
JOB NO: ND1980
DWG NO: AR-CD05
REV: A

Cambridge Reserve – Community Engagement

Findings and Outcomes Report

Surveys

Overview

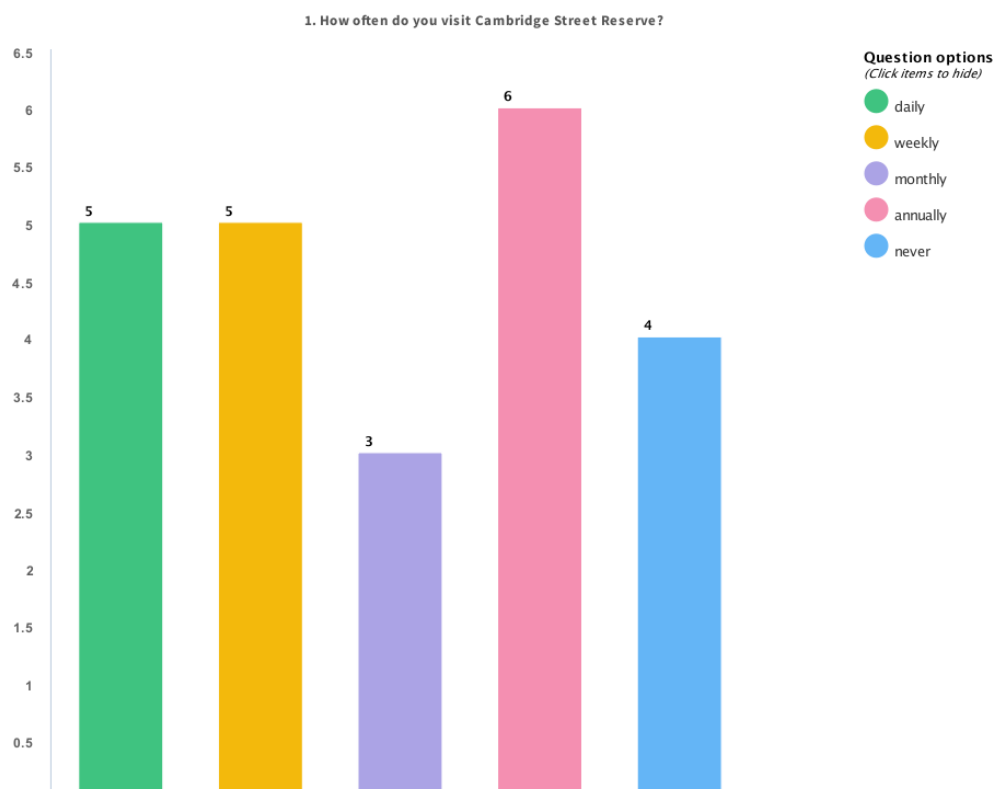
The City of Kalamunda (the City) engaged the community on the future improvement of Cambridge Reserve in Forrestfield. The survey was open from February 2018 to March 2018. Over that time 23 surveys were completed. The survey was responded by 55% female and 45% male (of those that indicated their gender).

The 36-45 age bracket provided the highest number of responses, this was followed by 66-75, all other age age brackets had similar response numbers.

14 of the 23 responses were from people living in Forrestfield. 4 people from Kalamunda, 1 from Lesmurdie, 2 from Gooseberry Hill, 1 from Redcliffe (outside the City) and 1 from Bickley answered the survey.

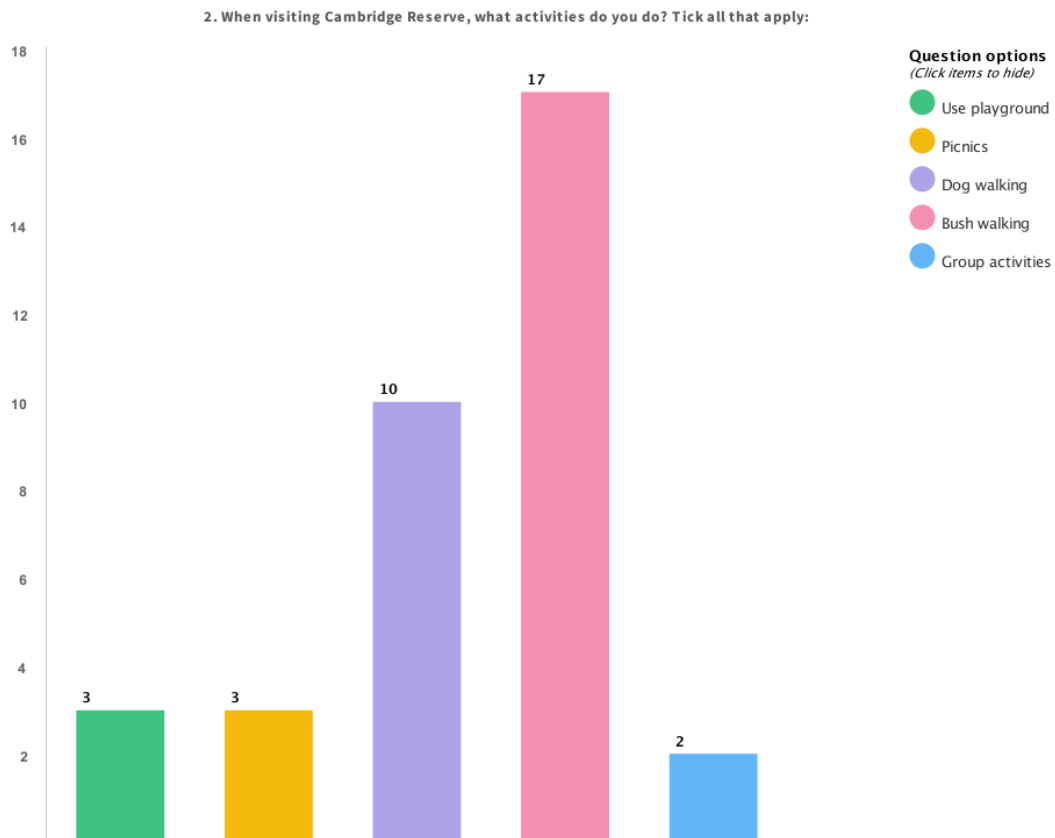
Park Visitation

The frequency which people visit the Reserve was similar for all options, with annually marginally the most common frequency.



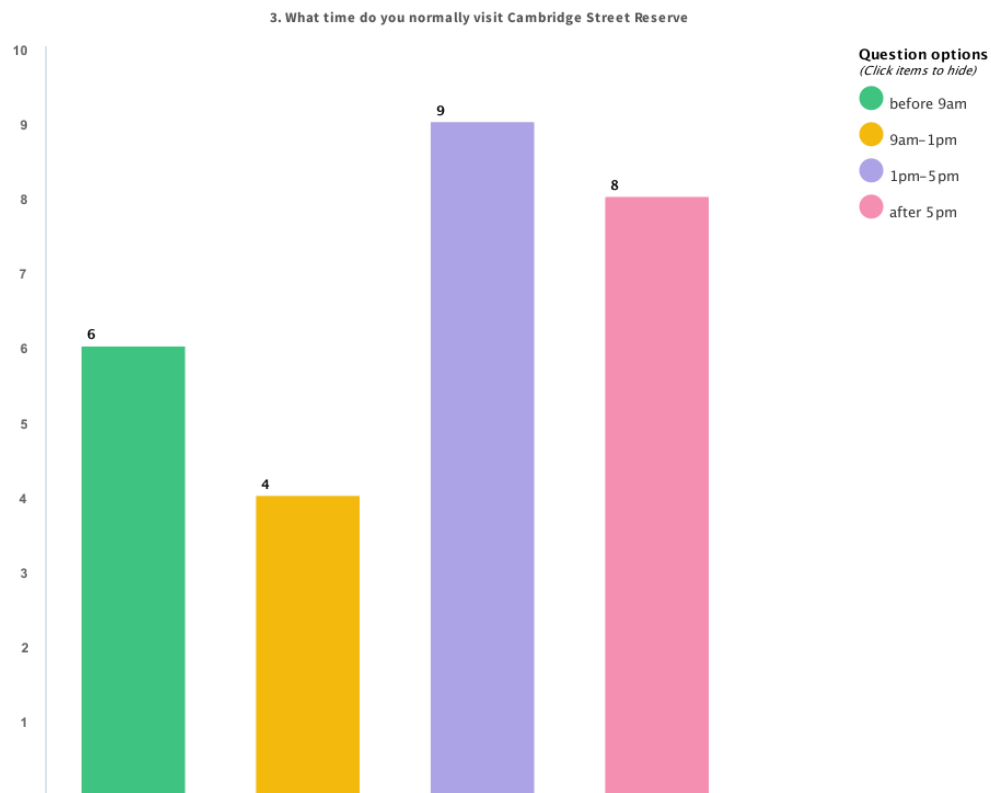
Activities

The most common activity was bush walking by a fair margin, which was followed by dog walking. Playground usage, picnics and group activities appear to be less common activities undertaken at the Reserve.



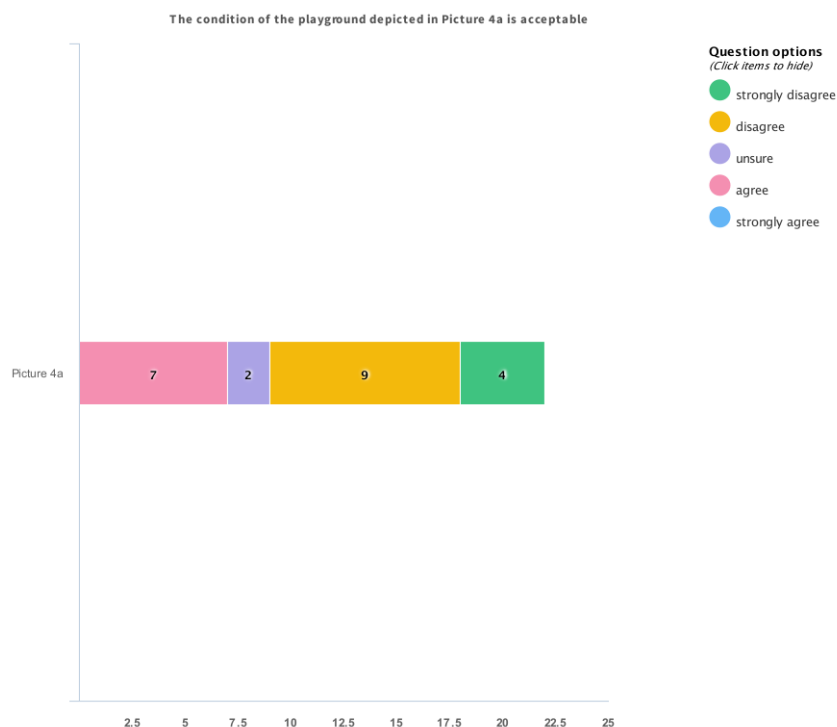
Time

The most common time to visit Cambridge Reserve was between 1-5pm. After 5pm was also a common time to visit the Reserve.

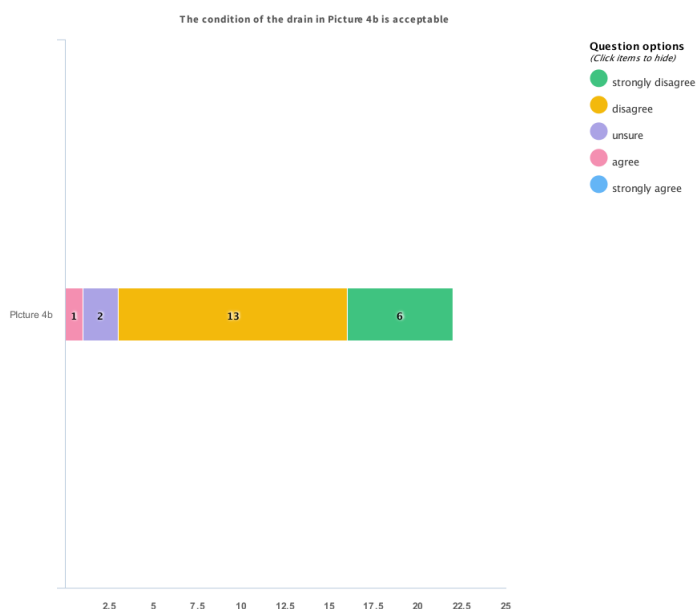


Condition of the Reserve

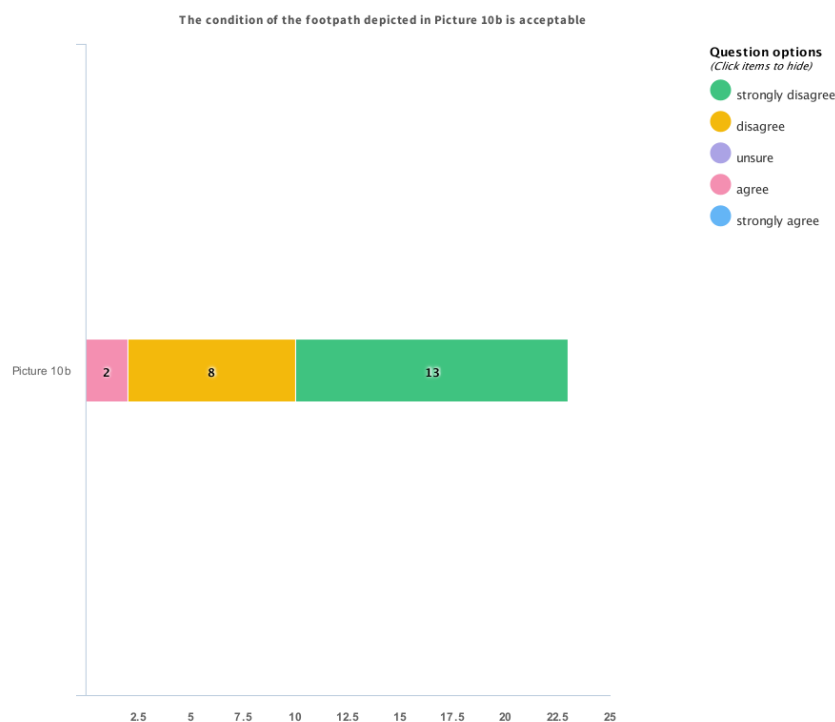
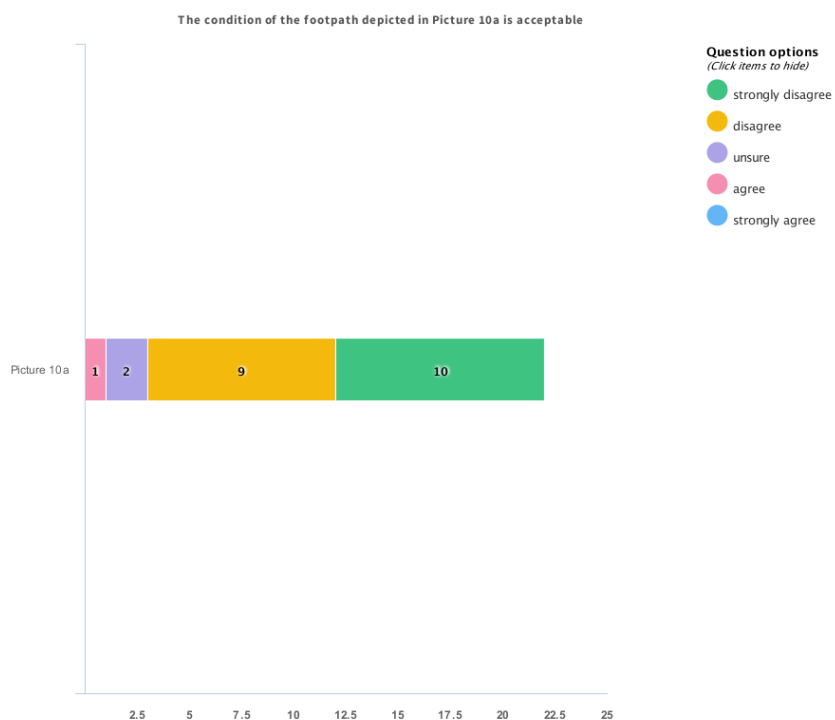
The majority of respondents (59.1%) either disagree or strongly disagree that the playground condition is acceptable.



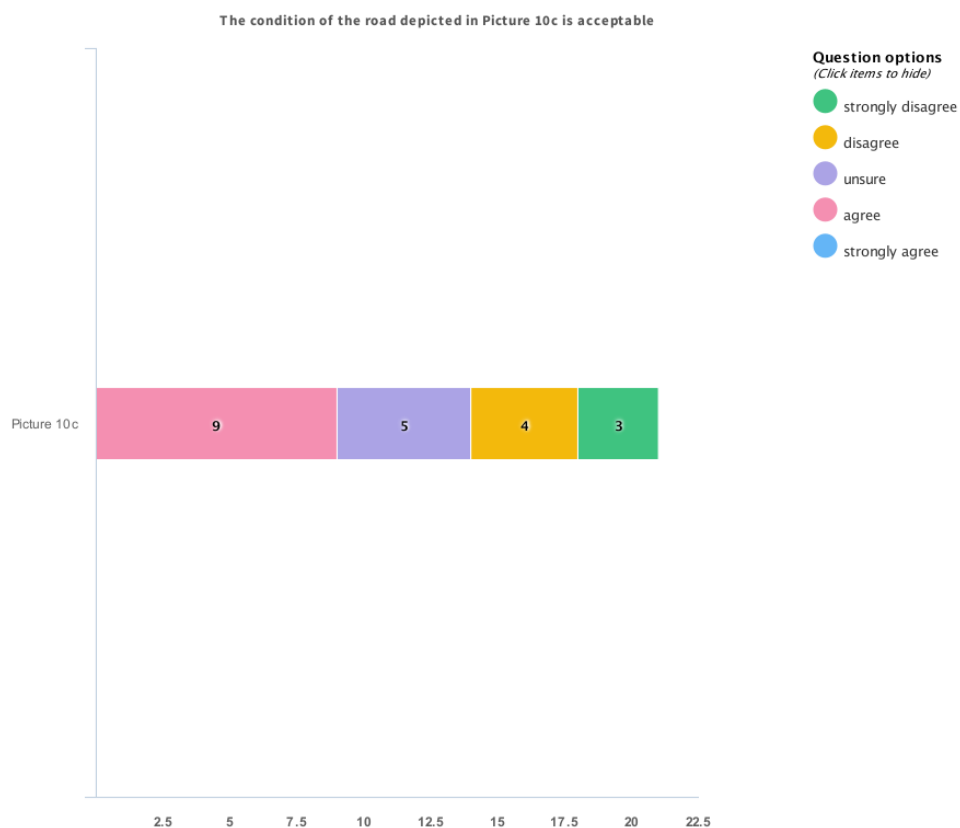
A considerable majority (86.4%) either disagree or strongly disagree that the condition of the drain is acceptable.



A considerable majority of respondents (86.5% for footpath A and 91.3% for footpath B) either disagree or strongly disagree that the condition of footpaths are acceptable.

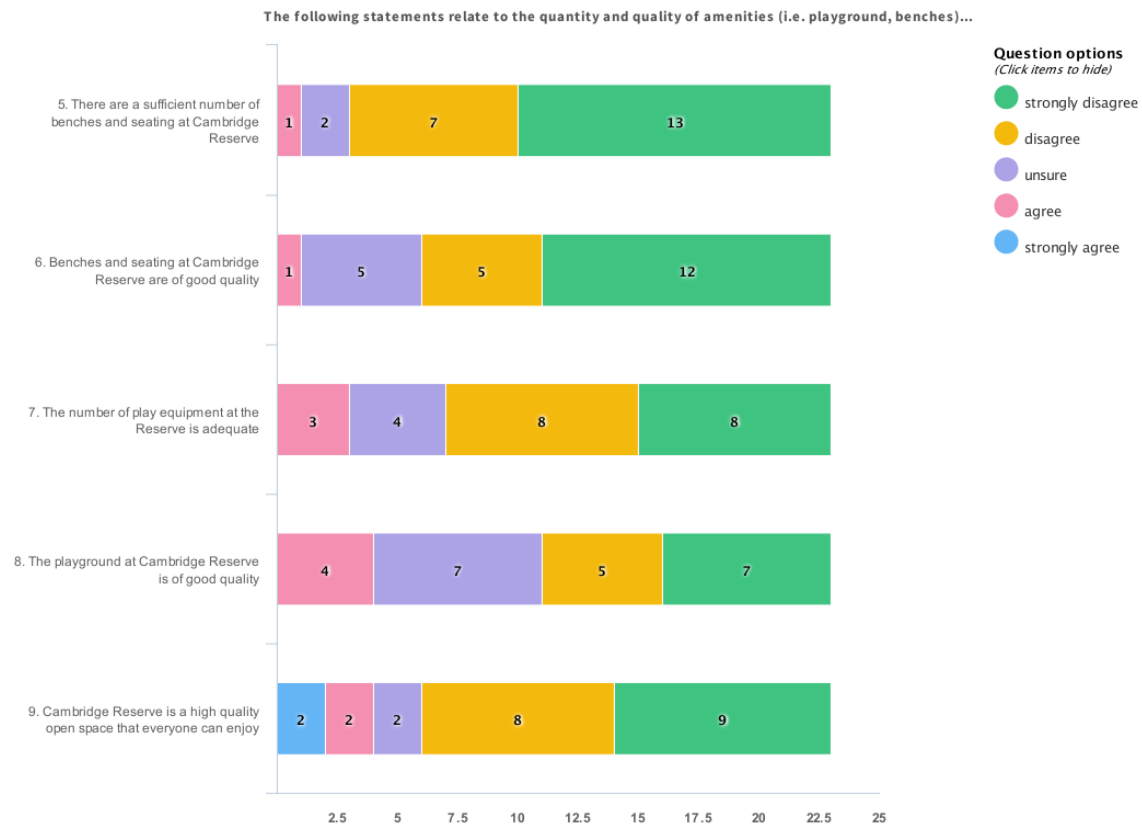


Respondents were more in favour of the condition of the road surrounding the Reserve. 66.7% of respondents either agreed or were unsure whether the condition of the road is acceptable, whereas 33% of respondents either disagreed or strongly disagreed that the condition of the road is acceptable.



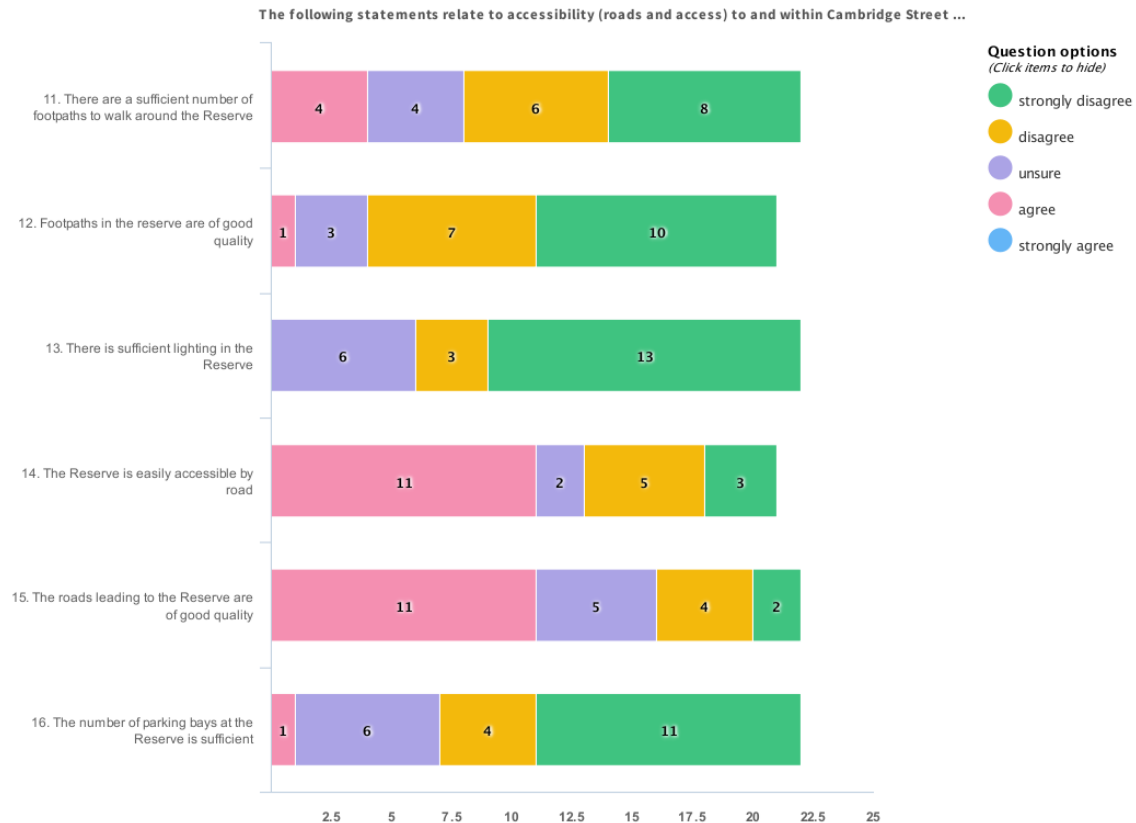
Quality of Amenities

Respondents indicated that the quality of amenities at the Reserve are poor for all categories. 80.9% disagree or strongly disagree that there are sufficient number of seating at the Reserve, 73.9% either disagree or strongly disagree that the seating is of good quality, 69.6% either disagree or strongly disagree that the amount of play equipment is adequate and 73.9% either disagree or strongly disagree that the Reserve is a high quality open space that everyone can enjoy.



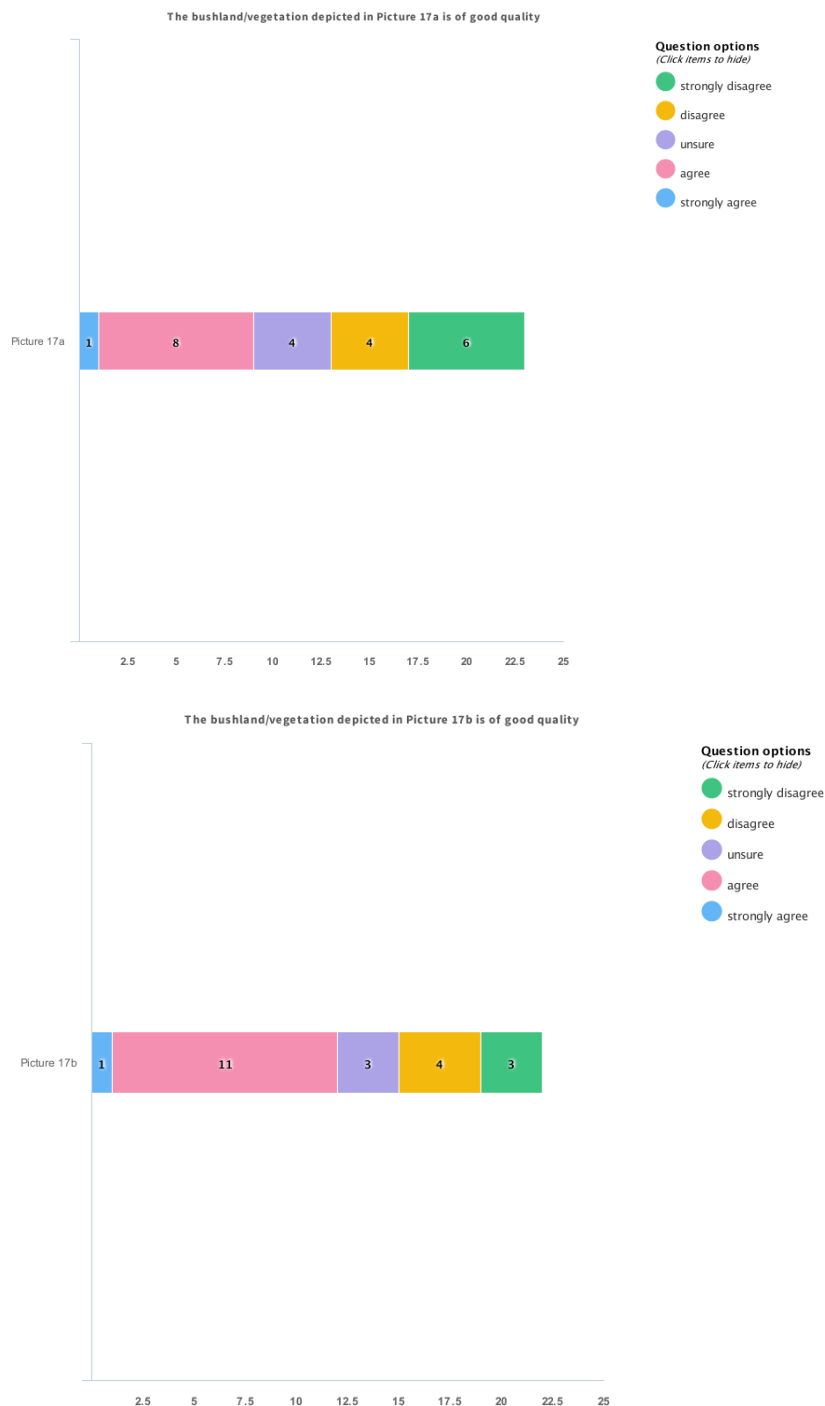
Accessibility

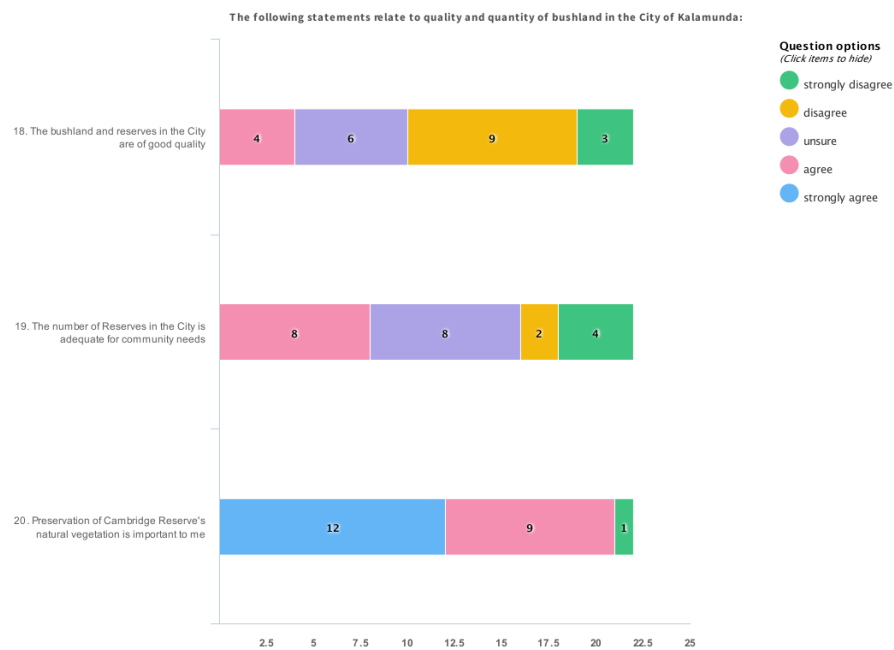
Respondents indicated that the quality of access relating to footpaths, lighting and car parking is of poor quality. Road access however had more favourable results.



Bushland

The views on the quality of bushland in the Reserve was mixed and was the view of the quality and quantity of reserves throughout the City. It was clear from respondents that the preservation of bushland on the Reserve is important for the community with 95% of respondents stating its importance.





Values

The following lists in order the most common themes the community stated they value about the Reserve:

1. Bushland / Natural Feel
2. Walking / Trails
3. Nothing
4. Waterbody / Lake
5. Quietness
6. Proximity to Home
7. Size
8. Dog Walking
9. Family Orientated
10. Playground

Improvements

The following lists in order the most common themes the community stated they said would like to see improved at the Reserve:

1. Pedestrian / Cycling Pathways
2. Weed Control / Better Maintenance
3. Nature Play / Play Equipment
4. Seating
5. Shade / Shelter
6. Retain Bushland / Vegetation Planting
7. Lighting
8. Prevent Vehicle / Motorbike Access
9. Toilets
10. BBQs

Priorities

Respondents were asked to allocate \$100 to the following items at the reserve for improvement:

- Play Equipment
- Shade / Shelter
- Toilets
- Seating
- BBQs

Seating had the highest average allocation of \$26.78, followed by play equipment \$22.68, shade / shelter \$22.53, BBQs \$17.92 and toilets \$17.09.

Additional Comments

Respondents were asked to add anything else they wished to comment on. The most common additional comments received were regarding the importance of retaining bushland, improvement of amenities, better maintenance and the potential for the site to be used as an aged care site.

Workshop

A workshop was undertaken onsite at Cambridge Reserve on 28 February 2018. The workshop allowed the community to see the Reserve and provide ideas and concerns.

Refer to Appendix 1 and 2 for the summary and notes.

Information Stalls

During February the City set up information stalls for the Reserve, handing out surveys and gathering the community's ideas. The stalls were set up at Forrestfield District Shopping Centre.

The themes and ideas the community mentioned included the following:

- Improved pathways
- Better maintenance
- Retain and enhance the bushland
- Green space
- Prevent vehicle and motorbike access to the park
- Use a portion of the site for aged care
- Improved playground
- More shade / shelter

Submissions

A total of 4 submissions were received during the public advertising period, and are taken into consideration as part of the concept planning for Cambridge Reserve.

The key theme that was expressed by the submissions was utilising a portion of the Reserve for aged care. The site has previously been flagged as an aged care site and submissions requested this option be considered as part of the concept planning.

Appendix 1 – Workshop Notes



CAMBRIDGE ROAD RESERVE ENGAGEMENT NOTES

**Public engagement workshop undertaken: Wednesday, 28 February from
3:30pm -
5:45pm at Cambridge road reserve**

Emotional Mapping

- Stronger communications about preservation i.e. plaques about wildlife, boxes in trees, etc
- This is a much better way to engage then previous attempts
- Make something happen and keep in touch!
- I like natural aspect (trees, natural shrubs)
- Happy – Restoration of Shrubbery
- Happy – Natural feel of park
- Sad – Storm drain not working and causes flooding in winter
- Sad – Poor maintenance of laneway
- Happy – Trail leads to Lesmurdie Falls – Needs improved wayfinding to find track
- Sad – Unauthorised vehicles entering park
- Happy – park playground
- Sad – Only part of park not green
- Happy – Quietness
- Sad – Needs better maintenance
- Confused – Not sure what happened to BMX track – attracted people
- Happy – Natural areas for playing – not very common anymore in most parks
- Happy – love the area around the lake – better paths would be great
- Unsure – keep drains clean
- Happy – lake, ducks and wildlife
- Happy – playing in mud
- Confused – Boxes in Trees
- Happy – bike riding

Ideas Mapping

- Everything is currently balanced, keep the same
- Love natural wildlife, don't want to disturb
- Create a general active area near existing playground i.e. Tomato Lake
- Irrigate and keep the rest of the area natural
- Seating
- Lighting in play area (if you want open after dark)
- Larger playground and playground – no toilets
- Pop-up café – maybe in stage 2 once park becomes more popular

- Improved grass area with BBQ – paths and natural plantings
- Mini soccer pitch and half court basketball – drink fountain – don't want to annoy residents
- Signage with info about wildlife – plants to look out for
- Sheltered areas – sealed natural paths for walking and riding, BBQ, etc
- Fountain for ppl and dogs
- Natural Play Area
- Natural filtration of lake – protect dogs using in Winter
- Bins and seating
- Tidy lake , water feature, sculpture, BBQ, paths
- Mountain bike trail around park
- Understore planting under trees which were planted many years ago
- Pathways better maintained
- Dog exercise area – where appropriate
- Keep trees – Attracts bird life
- Would be good to see some of the area used for development of aged care
- Natural sealed path around park for prams, etc
- Pipe drainage areas – maybe lake will be filled for longer periods
- Signs to keep dogs on leads – don't agree
- Would like mechanisms to keep unauthorised vehicles out (bollards, signs, etc)
- Bins and seating
- Ranger to monitor wildlife
- Kids hide and seek
- Generally keep natural, be mindful and preserve wildlife
- Maybe look at kiosk if opportunity arises
- Like wild bush

Choose Top 5 Ideas

Idea	Tally
Dirt BMX	3
Mountain Bikes	3
Play Equipment	2
Nature Play	4
Open Space Lawns	8
BBQ	7
Natural plantings and hangout spaces	5
Improved lighting	10
Water Sensitive Urban Design	6
Shade and Seating	8
Walking Trails and Improved Footpaths	19

Pet Friendly	16
Park Kiosk	4
Drinking Fountain	7
Kids Activities	7
Community Garden	3
Flying Fox and Adventure Play	7
Exercise Equipment	3
Toilets	4
Public Sculptures	3
Basketball Half Court	13
Soccer Mini Pitch	8
Bins	6

Other ideas: cross-country track for runners, more green areas, more natural areas, a nice dog track, swings, keep native bush, fenced dog area

General Brainstorming Notes

- Too many delays in residential zoning
- Don't cut down trees
- Maintenance
- Today was the best grass cutting we've seen. Normally we need to poison areas next to our fence
- Pathways for prams
- Kids love the wild bushland
- Prefer no toilets
- Doggy bags for pet waste
- Free range for pets
- I like there being neighbourhood parks in Forrestfield due to increased living density (no backyards)
-

Appendix 2 – Workshop Summary



CAMBRIDGE ROAD RESERVE ENGAGEMENT SUMMARY

Report prepared on: 2 March 2018

**Public engagement workshop undertaken: Wednesday, 28 February from
3:30pm – 5:45pm at Cambridge road reserve**

The public engagement workshop provided fairly clear and consistent reporting from the community without too much general debate about development of the reserve as public open space. In general, the community communicated the following as a priority for development:

- Appreciate the current natural feel of the reserve and would like to see this maintained and protected without the loss of any trees or wildlife.
- A majority of people identified the open area near the children's playground as more of an active and social community space with barbeques, native plantings, a large grassed area, seating, shade and possibility of a half-court basketball court and mini soccer pitch.
- Better maintenance of existing trails throughout the park with a preferred desire for sealed areas that have a natural feel for prams, scooters and people with disabilities.
- On-going regular maintenance of the entire reserve and laneways leading to the park.
- A fenced dog area with drinking fountain, natural play area and better maintenance of the open drain were also desired.

Although the above is a general recollection from the written notes, there were a few residents who live opposite the reserve on Cambridge Road who prefer the park as it is due to its quietness, natural feel and abundance of wild life. They believe any development of the reserve will compromise the natural balance, existing amenity and attract too many people.

Below is a brief summary of the five engagement boards.

Emotional Mapping:

Elements of the park, which made people feel happy are mostly revolved around the natural feel of the park, using the existing trails, the quietness, wildlife (including the ducks, which use the lake) and restoration of a patch of shrubbery.

Elements that make people feel sad are generally about the poor maintenance of the park, which includes the open drain, which causes flooding in winter, mowing of the grassed area, laneways leading to the park, the grassed area around the play equipment and trails throughout the park.

The participants also felt confused about some of the previous decisions, which were allegedly not communicated very well and include the 'bird feeding boxes in trees', demolition of the

independently made dirt BMX tracks and felt some better signage and letter drops could resolve these matters.

In general, participants also acknowledged that they are much happier with this engagement program and would like to be kept in touch in regard to the progress of any development.

Ideas Mapping:

There are many different ideas to develop the park, however in general most people agreed the reserve needs to maintain its natural uniqueness. There was some debate over ideas such as:

- Sealed or unsealed pathways;
- Lighting or no lighting;
- Toilets or no toilets
- Allowing dogs off leads or having a fenced area (most people agreed with having a fenced area)
- Pop-Up café

Popular ideas included:

- Creating a general active area near the child's playground
- Paths around the park
- Kids play area – natural, hide and seek and/or larger equipment
- Seating
- Native Plantings
- Pipe drainage areas.

Top 5 Ideas:

Having people prioritise their favourite ideas is a great way to better understand what is really important to people. The most popular ideas for developing the park include:

Walking Trails and Improved Footpaths	19
Pet Friendly	16
Basketball Half Court	13
Improved lighting	10
Open Space Lawns	8
Shade and Seating	8
Soccer Mini Pitch	8

It is noted that there was a family with a few kids who may have skewed the waiting of the basketball half court and soccer pitch, however regardless they were still popular items.

General Brainstorming Notes:

The brainstorming notes mostly reiterated the other engagement presentation boards, however there were a few interesting comments including:

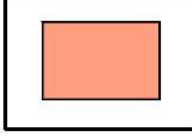
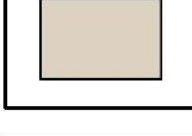
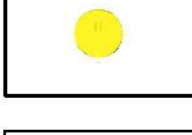

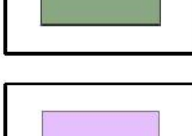


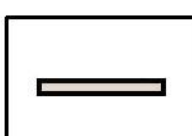

- Too many delays in residential zoning
- Doggy bags for pet waste
- I like there being neighbourhood parks in Forrestfield due to increased living density (no backyards)
- Today was the best grass cutting we've seen. Normally we need to poison areas next to our fence

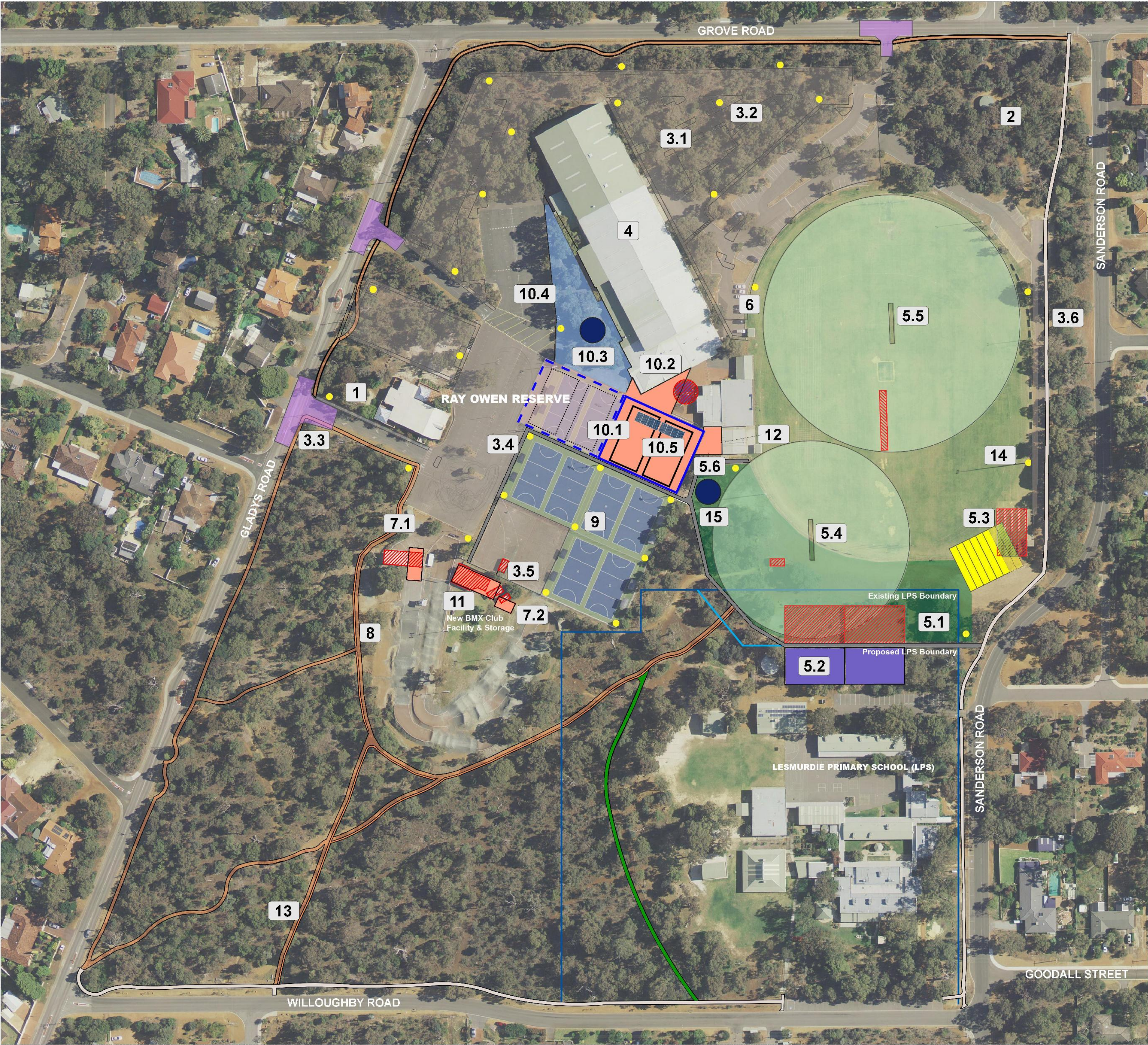
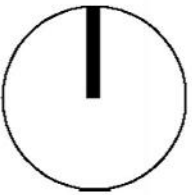
Shire of Kalamunda - Ray Owen Reserve Master Plan



shire of
kalamunda

LEGEND

-  Demolished Buildings/Structures
-  New Buildings & Extensions
-  New Parking Expansion
-  New Lighting
-  New Dual Use Pathways
-  Upgrade Existing Gravel Paths
-  Existing LPS Boundary
-  Proposed LPS Boundary
-  New Turf Expansion
-  Driveway Entrance Upgrade
-  Potential Second Stage of Indoor Courts
-  New/Relocated Playground
-  Relocated School Outdoor Court
-  Priority Pram Passable Trail
-  Track along LPS fence: student access
-  Concrete Paths



Summary of Facility Developments

- Power upgrade to the site
- Water supply upgrade to the site
- Parking and Access Expansion subject to Environmental Impact Assessment and Detailed Parking Study
 - Parking area expansion
 - Lighting to all parking areas
 - Upgrade entrances
 - Anti-hooring treatments to all parking areas
 - Formalise old netball court car park
 - Formalise old fire track parking and provide separation barrier for pathway
- Install ventilation/air circulation equipment to the indoor courts
- Develop turf expansion area including:
 - Oval Turf Expansion subject to Environmental Impact Assessment
 - Relocation of Lesmurdie Primary School outdoor courts
 - New practice nets (6 short term + 2 long term)
 - New cricket wicket
 - Relocate current wicket
 - Public toilets
- Install new floodlighting to the Oval
- New BMX Start Ramp and Storage
 - 5m Start Ramp
 - Equipment Storage Shed
- Undertake enhanced protection measures of bushland from BMX run off
- Install floodlighting to outdoor netball courts
- Ray Owen Sports Centre expansion
 - Develop new indoor courts, potentially staged.
 - Supporting facilities including additional administration space, changerooms and storage
 - Playground relocation
 - External entrance upgrade (i.e. landscaping, paving, awning, public artwork etc)
 - Possible PV solar system
- New BMX Clubroom facility
- Develop new football/cricket away team changeroom and physio rooms
- Upgrade existing trails and develop new pathways including rest stops, fencing in sensitive areas and interpretive signage.
- Redevelopment of existing oval turf sub-grade.
- New/Relocated Playground

Concept Site Master Plan - As Proposed

Scale Approx. 1:1250/A1 & 1:2500/A3

Date: January 2015

Drg. No: P14002. SK.01. Rev:8



RAY OWEN RESERVE PROPOSED CARPARK & DRAINAGE

city of
Kalamunda



SHEET INDEX	
DRAWING No.	DESCRIPTION
4235-01/0	OVERALL CONCEPT PLAN
4235-02/0	CONCEPT PLAN - STAGE 1
4235-03/0	CONCEPT PLAN - STAGE 2
4235-04/0	CONCEPT PLAN - STAGE 3 (1 OF 2)
4235-05/0	CONCEPT PLAN - STAGE 3 (2 OF 2)
4235-06/0	CONCEPT PLAN - STAGE 4

MAZENOD JUNIOR FOOTBALL CLUB

[Signature]
VICE PRESIDENT, IVAN ADRIANO
20/11/18

LESMURDIE MAZENOD JUNIOR CRICKET CLUB

[Signature]
PRESIDENT, NEIL WARDEN
8/11/18

CLUB / ORGANISATION NAME:
KALAMUNDA DISTRICT BASKETBALL ASSOCIATION
REPRESENTATIVE DETAILS:
SIGNATURE: *[Signature]*
NAME: PETER HANSON
POSITION HELD: PRESIDENT
DATE: 1/11/2018

CLUB / ORGANISATION NAME:
KALAMUNDA DISTRICT NETBALL ASSOCIATION
REPRESENTATIVE DETAILS:
SIGNATURE: *[Signature]*
NAME: NICOLE MCKENNEY
POSITION HELD: PRESIDENT
DATE: 20/11/18

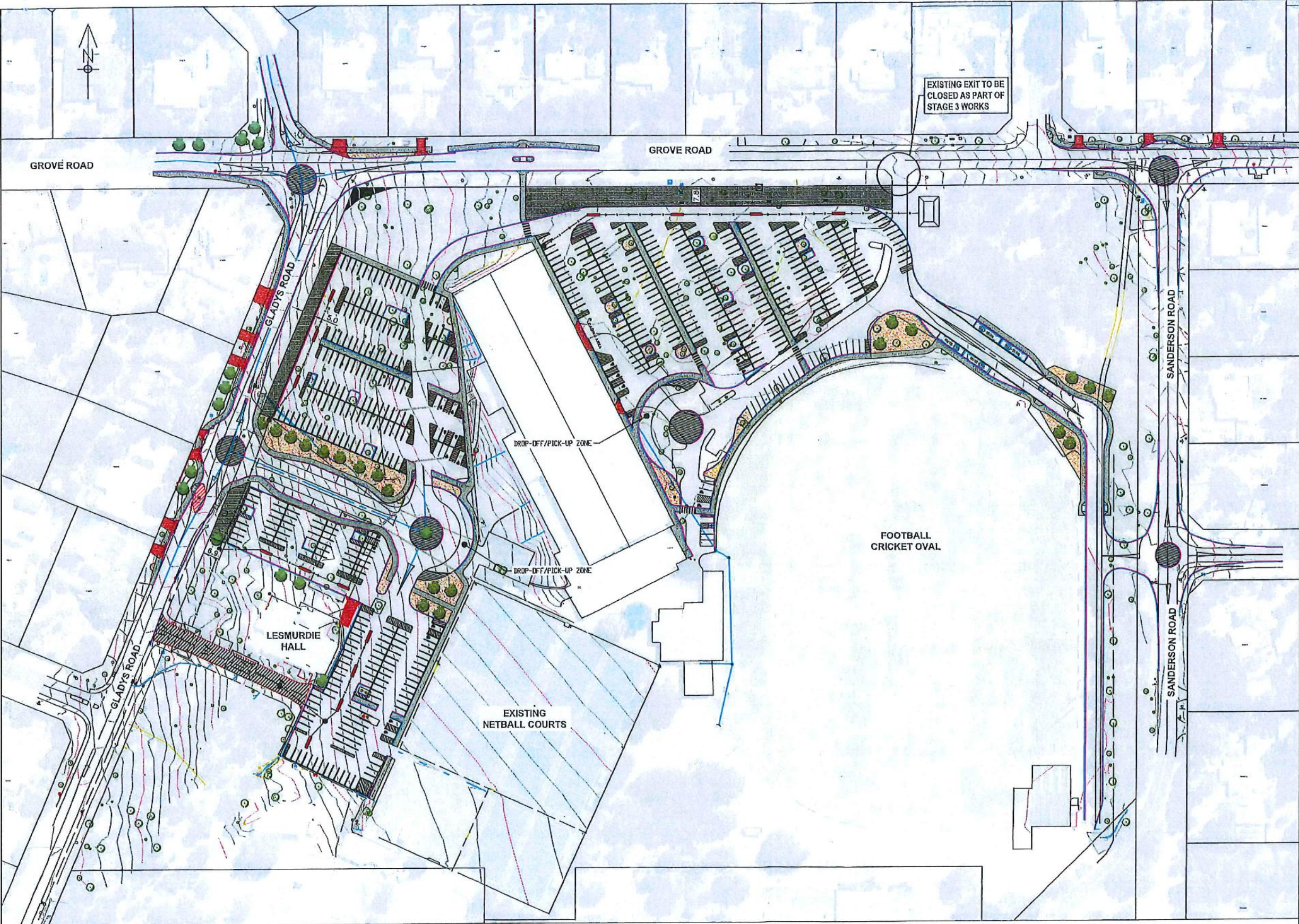
CLUB / ORGANISATION NAME:
LESMURDIE MAZENOD CRICKET CLUB
REPRESENTATIVE DETAILS:
SIGNATURE: *[Signature]*
NAME: BUSTER AAMOT
POSITION HELD: PRESIDENT
DATE: 20/11/2018

CLUB / ORGANISATION NAME:
KALAMUNDA AND DISTRICTS FOOTBALL CLUB
REPRESENTATIVE DETAILS:
SIGNATURE: *[Signature]*
NAME: BEAU BARRETT
POSITION HELD: PRESIDENT
DATE: 22/11/2018

CLUB / ORGANISATION NAME:
HILLS BMX
REPRESENTATIVE DETAILS:
SIGNATURE: *[Signature]*
NAME: MATT CLANCY LIBBY
POSITION HELD: PRESIDENT
DATE: 1/11/18

CLUB / ORGANISATION NAME:
FRIENDS OF RAY OWEN GROUP
REPRESENTATIVE DETAILS:
SIGNATURE: *[Signature]*
NAME: BRUCE GLOVER
POSITION HELD: PRESIDENT
DATE: 1/11/2018

CLUB / ORGANISATION NAME:
LESMURDIE PRIMARY SCHOOL
REPRESENTATIVE DETAILS:
SIGNATURE: *[Signature]*
NAME: RITCHIE GRIFFITHS
POSITION HELD: PRINCIPAL
DATE: 8/11/18



LEGEND

- PROPOSED KERBING MK-MOUNTABLE KERB
- PROPOSED PRAM RAMP
- PROPOSED FOOTPATH
- EXISTING VEGETATION BUFFER
- RAISED ROAD ISLAND
- PROPOSED MULCH
- PROPOSED CONCRETE CROSSOVER
- PROPOSED RED FLOWERING GUM
- PROPOSED MARKING PARKING ROW (NUMBER OF BAYS AVAILABLE - 507 and 8 BUS BAYS)
- PROPOSED MARKING DISABLE PARKING ROW (NUMBER OF BAYS AVAILABLE - 20)
- PROPOSED MARKING TRAILER PARKING ROW (NUMBER OF BAYS AVAILABLE - 8)
- PROPOSED SIDE ENTRY PIT
- PROPOSED STORMWATER DRAINAGE CELL
- PROPOSED DRAINAGE
- EXISTING FENCE
- EXISTING FOOTPATH
- EXISTING KERBING
- EXISTING CADASTRAL BOUNDARY
- EXISTING ONE POST SIGN FACING ONE DIRECTION
- EXISTING SERVICE LP
- EXISTING DRAIN MH CONC. CIRC.
- EXISTING SERVICE METER
- EXISTING SERVICE TELSTRA PIT
- EXISTING TREE
- EXISTING DRAIN GULLY
- EXISTING DRAIN SIDE ENTRY PIT
- EXISTING SERVICE SEWER MH
- EXISTING SERVICE MAILBOX
- TO BE UNDERTAKE AS SEPARATE PROJECTS

- NOTES:**
1. TRAFFIC CALMING TO BE INCORPORATED WITH DETAILED DESIGN
 2. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE SPECIFICATION AND REQUIREMENTS OF THE LOCAL GOVERNMENT.
 3. ALL CONSTRUCTION SHALL MAKE SMOOTH CONNECTION TO EXISTING WORK.
 4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPORT OF ALL EXISTING SERVICES. WHERE SERVICES CROSS, THE UPPER SERVICE SHALL BE PROVIDED WITH A SUITABLE SUPPORT AS REQUIRED, BY THE RELEVANT SERVICE AUTHORITY MANUAL.
 5. ALL DRAWING DETAILS LIKE PROPOSED: KERB MK - DWG NO: , FOOTPATH, CROSSOVER - DWG NO: 1/3, PRAM-RAM, - DWG NO: SHEET 12/30 AND DWG NO: SHEET 4/30, ENTRY PIT - DWG NO: 17/30, GULLY PIT - DWG NO: STD-DRO1-01/A, - AS THE SPECIFICATION (STANDARD DRAWINGS) AND REQUIREMENTS OF THE CITY OF KALAMUNDA.


PRELIMINARY
UNCHECKED

CONCEPT
ONLY

WARNING
SERVICES AND CADASTRAL BOUNDARY
LOCATIONS ARE ONLY INDICATIVE AND
MUST NOT BE USED FOR EXCAVATION.
THE "ONE CALL 1100" SYSTEM SHALL BE
USED TO OBTAIN ACCURATE SERVICE
LOCATIONS.



PLAN



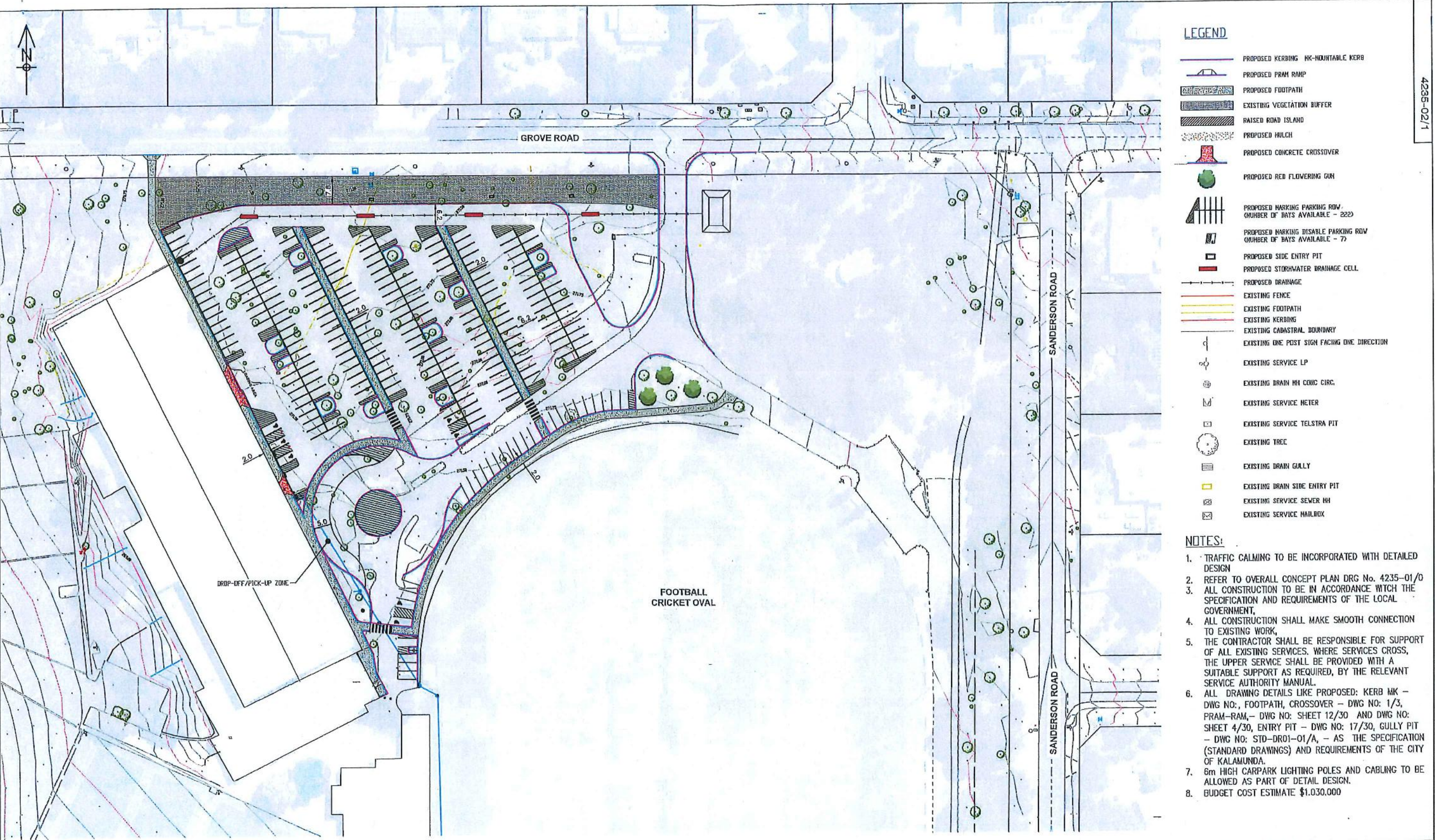
ASSET SERVICES
RAY OWEN
PROPOSED CARPARK & DRAINAGE
LESMURDIE
OVERALL ULTIMATE CONCEPT PLAN

REVISION				REVISION				REVISION			
NO.	DESCRIPTION	BY	DATE	AUTH	NO.	DESCRIPTION	BY	DATE	AUTH	NO.	DESCRIPTION
0	ISSUED FOR CONCEPT ENGAGEMENT	CC	11/09/18	UP							
1	TWO-THREE DESIGN NOTE ADDED	CC	11/10/18	UP							

SCALE	75 0 75 150 225 300 375
1:750	
SCALE IN METERS	
DATE	AND
PC091	

DRAWN BY	C. CARRILLO	DATE	01/09/2018
CHECKED BY	R. KORNHOF	DATE	20/09/2018
DESIGNED BY	L. PUDHOTA	DATE	20/09/2018
COORDINATOR	B. JACKSON	DATE	02/10/2018

PROJECT NO.	4235-01/1
CLIENT	CI
STRUCTURE CODE	420
DATE	02/10/2018
BY	RAY OWEN



- LEGEND**
- PROPOSED KERBING HK-MOUNTABLE KERB
 - PROPOSED PRAM RAMP
 - PROPOSED FOOTPATH
 - EXISTING VEGETATION BUFFER
 - RAISED ROAD ISLAND
 - PROPOSED MULCH
 - PROPOSED CONCRETE CROSSOVER
 - PROPOSED RED FLOWERING GUN
 - PROPOSED MARKING PARKING ROW NUMBER OF BAYS AVAILABLE - 222
 - PROPOSED MARKING DISABLE PARKING ROW NUMBER OF BAYS AVAILABLE - 7
 - PROPOSED SIDE ENTRY PIT
 - PROPOSED STORMWATER DRAINAGE CELL
 - PROPOSED DRAINAGE
 - EXISTING FENCE
 - EXISTING FOOTPATH
 - EXISTING KERBING
 - EXISTING CADASTRAL BOUNDARY
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 - EXISTING TREE
 - EXISTING DRAIN GULLY
 - EXISTING DRAIN SIDE ENTRY PIT
 - EXISTING SERVICE SEWER MH
 - EXISTING SERVICE HAILBOX

- NOTES:**
- TRAFFIC CALMING TO BE INCORPORATED WITH DETAILED DESIGN
 - REFER TO OVERALL CONCEPT PLAN DRG No. 4235-01/0
 - ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE SPECIFICATION AND REQUIREMENTS OF THE LOCAL GOVERNMENT.
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 - 6m HIGH CARPARK LIGHTING POLES AND CABLING TO BE ALLOWED AS PART OF DETAIL DESIGN.
 - BUDGET COST ESTIMATE \$1,030,000

PLAN

PRELIMINARY
UNCHECKED

CONCEPT
ONLY

WARNING
SERVICES AND CADASTRAL BOUNDARY LOCATIONS ARE ONLY INDICATIVE AND MUST NOT BE USED FOR EXCAVATION. THE "ONE CALL 1100" SYSTEM SHALL BE USED TO OBTAIN ACCURATE SERVICE LOCATIONS.

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city of
Kalamunda

ASSET SERVICES

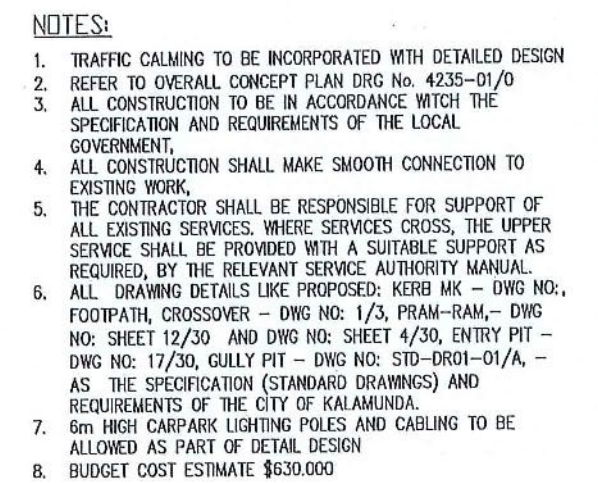
RAY OWEN

PROPOSED CARPARK & DRAINAGE
LESMURDIE

CONCEPT PLAN - STAGE 1

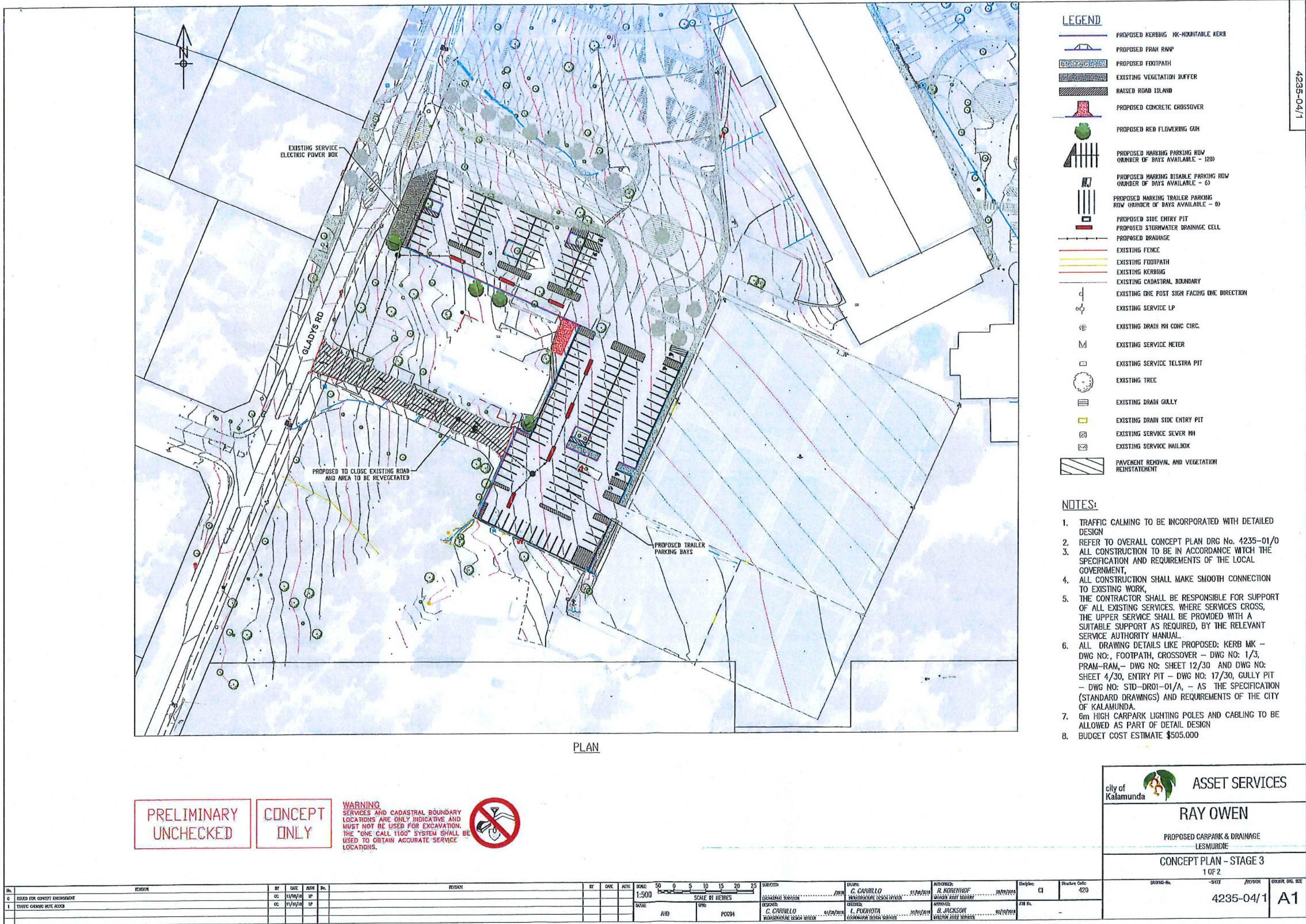
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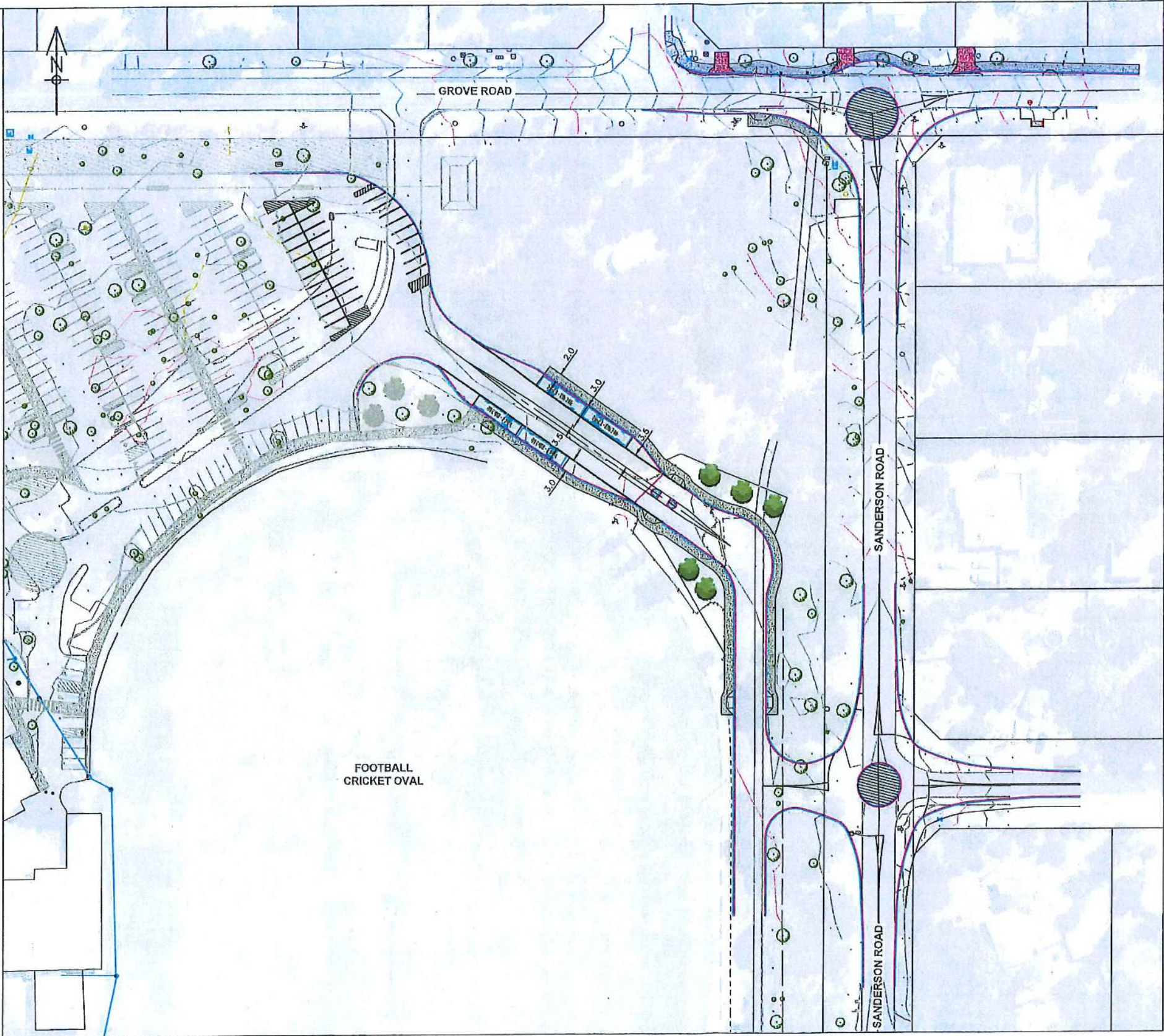
A1



WARNING
SERVICES AND CADASTRAL BOUNDARY
LOCATIONS ARE ONLY INDICATIVE AND
MUST NOT BE USED FOR EXCAVATION.
THE "ONE CALL 1100" SYSTEM SHALL
BE USED TO OBTAIN ACCURATE SERVICE
LOCATIONS.

[illegible]





PLAN

LEGEND

- PROPOSED KERBING HK-MOUNTABLE KERB
- PROPOSED PRAM RAMP
- PROPOSED FOOTPATH
- EXISTING VEGETATION BUFFER
- RAISED ROAD ISLAND
- PROPOSED CONCRETE CROSSOVER
- PROPOSED RED FLOWERING GUM
- PROPOSED PARKING PARKING ROW (NUMBER OF BAYS AVAILABLE - 34 and 4 BUS BAYS)
- PROPOSED PARKING DISABLE PARKING ROW (NUMBER OF BAYS AVAILABLE - 6)
- PROPOSED SIDE ENTRY PIT
- PROPOSED STORMWATER DRAINAGE CELL
- PROPOSED DRAINAGE
- EXISTING FENCE
- EXISTING FOOTPATH
- EXISTING KERBING
- EXISTING CADASTRAL BOUNDARY
- EXISTING ONE POST SIGN FACING ONE DIRECTION
- EXISTING SERVICE LP
- EXISTING DRAIN IN CONC. CIRC.
- EXISTING SERVICE METER
- EXISTING SERVICE TELSTRA PIT
- EXISTING TREE
- EXISTING DRAIN GULLY
- EXISTING DRAIN SIDE ENTRY PIT
- EXISTING SERVICE SEWER MH
- EXISTING SERVICE MAILBOX
- PAVEMENT REMOVAL AND VEGETATION REINSTATEMENT

NOTES:

1. TRAFFIC CALMING TO BE INCORPORATED WITH DETAILED DESIGN
2. REFER TO OVERALL CONCEPT PLAN DRG No. 4235-01/0
3. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE SPECIFICATION AND REQUIREMENTS OF THE LOCAL GOVERNMENT.
4. ALL CONSTRUCTION SHALL MAKE SMOOTH CONNECTION TO EXISTING WORK.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPORT OF ALL EXISTING SERVICES. WHERE SERVICES CROSS, THE UPPER SERVICE SHALL BE PROVIDED WITH A SUITABLE SUPPORT AS REQUIRED, BY THE RELEVANT SERVICE AUTHORITY MANUAL.
6. ALL DRAWING DETAILS LIKE PROPOSED: KERB MK - DWG NO: 1/3, FOOTPATH, CROSSOVER - DWG NO: 1/3, PRAM-RAM, - DWG NO: SHEET 12/30 AND DWG NO: SHEET 4/30, ENTRY PIT - DWG NO: 17/30, GULLY PIT - DWG NO: STD-DRO1-01/A, - AS THE SPECIFICATION (STANDARD DRAWINGS) AND REQUIREMENTS OF THE CITY OF KALAMUNDA.
7. 6m HIGH CARPARK LIGHTING POLES AND CABLING TO BE ALLOWED AS PART OF DETAILED DESIGN
8. BUDGET COST ESTIMATE \$505,000


PRELIMINARY
UNCHECKED

CONCEPT
ONLY

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REVISION					REVISION					REVISION				
No.	BY	DATE	APPROV	DESCRIPTION	No.	BY	DATE	APPROV	DESCRIPTION	No.	BY	DATE	APPROV	DESCRIPTION
0	CC	13/04/18	LP	ISSUED FOR CONCEPT EXHIBITION										
1	CC	11/10/18	LP	TRAFFIC CALMING HERE ADDED										



ASSET SERVICES

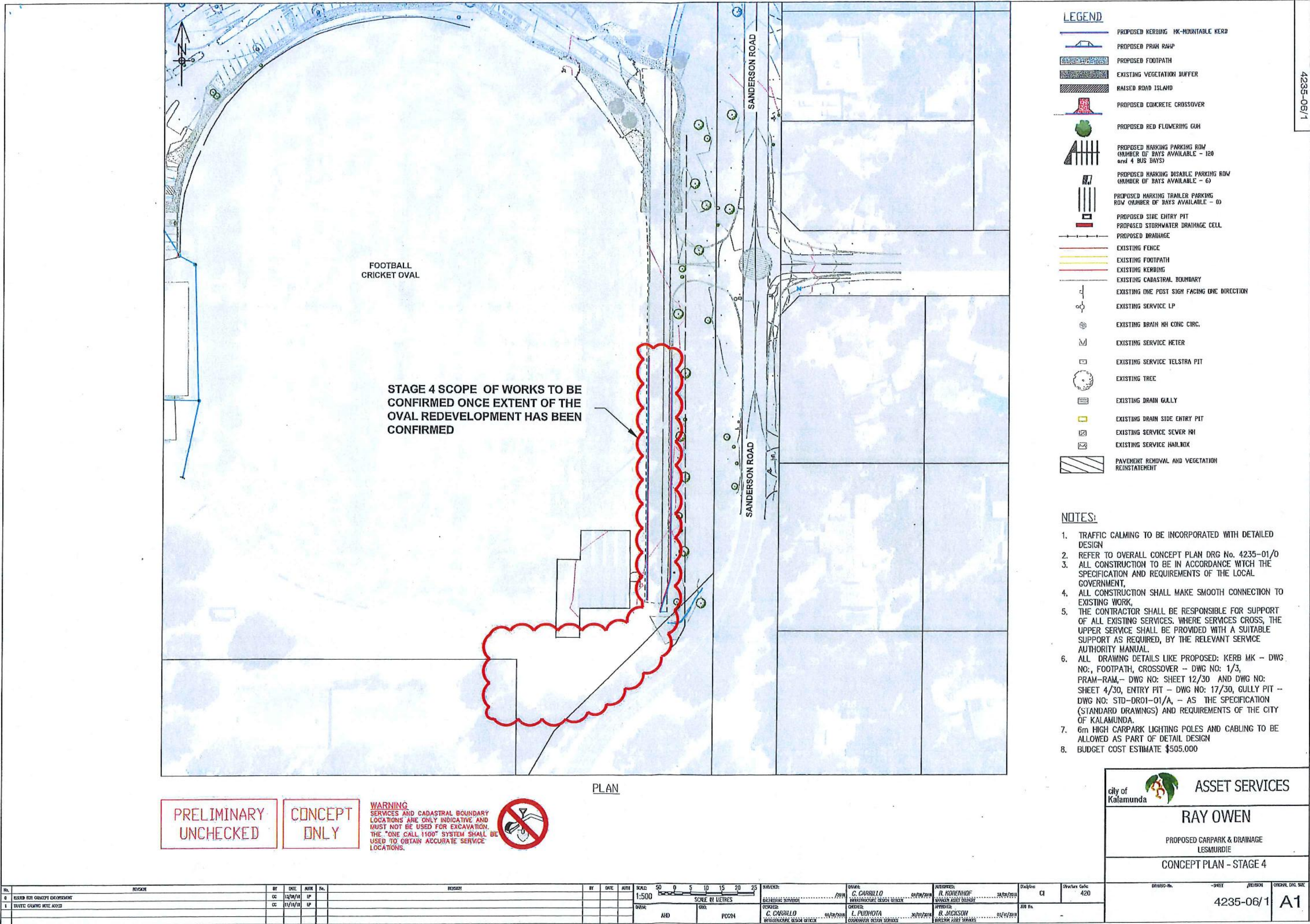
RAY OWEN

PROPOSED CARPARK & DRAINAGE
LESMURDIE

CONCEPT PLAN - STAGE 3
2 OF 2

4235-05/1

A1



LOCAL GOVERNMENT ACT 1995

City of Kalamunda

REPEAL OF LOCAL LAW RELATING TO MODEL BY-LAW (OLD REFRIGERATORS AND CABINETS) No. 8

Under the powers conferred by the Local Government Act 1995 and all other powers enabling it, the Council of the City of Kalamunda resolved on ??? to make the following Local Law-

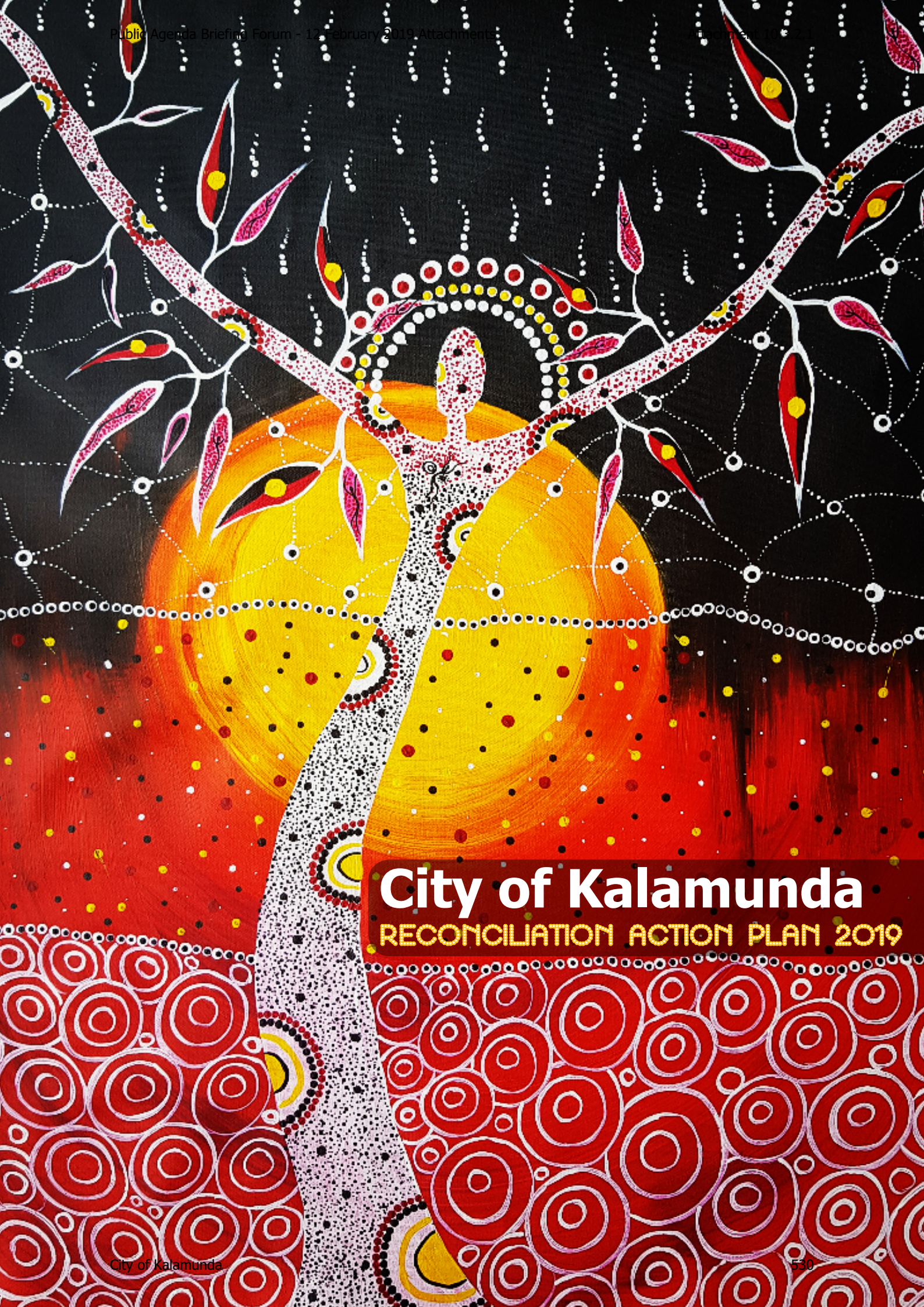
Repeal Local Law relating to "Model By Law (Old Refrigerators and Cabinets) No. 8", published in the *Government Gazette* on 1 May 1962.

Dated ???

The Common Seal of the City of Kalamunda was affixed in the presence of-

John Giardia
Mayor

Rhonda Hardy
Chief Executive Officer



City of Kalamunda

RECONCILIATION ACTION PLAN 2019

ACKNOWLEDGEMENT TO COUNTRY

The City of Kalamunda acknowledges the Traditional Owners of the land, the Whadjuk people of the Noongar nation and pay our respects to Elders past, present and emerging.

Cover page artwork by Nerolie Bynder-Blurton



CONTENTS PAGE

Message from the Mayor	4
Message from the CEO	5
Our Business	6
Our Organisation	6
Towards Partnership	7
Cultural Heritage Management Plan	7
What is a RAP?	8
In keeping with our Strategic Community Plan	8
Respect	10
Relationships	14
Opportunities	17
Governance and Reporting	19
Glossary	20



MESSAGE FROM THE MAYOR

Kaya (Hello). As Mayor of the City of Kalamunda I am proud to be part of delivering the City's Reconciliation Action Plan (RAP).

The Reflect RAP will guide us in our understanding of where we need to progress in our reconciliation journey; what we are doing well to build on as foundations; and continue to develop relationships and seek guidance from our Aboriginal and Torres Strait Islander community.



This plan is our commitment to support our community and staff to build respect, lasting relationships, and generate opportunities to create business synergies. It will also support us when developing events and community activities that will acknowledge and recognise respect and pride for Aboriginal culture and history.

I acknowledge the strength and resilience shown by Aboriginal and Torres Strait Islander peoples, cultures and communities through our histories and celebrate the continued significance of Aboriginal and Torres Strait Islander contributions in shaping a shared sense of unity and identity in our region. I am proud to present this Reflect RAP as Council's first formal commitment to advancing reconciliation.

As your Mayor I look forward to delivering this Plan and along with the community's support we will continue to work together to see the Plan become a success.

Reconciliation brings unity, understanding and respect between Aboriginal and Torres Strait Islanders and non-Indigenous Australians.

John Giardina
Mayor



MESSAGE FROM THE CEO

Kaya (Hello.) Nyung kadij nidja boodjar Whadjuk Noongar boodjar, nguny wongi baal birdiyah moort kure yeye boorda. (I acknowledge that I work on the grounds of the Whadjuk Noongar people, the traditional owners of this area and pay my respects to their ancestors past present and future.)



This 'Reflect' Reconciliation Action Plan (RAP) represents a significant and symbolic step on the City of Kalamunda ongoing journey towards reconciliation. Kalamunda is an area of great social, cultural and spiritual importance to the Whadjuk Noongar people. For several years, the City of Kalamunda has shown commitment to building relationships with the Aboriginal and Torres Strait Islander community by celebrating National Reconciliation Week and NAIDOC Week. Each year community participation and engagement in these celebrations grows.

Reconciliation Action Plans (RAP) are about organisations from every sector turning good intentions into real actions and rising to the challenge of reconciling Australia. A RAP is a business plan that uses a holistic approach to create meaningful relationships, enhanced respect and promote opportunities with Aboriginal and Torres Strait Islander Australians.

A Reflect RAP is for organisations starting out their journey of reconciliation. The City of Kalamunda's Reflect RAP commits to completing the following actions as this will reinforce that as a Local Government Authority we will have time to build relationships with our community.

Under the RAP, the City will work with our community to solve problems and generate success that is in everyone's best interests. I believe through the actions within this Reconciliation Action Plan we will foster an inclusive culture and increase positive, productive relationships with local Aboriginal communities.

Rhonda Hardy

CEO





OUR BUSINESS

Governing For Our Place and Our People

The City of Kalamunda is a local government. We are focused, then, on our much more than ourselves as a corporation; we are committed to ensuring that people and communities living in our area have optimum wellbeing. In this, we also strive to ensure that the natural environment — the Boodjar — in our area is healthy and strong, and that all infrastructure and buildings meet the needs and aspirations of our residents and other stakeholders.

We also have responsibility for much of the land — the Boodjar — in our area. We are responsible for ensuring that the Boodjar remains as healthy as possible, and that our communities and our visitors are enriched by connection with this Boodjar. Whadjuk people have been the custodians of this Boodjar for millennia, and remain deeply connected to it today, so we want to honour that connection by working in partnership with them in this work of caring for country.

We cover an area of 324 square km. The majority of that area is rural, state forest, or National Park. Around 60,000 people live within our boundaries, with over 75% of them living in the urban suburbs. Over 1,000 people — 1.8% — identified as Aboriginal or Torres Strait Islander in the 2016 Census. In addition, many traditional custodians of our country live in other parts of the Perth Metropolitan area.

OUR ORGANISATION

We employ 304 people. Of these, 0.65% identify as Aboriginal. We hope that in enacting this plan and subsequent Reconciliation Action Plans we will increase this percentage. One of our Councillors is Aboriginal (non-Noongar).





TOWARDS PARTNERSHIP

We govern for all our residents and stakeholders. We are aware that Aboriginal people have experienced a very particular history of race-based exclusion, segregation and injustice on our land. As a result, we acknowledge that quite specific reconciliation work is needed to build a relationship of trust and partnership; a relationship in which the people who so generously welcome us to country come to know that they and thousands of generations of their ancestors are genuinely respected. Our hope and our commitment is that this relationship and respect will provide a foundation for us to stand together with Aboriginal people in their long, courageous journey of healing, re-empowerment and opportunity.

CULTURAL HERITAGE MANAGEMENT PLAN

The RAP will also honour a commitment made in February 2017. At that time, Council endorsed the Hartfield Park Redevelopment Project inclusive of an Aboriginal Cultural Heritage Management Plan requiring the City to enter into a RAP, engaging with the Whadjuk Noongar people and other Noongar consultants.

In doing so we hope we can support Whadjuk Noongar people in their ongoing cultural revival and maintenance and they in turn will help us all in genuinely understanding this land we are on. That is an exciting prospect and we hope that this Reflect RAP will create the foundations for that work. Many of our residents have a thirst for Noongar knowledge of our country and we will all benefit as we work together to build that knowledge.



WHAT IS A RAP?

The City of Kalamunda Reflect RAP outlines the steps to prepare our organisation for Reconciliation. The City's vision for reconciliation is to promote unity, respect and understanding. We aim to create lasting and meaningful relationships, encourage respect, and promote sustainable opportunities for Aboriginal and Torres Strait Islander Australians within our region. The Reflect RAP has four focus areas.

Focus Area 1 **RESPECT**

Through partnerships we can work with all our community to create mutual respect and harmony by:

- Respect for Boodjar
- Respect for Culture
- Acknowledgement of Dispossession
- Creating Public Awareness

Focus Area 2 **RELATIONSHIPS**

The City values more meaningful relationships with the Traditional owners of the land by:

- Community Connections
- Undertaking Events
- Exploring a Local Treaty
- Enhancing Cultural Competence

Focus Area 3 **OPPORTUNITIES**

The City aims to build capacity within the community, to create opportunities for all and ensure equality and diversity within our organisation by:

- Employment Opportunities
- Supporting Business Development
- Creating Opportunities for Young People
- Working Collaboratively

Focus Area 4 **GOVERNANCE AND REPORTING**

The City will continue to reinforce current strategic directions and Reconciliation Australia guidelines by:

- Developing a RAP Reference Group
- Implementation of the Plan

IN KEEPING WITH OUR STRATEGIC COMMUNITY PLAN

Our Reflect RAP will help us realise key aspects of our Strategic Community Plan including:

Our Vision: "Connected Communities, Valuing Nature and Creating our Future Together."

"Our simple guiding principle will be to ensure everything we do will make Kalamunda socially, environmentally and economically sustainable."

In particular it will further our values of:

- Service
- Respect
- Diversity
- Ethics (including honest, open, equitable and responsive leadership)
- Creativity
- Courage
- Prosperity and
- Harmony



Our Priorities

1 Kalamunda Cares and Interacts

Looking after our people and providing our people with social and cultural enjoyment

2 Kalamunda Clean and Green

Delivering environmental sustainability and maintaining the integrity of the natural environment

3 Kalamunda Develops

Supporting our local economy and using our land and assets sustainably, diversely and effectively

4 Kalamunda Leads

Providing good government and leadership

Our hope through this RAP is that Whadjuk, Noongar and other Aboriginal residents and stakeholders will want to stand in partnership with us in ensuring that their people and their Boodjar thrives. We know that can only occur if we take genuine, committed action as outlined in this Plan.

ACTION PLAN FOCUS AREA 1:

RESPECT

1.1 RESPECT FOR BOODJAR

Work together to enhance respect for the Boodjar (life-giving country) we're on; led by Whadjuk knowledge and perspectives.

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
1.1.1	Identify in partnership with RAP Reference Group, appropriate Whadjuk partners to undertake 'respect for Boodjar' project.	Short Term	Community Services
1.1.2	Develop, together, a 'Respect for Boodjar' Plan that: <ul style="list-style-type: none"> a) Identifies and documents: <ul style="list-style-type: none"> • Sacred or significant sites • Important cultural or historic features of open spaces • Original (i.E. Noongar) names of any localities or sites b) Proposes ideas for: <ul style="list-style-type: none"> • Creating appropriate awareness, understanding and/or celebration of identified sites • Co-naming of identified sites • Bi-lingual signage c) Creates clear implementation plan for 'respect for Boodjar' project. 	Long Term	Asset Planning and Management



ACTION PLAN FOCUS AREA 1:

RESPECT

1.2 RESPECT FOR CULTURE

Enhance visibility of, and respect for, ongoing Whadjuk presence, culture and language.

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
1.2.1	Fly the Aboriginal flag at all City of Kalamunda Council buildings with flag mast, whenever the Australian flag is being flown.	Ongoing	Customer and Public Relations
1.2.2	Develop public awareness campaign on why the Aboriginal flag is being flown.	Ongoing	Public Relations
1.2.3	Encourage community learning centres and educational institutions to provide Noongar language courses.	Ongoing	Community Development
1.2.4	Work with Reconciliation Reference Group to consider/be consulted on new open spaces, roads, sub-divisions, etc with appropriate and approved Noongar names.	Ongoing	Asset Planning & Management
1.2.5	Encourage staff and Councillors to participate in Aboriginal cultural events including: <ul style="list-style-type: none"> • Reconciliation Week events • NAIDOC Week events 	Ongoing	Public Relations
1.2.6	Promote Reconciliation Week and NAIDOC Week events to Kalamunda residents.	Ongoing	Public Relations
1.2.7	Ensure Noongar culture, art, knowledge and creativity is incorporated into local events.	Ongoing	Public Relations
1.2.8	Include appropriate Acknowledgment to Country at all events hosted by Council (including Citizenship ceremonies) and Welcome to Country at significant Civic events.	Ongoing	Public Relations

ACTION PLAN FOCUS AREA 1:

RESPECT

1.3 ACKNOWLEDGE IMPACTS OF DISPOSSESSION AND NEED FOR HEALING AND RE-EMPOWERMENT

Heighten awareness and acknowledgement of the history of dispossession and its impacts on us today (within Council and local community).

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
1.3.1	Include in local historical information the facts about and impacts of, dispossession on Whadjuk people.	Long Term	Economic & Tourism Development
1.3.2	Library Services to develop and promote collections on local, state and national history from an Aboriginal and/or reconciliation perspective.	Ongoing	Library Services
1.3.3	Identify healing places within the City.	Long Term	Economic & Tourism Development
1.3.4	Tourism/historical tours to be incorporated into the Tourism Strategy.	Long Term	Economic & Tourism Development



ACTION PLAN FOCUS AREA 1:

RESPECT

1.4 PUBLIC AWARENESS AND INTEREST

Heighten public awareness of, and interest in, Aboriginal culture, history, and current Aboriginal circumstances (including strengths).

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
1.4.1	Develop, in collaboration with Reconciliation Reference Group, an 'information pack' about Whadjuk, and wider Aboriginal culture, history and current circumstances.	Long Term	Public Relations Economic & Tourism Development Community Development
1.4.2	Provide and promote the 'information pack' via: <ul style="list-style-type: none"> • The Council website and related social media • Local Newspapers • Local Library 	Medium Term	Public Relations Economic & Tourism Development Community Development
1.4.3	Pursue via Western Australian Local Government Association (WALGA) a coordinated local government approach to public engagement in Reconciliation.	Ongoing	Public Relations Community Development
1.4.4	Identify opportunities for interpretive signage that positively highlights Aboriginal connection (both historic and contemporary).	Long Term	Public Relations
1.4.5	Establish an 'Aboriginal Leadership Award' that recognises leadership by local residents or by Aboriginal people who have a positive impact on local Boodjar (land) or community.	Medium	Public Relations

ACTION PLAN FOCUS AREA 2: RELATIONSHIPS

2.1 COMMUNITY CONNECTIONS

Enhance direct connections between Aboriginal and non-Aboriginal residents.

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
2.1.1	Encourage local community centres, learning centres and agencies to hold 'story circles'.	Ongoing	Economic & Tourism Development Community Development
2.1.2	Identify opportunities for shared experiences at which Aboriginal and non-Aboriginal people can engage together.	Ongoing	All staff
2.1.3	Strongly encourage City of Kalamunda staff to attend all these opportunities.	Ongoing	All staff

2.2 EVENTS

Facilitate and/or arrange events that bring Aboriginal and non-Aboriginal people together. Encourage arts and creativity to promote connection, interest and awareness.

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
2.2.1	Identify in partnership with the Reconciliation Reference Group, events and festivals that will promote Reconciliation.	Medium Term	Public Relations
2.2.2	Engage with local event organisers to include Aboriginal community connection.	Ongoing	Public Relations
2.2.3	Encourage Staff who organise events and festivals to actively include Aboriginal people as performers, entertainers and public attendees.	Ongoing	Public Relations

ACTION PLAN FOCUS AREA 2:

RELATIONSHIPS

2.3 TREATY

Explore (in collaboration with other Local Governments, and Whadjuk people) a local treaty or equivalent agreement.

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
2.3.1	Consider, with the Reconciliation Reference Group and other key Elders and leaders, the potential benefits and risks of a local treaty or equivalent agreement.	Long Term	Community Services

2.4 CULTURAL COMPETENCE

Enhance cultural competence within the City of Kalamunda.

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
2.4.1	Create 'Towards Reconciliation' training opportunities for staff and Councillors, to gain a greater understanding of: <ul style="list-style-type: none"> • Cultural issues • Impacts of dispossession • Keys to enhancing the relationship with Aboriginal residents, visitors and stakeholders 	Ongoing	People Services

2.5 ANTI-DISCRIMINATION STRATEGIES

Promote positive race relations through anti-discrimination strategies.

2.5.1	Workforce Plan includes review of People Services policies and procedures to identify existing anti-discrimination provisions and future needs.	Ongoing	People Services
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ACTION PLAN FOCUS AREA 2: RELATIONSHIPS

2.6 COMMUNICATION AND CONNECTION

Develop improved communications and connections between Council, Whadjuk people and other Aboriginal and non-Aboriginal residents.

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
2.6.1	Identify via the Reconciliation Reference Group Aboriginal residents and stakeholders who may be interested in ongoing communications.	Short Term	Public Relations
2.6.2	Identify volunteer opportunities for community to assist with local Noongar activities.	Ongoing	All staff
2.6.3	Develop locally focused connection with Noongar Radio.	Medium Term	Public Relations
2.6.4	Facilitate the establishment of Aboriginal led community workshops.	Medium Term	Public Relations



ACTION PLAN FOCUS AREA 3:

OPPORTUNITIES

3.1 EMPLOYMENT

Significantly increase Aboriginal employment within the City.

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
3.1.1	Workforce Plan includes an annual review of industry best practise strategies.	Ongoing	People Services
3.1.2	Develop an Aboriginal employment strategy including: <ul style="list-style-type: none"> identifying internal champions identifying appropriate mentors considering an Aboriginal employment target identifying opportunities to assist in Aboriginal-led 'caring for Boodjar' for example environmental/horticultural/park management. 	Ongoing	People Services

3.2 BUSINESS DEVELOPMENT

Support Aboriginal business development.

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
3.2.1	Establish a relationship with the Noongar Chamber of Commerce to identify opportunities for Aboriginal business development.	Ongoing	Economic & Tourism Development

ACTION PLAN FOCUS AREA 3:

OPPORTUNITIES

3.3 OPPORTUNITIES FOR YOUNG PEOPLE

Contribute to the empowerment of young Aboriginal residents (and emerging leaders).

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
3.3.1	Seek out and engage with young Aboriginal residents and emerging leaders.	Ongoing	Community Development
3.3.2	Through ongoing support and engagement with young people, provide opportunities for: <ul style="list-style-type: none"> • Connection with Elders • Leadership programs and/or awards • Access to relevant and culturally safe services, clubs, etc. • Sports opportunities • Employment opportunities 	Ongoing	Community Development

3.4 WORK COLLABORATIVELY

Foster genuine 'co-design' - collaborative planning and decision making around policies and practices that particularly impact on Aboriginal stakeholders and residents.

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
3.4.1	Develop, in collaboration with Aboriginal Stakeholders and residents, clear protocols on 'who can speak' for different issues.	Short Term	Public Relations
3.4.2	Ensure that the Reconciliation Reference Group continues to have a direct and formal relationship with the City of Kalamunda to oversee the development of the RAP and consequent activities.	Ongoing	Public Relations Community Development



ACTION PLAN FOCUS AREA 4:

GOVERNANCE AND REPORTING

4.1 RECONCILIATION REFERENCE GROUP

Establish and maintain an effective Reconciliation Reference Group (RRG) to drive governance of the RAP.

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
4.1.1	Form a RRG to govern RAP implementation.	Short Term	Public Relations Community Development
4.1.2	Draft a Terms of Reference for the RRG.	Short Term	Public Relations Community Development
4.1.3	Establish Aboriginal and Torres Strait Islander representation on RRG.	Medium Term	Public Relations Community Development

4.2 IMPLEMENTATION

Provide appropriate support for effective implementation of RAP commitments.

	RECOMMENDED DELIVERABLE	TIMELINE	RESPONSIBILITY
4.2.1	Define resource needs for RAP implementation.	Long Term	Public Relations Community Development
4.2.2	Engage senior leaders in the delivery of RAP commitments.	Long Term	Public Relations Community Development
4.2.3	Define appropriate systems and capability to track, measure and report on RAP commitments.	Long Term	Public Relations Community Development

GLOSSARY



The City of Kalamunda will align with Reconciliation Australia's guidelines with a view to consider developing our future Reconciliation Action Plan



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