LANDCORP

Courtesy of CODA Architects

OUTLINE DEVELOPMENT PLAN

LOT 520 SALVADO ROAD, JOLIMONT

PREPARED BY ROWE GROUP ON BEHALF OF LANDCORP

LANDCORP

ROWEGROUP

PROJECT TEAM

Town Planner:	**Rowe Group**
Civil Engineer:	**JDSI**
Landscape Architect:	**EPCAD**
Architect:	**CODA**
Hydrologist:	**Essential Environmental**

DOCUMENT HISTORY

Version	Filename	Prepared by	Approved by	Date
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Record of Endorsement

Certified that this Outline Development Plan was adopted by resolution of the Western Australian Planning Commission on:

..... Date

Signed for and on behalf of the Western Australian Planning Commission

.....

an officer of the Commission duly authorised by the Commission pursuant to section 16 of the Planning and Development Act 2005 for that purpose, in the presence of:

..... Witness

..... Date

And by
Resolution of the Council of the Town of Cambridge on:

..... Date

And
Pursuant to the Council's resolution hereunto affixed in the presence of:

..... Mayor, Town of Cambridge

..... Chief Executive Officer, Town of Cambridge

..... Date

This Outline Development Plan is prepared under the provisions of the Town of Cambridge Town Planning Scheme No. 1

Table of Modifications to Outline Development Plan

Modification No.	Description of Modification	Date Endorsed by Council	Date Endorsed by WAPC

Executive Summary

This Outline Development Plan (ODP) addresses the 'Residential' zoned portion of Lot 520 Salvado Road, Jolimont referred to as the 'Former Nursery Site'. Since the Town ceased use of Lot 520, the site has remained vacant and represents an underutilised central landholding, close to the amenities of the Wembley Town Centre, Subiaco and the Perth City Centre. The site is also afforded access to key local recreation areas abutting Mabel Talbot Park, Henderson Park and the Wembley Sports Park, as well as public transport services. It is therefore considered to present a key redevelopment opportunity for residential intensification.

The purpose of this ODP is to facilitate medium and high density residential development, meeting the Town of Cambridge's housing target of at least 200 dwellings for the Former Nursery Site. Development of the Former Nursery Site will also contribute to the Town of Cambridge's housing diversity and infill targets identified under the Town's Local Housing Strategy and the Western Australian Planning Commission's Direction 2031 infill requirements for the Town of Cambridge.

Given the built form nature proposed for the majority of the site, and the opportunity for dwelling yields to vary depending on the building design for individual sites, the ODP sets a dwelling target range to ensure the provisions of Town Planning Scheme No.1 are adequately met, whilst also considering maximum dwelling yield opportunities.

The Indicative Concept Plan prepared in support of the ODP, identifies a maximum dwelling yield of 350 dwellings for the site (325 apartments and 25 single dwellings) and as such, has been utilised in the preparation of this ODP and its supporting transport, drainage and servicing assessments.

Whilst this is substantially higher than the minimum target density of 200 dwellings, given the flexibility of the built form to deliver a range of dwelling yields, the ODP is considered to sufficiently test a 'maximum development scenario' in relation to the impact of the ODP upon the existing area.

The ODP also gives due consideration to the interface of the site with the adjacent residential areas, Wembley Sports Park, Henderson Park and Mabel Talbot Park.

The preparation of this ODP has been informed by a community engagement strategy comprising six community open days and online community forum, undertaken from August, 2013 through to June, 2014.

Outline Development Plan Summary Table

Item	Data	Section number referenced in report
Total area covered by the Structure Plan (hectares)	3.91	1.2
Area of each land use proposed (hectares): Residential Public Open Space Drainage Roads	 2.33 0.43 0.05 1.1	3.3
Estimated lot yield (lots)	32	3.3
Estimated dwelling target (dwellings per gross site hectare)	200 - 350	3.3
Estimated population (people)	340 -595	3.3
Number of high schools	0	3.6
Number of primary schools	0	3.6
Employment self sufficiency targets	N/A	3.5
Estimated area and number: neighbourhood park local parks	 0.32 hectares, 1 park 0.15 hectares, 2 parks	3.4

Note: All information and areas are approximate only and are subject to survey and detailed design.

Pre-Lodgement Consultation Table

The following provides a summary of the authorities consulted in the preparation of this ODP.

Authority	Date of Consultation	Method of Consultation	Summary of Outcome
Landowners adjacent to the ODP area	June and August 2014.	Two Community Open Days.	Design objectives relating to access, density and height.
Town of Subiaco	August / September 2014	Meeting and Presentation of Draft Concept Plan to Council	Support, comments regarding: - No Vehicle interface from the south; - Create north south pedestrian and cycling connections through site - Landscaping of southern Interface to existing residents.
Water Corporation	June 2014	Meetings and Correspondence	Resolution of: - Future Sewer and Water Services. - Redundant Sewer Main. - Existing Sewer and Water Main.
Town of Cambridge	Ongoing through 2014	Meetings and Correspondence	Resolution of: - Built Form and Density - Water Management - Movement Network - Tree Retention
DER	August 2014	Discussion and Correspondence	Contamination requirements to be dealt with at subdivision.

CONTENTS

FIGURES

TECHNICAL APPENDICES

Appendix Number	Document Title	Nature of Document	Referral / Approval Agency	Summary of Document Modifications
1.	Certificate of Title	Tenure	N/A	
2.	Proposed Plan of Subdivision	Proposed Parent Lot Creation	N/A	
3.	Environmental Assessment Report	Environmental	Town of Cambridge / Department of Parks and Wildlife	
4.	Detailed Site Investigation Report	Contaminated Sites	Department of Environment Regulation	
5.	Community Engagement Material	Community Engagement	N/A	
6.	Indicative Concept Plan	N/A	N/A	
7.	Indicative Built Form	Architectural	N/A	
8.	Landscape Master Plan	Landscape Design	Town of Cambridge	
9.	Transport Impact Assessment	Traffic Management	Town of Cambridge	
10.	Local Water Management Plan	Hydrology	Town of Cambridge / Department of Water	
11.	Servicing Report	Engineering	Town of Cambridge / Water Corporation / Western Power	

PART ONE
STATUTORY SECTION

1. Outline Development Area

This Outline Development Plan shall apply to the portion of Lot 520 Salvado Road, Jolimont zoned 'Residential' under the Town of Cambridge Town Planning Scheme No.1, being the land contained within the inner edge of the line denoting the Outline Development Plan boundary on the Outline Development Plan (Plan 1).

2. Outline Development Plan Content

This Outline Development Plan comprises:

- Part 1 - Statutory section
  This section contains the Outline Development Plan map and statutory planning provisions and requirements.
- Part 2 – Non-statutory (explanatory) section
  This section is to be used to interpret and implement Part One.
- Appendices – Technical reports and supporting plans and maps.

3. Interpretations and Relationship with the Scheme

Unless otherwise specified in this part, the words and expressions used in this Outline Development Plan shall have the respective meanings given to them in the Town of Cambridge Town Planning Scheme No.1 (the Scheme) and the Residential Design Codes of Western Australia (R Codes) including any amendments gazetted thereto.

The Outline Development Plan map (Plan 1) outlines land use, zones and reserves applicable within the Outline Development Plan area. The zones and reserves designated under this Outline Development Plan apply to the land within it as if the zones and reserves were incorporated into the Scheme.

Pursuant to Schedule 7 of the Scheme:

3.1 The provisions, standards and requirements specified under Part One of this Outline Development Plan shall have the same force and effect as if it were a provision, standard or requirement of the Scheme. In the event of there being any inconsistency between the provisions, standards or requirements of the Scheme and the provisions, standards or requirements of this Outline Development Plan, then the provisions, standards or requirements of the Scheme shall prevail;

3.2 Any other provision, standard or requirement of Part One of the Outline Development Plan that is not otherwise contained in the Scheme, shall apply to the Outline Development Plan area as though it is incorporated into the Scheme, and shall be binding and enforceable to the same extent as if part of the Scheme; and

3.3 Part Two of this Outline Development Plan and all appendices are to be used to clarify and guide interpretation and implementation of Part One.

4. Operation

In accordance with Clause 11 Schedule 7, this Outline Development Plan shall come into operation when it is endorsed by the Western Australian Planning Commission (WAPC) pursuant to Clause 9.2 of the Scheme.

5. Site Analysis

The Site Analysis Plan (Plan 2) outlines the site characteristics which have informed the design including land form, typography, environmental values and hydrological conditions.

6. Land Use

The Outline Development Plan map (Plan 1) outlines land use, zones and reserves applicable within the Outline Development Plan area. The zones and reserves designated under this Outline Development Plan apply to the land within it as if the zones and reserves were incorporated into the Scheme.

6.1 Land Use Permissibility

6.1.1 Land use permissibility within the Outline Development Plan area shall be in accordance with the corresponding zone or reserve under the Scheme. In the case of multiple dwellings, these shall be discretionary 'AA' use in the Residential 'R80' zone.

6.1.2 In accordance with Clause 7 of Part 7 – Special Control Areas, in addition to the land use permissibly within the 'Residential' zone, 'Restaurant' is to be considered an 'AA' use.

6.2 Residential

6.2.1 Dwelling Target

6.2.1.1 Objective

To provide at least 200 dwellings within the Outline Development Plan area.

6.2.2 Multiple Dwelling Sites

6.2.2.1 The Site Reference Plan (Plan 3) outlines the Multiple Dwelling Precincts referred to in the Outline Development Plan.

6.2.2.2 Developments within the three Multiple Dwelling Precincts are to achieve the following requirements:

Multiple Dwelling Precinct Reference	Dwelling Target Range	Maximum Dwelling Height (Storeys)
Northern Precinct	50 - 137	3 storeys at Salvado Road 4 to 6 storeys for the balance of the site
Central Precinct	103 - 142	3 storeys at street front 6 storeys
Mabel Talbot Precinct	22 - 46	3 storeys at street front 3 storeys adjacent to Mabel Talbot Park 6 storeys for the balance of the site

6.2.2.3 Multiple Dwelling development shall comply with the provisions of the Design Guidelines.

6.2.2.4 Multiple Dwelling sites within the same Multiple Dwelling Precinct may be amalgamated and/or reconfigured to create larger development sites. Development which proposes the amalgamation and/ or reconfiguration of lots shall comply with the provisions applicable under Part 1 and the Design Guidelines for each of the sites, including but not limited to, dwelling target ranges, building height, street setbacks and access locations. A proposal to amalgamate and/ or reconfigure lots should be accompanied by justification illustrating the proposal meets the dwelling targets applicable to the Multiple Dwelling Precinct.

6.2.2.5 Applications for subdivision to create Multiple Dwelling sites shall be accompanied by a Target Dwelling Yield Allocation Plan. The Dwelling Target Allocation Plan shall illustrate the distribution of target dwelling yields for each Multiple Dwelling lot proposed, to achieve the total Precinct Dwelling Target identified in Clause 6.2.2.2. The Target Dwelling Yield Allocation Plan shall consider the provisions of the Outline Development Plan, the Residential Design Codes of Western Australia and the Design Guidelines to illustrate the ability for each Multiple Dwelling Site to achieve the dwelling targets proposed.

6.3 Public Open Space

a) The provision of a minimum of 10 per cent public open space being provided in accordance with the WAPC's Liveable Neighbourhoods.

b) Public open space is to be provided generally in accordance with the Public Open Space Plan (Plan 4), with an updated public open space schedule to be provided at the time of subdivision for determination by the WAPC, upon the advice of the Town of Cambridge.

7. Movement Network

7.1 Development is to comply with the Movement Network Plan (Plan 5) which specifies:

a) Road Configuration and Intersection Treatments;

b) Dual Use Path network; and

c) Pedestrian Footpath network.

8. Subdivision and Development

8.1 Variations to the Residential Design Codes (2013)

8.1.1 This Structure Plan amends the following deemed-to-comply provisions requiring the approval of the Western Australian Planning Commission.

Table 1 - R-Code Variations

Design Element	Current Provision	Amended Deemed to-Comply Provision
5.1.4 Open space for the R50 density coding	40% minimum	30% minimum

Table 4 – R- Code Variations

Design Element	Current Provision	Amended Deemed to-Comply Provision
6.1.5 Building Size – Maximum Plot Ratio for R80 density coding	1.0	2.0

Part 5 – Ancillary Dwellings

Design Element	Current Provision	Amended Deemed to-Comply Provision
5.5.1 Ancillary Dwelling Provisions	Ancillary dwelling associated with a single house and on the same lot where: I. The lot is not less than 450m^2 in area; II. Parking provided in accordance with clause 5.3.3 C3.1; and III. Complies with all other R-Code provisions, only as they apply to single houses, with the exception of clauses: a) 5.1.1 site area; b) 5.22.3 street surveillance; and c) Outdoor living areas.	Ancillary dwelling associated with a single house and on the same lot where: I. The lot is not less than 250m^2 in area; II. Parking provided in accordance with clause 5.3.3 C3.1; and III. Complies with all other R-Code provisions, only as they apply to single houses, with the exception of clauses: a) 5.1.1 site area; b) 5.22.3 street surveillance; and c) Outdoor living areas.

8.1.2 Design Guidelines

Design Guidelines are to be prepared and adopted by Council as a Local Planning Policy in accordance with Part 5 of the Scheme.

The Design Guidelines shall provide deemed-to-comply provisions for the R50 and R80 Density Code, for the following elements:

a) Building Height;
b) Street Setbacks;
c) Lot Boundary Setbacks;
d) Open Space;
e) Parking;
f) Visitor Parking;
g) Visual Privacy;
h) Solar Access;
i) Fencing and Street walls;
j) Street Surveillance;
k) Vehicle Access and Crossovers;
l) Carports and Garages;
m) Landscaping; and
n) Interface with Public Realm.

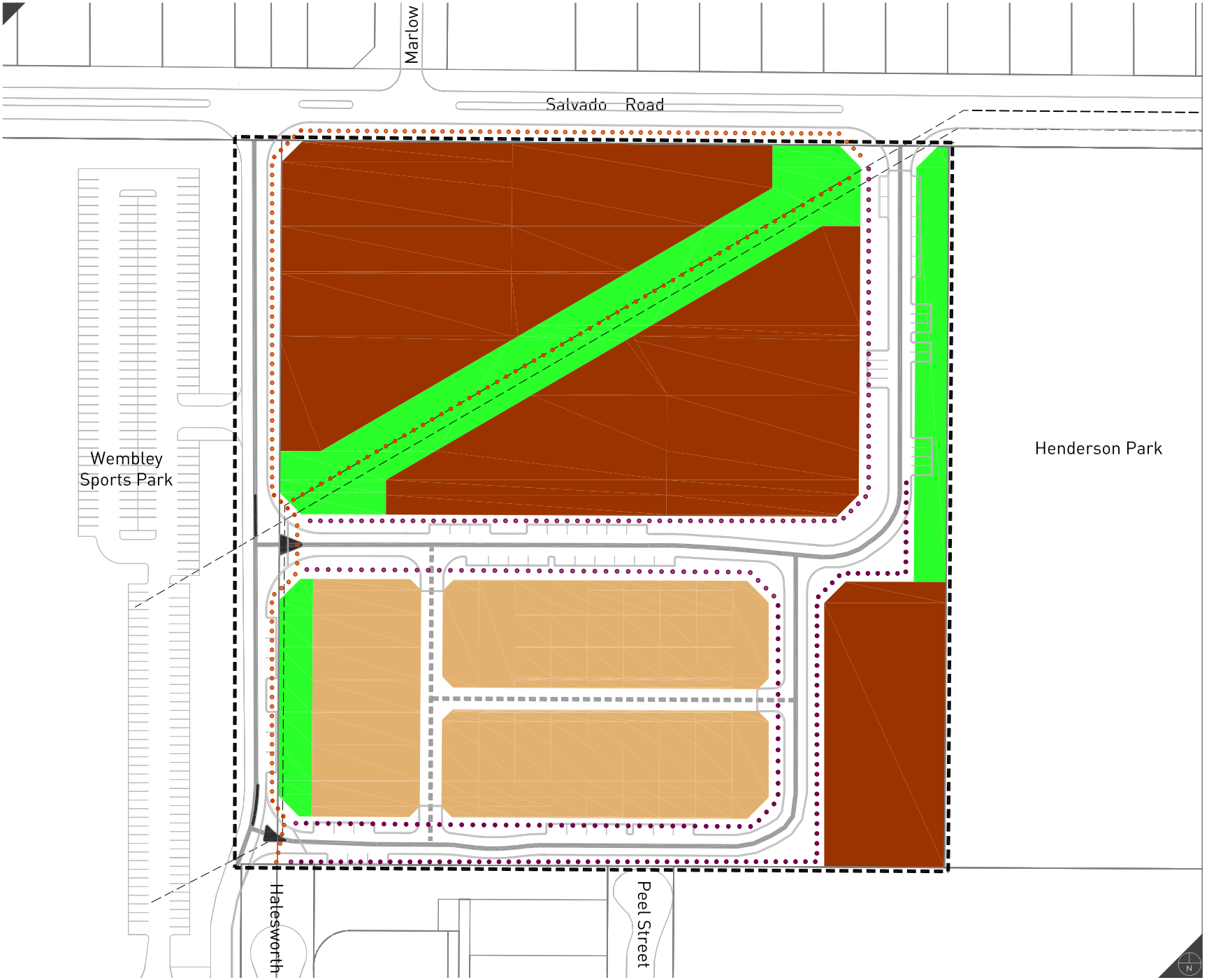
9. Reports / Strategies Required Prior to Subdivision

Prior to the lodgement of subdivision applications to the WAPC, the following being prepared, to the satisfaction of the Town of Cambridge and provided with the application for subdivision:

a) Design Guidelines; and

b) Fauna Management Plan.

Planning Design Delivery



LEGEND

- ODP Boundary
- Existing Boundaries
- Proposed Boundaries
- Residential (R50)
- Residential (R80)
- Public Open Space
- Pathway - Dual Use
- Pathway - Pedestrian
- Sewer Easement
- Access Street
- Laneway
- Traffic Treatment

0 25 50 Metres

REVISIONS

Rev	Date	Drawn
C	2014.10.14	K. Trenberth
D	2014.10.16	K. Trenberth
E	2014.10.21	K. Trenberth
F	2014.12.22	K. Trenberth

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w: www.rowegroup.com.au
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p: 08 9221 1991

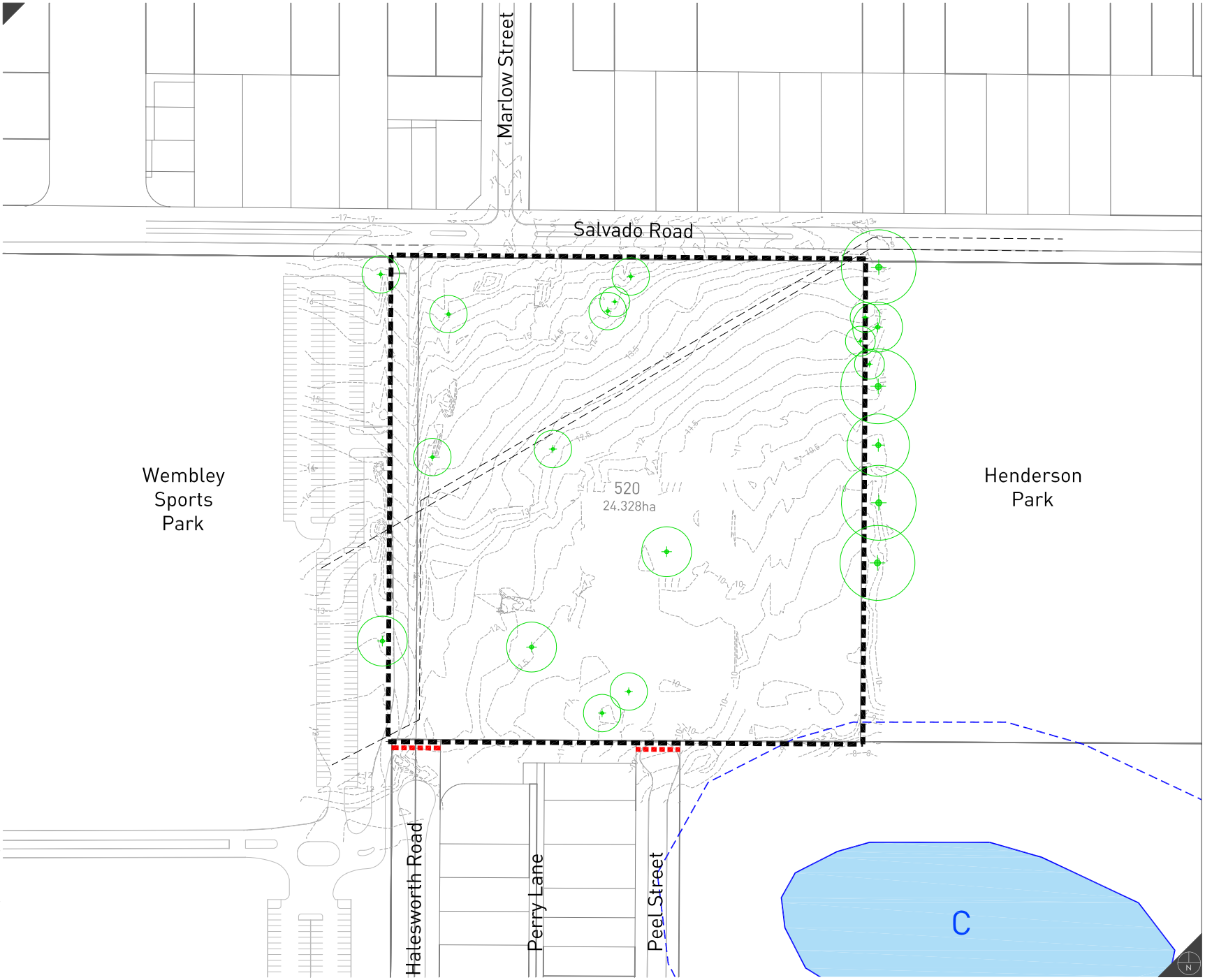
Date Drawn:	2014-08-04
Job Ref:	7898
Scale:	1:1000 @ A3
Client:	Satterley
Designer:	P. Caddy
Drawn:	M. Sullivan
Projection:	PCG94
Plan ID:	7898-FIG-18-F

Cadastre supplied by T.o.C. and McMullen Nolan

Outline Development Plan

Lot 520 Salvado Road, Jolimont
Plan 1

N:\TOWN PLANNING\7000-7999\7898\DRAFTING\DA-CAD\7898_FIG18F_20140122_JOLIMONT ODP1 PLAN 1.DWG
Kim Trenberth 22 December 2014



Site Analysis Plan

N:\TOWN PLANNING\7000-7999\7898\DRAFTING\DWG-CAD\7898_FIG27A_2014.10.16_JOLIMONT ISITE ANALYSIS\ PLAN 2.DWG
Kim Trenberth 16 October 2014

Planning Design Delivery

LEGEND

- ODP Boundary
- 7 Existing Lot Numbers
- Contours
- Sewer Line
- No Vehicle Access from South
- Mature Trees
- C Conservation Category Wetlands
- 50m CCW Buffer

0 75 Metres

REVISIONS

Rev	Date	Drawn
A	2014.10.16	K. Trenberth

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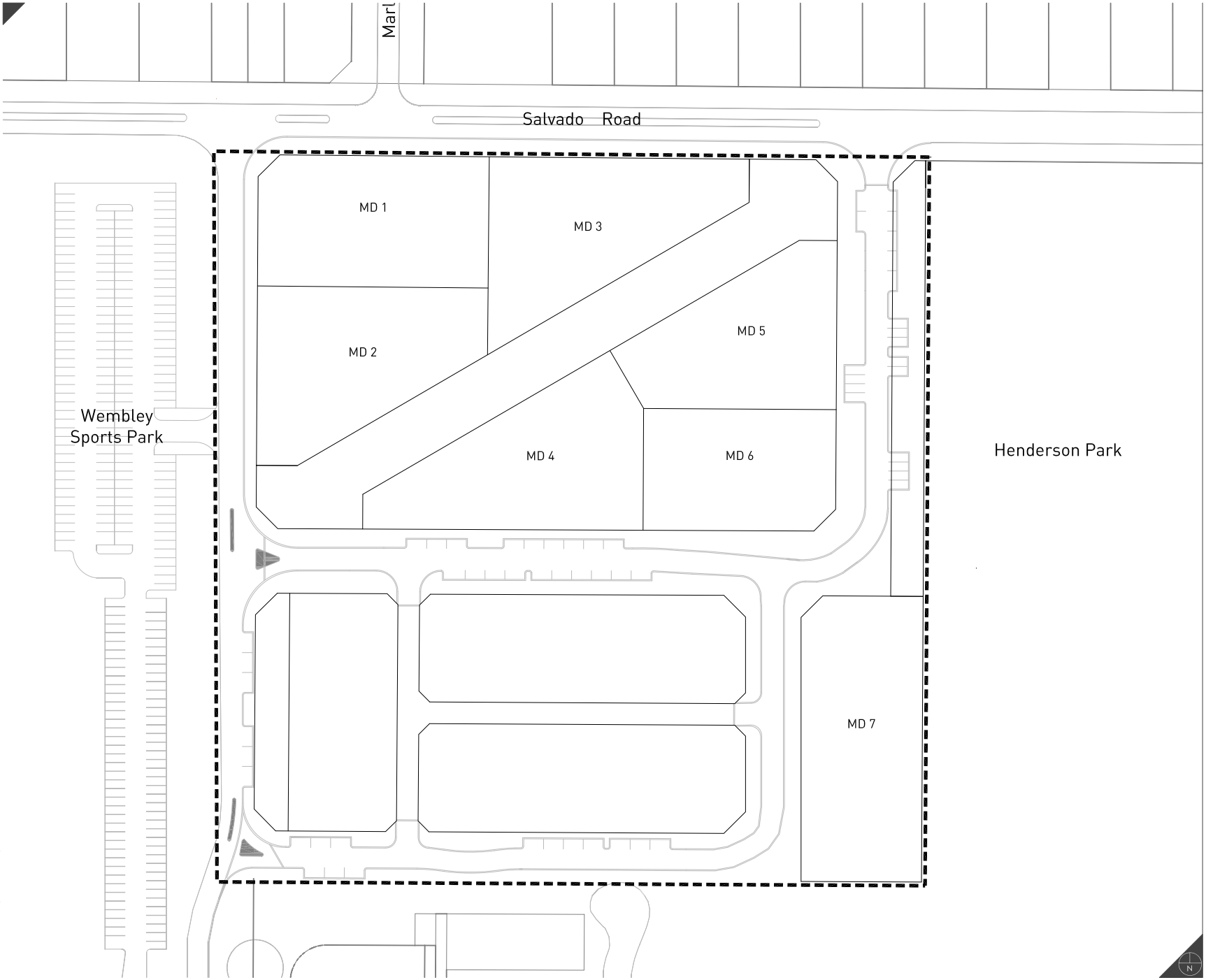
Client:	Satterley
Designer:	K. Kyle
Drawn:	K. Trenberth
Projection:	NA
Plan ID:	7898-FIG-27-A

Aerial photography supplied by Nearmap

Lot 520 Salvado Road, Jolimont
Plan 2



Planning Design Delivery

LEGEND

- ODP Boundary
- Existing Boundaries
- Proposed Boundaries
- MD Multiple Dwelling Site
- Traffic Treatment

0 25 50 Metres

REVISIONS

Rev	Date	Drawn
A	2014.10.16	K. Trenberth
B	2014.12.22	K. Trenberth

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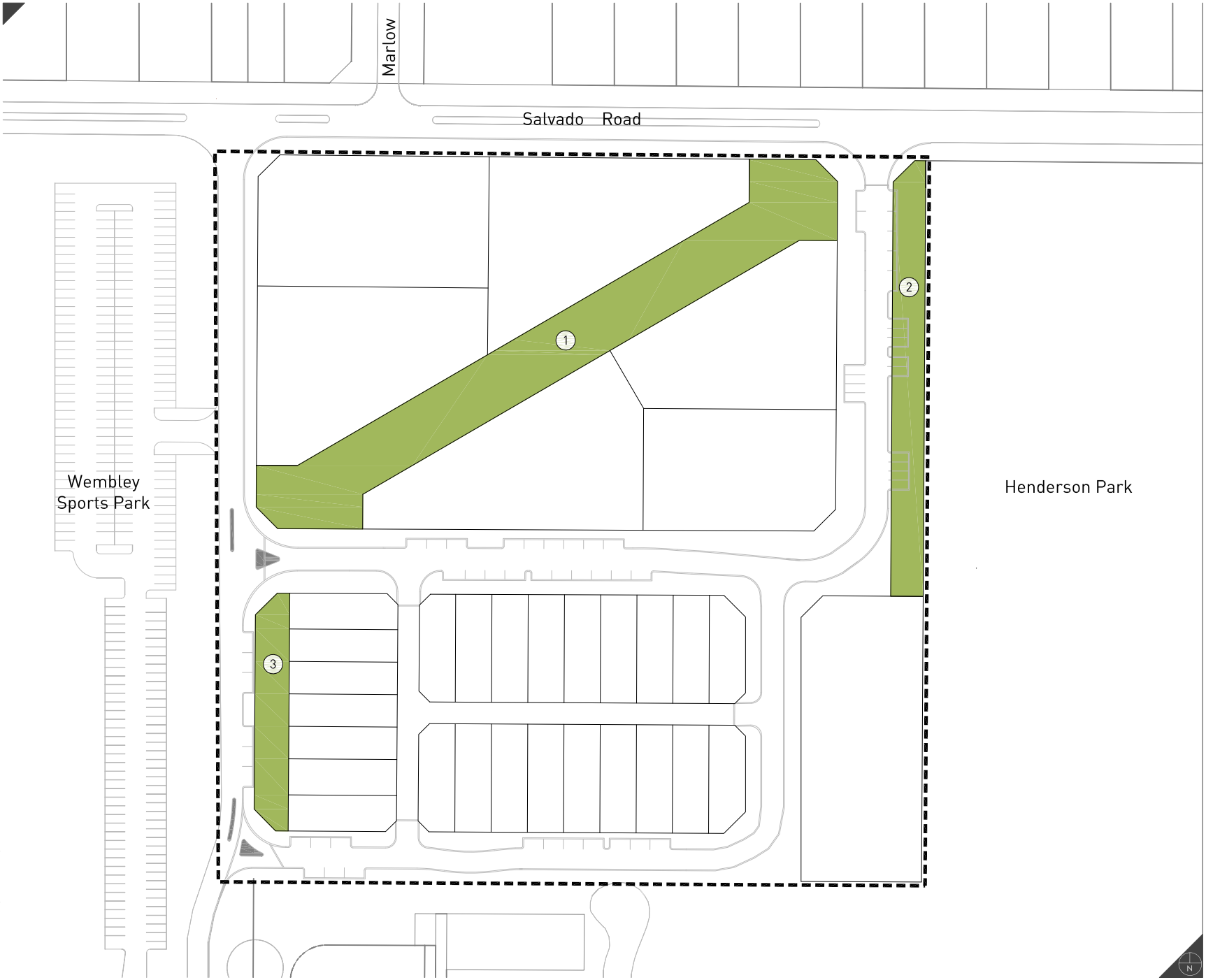
Client:	Landcorp
Designer:	P. Caddy
Drawn:	K. Trenberth
Projection:	PCG94
Plan ID:	7898-FIG-28B

Cadastre supplied by T.o.C. and McMullen Nolan

Multiple Dwelling Site Reference Plan

Lot 520 Salvado Road, Jolimont
Plan 3

N:\TOWN PLANNING\7000-7999\7898\DRAFTING\A-CAD\7898_FIG28B_20141222_JOLIMONT MD SITE REFERENCE PLAN 3.DWG
Kim Trenberth 22 December 2014



Planning Design Delivery

LEGEND

- ODP Boundary
- Existing Boundaries
- Proposed Boundaries
- Public Open Space
- (1) POS Number

Public Open Space	
POS Number	Area
1	3171.94m²
2	1069.23m²
3	587.61m²

0 25 50 Metres

REVISIONS

Rev	Date	Drawn
A	2014.10.16	K. Trenberth
B	2014.12.22	K. Trenberth

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Scale:	1:1000 @ A3
Client:	Landcorp
Designer:	P. Caddy
Drawn:	K. Trenberth
Projection:	PCG94
Plan ID:	7898-FIG-29-B

Cadastre supplied by T.o.C. and McMullen Nolan

Public Open Space Plan

Lot 520 Salvado Road, Jolimont
Plan 4

N:\TOWN PLANNING\7000-7999\7898\DRAFTING\DWG-CAD\7898_FIG29B_20141222_JOLIMONT PUBLIC OPEN SPACE PLAN 4.DWG
Kim Trenberth 22 December 2014

Planning Design Delivery

Marl

Salvado Road

Wembley Sports Park

Henderson Park

LEGEND

- ODP Boundary
- Existing Boundaries
- Proposed Boundaries
- 1 Lot Numbers
- Access Street B
- Access Street C
- Access Street D
- Laneway
- Pathway - Dual Use
- Pathway - Pedestrian
- Traffic Treatment

0 25 50 Metres

REVISIONS

Rev	Date	Drawn
A	2014.10.16	K. Trenberth
B	2014.10.21	K. Trenberth
C	2014.12.22	K. Trenberth

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Job Ref:	7898
Scale:	1:1000 @ A3
Client:	Landcorp
Designer:	P. Caddy
Drawn:	K. Trenberth
Projection:	PCG94
Plan ID:	7898-FIG-30-C

Cadastre supplied by T.o.C. and McMullen Nolan

Movement Network Plan

Lot 520 Salvado Road, Jolimont
Plan 5

N:\TOWN PLANNING\7000-7999\7898\DRAFTING\DA-CAD\7898_FIG30C_20141221_JOLIMONT MOVEMENT PLAN 5.DWG
Kim Trenberth 22 December 2014

PART TWO
EXPLANATORY SECTION

1. Planning Background

1.1 Introduction and Purpose

This Outline Development Plan (ODP) has been prepared for land located within Jolimont locality, referred to as the 'Former Nursery Site'.

The purpose of the ODP is to refine the provisions under the existing planning framework to ensure a comprehensive approach to development is undertaken with input from landowners, government agencies and other key stakeholders.

The ODP is a statutory document that will guide future land use and development for the Former Nursery Site.

1.2 Land Description

1.2.1 Location

The site is located approximately 5 km north west of Perth's Central Business District area, 1km from Subiaco Town Centre and 400m south west of the Wembley Town Centre.

The site's location is approximately 2 km west of Lake Monger Reserve and 1.6 km south of Herdsman Lake. The site also abuts Henderson Park to its eastern boundary and the Wembley Sports Park to its western boundary.

Refer to Figure 1: Location.

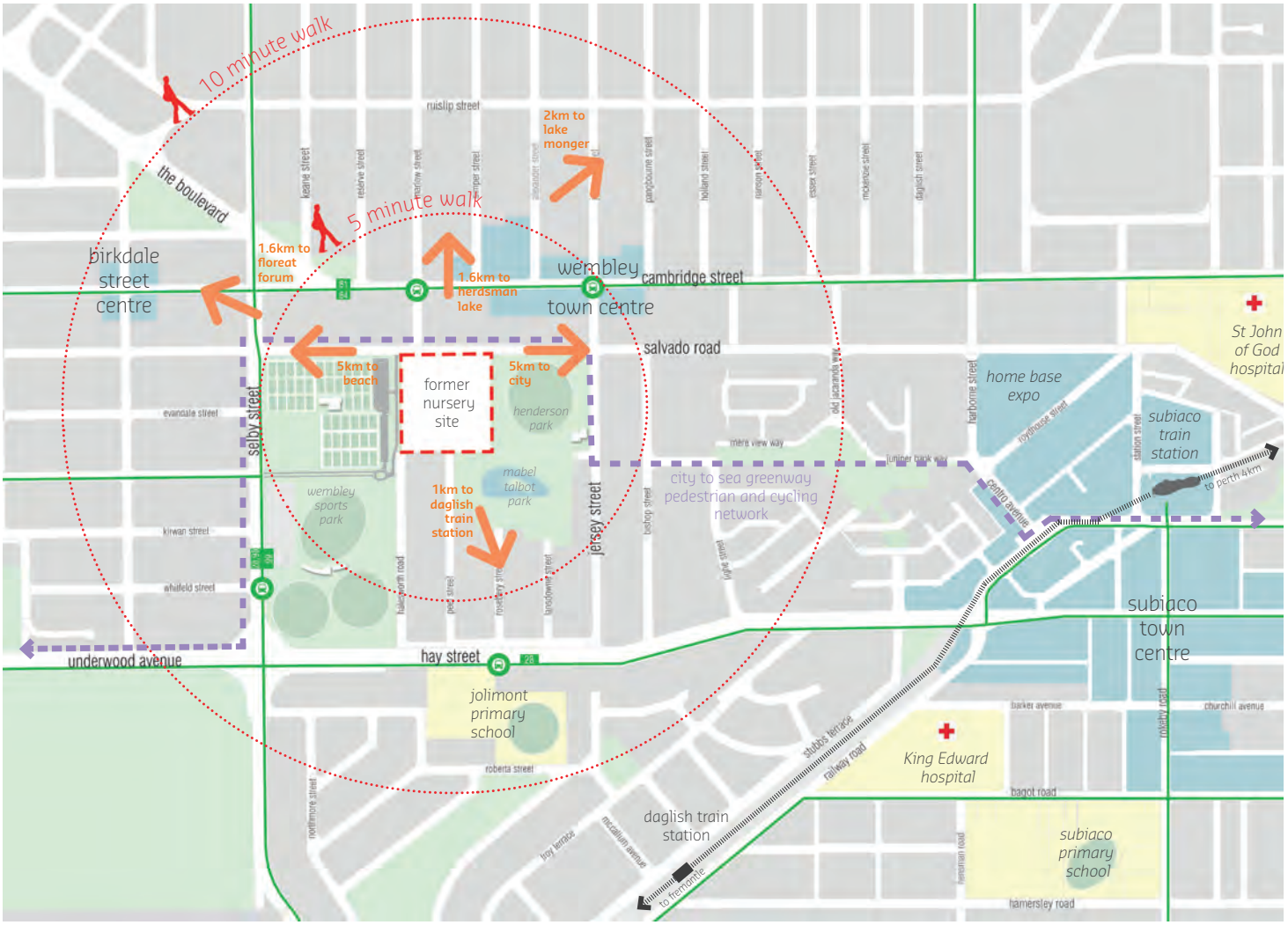


FIGURE 1: LOCATION

1.2.2 Area and Land Use

Lot 520 Salvado Road, Jolimont comprises approximately 24.32ha and is characterised by three distinct areas:

- Wembley Sports Park (16.3ha);
- Former Nursery Site (3.9ha); and
- Henderson Park (4.1ha).

For the purposes of the ODP, the Former Nursery Site (subject site) is the subject of this report.

The ODP area comprises a predominately cleared site with a vacant residential dwelling to be demolished as part of future subdivision works.

The site maintains approximately 185m frontage to Salvado Road, and is fenced and accessible via an entrance gate located on Salvado Road.

Refer to Figure 2: Site Plan.

FIGURE 2: SITE PLAN

1.2.3 Legal Description and Ownership

The ODP area comprises a portion of:

- Lot 520 on Deposited Plan 35670, Certificate of Title Volume 2535 and Folio 100;

Refer to Appendix 1 for a copy of the Certificates of Title, identifying owners of the site.

Refer to Figure 3: Outline Development Plan Boundary.

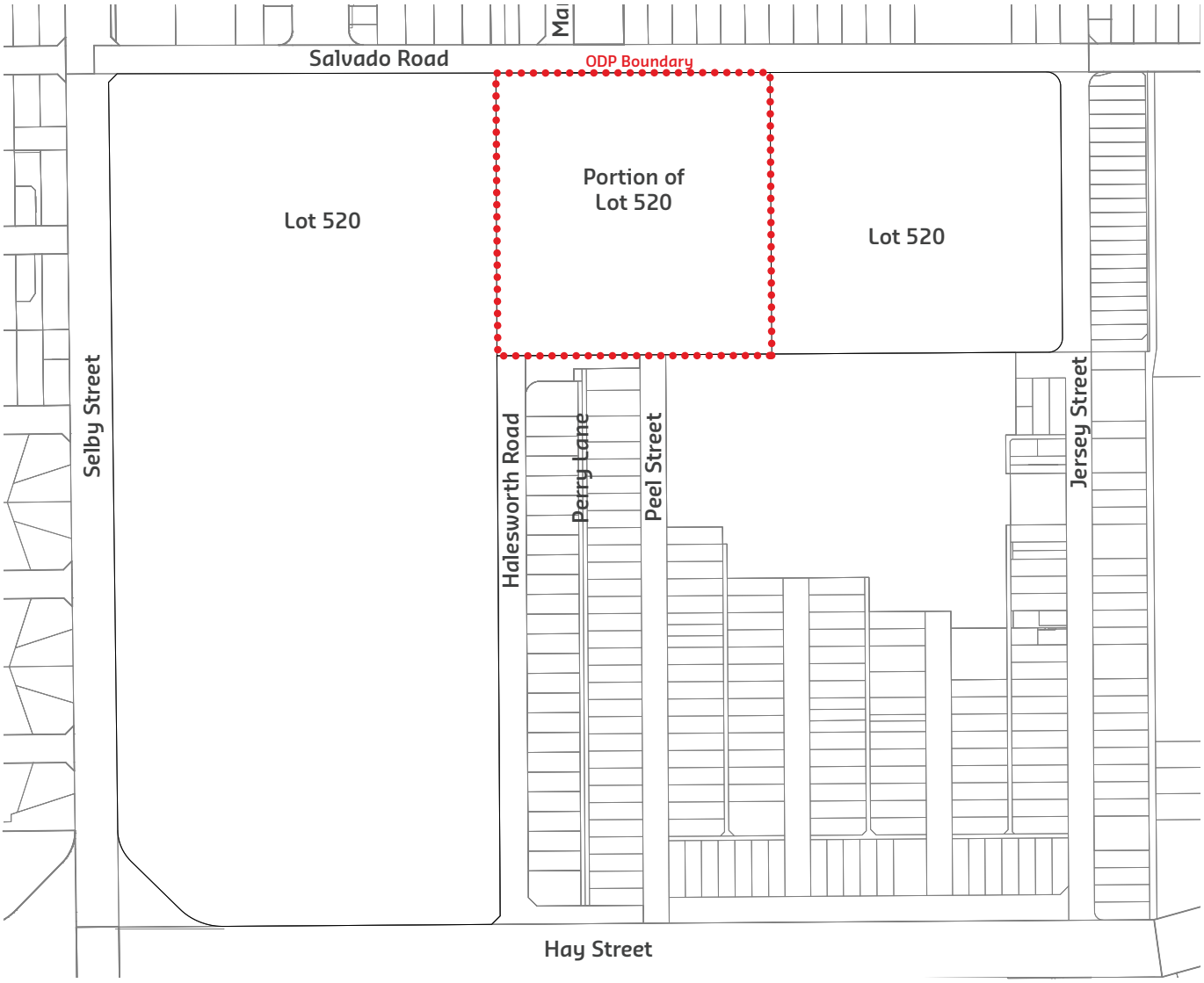


FIGURE 3: OUTLINE DEVELOPMENT PLAN BOUNDARY

1.3 Planning Framework

This section addresses the relevant policies, strategies and local town planning scheme provisions, which apply to the land, and any environmental conditions which apply under the Scheme.

1.3.1 Zoning and Reservations

1.3.1.1 Metropolitan Region Scheme Zoning

The portion of Lot 520 the subject of this ODP is zoned 'Urban' under the Metropolitan Region Scheme (MRS), consistent with the development of the land for residential purposes.

Refer Figure 4: MRS Zoning.

FIGURE 4: MRS ZONING

1.3.1.2 Town of Cambridge Town Planning Scheme No. 1

The ODP area was recently rezoned 'Residential' under the provisions of the Town of Cambridge Town Planning Scheme No.1 (TPS 1).

The site is also identified within 'Special Control Area No.2' (SCA-2). The objectives of SCA No.2 are as follows:

a) To facilitate orderly development and subdivision of the land for residential purposes, in accordance with the use permissibility designations applicable to the Residential Zone in the Zoning Table;

b) To facilitate a vibrant inner city community with a yield of at least 200 dwellings;

c) To encourage a high standard of built form design outcomes;

d) To encourage connectivity, permeability and enhanced pedestrian and cycle movements; and

e) To ensure that development of the site produces a diverse range of residential built form and, lot types by requiring the preparation and approval of an Outline Development Plan and Design Guidelines prior to the Council—
   i. Considering recommending subdivision; or
   ii. Approving development within the area.

An Outline Development Plan (ODP) is required as a precursor to the development of the site for residential purposes.

Design Guidelines will be prepared further to the advertising of the ODP, to be adopted prior to the Proposed Plan of Subdivision.

Refer to Figure 5: Town Planning Scheme No. 1.

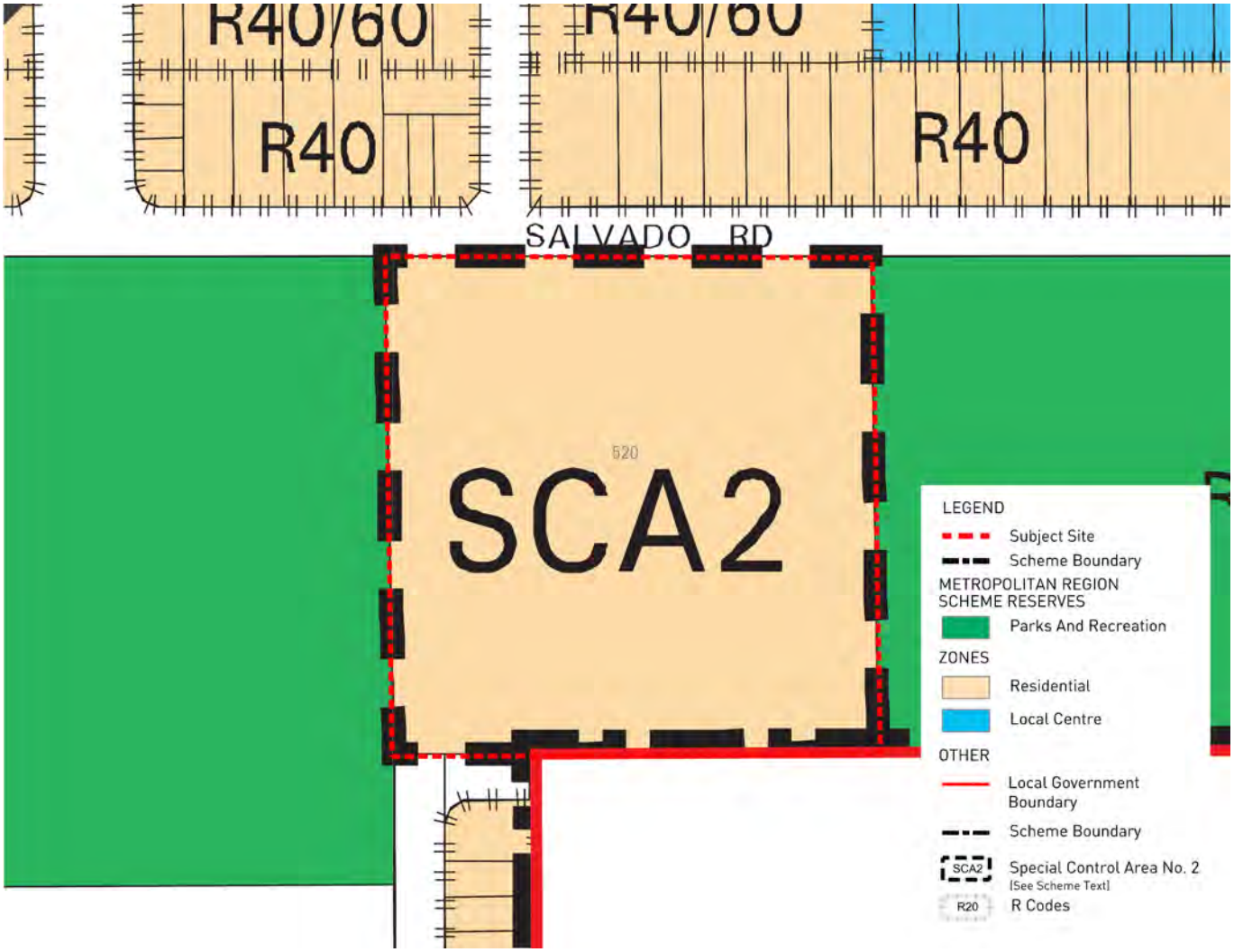


FIGURE 5: TOWN PLANNING SCHEME NO. 1

1.3.2 Regional and Sub-Regional Strategy / Structure Plans

1.3.2.1 Directions 2031 and Beyond

Directions 2031 prepared by the Western Australian Planning Commission (WAPC), provides a spatial framework to guide detailed planning and delivery of housing, infrastructure and services necessary in accommodating the anticipated population growth of the Metropolitan and Peel regions. Direction 2031 identifies a 47% infill target for future development within the metropolitan area.

The site is located within the Central Metropolitan Sub-Region, with the Wembley/ Jolimont Centre identified as a District Centre for future infill opportunities.

1.3.2.2 Central Metropolitan Perth Sub-Regional Strategy (August 2010)

The Central Metropolitan Perth Sub Regional Strategy (the 'Strategy') was prepared to provide further direction to the Central Sub Region, as identified under Directions 2031.

The Town of Cambridge is located within 'Quadrant 2' of the Central Sub Region identified to accommodate an additional 4,000 new dwellings. To achieve this target, the Strategy identifies a number of actions, including the application of higher densities within areas which are within close proximity to:

- Suburban corridors (such as Cambridge Street);
- Retail and employment centres (Cambridge Street, Floreat and Subiaco);
- Public open space, foreshores, parks and areas with potential for high quality views (Henderson Park, views west to the City);
- Educational Institutions (Jolimont Primary School etc.), and
- Community and recreational facilities and services such as hospitals, medical centres and libraries (St John of God, Royal Perth Shenton Park campus and King Edward).

The Strategy stipulates that proposed densities and provisions within local planning strategies and schemes also support diversity in housing types and sizes. The proposed ODP design outcomes facilitate the objectives proposed by the Strategy, in that the ODP has been development to provide for a range of housing types (single and multiple dwellings) as well an appropriate range of densities, and by virtue of the land's location close to community/recreation facilities, adjacent to open space and in proximity to suburban corridors and centres.

1.3.3 State Planning Framework

1.3.3.1 Liveable Neighbourhoods

Liveable Neighbourhoods (LN) is a WAPC operational policy for the design and assessment of structure plans and subdivision for new urban areas, it seeks to create a more vibrant, self sufficient and interactive communities that provide a wide range of residential, employment, recreational and business opportunities within a reasonable catchment.

The aims of LN can be summarised as follows:

- To promote an environment for safe, efficient and pleasant walking, cycling and driving;
- To facilitate mixed use urban development which provide a wider range of living, employment and leisure opportunities;
- To provide for a flexible neighbourhood structure capable of adapting over time as a community changes;
- To provide for a variety of lot sizes for housing choice and diversity;
- To provide a comprehensive approach to the design of open space and water management.

The ODP has been prepared in accordance with LN.

1.3.4 Local Planning Framework

1.3.4.1 Town of Cambridge (draft) Local Planning Strategy

The Draft Local Planning Strategy (draft LPS) provides strategic direction for future development within the Town of Cambridge, as well as providing guidance to the review of TPS No.1.

The Former Nursery Site is identified as a 'Development Area' under draft LPS, within close proximity to the Wembley Town Centre and the Cambridge Street Activity Corridor. The Former Nursery site is identified as an opportunity to deliver 'new development' to meet housing diversity and density requirements.

The ODP is consistent with the draft LPS objectives.

1.3.4.2 Policy 3.1 Streetscape

The Town's Policy 3.1: Streetscape provides guidance on applicable building standards and variations to the R Codes as they apply to streetscape elements such as setbacks, fencing, surveillance and massing. Amendments to the Policy were considered and adopted at Council's August 2014 meeting.

The site is located within the Wembley Precinct, and is subject the following provisions:

- Primary Street Setback – 4m for R30 and above;
- Side Street Setback – 1.5m for R30 and Multiple Dwellings, 1m for R50 and above;

Variations to the Policy are however also permitted on a performance basis.

Development of the Former Nursery Site is relatively unique within the Town with respect to development form, proximity to parks and reserves, and proximity to an important activity corridor. Accordingly, a set of design controls that are particular to the land and respond to its specific context while responding to its setting is considered an appropriate approach.

The provisions of Policy 3.1 will therefore be further considered through the preparation of Design Guidelines for single dwelling lots and apartment sites.

1.3.4.3 Policy 3.3 Building Height

The Town's Policy 3.3 provides guidance on building height to ensure a consistency of the scale within a locality and the avoidance of undue impact on streetscape/neighbouring properties.

The following building height provisions are applicable under the Wembley Precinct:

- Single and Grouped Dwellings: a maximum wall height of 6.0 metres with a maximum roof height ranging from 7.0 metres – 9.0 metres depending on roof type.
- Multiple Residential Dwellings: a maximum wall height ranging from 6.0 metres to 9.0 metres and maximum roof height ranges from 10 metres to 18 metres depending on roof type.

As noted above, given the Former Nursery Site represents a consolidated development site, primarily abutting areas of open space, the opportunity exists to tailor a range of design controls specific to the site which responds to its context while respecting to its setting.

The provisions of Policy 3.3 will therefore be further considered through the preparation of Design Guidelines for single dwelling lots and multiple dwelling sites.

1.3.5 Other Approvals and Decisions

In April, 2013 the Town of Cambridge and the Western Australian Land Authority entered into a development agreement (in the form of a land sale contract) in relation to the Former Nursery Site. Under the terms of the contract, the Former Nursery Site portion of Lot 520 was to be rezoned to 'Residential' and excised from the parent lot, with the Trust Condition to be removed from its Title. Upon the Western Australian Planning Commission (WAPC) approving an ODP for the site, the Town will nominate whether to remain as a long-term partner in the project, or accept a final payment based on an independent valuation of the site and exit the project.

The above approach to redeveloping the site was approved by both Cabinet and the Town in 2012.

An application was lodged with the WAPC in June, 2014 (WAPC Ref: 155331) proposing the creation of three (3) lots being;

- The Former Nursery Site (proposed Lot 1),
- The existing residential dwelling (proposed Lot 2), and
- The balance of the parent lot (proposed Lot 3).

The Plan of Subdivision proposes the Former Nursery Site to be transferred to two separate titles (Lot 1 and 2) with a total site area of 3.7ha. The existing dwelling is proposed to be retained on a separate title (807m^2) in the interim, prior to redevelopment for matters associated with the transfer of the site from the Town of Cambridge to LandCorp. Further to the approval of an ODP for the site, the site will be re-subdivided to create new residential lots to be on-sold by LandCorp.

The balance of the current parent title (Lot 520) will remain in the Town of Cambridge ownership as reserves as proposed Lot 3, having a total area of 20.3ha.

In addition, the proposal seeks to create a 15.4m road reserve along the western boundary of Lot 1 in order to provide an alternate access to the Former Nursery Site redevelopment. Essentially this formalise the existing Netball Centre access to the southern boundary of the subject site as a public road.

Approval for the subdivision was granted on the 17th September, 2014.

Appendix 2 provides a copy of the proposed Plan of Subdivision.

2. Site Conditions and Constraints

The following provides a summary of the site conditions and constraints applicable to the Former Nursery Site.

The Environmental Assessment Report (EAR) is provided in Appendix 3 for further information.

2.1 Biodiversity and Natural Area Assets

2.1.1 Flora

Given the historic and current use, limited vegetation occurs within the site, with the exception of stands of individual trees and concentrated pockets of vegetation on the eastern and southern perimeter of the site. The site therefore is completely cleared of remnant native understorey species leaving individual trees as the predominant vegetation.

The EAR concludes:

- The site is predominantly cleared of remnant native understorey species;
- No Declared Rare Flora (DRF) species have been identified within the site based on site specific surveys;
- Three species of State conservation significance have the potential to occur on site;
- Native vegetation has been largely cleared and severely altered, and
- Many of the trees within the site have also died or display poor structural condition due to the lack of tree management practices and competing for sunlight.

A comprehensive tree survey was undertaken by Paperbark Technology in 2012, assessing the health, age and size of trees within, or within close proximity to, the site. In essence, the majority of the trees within the site of stature are either Ficus, Eucalypts or self seeded Pepper trees. Pepper trees are an invasive weed species and although having an aesthetic value, are not considered worthy of retention. The major Eucalypt stand, located within the northern portion of the site adjacent to Salvado will be subject to modified ground conditions and therefore are not considered viable for retention given rooting characteristics.

The most interesting specimen on site is a Ficus referred to as the 'Budda tree'. It was deemed capable of relocation or retention along with some smaller rare exotics left over from nursery production. The relocation of this tree is reflected in the Landscape Master Plan.

Those trees identified as being suitable for retention along the southern and western boundaries of the site predominantly fall outside of the site boundary. Additionally those trees along the western boundary have, since the site investigation, been subsequently cleared to construct the Wembley Sports Park access.

Figure 6 identifies the trees suitable for retention / relocation within the site.

2.1.1.1 Moreton Bay Figs

Six Moreton Bay Figs exist within the adjoining Henderson Park Reserve, outside of the subject site boundary. An Arboriculture Report was undertaken by Arbor Centre in January 2014, to establish the health and well as provide preservation advice.

The overall health and structure of the six trees was considered Good to Acceptable for their respective species. The assessment suggests remedial and corrective pruning can address defects, improving tree structure.

Moreton Bag Figs

Vegetation

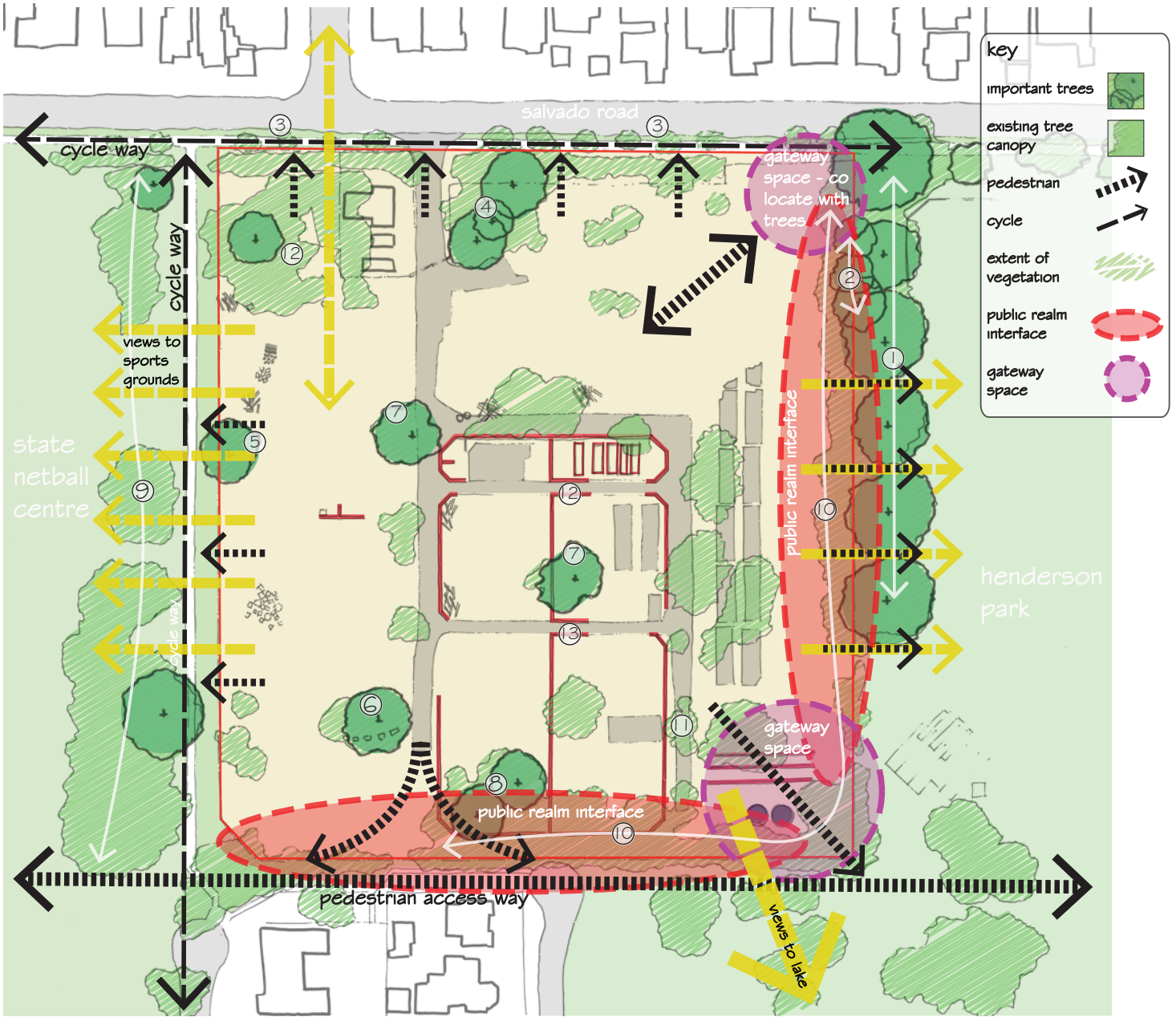


FIGURE 6: TREE AND LANDSCAPE ANALYSIS

2.1.2 Fauna

2.1.2.1 State Significance

A search of the Department of Environment and Conservation (DEC) database identified eight birds, two reptiles and two mammal species of State conservation significance as potentially occurring within site. Of the twelve species identified, three are considered to have a potential likelihood of occurrence within the ODP area being:

- Forest Red-Tailed Black-Cockatoo;
- Carnaby's Cockatoo, short-billed black-cockatoo;
- Rainbow Bee Eater.

Of the five migratory bird species identified, the Rainbow Bee-Eater, Red-Tailed Cockatoos and Carnaby's Cockatoos have been observed at Mabel Talbot Park adjacent to the site . The Rainbow Bee-Eater occurs in a variety of habitats, including urban areas, and may forage within the site. As noted, this species has been recorded at Mabel Talbot Park to the south-east of the Salvado Road site (DSEWPaC 2012, Ecoscape 2003), however no records are evident of the species within the ODP area.

The remainder of the migratory species are largely associated with wetlands and water bodies, including artificial wetlands or inundated cropping areas, and as such, may be present around the lake within Mabel Talbot Park (DSEWPaC 2012). The ODP area is however unlikely to represent a significant area of habitat for any migratory species given the absence of water bodies.

The City of Subiaco has also advised a population of long-neck turtles (known as the oblong turtle) is located within Mabel Talbot Reserve. Given the potential for the turtles to nest in the surrounding area, further investigation will be required prior to subdivision to identify the impact of the development on this community.

A Fauna Management Plan will be required prior to subdivision approval to investigate fauna matters further.

2.1.2.2 EPBC Act – Significant Fauna

An EPBC Act Protected Matters database search indicated seven EPBC listed species may occur within the site. Only Carnaby's Black Cockatoo are however identified as having a possible likelihood of occurring on site. The majority of trees previously identified as foraging habitat were located within the western portion of the site, these trees were however cleared in 2012 as part of works associated with the development of the Wembley Sports Park access.

Twenty trees remain within the site identified as potential habitat, comprising three native species and thirteen exotic species. Of the twenty trees identified only five trees were considered suitable for retention following the tree survey undertaken by Paperbark Technology.

Given the limited habitat available, the clearing proposed (being under the 1.5ha threshold), its location within an existing urban area, the absence of evidence of breeding sites and the existence of existing foraging habitat within protected reserves within close proximity to the site, clearing of the site is not considered to have an impact on Carnaby's Black Cockatoo.

2.1.3 Wetlands

No wetlands exist within the subject site, however the adjacent artificial water body located with the Mabel Talbot Park Reserve to the south east of the site is identified as an Environmental Protection Policy (EPP) wetland and therefore protected under the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992. This wetland is considered highly modified from its original form. It is an expression of groundwater derived from the unconfined superficial aquifer over which it is situated. The lake was originally a swamp used for watering cattle and has also been called 'Perry's Watering Hole' and 'Jolimont Swamp'.

The natural water level in the lake ranges from within 1m of the natural ground surface approximately 8m AHD) in winter to completely dry in summer. Winter water levels are controlled by a weir that overflows into the downstream Water Corporation Wembley-Jolimont Main Drain so that the lake also functions as a stormwater compensating basin. Notwithstanding the above, the Mabel Talbot wetland is subject to a 50m buffer which slightly extends into the south eastern corner of the site.

Figure 7 identifies the wetland located within Mabel Talbot Reserve and its associated buffer.

Mabel Talbot Park and Lake

Park Interface

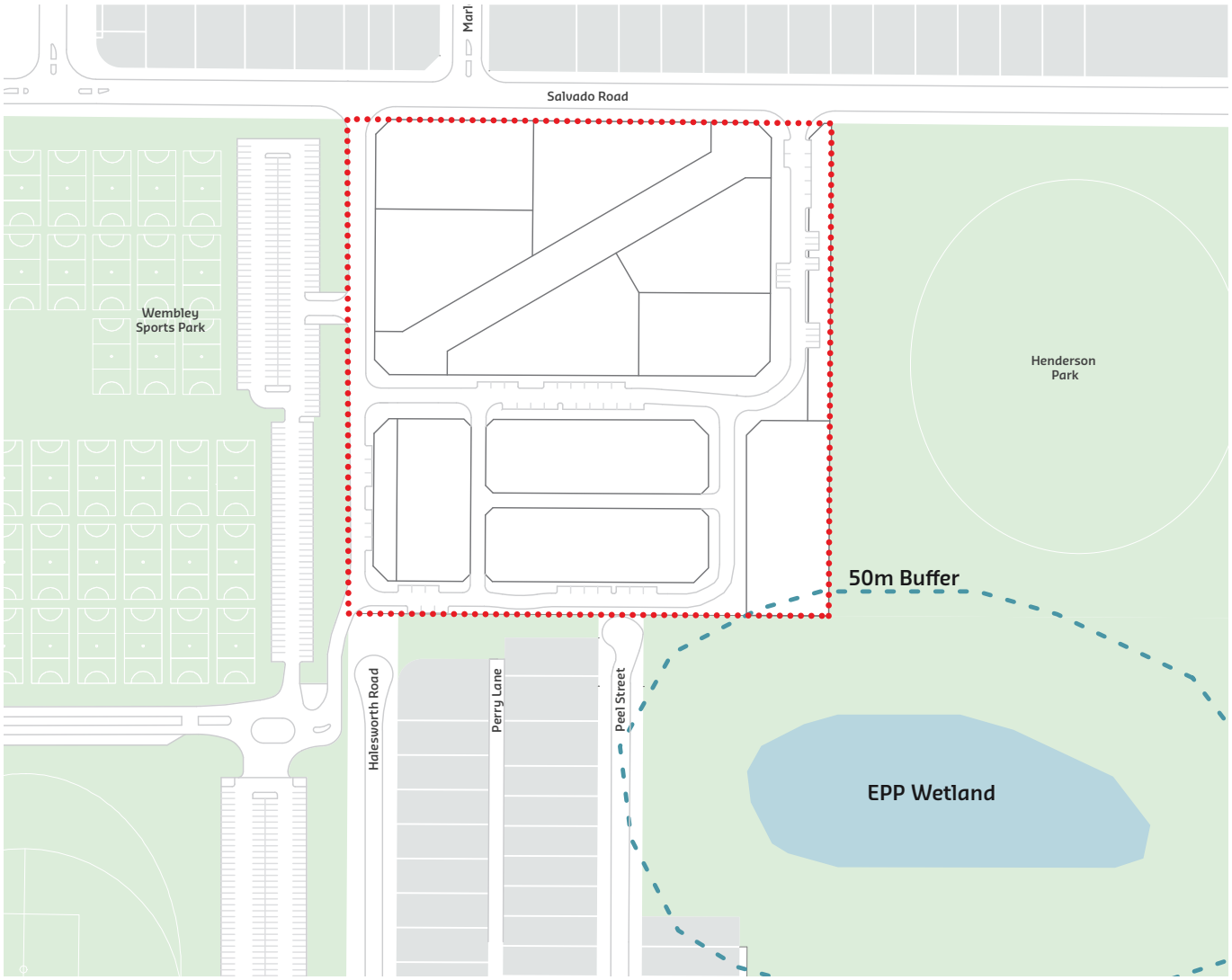


FIGURE 7: WETLAND AND BUFFER

2.2 Landform and Soils

2.2.1 Topography

The site falls 7m in a south-easterly direction from 16.6m AHD in north western corner of the site to 9.3m AHD in the south eastern corner of the site.

The topography also reflects a fall of 3m with the southern portion of the site, in a west to east direction from 12.3m AHD from the sites western boundary to 9.4m AHD on its eastern boundary.

Refer to Figure 8: Contour Plan.

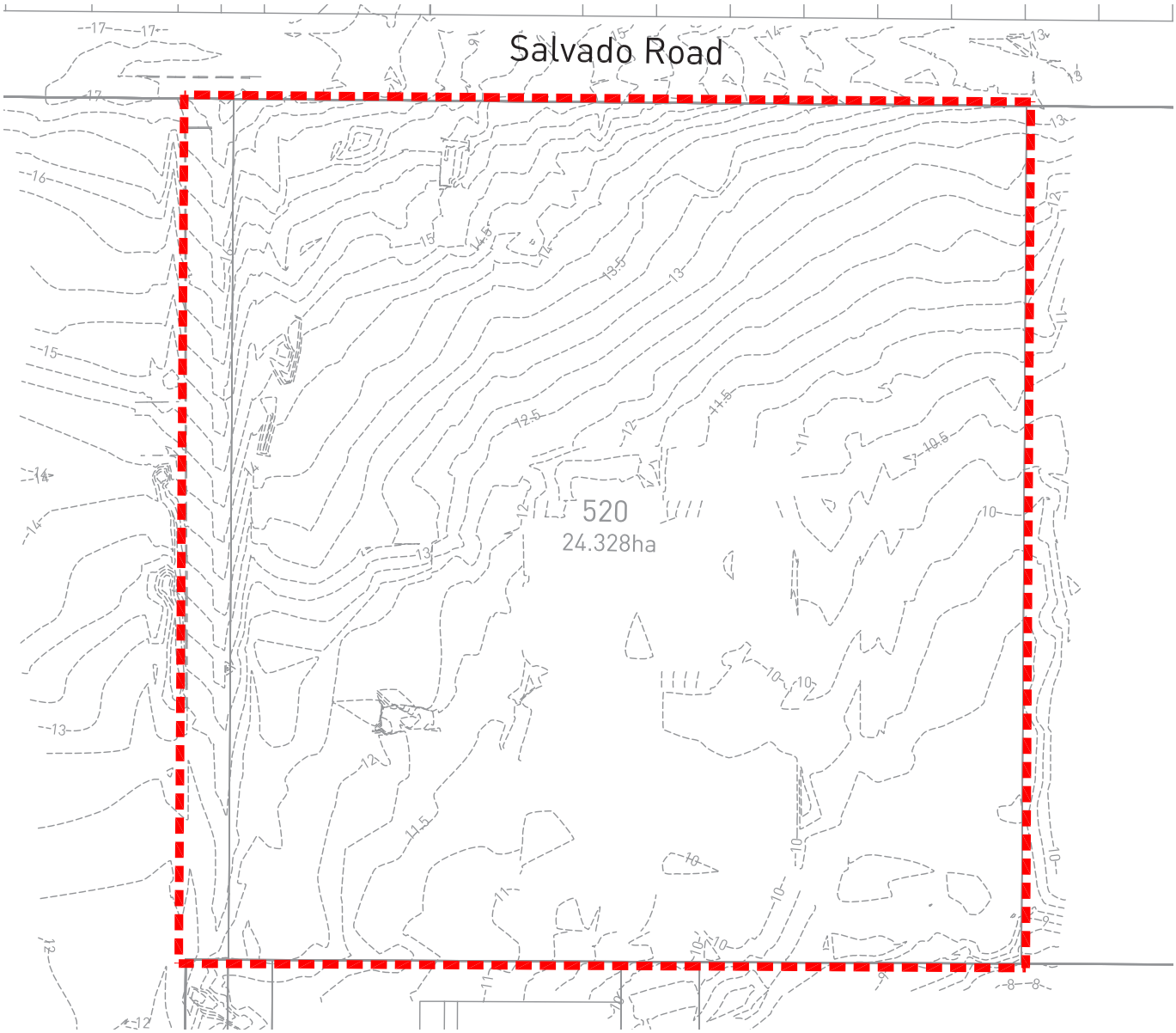


FIGURE 8: CONTOUR PLAN

2.2.2 Soil Types

The site comprises of sand derived from Tamala Limestone, described by the Geological Survey of Western Australia as:

- S7 Sand – pale and olive yellow, medium to course-grained, sub-angular to sub-rounded quartz, trace of feldspar, moderately sorted, or residual origin.

2.2.2.1 Acid Sulphate Soils

The WA Atlas includes maps pertaining to Acid Sulphate Soils (ASS) areas, which are widespread in low lying coastal areas of Western Australia.

The site is classified as 'no known risk'. However, 'Mabel Talbot Park' to the south of the subject site is classified as 'high to moderate risk' around the park pond which extends to the south east corner of the site.

Refer to Figure 9: Acid Sulphate Soils.

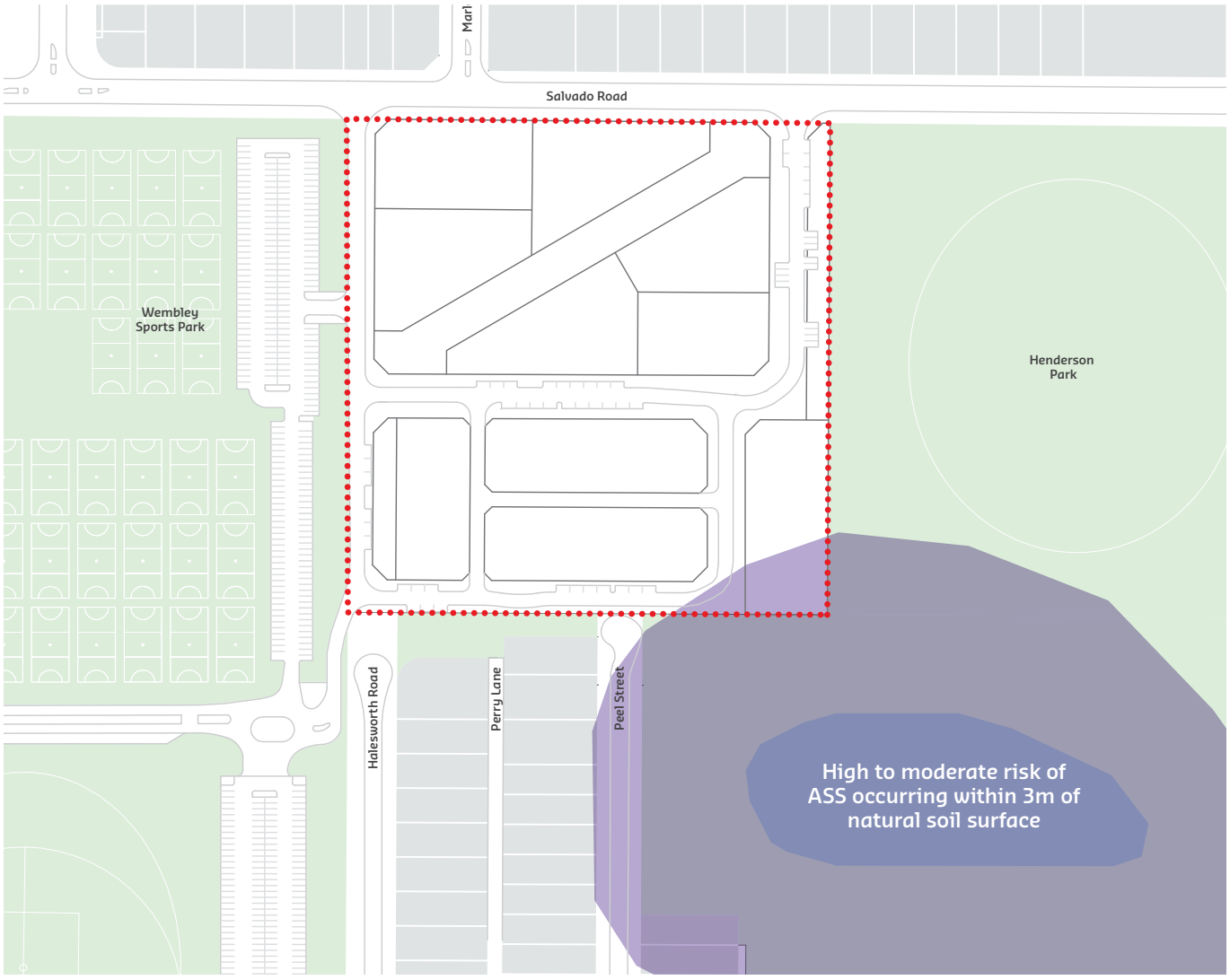


FIGURE 9: ACID SULPHATE SOILS

2.2.3 Contaminated Soils

A search of the DEC contaminated sites database indicates the site is not currently listed. Given the historic activities on site a Preliminary Site Investigation (PSI) and a Detailed Site Investigation was however undertaken by GHD in 2012 and 2104 respectively. Refer to Appendix 4 for the DSI report.

The DSI was reviewed by the Auditor in June 2014 and the following interim advice was provided:

- The DSI meets the requirements of the DER guidelines;
- The management of ACM is required to be addressed prior to earthworks commencing, and
- The preparation of an unexpected finds protocol as part of any environmental management for site development works is recommended. These documents will be provided to the Auditor for comment prior to the commencement of works.

2.3 Groundwater and Surface Water

2.3.1 Groundwater

An unconfined groundwater aquifer is supported beneath the site by sandy soils, which flows south and east towards the Swan River and west towards the coast. The Perth Groundwater Atlas suggests the maximum groundwater levels are expected to occur between 8.0m and 9.0m AHD, which is 1-6m below the existing ground level.

Long term groundwater monitoring bores within the locality indicate seasonal variation in groundwater levels between 0.5m and 1.25m. A maximum groundwater level recorded at Mabel Talbot Reserve of 6.41m AHD (since 1998) suggests that current maximum groundwater levels near the site are lower than the Perth Groundwater Atlas (2006) historical maximum groundwater level.

2.3.2 Surface Water

No surface water exists within the site however the site is within close proximity to four distinct surface water bodies, being Mabel Talbot Park Lakes, Jualbup Lake, Perry Lake and Herdsman Lake.

The site's topography results in the draining of surface water to the south east towards the lake contained within the Mabel Talbot Reserve. The lake overflows through to the Wembley-Jolimont Main Drain to Lake Monger.

2.4 Heritage

A search of the Department of Indigenous Affairs database indicates no listed Aboriginal heritage sites are located within the site.

The Heritage Council of Western Australia database indicates no registered heritage sites are located within the site.

2.5 Context and Other Land Use Constraints

The site is inner-suburban in nature, being approximately 4km west of the Perth Central Area.

It is well positioned with respect to shopping, services and entertainment opportunities with the Wembley Town Centre located within 400m of the site providing employment, shops, cafés and restaurants within a short walk. Other, higher order shopping, employment and entertainment opportunities are available at Floreat Forum to the northwest and Subiaco to the east. The land is located approximately equidistant (1.5 kilometres) between these centres.

The site is particularly well located in the context of recreation. Passive recreation is provided for by Mabel Talbot Park to the south and active recreation opportunities are available at the Wembley Sports Park, Henderson Park and Pat Goodridge Hockey Centre. Floreat Oval, Grantham Selby Park and Floreat Park Tennis Club are also situated nearby.

With respect to health services, St John of God Hospital, Royal Perth (Shenton Park) Hospital and King Edward Hospital are located 1.5 kilometres west, 1.3 kilometres southwest and 1 kilometre southeast respectively.

The land is also well catered for with respect to schools with Jolimont, Wembley and Floreat Primary Schools all in close proximity. Senior education is similarly available with nearby secondary schools including Churchlands Senior High School, Perth Modern School and John XXIII.

The above factors combine to illustrate the land is afforded a high level of amenity and is well located to deliver higher density residential development opportunities.

PAW looking East

PAW interface to site

2.5.1 Pedestrian Access Way

An existing pedestrian access way (PAW) exists along the southern boundary of the site, which provides a footpath connection from the Wembley Sports Park to Mabel Talbot Park.

Existing dwellings on Peel Street and Halesworth Road abut the PAW's southern boundary however provide no direct frontage and therefore limited surveillance to this area.

This PAW is landscaped to a low maintenance standard, with unirrigated turf. Existing vegetation on the northern boundary of the PAW also screens this area creating a potentially unsafe pedestrian environment at certain times of the day.

The PAW therefore presents an opportunity for the development of the site to address the current presentation/ safety concerns, whilst providing a green buffer to the site through its interface treatments.

2.5.2 Sewer Main

The Perth Section 2 Main Sewer (2100mm dia.) traverses the site diagonally, from the north eastern corner of the site to the centre of the western boundary. From the centre of the western boundary the sewer traverses the western boundary of the site south. A 16m easement is required, 8m either side of the sewer alignment.

Initial discussions with Water Corporation undertaken by the Project Engineer identify the preference for the easement to remain within the public realm for ease of access and maintenance (should this be required). The sewer main and easement therefore provides an opportunity to create a high quality open space area.

A disused sewer main also exists adjacent to the Main Sewer alignment. This section is redundant and will be removed as part of future subdivision works.

3. Land Use and Subdivision Requirements

The ODP sets out land use, residential densities, public open space, transport networks, environmental considerations and servicing requirements. This section describes these elements in detail including, as applicable, how they relate to LN, the provisions of TPS 1 and the Town's Policy Framework.

3.1 Design Objectives

The design objectives/ rationale adopted for the site has been informed by both the planning objectives specified in the TPS 1 for the SCA 2 as well as the outcomes of the community consultation. The following provides an overview of the objectives derived from the above, which guided the design response proposed under the ODP.

3.1.1 Special Control Area 2 Objectives

As previously noted in Section 1.3 of this report, SCA 2 stipulates specific design objectives to be considered in the development outcomes for the site. The following provides those objectives relevant to the ODP design response:

- To facilitate orderly development and subdivision of the land for residential purposes, in accordance with the use permissibility designations applicable to the Residential Zone in the Zoning Table;
- To facilitate a vibrant inner city community with a yield of at least 200 dwellings;
- To encourage a high standard of built form design outcomes;
- To encourage connectivity, permeability and enhanced pedestrian and cycle movements; and
- No vehicle access will be taken from Halesworth Road or Peel Street, which connect with the southern boundary of the site.

Whilst a dwelling target of at least 200 dwellings is identified under SCA 2, as previously discussed given the built form nature proposed for the majority of the site, and the opportunity for dwelling yields to vary depending on the design of individual sites, the ODP utilises a dwelling target range to ensure the provisions of Town Planning Scheme No.1 are adequately met, whilst also considering maximum dwelling yield opportunities.

The ODP and supporting assessments of transport, drainage and servicing, therefore utilises a maximum dwelling yield of 350 dwellings for the site (325 apartments and 25 single dwellings) in order to appropriately consider a maximum development scenario.

3.1.2 Community Objectives

Community engagement through the formal advertising period of the Local Scheme Amendment in August, 2013 provided a range of community objectives which informed the preparation of a Concept Plan for the site. Subsequent community engagement was undertaken in June, 2014 to enable the community to review and provide further feedback on the Concept Plan

Feedback predominantly comprised three key areas being Access, Public Realm and Housing Types. Refer to Appendix 5 for community feedback from the August 2013 engagement.

The following objectives are therefore derived from the community feedback provided through the community engagement.

Access

- The proposed road network within the site to limit traffic impacts to Wembley Sports Park and Salvado Road;
- Sufficient parking to be provided for both future residents and visitors;
- Maintain the City to Sea Greenway along Salvado Road as well as consider any additional paths required internally to the site to facilitate pedestrian and cycling movements, and
- Enhance pedestrian connectivity between the site, public open space area and existing residential areas.

Housing Types

- A variety of housing types to meet a range of demographics;
- Density to be delivered through a balance of single and multiple dwellings;
- Density facilitated through quality design and built form outcomes, and
- The location of apartment sites and corresponding building heights to minimise visual presence external to the site and ensure no overshadowing occurs.

Public Realm

- Ensure the streetscape supports mature trees and the development is not a 'sea of roofs'.
- Moreton Bay Figs on Henderson Park to remain and be protected;
- Limit impacts to existing and surrounding public open space areas, and
- Open space and landscaping to 'soften' interface with existing residential areas.

3.2 Land Use and Structure

In light of the SCA 2 and Community Objectives discussed above, the ODP provides for a range of residential housing opportunities, encompassing single and apartment sites. The location of single and multiple dwelling built forms within the site has directly responded to community objectives which identifies the need to respect and respond to the existing residential fabric to both the northern and southern boundaries of the site, whilst still achieving the minimum dwelling target

As previously noted, the Perth Section 2 Main Sewer traversing the site diagonally and along the western boundary of the site is required to be retained within the public realm and as such, this area is identified for public open space. The easement area therefore creates a central public open space spine to the apartment sites, creating a focal point, landscape and drainage treatment opportunities delivering a high level of amenity. This link also assists in facilitating greater east west movements through the site, linking Wembley Sports Park to Henderson Park.

Other areas of public open space have been provided within the site to respond to the protection of trees and the treatment of drainage.

Alternate land uses, such as 'local shop', 'restaurant' which are incidental to the site's predominant residential dwelling outcomes, are permitted subject to approval in accordance with Part 1 of the ODP.

The ODP (Plan 1) provides an overview of the land use arrangement proposed with an Indicative Concept Plan provided as Figure 10.

FIGURE 10: INDICATIVE CONCEPT PLAN

3.3 Residential

The outcomes of the community consultation highlighted the need for a lower density interface to the southern, and to a lesser degree, the northern boundaries of the site. The design therefore considers the bulk and scale of development which exists within the immediate locality and responds accordingly.

Considering both the SCA 2 and Community Objectives, the design response also addresses the following site constraints and opportunities:

- Existing public open space, vistas and community assets;
- Typography of site;
- Density and Housing Diversity; and
- Climate Responsive Design.

The following section provides an overview of the above in further detail.

3.3.1 Existing Open Space and Community Assets

Since its closure in 1994, the site has been fenced off from the wider community, creating a strong visual barrier and limiting pedestrian movements between the Wembley Sports, Henderson and Mabel Talbot Parks. One of the key objectives of the ODP is therefore to ensure the development removes these barriers within the local community, integrating the site back into the locality.

The site's location, abutting three major recreation areas, provides the opportunity for the development to deliver unobstructed access to the surrounding public open space network. The interface to these areas provide the opportunity for the development to both 'borrow' amenity from the adjacent open space areas as well as contribute to, the existing open space network.

The interface to the row of Moreton Bay Figs located within Henderson Park adjacent to the eastern boundary of the site was a key consideration in the design response. The row of figs is considered an important community asset to both the Town as well as the existing residents, and whilst not within the subject site, the development aims to both protect and enhance these trees. In accordance with advice provided by the Arbor Centre, the design therefore proposes a road interface to the eastern boundary where it abuts the row of figs, with an area of open space of approximately 10 metres in width. This open space area was defined by the existing canopy which extends from Henderson Park into the subject site, which generally

Henderson Park interface

delineates the extent of the 'root zone' area. The widened public open space therefore acts as a 'Tree Preservation Zone' (TPZ).

Residential development is further setback from the TPZ, capturing views through the tree canopy to the Perth City Centre. Given the screening opportunities the figs provide from Henderson Park (being 9 to 10 metres in height, or roughly 3 storeys), these sites are identified for apartment dwellings to a maximum height of 6 storeys.

The western boundary of the site abutting the Wembley Sports Park also provides similar opportunities for apartments. By orientating height to both public open space areas, the impact of height and bulk to the northern and southern boundaries adjacent to existing residential areas are minimised.

A row of large trees has also been retained within the Wembley Sports Park car park. These trees provide opportunities for protection and shade to the western facade of future dwellings, screening from the site to the Netball Centre courts, as well as providing a green outlook to the upper stories.

3.3.2 Site Topography

As previously discussed, a fall in natural ground level of approximately 5-6m (or roughly two storeys) occurs from the Salvado Road frontage to the internal east/ west road. Rather than importing fill to created elevated sites which are visually prominent from the surrounding residential areas, the design response proposes to 'cut into' the existing natural ground level.

This approach will enable the built form to 'sit within' the surrounds, thereby ensuring building heights of 5-6 storeys present externally to the site as 4-5 storeys above natural ground level.

This outcome will be delivered through the creation of finished lots at basement level (below existing natural ground level) which will also ensure:

- Parking required at grade is limited, thereby maximising opportunities for private open space, and residential uses within each site, and
- Achieving a cut to fill balance across the site, minimising the need for import fill, reducing construction costs and ensuring affordable outcomes.

Refer to Appendix 7 for Built Form Perspectives from key locations around the site.

Proposed built form

3.3.3 Density and Housing Diversity

3.3.3.1 Housing Diversity

Housing diversity is achieved through a balance of single residential lots and apartment sites, delivering a range of housing typologies, including:

- Terrace style housing – accessed via rear laneway; and
- Apartments – providing a mix of product ranging from 1 to 3 bedrooms.

As previously discussed the site, by virtue of its locational characteristics near key centres as well as its access to public open space and public transport, presents a key opportunity for residential intensification in the form of multiple dwelling development. Given however the adjacent lower density detached housing, single residential lots are proposed along the southern interface to the site.

Single residential lots rather than grouped housing was considered more reflective of both the 'terrace' style housing which exists in Subiaco as well as the desired housing product. The single residential lots therefore provide for a transition of housing product and density between the existing southern residential community and the centre of the site.

The Indicative Concept Plan (Figure 10) provides for twenty five (25) single residential lots ranging from 270m^2 to 300m^2.

Whilst these lots are identified for single dwellings, ancillary dwellings as per the Town's Housing Options Study may also be considered from the rear laneway to encourage surveillance as well as to diversify the housing product available. This may also provide opportunities for alternate demographic or family structures, ageing in place objectives and to encourage affordable rental accommodation. The provisions of Clause 5.5.1 of the R Codes to reduce the minimum site area for ancillary development are therefore varied under Part 1 to facilitate ancillary dwelling outcomes for the proposed single residential lots. This variation is considered appropriate given:

- The proposed single residential lots are afforded two access points via the laneway and street front and therefore present greater opportunities for a dwelling over garage arrangement; and
- The design and implementation of the dwelling and the ancillary accommodation can occur concurrently and present a holistic design outcome, rather than the ancillary dwelling occurring as 'infill' development.

Apartment sites are proposed to provide for smaller scale built form opportunities, in keeping with the immediate residential locality. The configuration of apartment sites is characteristic of sites ranging in areas of approximately 1,800m^2 through to 2,400m^2. The sites, whilst created to facilitate smaller scale built form outcomes, may however be amalgamated and considered as larger consolidated development sites. The characteristics and built form outcomes proposed under the Design Guidelines for each will however still need to be addressed as they apply to the individual sites.

The apartment sites will be required to deliver housing diversity via the R Codes requirements, which specify the inclusion of single bedroom dwellings. From market research already undertaken by the LandCorp, it is evident the there will be a strong demand for both two and three bedroom apartments. The ODP area therefore has the ability to deliver the following housing types:

- Apartments comprising single as well as two and three bedroom dwellings;
- Terrace style single houses; and
- Ancillary dwellings

In the wider context of the locality, the ODP area provides for a greater mixture of housing diversity, which current comprises mainly of detached housing and grouped housing development.

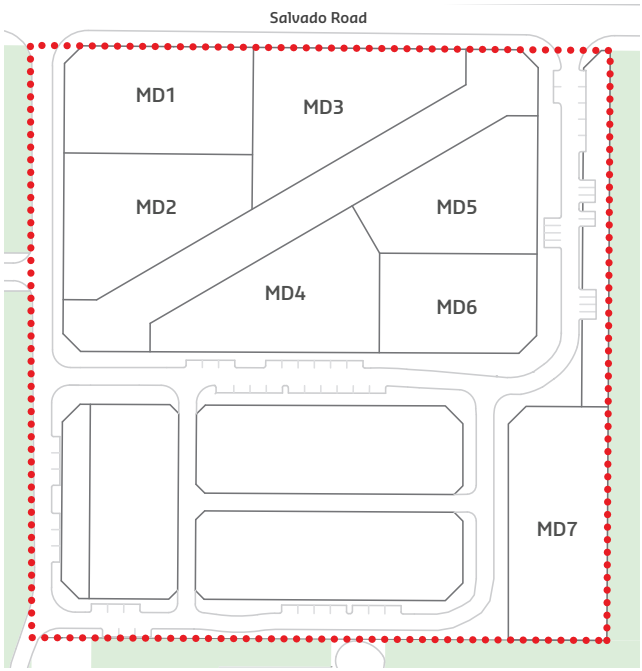


FIGURE 11: APARTMENT SITE REFERENCE PLAN

3.3.3.2 Density

The planning framework stipulates two density requirements applicable to the ODP area, as follows:

Planning Framework	Density Provision
SCA 2	At least 200 dwellings
Liveable Neighbourhoods	30-40 dwellings per site hectare (400m from a town centre)

The ODP proposes two density requirements within the site:

- R50 – Single Residential Lots; and
- R80 – Multiple Dwelling Sites.

Single lots are proposed at a R50 density however Part 1 of this ODP proposes a variation to Table 1 to allow for an increase in site coverage to 50%. Given the urban nature of the built form proposed, as well as the lots access to open space in the immediate locality, the site coverage requirements of the R50 coding were not considered to provide great enough flexibility for the built form.

Development within the R50 lots will be guided by a Detailed Area Plan and Design Guidelines which will stipulate design objectives in relation to bulk, scale and private open space. The proposed site coverage is not considered to detrimentally impact the ability to provide adequate solar access, private open space, or the utilisation of private outdoor areas for future residents.

The Indicative Concept Plan provided as Figure 10, generates the following yields:

Site	Indicative Area	Minimum Dwelling Yield
MD 1	0.23 ha	13
MD 2	0.23 ha	23
MD 3	0.24 ha	14
MD 4	0.20 ha	44
MD 5	0.18 ha	33
MD 6	0.24 ha	26
MD 7	0.26 ha	22

'The density provided by the ODP therefore meets the minimum dwelling target of 200 and equates to an overall density of approximately 85 dwellings per site hectare. This satisfies the Liveable Neighbourhoods target of 30-40 dwellings per site hectare (for standard lot layouts).

Given the R80 density code for multiple dwelling sites provide for plot ratio floor area only, in order to ensure that the target density is implemented, Part 1 identifies a minimum dwelling density per site to be achieved through development. This will ensure that the appropriate dwelling target is reached for the ODP area. Minimum density targets may be exceeded for individual sites, provided the characteristics and form of development is compliant with the development controls prescribed within the Design Guidelines.

In order to secure the above density requirements per site, Part 1 also proposes a variation to Table 4 of the R Codes, increasing the plot ratio floor area from 1.0 to 2.0 for R80 development. The inclusion of single residential lots along the southern boundary of the site to address the adjacent Subiaco residents concerns, limits the number of multiple dwelling sites proposed within the ODP area. Furthermore, and as discussed under section 3.3.3.1, current market research has indicative a strong demand for larger two and three bedroom apartments. As such, increasing floorspace will allow for greater flexibility in achieving the dwelling targets for the ODP area, whilst allowing for apartments to be delivered reflective of the desired size for the local market.

3.3.4 Building Height

A standard building height of 3 storeys is applicable across the site. Additional building height is however proposed at three locations within the subject site:

- Centrally to the site – abutting the sewer easement and within the area north of the internal access road;
- The western boundary of the site – north of the internal access road; and
- Along the eastern boundary of the site as it abuts Henderson Park.

The majority of the multiple dwelling sites include a maximum building height of six (6) storeys. Buildings are proposed to be three (3) storeys at most street frontages and up to an additional three (3) storeys setback on upper levels depending on the site. The variation in building height is to ensure development is appropriately set back from street level, which reduces the impact on the street.

Along the Salvado Road and the Mabel Talbot Park frontages, building heights are restricted to three (3) storeys overall, which is one (1) storey higher than the surrounding existing housing form, which is proposed to provide transition to the residential area to the north.

The following table provides an overview of the proposed building heights for each of the Multiple Dwelling sites. The below heights will be formalised through the Design Guidelines prepared subsequent to the ODP.

FIGURE 12: BUILDING HEIGHTS PLAN

Multiple Dwelling Site Reference	Street Frontage Building Height[1]	Upper Level[2]	Overall Building Height
MD 1.	3 storeys	1 storey[3]	4 storeys
MD 2.	3 storeys	2 storeys	5 storeys
MD 3.	3 storeys	3 storey[3]	6 storeys
MD 4.	3 storeys	3 storeys	6 storeys
MD 5.	3 storeys	3 storeys	6 storeys
MD 6.	3 storeys	3 storeys	6 storeys
MD 7.	3 storeys (southern interface to Mabel Talbot)	3 storeys	6 storeys

[1] *Street Frontage Building Height – is defined as the lower portion of the building which maintains a relationship/ interface to the street or other public realm (i.e. public open space).*

[2] *Upper Level – is defined as the upper portion of the building, setback to be defined through the Design Guidelines.*

[3] *Adjacent to sewer easement*

Refer to Figure 12 for the Building Heights Plan

3.3.5 Climate Responsive Design

All single residential lots are oriented north-south or east-west to orientate to the public realm and to achieve excellent solar access. The Design Guidelines prepared subsequent to the ODP will include building envelopes to ensure that future development will be oriented to achieve solar access and meet overshadowing requirements.

Importantly, the site is also well located, in the western suburbs of Perth, to capture cooling westerly winds in summer. The multiple dwelling development sites are particularly well placed to take advantage of these breezes, facilitated by the southeast-northwest POS link through the site.

3.4 Open Space

Under the provisions of LN a range of site responsive open space is required, which appropriately addressed district, neighbourhood and local needs of residents.

The ODP therefore considers the location and requirement of public open space areas across the site, considering the existing provision of open space within the locality and the requirements for drainage and tree retention.

The ODP provides for approximately 0.48 hectares of public open space (POS) across the site by way of two local parks. This comprises 0.37 hectares of unrestricted (9.5% of gross subdivisible area) and 0.1 hectares of restricted open space 2.5% of gross subdivisible area). Additional public open space required in response to the proposed development is limited to local open space given the sites proximity to:

- Wembley Sports Park – Regional and District Facility (16.3ha)
- Henderson Park – District Playing Fields (4.1ha)
- Mabel Talbot Park – Neighbourhood Park

The following provides an overview of the public open space design response proposed under the ODP.

A Landscape Master Plan has been prepared for the ODP area, depicting the anticipated use and intent of each of the public open space areas. Refer Appendix 8.

Please also refer Figure 14: Key Public Open Space and Landscape Features and the Public Open Space Schedule.

3.4.1 Retention of Significant Trees

The key trees within the locality are, as previously discussed, the row of Moreton Bay Figs located along the eastern boundary of the site which will be retained, the 'Budda' tree and trees located along the southern boundary of the site to the PAW.

The 'Buddha' tree is proposed to be relocated to create a landscape statements at the western boundary of the linear public open space link and along the internal access road. It was deemed capable of relocation or retention along with some smaller rare exotics left over from nursery production. Development layout options that sought to retain trees in their present position and levels were investigated and considered however the impact on the amount of developable land, disruption to required road alignments combined with the potential root zone impacts, have resulted in retention of peripheral trees and relocation of those in the heart of the development.

Mature trees along the northern boundary of the site, will be subject to water main relocation works and earthworks.

The trees which exist within the Wembley Sports Park access road are not impacted by the proposed design response.

POS Schedule – Former Nursery Site Jolimont		
Site Area		3.91 ha
Deductions	Nil	
Gross Subdivisible Area		3.91 ha
POS @10%	0.391 ha	
Public Open Space Contribution Required:		
Unrestricted (8%)	3128m²	
Restricted (2%)	782m²	
Public Open Space Provided:		
	Unrestricted	*Restricted*
POS 1 – 3171m²	2978m²	193m²
POS 2 - 1069m²	701m²	368m²
POS 3 - 587m²	587m²	
TOTAL	**4266m² (10.9%)**	**561m² (1.4%)**

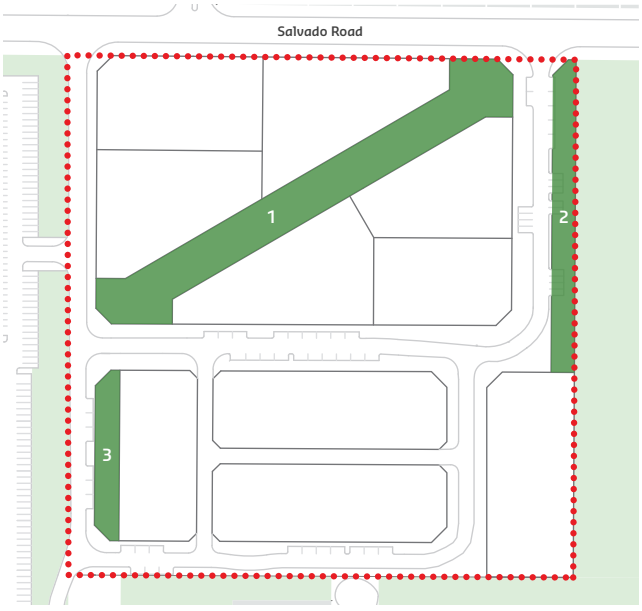


FIGURE 13: PUBLIC OPEN SPACE REFERENCE PLAN

FIGURE 14: KEY PUBLIC OPEN SPACE AND LANDSCAPE FEATURES

3.4.2 Public Access Way

The PAW located along the southern boundary of the site has been considered within the Landscape Master Plan and overall design response. Whilst the PAW does not form part of the site, the opportunity exists to include the upgrade of this area as part of the landscape works, to deliver a high quality green buffer to the adjacent residential area.

The proposed Landscape Master Plan therefore extends the planted verge of the proposed access road within the site into the PAW, creating a seamless interface. Additional areas of planting and turf are proposed along the PAW, as well as an upgrade to the footpath to match the design theme within the proposed ODP area.

PAW landscape detail

3.4.3 Sewer Easement

The sewer easement comprising approximately 0.3 ha of POS, is proposed to form a linear parkway linking Salvado Road to the Wembley Sports Park. The easement area will make a positive contribution to the open space within the immediate locality.

This linear space will comprise a range of hard and soft landscaping treatments that will infer subspaces along its length, with each of the spaces linking to the next and providing interest and useability to the area. Dwellings are proposed to be orientated to the linear open space were possible to provide security and passive surveillance of the area, as well as draw on the amenity provided by the space. Two small squares or piazzas are proposed at both ends of the linear POS to create and entry statement and sense of arrival from the Salvado Road intersection and the Wembley Sports Park, the treatment and theming of the linear open space will be reflective of the urban nature of the proposal contributing an alternate type of open space to the locality. The character of the linear parkway will be created through a balance of canopy trees established in raised planters and variations to the surface treatments.

In addition to the linear POS area, an additional portion of the sewer main runs from the western edge of the linear POS to the southern boundary of the site. As with the linear park, the sewer in this location is also required to be located in public reserve. POS 3 therefore responds to the requirement for this sewer and its easement. POS 3 will present a passive space, providing for north- south pedestrian movements with areas of planted gardens and turf. This POS area will provide a landscaped buffer to the Wembley Sports Park car park improving the amenity of the single residential lots directly abutting.

Within the easement a range of small rain gardens will also be provided to collect, treat and infiltrate stormwater. The rain gardens will be fully integrated within soft and hard landscape detailing and will be designed in consultation with the Water Corporation to ensure unencumbered access to the sewer for maintenance purposes.

3.5 Commercial and Employment

No new commercial areas or centres are proposed by the ODP. Previous contextual discussion at Section 2.5 confirms the full range of commercial and employment opportunities in proximity to the site with particular regard to the Activity Corridor of Cambridge Street, which incorporates a wide variety of shopping, commercial and employment opportunities. The proximity of the site to major centres such as Subiaco and the Perth Central Area is also noted.

The inclusion of 'Restaurant' as a discretionary use within the ODP area also provides the opportunity for the development of a restaurant or café to take advantage of the site's location adjacent to existing public open space areas. As such, the inclusion of this use would ideally be located adjacent to Henderson Park or Mabel Talbot Park and comprise part of the overall residential built form outcome for the multiple dwelling sites.

3.6 Education Facilities

The site is within close proximity to a number of local schools including, Jolimont, Wembley and Floreat Primary Schools. Senior education is similarly available with nearby secondary schools including Churchlands Senior High School, Perth Modern School and John XXIII.

On the basis of a maximum population of approximately 340 people and given the densities proposed, the existing education facilities are considered to adequately cater for any need created by the site.

3.7 Movement Networks

The following provides a summary of the movement network inclusive of traffic safety and management. Refer to the Transport Assessment Report Provided in Appendix 9.

3.7.1 Existing Road Network

The following table provides an overview of the existing road network within the locality and adjacent to the site. In addition to the road network below, Peel Street and Halesworth Road (access streets) terminate at the site's southern boundary. Given the extension of these roads are however restricted within the development they have not been assessed under the ODP.

Existing Road Network Table

Road	Classification	Volume (vehicle movements per day)	Existing Design
Salvado Road (adjacent to site)	Access Street	8,257	9.3 pavement, single lane, footpath northern side cycle path southern side.
Marlow Street	Access Street	3,108	11.9m pavement, single lane, footpaths and parking on both sides of road.
Jersey Street	Distributor A	6,488	13m pavement, single lane, footpaths and parking on both sides.
Selby Street	Distributor A	20,000	Four lane divided pavement.
Cambridge Street	Distributor A	20,349	Four land undivided pavement.

3.7.1.1 Wembley Sports Park Access and Parking

The Wembley Sports Park is currently undergoing significant facility upgrades encompassing new playing fields and buildings, as well as a complete upgrade to the site's internal access and parking arrangements. Works commenced on the upgrade in 2012 and have been staged to allow for the continued use of the site.

As such, the sports park has been subject to temporary access and parking arrangements for the duration of the works, which has placed pressure on the surrounding road network. The Netball Centre access way and associated parking from Salvado Road was completed as the first stage of the access and parking upgrades, with all access and parking for the site focused to this area.

The recently completed second stage of these works however, including the signalised intersection on Selby Street, now provides direct access to the Wembley Sports Park. This ensures the distribution of traffic and parking as well as providing an alternate route to exit the sports park.

Upon full completion of all parking and access within the sports park, the impact of the temporary arrangements upon the access way/ Salvado Road intersection will significantly decrease.

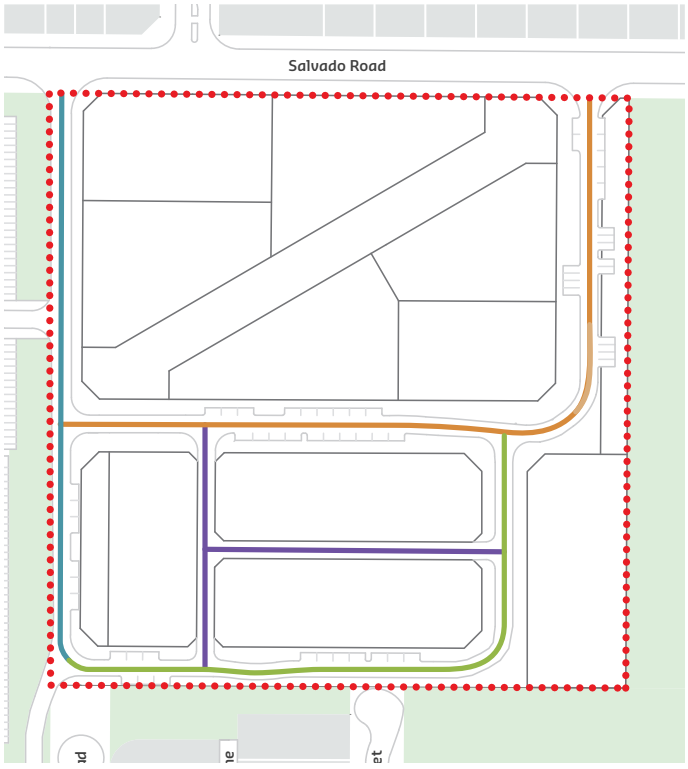


FIGURE 15: ROAD CLASSIFICATION

3.7.2 Proposed Movement Network

The proposed road network is designed as a permeable grid, creating a low speed, legible layout. The following provides an overview of the proposed movement network in accordance with the provisions of Liveable Neighbourhoods.

3.7.2.1 Road Network

The ODP proposes the creation of two internal access roads.

The northern portion of the site is serviced by an internal access road, design to an Access B classification under Liveable Neighbourhoods. This wider Access Street B design allows for on-street parking allowing as well as the opportunity for more verge and street planting creation of an 'entry' statement at its intersection at Salvado Road.

The southern portion of the site is serviced by a lower order Access Street D, given the limited dwellings within this portion of the site, as well as its interface to public open space/ PAW. An Access Street D is therefore sufficient to service the volume of traffic anticipated, whilst allowing for on-street parking.

Both internal access roads connect to the Wembley Sports Park access way, which is created as a public road under the parent lot title subdivision (WAPC Ref: 155331) This road is created as an Access C standard under Liveable Neighbourhoods.

Two laneways are proposed to service the rear loaded terrace lots, these are designed to LN standard of 6m.

Refer to Figure 15: Road Classification.

3.7.2.2 Access

Through the Local Scheme Amendment, access to the site from the south was restricted from Halesworth Road and Peel Street, given concerns raised by residents regarding traffic movements through the area. As such vehicle movements are restricted to Salvado Road and the Wembley Sports Park access way.

Give the volumes experienced on Salvado Road, the proposed intersection of the Access B Road was determined on the basis of a minimum separation distance of 60m from Marlow Street Intersection. Whilst a reduced intersection separation is technically possible as Salvado Road at this location is classified as an access street, current traffic volumes are more aligned to a distributor road classification and therefore the higher intersection separation distance has been utilised.

Driveways on the northern side of Salvado Road were also considered, however given the multitude of driveways the total avoidance was not achievable. Therefore as part of detailed subdivision design the intersection design and treatment will need to consider appropriate traffic islands/ treatments and potentially protected turning/ reversing bays should it be required. It should be noted that two of the driveways opposite the intersection of the site provide access to grouped housing sites, therefore the vehicle movements from these lots will be in forward gear minimizing any movement conflicts.

Refer to Figure 16: Access Strategy.

The western access way within the Wembley Sports Park, will similarly require further detailed engineering design, considering appropriate traffic treatments to ensure safe and efficient movements. The internal Access B and D roads which intersect with the Wembley Sports Park access way will also be subject to detailed engineering design to restrict right hand turns into the site. By restricting right-hand movements into the site, the opportunity to utilise the Wembley Sports Park access / Selby Street intersection to 'rat run' will be minimised. Further detailed design of the Salvado Road intersection will be required to determine if a similar treatment is required at this intersection.

Refer to Figure 17: Indicative Pavement Treatment.

Access arrangements to each of the Multiple Dwelling sites will be formalised through the Design Guidelines.

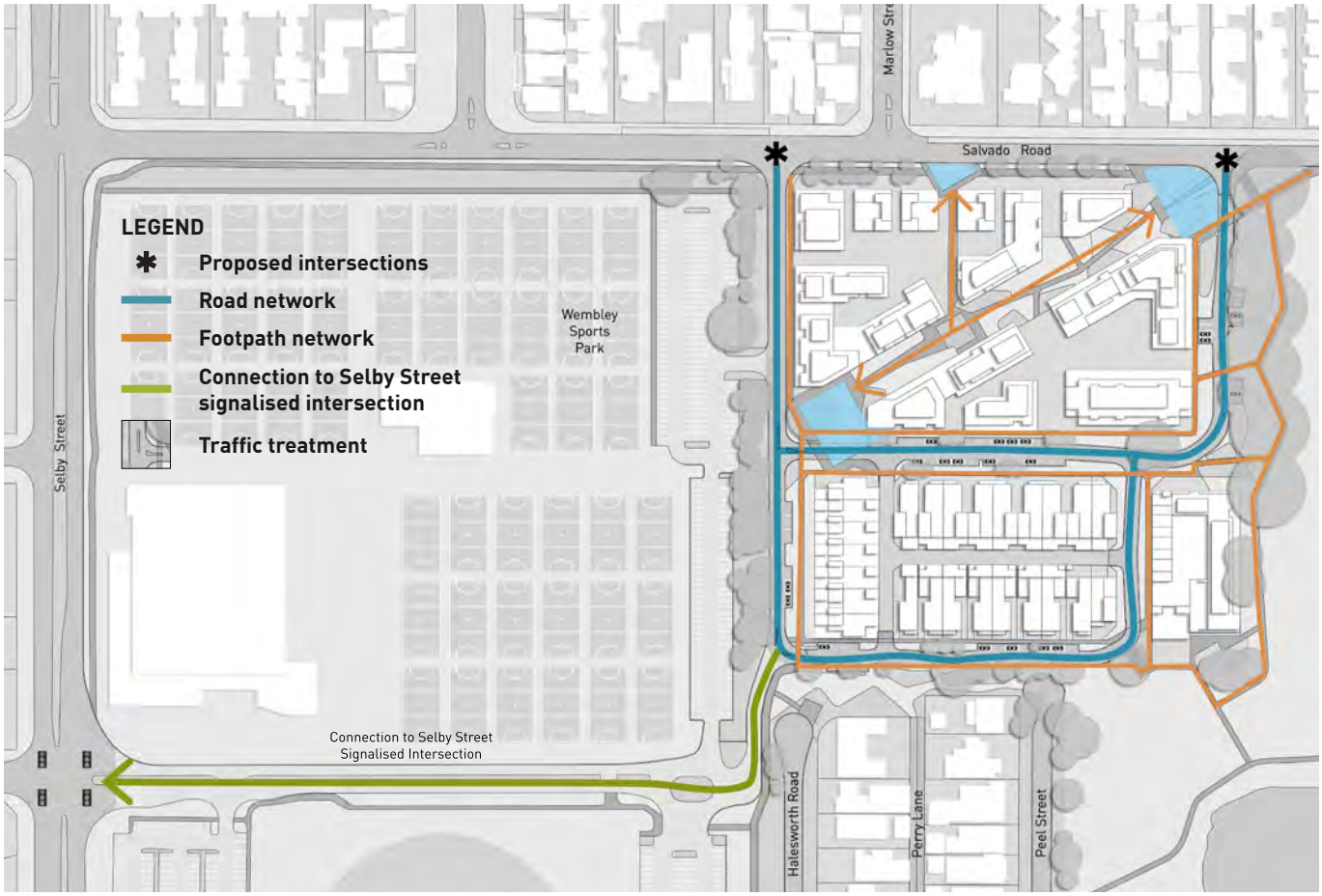


FIGURE 16: ACCESS STRATEGY

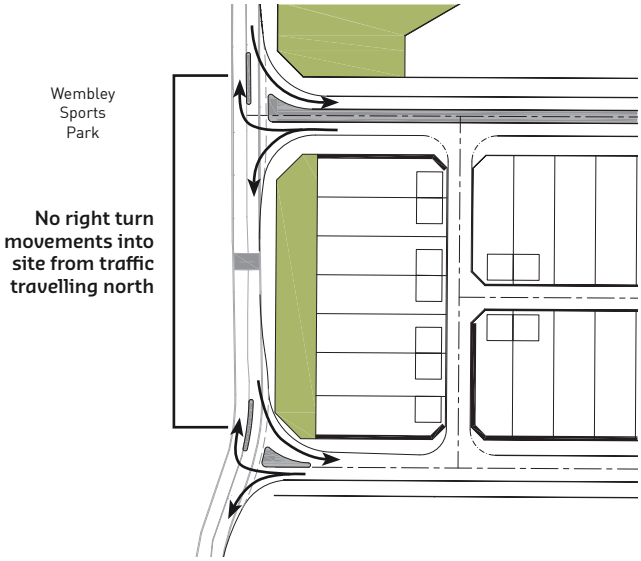


FIGURE 17: INDICATIVE PAVEMENT TREATMENT

3.7.2.3 Parking

Car parking for residential dwellings will be in accordance with the R Codes 'Location A' provisions, given the site's proximity to the high frequency bus route located on Cambridge Street.

Given the fall across the site and the anticipated creation of finished lots at basement level, the majority of parking for the apartment sites is anticipated to be wholly or partially provided as basement parking.

The Design Guidelines prepared for the site will provide guidance on the configuration of parking for each of the multiple dwelling sites, as well as provide deemed-to-comply provisions for the design of car parking spaces and vehicular access.

Visitor Parking

Whilst visitor bays will be required by each development 'on site' as per the R Codes, on-street parking will also be provided within the road reserves.

From initial designs undertaken, the movement network comprising the internal access roads and the eastern side of the Wembley Sports Park access way to be upgraded to an access road, may accommodate approximately 50-55 on-street bays. Given the minimum dwelling yield of 200 dwellings this equates to approximately 1 visitor bay per 4 dwellings consistent with the requirements of the R Codes.

Visitor bays for single residential lots will be provided at a rate of 1 bay for every for 4 dwellings. The ultimate number of on street visitor bays will be determined at detailed engineer design stage.

Given the majority of apartment sites will utilize basement car parking, a variation to the provision of the R Codes allowing for the provision of visitor parking within the secured parking area will also be sought under the Design Guidelines. This variation will enable additional flexibility required for small scale multiple dwelling development, whilst also ensuring that visitor parking provided on site is not utilized by the Wembley Sports Park during peak periods.

3.7.2.4 Traffic Volumes

Given the built form nature proposed for the majority of the site, the transport assessment has utilised the Indicative Concept Plan to identify a maximum yield and therefore maximum traffic movements generated by the site. On the basis of the Indicative Concept Plan a total dwelling yield of 350 dwellings has been utilised (325 apartments and 25 single dwellings).

Whilst this is substantially higher than the target density of 200 dwellings, given the concerns raised by local residents, the traffic assessment is considered to sufficiently test a 'maximum development scenario' in relation to the impact of the ODP upon the existing road network.

Based on the above the site could generate up to 1,776 vpd, however given the location of the high frequency bus route along Cambridge Street there is an expectation trips could be reduced within peak times.

The following provides an overview of the impacts of the ODP upon the surrounding road network:

- Salvado Road will be affected by any development on the subject land. The forecast increase of up to 1,420 trips per day will result in a volume of 9,677vpd. Salvado Road in its current form is able to accommodate the forecast traffic increases.
- The traffic on Marlow Street (3,108vpd) already exceeds the desirable level for a residential access street (3,000vpd). The forecasted increase of 311 vpd is unlikely to impact the current function of the street, in particular the on street parking.
- The traffic on Veryard Terrace is anticipated to remain well below the 3,000 vehicles per day residential threshold.
- Jersey Street north is shown to experience an increase of 12.7% as a result of traffic using the traffic signals to access Cambridge Street. Some additional delays may be experienced during peak periods, but the traffic signals should automatically re-time to accommodate the forecast traffic increases.

3.7.3 Public Transport

The locality is serviced by 3 bus services, which provide 7 buses during peak periods and 4 services across the day. These services link the site to City Beach to the west and Roe Street Bus Station (via Glendalough Train Station) to the east. Other services link the site to Claremont and the QEII Precinct, from Selby Street.

The Subiaco Train Station is located 1.5km and the Daglish Station 1km from the site, providing additional access to the wider public transport network.

3.7.4 Pedestrian and Cycle Networks

The locality is highly walkable with the site being in within 400m of a range of services within the Wembley Town Centre. The majority of roads within the locality provide at least one footpath, with several cycle routes currently existing in Jolimont and Subiaco. A high quality route is provided on Salvado Road linking to the railway cycle route linking Perth CBD to Fremantle.

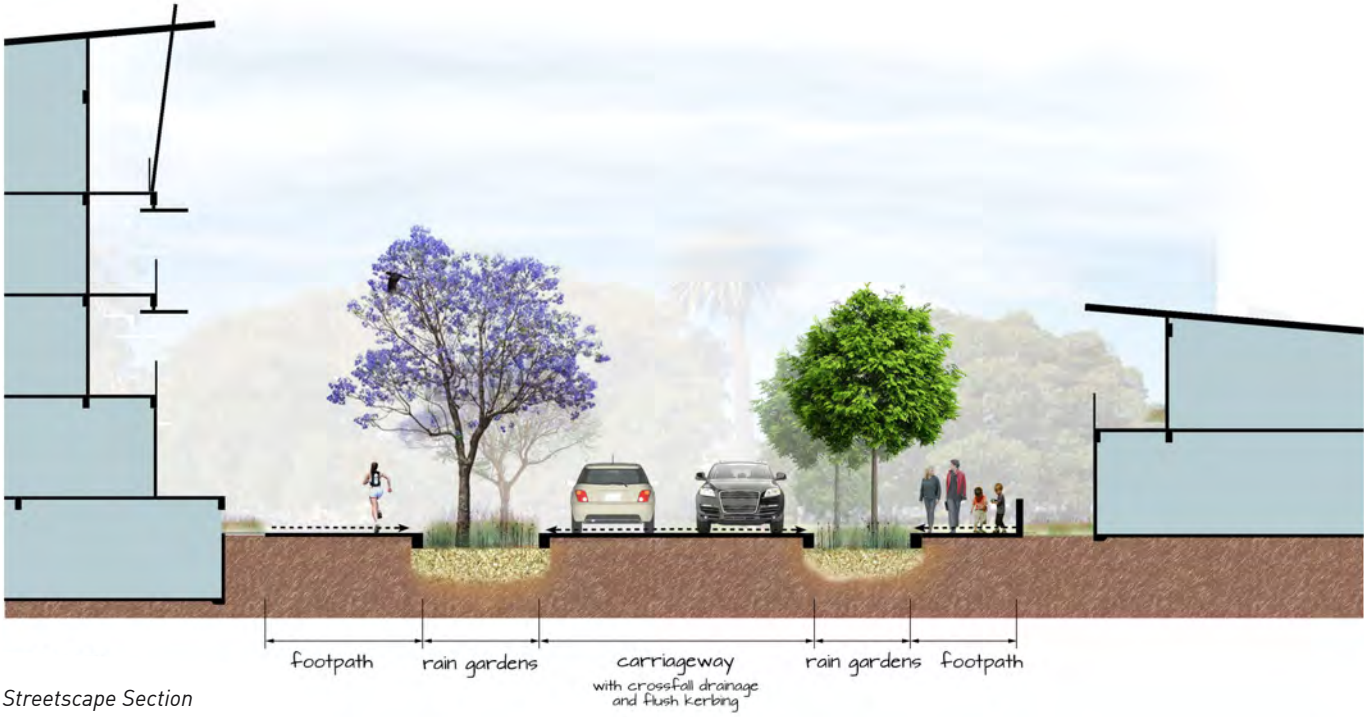
At a local level to the proposed design response further adds to the pedestrian network by way of the provisions of:

- The central linear link creating a strong east west linkage through the site;
- Proposed integration and upgrade to the southern PAW to strengthen existing movements and provide a more safe and secure environment;
- North/ south links by way of the road network to include footpaths;
- Proposed extension of the footpath network with Mabel Talbot Park north adjacent to the eastern boundary of the site, and
- Maintaining, and upgrading/ enhancing where required, the existing dual use path network on the western boundary of the site.

3.8 Urban Water Management

An Urban Water Management Plan has been prepared in support of this ODP, and is provided as Appendix 10.

The UWMP has been prepared in accordance with the water sensitive urban design practices as described in the Stormwater Management Manual of WA.



Streetscape Section

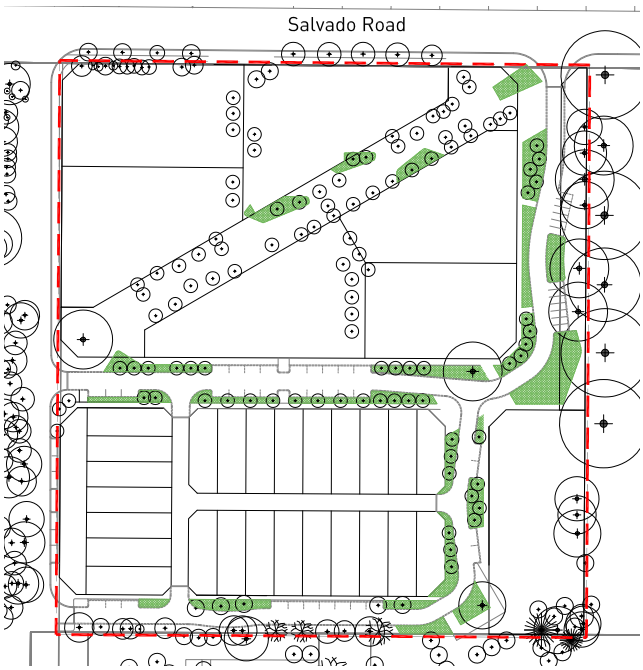


FIGURE 18: RAIN GARDEN PLAN

3.8.1 Proposed Drainage Network and Infrastructure Requirements

3.8.1.1 Local Drainage

Given the site experiences a 1 - 6m of groundwater separation with relatively permeable soils, infiltration is proposed to be the primary disposal route for stormwater on site comprising a mixture of treatments being:

- On lot retention (soak wells);
- 'Leaky' drainage pipes and pits, and
- Rain garden underground bio-infiltration systems
- Modular Underground infiltration/storage systems (i.e. StormTech)
- Porous pavements and landscaping treatments.

The major drainage system is designed to manage rainfall events up to the 100 year ARI. The minor drainage system is designed to manage rainfall events up to the 10 year ARI event. The following strategies and key elements of the drainage system are as follows:

- The 100 year ARI event will be retained on site with no discharge to the downstream drainage system;
- Where depth to AAMGL is greater than or equal to 2 metres, stormwater events will be managed by infiltrataion using soakwells or on-site internal modular underground infiltration systems for ARI rainfall events up to 100year ARI.
- Storage areas are to have a minimum separation of 0.5 metres between AAMGL or controlled groundwater levels.
- Lots shall be designed at 300mm above the 100year flood level in the road reserves
- Single lots manage minor events up to 10 year ARI via soakwells
- Where depth to AAMGL is greater than 1.5 metres, but less than 2 metres, or where lot frontage is 10 metres or less, soakwells with an overflow to rain gardens are provided to infiltrate above the 10 year ARI rainfall event.
- Multi dwelling sites managed up to 100 year ARI events on site via modular underground systems.
- Road reserves manage up to 100 year ARI events using leaky pits and rain garden systems.

The minor drainage system is designed to manage rainfall events up to the 10 year ARI event. The following strategies are proposed:

- Where depth to AAMGL is greater than 2 metres, soakwells or on-site internal modular underground infiltration systems will infiltrate the 100 year ARI rainfall event.
- Where depth to AAMGL is greater than 1.5 metres, but less than 2 metres, or where lot frontage is 10 metres or less, soakwells with an overflow to rain gardens provided to infiltrate above the 1 year 10 hour ARI rainfall event.

The following provides the indicative drainage requirements per site to be accommodated through on-site infiltration. The volumes provide a general guide only and will be subject to further detailed design through the development application stage.

Site Reference	Drainage Requirements Per Site (Volume)
MD 1	77m^3
MD 2	81m^3
MD 3	83m^3
MD 4	82m^3
MD 5	70m^3
MD 6	59m^3
MD 7	108m^3
Single Residential Lots	8.5m^3

3.9 Infrastructure Coordination, Servicing and Staging (Public Utilities)

The following provides a summary of the servicing conditions and constraints. Refer to the Servicing Report provided in Appendix 11.

3.9.1 Wastewater

Given the limitations imposed by the sewer main alignment (its location through the site as well as the angled nature of the alignment), preliminary discussions with the Water Corporation were undertaken to determine whether the relocation of the main to facilitate more regular development of the site would be supported.

Through project feasibility analysis it was however determined the cost of relocation was too great to be borne solely by the development given its size and potential yields. As such, the ODP reflects the sewer remaining in-situ, within public open space, thereby also providing unencumbered access to the Water Corporation.

3.9.1.1 Reticulated Mains

Several gravity sewerage options have been explored and discussion in preparation of the ODP with the Water Corporation. From the discussions to date, the preferred strategy is for the site to be serviced via a new internal DN150 gravity reticulation network that will connect into the existing DN 150 gravity reticulate along Jersey Street to the east of Henderson Park.

The existing Jersey Street sewer main currently services the Henderson Park clubrooms and grades southwards to the existing Jersey Street Pump Station A162. To service the development this option will require an extension of the sewer main through Henderson Park. Initial discussions with the Town have confirmed this option is supported.

This option however provides the following benefits:

- The existing grade experienced across the site can be utilised and therefore the development will be serviced from the lowest portion of the site. This will substantially reduced the need for earthworks and imported fill, and
- Utilising the grade of the site also assists in minimising any level difference and hard interface edge (high retaining walls) along the southern boundary of the site.

3.9.2 Water

An existing 535mm Dia. Reinforced concrete water distribution main runs within the northern boundary of the site adjacent to Salvado Road. Water Corporation has advised this water main cannot be protected via an easement on private property and must be located wholly within the public realm.

To maximise the developable area within the site, the water main is proposed to be relocated within the Salvado Road reserve on a major services trunk alignment, as agreed to in principle by the Water Corporation.

3.9.2.1 Water Reticulation Mains

The proposed water reticulation layout will be designed in accordance with Water Corporation design standards. Should the final development supply requirement exceed the capacity of the existing 900mm/ 1000mm diameter water reticulation mains immediately adjacent to the site an extension to the 205mm water main in Cambridge Street (135 metre north of the site) will be required.

3.9.3 Gas

Reticulated gas is available for the site via a 230mm steel medium pressure gas main along the southern side of Salvado Road.

3.9.4 Electricity

The existing power network adjacent to the development site along Salvado Road is low voltage (415V) only and as such is not suitable to supply the proposed ODP area. An extension of the high voltage network into the development is therefore required with three options available:

- Option 1 – From the intersection of Selby Street and Salvado Road;
- Option 2 – From the intersection of Jersey Street and Salvado Road;
- Option 3 - From the intersection of Cambridge Street and Marlow Street.

Option 2 is the recommend extension, given its location adjacent to Henderson Park, limiting any impact on existing residents.

3.9.5 Communication

Communications will be provided via pit and pipe network to be installed at the developers cost, to the NBN Co. Standard requirements. Whilst the site comprises less than 100 green title lots, the introduction of multiple dwellings may ensure the consideration of the development by NBN Co. In this instance the developer will be required to cover cost is associated with trenching and ducting the internal reticulation, however NBN Co. will cover the cost of installation.

3.10 Implementation

3.10.1 Developer Contribution Arrangements

The Town of Cambridge do not impose developer contributions on a district or regional scale across the municipality.

All works and upgrades required to deliver the development will be developer funded and therefore no developer contributions apply to the site.

3.10.2 Staging of Subdivision and Development

Subdivision construction to create twenty five (25) single residential green title lots and seven (7) multiple dwelling sites, is likely to occur as one stage given the size of the site and the upgrade works required to facilitate development.

Any required road upgrades to the adjacent access way to a public road standard (WAPC Ref: 155331) will occur concurrently with the subdivision site as deferred works (as agreed with the Town) to ensure appropriate integration with the finished levels and final engineering design internally to the site.

Public open space areas will be delivered as part of the subdivision works, however items such as street tree planting and driveways, are proposed to be staged to reflect the construction programs for each development site, to avoid damage occurring through the construction process.

Upon sale of the apartment sites, individual purchasers/ developers will be required to prepare and submit development applications, in accordance with the ODP and Design Guidelines for the individual sites.

3.10.3 Management Plan

The following management plans are anticipated as conditions of subdivision approval:

- Landscape Management Plan, and
- Construction Management Plan.

3.11 Subsequent Approval Framework

Given the built form proposed for the site, and the requirements of SCA 2, Design Guidelines will be prepared for the site to provide further guidance on:

- Setbacks;
- Access;
- Privacy;
- Private open space
- Building height and bulk requirements – through 3D massing/ built form envelopes, and
- Design of car parking spaces.

The above will be required prior to the lodgement of the Proposed Plan of Subdivision, in accordance with the requirements of SCA 2 under TPS 1.

PART THREE
TECHNICAL APPENDICES

APPENDIX ONE

CERTIFICATES OF TITLE

WESTERN AUSTRALIA

REGISTER NUMBER	
520/DP35670	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
2	14/8/2013

RECORD OF CERTIFICATE OF TITLE

VOLUME 2535 FOLIO 100

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 520 ON DEPOSITED PLAN 35670

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

TOWN OF CAMBRIDGE OF WESTRALIA SQUARE, 141 SAINT GEORGE'S TERRACE, PERTH
(AF I427652) REGISTERED 27 MARCH 2003

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

1. CROWN GRANT IN TRUST. SEE CROWN GRANT FOR CONDITIONS. (AS TO THE PORTION COLOURED GREEN ON SUPERSEDED PAPER TITLE VOLUME 1665 FOLIO 259 ONLY)
2. M349034 LEASE TO MINISTER FOR SPORT AND RECREATION OF 8TH FLOOR, DUMAS HOUSE, 2 HAVELOCK STREET, WEST PERTH EXPIRES: SEE LEASE. AS TO PORTION ONLY. REGISTERED 23.7.2013.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF 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.

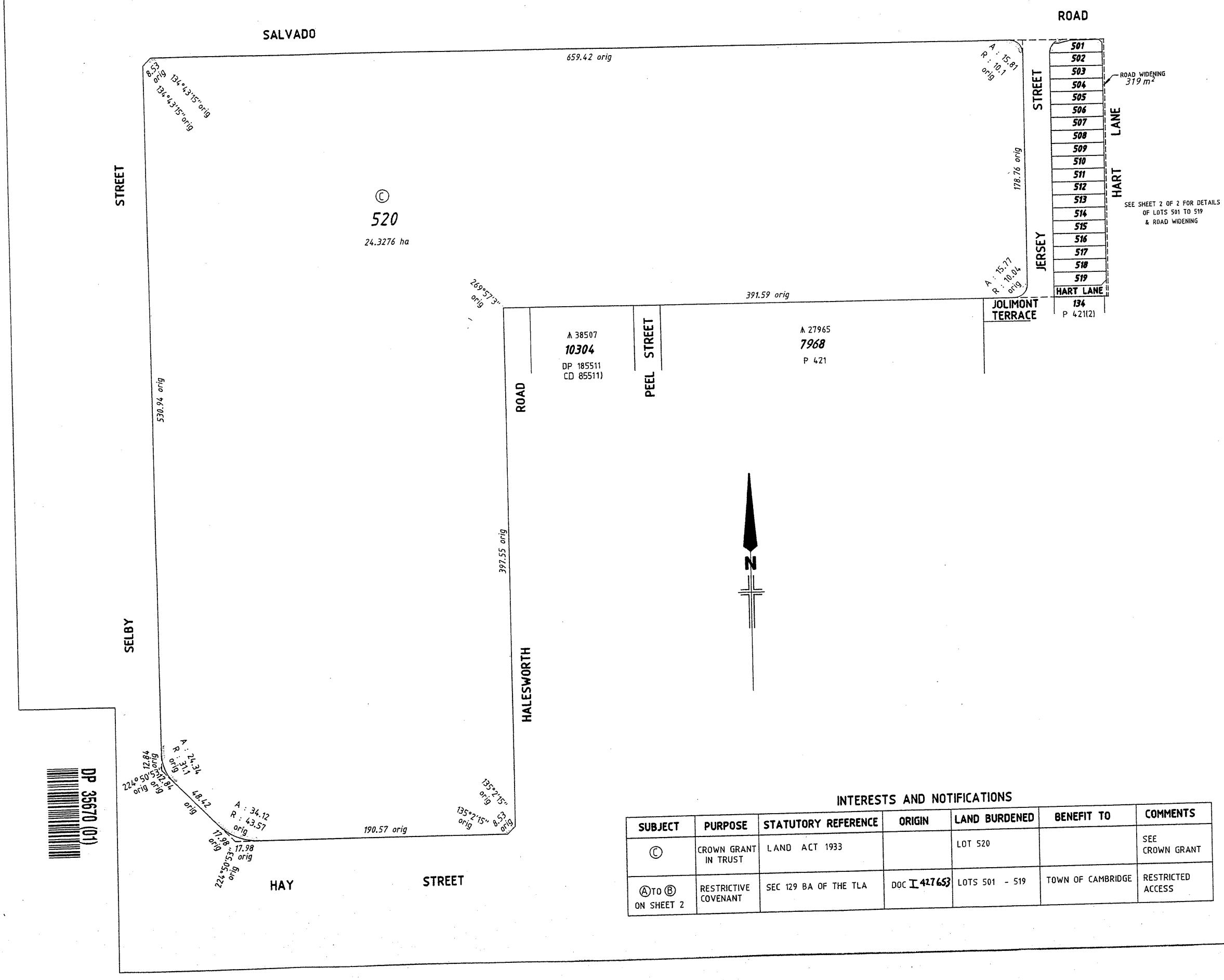
SKETCH OF LAND: DP35670.
PREVIOUS TITLE: 1665-259.
PROPERTY STREET ADDRESS: 199 SALVADO RD, JOLIMONT.
LOCAL GOVERNMENT AREA: TOWN OF CAMBRIDGE.

NOTE 1: L593285 DEPOSITED PLAN (INTEREST ONLY) 70583 LODGED.
NOTE 2: M334668 DEPOSITED PLAN 73717 LODGED (INTEREST ONLY)

ED/VER	AMENDMENT	BY		DATE
2/1	DP REPLACED TO RECTIFY ERRORS FOUND DURING AUDIT	GHD	John Demiris	21.2.03

LIMITED IN DEPTH TO 60.96 METRES

SEE SHEET 2 OF 2 FOR DETAILS OF LOTS 501 TO 519



INTERESTS AND NOTIFICATIONS

SUBJECT	PURPOSE	STATUTORY REFERENCE	ORIGIN	LAND BURDENED	BENEFIT TO	COMMENTS
©	CROWN GRANT IN TRUST	LAND ACT 1933		LOT 520		SEE CROWN GRANT
Ⓐ TO Ⓑ ON SHEET 2	RESTRICTIVE COVENANT	SEC 129 BA OF THE TLA	DOC I 427653	LOTS 501 - 519	TOWN OF CAMBRIDGE	RESTRICTED ACCESS

TYPE FREEHOLD

PURPOSE SUBDIVISION

PLAN OF

LOTS 501-520, ROAD, ROAD WIDENING AND RESTRICTIVE COVENANT

DISTRICT SWAN
TOWNSITE
DOLA FILE
LOCAL AUTHORITY TOWN OF CAMBRIDGE
LOCALITY JOLIMONT

EARLY ISSUE YES/NO

FORMER TENURE
LOT 2124
CT : 1665-259
DP 117027

ON
INDEX BG34 (2) 10:25, 10:26
PUBLIC

FIELD BOOK
86260
88891

SCALE: 1:2000 (20 0 40 80m)
ALL DISTANCES ARE IN METRES

SURVEYOR'S CERTIFICATE - Reg 54

I J.DEMIRIS

hereby certify that this plan is a correct representation of the survey and/or calculation from measurements recorded in the field book for the purposes of this plan and that it complies with the relevant written law(s) in relation to which it is lodged.

John Demiris 21.2.03
Licensed Surveyor Date

GHD Surveys Pty Ltd
ACN 008 601 054
SURVEYS
"GHD House" 239 Adelaide Terrace
Perth WA 6004
Tel: (8) 9429 6666 Fax: (8) 9429 6555
Email: permail@ghd.com.au
Web: www.ghd.com.au

6110866-V4 GHD No. 0 REV

LODGED
DATE 28.1.03
FEE PAID #1063
ASSESS No. 371088

TYPE OF VALIDATION
FULL AUDIT
LEGAL COMPONENT BLG
DOCKET PLAN / ~~DIAGRAM~~ 33270
CERTIFIED CORRECT 27.2.03
F.S.G.

WESTERN AUSTRALIAN PLANNING COMMISSION
FILE 117059
DELEGATED UNDER S.20 WAPC ACT 1985
20/3/2003 DATE

IN ORDER FOR DEALINGS

SUBJECT TO

SEC. 295(5) OF THE LOCAL GOVT ACT, SEC. 28(3) OF THE T.P.&D. ACT AND SEC. 129 BA OF THE T.L.A.

b.g. Burton 21.3.2003
FOR INSPECTOR OF PLANS & SURVEYS/AUTHORIZED LAND OFFICER DATE

APPROVED

APPROVED 27.3.2003
INSPECTOR OF PLANS & SURVEYS/AUTHORIZED LAND OFFICER DATE

DOLA
Department of LAND ADMINISTRATION

DEPOSITED PLAN

35670

SHEET 1 OF 2
EDITION 2 VERSION 1

DP 35670 (01)

DP 35670 (02)

LIMITED IN DEPTH TO 60.96 METRES

Ⓐ TO Ⓑ DENOTES RESTRICTIVE COVENANT.
SEE INTERESTS & NOTIFICATIONS
ON SHEET 1 OF 2 SHEETS.

SCALE: 1:600 ALL DISTANCES ARE IN METRES

10 0 20 40m

Licensed Surveyor 21.2.03 Date

APPROVED BY WESTERN AUSTRALIAN PLANNING COMMISSION

FILE 117059

DELEGATED UNDER S.20 WAPC ACT 1985

DATE 20/3/2003

DOLA Department of LAND ADMINISTRATION

DEPOSITED PLAN 35670

SHEET 2 OF 2

EDITION 2 VERSION 1

FOR HEADING SEE SHEET 1

SALVADO ROAD

JOLIMONT TERRACE

HART LANE

JERSEY STREET

SEE SHEET 1 OF 2 SHEETS

178.76 orig

659.42 orig

391.59 orig

40.23 orig

30.18 orig

(198.66)

(188.75)

A : 15.81
R : 10.1
orig

A : 15.77
R : 10.04
orig

A : 15.77
R : 10.00

SEE ENLARGEMENT

ROAD WIDENING 319m²

ROAD WIDENING

OMGR

RAMSET IN CONC

RAMSET/PLATE IN CONC

DECK SPIKE IN BIT

501 354m² 40

502 398m² 40

503 398m² 40

504 398m² 40

505 398m² 40

506 398m² 40

507 398m² 40

508 398m² 40

509 398m² 40

510 398m² 40

511 398m² 40

512 398m² 40

513 398m² 40

514 398m² 40

515 398m² 40

516 398m² 40

517 398m² 40

518 398m² 40

519 419m² 36

520

134 P 421(2)

A 27965 7968

ENLARGEMENT
(NOT TO SCALE)

APPENDIX TWO

PROPOSED PLAN OF SUBDIVISION

Planning Design Delivery

LEGEND

- Subject Site
- 7 Existing Street Number
- 1 Proposed Lot Number
- Existing Boundaries
- Proposed Boundaries
- 2 Contours
- Water
- Sewer
- Buildings to be Removed
- Vegetation to be Cleared
- Existing Trees

0 75 150 Metres

REVISIONS

Rev	Date	Drawn
A	2013.07.29	M Callaghan
B	2013.07.31	M Callaghan
C	2014.04.29	M Winfield

ROWEGROUP
PLANNING DESIGN DELIVERY

w: www.rowegroup.com.au
e: info@rowegroup.com.au
p: 08 9221 1991

Date Drawn:	2013-07-29
Job Ref:	7898
Scale:	1:3000 @ A3
Client:	Landcorp
Designer:	K Kyle
Drawn:	M Callaghan
Projection:	MGA50
Plan ID:	7898-SUB-01-C

Cadastre supplied by Town of Cambridge

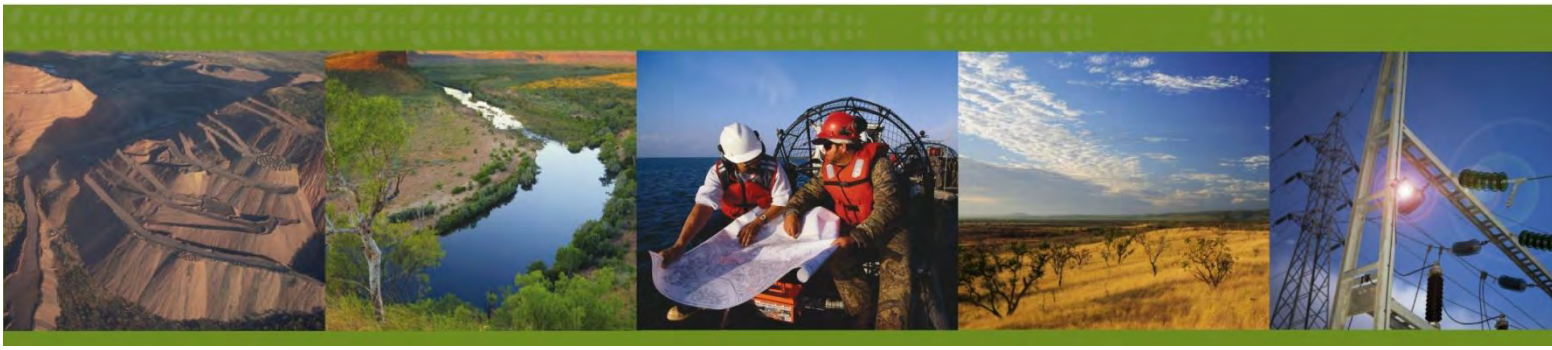
Proposed Plan of Subdivision

Lot 520 Salvado Road
Jolimont

N:\TOWN PLANNING\7000-7999\7898\DRAFTING\A-CAD\7898_SUB01C_20130731 JOLIMONT.DWG
Matt Winfield 20 May 2014

APPENDIX THREE

ENVIRONMENTAL ASSESSMENT REPORT



Environmental Assessment Report

Part Lot 520 Salvado Road, Jolimont

Prepared for
LandCorp
by Strategen

November 2012

STRATEGEN
environmental consultants

Environmental Assessment Report

Part Lot 520 Salvado Road, Jolimont

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

November 2012

Disclaimer and Limitation

This report has been prepared for the exclusive use of the Client, in accordance with the agreement between the Client and Strategen ("Agreement").

Strategen accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any person who is not a party to the Agreement.

In particular, it should be noted that this report is a qualitative assessment only, based on the scope of services defined by the Client, budgetary and time constraints imposed by the Client, the information supplied by the Client (and its agents), and the method consistent with the preceding.

Strategen has not attempted to verify the accuracy or completeness of the information supplied by the Client.

Client: LandCorp

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
				Form	Date
Draft Report	A	Client review	G Houghton / J Morgan / D Walsh	Electronic	17/11/2012
Final Report	B	Client finalisation	J Morgan / D Walsh	Electronic	23/11/2012

Filename: LAN12227.01_R001_RevB - 27 November 2012

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1. Introduction

1.1 Background

LandCorp, in partnership with the Town of Cambridge, is seeking to develop a 3.9 ha site at Salvado Road, Jolimont (Part Lot 520) (Figure 1). The site is located approximately 300 m east of the intersection of Salvado Road and Jersey Street and is situated between the Matthews Netball Centre to the west and Henderson Park to the east (Figure 2).

The site is zoned „Urban" under the Metropolitan Region Scheme (MRS), however, it currently has no zoning under the local Town Planning Scheme (TPS). Strategen have therefore been engaged by LandCorp to undertake an environmental assessment of the site to support a Town Planning Scheme (TPS) Amendment. The proposed Amendment seeks a rezoning of the site to „Residential" with a „Special Control Area No. 2" overlay.

1.2 Land use

1.2.1 Existing land use

Commonly referred to as the Old Nursery Site, the site was originally developed as a plant nursery by the former City of Perth. It is currently used for storage purposes by the Town of Cambridge as shown by the aerial photograph in Figure 2. The site is fenced and accessible via the entrance gate along Salvado Rd.

The site is situated in an urban environment, with the Matthews Netball Centre and the Pat Goodridge Hockey Centre located directly adjacent to the west. These facilities provide a combined sporting precinct of State significance.

Land to the south of the site contains existing low density residential development set around Malbel Talbot Park and Henderson Park. North of Salvado Road is also utilised for higher density residential and commercial purposes.

1.2.2 Future land use

The purpose of the rezoning is to allow for the development of the site for residential purposes. This will be achieved by introducing a „Residential" zoning over the subject land and also provide for the preparation of an Outline Development Plan and Design Guidelines over the site by introducing a „Special Control Area No. 2" overlay over the subject land. This will be supported by provisions in Part 7 of Town Planning Scheme No. 1.

Through its redevelopment the site will be integrated into the existing urban environment.

Figure 1 Regional location

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Scale

0 20 40 60 80 100

Meters

N

1:5,000 at A4

Coordinate System: GDA 1994 MGA Zone 50
Date: 27/11/2012
Author: JCrute

Source: Cadastre: SLIP online Database, Landgate 11/2012.
Aerial image: ESRI online, 11/2012.
Note that positional errors may occur in some areas

Regional Map

Source: ESRI 2006

Path: Q:\GIS\Consult\2012\LAN\LAN12227.01\ArcMap_documents\R001\RevB\LAN12227_01_R001_RevB_F001.mxd

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Scale
0 10 20
Meters

N

Figure 2 Subject site

Coordinate System: GDA 1994 MGA Zone 50
Date: 27/11/2012
Author: jcrute
Note that positional errors may occur in some areas

Scale: 1:1,500 at A4
Source: Arial image: Nearmap, 27/05/2012, downloaded 01/11/2012. Cadastre: SLIP Database, Landgate 2012.

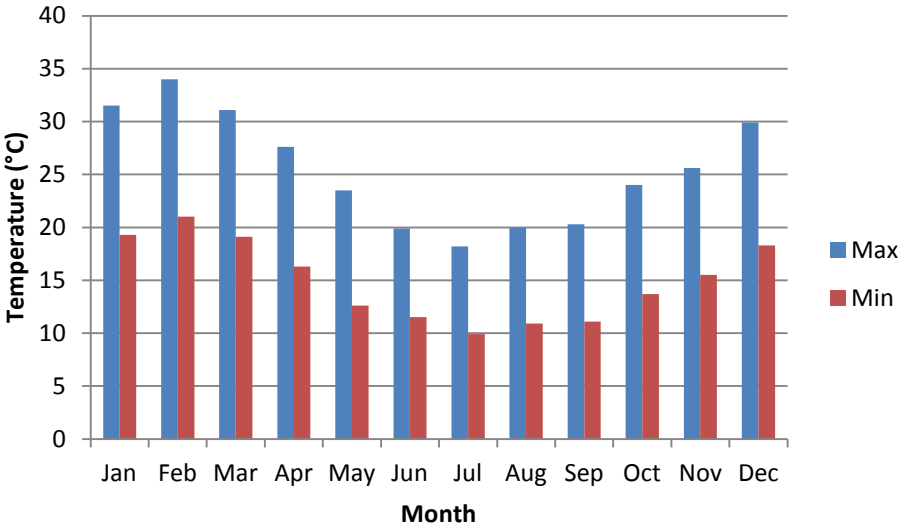
Legend
- Subject site boundaries
- Cadastral boundaries

Path: Q:\GIS\Consult\2012\LAN\LAN12227.01\ArcMap_documents\R001\RevB\LAN12227_01_R001_RevB_F002.mxd

2. Existing environment

2.1 Climate

The Perth Metropolitan region is described as Mediterranean, with hot dry summers and mild wet winters. During summer, winds blow from the south-east in the morning and from the south-west in the afternoon with the local sea breeze. Winter is characterised by north-westerly storm winds that back around to the west and south-west, interspersed with calmer periods. The nearest official meteorological weather station is the Swanbourne station located approximately 8 km away. Mean maximum and minimum temperatures are based on these records and shown in Figure 3. The highest mean maximum temperature during 2011 was recorded in February at 34 C and the lowest mean minimum temperature was recorded during July at 9.9 C.



Source: BoM 2012

Figure 3 Mean monthly maximum and minimum temperatures for Swanbourne

2.2 Geology, soils and topography

The topography of the site is flat with a slight downhill slope in a south-easterly direction. Elevation across the site is between 10m and 16m AHD with the highest elevation in the north-west corner of the site.

The site comprises sand (S7) derived from Tamala Limestone. This is described by the Geological Survey of Western Australia (GSWA) (Gozzard 1986) as:

- S7 Sand - pale and olive yellow, medium to coarse-grained, sub-angular to sub-rounded quartz, trace of feldspar, moderately sorted, of residual origin.

2.3 Hydrology

There are no surface water bodies on the site; however the following water bodies are located within 2 km of the site:

- Mabel Talbot Park pond – less than 0.1 km south-east of the Site
- Jualbup Lake – approximately 1.5 km south of the site
- Perry Lakes – approximately 2 km to the west of the site

- Herdsman Lake – approximately 1.6 km north of the site.

The site is located above a superficial (unconfined) aquifer. The groundwater is approximately 8m below surface level and flows in a south-westerly direction (GHD 2012).

2.4 Wetlands

There are no RAMSAR or Conservation Category Wetlands located within the Salvado Road site (Landgate 2012), however Herdsman Lake is a Conservation Category Wetland located approximately 1.6 km north of the site. Mabel Talbot Park pond, located adjacent to the site, is also an Environmental Protection Policy (EPP) wetland and therefore protected under the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (Figure 4). Neither of these wetlands are likely to be impacted on by the proposed rezoning.

2.5 Acid sulphate soils

The WA Atlas has compiled maps of ASS risk areas; these provide a broad-scale indication of the areas where ASS is most likely to exist. The Site is classified as „no known risk". The closest area of potential ASS risk is approximately 100 m south-east of the site, associated with the Mabel Talbot Park pond (GHD 2012). This specific area is classed as having a high to moderate risk of acid sulphate soils occurring around the park pond which could potentially spread to the south-east corner of the site. Additional assessment will be required during future development of the site, however at this stage any ASS are unlikely to be affected by the proposed rezoning.

Figure 4 Conservation significant wetlands

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Scale

0 20 40 60 80 100

Meters

N

1:5,000
at A4

Coordinate System: GDA 1994 MGA Zone 50
Date: 27/11/2012
Author: JCrute

Source: Cadastre: SLIP online Database, Landgate 11/2012. Aerial image: ESRI online, 11/2012. Wetlands: DEC 01/2012, downloaded 11/2012.
Note that positional errors may occur in some areas

Path: Q:\GIS\Consult\2012\LAN\LAN12227.01\ArcMap_documents\R001\RevB\LAN12227_01_R001_RevB_F004.mxd

2.6 Aboriginal heritage

The Department of Indigenous Affairs (DIA) database indicates no listed Aboriginal heritage sites are located within the site (DIA 2012). The closest listed site is Jolimont Swamp, a camp, hunting place and water source found in Mabel Talbot Park, south-east of the site. This site will not be affected by the proposed Amendment.

2.7 European history

The Heritage Council of Western Australia database indicates no registered heritage sites are located within the site (Heritage Council of WA 2012).

2.8 Contaminated sites

The DEC contaminated sites database shows no evidence of confirmed contaminated sites within the site (DEC 2012). However, there are several registered contaminated sites located within a 1 km radius of the site (GHD 2012):

- 23 Bishop Street, Jolimont: approximately 0.25 km east (hydraulically up-gradient) of the Site, classified as *'remediated for restricted use'*. 23 Bishop Street was formerly used as a salvage and storage yard with fuel facilities. Copper and lead contamination in the soil was identified at 0.5 m bgl.
- 59 Marlow Street, Wembley: approximately 0.7 km north (hydraulically cross-gradient) of the Site, classified as *„contaminated – remediation required'*. 59 Marlow Street was previously used as a service station and has hydrocarbons present in the subsurface soils (3 m to 9.5 m bgl) and dissolved phase hydrocarbons in the groundwater. The groundwater plume extends from the eastern half of the source site in a southerly direction.
- 57 Marlow Street, Wembley: approximately 0.7 km north (hydraulically cross-gradient) of the Site, classified as *'contaminated – remediation required'*. 57 Marlow Street has hydrocarbon contamination present in the groundwater from a plume extending south from 59 Marlow Street.
- 55 Salvado Road, Subiaco: approximately 0.7 km south-east (hydraulically cross-gradient) of the Site, classified as *'contaminated – remediation required'*. 55 Salvado Road was historically a bitumen batching plant. Hydrocarbons have been detected in the soil and left in-situ at depths of approximately 5 m to 22 m. Furthermore, dissolved and free phase hydrocarbons were detected in the groundwater. The site is acting as an ongoing source site of groundwater hydrocarbon contamination.
- Lots 201, 202 and 8001 on DP 71019, Subiaco: approximately 0.8 km south-east (hydraulically cross-gradient) of the Site, classified as *'remediated for restricted use'*. The lots were historically a bitumen batching plant. Hydrocarbons have been detected in the soil and left in-situ at depths of approximately 5 m to 22 m. Furthermore, dissolved and free phase hydrocarbons were detected in the groundwater. The site is acting as an ongoing source site of groundwater hydrocarbon contamination.
- Lot 203 on DP 71019, Subiaco: approximately 0.9 km south-east (hydraulically cross-gradient) of the Site, classified as *'remediated for restricted use'*. Lot 203 was historically used for light industrial and commercial land uses. Asbestos containing material is present coating a pipe 1 m bgl. Minor organochlorine pesticide (OCP) concentrations have been identified in the groundwater.
- 234 Cambridge Street, Wembley: approximately 1 km north-east (hydraulically up-gradient) of the Site, classified as *'contaminated – remediation required'*. 234 Cambridge Street is a service station. Hydrocarbon contamination in soil and groundwater was identified.

The Preliminary Site Investigation (PSI) undertaken by GHD (2012) initially identified a range of potential contamination sources in the site characterisation and site history. The following are considered to be potential sources of contamination and will be considered for further assessment:

- Fill material across the Site;

- Previous storage and application of chemicals (including herbicides, fungicides, fertilisers, pesticides and possible treatment of wooden products);
- Previous storage of fuel;
- Asbestos (scattered debris, within stockpiles and onsite building);
- Waste material (including discarded drums of kerosene);
- Acid sulphate soils (south eastern corner);
- Stockpiles of material;
- Town of Cambridge car wash down; and
- Disposal of street sweeping

Based on the information contained in the PSI report it is recommended that a detailed sampling and analysis plan is prepared in accordance with DEC Guidelines to incorporate the identified potential sources of contamination. Detailed investigations should include soil, asbestos and groundwater investigations to assess the extent of contamination (if any) across the site. This work is not required for the rezoning of the land but rather it is assumed that an independent contaminated sites auditor will be appointed at a future stage of the project to address requirements that will otherwise be triggered as a condition in the planning process. Further, it is recommended to appoint a DEC approved auditor to review the Sampling and Analysis plan prior to the commencement of intrusive works (GHD 2012).

2.9 Flora and vegetation

Vegetation across the site is sparse with dense vegetation limited to the perimeter (outside of the site boundaries) and a concentrated pocket in the north-west corner, comprising native trees and bushes (GHD 2012). The site appears to have been completely cleared of remnant native understorey species leaving trees as the predominant vegetation.

2.9.1 Conservation significant flora species

Table 1 identifies flora species listed under the EPBC Act that have the potential to occur on site.

Table 1 Flora species listed under the EPBC Act identified as potentially occurring at the Salvado Road site

Species	Common name	Likelihood of occurrence at Salvado Road site
Centrolepis caespitosa	Matted Centrolepis	Not present All known populations are outside the Perth region, with the closest being in Pinjarra. Native vegetation has been largely cleared at the site and heavily disturbed by nursery activities; as such, it is unlikely that any native understorey species remain.

Source: ANBG 2012, Bush *et al*. 2010, DEC 2012a, DSEWPaC 2012, Ecoscape 2003, Orange *et al.* 2005

No Declared Rare Flora (DRF) species have been identified within the site based on site specific surveys, although Table 2 identifies species of State conservation significance that have the potential to occur on site.

Table 2 Flora species of State conservation significance, identified as potentially occurring at the Salvado Road site

Species	Common name	Listing under Wildlife Conservation Act/DEC listing	Likelihood of occurrence at Salvado Road site
Jacksonia sericea	Waldjumi	P4	Unlikely Site appears to have been completely cleared of remnant native understorey species
Lasiopetalum membranaceum		P3	Unlikely Site appears to have been completely cleared of remnant native understorey species
Melaleuca viminalis		P2	Unlikely Site appears to have been completely cleared of remnant native understorey species

Source: ANBG 2012, Bush *et al*. 2010, DEC 2012a, Ecoscape 2003, Orange *et al.* 2005
Key: P1 – 4 = Priority 1 – 4 as listed by DEC.

2.9.2 Vegetation complexes

Mapping undertaken by Heddle (1980) indicates the site is considered to be representative of the Karrakatta vegetation complex – yellow sand with limestone and predominantly open forest of *Eucalyptus gomphocephala*, *Eucalyptus marginata*, *Eucalyptus calophylla* and woodland of *Eucalyptus Marginata* and *Banksia spp*.

2.9.3 Vegetation condition

The majority of the site has been highly disturbed due to previous and current land uses. Native vegetation has been largely cleared and severely altered, with remaining remnant vegetation found mainly on the perimeter of the site (outside of the site boundaries). Many of the trees within the site have also died or display poor structural condition due to the lack of tree management practices and competing for sunlight as they were originally planted too close together (Paperbark 2012).

2.9.4 Significant trees

Paperbark Technologies conducted a detailed inspection of all trees with a diameter at breast height (DBH) of 200 mm or above at the Salvado Road site, and identified 322 trees of 59 species, including those that could potentially be retained (Paperbark 2012) (Figure 5). It is noted this assessment also included a number of mature trees located on the eastern and western perimeters, outside of the site boundaries.

- Based on an assessment of factors including tree age, health and species characteristics, a recommendation was made for each tree as to whether it would be suitable for retention in an urban development.
- Including trees proposed to be retained, the assessment indicated that 149 trees were not considered suitable to be retained within the urban development, 134 were considered suitable to retain and a further 39 were considered suitable for retention where practicable (Paperbark 2012).

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Figure 5 All trees of Old Nursery Site

Date: 27/11/2012
Author: jcrute
Source: Page 41 of report "Tree Survey of Old Nursery Site, Jolimont", prepared by Paperbark Technologies, 2012.

Path: Q:\GIS\Consult\2012\LAN\LAN12227.01\ArcMap_documents\R001\RevB\LAN12227_01_R001_RevB_F005.mxd

2.10 Fauna

2.10.1 Conservation significant fauna species

An EPBC Act Protected Matters database search (undertaken August 2012) identified seven EPBC listed species as having the potential to occur at the Salvado Road site. Of these only Carnaby"s black cockatoo are likely to occur at the site (Table 3).

Table 3 Species listed under the EPBC Act identified as potentially occurring at the Salvado Road site

Species	Common name	Likelihood of occurrence at Salvado Road site
Calyptorhynchus latirostris	Carnaby"s black-cockatoo	Possible Potential foraging and roosting habitat is known to be present at site. The species is known to forage in urban areas.
Leipoa ocellata	Malleefowl	Unlikely Not known on Swan Coastal Plain, therefore the site is outside of known distribution of species.
Rostratula australis	Australian painted snipe	Unlikely Generally inhabits natural and artificial wetlands and water bodies, as well as areas of inundated grassland. If present in the area, the species may utilise the wetland to the south-east of the site.
Sternula Nereis Nereis	Fairy tern	Unlikely Species is associated with habitats including offshore, estuarine or lacustrine wetlands, islands, wetlands and mainland coastline. Suitable habitat is not present at the site.
Synemon gratiosa	Graceful sun-moth	Unlikely Requires specific host plants *Lomandra maritima* or *L. hermaphrodita* for breeding. Native vegetation has been largely cleared at site and heavily disturbed by nursery activities. No remnant native understorey appeared to be left at the site.
Dasyurus geoffroii	Chuditch, western quoll	Unlikely No longer known to occur on the Swan Coastal Plain due to urban development and predation by feral animals.

Source: ANBG 2012, Birdlife International 2012, Bush *et al*. 2010, DEC 2012a, DSEWPaC 2012, Ecoscape 2003, Orange *et al*. 2005

The following species listed as Migratory under the EPBC Act potentially occur at the Salvado Road site.

- fork-tailed swift (*Apus pacificus*)
- great egret, white egret (*Ardea alba*)
- cattle egret (*Ardea ibis*)
- white-bellied sea-eagle (*Haliaeetus leucogaster*)
- rainbow bee-eater (*Merops ornatus*)
- painted snipe (*Rostratula benghalensis* [sensu lato]).

The fork-tailed swift is almost exclusively aerial over a variety of habitats. The rainbow bee-eater occurs in a variety of habitats, including urban areas, and may forage within the site. This species has been recorded at Mabel Talbot Park to the south-east of the Salvado Road site (DSEWPaC 2012, Ecoscape 2003). However no records are evident of the species within the subject site.

The remainder of the migratory species listed above are largely associated with wetlands and water bodies, including artificial wetlands or inundated cropping areas, and, as such, may be present around the wetland to the south-east of the Salvado Road site (DSEWPaC 2012). The site is unlikely to represent a significant area of habitat for any migratory species.

State significance

A search of the Department of Environment and Conservation (DEC) database identified eight birds, two reptiles and two mammal species of State conservation significance as potentially occurring at the Salvado Road site (Table 4).

Table 4 Fauna species of State conservation significance, identified as potentially occurring at site

Species	Common name	Listing under Wildlife Conservation Act/DEC listing	Likelihood of occurrence at Salvado Road site
Birds			
Actitis hypoleucos	Common sandpiper	IA	Unlikely - May be an occasional visitor to the wetland to the south-east of the site in Mabel Talbot Park.
Calyptorhynchus banksii subsp. *naso*	Forest red-tailed black-cockatoo	T	Possible - Outside of usual range, but known to occur occasionally on the Swan Coastal Plain and utilise *Melia azedarach* as a food source during the breeding season.
Calyptorhynchus latirostris	Carnaby's cockatoo, short-billed black-cockatoo	T	Pssible - See comments in Table 3.
Falco peregrinus	Peregrine falcon	S	Unlikely - Has been observed at Herdsman Lake, approximately 1.5 km to the north of the site, but unlikely to be a common visitor to the site itself.
Merops ornatus	Rainbow bee-eater	IA	Possible - May forage at site, see comments in previous section.
Plegadis falcinellus	Glossy ibis	IA	Unlikely - May be an occasional visitor to the wetland to the south-east of the site in Mabel Talbot Park.
Tringa glareola	Wood sandpiper	IA	Unlikely - May be an occasional visitor to the wetland to the south-east of the site in Mabel Talbot Park.
Tringa nebularia	Common greenshank	IA	Unlikely - May be an occasional visitor to the wetland to the south-east of the site in Mabel Talbot Park.
Mammals			
Dasyurus geoffroii	Chuditch, western quoll	T	Highly unlikely - See comments in Table 3.
Macropus irma	Western brush wallaby	P4	Unlikely - Macropods have largely disappeared from the urban environment and replaced with a suite of feral species.
Reptiles			
Morelia spilota subsp. imbricata	Carpet python	S	Unlikely - Present in the Perth region but only in large areas of undisturbed bushland.
Neelaps calonotos	Black-striped snake	P3	Unlikely - Restricted to areas of Banksia woodland and coastal dunes on the Swan Coastal Plain, neither of which are present at, or adjacent to the site.

Source: ANBG 2012, Birdlife International 2012, Bush *et al*. 2010, DEC 2012a, DSEWPaC 2012, Ecoscape 2003, Orange *et al*. 2005

Key: IA = International migratory bird agreement; T = Threatened under Wildlife Conservation Act; S = Other specially protected fauna (Wildlife Conservation Act); P1 – 4 = Priority 1 – 4 as listed by DEC.

None of the migratory bird species were recorded in Mabel Talbot Park across six waterbird surveys between 1996 and 2002 (Ecoscape 2003).

2.10.2 Carnaby's Black Cockatoo habitat

The site contains a number of potential flora species commonly utilised by Carnaby"s Black Cockatoo for foraging habitat. It is noted that the trees located on the western perimeter are outside of the subject site boundaries and are identified for removed by the Town of Cambridge as part of the Netball Centre redevelopment adjacent to the site.

However, in the area proposed to be cleared as part of future development of the Salvado Road site, three native species were recorded which provide potential Carnaby"s black-cockatoo foraging habitat (Table 5). Specific details of these trees are included in Table 6.

Table 5 Potential Carnaby's black-cockatoo habitat trees (native to Perth region) proposed to be cleared at Salvado Road site

Species	Number of trees proposed to be cleared*	Suitability as Carnaby"s black-cockatoo habitat**	
		Foraging	Roosting
Eucalyptus rudis	2	✓	✓
Agonis flexuosa	2	✓	
Callitris preissii	3	✓	

Source: *Paperbark 2012, **DEC 2012b

Other exotic tree species are located throughout the site and are likely to have been planted at the site as ornamental trees. They are still considered by DEC to provide potential foraging or roosting habitat for Carnaby"s black-cockatoo and are therefore included within the summary of trees to be cleared (Table 6).

Table 6 Summary of trees to be cleared at Salvado Road site

Tree ref no.	Botanical name	Height (m)	DBH (mm)	Comments	Potential Carnaby"s habitat	
					Foraging	Roosting
718	*Agonis flexuosa*	8.3	440	Not suitable for retention, very poor structure	✓	
576	*Agonis flexuosa*	5	280	Not suitable for retention, poor structure	✓	
753	*Banksia* species	3.2	220	Not suitable for retention, very poor structure	✓	
93	*Callitris preissii*	7	200	Not suitable for retention, very poor structure	✓	
94	*Callitris preissii*	7	320	Not suitable for retention, very poor structure	✓	
95	*Callitris preissii*	7	450	Not suitable for retention, very poor structure	✓	
715	*Casuarina cunninghamiana*	12.3	590	Not suitable for retention, very poor structure	✓	
699	*Casuarina cunninghamiana*	11	590	Not suitable for retention, very poor structure	✓	
721	*Casuarina cunninghamiana*	7	400	Possibly suitable for retention	✓	
685	*Casuarina* species	14.2	470	Possibly suitable for retention	✓	
632	*Corymbia citriodora*	14	300	Suitable for retention TPZ 3.6m SRZ 2m	✓	✓
751	*Corymbia maculata*	18	1100	Suitable for retention		✓
745	*Cupressus* species	6.2	300	Suitable for retention	✓	

Tree ref no.	Botanical name	Height (m)	DBH (mm)	Comments	Potential Carnaby"s habitat	
					Foraging	Roosting
527	*Eucalyptus camaldulensis var. obtusa*	12	600	Not suitable for retention almost dead		✓
526	*Eucalyptus camaldulensis var. obtusa*	14.6	1200	Possibly suitable for retention		✓
528	*Eucalyptus camaldulensis var. obtusa*	12	1200	Not suitable for retention, poor structural condition		✓
435	*Eucalyptus camaldulensis var. obtusa*	9	530	Not suitable for retention trunk is leaning is too severe		✓
417	*Eucalyptus camaldulensis var. obtusa*	13	1220	Not suitable for retention, very poor structure		✓
730	*Eucalyptus camaldulensis var. obtusa*	14	1010	Possibly suitable for retention		✓
416	*Eucalyptus camaldulensis var. obtusa*	6	430	Not suitable for retention has died		✓
708	*Eucalyptus camaldulensis var.camaldulensis*	12.1	420	Possibly suitable for retention		✓
680	*Eucalyptus camaldulensis var.camaldulensis*	11	480	Not suitable for retention		✓
657	*Eucalyptus camaldulensis var.camaldulensis*	20.8	900	Possibly suitable for retention		✓
642	*Eucalyptus camaldulensis var.camaldulensis*	13	750	Not suitable for retention, poor structure at base.		✓
698	*Eucalyptus camaldulensis var.camaldulensis*	12	780	Not suitable for retention, very poor structure		✓
620	*Eucalyptus grandis*	25.5	780	Prone to shedding limbs without warning		✓
636	*Eucalyptus rudis*	10	280	Suitable for retention	✓	✓
712	*Eucalyptus rudis*	17.6	1100	Suitable for retention	✓	✓
701	*Eucalyptus* species	9	400	Not suitable for retention, tree has died		✓
100	*Eucalyptus* species	9	290	Not suitable for retention, tree has died.		✓
673	*Melia azedarach*	8.6	790	Not suitable for retention, weed species.	✓	
725	*Melia azedarach*	6	470	Not suitable for retention, weed species	✓	
69	*Melia azedarach*	6	470	Not suitable for retention, weed species	✓	
741	*Melia azedarach*	6	400	Not suitable for retention, weed species	✓	
740	*Melia azedarach*	6	530	Not suitable for retention, weed species	✓	
652	*Melia azedarach*	6.5	580	Not suitable for retention weed species	✓	
668	*Melia azedarach*	8	400	Not suitable for retention, weed species	✓	
677	*Melia azedarach*	8	400	Not suitable for retention, weed species	✓	
690	*Melia azedarach*	8	540	Not suitable for retention, weed species	✓	
713	*Melia azedarach*	8	700	Not suitable for retention, weed species	✓	

Source: Paperbark 2012, DEC 2012b

Analysis against EPBC significance criteria

There are two policy documents which are relevant to the assessment of impacts on Carnaby"s black cockatoo and the need for EPBC referrals. These are:

1. Department of the Environment, Water, Heritage and the Arts (2009) *Matters of National Environmental Significance, Significant impact guidelines 1.1*.
2. Department of Sustainability, Environment, Water, Population and Communities (2012) *EPBC Act Referral Guidelines for three threatened black cockatoo species*, April 2012.

A separate evaluation of these guidelines by Strategen is provided below.

Significant Impact Guidelines 2009

Table 7 provides an assessment of the nature, extent, and significance of the expected impact to the Carnaby"s black-cockatoo against the relevant nine significant impact criteria, relevant to the Carnaby"s black cockatoo as an Endangered species (DEWHA 2009).

Table 7 Assessment against significance criteria

Significance criteria	Assessment
Lead to a long-term decrease in the size of a population	The proposed action is unlikely to lead to a long-term decrease in the size of Carnaby"s Black-Cockatoo populations given the small area of clearing (<1.5 ha of scattered trees) and the presence of foraging habitat available in nearby secure reserves.
Reduce the area of occupancy of the species	The proposed action is unlikely to reduce the area of occupancy of Carnaby"s black-cockatoo as nearby secure reserves contain/protects vegetation of similar composition in similar condition.
Fragment an existing population in two of more populations	The site does not support a known population of the species. The proposed action involves clearing of patches of scattered trees with a cumulative total of less than 1.5 ha in an urban area. Clearing for the proposed action will not result in further fragmentation of any potential habitat, as the vegetation is already fragmented from surrounding areas of bushland.
Adversely affect habitat critical to the survival of a species	The proposed clearing of vegetation is unlikely to adversely affect habitat critical to the survival of Carnaby"s Black Cockatoo given the small area of foraging habitat to be removed.
Disrupt the breeding cycle of a population	There are no known breeding sites within the Proposal area. The proposed action is unlikely to disrupt the breeding cycle of a population of Carnaby"s Black Cockatoos due to the small size of the proposed clearing and the scattered nature of the habitat.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The loss of habitat as a result of the proposed action represents only a small portion of the potential habitat available in the vicinity of the proposed clearing. The proposed action involves clearing of less than 1.5 ha of scattered vegetation, which will not result in any further fragmentation of potential habitat in the area. As the Carnaby"s black-cockatoo is a highly mobile species, the small size of the proposed action will not present a barrier to movement across the region.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species" habitat	The proposed action will not result in the establishment of invasive species that are harmful to the Carnaby"s black cockatoo or its habitat. The proposed action is unlikely to introduce or attract any further non-native fauna species to the site.
Introduce disease that may cause the species to decline	The proposed action has a low potential to involve any actions that may cause the introduction of new diseases to Carnaby"s black cockatoos. No new avifauna will be introduced or attracted to the area as a result of the proposed action, therefore it is not expected that any avian diseases will be introduced to populations in or near the site.
Interfere with the recovery of the species (DEWHA 2009).	The proposed action is unlikely to interfere with recovery of the Carnaby"s black cockatoo as extensive areas of foraging habitat are retained within nearby secure reserves.

Referral guidelines 2011

Table 8 provides a further assessment of the expected impact to the Carnaby"s black-cockatoo against the relevant five significant impact criteria for determining whether a referral is required (DSEWPaC 2012).

Table 8 Assessment against referral guidelines

High risk of significant impacts: referral recommended	Assessment
Clearing of any known nesting tree	No known breeding / nesting trees have been recorded on the site.
Clearing of any part or degradation of a vegetation community known to contain breeding habitat	No evidence of past or present breeding habitat has been recorded on the site. It is noted that breeding habitat is defined in the draft guidelines as „any patch of woodland or forest that contains live or dead trees" of the listed species. The vegetation within the site consists of scattered trees only and therefore could be argued to not classify as a „patch of woodland or forest".
Clearing of more than 1 ha of quality foraging habitat	The vegetation within the site is not considered to be quality foraging habitat. Trees are scattered across the site and consequently do not reflect suitable foraging habitat for Black cockatoos.
Clearing or degradation (including pruning the top canopy) of a known roosting site	No evidence of roosting activity or known roosting sites for Black cockatoos are recorded on the site.
Creating a gap of greater than 4 km between patches of black cockatoo habitat (breeding, foraging or roosting)	The site is small and located within an urban environment so will not create a gap of greater than 4 km between habitat.

Based on the review of the documentation provided, it is strongly arguable that a referral to the Commonwealth is unnecessary for this specific project. The likely impact on potential Carnaby"s habitat as a result of the development is very limited.

3. Conclusion

Based on this assessment and the work previously undertaken on the site, the environmental values of the proposed rezoning area are not considered significant.

The majority of the site has been highly disturbed due to previous and current land uses. Native vegetation has been largely cleared and altered, with most remaining vegetation around the perimeter located outside of the site boundaries. This includes the majority of potential Carnaby's Black Cockatoo foraging habitat. The impact to this species is therefore considered not significant.

The main environmental issue of note is the potential for contamination to exist within the site. A number of potential contamination sources were identified in the site characterisation and site history undertaken for the Preliminary Site Investigation (PSI), including:

- Fill material across the Site;
- Previous storage and application of chemicals (including herbicides, fungicides, fertilisers, pesticides and possible treatment of wooden products);
- Previous storage of fuel;
- Asbestos (scattered debris, within stockpiles and onsite building);
- Waste material (including discarded drums of kerosene);
- Acid sulphate soils (south eastern corner);
- Stockpiles of material;
- Town of Cambridge car wash down; and
- Disposal of street sweeping (GHD 2012)

In line with the PSI findings it is therefore recommended that a detailed sampling and analysis plan is prepared in accordance with DEC Guidelines to incorporate the identified potential sources of contamination. Detailed investigations should include soil, asbestos and groundwater investigations to assess the extent of contamination (if any) across the site. This work is not required for the rezoning of the land but rather it is assumed that an independent contaminated sites auditor will be appointed at a future stage of the project to address requirements that will otherwise be triggered as a condition in the planning process. Further, it is recommended to appoint a DEC approved auditor to review the Sampling and Analysis plan prior to the commencement of intrusive works (GHD 2012).

In conclusion, the Environmental Assessment has not identified any fundamental environmental constraints to the proposed TPS rezoning.

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APPENDIX FOUR

DETAILED SITE INVESTIGATION REPORT

APPENDIX FIVE

COMMUNITY ENGAGEMENT MATERIAL

Concept Plan

POS	14%
Road reserves	23%
Developed land	63%
Total site area	**100%**

1. Primary entrance from Salvado Road, next to Henderson Park.

2. Alternative access from Wembley Sports Park, with connection to Selby Street.

3. Retention of significant trees in Henderson Park, with new buildings to be setback to maintain tree health.

4. Entry statement / piazza creating a visual arrival feature along Salvado Road.

5. Sewer easement to be utilised for public access connecting Salvado Road to Wembley Sports Park, with a mixture of hard and soft landscaping elements.

6. Key pedestrian access points to the site to be formalised through landscaping elements such as tree planting, paving, seating and shading.

7. Extensive visitor parking provided on-street with potential for overflow parking (if required) at Wembley Sports Park.

8. Visitor parking to also be provided within individual development sites.

9. Town house and terrace housing along southern interface to existing residential area.

10. Apartment sites to be located centrally to minimise the visual presence from Peel Street, Halesworth and Salvado Roads.

11. Existing public access way identified for potential upgrade and landscaping to enhance interface and improve security and surveillance of area.

12. Introduction of additional footpaths within and around the site to provide additional connections to key local destinations.

13. Site edges to interface and blend with the existing public open space areas.

14. No vehicle access from the South.

Plans are conceptual only and images are for illustrative purposes only

7898_CON26H_20140530 Jolimont_Master Plan

DELIVERING DIRECTIONS 2031

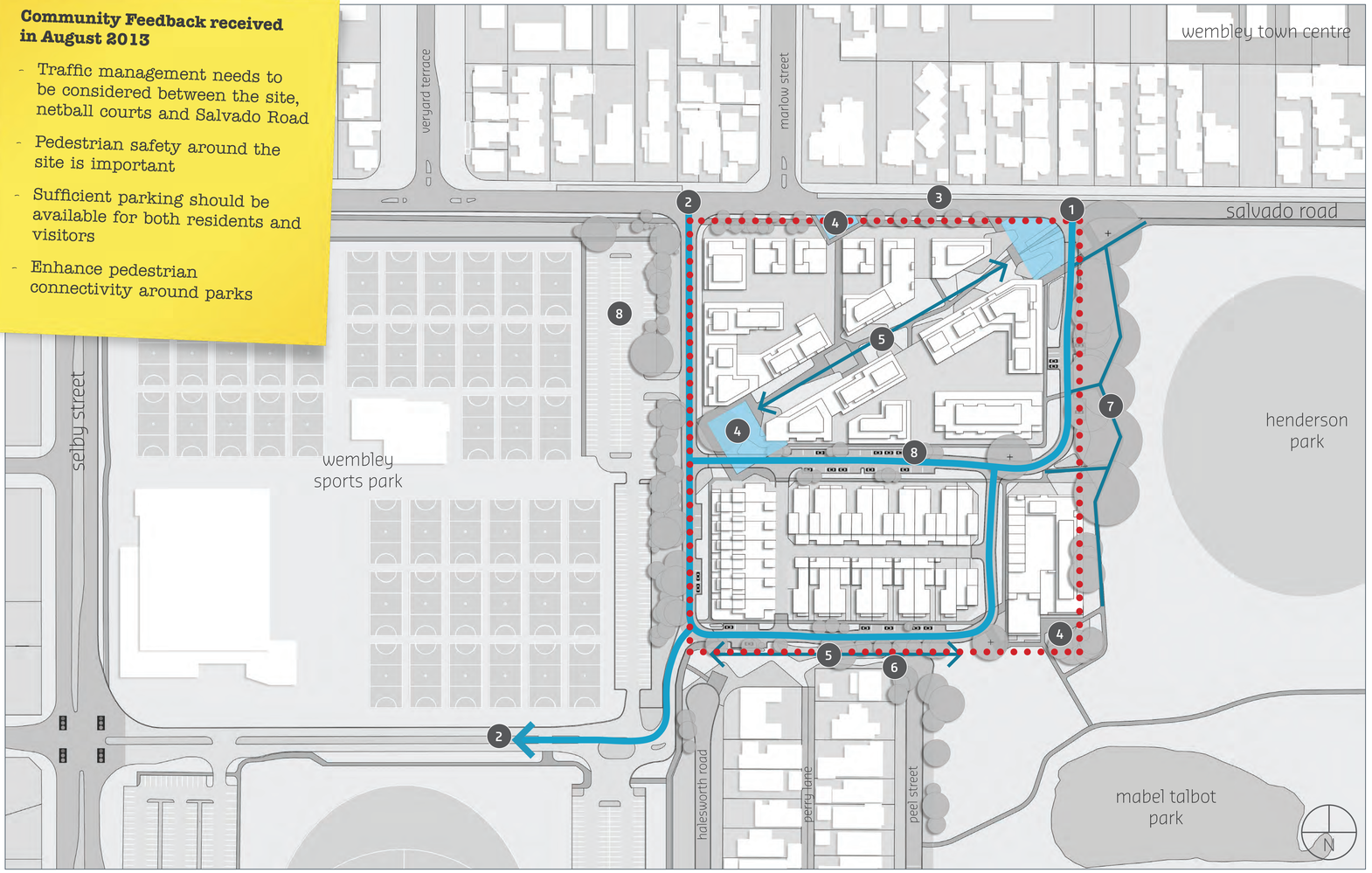
Town of Cambridge

LANDCORP

Design Response 1: Access

Community Feedback received in August 2013

- Traffic management needs to be considered between the site, netball courts and Salvado Road
- Pedestrian safety around the site is important
- Sufficient parking should be available for both residents and visitors
- Enhance pedestrian connectivity around parks



1. Primary entrance from Salvado Road, next to Henderson Park.

2. Alternative access from Wembley Sports Park, with connection to Selby Street.

3. Intersection spacing and treatments on Salvado Road to be designed in consultation with Town of Cambridge.

4. Key pedestrian access points formalised through landscaping features.

5. Enhanced pedestrian network through the site.

6. No vehicle access from the South.

7. Proposed footpath and upgrade to landscape treatment within Henderson Park conceptual only, to be designed in consultation with the Town of Cambridge.

8. Extensive visitor parking provided on-street with potential for overflow parking (if required) at Wembley Sports Park.

Plans are conceptual only and images are for illustrative purposes only

DELIVERING DIRECTIONS 2031

Town of Cambridge

LANDCORP

Design Response 2: Public Realm

Community Feedback received in August 2013

- Ensure streetscape supports mature trees and the development is not a sea of roofs.
- Moreton Bay Figs on Henderson Park to remain
- Keeping the existing and surrounding public open space as it is

1. Significant trees at Henderson Park retained and protected.

2. Significant trees on-site retained where possible, with opportunities for the relocation of some trees to areas of public open space.

3. Strong pedestrian connection between Salvado Road and Wembley Sports Park through use of sewer easement as public accessway.

4. Potential for public access way along southern boundary to be upgraded and landscaped to improve interface to existing residents.

5. Site edges landscaped to integrate with the existing Henderson Park and Mabel Talbot Park.

6. Proposed footpath and upgrade to landscape treatment within Henderson Park conceptual only, to be designed in consultation with the Town of Cambridge.

Plans are conceptual only and images are for illustrative purposes only

DELIVERING DIRECTIONS 2031

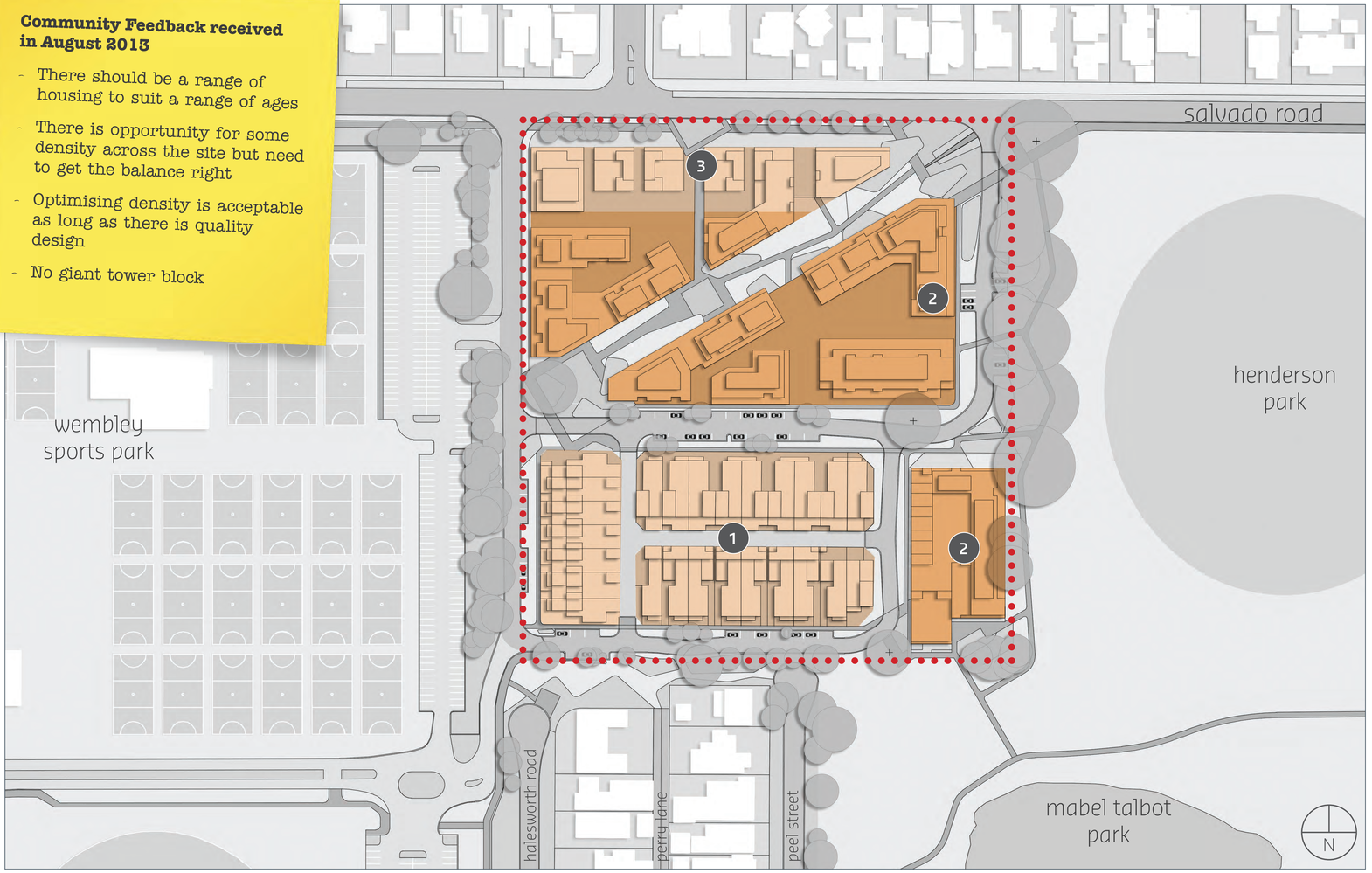
Town of Cambridge

LANDCORP

Design Response 3: Housing Types

Community Feedback received in August 2013

- There should be a range of housing to suit a range of ages
- There is opportunity for some density across the site but need to get the balance right
- Optimising density is acceptable as long as there is quality design
- No giant tower block



1. 2-3 storey town house and terraced housing along southern interface with existing residential area.

2. Apartment sites up to 5 - 6 storeys to be located centrally and adjacent to public open space to minimise the visual presence from Peel Street, Salvado and Halesworth Roads.

3. 2-3 storey development on Salvado Road, with any additional height to be stepped back to ensure suitable streetscape interface.

Plans are conceptual only and images are for illustrative purposes only

DELIVERING DIRECTIONS 2031

Town of Cambridge

LANDCORP

APPENDIX SIX

INDICATIVE CONCEPT PLAN

Planning Design Delivery

Marlow Street

Salvado Road

Wembley Sports Park

Henderson Park

Halesworth Road

Perry Lane

Peel Street

N

Concept Plan

Lot 520 Salvado Road, Jolimont

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Kim Trenberth 12 September 2014

REVISIONS		
Rev	Date	Drawn
C	2014.09.10	K. Trenberth

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e: info@rowegroup.com.au
p: 08 9221 1991

Date Drawn:	2014-09-10
Job Ref:	7898
Scale:	N.T.S. @ A3
Client:	Satterley
Designer:	K. Kyle
Drawn:	K. Trenberth
Projection:	PCG 94
Plan ID:	7898-FIG-21-A

Cadastre supplied by T.o.C. and McMullen Nolan

APPENDIX SEVEN

INDICATIVE BUILT FORM

Overview from SE

View from East

CODA
ARCHITECTURE + URBAN DESIGN

DRAWING
DRAWN BY DC
CHECKED LS

ISSUE 03 (Draft)
JOB REF A14003
SCALE AT A3 -

DATE: 20/10/2014

OLD NURSERY SITE

LOCATION Jolimont
CLIENT NAME Landcorp

10 ELDER PLACE, FREMANTLE, PO BOX 671 WA 6159. TEL (08) 9433 6000. www.coda-studio.com NOTE: This is an uncontrolled document issued for information purposes only. CODA Studio Pty Ltd. atf DRAVA Trust ACN 119 667 300 A14003_140903_Jolimont SE Corner Lot Study.pdf

View from West

View from South: For the purposes of explaining the built form, the existing trees that would screen this elevation have been removed

CODA
ARCHITECTURE + URBAN DESIGN

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JOB REF A14003
SCALE AT A3 -

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CHECKED	LS			

JOLIMONT BUILT FORM STUDIES, View from Henderson Park

LOCATION JOLIMONT
CLIENT NAME LANDCORP

10 ELDER PLACE, FREMANTLE, PO BOX 671 WA 6159. TEL (08) 9433 6000. www.coda-studio.com 141021_Park view update.pdf

CODA
ARCHITECTURE + URBAN DESIGN

DRAWING		ISSUE	DRAFT	DATE: 22/10/2014
DRAWN BY	DC	JOB REF	A14003	SCALE AT A3 -
CHECKED	LS			

JOLIMONT BUILT FORM STUDIES, View from Salvado Road

LOCATION	JOLIMONT
CLIENT NAME	LANDCORP

10 ELDER PLACE, FREMANTLE, PO BOX 671 WA 6159. TEL (08) 9433 6000. www.coda-studio.com 141021_Salvado Road view update.pdf

JOLIMONT BUILT FORM STUDIES, Street View from Peel Street

CODA
ARCHITECTURE + URBAN DESIGN

DRAFT ONLY

JOB REF: A14003 |**issue: B** | 15/05/14
LANDCORP

APPENDIX EIGHT

LANDSCAPE MASTER PLAN

Graphical Legend

500L mature trees

200L trees

Existing trees

Proposed relocation of existing tree

Shrub planting

Littoral planting to drainage area

Lawn

PLANT LIST

Trees

Agonis flexuosa
Citrus spp
Corymbia ficifolia
Corymbia calophylla
Eucalyptus rudis
Erythrina indica
Fraxinus raywoodii
Gleditsia ‘shademaster’
Jacaranda mimosifolia
Melaleuca spp
Olivacea spp
Platanus acerifolia
Tipuana tipu

Shrubs

Acmena hemilampra
Anigozanthus spp
Baumea preissii
Bouganvillea spp
Dianella spp
Eremophila spp
Ficinia nodosa
Grevilliea spp
Hardenbergia comptoniana
Hibbertia scandens
Juncus krausii
Lepidosperma spp
Lomandra spp
Patersonia occidentalis
Photenia ‘Red Robin’
Pittosporum ;Screenmaster’
Scaevola spp
Syzygium spp
Viburnum tinus
Westringia spp

N

0 5 10 20 30 40 50

1:500 @ A1

LEGEND

1. Entry Plaza from Salvado Road with feature planting and modwood decking.
2. Raised planter bed with blade wall seating.
3. Drainage swale with littoral planting.
4. Lawn area flushed to paving or mounded.
5. Band of feature paving.
6. Raised seat wall in render.
7. Small node with artwork.
8. Public access way. Alternative access between residential lots.
9. Entry Plaza from Matthews Netball Centre.
10. Shade canopy with perforated abstract pattern.
11. Sculpture.
12. Feature Mature Tree.
13. Open lawn area
14. Native shrub planting.
15. Dual Access Path for pedestrian and bikes.
16. Change of paving texture to slow vehicles.
17. Feature tree grove.
18. Mature tree transplant to create iconic corner.
19. Seating area.
20. Meandering road to slow vehicles.
21. Grassed area connecting adjacent park.
22. Street Parking.
23. Concrete footpath.
24. Connection footpath towards lake.
25. Civic space.
26. Laneway access with red asphalt.
27. Greenwall to laneway lots.
28. Angled softscape pattern to existing park edge.
29. Henderson Park.
30. Matthew Netball Centre.

Jolimont Nursery Redevelopment

Landscape Masterplan Concept

Rev D

FEBRUARY 2015

EPCAD

EPCAD

October 2014

Jolimont Streetscape Section - Rev A

APPENDIX NINE

TRANSPORT IMAPCT ASSESSMENT

LANDCORP

SALVADO ROAD OLD NURSERY

TRAFFIC AND PARKING ASSESSMENT

October 2014

PO Box Z5578

Perth WA 6831

0413 607 779 Mobile

Issued on	14 October 2014	Amendments V2 edits for ToC comments V3 Plan amended
Version	V3	
Reference	682	

CONTENTS

1.0 EXECUTIVE SUMMARY

Riley Consulting has been commissioned by Landcorp to consider the traffic issues associated with the proposed residential development on Part Lot 520, Salvado Road, Jolimont. The analysis undertaken in this report indicates the following:

- The site is closely located to existing local centres (Wembley and Subiaco) and has a high walk score, indicating that most errands can be completed on foot. Good local transport is easily accessible and a good cycle path network currently exists. The location of the site provides a significant opportunity to decrease the need to undertake trips by private vehicle.

- Based on recognised trip generation rates, the development of the subject land is calculated to increase local traffic flows by up to 1,776 vehicle movements per day. It is noted that the standard trip rates may not reflect the high level of walkability of the site and easy access to public transport and can, therefore, be expected to over-estimate the future development impact.

- Assessment of the traffic increases to surrounding roads indicates that whilst some percentage increases would be considered significant, the proposed development is not expected to result in a detrimental impact to current amenity and road network operation. It is concluded that the local road network can accommodate the forecast traffic demands.

- Access to the site can be achieved in accordance with current standards and is shown to operate in a safe and acceptable manner.

2.0 THE SITE AND SURROUNDING ROAD NETWORK

This report has been prepared to review the access requirements of a proposed residential development on Part Lot 520, Salvado Road. The location of the subject site is shown in Figure 1.

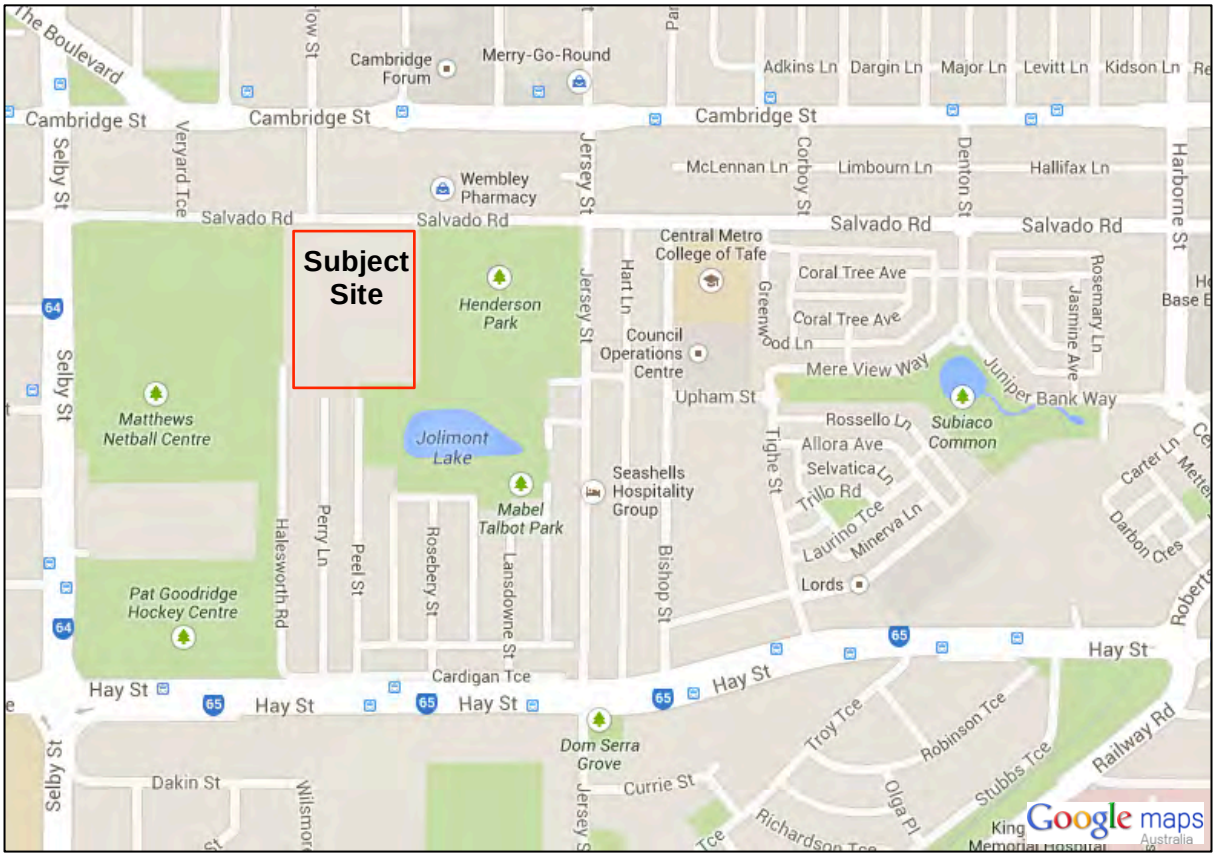

Figure 1 Site Location

Roads of significance to the development site are considered below.

Salvado Road

Salvado Road west of Jersey Street is classified as an access street in the Main Roads *Functional Road Hierarchy* (adjacent to the subject site). East of Jersey Street it is classified as a distributor B road. It is constructed with a pavement of about 9.3 metres adjacent to the subject site and operates with a single traffic lane in each direction.

To the north side of Salvado Road there is a standard footpath and to the south side, the subject site side, there is an existing cycle path (Dual Use Path). Table 1 shows the current

traffic data recorded in August 2011 (Town of Cambridge). The recorded speed data indicates an 85th%ile speed of about 57kph.

Table 1 Salvado Road Traffic Data (between Marlow Street and Jersey Street)

Direction	Daily	AM	PM
Westbound	4,029	232	604
Eastbound	4,284	918	210
Total	8,313	1,150	814

West of Marlow Street traffic flows reduce to 5,639vpd (2,700 westbound / 2,939 eastbound) with the peak eastbound flow reducing to about 563 vehicles. During Saturdays the daily flow is similar to the weekday flow, with the peak occurring between 11am – 1pm. On Saturday between 12pm and 1pm the flow is shown to be 581 vehicles split 360 westbound and 221 eastbound (2011 data).

Marlow Street

Marlow Street is classified as an access street in the Main Roads *Functional Road Hierarchy*. It is constructed with a pavement of about 11.9 metres and provides marked parking bays to both sides. Footpaths are provided to both sides. Table 2 shows the current traffic data recorded in August 2011 (Town of Cambridge). The recorded speed data indicates an 85th%ile speed of about 42kph.

Table 2 Marlow Street Traffic Data (Salvado Road to Cambridge Street)

Direction	Daily	AM	PM
Northbound	1,477	61	231
Southbound	1,560	356	62
Total	3,037	409	306

Veryard Terrace

Veryard Terrace is a local access street linking Salvado Road to Cambridge Street. It is a short street provided with a standard 7.2 metre road pavement. Access at Cambridge Street is restricted to left in / left out. Traffic data indicates 779vpd split 685vpd northbound and 94vpd southbound.

Jersey Street

Jersey Street is classified as a distributor B road in the Main Roads *Functional Road Hierarchy* between Cambridge Street and Hay Street. South of Salvado Road it is constructed with a painted boulevard treatment with a single traffic lane in each direction. North of Salvado Road is has a wider pavement allowing multiple lanes on the approaches to traffic signals at Salvado Road and Cambridge Street. Traffic data on the Main Roads web site indicates 5,334vpd to the north of Cambridge Street and 6,488vpd north of Hay Street (2014).

Selby Street

Selby Street is classified as a distributor A road in the Main Roads *Functional Road Hierarchy*. It is constructed as a four lane divided road. Access to Salvado Road is permissible, although egress from Salvado Road is restricted to left turns only.

Traffic signals have recently been installed to access the Matthews Netball Centre. Traffic data on the Main Roads web site indicates about 20,000vpd between Hay Street and Grantham Street (2014).

Cambridge Street

Cambridge Street is classified as a distributor A road in the Main Roads *Functional Road Hierarchy*. It is typically constructed as a four lane undivided road although recent upgrades have reduced the road pavement in retail areas to a single lane in each direction (Simper Street roundabout to Alexander Street). The pavement reduction is unlikely to significantly affect peak hour capacity. Traffic data on the Main Roads web site indicates 20,349vpd to the west of Jersey Street (2014).

Matthews Netball Centre

To the west of the subject site is the Matthews Netball Centre, which has recently been upgraded. The centre has been in existence for many years and is a popular sporting precinct. A report prepared by Aecom suggests that peak paring demands at the centre would be in the order of 890 vehicles. It can be expected therefore that at peak times of operation, local streets will be busy. However, the attraction to the centre is seasonal and predominantly the peak attraction is at weekends. Traffic from the netball centre will have an impact to existing residents and residents of the proposed development. However, as an

existing facility, residents can be expected to accommodate the traffic movements. Detail analysis of the impact with the Matthews Netball Centre traffic is therefore not included.

Walkability

Reference to Google walk score indicates a score of 82, meaning the walkability of the location is considered very good so most errands can be completed on foot. All local streets are provided with at least one footpath. Access to Subiaco town centre could be achieved through parkland and minimal use of local roads.

Public Transport

The site is well located to access existing public transport services on Cambridge Street and Hay Street. Cambridge Street is within 200 metres and is provided with bus stops either side of Marlow Street. Medians adjacent to Marlow Street would assist pedestrian crossing movements.

Figure 2 shows the local bus routes, which comprise of services 82, 83 and 85. These services run between City Beach and Roe Street bus station via Glendalough train station. The services combine to provide 7 buses during the peak periods (by direction and 4 services during the day. Although the number of buses per hour is considered good, the frequency is irregular. However, under current planning guidelines, the services combined are considered as High Frequency and a reduced car parking requirement for multiple developments is permissible under the R-codes. Given the higher density of residential land uses in the locality it is surprising the bus services are not more frequent.

Additional services are accessible on Selby Street serving QEII precinct and Claremont.

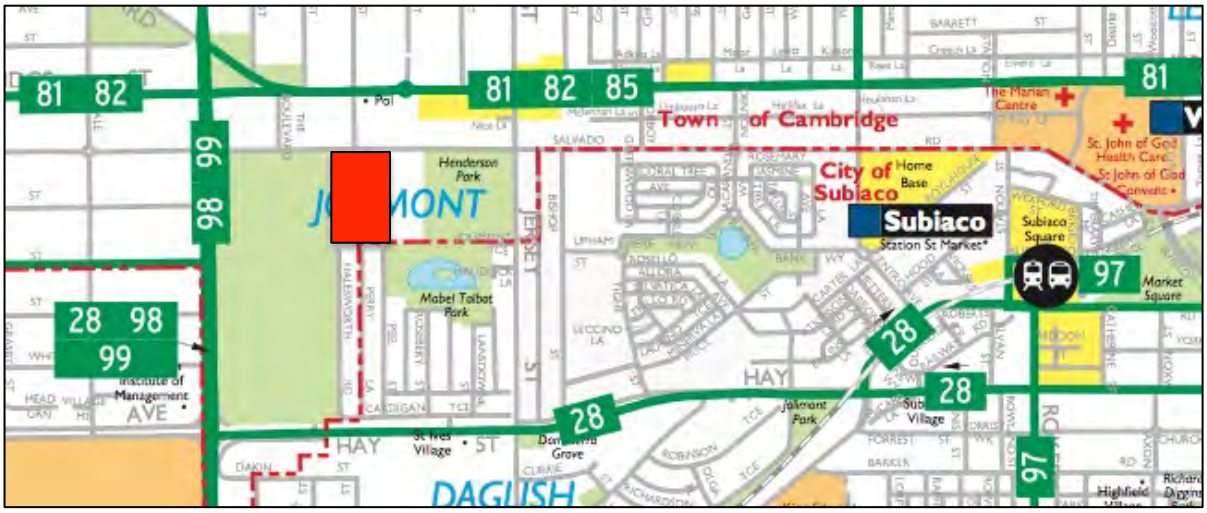

Figure 2 Local Bus Services

Cycle Routes

Several cycle routes currently exist in Jolimont and Subiaco. A high quality route is provided on Salvado Road linking to the railway cycle route between Perth CBD and Fremantle. Figure 3 shows the local cycle routes.

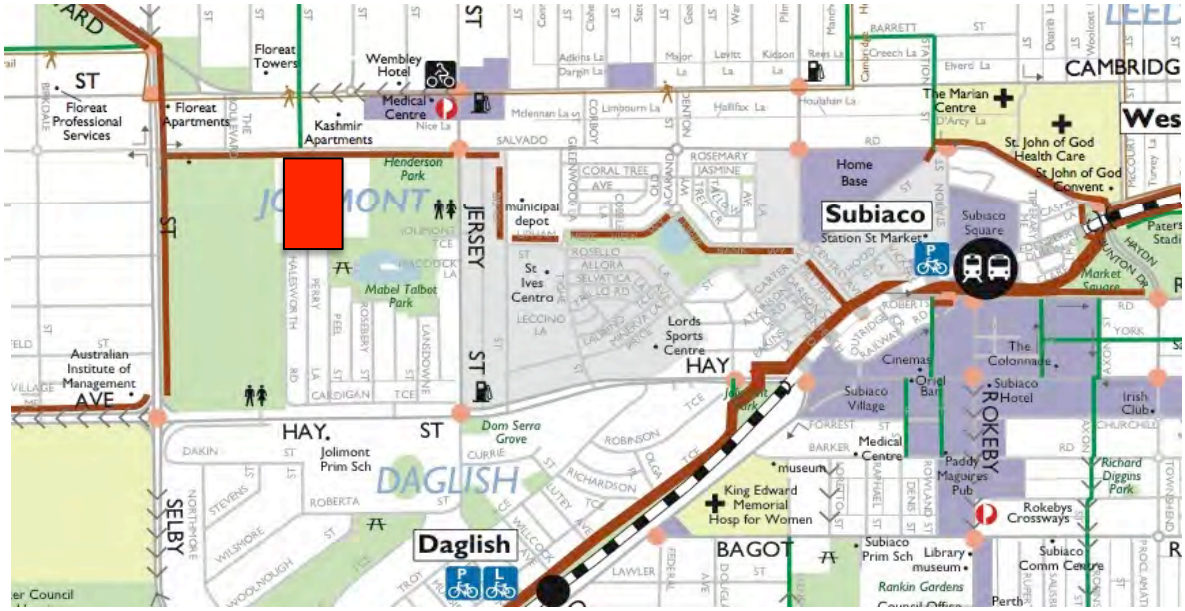

Figure 3 Local Cycle Routes

The concept layout for the proposed development is shown in Figure 4.

Figure 4 Outline Development Plan (refer to Planner for detail)

3.0 TRAFFIC GENERATION AND DISTRIBUTION

To assess the access requirements of the proposed development an understanding of the potential traffic generation is required. At the time of preparing this traffic report the number of residential units that can be developed is still being formulated and thus the maximum expectations of development are used.

It is estimated that a possible yield of 325 apartment dwellings and 25 individual dwelling lots can be achieved on the site.

Reference to the RTA *Guide to Traffic Generating Developments* indicates that a one bed apartment can be expected to generate about 4 trips per day, a two bed apartment / townhouse about 5 trips per day and a 3 bed apartment / townhouse about 6 trips per day. It can be expected that the apartments will provide a mixture of 1 to 3 bedroom dwellings and to provide a robust assessment, the use of the 2 bedroom apartment trip rate is applied. Thus the apartment buildings can be expected to generate about (325 x 5) 1,625 vehicle movements per day.

The residential lots would be expected to generate about 6 trips per dwelling of (25 x 6) 150 vehicle movements per day.

The subject site could generate up to 1,775 vehicle movements per day.

During the peak hours 10% of the daily flow can be expected split 80% in the peak direction[1].

The site is closely located to high frequency bus services on Cambridge Street and the trip rate per dwelling could be less. Surveys of apartments in West Perth indicate a trip rate in the order of 2 trips per dwelling per day. The significantly reduced trip rate reflects the excellent accessibility to the CBD by walking and bus. However, these trip rates may be a little unrealistic and thus the recognised trip rates have been used to ensure robustness of this assessment and identify the maximum potential impacts of the proposed development.

[1] However, any reductions in vehicle trips would most likely occur during the peak periods.

Distribution

The traffic generated by the residential land uses can be expected to access longer distance destinations (trips to Perth CBD would be considered unlikely). Local shopping would be expected in Subiaco and access to the Freeway would be expected from Cambridge Street / Southport Street. It is likely that Osborne Park would be a major attractor and traffic is expected to use Selby Street to Herdsman. However, some residents may use Jersey Street.

Figure 5 shows the expected distribution of traffic and the expected traffic increases with full development of the site.

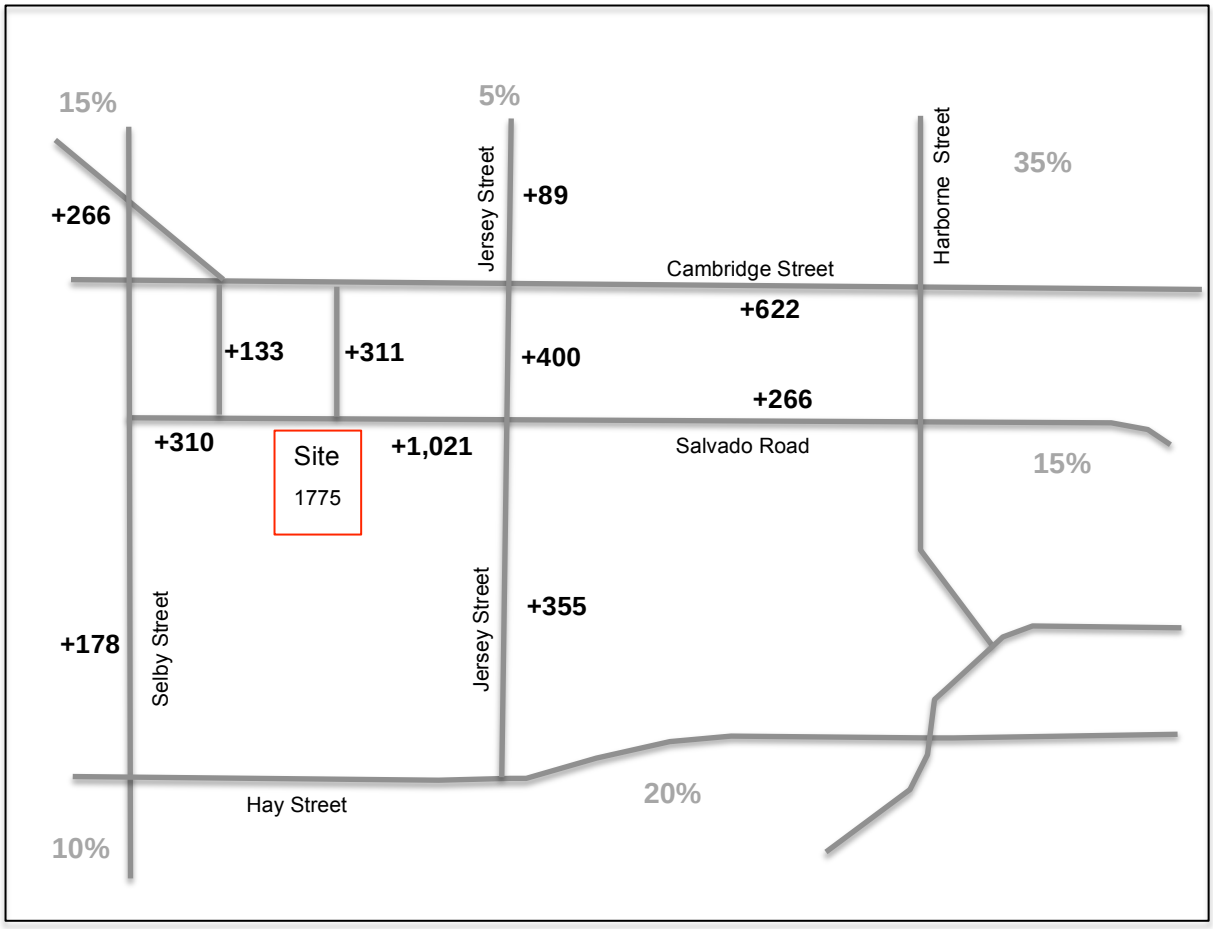

Figure 5 Forecast Increase to Daily Traffic Movements

The forecast traffic demands shown in Figure 5 reflect the maximum expectations of traffic increases as a result of the proposed development.

4.0 TRAFFIC IMPACT

Figure 5 indicates the anticipated traffic increases to the local road network. Table 3 considers the anticipated traffic generation of the site in comparison to the current daily traffic volumes.

Table 3 Increases to Local Road Network

Road	Daily Flow	Development	% Change
Salvado Road west of Marlow Street	5,639	310	5.5%
Salvado Road east of Marlow Street	8,313	1,021	12.3%
Marlow Street	3,037	311	10.2%
Veryard Terrace	779	133	17.1%
Jersey Street south of Salvado Road	6,488	355	5.5%
Jersey Street north of Salvado Road	6,300	400	6.3%
Jersey Street north of Cambridge Street	5,334	89	1.7%
Cambridge Street east of Jersey Street	20,349	622	3.1%
Selby Street south of Salvado Road	20,000	178	0.9%

In traffic engineering terms it is recognised that daily traffic flows can vary by +/-5% and when a development increases the daily flow within this range it is considered to have no significant impact. Reference to the Western Australian Planning Commissions *Transport Assessment Guidelines for Developments* further suggests that an increase of less than 10% of capacity would not be likely to have a material impact. It can be seen therefore, that the majority of major streets would experience no material impact. Where the forecast increase is shown to be greater than 10% further assessment of the impacts are provided.

Salvado Road east

Salvado Road provides primary access to the site and will be affected by any development on the subject land. The forecast increase 1,021 trips per day heading east from the subject site will result in a volume of about 9,334vpd. Based on data attached as Appendix A, Salvado Road would currently be operating with a Level of Service D. The forecast traffic increases will not result in a change to the current Levels of Service. It is considered that Salvado Road can accommodate the expected traffic increases.

During the peak periods the development may result in an additional vehicle every 2 minutes and the increase may result in additional delay for existing residents accessing Salvado Road. However, the increase in local traffic may benefit existing residents, as local residents are more likely to provide gaps in the traffic stream for existing residents to enter.

Marlow Street

Marlow Street is classified as an access street and current planning guidelines suggest a daily traffic flow of less than 3,000vpd. It can be seen that current traffic demands have already exceeded this desirable level. Planning guidelines also state that an impact on parking and residential driveway access can be expected at about 5,000vpd. The forecast increase will not result in a daily traffic flow greater than 5,000vpd. Thus current residential amenity, which is already affected, is unlikely to be significantly affected further.

It is likely that the increase to Marlow Street will be as a result of residents returning home in the evening, when the peak flow is significantly lower. During peak periods the increase equates to an additional vehicle every 2 to 3 minutes and it is unlikely that many residents would notice the increase.

Veryard Terrace

Veryard Terrace is classified as an access street and current planning guidelines suggest a daily traffic flow of less than 3,000vpd. It can be seen that with the potential traffic increases, daily traffic flows are retained well below this residential amenity threshold. The use of Veryard Terrace is expected as a result of the restricted access to Selby Street from Salvado Road. Although a significant proportional increase, the forecast traffic increase would be unlikely to affect existing residential amenity.

Jersey Street

The forecast traffic increases to Jersey Street are shown to be less that 10%. Reference to Appendix A indicates that Level of Service C currently exists and will be maintained. No material impact would be expected.

It is concluded that whilst traffic increase may indicate an impact by proportional increase, the operation of the local road network is not expected to operate in a significantly different manner as a result of the proposed development. Local streets are expected to retain their residential amenity.

5.0 ACCESS

Access to the future development can be achieved from Salvado Road and from the new road constructed to the west of the site that services the Matthews Netball Centre. The accesses are considered below.

Road Access to Salvado Road

Access to Salvado Road will need to conform to current standards of *Liveable Neighbourhoods* and compliance to AS2890.1 is very desirable. *Liveable Neighbourhoods* states that for a district distributor B road a centre line to centre line separation of 40 metres minimum is required for right / left staggers and 60 metres minimum for left / right staggers. A reduced separation is technically possible as Salvado Road at this location is classified as an access street. However, current traffic volumes are more aligned with a distributor road and the higher separation requirements is considered appropriate to maintain a safe road environment.

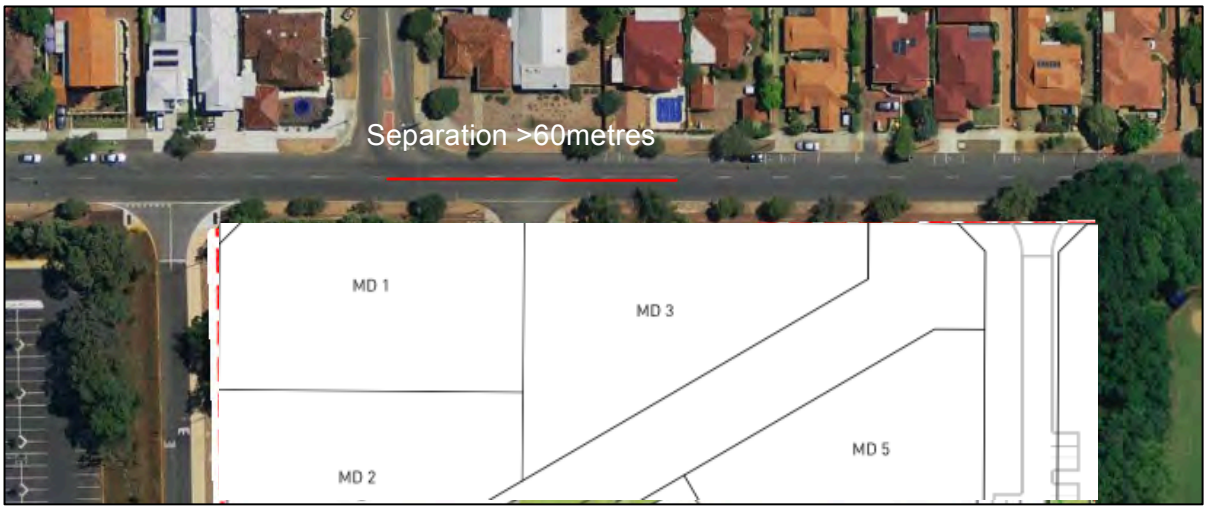

Figure 6 Access to Salvado Road

Driveway Access to Salvado Road

AS2890.1 sets out that driveway accesses should not be located in close proximity to intersections and a minimum of 6 metres from the side road corner radii tangent should be provided. But this restriction does not need to apply to residential driveways, which are permitted to access any section of road (including the middle of a traffic signal controlled intersection). The intent of the restriction is to minimise driver confusion in regard to who has priority. As Salvado Road is currently constructed and many of the lots to the northern side have been developed with multiple driveways, strict adherence to the requirements of

AS2890.1 is not possible. However, taking on-board the intent of AS2890.1, Figure 7 shows the preferred locations for multiple dwelling driveways.

Figure 7 Salvado Road Driveway Access Locations

Matthews Netball Centre Road Access

The recent upgrading to the Matthews Netball Centre created a new car park access to Salvado Road that lies adjacent to the subject land. The construction standard of the new access road is suited to allow access from the subject land. No civil engineering works are indicated to be required except to create the residential access roads. Discussions with the Town of Cambridge have identified a need to provide traffic treatments for the proposed residential access roads to prohibit traffic departing the Matthews Netball Centre to pass through the subject land. A half seagull treatment is considered suitable.

Should it be decided that the Matthews Netball Centre access road should become a dedicated road reservation a 15.4 metre wide reservation would be recommended to allow:

- Retention of the existing 6.0 metre pavement
- A verge varying from 3m to 5 metres to the development side
- A residual verge of 4.4 metres to 7.4 metres adjacent to the car park

The road reservation accords with the standard for an access street under *Liveable Neighbourhoods* and is appropriate to cater for 3,000 vehicles per day.

Residential cross over access to the netball centre access road will need to conform to the requirements of AS2890.1 in regard to providing the required off set to any car park access taken to the west side of the service road. This is a matter for the development application to address, however, Figure 8 shows where future access may not be located.

Figure 8 Netball Centre Access Road Restrictions to Cross Overs

Peak Hour Operation

Residential access to Salvado Road will be busiest during the weekday peak hours. The main access for the proposed development will to the east of Marlow Street. Residential traffic demands using the Matthews Netball Centre access road are expected to be about 20% lower than the eastern access road. Further, the additional traffic accessing Salvado Road from Marlow Street results in the eastern access being opposed by more peak hour traffic. Analysis of the access is undertaken using Sidra to test the expected performance.

Table 4 shows the morning peak hour Sidra analysis for the proposed eastern road access to Salvado Road. The analysis considers the worst-case scenario based on the peak morning demand passing the subject site. It is noted that Marlow Street contributes approximately 350 vehicles to Salvado Road eastbound during the morning peak hour (based on local traffic counts). This indicates that should delays at the eastern site access be greater than shown in table 4, traffic may likely divert to the Matthews Netball Centre access road, where opposing traffic movements are reduced. This may result in longer delays for traffic exiting Marlow Street during the morning peak hour and therefore, may result in less traffic using Marlow Street to access Salvado Road.

PM peak analysis is not undertaken as the majority of traffic movements associated with the subject site will turn left in and thus will only slow following traffic on Salvado Road. Traffic flows on Salvado Road during the evening peak hour are shown in Table 1 to be significantly lower and thus acceptable operation during the morning peak will result in acceptable operation during the evening peak.

Access to Salvado Road is expected to operate in an acceptable manner.

Table 4 Salvado Road / Site Access AM Peak operation

Salvado Road Site Access
AM Peak
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Site Access											
1	L	18	0.0	0.497	41.5	LOS C	2.2	15.5	0.84	0.92	27.9
3	R	54	0.0	0.502	41.7	LOS C	2.2	15.5	0.84	1.03	27.8
Approach		72	0.0	0.500	41.7	LOS C	2.2	15.5	0.84	1.00	27.9
East: Salvado Road East											
4	L	14	0.0	0.132	8.2	LOS A	0.0	0.0	0.00	1.05	49.0
5	T	242	0.0	0.132	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		256	0.0	0.132	0.4	LOS A	0.0	0.0	0.00	0.06	59.3
West: Salvado Road West											
11	T	998	0.0	0.517	2.8	LOS A	9.5	66.2	0.65	0.00	49.3
12	R	5	0.0	0.526	11.2	LOS A	9.5	66.2	0.65	0.97	49.0
Approach		1003	0.0	0.516	2.8	LOS A	9.5	66.2	0.65	0.01	49.3
All Vehicles		1331	0.0	0.516	4.5	NA	9.5	66.2	0.54	0.07	48.8

6.0 PARKING

Car parking for the residential development will need to be provided in accordance with the R-Codes. It is noted that the proposed multiple dwelling sites are located within 250m of the high frequency bus routes on Cambridge Street and therefore it is anticipated that detailed design outcomes through development applications will seek to utilise the reduced parking provisions for 'Location A' dwellings under the R Codes.

A provision of 1 visitor bay per 4 dwellings is required under the R-codes and it is recommended that visitor parking be provided on street. The number of on street bays will need to be determined as part of the development application.

The Matthews Netball Centre provides 161 car bays within the car park adjacent to the site. Whilst on street parking will be provided within the ODP area, the additional provision of bays off site may be considered at detailed design as 'overflow' visitors parking outside of the peak netball centre activity times.'

APPENDIX A

LOS	Single Carriageway[1]	2-Lane Boulevard[2]	Dual Carriageway (4-Lanes)[3]	Dual Carriageway (4-lane Clearway)[3]
A	2,400vpd	2,600vpd	24,000vpd	27,000vpd
B	4,800vpd	5,300vpd	28,000vpd	31,500vpd
C	7,900vpd	8,700vpd	32,000vpd	36,000vpd
D	13,500vpd	15,000vpd	36,000vpd	40,500vpd
E	22,900vpd	25,200vpd[4]	40,000vpd	45,000vpd
F	>22,900vpd	>25,200vpd[4]	>40,000vpd	>45,000vpd

[1] Based on Table 3.9 Austroads - Guide to Traffic Engineering Practice Part 2

[2] Based on single carriageway +10% (supported by Table 3.1 Austroads - Guide to Traffic Engineering Practice Part 3) – Boulevard or division by medians.

[3] Based on RRR Table 3.5 - mid-block service flow rates (SF.) for urban arterial roads with interrupted flow. Using 60/40 peak split.

[4] Note James Street Guildford passes 28,000vpd.

APPENDIX TEN

LOCAL WATER MANAGEMENT PLAN

‘Former Nursery Site’ (Part Lot 520 Salvado Road, Jolimont)

Urban water management plan

Prepared for LandCorp

By Essential Environmental

October 2014

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SUMMARY

Table 1: Design elements and compliance

WMP Element	Design response
Stormwater management	The development is required by the Water Corporation to retain the 100 year ARI event on site with no discharge to the downstream drainage system. Infiltration will be the primary disposal route for stormwater on the site and the following the use of; on-lot retention (soakwells), 'leaky' drainage pipes and pits, and porous pavements where appropriate are recommended. Achieving the required on-site infiltration of stormwater may be difficult on less elevated areas of the site where separation to maximum groundwater level is minimal.
Groundwater management	According to the *Perth groundwater atlas* (DoW 2006), the historic maximum groundwater level on the site would be expected at between 8 m and 9 m AHD. However, the recently recorded maximum groundwater level is 6.41 m AHD. Groundwater level management is not expected to be required on the site given separations between 1 and 6 m from maximum groundwater level to the existing natural surface. Lower portions of the site may require limited filling to achieve suitable separation of maximum groundwater level from infrastructure and building foundations and to achieve the required on-site infiltration of stormwater.
Water quality management	The use of water sensitive urban design elements including; bioretention, soil amendment and non-structural controls is expected to provide sufficient water quality treatment for protection of surface and groundwater resources. As a guide; bioretention areas should be sized at 2% of the impervious area that they are connected to and soils should be amended to achieve a minimum PRI of 10 surrounding infiltration devices and in landscaped public open spaces. Preliminary investigations for acid sulfate soils are recommended prior to commencing earth disturbing activity in the south-eastern corner of the site.
Water servicing	Water servicing has not been considered as a part of this water management plan
Managing subdivision works	A construction management plan should include: • Sediment control measures for protection of Mabel Talbot Lake and constructed drainage infrastructure (including; soakwells, piped drainage and bioretention areas). • Dewatering and acid sulfate soils management.
Monitoring	Given the proximity of the proposed development to Mabel Talbot Reserve and its location within the Mounts Bay drainage catchment post-development groundwater monitoring is proposed. Monitoring will be undertaken at three locations within the site for a period of three (3) years after practical completion. The site will not discharge surface water off-site and there will be no permanent or semi-permanent water bodies within the development. Therefore no surface water monitoring is proposed.

CONTENTS

Figures

Charts

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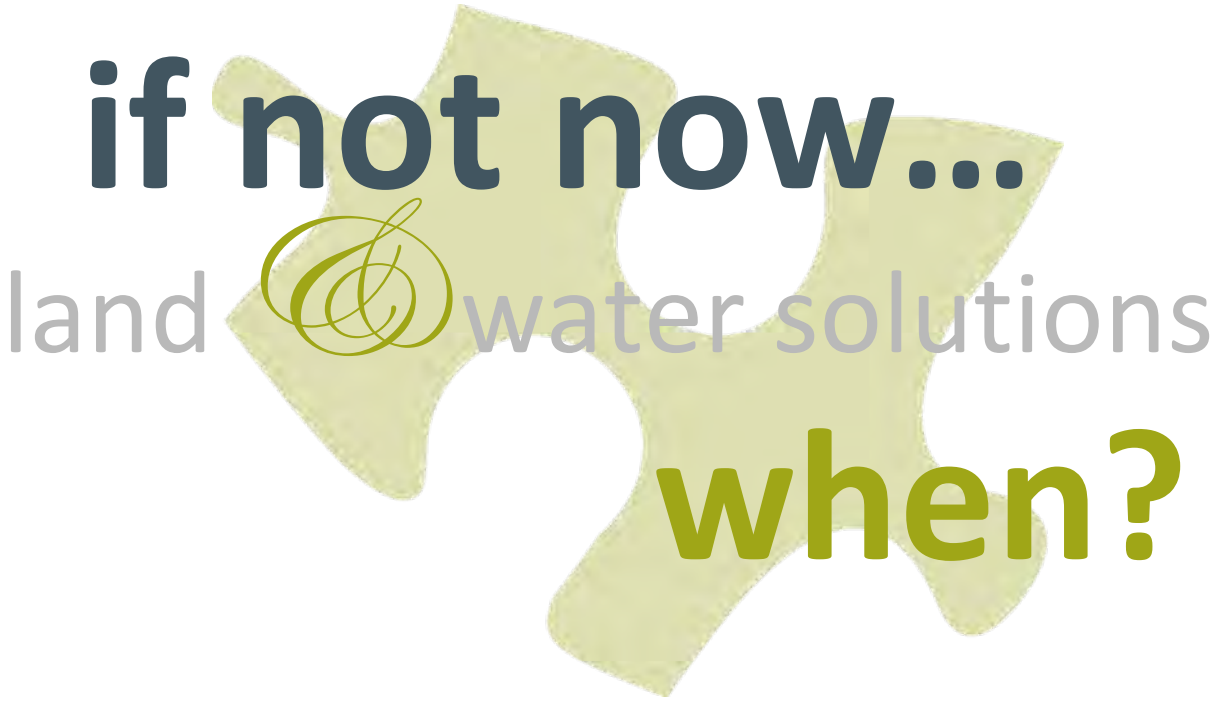
if not now...
land & water solutions
when?

1 INTRODUCTION

This urban water management plan has been developed to support the proposed subdivision and future development of the 'Former Nursery Site' which is a part of Lot 520 Salvado Road, Jolimont in the Town of Cambridge. It is located approximately 4 km west of Perth's CBD within the Town of Cambridge, and is approximately 3.6 ha in area.

Lot 520 Salvado Road, Jolimont, contains; Matthews Netball Centre, Henderson Park and the site of a Former Nursery which is the subject land for this urban water management plan (location shown in Figure 1). A residential area and a conservation category wetland and Environmental Protection Policy lake (Mabel Talbot Lake) is located directly south of the site.

This urban water management plan has been prepared consistent with *Better Urban Water Management* (WAPC, 2008) and the Department of Water's *Urban Water Management Plan: Guidelines for Preparing Plans and Complying with Subdivision Conditions* (DoW, 2008). Other key documents that have been used to guide this urban water management plan include:

- Geotechnical Investigation, Redevelopment of Pat Goodridge Precinct, Selby Street, Wembley, Perth (Golder Associates, 2010)
- Jolimont Nursery Site Redevelopment Preliminary Site Investigation (GHD, 2012)
- Environmental Assessment Report {art Lot 520 Salvado Road, Jolimont (Strategen, 2012)
- Local Water Quality Improvement Plan, Mounts Bay Catchment (SRT, 2009)
- Mabel Talbot Reserve Management Plan (Ecoscape, 2003)
- Regional Strategy for Management of Stormwater Quality for WESROC (JDA, 2002)

The site is not subject to a local water management strategy nor a distract water management strategy.

1.1 Proposed subdivision

The subdivision includes 25 two and three storey single dwelling 'townhouse' lots, with a minimum size of 270 m^2, and seven multiple dwelling lots up to five stories to a maximum size of 2643 m^2. An area of public open space or 'public realm' crossing from the south west to the north east corner of the subject land is proposed to provide pedestrian access between residential blocks at the site. In addition, narrow strips of public open space to retain existing trees and provide amenity are located along the eastern and western boundaries of the site.

The proposed subdivision layout is presented in Figure 2.

LandCorp - Old Nursery Lot 520 Salvado Rd, Jolimont
Urban water management plan
Figure 1: Location plan

Data source: LandCorp, Landgate.
Created by: H. Lamparski. Projection: MGA: zone 50.

essential environmental

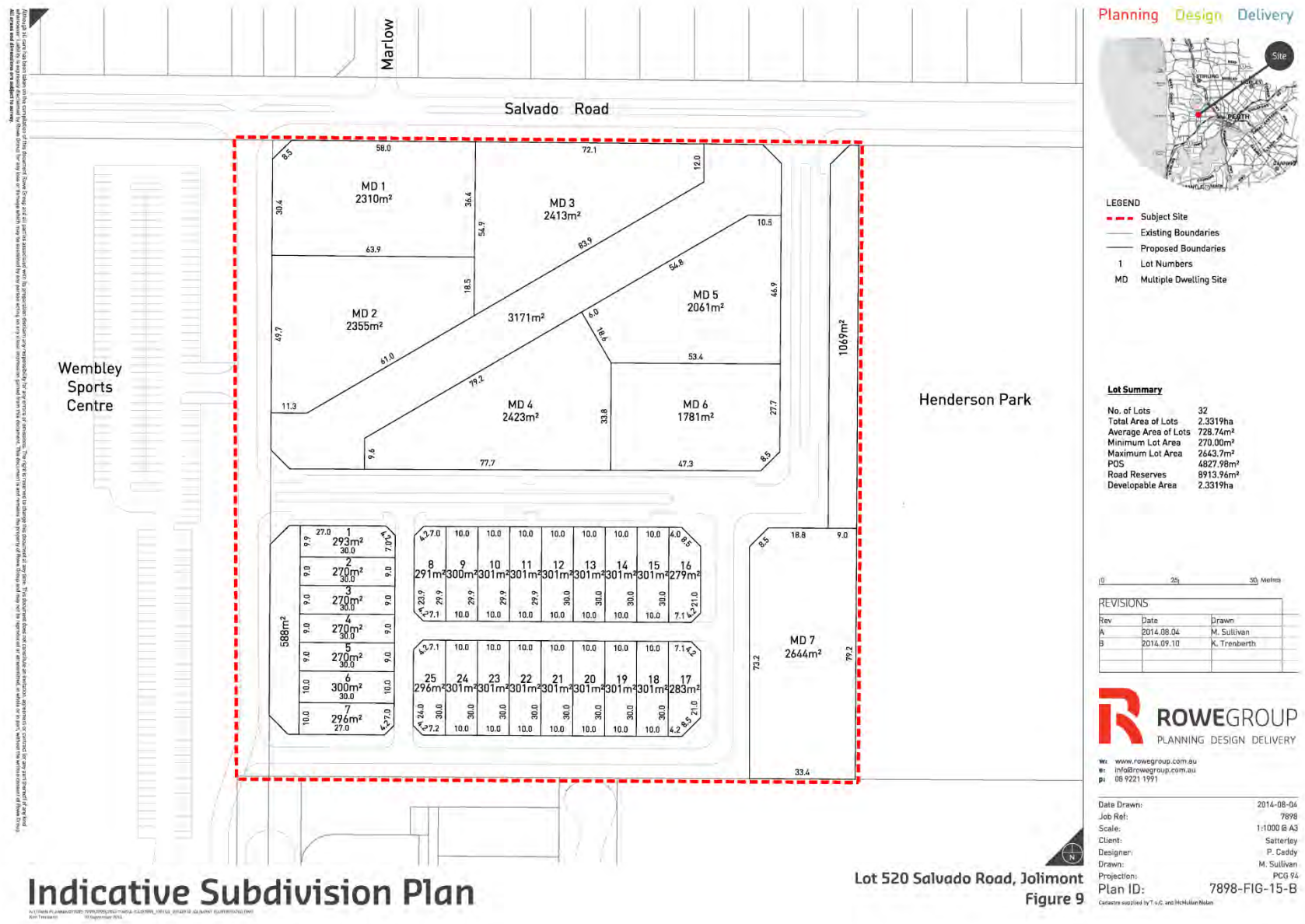

Figure 2: Proposed subdivision

2 DESIGN OBJECTIVES

This urban water management plan adapts and applies the design objectives of *Better urban water management* (WAPC, 2008) and the *Local Water Quality Improvement Plan, Mounts Bay Catchment* (SRT, 2009) to the site specific characteristics of Lot 520 Salvado Road, Jolimont. The urban water management plan also considers relevant *Town of Cambridge Policy 5.3: Landscaping and Water Sensitive Urban Design*, and *Town of Cambridge Policy 3.1: Streetscape*.

2.1 Water conservation

- Minimise water use and improve water flow management to improve environmental values

2.2 Stormwater management

- Manage the 100 year ARI rainfall event on site in accordance with the requirements of the Water Corporation.

2.3 Water quality management

- Improve water quality in water bodies, drains and receiving waters to support ecosystem health
- Promote better understanding of water quality issues and improved behaviour in the catchment population
- Improve water quality to maintain and enhance recreational and aesthetic values of water bodies in the catchment
- Protect and recognise cultural and spiritual values of the catchment

2.4 Groundwater management

- Provide sufficient clearance above groundwater to protect against waterlogging and/or inundation due to seasonal rise.

These items are considered in the context of the urban water management plan checklist (Appendix 1).

3 PLANNING APPROVALS

3.1 Metropolitan region scheme

The subject land is currently zoned 'urban' under the Metropolitan Region Scheme.

3.2 Town planning scheme

The subject land is currently zoned 'residential (special control area)' under the Town of Cambridge Town Planning Scheme No. 1.

3.3 Subdivision approval (following Outline Development Plan approval)

This urban water management plan has been developed to support the preparation of the Outline Development Plan, subsequent proposed subdivision and future development of the 'Former Nursery Site'.

4 SITE CHARACTERISTICS

4.1 Location and climate

The subject land (Figure 1) is a 3.6 ha site is located at Lot 520 Salvado Road, Jolimont. It is bounded directly by Salvado Road to the north, turfed public open space to the east and west, and part residential development and public open space accommodating a wetland / drainage basin to the south (Mabel Talbot Park). The land north of Salvado Road is developed for residential uses.

The average annual rainfall recorded at the nearest Bureau of Meteorology weather station at Subiaco Wastewater Treatment Plant (no. 9151) (approx. 2 km to the west) since 1967 is 722 mm but has declined in recent years to an average of 697 mm since 1995. The minimum recorded annual rainfall was in 1984 at just 440 mm and the maximum recorded was in 1991 at 925 mm.

The majority of rainfall is experienced in the winter between May and September with the driest months being January and February.

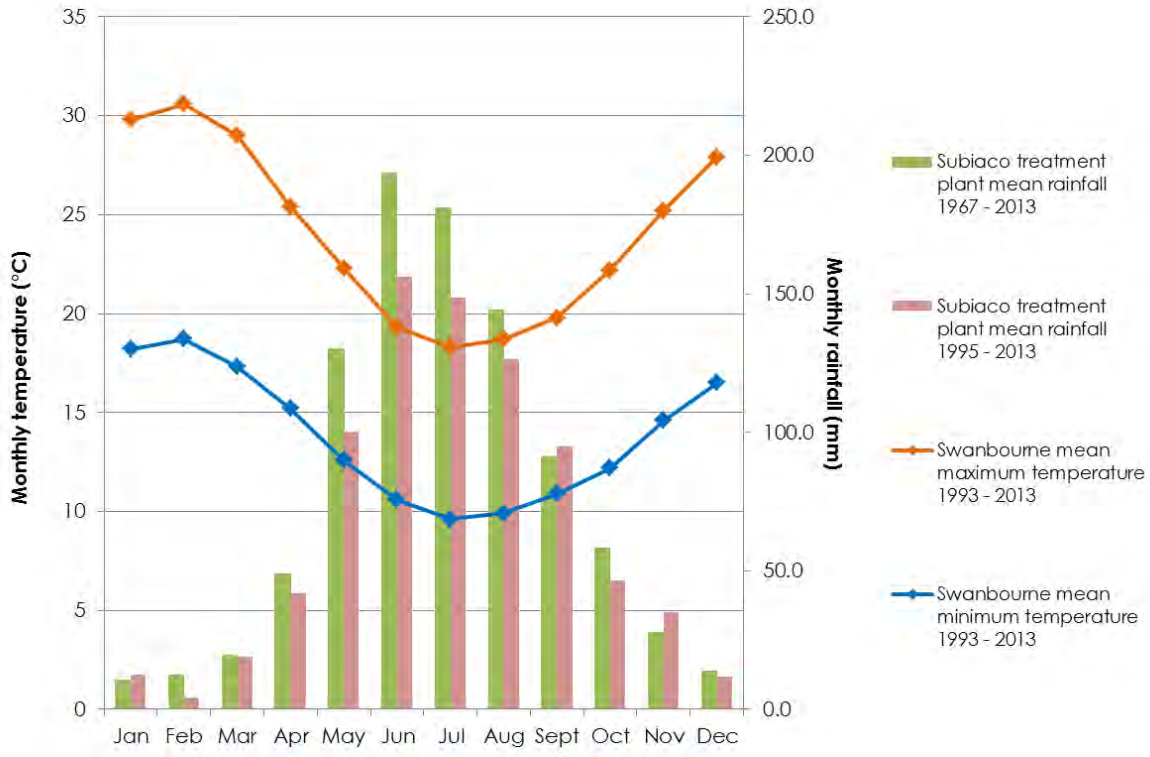

Chart 1: Climate summary data (Rainfall: Subiaco, Temperature: Swanbourne, BoM, 2014)

The nearest weather station with a temperature record is Swanbourne (no. 9215) (approx. 5 km to the south west). Average maximum temperatures range between 18.3°C in July and 30.6°C in February, while average minimum temperatures range between 9.6°C in July and 18.7°C in February.

4.2 Geotechnical

4.2.1 Topography and soils

Topography and surface geology of the subject land are presented on Figure 3.

The site slopes in a south-easterly direction from an elevation of approximately 17 m AHD in the north-west corner down to 9 m AHD in the south-east corner. A main sewer easement runs diagonally across the site in a north-east to south-west direction.

The surface geology of the majority of the subject land is broadly classified as sand derived from Tamala Limestone (S7). An area of peaty clay (Cps) associated with the wetland in Mabel Talbot Reserve is located in the south eastern corner of the subject land.

Golder Associates undertook geotechnical investigations at the site for the Town of Cambridge in 2010 as part of a study of a larger area to consider redevelopment of the site and surrounding land.

The geotechnical investigation included CPT testing at six locations and hand auguring at two locations within the site. The investigation concluded that the subsurface conditions at the nursery site could be generally described as follows (Golder Associates, 2010):

- *Topsoil – Fill Sand, extending to a typical depth of about 0.3m; overlying*
- *Fill – Sand, very loose to dense, not present at all locations, extending to depths of up to 3m, overlying*
- *Sand (SP), loose to medium dense, extend to the depth investigated.*

4.2.2 Permeability

In addition to the observations regarding underlying soils, Golder Associates (2010) also provided an assessment of the permeability of the sites soils as follows:

> *The sandy soils... are considered to be relatively permeable and suitable for on-site disposal of stormwater by way of an infiltration system such as soakwells.*

4.2.3 Acid sulfate soils

Acid sulfate soil risk mapping has been undertaken for the entire Swan Coastal Plain (DEC, 2010). The majority of the subject land is classified as having no known risk of acid sulfate soils occurring within 3 m of the natural surface. However, a small a small part of the south-eastern corner of the study area associated with Mabel Talbot Lake and its immediate surrounds is classified as having a high to moderate risk of acid sulfate soils occurring within 3m of the natural surface. No acid sulfate soil testing was undertaken as part of the geotechnical investigation (Golder Associates, 2010).

Acid sulfate soil risk mapping is presented on Figure 4.

4.3 Environmental assets

An environmental assessment report (Strategen 2012) has been prepared for the site. The report identified that the site is considered representative of the Karrakatta vegetation complex; yellow sand with limestone and predominantly open forest of *Eucalyptus gomphocephala, Eucalyptus marginata, Eucalyptus calophylla* and woodland of *Eucalyptus Marginata* and *Banksia spp*. However, native vegetation has been largely cleared and severely altered, with remaining remnant vegetation found mainly outside of the perimeter of the site. A detailed inspection of all trees on site indicated that 134 trees were considered suitable for retention and a further 39 were considered suitable for retention where practicable, including some mature trees located on the eastern and western perimeters outside of the site boundary and have subsequently been cleared to facilitate the adjacent netball centre development.

A number of flora species of State conservation significance were considered to have the potential to occur on site, however, no declared rare flora species were identified during site specific surveys undertaken as part of this assessment.

An EPBC Act Protected Matters database search revealed that Carnaby"s black cockatoo is the only protected faunal species likely to occur at the site. In addition, six species of migratory birds largely associated with wetlands were listed under the EPBC Act as potentially occurring at the site, however, evidence of these species has not been recorded. While these migratory birds may be present in the nearby wetland, the site itself is unlikely to represent a significant area of habitat for any migratory species. A search of the Department of Parks and Wildlife database also identified a number of birds, mammals and reptiles of State conservation significance as potentially occurring at the site. However, only the Forest red-tailed black-cockatoo, Carnaby"s black cockatoo and the Rainbow bee-eater are considered possible to occur at the site. No migratory bird species were recorded in the nearby wetland within Mabel Talbot Park across six waterbird surveys between 1996 and 2002.

A number of trees in the area were considered potential Carnaby"s black cockatoo foraging habitat, however, the majority of these trees were located outside of the site boundary. Therefore, the likely impact on potential Carnaby's habitat as a result of the development is considered very limited and based on this assessment the environmental values of the site are overall not considered significant (Strategen, 2012).

4.3.1 Mabel Talbot Reserve

An artificial lake is maintained on the land immediately south and west of the site in a low lying area which is protected under the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (EPP Lakes Policy) and evaluated as a conservation category wetland under the geomorphic wetlands mapping (Figure 5). It is an expression of groundwater derived from the unconfined superficial aquifer over which it is situated. The lake was originally a swamp used for watering cattle and has also been called "Perry's Watering Hole" and "Jolimont Swamp". It is situated in the locality of the City of Subiaco.

The natural water level in the lake ranges from within 1 m of the natural ground surface (approximately 8 m AHD) in winter to completely dry in summer. Winter water levels are controlled by a weir that overflows into the downstream Water Corporation Wembley-Jolimont Main Drain so that the lake also functions as a stormwater compensating basin (Ecoscape, 2003). The City of Subiaco maintains water levels in the lake in summer artificially, using groundwater from a nearby bore located within the Reserve. This bore also supplies irrigation water for the Reserve (Ecoscape, 2003).

Various studies have been undertaken in regards to the Mabel Talbot Reserve and stormwater management in the area. The City of Subiaco has been recording water levels and collecting water samples from the Mabel Talbot Lake and a nearby groundwater bore in the reserve since 1998 (Figure 2). Water quality measurements from collected samples included a suite of nutrients, heavy metals, in situ physical parameters and total petroleum hydrocarbons. Results from this monitoring program have been provided to Essential Environmental in confidence and statistical analyses presented in this report are for internal use by LandCorp only.

Monitoring results from the last four years show that water levels in the Lake can vary by up to 0.8 m (minimum recording of 5.78 m AHD and maximum recording of 6. 58 m AHD) (Chart 2). Recent monthly-recorded groundwater levels in a nearby bore south of the Lake vary between 4.48 m AHD and 6.41 m AHD (Chart 2).

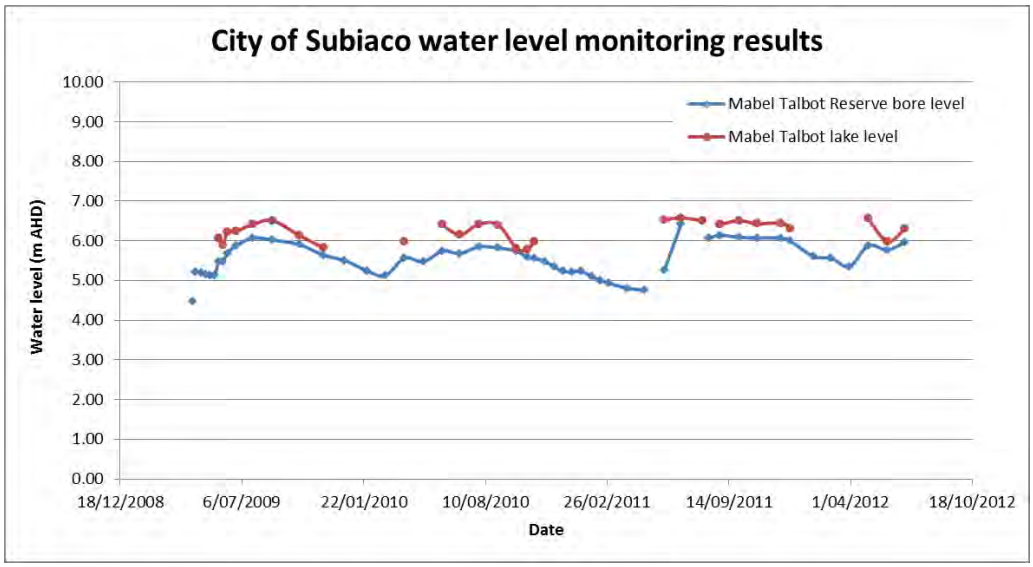

Chart 2: Mabel Talbot Res. (lake & groundwater) water level results (Source: City of Subiaco)

A summary of average nutrient concentration levels recorded by the City of Subiaco since 2002 is presented in Table 2 below. While heavy metals and hydrocarbons were also measured, the majority of results were below detection limits and thus have not been presented in this report.

Average Total Phosphorous (TP) and Total Nitrogen (TN) concentrations in the Lake were 0.17-0.19 mg/L and 1.05-1.10 mg/L, respectively. Average levels of nitrogen oxides (NO_x-N) and ammonia (NH_3) in the lake were found to be 0.05-0.06 mg/L and 0.17-0.22 mg/L, respectively. TP, TN and NH_3 levels in groundwater were found to be slightly higher than that in the lake with average concentrations of 0.24 mg/L, 1.29 mg/L and 0.99 mg/L, respectively. However, the average NO_x-N concentration was found to be lower in groundwater at 0.03 mg/L.

Average TN and NO_x-N concentrations were below the ANZECC guideline levels (1.5 mg/L and 0.7 mg/L) applicable to wetlands in southern Western Australia (2000) in both lake water and groundwater. However, average TP concentrations were significantly higher than the ANZECC guideline level (0.06 mg/L). Average lake NH_3 levels were below the ANZECC guideline level (0.7 mg/L), in contrast to the average groundwater NH_3 levels which was slightly higher. Average ortho-P concentration in groundwater (0.03 mg/L) was also slightly higher than the ANZECC guideline level (0.04 mg/L).

Table 2: Summary of average nutrient concentration data – Mabel Talbot lake & groundwater bore (Source: City of Subiaco)

Location	TN (mg/L)	TP (mg/L)	Ortho-P (mg/L)	NO_x-N (mg/L)	NH_3 (mg/L)
Mabel Talbot Main Drain - east	1.05	0.17	-	0.06	0.17
Mabel Talbot Main Drain - west	1.10	0.19	-	0.05	0.22
Mabel Talbot Reserve groundwater bore	1.29	0.24	0.04	0.03	0.99
ANZECC & ARMCANZ guidelines (wetlands, southern WA) (2000)/ Mounts Bay WQIP (SRT, 2009)	1.5	0.06	0.03	0.7	0.9

The *Mabel Talbot Reserve Management Plan* prepared for the City of Subiaco (Ecoscape, 2003) provides further information regarding the reserve and provides recommendations in regards to ongoing management. The Management Plan classifies the lake as eutrophic. High nutrient concentrations are identified to be a likely result of nutrient-enriched sediments entering the lake via stormwater, and nutrient-enriched groundwater inflow from fertiliser use in surrounding urban areas.

4.3.2 Lake Monger and the Hamilton Interchange Lakes

Surface water flows generated in the Wembley-Jolimont Main Drain catchment drain via the regional drainage system to a series of lakes and wetlands on route to the Swan River. Although highly modified from natural conditions, the lakes in this system have been identified as important habitat for native fauna and migratory species. Lake Monger is also protected under the EPP Lakes Policy and evaluated as a Conservation Category Wetland under the geomorphic wetlands mapping.

Management of water quality of stormwater discharged from the site is relevant to the ongoing management of the lakes within the Mounts Bay Catchment.

4.3.3 Swan River

Ultimately, stormwater generated in the Wembley-Jolimont Main Drain catchment will discharge to the Swan River via the Mounts Bay Main Drain as well as through infiltration and subsequent movement as shallow groundwater.

4.4 Surface water

There are no surface water bodies located on the subject land. Mabel Talbot Reserve lake is located within 100 m south east of the subject land, as described in section 4.3.1.

Surface water drainage from the site and surrounding areas contributes to the Mounts Bay Drainage Catchment (SRT, 2009). The topography of the site results in the immediate area draining to the lake located in Mabel Talbot Reserve south east of the site (Figure 5).

This lake overflows through the Wembley-Jolimont Main Drain to Lake Monger which in turn overflows to the Hamilton Interchange Lakes, Narrows Interchange Lakes and then to the Swan River (the lake's outlet and drainage connection is indicated on Figure 5).

The main drainage system (including Mabel Talbot Reserve, which is utilised as a compensating basin) is vested with the Water Corporation to provide integrated management of the regional drainage system (Ecoscape, 2003). It is understood that the interchange lakes are vested and managed by Main Roads.

The Western Suburbs Regional Organisation of Councils (WESROC) commissioned various studies (undertaken by JDA Hydrologists) between 2002 and 2006 to review stormwater management practices and to monitor water quality in catchments throughout the local area. Studies included analysis of water samples from stormwater, groundwater and from lake water at Mabel Talbot Reserve. Analysis of water samples found elevated concentrations of nutrients and other contaminates in stormwater and groundwater. The JDA studies recommended infiltration of stormwater to groundwater and installation of Gross Pollutant Traps at key locations to improve water resource management in the western suburbs.

The installation of gross pollutant traps, whilst effective for removal of gross pollutants in large mixed land-use drainage catchments, are not generally considered necessary for small scale residential only developments where 'at source' water sensitive urban design measures have been implemented.

The Swan River Trust has developed a Local Water Quality Improvement Plan (LWQIP) for the Mounts Bay Catchment (SRT, 2009). The plan identifies decreasing groundwater levels and management of nutrients and heavy metals in stormwater as key challenges to maintaining and improving water quality in system.

4.5 Groundwater

The sandy soils beneath the site support an unconfined groundwater aquifer which flows south east on a local scale towards Mabel Talbot Reserve lake and the Swan River. However, the direction of local groundwater flow differs from regional groundwater flow, which is west towards the coast. The Perth Groundwater Atlas (DoW. 2006) suggests that maximum groundwater level should be expected to occur between 8.0 m and 9.0 m AHD (Figure 5), which is between approximately 1-6 m below the existing ground level. Groundwater was not encountered within the maximum investigation depth of 5.2 m during the geotechnical investigation undertaken by Golder Associates in March 2010 (Golder Associates, 2010)

The site lies midway between long term groundwater monitoring bores; the first located in Rosalie Park, Derby Road in Shenton Park (WIN SITE 61610045) and the other located adjacent to Herdsman Lake, on Pearson Street near Goldfinch Avenue in Churchlands (WIN SITE 61610029). Historical records from both bores indicate a seasonal variation in groundwater level of between 0.5 m and 1.5 m.

The City of Subiaco has been recording water levels and collecting water samples from a groundwater bore south of the lake in Mabel Talbot Reserve since 1998 (shown in Figure 5). The maximum recorded groundwater level at this bore is 6.41 m AHD, as presented in Figure 5, suggesting that current maximum groundwater levels near the site are lower than Perth Groundwater Atlas (2006) mapping of historical maximum groundwater might suggest.

Water quality analysis of samples collected from this bore indicate high nutrient concentrations in local groundwater, as shown in Table 2. Total nitrogen concentrations measured in 17

samples taken between July 2003 and February 2012 averaged 1.29 mg/L, less than the ANZECC / Mounts Bay WQIP guidelines trigger level of 1.5 mg/L. However, total phosphorus measured from the same samples averaged 0.24 mg/L, well over the 0.06 mg/L trigger levels defined in the ANZECC / Mounts Bay WQIP guidelines.

The study area lies within the Perth North Confined and Town of Cambridge sub-areas of the Perth groundwater management area and the aquifers present underlying the study area in order of increasing depth are:

- Superficial – Swan
- Yarragadee North

Groundwater within the Town of Cambridge sub-area is reported to be available in the Superficial-Swan Aquifer (Table 3). Groundwater within the Perth North Confined sub-area is reported to be fully allocated in the Leederville Aquifer but not in the Yarragadee North Aquifer (Table 3). Currently, 1,068,405 kL is available for allocation from the Superficial-Swan Aquifer and 167,000 kL is available for allocation from the Yarragadee North Aquifer (DoW, Resource Allocation Report – 30th June 2014).

Table 3: Groundwater allocation limits and volumes (Source: DoW, July 2014)

Aquifer	Sub-area	Allocation limit (kL/year)	Availability (July 2014)
Superficial – Swan	Town of Cambridge	3,500,000	Available
Leederville	Perth North Confined	1,364,220	Fully allocated
Yarragadee North	Perth North Confined	247,000	Available

4.6 Land use

The entire study area is currently zoned 'urban' under the Metropolitan Region Scheme and inspection of historical aerial photographs reveals that site was developed for horticultural uses sometime between November 1953 and March 1965. It is understood that the site has accommodated a variety of uses including council use of the area for stockpiling of construction materials and wash down of machinery. The site is currently vacant and last functioned as a plant nursery, closing in 1994.

The land north of Salvado Road and along part of the southern boundary of the site has been developed for residential uses. The remaining land in the immediate area is used for public open space including land south west of the site (Mabel Talbot Park) which accommodates a wetland / drainage basin.

4.6.1 Aboriginal heritage

Results of a search of the Department of Aboriginal Affairs' Aboriginal Heritage Inquiry System shows no records of any registered Aboriginal heritage sites within the subject land. The lake located within Mabel Talbot Reserve directly south west of the site (also known as 'Jolimont Swamp') is a registered heritage site (ID 3736), and therefore holds significant cultural value and is considered an important social amenity for the local community. The site is shown on Figure 4.

4.6.2 Contamination

There are no known or reported contaminated sites registered in the Department of Environment Regulation (DER) Contaminated Sites database within approximately 250 m of the study area.

The site, formerly a Nursery, has been subject to a preliminary site investigation (GHD 2012) which found that the following potential sources of contamination should be considered for further assessment:

- Fill material across the site;
- Previous storage and application of chemicals (including herbicides, fungicides, fertilisers, pesticides and possible treatment of wooden products);
- Previous storage of fuel;
- Asbestos (scattered debris, within stockpiles and onsite building);
- Waste material (including discarded drums of kerosene);
- Acid sulfate soils (south eastern corner);
- Stockpiles of material;
- Town of Cambridge wash down; and
- Disposal of street sweeping

As recommended by the preliminary site investigation; a Detailed Site Investigation has been undertaken and a Sampling and Analysis Plan (SAP) has been prepared in accordance with the DER guidelines to investigate the extent of soil, asbestos and groundwater contamination at the site.

There is a site which was historically used as a salvage and storage yard, with fuel storage facilities, approximately 300 m to the east of the subject land classified by the Department of Environment Regulation as 'Remediated for restricted use' (23 Bishop St, Jolimont). Investigations associated with a contamination assessment initially undertaken in 2005 and continued during 2007-2008 identified that copper and lead were present in soils beneath the site. Remedial works were undertaken in 2008-2009, however, copper and lead concentrations exceeding Ecological Investigation Levels and Health-based Investigation Levels for high-density residential sites but below commercial and industrial sites (DoE, 2003) were taken and identified soil at an isolated area, 0.5 m below ground level. Further sampling did not identify any contaminants over Ecological Investigation Levels, Health-based Investigation Levels for high-density residential or Health-based Investigation Levels for commercial and industrial sites, and provided confirmation that the copper and lead detected do not represent a risk to human health or the environment. The site considered suitable for high density residential use with limited soil access, however, is unlikely to impact upon the subject land due to the limited nature and location of the contamination.

LandCorp - Old Nursery Lot 520 Salvado Rd, Jolimont
Urban water management plan
Figure 3: Topography and surface geology

Data source: LandCorp, Landgate, DMP.
Created by: H. Lamparski. Projection: MGA: zone 50.

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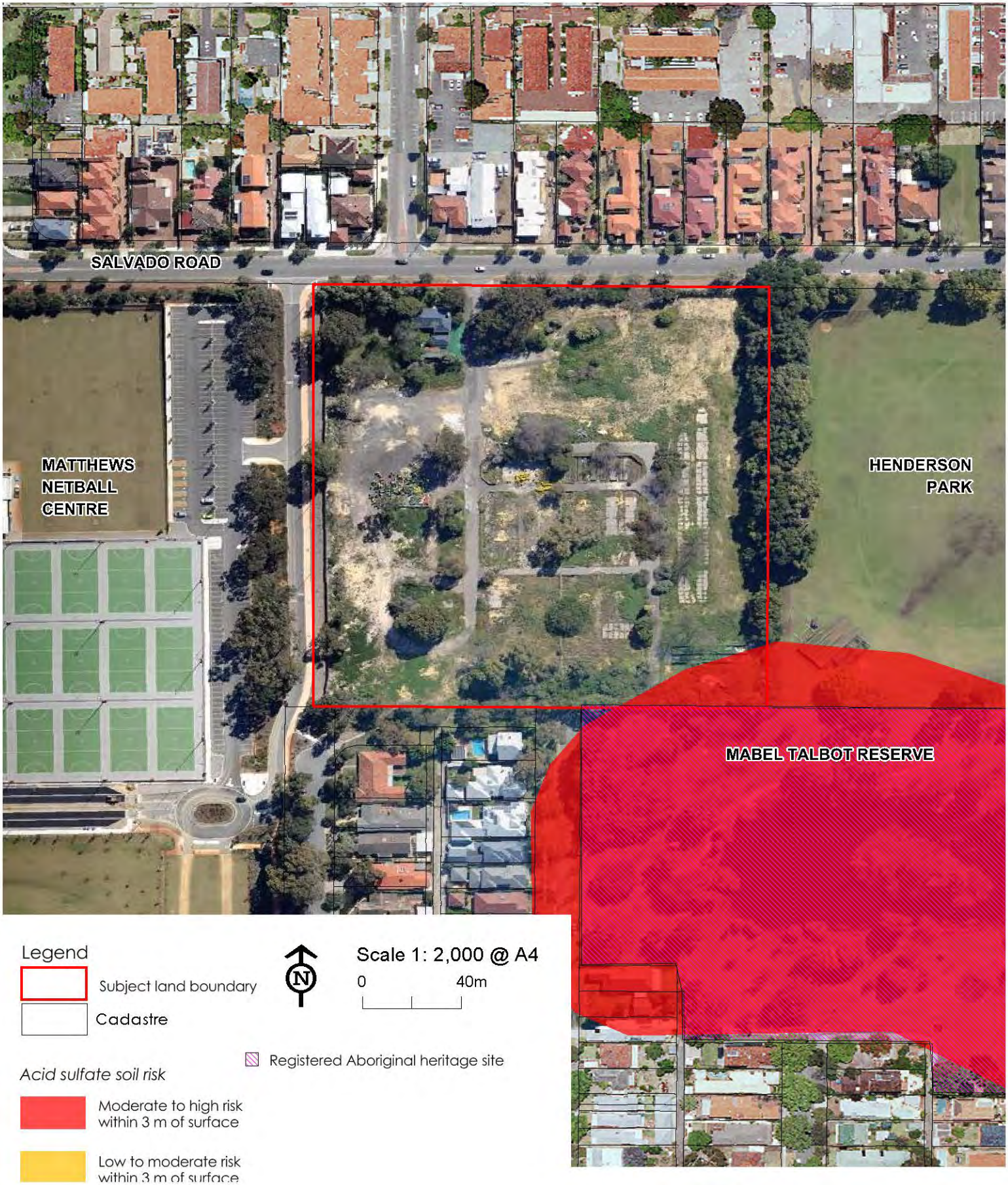
LandCorp - Old Nursery Lot 520 Salvado Rd, Jolimont
Urban water management plan
Figure 4: Acid sulfate soils and Aboriginal heritage sites



Data source: LandCorp, Landgate, DAA, DER.
Created by: H. Lamparski. Projection: MGA: zone 50.

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LandCorp - Old Nursery Lot 520 Salvado Rd, Jolimont, Urban water management plan
Figure 5: Surface water and groundwater features

Data source: LandCorp, Landgate, DoW, Water Corporation, DER, DPaW, City of Subiaco.
Created by: H. Lamparski. Projection: MGA: zone 50.

Scale 1: 4,000 @ A4

0 80 m

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5 WATER CONSERVATION

5.1 Water supply

5.1.1 Drinking water

The study area is located in an area currently serviced for water by the Water Corporation and will be connected to the existing system.

Water reticulation for the new development will be designed in accordance with the Water Corporation's design standards.

The property is not currently irrigated. However, it is included within bore license no. 164916 which is held by the Town of Cambridge. This License has been granted by the Department of Water for 1,397,325 kL from the Perth-Superficial Swan aquifer in the Town of Cambridge subarea to service the Town's public open space irrigation demands. In order to meet the future irrigation demands for the public realm areas of this site it will be necessary to increase the licensed amount by approximately 3,500 kL/year.

5.2 Wastewater treatment and disposal

The study area is located in an area currently serviced for wastewater by the Water Corporation and will be connected to the existing sewer system.

Sewers will be designed in accordance with the Water Corporation's design standards.

5.3 Water conservation and efficiency measures

Individual households and multi-residential developments could significantly reduce drinking water consumption through the use of backyard groundwater bores, rainwater tanks and/or greywater systems. However, because it is not possible for a developer to mandate these devices it is not realistic to expect that a specific consumption target could be met across the whole development.

Water conservation management strategies and design measures that have been incorporated into the former nursery development to achieve the objectives of maximising reuse of stormwater and limiting drinking water use include:

- On-site infiltration of stormwater via soakwells, underground infiltration cells, rain gardens and public open space infiltration areas will be maximised to maximise recharge of the local groundwater system providing ongoing hydrological support for important local wetland ecosystems.
- Groundwater will be used for all public open space (verges and public realm) and apartment garden irrigation and the following specific landscaping measures will be implemented to minimise demand:
    - Use of plant species with low watering requirements (such as native species) will be maximised.
    - The use of turfed areas will be minimised.
    - Where turf is used, a low nutrient and water requiring species will be utilised.
    - Waterwise irrigation practises will be used within public open space areas to minimise losses to evaporation.

A water balance has been prepared to estimate future water demands for the site. Demands have been calculated based on consumption rates for various domestic uses adopted from Water Corporation water demand information. The resulting future water demands are summarised in Table 4.

Based on an estimated future population of 550, calculated using standard occupancy rate for cottage lots (25 lots) and apartments (325 apartments) in Perth of; 1.814 persons/household and 1.552 persons/household, the estimated per capita residential water demand is; 73 kL/person/year.

5.3.1 Non-drinking water

The non-drinking water demand is generated from future irrigation requirements based on preliminary landscape designs. It assumes that groundwater will be used for irrigation of verges and communal gardens within the multi-dwelling lots. Communal gardens in multi-dwelling lots are usually managed by a strata company, and it is therefore expected that such a company would manage the operation and maintenance of a groundwater bore for irrigation purposes under this scenario.

The water balance was used to estimate the total irrigation demand for groundwater for the development: 4,540 kL/year, which is less than the Department of Water's current target for public open space irrigation which is 7,500 kL/ha/year. Under a scenario where only verges were irrigated by groundwater and communal gardens were instead irrigated by drinking water, the total irrigation demand for groundwater would decrease to 3,500 kL/year.

Table 4: Water demands summary - future

Water demand	Annual water demand (kL)	
	IWSS	Groundwater
Domestic:		
In-house	34,938	
Ex-house	553	1,040
Other land uses:		
Verges		3,500
Totals	**35,491**	**4,540**

6 STORMWATER AND GROUNDWATER MANAGEMENT

6.1 Flood protection

The site is not expected to be subject to flooding from the external area in the 100 year ARI event. The on-site drainage system, road layout and earthworks design should ensure that lots are located at a minimum of 0.3 m above the 100 year ARI flood level in the adjacent roads and drainage infrastructure.

6.2 Stormwater management

Consideration of local environmental conditions, restrictions due to space associated with urban infill, drainage capacity of catchment infrastructure and water sensitive urban design objectives should be made to design an effective water quantity management system.

Natural surface to groundwater separation is approximately 1-6 m across the site and site soils are considered to be relatively permeable and suitable for on-site disposal of stormwater (Golder, 2012). Therefore, systems designed around on-site infiltration may be accommodated at the site to deliver hydraulic requirements. Infiltrating stormwater at source will also achieve water sensitive urban design through maintenance of the total water cycle.

The Water Corporation assumes that all runoff generated at the former nursery site, as well as the adjacent Mathews Netball Centre, Mabel Talbot Reserve and Henderson Park, is infiltrated on-site. Specifically, that no runoff is discharged into the Wembley-Jolimont Main Drain for all recurrence intervals up to and including the 100-year ARI event (*pers. comms*. T. Pearce, Water Corporation, 9th August 2012).

The lack of significant public open spaces in the current development layout excludes the use of large infiltration areas at the relatively small 3.6 ha site. In addition it may be difficult to achieve sufficient infiltration in less elevated areas of the site where separation from maximum groundwater level is less than 2 m.

Given these conditions, on-site infiltration is considered the primary disposal method of stormwater at the site, rather than conveyance to a single large infiltration area. The stormwater management strategy is shown in Figure 7.

Residential lots

Run-off generated on multi-dwelling residential lots from storm events up to and including the 100-year ARI event will be retained on-site via internal drainage using modular underground infiltration systems or similar. Underground systems using products such as StormTech® cells or Humes StormTrap® modules may be located under common driveways and parking areas. Run-off generated on single-dwelling cottage lots from storm events up to and including the 10-year ARI event will be retained on-site via soak wells. Approximately 8.5 m^3 of storage in soakwells will be required per cottage lot. Remaining run-off generated from storm events up to and including the 100-year ARI event will be drained off-site using modular underground infiltration systems or similar located in adjacent verges.

In addition, rooftop gardens are recommended for at least 50 % of the roof space within the development. For the purposes of this urban water management plan a rooftop garden is defined as a vegetative layer grown in permeable soil substrate on the roof of a building. The installation of rooftop gardens can assist in reducing peak flows and treatment volumes through absorption and detention, as well as providing insulation, air quality and urban heat island mitigation advantages. A rooftop garden design typically includes a layer of lightweight

soil media underlain by a geotextile material, drainage medium, and an impermeable membrane that protects the building structure. The soil is planted with vegetation that can thrive in the dry, high temperature conditions of a roof and tolerate short periods of inundation from storm events. The detail of a typical roof garden cross-section is shown in Figure 6.

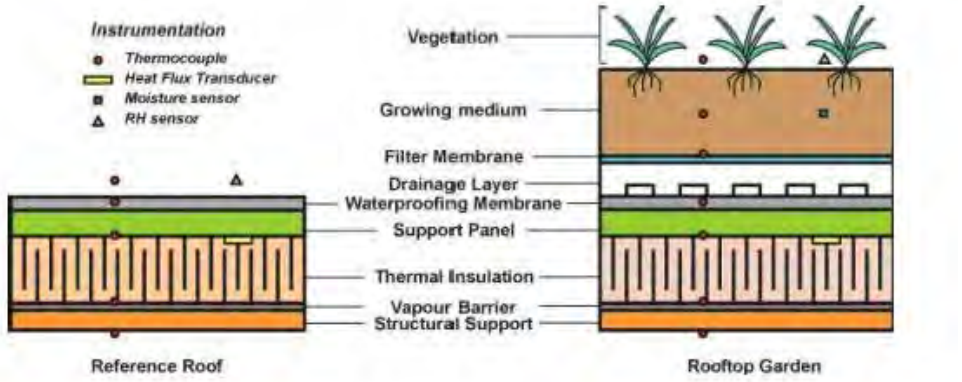

Figure 6: Typical rooftop garden cross-section

The use of porous asphalt and concrete for paving of key laneways and pedestrian access areas within residential lots is also recommended to allow greater at-source infiltration and reduce pressure on underground storage systems. Example products include StoneSet porous paving and Permeococrete pervious concrete.

Because of difficulties in enforcing the use of rooftop gardens, all drainage and stormwater calculations have excluded their effects for calculation purposes.

Road reserves

Stormwater run-off from road reserves and open space in the 'public realm' will be retained on-site in leaky pits and pipes and rain gardens generated up to the 100-year ARI event.

Rain gardens will have a footprint of at least 2% of the connected impervious area and have sufficient volume to contain the first 16 mm of rain from those areas, and therefore achieve for water quality treatment as well as on-site retention requirements. The detail of a typical rain garden is shown in Figure 8 and Figure 9 shows the integration of raingardens within the streetscape.

The typical design includes a limestone edge and an average base level 250 mm lower than the road gutter level. An overflow side entry pit will be located downstream of the rain garden inlet for flows in excess of the capacity of the rain garden and will ensure that the rain gardens are 'offline'. The average depth for each rain garden will determine the base area required in order to contain the design volume. With an effective depth of 250 mm the base areas is equivalent to 13% of the respective impervious catchment area. It follows that if additional depth can be achieved then the footprint can be reduced without compromising on the criteria for minimum surface areas (i.e. 2%).

Possible locations and sizes of rain gardens in the Former Nursery site are shown on Figure 7. Where possible rain gardens will be located away from the front of lots in non-frontage verges (not obstructing driveway crossovers) and road nibs. Rain gardens will be planted with locally native, drought tolerant plant species.

The combined retention capacity provided in lots and road reserves for each subcatchment for the 100-year ARI event is presented in Table 5. The stormwater management strategy, including locations and sized of underground infiltration systems and rain gardens is shown in Figure 7.

Table 5: Former Nursery, Lot 520 Salvado Rd Jolimont 100-year ARI event stormwater management

Catchment		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Total
Total area	m^2	2,330	2,357	2,464	2,073	1,770	2,425	2,958	3,089	2,376	2,581	961	2,262	2,284	2,341	2,682	2,038	**36,990**
Impervious area	m^2	2,036	2,235	2,252	1,937	1,613	2,224	2,780	2,445	1,931	1,936	466	1,535	1,603	1,368	1,628	1,291	**29,280**
Pervious paving	m^2	-	-	-	-	-	-	-	521	390	-	-	-	-	-	-	-	**911**
Soakwell storage volume	m^3	-	-	-	-	-	-	-	76	60	51	-	26	-	-	-	-	**213**
	m^2	-	-	-	-	-	-	-	63	50	42	-	21	-	-	-	-	**176**
Underground cell storage volume	m^3	77	81	83	70	59	82	108	36	28	24	-	12	-	-	-	-	**660**
	m^2	156	164	169	143	121	166	222	73	57	49	-	25	-	-	-	-	**1,345**
Rain gardens	m^3	-	-	-	-	-	-	-	4	3	18	20	29	48	51	49	43	**264**
	m^2	-	-	-	-	-	-	-	15	11	71	81	115	193	203	196	172	**1,056**
	% imp catchment area	-	-	-	-	-	-	-	3%	3%	22%	19%	16%	12%	15%	12%	13%	**13%**

Stormwater retention calculations assume:

- infiltration rate is 3 m/day
- soak wells have a depth of 1.2 m;
- rain gardens have a depth of 250 mm;
- underground infiltration systems are comprised of 1.9 m wide modules which have a depth of 490 mm and a volume of 2.12 m^3;
- impervious areas include roof, road, 70% of the public realm and 80% of private open space.

LandCorp - Old Nursery Lot 520 Salvado Rd, Jolimont
Urban water management plan
Figure 7: Stormwater management strategy

Legend

Subcatchment

Landuse

- Private open space
- Public realm
- Road
- Roof
- Verge

Stormwater infrastructure

- Underground infiltration cells
- Rain gardens
- Permeable paving

Scale 1: 1,200 @ A4

0 24 m

NOTES:

100-yr ARI event retained on apartment lots using underground cells (catchments A, B, C, D, E F & G).
100-yr ARI event retained on major road/public realm lots using rain gardens (K, M, N, O & P).
10-yr ARI event retained on cottage lots using soakwells (H, I, J & L).
Remaining volume up to the 100-yr ARI event generated from cottage lots (H, I, J & L) are retained in underground cells in verges J & L catchments.

Data source: LandCorp, Landgate, DAA, DER.
Created by: H. Lamparski. Projection: MGA: zone 50.

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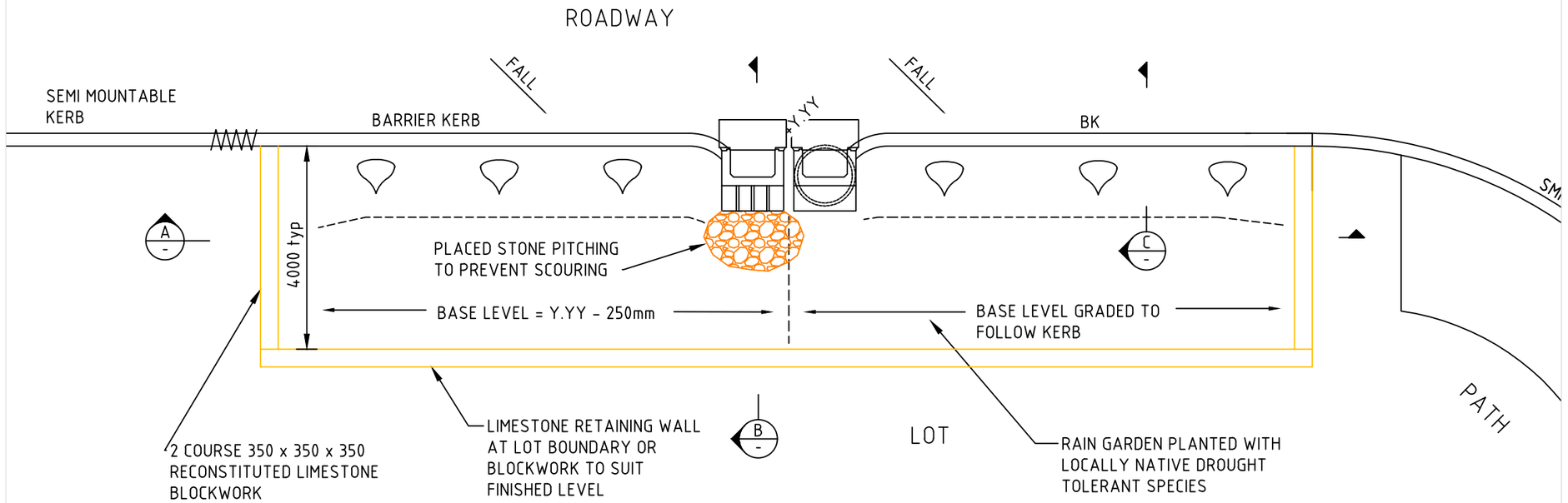
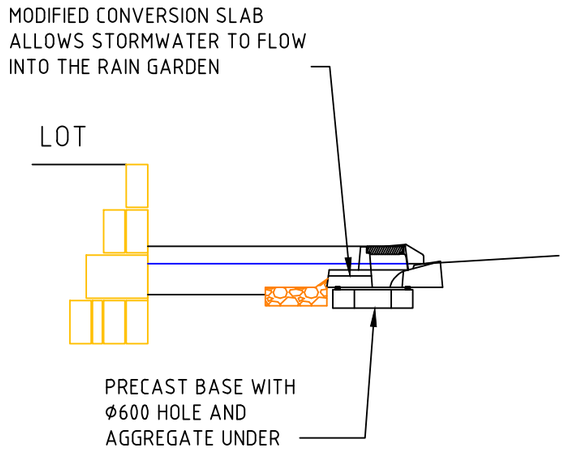
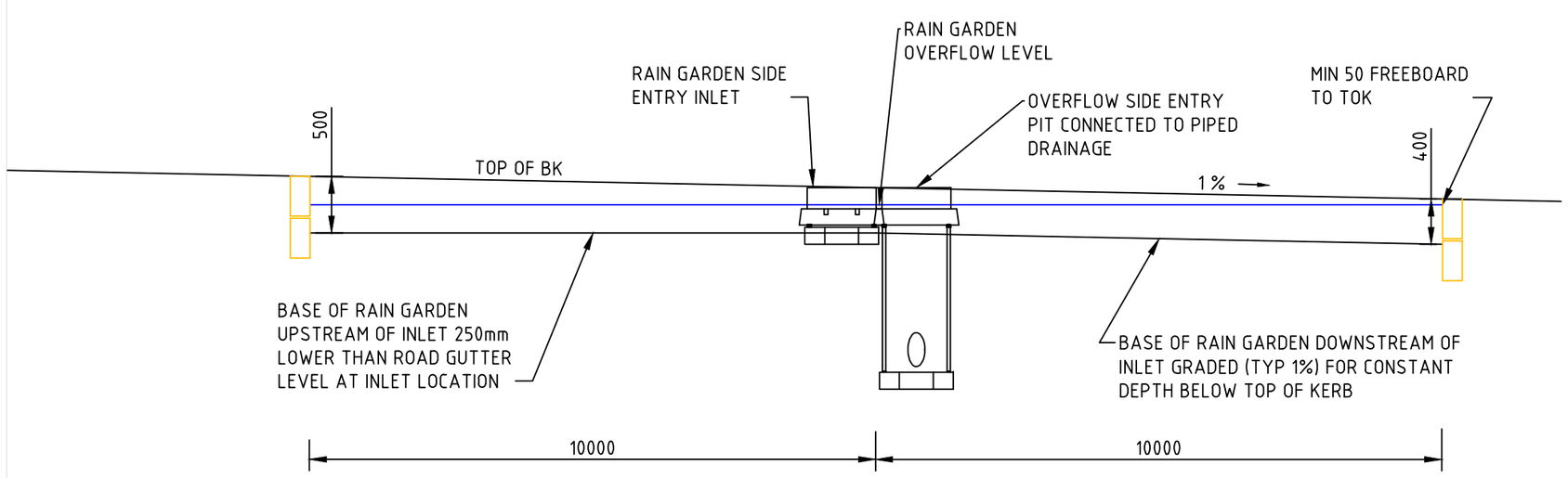


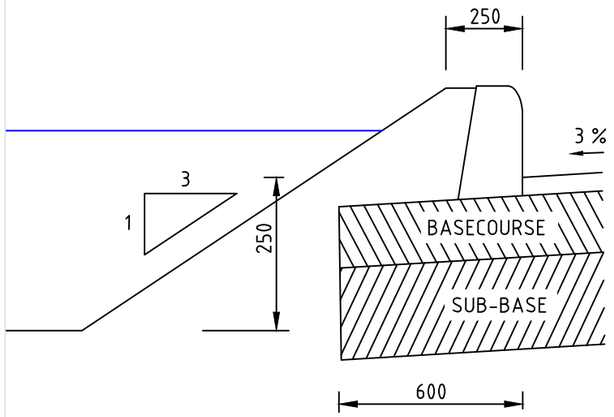
PLAN
Scale - 1:100



B SECTION
Scale - H 1:100; V 1:50



A SECTION
Scale - H 1:100; V 1:50



C SECTION
Scale - H 1:20; V 1:10

Typical Detail
Roadside rain garden

ISSUE	DATE	DESIGN	CHECK
B	08 SEP 2014	KN	HB

DATA SOURCES

A3 SCALE 1:100

0 2 4m

Projection: MGA50 | Datum: AHD

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Figure 9: Typical streetscape showing rain garden integration

6.3 Groundwater management

According to the *Perth groundwater atlas* (DoW 2006), the historic maximum groundwater level on the site is expected to be between 8 m and 9 m AHD, which is between approximately 1 - 6 m below the existing ground level (Figure 3). However, maximum groundwater levels recently recorded by the City of Subiaco and Department of Water in reserves approximately 200 m south of the site are 5.38 m AHD and 6.41 m AHD (Figure 5). This suggests that current maximum groundwater levels may in fact be lower than suggested by the Perth groundwater atlas. This is not uncommon, since the atlas was prepared with a limited dataset and in some areas the spatial coverage of bores used to create the contours fails to capture local variability.

Groundwater level management is therefore not expected to be required on the site given the presence of sandy soils and separations between 1 and 6 m from maximum groundwater level to the existing natural surface. However, areas of the site with less than 2 m clearance to maximum groundwater level, and on the advice of geotechnical engineers, may require some limited filling to achieve suitable separation from maximum groundwater level for protection of infrastructure and building foundations, and to achieve the required on-site infiltration of stormwater.

6.4 Water quality management

Water quality management is a significant issue at the site, particularly because high nutrient concentrations have been recognised as a concern within the Mounts Bay Catchment and the adjacent conservation category wetland in Mabel Talbot Lake has been identified as eutrophic in the past.

High nutrient concentrations have been identified as a likely result of both nutrient-enriched sediments entering the lake via stormwater as well as groundwater inflow from surrounding urban areas. Therefore water quality management strategies at the site need to be implemented targeting both stormwater and groundwater systems.

The principal objective is to improve water quality discharging from the site, thereby contributing to an improvement in water quality in the greater Mounts Bay catchment which discharges to the Swan River.

The change in land use from nursery to urban development at the site is a key opportunity to improve water quality within the catchment because of reduced nutrient application due to lower fertiliser use and improved drainage infrastructure which includes water sensitive urban design.

Water quality management is best achieved through an integrated approach which includes structural and non-structural controls that will reduce the concentrations and total load of contaminants which leave a site.

Water quality management strategies for the site also considered water sensitive urban design objectives and water quality controls defined in:

- Mabel Talbot Reserve Management Plan (Ecoscape, 2003);
- Local Water Quality Improvement Plan, Mounts Bay Catchment (Swan River Trust, 2009); and
- Regional Strategy for Management of Stormwater Quality for WESROC (JDA, 2002)

The following structural controls will be implemented at the site:

- Rain gardens in proposed road reserves and in the 'public realm', in accordance with the *Stormwater Management Manual for Western Australia* (DoW, 20045-2009). Vegetated rain garden systems have the capacity to effectively uptake organic and inorganic nutrients through bio-processes and will be sized at 2% of the impervious area they are connected to;
- Rooftop gardens will provide treatment to runoff before infiltration and discharge to the groundwater system.

The following non-structural controls will also be implemented at the site:

- Water-wise and nutrient-wise landscaping;
- Soil amendments as backfill surrounding infiltration structures and in public open space areas. Soils amended to achieve a phosphorous retention index of greater than ten have the capacity to remove dissolved nutrients through adsorption and clearance to groundwater at the site will allow treatment during percolation;
- Behaviour change through community education programs on such topics as effective fertiliser use (recently provided by the City of Subiaco and the Town of Cambridge) and water sensitive garden design; and
- Effective infrastructure management and maintenance practices including; street sweeping, sediment education and weed control.

6.5 Management of disease vectors and nuisance insects

There will be no permanent water bodies constructed within the development.

7 MANAGING CONSTRUCTION WORKS

A construction management plan will need to be prepared to reduce the risk of damage to sensitive environments during construction activities. Many of the issues to be considered in preparation of this plan are related to management of water to protect water resources and water dependant ecosystems.

7.1 Sediment Control

Silt and sand that is disturbed during construction works will be highly susceptible to mobilisation and transport via surface / storm water. The construction management plan will need to carefully consider runoff flow paths during and following construction to ensure no surface water is allowed to leave the site or enter constructed parts of the drainage system without adequate treatment to manage water quality.

7.2 Dewatering

Groundwater levels are such that dewatering is not likely to be required during construction over most of the site. However, areas of the site with the least elevation may require some dewatering if construction and installation of services occurs during winter months. Any requirement for dewatering should be considered in conjunction with acid sulfate soils investigations and the acid sulfate soils and dewatering management requirements identified.

7.3 Acid sulfate soils

Acid sulfate soils risk mapping (DER, 2010) indicates an area of high to moderate risk of acid sulfate soils occurring within 3 m of the natural soil surface within and surrounding Mabel Talbot Lake. The area extends into the south-eastern corner of the study area and it is recommended that preliminary investigations for acid sulfate soils are undertaken in this part of the land prior to earth disturbing activity commencing.

8 POST-DEVELOPMENT MONITORING

The site will not discharge surface water off-site and there will be no permanent or semi-permanent water bodies within the development. Therefore no surface water monitoring is proposed.

Given the proximity of the proposed development to an environmentally sensitive area (Mabel Talbot Reserve) and its location within the Mounts Bay drainage catchment post-development groundwater monitoring is proposed.

Post-development monitoring will be undertaken for a period of three (3) years after the development is completed.

Monitoring of groundwater levels will be undertaken on a monthly basis at three proposed locations (B1, B2 and B3) identified in Figure 9.

Monitoring of groundwater quality will also be undertaken on a quarterly basis at the three proposed locations identified on Figure 9. Samples will be analysed for the following parameters:

- In-situ pH
- In-situ Electrical Conductivity
- In-situ temperature
- Ammonium (NH4)
- Total Kjeldahl Nitrogen (TKN)
- Total Nitrogen (TN)
- NOx (NO3 + NO2)
- Total Phosphorous (TP)
- Filterable Reactive Phosphorous (FRP)

All monitoring results compared against City of Subiaco pre-development data and ANZECC trigger values will be provided to the Town of Cambridge and Department of Water on an annual basis with an accompanying report providing details of any significant changes observed and reviewing trigger values and the contingency action plan where necessary.

LandCorp - Old Nursery Lot 520 Salvado Rd, Jolimont
Urban water management plan
Figure 10: Proposed post-development monitoring locations

Data source: LandCorp, Landgate, DAA, DER.
Created by: H. Lamparski. Projection: MGA: zone 50.

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8.1 Contingency action plan

Trigger values for contingency action are identified in Table 6. Trigger values are based on average groundwater quality monitoring data collected by the City of Subiaco at a bore south of Mabel Talbot Lake between 2003 and 2012.

Mounts Bay Catchment Local Water Quality Improvement Plan target concentrations, which are based on ANZECC & ARMCANZ 2000 trigger values for wetlands and Healthy Rivers Action Plan (HRAP) interim targets for drains, are also presented for comparison (SRT, 2009).

Table 6: Post-development groundwater quality trigger values (SRT, 2009)

Analyte	ANZECC Guidelines (wetlands)	HRAP interim (drains)	Trigger values
Total Nitrogen (TN)	1.5 mg/L	1 mg/L	1.29 mg/L
Total Phosphorous (TP)	0.06 mg/L	0.1 mg/L	0.24 mg/L
Ammonium (NH4)			0.99 mg/L
NOx-N (Nitrate + Nitrite)			0.03 mg/L
Total Kjedahl Nitrogen (TKN)			1.21 mg/L
Filterable Reactive Phosphorus (FRP)			0.04 mg/L

If monitored pollutants in groundwater and surface water exceed specified trigger values on more than two (2) consecutive sampling runs, the Department of Water and Town of Cambridge will be notified and the site and drainage infrastructure will be inspected to identify potential contaminant sources

Depending on the outcomes of this investigation, recommendations for remediation will be discussed and agreed with the Department of Water and Town of Cambridge, these may include (but are not limited to):

- Soil amendment in drainage and public open space areas
- Modifications to management of public open spaces
- Modifications to management of waste and street sweeping
- Resident education activities to improve gardening practices

9 IMPLEMENTATION PLAN

9.1 Roles responsibilities and funding for implementation

Table 7: Roles responsibilities and funding for implementation

Implementation Issue	Responsibility and Funding
Subdivision earthworks and construction of subdivision service infrastructure including water, wastewater and drainage	Landowner/developer
Landscaping of public realm areas	Landowner/developer
Construction of residential dwellings	Future lot owners
Landscaping of private lots	Future lot owners
Maintenance of subdivision drainage	Town of Cambridge
Maintenance of public realm areas	Town of Cambridge

9.2 Agreed maintenance arrangements

Drainage structures will require regular maintenance to ensure efficient operation. Table 8 outlines the proposed maintenance schedule.

Table 8: Drainage infrastructure maintenance schedule

Maintenance task	Interval		
	Bi-Annually	Annually	As required
Remove litter, rocks, sand and other debris from stormwater system	✓		
Sweep Roads			✓ *(Quarterly as a minimum)*
Eduction of sediment and rubbish in manholes and underground storage systems		✓	

9.3 Assessment and review

This water management plan has been submitted to Town of Cambridge for assessment and review in support of subdivision of Lot 520 Salvado Road, Jolimont.

10 REFERENCES

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Department of Environment 2003, *Assessment Levels for Soil, Sediment and Water – Version 3 (draft for public comment)*, Government of Western Australia, Perth.

Department of Environment and Conservation (DEC) 2010, *Acid Sulfate Soil Risk Map, Swan Coastal Plain*, Perth.

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Department of Water 2004-2009, *Stormwater Management Manual for Western Australia*, Perth.

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Ecoscape 2003, *Mabel Talbot Reserve Management Plan*, Perth.

GHD Pty Ltd 2012, *Jolimont Nursery Site Redevelopment Preliminary Site Investigation*, Perth.

Golder Associates 2010, *Geotechnical Investigation, Redevelopment of Pat Goodridge Precinct, Selby Street, Wembley*, Perth.

JDA 2002, *Regional Strategy for Management of Stormwater Quality for WESROC*, Perth.

Strategen 2012, *Environmental Assessment Report Part Lot 520 Salvado Road, Jolimont*. Prepared for LandCorp.

Swan River Trust (SRT) 2009, *Local Water Quality Improvement Plan, Mounts Bay Catchment*, Perth.

Western Australian Planning Commission (WAPC) 2008, *Better Urban Water Management*, Perth.

APPENDIX 1 – UWMP CHECKLIST

Appendix 1: UWMP checklist

UWMP item	Deliverable	☑
Summary		
Development of design elements and compliance with design objectives	Table 1: Design elements and compliance	☑
Key design requirements for detailed design – critical control points and elements	Table 2: Design requirements for critical control points	n/a
Planning approval		
Location plan, adjoining lots, key landscape features and roads, local water management strategy Structure plan, zoning and land use Subdivision plan and/or approval	Location plan	☐
	Site context plan	☐
	Subdivision layout plan	☐
	OR a combination of the above	☑
Design objectives		
Agreed design objectives and demonstration of compliance		☑
Site characteristics		
Existing information and more detailed assessments (monitoring) of site; explanation of how the site characteristics affect the design		☑
Site conditions – existing topography/contours, aerial photo underlay, major physical features	Site condition plan	☑
Geotechnical – topography, test pit locations, soil zones and descriptions, site classification zones, Proposed earthworks and approximate finished contour levels	Geotechnical plan	☑
Environmental – sensitive or significant vegetation areas, wetlands and buffers, waterways and buffers, contaminated sites	Environmental plan, plus supporting data where appropriate	☑
Surface water – topography, 100-year floodways and flood fringe areas, 100-year proposed flow paths, water quality of flows entering and leaving (if applicable)	Surface water plan	☑
Groundwater – topography, test bore locations, groundwater pre- and post-development, water quality, groundwater variation hydrograph	Groundwater plan, plus details of groundwater monitoring and testing	☑
Landscape – proposed public open spaces, water source, bore(s), lake details (if applicable), approx. watering requirements and water balance, indicative irrigation schedule; demonstrate compliance with *Interim position statement: Constructed lakes* (if applicable)	Landscape plan	☑
Water sustainability initiatives		
Water supply and efficiency measures		
Fit-for-purpose strategy and agreed actions; if non-potable supply, support with water balance	Alternative supply scheme and plan	☑
Wastewater management		☑

UWMP item	Deliverable	☑
Stormwater and groundwater management		
Flood protection – peak flow rates, top water levels at control points,100-year flow paths – floodways and flood fringe zones and/or along roads and reserves, 100-year inundation areas and volumes	100-year flood plan	n/a
	Long section of critical points	n/a
Stormwater management system – storage areas, flows and hydraulic grade lines for both major and minor events including controlling inverts (critical control points); locations and arrangements for agreed structural and non-structural management practices and treatment trains, supported by sizing criteria, areas of inundation, flow paths and cross sections; show integration with landscaping	1-year event plan	☐
	5-year event plan	☐
	Typical cross sections	☐
	Combined drainage plan/catchment plan	☑
Post-development groundwater levels and fill requirements (including existing and final surface levels), outlet controls, and any subsoils (showing drawdown/effects near sensitive environments; describe modelling assumptions	Groundwater/subsoil plan	n/a
	Typical cross section (max and minimum)	n/a
Actions to address acid sulfate soils or contamination		n/a
Protection of waterways, wetlands (and their buffers), remnant vegetation and ecological linkages		n/a
Management of disease vectors and nuisance insects		☑
Other issues		
Any other issues as explained in Table 2		n/a
Managing subdivision works		
Management of construction activities including dewatering, acid sulphate soils, constructed best-management practices, and dust, sediment and erosion control – timing and possible staging		☑
Monitoring program		
Sampling and assessment plan including duration and arrangements for ongoing actions		☑
Implementation plan		
Roles, responsibilities, funding for implementation		☑
Agreed maintenance arrangements		☑
Assessment and review		☑

APPENDIX 2 – LANDSCAPE CONCEPT

LEGEND

1. Entry Plaza from Salvado Road with feature planting and modwood decking.
2. Raised planter bed with blade wall seating.
3. Drainage swale with littoral planting.
4. Lawn area flushed to paving or mounded.
5. Band of feature paving.
6. Raised seat wall in render.
7. Small node with artwork.
8. Public access way. Alternative access between residential lots.
9. Entry Plaza from Matthews Netball Centre.
10. Shade canopy with perforated abstract pattern.
11. Sculpture.
12. Feature Mature Tree.
13. Open lawn area
14. Native shrub planting.
15. Dual Access Path for pedestrian and bikes.
16. Change of paving texture to slow vehicles.
17. Feature tree grove.
18. Mature tree transplant to create iconic corner.
19. Seating area.
20. Meandering road to slow vehicles.
21. Grassed area connecting adjacent park.
22. Street Parking.
23. Concrete footpath.
24. Connection footpath towards lake.
25. Civic space.
26. Laneway access with red asphalt.
27. Greenwall to laneway lots.
28. Angled softscape pattern to existing park edge.
29. Henderson Park.
30. Matthew Netball Centre.

N

0 5 10 20 30 40 50

1:500 @ A1

Jolimont Nursery Redevelopment

Landscape Masterplan Concept

Rev C

OCTOBER 2014

EPCAD

Client: LandCorp

Report	Version	Prepared by	Reviewed by	Submitted to Client	
				Copies	Date
Preliminary draft	V1	HL	HBr	Electronic	18th Sept 2014
Final report	V2	HL	HBr	Electronic	26th Sept 2014
Revised final report	V3	HL	HBr	Electronic	17th Oct 2014

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APPENDIX ELEVEN

SERVICING REPORT

JDS12583.1 - Rev 1

Jolimont Nursery Site Redevelopment

Engineering Servicing Report

Submitted by

JDSi Consulting Engineers

October 2014

TABLE OF CONTENTS

DOCUMENT REVIEW				
Revision	**Date Issued**	**Written By**	**Reviewed By**	**Approved By**
Rev A	05/06/14	D. Hellmuth	G. Boyd	D.Hellmuth
Rev 0	16/06/14	G. Boyd	G. Boyd	D.Hellmuth
Rev 1	27/10/14	D. Hellmuth	G. Boyd	D.Hellmuth

1.0 Introduction

This report is prepared in support of an Outline Development Plan (Rowe Group, 2014 – **Appendix A**) of the Jolimont Nursery site and includes engineering requirements to support urban development for the site. The findings in this report are based on preliminary advice provided by service authorities and the Town of Cambridge. The information is current as at June 2014 and is subject to change as the development proceeds.

The following services are included in this Engineering Services Report:

- Roads & Stormwater Drainage
- Wastewater
- Water
- Power
- Gas & Communications

The site is approximately 4ha in size and is located immediately south of Salvado Road, west of Henderson Park and east of Matthews Netball Centre.

The topography is generally flat grading from approximately RL16 in the North West to RL9 in the South East. The site has been predominantly cleared of vegetation with the exception of trees along the North West, Western and South East boundaries. There is an existing homestead as well as remnant building infrastructure including pavement, storage tanks and block walls that will require removal under forward demolition works prior to service infrastructure works commencing.

In general the area is well serviced with existing infrastructure however service extensions and relocations are required to ensure services cater for the proposed development. The site is expected to be unencumbered by the relocation of a live 535mm diameter water distribution main and by retaining a live 2100mm diameter main Sewer within POS subject to detail design and associated authority approvals.

2.0 Roadworks & Stormwater Drainage

In accordance with the Site Reference Plan (Rowe Group, 2014 - Refer **Appendix B**) it is expected that road access to the site will be provided by connection to Salvado Road and the Matthews Netball Centre access road and that this access road will be gazetted in order to facilitate vehicle movements and servicing of the development.

It is proposed that the stormwater management strategy for the site be self-containment and direct infiltration as direct surface runoff or new direct pipe connections into the existing Mabel Talbot lake system are not permitted by the Water Corporation (for all storm events up to a 100 year ARI). The 50m Lake Buffer which appears to encroach into the South Eastern corner of the Site will also be avoided under this proposal

Infiltrating water at the source facilitates Water Sensitive Urban Design and follows the principals of Urban Water Management. It is expected the separation to the water table and finished design levels in conjunction with the high permeability sandy soil substrata will support effective infiltration.

Multi-dwelling sites are to retain all stormwater events up to and including the 100 year ARI separately at the source. The balance of the development (POS, road reserves and single residential lots) will also manage the 100 year ARI storage requirements via underground storage in POS and road reserve areas. The single residential lots will manage up to 10 year ARI events at the source using soakwells. Conveyance of runoff into the infiltration sources will be via will be via traditional pit and pipe systems for minor events and overland flow within road reserves for major events.

3.0 Wastewater

3.1 Main Sewer

The 'Perth Section 2 Main Sewer' (2100mm dia.) traverses the Site diagonally and although an agreement in principle has been received by the Water Corporation (WC) for the relocation of the Perth Section 2 Main Sewer, the likely costs and constructability of this appear to be prohibitive for this scale of development. The proposed concept plan allows for the sewer to remain in-situ within a proposed POS reserve. JDSi advise that final Water Corporation approval will be subject to the landscaping and bulk earthworks approach to this POS and ensuring that WC will have unencumbered access to the easement for future maintenance.

3.2 Sewer Reticulation Mains

Preliminary investigations have been undertaken to determine feasible options based on selected planning layouts to service the Site with sewer infrastructure. Subsequent to discussions held with the Water Corporation, JDSi has considered several gravity sewerage options. The initial proposal to connect into existing infrastructure in Perry Lane was not supported by the Water Corporation Assets group due to the flat grades and condition of the downstream sewers. Based on the proposed concept plan JDSi have assumed that servicing the site for sewer will be via a new internal DN150 gravity reticulation network that will connect into the existing DN150 gravity reticulation along Jersey Street to the east of the development site (refer **Appendix C**).

The existing Jersey Street sewer main currently services the Henderson Park clubrooms and grades southwards to the existing Jersey Street Pump Station A162. To service the development this option will require an extension of the sewer main through Henderson Park. The potential benefit of this is option is that the development lots will be serviced from the lowest part of the site (south eastern corner) which reduces the required finished lot levels and imported fill required in this part of the Site. Additionally servicing lots at minimum grade with this option also allows for more aesthetic management of the southern boundary interface with the adjacent parks and reserves. This is achieved by reducing the height differential thereby removing the need for substantial retaining walls.

A critical aspect to be considered for this option will be the gravity main extension through Henderson Park and along Jersey Street which will require a minimum 3m wide easement. The alignment of the sewer through Henderson Park is shown in **Appendix C** however if the Town demolishes the Club Rooms and relocates the cricket nets the alignment could be adjusted to suit a more direct route. Whilst the construction of this section of mains is expected to be relatively straight forward consideration shall be given

to ensure the timing of the installation and reinstatement works do not conflict with park activities and existing residences

The layout concepts and capacity of the existing pump station will need to be confirmed by the Water Corporation during the detailed design phase of the project.

4.0 Water Supply

4.1 Distribution Water Main

An existing 535mm Dia. Reinforced Concrete water distribution main runs within the northern boundary of the site adjacent to Salvado Road. Water Corporation has advised that this water main cannot be protected via an easement on private property and must be located wholly within road reserve or within an easement within public open space.

To unencumber the development frontage along Salvado Road it is proposed to relocate the existing water distribution main into the Salvado Road reserve on a major services trunk main alignment subject to detail design and associated approvals.

Restrictions may be imposed on the water connection tie-ins based around high demand and seasonal periods, however at this stage the Water Corporation has advised that the main shutdown can be accommodated at any time as long as a schedule is provided with sufficient notice of 2 weeks minimum.

4.2 Water Reticulation Mains

The proposed water reticulation layout will be designed in accordance with the relevant Water Corporation design standards and the proposed development yields. If the final development supply requirement exceeds the capacity of the existing 90mm / 100mm diameter water reticulation mains immediately adjacent to the site an extension to the 205mm water main in Cambridge Street (approximately 135m north of the development site) may be required.

5.0 Power Supply

The existing Western Power overhead power network adjacent to the development site and along Salvado Road is low voltage (415V) only and as such not suitable for the supply into the proposed subdivision.

To support the proposed lot yields an extension of the high voltage (HV) network into the development site is required. There are three potential points from which to extend the Western Power high voltage network. They are:-

Option 1. From the intersection of Selby Street and Salvado Road

Option 2. From the intersection of Jersey Street and Salvado Road

Option 3. From the intersection of Cambridge Street and Marlow Street

Option 2 is the recommended extension point given there is an existing POS (Henderson Park) at the corner of Salvado Road and Jersey Street that will facilitate the installation of 400mm² HV feeder cables from Jersey Street along Salvado Road into the development for termination into high voltage ring main units (RMU). Based on a yield of 350 dwellings, an estimated 2.15 MVA power demand can be serviced by three RMU units each comprising switchgear and transformer equipment. These RMU units will be located inside POS reserves within the site where practicable.

The design of the high voltage power ring main cable route through the development site will follow the proposed road reserves and assumes an entry from Salvado Road via the new Eastern perimeter intersection and a return to Salvado Road via the Matthews Netball Centre access road. It is anticipated the access road will become a gazetted public road. The ring main cable route has been designed to avoid where possible proximity to the proposed Water Corporation steel water main to mitigate the potential for electrical interference between the two assets.

Due to the location of the project within the locality of Jolimont the DADMD (Design After Diversity Maximum Demand) allocations will be 8.7kVA per residential lot and 5.9kVA per apartment which is the minimum Western Power requirement.

All internal low voltage electrical distribution and street lighting will be designed in accordance with Western Power guidelines.

6.0 Gas and Communications

Reticulated gas is not considered to be an essential service and as such is not required as a condition of subdivision. It is usual practice to install gas reticulation network for the subdivision within a common civil trench at no cost to the developer. If there is an extension required to connect to the nearest high pressure gas main the developer will be required to pay for the trenching to the gas main as a headworks cost.

Gas reticulation is available for the site and no significant constraints have been identified for standard service provision given a 230mm steel medium pressure gas main exists along the southern side of Salvado Road.

Communications have been allowed for via a pit and pipe network to be installed at the developers cost through the proposed road reserves to NBN Co. standard requirements. Although the site may be developed with less than 100 green title lots (a typical minimum requirement to install NBN networks) the addition of apartment sites may give the development reason to be considered by NBN Co.

The developer will be required to cover the cost for trenching and ducting of the internal reticulation, however NBN Co will cover the cost of installing fibre. No allowance for back haul of optic fibre has been made as we have assumed that this will be undertaken by NBN Co at no cost to the developer.

If for any reason NBN Co. did not support this development a Telstra pit and pipe network could be installed.

All communication assets within the development will remain in the ownership of the provider and easements will need to be granted in favour of the service provider.

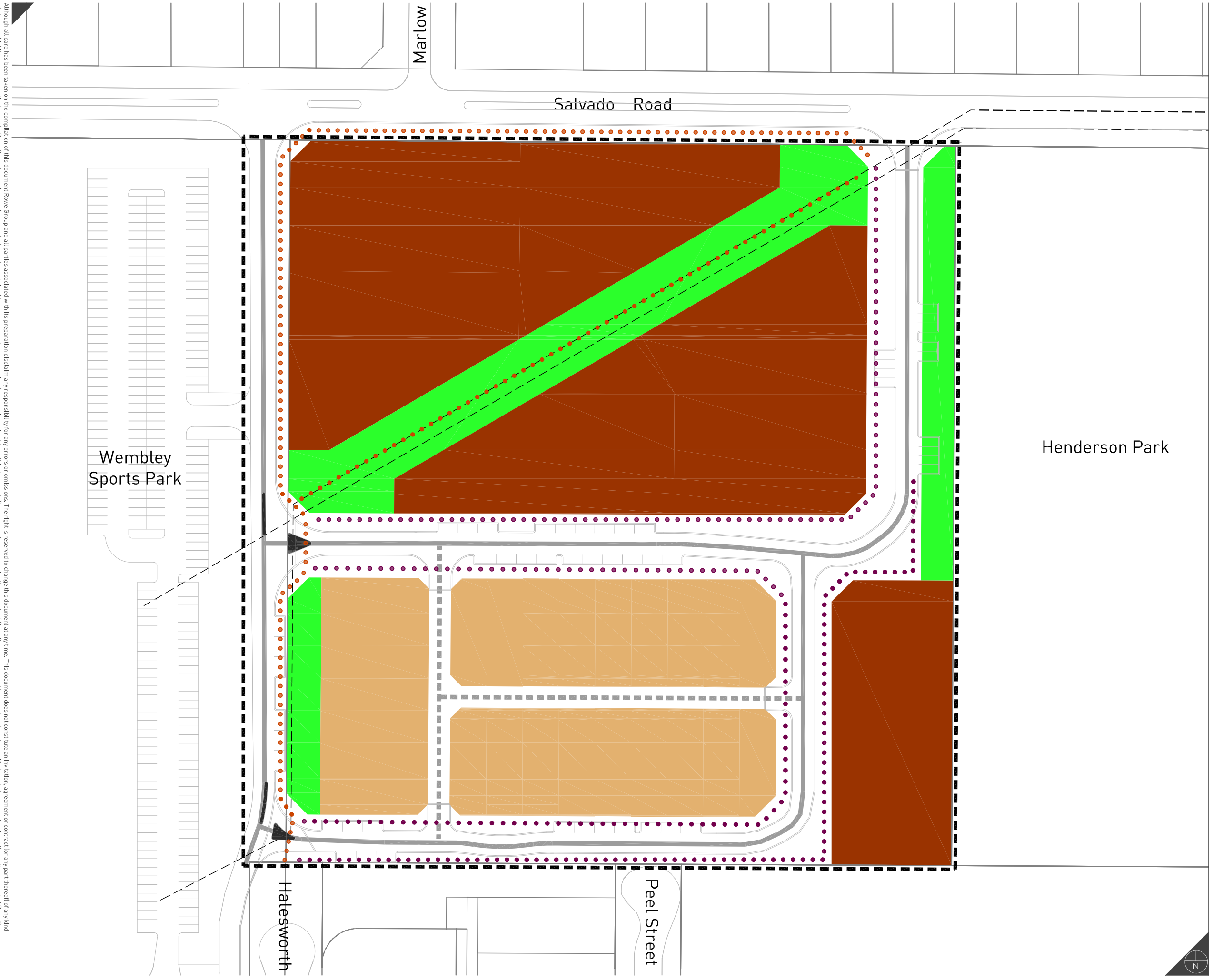
7.0 Disclaimer

JDSi have undertaken this servicing report based on information available at this time and subsequently assumptions have been made which, if incorrect, have potential to change costs. Major cost implications exist through factors which cannot be assured at this time including but not limited to the requirements of utility service providers, WAPC conditions of development, Local Authority Scheme Requirements, ground conditions, timing of adjacent developments and the like.

If any further information is required or should you wish to clarify any issue, please contact our office.

APPENDIX A

Planning Design Delivery



LEGEND

- ODP Boundary
- Existing Boundaries
- Proposed Boundaries
- Residential (R50)
- Residential (R80)
- Public Open Space
- Pathway - Dual Use
- Pathway - Pedestrian
- Sewer Easement
- Access Street
- Laneway
- Traffic Treatment

0 25 50 Metres

REVISIONS

Rev	Date	Drawn
B	2014.09.10	K. Trenberth
C	2014.10.14	K. Trenberth
D	2014.10.16	K. Trenberth
E	2014.10.21	K. Trenberth

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PLANNING DESIGN DELIVERY

w: www.rowegroup.com.au
e: info@rowegroup.com.au
p: 08 9221 1991

Date Drawn:	2014-08-04
Job Ref:	7898
Scale:	1:1000 @ A3
Client:	Satterley
Designer:	P. Caddy
Drawn:	M. Sullivan
Projection:	PCG94
Plan ID:	7898-FIG-18-E

Cadastre supplied by T.o.C. and McMullen Nolan

Outline Development Plan

Lot 520 Salvado Road, Jolimont
Plan 1

N:\TOWN PLANNING\7000-7999\7898\DRAFTING\A-CAD\7898_FIG18E_20140102__JOLIMONT (ODP) PLAN 1.DWG
Kim Trenberth 30 October 2014

APPENDIX B

Planning Design Delivery

All areas and dimensions are subject to survey.

Marl

Salvado Road

MD 1

MD 3

MD 2

MD 5

MD 4

MD 6

MD 7

Wembley Sports Park

Henderson Park

LEGEND

- ODP Boundary
- Existing Boundaries
- Proposed Boundaries
- MD Multiple Dwelling Site
- Traffic Treatment

0 25 50 Metres

REVISIONS

Rev	Date	Drawn
A	2014.10.16	K. Trenberth

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Date Drawn:	2014-10-16
Job Ref:	7898
Scale:	1:1000 @ A3
Client:	Landcorp
Designer:	P. Caddy
Drawn:	K. Trenberth
Projection:	PCG94
Plan ID:	7898-FIG-28-A

Cadastre supplied by T.o.C. and McMullen Nolan

Multiple Dwelling Site Reference Plan

Lot 520 Salvado Road, Jolimont
Plan 3

N:\TOWN PLANNING\7000-7999\7898\DRAFTING\A-CAD\7898_FIG28A_20141016_JOLIMONT (MD SITE REFERENCE) PLAN 3.DWG
Kim Trenberth 23 October 2014

APPENDIX C

SERVICES.

LEGEND

- PROPOSED SEWER RETICULATION
- EXISTING SEWER
- G.H. — GROUP HOUSING SITE

PLAN

SCALE 1:1000

0 10 20 40 60m

SCALE 1:1000 @ ORIGINAL SHEET SIZE A1

WARNING

BEWARE OF UNDERGROUND SERVICES.

DIAL 1100 BEFORE YOU DIG

The location of underground cables are approximate only and their exact position should be checked on site. No guarantee is given that all existing cables and services are shown. Locate all underground cables and services before commencement of work. Refer to Worksafe Regulation 3.21.

REV	DATE	DRAWN	CHECKED	APPROVED	
A	14.04.14	CLS	DAH		ISSUED FOR INFORMATION

NOTE
This drawing shall be preliminary only until it is Issued for Construction.

Certified Quality System to ISO 9001

JDSi CONSULTING ENGINEERS
Level 1, 59 Parry Street, Perth Western Australia 6000
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CLIENT: LANDCORP

PROJECT: LOT 520 SALVADO ROAD JOLIMONT

DRAWING TITLE: PRELIMINARY SEWER LAYOUT OPTION 13

DRAWN: C. CURRIE	WAPC No.: .
DESIGNED: C. CURRIE	SCALE @ A1: 1:1000
PROJECT MANAGER: D. HELLMUTH	DATUM: AHD; CO-ORDS: PCG 94
JDSi PROJECT No.: JDS12583	DRAWING No.: SK13; REVISION: A

Plotted By: CStewart Plot Date: 14/04/14 - 16:09 Cad File: I:\JDS12583\Drawings\DWG\Rowe Group ODP Options\FINAL OPTION 13\JDS12583_SK13.dwg 4