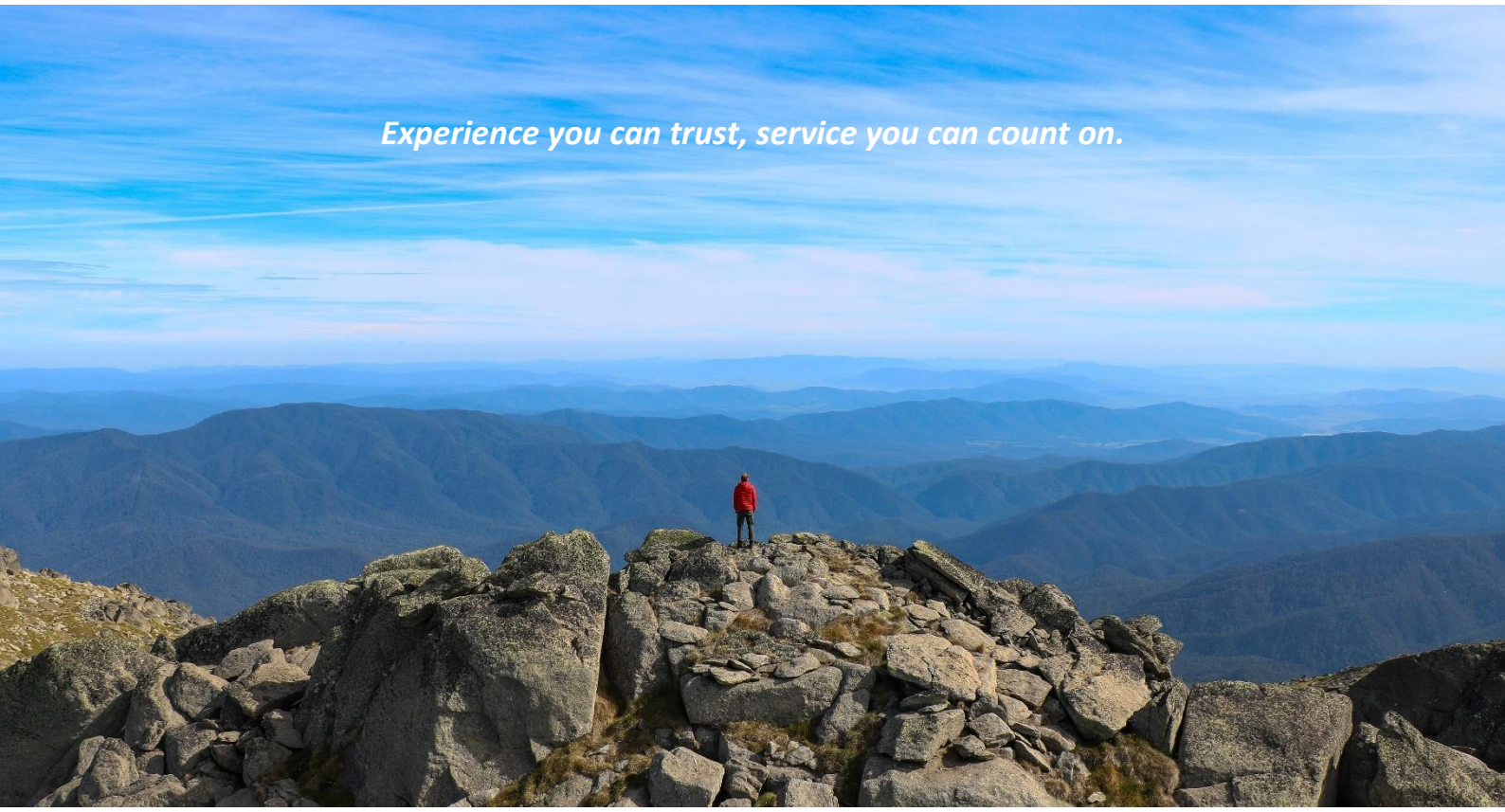

Remedial Action Plan (RAP)

10 & 12 Marshall Avenue and 1 & 3 Holdsworth Avenue, St Leonards NSW 2065

Prepared For:	New Golden St Leonards Pty Ltd
Reference:	21-1268
Date:	29 November 2021

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Report Author:	Technical Reviewer
	
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This report is to be read in its entirety and should not be review in individual section to provide any level of information independently. Each section of the report relates to the rest of the document and as such is to be read in conjunction, including its appendices and attachments.

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EXECUTIVE SUMMARY

ECON Environmental Pty Ltd was engaged by New Golden St Leonards Pty Ltd to prepare a Remedial Action Plan (RAP) for the remediation of contaminated soils within the subject site located at 10 & 12 Marshall Avenue and 1 & 3 Holdsworth Avenue, St Leonards NSW 2065, in accordance with the conclusions and recommendations identified in the Detailed Site Investigation, prepared by ECON Environmental Pty Ltd, Ref: 20-1082, dated 17 May 2021.

A detailed site investigation was carried out on Wednesday 5th May 2021 by ECON Environmental's representative Con Kariotoglou, which involved a visual assessment of the subject site and surrounding areas as well as the acquisition of representative soil samples.

All soil samples collected on Wednesday 5th May 2021 were reported by the laboratory to have concentrations BELOW the adopted site assessment criteria for HIL A, land use as per the NEPM, 2013, with the exception of the following samples:

- **BH2 (0.15-0.25m) Lead 417mg/kg, TRH F3(C_{16}-C_{34}) 330mg/kg, B(a)P TEQ 5.5mg/kg and B(a)P 4.0mg/kg**
- **BH3 (0.1-0.2m) F3(C_{16}-C_{34}) 350mg/kg**
- **BH3 (0.6-0.7m) Lead 415mg/kg and B(a)P 1.0mg/kg**
- **BH5 (0.1-0.2m) B(a)P 1.0mg/kg, and**
- **BH6 (0.1-0.2m) Lead 1,260mg/kg**

The conclusion and recommendations stated in the ECON Environmental Detailed Site Investigation (May 2021) that:

- A Remedial Action Plan (RAP) is to be prepared by a suitably qualified and experienced professional detailing appropriate Lead, F3(C_{16}-C_{34}) and B(a)P Remediation and Validation procedures with the vicinity of borehole locations BH2 (0.15-0.25m), BH3 (0.1-0.2m), BH3 (0.6-0.7m), BH5 (0.1-0.2m) and BH6 (0.1-0.2m) to render the subject site suitable for its intended future proposed development and land use.
- Appoint an appropriate qualified and licenced asbestos contractor to remove all identified hazardous building structures in accordance with the ECON Environmental Hazardous Materials Assessment, see Appendix C.
- If any proposed plans for the subject site include excavations and disposal of those underlying soils to a NSW EPA licenced facility, then a Waste Classification report of soils is to be prepared in accordance with the NSW EPA Waste Classification Guidelines: Part 1 Classifying Waste (2014).

This RAP outlines procedures for the remediation of the site to a condition suitable for its intended land use and for its proposed development. The RAP also provides guidance on how the remedial strategy is to be implemented during construction and relevant occupational and environmental controls to be adopted for the proposed land use and potential future development of the site.

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The following reports were reviewed specifically for the proposed works and are the principal documents used in the preparation of this RAP:

- ECON Environmental Pty Ltd, Detailed Site Investigation, 10 & 12 Marshall Avenue ad 1 & 3 Holdsworth Avenue, St Leonards NSW 2065 Ref: 20-1082, dated 17 May 2021.

Based on the proposed development, soil investigation results within the subject sites will be assessed against the following criteria: **HIL 'A' -** *Residential use with gardens/accessible soils, including children's day-care centres, preschools and primary schools.*

Therefore, based on an assessment of the options and considering the proposed land-uses and development, the remediation option which should be adopted for the site is ***Excavation of contaminated soil offsite.***

The remediation strategy involves the following:

- Appoint a Contractor to excavated and dispose of the Lead, TRH and Benzo(a)pyrene contaminated soils from within boreholes BH2, BH3, BH5 and BH6 to an EPA licenced facility,
- Appoint a suitably experienced and licensed Class B Asbestos contractor is to be commissioned to safely remove Asbestos building materials from the residential dwelling prior to its demolition, as per the Hazardous Materials Assessment – Appendix C of the RAP report.
- Appoint a suitably experienced and SafeWork NSW Licensed Asbestos Assessor (LAA) is to provide an asbestos inspection of the residential dwelling prior to its demolition to confirm that all hazardous materials within the subject site have been appropriately removed, and then provide an Asbestos Clearance Certificate.
- Appoint a suitably experienced and licensed contractor is to be commissioned to demolish the residential dwelling, only after an Asbestos Clearance Certificate has been provided, and then remove all demolition building materials offsite.
- To provide a Remediation Validation report for the remediation works undertaken within boreholes BH2, BH3, BH5 and BH6 as identified.

The table below summarises the preferred remediation strategy:

Remediation Strategy Summary					
Contaminated Hotspot Area	Hotspot Location	Excavation area	Excavation Depth (m)	Approximate Volume (m^3)	Approximate Volume (tonne)
BH2	Eastern portion of 12 Marshall Avenue	3m x 3m	0.5	4.5	7.2
BH3	Southern portion of 12 Marshall Avenue	3m x 3m	1.0	9.0	14.4
BH5	Eastern portion of 10 Marshall Avenue	3m x 3m	0.5	4.5	7.2
BH66	Southern portion of 10 Marshall Avenue	3m x 3m	0.5	4.5	7.2
Estimated Total				**22.5**	**36**

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Validation will involve a validation soil sampling and laboratory analysis regime as per follows:

Hotspot BH2:

- At least one (1) sample for the contaminates of concern from of the each four (4) walls of the excavated hotspot pit, additional discretionary samples, if necessary,
- At least one (1) sample for the contaminants of concern from each of the base/floor of the excavated hotspot pit areas, additional discretionary samples, if necessary,
- Each validation sample retrieved will be analysed for the contaminate of concern:
    - **Lead, TRH, PAH.**

Hotspot BH3:

- At least one (1) sample for the contaminates of concern from of the each four (4) walls of the excavated hotspot pit, additional discretionary samples, if necessary,
- At least one (1) sample for the contaminants of concern from each of the base/floor of the excavated hotspot pit areas, additional discretionary samples, if necessary,
- Each validation sample retrieved will be analysed for the contaminate of concern:
    - **Lead, TRH, PAH.**

Hotspot BH5:

- At least one (1) sample for the contaminates of concern from of the each four (4) walls of the excavated hotspot pit, additional discretionary samples, if necessary,
- At least one (1) sample for the contaminants of concern from each of the base/floor of the excavated hotspot pit areas, additional discretionary samples, if necessary,
- Each validation sample retrieved will be analysed for the contaminate of concern:
    - **PAH.**

Hotspot BH6:

- At least one (1) sample for the contaminates of concern from of the each four (4) walls of the excavated hotspot pit, additional discretionary samples, if necessary,
- At least one (1) sample for the contaminants of concern from each of the base/floor of the excavated hotspot pit areas, additional discretionary samples, if necessary,
- Each validation sample retrieved will be analysed for the contaminate of concern:
    - **Lead.**

The Remediation and Validation Report (RemVal) must be prepared in accordance with the NSW EPA (2020) Guidelines: Consultants reporting on Contaminated Land, to present the remediation works undertaken and confirm that the objectives of the remediation works have been attained.

The RemVal Report must include all documentation including clearance certification(s) required under the WH&S Regulation 2017 to demonstrate all hazardous building materials presented in the HazMat Survey (Appendix E of DSI) have been safely removed and lawfully disposed of from the structures present on site.

Additionally, all remediation and validation work, imported fill material certification, waste classification and disposal documentation must be documented in the Remediation and Validation Report prepared for the site.

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1. INTRODUCTION

1.1 Background

ECON Environmental Pty Ltd was engaged by New Golden St Leonards Pty Ltd to prepare a Remedial Action Plan (RAP) for the remediation of contaminated soils within the subject site located at 10 & 12 Marshall Avenue and 1 & 3 Holdsworth Avenue, St Leonards NSW 2065, in accordance with the conclusions and recommendations identified in the Detailed Site Investigation, prepared by ECON Environmental Pty Ltd, Ref: 20-1082, dated 17 May 2021.

A detailed site investigation was carried out on Wednesday 5th May 2021 by ECON Environmental's representative Con Kariotoglou, which involved a visual assessment of the subject site and surrounding areas as well as the acquisition of representative soil samples.

All soil samples collected on Wednesday 5th May 2021 were reported by the laboratory to have concentrations BELOW the adopted site assessment criteria for HIL A, land use as per the NEPM, 2013, with the exception of the following samples:

- **BH2 (0.15-0.25m) Lead 417mg/kg, TRH F3(C_{16}-C_{34}) 330mg/kg, B(a)P TEQ 5.5mg/kg and B(a)P 4.0mg/kg**
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- **BH5 (0.1-0.2m) B(a)P 1.0mg/kg, and**
- **BH6 (0.1-0.2m) Lead 1,260mg/kg**

The conclusion and recommendations stated in the ECON Environmental Detailed Site Investigation (May 2021) that:

- A Remedial Action Plan (RAP) is to be prepared by a suitably qualified and experienced professional detailing appropriate Lead, F3(C_{16}-C_{34}) and B(a)P Remediation and Validation procedures with the vicinity of borehole locations BH2 (0.15-0.25m), BH3 (0.1-0.2m), BH3 (0.6-0.7m), BH5 (0.1-0.2m) and BH6 (0.1-0.2m) to render the subject site suitable for its intended future proposed development and land use.
- Appoint an appropriate qualified and licenced asbestos contractor to remove all identified hazardous building structures in accordance with the ECON Environmental Hazardous Materials Assessment, see Appendix E.
- If any proposed plans for the subject site include excavations and disposal of those underlying soils to a NSW EPA licenced facility, then a Waste Classification report of soils is to be prepared in accordance with the NSW EPA Waste Classification Guidelines: Part 1 Classifying Waste (2014).

This RAP outlines procedures for the remediation of the site to a condition suitable for its intended land use and for its proposed development. The RAP also provides guidance on how the remedial strategy is to be implemented during construction and relevant occupational and environmental controls to be adopted for the proposed land use and potential future development of the site.

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The principal objective of this plan is to outline the management techniques and safeguards that should be implemented to ensure the remediation and development are completed in an acceptable manner, preventing any adverse exposure on site contractors and the surrounding environment during future development and land use of the site.

1.2 Objectives

The objectives of the Remedial Action Plan are to:

- Set remediation goals, which will be adopted to ensure the remediated site will be suitable for the proposed land use and will pose no unacceptable risk to the human health or the environment,
- Document the procedures and plans to be implemented to reduce the risk of significant harm to acceptable levels within the site,
- Establish the environmental safeguards required in completing the remediation in an environmentally acceptable manner within the site and,
- Identify necessary approvals and licenses required by regulatory authorities if required.

1.3 Scope of Works

The Scope of Works included the following:

- A review of previous investigations and summary of the site's contamination status for the entire investigative site,
- Identify the areas of environmental concern to determine the lateral and vertical extent of the contamination within nominated hotspot areas,
- Detail the preferred remediation strategy, and an outline of the methodology for the implementation of the selected strategy within the site,
- Describe a brief outline of environmental pollution controls, community health and safety, and occupational health and safety measures that should be implemented during remedial works within the site, and
- An outline of regulatory approvals and licenses which may be required to adopt the preferred remedial strategy for the site.

1.4 Legislative Requirements

The legislative framework for the report is based on guidelines that have been set out by the NSW Environmental Protection Agency (EPA) in the form of the following Acts/Regulations:

- Protection of the Environment Operations Act (1997)
- Protection of the Environment Operations Regulation (2008)
- Contaminated Land Management Act (1998)

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In addition, the following guidelines and technical documents have been reviewed and applied where applicable:

- Contaminated Land Management - Guidelines for the NSW Site Auditor Scheme (3 Edition, 2017).
- State Environmental Planning Policy No.55 (SEPP55) – Remediation of Land (2018)
- NSW EPA Guidelines for Consultants Reporting on Contaminated Sites (2020).
- NSW EPA Sampling Design Guidelines (1995).
- NSW EPA Waste Classification Guidelines Part 1: Classifying Waste (2014).
- Guidelines on the Investigation Levels for Soil and Groundwater, National Environmental Protection Measure 1999, 2013 Amendment (NEPC, 2013).
- Guidelines for the Assessment, Remediation & Management of Asbestos - Contaminated Sites (DOH, 2009).
- SafeWork NSW Code of Practice: How to Safely Remove Asbestos – August 2019
- SafeWork NSW Code of Practice; How to Manage and Control Asbestos in the Workplace – August 2019
- Guidelines for the Assessment, Remediation & Management of Asbestos - Contaminated Sites (WA DOH, 2009).
- AS2601 (2001) The Demolition of Structures.

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2. SITE IDENTIFICATION

2.1 Site Details

The study area is the proposed development included the four lots located at 10 & 12 Marshall Avenue and 1 & 3 Holdsworth Avenue, St Leonards NSW 2065 (Figure 1). The subject site is surrounded by low density residential properties to the east, south and west and high density residential to the north. Figure 2 shows an aerial photograph of the site and the surrounding land.

Table 1: Site Identification	
Street Address	10 & 12 Marshall Street and 1 & 3 Holdsworth Avenue, St Leonards NSW
Lot and DP Number	Lot 8 in DP1275969, previously known as: *Lot 4 in DP 7259 (10 Marshall Avenue)* *Lot 3 in DP 7259 (12 Marshall Avenue)* *Lot 5 in DP 7259 (1 Holdsworth Avenue)* *Lot 6 in DP 7259 (3 Holdsworth Avenue)*
Approx. Total Site Area	The total area of 10 Marshall Avenue is approximately 840m^2, The total area of 12 Marshall Avenue is approximately 660m^2, The total area of 1 Holdsworth Avenue is approximately 560m^2, The total area of 3 Holdsworth Avenue is approximately 560m^2, Total combined area of all the sites is approximately 2,620m^2.
Zoning	R4 – High Density Residential
Local Government Area	Lane Cove City Council
LGA Legislation	Lane Cove Local Environmental Plan 2009

2.2 Proposed Development or Intended Land Use

The development approval includes a new multi-storey, high-density residential dwellings, as shown in the proposed development plans in Appendix B – Proposed Development Plans.

2.3 Surrounding Land Use

The subject site is bordered by:

- Low density residential properties directly south, east and west of the subject site,
- High density residential properties directly north of the subject site,
- Gore Hill Park, 130m northwest of the subject site,
- North Shore Railway corridor, 130m east of the subject site,
- North Shore Hospital precinct, 135m north of the subject site,

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2.4 Topography and Drainage

According to https://www.environment.nsw.gov.au/eSpade2Webapp the topography of the site includes low rolling and steep hills. Local relief 50–120 m, slopes 5–20%. Convex narrow (20–300 m) ridges and hillcrests grade into moderately inclined side slopes with narrow concave drainage lines. Moderately inclined slopes of 10–15% are the dominant landform elements.

2.5 Geology and Soils

Reference to the NSW Department of Industry Resources and Energy indicate this soil landscape is underlain by Wianamatta Group Ashfield Shale and Bringelly Shale formations. 71 The Ashfield Shale is comprised of laminite and dark grey shale. Bringelly Shale consists of shale, calcareous claystone, laminite, fine to medium grained lithic-quartz sandstone (Herbert, 1983).

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3. CONCEPTUAL SITE MODEL

The refined Conceptual Site Model (CSM) is presented in the table below:

Table 2: Conceptual Site Model

Potential Sources	Potential Receptor	Potential Exposure Pathways	Complete Linkages	Risk	Justification
Contaminated soil from placement of uncontrolled fill across the subject site, in particular within the vicinity of boreholes BH1, BH2, BH3, BH5 and BH6.	Site users or the general public	Dermal contact, inhalation or ingestion of exposed impacted soils	Limited (current)	Low	If present, contaminated soils are likely to be remediated and removed with the remaining soils from the site for off-site disposal.
			No (future)	Negligible	If present, contaminated soils are likely to be remediated and removed with the remaining soils from the site for off-site disposal.
		Inhalation or ingestion of exposed impacted soils	Limited	Low	As above
			No (future)	Negligible	As above
	The aquatic ecosystems.	Migration of impacted groundwater and surface water run-off	Limited (current)	Low	No obvious sources of gross contamination were observed on site that could migrate off site with surface water run-off.
			No (future)	Negligible	If present, contaminated groundwater is likely to be remediated and any remaining residual contamination would likely be at negligible concentrations.
	Underlying Aquifer	Leaching and migration of contaminants through groundwater infiltration	Limited (Current)	Low	No obvious sources of gross contamination were observed on site that could migrate off site through groundwater infiltration. Any identified areas of contamination were at a distance from the Killarney Chain of Ponds and are likely to only be localised.
			No (Future)	Negligible	If present, overlying contaminated soils are likely to be remediated and removed with the remaining soils from the proposed development for off-site disposal.
Asbestos in buildings	Site user or visitors	Inhalation of airborne fibres	Limited (Current)	Low	If present, asbestos material is likely to be limited to the existing building fabric or previous building footprint areas and would be in bonded form.
			No (Future)	Negligible	A hazardous materials survey is likely to be required prior to the demolition of the existing buildings for the proposed development and licensed contractors would have to remove any asbestos likely to be present.

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3.1 Human Receptors and Sensitive Environments

On-site Human Receptors & Sensitive Environments:

- Demolition / Excavation / Construction workers during the construction process
- Future users and/or occupants of the site

Off-site Human Receptors & Sensitive Environments:

- Occupants of the low density residential properties to the south, east and west of the site,
- Occupants of the high density residential properties to the north of the subject site.
- Public users of the Gore Hill Park, 130m northwest of the subject site,
- Public users of the North Shore Railway corridor, 130m east of the subject site,
- Public users of the North Shore Hospital precinct, 135m north of the subject site,

3.2 Potential Risks to Onsite Receptors

Human exposure to the potential contaminants identified is currently considered as **LOW** as:

- The subject sites are privately owned,
- The site is not publicly accessible,
- The soil samples collected on Wednesday 5th May 2021 that were reported by the laboratory to have concentrations ABOVE the adopted site assessment criteria for HIL A, land use as per the NEPM, 2013, were 0.1-0.2m or 0.6-0.7m below ground level (BGL), therefore potential exposure risks to humans and the environment were reduced.

3.3 Potential for Migration and Exposure of Contaminants

Site history information and onsite inspection observations indicated that due to the conditions of the site, there is a **LOW** potential for contaminants to provide exposure risks to humans within the site.

However, if future proposed developments of the subject site include the excavation of the underlying soils with the subject site, then there is a **MEDIUM TO HIGH** potential for contaminants present within surface and underlying soils to have the ability to migrate vertically up into the atmosphere, or down through the water column into the groundwater or migrate horizontally to adjacent properties or washed downgradient with stormwater runoff into adjacent properties or into Marshal Avenue or Holdsworth Avenue drainage system.

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4. SUMMARY OF PREVIOUS INVESTIGATIONS

The following reports were reviewed specifically for the proposed works and are the principal documents used in the preparation of this RAP:

- ECON Environmental Pty Ltd, Detailed Site Investigation, 10 & 12 Marshall Avenue ad 1 & 3 Holdsworth Avenue, St Leonards NSW 2065 Ref: 20-1082, dated 17 May 2021.

4.1 ECON Environmental – Detailed Site Investigation (May 2021)

ECON Environmental Pty Ltd was engaged by New Golden St Leonards Pty Ltd to undertake a Detailed Site Investigation on the subject site located at 10 & 12 Marshall Avenue and 1 & 3 Holdsworth Avenue, St Leonards NSW 2065.

The objective of the investigation is to assess the subject site for contamination, based on the detailed investigation undertaken for the site and acquisition of soil samples from within the site to evaluate its suitability for its intended land use and proposed development.

The total combined area of the sites was approximately 2,725m^2. A site investigation was carried out on Wednesday 5th May 2021 by ECON Environmental's representative Con Kariotoglou, which involved a visual assessment of the entire subject site and surrounding areas as well as the acquisition of representative soil samples, and the inspection of all existing building structures on site. Details of the findings are presented within the body of this report, as well as an assessment of significance with regards to the findings of the investigation. An inspection of the residential premises was also conducted to assess the building structures of hazardous containing materials.

Based on the data and evidence collected during the site inspection and site history review, the findings of this Detailed Site Investigation, at the time of inspection, on Wednesday 5th May 2021, were as follows:

10 Marshall Avenue

- The site had consisted of a single storey brick and sandstone block residential house with terracotta roof tiles, timber eaves, and a rear brick and fibre-cement shed at the rear of the property.
- Hazardous building materials were noted within the residential property.
- The site was mainly covered by low lying grasses with a concrete hardstand driveway.
- Medium to large trees were noted around the boundary perimeter of the property.
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection.
- No visible signs of Asbestos containing fragments were detected within surface soils within the site.

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12 Marshall Avenue

- The site had consisted of a double storey brick and timber panel residential house with terracotta roof tiles, timber eaves, timber decking and brick paved areas around the perimeter of the house, and a brick and fibre-cement sheeting side sunroom.
- Hazardous building materials were noted within the residential property.
- Medium to large trees were noted around the boundary perimeter of the property.
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection.
- No visible signs of Asbestos containing fragments were detected within surface soils within the site.

1 Holdsworth Avenue

- The site had consisted of a double storey brick, fibre-cement and sandstone block residential house with terracotta roof tiles, timber eaves and brick paved areas around the perimeter of the house.
- Hazardous building materials were noted within the residential property.
- Medium to large trees were noted around the boundary perimeter of the property, with front and backyards covered by low lying grasses.
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection.
- No visible signs of Asbestos containing fragments were detected within surface soils within the site.

3 Holdsworth Avenue

- The site had consisted of a single storey cement rendered and concrete block residential house with terracotta roof tiles, timber eaves and brick paved areas around the perimeter of the house.
- Hazardous building materials were noted within the residential property.
- Medium to large trees were noted around the boundary perimeter of the property.
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection.
- No visible signs of Asbestos containing fragments were detected within surface soils within the site.

According to the NSW EPA Contaminated Sites Sampling Guidelines (Sept. 1995), for this sized area site (2,620m^2), a total of nine (9) soil samples plus two (2) QA/QC sample is required to be collected. The soil samples were collected on Wednesday 5th May 2021 via boreholes. A total of nine (9) boreholes (BH1-BH9) were advanced across the entire subject site (Figure 3) and were collected from within the near surface fill material (0-0.4m BGL) and at depth. Samples were collected from using a hand auger with a 150mm diameter drill. No groundwater was encountered within any of the boreholes drilled onsite. The laboratory used for the analysis of all samples was ALS Environmental located at 277-289 Woodpark Road, Smithfield NSW Australia. The laboratory is NATA accredited for the selected analyses.

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All soil samples collected on Tuesday 20th April 2021 were reported by the laboratory to have concentrations BELOW the adopted site assessment criteria for HIL A, land use as per the NEPM, 2013, except for the following samples:

- **BH2 (0.15-0.25m) Lead 417mg/kg, F3(C_{16}-C_{34}) 330mg/kg, B(a)P TEQ 5.5mg/kg and B(a)P 4.0mg/kg**
- **BH3 (0.1-0.2m) F3(C_{16}-C_{34}) 350mg/kg**
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Human exposure to the potential contaminants identified is currently considered as **LOW** as:

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Site history information and onsite inspection observations indicated that due to the conditions of the site, there is a **LOW** potential for contaminants to provide exposure risks to humans within the site.

However, if future proposed developments of the subject site include the excavation of the underlying soils with the subject site, then there is a **MEDIUM TO HIGH** potential for contaminants present within surface and underlying soils to have the ability to migrate vertically up into the atmosphere, or down through the water column into the groundwater or migrate horizontally to adjacent properties or washed downgradient with stormwater runoff into adjacent properties or into Marshal Avenue or Holdsworth Avenue drainage system.

Subject to the above, it is considered that the subject site can be made suitable for its future intended proposed development and land use, subject to the following recommendations:

- A **Remedial Action Plan (RAP)** is to be prepared by a suitably qualified and experienced professional detailing appropriate **Lead, F3(C_{16}-C_{34}) and B(a)P Remediation and Validation** procedures with the vicinity of borehole locations **BH2 (0.15-0.25m), BH3 (0.1-0.2m), BH3 (0.6-0.7m), BH5 (0.1-0.2m) and BH6 (0.1-0.2m)** to render the subject site suitable for its intended future proposed development and land use.
- Appoint an appropriate qualified and licenced asbestos contractor to remove all identified hazardous building structures in accordance with the ECON Environmental **Hazardous Materials Assessment**, see Appendix E.
- If any proposed plans for the subject site include excavations and disposal of those underlying soils to a NSW EPA licenced facility, then a **Waste Classification** report of soils is to be prepared in accordance with the NSW EPA Waste Classification Guidelines: Part 1 Classifying Waste (2014).

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5. DATA QUALITY OBJECTIVES

Data quality objectives were established for the site characterisation works, following the decision-making procedures steps outlined in NEPC (2013):

1. Define the problem,
2. Identify the decision,
3. Identify inputs to the decision,
4. Define the study boundaries,
5. Develop a decision rule,
6. Specify limits on decision errors, and
7. Optimise the design for obtaining data.

5.1 STEP 1 – Define the Problem

Potential risks to human health and the environment exist from Lead, TRH and Benzo(a)pyrene contamination to underlying soils boreholes BH2, BH3, BH5 and BH within the subject site. Also, the investigation indicated Asbestos contamination in the form of BONDED building materials within the building structures of the residential dwellings within the subject site.

5.1.1 Objectives

The objectives are to:

- Appoint a Contractor to excavated and dispose of the Lead, TRH and Benzo(a)pyrene contaminated soils from within boreholes BH2, BH3, BH5 and BH6 to an EPA licenced facility,
- To provide a Remediation Validation report for the remediation works undertaken within boreholes BH2, BH3, BH5 and BH6 as identified.

5.2 STEP 2 - Identify the Decision

Based on the decision-making process for assessing urban redevelopment sites, the following decisions must be made:

1. Are there any unacceptable health risks to future onsite receptors?
2. Are there any unacceptable ecological risks posed by the site?
3. Are there any aesthetic issues at the site?
4. Is there any evidence of, or potential for, migration of contaminants from the site?
5. Is a site management strategy required?

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5.3 STEP 3 - Identify Inputs to the Decision

The following information is required for input into the decisions identified in Step 2:

- Findings and conclusions from previous assessments carried out on site,
- Laboratory analytical results from soil analysis previously carried out,
- Field observations made on site during additional assessment or characterisation,
- Collection and laboratory analysis of soil samples from locations specified in this RAP,
- Laboratory analysis in accordance with USEPA/APHA methods, and
- Comparison and interpretation of laboratory results against the adopted soil investigation and screening levels as specified in this RAP.

5.3.1 Contaminants of Concern

The contaminants of concern identified in soils during previous investigations are listed in the table below:

Table 3: Summary Areas and Contaminants of Concern

Areas of Environmental Concern	Contaminating Activities	Contaminants of Concern
Borehole BH2	Lead, TRH (F3), B(a)P as TEQ, and B(a)P contamination within underlying soils (0.15-0.25m)	Lead, TRH (F3), B(a)P as TEQ and B(a)P
Borehole BH3	TRH (F3) contamination within underlying soils (0.1-0.2m)	TRH (F3)
	Lead and B(a)P contamination within underlying soils (0.6-0.7)	Lead, B(a)P
Borehole BH5	B(a)P contamination within underlying soils (0.1-0.2m)	B(a)P
Borehole BH6	Lead contamination within underlying soils (0.1-0.2m)	Lead

5.4 STEP 4 - Define the Study Boundaries

The spatial and temporal aspects of the investigative area that the data must represent to support the decisions identified in Step 2 are as follows:

- The lateral extent of the assessment is limited to the boundaries of the investigated subject site, and
- The vertical extent of the assessment is the depth of the excavations of the hotspot remediation is 0.5m BGL within boreholes BH2, BH5 and BH6, and 1.0m BGL within borehole BH3.

5.5 STEP 5 - Develop a Decision Rule

Soil analytical data were assessed against National Environmental Protection Measure (NEPM) criteria as referenced in Section 8. Statistical analysis of the data will be undertaken if necessary. The following statistical criteria shall be adopted:

1. The upper 95% confidence limit on the average concentration for each analyte (calculated for samples collected from consistent soil horizons, stratigraphy or material types) must be below the adopted criterion,
2. No single analyte shall exceed 250% of the adopted criterion, and
3. The standard deviation of the results must be below 50 % of the criterion.

The acceptable limits for laboratory QA/QC parameters are shown in the table below and are based upon the laboratory reported acceptable limits and those stated within the NEPM 2013 Schedule B3 Guideline & AS 4482.1-2005.

Table 4: QA/QC Parameters

Type of QC Sample	Control Limit
FIELD	
Rinsate Blanks	Analytes <LOR
Intra-Laboratory Duplicates	RPD's < 30 - 50%
Inter-Laboratory Duplicates	RPD's < 30 - 50%
Trip Blanks	Volatiles <LOR
Trip Spike Recovery	>70%
LABORATORY	
Method Blanks	< Laboratory LOR
Matrix Spike	Recovery targets: • Metals: 70% to 130% • Organics: 60% to 140%
Laboratory Duplicate	RPD's <30%
Laboratory Control Samples	Recovery targets: 70% to 130%
Surrogate Spike	Recovery targets: 60% to 140%

The following conditions should be adopted:

- If the control limits are exceeded, then an assessment of the significance of the results should be carried out,
- If major non-conformances from the laboratory or field data are identified, then further sampling and laboratory analysis may be required to provide an adequate sample set for data reliance,
- If the results of the DQI assessment indicate that the data set is reliable, then the data set will be deemed to be acceptable for the purposes of the validation works, and

- If the measured concentrations of soil, groundwater and soil vapour samples analysed meet their respective validation criteria, then no additional remediation is required.

The following conditions should be adopted:

- If the control limits are exceeded, then an assessment of the significance of the results should be carried out,
- If the results of the DQI assessment indicate that the data set is reliable, then the data set will be deemed to be acceptable for the purposes of the additional investigation and validation works, and
- If the measured concentrations of soil samples analysed meet their respective validation criteria, then no additional assessment is required is required.

5.6 STEP 6 - Specify Limits of Decision Errors

There are two types of decision errors:

- **Sampling errors,** which occur when the samples collected are not representative of the conditions within the investigative area, and
- **Measurement errors,** which occur during sampling collection, handling, preparation, analysis and data reduction. Ensure all samples are compliant with guidelines and comply with holding times. Soil samples are to be assessed by a NATA accredited laboratory.

These errors may lead to following (null hypothesis):

- Deciding that the site is not suitable for the proposed development when it actually is (Type I error), and
- Deciding that the site is suitable for the proposed development when it is actually not (Type II error).

A 5% significance level has been selected for Type I errors on the basis that 95% of the data set will satisfy the DQIs. Therefore, the acceptable limit of the decision errors is based on a 5% probability of the hypothesis being incorrect.

An assessment will be made as to the likelihood of a decision error being made based on:

- The acceptable limits for inter/intra laboratory duplicate sample comparisons as specified in Step 5 of the DQOs, and
- The acceptable limits for laboratory QA/QC parameters are based upon the laboratory reported acceptable limits and those stated within the NEPM Guidelines.

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If the concentration of a particular contaminant of concern exceeds its assessment criteria, then a further assessment is required to address the significance of the result.

Statistical analysis based on 95% UCL may be used to assess the significance of the data provided the following conditions are met:

- the arithmetic mean of the data set must be less than its respective threshold level; that is, it is acceptable for individual results to exceed its respective threshold level, but the cumulative mean of the data set of soil sample results must not exceed the threshold level,
- the standard deviation of the data set is less than 50% of the relevant threshold level, and
- no individual sample result should be greater than 250% of the relevant threshold level.

5.7 STEP 7 - Optimize Design for Obtaining Data

The optimum design for obtaining data in order to achieve the Data Quality Objectives is as follows:

- Review of previous reports prepared by ECON Environmental,
- Adhering to the specifications of this RAP, and other requirements that the Council may have,
- Only NATA-accredited environmental testing laboratories will be commissioned to analyse soil samples and will implement a quality control plan conforming to the NEPM (Assessment of Site Contamination) Measure Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils,
- An assessment of the Data Quality Indicators to determine if the field procedures and laboratory analytical results are reliable, and
- Field sampling works will be carried out by an experienced and qualified Environmental Scientist in accordance with ECON Environmental protocols, based on National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 Schedules B1, B2, B4, B6 & B9 and other NSW EPA endorsed guidelines.

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6. SITE ASSESSMENT VALIDATION CRITERIA

6.1 General

Concentrations of contaminants in soil samples were compared against the National Environmental Protection Council (2013) site assessment criteria presented below and summarised in Table 6:

- Health Investigation Levels (HIL) for Soil Contaminants – NEPM HIL Residential A
- Soil Health Screening Levels (HSL) for Vapour Intrusion – Residential A
- NEPM 2013 Management Limits for TRH Fractions F1-F4 in Soil - Residential, Parkland and Public Open Space (Fine Grained Soils)
- NEPM 2013 ESLs for TRH fractions F1 – F4, BTEX and benzo(a)pyrene in soil

6.2 Soil Investigation and Screening Levels

6.2.1 Health Investigation Levels (HILs)

The NEPM presents Tier 1 Health Investigation Levels (HILs) for a broad range of chemicals such as metals, inorganics, PAHs, phenols, pesticides and other organics. The HILs are applicable to generic land uses such as residential, commercial/industrial or public open space and all soil types, generally within the first 3 metres of soil below ground level. The HILs have been applied to assess human health risks via all relevant pathways of exposure.

Based on the proposed development, soil investigation results within the building footprint/site will be assessed against the following criteria:

- ***HIL 'A' -*** *Residential use with gardens/accessible soils, including children's day-care centres, preschools and primary schools,*

6.2.2 Health Screening Levels (HSLs)

The NEPM presents Tier 1 Health Screening Levels (HSLs) for the following petroleum compounds and fractions:

- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX);
- Naphthalene, and
- TPH C6-C10 and TPH >C10-C16 fractions.

The HSLs are applicable to generic land uses such as residential, commercial/industrial or recreational/public open space and different soil types between the ground surface and soils >4 metres below ground level. The HILs have been applied to assess human health risks via the inhalation and direct contact pathways of exposure.

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Point 1 of Table 1A (4), which indicates that HSL D can be used in lieu of HSL B for buildings that comprise car parks or commercial properties on the ground floor.

6.2.3 Interim Soil Vapour Health Investigation Levels (Interim HILs)

The NEPM presents Interim Soil Vapour Health Investigation Levels (Interim HILs) for selected Volatile Organic Chlorinated Compounds (VOCCs).

The Interim Soil Vapour HILs are applicable to generic land uses such as residential, commercial/industrial or recreational/public open space and all soil types within the first metre depth from the ground surface or the first metre depth beneath a sub-slab. The Interim Soil Vapour HILs have been applied to assess human health risks via the inhalation pathways of exposure.

6.2.4 Ecological Investigation Levels (EILs)

The NEPM presents Ecological Investigation Levels (Interim EILs) for As, Cu, CrIII, Ni, Pb, Zn, DDT and naphthalene.

The EILs are applicable to generic land uses such as areas of ecological significance, urban residential areas and public open space, and commercial/industrial land uses. The EILs have been applied to assess risks to terrestrial ecosystems, generally, within the top 2 metres of soil at the final surface/ground level.

Site specific EILs for Copper, Zinc, Nickel and Chromium III can be derived by adding the Ambient Background Concentration (ABC) to the Added Contaminant Limits (ACL), as per the following formula:

$$EIL = ABC + ACL$$

The ABC of a contaminant is the soil concentration in a specified locality that is the sum of the naturally occurring background level and the contaminant levels that have been introduced from diffuse or non-point sources by generating anthropogenic activity not attributed to industrial, commercial, or agricultural activities.

The ACL is the added concentration (above the ABC) of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values is required. ACLs are based on the soil characteristics of pH, CEC and clay content. Different soils types / profiles will have different contaminant EILs rather than a single generic EIL for each contaminant. ACLs apply chromium III (CrIII), copper (Cu), nickel (Ni) and zinc (Zn) for site-specific EIL determination. The soil properties to be measured for site-specific derivation of ACLs for CrIII, Cu, Ni and Zn are summarised below:

- pH - Cu
- CEC - Cu, Ni, Zn
- % clay - CrIII

Note – the lowest concentration of copper that is derived from the pH or the CEC calculation is to be used for the ACL.

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Insufficient data was available to derive ACLs for As, Pb, DDT and naphthalene. As a result, the derived EILs are generic to all soils and are presented as total soil contaminant concentrations in Tables 1(B)4 and 1(B)5.

6.2.5 Ecological Screening Levels (ESLs)

Table 1B (6) of the NEPM presents Ecological Screening Levels (ESLs) for TPH C6-C40 fractions, BTEX and benzo(a)pyrene.

The ESLs are applicable to generic land uses such as areas of ecological significance, urban residential areas and public open space, and commercial/industrial land uses. The ESLs have been applied to assess risks to terrestrial ecosystems, generally, within the top 2 metres of coarse or fine soil at the final surface/ground level.

6.2.6 Petroleum Hydrocarbon Management Limits

Table 1B (7) of the NEPM presents petroleum hydrocarbon management limits for application to TPH fractions C_6-C_{10}, >C_{10}-C_{16}, >C_{16}-C_{34} and >C_{34}-C_{40}. The management limits are applicable for coarse or fine soils in residential, parkland, public open space or commercial/industrial land uses following consideration of relevant ESLs and HSLs.

6.3 Export of Waste

To assess the waste classification of materials to be disposed of off-site, the NSW EPA refers to the NSW EPA (2014) “Waste Classification Guidelines, Part 1: Classifying Waste”.

7. REMEDIATION OPTIONS

7.1 Overview

With regards to site remediation, the Environment Protection Authority (EPA) endorses the Policy of the 1992 Australian and New Zealand Environment and Conservation Council (ANZECC) and National Health and Medical Research Council (NHMRC) Guidelines for the Assessment and Management of Contaminated Sites. Furthermore, the threshold concentrations presented in the NSW EPA Third Edition 2017 Guidelines for the NSW Site Auditor Scheme and the National Environment Protection (Assessment of Site Contamination) Measure 2013 (NEPM) are considered as appropriate soil and groundwater clean-up criteria.

For groundwater, the ANZECC 2000 Guidelines for Fresh and Marine Water Quality have been generally accepted by the NSW EPA as appropriate investigation levels along with criteria outlined in the National Environment Protection (Assessment of Site Contamination) Measure 2013. The NSW EPA Service Station Guidelines also provide reference guidelines. In addition, the NSW EPA 2014 Waste Classification Guidelines Part 1: Classifying Waste have been used as the basis of technical review for the waste disposal options most applicable to the site.

A risk management approach has provided the basic principle of the remediation technologies/methods selected for the Site. This approach is consistent with the strategy outlined in the Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC, 1992) and the National Environment Protection (Assessment of Site Contamination) Measure 2013, which are endorsed by NSW EPA.

A contaminated site, as defined by the NEPM 2013 and the ANZECC 1992, is a site at which hazardous substances occur at concentrations above background levels, and where assessment indicates it poses, or is likely to pose, an immediate or long-term hazard to human health or the environment.

Wherever human health is at risk, either on or off-site, or the off-site environment is at risk, a contaminated site should be remediated to the extent necessary in order to minimise such risks in both the short and long terms.

Environmental and Human Health Risk is based on exposure to potential hazards and is defined as:

Risk = Hazard x Exposure

The elimination of the risk can be achieved by the removal of the hazard and/or the exposure pathway. Remediation is defined as any measure that removes the risk to an acceptable level by negating the hazard or exposure pathway. Therefore, remediation can involve removal of the hazard (i.e. no risk remains) or alternatively, management of the risk by removal of the exposure pathway even if the hazard remains. Exposure pathways to contaminated material can be managed by undertaking a physical action (e.g. erection of a fence, installation of cap, etc.) and/or a management plan, which prevents exposure to contaminants (e.g. use of planning controls, management of site activities etc.).

7.2 Typical Remedial Options Available

Several remedial options were reviewed. The suitability of the remedial options was examined with respect to the requirements of the proposed development, whilst taking into account the provisions of a number of relevant guideline documents, including:

- ANZECC/NHMRC document Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Lands 1992 (ANZECC 1992). Department of Environment and Conservation (now DECCW), Contaminated Site: Guidelines for the NSW Site Auditor Scheme (3rd Edition) 2017,
- ANZECC, Guidelines for the Assessment of On-site Containment of Contaminated Soil' (ANZECC 1999),
- NSW EPA Best Practice Note: landfarming (NSW EPA, 2014).

Typical remedial options that may achieve the remedial objectives are identified as:

- Removal of contaminated material to landfill,
- Encapsulation of the contaminated soils by a physical barrier system, or
- On-site treatment and re-use of contaminated material.

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8. SELECTION OF PREFERRED REMEDIATION STRATEGY

8.1 Evaluation of Remediation Options

A summary of the hierarchical policy for site remediation options (Guidelines for the NSW Site Auditors Scheme NSW DEC 2017) is as follows:

1. On-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level,
2. Off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site,
3. Removal of contaminated soil to an approved site or facility, followed where necessary by replacement with clean fill,
4. Bioremediation which uses naturally occurring micro-organisms, such as bacteria and fungi, to eliminate, attenuate or transform polluting or contaminating substances in soils, and
5. Consolidation and isolation of the soil on site by containment within a properly designed barrier.

An evaluation of remedial options was considered as follows:

- **Do nothing** – Whereby no remediation is undertaken, and impacted soil remains on site. Given the sensitive nature of the proposed development, including residential and commercial uses, this option is not considered suitable.
- **On-site containment** – Given that this option will result in the site recorded on the Register of Contaminated Sites under section 21(A) of the Environmental Protection Act 1997, it is the least preferred option in the hierarchy of remediation options as outlined above.
- **On-site treatment and re-use of contaminated land** – This strategy is feasible for some contaminants such as bacterial contamination. Bacterially contaminated soil is excavated and then spread thin over plastic exposed to the sun for seven days. This can be carried out by the caretaker/owner of the site. This is an advantageous strategy as the soil, once exposed to the sun, is reusable onsite.
- **Excavation to offsite** – This remedial strategy involves the complete removal of impacted soil from the site for disposal at an appropriately licensed waste management facility. The advantage of this strategy is that it removes the contaminants and their associated problems from the site. The disadvantage is that it is typically more costly than on-site containment and off-site transport of contaminated soil increases the risk of exposure within the surrounding community.
- **Bioremediation** – This remedial strategy involves 'landfarming' wherein engineered bioremediation systems which generally use tilling or ploughing of impacted soils to reduce contaminant levels biologically. Another well-practiced system of bioremediation uses forced air that actively aerates the contaminated mass to encourage bioremediation.

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8.2 Preferred Remediation Options

Based on an assessment of the options and considering the proposed land-uses and development, the remediation option which should be adopted for the site is ***Excavation of contaminated soil offsite.***

Excavation Offsite: The excavation to offsite is considered to be the most appropriate remedial strategy for specific areas within the site where Asbestos contamination is at greatest concentrations. The sensitive nature of the potential inhabitants for the proposed are key to this remediation recommendation. Off-site disposal of contaminated soil is considered a suitable option for managing human health and environmental impacts from the contaminated materials. Off-site disposal harnesses the excavation of soil, classification of spoil, and disposal to a facility which can legally receive it.

The EPA permits disposal of contaminated material subject to an approved landfill. The NSW EPA Waste Classification Guidelines (2014) document sets out the methodology for assessing and classifying wastes to be disposed to landfill. Essentially, wastes are classified into General Solid (Non-putrescible), General Solid (Putrescible), General Solid – Special Waste Asbestos, General Solid – Restricted Waste and Hazardous Waste.

The selection of an appropriate landfill will normally depend largely upon the results of classification of the wastes. It is sometimes necessary for heavily contaminated soils to be pre-treated prior to disposal, to reduce the concentrations or minimise the mobility of the contaminants. Special criteria are sometimes applicable to certain categories of waste. Contaminants covered by Chemical Control Orders have restrictions placed on their handling and disposal.

Note: The preferred remediation option will be undertaken by an appropriate licenced and experienced contractor.

8.3 Contingency Plan

The stated primary remedial objectives stated include excavations within the BH1, BH2, BH3, BH4, BH5 and BH6 hotspot locations within the site, as stated. If further contaminants are identified, then chasing out the contaminants apply and the implementation of the unexpected finds protocol in Section 11.

8.4 Excavation Contingency Plan

The conditions that may be encountered when excavating is uncertain. As unknown and variable subsurface conditions impose a degree of uncertainty for the project a set of anticipated conditions has been assumed in developing the excavation plan. However, because field conditions vary, flexibility has been built into the excavation plan to adapt to differing conditions. The table below summarises conditions that can be reasonably expected and the resulting problems they may cause and how these problems may be resolved within the context of the excavation program.

Table 5: Excavation Contingency Planning

Anticipated Problem	Corrective Action by Contractor
Chemical spill / exposure	Stop work, refer to Occupational Health, Safety and Rehabilitation Plan and immediately contact ECON Environmental
Excessive rain	Maintain access roads, cover high-traffic areas with gravel; or cover working areas/stockpiles with plastic during off-shifts; or shut down operations until runoff is more manageable. Inspect & maintain sediment control pond & filter fences.
Unmanageable mud in excavation zone	Improve drainage collection system; add geotextile/gravel in problem areas; or strip off mud/slurry materials; or excavate from the top of the fill.
Excessive drainage	Minimise active/contaminated work area; or improve diversion clean run-on; or maintain sufficient on-site wastewater storage capacity; or mobilise additional storage and/or treatment systems as needed.
Excessive dust	Use water sprays or biodegradable dust sprays or cease dust-generating activity until better dust control can be achieved or apply interim capping systems.
Sediment pond water for discharge – analytical results exceed site response levels	Perform in-situ treatment, e.g. flocculant dosing, until response levels are met. Alternatively arrange off-site disposal by a licensed Contractor.
Excessively wet materials	Stockpile and dewater on-site; or add absorbents.
Equipment failures	Maintain spare equipment or parts; or maintain alternate rental options; or shut down affected operations until repairs are made.
Release of fuel/oil from machinery	Remove source, use absorbent booms to remove oil and make any repairs as required.
Silt fence fails	Stop work and repair fence to specifications.
Excessive noise	Identify source and review noise attenuation equipment and as necessary provide silencers on noisy equipment.
Unexpected Problem	**Corrective Action by Contractor**
Asbestos cement sheeting, lagging, pipping etc.	Stop excavations if there is the potential for people to inhale airborne asbestos fibres. Contact ECON Environmental immediately to assess whether the material is asbestos. Cover the area with plastic and suppress dust by wetting down if needed. Place a warning sign at the entrance to the site where asbestos removal or site remediation is taking place.
Discovery of USTs	Stop excavations, contact ECON Environmental immediately.
Excessive odours	Monitor for volatiles using PID and upgrade PPE if necessary. Use odour and volatile suppressing agents to eliminate or reduce odours as required and/or cover odorous material if practicable.
Unearthing drummed material	Isolate and contact Superintendent. Arrange temporary storage in a secure part of the remediation site (to be nominated).

In addition to the above listed contingencies, the following steps may need to be undertaken should non-spadeable sludges or buried drums be discovered during the remediation works:

- upgrade of personal protective equipment (PPE), for workers within the active work zone, in accordance with the site Occupational Health, Safety and Rehabilitation Plan,
- segregation and bunding of discovered material,
- use of odour suppressants (where appropriate),
- cover the discovered material with plastic sheeting,
- appropriate sampling and analysis to assess potential contaminants, and
- appropriate off-site disposal of the materials following receipt of analytical results and any associated regulatory approvals required.

8.5 Unexpected Finds Protocol

The possibility exists for residual hazards to be present at the site. Environmental sampling is based on chemical analytes identified as a potential concern during a documented process of reviewing historical site activities. However, ground conditions between sampling points may vary and further hazards may arise from unexpected sources and / or in unexpected locations.

The nature of any residual hazards which may be present at the site are generally detectable through visual or olfactory means, for example:

- Fragments of asbestos-containing materials (visible),
- Construction / Demolition Waste (visible),
- Hydrocarbon impacted materials (visible / odourous), and
- Ash and / or slag contaminated soils / fill materials (visible).

As a precautionary measure to ensure the protection of the workforce and surrounding community, should any of the abovementioned substances be identified (or any other unexpected potentially hazardous substance), the procedure summarised in Section 12 is to be followed.

An enlarged version of the unexpected finds protocol, suitable for use on site, should be posted in the Site Office and referred to during the Site-Specific Induction by the Principal Contractor.

The sampling strategy for each “unexpected find” shall be designed by a suitably qualified environmental consultant. The strategy will, however, be aimed at determining the nature of the substance – that is, is it hazardous and, if so, at concentrations which pose an unacceptable risk to human health or the environment.

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The sampling frequency of the identified substance / materials shall meet the following minimum requirements in-situ:

- In-situ Sampling
  - <25m^3 = 3 samples
  - <50m^3 = 3 samples
  - 75m^3= 4 samples
  - 100m^3 = 5 samples
  - 125m^3 = 7 samples
  - 150m^3 = 8 samples
  - 175m^3 = 9 samples
  - 200m^3 = 10 samples
  - >200m^3 = 1 samples per 25m^3

Lower sampling rates may be derived for soil quantities greater than 200m^3 by applying statistical analysis, such as 95% UCL.

- Stockpile Sampling
  - Samples should be analysed for the chemicals of concern.
  - <=75m^3 = 3 samples
  - >75m^3 to <=100m^3 = 4 samples
  - >100m^3 to <=125m^3 = 5 samples
  - >125m^3- to <=150m^3 = 6 samples
  - >150m^3 to <=175m^3 = 7 samples
  - >175m^3 to <=200m^3 = 8 samples
  - >200m^3 = 1 sample every 25m^3

All additional works should be documented by the use of field notes, site photographs, site plans and reporting.

The Site Owner will be notified of any unexpected finds together with a proposed amendment to the existing RAP document.

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9. IMPLEMENTATION OF PREFERRED REMEDIATION STRATEGY

9.1 Roles and Responsibilities

Principal and/or Principal's Representative

- The principal and / or their representative, is responsible for the environmental performance of the proposed remediation works, including implementation of acceptable environmental controls.

Principal Contractor and Site Manager

- The Principal Contractor (referred to herein as the Contractor) is anticipated to be the party responsible for the day-to-day implementation of this RAP and shall fulfil the responsibilities of the Principal Contractor as defined by SafeWork NSW.
- If hazardous materials (Asbestos) are identified, SafeWork NSW licensed contractors are to be commissioned to safely remove them from site and dispose of them at a suitably licensed waste disposal facility (tickets retained for proof).
- Furthermore, Principle and / or their Representative, Principal Contractor and Site Manager will be responsible for implementing the Remedial Environmental Monitoring Plan (REMP) including:
    - Notification of adjoining residents and local planning authority (involved in remedial works) prior to commencement of remedial works,
    - Define hours of operation (complying with council requirements),
    - Define roles and responsibilities for relevant parties to provide contact details,
    - Traffic control measures,
    - Handling of contaminated material,
    - Odour control measures,
    - Stockpiling of excavated soils on site, and
    - Complaints and how they will be handled.

9.2 Hotspot Remediation Summary

It is concluded that the source of the underlying soil contamination is likely to be the unsourced fill material within the subject site, therefore it is recommended that the hotspot areas are to be excavated and disposed of offsite to an NSW EPA licensed facility.

The table below summarises the preferred remediation strategy:

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Table 6: Hotspot excavations					
Contaminated Hotspot Area	Hotspot Location	Excavation area	Excavation Depth (m)	Approximate Volume (m^3)	Approximate Volume (tonne)
BH2	Eastern portion of 12 Marshall Avenue	3m x 3m	0.5	4.5	7.2
BH3	Southern portion of 12 Marshall Avenue	3m x 3m	1.0	9.0	14.4
BH5	Eastern portion of 10 Marshall Avenue	3m x 3m	0.5	4.5	7.2
BH66	Southern portion of 10 Marshall Avenue	3m x 3m	0.5	4.5	7.2
Estimated Total				**22.5**	**36**

9.3 Asbestos Remediation Process – Demolition, Excavation and Disposal Offsite

- A suitably experienced and licensed Class B Asbestos contractor is to be commissioned to safely remove Asbestos building materials from the residential dwelling prior to its demolition, as per the Hazardous Materials Assessment – Appendix C of the RAP report.
- A suitably experienced and SafeWork NSW Licensed Asbestos Assessor (LAA) is to provide an asbestos inspection of the residential dwelling prior to its demolition to confirm that all hazardous materials within the subject site have been appropriately removed, and then provide an Asbestos Clearance Certificate.
- A suitably experienced and licensed contractor is to be commissioned to demolish the residential dwelling, only after an Asbestos Clearance Certificate has been provided, and then remove all demolition building materials offsite.

9.4 Work Health and Safety (WHS)

- All transport of waste and disposal of materials must be conducted in accordance with the requirements of the POEO Act,
- Removal of waste materials from the site shall only be carried out by suitably licensed contractors holding consent and/ or approvals to dispose of the waste materials per the assigned waste classification, and
- Asbestos containing soils are to be safely disposed at a facility licensed to receive such waste with receipts retained for proof of safe and appropriate disposal.

9.5 Waste Classification and Disposal

All wastes generated for off-site disposal as part of the remediation of the site must be classified in accordance with the NSW EPA (2014) Waste Classification Guidelines and taken for disposal off site at

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a lawfully licensed landfill regulated under Protection of the Environment Operations (Waste) Regulation 2014.

In New South Wales, it is an offence to transport waste to a place that cannot lawfully receive it or use a site to receive waste that cannot lawfully be used as a waste facility. To ensure that waste generators (or their representatives) do not trigger such offences:

- in relation to disposal, excavated soil material must ensure the waste is classified in accordance with the Waste Classification Guidelines – Part 1: Classifying Waste (EPA 2014), and the waste is taken to a facility that is lawfully able to receive that waste.

The Waste Guidelines set out six important steps for classifying waste and are undertaken to ensure the consultant or waste generator (or their representative):

- has assessed the waste against the relevant step(s) of the Waste Guidelines,
- has provided adequate justification for the determined classification of the waste.

Where a waste has undergone chemical assessment to determine its classification, the consultant or waste generator (or their representative) needs to provide adequate justification for:

- sampling density,
- sampling pattern and method used,
- selection of contaminants of potential concern for laboratory analysis,
- leachate analysis using the toxicity characteristics leaching procedure,
- the determined classification of the waste based on chemical assessment.

Waste generated from the site must be taken to a facility lawfully able to receive that waste. The consultant or waste generator (or their representative) must demonstrate the following:

- If the waste is taken to a facility licensed by the EPA for waste disposal, the facility's environment protection licence (EPL) must show it can lawfully receive that waste. A waste facility licensed by the EPA does not necessarily mean it can lawfully receive a class of waste for disposal,
- If the waste is taken for processing to a facility licensed by the EPA, that waste must meet the 'limit conditions' for that waste in the EPL, and
- If the waste facility is not licensed by the EPA, the facility must have consent from the appropriate regulatory authority to receive that waste for its waste activities.

The consultant or waste generator (or their representative) must provide the following:

- the estimated volume of waste taken off site,
- receipts verifying the facility has received that volume and class of waste from the waste generator (or its representative). This may include a valid consignment authorisation, and

reconciliation documents demonstrating the total volume of waste taken off site is consistent with the total volume of waste generated from the site

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10. VALIDATION GOALS AND IMPLEMENTATION

10.1 General

The validation goals are to have no contaminated soils remaining in the areas of concern. A Remediation Validation report must be provided by a suitably qualified and experienced environmental consultant, or equivalent person, for the proposed development.

10.2 Validation of Hotspot Areas

Validation will involve a validation soil sampling and laboratory analysis regime as per follows:

Hotspot BH2:

- At least one (1) sample for the contaminates of concern from of the each four (4) walls of the excavated hotspot pit, additional discretionary samples, if necessary,
- At least one (1) sample for the contaminants of concern from each of the base/floor of the excavated hotspot pit areas, additional discretionary samples, if necessary,
- Each validation sample retrieved will be analysed for the contaminate of concern:
    - **Lead, TRH, PAH.**

Hotspot BH3:

- At least one (1) sample for the contaminates of concern from of the each four (4) walls of the excavated hotspot pit, additional discretionary samples, if necessary,
- At least one (1) sample for the contaminants of concern from each of the base/floor of the excavated hotspot pit areas, additional discretionary samples, if necessary,
- Each validation sample retrieved will be analysed for the contaminate of concern:
    - **Lead, TRH, PAH.**

Hotspot BH5:

- At least one (1) sample for the contaminates of concern from of the each four (4) walls of the excavated hotspot pit, additional discretionary samples, if necessary,
- At least one (1) sample for the contaminants of concern from each of the base/floor of the excavated hotspot pit areas, additional discretionary samples, if necessary,
- Each validation sample retrieved will be analysed for the contaminate of concern:
    - **PAH.**

Hotspot BH6:

- At least one (1) sample for the contaminates of concern from of the each four (4) walls of the excavated hotspot pit, additional discretionary samples, if necessary,
- At least one (1) sample for the contaminants of concern from each of the base/floor of the excavated hotspot pit areas, additional discretionary samples, if necessary,
- Each validation sample retrieved will be analysed for the contaminate of concern:
    - **Lead.**

10.3 Validation of Imported Clean Fill Material

The imported clean fill must be accompanied by a certificate and supporting information confirming it is deemed suitable for the proposed use at the site. Imported material would be:

- Virgin excavated natural material (VENM) as per Protection of the Environment Operations Act 1997,
- Excavated natural material (ENM) Order 2014,
- Compost under Resource Recovery Order 2016,
- Manure under Resource Recovery Order 2014,
- Pasteurised garden organics under Resource Recovery Order 2016,
- Recovered aggregate under Resource Recovery Order 2014.

Based on the proposed development and land use, the importation of clean fill may be required to backfill the excavations where fill soils have been removed and where levels are required to be raised, if required.

The imported fill must be certified VENM material OR other material that is certified and suitable to be used on the site and be tested in accordance with the requirements of the relevant Resource Recovery Order or Resource Recovery Exemption made and endorsed under the POEO Act. It will also be visually assessed for fibro sheeting and samples analysed for asbestos if detected.

A minimum of 5 samples for imported soil will be conducted.

10.4 Remediation and Validation Report

The Remediation and Validation Report (RemVal) must be prepared in accordance with the NSW EPA (2020) Guidelines: Consultants reporting on Contaminated Land, to present the remediation works undertaken and confirm that the objectives of the remediation works have been attained.

The RemVal Report must include all documentation including clearance certification(s) required under the WH&S Regulation 2017 to demonstrate all hazardous building materials presented in the HazMat Survey (Appendix E of DSI) have been safely removed and lawfully disposed of from the structures present on site.

Additionally, all remediation and validation work, imported fill material certification, waste classification and disposal documentation must be documented in the Remediation and Validation Report prepared for the site.

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11. ENVIRONMENTAL MANAGEMENT PLAN

11.1 Introduction

A major component of the remedial works shall involve the installation and maintenance of an Environmental Management Plan (EMP). The EMP will provide details of the environmental protection and pollution control measures to be implemented during the operational phase of the remedial works. The pollution control measures have the objective of removing/minimizing any adverse impact on the surrounding environment.

In the following sections, outlines have been presented of the various pollution control measures that would be implemented during most elements of the remedial works. These form the basis of the Environmental Management Plan that should be read in conjunction with this document.

11.2 Site Fencing

Reasonable measures need to be taken to ensure the site boundary remains secure during all remedial site works. Secure temporary fencing is required to be in place for the duration of site works with gates secured and locked outside of site operating hours to prevent unauthorized access.

11.3 Erosion Sediment Control Plan

An erosion and sediment control plan will be prepared for the site. Erosion and run-off control measures will be implemented during all elements of remedial works. Typically, these measures will be designed to prevent the transport of pollutants (including sediments) out of the remediation area (including the designated stockpile areas) via surface run-off. Such measures typically include:

- Minimizing disturbed areas,
- Sediment control fencing,
- Stabilized site access points,
- Strict excavation times tables, and
- Prompt rehabilitation of disturbed areas.

11.4 Noise Control Plan

The Principal Contractor and Site Manager will be responsible for keeping noise levels to a minimum and not exceed limits outlined in AS 2436-1981. Noise levels must comply with Council and NSW EPA requirements. It is expected that equipment and machinery used onsite will not generate noise levels above this requirement.

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11.5 Dust Control Plan

Dust generation should be kept to an absolute minimum. Dust control measures will be implemented to ensure that dust generated from the site is controlled within acceptable levels. These control measures will be developed considering the site conditions in each remediation area, and are likely to include (but not necessarily be limited) to the following:

- All vehicles leaving the site will be hosed down to remove any potentially contaminated dust,
- A water cart or equivalent will be utilized on-site to keep vehicle paths and areas of site work damp to minimise dust generation,
- Access to water sprays shall be available to water down excavation / loading areas, and
- Plastic sheeting shall be available to cover excavation faces and stockpiles.

11.6 Odour Control Plan

All potential odours generated during remedial action is taking place must be monitored and comply with local Council and NSW EPA requirements. Due to the type of contamination present onsite, odours are not expected to be encountered.

11.7 Health and Safety

A Work Health and Safety (WHS) plan is an essential part of all remediation projects, to ensure the health and safety of all personnel working on or visiting the site. All remediation work would be undertaken in accordance with the provisions set out by the Work Health and Safety Act (2011) and associated Regulations 2017, and any other regulations or directions set out by regulatory authorities. Prior to commencing any remediation works, a specific WHS Plan would be prepared by the Remediation Contractor covering the following minimum aspects:

- Method statements,
- Identification of the remediation area and exclusion zones,
- Induction of personnel,
- Personal protective equipment (PPE),
- Hazard identification / locations,
- Identification of contaminants of concern and their physical and toxicological properties,
- Description of exposure pathways and personal protection requirements,
- Location of all underground/aboveground services,
- Details of specific work practice procedures to be followed within the designated contaminated areas,
- Monitoring protocols to identify a potentially hazardous practice,
- Emergency information, and
- Incident reporting.

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11.8 Onsite Stockpiling

Onsite stockpiles, as a result of excavations works should be managed to minimise the risk of dust generation, erosion and leaching. The measures required to achieve this will depend on the materials in the stockpile and the length of time the stockpile is to remain on site, but should include:

- Restrict the height of stockpiles to reduce dust generation,
- Construct erosion, sediment and runoff control measures,
- Cover stockpiles of contaminated soils with GeoFabric to be left on site temporarily,
- Temporarily fence off the stockpile with sit bags around perimeter of the stockpile to ensure cross contamination does not occur,
- Keep temporary stockpiles moist, by using water spray where required,
- Once the stockpiles have been removed from site, 100mm of the underlying stockpile footprint area is to be scraped and removed from site along with the stockpile, and
- Underlying stockpile footprint areas will require floor validation sampling (minimum three (3) samples per stockpile footprint area) for asbestos analysis to ensure all asbestos contamination has been removed from the stockpile area.

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12. UNEXPECTED FINDS PROTOCOL

All unexpected finds must be documented in the Remediation and Validation Report upon the completion of the remediation works.

12.1 Management

Where earthworks are required, there is potential to expose unexpected forms of contamination within the surface and subsurface. In such instances, action is required to mitigate potential contaminated soil/material encountered during excavation or construction activities. If potentially contaminated material is encountered the Unexpected Finds Protocol is to be followed. Works in the vicinity will be stopped or modified and will not recommence until the material has been analysed and management measures developed.

12.2 Training

Personnel involved in earthworks on site are to be inducted on the identification of potential unexpected finds and asbestos awareness. The induction can be undertaken at the time of general site induction and refreshed periodically at toolbox meetings. Induction to provide awareness of all types of possible unexpected finds is not practicable. In general, a precautionary approach can be employed, and the unexpected finds procedure outlined in the following sections should be implemented.

12.3 Procedure

Personnel involved in earthworks on site are to be inducted on the identification of potential unexpected finds and asbestos awareness. The induction can be undertaken at the time of general site induction and refreshed periodically at toolbox meetings. Induction to provide awareness of all types of possible unexpected finds is not practicable. In general, a precautionary approach can be employed, and the unexpected finds procedure outlined in the following sections should be implemented.

Should an unexpected actual or suspected contamination be encountered during the development works, the following procedure applies:

- Stop work in the potentially hazardous area as soon as it is safe to do so and move to the upwind side of the area, or away from the area,
- Assess the potential immediate risk to human health posed by the unexpected find and assess if evacuation or emergency services need to be contacted,
- Delineate an exclusion zone around the affected area using fencing and/or appropriate barriers and signage. Additional control measures may be required for odours and/or volatile compounds: odours suppression and no smoking signage,

- Contact the appointed environmental consultant for advice and request a site visit to undertake an assessment of the unexpected find. The Site Supervisor should be informed of the find once a preliminary assessment is made,
- The environmental consultant will assess the unexpected find and provide advice regarding:
    - Preliminary assessment of the contamination and need for immediate management controls,
    - What further assessment and/or remediation works are required and how such works are to be undertaken in accordance with contaminated site regulations and guidelines,
    - Preparation of an addendum to the remediation action plan (if necessary) or provide clean up advice,
    - Remediation works required (where applicable),
    - Validation works required following remediation works (if applicable).
- Works are not to recommence in the affected area until appropriate advice has been obtained from the environmental consultant and the environmental consultant has provided relevant information to the Site Supervisor, particularly for considering change to the Site Safety Plan,
- If it is deemed safe to do so by the Site Supervisor, works may resume in the affected area.

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13. CONCLUSION

The site can be made suitable for the intended land-use through remedial action as part of the redevelopment works in accordance with State Environmental Planning Policy No.55 Managing Land Contamination: Planning Guidelines SEPP 55 Category 2 remediation works.

In conclusion, the RAP:

- Has been developed in a manner consistent with current industry practice,
- Has selected a preferred remediation strategy based on the site-specific issues and currently available technologies that will allow the site to be made suitable for the intended land use,
- Has selected a validation sampling process to ensure all contaminants of concern have been appropriately excavated and disposed of from the site,
- Has presented an outline of the Environmental Management Plan (EMP) and associated contingency plans to ensure the environment is appropriately protected during the proposed works,
- Has presented an information and consultation program to ensure the stakeholders are informed of the works as they proceed, and
- Has outlined the means of validation of the completed works and ongoing management.

Subject to the above, it is considered that the site can be remediated, and the site made suitable for the land use, pending on the findings of the following Remedial Works and Validation of the site.

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14. LIMITATION STATEMENT

The information contained within this report have been prepared exclusively for the client. ECON Environmental has carried out the investigation with a degree of care and skill ordinarily exercised in similar investigations by reputable members of the environmental industry in Australia. No other warranty, expressed or implied, is made or intended. This report is to be read in its entirety including attachments and appendixes and should not read in individual sections.

A third party should not rely upon the information prior to making an assessment that the scope of work conducted meets their specific needs. ECON Environmental cannot be held liable for third party reliance on this document.

The sub-surface environment can vary greatly across an individual site. The conclusions presented in this report are based on limited investigation of conditions at specific sampling locations chosen to be as representative as possible under the given circumstances. However, it is possible that this investigation may not have encountered all areas of contamination at the site due to the limited sampling and testing program undertaken.

ECON Environmental's professional opinions are based upon its professional judgment, experience, training and results from analytical data. In some cases, further testing and analysis may be required, thus producing different results and/or opinions. ECON Environmental has limited its investigation to the scope agreed upon with its client.

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APPENDIX A: SITE PLANS

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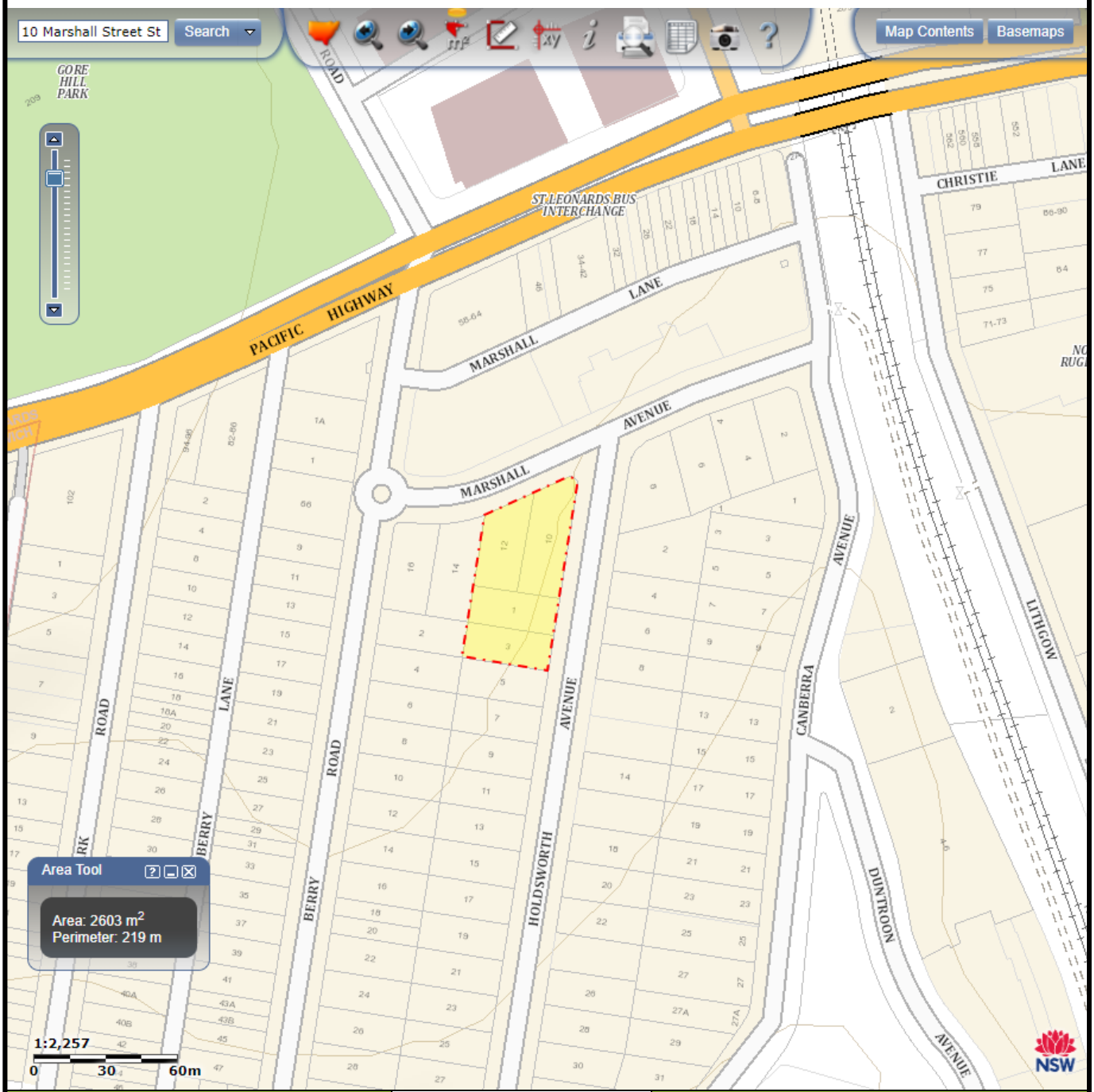

PROJECT DETAILS			DRAWING DETAILS: SITE LOCALITY			
Project Title	Remedial Action Plan (RAP)		Figure No.	1	Rev No.	0
Project No.	21-1268		Scale	As above	Size	A4
Client	New Golden St Leonards Pty Ltd		Drawn by	CK	Date	29.11.2021
Site Address	10 & 12 Marshall Ave, and 1 & 3 Holdsworth Ave, St Leonards NSW 2065		Approved by	CK	Date	29.11.2021

PROJECT DETAILS			DRAWING DETAILS: SITE AERIAL			
Project Title	Remedial Action Plan (RAP)		Figure No.	2	Rev No.	0
Project No.	21-1268		Scale	As above	Size	A4
Client	New Golden St Leonards Pty Ltd		Drawn by	CK	Date	29.11.2021
Site Address	10 & 12 Marshall Ave, and 1 & 3 Holdsworth Ave, St Leonards NSW 2065		Approved by	CK	Date	29.11.2021

PROJECT DETAILS			DRAWING DETAILS: SAMPLE LOCATIONS			
Project Title	Remedial Action Plan (RAP)		Figure No.	3	Rev No.	0
Project No.	21-1268		Scale	As above	Size	A4
Client	New Golden St Leonards Pty Ltd		Drawn by	CK	Date	29.11.2021
Site Address	10 & 12 Marshall Ave, and 1 & 3 Holdsworth Ave, St Leonards NSW 2065		Approved by	CK	Date	29.11.2021

PROJECT DETAILS			DRAWING DETAILS: HOTSPOT LOCATIONS			
Project Title	Remedial Action Plan (RAP)		Figure No.	4	Rev No.	0
Project No.	21-1268		Scale	As above	Size	A4
Client	New Golden St Leonards Pty Ltd		Drawn by	CK	Date	29.11.2021
Site Address	10 & 12 Marshall Ave, and 1 & 3 Holdsworth Ave, St Leonards NSW 2065		Approved by	CK	Date	29.11.2021

APPENDIX B: PROPOSED DEVELOPMENT PLANS

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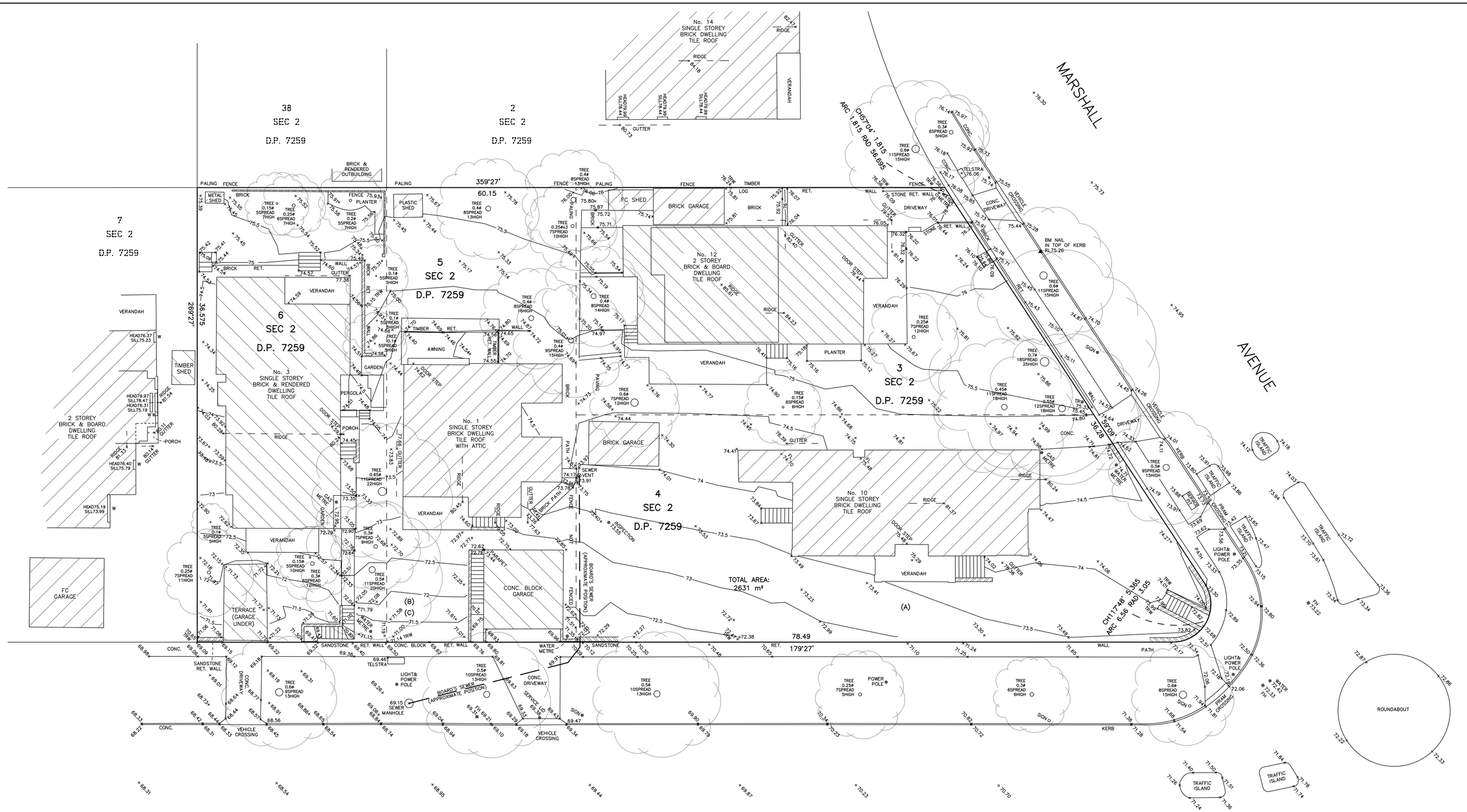


(A) DENOTES COVENANT (A241721)

(B) DENOTES COVENANT (A484331)

(C) DENOTES COVENANT (658032)

TRW DENOTES TOP OF RETAINING WALL

NOTES:

1. BEARINGS AND DISTANCES ARE BY TITLE ONLY,
   AREA IS BY CALCULATION FROM TITLE DIMENSIONS.
   IF THE AREA IS CRITICAL TO DESIGN FURTHER SURVEY SHOULD BE CARRIED OUT TO CONFIRM IT.
2. POSITION OF IMPROVEMENTS AND FENCES IN RELATION TO BOUNDARIES IS DIAGRAMMATIC ONLY EXCEPT WHERE BOUNDARY OFFSETS ARE SHOWN. IF FUTURE DEVELOPMENT IS CONTEMPLATED ON OR NEAR BOUNDARIES OF THE SUBJECT LAND, A FURTHER SURVEY SHOULD BE MADE TO MARK THOSE BOUNDARIES.
3. NO INVESTIGATION OF UNDER GROUND SERVICES HAS BEEN MADE.
   RELEVANT AUTHORITY SHOULD BE CONTACTED TO ESTABLISH DETAILED LOCATION AND DEPTH PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION.
4. CONTOURS ARE INDICATIVE OF GROUND FORM ONLY.
5. DRAWING INTERCHANGE FILE (.DXF) FORMAT AVAILABLE.
6. AUSTRALIAN HEIGHT DATUM WAS ESTABLISHED FROM SSM 86108 RL 78.678 (A.H.D.)
7. BOARD'S SEWER LINE IS INDICATIVE ONLY AND IS BASED ON DIAL BEFORE YOU DIG DIAGRAM. IF ITS POSITION IS CRITICAL, SEWER PEGOUT SHOULD BE CARRIED OUT BEFORE STARTING ANY DESIGN OR CONSTUCTION.

M. Y. XU & Co.
SURVEYORS & DEVELOPMENT CONSULTANTS
A. B. N. 82 357 803 551
162 Murray Farm Road, Beecroft NSW 2119
Telephone: (02) 8812 3029
Facsimile: (02) 8812 3680
E-Mail: land@landmarksurveyors.com.au

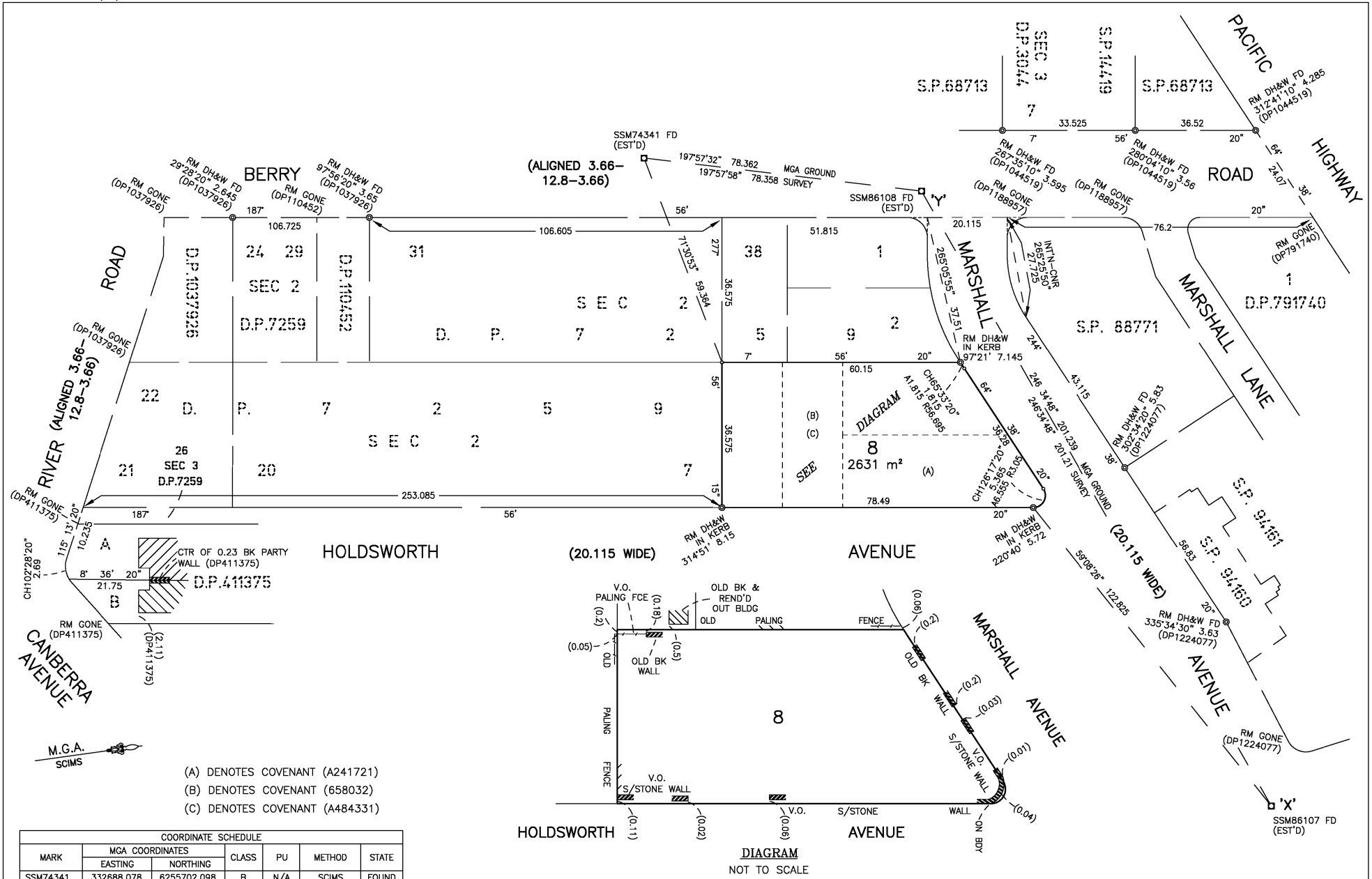
Registered Surveyor: Martin Y. Xu
Surveyor ID: 5501

CLIENT: NEW GOLDEN ST LEONARDS PTY LTD

SHEET 1 OF 1

PLAN OF DETAIL & LEVELS OVER LOTS 3,4,5 & 6 OF SECTION 2 IN D.P.7259
BEING No.1 & 3 HOLDSWORTH AVENUE AND No.10 & 12 MARSHALL AVENUE, ST LEONARDS

REF.: 14676-T1 SCALE: 1:150 ON A1 DATUM: A.H.D.
SURVEY DATE: 23/09/2020 DATE MODIFIED: 09/10/2020B



COORDINATE SCHEDULE						
MARK	MGA COORDINATES		CLASS	PU	METHOD	STATE
	EASTING	NORTHING				
SSM74341	332688.078	6255702.098	B	N/A	SCIMS	FOUND
SSM86107	332896.885	6255856.617	B	N/A	SCIMS	FOUND
SSM86108	332712.238	6255776.637	B	N/A	SCIMS	FOUND
DATE OF SCIMS COORDINATES: 18–02–2021 MGA ZONE: 56 MGA DATUM: GDA2020 COMBINED SCALE FACTOR: 0.999929						

Surveyor: MARTIN YAMENG XU Date of Survey: 29/04/2021 Surveyor's Ref: 14676	PLAN OF CONSOLIDATION OF LOTS 3, 4, 5 & 6 OF SECTION 2 IN DP7259	LGA: LANE COVE Locality: ST LEONARDS Subdivision No: ------ Lengths are in metres. Reduction Ratio 1:600	Registered 2.8.2021	DP1275969

FINAL 13/10/2020

ST LEONARDS SOUTH

DEVELOPMENT CONTROL PLAN

LOCALITY 8 – ST LEONARDS SOUTH

By: Annand Associates Urban Design

For: Lane Cove Council

TABLE OF CONTENTS

FIGURES

1.0 PRELIMINARY

1.1 Introduction

This Part provides a framework to guide future development in the St Leonards South Transit-Oriented Development Precinct. It sets in place Urban Design Guidelines to facilitate the Vision for St Leonards South.

1.2 Relationship with Other Documents

This Development Control Plan Part must be read in conjunction with Clause 4.6 (8)(cb) and Part 7 of the *Lane Cove Local Environmental Plan* and the *St Leonards South Landscape Master Plan (LMP)*.

It supplements the Lane Cove Local Environmental Plan (LEP) by providing detailed development principles, controls and guidelines. This Development Control Plan (DCP) was brought into effect on 19 October 2020 to support planning incentives contained in the Lane Cove LEP.

In addition, SEPP No 65 – Design Quality of Residential Development, Apartment Design Guide (ADG) and other relevant State Policies shall be taken into account.

This section of the DCP must be read in conjunction with all other parts of the DCP. Site specific clauses in this section of this DCP (Locality 8 St Leonards South) prevail over general clauses elsewhere in the DCP, unless stated otherwise.

1.3 Land Covered by this DCP – Locality 8

The DCP applies to the Area shown in Figure 8.1 which is located immediately south-west of the St Leonards Railway Station. It is bounded by Marshall Avenue, Canberra Avenue, Park Road and River Road.

Figure 8.1: St Leonards South DCP Area

2.0 VISION

The desired future character of the St Leonards South Precinct is for a liveable, walkable, connected, safe, Precinct which builds upon the transit and land use opportunities of St Leonards and Metro Stations and commercial centre.

2.1 OBJECTIVES

1. To create a highly liveable transit-orientated residential precinct that integrates with St Leonards Station and proposed over-rail public plaza that encourages community interaction, walking, cycling and use of public transport.

2. To ensure that all new development will achieve design excellence, as well as providing suitable transition and interfaces to adjoining zones and open space.

3. To provide a variety of housing (including affordable housing) that is sustainable, provides housing choice and that meet the needs of residents including access to community facilities.

4. To minimise traffic impacts within the precinct and to and from Pacific Highway and River Road.

5. To facilitate a new, accessible network for pedestrians, cyclists and families that integrate and connect to functional community infrastructure and open space.

6. To create an accessible, well-designed public open space network that provides a variety of recreation spaces (active and passive) and communal open space that is functional and shared by residents.

7. To create a Low Carbon Precinct that delivers sustainable and efficient buildings that provide energy, water and waste efficiency.

Figure 8.2: Vision

3.0 STRUCTURE

3.1 Introduction

The Structure Plan sets the broad framework for development within the St Leonards South Precinct in close proximity to the St Leonards Railway Station (the Station) and the St Leonards mixed-use/commercial centre.

3.2 Urban Structure Plan

The Urban Structure Plan builds on the existing urban framework, dramatically increases density around the Station and improves East-West connectivity and walkability to the Station.

The "perimeter block" building form is supported by communal open space (green spines) running North-South in the centre of each block.

Community infrastructure is also proposed along the East-West (E-W) links.

	Control	Provision	Notes/Location
3.3	**Land Use**	• Land Use shall be in accordance with the Structure Plan in Figure 8.3. • Small scale retail (convenience store, coffee shop restaurant etc) may be considered on major E-W pedestrian and bicycle link where it can serve the parks, community facilities, and the pedestrian (E-W) links.	
3.4	**Heritage**	• Development shall not have an adverse impact on the Heritage significance of Heritage Items in the vicinity of the development. • Significant streetscape elements, including street trees and sandstone walls, shall be retained and conserved where possible. When items cannot be retained a photographic record shall be provided to Council's library.	

Figure 8.3: Structure Plan

4.0 ACCESS

OBJECTIVES

- To provide improved access and circulation (vehicular, pedestrian and bicycle) within the Precinct, whilst not facilitating through vehicle traffic.

- To improve connectivity within the Precinct and to the external context pedestrian and bicycle linkages to St Leonards and Wollstonecraft Railway Stations, St Leonard's Commercial Centre and the Lane Cove River.

	Control	Provision	Notes/Location
4.1	**Access Network**	Provide new public roads and pedestrian and bicycle links in accordance with Figure 8.4 Access Network.	Refer to Table 6.2.11
4.2	**Roads**	• Create new road/lane between Berry and Park Roads to improve traffic circulation and access to southern end of Berry Road and Holdsworth Avenue, as shown in Figure 8.5 (a) in accordance with the "*Specifications for Infrastructure in the St Leonards South Precinct*" • Close Berry Lane and incorporate into development sites, with equivalent land area dedicated to Council along the Park Road frontage.	Refer to Table 6.2.11 Provide interim connections to maintain function of Berry Lane in a coordinated manner until fully redeveloped.
4.3	**Pedestrian and Bicycle Links**	• Create E-W pedestrian and bicycle links as indicated in Figures 8.4 and 8.5 (b) with associated stairs/ramps and lifts to optimise accessibility. • Ensure "Green Spines" connect/ integrate with E-W pedestrian and bicycle links, where applicable. • Make provision for potential connection of Canberra Avenue to the south, across River Road via traffic lights, to extend bicycle link from St Leonards Station to Wollstonecraft Station and beyond to the Lane Cove River.	Refer to Table 6.2.11

	Control	Provision	Notes/Location
4.4	**Sustainable Transport**	• Provide infrastructure for potential to provide electric charging points to every car space within the internal parking basements for hybrid and electric vehicles.	Part R of Council's Development Control Plan applies, where relevant. All technical requirements for electric charging points must be submitted with the Sustainable Travel and Access Plan in accordance with Part R of Council's DCP.

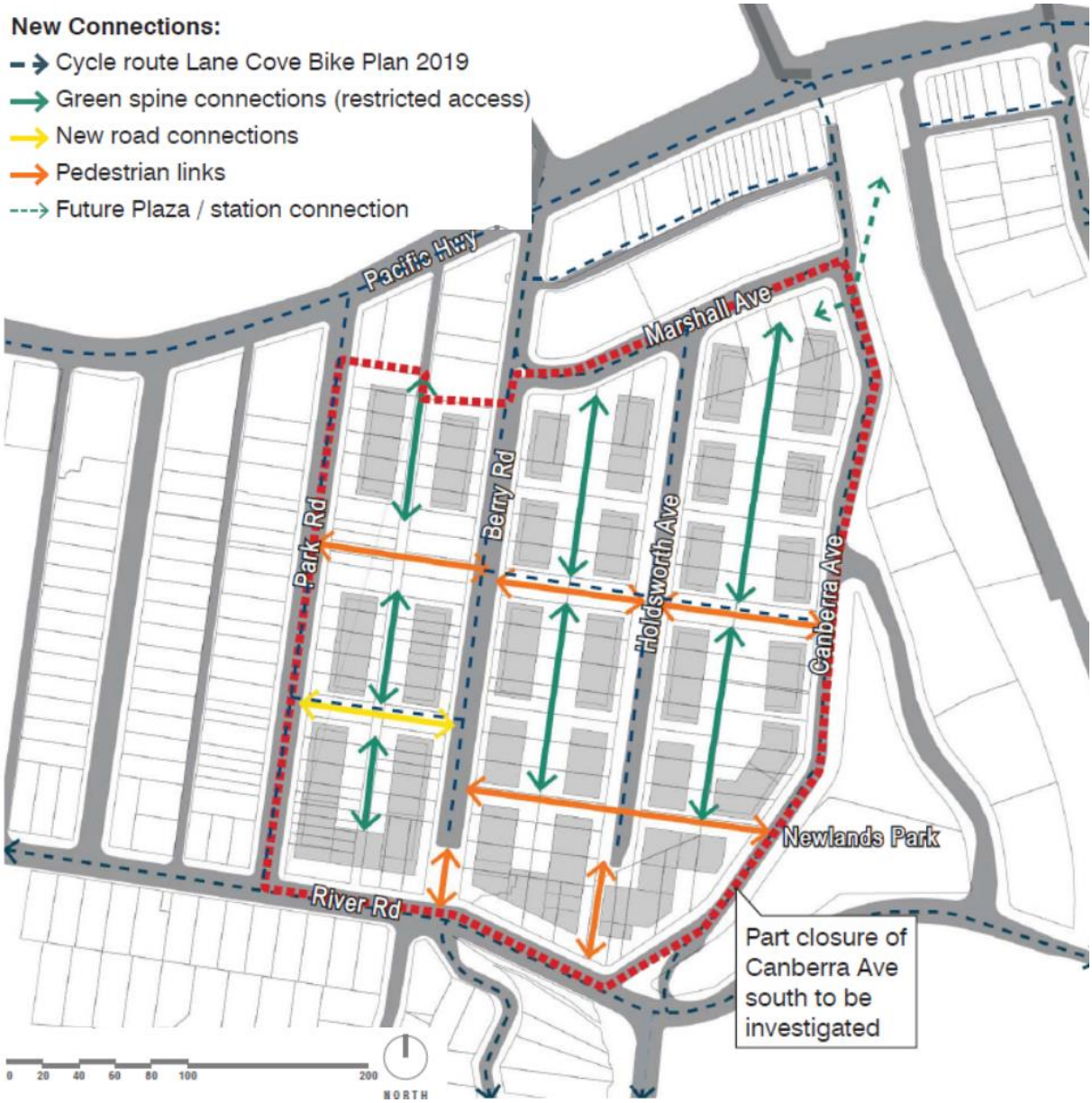


Figure 8.4: Access Network

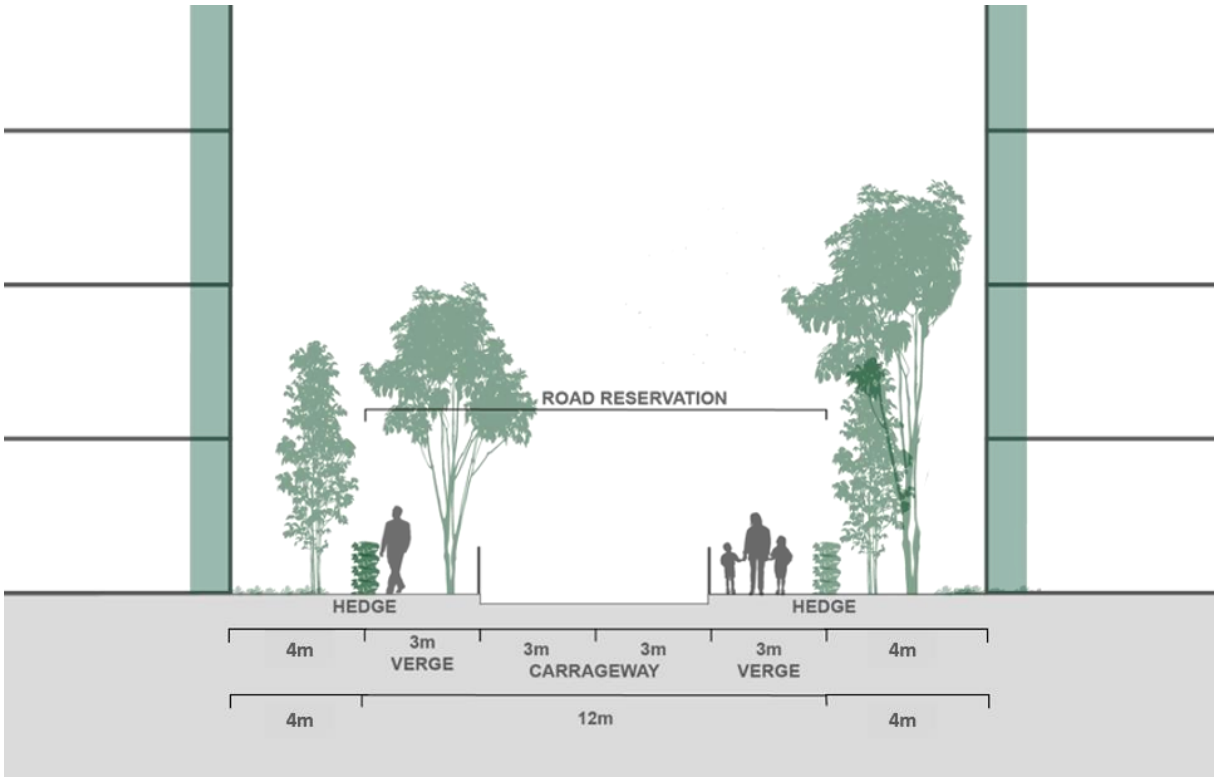


Figure 8.5 (a): Section - New Road (between Berry – Park Road)

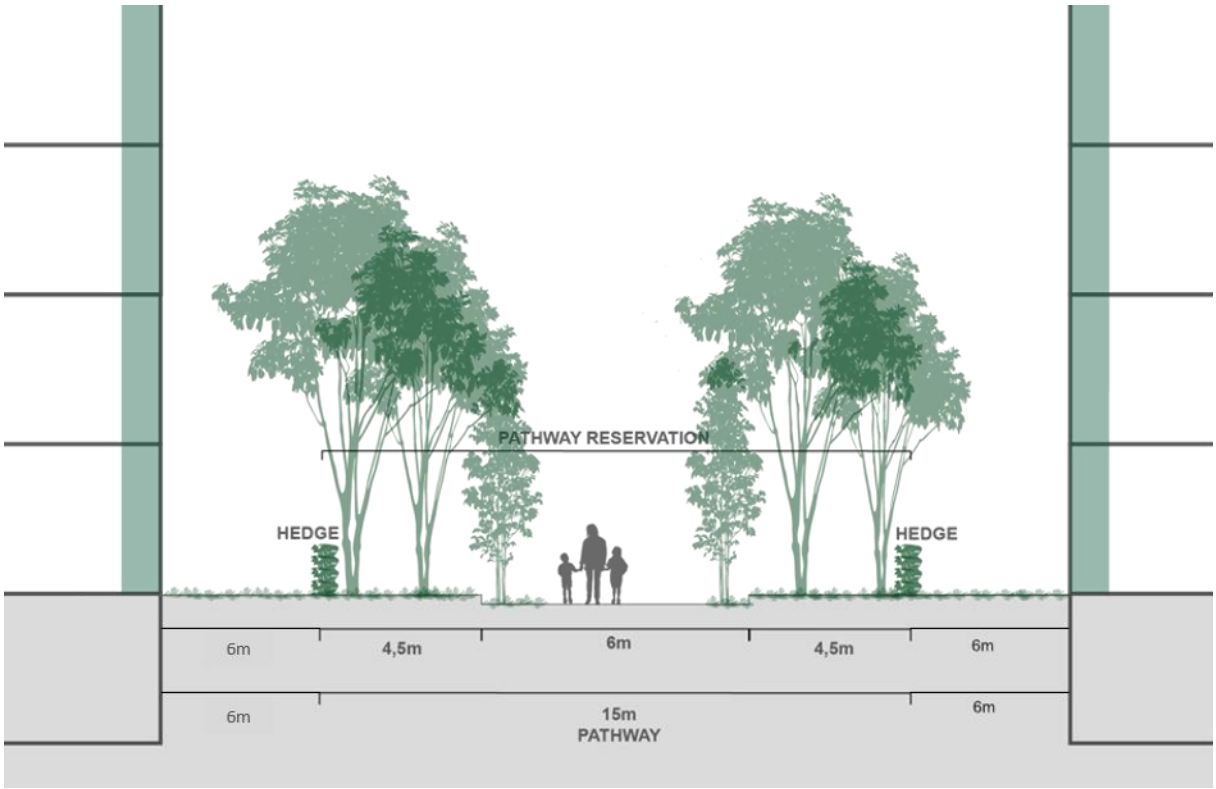


Figure 8.5 (b): Section - New E-W Path

5.0 INFRASTRUCTURE

OBJECTIVES

To identify and provide opportunities for additional public infrastructure including:

a. Recreation Areas (Public Open Space)
b. Community facilities that are multi-purpose
c. Affordable housing
d. Undergrounding of services

	Control	Provision	Notes/Location
5.1	**Recreation Areas (Public Open Space)**	• Create Recreation areas as indicated in Figure 8.6. • Locate driveways to maximise opportunity to convert the southern end of Berry Road and Holdsworth Avenue to a Recreation Area.	Refer to Table 6.2.11

Figure 8.6: Public Infrastructure

	Control	Provision	Notes/Location
5.2	**Community facilities**	Provide Community facilities including a multi-purpose facility of 600 sqm, comprising a child care centre (450sqm), community hall (150sqm) and an adjacent Recreation Area of 450sqm, as indicated in Figure 8.6.	Refer to Table 6.2.11
5.3	**Affordable Housing**	Affordable Housing shall be provided as indicated in Figure 8.7. Each dwelling shall comprise a minimum of 2 bedrooms with an internal area of at least 70 sqm (plus storage) and one car space, in accordance with the "*Specifications for Affordable Housing in the St Leonards South Precinct*"	Refer to Table 6.2.11
5.4	**Utility Services**	• All utility services within a public road reserve are to be placed underground for the total frontage of each site. • All utility services within each site are to be placed underground or within the building. • Design and construction of these works is to be at the cost of the developer. • Light poles are to be designed and provided as specified by Council. • All utility infrastructure, including electricity kiosks, hydrants, and meters shall be screened from the public domain.	This should be consistent with the "Street Tree Masterplan" and "Public Open Space Typologies – Street". See text and streetscape section in LMP.

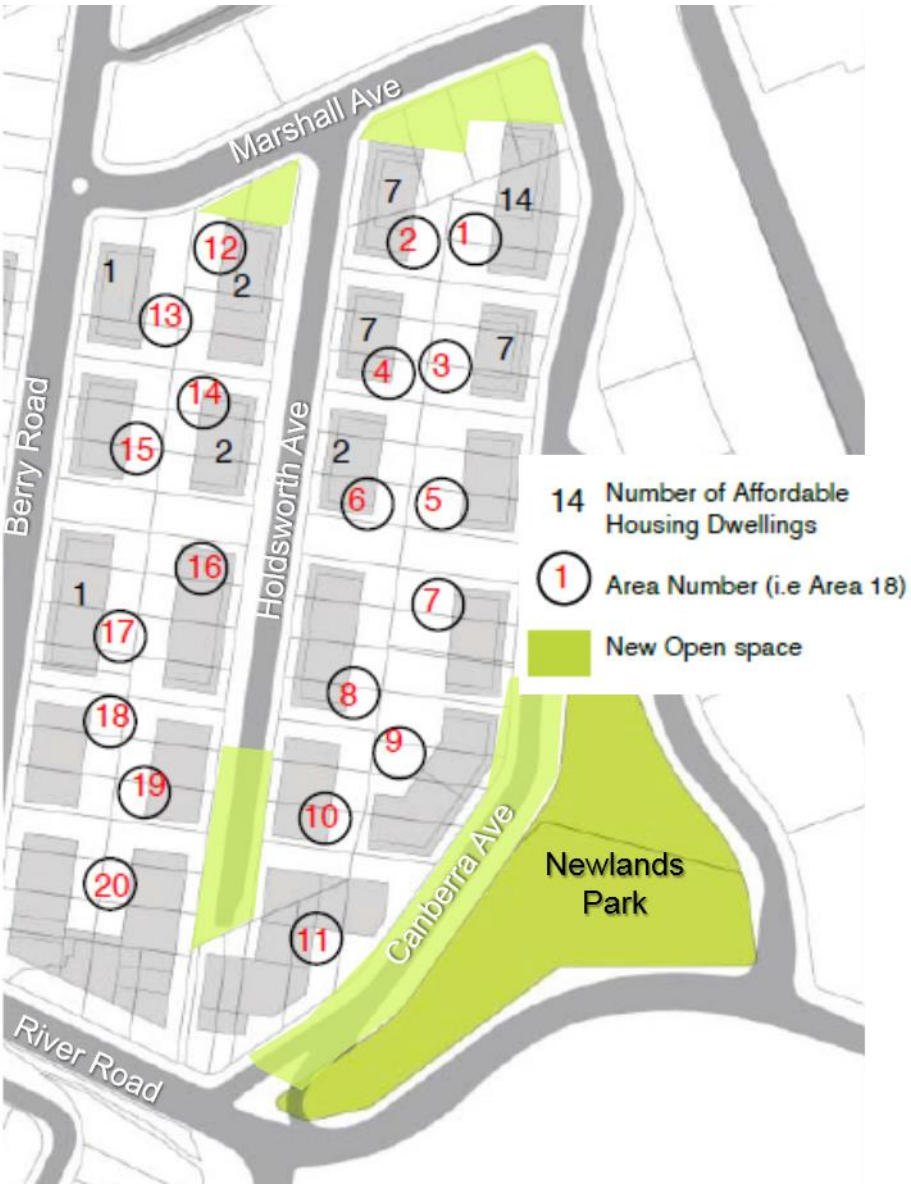


Figure 8.7: Number of Affordable housing dwellings to be provided by each Area

6.0 BUILT FORM

OBJECTIVES

- To facilitate amalgamation opportunities that allow for economic and aesthetic redevelopment while preventing land fragmentation or isolation that detracts from the desired future character of the precinct.
- To step the heights from tallest adjacent to the Railway Station, reducing with distance to the south and west (River Road and Park Road)
- To provide transitional built form at edges of the precinct.
- To locate building as “perimeter block” development fronting N-S streets in order to maximise solar access to building facades and open spaces.
- To limit the length of façade of buildings, to provide appropriate levels of articulation, and to use a complementary palette of materials which will relate positively to the streetscape and enhance the public domain.
- To encourage a stepped-back building form in order to reduce building bulk and scale to the street. To facilitate street and front setback (deep soil) tree planting to further reduce apparent bulk and scale.
- To ensure that parking basements are located beneath perimeter building footprints, wherever possible, in order to protect ‘central’ deep soil zones (Green Spines).
- To optimise solar access to all buildings, public domain and private open space.
- To activate and engage with the public domain in a manner which optimises public interaction and public safety.
- To encourage a mix and diversity of housing types within the precinct.

	Control	Provision	Notes/Location
6.1	**Amalgamation**	• Sites are to be amalgamated as per Figure 8.8 to comply with LEP minimum lot size. • Alternative amalgamation patterns will only be considered if it can be demonstrated that all outcomes and objectives for this Locality can be delivered by the subject and other Areas.	

Figure 8.8: Required Amalgamations

6.2 Building Envelope

	Control	Provision	Notes/Location
6.2.1	**Front Building Setbacks A, Refer Fig 8.9**	• 4m at street level • + 3m at and above Level 6	To Canberra, Marshall, Holdsworth & Berry (1-19) + east (21-23)
	Building Setbacks B, Refer Fig 8.9	• 4m at street level • +3m at and above Level 3 • +3m at and above Level 6	To Park Road (south) (23)
	Building Setbacks C, Refer Fig 8.9	• 10m at street level • +3m at and above Level 3 • +3m at and above Level 6	To Park Road (north) (21 & 22)
	Building Setbacks D, Refer Fig 8.9	• 10m at street level • +7m at and above Level 4 • +7m at and above Level 6	To River Road (20, 23 and 11)
	Building Setbacks E, Refer Fig 8.9	• 6m at park level +3m at and above Level 3	To Local Park (western buildings of Areas 21 and 22).
	Building Setbacks F, Refer Fig 8.9	• 6m at park level +3m at and above Level 5	To Local Park (eastern buildings of Areas 21 and 22).

	Control	Provision	Notes/Location
6.2.2	**Rear Building Setback**	Minimum 12m setback to rear boundary of an Area.	
6.2.3	**Building Separation**	As per ADG / SEPP 65	
6.2.4	**Building Depth**	Maximum depth 18-22m	As per Figure 8.9

Figure 8.9 Building Setbacks / Building Depth

	Control	Provision	Notes/Location
6.2.5	**Building Orientation/Length**	• Create north-south perimeter block buildings oriented to address N-S streets as shown in Figure 8.9. • Maximum building length shall not be greater than 35m unless strongly articulated. • River Road (lower levels) may be longer than 35m, but only with strong articulation to lower levels of River Road.	Optimise solar access to buildings and open space areas. Strongly articulated means for example a major indentation of 3-6m x 3m wide for the full height of the building.

	Control	Provision	Notes/Location
6.2.6	**Building Articulation**	• A high degree of articulation is mandatory for the front façade and include balconies, overhangs, blades and other architectural features. • Articulation elements shall not utilise contrasting 'bright' colours to emphasise the articulation.	
6.2.7	**Height in Storeys**	• Height of development in number of Storeys shall be as per Figure 8.10. • Part storeys resulting from excavation of steep slopes or semi basement parking will not count as a storey.	Refer to Clause 4.6 (8)(cb) and Part 7 of Lane Cove LEP.

Figure 8.10: Height of Buildings (in storeys)

	Control	Provision	Notes/Location
6.2.8	**Solar Access**	• Compliance with ADG solar access requirements. • Building design must ensure that overshadowing of public (i.e. Newlands Park and Local Park) and private open spaces (Green Spines) is minimised.	
6.2.9	**Building Floor Levels**	• Building floor levels shall have regard to Figure 8.18, to facilitate the creation and access to "Green Spines".	

6.2.10 Incentives

The following table (Table 6.2.11) summarises the Built form controls and the required outcomes which must be delivered in order to qualify for the incentives.

Table 6.2.11 – Requirements to be entitled to Incentives

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
Area 1	65 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	3.85:1	19 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 3,000m^2 b) Approximately 900sqm of public open space embellished in accordance with the "Specifications for Public Open Space in the St Leonards South Precinct" and dedicated to Council in perpetuity (Marshall Avenue); c) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); d) 14 affordable housing dwellings dedicated to Council in perpetuity. Each dwelling shall comprise a minimum of 2 bedrooms with an internal area of at least 70 sqm (plus storage) and one car space, in accordance with the "*Specifications for Affordable Housing in the St Leonards South Precinct*"; e) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; f) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
				g) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 2	53 metres & 2.5 metres – As shown in LEP Incentive Height of Buildings map	3.55:1	15 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 2,000m^2 b) Approximately 400sqm of public open space embellished in accordance with the "Specifications for Public Open Space in the St Leonards South Precinct" and dedicated to Council in perpetuity (Marshall Avenue); c) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); d) 7 affordable housing dwellings dedicated to Council in perpetuity. Each dwelling shall comprise a minimum of 2 bedrooms with an internal area of at least 70 sqm (plus storage) and one car space, in accordance with the "*Specifications for Affordable Housing in the St Leonards South Precinct*"; e) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; f) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and g) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 3	53 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	3.55:1	15 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 1,600m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) 7 affordable housing dwellings dedicated to Council in perpetuity. Each dwelling shall comprise a minimum of 2 bedrooms with an internal area of at least 70 sqm (plus storage) and one car space, in accordance with the "*Specifications for Affordable Housing in the St Leonards South Precinct*"; d) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
				the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; e) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and f) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 4	44 metres and 2.5 metres - As shown in LEP Incentive Height of Buildings map	3.55:1	12 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 1,500m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) 7 affordable housing dwellings dedicated to Council in perpetuity. Each dwelling shall comprise a minimum of 2 bedrooms with an internal area of at least 70 sqm (plus storage) and one car space, in accordance with the "*Specifications for Affordable Housing in the St Leonards South Precinct*"; d) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; e) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and f) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 5	44 metres and 2.5 metres - As shown in LEP Incentive Height of Buildings map	3.7:1	12 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 2,200m^2 b) A multi-purpose (child care centre and community hall) facility of 600sqm with direct connection to an outdoor play space of 450sqm provided in accordance with the "Specifications for Community Facilities in the St Leonards South Precinct" and dedicated to Council in perpetuity; c) Public lifts associated with multi-purpose facility, to provide accessibility; d) Design Excellence is achieved in accordance with LEP Clause 7.6,

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
				including the Maximum Height of Buildings (in storeys); e) A 15m wide pedestrian and bicycle link connecting Canberra Avenue and Holdsworth Avenue embellished in accordance with the "Specifications for Public Open Space in the St Leonards South Precinct" and dedicated to Council in perpetuity; f) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; g) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and h) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 6	44 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	3.65:1	12 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 2,200m^2 b) 2 affordable housing dwellings dedicated to Council in perpetuity. Each dwelling shall comprise a minimum of 2 bedrooms with an internal area of at least 70 sqm (plus storage) and one car space, in accordance with the "*Specifications for Affordable Housing in the St Leonards South Precinct*"; c) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); d) A 15m wide pedestrian and bicycle link connecting Canberra Avenue and Holdsworth Avenue embellished in accordance with the "Specifications for Public Open Space in the St Leonards South Precinct" and dedicated to Council in perpetuity; e) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919;

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
				f) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and g) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 7	25 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	2.6:1	6 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 1,900m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; d) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and e) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 8	37 metres & and 2.5 metres - As shown in LEP Incentive Height of Buildings map	2.6:1	10 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 2,000m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; d) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and e) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 9	25 metres & 2.5 metres - As shown in LEP	2.6:1	6 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 2,500m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys);

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
	Incentive Height of Buildings map			c) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; d) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and e) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 10	31 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	2.6:1	8 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 1,500m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; d) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and e) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 11	31 metres, 15 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	2.6:1	8, 6, & 4 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 4,000m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) A 6m wide pedestrian and bicycle link connecting Canberra Avenue and Holdsworth Avenue embellished in accordance with the "Specifications for Public Open Space in the St Leonards South Precinct" and dedicated to Council in perpetuity; d) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
				Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; e) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and a) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 12	44 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	3.45:1	12 & 10 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 2,500m^2 b) Approximately 400sqm of public open space embellished in accordance with the "Specifications for Public Open Space in the St Leonards South Precinct" and dedicated to Council in perpetuity (Marshall Avenue); c) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); d) 2 affordable housing dwellings dedicated to Council in perpetuity. Each dwelling shall comprise a minimum of 2 bedrooms with an internal area of at least 70 sqm (plus storage) and one car space, in accordance with the "*Specifications for Affordable Housing in the St Leonards South Precinct*"; e) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; f) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and g) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 13	37 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings	2.85:1	10 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 1,600m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) 1 affordable housing dwelling dedicated to Council in perpetuity. Each dwelling shall comprise a minimum of 2 bedrooms

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
	map			with an internal area of at least 70 sqm (plus storage) and one car space, in accordance with the "*Specifications for Affordable Housing in the St Leonards South Precinct*"; d) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; e) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and f) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 14	37 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	3.35:1	10 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 1,600m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) 2 affordable housing dwellings dedicated to Council in perpetuity. Each dwelling shall comprise a minimum of 2 bedrooms with an internal area of at least 70 sqm (plus storage) and one car space, in accordance with the "*Specifications for Affordable Housing in the St Leonards South Precinct*"; d) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; e) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and f) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 15	37 metres & 2.5 metres - As shown	2.85:1	10 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 2,000m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
	in LEP Incentive Height of Buildings map			Buildings (in storeys); c) A 15m wide pedestrian and bicycle link connecting Berry Road and Holdsworth Avenue embellished in accordance with the "Specifications for Public Open Space in the St Leonards South Precinct" and dedicated to Council in perpetuity; d) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; e) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and f) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 16	37 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	2.85:1	10 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 2,500m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) A 15m wide pedestrian and bicycle link connecting Berry Road and Holdsworth Avenue embellished in accordance with the "Specifications for Public Open Space in the St Leonards South Precinct" and dedicated to Council in perpetuity; d) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; e) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and f) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 17	38 metres & 2.5	3.8:1	10	a) Minimum site area of 2,200m^2 b) A multi-purpose (child care centre and

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
	metres - As shown in LEP Incentive Height of Buildings map		As shown in Figure 8.10 (consider 6.2.7)	community hall) facility of 600sqm with direct connection to an outdoor play space of 450sqm provided in accordance with the "Specifications for Community Facilities in the St Leonards South Precinct" and dedicated to Council in perpetuity; c) Public lifts associated with multi-purpose facility, to provide accessibility; d) 1 affordable housing dwelling dedicated to Council in perpetuity. Each dwelling shall comprise a minimum of 2 bedrooms with an internal area of at least 70 sqm (plus storage) and one car space, in accordance with the "*Specifications for Affordable Housing in the St Leonards South Precinct*"; e) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); f) A 15m wide pedestrian and bicycle link connecting Canberra Avenue and Holdsworth Avenue embellished in accordance with the "Specifications for Public Open Space in the St Leonards South Precinct" and dedicated to Council in perpetuity; g) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; h) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and i) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 18	31 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	2.6:1	8 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 1,500m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
				Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; d) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and a) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 19	31 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	2.6:1	8 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 1,500m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; d) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and a) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 20	31 metres, 15 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	2.6:1	8, 6 & 4 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 5,200m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) A 6m wide pedestrian and bicycle link connecting Berry Road and Holdsworth Avenue embellished in accordance with the "Specifications for Public Open Space in the St Leonards South Precinct" and dedicated to Council in perpetuity; d) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; e) A dwelling mix comprising a minimum

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
				20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and f) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 21	37 metres, 25 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	2.6:1	6 & 10 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 4,500m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; d) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and e) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.
Area 22	37 metres, 25 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	2.75:1	6 & 10 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 4,600m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) A 12m wide road connecting Park Road and Berry Road constructed in accordance with the "Specifications for Infrastructure in the St Leonards South Precinct" and dedicated to Council in perpetuity; d) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; e) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and f) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.

LEP Key sites	Maximum LEP height of buildings	Maximum LEP FSR	Maximum Height of Building (storeys)	Outcome to be entitled to Incentives
Area 23	37 metres, 25 metres, 15 metres & 2.5 metres - As shown in LEP Incentive Height of Buildings map	2.75:1	4, 6, 8 & 10 As shown in Figure 8.10 (consider 6.2.7)	a) Minimum site area of 6,800m^2 b) Design Excellence is achieved in accordance with LEP Clause 7.6, including the Maximum Height of Buildings (in storeys); c) A 12m wide road connecting Park Road and Berry Road constructed in accordance with the "Specifications for Infrastructure in the St Leonards South Precinct" and dedicated to Council in perpetuity; d) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the "Specifications for Private Open Space in the St Leonards South Precinct" with a positive covenant granting shared access in accordance with Section 88E of the Conveyancing Act 1919; e) A dwelling mix comprising a minimum 20% One Bedroom and Studio dwellings, 20% Two Bedroom dwellings and 20% 3 or more dwellings; and f) Amalgamation of lots as per Figure 8.8 to prevent the fragmentation or isolation of land.

	Control	Provision	Notes/Location
6.3	**Pedestrian Entry/ Address**	• All building access shall be sited to provide level street access to minimise ramps. • Provide direct access to ground floor /street level units for Areas 21, 22 & 23, and wherever possible within the precinct. • Provide entries to properties generally as indicated in Fig 8.11 • Design for passive surveillance of recreation areas and pedestrian and bicycle links from the public domain and from developments	Note Potential for Canberra Avenue fronting Newlands Park.

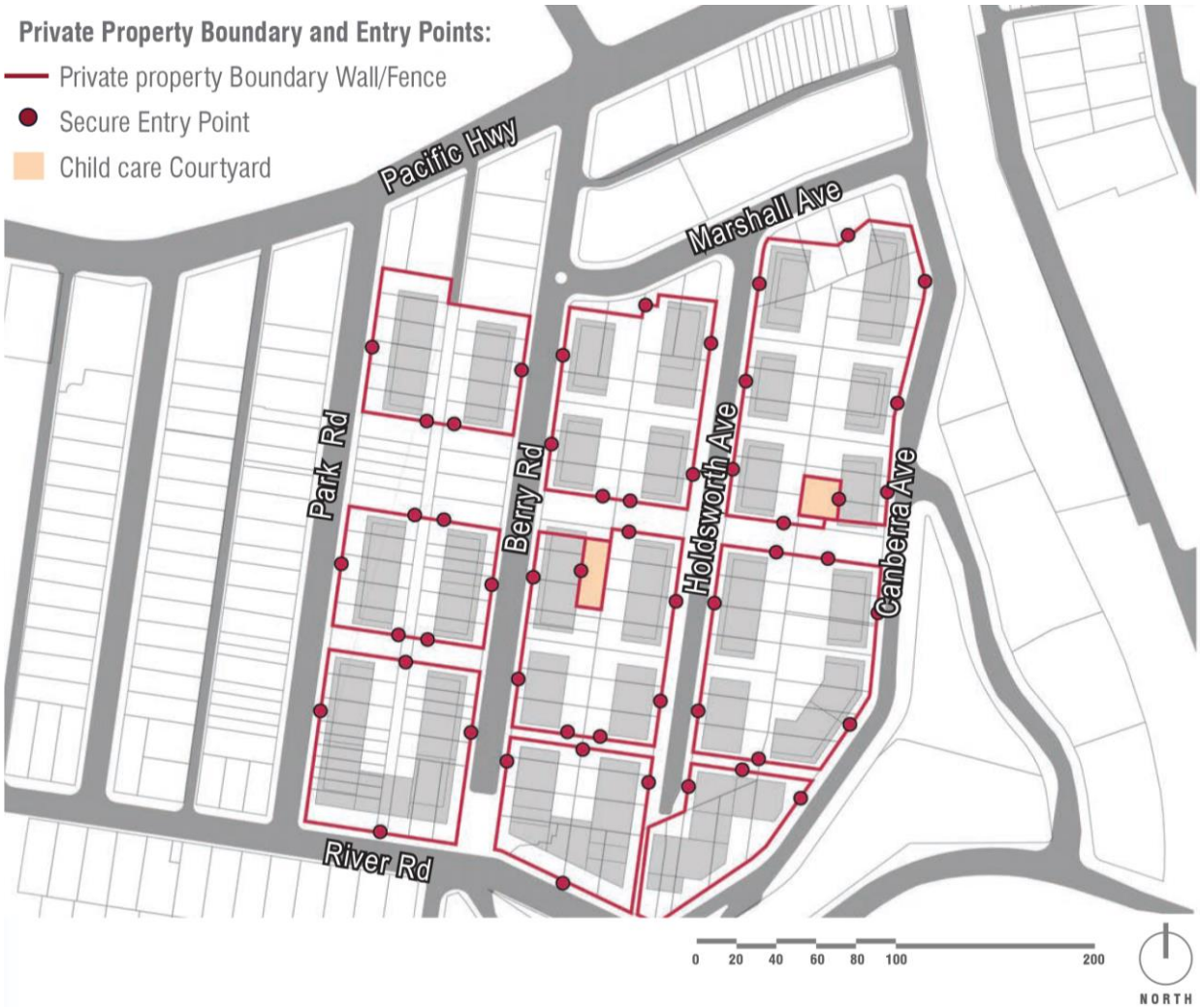


Figure 8.11 Indicative Site Entry Points

	Control	Provision	Notes/Location
6.4	**Edge Treatments**	• Limit basement protrusions to 1.5m. • Treat exposed basements with textural materials and landscaping as per the LMP to minimise visual impact. • Provide 1.2m front fence/ hedge or other landscape combination at front boundary to create privacy for ground floor and semi-basement units.	
6.5	**Transition to Lower Densities**	• Additional setback is to be provided to Park Rd by relocating land area of Berry Lane to Park Road frontage. • Plant large tree species in enlarged front setback. • Additional setback to include large trees and be unfenced with landscaping to integrate with site landscape design.	

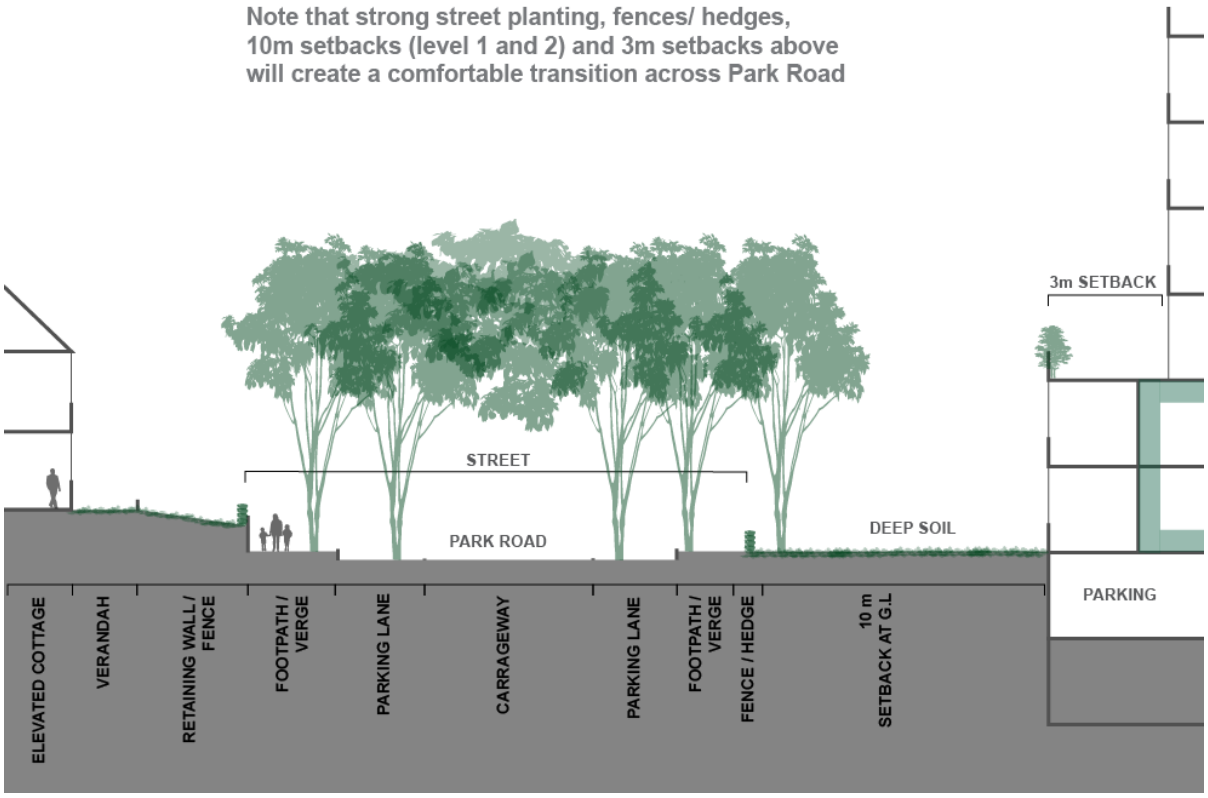


Figure 8.12: Density Transition

	Control	Provision	Notes/Location
6.6	**Vehicle Access**	• Provide vehicle access from street frontage at lower end/edge of site. • Where multiple areas are consolidated, minimise vehicle access points. • For Canberra Avenue South, locate vehicle access points to facilitate road closure to consolidate land into Newlands Park. • Restrict vehicle access from River Road.	For Areas 21, 22 & 23 - Temporary arrangements may be required to maintain access to Berry Lane pending ultimate closure.

6.7	**Parking**	• No parking is permitted within the front setback.
		• Parking is to be in basements under the building footprint but NOT:
		  • under designated deep soil zones as per LMP;
		  • under the front setback;
		  • under the 'Green Spine'. Where justification is provided, intrusions into deep-soil Green Spine areas shall only be considered after two levels of basement parking has been provided under the building footprint.
			• See Part R of Council's Development Control Plan for parking rates).

7.0 LANDSCAPE

OBJECTIVES

- To ensure all development will have a high level of landscaping.
- To conserve existing trees wherever possible and enhance tree planting.
- To implement the Landscape Master Plan (LMP) and Typology Plan.
- To create a “deep soil” network suitable for growing large trees.

Controls

	Control	Provision	Notes/Location
7.1	**Landscape Master Plan**	Landscaping for the Precinct shall be as set out in the Landscape Master Plan (LMP).	
7.2	**Open Space Configuration**	Open space shall be located as shown in the LMP (See Figure 8.14).	Open space typologies include: **Public** • Local park • Pocket parks • Streets • New Road • Pedestrian links; and **Private** • Green Spines • Front and side setbacks • Courtyards and balconies • Roof gardens

- This approach allows for a clear distinction between the private communal spaces and the public domain.
- The public spaces are in keeping with the existing native / informal character of the area and surrounding parks, tying together the overall development
- There is greater flexibility within the green spines which will allow for more individual expression between developments
- Deciduous trees in the private areas provide greater winter solar access to largely overshadowed communal areas
- Material palettes to be high quality and robust while providing a distinction between public and private areas

Figure 8.13: Landscape Master Plan

Figure 8.14: Landscape Typology

7.3 PUBLIC DOMAIN

	Control	Provision	Notes/Location
7.3.1	**Extension of Newlands Park**	Landscape design in Areas 7, 9 & 11 shall provide for possible future closure of Canberra Ave between River Rd and south of the intersection with Duntroon Ave to create an extension of Newlands Park.	
7.3.2	**Pocket Parks**	Landscape design in Areas 10, 11, 18, 19, 20 and 23 shall provide for future road closures in Holdsworth Avenue and Berry Road to create Recreation areas.	
7.3.3	**Street Trees**	Street tree and other landscape planting shall be provided as set out in the LMP.	Parking or Planting blisters as per typical streetscape section (Figure 8.15)
7.3.4	**E-W Pedestrian Links**	Landscape design of all E-W Pedestrian Links shall be provided as set out in the LMP.	

Figure 8.15: Cross-section of typical narrowed street

7.4 PRIVATE DOMAIN

OBJECTIVES

- To preserve and enhance, wherever possible, the existing vegetation and landscape character of the Precinct.
- To create a coherent and attractive private street-front landscape to support and enhance the Public Domain.
- To facilitate the creation of integrated communal open space (Green Spines) with extensive deep soil zones.
- To ensure that communal open space facilities (swimming pools, activity areas, playgrounds, barbeque areas etc) are located and designed to minimise negative impacts on adjacent residential apartments.
- To facilitate private open space (balconies and courtyards) which will enhance residential amenity.
- To facilitate roof gardens to provide further communal residential open space and contribute to sustainability.
- To minimise off-site impacts such as stormwater run-off.

	Control	Provision	Notes/Location

7.4.1	**Tree Conservation / Removal**	• Tree retention shall be as per Figure 8.16.
		• An Arborist's Report is required for each Area which shall include:
		  • Location, Age, condition, species and conservation value of all trees (SULE assessment)
		  • Justification for any trees proposed to be removed
		  • Trees to be retained and any measures needed to facilitate tree retention
		  • Measures taken to minimise impacts of construction on deep soil zones and mature existing trees	

Figure 8.16: Tree Conservation / Removal

	Control	Provision	Notes/Location
7.4.2	**Communal Open Space (Green Spines)**	• Green Spines are to be provided as set out on Figure 8.17 • The design of the Green Spines and provision of communal facilities shall be as set out in the LMP, in particular the nine specific landscape plans for contiguous Green Spine areas. • The Green Spines shall comprise predominantly deep soil as per the LMP. • Intrusions into deep-soil Green Spine areas shall only be considered after two levels of basement parking has been provided under the building footprint. • Alternative arrangements to the requirements of the LMP for Deep Soil areas in Areas 11, 20 and 23 may be considered provided it can be demonstrated the intent of the deep soil zones can be achieved. • Finished Green Spine levels shall generally comply with those shown on Figure 8.18 and (LMP) to relate to building floor levels. • Level transition at property boundaries shall generally be as per LMP and Figures 8.20 and 8.21. • Connections shall be provided (at levels shown in Figures 8.18 and 8.19) to adjacent areas and to areas of public domain as shown on LMP (particularly streets and E-W links) • Planting on structure (Podia, basements, roof gardens etc) shall be as specified in Figure 8.25 and LMP. • The Recreation Areas adjacent to the community facilities in Areas 5 & 17 Green Spine and all residual rear setback area are to be incorporated into the Green Spines • Connect Green Spines to communal areas of buildings/foyers and lobbies to provide access.	Refer to Part 7 of Lane Cove LEP Minor variations may be acceptable where accessibility and pedestrian connection can be demonstrated throughout the Green Spine and the adjacent public and private domains.

	Control	Provision	Notes/Location
7.4.2	**Communal Open Space (Green Spines) (continued)**	• Edge treatments to private open space, buildings and parking basements shall be as detailed in Figures 8.22-8.24 and LMP • Security gates shall be provided at the connection of Green Spines to Public Domain. See Figure 8.11	

Figure 8.17: Green Spines

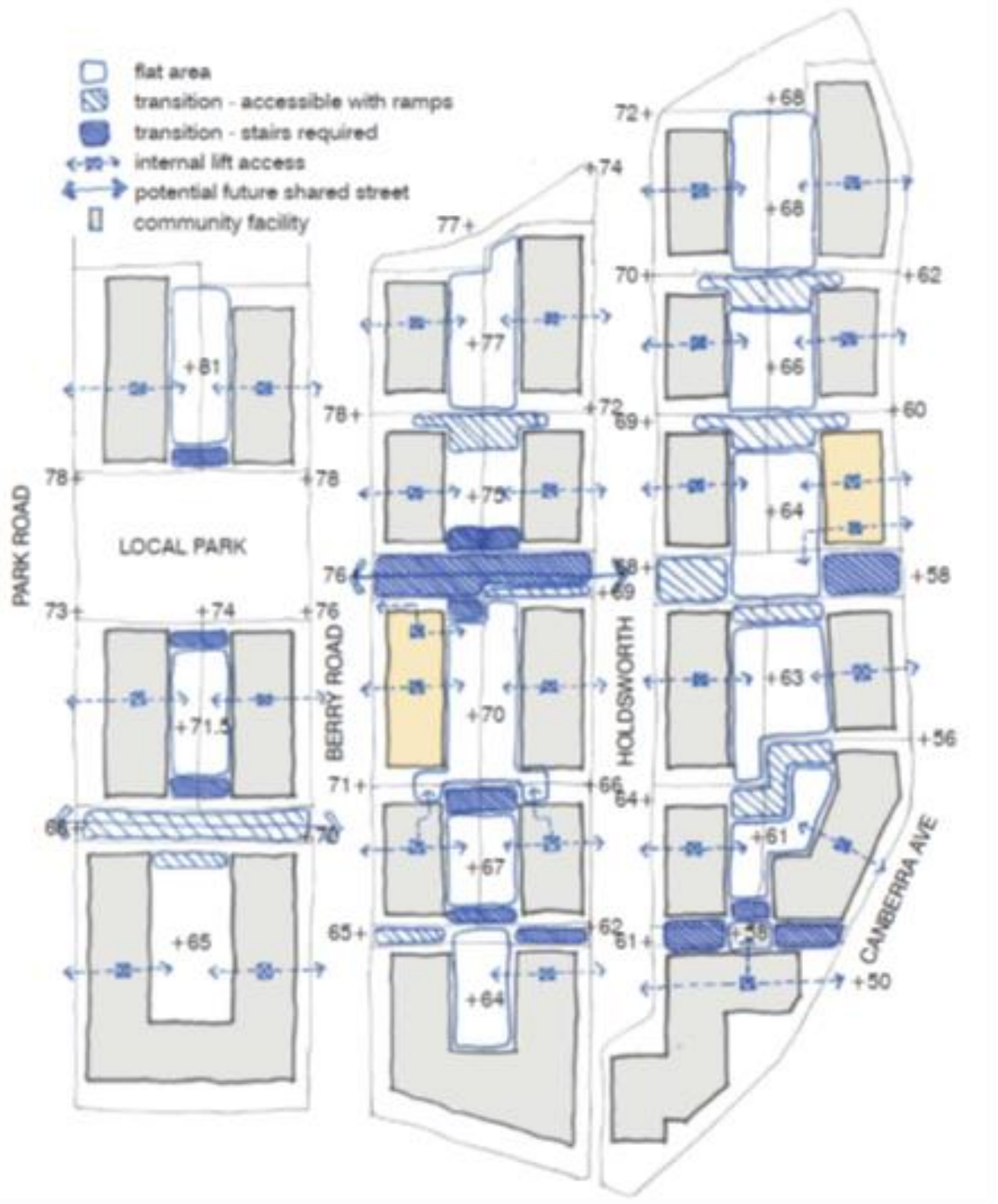


Figure 8.18: Indicative Site Levels

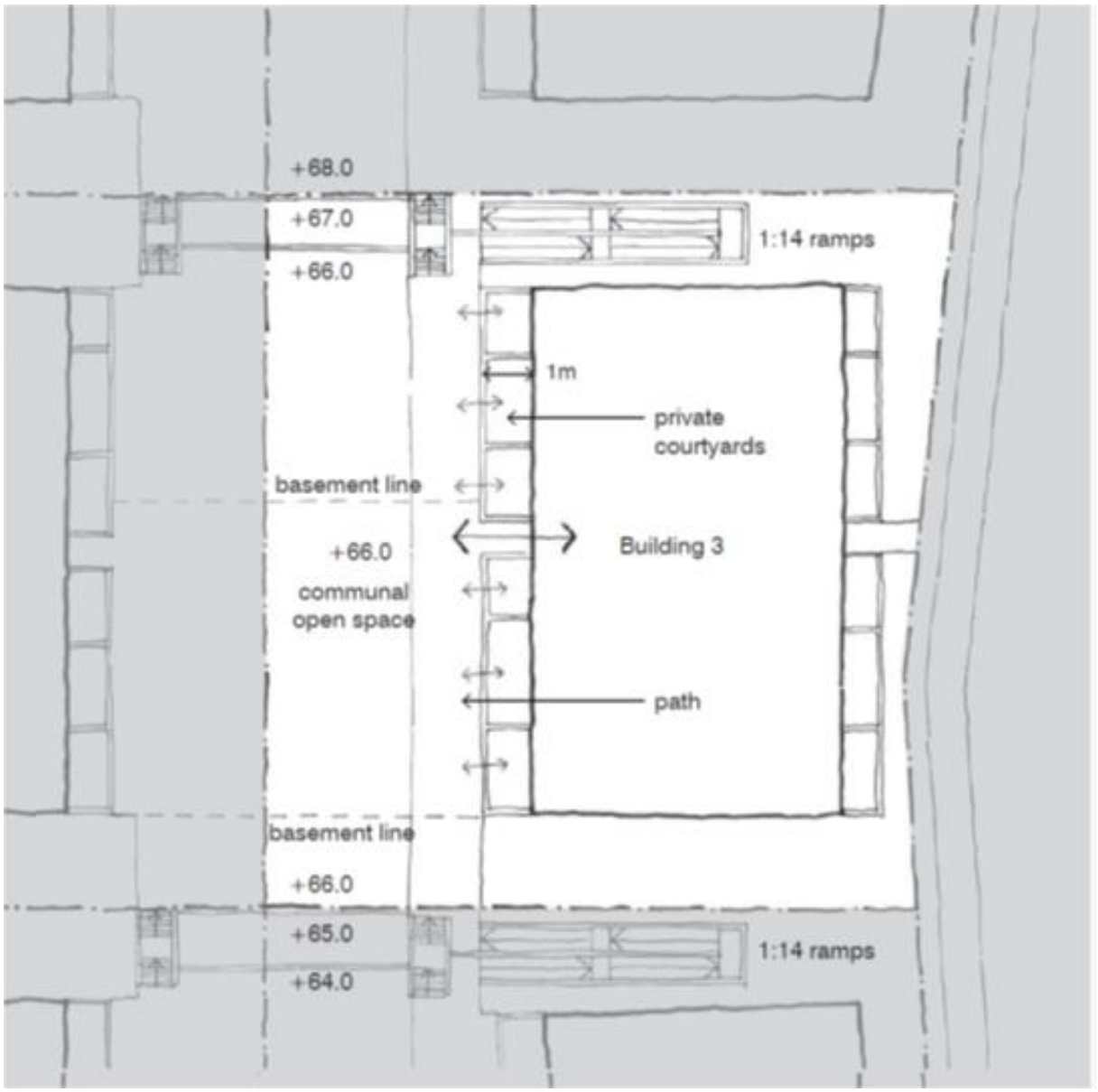


Figure 8.19: Level Changes (Ramp)

	Control	Provision	Notes/Location
7.4.3	**North-South Grade Transitions**	• North-South level transitions shall be accommodated at or near property boundaries by ramp or stairs to achieve the levels shown in Figures 8.18 and 8.20. • Any extensive ramps shall desirably be located between buildings (in side setbacks) as per Figure 8.19. • Ramps and stairs (connecting to LMP levels) will be provided by the first development area to proceed • Retaining walls shall be constructed as per LMP.	

	Control	Provision	Notes/Location

7.4.4	**East-West Grade Transitions**	• East-West transitions shall incorporate levels shown in Figures 8.18 and 8.21
		• The site may step at
		  • street edge and/or
		  • building facade
		• Green Spine levels shall connect seamlessly as per Figure 8.18 and LMP	

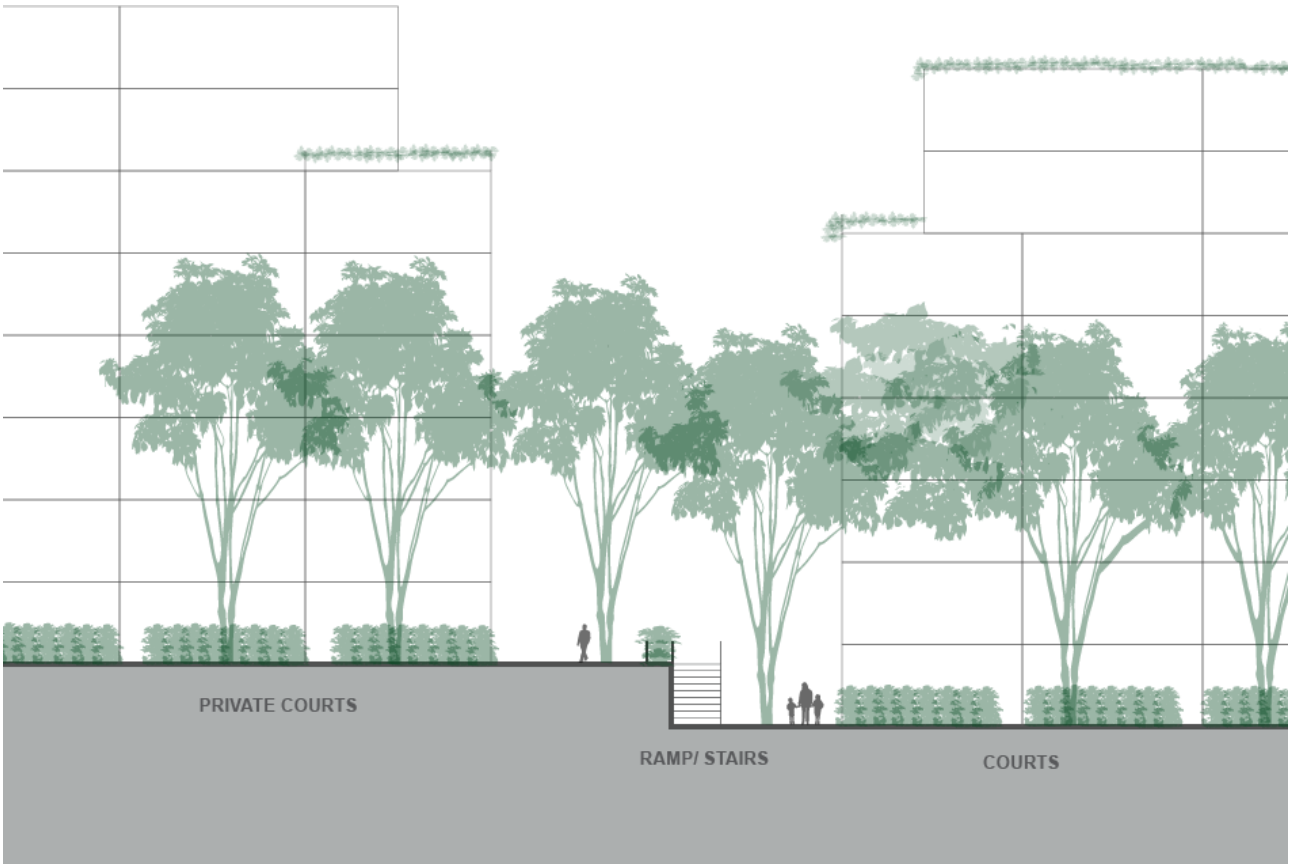


Figure 8.20 Indicative North-South Level Transition

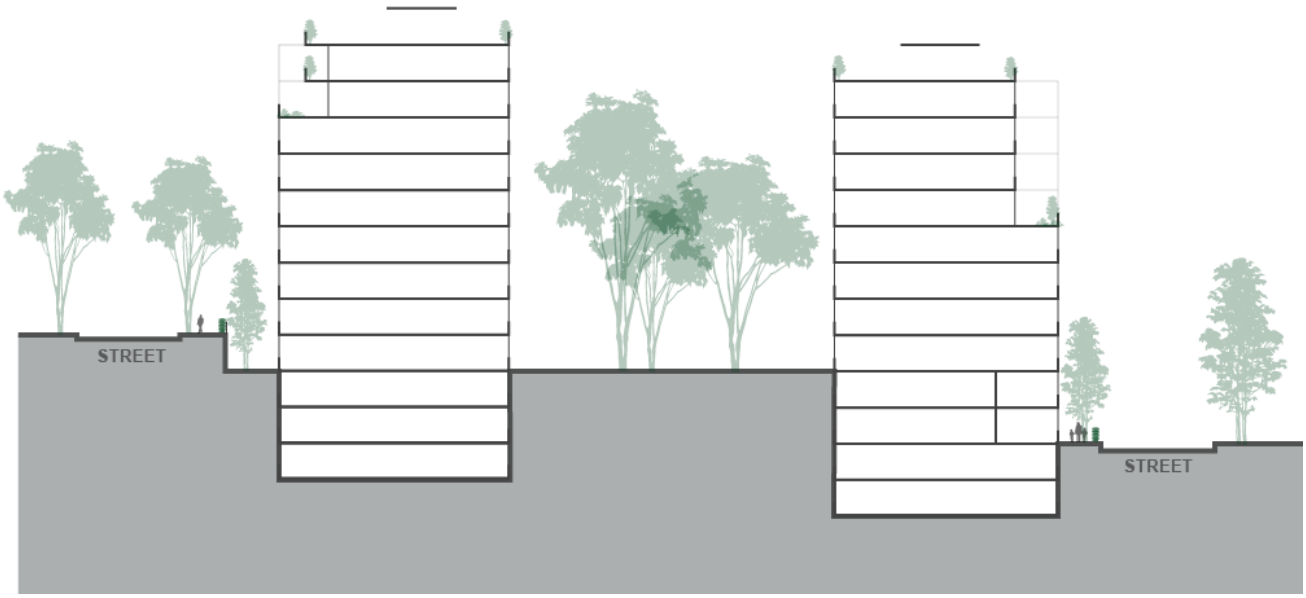


Figure 8.21 Indicative East-West Level Transition

	Control	Provision	Notes/Location
7.4.5	**Front Courtyards and Setbacks**	• Front setbacks to be deep soil and to be treated as front gardens to GF units (or basements units) • Edge treatment to the boundary shall comprise a 1.2m max fence/hedge to provide screening as per the LMP. • Boundary treatments shall be as indicated in Figures 8.23-8.24 & LMP	The setback area shall be of a suitable size to ensure the development is not visually intrusive by providing softening between buildings, driveways and car parking areas.

Figure 8.22: Front Boundary / Edge Treatments (Location)

	Control	Provision	Notes/Location
7.4.6	**Private Courtyards at ground level**	• Private courts to be located as indicated on Figure 8.23. • Private courts may extend a maximum of 1 metre into Green Spines. • Direct access shall be provided from private courts to Public Domain and/or Green Spine. • Edge treatment between private courts and communal Green Spine shall be as detailed in Figures 8.22, 8.23 and 8.24.	
7.4.7	**Edge Treatments**	• Edge treatments to protruding basements, retaining walls	

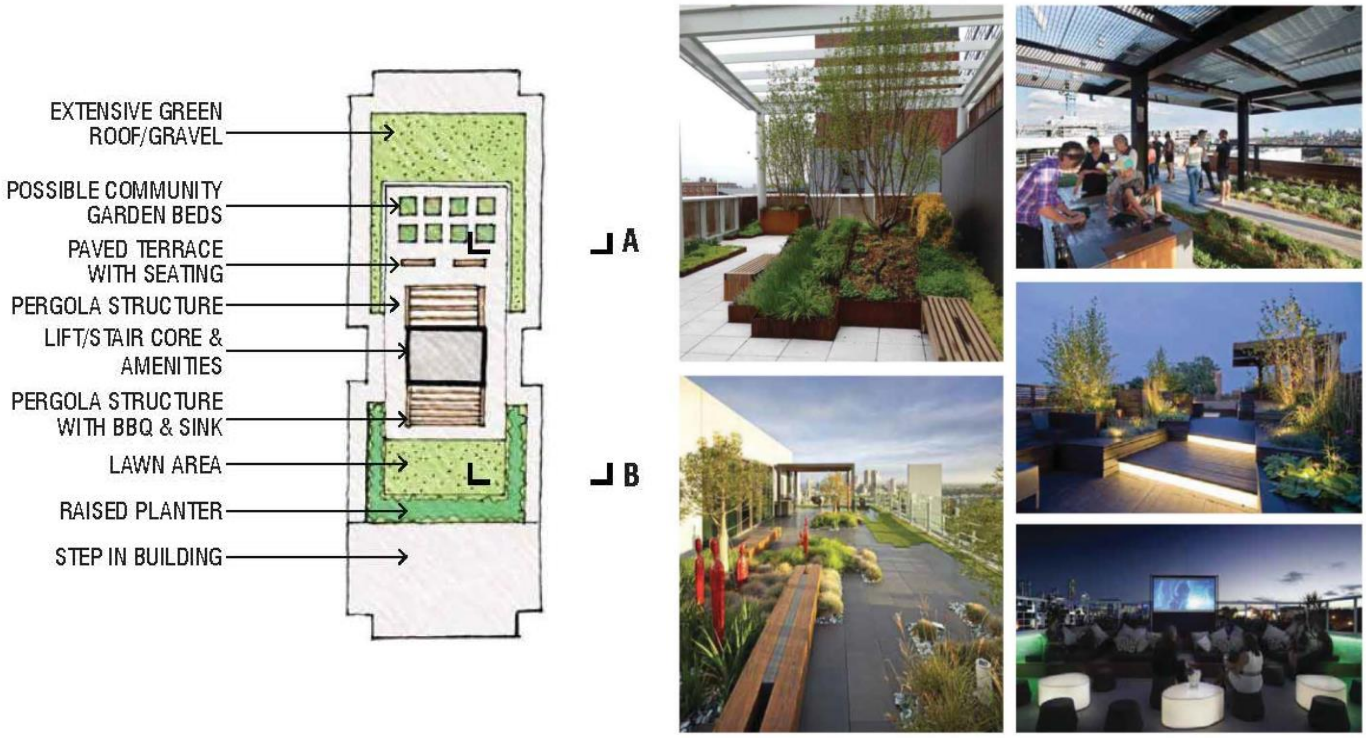
		shall be as per LMP details (Figure 8.24). • Edge treatments between private courts and communal green spine – see as detailed in Figures 8.22, 8.23 and 8.24	

Figure 8.23: Front Boundary / Edge Treatments (Details)

Figure 8.24: Front Boundary / Edge Treatments (Photos)

	Control	Provision	Notes/Location
7.4.8	**Roof Terraces**	• Roof Terraces are encouraged, refer Figures 8.25 (a) and (b) and LMP for desired Roof Terrace design. • Roof Terraces must be accessible (lift access). • Communal amenities shall be provided (kitchen, toilets, sheltered eating/BBQ areas). • Enclosed space and shelter for communal amenities provided for roof terraces are not counted as a storey. These spaces should only contain non-habitable floor space.	

Figure 8.25 (a): Roof Terraces - Location



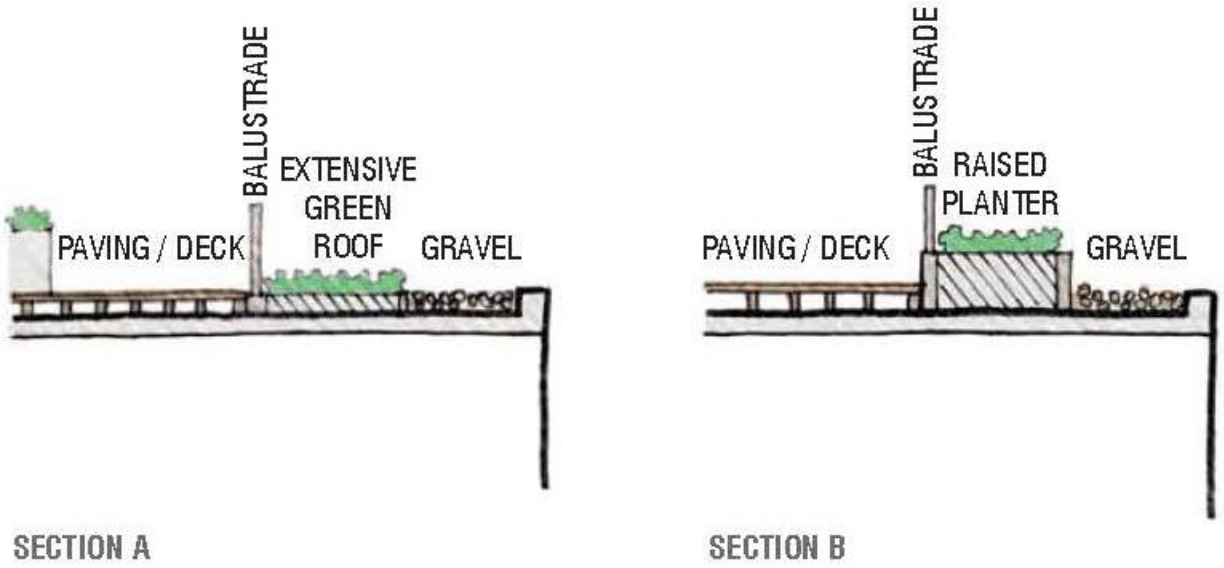


Figure 8.25 (b): Roof Terraces – Details

	Control	Provision	Notes/Location
7.4.9	**Public Art**	• Each Area shall prepare a public art strategy to integrate with their landscape plans (see LMP) • Each Area shall provide Public Art to a minimum value of 0.1% of the development construction value.	See LMP and Part L of Council's Development Control Plan

Figure 8.26: Public Art Samples

8.0 ENVIRONMENTAL / SUSTAINABILITY

Transit-orientated development alone significantly cuts energy consumption in multi-family buildings, more so than Energy Star building construction or green cars, though the latter make a significant contribution as well.

In this section, sustainable design refers to measures and provisions relating to building materials, water conservation (including water sensitive urban design), and energy efficiency.

OBJECTIVES

- To reduce the need for mechanical heating and cooling in buildings
- To reduce reliance on fossil fuels
- To minimise greenhouse emissions and environmental impact over the life-cycle of development
- To promote renewable energy initiatives

	Control	Provision	Notes/Location
8.1	**Environmental Performance**	• The design, construction and operations of any new building in this precinct, including its services and fit outs, must be capable of achieving a minimum 6 star rating under the Nationwide House Energy Rating Scheme (NatHERS) by a suitably qualified person.	Taller buildings should consider providing an centralised integrated air-conditioning system, located within the building plant.
8.2	**Wind Impact**	• Buildings shall comply Part B Cl 6.2 of Council's Development Control Plan	A Wind effects report relating to all facades, internal and external to the site, is to demonstrate methods to achieve appropriate outcomes for public and private domains, e.g. awnings, baffles, articulation etc.
8.3	**Green Roofs**	• All developments are encouraged to consider inclusion of a green roof to provide thermal efficiency.	
8.4	**Green Walls / Vertical Gardens**	• All developments are encouraged to consider inclusion of green walls / vertical gardens.	

8.5 Water Management and Conservation

Water sensitive urban design is the integrated management of water in urban areas. It takes into account all of the elements of the urban water cycle including potable (drinking quality) water, rainwater, wastewater, stormwater and groundwater.

The Building Sustainability Index (BASIX) ensures that all new dwellings are designed to minimise potable water use and reduce greenhouse gas emissions. To support the requirements of BASIX there are a number of planning and design considerations that are relevant to apartment developments.

	Control	Provision	Notes/Location
8.5.1	**Potable Water**	Minimise potable water use by: • Using water efficient appliances • Explore rainwater collection and reuse • Use drought tolerant plants	
8.5.2	**Urban Stormwater**	• Collect, store and treat on site • Maintain maximum Green Spine and other deep soil for percolation • Provide on-site stormwater and infiltration including bio-retention systems such as rain gardens • Buildings shall comply Part B Cl 6.3 of Council's Development Control Plan • All other stormwater management measures are detailed in Council's Development Control Plan Part O (Stormwater Management).	Stormwater can be collected and stored in combined storage tanks/retaining walls, which will be integrated with the stepped nature of green spines. This water can be used to irrigate garden areas.
8.5.3	**Flood Management**	• Provide detention tanks desirably under paved areas, driveways, in retaining walls or in basement car parks	See the LMP

9.0 INFRASTRUCTURE FUNDING

Objective

To provide new and improved built infrastructure (roads, drainage, pathways/E-W links, community facilities, public domain improvements, parks and public art) that is required within the Precinct to support population growth and to create an attractive, vibrant, liveable environment, as a sustainable TOD.

The specific Infrastructure items have been identified in the LEP under Part 7 and also in detail in this DCP.

Funding for the infrastructure will be achieved through:

- Development contributions under S7.11 of the Environmental Planning and Assessment Act;
- The development process as conditions of development; and
- The provision of planning incentives (Height and FSR) in return for items identified in LEP Part 7.

The principles of the planning incentives scheme are:

- **Nexus**: That some of the benefit afforded to sites within the St Leonards South Precinct (through an uplift in FSR) is captured by Council to provide essential infrastructure required as a result of increased densities in the area

- **Transparency**: this includes a clear understanding of what infrastructure is to be funded and how contribution rates and community benefit are calculated and applied to individual sites

- **Equity**: A framework that treats landowners fairly and where both infrastructure and incentives for development are based on equity and fairness

- **Practical**: The implementation of the mechanism must be practical and occur in a timely fashion to avoid delays and provide certainty for commercial dealings

- **Feasibility**: The contributions must be reasonable and provide infrastructure without burdening land such that development is not feasible at each stage

ST LEONARDS SOUTH LANDSCAPE MASTER PLAN

OCTOBER 2020

O C U L U S
landscape architecture // urban design

CONTENTS

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01

INTRODUCTION

INTRODUCTION

State policies, specifically the Greater Sydney Region Plan, identify the types of areas suitable for higher residential and employment densities as being those around transport and shopping hubs.

The St Leonards South Precinct has significant strategic potential in terms of increased densities and the application of sustainable planning principles of integrating residential and employment land use and transport, given its proximity to the St Leonards Strategic Centre and the rail-bus hub around St Leonards Station and the future Sydney Metro Crows Nest Station.

Inner city living provides access to the CBD and other centres, retail, jobs, education, health facilities and recreational activities. At the same time there is increased demand for parklands, child care centres and other infrastructure to provide services and amenity in response to population growth.

The St Leonards South precinct was planned to provide for high residential density based on transit-orientated development principles. Urban planning, traffic, transport and economic studies were undertaken to support the plan. The Master Plan envisages the Landscape Master Plan to be an important feature of the community's amenity.

This Landscape Master Plan gives effect to the Lane Cove LEP 2009, Part 7 and in particular Clause 7.6 Design excellence - St Leonards South Area insofar as it addresses delivery of the highest standard of landscape design.

This Master Plan is to be read in conjunction with Lane Cove Council's:

- Local Environment Plan 2009 - particularly Clause 4.6 (8) (cb) and Part 7
- Development Control Plan 2010 - particularly Part C - Residential Localities (Locality 8)

02

SITE ANALYSIS

SITE ANALYSIS

SITE CONTEXT

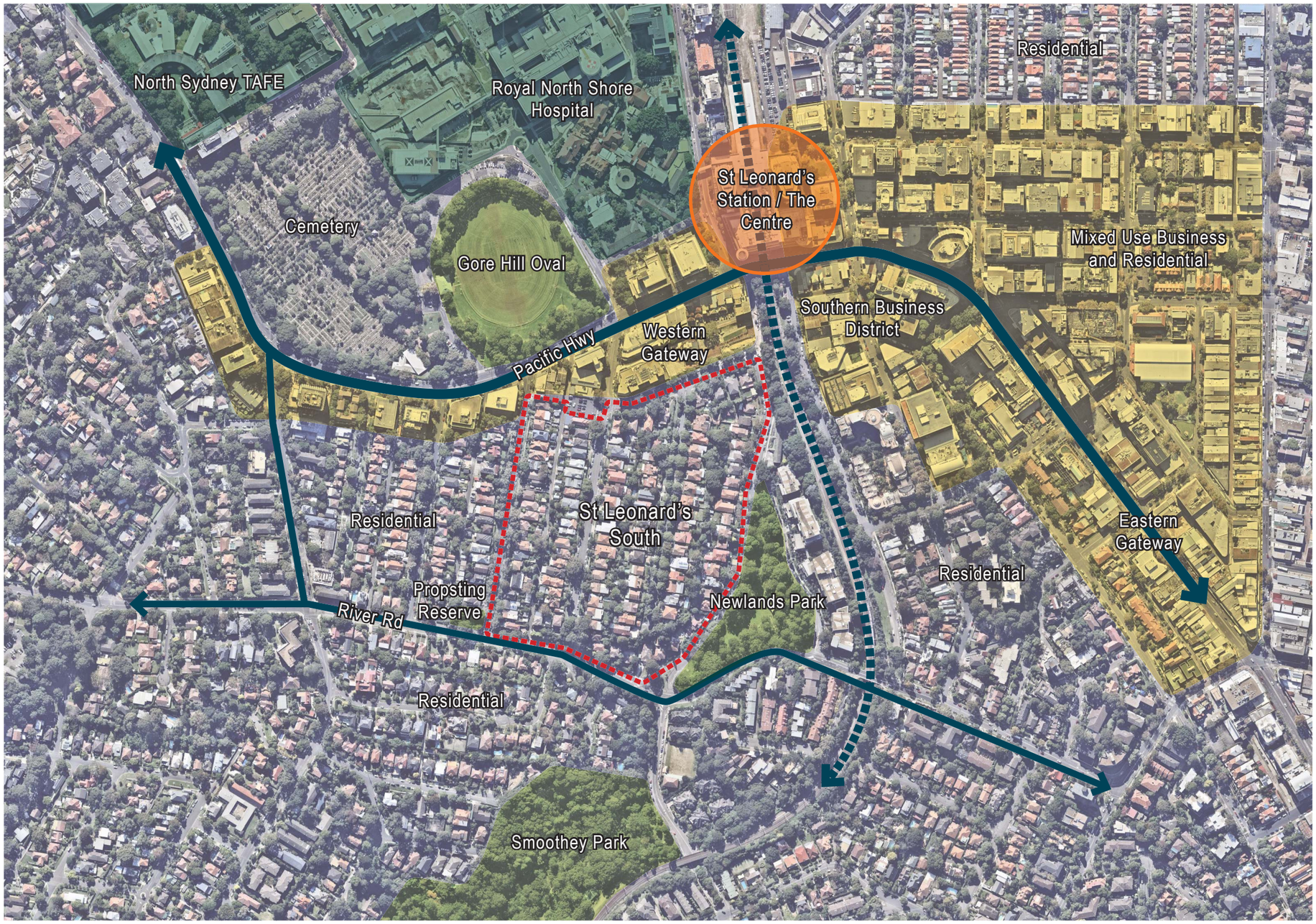
The precinct, comprising approximately 9 hectares (including local roads and development), is located immediately south-west of the St Leonards Strategic Centre as identified in the Greater Sydney Region Plan, six kilometers from Sydney CBD and on a major rail-bus transport network. It is proposed to be rezoned from a low density residential precinct to R4 High Density Residential.

The existing housing precinct, proposed to be rezoned for high density apartment development, is bounded by:

- the rail line south of St Leonards Station
- Marshall Avenue
- the eastern side of Park Road and
- the northern side of River Road.

The following areas are not part of the precinct or of the Landscape Master Plan project, but form the surrounding visual and physical context:

- North (closest to the station): The north side of Marshall Avenue is currently under development for a 29-storey residential tower at the eastern end closest to the rail line, with townhouses and up to 7-storey flats westwards, on the northern side of Marshall Avenue. The scale of development is intended to act as a catalyst for the revitalization of the southern side of St Leonards.
- North-East: The proposed St Leonards Plaza is a substantial public domain project is to be constructed over the rail line between Pacific Highway, Canberra Avenue and Lithgow Street and ending at Marshall Avenue. The aim is to introduce a major and vibrant open space area for the St Leonards centre, and this 5,000m2 urban park/ plaza will be important in terms of its social and functional role, pedestrian and bus/ rail connectivity and other matters, in complementing the St Leonards South precinct's lower-key residential landscaping character.
- East: Duntroon Avenue comprises 5-7-storey apartments. Newlands Park is a valued park of 1 hectare on the eastern end of the precinct.
- South and west: Low density residential precincts extend south of River Road and west of Park Road. The retention of the substantial existing street trees will be important in softening the visual interface between the houses and new 4-6 storey (along River and Park Roads) up to 19 storey apartments.



SITE ANALYSIS
OPEN SPACE CONTEXT

The local open space context includes the following areas of existing open space in close proximity to the site:

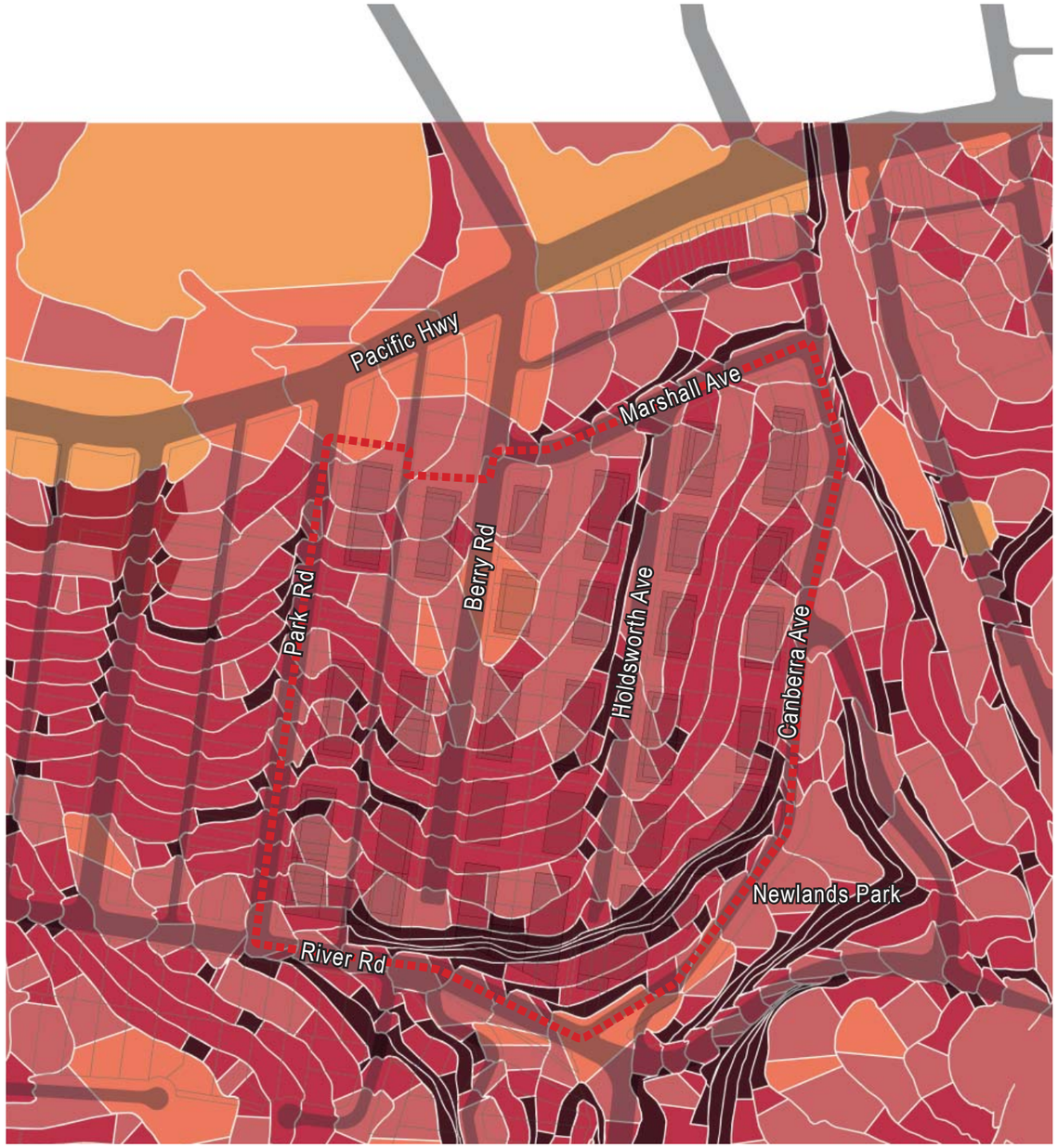
- Gore Hill Oval (3.3 Ha): a sports oval surrounded by mature trees which is subject to a potential upgrade by Willoughby Council including play area, half court, fitness equipment, picnic shelter and possible indoor multi-use sports facility;
- Newlands Park (1 Ha): including open lawn areas and a playground within a setting of mature trees;
- Propsting Reserve (0.09 Ha): a pocket park with small playground and mature trees; and
- Smoothey Park (2.1 Ha): a bushland reserve which includes a pedestrian pathway to Wollstonecraft Station.

These areas of existing open space need to be considered in developing the landscape master plan as their catchments overlap the site. It will be important that there is no duplication of recreational facilities with the proposed open space within the site. The landscape master plan may also include proposals to upgrade areas of existing open space if it is considered important to do so in order to meet the recreational needs of the existing and new population.

SITE ANALYSIS
TOPOGRAPHY

The existing site topography falls from the Pacific Highway north-south to River Road and also west-east to Canberra Avenue and Newlands Park. Grades are generally steep with the majority of the site being between 1:20 and 1:5 with localised slopes exceeding 1:5, particularly in the south part of the site.

The existing topography presents a number of issues in relation to the master plan including accessibility, solar access and how the built form responds to the often steep grade changes.



SITE ANALYSIS
EXISTING CHARACTER

The existing character of the site is largely determined by its topography, vegetation and built form. The significant grade changes both north-south and west-east provide for varied views, elevated in places. The existing tree cover, in both public and private ownerships, creates a green, leafy character. Street tree planting, where well established, tends to limit expansive views in some directions whilst focusing views down the streets.

The suburb generally has a leafy and relatively tranquil character and, although this will be changed by the proposed high rise redevelopment, it is hoped that some of the existing landscape quality will be retained, including significant tree planting along streets and in public and private open space.

The heritage properties on the west side of Park Road (Nos.3-7) contribute in an important way to the character of this street and it will be important that their heritage value is not compromised by the master plan.

SITE ANALYSIS

EXISTING TREES

- Mature street trees define the character of the area;
- Trees have been greatly impacted by overhead wires on one side of streets due to pruning;
- Generally native with a few exceptions dotted throughout such as Jacarandas and Crepe Myrtles;
- Holdsworth Avenue has the strongest street tree character with generous verges and mature Brushbox tree planting creating a strong avenue;
- Park Road Melaleucas are well established, however in poor condition on the eastern side due to pruning to clear overhead wires;
- Berry Road has less well established street trees;
- Canberra Avenue has Eucalypt species on the west side but a number of these have failed or had to be removed;
- There are numerous existing trees in backyards of varying sizes/species including several large Eucalypt species;
- There are several significant trees located in front yards, including several along the south side of Marshall Avenue.

Existing trees:

- road reserve / public domain
- private property

0 20 40 60 80 100 200

NORTH

SITE ANALYSIS

TRANSPORT & LINKS

The site lies in close proximity to the rail-bus hub around St Leonards Station and the future Sydney Metro Crows Nest Station.

The steep topography rising from south to north makes pedestrian and cycle access to public transport centred around the station from the south part of the site more difficult.

The current access to the station from the south side of the Pacific Highway is also not ideal with a degree of back-tracking required due to the current location of signalised crossings in relation to the station and Canberra Avenue. The proposed public plaza over the railway lines south of the Pacific Highway may assist with access to the station by allowing pedestrians to cross over the railway from the west side and access the existing underpass on the east.

A number of cycle routes pass through or adjacent to the site (as identified in the Lane Cove Bike Plan 2019) including several east-west routes including along River Road, and north-south along all of the precinct's roads to connect with Herbert St or via Marshall Ave to connect to Reserve Rd.

The existing streets all typically have on-street car parking although this is somewhat limited by driveways.

Transport:

- Cycle route Lane Cove Bike Plan 2019
- Train line
- Train station
- On street parking
- Bus stops

0 20 40 60 80 100 200

NORTH

03

DESIGN PRINCIPLES

DESIGN PRINCIPLES

TOPOGRAPHY & LEVELS

Design Principles related to topography and levels include:

- Working with the existing topography and grades as far as possible to minimise earthworks and difficult interfaces or level transitions and retain existing trees;
- Creating reasonably level areas that are usable as communal open space;
- Minimising changes in level between apartments and adjacent open space or streets;
- Integrating stairs and ramps into the landscape design of open space to ensure the usability and amenity of public and private open space.

ACCESSIBILITY

Design Principles related to accessibility include:

- Making the primary east-west public link between Canberra Ave and Park Road accessible by means of 1/20 walkways in combination with public lifts located in the two community buildings;
- Ensuring that the local park located between Park Road and Berry Road has accessible routes through it;
- Making the north-south communal open space (green spines) accessible between and from adjacent development sites as far as possible;
- Ensuring that the pocket parks are accessible from Marshall Avenue (where pocket parks are adjacent to Marshall Ave).

DESIGN PRINCIPLES

CONNECTIONS

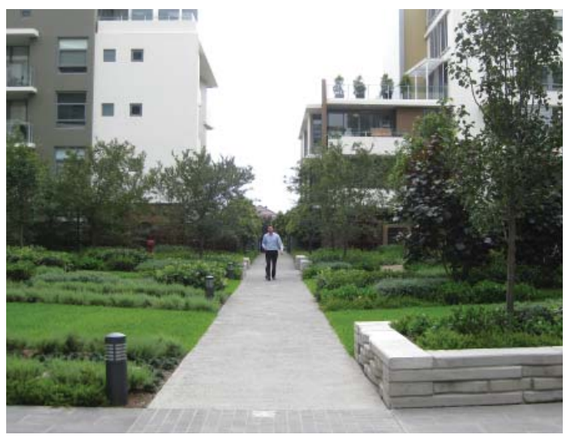
Design Principles related to connections include:

- The creation of a continuous east-west public accessible pedestrian route from Canberra Ave to Park Road through the proposed local park;
- The creation of secondary publicly accessible east-west pedestrian links between Canberra Ave and Berry Road, and between Holdsworth Ave and Berry Road;
- The provision of a new road between Berry Road and Park Road;
- The creation of continuous north-south accessible pedestrian routes along the communal open space (green spines) as far as possible for private residents use;
- The provision of private resident access between the two pocket parks on Marshall Ave and the north-south green links;
- Maintaining and upgrading the existing pedestrian connections from the south ends of Holdsworth Ave and Berry Road to River Road;
- Investigating the potential for a new signalised pedestrian crossing of River Road at the intersection with Canberra Ave\ and Russell St;
- Investigating the closure of Canberra Ave between River Road and south of the intersection with Duntroon Ave to create an extension of Newlands Park westward.

STREETS

Design Principles related to streets include:

- Maintaining and enhancing the current street network including footpath upgrades, street lighting improvements, the undergrounding of power lines, and additional/replacement street tree planting;
- The provision of a new low-speed, pedestrian-friendly road between Berry Road and Park Road;
- Providing new pedestrian crossings at the point where the new east-west links cross each of the public streets, including pram ramps, carriageway narrowing, planted blisters, signage and lighting;
- Widening several north-south verges to include extra tree planting combined with a structural soil system (Stratavault or equivalent).



DESIGN PRINCIPLES

OPEN SPACE NETWORK

Design Principles related to open space include:

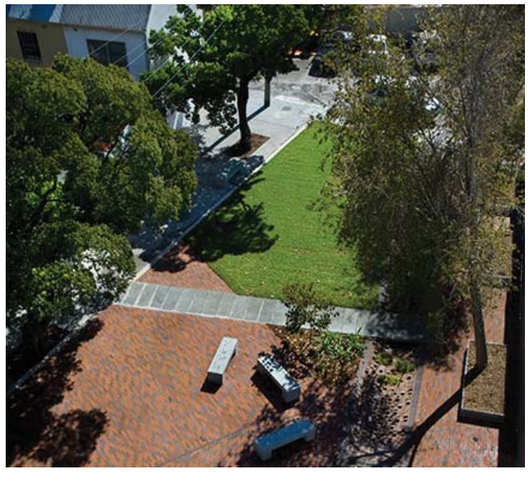
- Creating a new public local park located between Park Road and Berry Road;
- Creating two new publicly accessible pocket parks on the south side of Marshall Ave;
- Enhancing and expanding the two pocket parks at the ends of Berry Road and Holdsworth Ave;
- The creation of a continuous east-west public accessible pedestrian route from Canberra Ave to Park Road through the proposed local park;
- The creation of secondary publicly accessible east-west pedestrian links between Canberra Ave and Berry Road, and between Holdsworth Ave and Berry Road;
- The provision of a new road between Berry Road and Park Road;
- The creation of nine continuous north-south communal open spaces (green spines) located to the rear of the current residential lots (on private land and for residents use only);
- Upgrading the existing open space areas of Newlands Park and Propsting Reserve in order to provide improved or additional recreational facilities for the precinct;
- Investigating extending Newlands Park westward by closing and landscaping Canberra Ave between River Road and a point south of the intersection with Duntroon Ave.

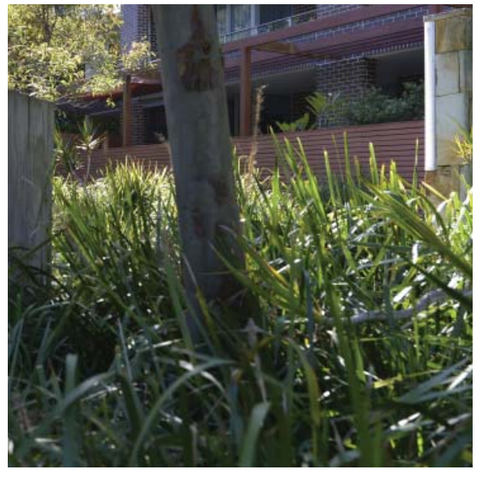
TREES & PLANTING

To be read in conjunction with Lane Cove Council's DCP, Part J - Landscaping.

Design Principles related to planting include:

- Maintaining and enhancing the existing green character of the precinct through planting, particularly of trees, in public and private open space;
- Retaining existing trees, especially within Communal Open Spaces (Green Spines) and setback zones;
- Enhancing existing street tree planting, particularly where currently in poor condition (eg. east side of Park Road, Berry Road, west side of Canberra Ave) in association with the undergrounding of power lines;
- Providing tree and other planting in areas of public open space including the local park and along pedestrian links;
- Providing tree and other planting in areas of private open space including the north-south communal open space (Green Spines), pocket parks, and along pedestrian links;
- Providing significant areas of deep soil planting within private development sites;
- Providing planting within building setbacks particularly in front setbacks to the street;
- Providing planting for amenity and shade to any communal open space located on rooftops.





DESIGN PRINCIPLES

PUBLIC & PRIVATE SPACE

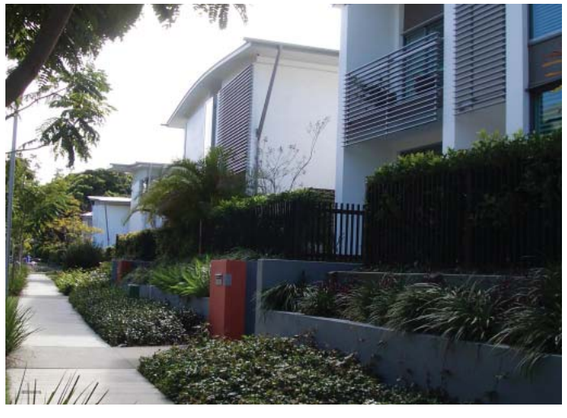
Design Principles related to public and private space include:

- Ensure there is clear definition and distinction between public and private open space;
- Ensure that transitions between public and private space are clear and legible;
- Provide adequate privacy to private apartments and terraces/ courtyards;
- The design of external spaces should follow CPTED principles;, including allowing adequate passive surveillance;
- External spaces should be adequately lit without being over-lit or resulting in light spill issues.

SETBACKS

Design Principles related to open setbacks include:

- Provide adequate front, side and rear setbacks to buildings with appropriate landscape treatments;
- Ensure that the landscape treatment of setbacks provides adequate privacy to private apartments and terraces/ courtyards;
- Use landscaped setbacks to provide amenity, privacy and accommodate level changes;
- Provide deep soil planting within landscaped setbacks;
- Landscaped setbacks should be used to help mitigate the impact of basement car park structures where these emerge above ground level.



DESIGN PRINCIPLES
SUSTAINABILITY

Design Principles related to sustainability include:

- Promoting active transport and physical activity through the provision of convenient and comfortable walking / cycling paths and attractive outdoor spaces with a range of recreation facilities;
- Incorporating water sensitive urban design measures such as rain gardens and bioretention swales within public and private open space;
- Explore opportunities to provide communal gardens as part of the communal open space;
- Explore opportunities to provide extensive or intensive green roofs on new buildings;
- Explore opportunities to include solar panels on roofs;
- Using materials with low VOC content, low embodied energy, high recycled content, the ability to be recycled, and are locally sourced wherever possible;
- Explore opportunities to retain existing features such as existing trees and sandstone walls;
- Ensuring all timber is either sourced from sustainable sources (with relevant certification) or is recycled;
- Using energy efficient lighting such as LED and solar powered.

04

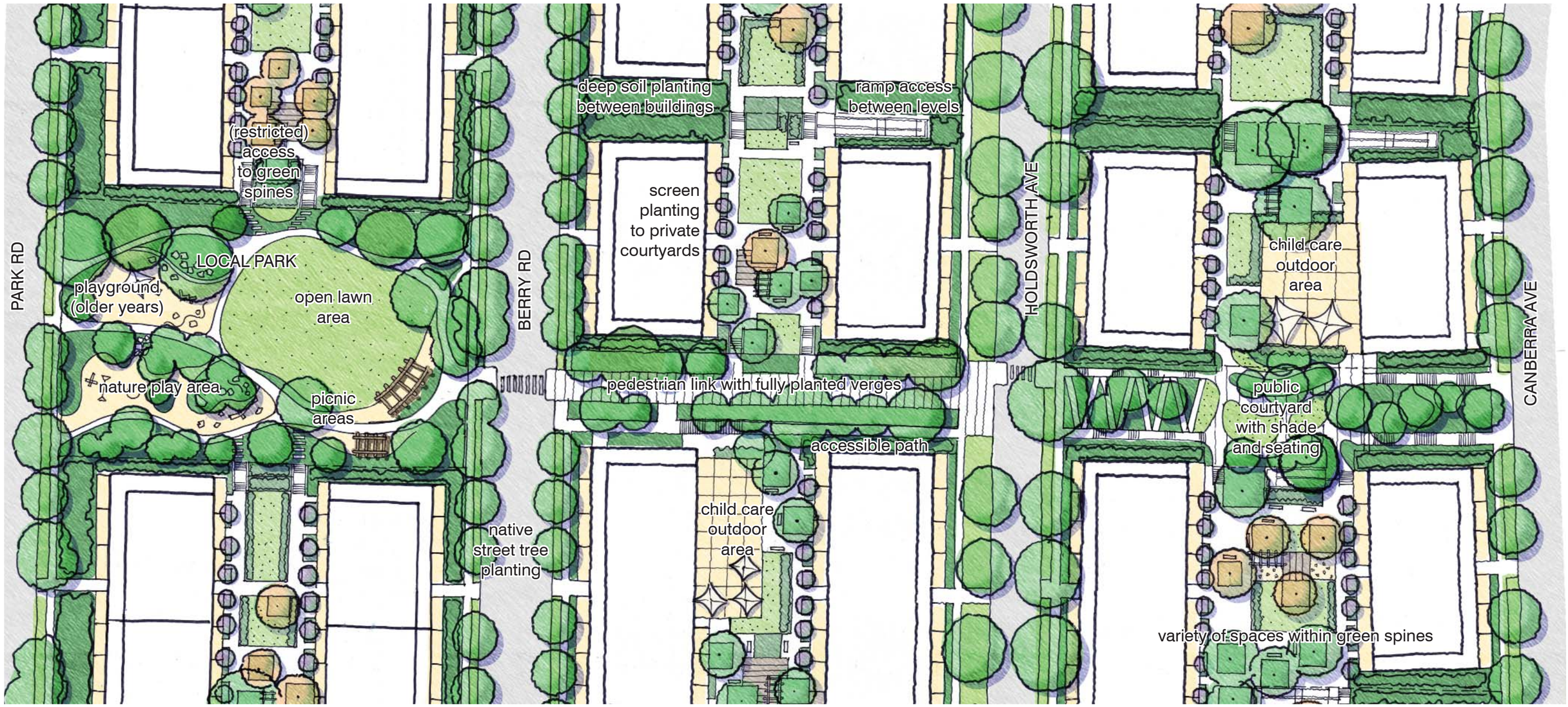
MASTERPLAN

MASTERPLAN

DESIGN APPROACH

- This master plan (shown on the right) takes elements from the formal (urban) and informal (natural) approaches to allow for a clear distinction between the private communal spaces and the public domain.
- The public spaces are in keeping with the existing native / informal character of the area and surrounding parks, tying together the overall development
- There is greater flexibility within the communal open spaces(green spines) which allow for more individual expression between developments
- Deciduous trees in the private areas provide greater winter solar access to largely overshadowed communal areas
- Material palettes to be high quality and robust while providing a distinction between public and private areas.

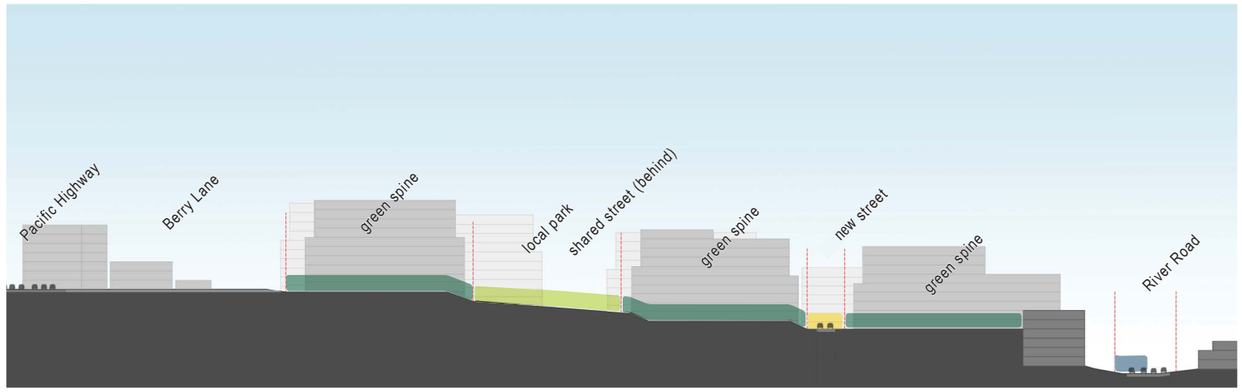
DESIGN APPROACH



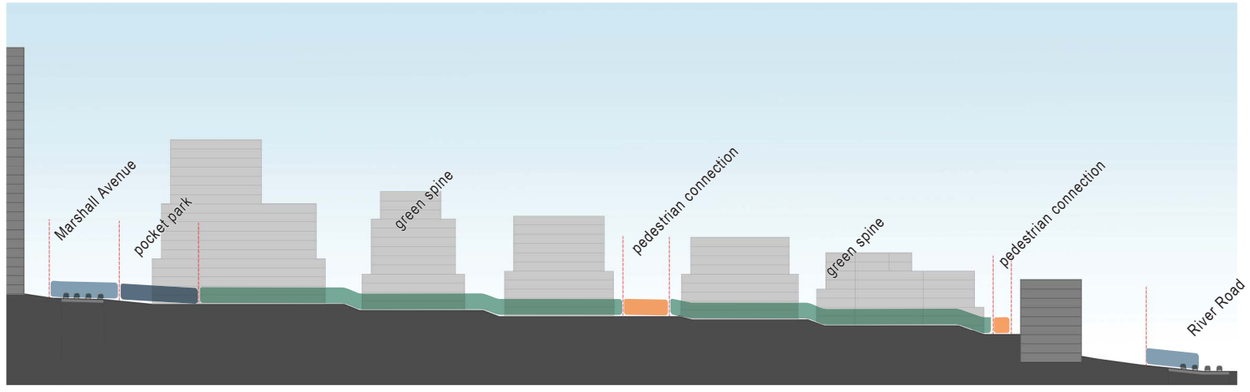
AERIAL PERSPECTIVE (LANDSCAPE FOCUS)

image credit: A+Design

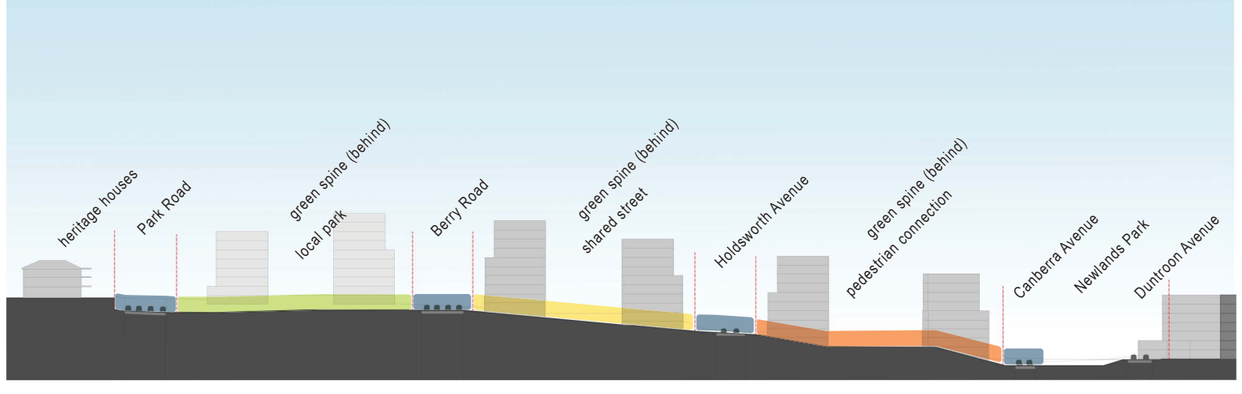
Site Section - north-south communal open space (green spine) (existing Berry Lane)



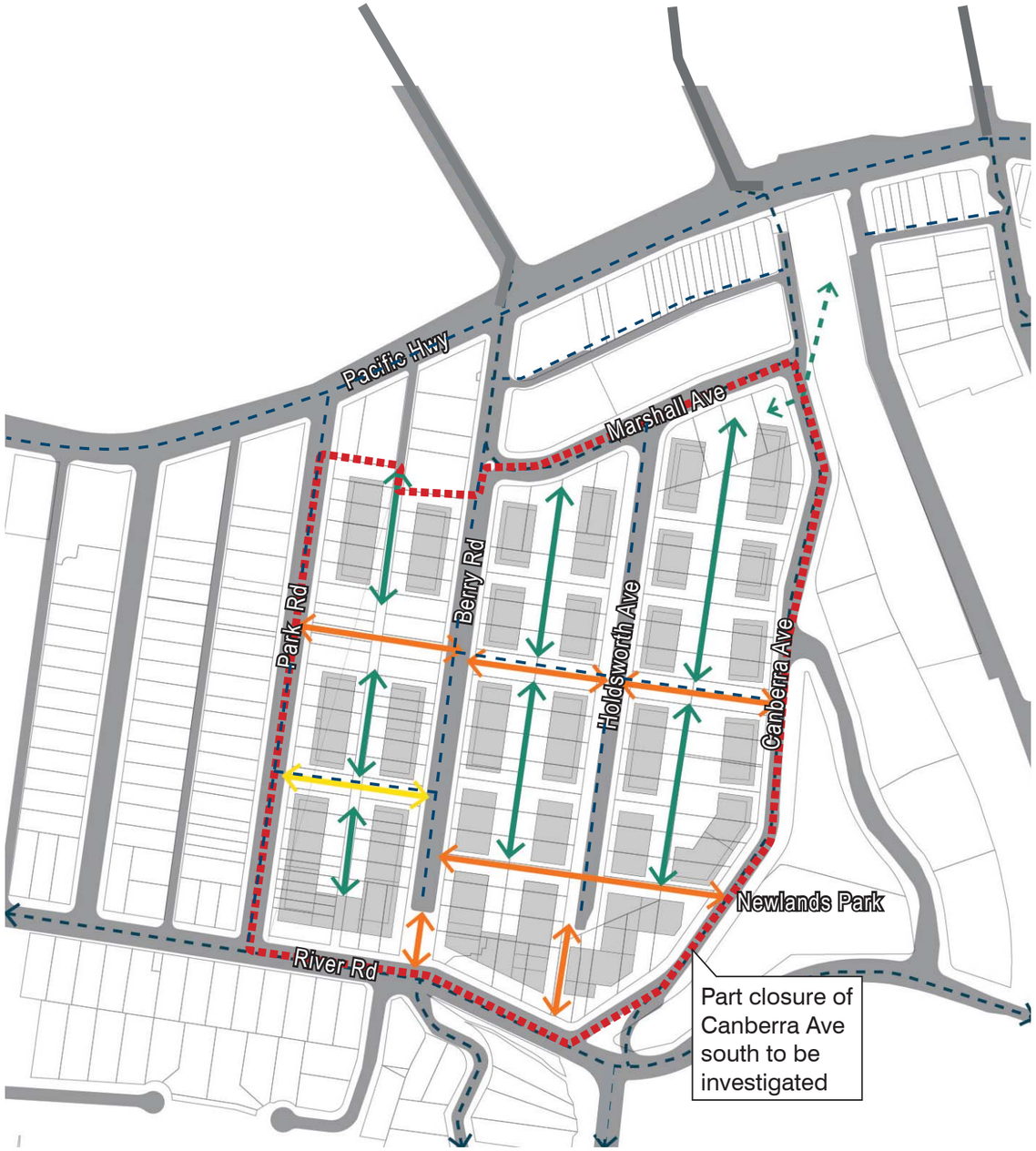
Site Section - north-south communal open space (green spine)



Site Section - east-west open space link



CONNECTIONS



New Connections:

- Cycle route Lane Cove Bike Plan 2019
- Green spine connections (restricted access)
- New road connections
- Pedestrian links
- Future Plaza / station connection

0 20 40 60 80 100 200

NORTH

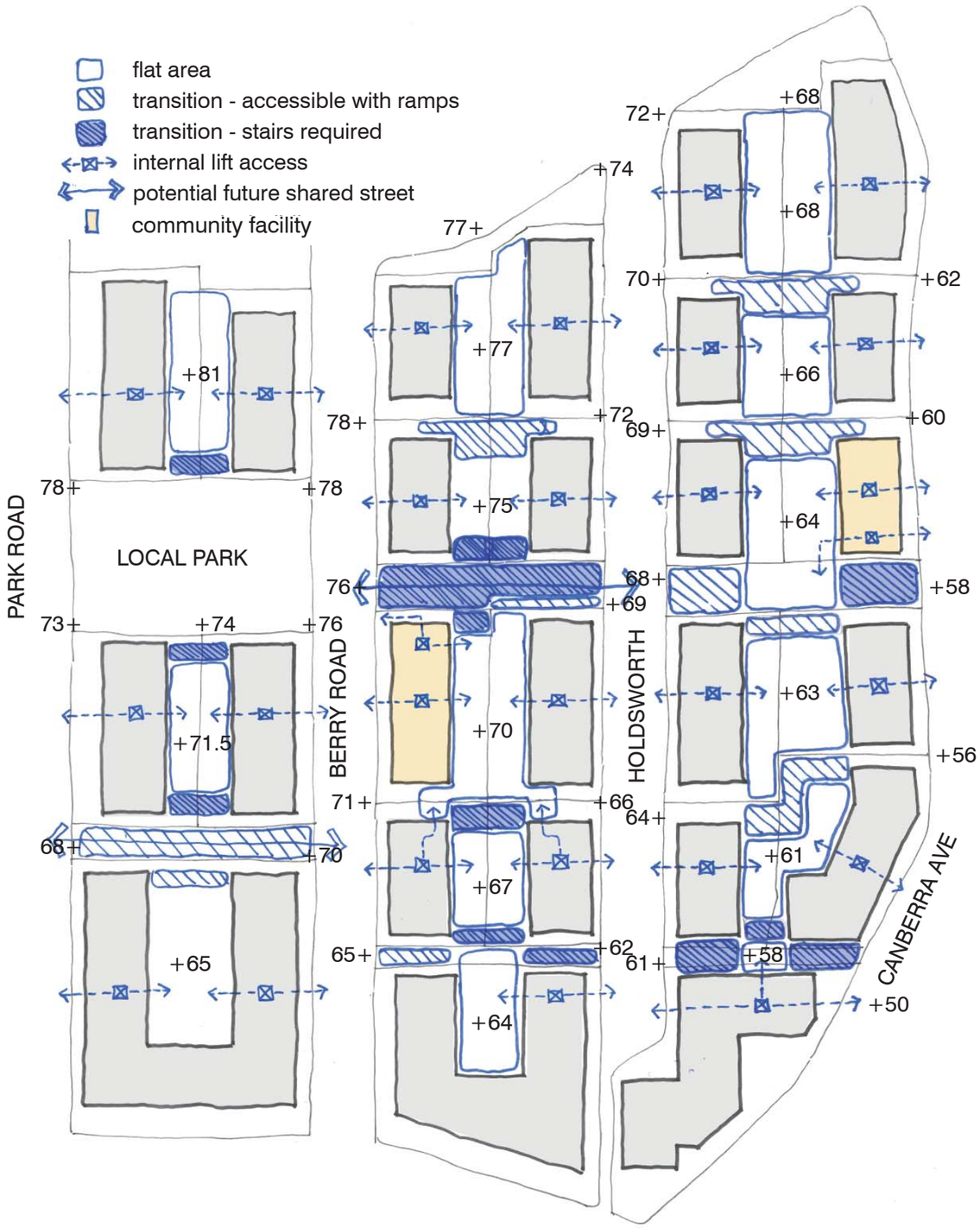
MASTERPLAN

LEVELS

The site presents significant challenges in terms of levels and as a result, accessibility across the precinct. Most of the existing streets and proposed development sites have steep grades which exceed those required for universal accessibility.

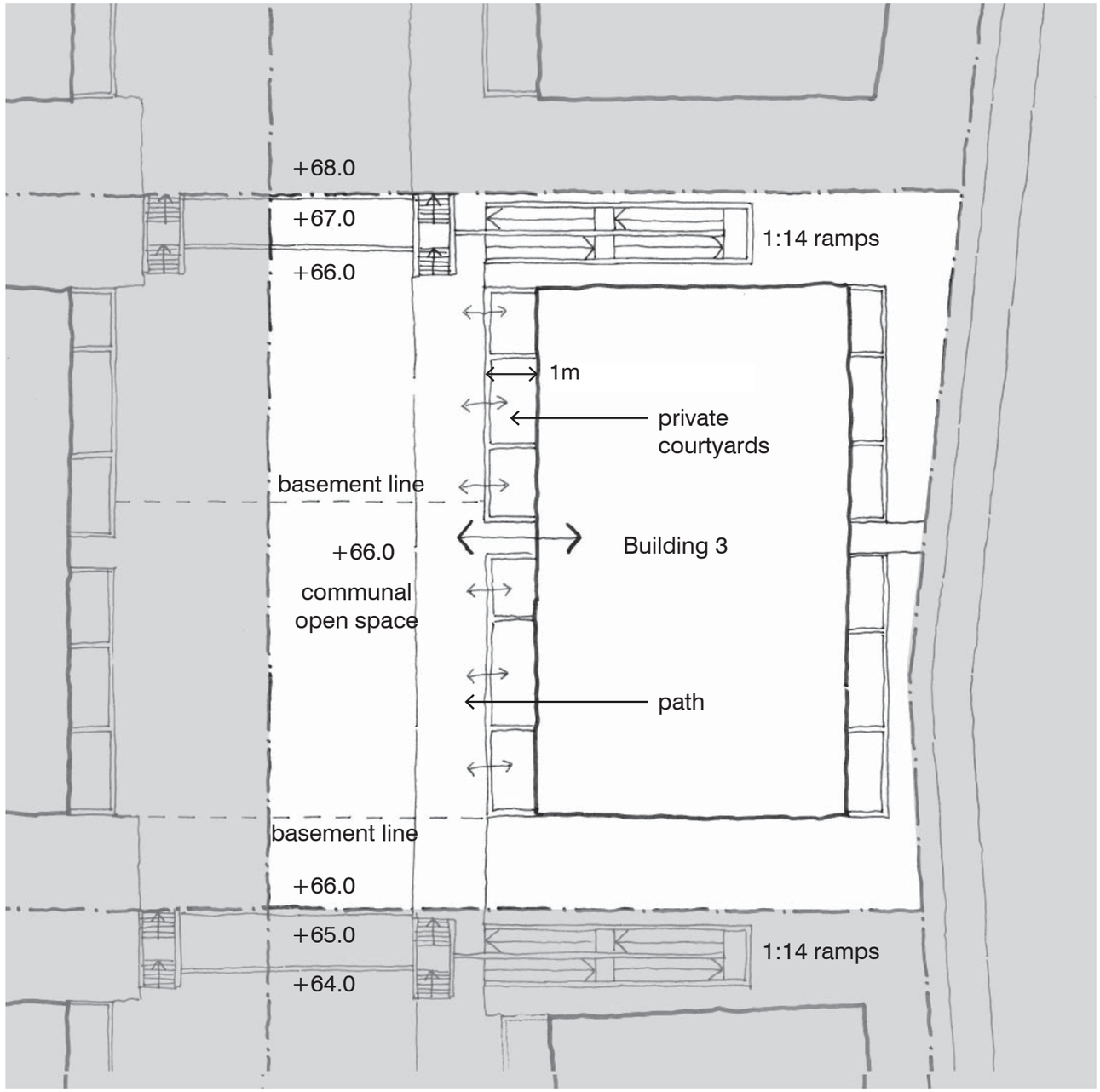
The approach taken in the landscape masterplan has been to prioritise providing an accessible public route along the main east-west open space link between Canberra Ave and Park Road through the proposed new local park. The master plan also aims to provide as much accessibility as possible along the north-south communal open space (green spines) between adjacent development sites, however, several buildings towards River Road have required compromised Green Spine levels due to the steep slopes of the natural ground here.

Indicative proposed levels of the communal green spines are shown in the adjacent diagram, along with the existing street levels, whether transitions are accessible via ramps or stairs, and where lift access within buildings is required to provide access to external spaces.

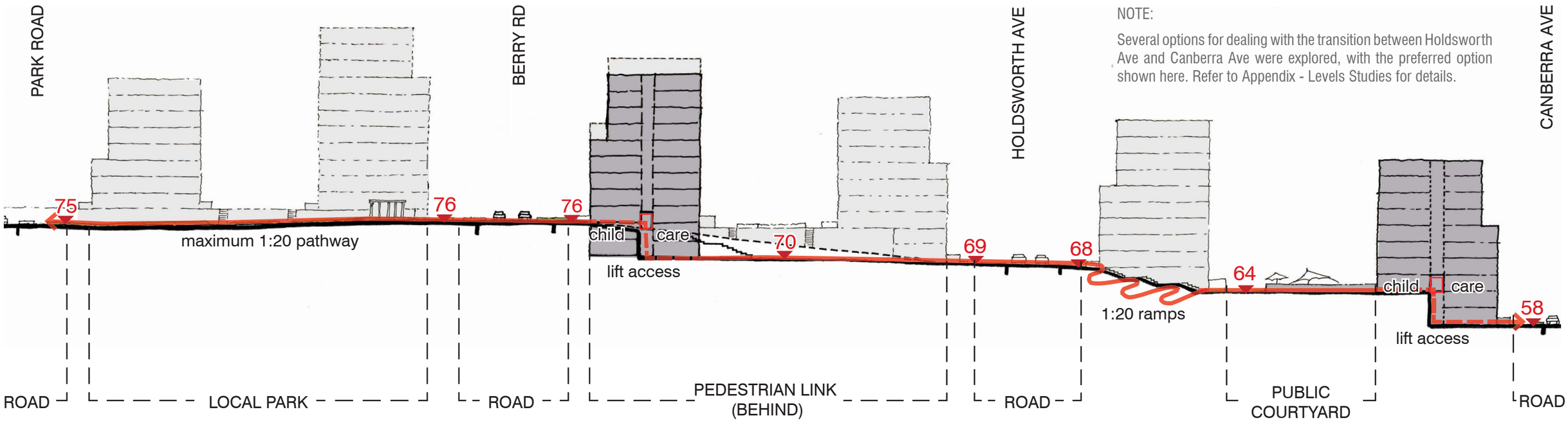


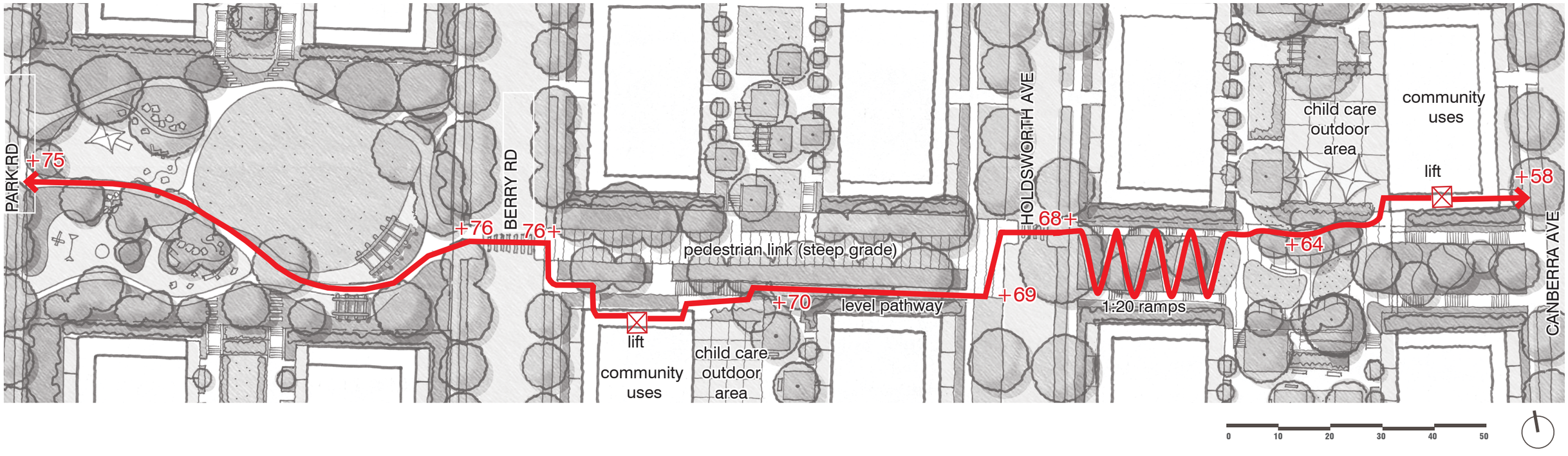
LEVELS - INDICATIVE NORTH-SOUTH TRANSITIONS

- Grade changes taken up in one location with accessible ramps, stairs and 1m (max) retaining walls
- Only one set of ramps required between north-south development lots, to be provided within the first of the 2 eastwest adjacent lots to be developed. This is to ensure that ramp access is provided between levels early on and without relying on both eastwest adjacent lots to be developed.
- Grade transition generally located to the north of the development lot. Developments are not required to step down to their southern neighbours unless they are connecting to public space.
- Minimum 1:14 ramps with handrails located outside of the main communal open space (green spine) area with direct access from main pathways
- If the ramps are required within the main communal open space (green spine) area, 1:20 ramps (no handrails required) are preferred.
- Direct access enabled between private courtyards and communal open space
- Consolidated communal open space

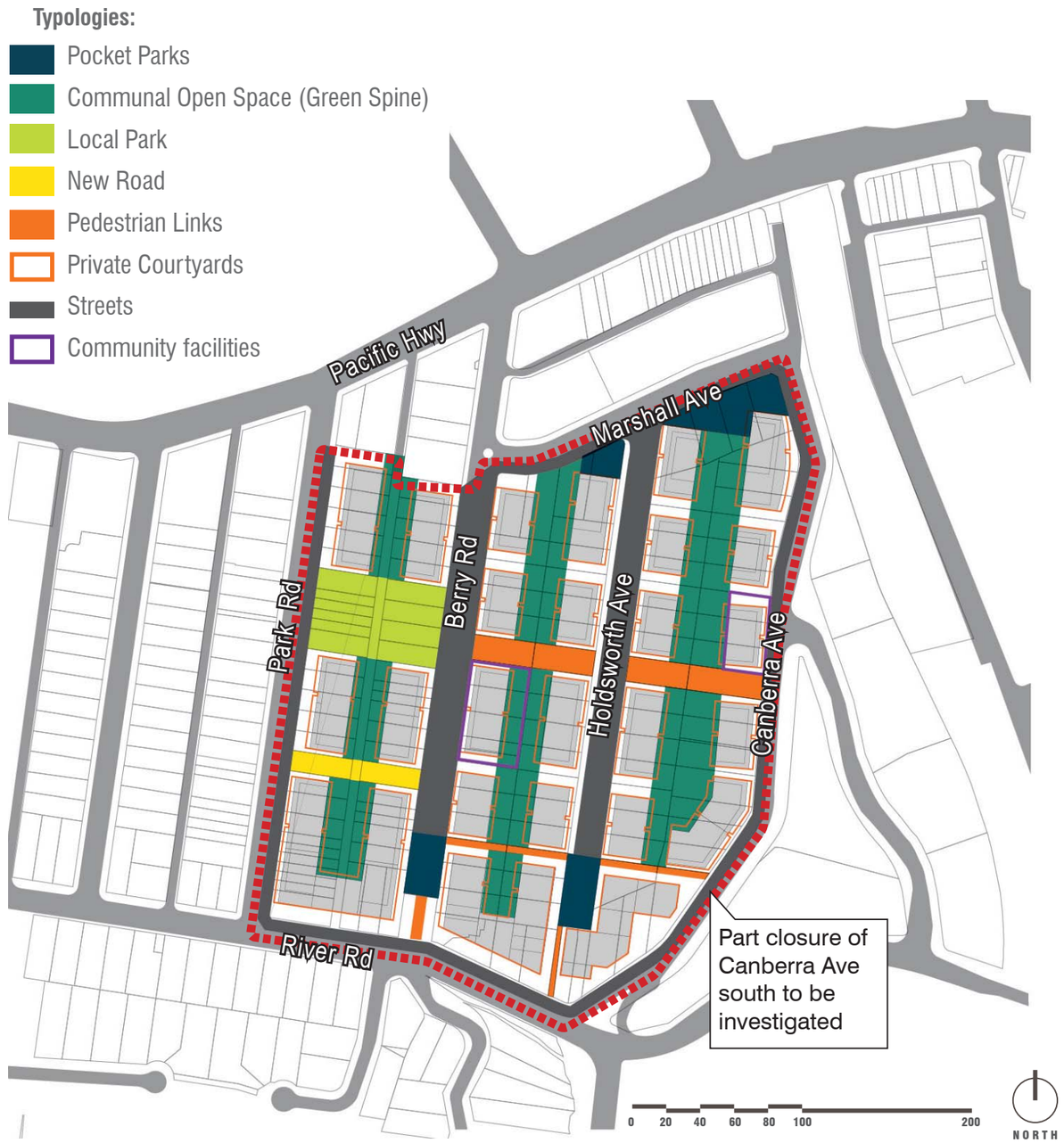


LEVELS - EAST-WEST ACCESSIBLE CONNECTION





OPEN SPACE TYPOLOGIES



OPEN SPACE TYPOLOGIES - FACILITIES MATRIX

TYPE	SIZE & CATCHMENT		USE & CHARACTER																																		
	Catchment	Size	Function	Character	Toilets	Shelters/shade structures	Pathways	Power	Wi-fi	Lighting	Signage	Irrigation	Water features	Multi-purpose courts	Fitness stations	Informal kick-about	Bike paths/circuit	Adventure play	Children's play	Informal play	Community garden	BBQs	Picnic tables	Seating	Bike racks	Litter bins	Drinking fountains	Performances	Interpretation	Public art	Open lawn	Shade trees	Feature planting	Rain gardens/bioswales	Bushland
Newlands Park (existing)	1000m+	1ha	Passive recreation, informal sports, community gatherings, urban tree canopy	Informal	●		●			●	●			●	●	●	●	●	●	●		●	●	●	●	●	●				●	●		●	●
Local Park	1000m+	3775m2	Passive recreation, informal sports, events, community gatherings	Informal	●	●	●	●	●	●	●			●	●	●	●		●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Propsting Reserve (existing)	400m	950m2	Passive recreation, urban tree canopy	Informal			●			●									●	●					●		●					●	●	●	●	●	
Pocket Parks	400m	4003m2	Passive recreation, urban tree canopy	Informal			●			●										●					●		●	●				●	●	●	●		
New Road	n/a	12m wide	Pedestrian, cycle & vehicle circulation	Informal						●	●														●								●		●		
Pedestrian Links	n/a	15m and 6m wide	Pedestrian circulation	Informal			●			●	●														●								●				
Communal Open Space (Green Spine)	Adjoining Apt buildings	24-30m wide	Passive recreation, urban tree canopy	Formal		●	●	●	●	●		●	●			●			●	●		●	●	●		●			●	●	●	●	●			
Roof Gardens	Apt building below	varies	Passive receation, community gardens	Formal		●	●	●	●	●		●	●							●	●		●	●	●		●		●			●	●	●			

Legend

● Required or Existing

● Desirable

PUBLIC OPEN SPACE TYPOLOGIES - LOCAL PARK

The new local park is intended to have the following attributes and facilities:

- accessible shared pedestrian/cycle path between Park and Berry Roads
- multi-use open lawn area and possible multi-purpose courts and fitness stations
- playground with play elements for a range of age groups
- public toilets and shelter or shade structure with bbq, picnic tables, drinking fountains, litter bins and seating
- shade trees and feature planting
- park lighting
- relocate local rocks; retain elements of the natural enivironment

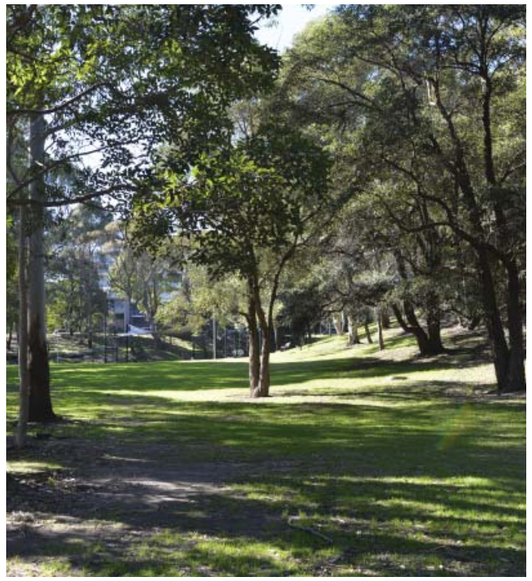
PUBLIC OPEN SPACE TYPOLOGIES - EXISTING PARKS

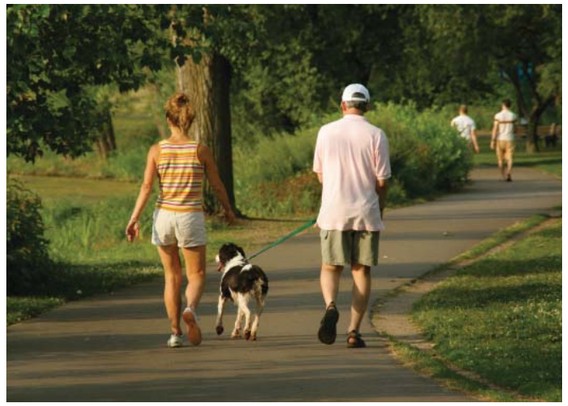
The following upgrades are proposed to Newlands Park:

- upgraded playground with play elements for a range of age groups
- new multi-purpose sports court with fencing and fitness station
- upgraded park lighting and furniture
- potential future expansion to include possible partial closure of Canberra Ave south

The following upgrades are proposed to Propsting Reserve:

- upgraded playground with play elements for a range of age groups
- upgraded park lighting and furniture





MASTERPLAN

PUBLIC OPEN SPACE TYPOLOGIES - POCKET PARKS

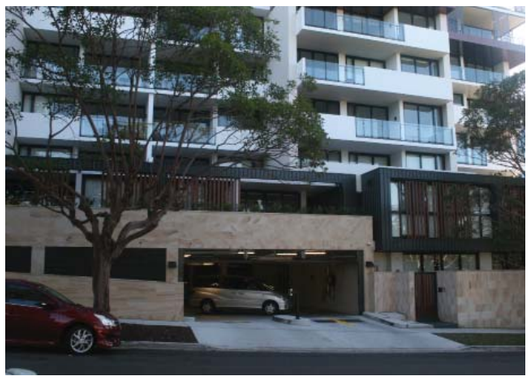
The new pocket parks are intended to have the following attributes and facilities:

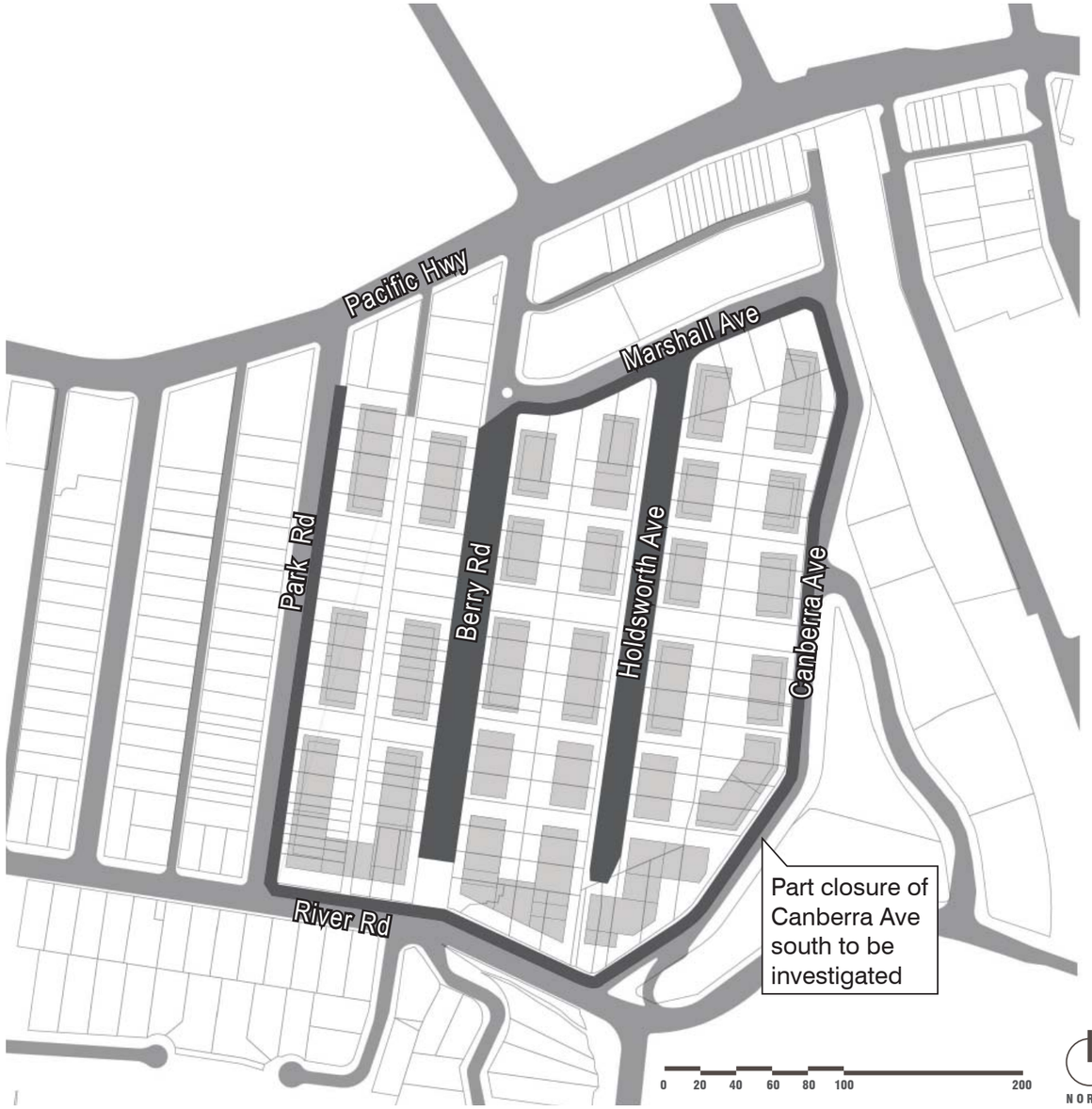
- accessible pedestrian access from Marshall Ave (where adjacent to Marshall Ave)
- access to adjoining communal open space (green spine) (for residents only)
- open lawn areas
- seating, drinking fountain, litter bin and other park furniture
- shade trees and feature planting
- park lighting
- relocate local rocks; retain elements of the natural environment

PUBLIC OPEN SPACE TYPOLOGIES - STREETS

The streets are intended to have the following attributes and character:

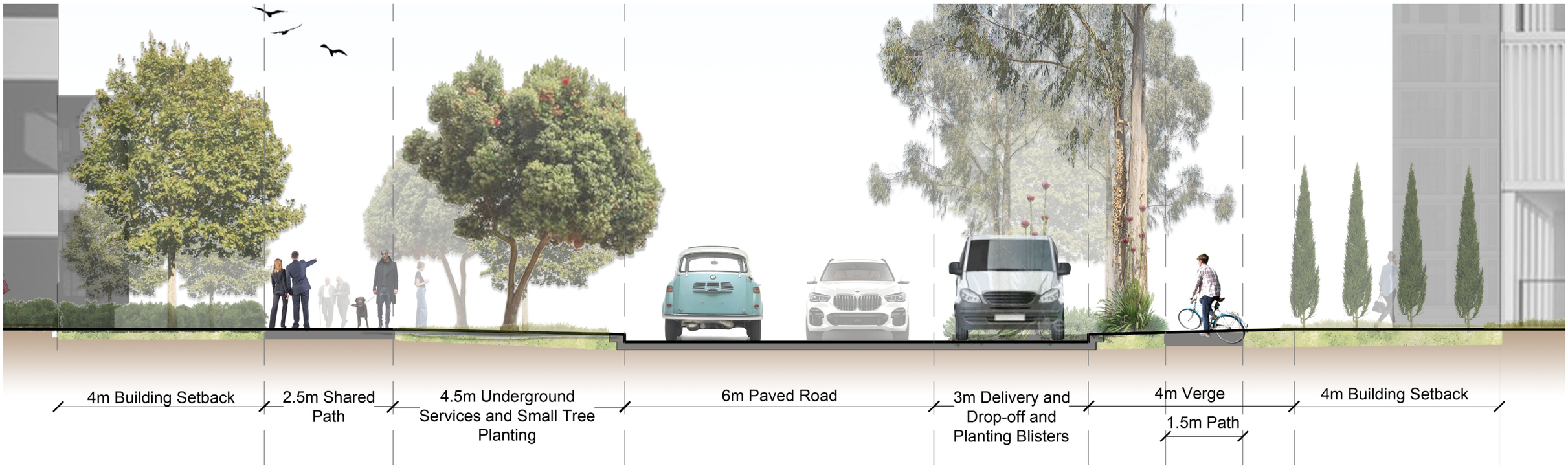
- pedestrian footpaths min 1.5m and ideally 1.8m wide
- formal pedestrian crossings where east-west links cross the streets
- underground power lines
- regular formal street tree planting
- adequate street lighting
- Tree species - refer to Tree Removal & Retention





PUBLIC OPEN SPACE TYPOLOGIES - STREETS

TYPICAL NARROWED STREET

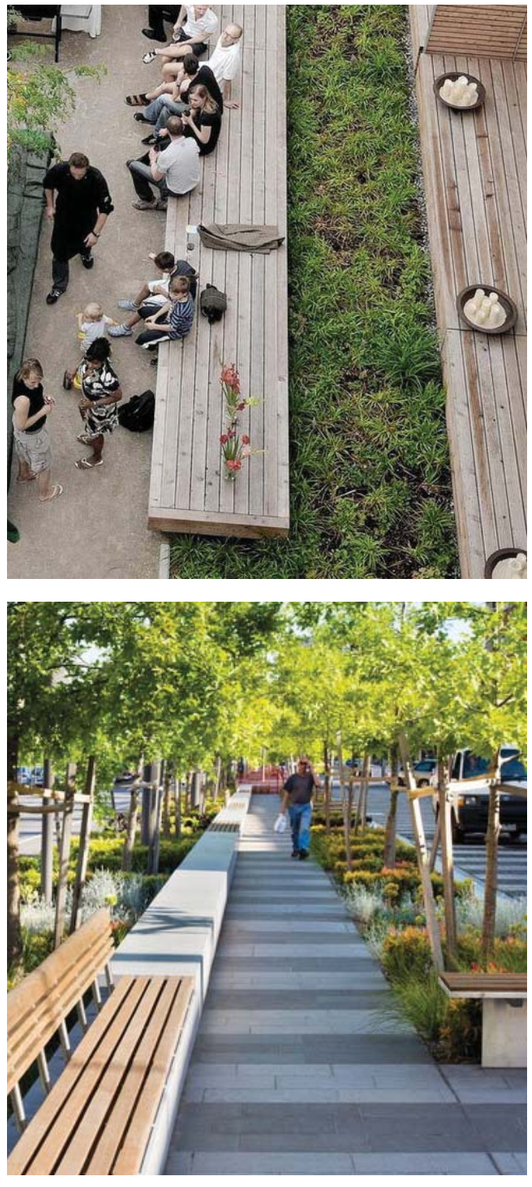


MASTERPLAN

PUBLIC OPEN SPACE TYPOLOGIES - NEW ROAD

The new road is intended to have the following attributes and character:

- designed for shared pedestrian and vehicle use in compliance with RMS guidelines
- encourage low vehicle speeds and clear visibility
- paving treatment to reinforce shared priority without kerbs
- entry thresholds where they adjoin public roads
- shade trees and feature planting along edges
- adequate street lighting



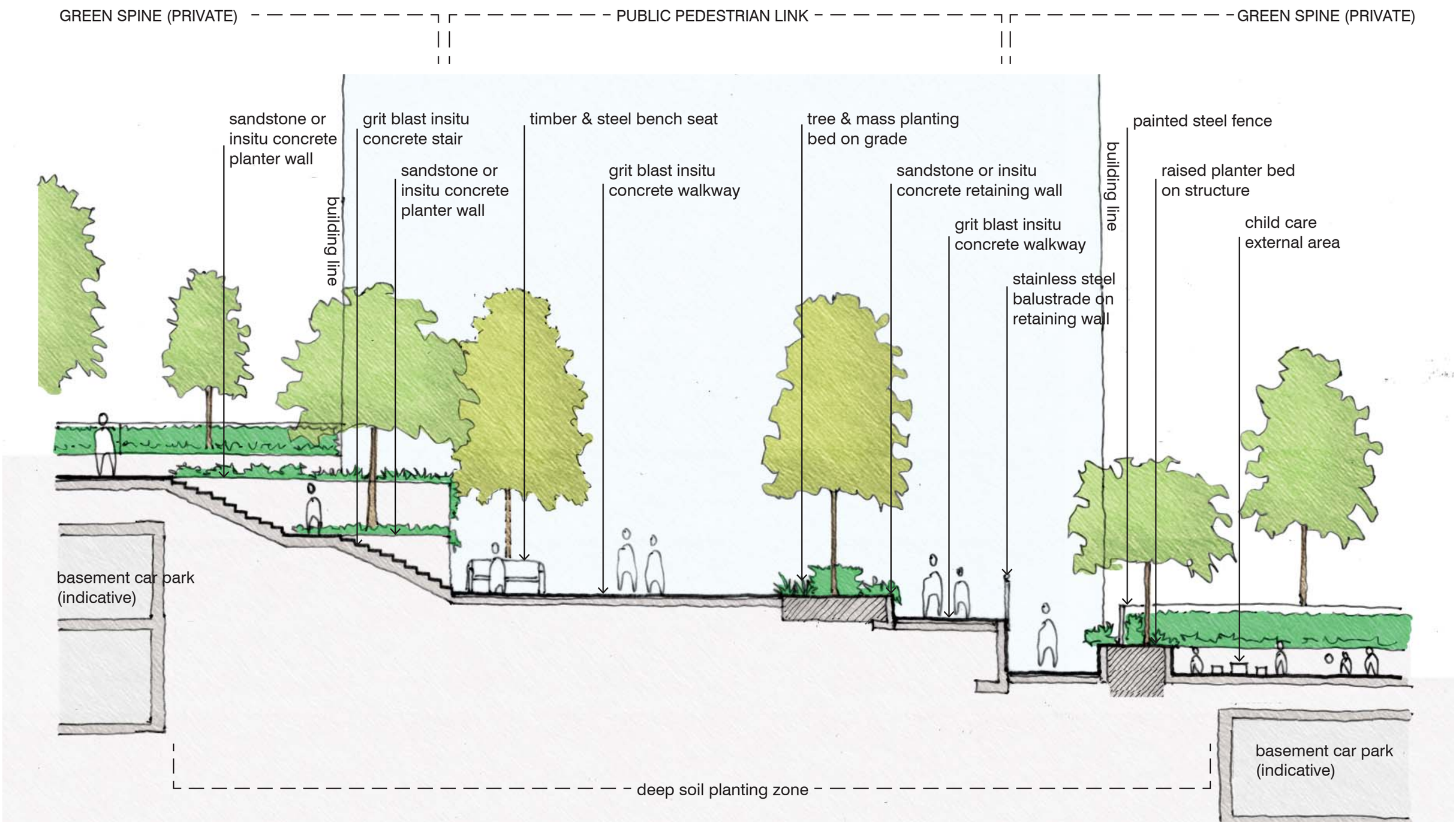
PUBLIC OPEN SPACE TYPOLOGIES - PEDESTRIAN LINKS

The new pedestrian links are intended to have the following attributes and character:

- shared pedestrian/cycle links
- accessible (max 1:20 grade) where possible
- min 2.5m wide shared pathway
- shade trees and feature planting along edges
- adequate pedestrian lighting

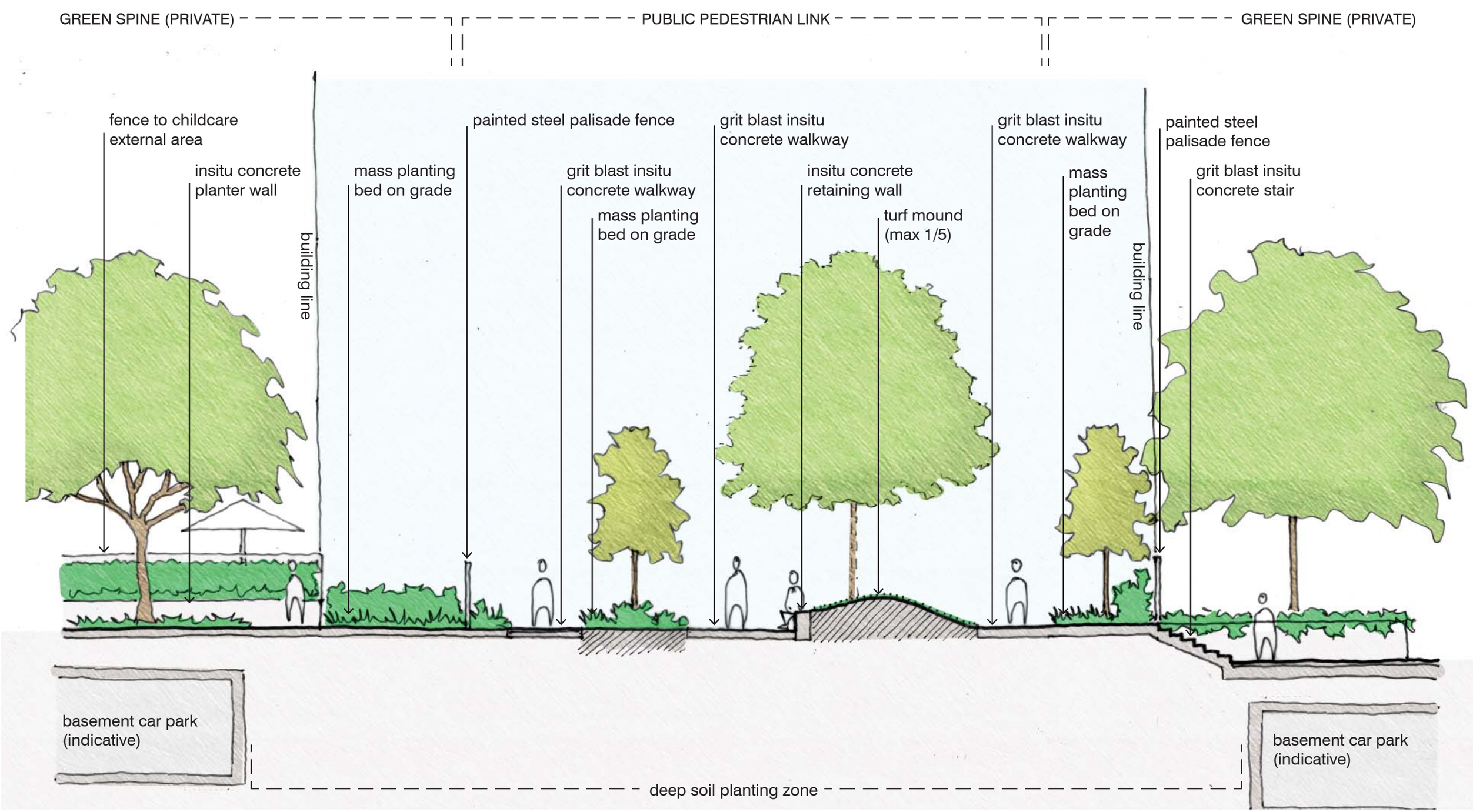
PUBLIC OPEN SPACE TYPOLOGIES - PEDESTRIAN LINKS

EAST-WEST PEDESTRIAN LINK - CROSS SECTION



PUBLIC OPEN SPACE TYPOLOGIES - PEDESTRIAN LINKS

EAST-WEST PEDESTRIAN LINK - CROSS SECTION



PUBLIC OPEN SPACE TYPOLOGIES - PEDESTRIAN LINKS

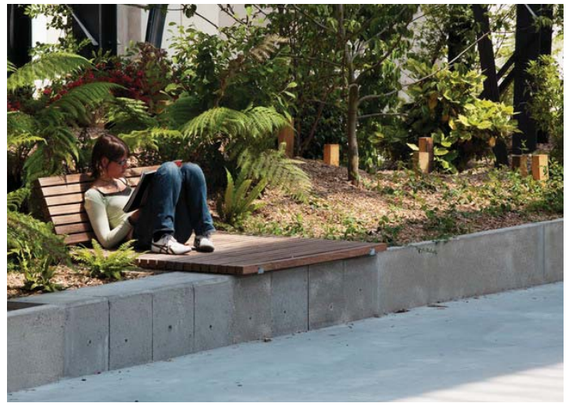
EAST-WEST PEDESTRIAN LINK - INDICATIVE PERSPECTIVE VIEW BETWEEN CANBERRA AND HOLDSWORTH AVE LOOKING WEST

PRIVATE PROPERTY BOUNDARY AND INDICATIVE ENTRY POINTS

PRIVATE OPEN SPACE TYPOLOGIES - COMMUNAL OPEN SPACE (GREEN SPINES)

The new green links are intended to have the following attributes and character:

- accessible (max 1:20 grade) where possible
- level with adjacent green link to east or west
- major changes in level generally located on north/south site boundaries - see North-south Transitions
- communal open space areas with outdoor gathering, seating and play areas
- existing trees retained (tree retention to be agreed with Council pre-DA)
- mature canopy tree cover (existing + proposed) is to be minimum 50% of area of Green Spine

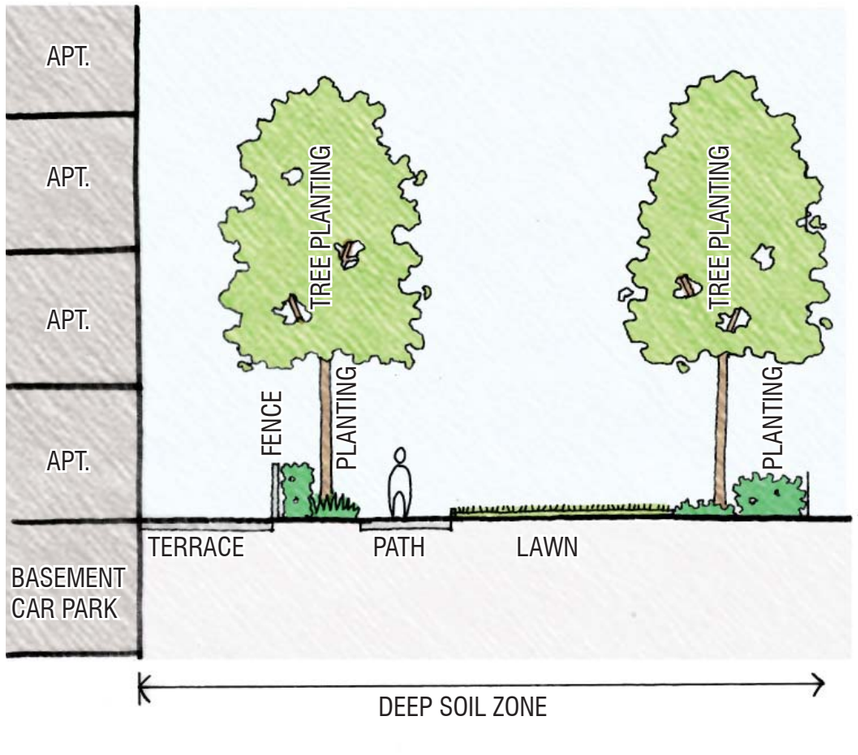


- new canopy trees to include min 50% large sized trees (12m high +) or medium sized trees (8-12m high) and max 50% small trees (up to 8m high)
- basement car parks are confined to the building footprint. Intrusion into Green Spine is only permitted if 2 levels of basement parking under the building is provided. If located under Green Spines, basement car parking is to be located so as to retain existing trees and to provide min 1m soil depth over entire area of basement subject to approval of Council's Landscape Architect.
- max 40% of area to be hard paved (including softfall); min 60% of area to be soft with max 40% of this lawn & 60% planted
- adequate pedestrian lighting

Communal Open Space (Green Spines):

Green Spines

PRIVATE OPEN SPACE TYPOLOGIES - COMMUNAL OPEN SPACE (GREEN SPINES)

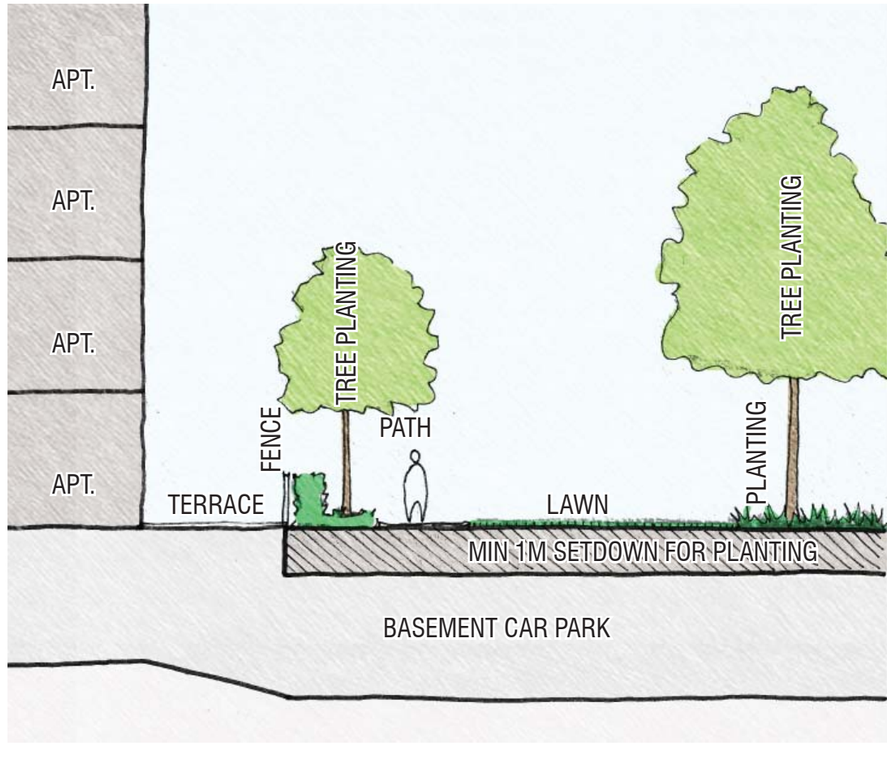


GREEN SPINE INTERFACE WITHOUT BASEMENT CAR PARKING

Green Spine Facilities (within any contiguous area of Green Spine across adjoining development sites) are to include:

- max 40% of area to be hard paved (including softfall)
- min 60% of area to be soft with max 40% of this lawn & 60% planted
- separate play areas for toddlers (ages 6 months - 3 years) and young children (ages 3-8 years+)
- play areas to provide range of play equipment, min 70% shade cover and seating
- play areas to be located and designed to enable good surveillance
- provision for adult & young person recreation eg. outdoor table tennis table, boules court, informal kick-about area
- min 1no. flexible lawn area (min 150m2) centrally located with direct access from apartment lobbies, main north-south pathways, play and picnic/bbq areas
- a picnic/bbq area including min 1no. dual hotplate built-in BBQ with sink, min 2no. picnic table settings, bench seating, shade in the form of canopy trees or shde structure, external GPO
- min 2no. quiet outdoor seating areas with shaded bench seating located away from play and picnic/bbq area
- provision for small scale public art, interpretation and/or water features

For layouts, see INDICATIVE COMMUNAL OPEN SPACE (GREEN SPINE) LAYOUTS FOR CONTIGUOUS AREAS (following pages)



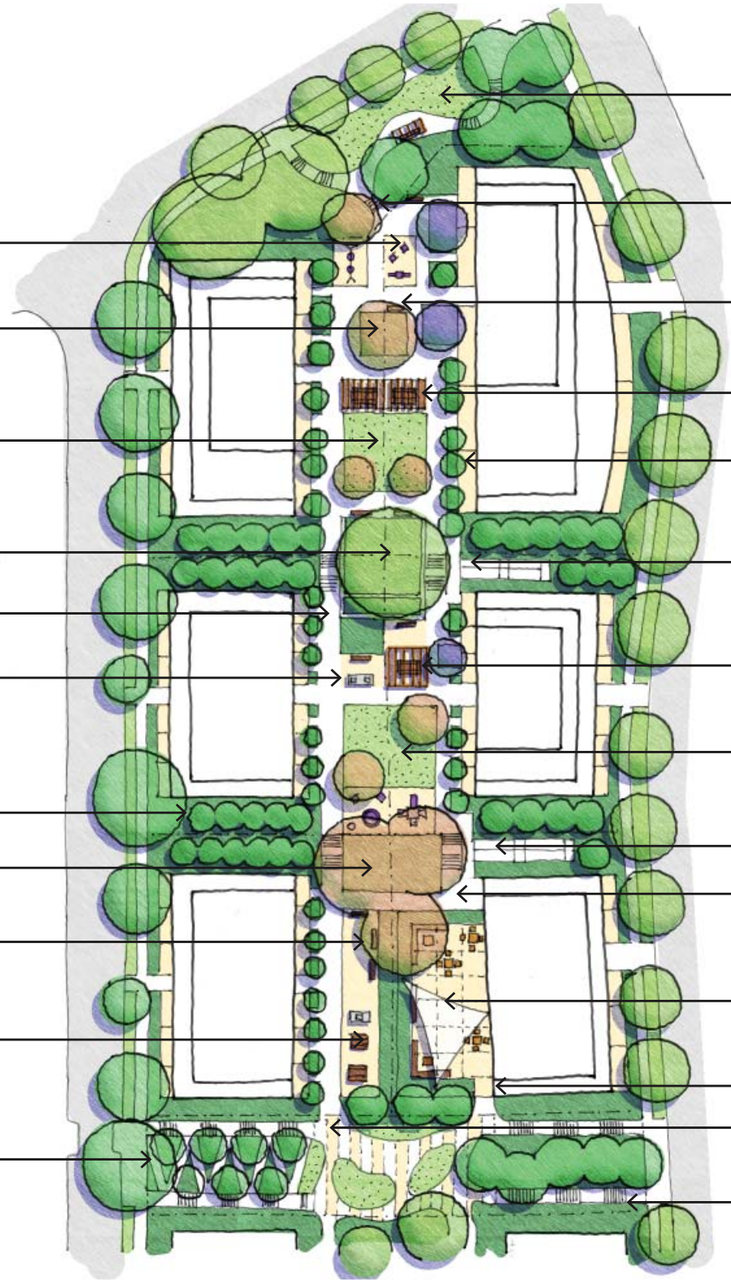
GREEN SPINE INTERFACE WITH BASEMENT CAR PARKING

Basement car parks are confined to the building footprint. Intrusion into Green Spine is only permitted if 2 levels of basement parking under the building is provided. If located under Green Spines, basement car parking is to be located so as to retain existing trees and to provide min 1m soil depth over entire area of basement subject to approval of Council's Landscape Architect.

PRIVATE OPEN SPACE TYPOLOGIES - COMMUNAL OPEN SPACE (GREEN SPINES)

INDICATIVE COMMUNAL OPEN SPACE (GREEN SPINES) LAYOUT FOR CONTIGUOUS AREA (KEY SITE AREAS 1-6)

Each contiguous area of Communal Open Space (Green Spine) must contain the landscape elements shown in the landscape plan for each. Final sign-off of the design is required by Council's landscape architect. Ensure that materials and colours in the private landscape areas are suitable for a formal landscape theme. There should be a common material, standard and colour for paths etc that pass through the Communal Open Space (Green Spine). Have regard to solar penetration, environmental factors and the likely apartment layouts / access.



PRIVATE OPEN SPACE TYPOLOGIES - COMMUNAL OPEN SPACE (GREEN SPINES)

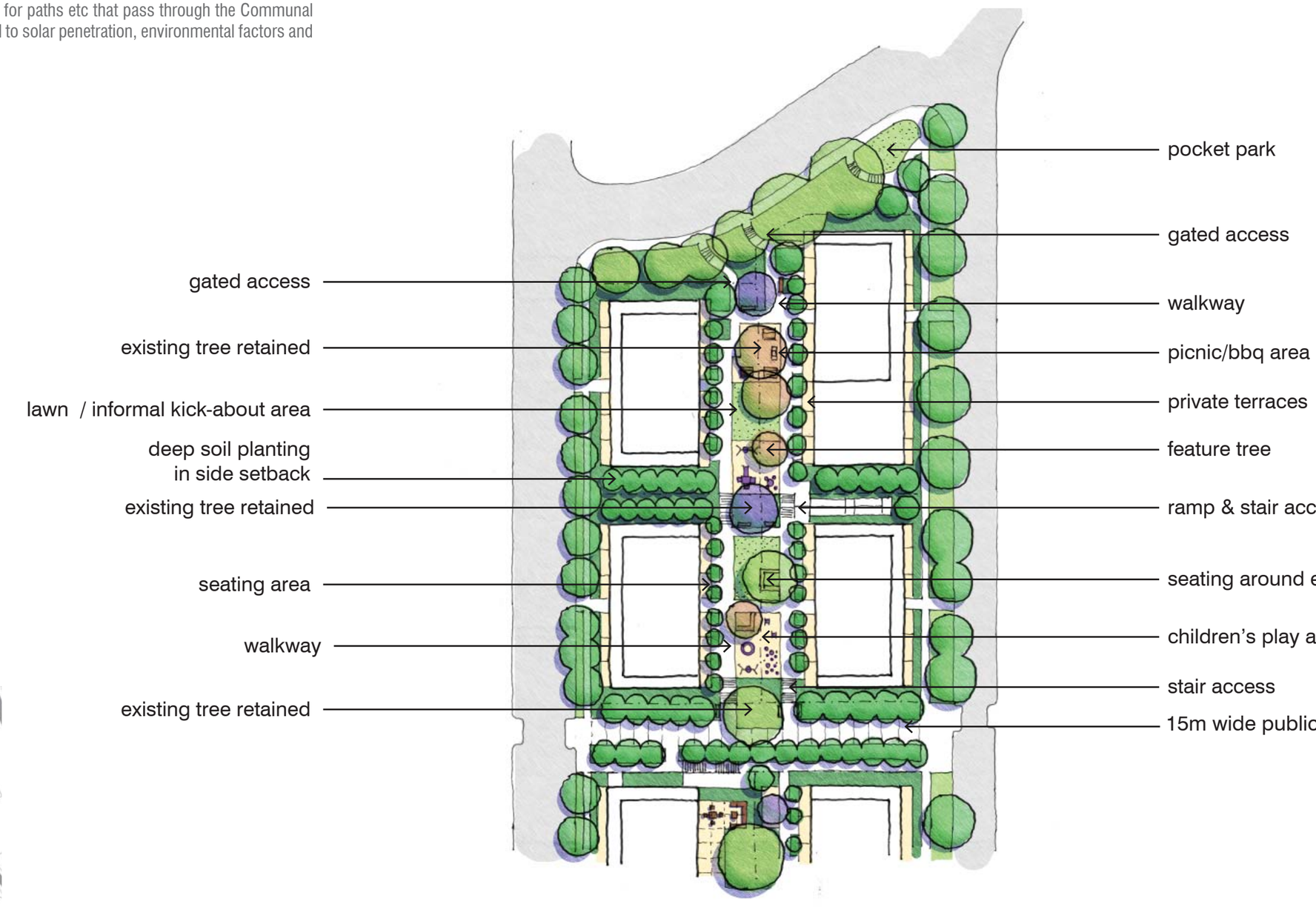
INDICATIVE COMMUNAL OPEN SPACE (GREEN SPINES) LAYOUT FOR CONTIGUOUS AREA (KEY SITE AREAS 7-11)

Each contiguous area of Communal Open Space (Green Spine) must contain the landscape elements shown in the landscape plan for each. Final sign-off of the design is required by Council's landscape architect. Ensure that materials and colours in the private landscape areas are suitable for a formal landscape theme. There should be a common material, standard and colour for paths etc that pass through the Communal Open Space (Green Spine). Have regard to solar penetration, environmental factors and the likely apartment layouts / access.

PRIVATE OPEN SPACE TYPOLOGIES - COMMUNAL OPEN SPACE (GREEN SPINES)

INDICATIVE COMMUNAL OPEN SPACE (GREEN SPINES) LAYOUT FOR CONTIGUOUS AREA (KEY SITE AREAS 12-15)

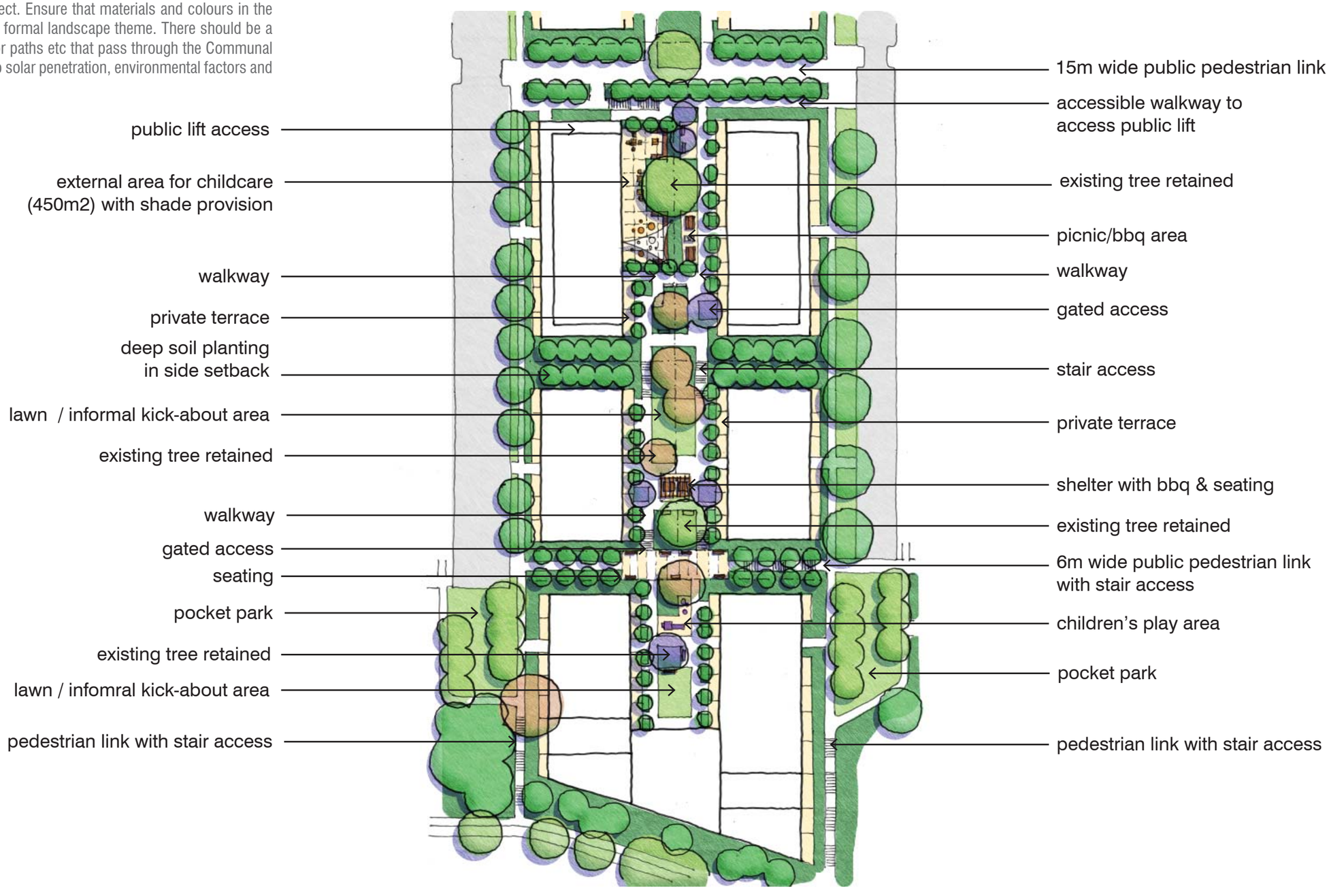
Each contiguous area of Communal Open Space (Green Spine) must contain the landscape elements shown in the landscape plan for each. Final sign-off of the design is required by Council's landscape architect. Ensure that materials and colours in the private landscape areas are suitable for a formal landscape theme. There should be a common material, standard and colour for paths etc that pass through the Communal Open Space (Green Spine). Have regard to solar penetration, environmental factors and the likely apartment layouts / access.



PRIVATE OPEN SPACE TYPOLOGIES - COMMUNAL OPEN SPACE (GREEN SPINES)

INDICATIVE COMMUNAL OPEN SPACE (GREEN SPINES) LAYOUT FOR CONTIGUOUS AREA (KEY SITE AREAS 16-20)

Each contiguous area of Communal Open Space (Green Spine) must contain the landscape elements shown in the landscape plan for each. Final sign-off of the design is required by Council's landscape architect. Ensure that materials and colours in the private landscape areas are suitable for a formal landscape theme. There should be a common material, standard and colour for paths etc that pass through the Communal Open Space (Green Spine). Have regard to solar penetration, environmental factors and the likely apartment layouts / access.



PRIVATE OPEN SPACE TYPOLOGIES - COMMUNAL OPEN SPACE (GREEN SPINES)

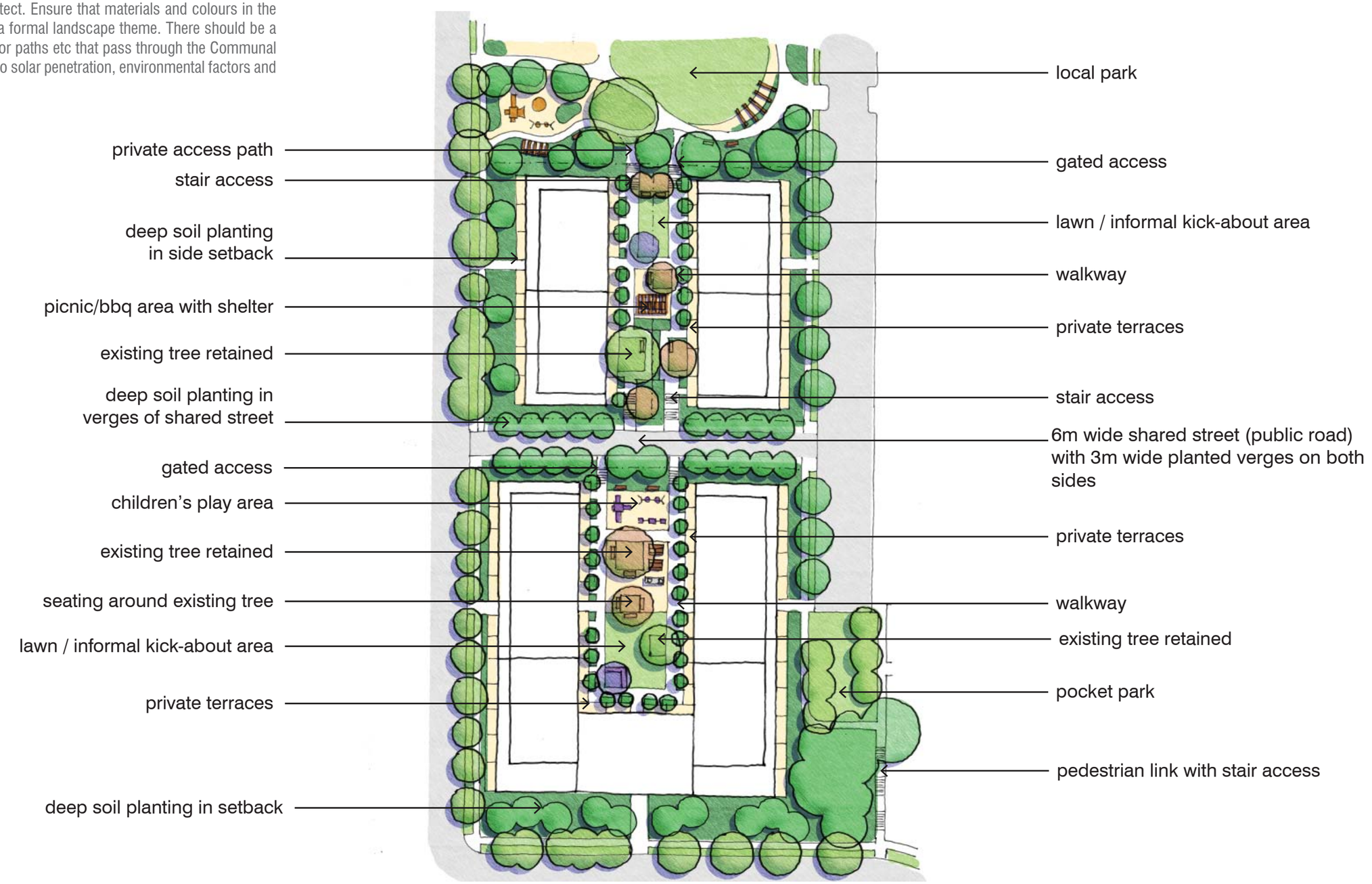
INDICATIVE COMMUNAL OPEN SPACE (GREEN SPINES) LAYOUT FOR CONTIGUOUS AREA (KEY SITE AREA 21)

Each contiguous area of Communal Open Space (Green Spine) must contain the landscape elements shown in the landscape plan for each. Final sign-off of the design is required by Council's landscape architect. Ensure that materials and colours in the private landscape areas are suitable for a formal landscape theme. There should be a common material, standard and colour for paths etc that pass through the Communal Open Space (Green Spine). Have regard to solar penetration, environmental factors and the likely apartment layouts / access.

PRIVATE OPEN SPACE TYPOLOGIES - COMMUNAL OPEN SPACE (GREEN SPINES)

INDICATIVE COMMUNAL OPEN SPACE (GREEN SPINES) LAYOUT FOR CONTIGUOUS AREA (KEY SITE AREAS 22-23)

Each contiguous area of Communal Open Space (Green Spine) must contain the landscape elements shown in the landscape plan for each. Final sign-off of the design is required by Council's landscape architect. Ensure that materials and colours in the private landscape areas are suitable for a formal landscape theme. There should be a common material, standard and colour for paths etc that pass through the Communal Open Space (Green Spine). Have regard to solar penetration, environmental factors and the likely apartment layouts / access.



MASTERPLAN

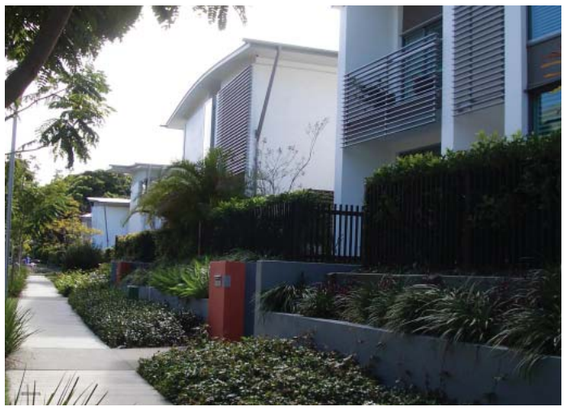
PRIVATE OPEN SPACE TYPOLOGIES - SETBACKS

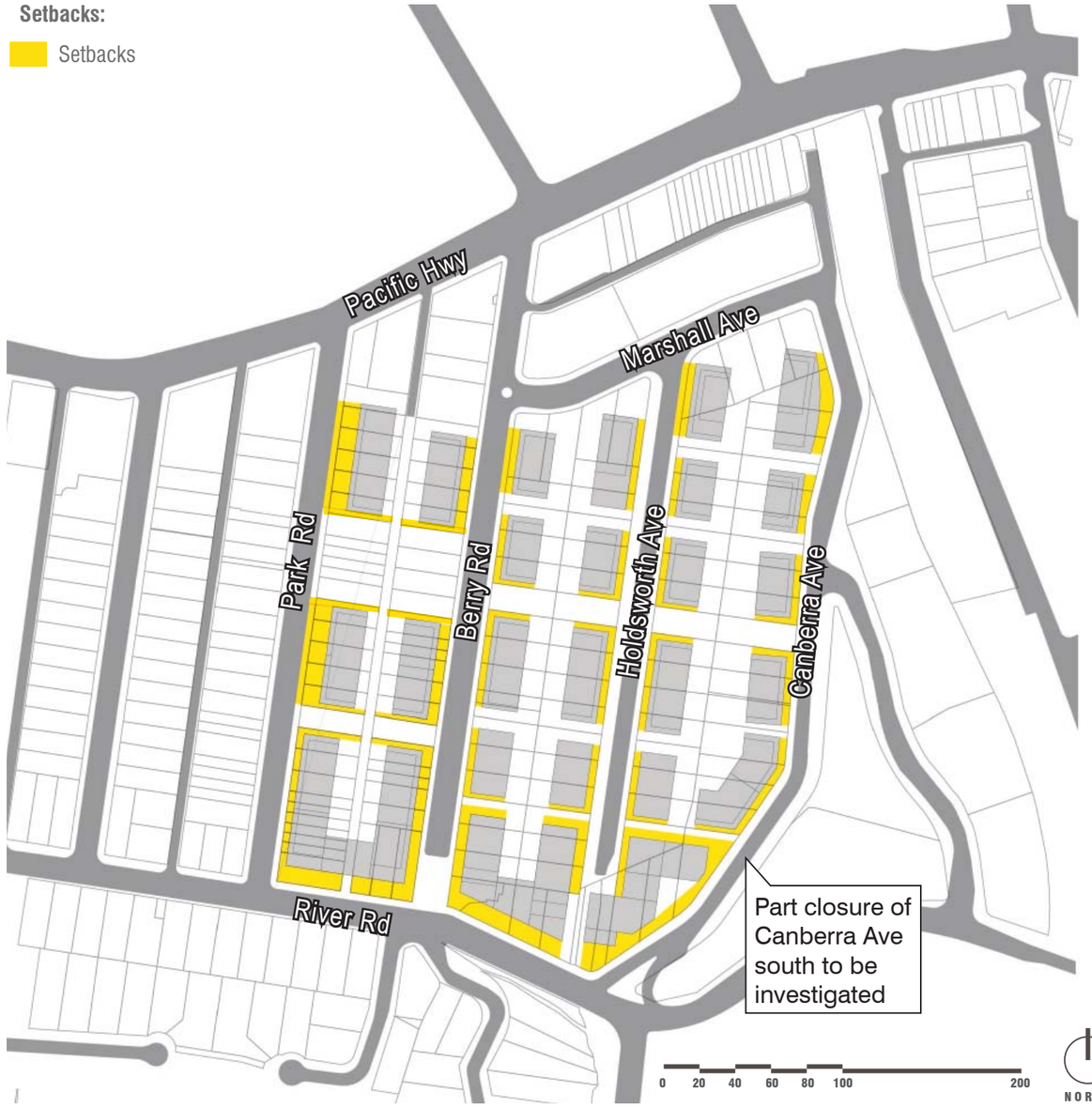
Landscape setbacks are intended to have the following attributes and character:

- provide adequate privacy to private apartments and terraces/courtyards
- accommodate level changes where required
- mitigate the impact of basement car park structures where these emerge above ground level
- include trees and planting, including deep soil planting
- existing trees retained if possible within landscape setbacks
- adequately lit
- parking is not permitted in front setbacks

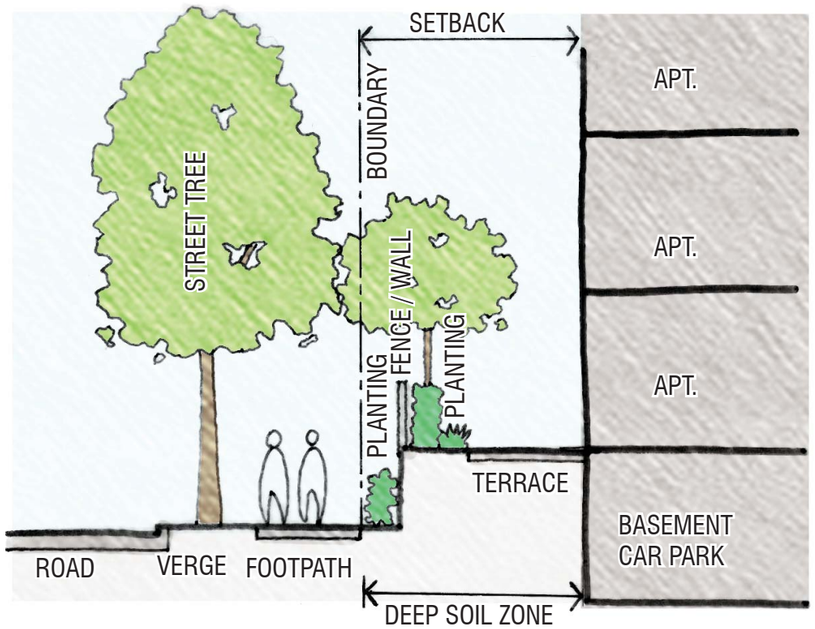
Tree planting in front setback areas:

- Proper tree selection and placement in the front setback areas is crucial in order to ensure good amenity and privacy for residents while reducing the size and bulk of the built form.
- Trees in the front setback area shall:
- be selected from Council's DCP Part J Landscaping Appendix 1 - Plant Lists; and
- be of a suitable size to assist in ensuring that the development in not visually intrusive by providing visual softening of buildings, driveways and car parking areas

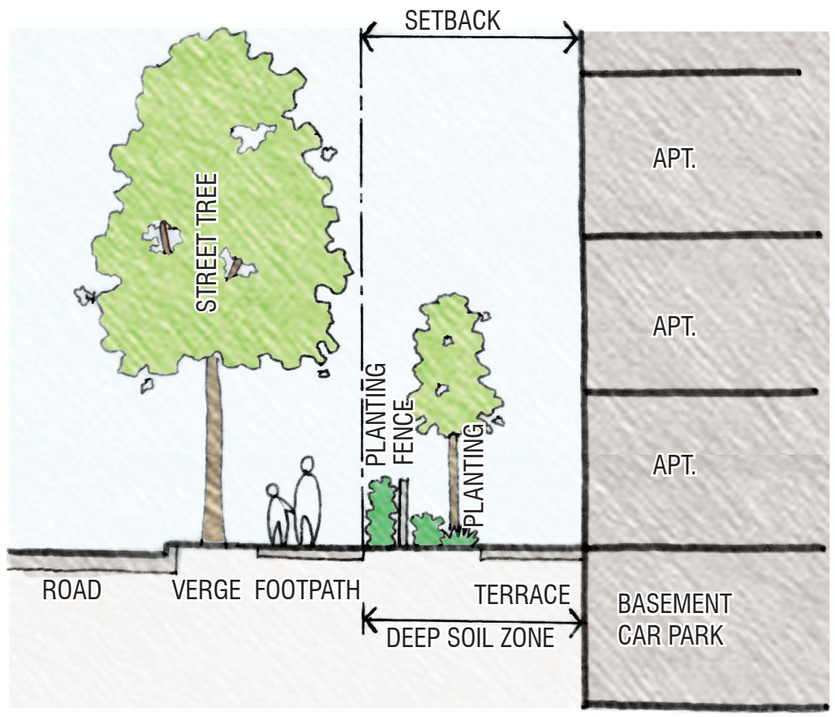




PRIVATE OPEN SPACE TYPOLOGIES - SETBACKS

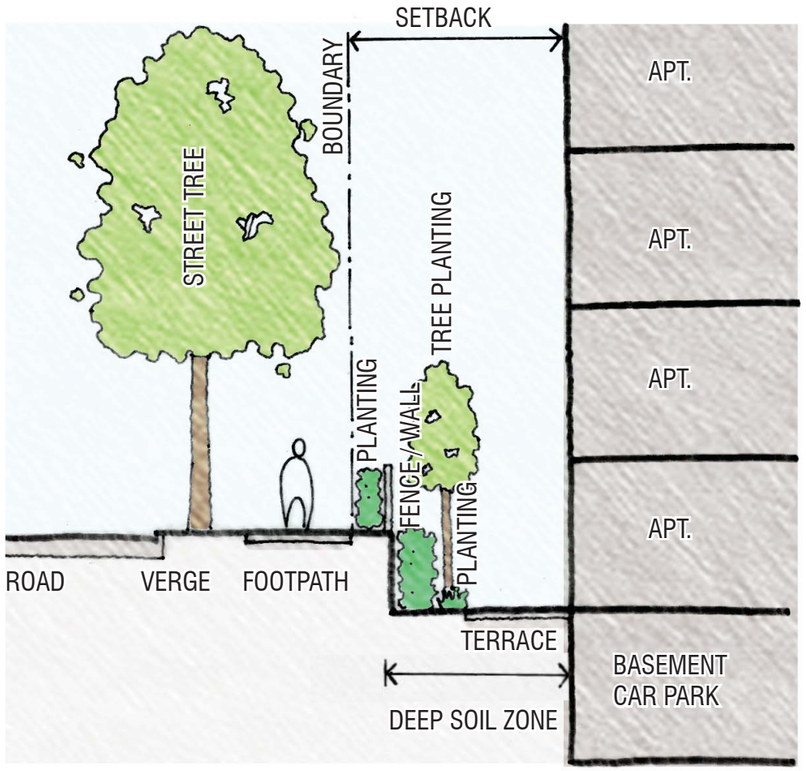


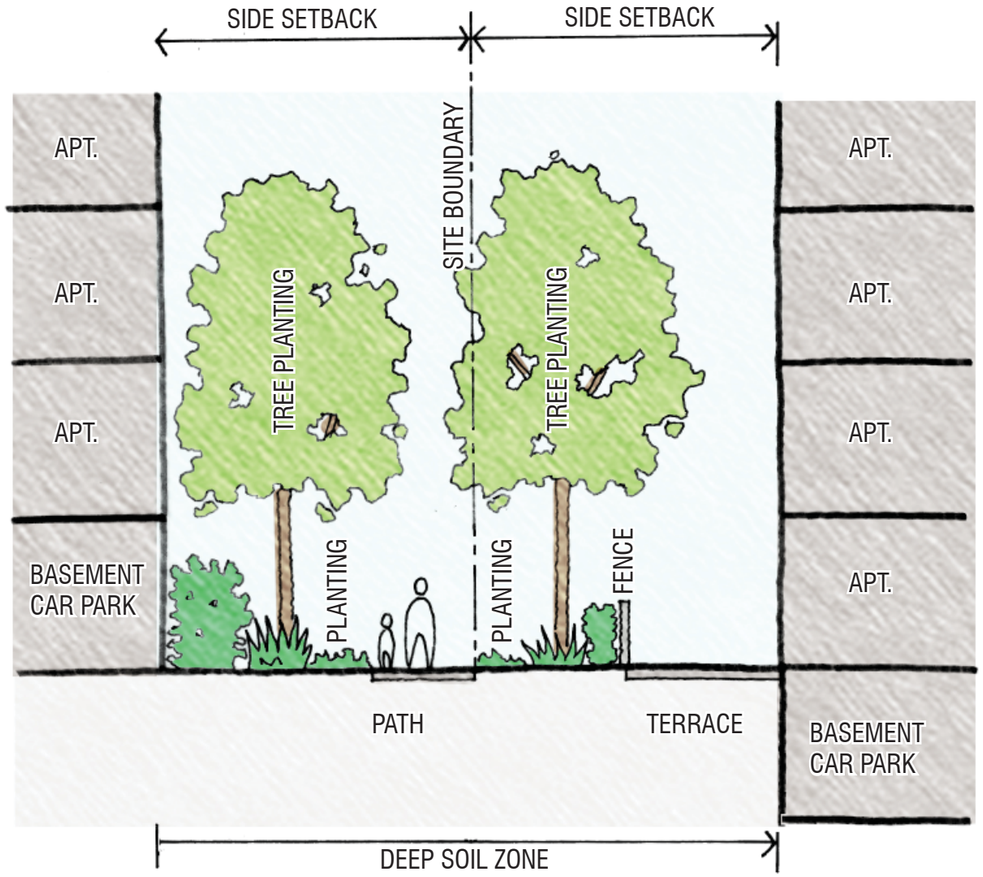
STREET FRONTAGE A. ELEVATED



STREET FRONTAGE B. AT GRADE

PRIVATE OPEN SPACE TYPOLOGIES - SETBACKS





STREET FRONTAGE C. SUNKEN

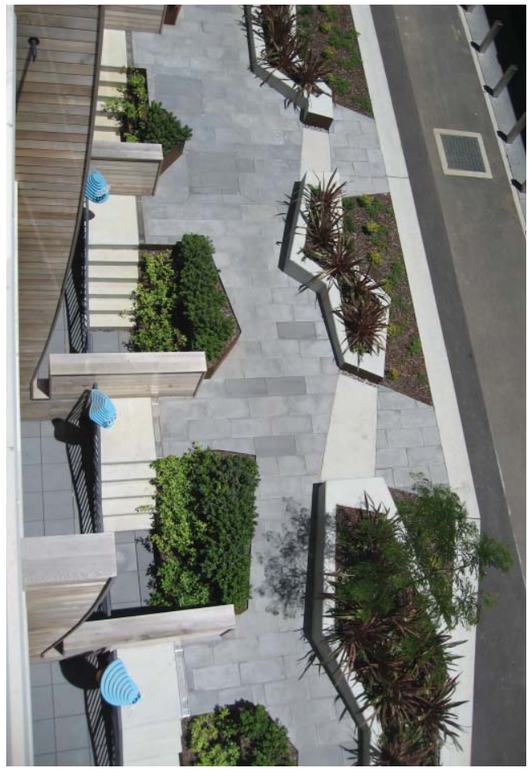
SIDE SETBACK

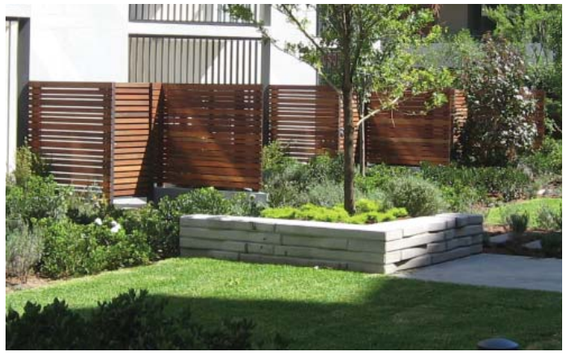
MASTERPLAN

PRIVATE OPEN SPACE TYPOLOGIES - PRIVATE COURTYARDS & TERRACES

Private courtyards and terraces are intended to have the following attributes and character:

- Clearly defined as private open space
- Designed to ensure appropriate privacy whilst also allowing adequate passive surveillance
- Open out onto communal open space (green spines) or walkways wherever possible
- Be of the required minimum size and have adequate solar access
- Include a mix of paved areas for usability and planted areas for amenity





Private Courtyards and Terraces:

Private Courtyards

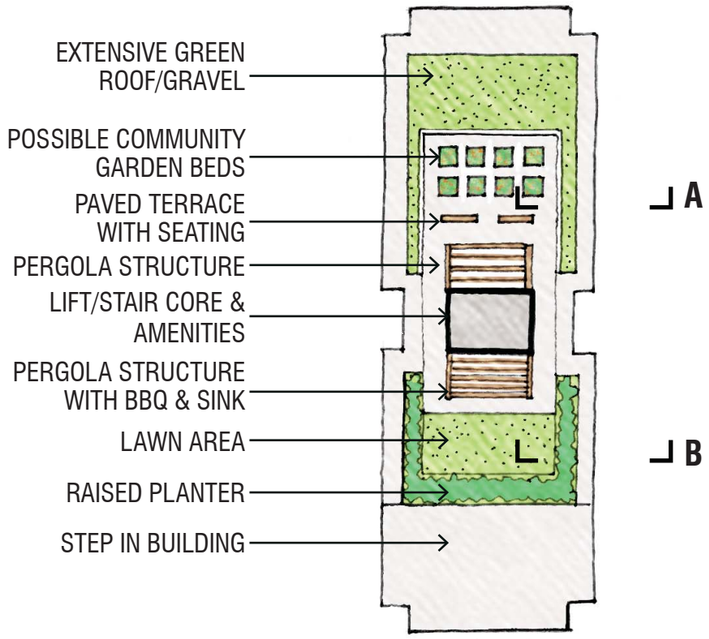
MASTERPLAN

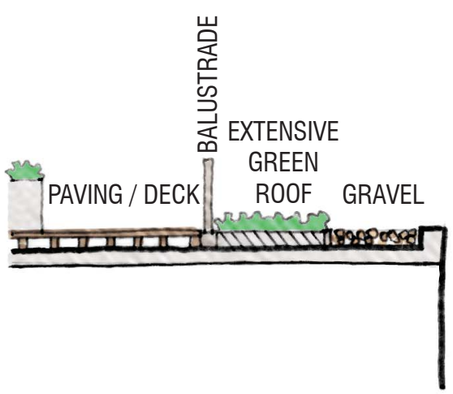
PRIVATE OPEN SPACE TYPOLOGIES - ROOF GARDENS

Roof Gardens are intended to have the following attributes and character:

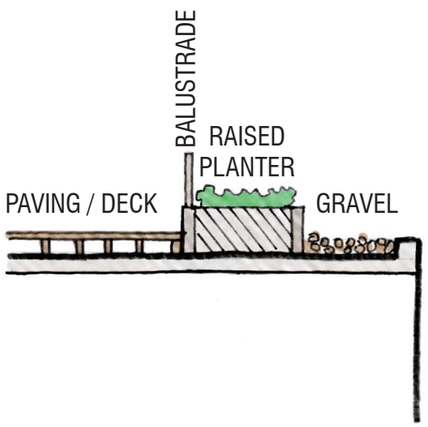
- Be accessible to all residents via lifts and stairs
- Be of the required minimum size
- Have adequate solar access and shade
- Include a mix of paved/decked/turfed areas for usability and planted areas for amenity
- Provide a range of facilities/amenities such as lawn areas, bbqs, potable water supply & sink, picnic tables, seats, lighting, community garden beds

PRIVATE OPEN SPACE TYPOLOGIES - ROOF GARDENS





SECTION A



SECTION B

MASTERPLAN

TREE REMOVAL & RETENTION

Park Road

- existing Melaleuca spp. to be retained on west side and replaced on east side where affected by pruning to clear powerlines with same species.

Berry Road

- existing street trees to be progressively replaced with new species (Flindersia australis) to create strong avenue effect.

Holdsworth Ave

- existing Lophostemon to be retained.

Canberra Ave

- existing Eucalypt spp. on west side of street to be removed and replaced with new species (Tristaniopsis).

Marshall Ave

- existing Lophostemon to be retained on north side.
- existing Lophostemon to be progressively removed on south side where affected by pruning to clear powerlines and replaced with Tristaniopsis.
- existing Tristaniopsis on south side to be retained and supplemented to create continuous row on this side of street.

River Road

- existing Eucalypt spp. to be retained and supplemented where possible with same species.

Public Open Space and Links

- retain existing trees unless prior approval obtained from Council

Private Open Space and Setbacks

- Retain existing trees unless prior approval obtained from Council
- Council requires an arboricultural impact assessment including SULE assessment to be carried out by a qualified arborist
- Agreement with Council on existing trees to be retained is required pre-DA
- Additional street tree planting as per indicative section at Public Open Space Typologies - Streets

Tree Removal:

- Retain existing trees and supplement with same species (subject to Preliminary Tree Assessment Report)
- Progressively remove existing trees and replace with new species as per Street Tree Master Plan
- Retain existing trees (agreement on trees to be retained is required pre-DA)

MASTERPLAN

STREET TREE MASTERPLAN

The street tree masterplan aims to build upon the existing character of the precinct by retaining existing street trees where well established and of suitable species, and supplementing these to help maintain and enhance the existing leafy character. Priority will be given to those sides of the streets where trees have been adversely affected by pruning to clear overhead powerlines (eg. east side of Park Rd), in conjunction with a program to underground power lines, and to streets where trees are less well established (eg. Berry Road) or are absent / in poor condition (west side of Canberra Ave). It is proposed to continue to plant street trees predominantly within the verges to maintain/create a symmetrical avenue affect.

The Green Plan of the St Leonards/Crows Nest 2036 Plan identifies this suburban area as already having 40% tree canopy cover (in private and public domain - this target is to be maintained and enhanced where possible.

Lophostemon confertus (Bushbox)

Flindersia australis (Crow's Ash)

Melaleuca quinquenervia (Broad Leafed Paperbank)

Eucalyptus scoparia (Wallangarra White Gum)

Street Tree:

- Lophostemon confertus (Bushbox)
- Tristaniopsis laurina (Water Gum)
- Flindersia australis (Crow's Ash)
- Melaleuca quinquenervia (Broad Leafed Paperbank)
- Eucalyptus scoparia (Wallangarra White Gum)

MASTERPLAN
PLANTING

This LMP is to be read in conjunction with Lane Cove Council's DCP, Part J - Landscaping.

Planting within public open space (excluding streets) and private open space should adopt the following principles:

- Assisting with maintaining and enhancing the existing green character of the precinct, particularly through tree planting, in public and private open space;
- Providing significant areas of deep soil planting within private development sites;
- Selecting suitable tree species for the size of space and volume of soil available;
- Planting to building setbacks particularly in front setbacks to the street to help reduce the scale of buildings;
- Planting for amenity and shade to other communal open space located on ground, podiums or rooftops;
- Mature canopy tree cover (existing + proposed) is to be minimum 50% of area of communal open space (Green Spine);
- New canopy trees within communal open space (Green Spine) to include min 50% large sized trees (12m high +) or medium sized trees (8- 12m high) and max 50% small trees (up to 8m high);
- Basement car parks if located under communal open space (Green Spines) to be located in order to retain significant existing trees and to provide min 1m soil depth over entire area of basement, subject to approval of Council's Landscape Architect;
- All planting on structures to provide minimum soil depth and volume requirements in accordance with the Apartment Design Guide section 4P and Part J - Landscaping;
- Selecting hardy, low water use and low maintenance species.

<u>Street Tree Planting</u>

Where a new street and / or undergrounding of power lines is proposed and new street tree planting is required, a structural root cell system (such as Strata Vault by City Green or approved equal) shall be used and the appropriate amount of both structural soil and an adequate supply of loose, well-aerated, moist and uncompacted soil structure shall be supplied in order for the trees to thrive. This enables their roots to obtain nutrients, oxygen and water - all essential for healthy tree growth.

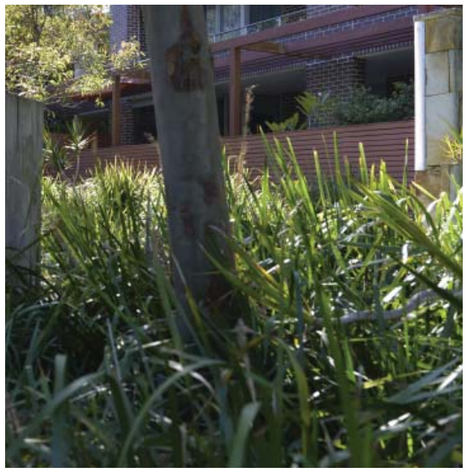
Construction drawings and details are to be submitted to Council's Landscape Architect for assessment and approval as part of the Development Application stage clearly outlining the soil structure, soil volumes and depths as well as construction methods of the structural root cell system.

The following table shall apply:







	PLANT SIZE	MINIMUM STANDARDS
A	Large trees (canopy diameter of up to 16m at maturity)	minimum soil volume 150m3 minimum soil depth 1.3m minimum soil area 10m x 10m or equivalent
B	Medium trees (8m canopy diameter at maturity)	minimum soil volume 35m3 minimum soil depth 1m minimum soil area 6m x 6m or equivalent
C	Small trees (4m canopy diameter at maturity)	minimum soil volume 9m3 minimum soil depth 800mm minimum soil area 3.5m x 3.5m or equivalent
D	Shrubs	minimum soil depth 500-600mm
E	Ground cover	minimum soil depth 300-450mm
F	Turf	minimum soil depth 100-300mm

PUBLIC DOMAIN PLANTING - TREES

Acer buergerianum

Angophora costata

Brachychiton acerifolius

Callistemon viminalis

Cupaniopsis anacardiodes

Elaeocarpus reticulatus

Eucalyptus paniculata

Eucalyptus pilularis

Eucalyptus scoparia

Hymenosporum flavum

Jacaranda mimosifolia

Liquidambar styraciflua

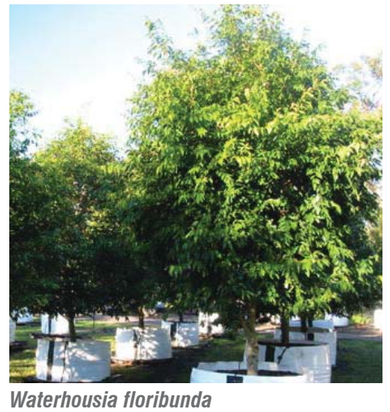
Melaleuca quinquenervia

Podocarpus elatus

Syzygium luehmannii

Tristaniopsis laurina

Ulmus parvifolia



Waterhousia floribunda

PUBLIC DOMAIN PLANTING - SHRUBS, GROUNDCOVERS & VINES

Acacia terminalis

Asplenium australasicum

Callistemon viminalis

Cissus antarctica

Clivia miniata

Dianella caerulea

Doryanthes excelsa

Grevillea sericea

Leptospermum trinervium

Agonis flexuosa

Lomandra 'Tanika'

Myoporum parvifolium

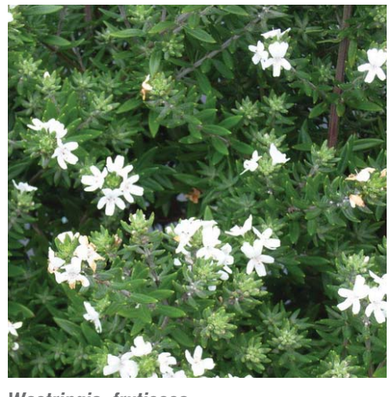
Hibbertia scandens

Philodendron 'Xanadu'

Phormium cookianum

Poa labillardieri

Melaleuca thymifolia



Westringia fruticosa

PRIVATE DOMAIN PLANTING - TREES

GREEN SPINES & SETBACKS

Angophora costata

Brachychiton acerifolius

Eucalyptus paniculata

Eucalyptus pilularis

Eucalyptus scoparia

Hymenosporum flavum

GREEN SPINES & SETBACKS

Jacaranda mimosifolia

Liquidambar styraciflua

Syzygium luehmannii

Tristaniopsis laurina

Ulmus parvifolia

Waterhousia floribunda

ROOF GARDENS

Backhousia citriodora

Banksia serrata

Cupaniopsis anacardiodes

Hibiscus tileaceous ‘Rubra’

Lagerstroemia indica

Magnolia grandiflora ‘Little Gem’

PRIVATE DOMAIN PLANTING - SHRUBS, GROUNDCOVERS & VINES (GREEN SPINES)

Acanthus mollis

Anemone x hybrida

Arthropodium cirratum

Aspidistra elatior

Asplenium australasicum

Calathea zebrinus

Ctenanthe 'Silver-Maroon'

Clivia miniata

Cissus antarctica

Dichondra argentea Silver Falls

Hydrangea quercifolia

Phormium cookianum

Liriope muscari 'Silver Lawn'

Philodendron 'Xanadu'

Plectranthus argentatus

Camelia sasanqua

Rhapis excelsa

Viola hederacea

PRIVATE DOMAIN PLANTING - SHRUBS, GROUNDCOVERS & VINES (FRONT & SIDE SETBACKS)

Acanthus mollis

Arthropodium cirratum

Aspidistra elatior

Asplenium australasicum

Blechnum nudum

Callistemon viminalis 'Little John'

Clivia miniata

Cyathea spp

Dianella caerulea

Doryanthes excelsa

Viola hederacea

Lomandra 'Tanika'

Philodendron 'Xanadu'

Phormium cookianum

Camelia sasanqua

Rhapis excelsa

Syzygium australe 'Elite'

Westringia fruticosa

PRIVATE DOMAIN PLANTING - SHRUBS, GROUNDCOVERS & VINES (ROOF GARDENS)

Acacia cognata 'limelight'

Banksia Birthday Candles

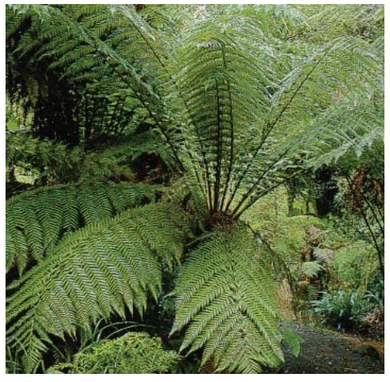
Carpobrotus glaucescens

Callistemon viminalis 'Little John'

Dianella revoluta 'Little Rev'

Eriostemon myoporoides

Grevillea 'Superb'



Cyathea spp

Hardenbergia violacea

Hibbertia scandens

Lomandra 'Tanika'

Leptospermum 'Lemon Bun'

Myoporum parvifolium

Poa labillardieri

Baeckia virgata 'Nana'

Russelia equisetiformis

Scaevola 'Mauve Clusters

Westringia fruticosa

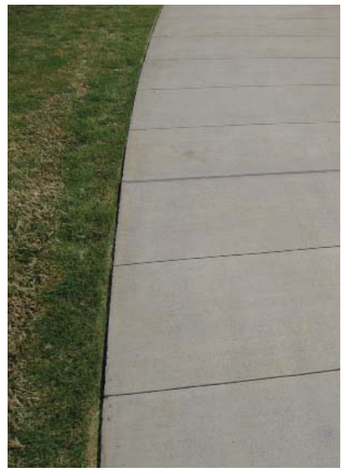
MASTERPLAN
MATERIALS

Materials selections for public and private open space should adopt the following principles:

- Using materials with low VOC content, low embodied energy, high recycled content, the ability to be recycled, and are locally sourced wherever possible;
- Ensuring all timber is either sourced from sustainable sources (with relevant certification) or is recycled;
- Using materials that are robust, fit for purpose and easily maintained and replaced;
- Using a hierarchy of materials, with higher quality materials and more bespoke elements used for the most important areas, and standard quality materials / elements used for less important areas;
- Consistent use of paving materials and colour for private domain footpaths for continuity between development sites;
- Private domain materials and colours should be suitable for a formal landscape theme and complement building materials and colours;
- Retain or reuse existing sandstone walls. Where not possible to retain, they should be photographically recorded;
- Private domain materials and colours should reflect the local context by appropriate material and colour selections eg. sandstone, sandstone coloured concrete or plain insitu concrete, hardwood timber, natural or neutral paint colours.

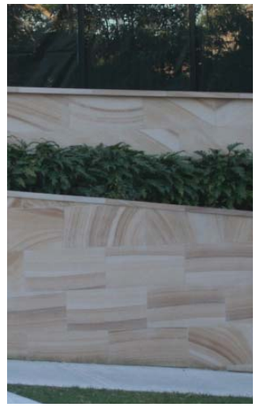
Refer below for indicative materials selections.

1. Public domain footpaths: broom finished insitu concrete
2. Private domain paving: exposed aggregate insitu concrete
3. Private domain feature paving: precast concrete or granite unit paving
4. Stairs: insitu concrete, precast concrete or granite unit paving
5. Drainage grates: heelguard type stainless steel
6. Landscape walls: Class 2 off-form insitu concrete or sandstone clad blockwork
7. Fences & balustrades: painted mild steel
8. Handrails: painted mild steel or stainless steel
9. Bench seats: painted mild steel frames with composite timber (TREX or approved equal) battens
10. Wall seats: insitu concrete or sandstone bases with composite timber (TREX or approved equal) battens on galvanised steel frame
11. Litter bins, bollards, bike racks: stainless steel
12. Play areas: recycled rubber softfall or play bark
13. Play equipment: hardwood timber and painted steel
14. Shade structures: hardwood timber battens or stainless steel cables/mesh (to support climbing plants) and insitu concrete or painted steel frames





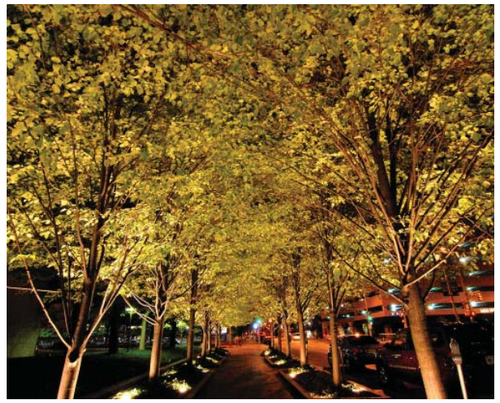
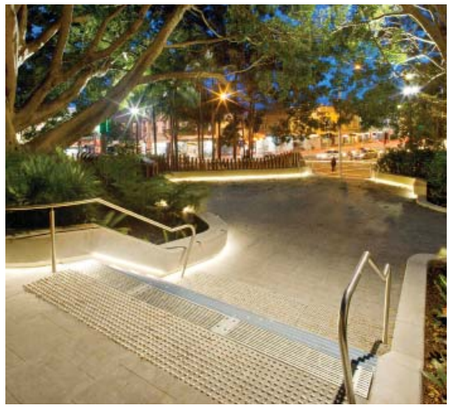

MASTERPLAN
LIGHTING

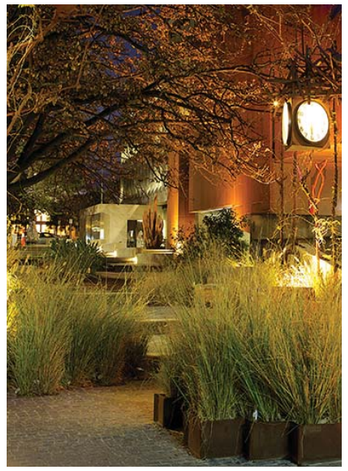
The approach to lighting should be based on the following principles:

- External spaces should be lit to the appropriate lighting category in accordance with Australian Standards;
- The lighting strategy should adopt a hierarchy, with a higher category of lighting and more feature lighting used for the most important spaces or major circulation routes, and a lower category of lighting used for less important spaces or routes;
- External spaces should be adequately lit without being over-lit or resulting in light spill issues;
- External lighting should encourage the use of spaces during hours of darkness in order to promote activation and surveillance;
- Lighting should not just be utilitarian but should include feature or architectural lighting of key spaces or elements to enhance the design;
- Energy efficient lighting such as LED and solar powered should be used.

Refer below for indicative lighting type selections:

- Public streets: street pole lighting
- Public parks: pedestrian pole lighting
- Private open space: pedestrian pole lighting to major pathways/spaces, low level bollard lighting or wall lighting to minor pathways/spaces, handrail lighting to stairs, feature lighting to structures, water features and feature trees

MASTERPLAN

PUBLIC ART

The approach to public art should be based on the following principles:

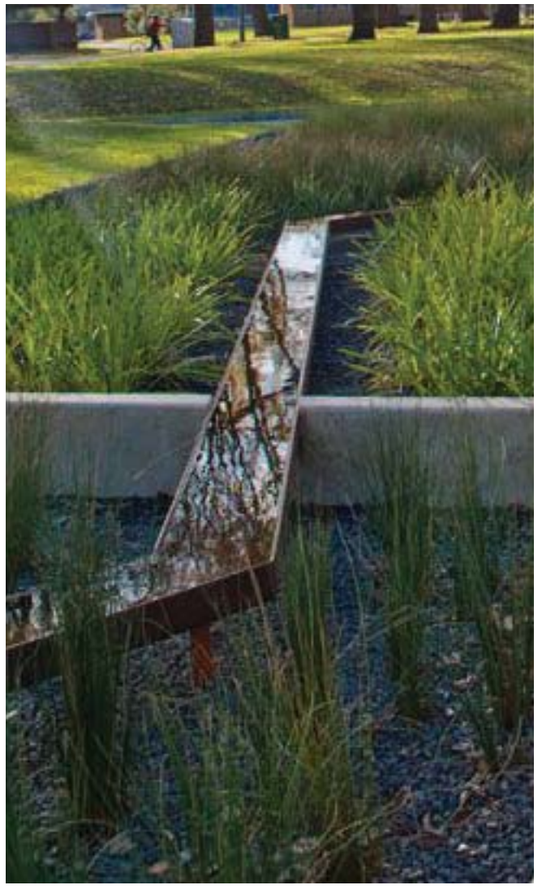
- all developments should include a public art component;
- the delivery of public art should be based on relevant Council policies and protocols;
- public art should be closely integrated with the design of buildings and spaces rather than included as an afterthought or add-on;
- the scale of public art should be appropriate for the scale of the space in which it is located;
- the design of public art should be site specific and relevant to the character, history or design of that particular place;
- public art should be designed to be safe, robust and easily maintained;
- all public art shall be submitted to Lane Cove Council's Public Art Advisory Committee for approval at the DA stage.

MASTERPLAN
SUSTAINABILITY

The approach to sustainability should be based on the following principles:

- The location and design of walking / cycling paths and outdoor spaces should promote active transport and physical activity;
- Water sensitive urban design measures should be incorporated within public and private open space. Examples include the provision of rain gardens within the parking lanes or in open space at the low end of public streets, and rainwater tanks to collect rainwater for reuse within buildings and/or for irrigation. Stormwater can be collected and stored in combined storage tanks/ retaining walls which will be integrated with the stepped nature of the Green Spines. This water can be used to irrigate the garden areas;
- Opportunities to provide communal gardens as part of the communal open space should be explored;
- Opportunities to provide extensive or intensive green roofs on new buildings should be explored;
- Materials used in the public and private domains should have low VOC content, low embodied energy, high recycled content, the ability to be recycled, and be locally sourced wherever possible;
- Retain or reuse existing sandstone walls. Where not possible to retain, they should be photographically recorded;
- All timber used in the public and private domains should be either sourced from sustainable sources (with relevant certification) or recycled;
- Energy efficient lighting such as LED and solar powered should be used;
- The use of a structural rootcell system along with drainage cell and other water storage / reuse elements in areas where appropriate is strongly encouraged;
- Permeable paving to reduce run-off and increase water reuse;
- Vertical gardens / green walls to reduce building temperatures where appropriate.

Refer to DCP Part B 6.1, 6.2 & 6.3 for further guidance.



MASTERPLAN

STAGING & OWNERSHIP

As the precinct will be divided into separate development sites which will be developed at different times, it is critical that the design of the buildings and private domain considers the interfaces with the adjoining sites, both east-west and north-south.

In terms of East-West transitions, it is essential that the communal open space (green spines) of adjoining east-west development sites is treated as a single open space and is at the same level. Refer to the indicative levels plan on page 24 for suggested private domain levels.

For north-south transitions, the preferred approach is shown on page 25, with ramps located on the north side of each development site which accommodate the level change between sites.

Temporary and civil works may be required to deal with interim conditions between adjacent development sites.

In terms of ownership, the following delineation between public and private ownership of open space is proposed:

1. Public ownership: local park, new road, major east-west pedestrian link, and all pocket parks along Marshall Ave and within road reserves at ends of Berry Rd and Holdsworth Ave.
2. Private Ownership: communal open space (green spine).

In particular, the land shown as 'Green Spines' (described on pages 28-46 of ths document) must have satisfactory conditions imposed by the consent authority to the effect that all 'Green Spines' shall:

- be constructed in accordance with the St Leonards South Landscape Master Plan,
- have a right of foot way and public positive covenant that authorises the Council and every person authorised by the Council, to go, pass and repass on foot at all times and for all purposes, without motor vehicles to and from the land to be registered, before the date of issue of the occupation certificate, against the title of the property on which development is to be carried out, in accordance with Section 88E of the *Conveyancing Act 1919*; and
- the 'Green Spines' are to be maintained, repaired and insured by the landowners.

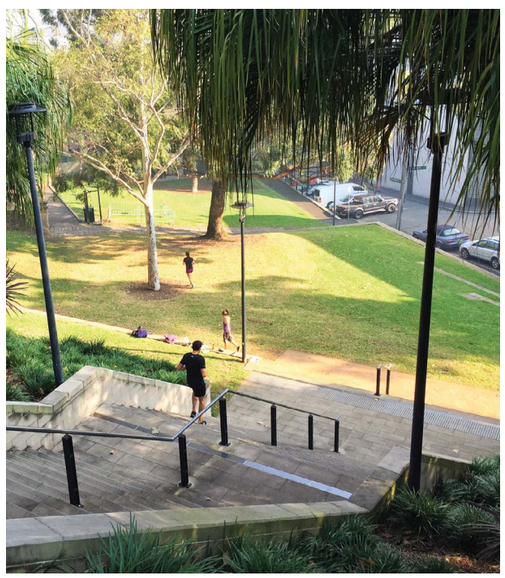
05

APPENDICES

LOCAL PARK

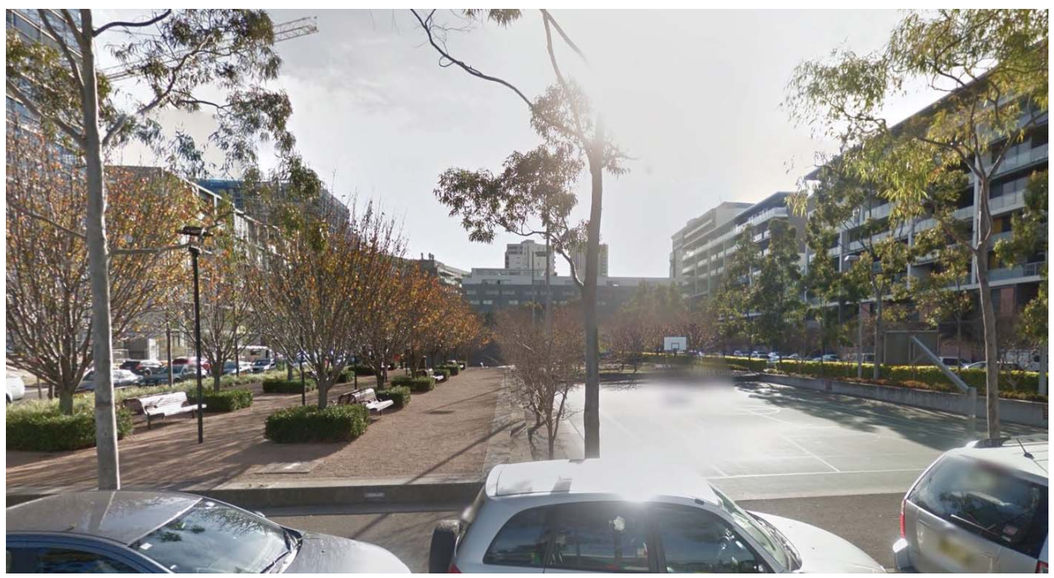
Frog Hollow Reserve, Surry Hills

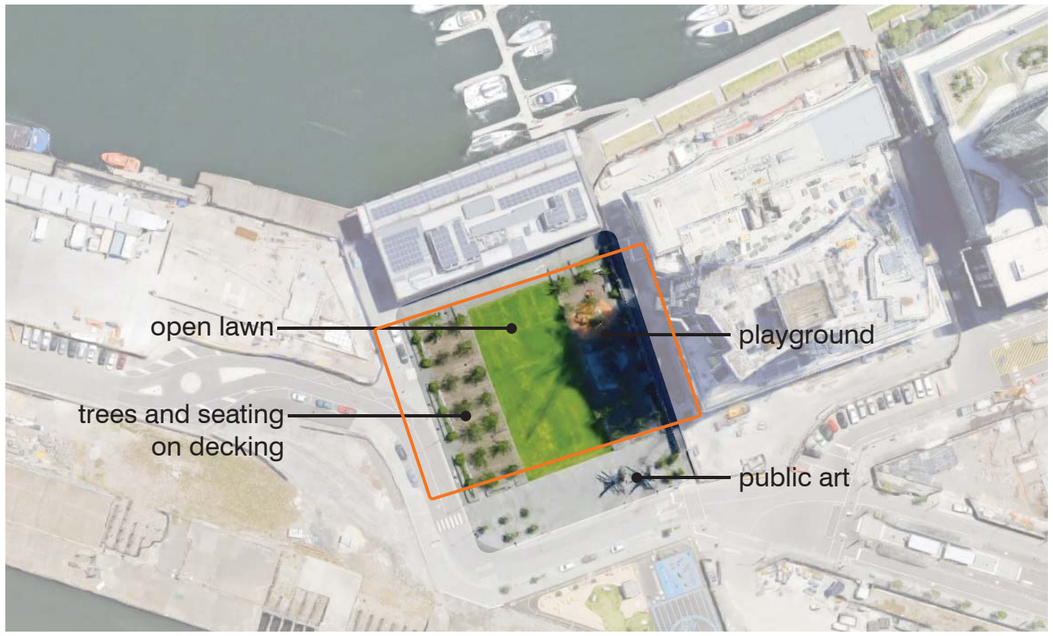
- 3100m^2
- level change with stairs and terraced spaces
- open lawn areas
- mature trees
- perimeter planting



Nuffield Park, Zetland

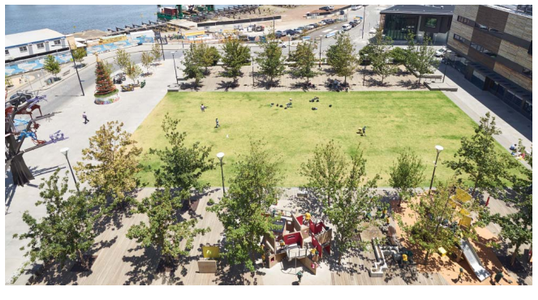
- 5000m^2
- tennis and basketball court
- open lawn area (drainage basin)
- perimeter planting
- tree groves with seating

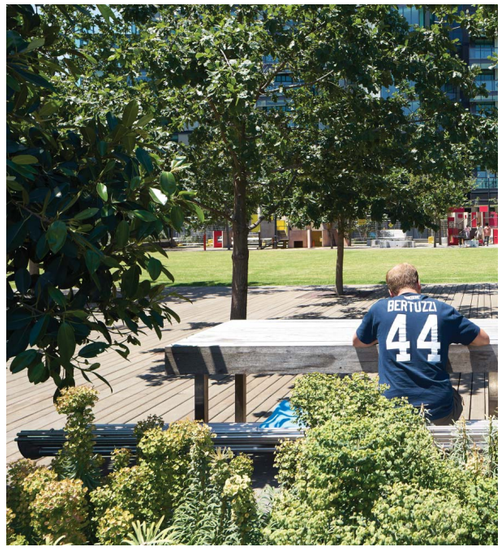


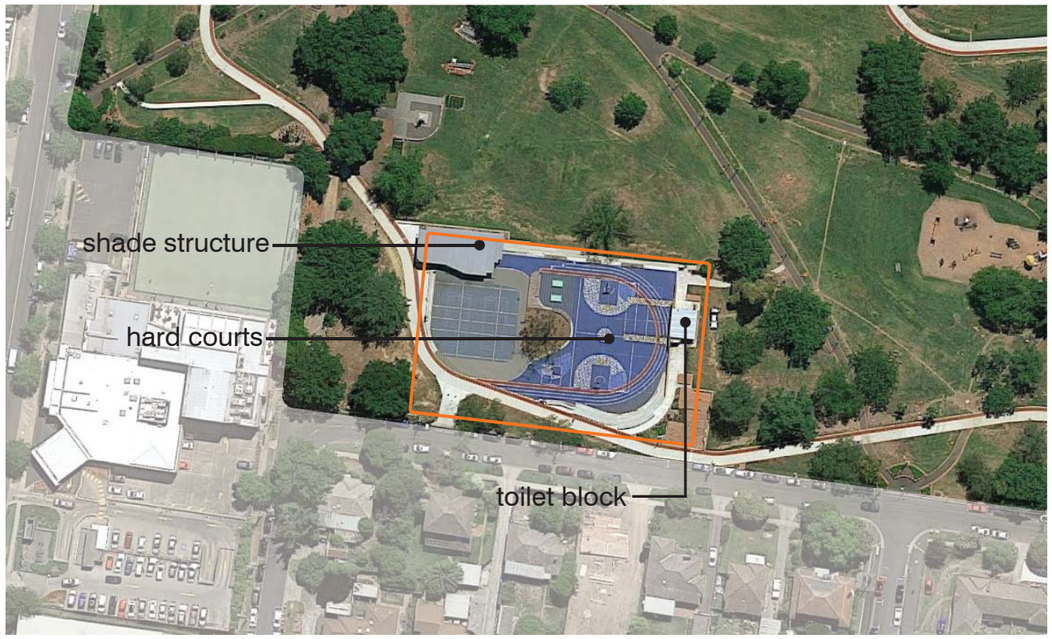


Buluk Park, Melbourne

- 3100m^2
- formal layout
- sculptural playground
- tree groves and seating
- paved areas
- public art







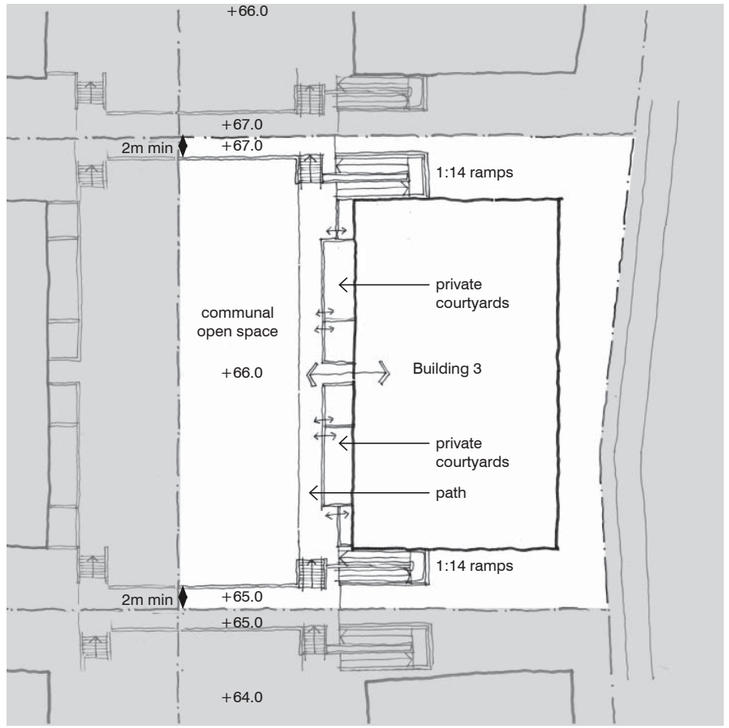
Box Hill Gardens, Melbourne

- multi-use courts
- predominantly paved surfaces
- flexible space
- existing trees
- seating and tables

N-S TRANSITION STUDY

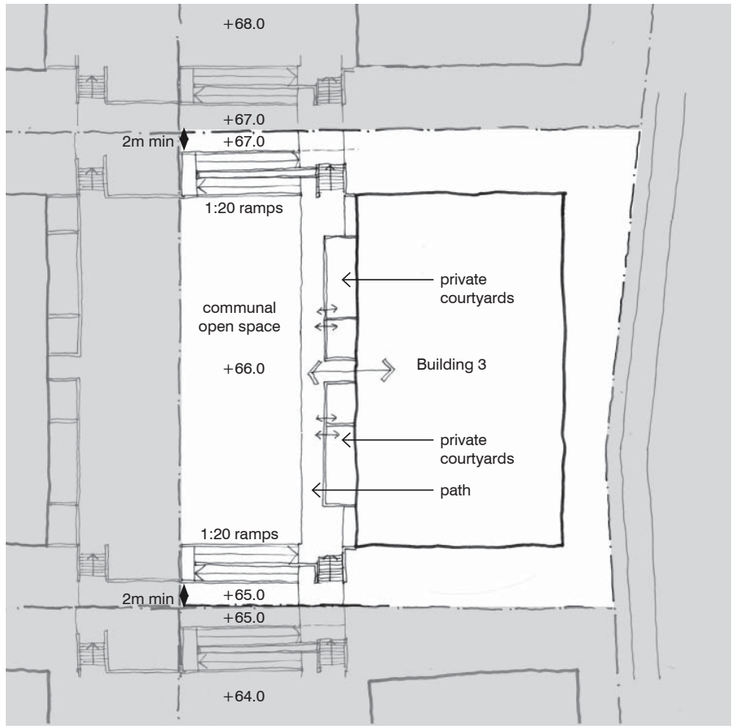
Transitions study - Option 1

- Grade changes taken up at edges of the site with ramps, stairs and 1m (max) retaining walls
- Min 2m setback to boundaries at designated RL required
- Accessible ramps at 1:14 (with handrails) located outside of main north-south open space
- Direct access enabled between private courtyards and open space pathway
- Maximises the flat area available for communal open space



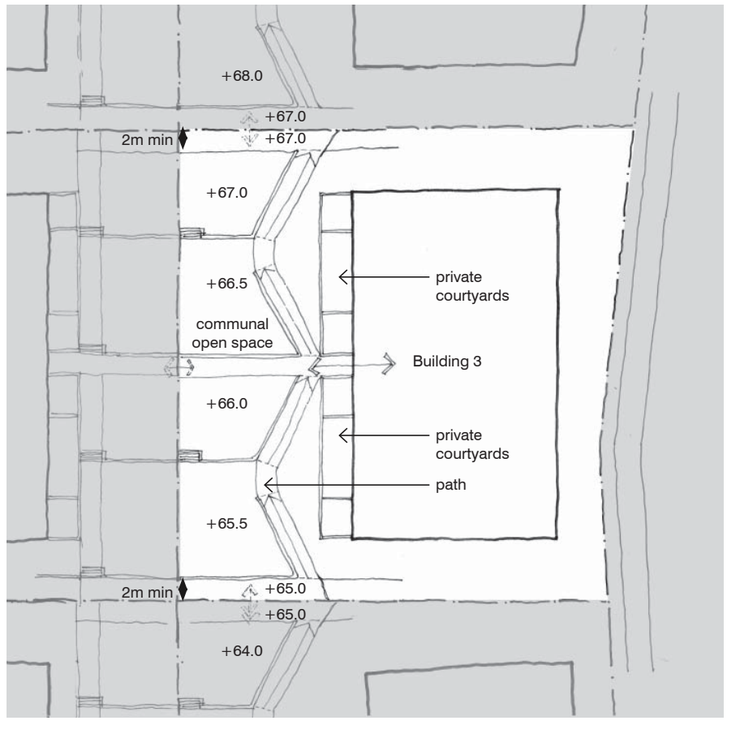
Transitions study - Option 2

- Grade changes taken up at edges of the site with ramps, stairs and 1m (max) retaining walls
- Min 2m setback to boundaries at designated RL required
- Accessible ramps at 1:20 (no handrails required) located within main north-south open space
- Direct access enabled between private courtyards and open space pathway
- Consolidated communal open space



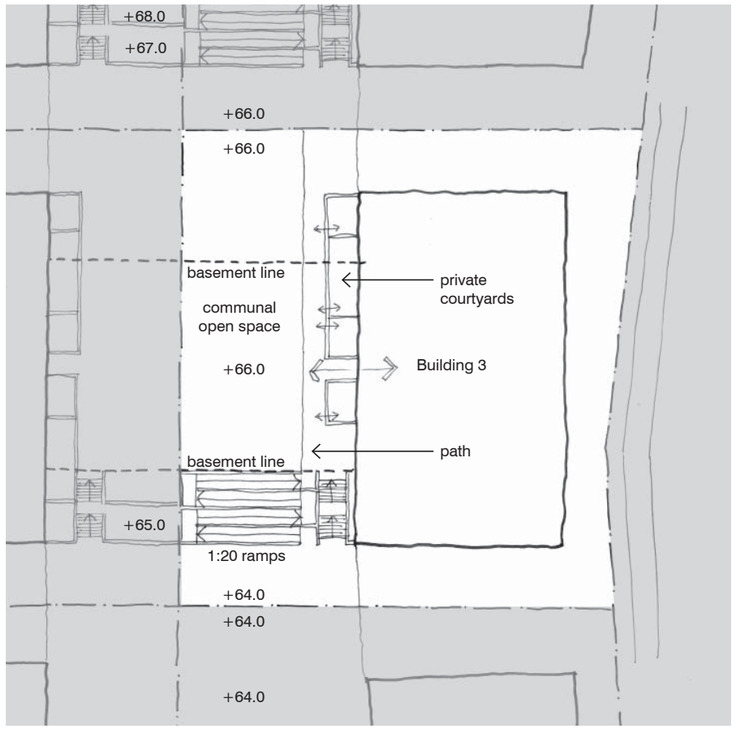
Transitions study - Option 3

- Gradual grade changes across site taken up with 0.5m walls, stairs and ramps
- Min 2m setback to boundaries at designated RL required
- Accessible ramps at 1:20 (no handrails required) located across main north-south open space
- Restricted access between private courtyards and open space pathway - could be achieved with stairs
- Terraced communal open space - reduces the impression of segmentation between lots



Transitions study - Option 4

- Grade changes taken up in one location with ramps, stairs and 1m (max) retaining walls
- Accessible ramps at 1:20 (no handrails required) located within main north-south open space and south of the basement boundary. Option for 1:14 ramps at ~3/4 length shown, with handrails.
- Direct access enabled between some private courtyards and open space pathway
- Consolidated communal open space, however spread over adjacent developments

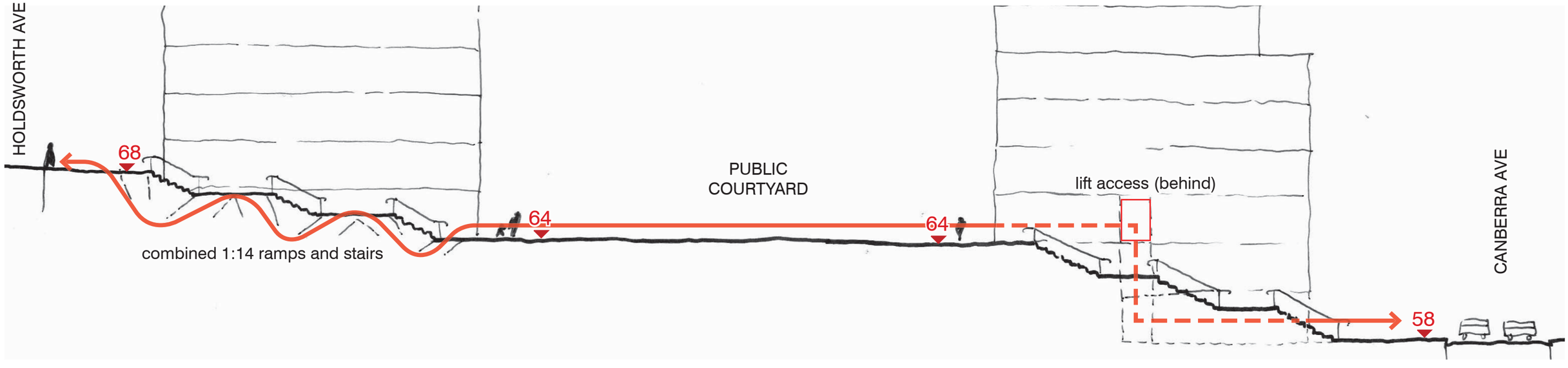


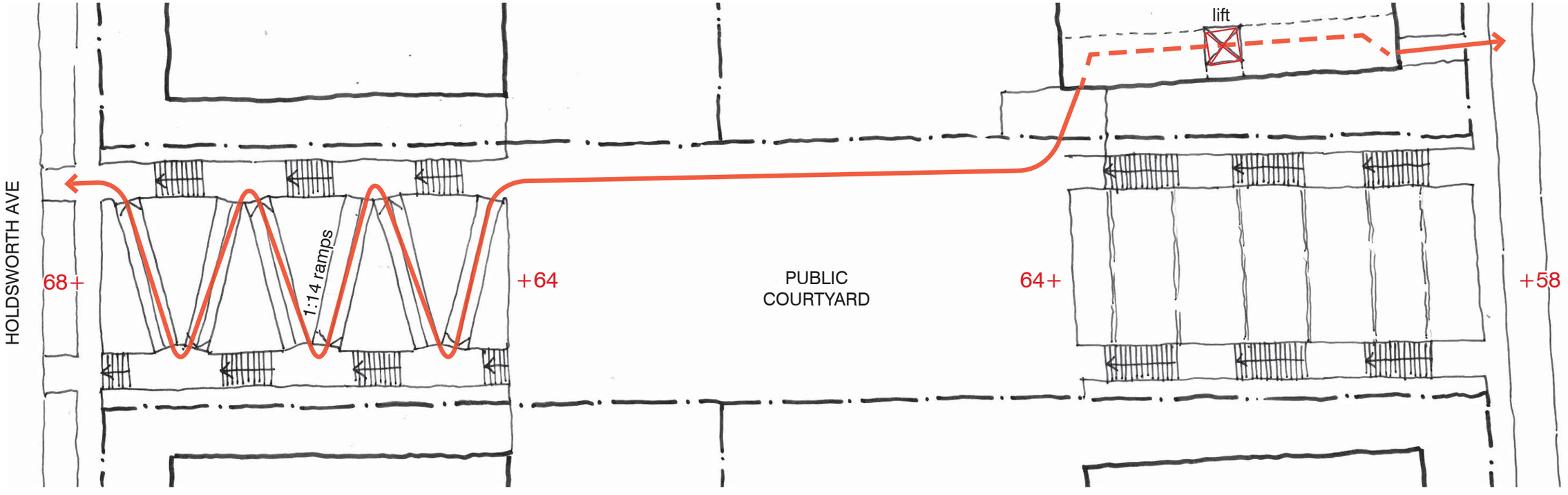
LEVELS STUDY

E-W ACCESSIBLE CONNECTION

Option 1 (Note: This is the preferred option, with a change to 1:20 ramps instead of 1:14 ramps)

- 1:14 ramps are integrated into the stairs and landscape between Holdsworth Ave and the public courtyard.
- Landscape treatment around ramps allows for softening of the transition and helps hide handrails
- Ramps and stairs co-located with equal access and visibility as per best practice disabled access
- Lift access between the public courtyard and Canberra Avenue through public section of building



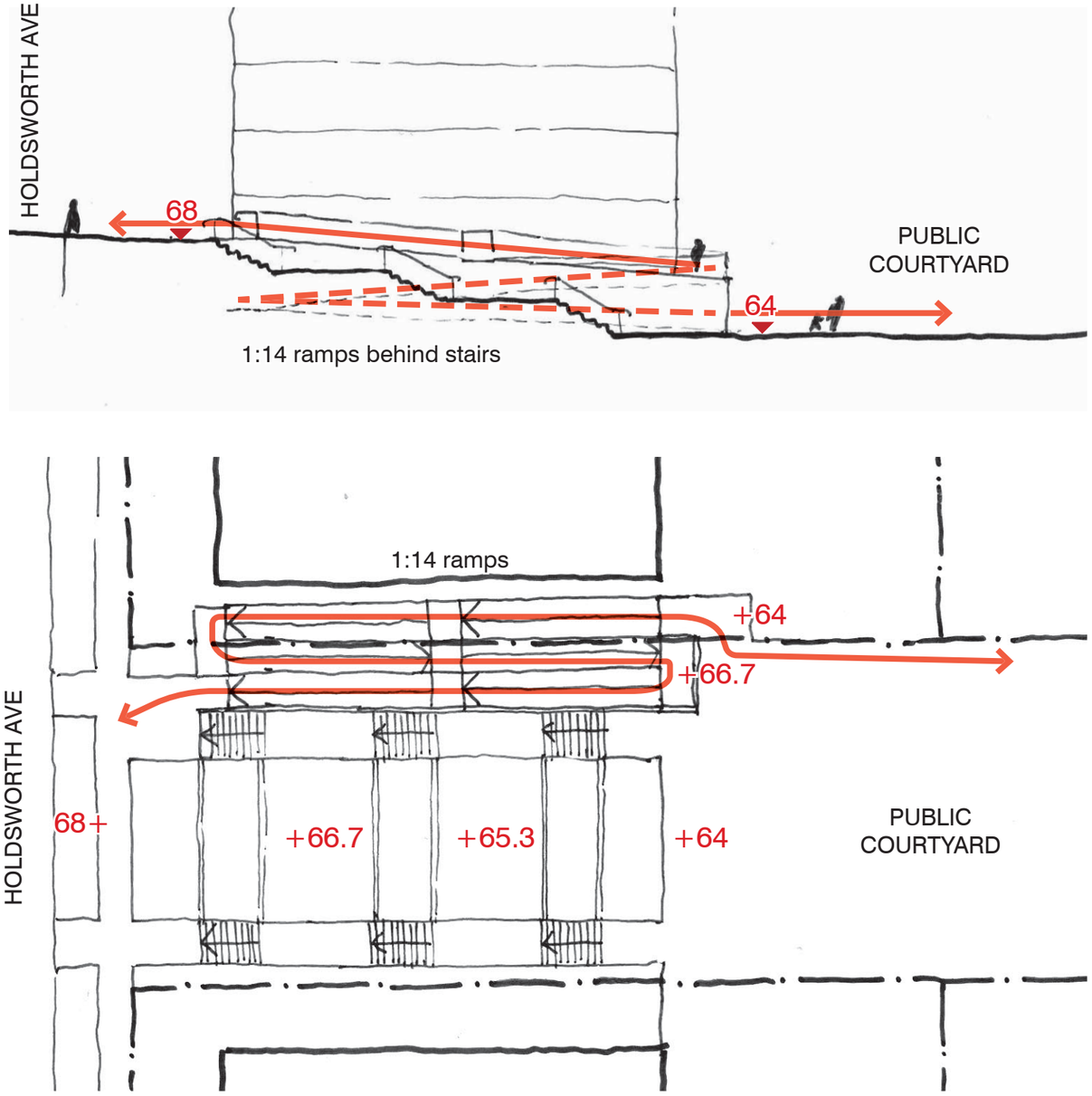


LEVELS STUDY

E-W ACCESSIBLE CONNECTION

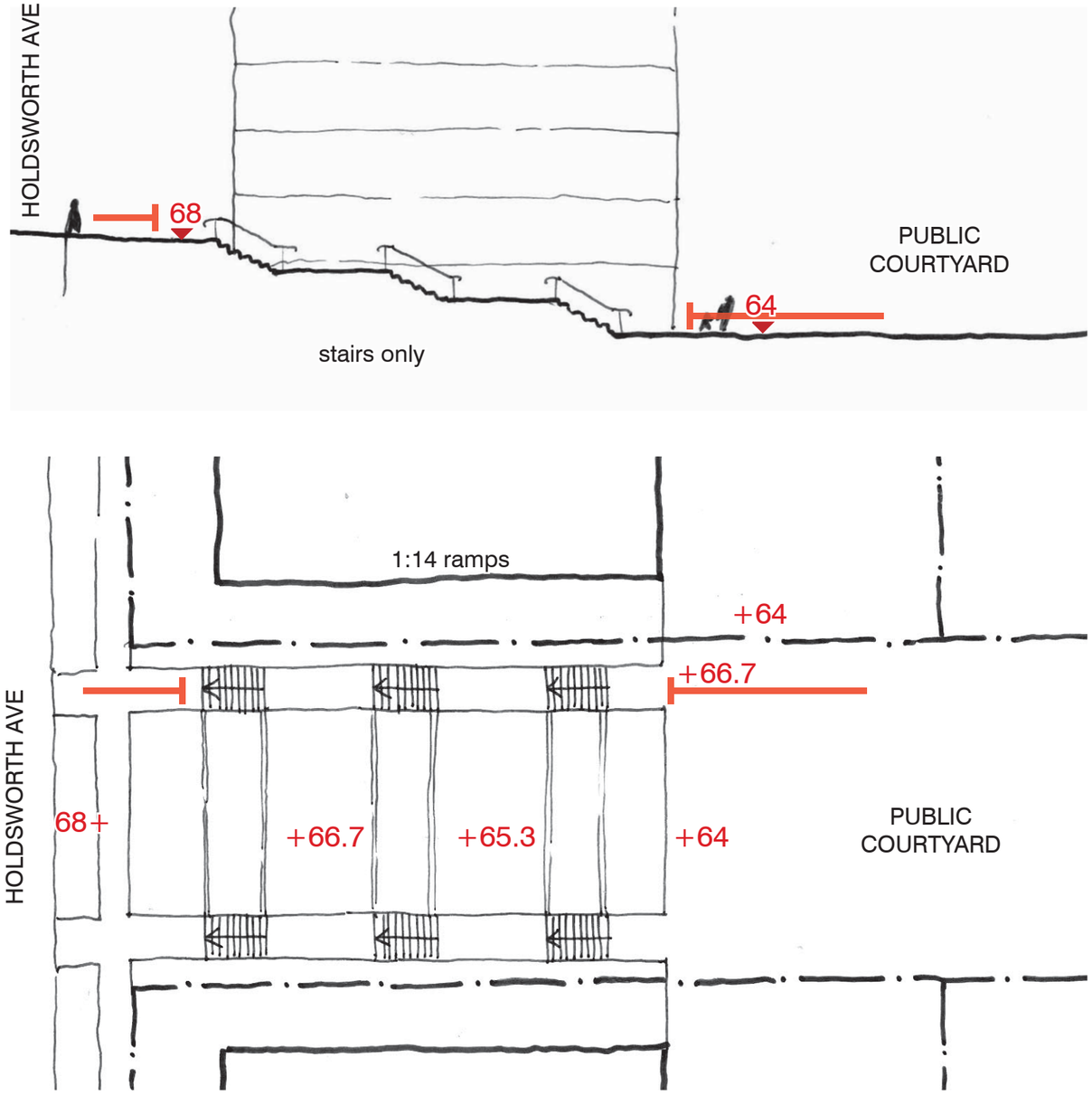
Holdsworth Ave to Public Courtyard - Option 2

- 1:14 ramps separated from stair and landscape transition
- Public walkway encroaches into private development lot and creates a poor relationship between building and public space
- Separate ramp access separates wheelchair / pram users from main pedestrian connection - poor accessibility outcome
- Poor visibility to lower portion of ramps creates a safety issue
- Ramps become visually obtrusive within the public space with no screening to walls and handrails.
- Central landscape still requires terracing to take up the 4m level change - recommended max 1m walls to avoid balustrades



Holdsworth Ave to Public Courtyard - Option 3

- Stairs only between upper and lower level
- No access available for wheelchair users (or prams) - very poor accessibility outcome
- Central landscape still requires terracing to take up the 4m level change - recommended max 1m walls to avoid balustrades



APPENDIX C: HAZARDOUS MATERIAL ASSESSMENT REGISTRY

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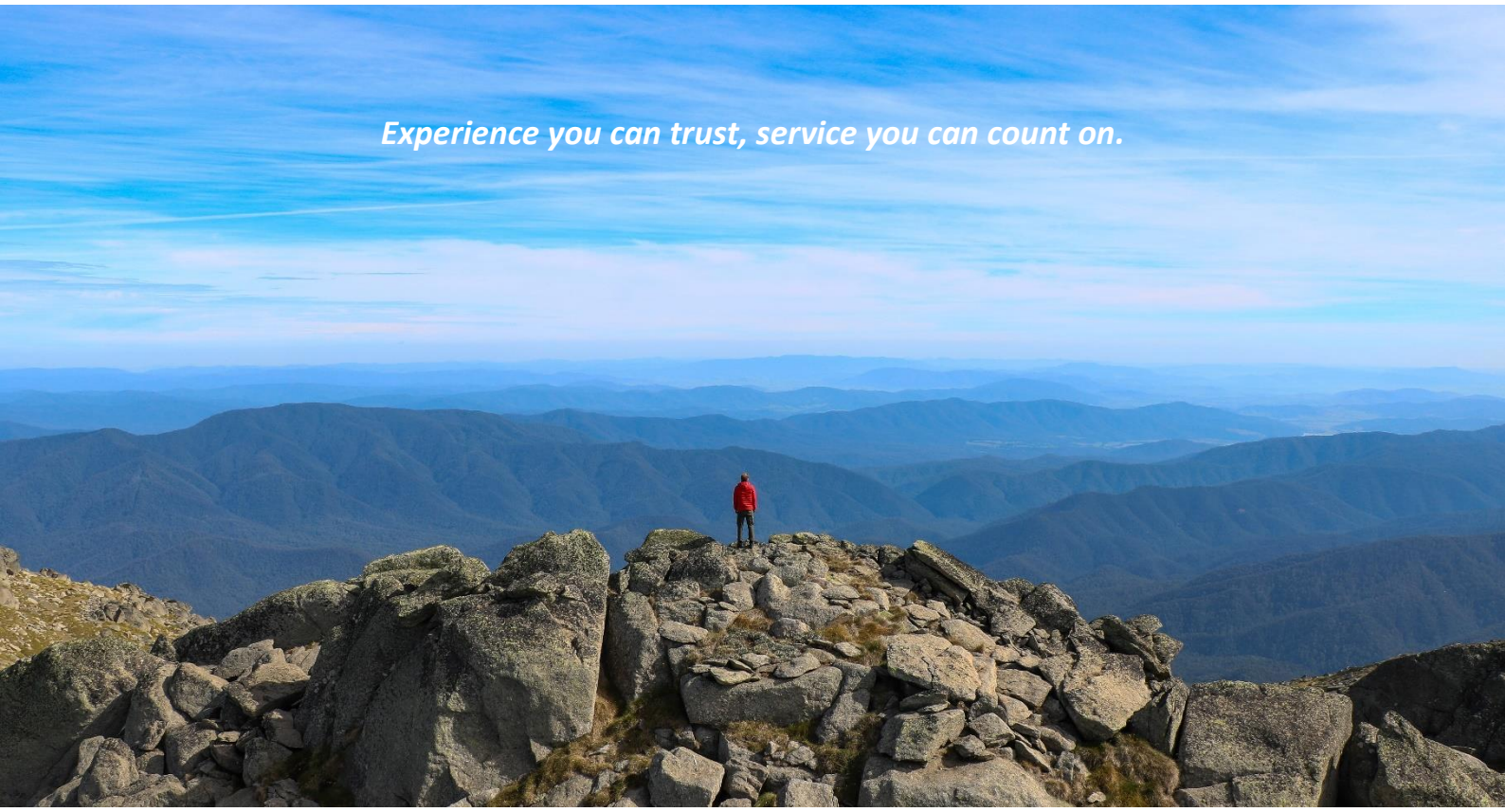

Hazardous Material Assessment

10 & 12 Marshall Avenue and 1 & 3 Holdsworth Avenue, St Leonards NSW 2065

Prepared For:	New Golden International Gladesville Pty Ltd
Reference:	20-1082HAZ
Date:	17 May 2021

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Document History:		
Document No	**Revision No.**	**Issue Date**
20-1082HAZ	A	17.05.2021

Report Author:	Technical Reviewer
	
Con Kariotoglou Managing Director *BSc, Cert IV WHS, AFMIML, MEIANZ, MALGA* *SafeWork NSW Approved Asbestos Assessor, License No. LAA001006*	Con Kariotoglou Managing Director *BSc, Cert IV WHS, AFMIML, MEIANZ, MALGA* *SafeWork NSW Approved Asbestos Assessor, License No. LAA001006*

This report is to be read in its entirety and should not be review in individual section to provide any level of information independently. Each section of the report relates to the rest of the document and as such is to be read in conjunction, including its appendices and attachments.

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EXECUTIVE SUMMARY

ECON Environmental Pty Ltd was appointed by New Golden International Gladesville Pty Ltd to undertake a Hazardous Building Materials Survey of the existing building structures within the subject site proposed to be demolished. The subject sites are located at 10 & 12 Marshall Street and 1 & 3 Holdsworth Avenue, St Leonards NSW 2065.

The site inspections were carried out on the Wednesday 5th May 2021 by Con Kariotoglou *(SafeWork NSW Asbestos Approved Assessor, LAA 001006)*. At the time of the inspection:

10 Marshall Avenue

- The site had consisted of a single storey brick and sandstone block residential house with terracotta roof tiles, timber eaves, and a rear brick and fibre-cement shed at the rear of the property.
- Hazardous building materials were noted within the residential property.
- The site was mainly covered by low lying grasses with a concrete hardstand driveway.
- Medium to large trees were noted around the boundary perimeter of the property.
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection.
- No visible signs of Asbestos containing fragments were detected within surface soils within the site.

12 Marshall Avenue

- The site had consisted of a double storey brick and timber panel residential house with terracotta roof tiles, timber eaves, timber decking and brick paved areas around the perimeter of the house, and a brick and fibre-cement sheeting side sunroom.
- Hazardous building materials were noted within the residential property.
- Medium to large trees were noted around the boundary perimeter of the property.
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection.
- No visible signs of Asbestos containing fragments were detected within surface soils within the site.

1 Holdsworth Avenue

- The site had consisted of a double storey brick, fibre-cement and sandstone block residential house with terracotta roof tiles, timber eaves and brick paved areas around the perimeter of the house.
- Hazardous building materials were noted within the residential property.
- Medium to large trees were noted around the boundary perimeter of the property, with front and backyards covered by low lying grasses.
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection.
- No visible signs of Asbestos containing fragments were detected within surface soils within the site.

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3 Holdsworth Avenue

- The site had consisted of a single storey cement rendered and concrete block residential house with terracotta roof tiles, timber eaves and brick paved areas around the perimeter of the house.
- Hazardous building materials were noted within the residential property.
- Medium to large trees were noted around the boundary perimeter of the property.
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection.
- No visible signs of Asbestos containing fragments were detected within surface soils within the site.

Summary of Results

Hazardous Material	Identified
Friable asbestos presumed:	No
Bonded asbestos presumed:	Yes
Synthetic mineral fibres presumed:	No
Lead-containing paints presumed:	No
Lead containing dust presumed:	No
PCBs containing capacitors presumed:	No
Ozone Depleting Substances presumed:	No

(Refer to Hazardous Materials Register (Appendix A for detailed results).

General Recommendations

- It is a requirement that all controllers of premises provide all occupiers of their place of work with a copy of the Hazardous Materials Register and all associated updates in accordance with the SafeWork NSW Code of Practice: How to manage and control asbestos in the workplace (2019).
- A copy of the Hazardous Materials Register should be made readily available to all contractors conducting works on the premises/site.
- Should any previously unidentified suspect hazardous materials be identified during renovation / demolition, works should cease, and the materials should be inspected by an experienced occupational hygienist.
- Remove all hazardous materials identified in accordance with the appropriate guidelines and codes of practice prior to refurbishment or demolition of an area.

(Refer to recommendations page for more information).

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1. INTRODUCTION

1.1 Background

ECON Environmental Pty Ltd was engaged by New Golden International Gladesville Pty Ltd to undertake a Hazardous Material Assessment on the subject site located at 10 & 12 Marshall Avenue and 1 & 3 Holdsworth Avenue, St Leonards NSW 2065. The intention of client is to demolish the existing dwelling and all associated structures and redevelop the site.

The total combined area of the sites was approximately 2,725m2. A site inspection was carried out on Wednesday 5th May 2021 by ECON Environmental's representative Con Kariotoglou *(SafeWork NSW Asbestos Approved Assessor, LAA 001006)*, which involved a visual assessment of the entire building structures within the subject site. Details of the findings are presented within the body of this report, as well as an assessment of significance with regards to the findings of the investigation.

The purpose of the survey is to identify the presence of hazardous building materials within the existing building structures onsite and to assess the risk these materials might present to occupants, workers or contractors. The results of the survey and Hazardous Materials Register (Appendix A) are provided in this report. The results of the survey and Hazardous Materials Register are provided in this report (Please refer to appendix A - Asbestos register).

For the purpose of this report hazardous materials are limited to:

- Asbestos Containing Material (ACM)
- Asbestos Containing Dust (ACD)
- Synthetic Mineral Fibre (SMF)
- Lead Containing Paint (LCP)/ (Pb)
- Lead Containing Dust (LCD)
- Polychlorinated Biphenyls (PCB's)
- Ozone Depleting Substances (ODS)

1.2 Objectives

The objectives / scope of the Hazardous Material Survey is to:

- Complete a Safety, Health & Environmental Work Methods Statement (SH&EWMS) prior to undertaking works
- Identify hazardous materials within the accessible subject areas
- Provide a qualitative risk assessment of the hazardous materials identified
- Provide recommendations on the control measures strategies and
- Prepare a Hazardous Materials Register for the site to ensure legislative compliance prior to and during scheduled demolition works.

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1.3 Scope of Works

The scope of work involved the following:

- Walkthrough inspection of the subject areas
- Identification of the hazardous building materials
- Sampling of fixed building fabric, where possible
- Laboratory analysis of selected samples where the inspector suspected the presence of hazardous materials, and
- Preparation of a report/risk assessment outlining the site data and recommendations.

1.4 Results and findings

The results of this hazardous materials survey are provided in a tabular format and are designed to provide readily available information about the presence of hazardous materials on the premises and the risks that these materials present to contractors during upcoming scheduled demolition works.

- The Hazardous Materials Register is shown in Appendix A.
- Photographs taken during the survey are shown in Appendix B.

1.5 Legislative Requirements

The survey works and production of this report have been undertaken in accordance with the requirements of:

- Workplace Health and Safety (WHS) Regulation 2017 & WHS Act 2011 (2017)
- Australian Standard AS2601 (2001) The Demolition of Structures
- SafeWork NSW Code of Practice: Demolition Work (2019)
- SafeWork NSW Code of Practice: How to Manage and Control Asbestos in the Workplace (2019)
- SafeWork NSW Code of Practice: How to Safely Remove Asbestos (2019)
- Code of Practice for Synthetic Mineral Fibres [NOHSC:2006(1990)]
- Australian / New Zealand Standard AS/NZS 4361.1 (2017) Guide to Hazardous Paint Management. Part 1: Lead and Other Hazardous Metallic Pigments in Industrial Applications
- Australian / New Zealand Standard AS/NZS 4361.2 (2017) Guide to Hazardous Paint Management. Part 2: Lead Paint in Residential, Public and Commercial Buildings
- Australian Standard AS4874 (2000) Guide to the Investigation of Potentially Contaminated Soil and Deposited Dust as a Source of Lead Available to Humans
- Australian and New Zealand Environment and Conservation Council ANZECC (1997) Identification of PCB-containing Capacitors: An Information Booklet for Electricians and Electrical Contractors
- ANZECC (2003): Polychlorinated Biphenyls Management Plan.
- Australian Commonwealth Ozone Protection & Synthetic Greenhouse Gas Management Act 1989 & Ozone Protection and Synthetic Greenhouse Gas (Manufacture Levy) Regulations 2004.

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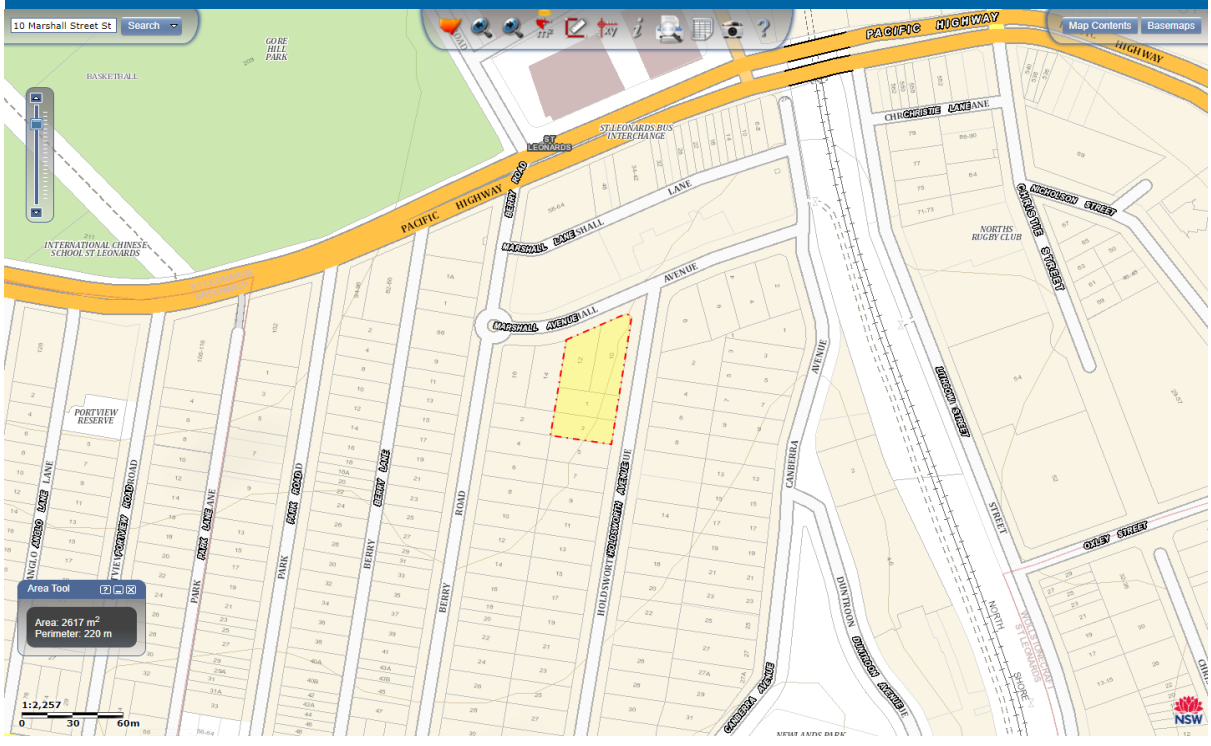
2. SITE IDENTIFICATION

The study area is the proposed development included the four lots located at 10 & 12 Marshall Avenue and 1 & 3 Holdsworth Avenue, St Leonards NSW 2065 (Figure 1). The subject site is surrounded by low density residential properties to the east, south and west and high density residential to the north. Figure 2 shows an aerial photograph of the site and the surrounding land.

Table 1: Site Identification	
Street Address	10 & 12 Marshall Street and 1 & 3 Holdsworth Avenue, St Leonards NSW
Lot and DP Number	Lot 4 in DP 7259 (10 Marshall Avenue) Lot 3 in DP 7259 (12 Marshall Avenue) Lot 5 in DP 7259 (1 Holdsworth Avenue) Lot 6 in DP 7259 (3 Holdsworth Avenue)
Approx. Total Site Area	The total area of 10 Marshall Avenue is approximately 840m^2, The total area of 12 Marshall Avenue is approximately 660m^2, The total area of 1 Holdsworth Avenue is approximately 560m^2, The total area of 3 Holdsworth Avenue is approximately 560m^2, Total combined area of all the sites is approximately 2,620m^2.
Zoning	R4 – High Density Residential
Local Government Area	Lane Cove City Council
LGA Legislation	Lane Cove Local Environmental Plan 2009

Figure 1: Site location map – source www.maps.six.nsw.gov.au



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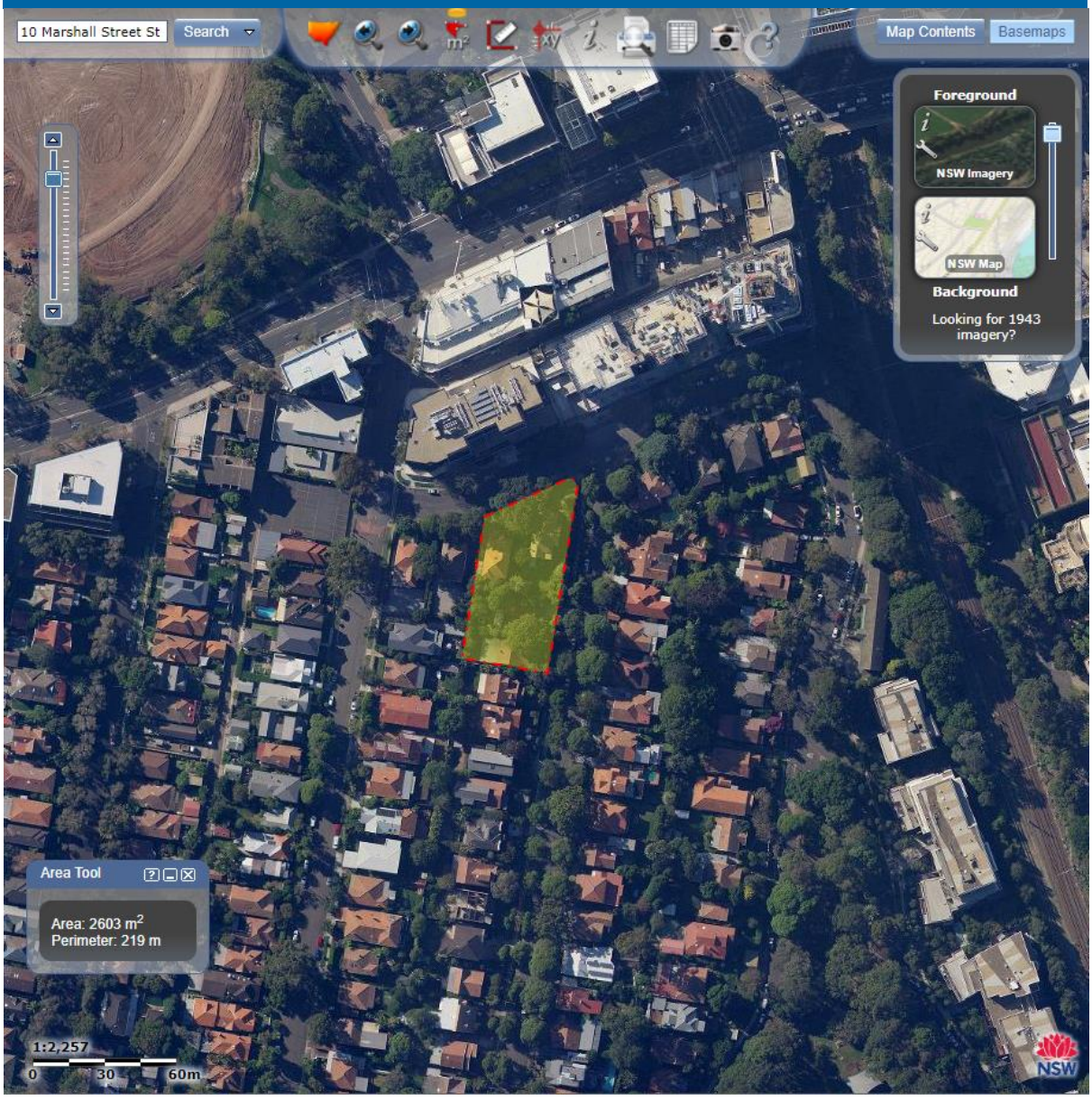
3. REQUIREMENT REASONING

The objective of the 'Hazardous Material Assessment is to assess the existing building structures within the subject site for potential hazardous building materials, prior to their demolition.

Figure 2: Aerial photograph of the subject site – *source www.maps.six.nsw.gov.au*



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4. SITE DESCRIPTION

4.1 Site Inspections

On Wednesday 5th May 2021, a site investigation was conducted by ECON Environmental's representative Con Kariotoglou. Field work was carried out in accordance with the methodology described in AS4482.1 – 2005 and the NEPM (2013). At the time of inspection, the following observations were noted:

10 Marshall Avenue

- The site had consisted of a single storey brick and sandstone block residential house with terracotta roof tiles, timber eaves, and a rear brick and fibre-cement shed at the rear of the property.
- Hazardous building materials were noted within the residential property.
- The site was mainly covered by low lying grasses with a concrete hardstand driveway.
- Medium to large trees were noted around the boundary perimeter of the property.
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection.
- No visible signs of Asbestos containing fragments were detected within surface soils within the site.

12 Marshall Avenue

- The site had consisted of a double storey brick and timber panel residential house with terracotta roof tiles, timber eaves, timber decking and brick paved areas around the perimeter of the house, and a brick and fibre-cement sheeting side sunroom.
- Hazardous building materials were noted within the residential property.
- Medium to large trees were noted around the boundary perimeter of the property.
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection.
- No visible signs of Asbestos containing fragments were detected within surface soils within the site.

1 Holdsworth Avenue

- The site had consisted of a double storey brick, fibre-cement and sandstone block residential house with terracotta roof tiles, timber eaves and brick paved areas around the perimeter of the house.
- Hazardous building materials were noted within the residential property.
- Medium to large trees were noted around the boundary perimeter of the property, with front and backyards covered by low lying grasses.
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection.

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- No visible signs of Asbestos containing fragments were detected within surface soils within the site.

3 Holdsworth Avenue

- The site had consisted of a single storey cement rendered and concrete block residential house with terracotta roof tiles, timber eaves and brick paved areas around the perimeter of the house.
- Hazardous building materials were noted within the residential property.
- Medium to large trees were noted around the boundary perimeter of the property.
- No visible signs of oil stains or olfactory signs of odours were detected during the inspection.
- No visible signs of Asbestos containing fragments were detected within surface soils within the site.

4.2 Restrictions on survey / areas not assessed

It is possible that hazardous building materials, which may be concealed within inaccessible areas/voids, may not have been located during the survey. This may include:

Restricted areas:

- In set ceilings or wall cavities.
- Those areas accessible only by dismantling equipment or performing minor localized demolition works.
- Service shafts, ducts etc., concealed within the building structure.
- Height restricted areas, surfaces above 2.8 meters height.
- Voids or internal areas of plant, equipment, air-conditioning ducts, etc.,
- Totally inaccessible areas such as voids and cavities created and intimately concealed within the building structure (these voids are only accessible during major demolition works).
- Latent asbestos contamination may not be identified on the site during the time of the visual inspection within subsurface soils and beneath building footprints

Inaccessible areas:

- Building interior roof cavities – unlikely to contain potential hazardous materials.
- Building interior subflooring areas – unlikely to contain potential hazardous materials.

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5. HAZARDOUS MATERIALS REPORT INTERPRETATION, RISK ASSESSMENT FACTORS AND PRIORITY RATING

5.1 How to interpret this report

To assist in the interpretation of the hazardous materials register, the following provides a detailed explanation and meaning of the headings, the abbreviations and the terms that appear in the table.

- ***Building Name / No*** – States the building name / number (if available) of the particular building on for which the survey was undertaken.
- ***Company preparing report & Occupational Hygienists name*** – provides the source of the report.
- ***Survey Date*** – Provides the date on which the on-site survey of the particular building or room occurred.
- ***Specific Room Name or Area Name & No***. where available – States the room or area name / number (if available) of the particular building for which the survey was undertaken.
- ***Specific Location within Room or Area*** – States the precise location of the material within a room (Direction, adjacent features etc.) – e.g. Infill panel below window on southern wall. Only the specific locations at which hazardous materials are identified are to be shown.
- ***Description of Material*** – States the type of material identified – e.g. Vinyl tile, fibre cement sheeting, fibrous insulation, etc.
- ***Dimension / quantity*** – States the surface area or length of the material usually expressed as square metres (m^2) or linear metres (Lin m), or the number of materials identified (e.g. Number of doors, capacitor etc). The dimension is an estimate only and should not be relied upon as an exact measure.
- ***Sample ID No. / Photo No***. – Sample No. refers to the identification number of any samples collected. Photo No. refers to the identification number of photographs in Appendix C.
- ***Analysis Result*** – Refers to the results of laboratory analysis. The term 'NAD' means no asbestos was detected during laboratory analysis of samples of suspected asbestos containing materials.
- ***Condition*** – Refers to the physical state or condition of the material at the time of the survey.
- ***Good*** – Material shows no, or very minor, sign of damage and/or deterioration.
- ***Fair*** – Material shows signs of minor damage and/or deterioration.
- ***Poor*** – Material shows sign of significant damaged and/or deterioration or the material is partly or wholly unserviceable for its intended use.
- ***Recommended Control measures / Additional Comments*** – Indicates what control measures have been recommended, and also may include any other relevant comments that may assist with the future management of the material. Due to available space, the entry may refer the reader to another location in the Register.
- ***Survey Review Date*** – Refers to recommended next date for review of the Hazardous material at this particular location.
- ***Overall Risk*** – Refers to the level of risk posed by the material based on its present condition, friability, accessibility and other factors such as exposure to future disturbance. Five (5) levels

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of risk, based on the above factors are defined as Extreme (E), High (H), Medium (M), Low (L) and Negligible (N) in accordance with the following definitions

5.2 Risk assessment factors and priority rating

To assess the health risk posed by the presence of hazardous materials, all relevant factors must be considered.

5.2.1 Asbestos containing materials (ACM) and asbestos containing dust (ACD)

The following factors were considered when assessing the human health risk posed by ACM:

- Evidence of physical damage, water damage or cracking.
- Requirement for access for building or maintenance works.
- Likelihood of disturbance and accessibility to exposed areas; and
- Environmental and occupational conditions.

High**:** Friable (un-bonded) asbestos material that has deteriorated significantly. The material is readily accessible and prone to further disturbance. Can include unsealed friable asbestos material located in or near air-conditioning systems where disturbance may result in spread of contamination to other areas.

Medium: Minor deterioration of the ACM is evident, or the material is prone to mechanical disturbance due to routine building activity, maintenance, degradation or due to environmental conditions.

Low: Asbestos or other material shows no or very minor signs of damage / deterioration. Routine accessibility is unlikely to cause significant deterioration, or the material is adequately sealed.

5.2.2 Synthetic mineral fibres (SMF)

The risk assessment factors for SMF are similar to those of asbestos including:

- Evidence of physical damage
- Accessibility to material
- Likelihood of disturbance
- Accessibility to exposed areas and
- Environmental and occupational conditions.

High: Friable synthetic mineral fibre exposed and readily accessible.

Medium: Friable synthetic mineral fibre or damaged bonded material which due to its present condition and/or location is likely to be further damaged resulting in fibre release.

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Low: Non friable or sealed friable material that is unlikely to present a risk to health unless damaged, tooled, cut, sanded or machined.

5.2.3 Lead containing paint (LCP)

Lead when inhaled or ingested is toxic to humans. The lead containing paint risk assessment factors are based on these two exposure routes on human receptors (infants, children, adults or contractors). These factors include:

- Likelihood of inhalation or ingestion.
- Likelihood of disturbance.
- Condition of the paint system; and
- Environmental and occupational conditions.

High*:* Damaged or deteriorated paint membrane, which due to its present condition and location, presents a significant health risk.

Medium*:* Paint membrane showing signs of deterioration and weathering, which if left untreated will continue to deteriorate and require abatement that is more extensive than its current requirement.

Low*:* Stable paint membrane that is in good condition or covered by a lead-free paint membrane, which is also in a good condition.

5.2.4 Lead containing dust (LCD)

Settled dust containing lead in ceilings spaces, voids and cavities is in fine particles and has a potential for greater bioavailability causing serious long-term health problems on the brain, kidneys and reproductive organs. Human exposure is through inhalation or ingestion. Routes of exposure and risk assessment factors include:

- Areas of exposed soil adjacent to the building.
- Type of materials and age of the building.
- Refurbishment works conducted on the building.
- Environmental and occupational conditions.
- Distance from roads, commercial garages and mining/smelting operations.
- Dust fall rates and carpet wear; and
- Nature of paint work.

5.2.5 Polychlorinated biphenyls (PCBs)

Polychlorinated biphenyls (PCBs) are a set of persistent organic chemicals that are known or suspected to cause a wide range of health effects. There is clear evidence that PCBs cause cancer in animals, and they are considered probable human carcinogens *U.S. Environmental Protection*

Agency (EPA) 1996. Human and animal data provide evidence that PCBs have significant toxic effects, including effects on the immune system, the reproductive system, the nervous system, and the endocrine system.

High: PCB oil leaking from the component item under consideration.

Low: Component item is in good condition. Unlikely to present a risk to health unless capacitor is damaged or deteriorates.

5.2.6 Ozone depleting substances (ODS)

Refrigeration systems and air conditioning systems may contain chlorofluorocarbon (CFC) or hydrochlorofluorocarbon (HCFC) gases which are ODS. ODS are regulated by the Commonwealth *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989.* Considering that these gases are dangerous when released to the atmosphere, two factors were considering during the assessment:

- Type of refrigerant gas; and
- Condition of the equipment (Air conditioning system, refrigeration system).

High: Refrigerant gas is an ODS and the condition of the equipment is poor (likelihood of leaks).

Low: Refrigerant gas is an ODS and the condition of the equipment is good.

5.3 Assessment conditions of hazardous materials during survey

***Poor*:** Friable (un-bonded) asbestos material that has deteriorated significantly. The material is readily accessible and prone to further disturbance. Can include unsealed friable asbestos material located in or near air-conditioning systems where disturbance may result in spread of contamination to other areas.

Bonded asbestos material that has been damaged or major deterioration is evident, which requires replacement.

Fair: Minor deterioration of the ACM is evident, or the material is prone to mechanical disturbance due to routine building activity, maintenance, degradation or due to environmental conditions.

Good: Asbestos or other material shows no or very minor signs of damage / deterioration. Routine accessibility is unlikely to cause significant deterioration, or the material is adequately sealed.

To grade the risk it is important to identify the danger of the hazardous materials. Each material is graded depending on the potential effects they could cause to building occupants. **Table 3** below outlines the consequence rating for the hazardous materials.

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Table 3: Consequence Rating for hazardous materials.			
Scale	**Consequence**	**Description**	**Examples**
5	Severe	Will cause multiple fatalities or significant irreversible effects	Unsealed loose friable asbestos material located in or near air-conditioning systems or wind where disturbance will result in spread of contamination to other areas. Leaking PCB's from capacitors.
4	Major	Can cause multiple fatalities or irreversible health effects or disabling illness to one or more persons	Unsealed friable asbestos material located in or near air-conditioning systems where disturbance may result in spread of contamination to other areas.
3	Moderate	May cause severe irreversible health effects of concern- that would typically result in a medical treatment in a lost time illness	Minor deterioration of the ACM board
2	Minor	Minor chance to cause irreversible health effects of concern that would typically result in a medical treatment in a lost time illness	ACM board shows no or very minor signs of damage / deterioration
1	Negligible	Extremely low chance to cause reversible health effects.	ACM board shows no or very minor signs of damage / deterioration

Table 4. Explanation of the meaning of the likelihood rating with regards to ACM/ACD contaminant exposure.		
Likelihood		**Explanation of the Likelihood rating**
A	Almost certain	Regular contact with the potential hazard at very high levels
B	Likely	Periodic contact with the potential hazard at very high levels or regular contact with the potential hazard at high levels
C	Possible	Periodic contact with the potential hazard at high levels or regular contact with the potential hazard at moderate levels
D	Unlikely	Periodic contact with the potential hazard at moderate levels or regular contact with the potential hazard at low levels
E	Rare	Periodic contact with the potential hazard at low levels
F	Negligible	Negligible contact with the potential hazard

Likelihood is a descriptor of the probability of exposure directly related to a particular consequence that is associated with the hazard in question. **Table 4** on the below page outlines the likelihood ratings used to assess the exposure from the asbestos contaminants. In determining likelihood, it is necessary to consider the exposure to a hazard and the probability that harm will occur following that exposure. Exposure was determined in terms of the amount of product which could be exposed

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to building occupants (including visitors and contractors), the dustiness / volatility of the product and the present ventilation at the time asbestos are exposed to contractors.

Observations at the time of the inspection and laboratory results will be used to determine the amount of contaminant and the subsequent likelihood of exposure.

5.4 Exposure characterisation and likelihood

Table 5 provides the Health Risk Rating combining consequence (health effects) and likelihood (exposures). The matrix therefore gives a health risk rating for each combination of these. The higher the Health Risk Rating, indicated by five bands of risk severity, 'Negligible' (N), 'Low' (L), 'Medium' (M), 'High' (H) and 'Extreme' (E), the higher the priority for action.

Table 5: Health Risk Rating

		Consequence Rating (Health Effect)				
		1 Negligible	2 Minor	3 Moderate	4 Major	5 Severe
Likelihood Rating	A Almost Certain	M	H	H	E	E
	B Likely	M	M	H	H	E
	C Possible	L	M	M	H	H
	D Unlikely	L	L	M	M	H
	E Rare	L	L	L	M	M
	F Negligible	N				

E = Extreme – needs urgent and immediate senior executive management attention.

H = High – requires proactive management (controls).

M = Medium – require active monitoring.

L = Low – will likely not require active management, other than existing routine procedures.

N = Negligible – No action is required.

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6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General recommendations

A copy of the Hazardous Material Registers should be made readily available to all contractors conducting works on the premises/site.

Hazardous containing materials were identified during the inspection within the nominated buildings within the subject sites.

Should any previously unidentified suspect hazardous materials be identified during demolition, works should cease, and the materials should be inspected by an experienced occupational hygienist.

6.2 Asbestos containing materials

6.2.1 General recommendations for the treatment of friable asbestos and asbestos containing dust (ACD)

At the time of the hazardous materials inspection, NO friable asbestos and asbestos containing dust was visible or potentially present within the building structures. Friable asbestos and asbestos containing dust was NOT suspected due to the good and stable condition of the bonded ACM inspected within the building structures.

However, during demolition works if ACM is identified then the following procedures are required:

- All persons gaining access to the affected area of the property should wear appropriate PPE.
- To ensure that the implemented controls are continually being effective control air monitoring should be conducted until the removal works commence.
- A permit to work will need to be issued by the consent authority SafeWork NSW, for the appropriate type of asbestos materials on site before removal works can commence.
- Delineate and restrict access to the affected areas immediately. If access into the delineated areas is gained appropriate PPE must be worn.
- All dust generating activities should be stopped immediately. E.g. Sweeping or use of fans.
- Ensure that the affected areas remain covered with plastic or geo-fabric until all contaminated materials are removed from the site.
- Control monitoring for airborne asbestos in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* [NOHSC:3003(2005)] should be carried out during and after the works by a NATA accredited laboratory to ensure the method of control is effective. Refer to WHS Regulation (2017) for requirements.
- The asbestos-containing debris and dust should be removed from all surfaces and disposed of to an NSW EPA licensed landfill. If asbestos-containing materials/dust is found outside of the subject area further dust removal will be required. This process should be repeated until the area is completely remediated.
- All porous materials in the affected areas should be treated as containing asbestos. Materials may be kept if they are decontaminated and cleared by an experienced occupational hygienist.

- All removal procedures should be conducted by an experienced **Class B** licensed removal contractor in accordance with the *NSW Code of Practice: How to Safely Remove Asbestos.*
- Monitoring for airborne asbestos in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* [NOHSC:3003(2005)] should be carried out by a NATA accredited laboratory during the removal operations. Refer to WHS Regulation (2017) for requirements; and
- A clearance inspection should be carried out after the removal operations are completed. A clearance sampling/analytical program should be undertaken at the discretion of the occupational hygienist within the remediated area. Should none of the samples reveal the presence of asbestos fibres, a clearance certificate can be issued and normal operations at the site can continue.

6.2.2 General recommendations for the treatment of bonded asbestos (ACM):

At the time of the hazardous materials inspection, asbestos containing materials were visibly present within all of the building structures within the subject site.

During demolition works the following procedures are required:

- Remove the asbestos containing materials as per recommendations outlined in the Hazardous Materials Register.
- Appropriate warning signs should be placed on all types of asbestos materials identified. Refer to the *SafeWork Code of Practice: How to Safely Remove Asbestos (2016)*.
- All asbestos containing materials should be removed prior to any renovation, demolition or work taking place in that area. The asbestos containing materials must be lawfully transported and disposed of at a facility licensed to receive the waste.
- All removal procedures should be undertaken by an experienced appropriately licensed removal contractor in accordance with the *SafeWork Code of Practice: How to Safely Remove Asbestos (2016)*.
- Monitoring for airborne asbestos in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* [NOHSC:3003(2005)] is recommended to be carried out during any removal operations. Refer to Clause 49 and 50 of *the SafeWork WHS Regulation (2017) requirements.*
- At the end of removal operations all surfaces in the subject area, such as frames, floor/ground, etc., should be vacuumed then wet wiped. An industrial High Efficiency Particulate Air (HEPA) vacuum cleaner should be used. Spreading of dust into clean areas or outside the subject areas should be prevented.
- A clearance inspection should be carried out after the removal operations are completed. A clearance sampling/analytical program should consist of a number of samples of residual dust/soil determined by the occupational hygienist. Should none of the samples reveal asbestos fibres, a clearance certificate can be issued and further operations can continue.

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6.3 Synthetic mineral fibres (SMF)

At the time of the hazardous materials inspection, NO synthetic mineral fibres was visible or potentially present within the building structures within the subject site. SMF was NOT suspected due to the building containing new air conditioning plant and ductwork.

However, during demolition works if SMF is identified then the following procedures are required:

- If the SMF insulation is to be disturbed or removed, the airborne SMF monitoring should be carried out during the removal operations by a NATA accredited laboratory. Refer to the *SafeWork 2011 Safety Regulations* for requirements.
- The following National Standards and Codes of Practice are applicable to SMF:

Standard for Synthetic Mineral Fibres [NOHSC:1004(1990)]	Sets the recommended maximum exposure level for all types of SMF. (This is also contained in Exposure Standards for Atmospheric Contaminants [NOHSC: 1003 (1995)]
Code of Practice for Safe Use of Synthetic Mineral Fibres NOHSC:2006(1990)]	Provides practical guidance about managing risks from synthetic mineral fibres to keep exposure within the standard

- Use hand tools, not power tools, and wet or dampen the material before cutting. If power tools are used, local exhaust ventilation should be installed.
- Protective equipment must be used wherever other means cannot keep the exposure level below the exposure standard. It should include the appropriate type of mask and clothing. The code of practice has a detailed guide to selecting respiratory protection.
- At the end of demolition/removal operations, a clearance inspection and sampling program should be carried out and a Clearance Certificate issued.

SMF's are currently not on the schedule of substances requiring health surveillance.

6.4 Lead containing paint (LCP)

At the time of the hazardous materials inspection, NO lead containing paint was visible or potentially present within the building. Lead containing paint was NOT suspected due to the building not containing lead painted materials.

However, during demolition works if Lead containing Dust is identified then the following procedures are required: For the specific laws about working with lead, refer to Chapter 7, Part 7.2 of the *WHS Regulation (2017)*.

Lead paints were not identified at the site at the time of inspection. However, during demolition or refurbishment the following generic procedures should be followed:

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- Any works which may disturb potential lead-based paint systems should be conducted in accordance with the requirements of Australian / New Zealand Standard AS/NZS 4361.2 (2017) Guide to Hazardous Paint Management. Part 2: Lead Paint in Residential, Public and Commercial Buildings.
- It is recommended to remove or stabilize materials coated in lead-based paint prior refurbishment. However, depending on the selected removal method, these materials may be demolished and disposed of at an appropriate NSW EPA licensed landfill. These materials should not be recycled unless the recycling facility has been notified of the presence of lead paint and deem the material acceptable for disposal/recycling at the facility.
- The materials should be in a wet condition during the removal operations. A manually controlled, consistent low pressure, coarse spray such as from an adjustable, pistol grip garden hose may be used for this purpose.
- Monitoring for airborne lead should be carried out during any removal / demolition operations. Refer to Clause 49 and 50 for the WHS Regulation (2017) requirements.
- AS 1716 approved respirators with P2 (dust) filters and coveralls should be worn to prevent exposure to airborne lead.
- Spreading of lead-based dust into clean areas should be prevented.
- At the end of demolition operations, a clearance inspection and sampling program should be carried out and a clearance certificate issued.
- To ensure that no contamination has occurred as a result of the demolition process, soil and dust testing within the property should be carried out before and after the demolition process.

6.5 Dust accumulation

At the time of the inspection, no significant amounts of dust accumulation were observed across the building. For the generic dust removal, the following needs to be considered:

- All persons gaining access for removal dust in the facility should wear appropriate PPE.
- All dust generating activities should be stopped immediately. E.g. Sweeping or use of fans.
- To ensure that the implemented controls are continually being effective control air monitoring should be conducted during removal operations according to the AS 3640 -2009 Workplace atmospheres – Method for sampling and gravimetric determination of inhalable dust.

6.6 Lead containing dust (LCD)

At the time of the hazardous materials inspection, NO lead containing dust was visible or potentially present within the building. Lead containing dust was NOT suspected due to the building not containing lead painted materials.

However, during demolition works if Lead containing Dust is identified then the following procedures are required:

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ECON Environmental recommends the elimination of the lead containing dust in accordance with the hierarchy of controls. The risk exposure characterization to heavy metals for contractors / removalists was estimated following the methodology of the Australian Institute of Occupational Hygienists, Simplified Occupational Hygiene Risk Management Strategies, explained in section 5.2.6. This risk assessment showed a heavy metals health risk for contractors / removalists to be medium. It means that personal protection equipment (PPE) and active monitoring for inhalable heavy metals will be required at the time of the removal.

During removal, the following generic procedures should be followed:

- Delineate and restrict access to the areas affected by Heavy Metal dust. If access into the delineated areas is gained appropriate PPE must be worn.
- In agreement with the AS/NZS 4361.1:2017 "*Guide to lead paint management Part 1 Lead and other hazardous metallic pigments in industrial applications*" Appendix I "Worker Protection" a respirator suited with a filter for particulates with a minimum protection factor of 10 (for wet and vacuum removal methods) will be required. Additionally disposable overalls, disposable gloves, disposable shoe covers and goggles may be considered as appropriate PPE. Please note that the dust to remove also contains PAHs, therefore in addition to the first particle filter a second filter to retain the PAHs will also be necessary. Organic vapor cartridges filter will be satisfactory.
- All access to the removal spaces should be sealed in order to prevent dust contaminating adjacent areas.
- For further information on Lead Risk Work and Employee Health Surveillance, refer to NSW Work Cover *Lead Risk Work: Notification Guideline.*
- Personal monitoring for airborne heavy metals should be carried out during any removal operations. Refer to WHS Regulation, 2017 and in accordance with the Australian Standard AS3640-2009.
- Spreading of dust into clean areas should be prevented.
- The use of vacuum cleaners which comply with *AS/NZS 3544 Industrial vacuum cleaners for particulates hazardous to health*, to prevent the release of lead containing dust while it is being removed.
- A visual clearance inspection should be carried out after the removal operations are completed.
- Transport and final disposal of lead dust waste material shall be carried out in a manner that will prevent the liberation of lead dust to the atmosphere. All lead dust waste material shall be buried at an approved OEH landfill and in a manner approved by the local and state authorities (Refer to *Waste Classification Guidelines - Part 1: Classifying Waste*, NSW EPA, November 2014).

6.7 Polychlorinated biphenyls (PCBs)

At the time of the hazardous materials inspection, NO PCB's containing ballasts and capacitors were suspected in the fluorescent light fittings of the two buildings. PCB's were NOT suspected due to the age and appearance of the capacitors inside the lights.

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However during demolition works if PCB's are identified then the following procedures are required: Safe working methods, in accordance with the Polychlorinated Biphenyls Management Plans, Revised Edition April 2003 and the PCB Code of Practice for the safe handling of equipment containing Polychlorinated Biphenyl (PCB) Electrical contractor's Associations of Australia Ltd 1993, must be followed, when removing light fittings containing or suspected to contain PCBs. These recommend procedures include:

- Isolate the affected area from air conditioning ventilation and ventilate the area separately to prevent cross-contamination.
- Qualified contractors for the removal of the PCB's containing ballast or capacitors must wear PPE consisting of disposable Tyvek coveralls, chemically resistant gloves made of polyethylene or nitrile rubber, disposable Tyvek shoe covers, mask with organic vapour filters, safety glasses and face shield; PPE made of PVC and natural rubber must be avoided.
- The area must be de-energised prior removal.
- The lamp covers and fluorescent tubes are to be removed first.
- The material that appears to be contaminated with PCB leakage should be place in an approved container for transportation; refer to the Australian Government Department of Infrastructure and Regional Development, Australian Code for the transport of Dangerous Goods by Road and Rail.
- PCB's containing or contaminated materials must be disposed in a PCB remediation waste for disposal facility.
- In the unlikely event of PCB's leakage / spillage, it is recommended to use paper toweling, sawdust, wood, straw or soil to absorb the spill; all PCB's contaminated material must be disposed of with the PCB containing capacitors.
- It is recommended to employ good personal hygiene practices such as showering following removal.

(Maintenance of existing light fittings in good condition)

- Maintain the light fittings in working electrical order.
- Clean up the PCB oil inside the fittings as faults occur to make sure spillage / leakage does not occur.

For further information regarding the handing and removal of PCBs, please refer to WHS guidelines.

6.8 Ozone depleting substances (ODS)

At the time of the hazardous materials inspection, ODS refrigerant gas was NOT suspected in the air conditioning in the two building structures.

However, during demolition works if ODS refrigerant gases are identified, it is recommended to remove and dispose of the air conditioning units by a licensed contractor in accordance with the Ozone Protection and Synthetic Greenhouse Gas Management Amendment Regulation 2012 prior to refurbishment works. A licensed air conditioning contractor who will recycle and reuse the

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refrigerant should decommission CFC and HCFC based equipment that is being disposed of in accordance with Association of Fluorocarbon Consumers and Manufacturers, The Australian Refrigeration and Air Conditioning Code of Good Practice – 1992 and the Ozone Protection and Synthetic Greenhouse Gas Management Act.

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7. LIMITATION STATEMENT

This report has been prepared in accordance with the agreement between the client and ECON Environmental. Within the limitations of the agreed upon scope of services, this work has been undertaken and performed in a professional manner, in accordance with generally accepted practices, using a degree of skill and care ordinarily exercised by members of its profession and consulting practice. No other warranty is expressed, implied, made or intended.

This report is solely for the use of the client and any reliance on this report by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties or for other uses. This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval with comments is provided ECON Environmental. The following should also be noted:

While the survey has attempted to locate all the hazardous materials, the survey was a visual inspection and sampling process. Only those hazardous materials that were physically accessible could be located and identified. Therefore, it is possible that materials which may be concealed within inaccessible areas/voids, may not have been located during the survey. Such inaccessible areas fall into a number of categories:

- Locations behind locked doors,
- In set ceilings or wall cavities,
- Those areas accessible only by dismantling equipment or performing minor localized demolition works,
- Service shafts, ducts etc., concealed within the building structure,
- Voids or internal areas of plant, equipment, air-conditioning ducts, etc.,
- Totally inaccessible areas such as voids and cavities created and intimately concealed within the building structure (these voids are only accessible during major demolition works); and
- Height restricted areas,
- Latent asbestos contamination may not be identified on the site during the time of the visual inspection. Due to the nature of this identifiable contamination, it is likely that further ACM may be identified in the future subsequent to further weathering and site work.

Destructive surveying and sampling techniques were not employed to gain access to those areas listed above. Consequently, without substantial demolition of the building, it is not possible to guarantee that every source of asbestos has been detected.

It is recommended that an asbestos 'Unexpected Finds Procedure' (UFP) be established and implemented during any future site works. The UFP should include steps such as:

- Stop work
- Isolate the area (plus 10m in each direction where practicable)
- Signpost the area with asbestos warning signs (or Danger/Warning signs at a minimum)
- Contact ECON Environmental to inspect and test the material and provide further advice.

Inaccessible or obscured area may contain ACM, SMF, Lead paint/lead containing dust & PCB's. These may include but are not limited to; false ceilings, material within or beneath concrete, behind wall linings, beneath floor coverings, behind tiles, or within areas with limited access including subfloors, ceiling spaces and the like. Also, some occurrences may have been presumed positive /negative or presumed similar to another occurrence.

Therefore prior to any refurbishment works, further investigations should be performed using destructive survey sampling techniques. During the course of normal site works care should be exercised when entering any previously inaccessible areas and it is imperative that work cease pending further sampling if materials suspected of containing asbestos or unknown materials are encountered. This report is not intended to be used for the purposes of tendering, programming of works, refurbishment works or demolition works unless used in conjunction with a specification detailing the extent of the works. To ensure its contextual integrity, the report must be read in its entirety and should not be copied, distributed.

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APPENDIX A: HAZARDOUS MATERIALS REGISTER

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HAZARDOUS MATERIALS REGISTRY

Site Address: 10 & 12 Marshall Avenue and 1 & 3 Holdsworth Avenue, St Leonards NSW 2065
Inspection date: 05.05.2021
Hygienist: Con Kariotoglou (LAA001006) - ECON Environmental Pty Ltd

Consequence : 5 Severe/ 4 Major/ 3 Moderate/ 2 Minor/ 1 Negligable
Likelihood: A Almost Certain/ B likely/ C Possible/ D Unlikely/ E Rare / F Negligable

Risk Rating: E= Extreme / H= High / M= Medium / L= Low / N= Negligible

Date	Event	LOCATION			MATERIAL DESCRIPTION								RISK MANAGEMENT					CORRECTIVE ACTIONS			
		Building	Room	Surface	Material Application	Quantity	Units	Sample Type	Sample ID No.	Photo No.	Analytical Result	Condition	Consequence (1-5)	Likelihood (A-F)	Risk Status	Control Recommendations/ Comments	Review date	Consultant/ Hygienist Name	Control Action Taken	Date actioned	Contractor details
05.05.2021	1	12 Marshall Avenue, St Leonards Exterior	Side Rear Sunroom	Walls	Compressed Cement Sheeting	approx 20	sq m	Asbestos	-	4	**Visually identified as containing ACM**	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				
05.05.2021	2	10 Marshall Avenue, St Leonards Exterior	Front & Rear Gables	Walls	Compressed Cement Sheeting	approx 150	sq m	Asbestos	-	5, 7, 8	**Visually identified as containing ACM**	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				
05.05.2021	3	10 Marshall Avenue, St Leonards Exterior	Front Verandah	Ceiling	Compressed Cement Sheeting	approx 30	sq m	Asbestos	-	6	**Visually identified as containing ACM**	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				
05.05.2021	4	1 Holdsworth Avenue, St Leonards Exterior	Front Gable	Walls	Compressed Cement Sheeting	approx 50	sq m	Asbestos	-	9	**Visually identified as containing ACM**	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				
05.05.2021	5	3 Holdsworth Avenue, St Leonards Exterior	Front & Side Gable	Walls	Compressed Cement Sheeting	approx 50	sq m	Asbestos	-	13, 14, 15	**Visually identified as containing ACM**	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				
20.04.2021	6	Interior	Kitchen	Walls	Compressed Cement Sheeting	approx 10	sq m	Asbestos	-	11, 12	**Visually identified as containing ACM**	Good	2	D	Low	Remove prior to refurbishment or demolition by a Class B (non-friable) licensed asbestos removal contractor in line with the Code of practice How to safely remove asbestos 2019. Review date: Clearance certificate to be provided prior to demolition	Prior to building demolition				

Date	Event	LOCATION			MATERIAL DESCRIPTION								RISK MANAGEMENT					CORRECTIVE ACTIONS			
		Building	Room	Surface	Material Application	Quantity	Units	Sample Type	Sample ID No.	Photo No.	Analytical Result	Condition	Consequence (1-5)	Likelihood (A-F)	Risk Status	Control Recommendations/ Comments	Review date	Consultant/ Hygienist Name	Control Action Taken	Date actioned	Contractor details

		Consequence Rating (Health Effect)				
		1 Negligible	2 Minor	3 Moderate	4 Major	5 Severe
Likelihood Rating	A Almost Certain	M	H	H	E	E
	B Likely	M	M	H	H	E
	C Possible	L	M	M	H	H
	D Unlikely	L	L	M	M	H
	E Rare	L	L	L	M	M
	F Negligible	N				

E= Extreme – needs urgent and immediate senior executive management attention;
H= High – requires proactive management (controls);
M= Medium – require active monitoring;

L= Low – will likely not require active management, other than existing routine procedures;

N= Negligible – No action is required.

APPENDIX B: SITE PHOTOGRAPHS

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Photo 1: Showing subject site at 12 Marshall Street, St Leonards NSW, looking south.

Photo 2: Showing external eaves and gables around perimeter of residence, does not contain ACM.

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Photo 3: Showing second floor exterior wall panelling of 12 Marshall Avenue, does not contain ACM.

Photo 4: Showing exterior fibre-cement walls of side sunroom at 12 Marshall Avenue, contains ACM.

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Photo 5: Showing northern gable of 10 Marshall Avenue, contains ACM.

Photo 6: Showing front verandah ceiling of 10 Marshall Avenue, contains ACM.

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Photo 7: Showing rear gable of 10 Marshall Avenue, contains ACM.

Photo 8: Showing eastern gable of 10 Marshall Avenue, contains ACM.

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Photo 9: Showing eastern gable of 1 Holdsworth Avenue, St Leonards, contains ACM.

Photo 10: Showing exterior eaves of 1 Holdsworth Avenue, does not contain ACM.

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Photo 11: Showing rear of 1 Holdsworth Avenue, does not contain ACM.

Photo 12: Showing typical interior of 1 Holdsworth Avenue, does not contain ACM.

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Photo 13: Showing exterior eastern Gable of 3 Holdsworth Avenue, contains ACM.

Photo 14: Showing exterior eastern Gable of 3 Holdsworth Avenue, contains ACM.

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Photo 15: Showing exterior northern Gable of 3 Holdsworth Avenue, contains ACM.

Photo 16: Showing typical living and dining areas, no ACM detected.

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APPENDIX C: UNEXPECTED ASBESTOS FINDS PROTOCOL

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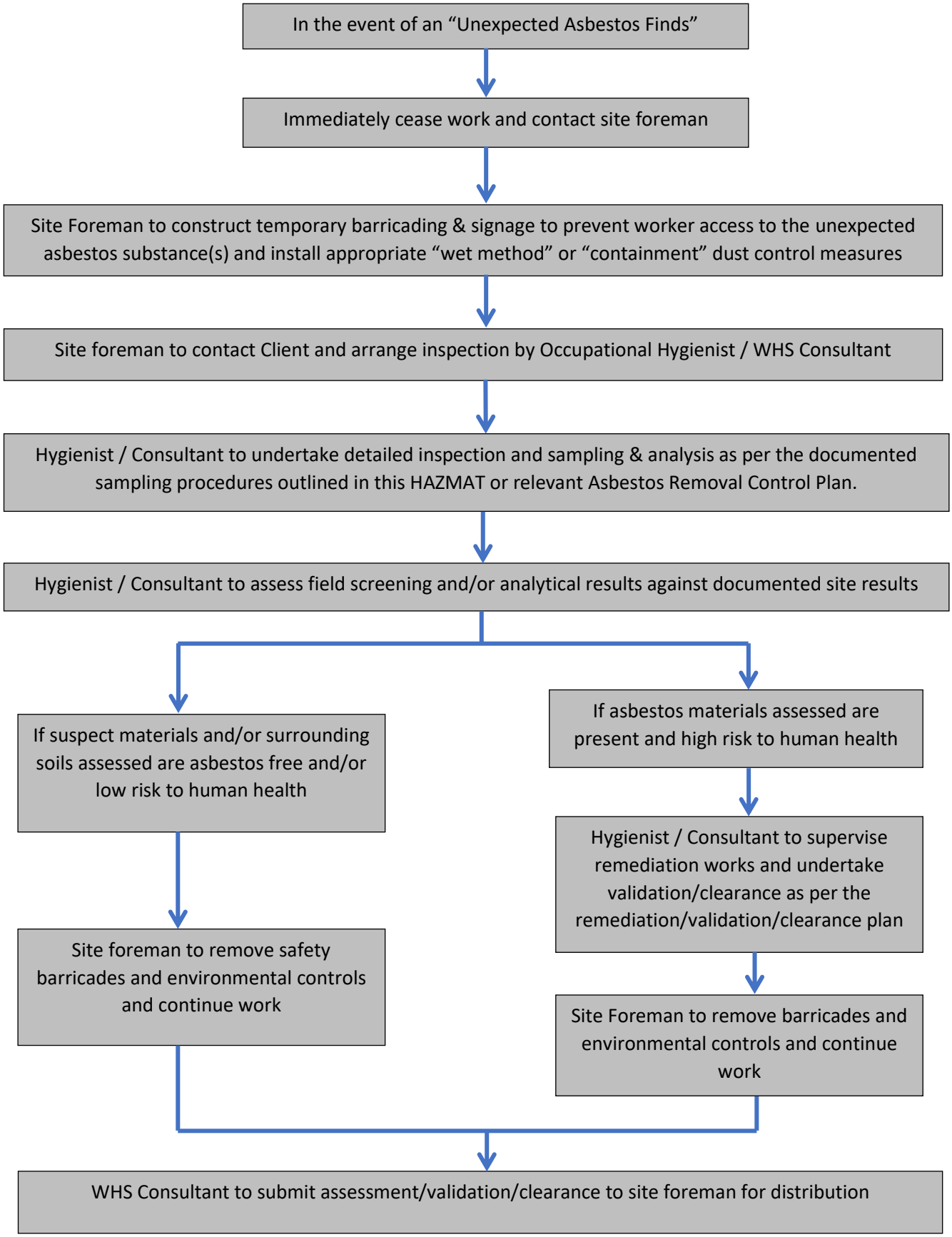

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