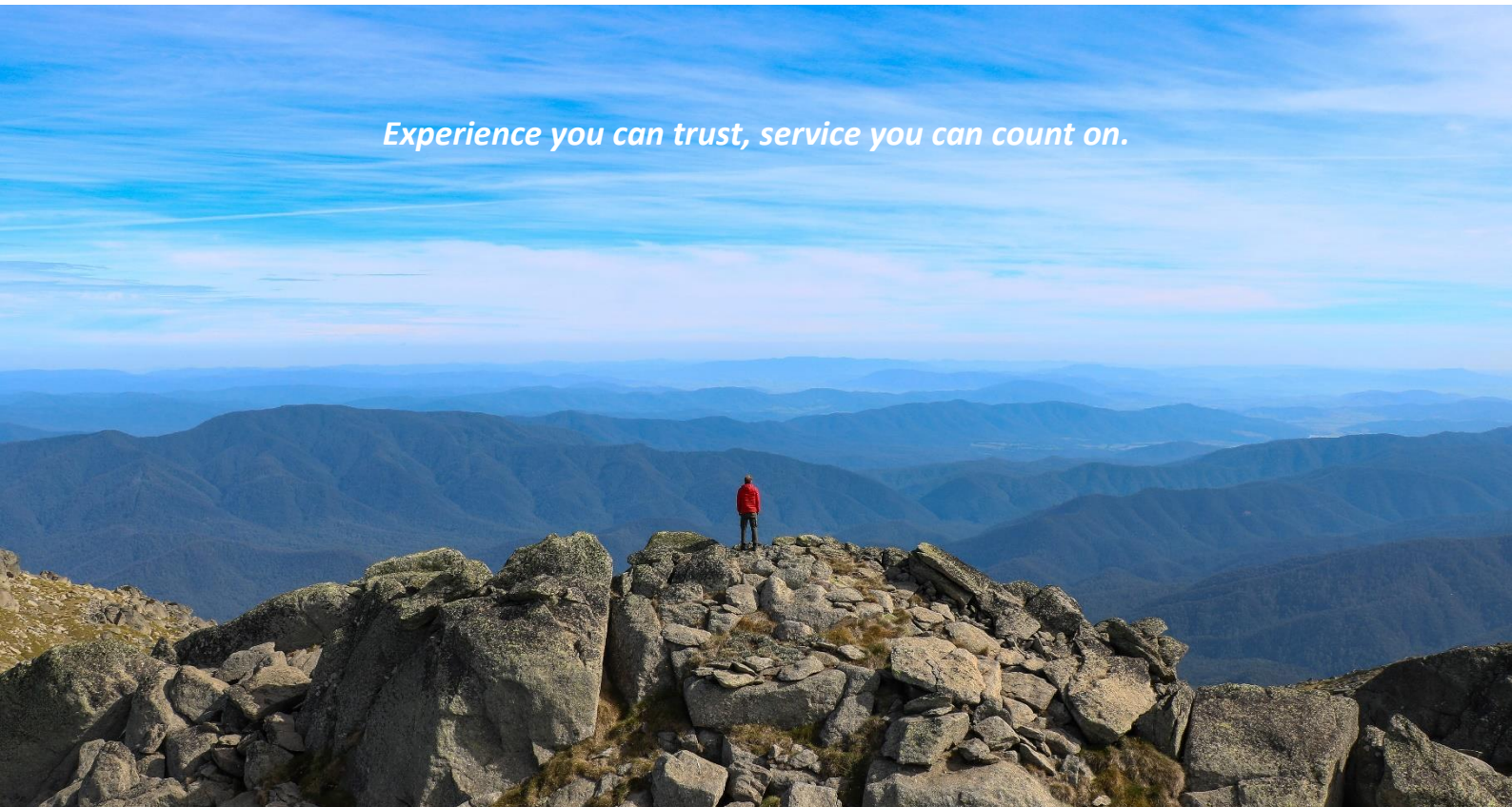


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Detailed Site Investigation

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

Prepared For:	New Golden St Leonards Pty Ltd
Reference:	20-1082
Date:	17 May 2021

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EXECUTIVE SUMMARY

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 2,725m². 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.

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 (2,620m²), 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.

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**
- **BH3 (0.6-0.7m) Lead 415mg/kg**
- **BH6 (0.1-0.2m) Lead 1,260mg/kg**
- **BH2 (0.15-0.25m) F3(C₁₆-C₃₄) 330mg/kg**
- **BH3 (0.1-0.2m) F3(C₁₆-C₃₄) 350mg/kg**
- **BH2 (0.15-0.25) B(a)P TEQ 5.5mg/kg, B(a)P 4.0mg/kg**
- **BH3 (0.6-0.7m) B(a)P 1.0mg/kg**
- **BH5 (0.1-0.2m) B(a)P 1.0mg/kg**

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.

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(C₁₆-C₃₄) 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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1. INTRODUCTION

1.1 Background

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 2,725m². 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.

This report was completed in accordance with the *Guidelines for Consultants Reporting on Contaminated Sites, NSW EPA, May 2020*.

1.2 Objectives

The objectives of this Detailed Site Investigation are to:

- Identify potential contaminants of concern,
- Inspect the building structures onsite for hazardous containing materials,
- Provide soil sampling and analysis to determine the vertical depth and horizontal extent of contamination onsite, and
- Assess the need for further remediation works and investigations.

1.3 Scope of Works

The scope of works included the following:

- A site inspection of building structures and surface soils within the boundaries of the sites,
- Soil sampling and analysis within soil profiles within the sites, and
- Reporting in accordance with the associated legislations and guidelines.

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)
- Work, Health and Safety (WHS) Act 2011 (2017)
- Work, Health and Safety (WHS) Regulation 2017

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 Manage and Control Asbestos in the Workplace (2019);
- SafeWork NSW Code of Practice: How to Safely Remove Asbestos (2019);
- AS2601 (2001) The Demolition of Structures.

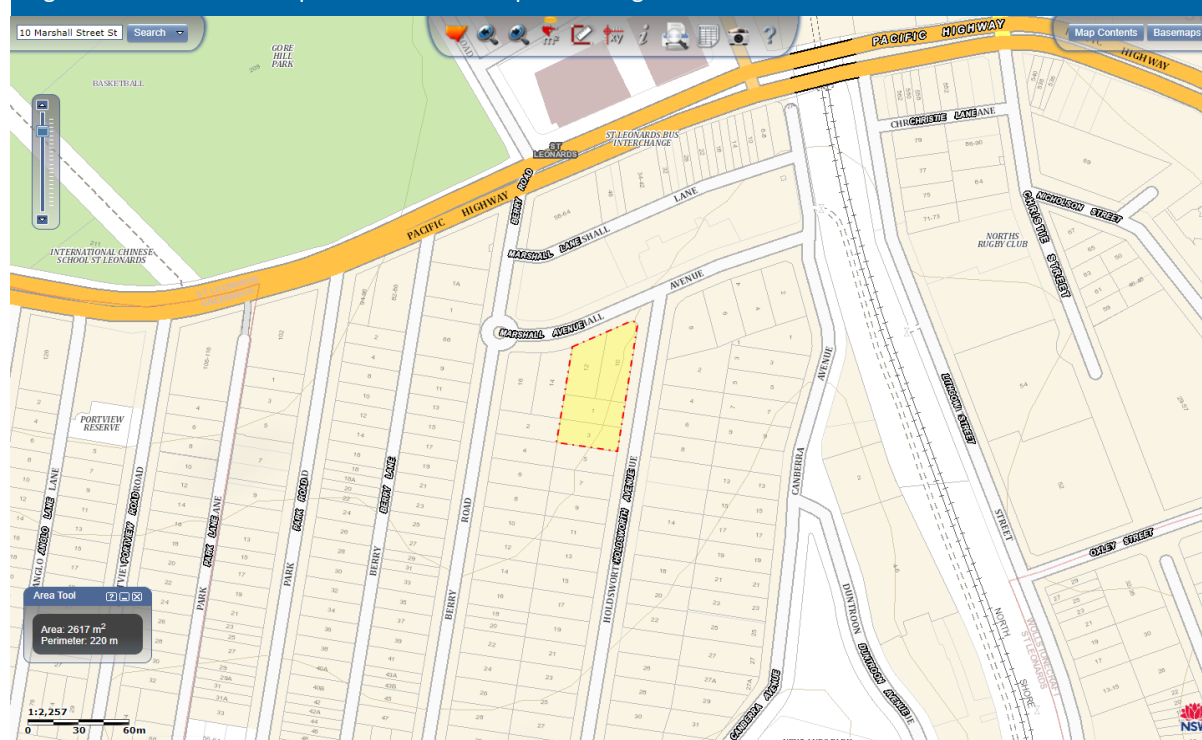
2. SITE IDENTIFICATION

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



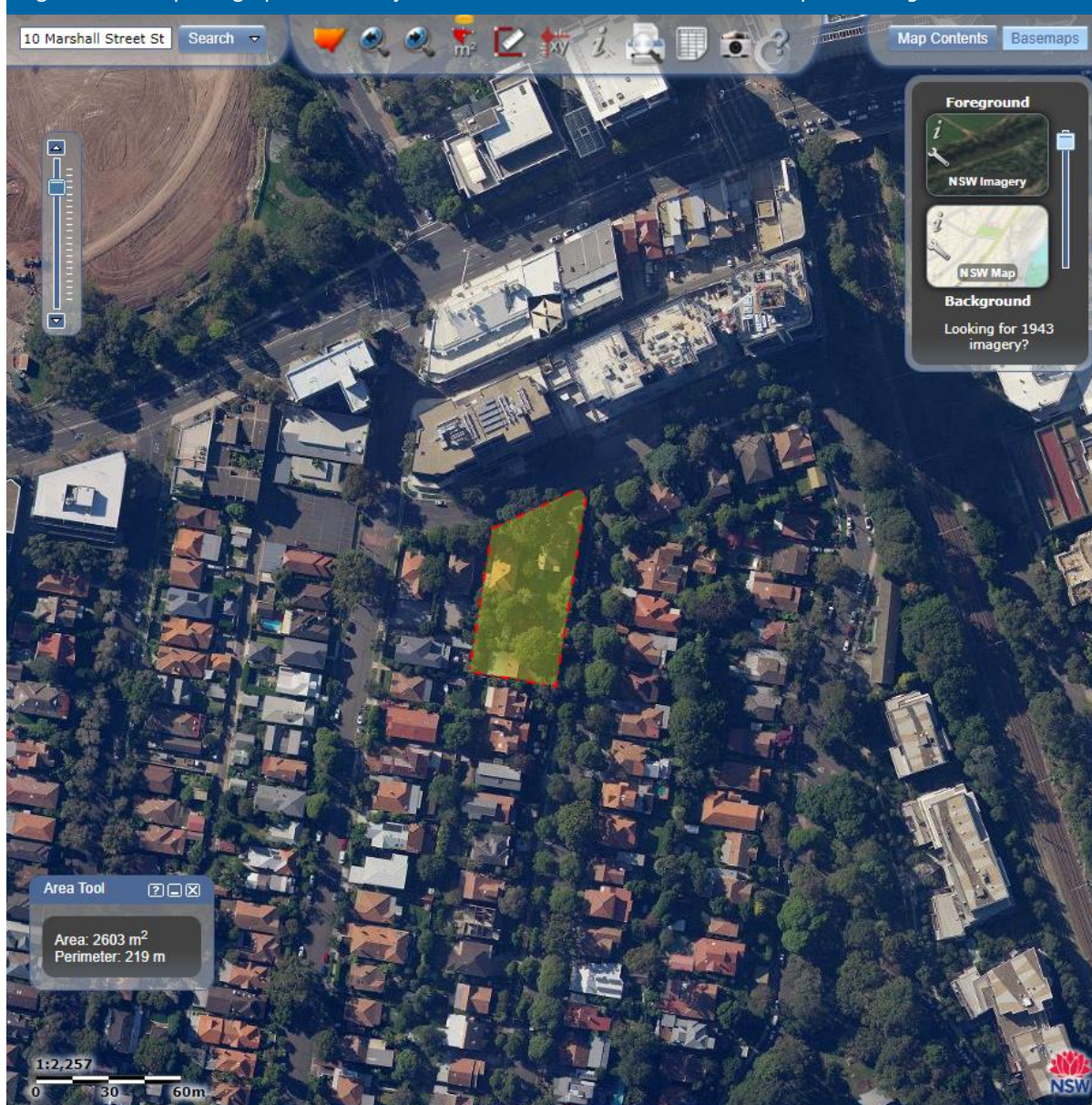
REF: 20-1082 DSI, 10 & 12 Marshall Ave and 1 & 3 Holdsworth Ave, St Leonards NSW 2065 - ©2021 ECON Environmental Pty Ltd

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3. REQUIREMENT REASONING

The objective of the 'Detailed Site Investigation' is to assess the subject site for potential contamination, based on detailed investigations undertaken within the site, to ensure the site is suitable for its intended land use and any future proposed development within the subject site.

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



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.

- 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 Surrounding Land Use

The site is located within a low-high density residential setting and 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,

4.3 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.

4.4 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).

5. CONCEPTUAL SITE MODEL (CSM)

5.1 Potential Areas of Concern

The following Table 2 identifies the main Potential Areas of Environmental Concern (PAECs), and their associated Contaminants of Concern (COCs), within the subject site using the information gathered through this assessment and qualitative judgement based on consultant experience.

Table 2: Potential Areas of Environmental Concern			
PAEC	Potentially Contaminating Activity	Contaminants of Concern	Likelihood of Contamination
Underlying fill material within the entire subject site (<i>including 10 & 12 Marshall Avenue and 1 & 3 Holdsworth Avenue</i>)	Underlying soils may be comprised of hazardous materials from previous business activities within and surrounding the subject site.	• Heavy Metals, • Total Recoverable Hydrocarbons (TRH), • Polyaromatic Hydrocarbons (PAH), • Pesticides and • Asbestos	Possible

5.2 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,

6. SOIL SAMPLING AND ANALYSIS

6.1 Data Quality Objectives

Data quality objectives were established for the site characterisation works, following the decision-making procedures 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.

6.2 STEP 1 - Define the Problem

Potential risks to human health and the environment exist from potential contamination to underlying soils associated with previous uncontrolled fill material within the subject site, and the existence of hazardous containing materials within building structures within the subject site.

6.3 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?

6.4 STEP 3 - Identify Inputs to the Decision

The following inputs were used to allow the assessment of the decisions:

1. Historical information,
2. Observations made during site investigations,
3. Soil analytical data from samples collected on site,
4. Adopted site assessment criteria, and
5. Data quality indicators.

6.5 STEP 4 - Define the Study Boundaries

The study subject site is located at 10 & 12 Marshall Avenue and 1 & 3 Holdsworth Avenue, St Leonards NSW 2065 (Lots 3, 4, 5, 6 in DP7259) (Figure 1). It can be identified as an irregular shaped allotment accessed from Marshall Avenue to the north and Holdsworth Avenue to the east.

The lateral extent of the investigation was within the boundaries of the site, as indicated in Appendix A – Proposed Development Plans. The vertical extent of the investigation was to the natural soil material depth, approx. 0.4m BGL.

6.6 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 3: 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.

6.7 STEP 6 - Specify Limits of Decision Errors

The usual null hypothesis for remediation of contamination is that the land has unacceptable risk from residual contamination, and this hypothesis is able to be accepted at a 95% confidence level, giving a 5% risk of a Type I error (site is deemed suitable when it is not).

An assessment of the likelihood of a decision error will be 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 2013 Schedule B3 Guideline & AS 4482.1-2005.

If the concentration of a particular contaminant of concern exceeds its remediation/validation criteria, then a further assessment is required to address the significance of the result. Statistical analysis (arithmetic mean) based on 95% UCL may be used to assess the significance of the data provided the following conditions are met:

- the 95%ucl of the arithmetic mean must be less than the criterion,
- 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.

6.8 STEP 7 - Optimize Design for Obtaining Data

Based on the available information, a targeted sampling plan was considered most appropriate to provide sufficient characterisation data. 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.

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

- 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
- 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.

6.9 Soil Sample Methodology

According to the NSW EPA Contaminated Sites Sampling Guidelines (Sept. 1995), for this sized area site (2,620m²), 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.

During the collection of soil samples, any features such as seepage, discoloration, staining, odours, or other physical indicators of contamination were noted. All site work was undertaken by Con Kariotoglou, Environmental Consultant of ECON Environmental. Soil Samples were transferred directly from the boreholes into laboratory supplied 250 mL sample jars sealed with Teflon lids. Asbestos samples were collected in asbestos sample bags and zip locked.

Sampling of asbestos was undertaken as follows:

- A minimum 10L sample from each sample location was recovered,
- Each sample (minimum of 10 L) was screened through a 7mm sieve and the material retained on the sieve examined for any bonded ACM and / or suspect material and forwarded to the laboratory for analysis if any suspected ACM is encountered,
- If visible FA material is present or suspected, the soil was wetted to minimise the release of fibres,
- Identified bonded ACM and FA was weighed for each sample, and
- One wetted 500ml sample from each sampling location was submitted to a NATA accredited laboratory for analysis for AF. Soil asbestos analysis should comply with Australian Standard Method for the Qualitative Identification of asbestos in bulk samples (AS4964–2004).

The samples were stored in a chilled esky and transferred to ALS Environmental Division under stringent chain of custody (COC) procedures. The decontamination of non-dedicated sampling equipment was achieved by washing with phosphate-free detergent and tap water, followed by a final rinse with distilled water. Decontamination was conducted after the collection of samples at each sample location. A clean pair of disposable gloves was used when handling each sample. The hand augers were decontaminated between sampling locations by physically removing soil material between boreholes, washing the augers with Decon 90 and rinsing them with water.

Figure 3: Site sampling borehole locations



Refer to Appendix B – Site Photographs for photographic evidence of sampling locations.

6.10 Sampling Borehole Locations & Descriptions

Table 4: Sampling Borehole Locations & Field Measurements					
Borehole Sample	Soil Description	Sample Depth (m)	Visible signs of environmental areas of concern	Latitude	Longitude
BH1	FILL: SILTY CLAY LOAM, 0.05-0.4m, dark brown, coarse grained, with minor inclusions of sand, rock and gravel, followed by:	0.1-0.2	No oil stains, odours or ACM detected during sampling.	-33.824991773	151.192848848
	NATURAL: SILTY CLAY, 0.4m to depth, medium plasticity, brown, moist.	0.6-0.7			
BH2	FILL: SILTY CLAY LOAM, 0.05-0.4m, dark brown, coarse grained, with minor inclusions of sand, rock and gravel, followed by:	0.15-0.25	No oil stains, odours or ACM detected during sampling.	-33.825180058	151.192875
	NATURAL: SILTY CLAY, 0.4m to depth, medium plasticity, brown, moist.	0.5-0.6			
BH3	FILL: SILTY CLAY LOAM, 0.05-0.4m, dark brown, coarse grained, with minor inclusions of sand, rock and gravel, followed by:	0.1-0.2	No oil stains, odours or ACM detected during sampling.	-33.825252475	151.192769723
	NATURAL: SILTY CLAY, 0.4m to depth, medium plasticity, brown, moist.	0.6-0.7			
BH4	FILL: SILTY CLAY LOAM, 0.05-0.4m, dark brown, coarse grained, with minor inclusions of sand, rock and gravel, followed by:	0.1-0.2	No oil stains, odours or ACM detected during sampling.	-33.824924369	151.193040626
	NATURAL: SILTY CLAY, 0.4m to depth, medium plasticity, brown, moist.	0.7-0.8			
BH5	FILL: SILTY CLAY LOAM, 0.05-0.4m, dark brown, coarse grained, with minor inclusions of sand, rock and gravel, followed by:	0.1-0.2	No oil stains, odours or ACM detected during sampling.	-33.825108755	151.193087565
	NATURAL: SILTY CLAY, 0.4m to depth, medium plasticity, brown, moist.	0.6-0.7			
BH6	FILL: SILTY CLAY LOAM, 0.05-0.4m, dark brown, coarse grained, with minor inclusions of sand, rock and gravel, followed by:	0.1-0.2	No oil stains, odours or ACM detected during sampling.	-33.825262502	151.192966195

	NATURAL: SILTY CLAY, 0.4m to depth, medium plasticity, brown, moist.	0.5-0.6			
BH7	FILL: SILTY CLAY LOAM, 0.05-0.4m, dark brown, coarse grained, with minor inclusions of sand, rock and gravel, followed by: NATURAL: SILTY CLAY, 0.4m to depth, medium plasticity, brown, moist.	0.1-0.2 0.5-0.6	No oil stains, odours or ACM detected during sampling.	-33.825360822	151.192782128
BH8	FILL: SILTY CLAY LOAM, 0.05-0.4m, dark brown, coarse grained, with minor inclusions of sand, rock and gravel, followed by: NATURAL: SILTY CLAY, 0.4m to depth, medium plasticity, brown, moist.	0.1-0.2 0.7-0.8	No oil stains, odours or ACM detected during sampling.	-33.825542142	151.193011792
BH9	FILL: SILTY CLAY LOAM, 0.05-0.4m, dark brown, coarse grained, with minor inclusions of sand, rock and gravel, followed by: NATURAL: SILTY CLAY, 0.4m to depth, medium plasticity, brown, moist.	0.1-0.2 0.8-0.9	No oil stains, odours or ACM detected during sampling.	-33.825458584	151.192701326

6.11 Laboratory Analysis

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. The completed analysis schedule is summarised in Table 5 below providing a diverse range of analytes with the full laboratory certificates in Appendix D:

Table 5: Analytical Schedule.		
Sample ID	Location	Analytes
Soil Samples BH1 to BH9 (05.05.2021)	Top 0.4m of fill material within the site (Figure 3).	- Heavy Metals - Hydrocarbons (TRH, BTEX, PAH) - OC/OP Pesticides - Phenols, PCB - Asbestos
Soil Samples BH1 to BH9 (05.05.2021)	Below 0.4m of natural material within the site (Figure 3).	- Heavy Metals - Hydrocarbons (TRH, BTEX, PAH) - Asbestos

7. SITE ASSESSMENT CRITERIA

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
- Health Screening Levels for Asbestos Contamination in Soil – Commercial/Industrial, Guidelines for the Assessment, Remediation and Management Asbestos-Contaminated sites in Western Australia.
- “Technical Report on Synthetic Mineral Fibres” in Technical Report on Synthetic Mineral Fibres and Guidance Note on the Membrane Filter Method for the Estimation of Airborne Synthetic Mineral Fibres” (National Occupational Health and Safety Commission, 1990);
- CCME: Soil Quality Guidelines for the Protection of Environmental and Human Health Agricultural, Residential/Parkland, Commercial and Industrial
- Assessment levels for Soil, Sediment and Water – Department of Environment and Conservation 2010
- Interim Ecological Soil Screening Level – United States Environmental Protection Agency 2005
- Dryland Salinity (1993).

Table 6: Adopted Human Health Based Soil Criteria and Hydrocarbon Management Limits (*all units in mg/kg*).

	Limit of Reporting	Health Screening Levels (HIL A, NEPM 2013)	Environmental Screening Levels	Management Limits
METALS AND INORGANICS				
Arsenic	5.0	100	100	-
Cadmium	1.0	20	-	-
Chromium	2.0	100	410	-
Copper	5.0	6,000	230	-
Lead	5.0	300	1100	-
Nickel	2.0	400	270	-
Zinc	5.0	7,400	770	-
Manganese	5.0	3800	220	-
Mercury	0.1	40	6.6	-
Selenium	5.0	200	1	-
PAH				
BaP (TEQ)	0.5	3	0.7	-
Total PAH	0.5	300		-
BTEX				

Benzene	0.2	0.6	65	-
Toluene	0.5	390	105	-
Total Xylenes	0.5	95	45	-
Naphthalene	1	4	170	-
PHENOLS				
Phenol	0.5	3,000	3.8	-
Pentachlorophenol	2.0	100	2.1 ⁸	-
Cresols	0.5	400	-	-
TRH				
F1 C6 – C10	10	40	180	800
F2 > C10 – C16	50	230	120	1,000
F3 > C16 – C34	100	-	1300	3,500
F4 > C34 – C40	50	-	5600	10,000
ASBESTOS				
Bonded ACM	0.05%		0.05%	
Friable ACM	0.001%		0.001%	
Visible ACM			No visible ACM	
OC AND OP PESTICIDES				
DDT+DDE+DDD	0.05	240	0.7	-
Aldrin and dieldrin	0.05	6	0.022	-
Chlordane	0.05	50	-	-
Endosulfan	0.05	270	-	-
Endrin	0.05	10	-	-
Heptachlor	0.05	6	-	-
HCB	0.05	10	-	-
Methoxychlor	0.05	300	-	-
Mirex	0.05	10	-	-
Toxaphene	0.05	20	-	-

*Health Screening levels are derived from the NEPM, 2013; and

* Asbestos screening levels are derived from the Guidelines for the Assessment, Remediation and Management Asbestos-Contaminated sites in Western Australia.

8. QUALITY ASSURANCE / QUALITY CONTROL

8.1 Site Procedures

The following field quality assurance and quality control measures were implemented:

1. All sample jars and sample bags were clearly labelled prior to site visit,
2. All soil samples were collected by hand (after using a hand-held auger with a 150mm drill),
3. Disposable gloves were worn throughout the process and changed between the collection of each soil sample,
4. All sampled jars and bags were immediately placed in an ice-block chilled esky,
5. All samples were clearly labelled and sealed for couriering,
6. The ALS Environmental chain-of-custody form was completed and emailed to the lab as well as a hard copy placed with the samples,
7. All samples were kept in the office of ECON Environmental Pty Ltd until collected by courier, and
8. Ice-blocks were interchanged prior to couriering.

8.2 Laboratory

The following is an extract from the quote for service provided by ALS Environmental Division.

"ALS has a comprehensive QA/QC program. Our QA/QC procedures are designed to provide reliable and defensible analytical results. Our analytical services are based on internal QCS3 schedule, which includes Laboratory Control Samples (LCS), Method Blanks (MB), Matrix Spikes (MS), Laboratory Duplicates (Dups) and Surrogates (for target organics) where applicable, at frequencies at or above that detailed in the 1999 NEPM guidelines.

The basis of the QCS3 Schedule is the 'analytical lot' (process analytical batch) of samples. Generally, the laboratory processes samples of similar matrices in groups called 'Lots'. 'Lots' are made up of 20 samples that may consist of several discrete batches and may be independent of project and / or client. The selection of samples for QC purposes will be biased towards the larger batches within the process lot" ...

The following summarizes the frequency that QC samples are processed:

1. 5% Method Blanks (MB) –1 analysed within each process lot of 20 samples.
2. 10% Laboratory Duplicates (Dups) –2 analysed within each process lot of 20 samples.
3. 5% Laboratory Control Samples (LCS) –1 analysed within each process lot of 20 samples.
4. 5% Matrix Spikes (MS) – 1 analysed within each process lot of 20 samples (except for dioxins).
5. Surrogate Spikes on all 'target' organics analyses.

8.3 QA/QC Results

8.3.1 Site

1. All soil samples arrived at ALS Environmental within specified holding times,
2. All soil samples arrived at ALS Environmental within specified temperature requirements,
3. No potential WHS incidents were recorded on site,
4. No quality assurance incidents (such as cross contamination or similar) were recorded,
5. The RPDs for all analytes (for the sampling set Wednesday 5th May 2021) were within their respective control limits. Therefore, the data set is considered to be adequately precise.

8.3.2 Lab

ALS Environmental Division provided a Quality Control Report and Interpretive Quality Control Report (Appendix D). Those Quality Control Reports contain the following information:

1. A Laboratory Duplicate (DUP) Report - referring to a randomly selected intra-laboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. For all matrices, no Duplicate outliers occurred.
2. A Method Blank (MB) Report - referring to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. For all matrices, no Method Blank outliers occurred.
3. Laboratory Control Spike (LCS) Report - referring to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. For all matrices, no Laboratory Control outliers occurred.
4. A Matrix Spike (MS) Report – referring to an intra-laboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. For all matrices, no Matrix Spike outliers occurred.
5. An Analysis Holding Time Compliance Report - No Analysis Holding Time outliers exist.
6. A Frequency of Quality Control Samples Report - No Quality Control Frequency Outliers exist.

8.4 QA/QC Conclusions

The field sampling and handling procedures across the site produced QA/QC results which indicate that the soil data collected is of acceptable quality and suitable for use in site characterisation.

The NATA certified laboratory reports indicate that the laboratory was generally achieving levels of performance within its recommended control limits during the period when the samples from this program were analysed.

On this basis of the results and the laboratory QA/QC program, the soil data is of an acceptable quality upon which to draw conclusions regarding the environmental condition of the site.

9. RESULTS

9.1 Soil Laboratory Results

Detailed laboratory reports and chain of custody documentation are provided in Appendix D. Laboratory results are summarized in Table 7 and Table 8 and discussed in the following sections in relation to the adopted assessment criteria. The summary of results are as follows:

- Heavy Metals: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria, except for samples:
 - **BH2 (0.15-0.25m) Lead 417mg/kg**
 - **BH3 (0.6-0.7m) Lead 415mg/kg**
 - **BH6 (0.1-0.2m) Lead 1,260mg/kg**
- TRH: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria, except for samples:
 - **BH2 (0.15-0.25m) F3(C₁₆-C₃₄) 330mg/kg**
 - **BH3 (0.1-0.2m) F3(C₁₆-C₃₄) 350mg/kg**
- BTEX: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria.
- PAH: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria, except for samples:
 - **BH2 (0.15-0.25) B(a)P TEQ 5.5mg/kg, B(a)P 4.0mg/kg**
 - **BH3 (0.6-0.7m) B(a)P 1.0mg/kg**
 - **BH5 (0.1-0.2m) B(a)P 1.0mg/kg**
- PCB: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria.
- OC/OP Pesticides: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria.
- Phenols: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria.
- Asbestos: All soil samples were reported by the laboratory to have concentrations below the adopted site assessment criteria.

Table 7: Schedule of Laboratory Testing (Sub-table A)

TABLE A
SCHEDULE OF LABORATORY TESTING

Analyte / Analyte Group		TYPE	SAMPLING DATE	DUPLICATE	MET-8	TPH & BTEX	PAH	OCP	PCB	PHENOLS	ASBESTOS
Sample	Depth (m)										
BH1	0.1-0.2	F	05.05.2021		✓	✓	✓	✓	✓	✓	✓
BH1	0.6-0.7	N	05.05.2021		✓	✓	✓				✓
BH2	0.15-0.25	F	05.05.2021	D1	✓	✓	✓	✓	✓	✓	✓
BH2	0.5-0.6	N	05.05.2021		✓	✓	✓				✓
BH3	0.1-0.2	F	05.05.2021		✓	✓	✓	✓	✓	✓	✓
BH3	0.6-0.7	N	05.05.2021		✓	✓	✓				✓
BH4	0.1-0.2	F	05.05.2021		✓	✓	✓	✓	✓	✓	✓
BH4	0.7-0.8	N	05.05.2021		✓	✓	✓				✓
BH5	0.1-0.2	F	05.05.2021		✓	✓	✓	✓	✓	✓	✓
BH5	0.6-0.7	N	05.05.2021		✓	✓	✓				✓
BH6	0.1-0.1	F	05.05.2021		✓	✓	✓	✓	✓	✓	✓
BH6	0.5-0.6	N	05.05.2021		✓	✓	✓				✓
BH7	0.1-0.2	F	05.05.2021		✓	✓	✓	✓	✓	✓	✓
BH7	0.5-0.6	N	05.05.2021		✓	✓	✓				✓
BH8	0.1-0.2	F	05.05.2021	D2	✓	✓	✓	✓	✓	✓	✓
BH8	0.7-0.8	N	05.05.2021		✓	✓	✓				✓
BH9	0.1-0.2	F	05.05.2021		✓	✓	✓	✓	✓	✓	✓
BH9	0.8-0.9	N	05.05.2021		✓	✓	✓				✓

Notes

MET-8: arsenic, cadmium, chromium, copper, lead, mercury,
 OCP : Organochlorine Pesticides
 OPP : Organophosphorus Pesticides
 PCB : Polychlorinated Biphenyls
 VOC: Volatile Organic Compounds
 PAH: Polycyclic Aromatic Hydrocarbons
 TPH: Total Petroleum Hydrocarbons
 BTEX: Benzene, Toluene, Ethyl Benzene, Xylene
 F,T,N: Fill, Topsoil, Natural

****Please note: No Rinsate samples were collected during the site inspection on 5th May 2021, as all samples were collected by hand using nitrile disposable gloves and placed directly into the sampling containers. New gloves were used between each sampling location.**

Table 8: Summary of Test Results (Sub-tables B-G)

TABLE B

HEAVY METALS TEST RESULTS FOR HILs & ESLs

Analyte			HEAVY METALS (mg/kg)							
			ARSENIC	CADMIUM	CHROMIUM (VI)	COPPER	MERCURY	NICKEL	LEAD ^e	ZINC
Sample Location	Date Sampled	Depth (m)								
BH1	05.05.2021	0.1-0.2	<5	<1	4	19	0.5	3	91	55
BH1	05.05.2021	0.6-0.7	<5	<1	5	10	<0.1	<2	24	10
BH2	05.05.2021	0.15-0.25	10	<1	7	74	0.2	4	417	161
BH2	05.05.2021	0.5-0.6	<5	<1	5	28	<0.1	<2	68	52
BH3	05.05.2021	0.1-0.2	10	<1	8	47	0.1	3	249	221
BH3	05.05.2021	0.6-0.7	23	<1	8	52	0.1	3	415	162
BH4	05.05.2021	0.1-0.2	<5	<1	6	8	<0.1	<2	28	19
BH4	05.05.2021	0.7-0.8	6	<1	11	<5	<0.1	<2	17	<5
BH5	05.05.2021	0.1-0.2	5	<1	11	16	<0.1	3	237	95
BH5	05.05.2021	0.6-0.7	<5	<1	5	<5	<0.1	<2	16	9
BH6	05.05.2021	0.1-0.2	12	1	18	143	0.1	10	1260	781
BH6	05.05.2021	0.5-0.6	6	<1	10	30	<0.1	4	244	164
BH7	05.05.2021	0.1-0.2	<5	<1	8	26	0.2	4	246	215
BH7	05.05.2021	0.5-0.6	<5	<1	5	14	<0.1	3	76	95
BH8	05.05.2021	0.1-0.2	<5	<1	7	28	0.2	4	232	213
BH8	05.05.2021	0.7-0.8	<5	<1	6	14	<0.1	4	72	91
BH9	05.05.2021	0.1-0.2	5	<1	7	24	0.1	4	135	102
BH9	05.05.2021	0.8-0.9	<5	<1	4	6	<0.1	<2	22	28
Practical Quantitation Limits (PQL)			5	1	2	5	0.1	2	5	5
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)										
Health Investigation Levels (HIL) - Table 1A (1)										
HIL A ^a			100	20	100	6000	40 ^e / 10 ^f	400	300	7400
HIL B ^b			500	150	500	30,000	120 ^e / 30 ^f	1200	1200	60,000
HIL C ^c			300	90	300	17,000	80 ^e / 13 ^f	1200	600	30,000
HIL D ^d			3000	900	3600	240,000	730 ^e / 180 ^f	6000	1500	400,000
Ecological Investigation Levels (EIL) - Table 1B (5)										
Areas of ecological significance			40 ^h							
Urban residential and public open space ⁱ			100 ^h							
Commercial and industrial			160 ^h							

Notes	a:	Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.
	b:	Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high rise buildings and apartments.
	c:	Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate
	d:	Commercial/industrial, includes premises such as shops, offices, factories and industrial sites
	e:	Elemental mercury: HIL does not address elemental mercury. A site-specific assessment should be considered if elemental mercury is present, or suspected to be present,
	f:	Methyl mercury: assessment of methyl mercury should only occur where there is evidence of its potential source. It may be associated with inorganic mercury and anaerobic microorganism activity in aquatic environments. In addition the reliability and quality of sampling/analysis
	g:	Lead: HIL is based on blood lead models (IEUBK for HILs A, B and C and adult lead model for HIL D where 50% oral bioavailability has been considered. Site-specific bioavailability may be important and should be considered where appropriate.
	h:	Aged values are applicable to arsenic contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
	i:	Urban residential / public open space is broadly equivalent to the HIL-A, HIL-B and HIL-C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.

TABLE C
TOTAL RECOVERABLE HYDROCARBONS (TRH), BTEX AND NAPHTHALENE TEST RESULTS
FOR HSLs IN SAND

Analyte			TRH (mg/kg)		BTEX (mg/kg)				PAH (mg/kg)
			F1 ^a	F2 ^b	BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENES	NAPHTHALENE
Sample Location	Date Sampled	Depth (m)							
BH1	05.05.2021	0.1-0.2	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH1	05.05.2021	0.6-0.7	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH2	05.05.2021	0.15-0.25	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH2	05.05.2021	0.5-0.6	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH3	05.05.2021	0.1-0.2	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH3	05.05.2021	0.6-0.7	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH4	05.05.2021	0.1-0.2	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH4	05.05.2021	0.7-0.8	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH5	05.05.2021	0.1-0.2	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH5	05.05.2021	0.6-0.7	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH6	05.05.2021	0.1-0.2	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH6	05.05.2021	0.5-0.6	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH7	05.05.2021	0.1-0.2	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH7	05.05.2021	0.5-0.6	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH8	05.05.2021	0.1-0.2	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH8	05.05.2021	0.7-0.8	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH9	05.05.2021	0.1-0.2	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
BH9	05.05.2021	0.8-0.9	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5
Practical Quantitation Limits (PQL)			10	50	0.2	0.5	0.5	0.5	1
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)									
Health Screening Levels (HSL) - Table 1A (3)									
<i>HSL A & HSL B: Low-high density residential</i>									
Source depth - 0m to <1m			45	110	0.5	160	55	40	3
Source depth - 1m to <2m			70	240	0.5	220	NL	60	NL
Source depth - 2m to <4m			110	440	0.5	310	NL	95	NL
Source depth - 4m +			200	NL	0.5	540	NL	170	NL
<i>HSL C: recreational / open space</i>									
Source depth - 0m to <1m			NL	NL	NL	NL	NL	NL	NL
Source depth - 1m to <2m			NL	NL	NL	NL	NL	NL	NL
Source depth - 2m to <4m			NL	NL	NL	NL	NL	NL	NL
Source depth - 4m +			NL	NL	NL	NL	NL	NL	NL
<i>HSL D: Commercial / Industrial</i>									
Source depth - 0m to <1m			260	NL	3	NL	NL	230	NL
Source depth - 1m to <2m			370	NL	3	NL	NL	NL	NL
Source depth - 2m to <4m			630	NL	3	NL	NL	NL	NL
Source depth - 4m +			NL	NL	3	NL	NL	NL	NL

Notes a: To obtain F1 subtract the sum of BTEX concentrations from the C₆-C₁₀ fraction.
 b: To obtain F2 subtract naphthalene from the >C₁₀-C₁₆ fraction.
 NL: Not Limiting

TABLE D
TOTAL RECOVERABLE HYDROCARBONS (TRH), BTEX AND BENZO(a)PYRENE TEST RESULTS
ESLs FOR COARSE GRAINED SOIL TEXTURE

Analyte			TRH (mg/kg)				BTEX (mg/kg)				PAH (mg/kg)
			F1 (C ₆ -C ₁₀) ^a	F2 (>C ₁₀ -C ₁₆) ^b	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₄₀)	BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENES	BENZO(a)PYRENE
Sample Location	Date Sampled	Depth (m)									
BH1	05.05.2021	0.1-0.2	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH1	05.05.2021	0.6-0.7	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH2	05.05.2021	0.15-0.25	<10	<50	330	<100	<0.2	<0.5	<0.5	<0.5	4.0
BH2	05.05.2021	0.5-0.6	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH3	05.05.2021	0.1-0.2	<10	<50	350	270	<0.2	<0.5	<0.5	<0.5	0.5
BH3	05.05.2021	0.6-0.7	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	1.0
BH4	05.05.2021	0.1-0.2	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH4	05.05.2021	0.7-0.8	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH5	05.05.2021	0.1-0.2	<10	<50	150	<100	<0.2	<0.5	<0.5	<0.5	1.0
BH5	05.05.2021	0.6-0.7	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH6	05.05.2021	0.1-0.2	<10	<50	130	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH6	05.05.2021	0.5-0.6	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH7	05.05.2021	0.1-0.2	<10	<50	110	<100	<0.2	<0.5	<0.5	<0.5	0.6
BH7	05.05.2021	0.5-0.6	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH8	05.05.2021	0.1-0.2	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH8	05.05.2021	0.7-0.8	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH9	05.05.2021	0.1-0.2	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
BH9	05.05.2021	0.8-0.9	<10	<50	<100	<100	<0.2	<0.5	<0.5	<0.5	<0.5
Practical Quantitation Limits (PQL)			10	50	100	100	0.2	0.5	0.5	0.5	0.5
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)											
Ecological Screening Levels (ESL) - Table 1B (6)											
Areas of ecological significance			125*	25*	-	-	10	10	1.5	10	0.7
Urban residential and public open space			180*	120*	300	2800	50	85	70	105	0.7
Commercial and industrial			215*	170*	1700	3300	75	135	165	180	0.7

Notes

a: To obtain F1 subtract the sum of BTEX concentrations from the C₆-C₁₀ fraction.

b: To obtain F2 subtract naphthalene from the >C₁₀-C₁₆ fraction.

*: ESLs are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability.

": " indicates that insufficient data was available to derive a value.

TABLE E
TOTAL RECOVERABLE HYDROCARBONS (TRH) TEST RESULTS
MANAGEMENT LIMITS FOR COARSE GRAINED SOIL TEXTURE

Analyte			TRH (mg/kg)			
			F1 (C ₅ -C ₁₀) ^a	F2 (>C ₁₀ -C ₁₆) ^a	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₄₀)
Sample Location	Date Sampled	Depth (m)				
BH1	05.05.2021	0.1-0.2	<10	<50	<100	<100
BH1	05.05.2021	0.6-0.7	<10	<50	<100	<100
BH2	05.05.2021	0.15-0.25	<10	<50	330	<100
BH2	05.05.2021	0.5-0.6	<10	<50	<100	<100
BH3	05.05.2021	0.1-0.2	<10	<50	350	270
BH3	05.05.2021	0.6-0.7	<10	<50	<100	<100
BH4	05.05.2021	0.1-0.2	<10	<50	<100	<100
BH4	05.05.2021	0.7-0.8	<10	<50	<100	<100
BH5	05.05.2021	0.1-0.2	<10	<50	150	<100
BH5	05.05.2021	0.6-0.7	<10	<50	<100	<100
BH6	05.05.2021	0.1-0.2	<10	<50	130	<100
BH6	05.05.2021	0.5-0.6	<10	<50	<100	<100
BH7	05.05.2021	0.1-0.2	<10	<50	110	<100
BH7	05.05.2021	0.5-0.6	<10	<50	<100	<100
BH8	05.05.2021	0.1-0.2	<10	<50	<100	<100
BH8	05.05.2021	0.7-0.8	<10	<50	<100	<100
BH9	05.05.2021	0.1-0.2	<10	<50	<100	<100
BH9	05.05.2021	0.8-0.9	<10	<50	<100	<100
Practical Quantitation Limits (PQL)			10	50	100	100
NATIONAL ENVIRONMENT PROTECTION MEASURE (2013)						
Management Limits - Table 1B (7)						
Residential parkland and public open space			700	1000	2500	10,000
Commercial and industrial			700	1000	3500	10,000

Notes a: Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2.

 b: Management limits are applied after consideration of relevant ESLs

TABLE F
POLYCYCLIC AROMATIC HYDROCARBONS (PAH), ORGANOCHLORINE PESTICIDES (OCP), POLYCHLORINATED BIPHENYLS (PCB) AND PHENOLS TEST RESULTS FOR HILs, EILs & ESLs

Analyte			PAH (mg/kg)				Organochlorine Pesticides (mg/kg)									Phenols (mg/kg)	
			Carcinogenic PAHs (as BaP TEQ) <														

- Notes
- a: Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary
 - b: Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high rise buildings and apartments.
 - c: Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate.
 - d: Commercial/Industrial, includes premises such as shops, offices, factories and industrial sites
 - e: Carcinogenic PAHs: HIL is based on the 8 carcinogenic PAHs and their TEFs (potency relative to B(a)P) adopted by CCME 2008 (refer Schedule B7). The B(a)P TEQ is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its B(a)P TEF, given below, and summing these products.

PAH species	TEF	PAH species	TEF
Benzo(a)anthracene	0.1	Benzo(g,h,i)perylene	0.01
Benzo(a)pyrene	1	Chrysene	0.01
Benzo(b+j)fluoranthene	0.1	Dibenz(a,h)anthracene	1
Benzo(k)fluoranthene	0.1	Indeno(1,2,3-c,d)pyrene	0.1

- f: Where the B(a)P occurs in bitumen fragments it is relatively immobile and does not represent a significant health risk.
- g: Total PAHs: HIL is based on the sum of the 16 PAHs most commonly reported for contaminated sites (WHO 1998). The application of the total PAH HIL should consider the presence of carcinogenic PAHs and naphthalene (the most volatile PAH). Carcinogenic PAHs reported in the total PAHs should meet the B(a)P TEQ/HIL. Naphthalene reported in the total PAHs should meet the relevant HSL.
- h: Insufficient data was available to calculate aged values for DDT and naphthalene, consequently the values for fresh contamination should be used.
- i: Urban residential / public open space is broadly equivalent to the HIL-A, HIL-B and HIL-C land use scenarios in Table 1A(1) Footnote 1 and as described in Schedule B7.
- j: For coarse and fine grained texture soils.
- k: PCBs: HIL relates to non-dioxin-like PCBs only. Where a PCB source is known, or suspected, to be present at a site, a site-specific assessment of exposure to all PCBs (including dioxin-like PCBs) should be undertaken.
- l: For DDT only.
- NT - Not tested

TABLE G
ASBESTOS TEST RESULTS

Analyte			Field Observations*	Laboratory Results	
Sample Location	Date Sampled	Depth (m)		Asbestos Type Present / Absent	Asbestos %w/w
BH1	05.05.2021	0.1-0.2	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH1	05.05.2021	0.6-0.7	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH2	05.05.2021	0.15-0.25	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH2	05.05.2021	0.5-0.6	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH3	05.05.2021	0.1-0.2	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH3	05.05.2021	0.6-0.7	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH4	05.05.2021	0.1-0.2	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH4	05.05.2021	0.7-0.8	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH5	05.05.2021	0.1-0.2	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH5	05.05.2021	0.6-0.7	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH6	05.05.2021	0.1-0.2	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH6	05.05.2021	0.5-0.6	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH7	05.05.2021	0.1-0.2	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH7	05.05.2021	0.5-0.6	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH8	05.05.2021	0.1-0.2	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH8	05.05.2021	0.7-0.8	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH9	05.05.2021	0.1-0.2	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
BH9	05.05.2021	0.8-0.9	No visible fibre-cement fragments observed	No Asbestos detected	<0.01%w/w
WA Guidelines for the Assessment, Remediation and Management of Asbestos - Contaminated Sites in Western Australia - May 2009					
National Environment Protection (Assessment of Site Contamination) Measure 2013 Schedule B1					
%w/w asbestos for FA and AF					0.001%
%w/w asbestos for ACM - Residential use, childcare centres, preschools etc.					0.01%
%w/w asbestos for ACM - Residential, minimal soil access (fully sealed surfaces)					0.04%
%w/w asbestos for ACM - Parks, public open spaces, playing fields etc.					0.02%
%w/w asbestos for ACM - Commercial / Industrial					0.05%

Note:

ACM = Asbestos Containing Materials >7mm x 7mm (visible by eye)

FA = Friable and Fibrous Asbestos Materials >7mm x 7mm (visible by eye)

AF = Asbestos Fines <7mm x 7mm ACM including free fibres (visible by microscope only)

* Field Observations: All fibro- cement fragments observed are assumed to contain Asbestos until otherwise tested and recorded as such.

NT = Not Tested

Table 9: Summary of QA/QC Duplicate Test Results (Sub-table H)

TABLE H1
DUPLICATE SAMPLE

ANALYTE	BH2 0.15-0.25m mg/kg	DUPLICATE D1 mg/kg	RELATIVE PERCENTAGE DIFFERENCE %
HEAVY METALS			
Arsenic	10	10	33
Cadmium	<1	<1	0
Chromium	7	11	44
Copper	74	76	3
Nickel	4	6	40
Lead	417	227	59
Zinc	161	220	31
Mercury	0.2	0.20	0
TOTAL PETROLEUM HYDROCARBONS (TPH)			
C6 - C9	<10	<10	0
C10 - C14	<50	<50	0
C15 - C28	220	<100	75
C29-C36	140	<100	33
BTEX			
Benzene	<0.2	<0.2	0
Toluene	<0.5	<0.5	0
Ethyl Benzene	<0.5	<0.5	0
Total Xylenes	<0.5	<0.5	0
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)			
BENZO(a)PYRENE	4.0	2.0	67
Total PAH	56.0	25.3	76
ORGANOCHLORINE PESTICIDES (OCP)			
Heptachlor	<0.05	<0.05	0
Aldrin	<0.05	<0.05	0
Dieldrin	<0.05	<0.05	0
DDD	<0.05	<0.05	0
DDE	<0.05	<0.05	0
DDT	<0.2	<0.2	0
Chlordane (trans & cis)	<0.05	<0.05	0
POLYCHLORINATED BIPHENYLS (PCB)			
Total PCB	<0.1	<0.1	0
PHENOLS & CYANIDES			
Total Phenols	<0.5	<0.5	0

Note: The RPDs for the majority of analytes were within their respective control limits, with the exception of Lead (59%), TRH C15-C2 (75%), B(a)P (67%), and Total PAH (76%) between primary sample BH2 (0.15-0.25m) and duplicate sample D1. The high RPDs were considered to be due to sample heterogeneity, given that the majority of results were within the same order of magnitude. However, none of the primary sample results exceeded their respective investigation or screening levels, with the exception of Lead and B(a)P. However, the data set is considered to be adequately precise.

TABLE H2
DUPLICATE SAMPLE

ANALYTE	BH8 0.1-0.2m mg/kg	DUPLICATE D2 mg/kg	RELATIVE PERCENTAGE DIFFERENCE %
HEAVY METALS			
Arsenic	<5	<5	33
Cadmium	<1	<1	0
Chromium	7	6	15
Copper	28	26	7
Nickel	4	4	0
Lead	232	219	6
Zinc	213	196	8
Mercury	0.2	0.2	0
TOTAL PETROLEUM HYDROCARBONS (TPH)			
C6 - C9	<10	<10	0
C10 - C14	<50	<50	0
C15 - C28	<100	<100	0
C29-C36	<100	<100	0
BTEX			
Benzene	<0.2	<0.2	0
Toluene	<0.5	<0.5	0
Ethyl Benzene	<0.5	<0.5	0
Total Xylenes	<0.5	<0.5	0
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)			
BENZO(a)PYRENE	<0.5	<0.5	0
Total PAH	4.1	3.8	8
ORGANOCHLORINE PESTICIDES (OCP)			
Heptachlor	<0.05	<0.05	0
Aldrin	<0.05	<0.05	0
Dieldrin	<0.05	<0.05	0
DDD	<0.05	<0.05	0
DDE	<0.05	<0.05	0
DDT	<0.2	<0.2	0
Chlordane (trans & cis)	<0.05	<0.05	0
POLYCHLORINATED BIPHENYLS (PCB)			
Total PCB	<0.1	<0.1	0
PHENOLS & CYANIDES			
Total Phenols	<0.5	<0.5	0

Note: The RPDs for the majority of analytes were within their respective control limits. Therefore, the data set is considered to be adequately precise.

10. CONCLUSION AND RECOMMENDATIONS

10.1 Site Observations

Based on the data and evidence collected during the site inspection and site history review, the findings of this Detailed Site Investigation, are as follows:

At the time of inspection, on Wednesday 5th May 2021, 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.

- 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.

10.2 Sampling Methodology

According to the NSW EPA Contaminated Sites Sampling Guidelines (Sept. 1995), for this sized area site (2,620m²), 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.

10.3 Soil Laboratory Results

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**
- **BH3 (0.6-0.7m) Lead 415mg/kg**
- **BH6 (0.1-0.2m) Lead 1,260mg/kg**
- **BH2 (0.15-0.25m) F3(C₁₆-C₃₄) 330mg/kg**
- **BH3 (0.1-0.2m) F3(C₁₆-C₃₄) 350mg/kg**
- **BH2 (0.15-0.25) B(a)P TEQ 5.5mg/kg, B(a)P 4.0mg/kg**
- **BH3 (0.6-0.7m) B(a)P 1.0mg/kg**
- **BH5 (0.1-0.2m) B(a)P 1.0mg/kg**

10.4 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.

10.5 Potential for Migration 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.

10.6 Recommendations

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(C₁₆-C₃₄) 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).

11. LIMITATION STATEMENT

ECON Environmental Pty Ltd has undertaken the following report in accordance with the scope of works set out between ECON Environmental Pty Ltd and the client. ECON Environmental Pty Ltd derived the data in this report primarily from the site and soil assessment conducted on the date of site inspection. The impacts of future events may require future investigation of the site and subsequent data analysis, together with a re-evaluation of the conclusions and recommendations of this report.

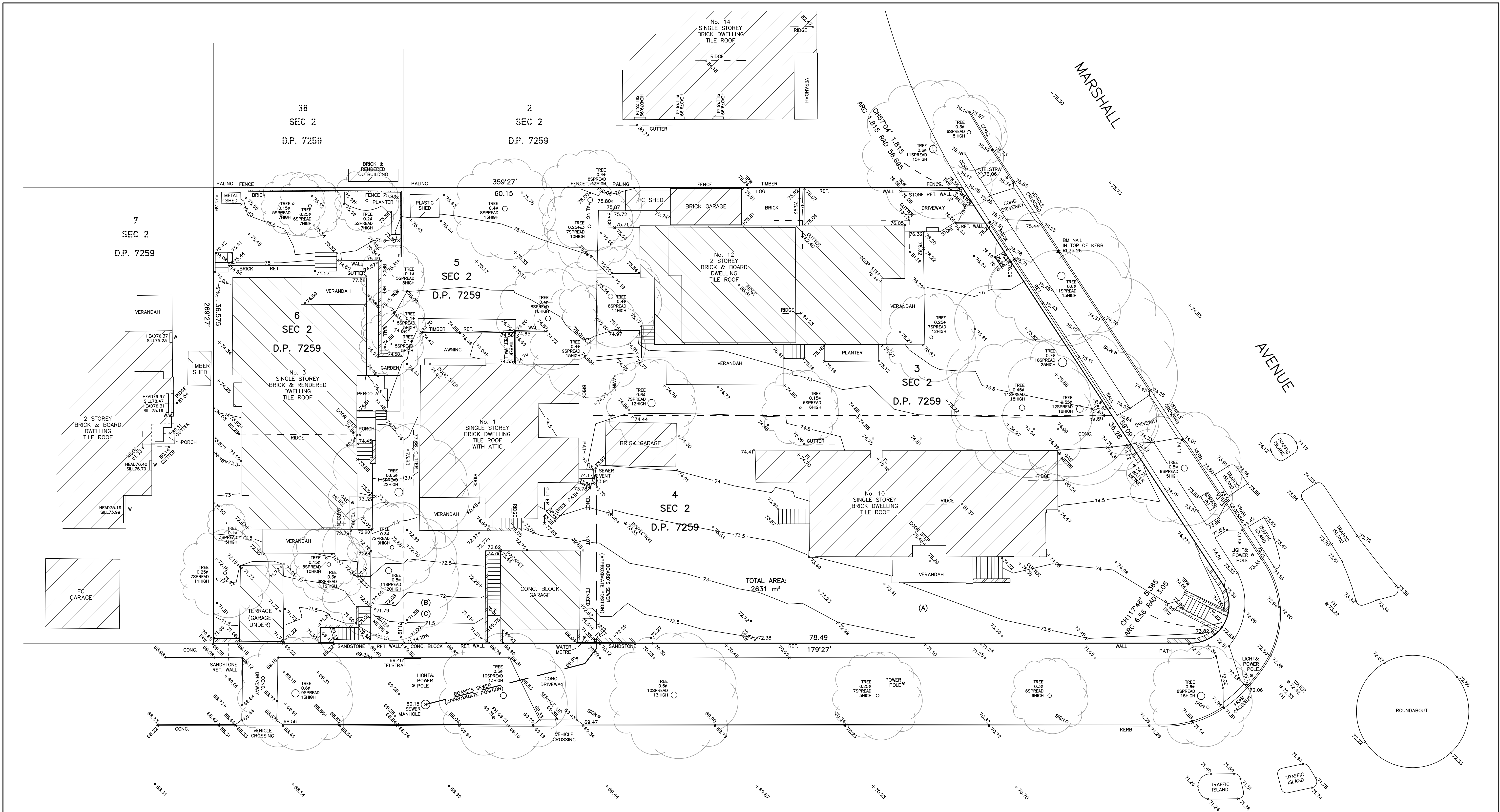
In preparing this report, ECON Environmental Pty Ltd has relied upon, and assumed accurate, certain site information provided by the client and other persons. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. ECON Environmental Pty Ltd accepts no liability or responsibility whatsoever for or in respect to any use or reliance upon this report by any third party.

The information contained within this report have been prepared exclusively for the client. ECON Environmental Pty Ltd have prepared the report to address the risk associated with scale of the works. The report has been prepared 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 appendices 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 Pty Ltd cannot be held liable for third party reliance on this document.

ECON Environmental Pty Ltd 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 Pty Ltd has limited its investigation to the scope agreed upon with its client.

APPENDIX A: PROPOSED DEVELOPMENT PLANS

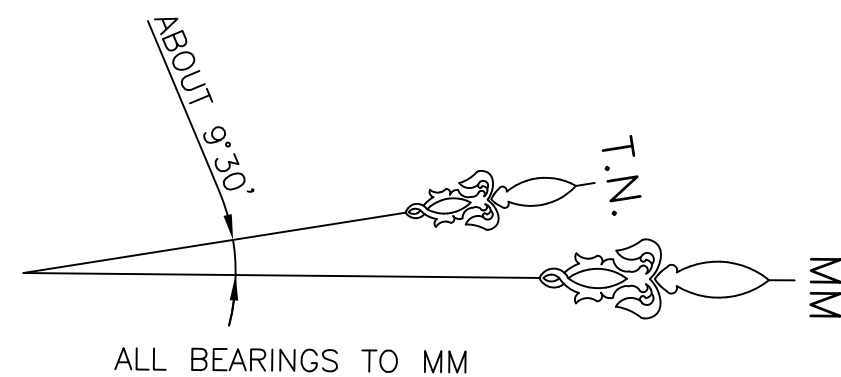
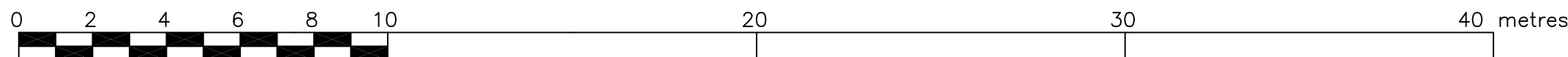


- (A) DENOTES COVENANT (A241721)
(B) DENOTES COVENANT (A484331)
(C) DENOTES COVENANT (658032)

TRW DENOTES TOP OF RETAINING WALL

NOTES:

- 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.
- 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.
- 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.
- CONTOURS ARE INDICATIVE OF GROUND FORM ONLY.
- DRAWING INTERCHANGE FILE (.DXF) FORMAT AVAILABLE.
- AUSTRALIAN HEIGHT DATUM WAS ESTABLISHED FROM SSM 86108 RL 78.678 (A.H.D.)
- 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 CONSTRUCTION.



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

FINAL 13/10/2020

ST LEONARDS SOUTH

DEVELOPMENT CONTROL PLAN

LOCALITY 8 – ST LEONARDS SOUTH

By: Annand Associates Urban Design

For: Lane Cove Council

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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 <i>"Specifications for Infrastructure in the St Leonards South Precinct"</i> • 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

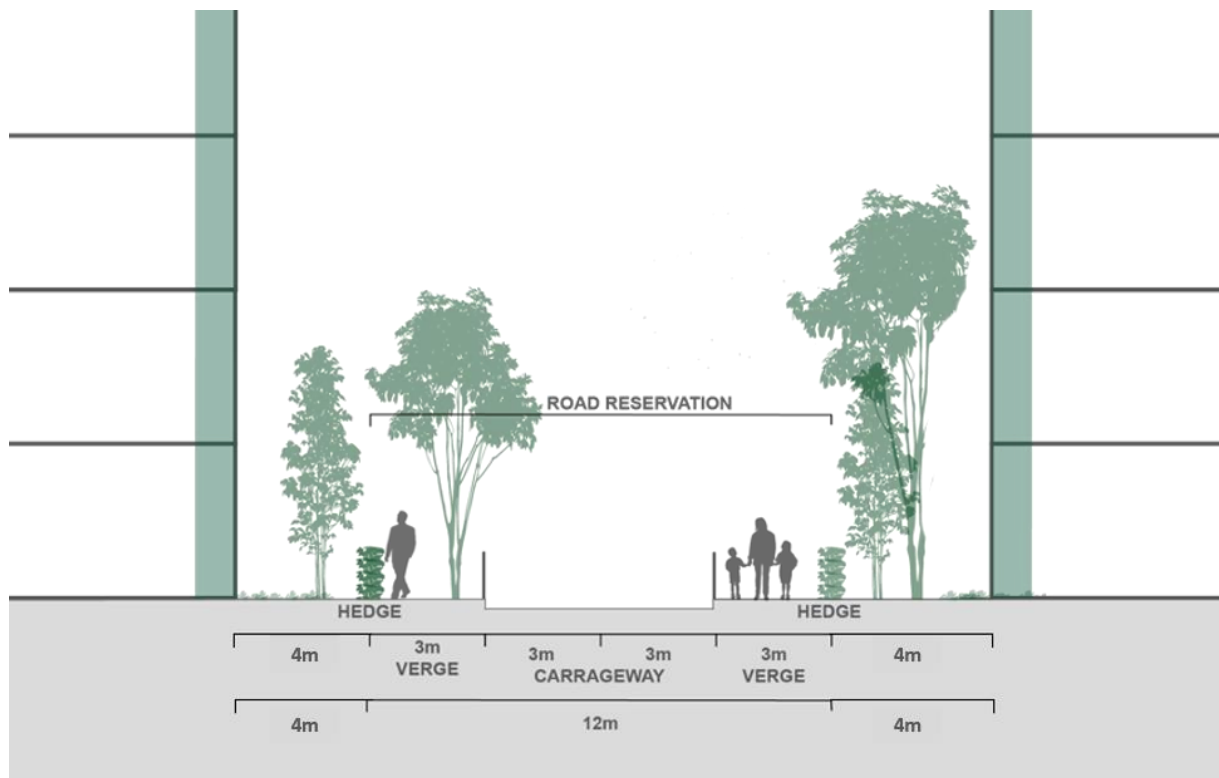


Figure 8.5 (a): Section - New Road (between Berry – Park Road)

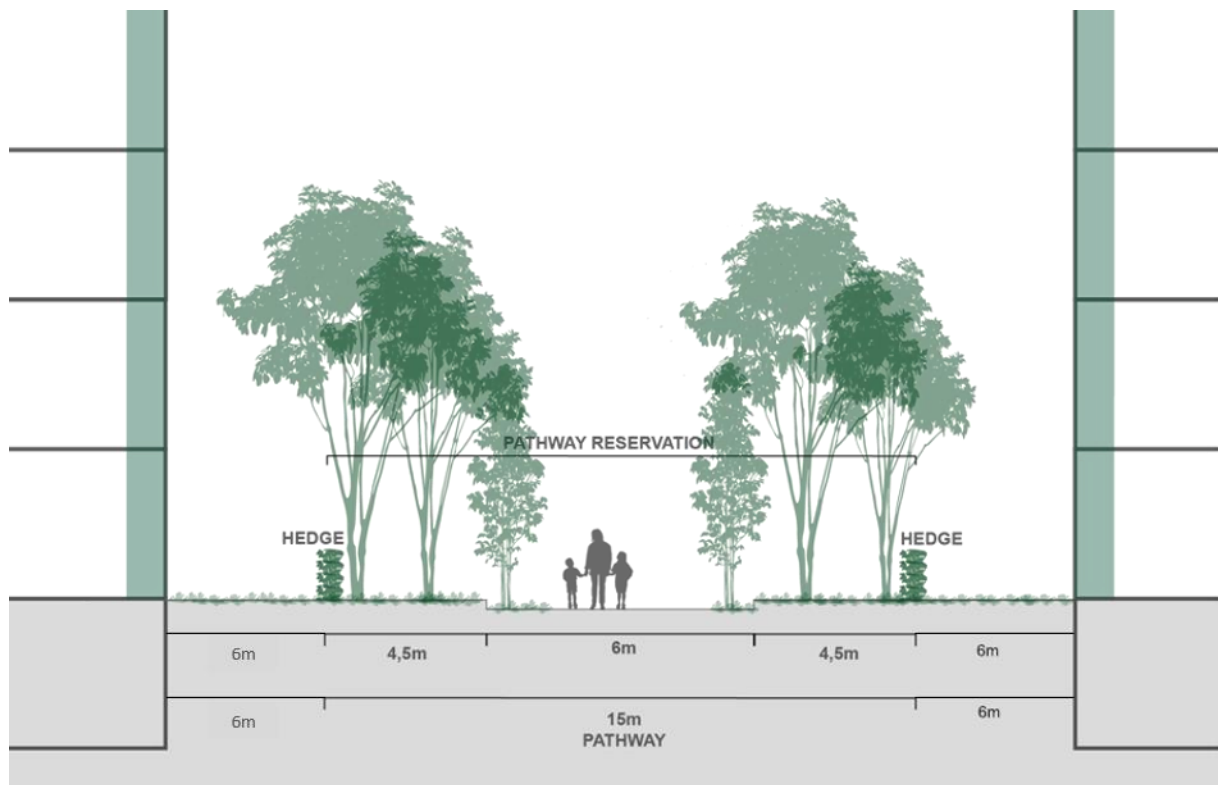


Figure 8.5 (b): Section - New E-W Path

5.0 INFRASTRUCTURE

OBJECTIVES

To identify and provide opportunities for additional public infrastructure including:

- Recreation Areas (Public Open Space)
- Community facilities that are multi-purpose
- Affordable housing
- 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 <i>"Specifications for Affordable Housing in the St Leonards South Precinct"</i>	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.

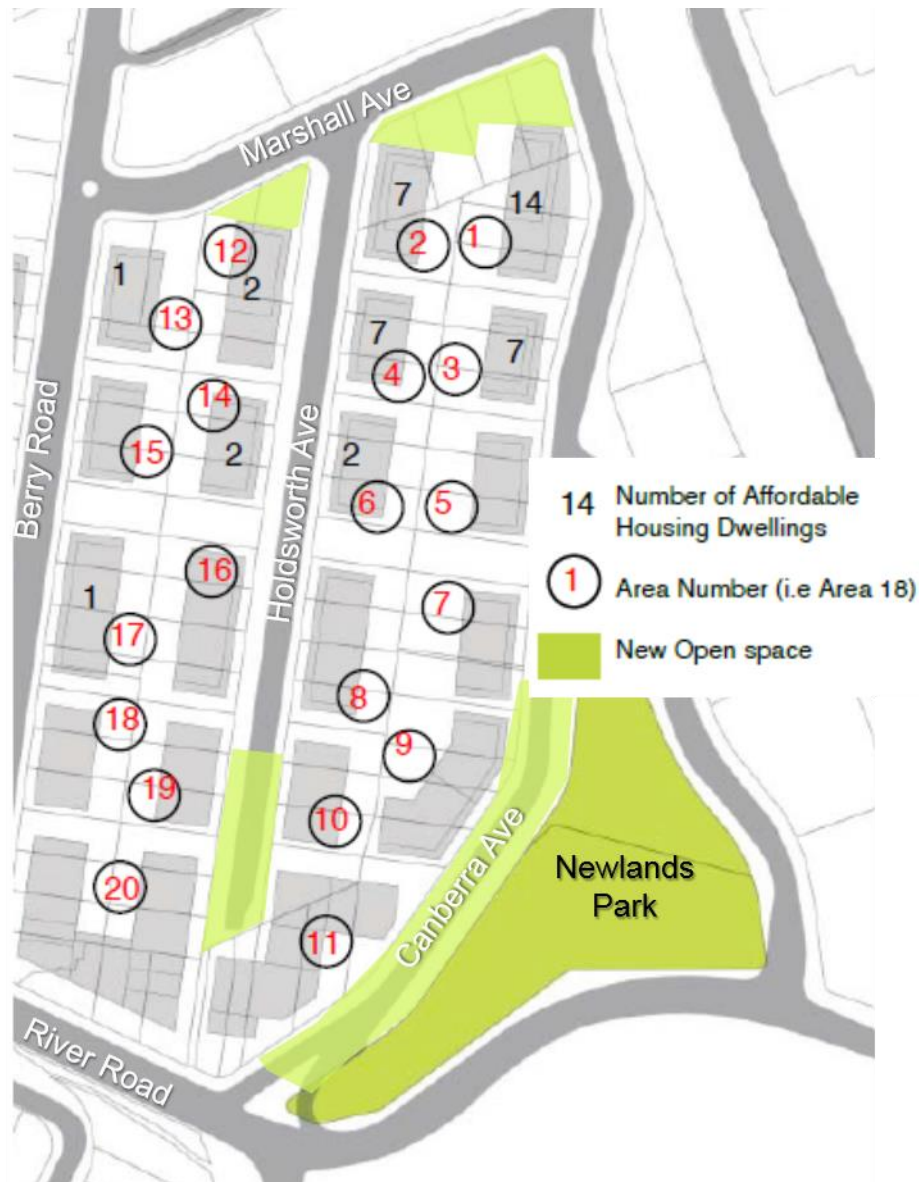


Figure 8.7: Number of Affordable housing dwellings to be provided by each Area

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 2,000m² 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 1,600m² 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 1,500m² 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 2,200m² 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 2,200m² 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 1,900m² 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 & 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 2,000m² 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 2,500m² 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 1,500m² 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 4,000m² 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 2,500m² 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 “<i>Specifications for Affordable Housing in the St Leonards South Precinct</i>”; 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 1,600m² 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 “<i>Specifications for Affordable Housing in the St Leonards South Precinct</i>”; d) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the “<i>Specifications for Private Open Space in the St Leonards South Precinct</i>” 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 1,600m² 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 “<i>Specifications for Affordable Housing in the St Leonards South Precinct</i>”; d) Provision of appropriate building setbacks to facilitate shared communal open space between buildings (Green Spines) embellished in accordance with the “<i>Specifications for Private Open Space in the St Leonards South Precinct</i>” 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 2,000m² 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 2,500m² 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 2,200m² 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 1,500m² 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 1,500m² 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 5,200m² 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 4,500m² 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 4,600m² 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 6,800m² 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.

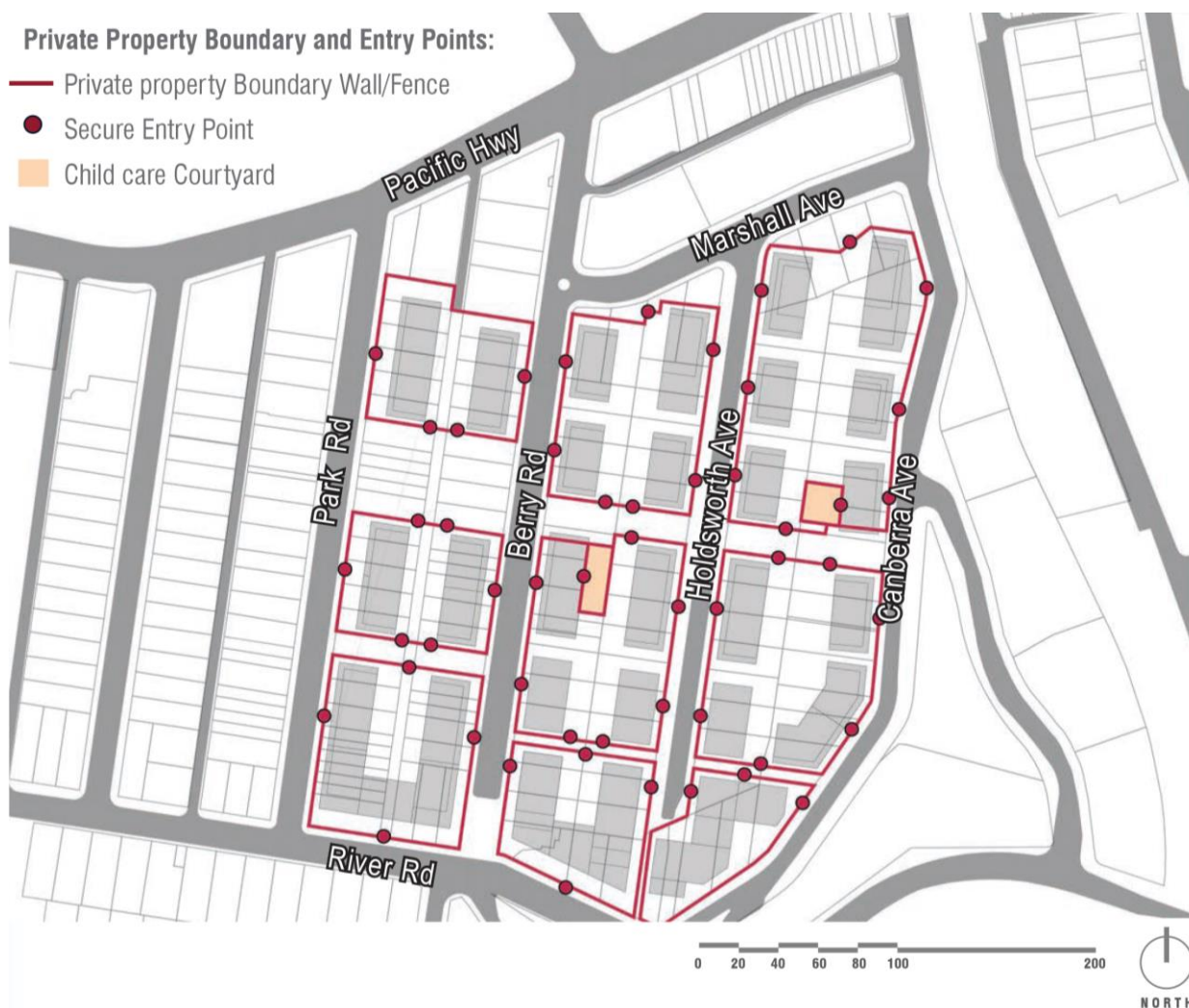


Figure 8.11 Indicative Site Entry Points

	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.	

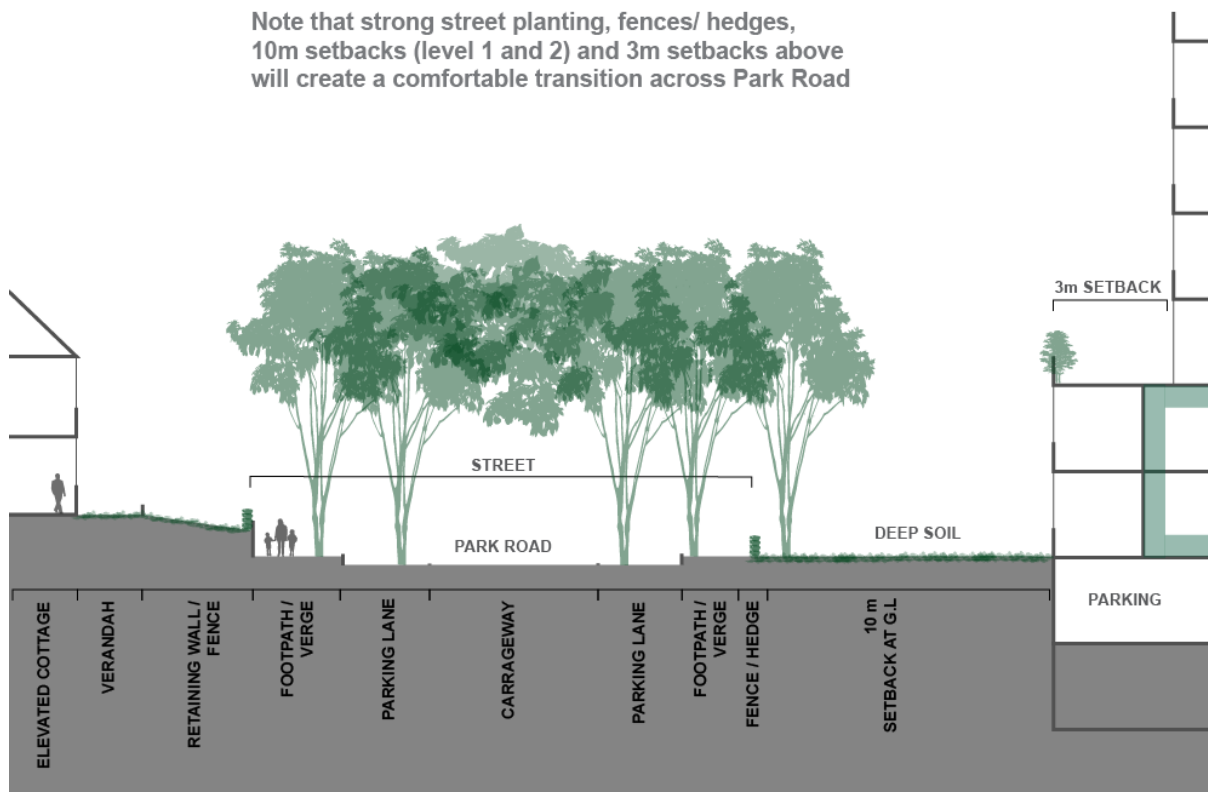


Figure 8.12: Density Transition

	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.	

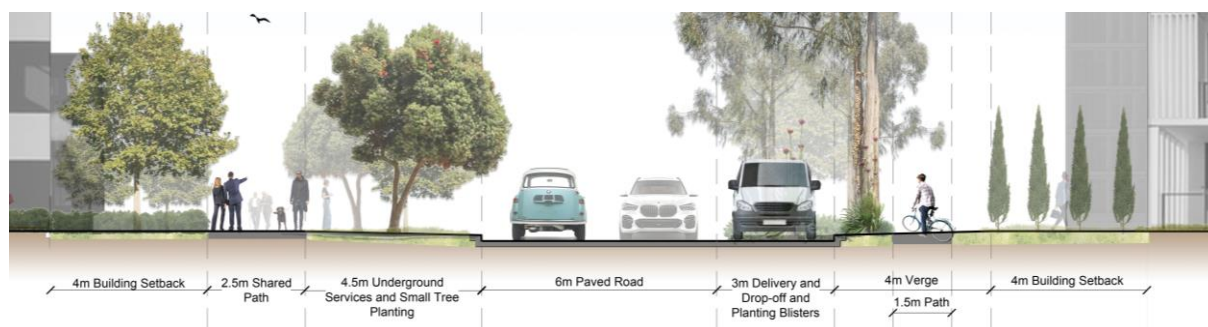


Figure 8.15: Cross-section of typical narrowed street

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	



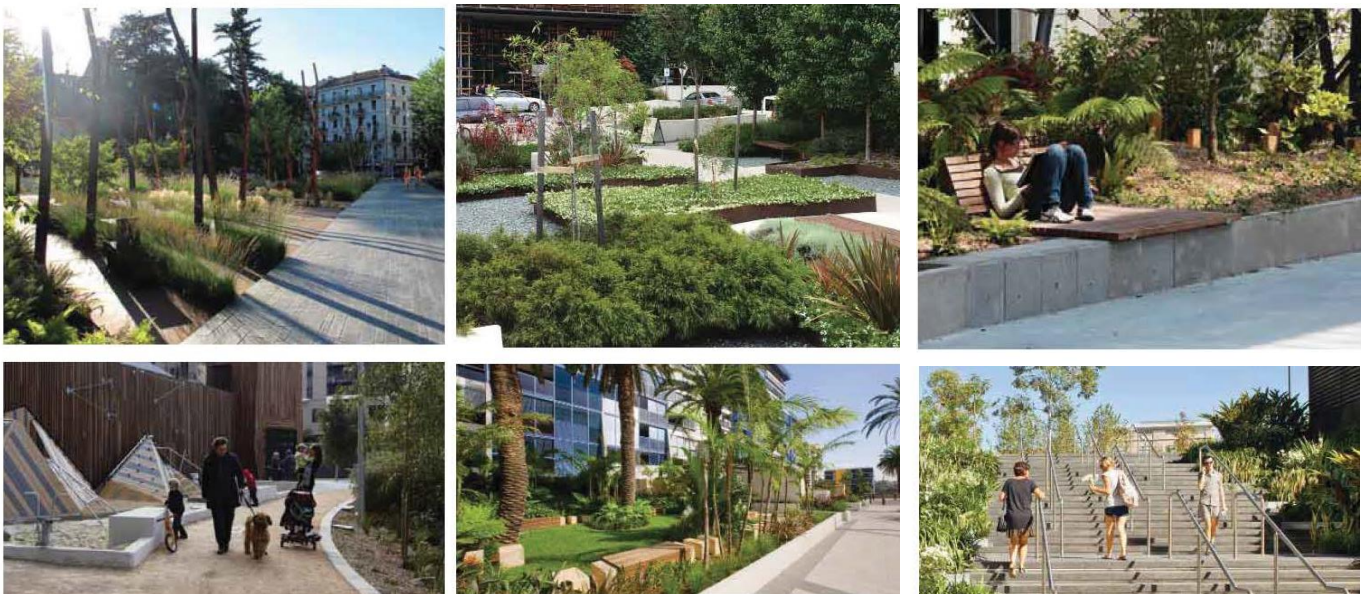
Figure 8.16: Tree Conservation / Removal

	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



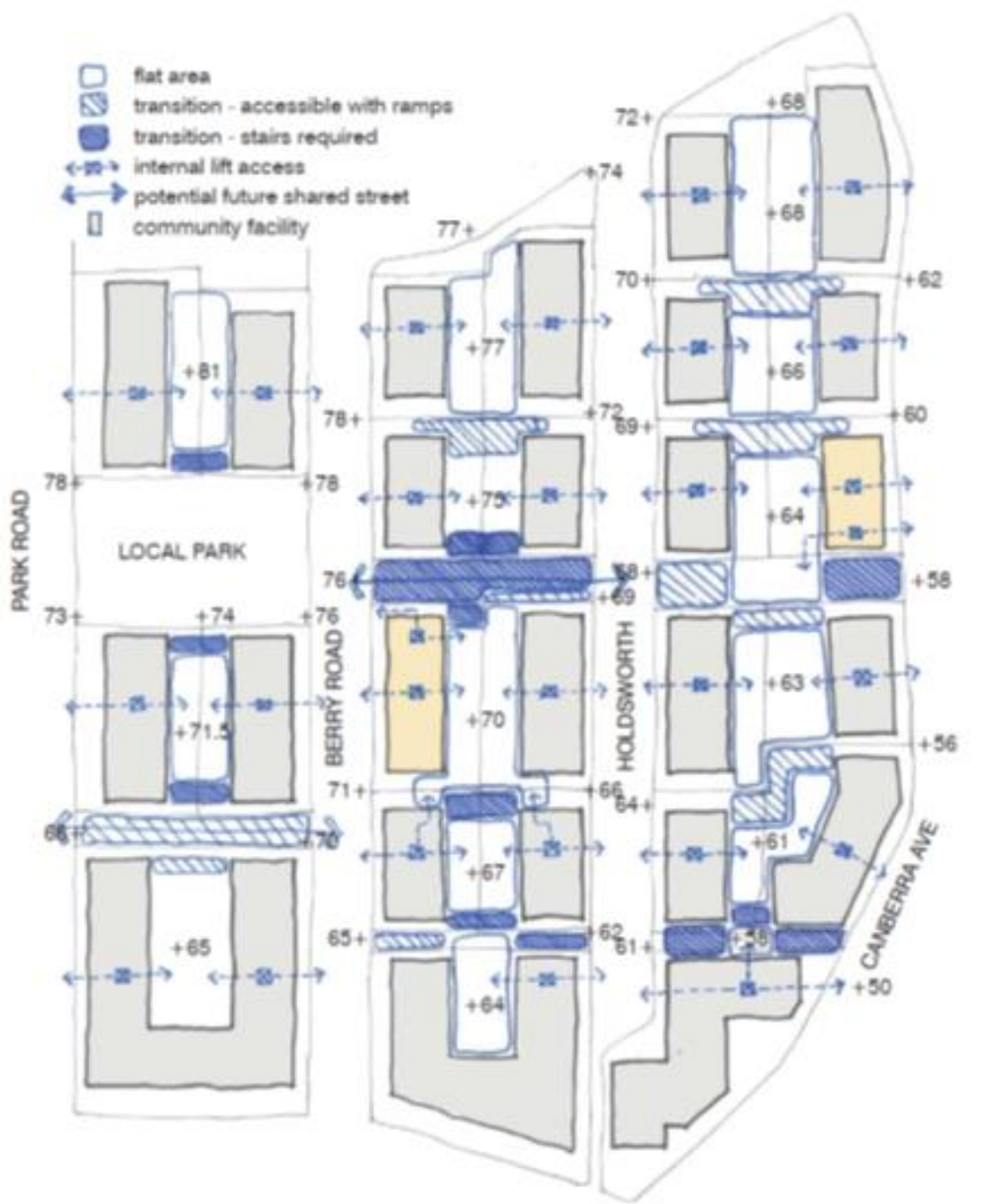


Figure 8.18: Indicative Site Levels

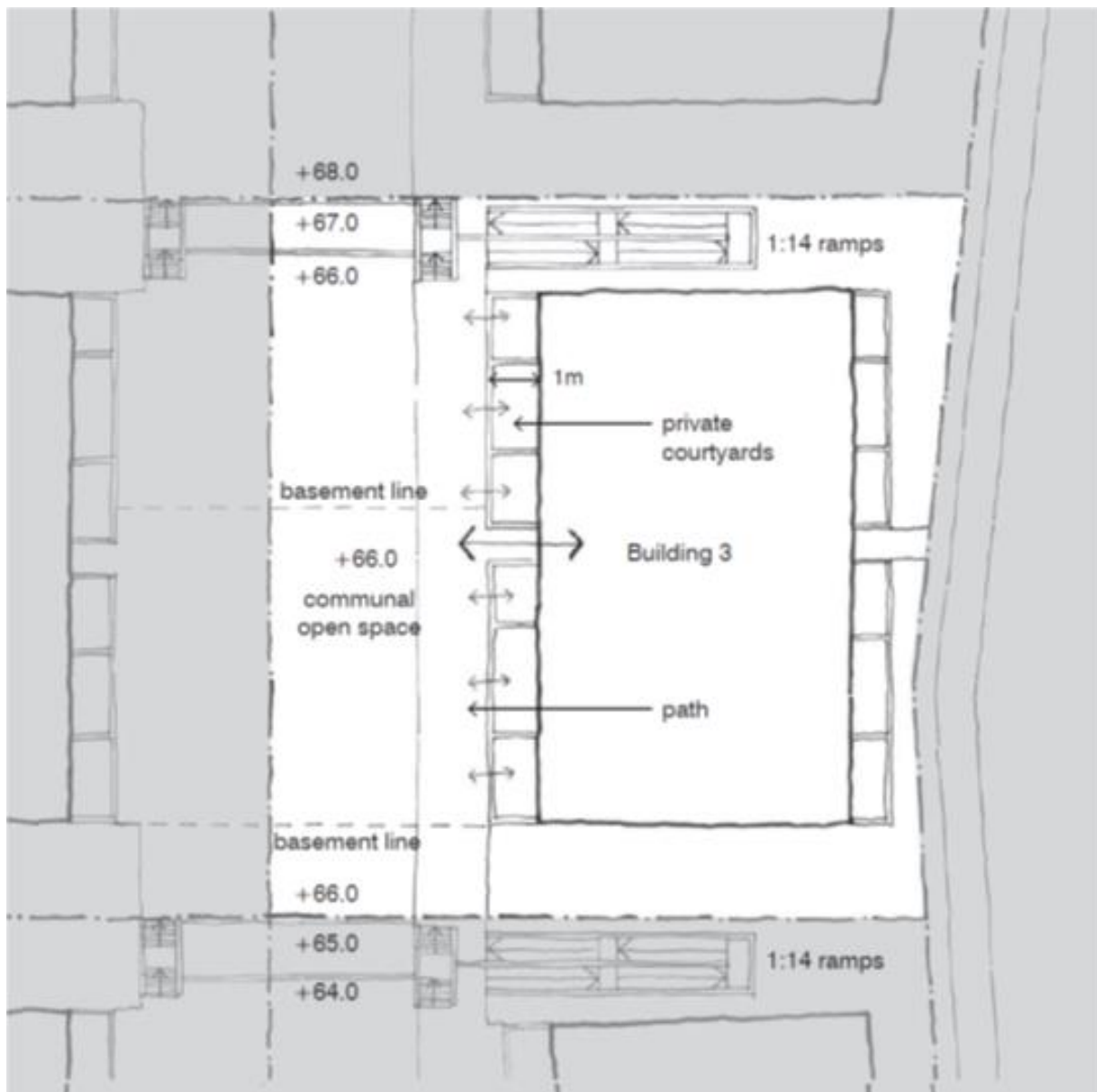


Figure 8.19: Level Changes (Ramp)

	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	

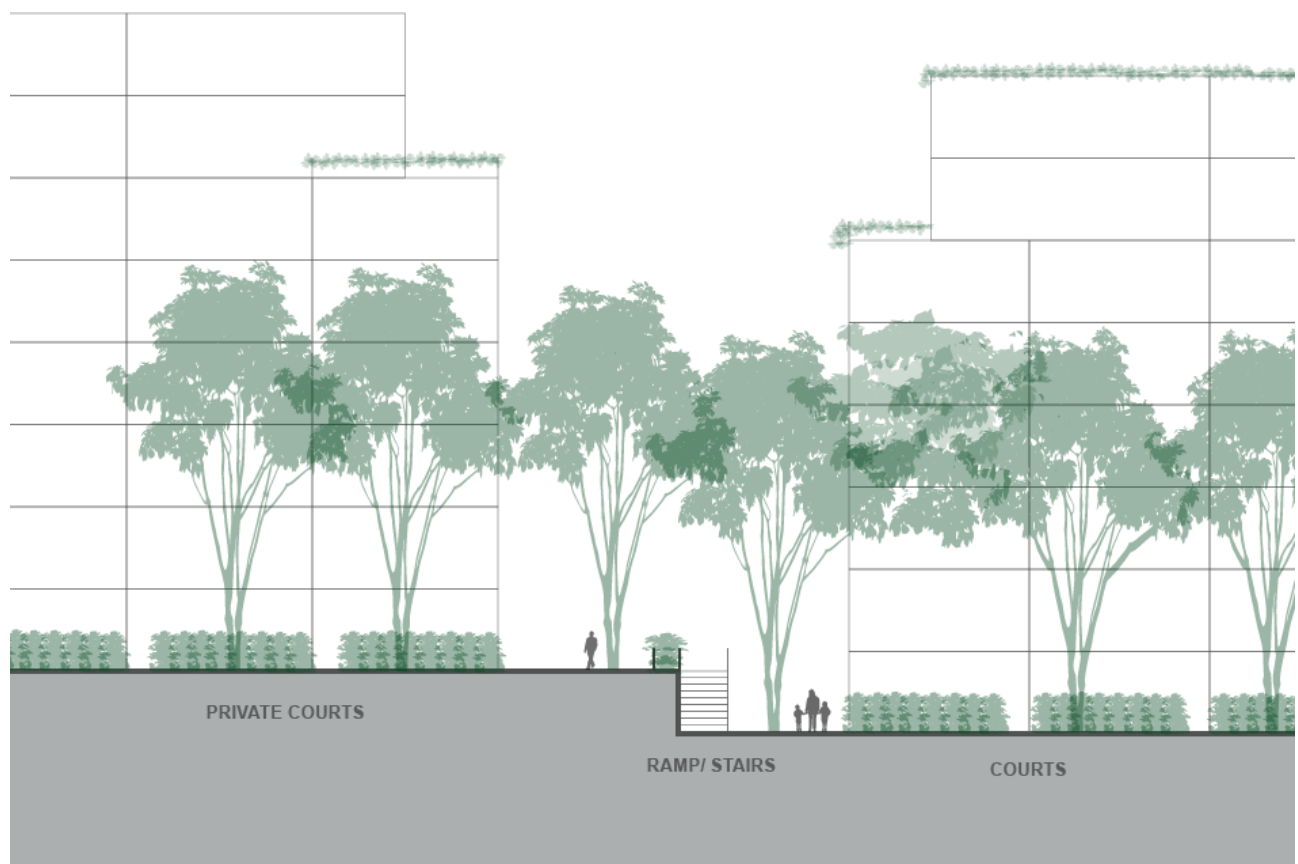


Figure 8.20 Indicative North-South Level Transition

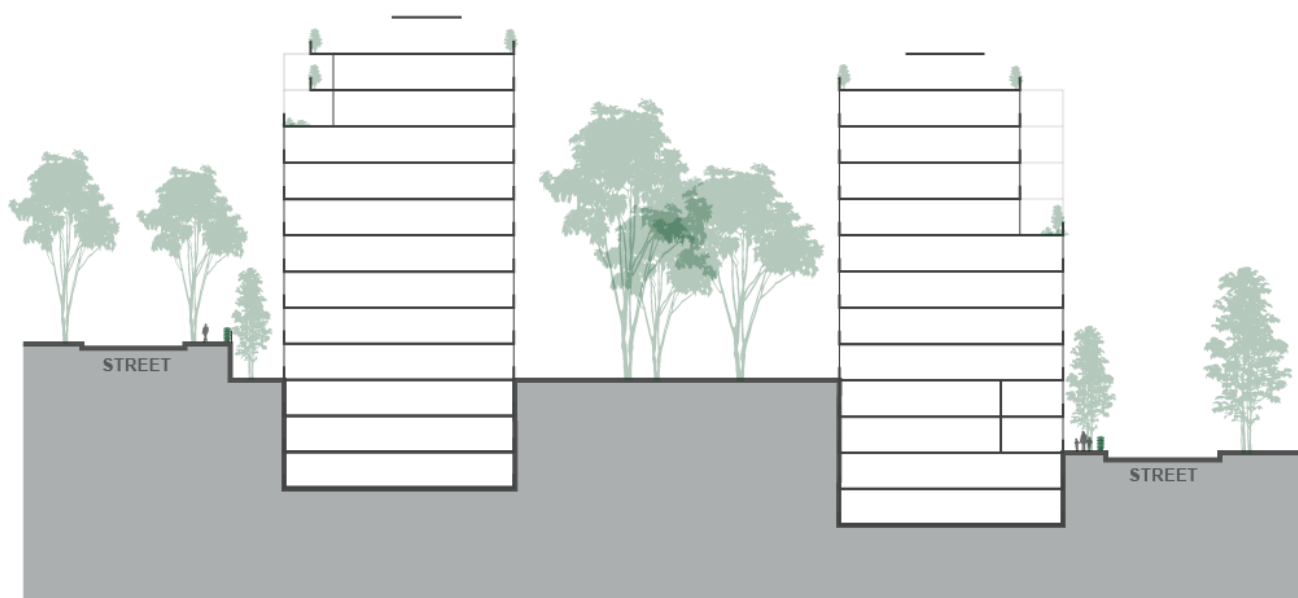


Figure 8.21 Indicative East-West Level Transition

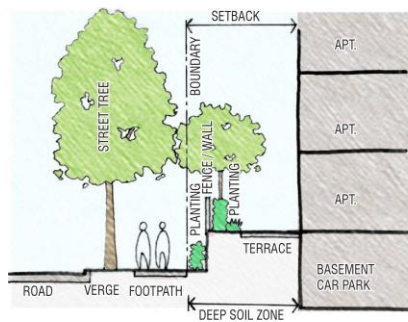
	Control	Provision	Notes/Location
7.4.5	Front Courtyards and Setbacks	• Front setbacks to be deep soil and to be treated as front gardens to GF units (or basements units) • Edge treatment to the boundary shall comprise a 1.2m max fence/hedge to provide screening as per the LMP. • Boundary treatments shall 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.



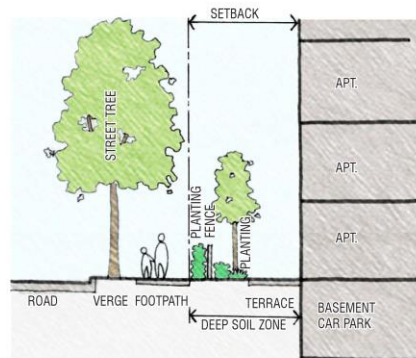
Figure 8.22: Front Boundary / Edge Treatments (Location)

	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	

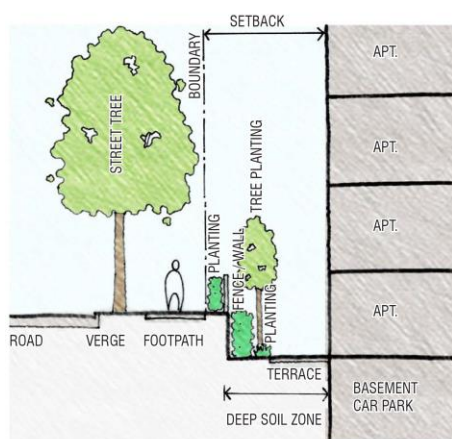
		shall be as per LMP details (Figure 8.24). • Edge treatments between private courts and communal green spine – see as detailed in Figures 8.22, 8.23 and 8.24	
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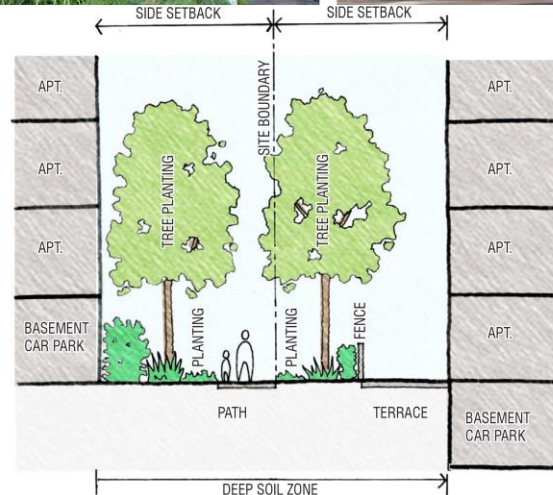
STREET FRONTAGE A. ELEVATED



STREET FRONTAGE B. AT GRADE



STREET FRONTAGE C. SUNKEN



SIDE SETBACK



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.	

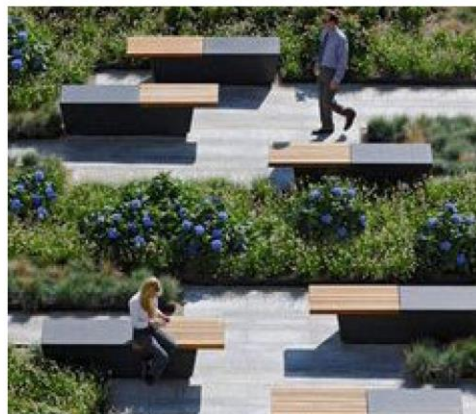


Figure 8.25 (a): Roof Terraces - Location

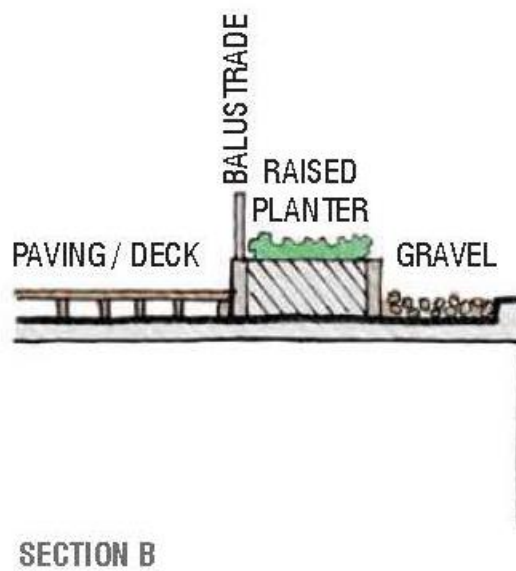
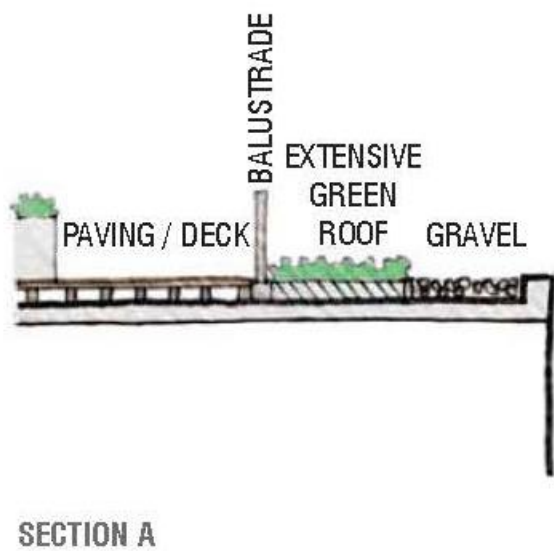
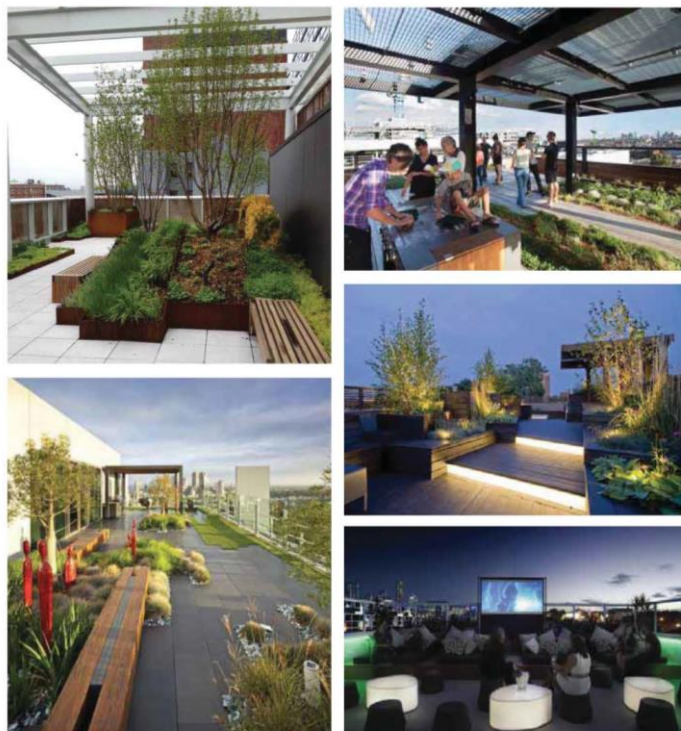
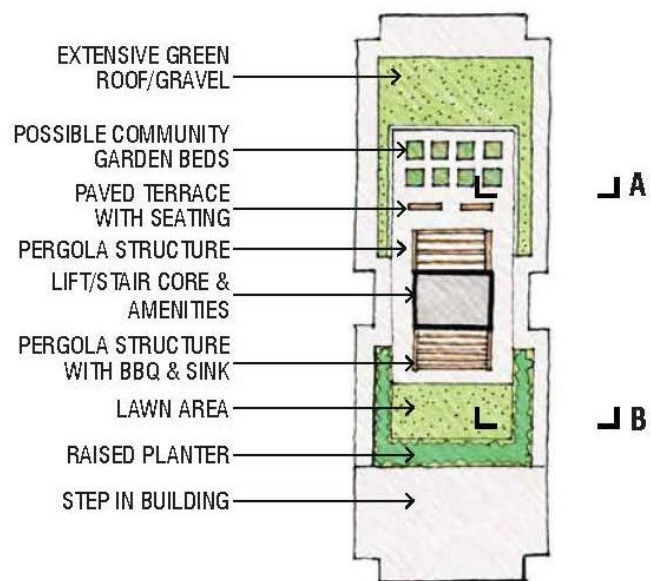


Figure 8.25 (b): Roof Terraces – Details

	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 CI 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



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05 APPENDICES

Precedent Studies
Levels Studies

OCULUS

landscape architecture // urban design

level 1 / 5 wilson street newtown nsw 2042 **australia**

www.oculus.info

CLIENT:

LANE COVE COUNCIL



IN COLLABORATION WITH:

ANNAND ASSOCIATES URBAN DESIGN



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

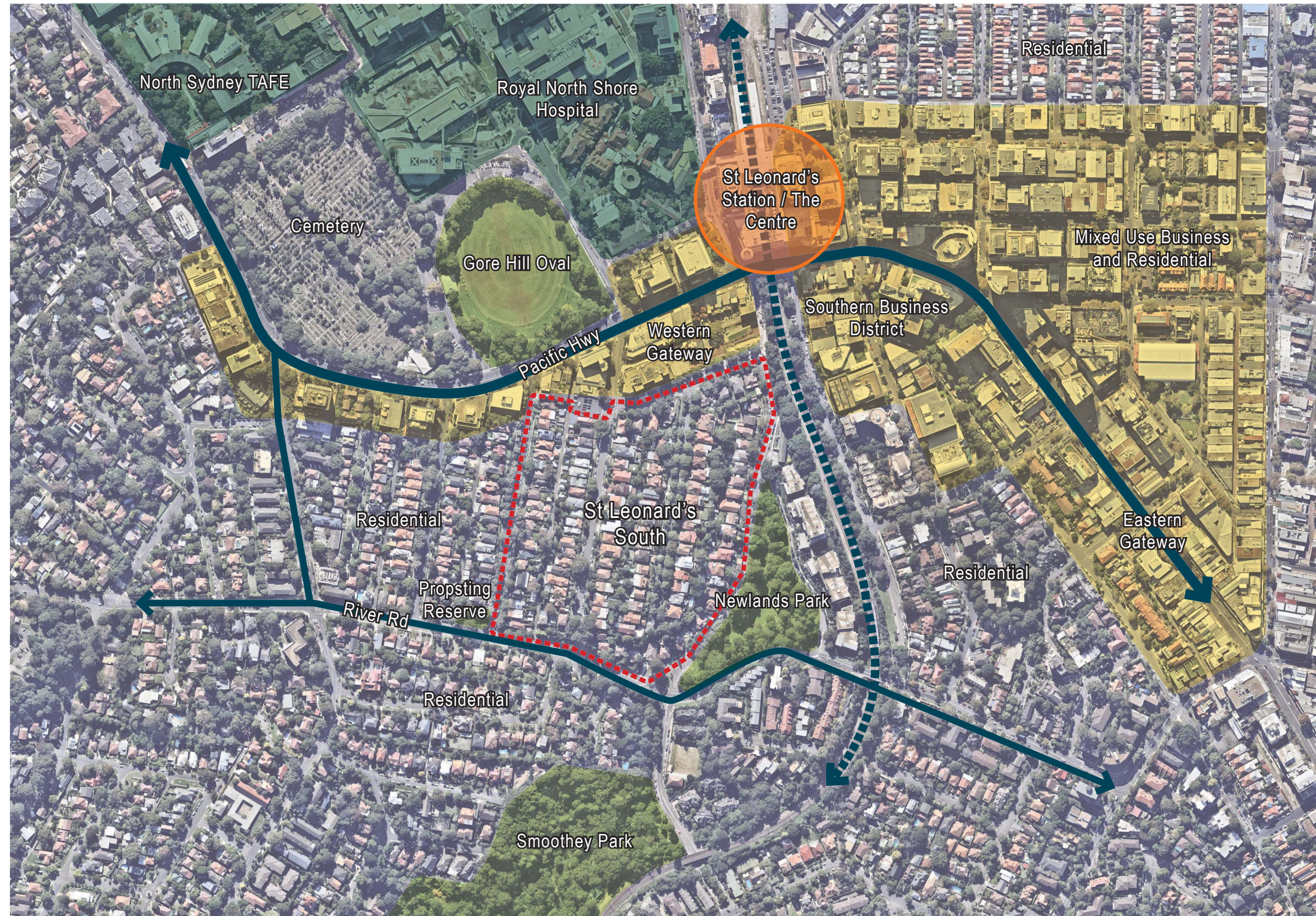
The precinct, comprising approximately 9 hectares (including local roads and development), is located immediately south-west of the St Leonards Strategic Centre as identified in the Greater Sydney Region Plan, six kilometers from Sydney CBD and on a major rail-bus transport network. It is proposed to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

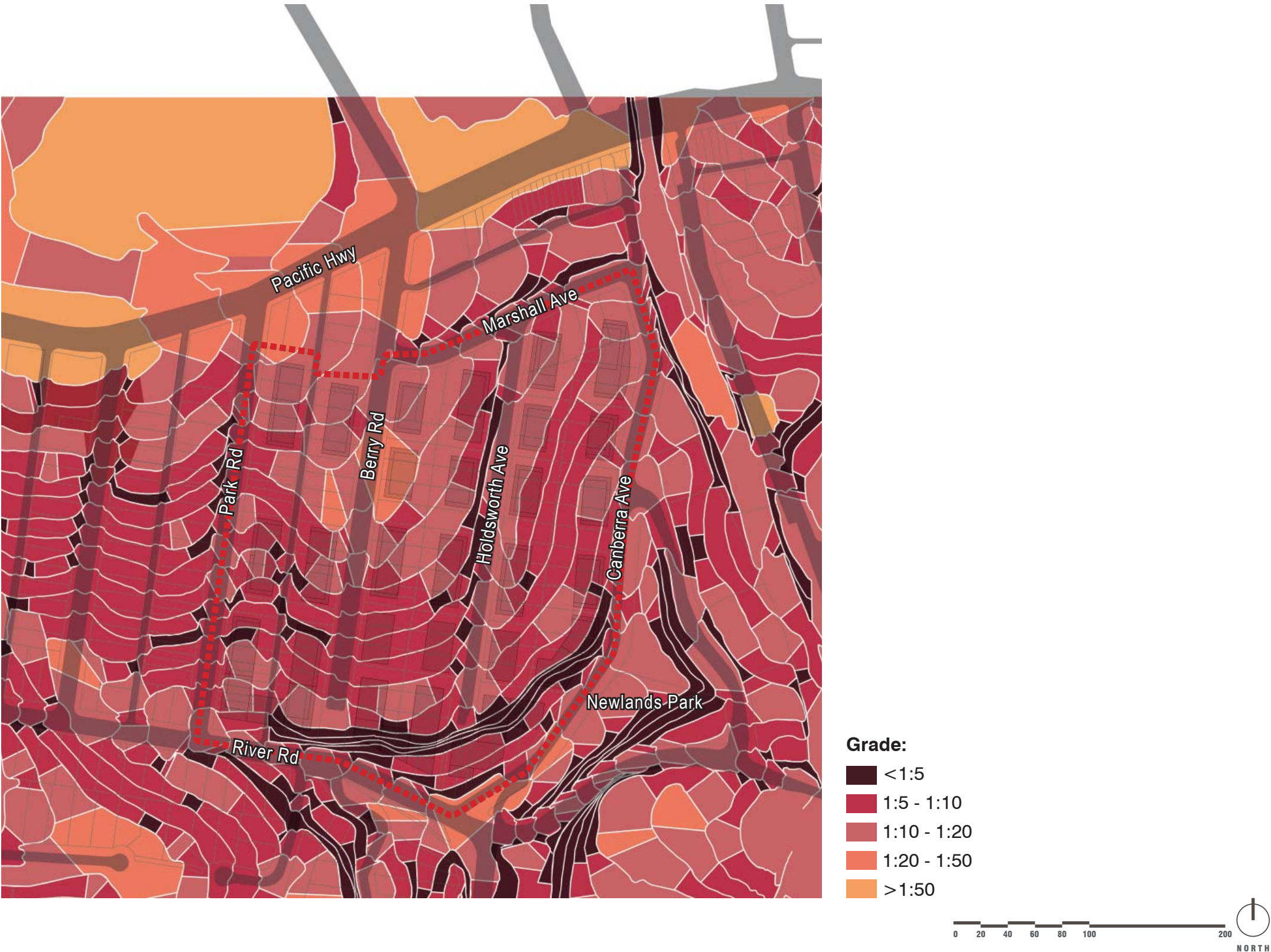


SITE ANALYSIS

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

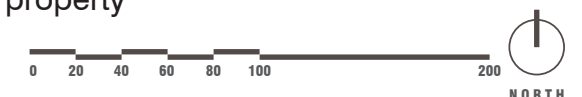
EXISTING TREES

- 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



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.





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

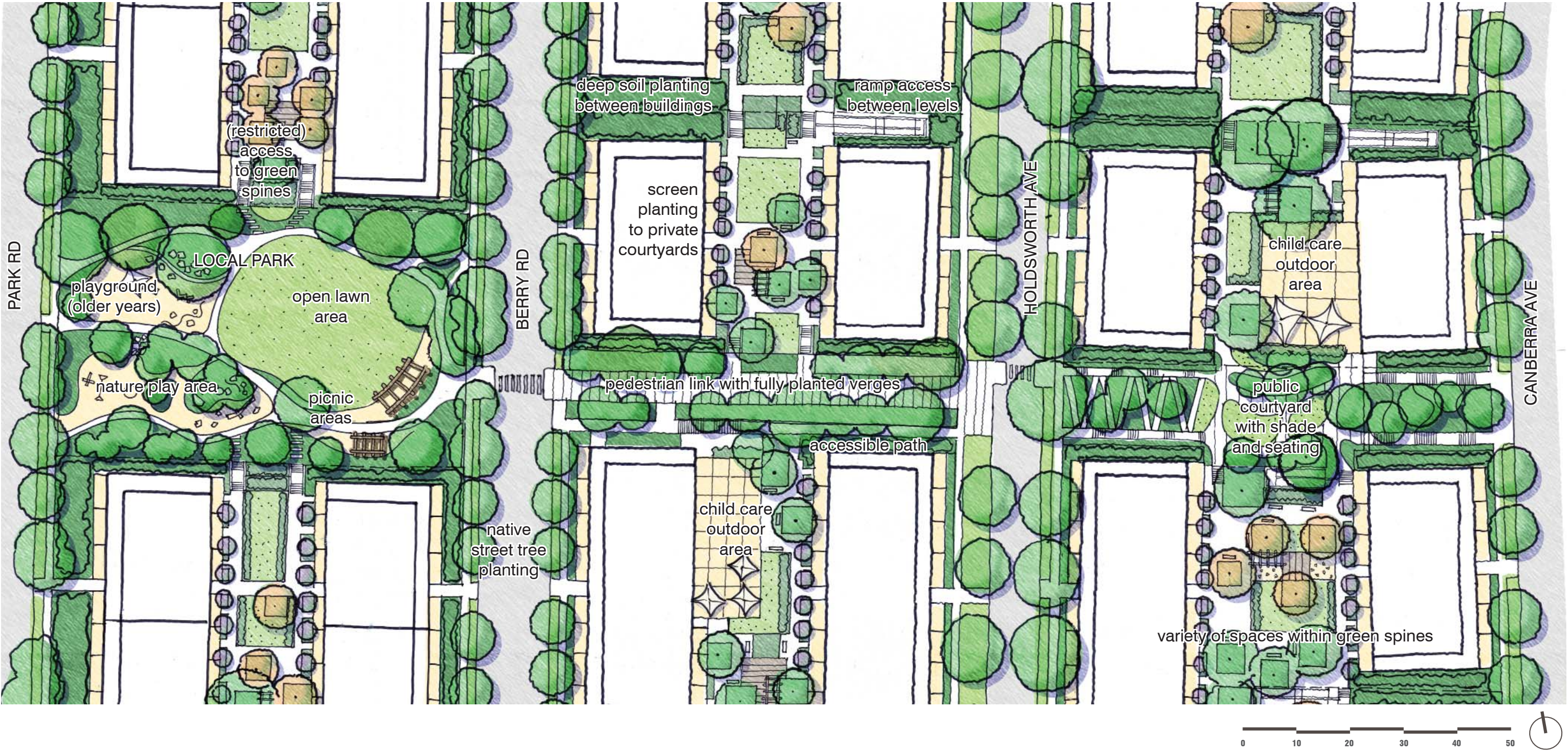
MASTERPLAN

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.



MASTERPLAN
DESIGN APPROACH

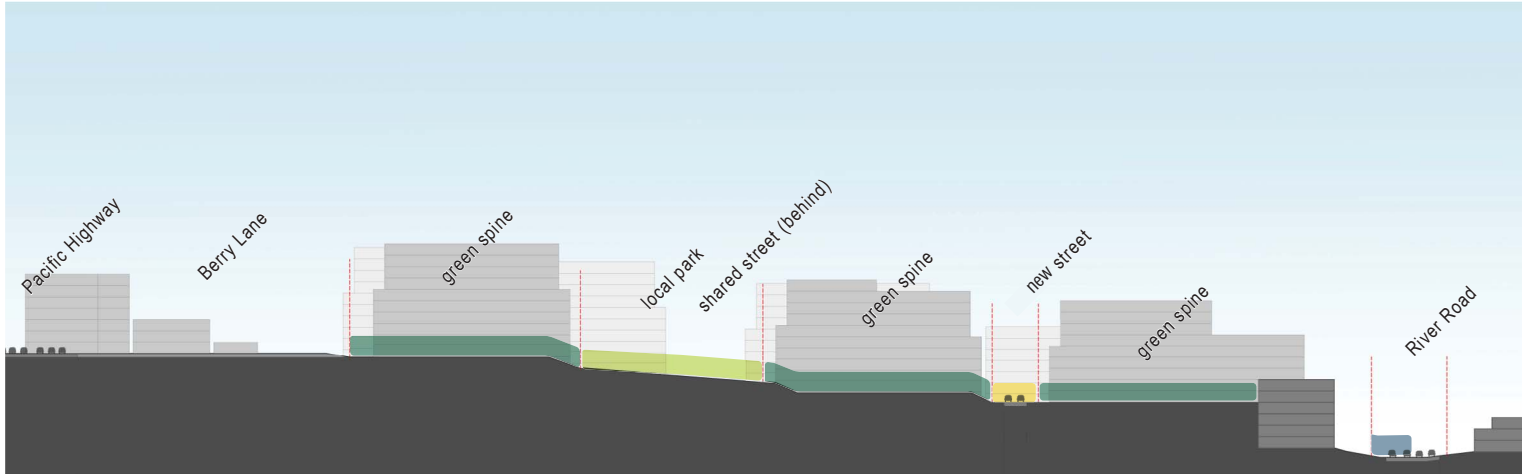


MASTERPLAN
AERIAL PERSPECTIVE (LANDSCAPE FOCUS)

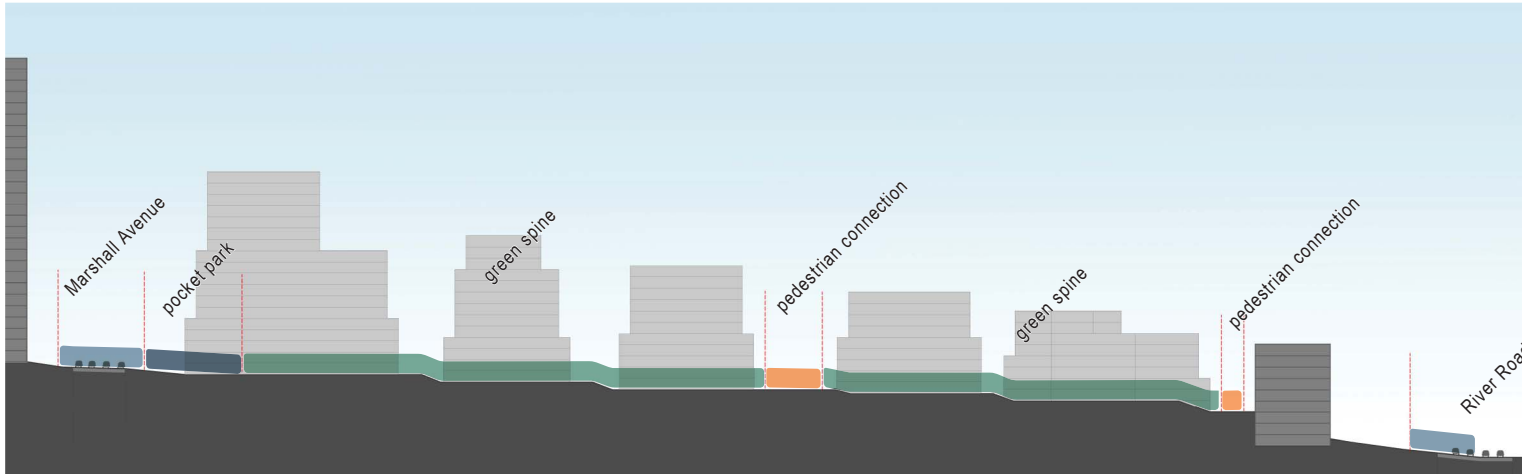


image credit: A+Design

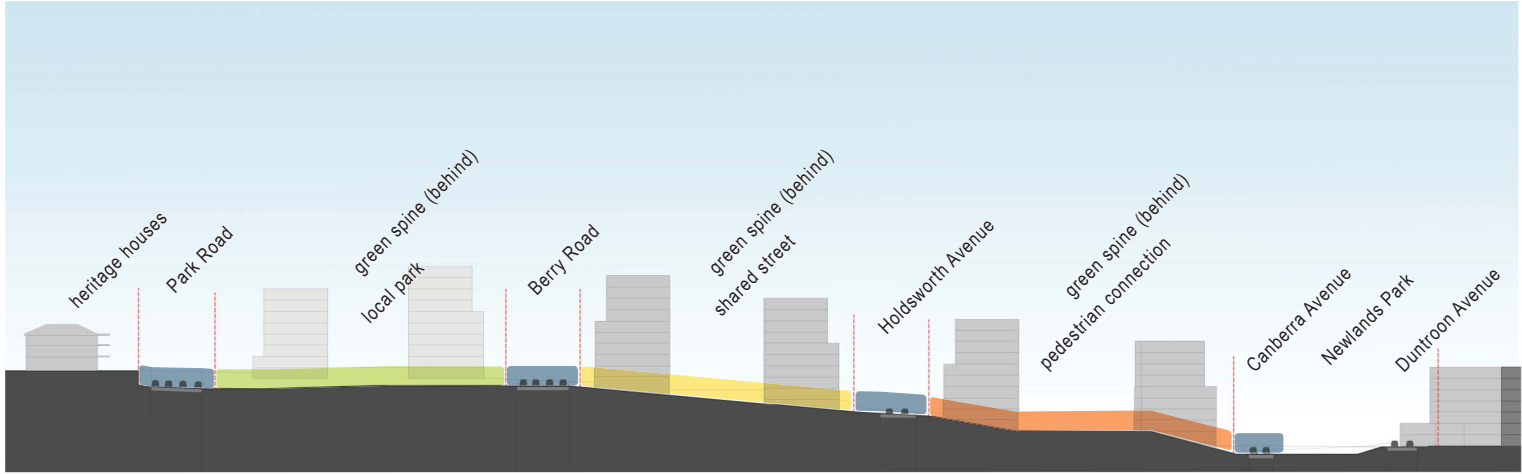
Site Section - north-south communal open space (green spine) (existing Berry Lane)

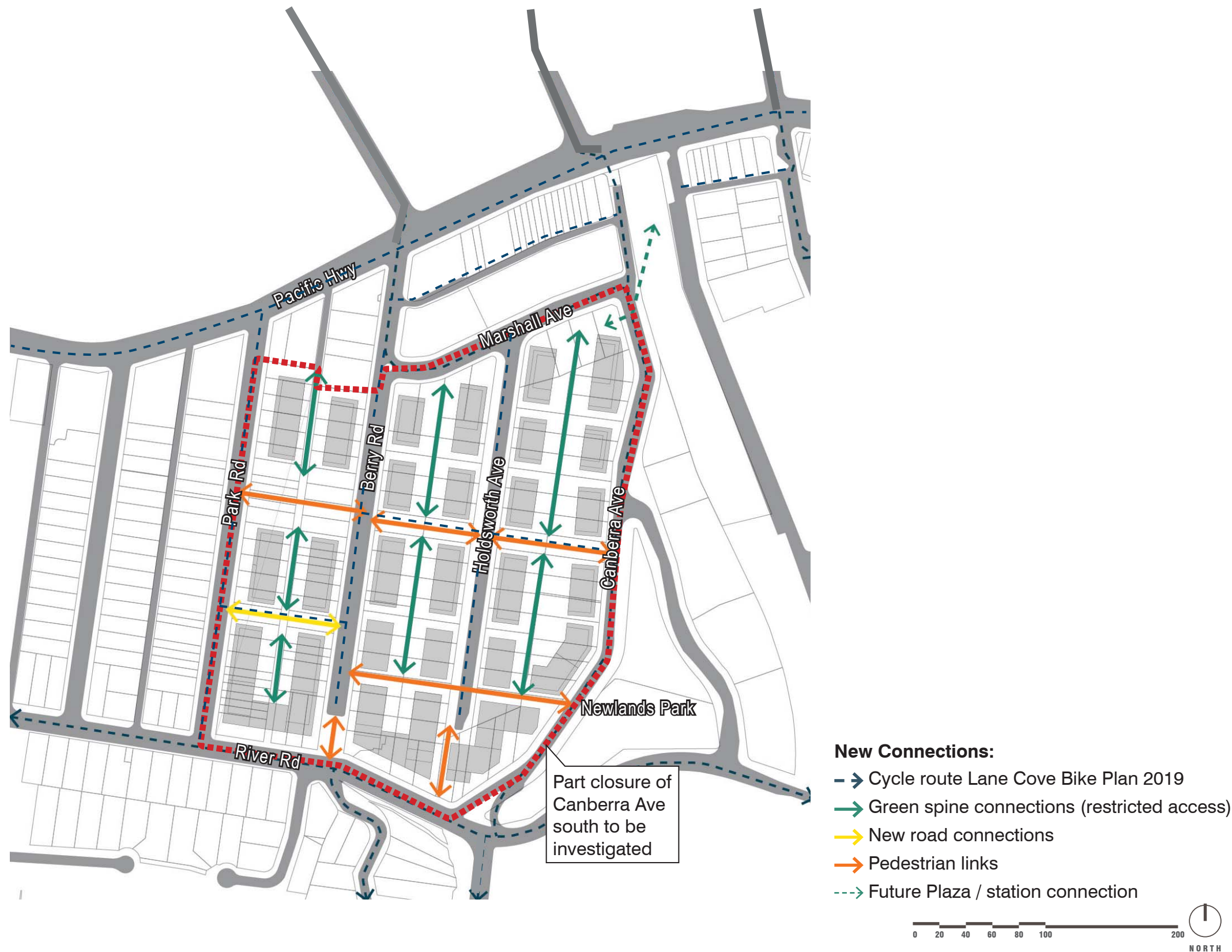


Site Section - north-south communal open space (green spine)



Site Section - east-west open space link





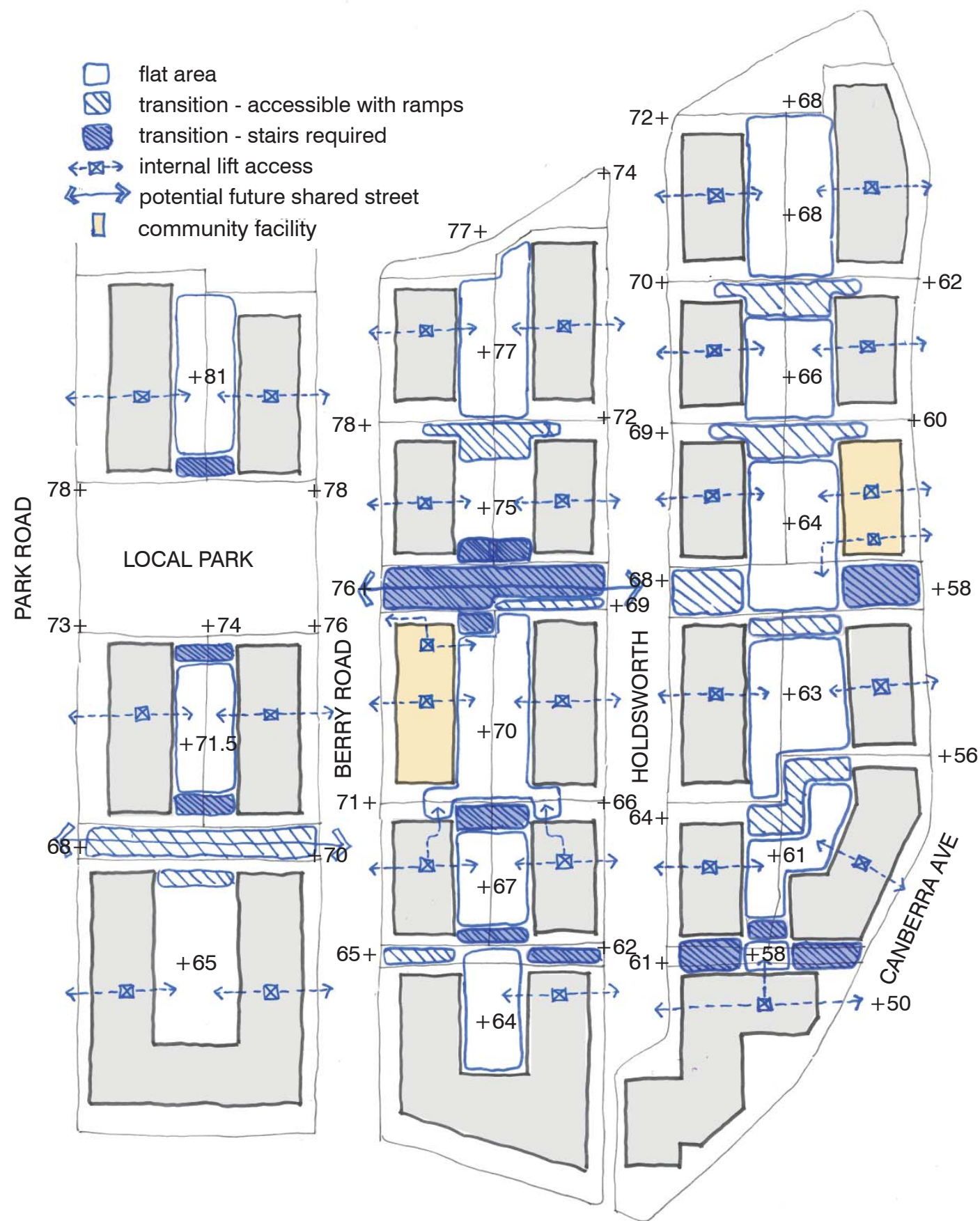
MASTERPLAN

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.

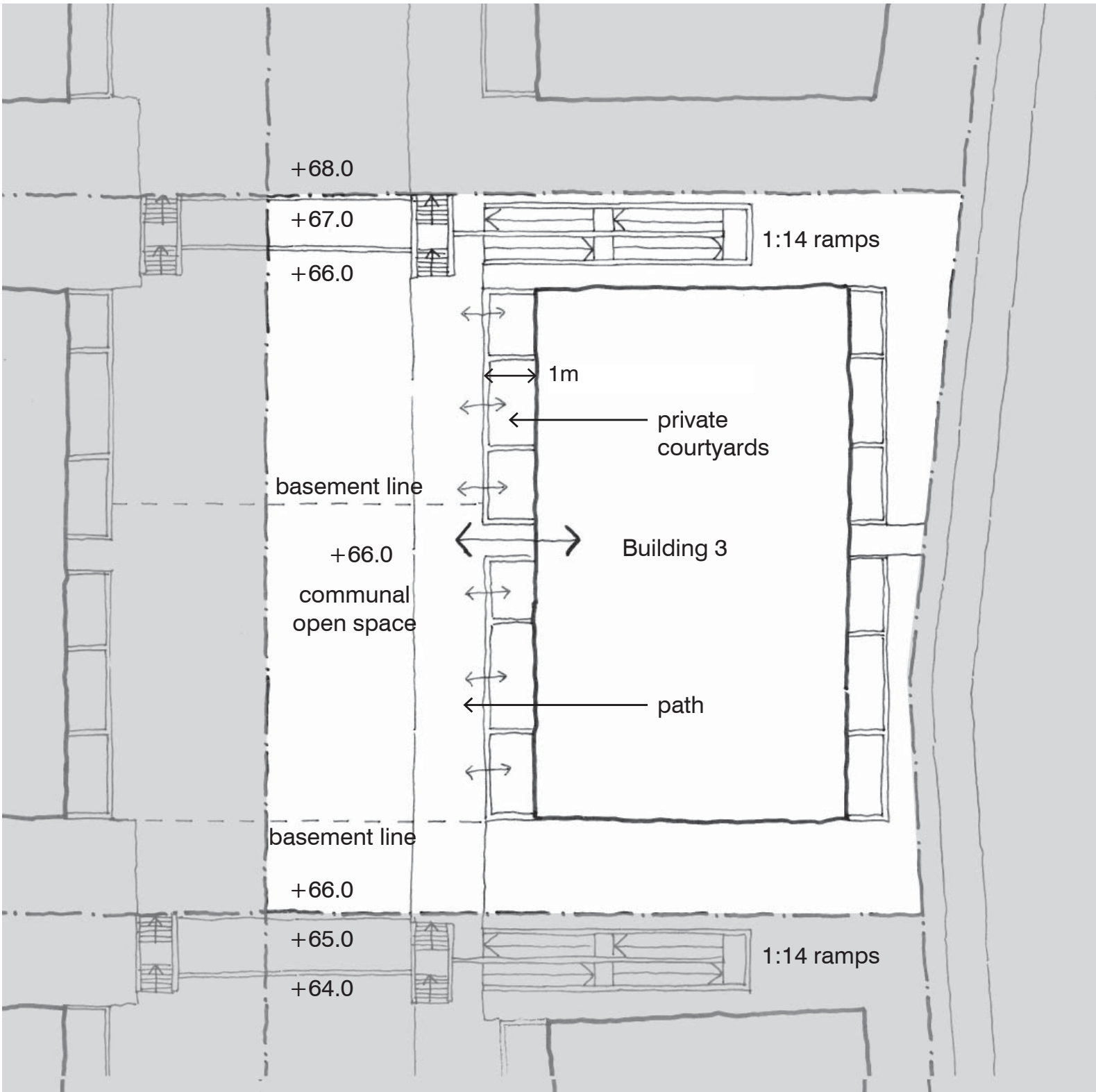
Indicative proposed levels of the communal green spines are shown in the adjacent diagram, along with the existing street levels, whether transitions are accessible via ramps or stairs, and where lift access within buildings is required to provide access to external spaces.



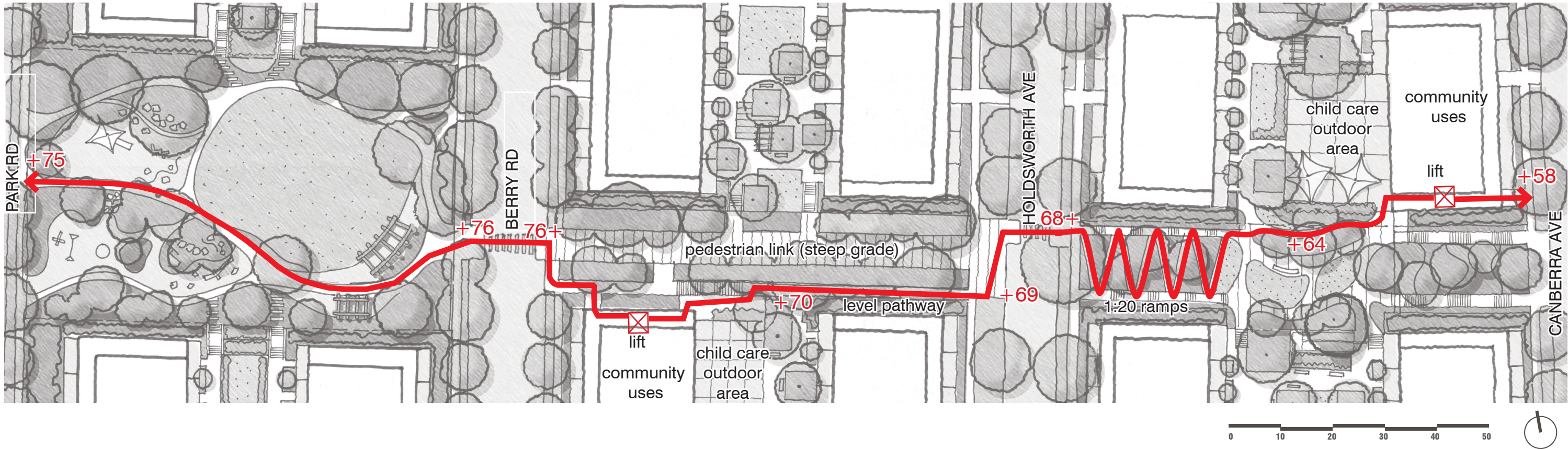
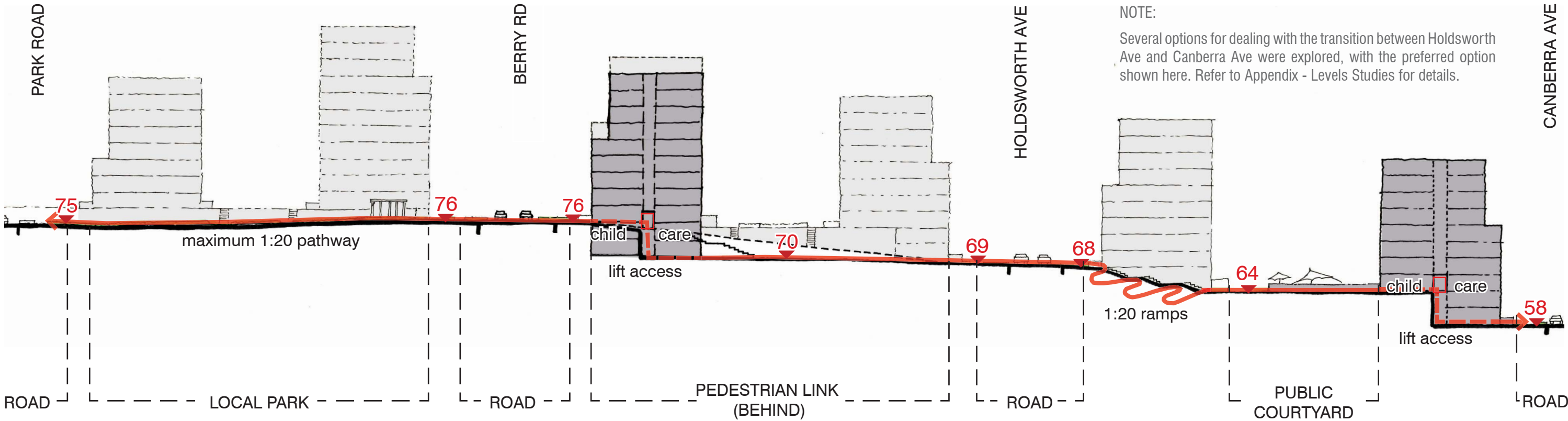
MASTERPLAN

LEVELS - INDICATIVE NORTH-SOUTH TRANSITIONS

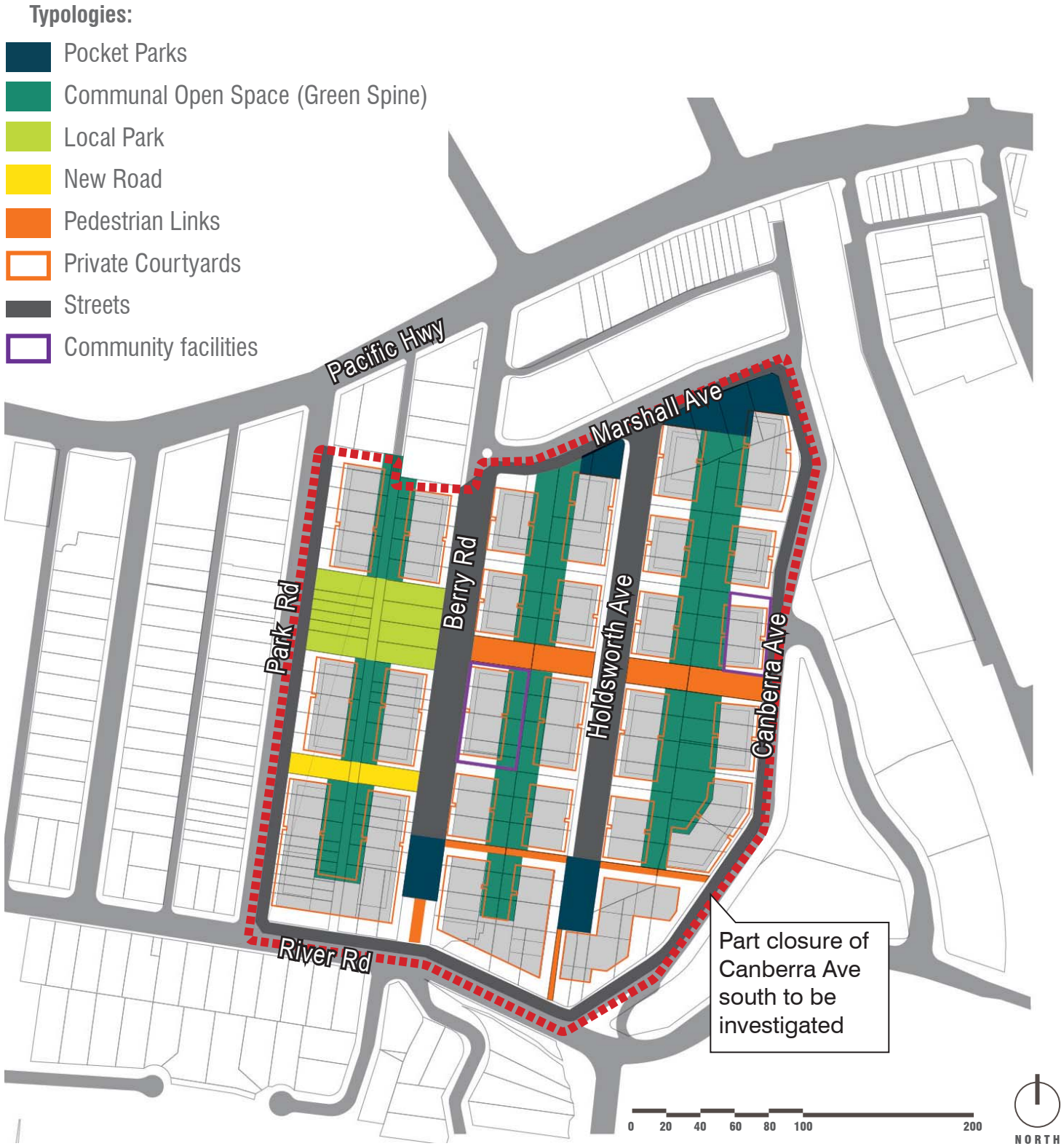
- Grade changes taken up in one location with accessible ramps, stairs and 1m (max) retaining walls
- Only one set of ramps required between north-south development lots, to be provided within the first of the 2 eastwest adjacent lots to be developed. This is to ensure that ramp access is provided between 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



MASTERPLAN
LEVELS - EAST-WEST ACCESSIBLE CONNECTION



MASTERPLAN
OPEN SPACE TYPOLOGIES



MASTERPLAN

OPEN SPACE TYPOLOGIES - FACILITIES MATRIX

TYPE	SIZE & CATCHMENT		USE & CHARACTER																				COMMUNITY FACILITIES						CULTURAL			VEGETATION				
	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 refection, community gardens	Formal		●	●	●	●	●		●	●							●	●	●	●		●		●	●				●	●	●		

Legend

Required or Existing

Desirable

MASTERPLAN

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 environment



MASTERPLAN

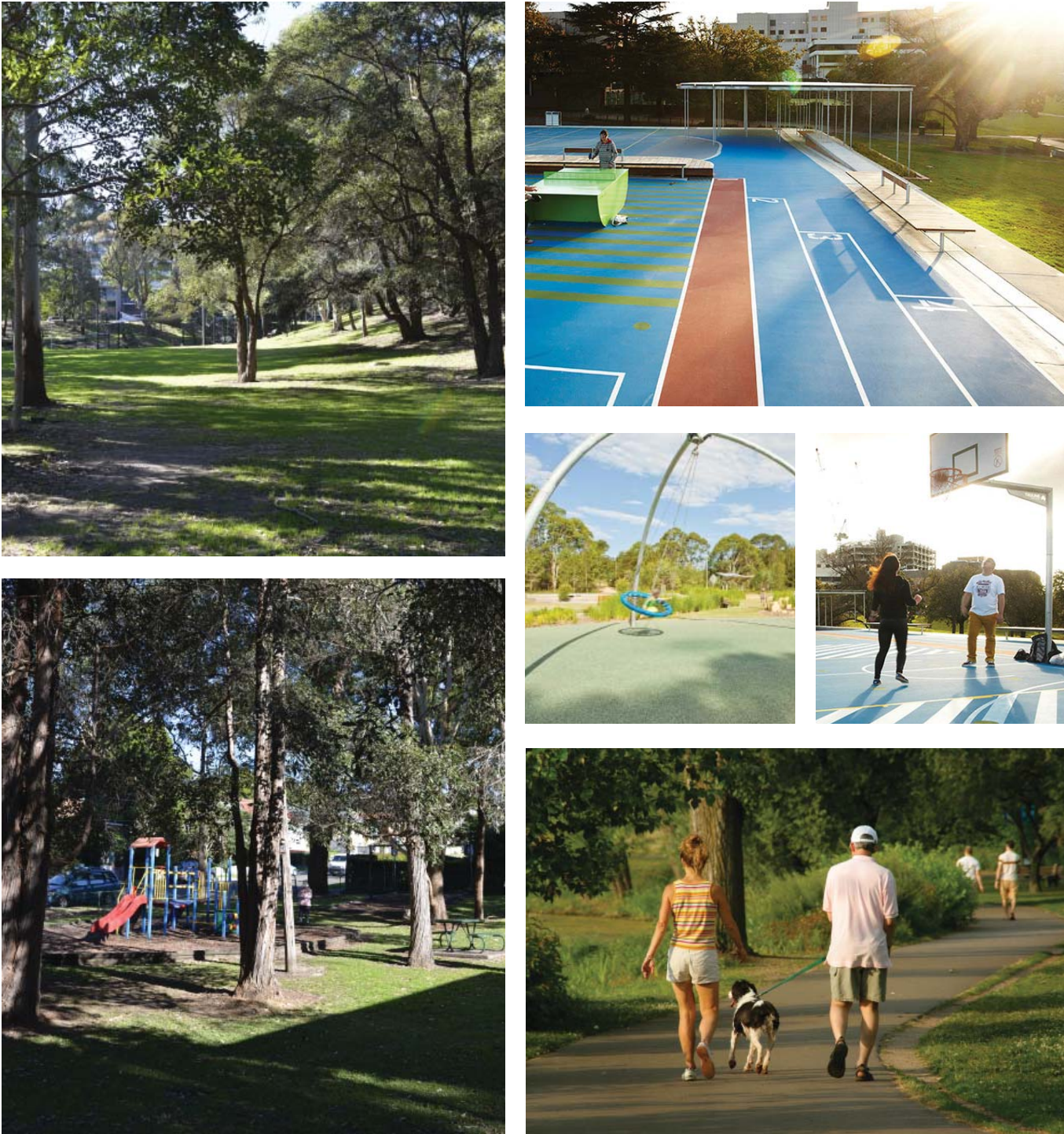
PUBLIC OPEN SPACE TYPOLOGIES - EXISTING PARKS

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



MASTERPLAN

PUBLIC OPEN SPACE TYPOLOGIES - STREETS

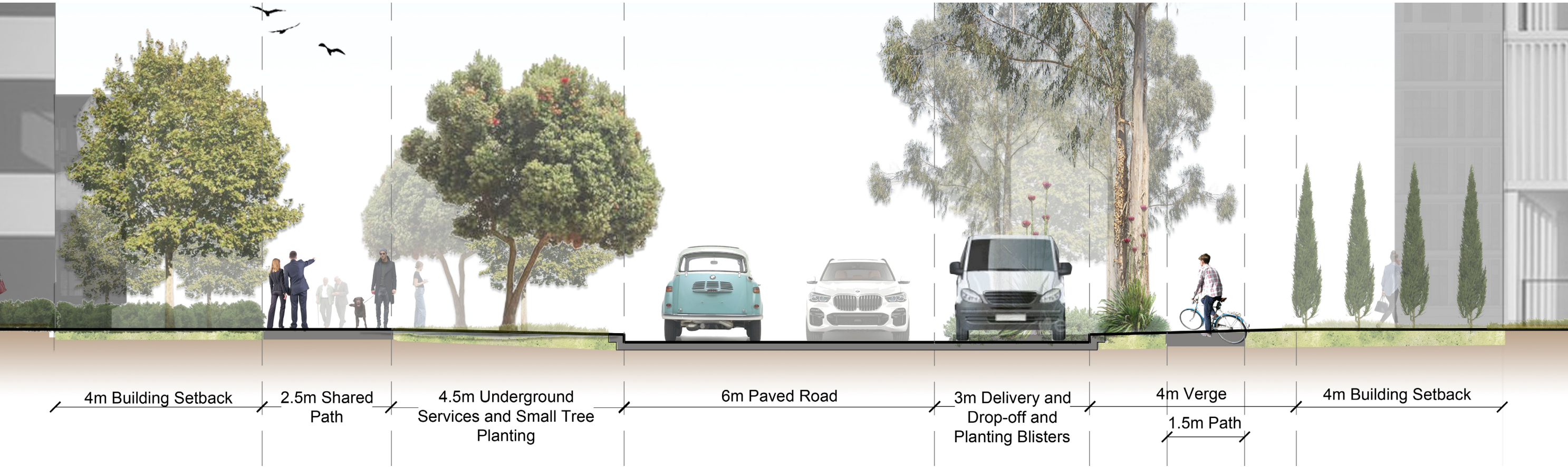
The streets are intended to have the following attributes and character:

- 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



MASTERPLAN
PUBLIC OPEN SPACE TYPOLOGIES - STREETS

TYPICAL NARROWED STREET

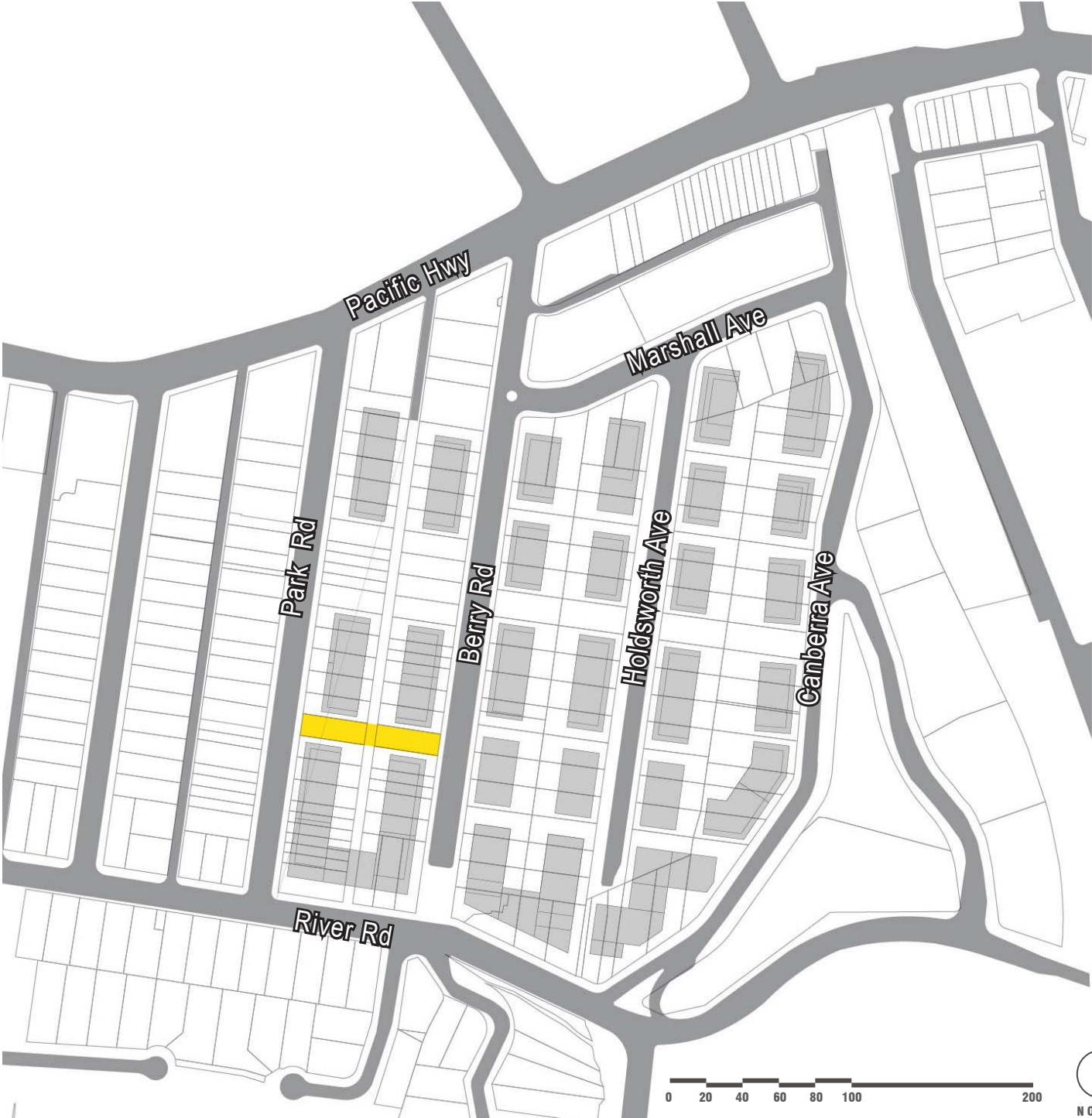


MASTERPLAN

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



MASTERPLAN

PUBLIC OPEN SPACE TYPOLOGIES - PEDESTRIAN LINKS

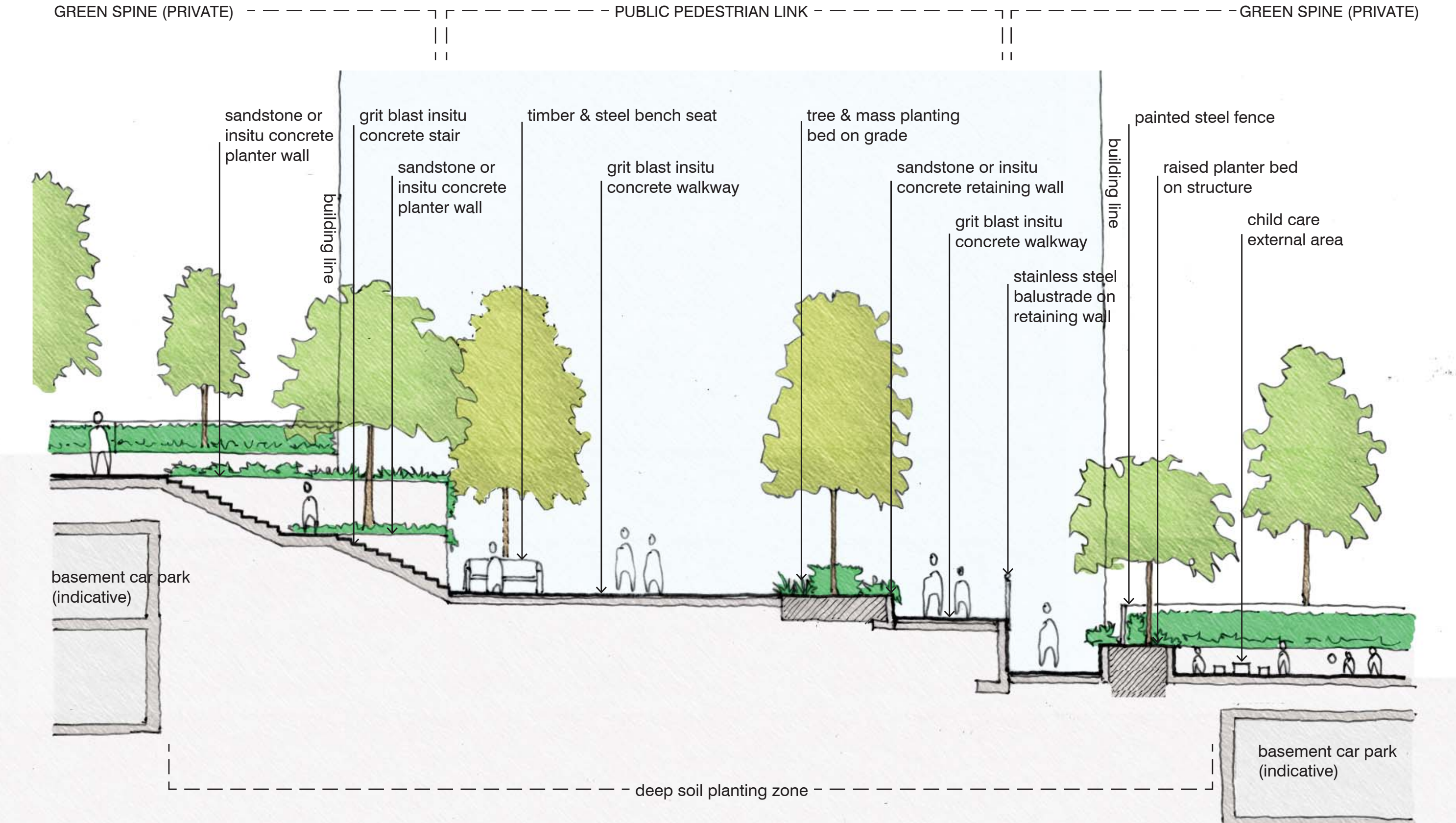
The new pedestrian links are intended to have the following attributes and character:

- 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



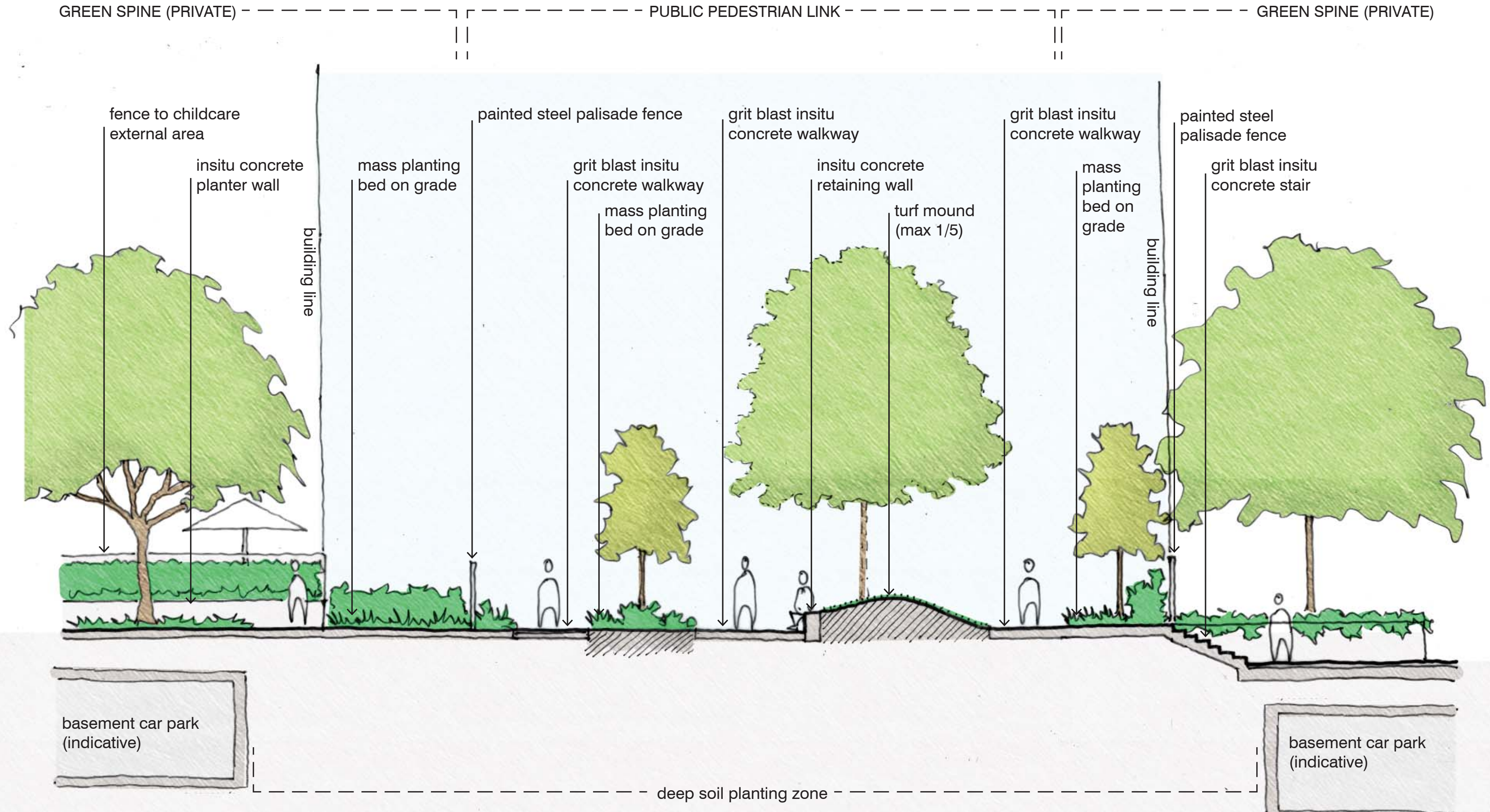
MASTERPLAN
PUBLIC OPEN SPACE TYPOLOGIES - PEDESTRIAN LINKS

EAST-WEST PEDESTRIAN LINK - CROSS SECTION



MASTERPLAN
PUBLIC OPEN SPACE TYPOLOGIES - PEDESTRIAN LINKS

EAST-WEST PEDESTRIAN LINK - CROSS SECTION



MASTERPLAN
PUBLIC OPEN SPACE TYPOLOGIES - PEDESTRIAN LINKS

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



MASTERPLAN

PRIVATE PROPERTY BOUNDARY AND INDICATIVE ENTRY POINTS

Private Property Boundary and Entry Points:

- Private property Boundary Wall/Fence
- Secure Entry Point
- Child care Courtyard



MASTERPLAN

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

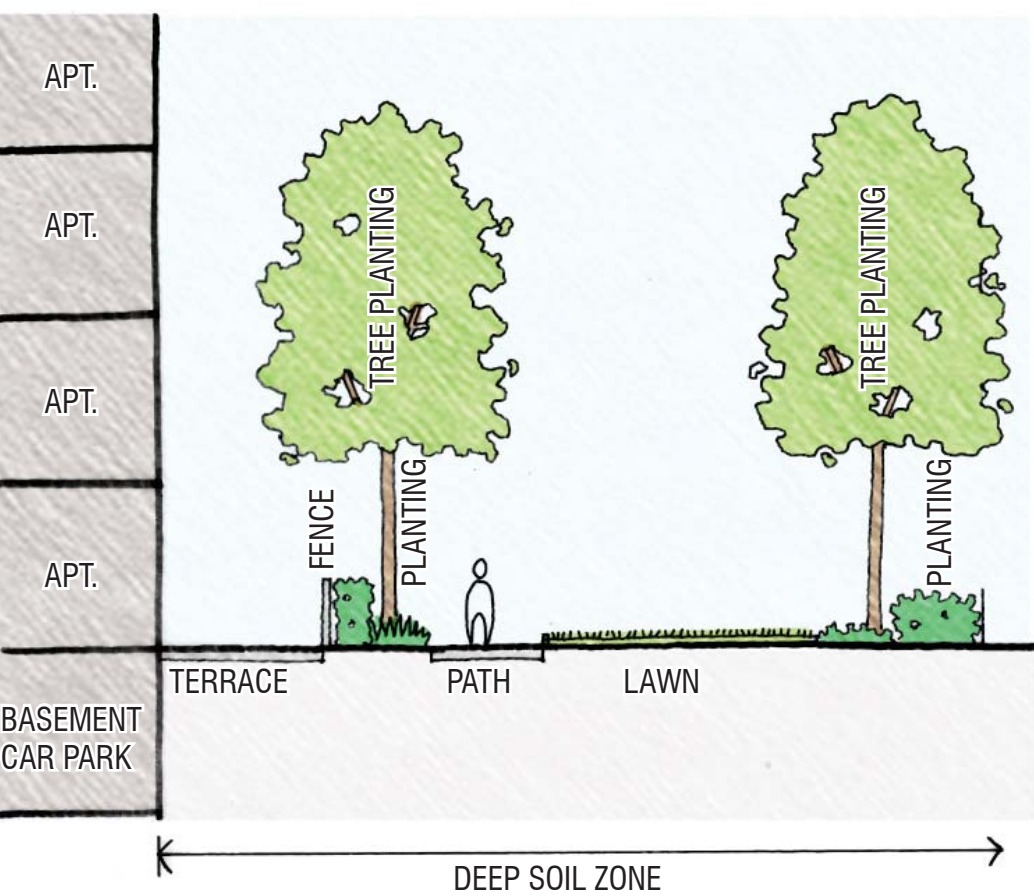
Communal Open Space (Green Spines):

Green Spines



MASTERPLAN

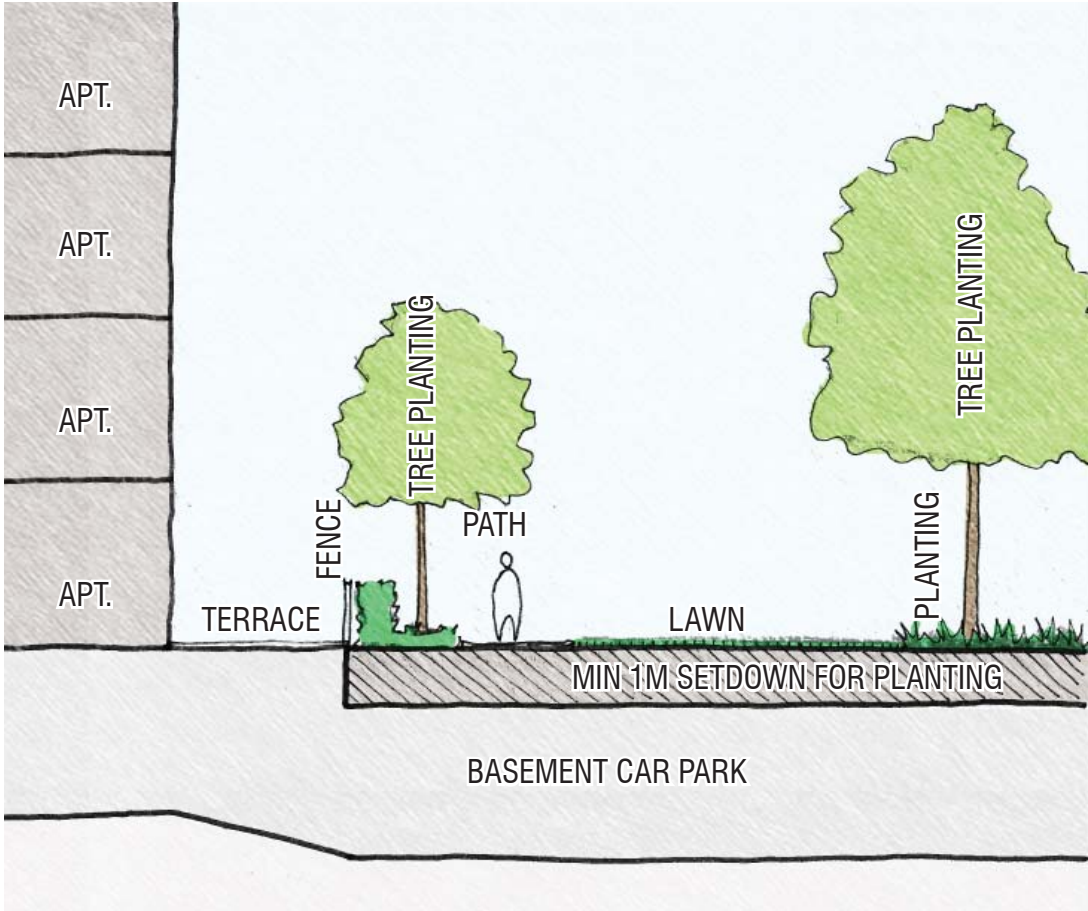
PRIVATE OPEN SPACE TYPOLOGIES - COMMUNAL OPEN SPACE (GREEN SPINES)



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 shade 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

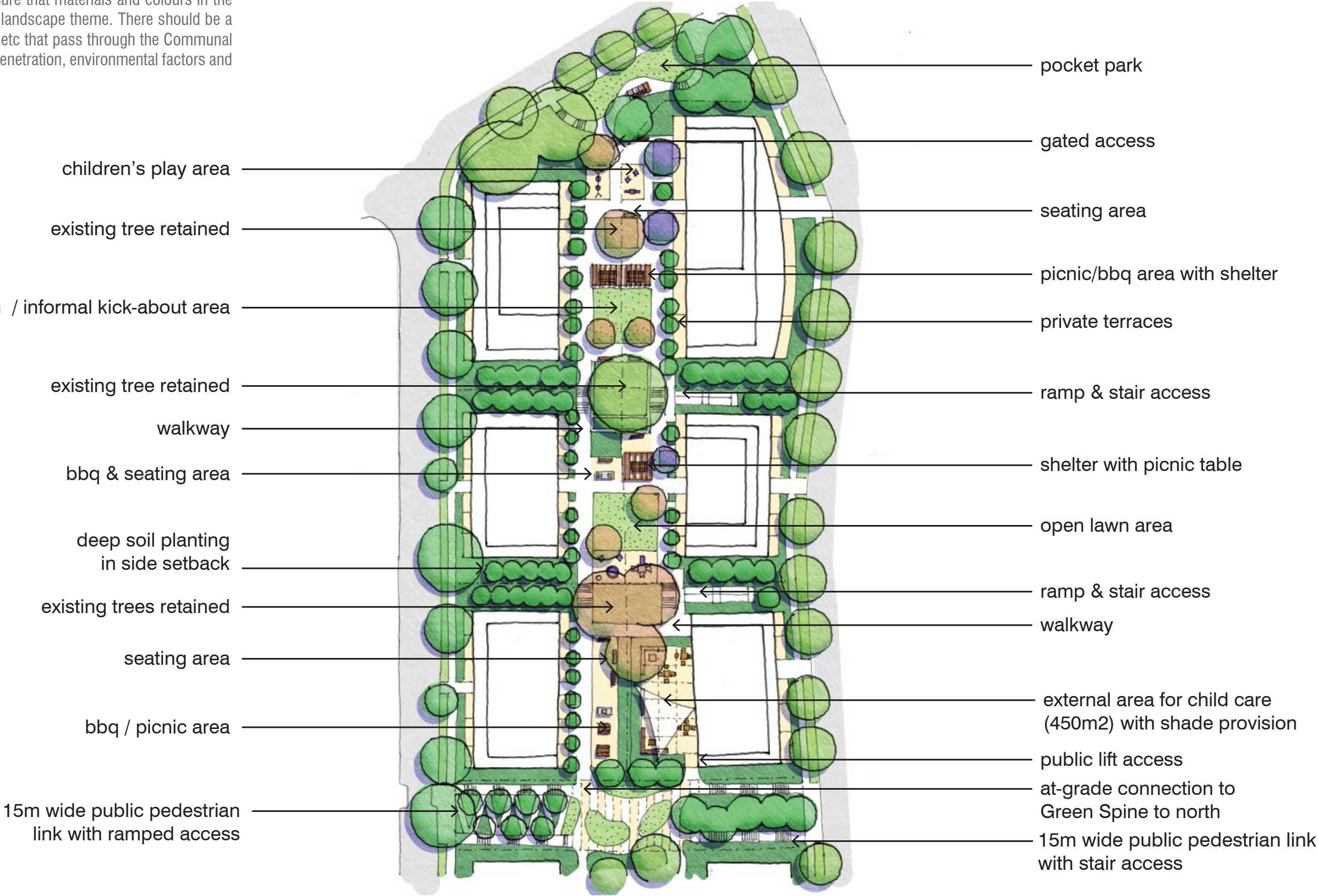
Basement car parks are confined to the building footprint. Intrusion into Green Spine is only permitted if 2 levels of basement parking under the building is provided. If located under Green Spines, basement car parking is to be located so as to retain existing trees and to provide min 1m soil depth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

MASTERPLAN

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.



MASTERPLAN

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.

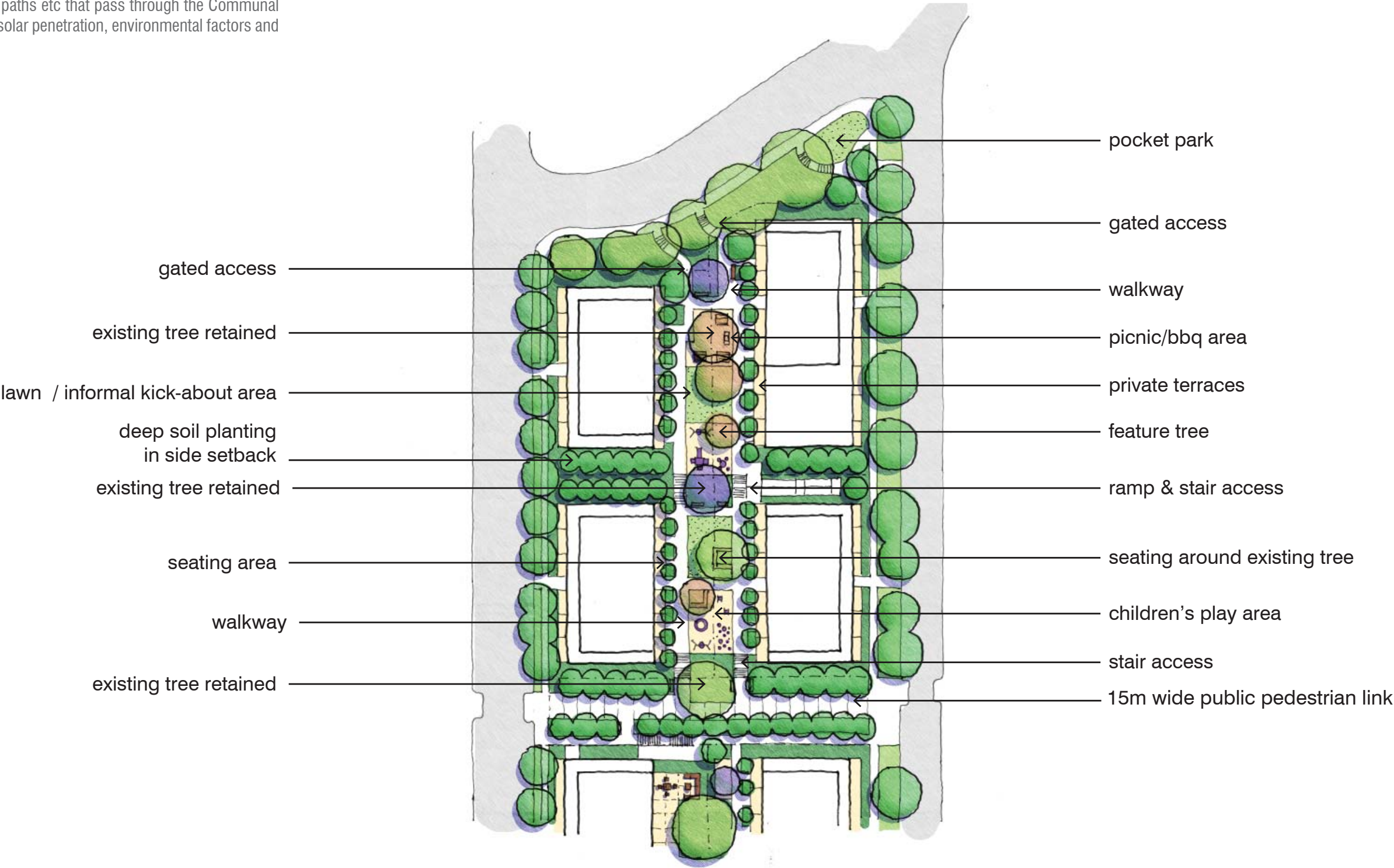


MASTERPLAN

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.



MASTERPLAN

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.

- public lift access

external area for childcare (450m2) with shade provision

walkway

private terrace

deep soil planting in side setback

lawn / informal kick-about area

existing tree retained

walkway

gated access

seating

pocket park

existing tree retained

lawn / infomral kick-about area

pedestrian link with stair access

15m wide public pedestrian link

accessible walkway to access public lift

existing tree retained

picnic/bbq area

walkway

gated access

stair access

private terrace

shelter with bbq & seating

existing tree retained

6m wide public pedestrian link with stair access

children's play area

pocket park

pedestrian link with stair access

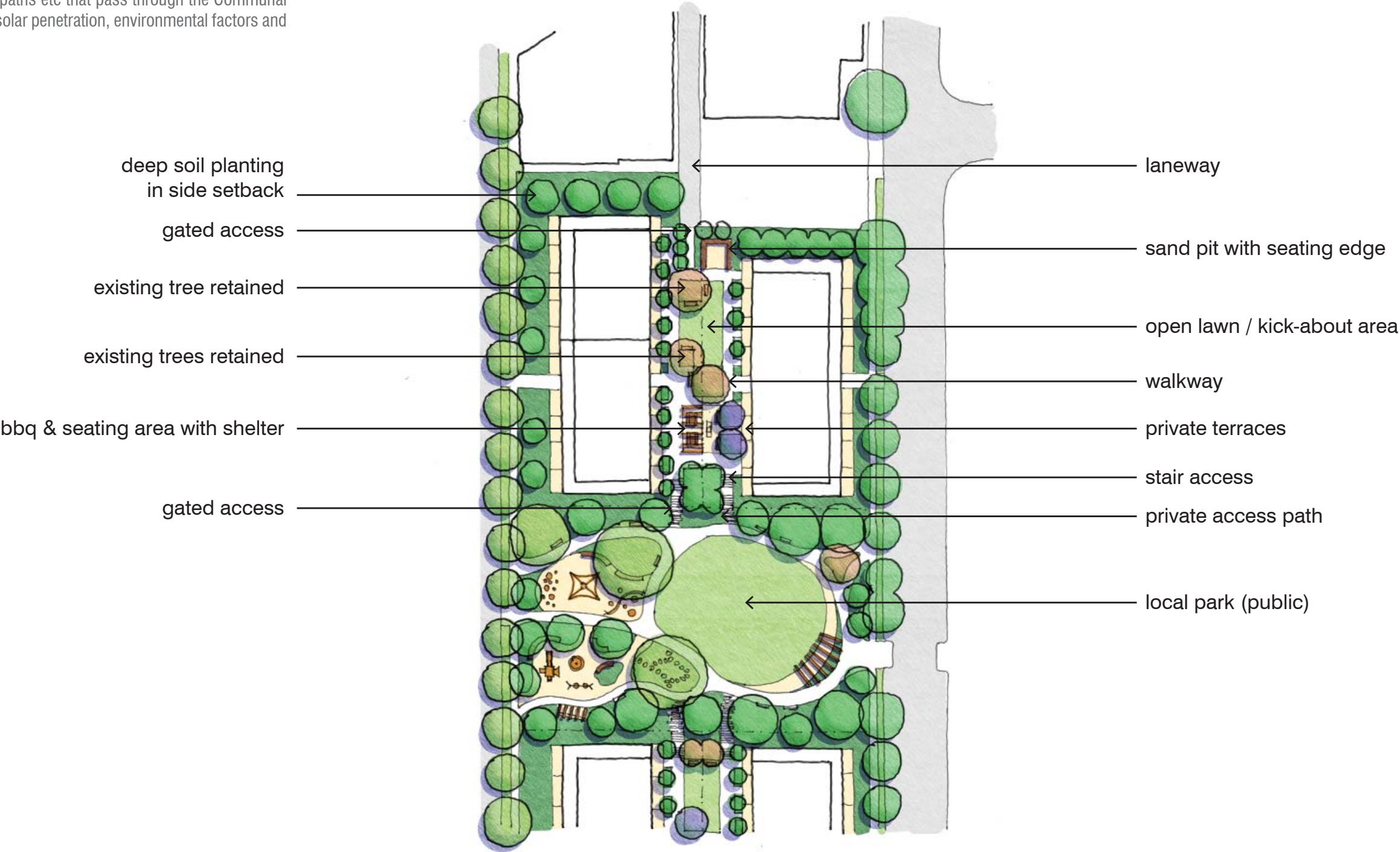


MASTERPLAN

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.



MASTERPLAN

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

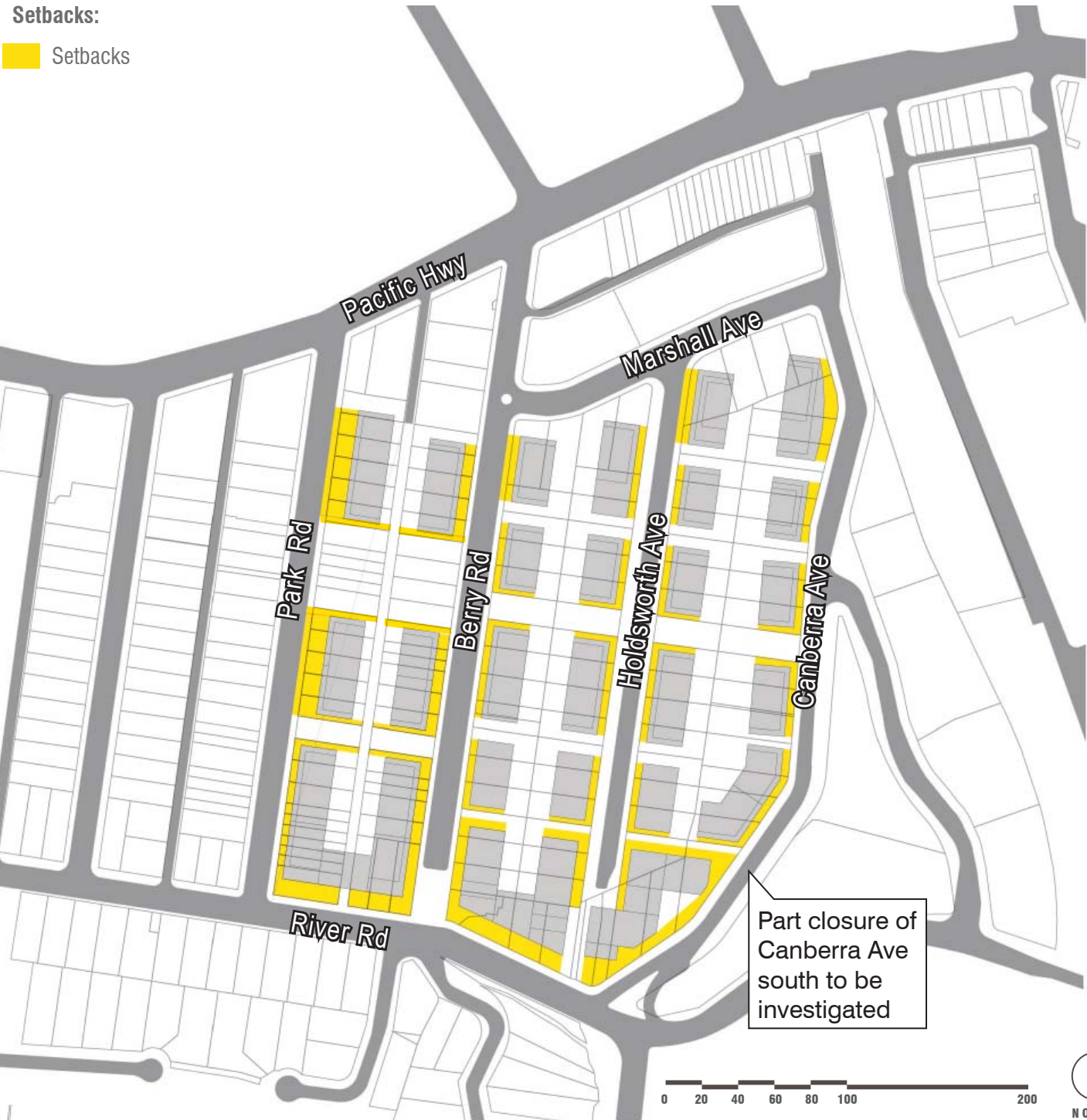
PRIVATE OPEN SPACE TYPOLOGIES - SETBACKS

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

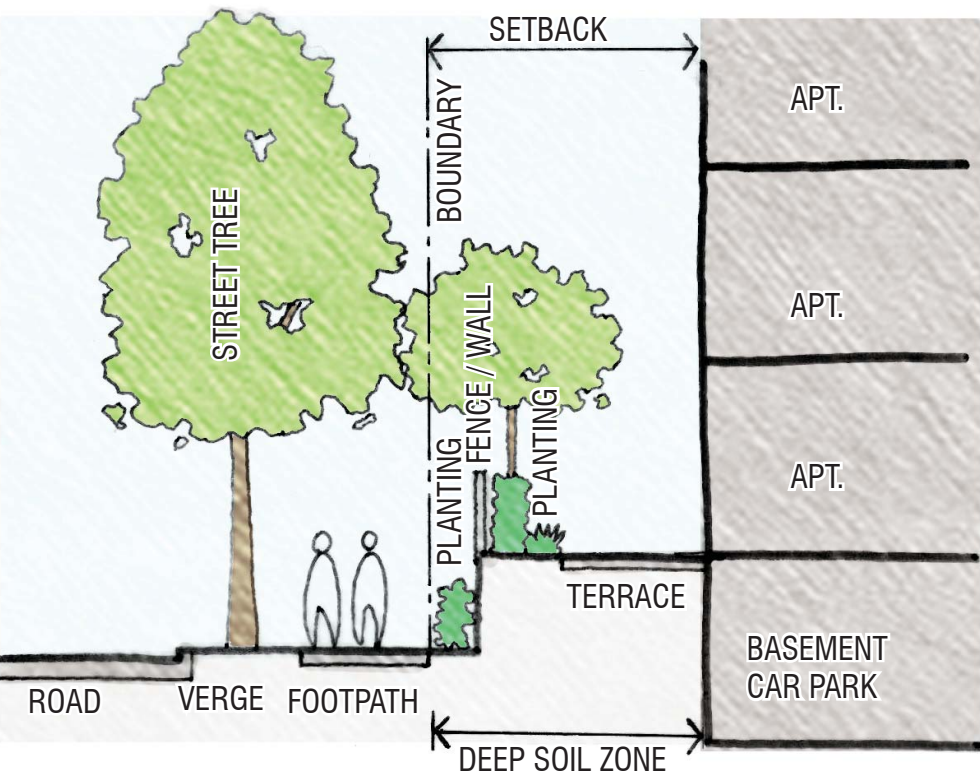
- provide adequate privacy to private apartments and terraces/courtyards
- accommodate level changes where required
- mitigate the impact of basement car park structures where these emerge above ground level
- include trees and planting, including deep soil planting
- existing trees retained if possible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

Tree planting in front setback areas:

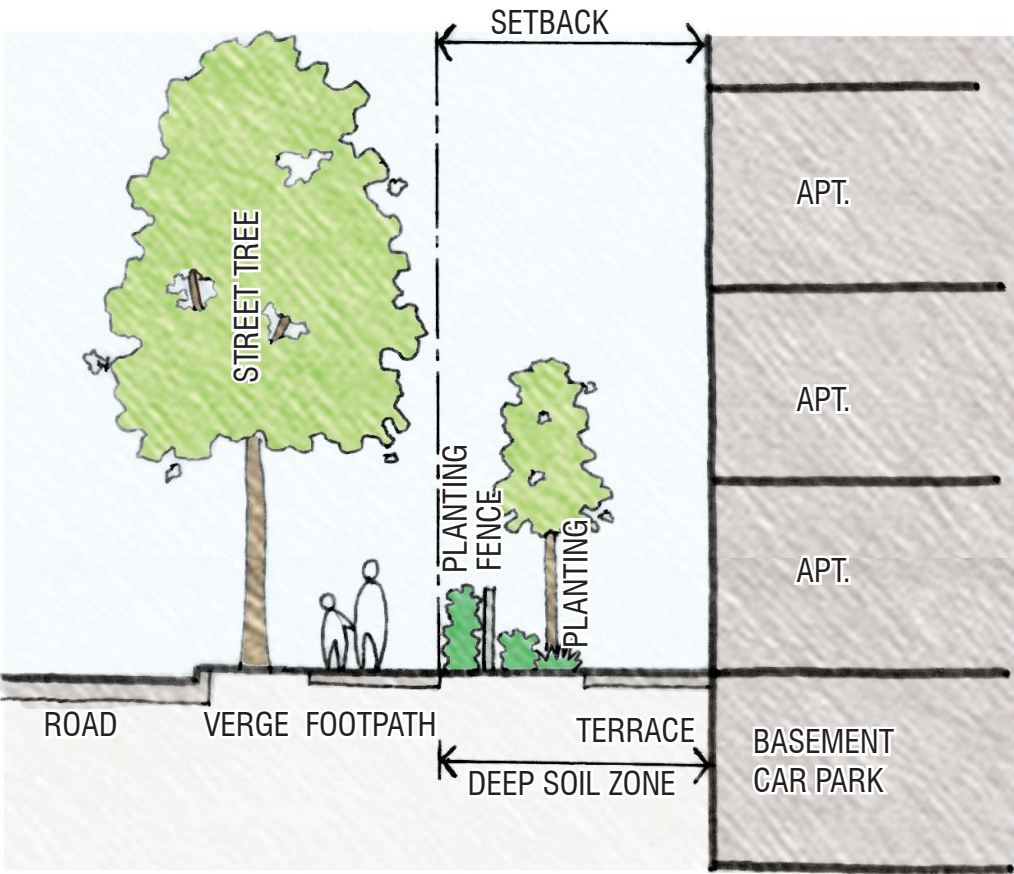
- Proper tree selection and placement in the front setback areas is crucial in order to ensure good amenity and privacy for residents while reducing the size and bulk of the built form.
- Trees in the front setback area shall:
- be selected from Council’s DCP Part J Landscaping Appendix 1 - Plant Lists; 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



MASTERPLAN
PRIVATE OPEN SPACE TYPOLOGIES - SETBACKS



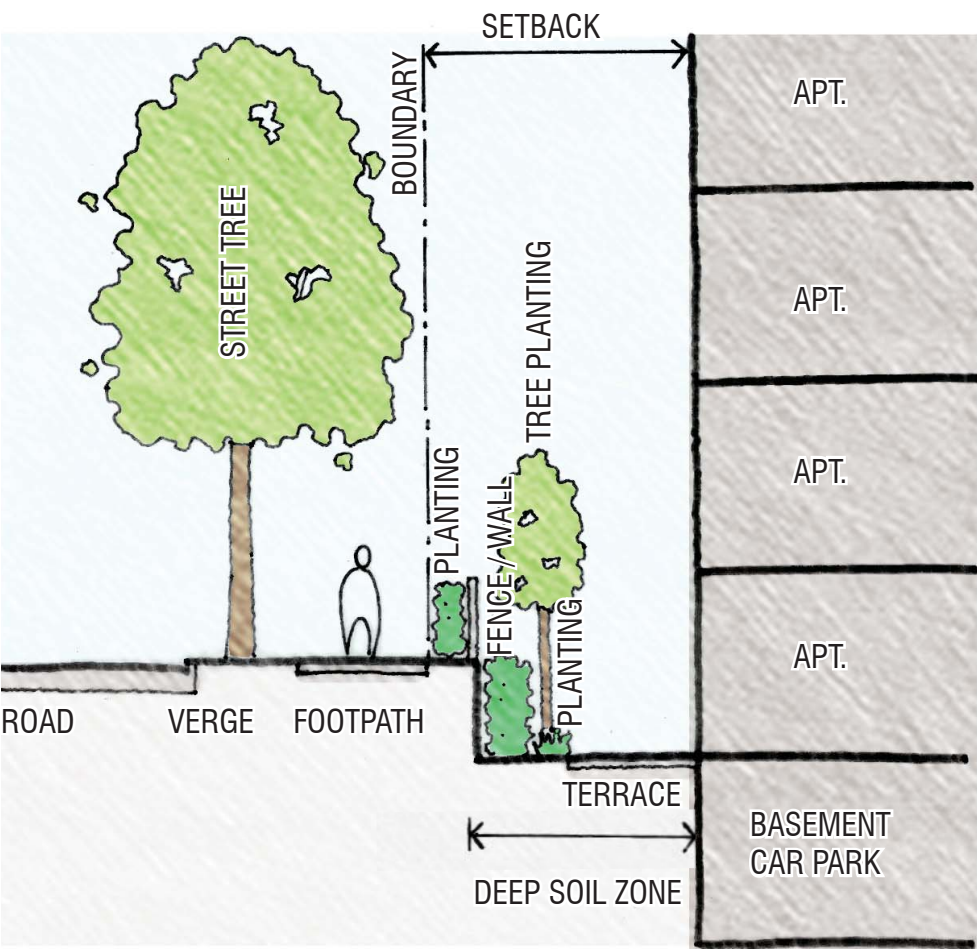
STREET FRONTAGE A. ELEVATED



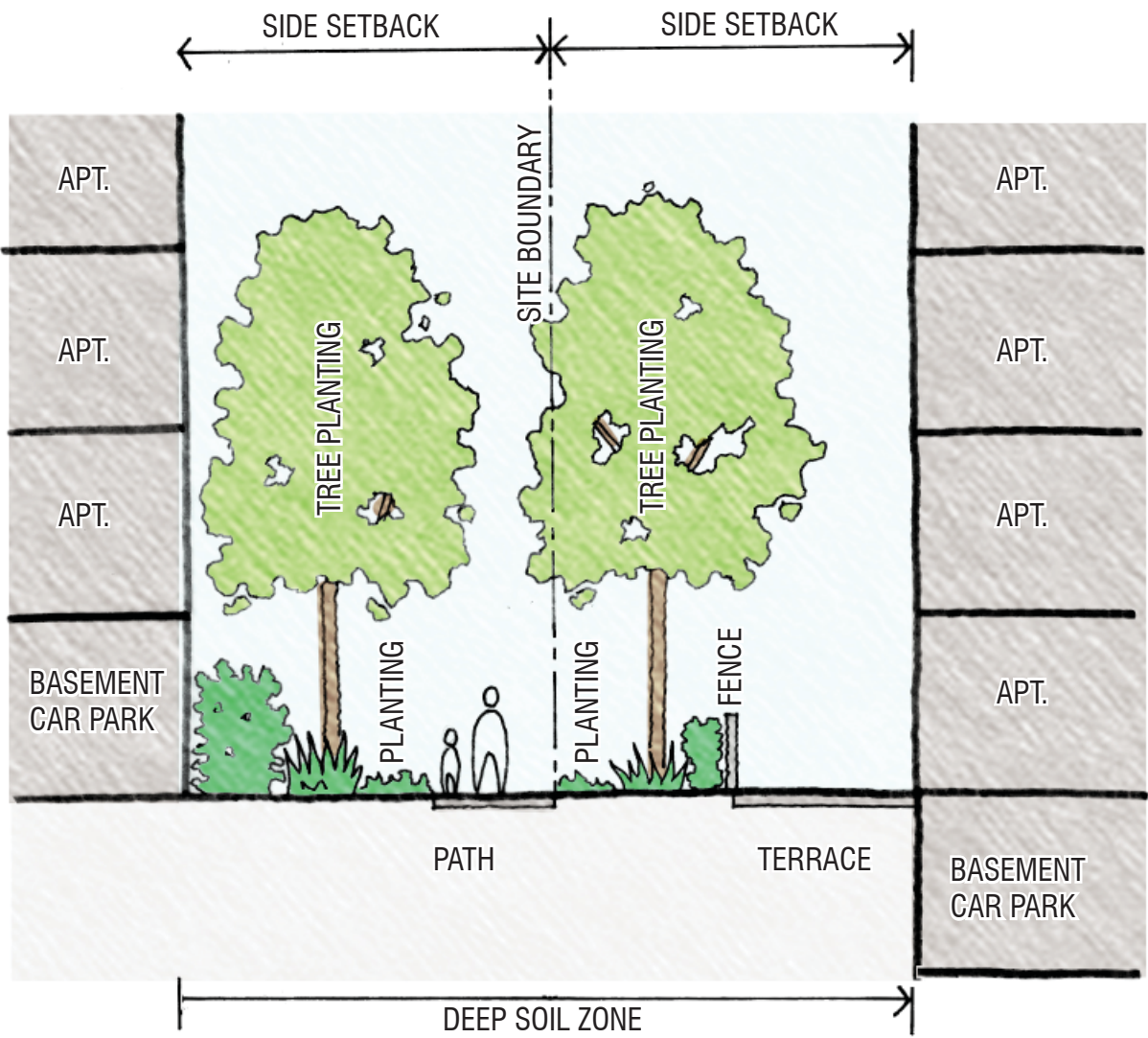
STREET FRONTAGE B. AT GRADE



MASTERPLAN
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

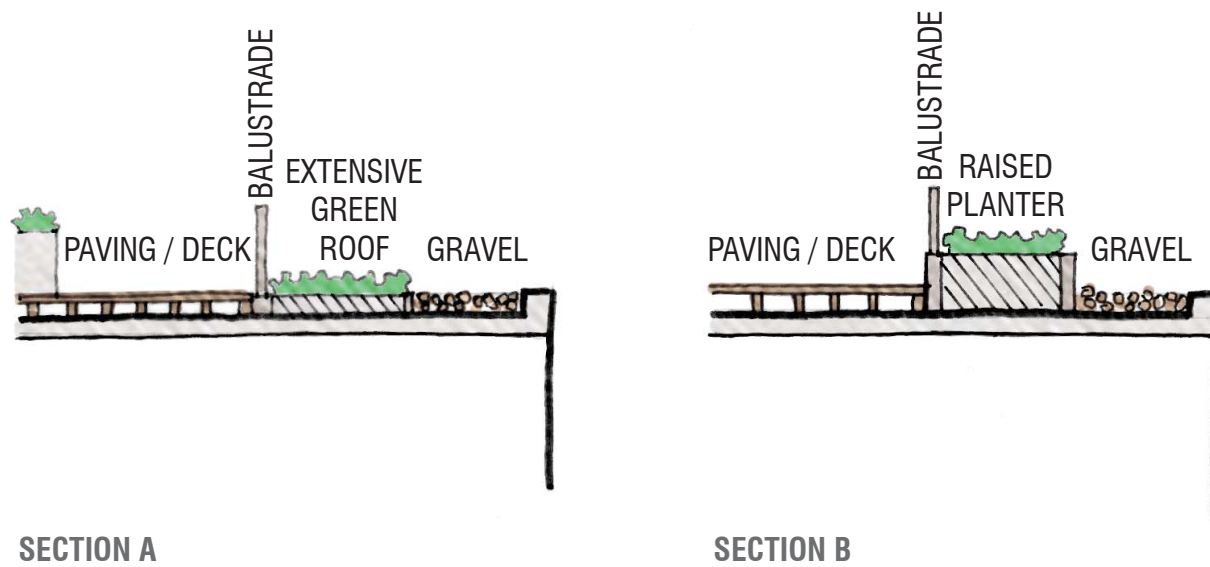
PRIVATE OPEN SPACE TYPOLOGIES - ROOF GARDENS

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



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 Paperbark)



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.

Street Tree Planting

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

	PLANT SIZE	MINIMUM STANDARDS
D	Shrubs	minimum soil depth 500-600mm
E	Ground cover	minimum soil depth 300-450mm
F	Turf	minimum soil depth 100-300mm

MASTERPLAN
PUBLIC DOMAIN PLANTING - TREES



Acer buergerianum



Angophora costata



Brachychiton acerifolius



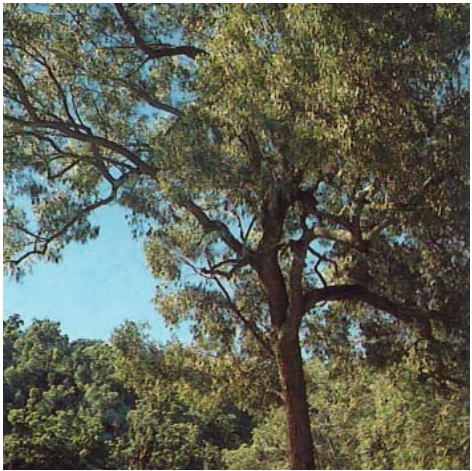
Callistemon viminalis



Cupaniopsis anacardioides



Elaeocarpus reticulatus



Eucalyptus paniculata



Eucalyptus pilularis



Eucalyptus scoparia



Hymenosporum flavum



Jacaranda mimosifolia



Liquidambar styraciflua



Melaleuca quinquenervia



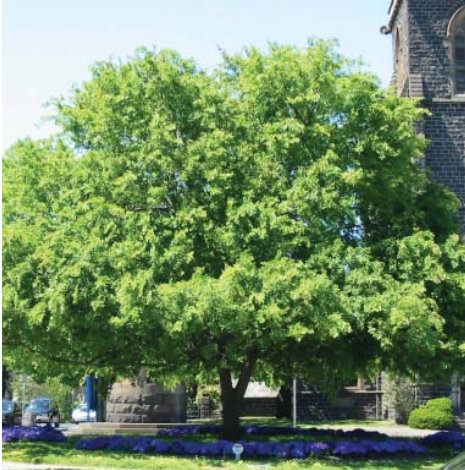
Podocarpus elatus



Syzygium luehmannii



Tristaniopsis laurina



Ulmus parvifolia



Waterhousia floribunda

MASTERPLAN
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

MASTERPLAN
PRIVATE DOMAIN PLANTING - TREES

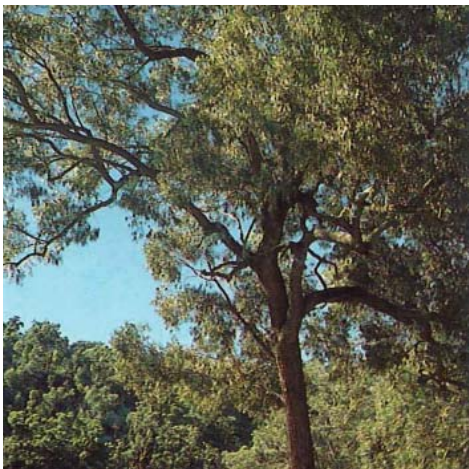
GREEN SPINES & SETBACKS



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 anacardioides



Hibiscus tileaceus 'Rubra'



Lagerstroemia indica



Magnolia grandiflora 'Little Gem'

MASTERPLAN
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

MASTERPLAN

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

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



Acacia cognata 'limelight'



Banksia Birthday Candles



Carpobrotus glaucescens



Callistemon viminalis 'Little John'



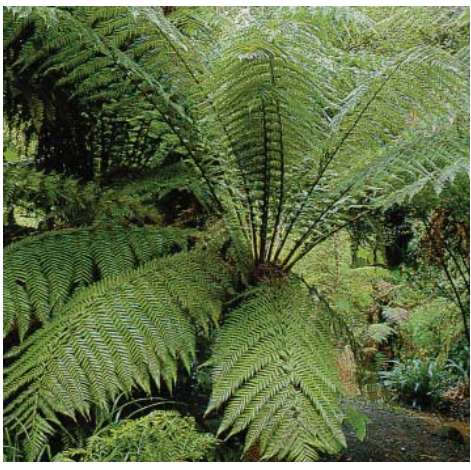
Dianella revoluta 'Little Rev'



Eriostemon myoporoides



Grevillea 'Superb'



Cyathea spp



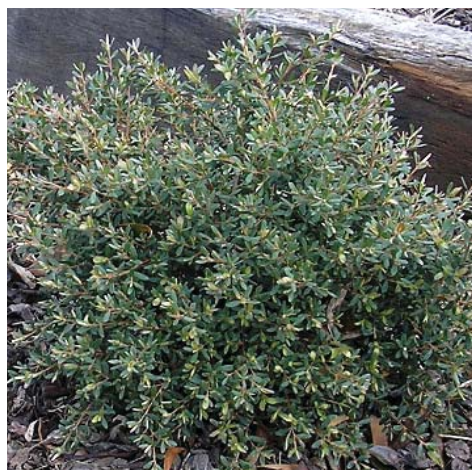
Hardenbergia violacea



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

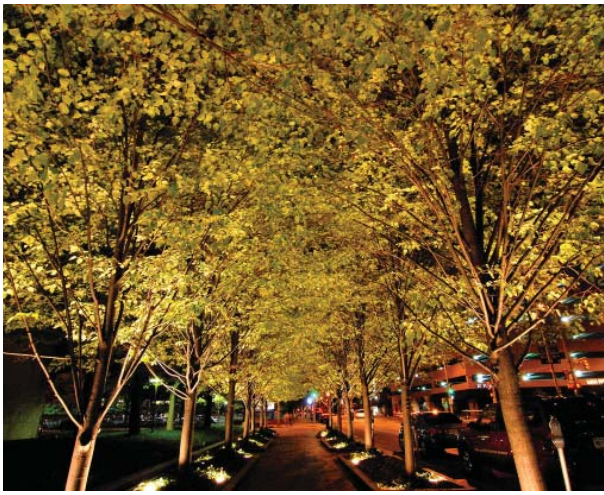
LIGHTING

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 this 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

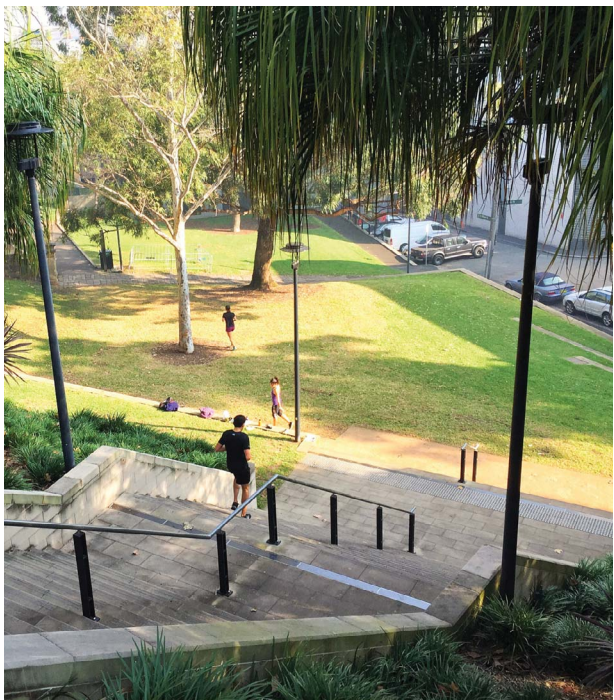
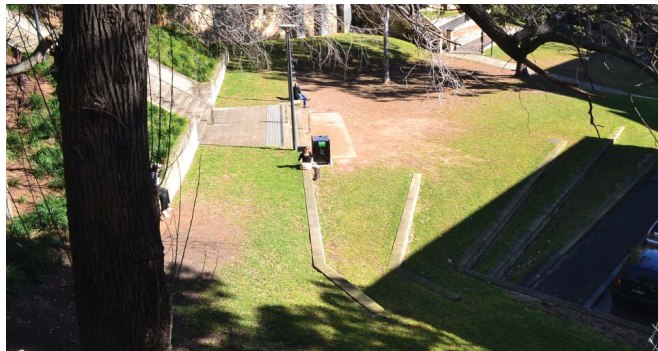
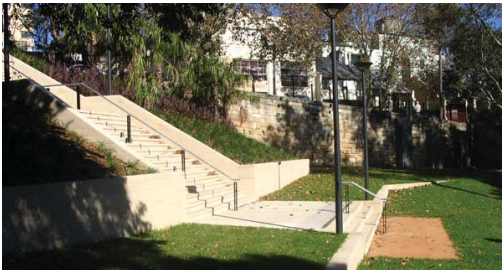
PRECEDENT STUDIES

LOCAL PARK



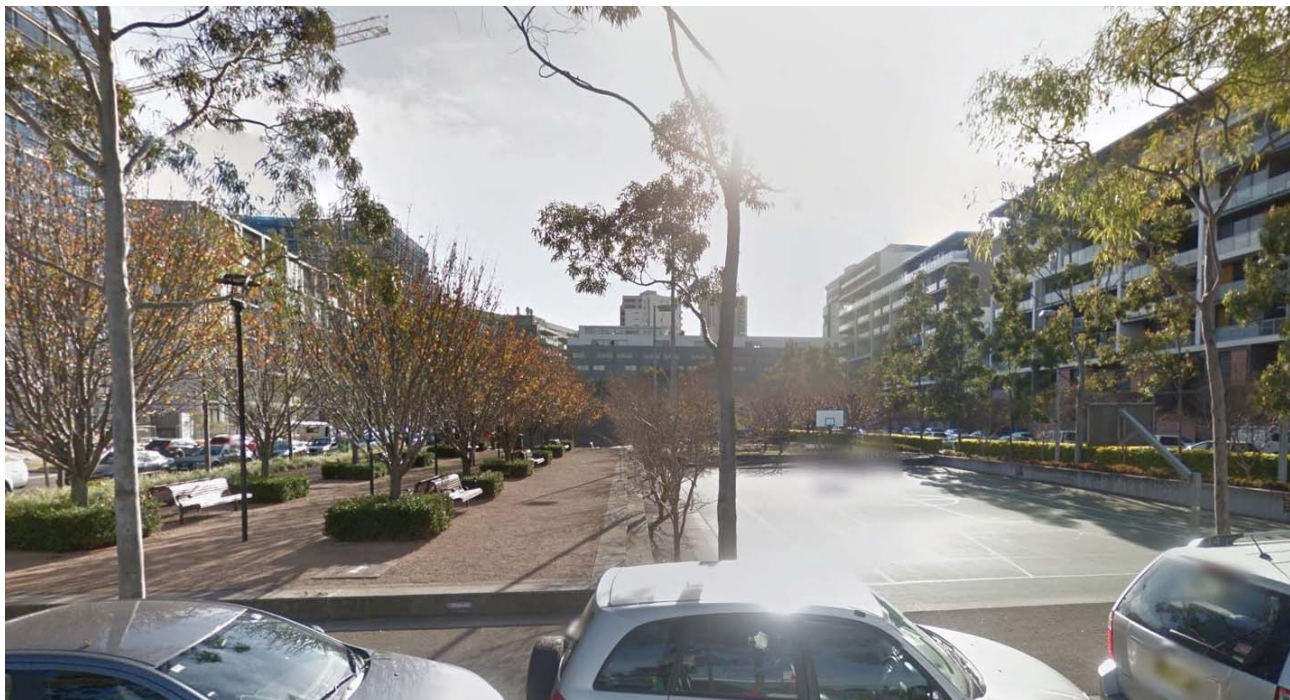
Frog Hollow Reserve, Surry Hills

- 3100m²
- level change with stairs and terraced spaces
- open lawn areas
- mature trees
- perimeter planting



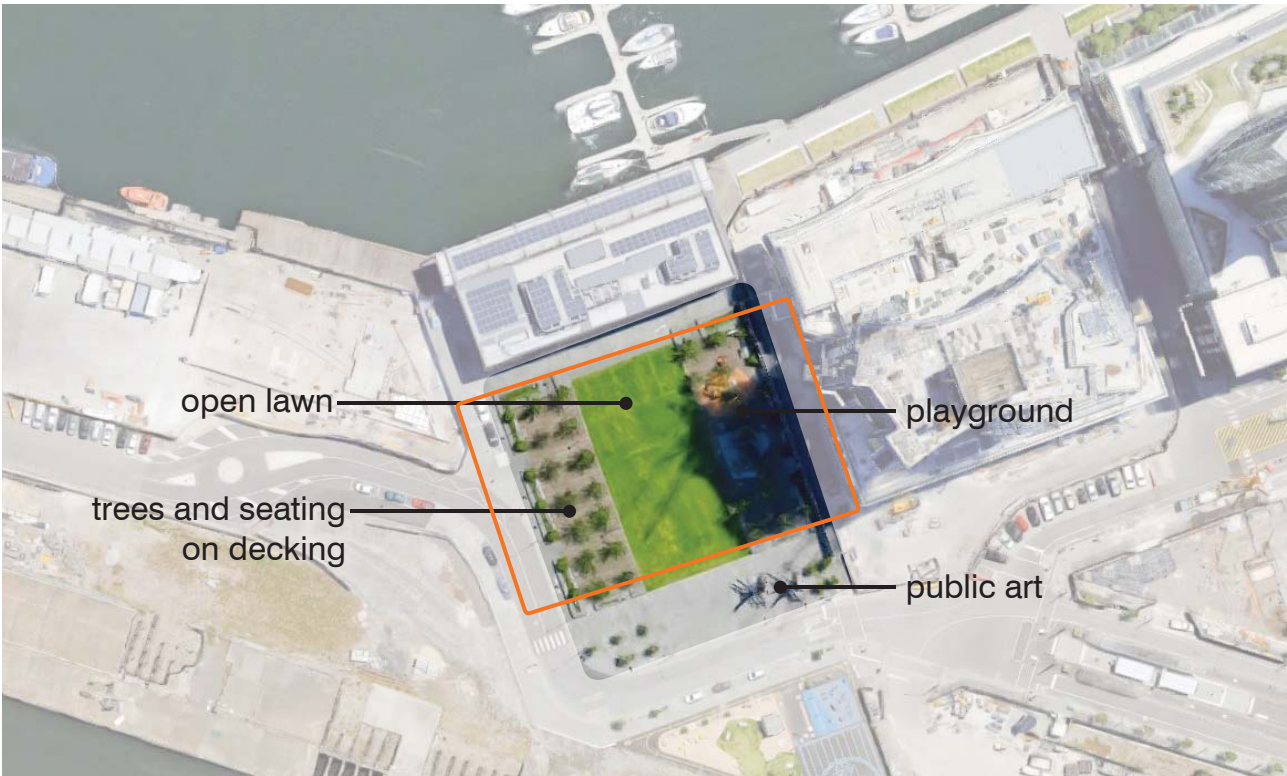
Nuffield Park, Zetland

- 5000m²
- tennis and basketball court
- open lawn area (drainage basin)
- perimeter planting
- tree groves with seating

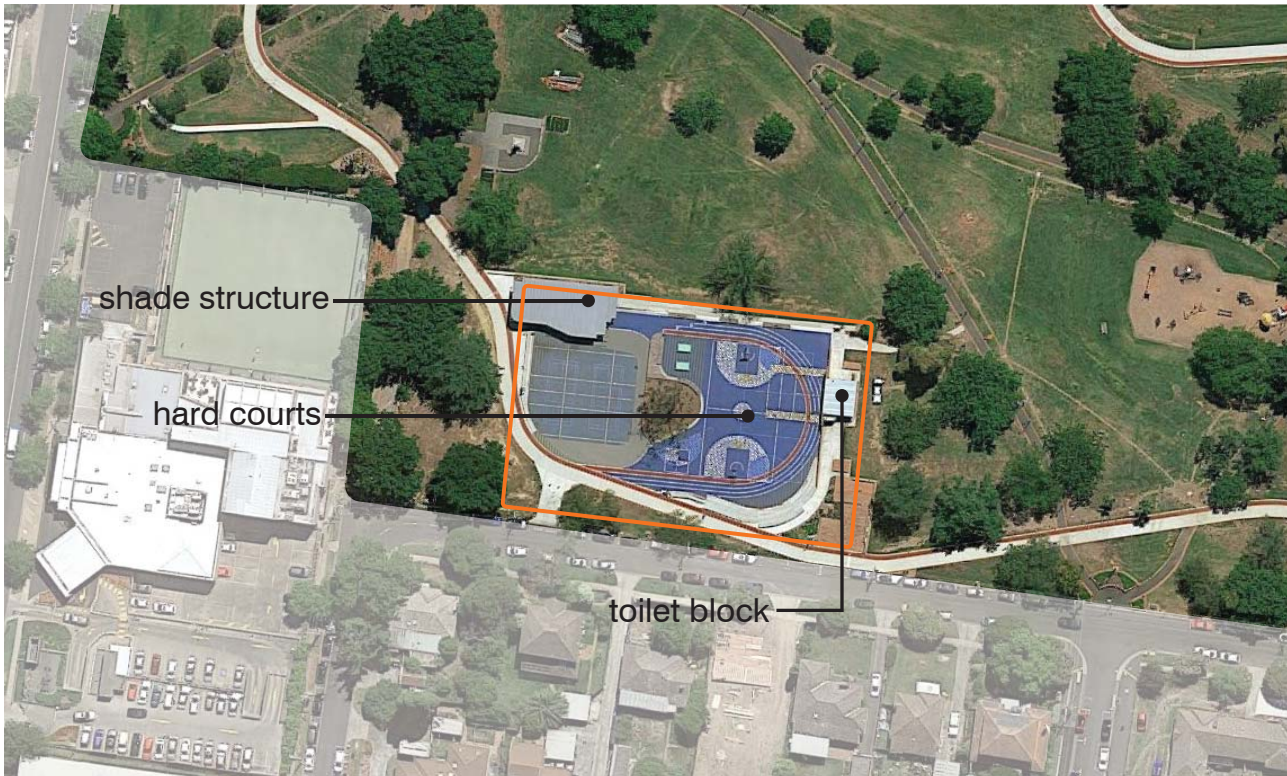


PRECEDENT STUDIES

LOCAL PARK



- Buluk Park, Melbourne**
- 3100m²
 - 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

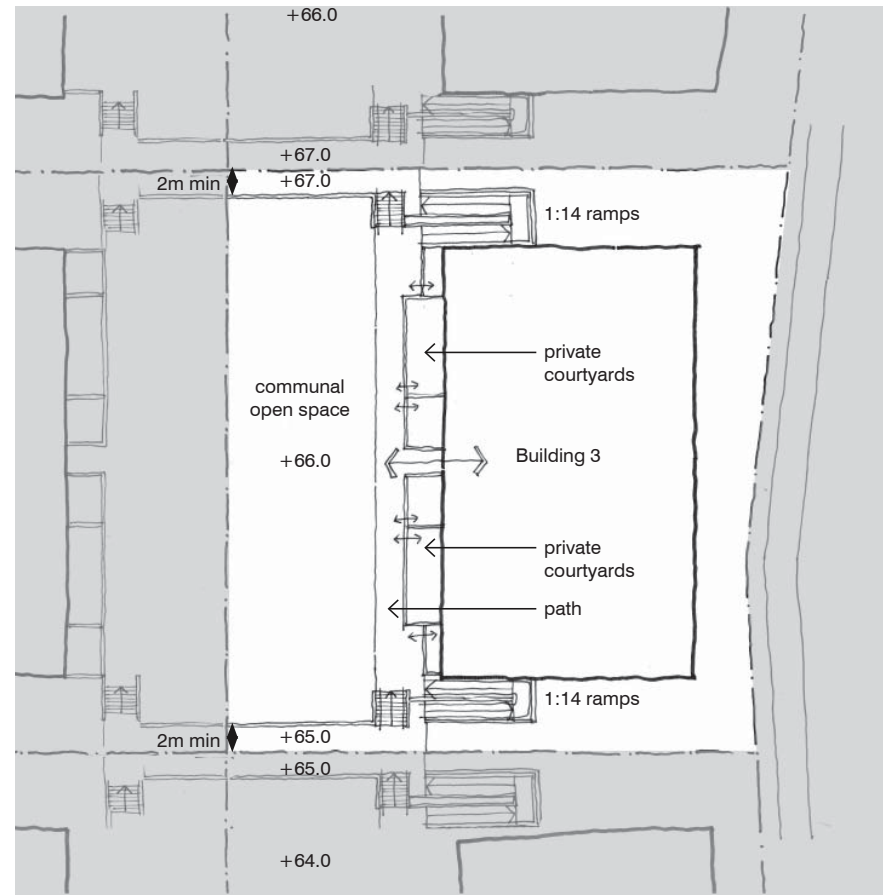


LEVELS STUDY

N-S TRANSITION STUDY

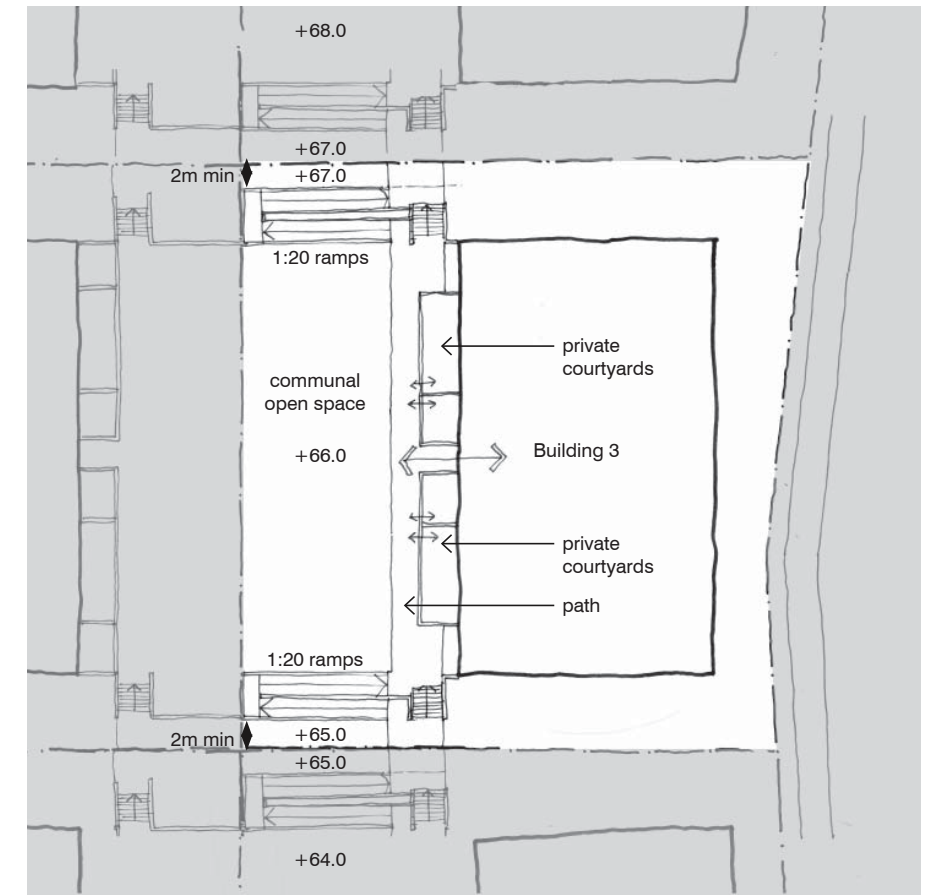
Transitions study - Option 1

- 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



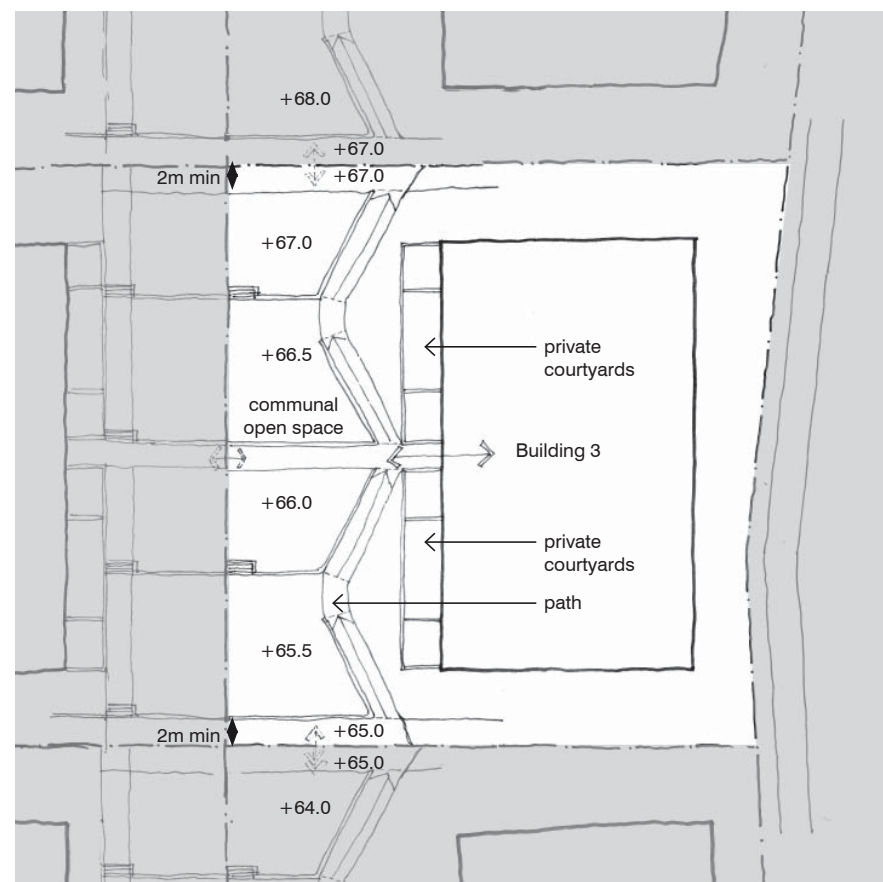
Transitions study - Option 2

- 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



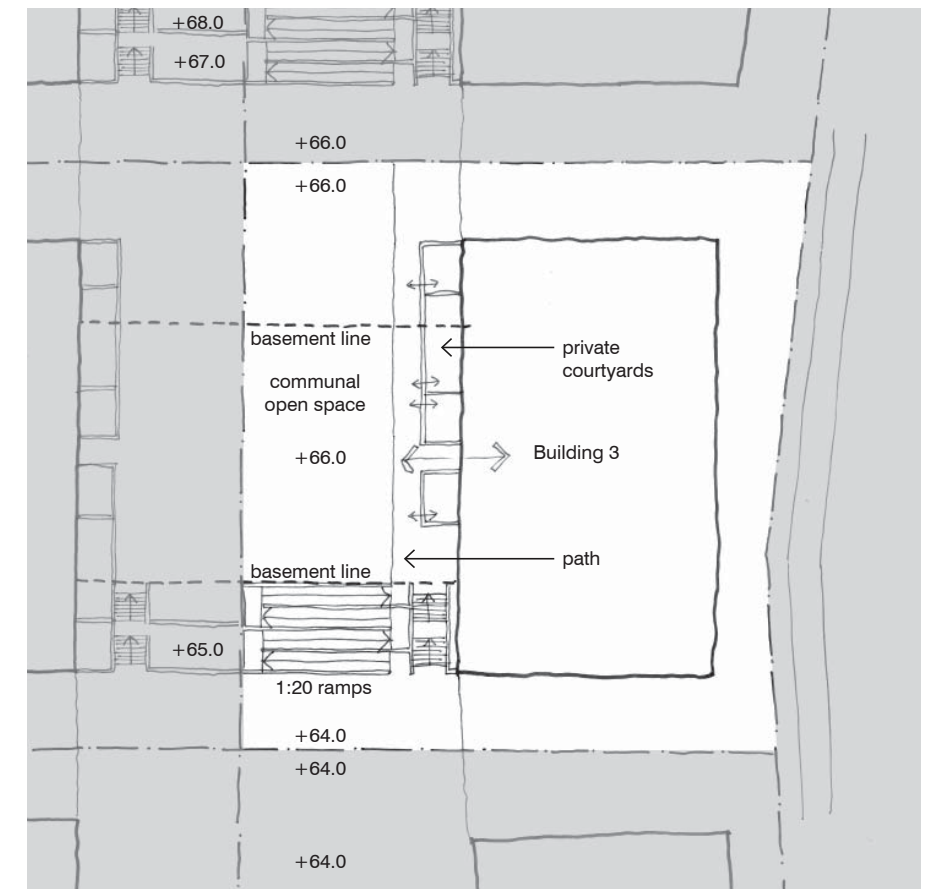
Transitions study - Option 3

- 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

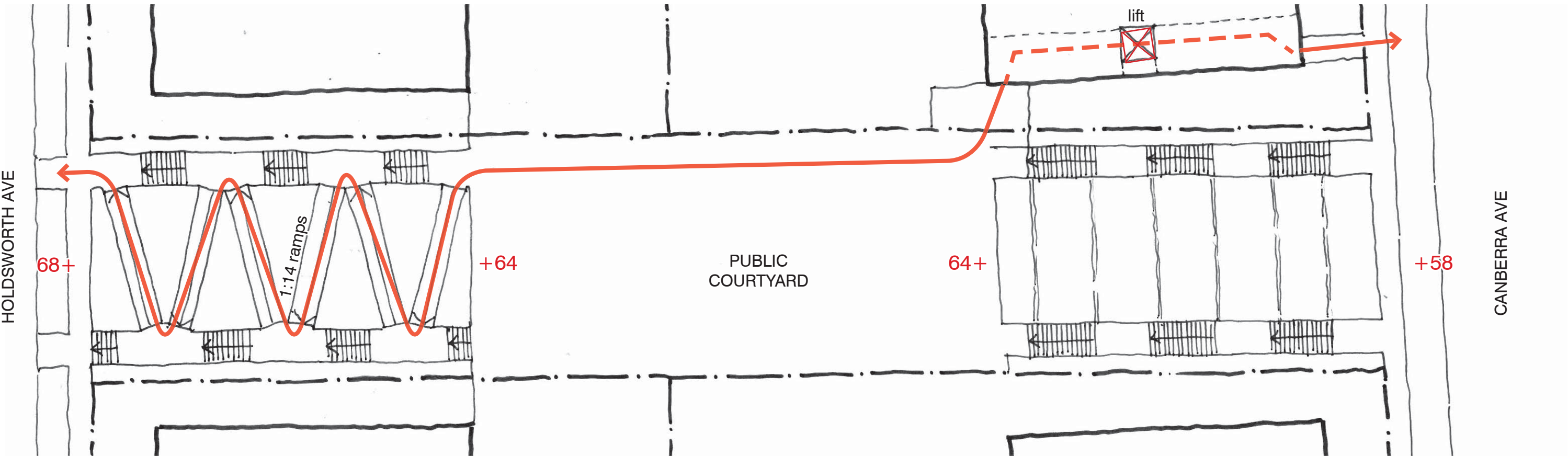
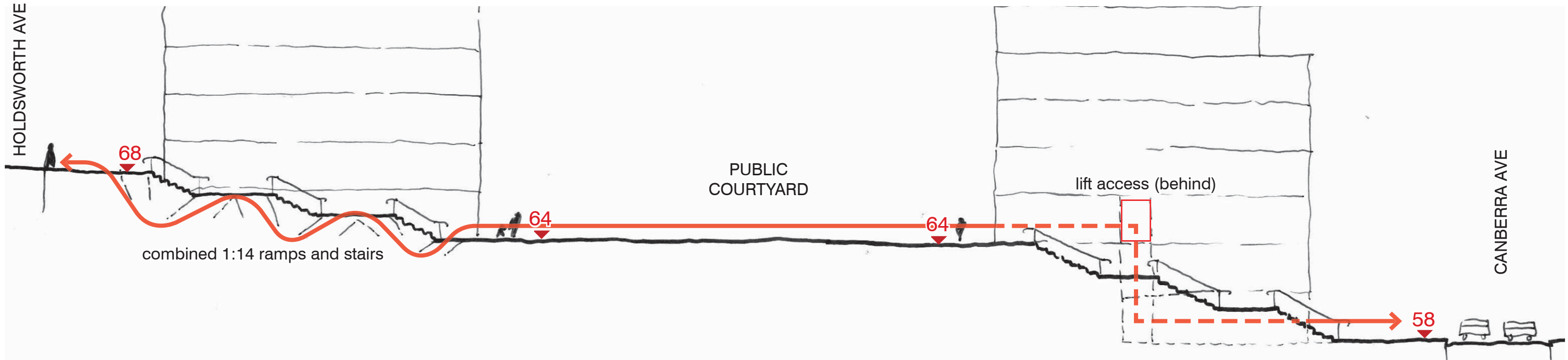


LEVELS STUDY

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

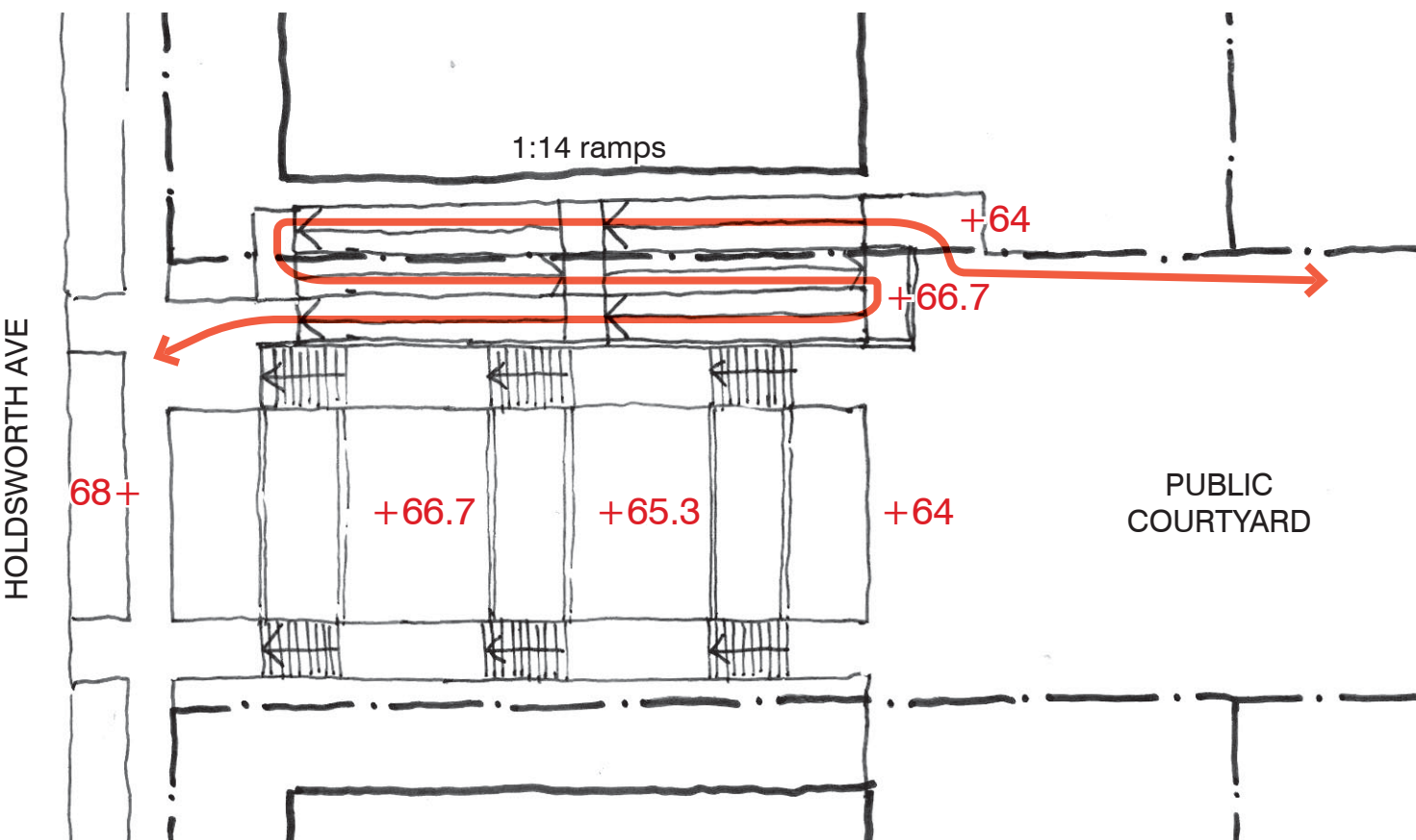
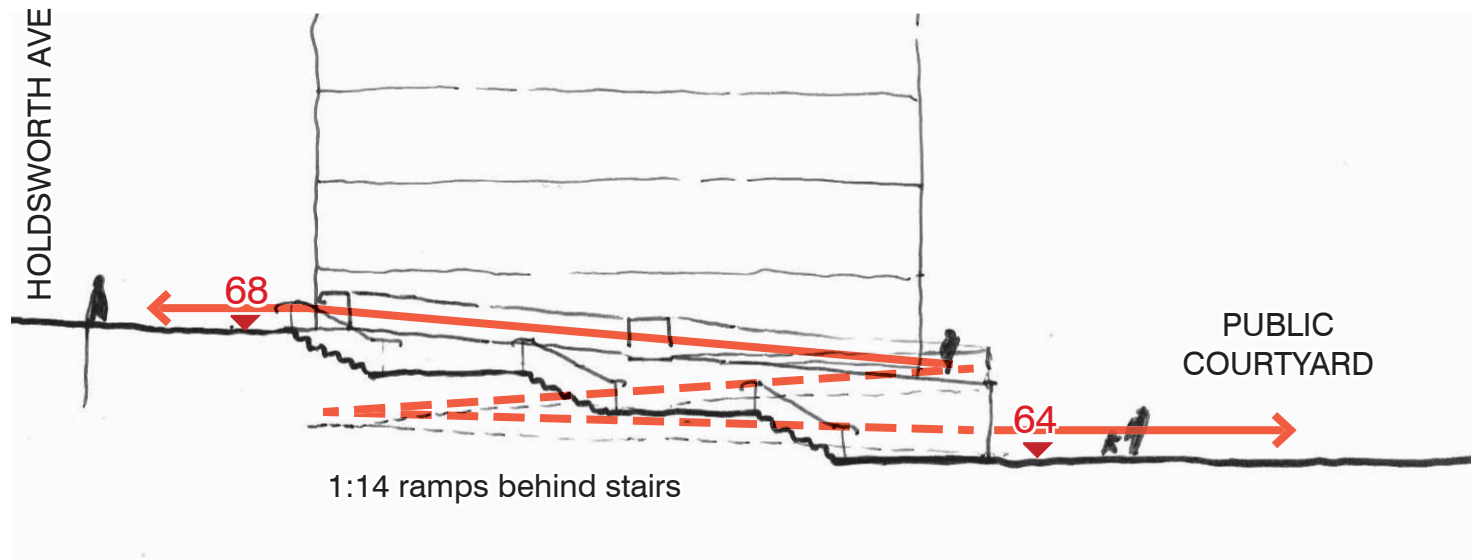


LEVELS STUDY

E-W ACCESSIBLE CONNECTION

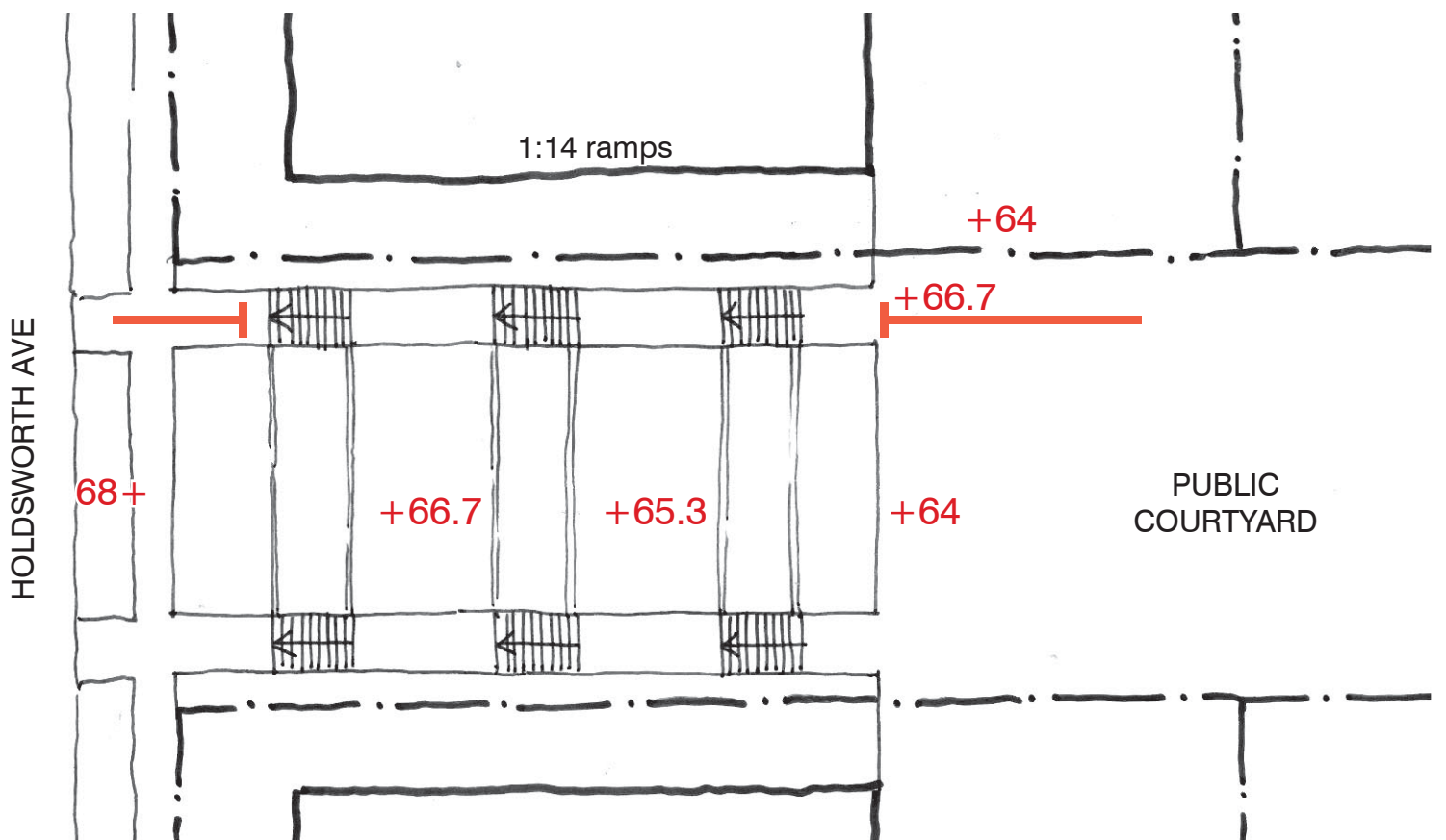
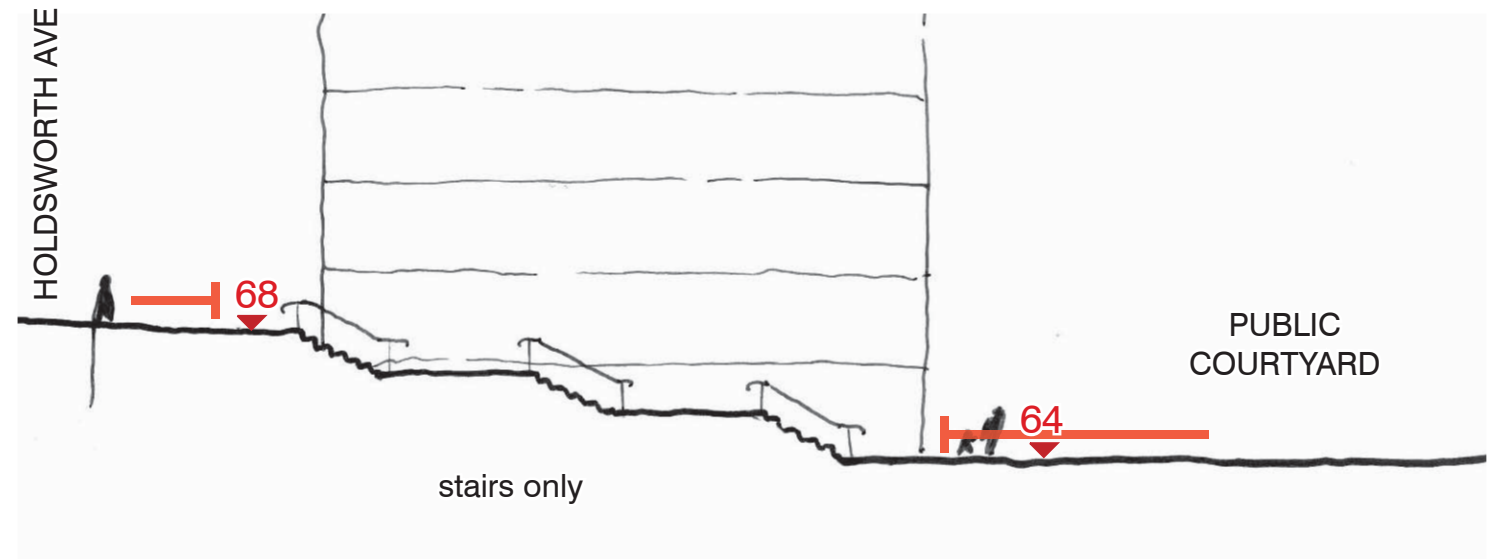
Holdsworth Ave to Public Courtyard - Option 2

- 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 B: SITE PHOTOGRAPHS



Photo 1: Showing subject site at 11 Marshall Avenue, St Leonards, looking south.



Photo 2: Showing rear yard of 12 Marshall Avenue, St Leonards, looking east.



Photo 3: Showing BH1 sampling location at 12 Marshall Avenue, St Leonards



Photo 4: Showing BH1 sampling location at 12 Marshall Avenue, St Leonards



Photo 5: Showing BH1 sampling location at 12 Marshall Avenue, St Leonards



Photo 6: Showing inside BH1 sampling location (0.6-0.7m) at 12 Marshall Avenue, St Leonards



Photo 7: Showing borehole BH2 sampling location at 12 Marshall Avenue, St Leonards.



Photo 8: Showing borehole BH2 sampling location at 12 Marshall Avenue, St Leonards.



Photo 9: Showing borehole BH2 sampling location at 12 Marshall Avenue, St Leonards.



Photo 10: Showing borehole BH2 sampling location (0.5-0.6m) at 12 Marshall Avenue, St Leonards.



Photo 11: Showing borehole BH3 sampling location at 12 Marshall Avenue, St Leonards.



Photo 12: Showing borehole BH3 sampling location at 12 Marshall Avenue, St Leonards.



Photo 13: Showing 10 Marshall Avenue, St Leonards, looking south.



Photo 14: Showing the rear of 10 Marshall Avenue, St Leonards, looking north.



Photo 15: Showing borehole BH4 sampling location at 10 Marshall Avenue, St Leonards.



Photo 16: Showing borehole BH4 sampling location at 10 Marshall Avenue, St Leonards.



Photo 17: Showing borehole BH5 sampling location at 10 Marshall Avenue, St Leonards.



Photo 18: Showing borehole BH5 sampling location at 10 Marshall Avenue, St Leonards.



Photo 19: Showing borehole BH6 sampling location at 10 Marshall Avenue, St Leonards.



Photo 20: Showing borehole BH6 sampling location at 10 Marshall Avenue, St Leonards.



Photo 21: Showing inside borehole BH7 sampling location (0.5-0.6m) at 1 Holdsworth Avenue, St Leonards.



Photo 22: Showing borehole BH7 sampling location (0.5-0.6m) at 1 Holdsworth Avenue, St Leonards.



Photo 23: Showing inside borehole BH8 sampling location (0.5-0.6m) at 3 Holdsworth Avenue, St Leonards.



Photo 24: Showing inside borehole BH9 sampling location (0.5-0.9m) at 3 Holdsworth Avenue, St Leonards.

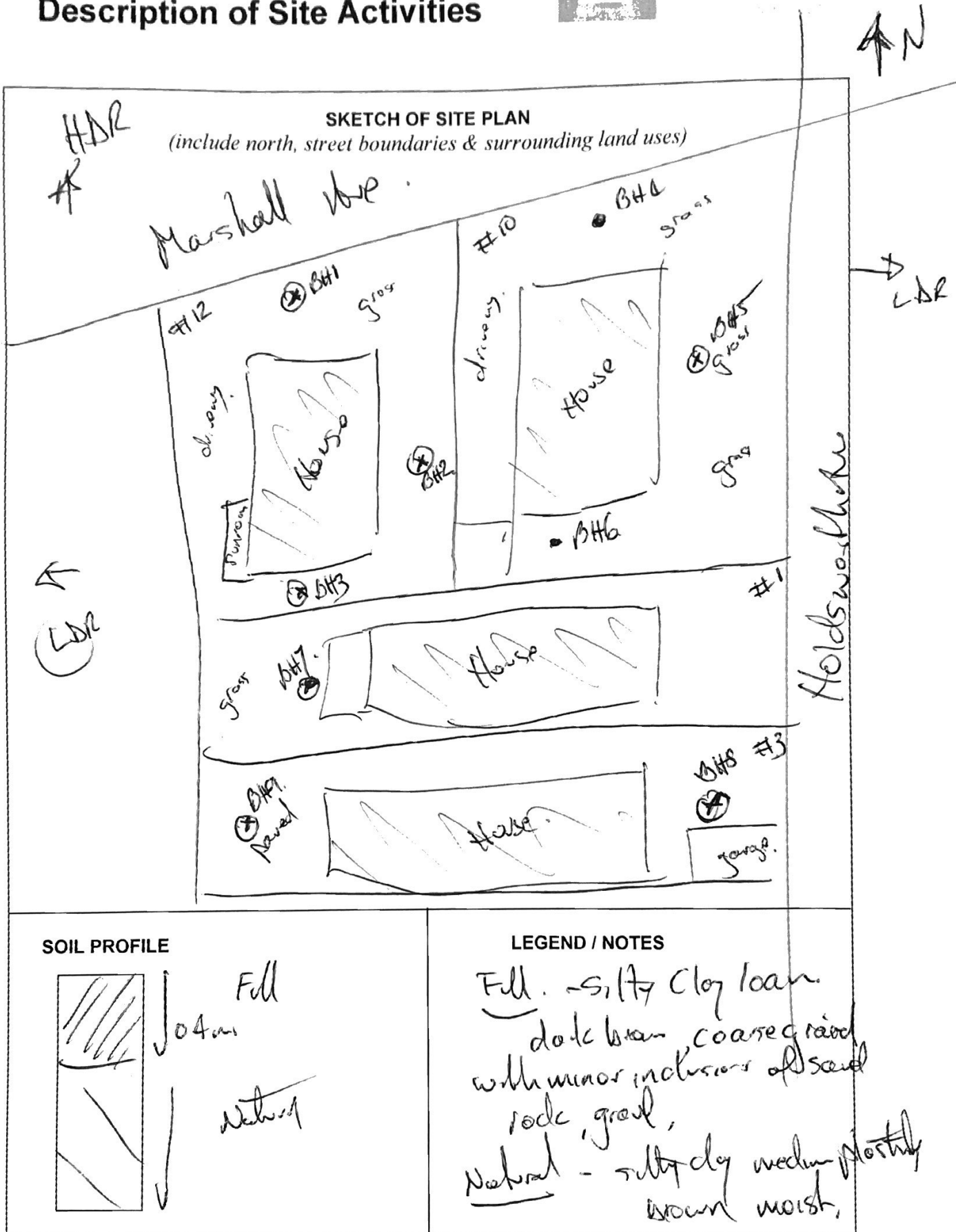
APPENDIX C: FIELDNOTES

Site Assessment Daily Worksheet Record



PROJECT NAME: <u>Detailed Site Investigation</u>		PROJECT NO: <u>20-1082</u>	
CLIENT: <u>New Golden International City</u>		DATE: <u>5/5/21</u>	
SITE ADDRESS: <u>10 & 12 Marshall Ave & 1 & 3 Holdsworth Ave St Leonards</u>			
SITE CONTACT: <u>Patricia Yang</u>		PHONE: <u>0426 201 822</u>	
ECON REPRESENTATIVE: <u>Con Karataglou</u>			
TITLE: <u>Environmental consultant</u>		PHONE: <u>0452654 962</u>	
FIELD NOTES:			
Start Time <u>10am.</u>		Finish Time <u>2.30pm.</u>	
Weather <u>cloudy & Rain</u>		Rainfall (mm) <u>13.6mm</u>	
Wind Direction <u>W</u>		Wind Speed <u>2km/hr</u>	
Humidity <u>100%</u>		Temp <u>15.3°C.</u>	
Odours Present <u>NIL</u>		Staining Present <u>NIL</u>	
Environmental and Safety Concerns			
<u>/</u>			
Actions			
Site Safety Induction <u>N/A</u>		Stormwater Control <u>N/A</u>	
Dust Suppression <u>N/A</u>		Traffic Control <u>N/A</u>	
Machinery onsite <u>N/A</u>		Equipment onsite <u>Agar, Esby,</u> <u>100 binders, sample jars, APE</u>	

ECON



Soil Sampling



SOIL ASSESSMENT AND SAMPLING			
Sample No. (show on site plan)	Depth (m)	Material Description Fill / Natural	PID (ppm)
BH1	0.1-0.2	Fill	
BH1	0.6-0.7	Natural	
BH2	0.15-0.25	Fill	
BH2	0.5-0.6	Natural	
BH3	0.1-0.2	Fill	
BH3	0.6-0.7	Natural	
BH4	0.1-0.2	Fill	
BH4	0.7-0.8	Natural	
BH5	0.1-0.2	Fill	
BH5	0.6-0.7	Natural	
BH6	0.1-0.2	Fill	
BH6	0.5-0.6	Natural	
BH7	0.1-0.2	Fill	
BH7	0.5-0.6	Natural	
BH8	0.1-0.2	Fill	
BH8	0.7-0.8	Natural	
BH9	0.1-0.2	Fill	
BH9	0.8-0.9	Natural	
No clods detected in all samples No staining detected in all samples No ACM fragments detected in all samples			

APPENDIX D: LABORATORY CERTIFICATES

CERTIFICATE OF ANALYSIS

Work Order : **ES2116871**
Client : **ECON Environmental Pty Ltd**
Contact : Con Kariotoglou
Address : PO Box 85 Oatlands NSW
Telephone : ----
Project : St Leonards
Order number : 20-1082
C-O-C number : ----
Sampler : Con Kariotoglou
Site : ----
Quote number : EN/222
No. of samples received : 20
No. of samples analysed : 20

Page : 1 of 25
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 06-May-2021 09:00
Date Analysis Commenced : 07-May-2021
Issue Date : 13-May-2021 15:44



Accreditation No. 825
 Accredited for compliance with
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Alex Rossi	Organic Chemist	Sydney Inorganics, Smithfield, NSW
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG005: Poor precision was obtained for Iron on sample ES2115975-21 Results have been confirmed by re-extraction and reanalysis.
- EP071: Results of sample D1 have been confirmed by re-extraction and re-analysis.
- EG035: Positive Hg result ES2116871 #1 has been confirmed by reanalysis.
- EA200N: Asbestos weights and percentages are not covered under the Scope of NATA Accreditation.
Weights of Asbestos are based on extracted bulk asbestos, fibre bundles, and/or ACM and do not include respirable fibres (if present)
The Asbestos (Fines and Fibrous) weight is calculated from the extracted Fibrous Asbestos and Asbestos Fines as an equivalent weight of 100% Asbestos
Percentages for Asbestos content in ACM are based on the 2013 NEPM default values.
All calculations of percentage Asbestos under this method are approximate and should be used as a guide only.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200N: ALS laboratory procedures and methods used for the identification and quantitation of asbestos are consistent with AS4964-2004 and the requirements of the 2013 NEPM for Assessment of Site Contamination
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.



- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
 - EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.
-



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH1 (0.1-0.2m)	BH1 (0.6-0.7m)	BH2 (0.0.15-0.25m)	BH2 (0.5-0.6m)	BH3 (0.1-0.2m)
Sampling date / time					05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2116871-001	ES2116871-002	ES2116871-003	ES2116871-004	ES2116871-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		9.8	14.7	18.3	18.7	40.5
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	No	No	No	No
Asbestos Type	1332-21-4	-	--		-	-	-	-	-
Asbestos (Trace)	1332-21-4	5	Fibres		No	No	No	No	No
Sample weight (dry)	----	0.01	g		643	554	459	533	267
Synthetic Mineral Fibre	----	0.1	g/kg		No	No	No	No	No
Organic Fibre	----	0.1	g/kg		No	No	No	No	No
APPROVED IDENTIFIER:	----	-	--		A. SMYLLIE	A. SMYLLIE	A. SMYLLIE	A. SMYLLIE	A. SMYLLIE
EA200N: Asbestos Quantification (non-NATA)									
Ø Asbestos (Fines and Fibrous <7mm)	1332-21-4	0.0004	g		<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
Ø Asbestos (Fines and Fibrous FA+AF)	----	0.001	% (w/w)		<0.001	<0.001	<0.001	<0.001	<0.001
Ø Weight Used for % Calculation	----	0.0001	kg		0.643	0.554	0.459	0.533	0.267
Ø Fibrous Asbestos >7mm	----	0.0004	g		<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	10	<5	10
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		4	5	7	5	8
Copper	7440-50-8	5	mg/kg		19	10	74	28	47
Lead	7439-92-1	5	mg/kg		91	24	417	68	249
Nickel	7440-02-0	2	mg/kg		3	<2	4	<2	3
Zinc	7440-66-6	5	mg/kg		55	10	161	52	221
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.5	<0.1	0.2	<0.1	0.1
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	----	<0.1	----	<0.1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
beta-BHC	319-85-7	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
delta-BHC	319-86-8	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Heptachlor	76-44-8	0.05	mg/kg		<0.05	----	<0.05	----	<0.05



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				BH1 (0.1-0.2m)	BH1 (0.6-0.7m)	BH2 (0.0.15-0.25m)	BH2 (0.5-0.6m)	BH3 (0.1-0.2m)
Sampling date / time				05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit	ES2116871-001	ES2116871-002	ES2116871-003	ES2116871-004	ES2116871-005
				Result	Result	Result	Result	Result

EP068A: Organochlorine Pesticides (OC) - Continued

Aldrin	309-00-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05

EP068B: Organophosphorus Pesticides (OP)

Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				BH1 (0.1-0.2m)	BH1 (0.6-0.7m)	BH2 (0.0.15-0.25m)	BH2 (0.5-0.6m)	BH3 (0.1-0.2m)
Sampling date / time				05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit	ES2116871-001	ES2116871-002	ES2116871-003	ES2116871-004	ES2116871-005
				Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued								
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	----	<1	----	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	----	<2	----	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.6	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	8.6	0.5	0.6
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	2.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	1.1	<0.5	10.9	1.0	1.4
Pyrene	129-00-0	0.5	mg/kg	1.1	<0.5	10.9	1.1	1.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	4.2	<0.5	0.6
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	4.0	<0.5	0.6
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	4.5	<0.5	0.6
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	1.7	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	4.0	<0.5	0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	1.7	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH1 (0.1-0.2m)	BH1 (0.6-0.7m)	BH2 (0.0.15-0.25m)	BH2 (0.5-0.6m)	BH3 (0.1-0.2m)
Sampling date / time					05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2116871-001	ES2116871-002	ES2116871-003	ES2116871-004	ES2116871-005
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	1.9	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		2.2	<0.5	56.0	2.6	5.8
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	5.3	<0.5	0.6
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	5.5	0.6	0.9
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	5.8	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	220	<100	170
C29 - C36 Fraction	----	100	mg/kg		<100	<100	140	<100	240
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	360	<50	410
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	330	<100	350
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	270
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	330	<50	620
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		95.3	----	76.6	----	110
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		78.5	----	64.6	----	75.8



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH1 (0.1-0.2m)	BH1 (0.6-0.7m)	BH2 (0.0.15-0.25m)	BH2 (0.5-0.6m)	BH3 (0.1-0.2m)
Sampling date / time					05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2116871-001	ES2116871-002	ES2116871-003	ES2116871-004	ES2116871-005
					Result	Result	Result	Result	Result
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		132	----	124	----	112
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		80.4	82.4	84.6	82.0	86.0
2-Chlorophenol-D4	93951-73-6	0.5	%		82.3	81.3	81.8	82.9	81.8
2,4,6-Tribromophenol	118-79-6	0.5	%		73.9	70.6	75.9	74.6	80.9
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		85.9	80.9	84.7	84.4	88.6
Anthracene-d10	1719-06-8	0.5	%		106	104	96.1	107	102
4-Terphenyl-d14	1718-51-0	0.5	%		90.1	87.3	87.6	88.8	91.9
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		113	110	109	97.8	104
Toluene-D8	2037-26-5	0.2	%		121	114	115	101	112
4-Bromofluorobenzene	460-00-4	0.2	%		110	106	103	93.4	98.1



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH3 (0.6-0.7m)	BH4 (0.1-0.2m)	BH4 (0.7-0.8m)	BH5 (0.1-0.2m)	BH5 (0.6-0.7m)
Sampling date / time					05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2116871-006	ES2116871-007	ES2116871-008	ES2116871-009	ES2116871-010
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		18.8	12.6	15.2	20.5	12.4
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	No	No	No	No
Asbestos Type	1332-21-4	-	--		-	-	-	-	-
Asbestos (Trace)	1332-21-4	5	Fibres		No	No	No	No	No
Sample weight (dry)	----	0.01	g		436	553	361	434	579
Synthetic Mineral Fibre	----	0.1	g/kg		No	No	No	No	No
Organic Fibre	----	0.1	g/kg		No	No	No	No	No
APPROVED IDENTIFIER:	----	-	--		A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE
EA200N: Asbestos Quantification (non-NATA)									
∅ Asbestos (Fines and Fibrous <7mm)	1332-21-4	0.0004	g		<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
∅ Asbestos (Fines and Fibrous FA+AF)	----	0.001	% (w/w)		<0.001	<0.001	<0.001	<0.001	<0.001
∅ Weight Used for % Calculation	----	0.0001	kg		0.436	0.553	0.361	0.434	0.579
∅ Fibrous Asbestos >7mm	----	0.0004	g		<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		23	<5	6	5	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		8	6	11	11	5
Copper	7440-50-8	5	mg/kg		52	8	<5	16	<5
Lead	7439-92-1	5	mg/kg		415	28	17	237	16
Nickel	7440-02-0	2	mg/kg		3	<2	<2	3	<2
Zinc	7440-66-6	5	mg/kg		162	19	<5	95	9
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		----	<0.1	----	<0.1	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	<0.05	----	<0.05	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	<0.05	----	<0.05	----
beta-BHC	319-85-7	0.05	mg/kg		----	<0.05	----	<0.05	----
gamma-BHC	58-89-9	0.05	mg/kg		----	<0.05	----	<0.05	----
delta-BHC	319-86-8	0.05	mg/kg		----	<0.05	----	<0.05	----
Heptachlor	76-44-8	0.05	mg/kg		----	<0.05	----	<0.05	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				BH3 (0.6-0.7m)	BH4 (0.1-0.2m)	BH4 (0.7-0.8m)	BH5 (0.1-0.2m)	BH5 (0.6-0.7m)
Sampling date / time				05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit	ES2116871-006	ES2116871-007	ES2116871-008	ES2116871-009	ES2116871-010
				Result	Result	Result	Result	Result

EP068A: Organochlorine Pesticides (OC) - Continued

Aldrin	309-00-2	0.05	mg/kg	----	<0.05	----	<0.05	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	<0.05	----	<0.05	----
^ Total Chlordane (sum)	----	0.05	mg/kg	----	<0.05	----	<0.05	----
trans-Chlordane	5103-74-2	0.05	mg/kg	----	<0.05	----	<0.05	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	<0.05	----	<0.05	----
cis-Chlordane	5103-71-9	0.05	mg/kg	----	<0.05	----	<0.05	----
Dieldrin	60-57-1	0.05	mg/kg	----	<0.05	----	<0.05	----
4,4'-DDE	72-55-9	0.05	mg/kg	----	<0.05	----	<0.05	----
Endrin	72-20-8	0.05	mg/kg	----	<0.05	----	<0.05	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	<0.05	----	<0.05	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	----	<0.05	----	<0.05	----
4,4'-DDD	72-54-8	0.05	mg/kg	----	<0.05	----	<0.05	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	<0.05	----	<0.05	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	<0.05	----	<0.05	----
4,4'-DDT	50-29-3	0.2	mg/kg	----	<0.2	----	<0.2	----
Endrin ketone	53494-70-5	0.05	mg/kg	----	<0.05	----	<0.05	----
Methoxychlor	72-43-5	0.2	mg/kg	----	<0.2	----	<0.2	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	<0.05	----	<0.05	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	0.05	mg/kg	----	<0.05	----	<0.05	----

EP068B: Organophosphorus Pesticides (OP)

Dichlorvos	62-73-7	0.05	mg/kg	----	<0.05	----	<0.05	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	<0.05	----	<0.05	----
Monocrotophos	6923-22-4	0.2	mg/kg	----	<0.2	----	<0.2	----
Dimethoate	60-51-5	0.05	mg/kg	----	<0.05	----	<0.05	----
Diazinon	333-41-5	0.05	mg/kg	----	<0.05	----	<0.05	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	<0.05	----	<0.05	----
Parathion-methyl	298-00-0	0.2	mg/kg	----	<0.2	----	<0.2	----
Malathion	121-75-5	0.05	mg/kg	----	<0.05	----	<0.05	----
Fenthion	55-38-9	0.05	mg/kg	----	<0.05	----	<0.05	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	<0.05	----	<0.05	----
Parathion	56-38-2	0.2	mg/kg	----	<0.2	----	<0.2	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	<0.05	----	<0.05	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	<0.05	----	<0.05	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	----	<0.05	----	<0.05	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				BH3 (0.6-0.7m)	BH4 (0.1-0.2m)	BH4 (0.7-0.8m)	BH5 (0.1-0.2m)	BH5 (0.6-0.7m)
Sampling date / time				05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit	ES2116871-006	ES2116871-007	ES2116871-008	ES2116871-009	ES2116871-010
				Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued								
Fenamiphos	22224-92-6	0.05	mg/kg	----	<0.05	----	<0.05	----
Prothiofos	34643-46-4	0.05	mg/kg	----	<0.05	----	<0.05	----
Ethion	563-12-2	0.05	mg/kg	----	<0.05	----	<0.05	----
Carbophenothion	786-19-6	0.05	mg/kg	----	<0.05	----	<0.05	----
Azinphos Methyl	86-50-0	0.05	mg/kg	----	<0.05	----	<0.05	----
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	----	<0.5	----	<0.5	----
2-Chlorophenol	95-57-8	0.5	mg/kg	----	<0.5	----	<0.5	----
2-Methylphenol	95-48-7	0.5	mg/kg	----	<0.5	----	<0.5	----
3- & 4-Methylphenol	1319-77-3	1	mg/kg	----	<1	----	<1	----
2-Nitrophenol	88-75-5	0.5	mg/kg	----	<0.5	----	<0.5	----
2,4-Dimethylphenol	105-67-9	0.5	mg/kg	----	<0.5	----	<0.5	----
2,4-Dichlorophenol	120-83-2	0.5	mg/kg	----	<0.5	----	<0.5	----
2,6-Dichlorophenol	87-65-0	0.5	mg/kg	----	<0.5	----	<0.5	----
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	----	<0.5	----	<0.5	----
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	----	<0.5	----	<0.5	----
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	----	<0.5	----	<0.5	----
Pentachlorophenol	87-86-5	2	mg/kg	----	<2	----	<2	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	1.1	<0.5	<0.5	1.2	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	2.2	0.7	<0.5	2.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	2.3	0.7	<0.5	2.4	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	0.9	<0.5	<0.5	0.8	<0.5
Chrysene	218-01-9	0.5	mg/kg	0.9	<0.5	<0.5	0.9	<0.5
Benzo(b+j)fluoranthene	205-99-2	205-82-3	0.5	1.0	<0.5	<0.5	1.1	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	1.0	<0.5	<0.5	1.0	<0.5
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH3 (0.6-0.7m)	BH4 (0.1-0.2m)	BH4 (0.7-0.8m)	BH5 (0.1-0.2m)	BH5 (0.6-0.7m)
Sampling date / time					05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2116871-006	ES2116871-007	ES2116871-008	ES2116871-009	ES2116871-010
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		9.4	1.4	<0.5	10.4	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		1.2	<0.5	<0.5	1.2	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		1.5	0.6	0.6	1.5	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.8	1.2	1.2	1.8	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	110	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	110	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	150	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	150	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	110	----	112	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	104	----	97.7	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH3 (0.6-0.7m)	BH4 (0.1-0.2m)	BH4 (0.7-0.8m)	BH5 (0.1-0.2m)	BH5 (0.6-0.7m)
Sampling date / time					05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2116871-006	ES2116871-007	ES2116871-008	ES2116871-009	ES2116871-010
					Result	Result	Result	Result	Result
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	120	----	99.3	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		86.6	82.5	83.9	82.0	80.2
2-Chlorophenol-D4	93951-73-6	0.5	%		90.5	83.2	84.2	88.7	84.4
2,4,6-Tribromophenol	118-79-6	0.5	%		74.4	73.8	64.5	76.9	68.5
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		88.4	90.3	83.0	90.2	90.6
Anthracene-d10	1719-06-8	0.5	%		107	111	99.2	110	110
4-Terphenyl-d14	1718-51-0	0.5	%		94.4	94.7	90.1	94.8	94.1
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		105	104	98.5	104	97.7
Toluene-D8	2037-26-5	0.2	%		112	111	101	106	103
4-Bromofluorobenzene	460-00-4	0.2	%		101	98.4	103	105	88.3



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH6 (0.1-0.2m)	BH6 (0.5-0.6m)	BH7 (0.1-0.2m)	BH7 (0.5-0.6m)	BH8 (0.1-0.2m)
Sampling date / time					05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2116871-011	ES2116871-012	ES2116871-013	ES2116871-014	ES2116871-015
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		25.3	15.4	14.0	9.6	12.6
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	No	No	No	No
Asbestos Type	1332-21-4	-	--		-	-	-	-	-
Asbestos (Trace)	1332-21-4	5	Fibres		No	No	No	No	No
Sample weight (dry)	----	0.01	g		445	506	564	604	535
Synthetic Mineral Fibre	----	0.1	g/kg		No	No	No	No	No
Organic Fibre	----	0.1	g/kg		No	No	No	No	No
APPROVED IDENTIFIER:	----	-	--		A. SMYLLIE	A. SMYLLIE	A. SMYLLIE	A. SMYLLIE	A. SMYLLIE
EA200N: Asbestos Quantification (non-NATA)									
Ø Asbestos (Fines and Fibrous <7mm)	1332-21-4	0.0004	g		<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
Ø Asbestos (Fines and Fibrous FA+AF)	----	0.001	% (w/w)		<0.001	<0.001	<0.001	<0.001	<0.001
Ø Weight Used for % Calculation	----	0.0001	kg		0.445	0.506	0.564	0.604	0.535
Ø Fibrous Asbestos >7mm	----	0.0004	g		<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		12	6	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		18	10	8	5	7
Copper	7440-50-8	5	mg/kg		143	30	26	14	28
Lead	7439-92-1	5	mg/kg		1260	244	246	76	232
Nickel	7440-02-0	2	mg/kg		10	4	4	3	4
Zinc	7440-66-6	5	mg/kg		781	164	215	95	213
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.1	<0.1	0.2	<0.1	0.2
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	----	<0.1	----	<0.1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
beta-BHC	319-85-7	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
delta-BHC	319-86-8	0.05	mg/kg		<0.05	----	<0.05	----	<0.05
Heptachlor	76-44-8	0.05	mg/kg		<0.05	----	<0.05	----	<0.05



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				BH6 (0.1-0.2m)	BH6 (0.5-0.6m)	BH7 (0.1-0.2m)	BH7 (0.5-0.6m)	BH8 (0.1-0.2m)
Sampling date / time				05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit	ES2116871-011	ES2116871-012	ES2116871-013	ES2116871-014	ES2116871-015
				Result	Result	Result	Result	Result

EP068A: Organochlorine Pesticides (OC) - Continued

Aldrin	309-00-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05

EP068B: Organophosphorus Pesticides (OP)

Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				BH6 (0.1-0.2m)	BH6 (0.5-0.6m)	BH7 (0.1-0.2m)	BH7 (0.5-0.6m)	BH8 (0.1-0.2m)
Sampling date / time				05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit	ES2116871-011	ES2116871-012	ES2116871-013	ES2116871-014	ES2116871-015
				Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued								
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	<0.05	----	<0.05
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	----	<1	----	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	----	<0.5	----	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	<2	----	<2	----	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.5	<0.5	0.7
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	0.7	<0.5	1.6	<0.5	1.3
Pyrene	129-00-0	0.5	mg/kg	0.7	<0.5	1.0	<0.5	1.6
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	0.5	<0.5	0.7	<0.5	0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.6	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH6 (0.1-0.2m)	BH6 (0.5-0.6m)	BH7 (0.1-0.2m)	BH7 (0.5-0.6m)	BH8 (0.1-0.2m)
Sampling date / time					05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2116871-011	ES2116871-012	ES2116871-013	ES2116871-014	ES2116871-015
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		1.9	<0.5	4.9	<0.5	4.1
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	0.7	<0.5	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	1.0	0.6	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	1.3	1.2	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		130	<100	110	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		130	<50	110	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		102	----	119	----	111
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		81.8	----	106	----	75.6



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH6 (0.1-0.2m)	BH6 (0.5-0.6m)	BH7 (0.1-0.2m)	BH7 (0.5-0.6m)	BH8 (0.1-0.2m)
Sampling date / time					05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2116871-011	ES2116871-012	ES2116871-013	ES2116871-014	ES2116871-015
					Result	Result	Result	Result	Result
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		85.1	----	120	----	105
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		82.9	96.3	96.1	97.6	97.0
2-Chlorophenol-D4	93951-73-6	0.5	%		82.4	92.5	91.8	99.0	93.7
2,4,6-Tribromophenol	118-79-6	0.5	%		71.7	72.0	75.2	62.8	88.3
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		91.0	88.3	95.2	82.8	85.6
Anthracene-d10	1719-06-8	0.5	%		106	97.9	81.8	108	95.7
4-Terphenyl-d14	1718-51-0	0.5	%		94.3	95.0	94.9	101	83.5
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		105	105	105	97.9	113
Toluene-D8	2037-26-5	0.2	%		110	109	106	98.3	115
4-Bromofluorobenzene	460-00-4	0.2	%		91.9	94.1	92.5	88.7	99.3



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH8 (0.7-0.8m)	BH9 (0.1-0.2m)	BH9 (0.8-0.9m)	D1	D2
Sampling date / time					05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2116871-016	ES2116871-017	ES2116871-018	ES2116871-019	ES2116871-020
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		10.2	21.1	10.5	19.6	12.1
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		No	No	No	No	No
Asbestos Type	1332-21-4	-	--		-	-	-	-	-
Asbestos (Trace)	1332-21-4	5	Fibres		No	No	No	No	No
Sample weight (dry)	----	0.01	g		541	530	572	527	596
Synthetic Mineral Fibre	----	0.1	g/kg		No	No	No	No	No
Organic Fibre	----	0.1	g/kg		No	No	No	No	No
APPROVED IDENTIFIER:	----	-	--		A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE	A. SMYLIE
EA200N: Asbestos Quantification (non-NATA)									
∅ Asbestos (Fines and Fibrous <7mm)	1332-21-4	0.0004	g		<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
∅ Asbestos (Fines and Fibrous FA+AF)	----	0.001	% (w/w)		<0.001	<0.001	<0.001	<0.001	<0.001
∅ Weight Used for % Calculation	----	0.0001	kg		0.541	0.530	0.572	0.527	0.596
∅ Fibrous Asbestos >7mm	----	0.0004	g		<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	5	<5	10	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		6	7	4	11	6
Copper	7440-50-8	5	mg/kg		14	24	6	76	26
Lead	7439-92-1	5	mg/kg		72	135	22	227	219
Nickel	7440-02-0	2	mg/kg		4	4	<2	6	4
Zinc	7440-66-6	5	mg/kg		91	102	28	220	196
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.1	<0.1	0.2	0.2
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		----	<0.1	----	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	<0.05	----	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	<0.05	----	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg		----	<0.05	----	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg		----	<0.05	----	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg		----	<0.05	----	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg		----	<0.05	----	<0.05	<0.05



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				BH8 (0.7-0.8m)	BH9 (0.1-0.2m)	BH9 (0.8-0.9m)	D1	D2
Sampling date / time				05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit	ES2116871-016	ES2116871-017	ES2116871-018	ES2116871-019	ES2116871-020
				Result	Result	Result	Result	Result

EP068A: Organochlorine Pesticides (OC) - Continued

Aldrin	309-00-2	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	----	<0.2	----	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	----	<0.2	----	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	----	<0.05	----	<0.05	<0.05

EP068B: Organophosphorus Pesticides (OP)

Dichlorvos	62-73-7	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	----	<0.2	----	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	----	<0.2	----	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	----	<0.2	----	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	----	<0.05	----	<0.05	<0.05



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				BH8 (0.7-0.8m)	BH9 (0.1-0.2m)	BH9 (0.8-0.9m)	D1	D2
Sampling date / time				05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit	ES2116871-016	ES2116871-017	ES2116871-018	ES2116871-019	ES2116871-020
				Result	Result	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued								
Fenamiphos	22224-92-6	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	----	<0.05	----	<0.05	<0.05
EP075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	0.5	mg/kg	----	<0.5	----	<0.5	<0.5
2-Chlorophenol	95-57-8	0.5	mg/kg	----	<0.5	----	<0.5	<0.5
2-Methylphenol	95-48-7	0.5	mg/kg	----	<0.5	----	<0.5	<0.5
3- & 4-Methylphenol	1319-77-3	1	mg/kg	----	<1	----	<1	<1
2-Nitrophenol	88-75-5	0.5	mg/kg	----	<0.5	----	<0.5	<0.5
2,4-Dimethylphenol	105-67-9	0.5	mg/kg	----	<0.5	----	<0.5	<0.5
2,4-Dichlorophenol	120-83-2	0.5	mg/kg	----	<0.5	----	<0.5	<0.5
2,6-Dichlorophenol	87-65-0	0.5	mg/kg	----	<0.5	----	<0.5	<0.5
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	----	<0.5	----	<0.5	<0.5
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	----	<0.5	----	<0.5	<0.5
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	----	<0.5	----	<0.5	<0.5
Pentachlorophenol	87-86-5	2	mg/kg	----	<2	----	<2	<2
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	2.5	0.6
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	0.8	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	0.9	<0.5	6.9	1.3
Pyrene	129-00-0	0.5	mg/kg	<0.5	0.8	<0.5	4.1	1.3
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	1.9	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	2.0	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	<0.5	2.4	0.6
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	0.9	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	2.0	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	0.8	<0.5
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH8 (0.7-0.8m)	BH9 (0.1-0.2m)	BH9 (0.8-0.9m)	D1	D2
Sampling date / time					05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2116871-016	ES2116871-017	ES2116871-018	ES2116871-019	ES2116871-020
					Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	1.0	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	1.7	<0.5	25.3	3.8
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	2.6	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	0.6	2.9	0.6
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		1.2	1.2	1.2	3.1	1.2
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	150	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	150	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		----	88.2	----	86.0	101
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		----	78.0	----	74.3	90.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	BH8 (0.7-0.8m)	BH9 (0.1-0.2m)	BH9 (0.8-0.9m)	D1	D2
Sampling date / time					05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00	05-May-2021 00:00
Compound	CAS Number	LOR	Unit		ES2116871-016	ES2116871-017	ES2116871-018	ES2116871-019	ES2116871-020
					Result	Result	Result	Result	Result
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		----	81.0	----	71.1	86.4
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		98.6	101	82.5	100	92.7
2-Chlorophenol-D4	93951-73-6	0.5	%		80.6	82.9	80.7	85.2	84.1
2,4,6-Tribromophenol	118-79-6	0.5	%		84.4	51.5	62.2	97.7	75.6
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		87.3	87.3	98.1	95.7	92.7
Anthracene-d10	1719-06-8	0.5	%		101	102	101	110	104
4-Terphenyl-d14	1718-51-0	0.5	%		86.5	88.0	82.2	94.5	94.1
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		111	111	101	107	106
Toluene-D8	2037-26-5	0.2	%		114	110	111	106	112
4-Bromofluorobenzene	460-00-4	0.2	%		97.0	98.5	92.8	87.6	96.6



Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	BH1 (0.1-0.2m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH1 (0.6-0.7m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH2 (0.0.15-0.25m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH2 (0.5-0.6m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH3 (0.1-0.2m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH3 (0.6-0.7m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH4 (0.1-0.2m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH4 (0.7-0.8m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH5 (0.1-0.2m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH5 (0.6-0.7m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH6 (0.1-0.2m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH6 (0.5-0.6m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH7 (0.1-0.2m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH7 (0.5-0.6m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH8 (0.1-0.2m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH8 (0.7-0.8m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH9 (0.1-0.2m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	BH9 (0.8-0.9m) - 05-May-2021 00:00	Mid brown soil.
EA200: Description	D1 - 05-May-2021 00:00	Mid brown soil.
EA200: Description	D2 - 05-May-2021 00:00	Mid brown soil.



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2,4,6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(SOIL) EA200N: Asbestos Quantification (non-NATA)

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

QUALITY CONTROL REPORT

Work Order : **ES2116871**

Page : 1 of 14

Client : **ECON Environmental Pty Ltd**
Contact : Con Kariotoglou
Address : PO Box 85 Oatlands NSW
Telephone : ----
Project : St Leonards
Order number : 20-1082
C-O-C number : ----
Sampler : Con Kariotoglou
Site : ----
Quote number : EN/222
No. of samples received : 20
No. of samples analysed : 20

Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 06-May-2021
Date Analysis Commenced : 07-May-2021
Issue Date : 13-May-2021



Accreditation No. 825
 Accredited for compliance with
 ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Alana Smylie	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW
Alex Rossi	Organic Chemist	Sydney Inorganics, Smithfield, NSW
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3667757)									
ES2115975-021	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	13	14	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	6	5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.0	No Limit
ES2115975-031	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	6	6	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	6	6	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	15	17	15.5	No Limit
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3670321)									
ES2116789-045	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	7	7	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	12	12	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	10	8	17.0	No Limit
ES2116789-069	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	20	22	8.9	0% - 50%



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3670321) - continued									
ES2116789-069	Anonymous	EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	18	18	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	26	27	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	39	39	0.0	No Limit
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3670323)									
ES2116871-016	BH8 (0.7-0.8m)	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	3	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	14	13	10.5	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	72	59	20.5	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	91	89	2.4	0% - 50%
ES2116887-006	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	26	22	15.1	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	19	16	12.5	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	7	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	27	30	10.4	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	20	22	12.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	58	57	0.0	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3667759)									
ES2116871-003	BH2 (0.0.15-0.25m)	EA055: Moisture Content	----	0.1	%	18.3	18.2	0.8	0% - 50%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3670325)									
ES2116789-048	Anonymous	EA055: Moisture Content	----	0.1	%	9.9	9.7	2.3	No Limit
ES2116871-009	BH5 (0.1-0.2m)	EA055: Moisture Content	----	0.1	%	20.5	19.9	3.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3670326)									
ES2116871-018	BH9 (0.8-0.9m)	EA055: Moisture Content	----	0.1	%	10.5	10.2	3.2	0% - 50%
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3667758)									
ES2115975-021	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2115975-031	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3670320)									
ES2116789-045	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2116789-069	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3670324)									
ES2116871-016	BH8 (0.7-0.8m)	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2116887-006	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3662310)									
ES2116871-001	BH1 (0.1-0.2m)	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES2116871-020	D2	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3662309)									
ES2116871-001	BH1 (0.1-0.2m)	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES2116871-020	D2	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3662309) - continued									
ES2116871-020	D2	EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3662309)									
ES2116871-001	BH1 (0.1-0.2m)	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES2116871-020	D2	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3662309) - continued									
ES2116871-020	D2	EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)A: Phenolic Compounds (QC Lot: 3662308)									
ES2116871-001	BH1 (0.1-0.2m)	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.0	No Limit
ES2116871-020	D2	EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	<1	0.0	No Limit
		EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	<2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3662308)									
ES2116871-001	BH1 (0.1-0.2m)	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	1.1	1.1	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	1.1	1.1	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3662308) - continued									
ES2116871-001	BH1 (0.1-0.2m)	EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	2.2	2.2	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
ES2116871-020	D2	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	0.6	0.6	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	1.3	1.3	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	1.3	1.4	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	0.6	0.6	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	3.8	3.9	2.6	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3662307)							
ES2116871-001	BH1 (0.1-0.2m)	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES2116871-020	D2	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3664165)									
ES2116871-001	BH1 (0.1-0.2m)	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES2116871-011	BH6 (0.1-0.2m)	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3662307)									
ES2116871-001	BH1 (0.1-0.2m)	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3662307) - continued									
ES2116871-001	BH1 (0.1-0.2m)	EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES2116871-020	D2	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3664165)									
ES2116871-001	BH1 (0.1-0.2m)	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES2116871-011	BH6 (0.1-0.2m)	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 3664165)									
ES2116871-001	BH1 (0.1-0.2m)	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
ES2116871-011	BH6 (0.1-0.2m)	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
		EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit		



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3667757)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	88.4	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	85.8	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	81.1	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	97.4	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	107	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	82.6	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	80.4	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3670321)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	98.6	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	93.9	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	100.0	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	99.1	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	96.8	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	102	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	88.1	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3670323)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	121.1 mg/kg	95.0	88.0	113
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	0.74 mg/kg	100	70.0	130
EG005T: Chromium	7440-47-3	2	mg/kg	<2	19.6 mg/kg	96.0	68.0	132
EG005T: Copper	7440-50-8	5	mg/kg	<5	52.9 mg/kg	96.9	89.0	111
EG005T: Lead	7439-92-1	5	mg/kg	<5	60.8 mg/kg	94.3	82.0	119
EG005T: Nickel	7440-02-0	2	mg/kg	<2	15.3 mg/kg	97.7	80.0	120
EG005T: Zinc	7440-66-6	5	mg/kg	<5	139.3 mg/kg	84.6	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3667758)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.073 mg/kg	115	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3670320)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.073 mg/kg	118	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3670324)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	0.073 mg/kg	120	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3662310)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	111	62.0	126
EP068A: Organochlorine Pesticides (OC) (QCLot: 3662309)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	100	69.0	113



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP068A: Organochlorine Pesticides (OC) (QCLot: 3662309) - continued								
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	103	65.0	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	91.5	67.0	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	105	68.0	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	99.0	65.0	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	91.7	67.0	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	101	69.0	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	104	62.0	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	105	63.0	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	105	66.0	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	102	64.0	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	106	66.0	116
EP068: 4,4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	85.3	67.0	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	101	67.0	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	83.8	69.0	115
EP068: 4,4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	89.1	69.0	121
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	80.4	56.0	120
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	81.7	62.0	124
EP068: 4,4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	87.1	66.0	120
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	90.2	64.0	122
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	75.2	54.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3662309)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	78.9	59.0	119
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.6	62.0	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	81.0	54.0	126
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	91.6	67.0	119
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	95.5	70.0	120
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	94.9	72.0	120
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	92.6	68.0	120
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	96.2	68.0	122
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	103	69.0	117
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	104	76.0	118
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	96.2	64.0	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	93.8	70.0	116
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	99.2	69.0	121
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	106	66.0	118
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	104	68.0	124
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	97.7	62.0	112
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	101	68.0	120
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	80.8	65.0	127



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3662309) - continued								
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	73.2	41.0	123
EP075(SIM)A: Phenolic Compounds (QCLot: 3662308)								
EP075(SIM): Phenol	108-95-2	0.5	mg/kg	<0.5	6 mg/kg	88.5	71.0	125
EP075(SIM): 2-Chlorophenol	95-57-8	0.5	mg/kg	<0.5	6 mg/kg	95.0	72.0	124
EP075(SIM): 2-Methylphenol	95-48-7	0.5	mg/kg	<0.5	6 mg/kg	95.3	71.0	123
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	1	mg/kg	<1	12 mg/kg	92.2	67.0	127
EP075(SIM): 2-Nitrophenol	88-75-5	0.5	mg/kg	<0.5	6 mg/kg	85.4	54.0	114
EP075(SIM): 2,4-Dimethylphenol	105-67-9	0.5	mg/kg	<0.5	6 mg/kg	96.3	68.0	126
EP075(SIM): 2,4-Dichlorophenol	120-83-2	0.5	mg/kg	<0.5	6 mg/kg	94.8	66.0	120
EP075(SIM): 2,6-Dichlorophenol	87-65-0	0.5	mg/kg	<0.5	6 mg/kg	99.1	70.0	120
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg	<0.5	6 mg/kg	92.4	70.0	116
EP075(SIM): 2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg	<0.5	6 mg/kg	75.1	54.0	114
EP075(SIM): 2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg	<0.5	6 mg/kg	82.8	60.0	114
EP075(SIM): Pentachlorophenol	87-86-5	2	mg/kg	<2	12 mg/kg	23.7	10.0	57.0
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3662308)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	92.7	77.0	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	90.4	72.0	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	96.7	73.0	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	92.0	72.0	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	88.7	75.0	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	91.0	77.0	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	94.9	73.0	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	98.2	74.0	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	90.2	69.0	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	94.8	75.0	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	93.3	68.0	116
	205-82-3							
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	94.8	74.0	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	97.2	70.0	126
EP075(SIM): Indeno(1,2,3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	74.7	61.0	121
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	74.4	62.0	118
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	70.6	63.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3662307)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	93.8	75.0	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	90.9	77.0	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	93.0	71.0	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3664165)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	104	68.4	128

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3662307)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	91.4	77.0	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	90.8	74.0	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	107	63.0	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3664165)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	105	68.4	128
EP080: BTEXN (QCLot: 3664165)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	106	62.0	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	107	67.0	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	104	65.0	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	103	66.0	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	102	68.0	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	90.0	63.0	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3667757)							
ES2115975-021	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	83.8	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	90.6	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	87.6	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	99.9	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	118	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	90.0	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	90.5	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3670321)							
ES2116789-045	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	102	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	104	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	90.8	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	94.5	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	104	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	102	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	99.4	66.0	133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3670323)							



Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3670323) - continued							
ES2116871-016	BH8 (0.7-0.8m)	EG005T: Arsenic	7440-38-2	50 mg/kg	96.0	70.0	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	94.8	70.0	130
		EG005T: Chromium	7440-47-3	50 mg/kg	82.1	68.0	132
		EG005T: Copper	7440-50-8	250 mg/kg	87.7	70.0	130
		EG005T: Lead	7439-92-1	250 mg/kg	98.7	70.0	130
		EG005T: Nickel	7440-02-0	50 mg/kg	93.4	70.0	130
		EG005T: Zinc	7440-66-6	250 mg/kg	93.5	66.0	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3667758)							
ES2115975-021	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	86.8	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3670320)							
ES2116789-045	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	85.5	70.0	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3670324)							
ES2116871-016	BH8 (0.7-0.8m)	EG035T: Mercury	7439-97-6	5 mg/kg	86.3	70.0	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3662310)							
ES2116871-001	BH1 (0.1-0.2m)	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	111	70.0	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 3662309)							
ES2116871-001	BH1 (0.1-0.2m)	EP068: gamma-BHC	58-89-9	0.5 mg/kg	91.7	70.0	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	93.4	70.0	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	109	70.0	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	113	70.0	130
		EP068: Endrin	72-20-8	2 mg/kg	106	70.0	130
		EP068: 4,4'-DDT	50-29-3	2 mg/kg	88.9	70.0	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3662309)							
ES2116871-001	BH1 (0.1-0.2m)	EP068: Diazinon	333-41-5	0.5 mg/kg	120	70.0	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	102	70.0	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	89.9	70.0	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	97.0	70.0	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	102	70.0	130
EP075(SIM)A: Phenolic Compounds (QCLot: 3662308)							
ES2116871-001	BH1 (0.1-0.2m)	EP075(SIM): Phenol	108-95-2	10 mg/kg	85.1	70.0	130
		EP075(SIM): 2-Chlorophenol	95-57-8	10 mg/kg	91.5	70.0	130
		EP075(SIM): 2-Nitrophenol	88-75-5	10 mg/kg	84.2	60.0	130
		EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	10 mg/kg	85.4	70.0	130
		EP075(SIM): Pentachlorophenol	87-86-5	10 mg/kg	69.2	20.0	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3662308)							
ES2116871-001	BH1 (0.1-0.2m)	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	84.2	70.0	130



Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3662308) - continued							
ES2116871-001	BH1 (0.1-0.2m)	EP075(SIM): Pyrene	129-00-0	10 mg/kg	93.3	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3662307)							
ES2116871-001	BH1 (0.1-0.2m)	EP071: C10 - C14 Fraction	----	523 mg/kg	94.9	73.0	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	115	53.0	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	110	52.0	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3664165)							
ES2116871-001	BH1 (0.1-0.2m)	EP080: C6 - C9 Fraction	----	32.5 mg/kg	111	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3662307)							
ES2116871-001	BH1 (0.1-0.2m)	EP071: >C10 - C16 Fraction	----	860 mg/kg	102	73.0	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	115	53.0	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	70.8	52.0	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3664165)							
ES2116871-001	BH1 (0.1-0.2m)	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	113	70.0	130
EP080: BTEXN (QCLot: 3664165)							
ES2116871-001	BH1 (0.1-0.2m)	EP080: Benzene	71-43-2	2.5 mg/kg	106	70.0	130
		EP080: Toluene	108-88-3	2.5 mg/kg	107	70.0	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	110	70.0	130
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	107	70.0	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	109	70.0	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	89.2	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2116871	Page	: 1 of 9
Client	: ECON Environmental Pty Ltd	Laboratory	: Environmental Division Sydney
Contact	: Con Kariotoglou	Telephone	: +61-2-8784 8555
Project	: St Leonards	Date Samples Received	: 06-May-2021
Site	: ----	Issue Date	: 13-May-2021
Sampler	: Con Kariotoglou	No. of samples received	: 20
Order number	: 20-1082	No. of samples analysed	: 20

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: ✖ = Holding time breach : ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
BH1 (0.1-0.2m),	BH1 (0.6-0.7m),	05-May-2021	----	----	10-May-2021	19-May-2021	✓	
BH2 (0.0.15-0.25m),	BH2 (0.5-0.6m),							
BH3 (0.1-0.2m),	BH3 (0.6-0.7m)							
Soil Glass Jar - Unpreserved (EA055)								
BH4 (0.1-0.2m),	BH4 (0.7-0.8m),	05-May-2021	----	----	11-May-2021	19-May-2021	✓	
BH5 (0.1-0.2m),	BH5 (0.6-0.7m),							
BH6 (0.1-0.2m),	BH6 (0.5-0.6m),							
BH7 (0.1-0.2m),	BH7 (0.5-0.6m),							
BH8 (0.1-0.2m),	BH8 (0.7-0.8m),							
BH9 (0.1-0.2m),	BH9 (0.8-0.9m),							
D1,	D2							
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Snap Lock Bag - Friable Asbestos/PSD Bag (EA200)								
BH1 (0.1-0.2m),	BH1 (0.6-0.7m),	05-May-2021	----	----	07-May-2021	01-Nov-2021	✓	
BH2 (0.0.15-0.25m),	BH2 (0.5-0.6m),							
BH3 (0.1-0.2m),	BH3 (0.6-0.7m),							
BH4 (0.1-0.2m),	BH4 (0.7-0.8m),							
BH5 (0.1-0.2m),	BH5 (0.6-0.7m),							
BH6 (0.1-0.2m),	BH6 (0.5-0.6m),							
BH7 (0.1-0.2m),	BH7 (0.5-0.6m),							
BH8 (0.1-0.2m),	D1, D2,							
BH8 (0.7-0.8m),								
BH9 (0.1-0.2m),	BH9 (0.8-0.9m)							



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA200N: Asbestos Quantification (non-NATA)								
Snap Lock Bag - Friable Asbestos/PSD Bag (EA200N)		05-May-2021	----	----	----	07-May-2021	01-Nov-2021	✓
BH1 (0.1-0.2m), BH2 (0.0.15-0.25m), BH3 (0.1-0.2m), BH4 (0.1-0.2m), BH5 (0.1-0.2m), BH6 (0.1-0.2m), BH7 (0.1-0.2m), BH8 (0.1-0.2m), BH8 (0.7-0.8m), BH9 (0.1-0.2m),	BH1 (0.6-0.7m), BH2 (0.5-0.6m), BH3 (0.6-0.7m), BH4 (0.7-0.8m), BH5 (0.6-0.7m), BH6 (0.5-0.6m), BH7 (0.5-0.6m), D1, D2, BH9 (0.8-0.9m)							
EG005(ED093)T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)		05-May-2021	10-May-2021	01-Nov-2021	✓	10-May-2021	01-Nov-2021	✓
BH1 (0.1-0.2m), BH2 (0.0.15-0.25m), BH3 (0.1-0.2m),	BH1 (0.6-0.7m), BH2 (0.5-0.6m), BH3 (0.6-0.7m)							
Soil Glass Jar - Unpreserved (EG005T)		05-May-2021	11-May-2021	01-Nov-2021	✓	11-May-2021	01-Nov-2021	✓
BH4 (0.1-0.2m), BH5 (0.1-0.2m), BH6 (0.1-0.2m), BH7 (0.1-0.2m), BH8 (0.1-0.2m), BH9 (0.1-0.2m), D1,	BH4 (0.7-0.8m), BH5 (0.6-0.7m), BH6 (0.5-0.6m), BH7 (0.5-0.6m), BH8 (0.7-0.8m), BH9 (0.8-0.9m), D2							
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG035T)		05-May-2021	10-May-2021	02-Jun-2021	✓	11-May-2021	02-Jun-2021	✓
BH1 (0.1-0.2m), BH2 (0.0.15-0.25m), BH3 (0.1-0.2m),	BH1 (0.6-0.7m), BH2 (0.5-0.6m), BH3 (0.6-0.7m)							
Soil Glass Jar - Unpreserved (EG035T)		05-May-2021	11-May-2021	02-Jun-2021	✓	12-May-2021	02-Jun-2021	✓
BH4 (0.1-0.2m), BH5 (0.1-0.2m), BH6 (0.1-0.2m), BH7 (0.1-0.2m), BH8 (0.1-0.2m), BH9 (0.1-0.2m), D1,	BH4 (0.7-0.8m), BH5 (0.6-0.7m), BH6 (0.5-0.6m), BH7 (0.5-0.6m), BH8 (0.7-0.8m), BH9 (0.8-0.9m), D2							



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)		05-May-2021	07-May-2021	19-May-2021	✓	11-May-2021	16-Jun-2021	✓
BH1 (0.1-0.2m),	BH2 (0.0.15-0.25m),							
BH3 (0.1-0.2m),	BH4 (0.1-0.2m),							
BH5 (0.1-0.2m),	BH6 (0.1-0.2m),							
BH7 (0.1-0.2m),	BH8 (0.1-0.2m),							
BH9 (0.1-0.2m),	D1,							
D2								
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)		05-May-2021	07-May-2021	19-May-2021	✓	11-May-2021	16-Jun-2021	✓
BH1 (0.1-0.2m),	BH2 (0.0.15-0.25m),							
BH3 (0.1-0.2m),	BH4 (0.1-0.2m),							
BH5 (0.1-0.2m),	BH6 (0.1-0.2m),							
BH7 (0.1-0.2m),	BH8 (0.1-0.2m),							
BH9 (0.1-0.2m),	D1,							
D2								
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068)		05-May-2021	07-May-2021	19-May-2021	✓	11-May-2021	16-Jun-2021	✓
BH1 (0.1-0.2m),	BH2 (0.0.15-0.25m),							
BH3 (0.1-0.2m),	BH4 (0.1-0.2m),							
BH5 (0.1-0.2m),	BH6 (0.1-0.2m),							
BH7 (0.1-0.2m),	BH8 (0.1-0.2m),							
BH9 (0.1-0.2m),	D1,							
D2								
EP075(SIM)A: Phenolic Compounds								
Soil Glass Jar - Unpreserved (EP075(SIM))		05-May-2021	07-May-2021	19-May-2021	✓	11-May-2021	16-Jun-2021	✓
BH1 (0.1-0.2m),	BH2 (0.0.15-0.25m),							
BH3 (0.1-0.2m),	BH4 (0.1-0.2m),							
BH5 (0.1-0.2m),	BH6 (0.1-0.2m),							
BH7 (0.1-0.2m),	BH8 (0.1-0.2m),							
BH9 (0.1-0.2m),	D1,							
D2								



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM)) BH1 (0.1-0.2m), BH2 (0.0.15-0.25m), BH3 (0.1-0.2m), BH4 (0.1-0.2m), BH5 (0.1-0.2m), BH6 (0.1-0.2m), BH7 (0.1-0.2m), BH8 (0.1-0.2m), BH8 (0.7-0.8m), BH9 (0.1-0.2m),	BH1 (0.6-0.7m), BH2 (0.5-0.6m), BH3 (0.6-0.7m), BH4 (0.7-0.8m), BH5 (0.6-0.7m), BH6 (0.5-0.6m), BH7 (0.5-0.6m), D1, D2, BH9 (0.8-0.9m)	05-May-2021	07-May-2021	19-May-2021	✔	11-May-2021	16-Jun-2021	✔
EP080/071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071) BH1 (0.1-0.2m), BH2 (0.0.15-0.25m), BH3 (0.1-0.2m), BH4 (0.1-0.2m), BH5 (0.1-0.2m), BH6 (0.1-0.2m), BH7 (0.1-0.2m), BH8 (0.1-0.2m), BH8 (0.7-0.8m), BH9 (0.1-0.2m),	BH1 (0.6-0.7m), BH2 (0.5-0.6m), BH3 (0.6-0.7m), BH4 (0.7-0.8m), BH5 (0.6-0.7m), BH6 (0.5-0.6m), BH7 (0.5-0.6m), D1, D2, BH9 (0.8-0.9m)	05-May-2021	07-May-2021	19-May-2021	✔	10-May-2021	16-Jun-2021	✔
Soil Glass Jar - Unpreserved (EP080) BH1 (0.1-0.2m), BH2 (0.0.15-0.25m), BH3 (0.1-0.2m), BH4 (0.1-0.2m), BH5 (0.1-0.2m), BH6 (0.1-0.2m), BH7 (0.1-0.2m), BH8 (0.1-0.2m), BH8 (0.7-0.8m), BH9 (0.1-0.2m),	BH1 (0.6-0.7m), BH2 (0.5-0.6m), BH3 (0.6-0.7m), BH4 (0.7-0.8m), BH5 (0.6-0.7m), BH6 (0.5-0.6m), BH7 (0.5-0.6m), D1, D2, BH9 (0.8-0.9m)	05-May-2021	07-May-2021	19-May-2021	✔	11-May-2021	19-May-2021	✔



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP071) BH1 (0.1-0.2m), BH2 (0.0.15-0.25m), BH3 (0.1-0.2m), BH4 (0.1-0.2m), BH5 (0.1-0.2m), BH6 (0.1-0.2m), BH7 (0.1-0.2m), BH8 (0.1-0.2m), BH8 (0.7-0.8m), BH9 (0.1-0.2m),	BH1 (0.6-0.7m), BH2 (0.5-0.6m), BH3 (0.6-0.7m), BH4 (0.7-0.8m), BH5 (0.6-0.7m), BH6 (0.5-0.6m), BH7 (0.5-0.6m), D1, D2, BH9 (0.8-0.9m)	05-May-2021	07-May-2021	19-May-2021	✔	10-May-2021	16-Jun-2021	✔
Soil Glass Jar - Unpreserved (EP080) BH1 (0.1-0.2m), BH2 (0.0.15-0.25m), BH3 (0.1-0.2m), BH4 (0.1-0.2m), BH5 (0.1-0.2m), BH6 (0.1-0.2m), BH7 (0.1-0.2m), BH8 (0.1-0.2m), BH8 (0.7-0.8m), BH9 (0.1-0.2m),	BH1 (0.6-0.7m), BH2 (0.5-0.6m), BH3 (0.6-0.7m), BH4 (0.7-0.8m), BH5 (0.6-0.7m), BH6 (0.5-0.6m), BH7 (0.5-0.6m), D1, D2, BH9 (0.8-0.9m)	05-May-2021	07-May-2021	19-May-2021	✔	11-May-2021	19-May-2021	✔
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) BH1 (0.1-0.2m), BH2 (0.0.15-0.25m), BH3 (0.1-0.2m), BH4 (0.1-0.2m), BH5 (0.1-0.2m), BH6 (0.1-0.2m), BH7 (0.1-0.2m), BH8 (0.1-0.2m), BH8 (0.7-0.8m), BH9 (0.1-0.2m),	BH1 (0.6-0.7m), BH2 (0.5-0.6m), BH3 (0.6-0.7m), BH4 (0.7-0.8m), BH5 (0.6-0.7m), BH6 (0.5-0.6m), BH7 (0.5-0.6m), D1, D2, BH9 (0.8-0.9m)	05-May-2021	07-May-2021	19-May-2021	✔	11-May-2021	19-May-2021	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Moisture Content	EA055	4	34	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	6	59	10.17	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	6	60	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	3	59	5.08	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	60	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	3	59	5.08	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	60	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	3	59	5.08	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	3	60	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Asbestos Classification and Quantitation per NEPM 2013	* EA200N	SOIL	Asbestos Classification and Quantitation per NEPM with Confirmation of Identification by AS 4964 - Gravimetric determination of Asbestos Containing Material, Fibrous Asbestos, Asbestos Fines and sample weight and calculation of percentage concentrations per NEPM protocols. Asbestos (Fines and Fibrous FA+AF) is reported as the equivalent weight in the sample received after accounting for sub-sampling (where applicable for the <7mm and/or <2mm fractions).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3).
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270 Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM Schedule B(3).
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015 Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.

Preparation Methods	Method	Matrix	Method Descriptions
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Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2116871

Client : ECON Environmental Pty Ltd Contact : Con Kariotoglou Address : PO Box 85 Oatlands NSW E-mail : info@econenvironmental.com.au Telephone : ---- Facsimile : ---- Project : St Leonards Order number : 20-1082 C-O-C number : ---- Site : ---- Sampler : Con Kariotoglou	Laboratory : Environmental Division Sydney Contact : Customer Services ES Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : ALSEnviro.Sydney@ALSGlobal.com Telephone : +61-2-8784 8555 Facsimile : +61-2-8784 8500 Page : 1 of 2 Quote number : ES2020ECONEV0001 (EN/222) QC Level : NEPM 2013 B3 & ALS QC Standard
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Dates

Date Samples Received : 06-May-2021 09:00	Issue Date : 06-May-2021
Client Requested Due : 13-May-2021	Scheduled Reporting Date : 13-May-2021
Date	

Delivery Details

Mode of Delivery : Carrier	Security Seal : Intact.
No. of coolers/boxes : 2	Temperature : 12.5°C - Ice Bricks present
Receipt Detail :	No. of samples received / analysed : 20 / 20

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Asbestos analysis will be conducted by ALS Newcastle.**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EA200F Asbestos Quantitation (FA+AF) in Soil by	SOIL - S-19 TRH/BTEXN/PAH/Ph/OC/OP/PCB/8 metals	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES2116871-001	05-May-2021 00:00	BH1 (0.1-0.2m)	✓	✓	✓	
ES2116871-002	05-May-2021 00:00	BH1 (0.6-0.7m)	✓	✓		✓
ES2116871-003	05-May-2021 00:00	BH2 (0.0.15-0.25m)	✓	✓	✓	
ES2116871-004	05-May-2021 00:00	BH2 (0.5-0.6m)	✓	✓		✓
ES2116871-005	05-May-2021 00:00	BH3 (0.1-0.2m)	✓	✓	✓	
ES2116871-006	05-May-2021 00:00	BH3 (0.6-0.7m)	✓	✓		✓
ES2116871-007	05-May-2021 00:00	BH4 (0.1-0.2m)	✓	✓	✓	
ES2116871-008	05-May-2021 00:00	BH4 (0.7-0.8m)	✓	✓		✓
ES2116871-009	05-May-2021 00:00	BH5 (0.1-0.2m)	✓	✓	✓	
ES2116871-010	05-May-2021 00:00	BH5 (0.6-0.7m)	✓	✓		✓
ES2116871-011	05-May-2021 00:00	BH6 (0.1-0.2m)	✓	✓	✓	
ES2116871-012	05-May-2021 00:00	BH6 (0.5-0.6m)	✓	✓		✓
ES2116871-013	05-May-2021 00:00	BH7 (0.1-0.2m)	✓	✓	✓	
ES2116871-014	05-May-2021 00:00	BH7 (0.5-0.6m)	✓	✓		✓
ES2116871-015	05-May-2021 00:00	BH8 (0.1-0.2m)	✓	✓	✓	
ES2116871-016	05-May-2021 00:00	BH8 (0.7-0.8m)	✓	✓		✓
ES2116871-017	05-May-2021 00:00	BH9 (0.1-0.2m)	✓	✓	✓	
ES2116871-018	05-May-2021 00:00	BH9 (0.8-0.9m)	✓	✓		✓
ES2116871-019	05-May-2021 00:00	D1	✓	✓	✓	
ES2116871-020	05-May-2021 00:00	D2	✓	✓	✓	

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

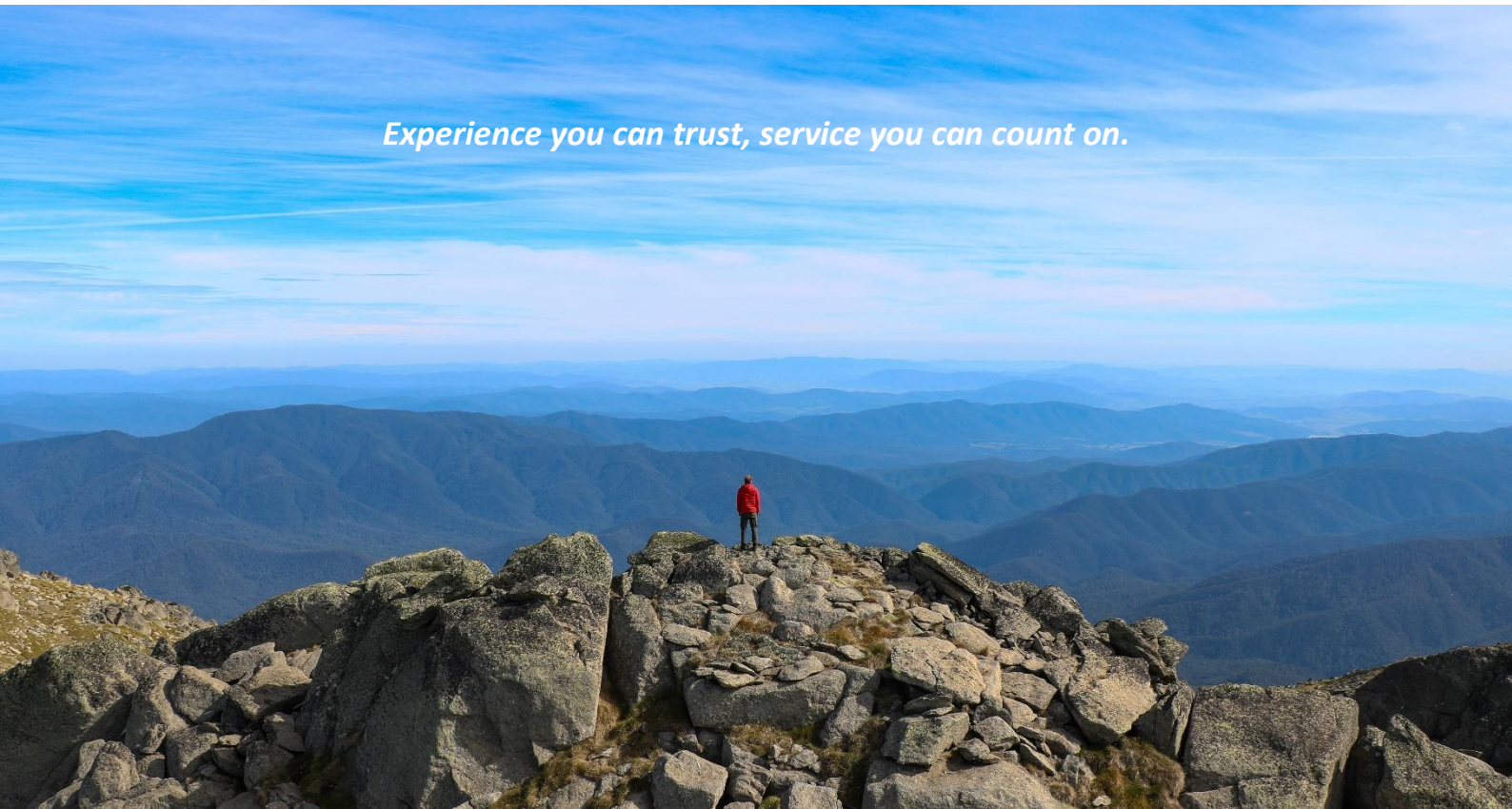
Requested Deliverables

Con Kariotoglou

- *AU Certificate of Analysis - NATA (COA)	Email	info@econenvironmental.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QC Rep) (QCI)	Email	info@econenvironmental.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	info@econenvironmental.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	info@econenvironmental.com.au
- A4 - AU Tax Invoice (INV)	Email	info@econenvironmental.com.au
- Chain of Custody (CoC) (COC)	Email	info@econenvironmental.com.au
- EDI Format - ESDAT (ESDAT)	Email	info@econenvironmental.com.au
- EDI Format - XTab (XTAB)	Email	info@econenvironmental.com.au

APPENDIX E: HAZARDOUS MATERIAL ASSESSMENT

Experience you can trust, service you can count on.



Hazardous Material Assessment

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

Prepared For:	New Golden International Gladesville Pty Ltd
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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.
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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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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.

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.

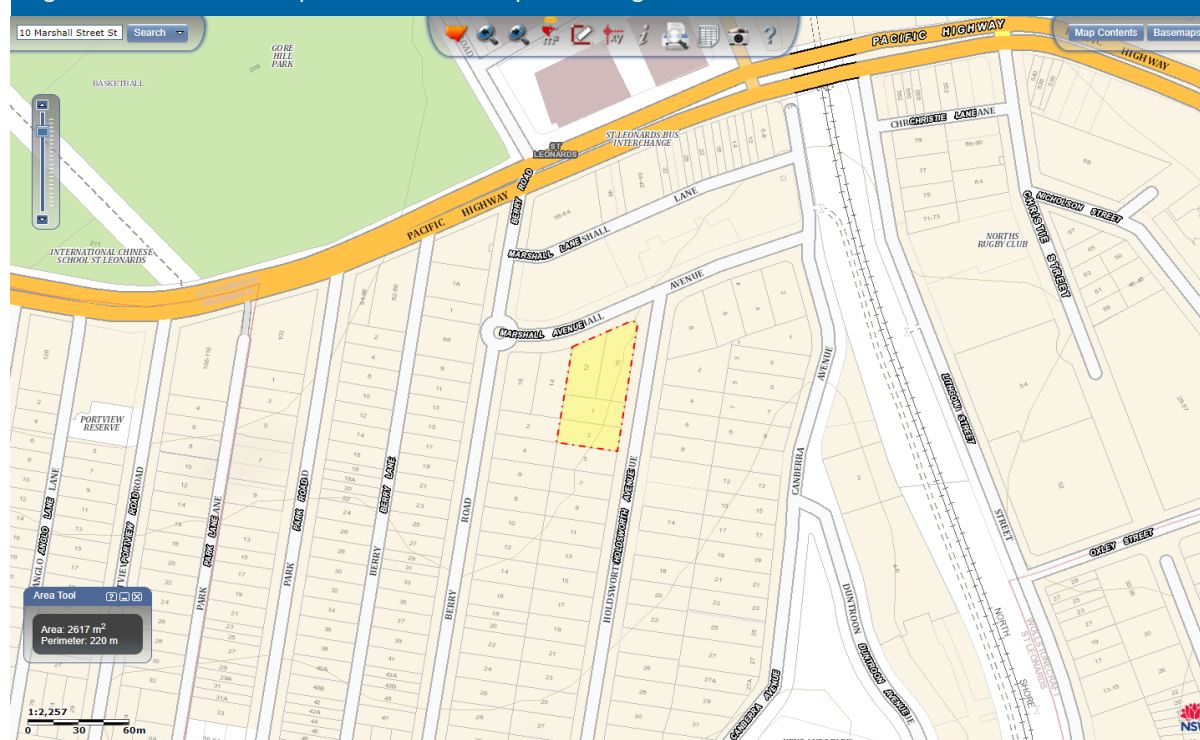
2. SITE IDENTIFICATION

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



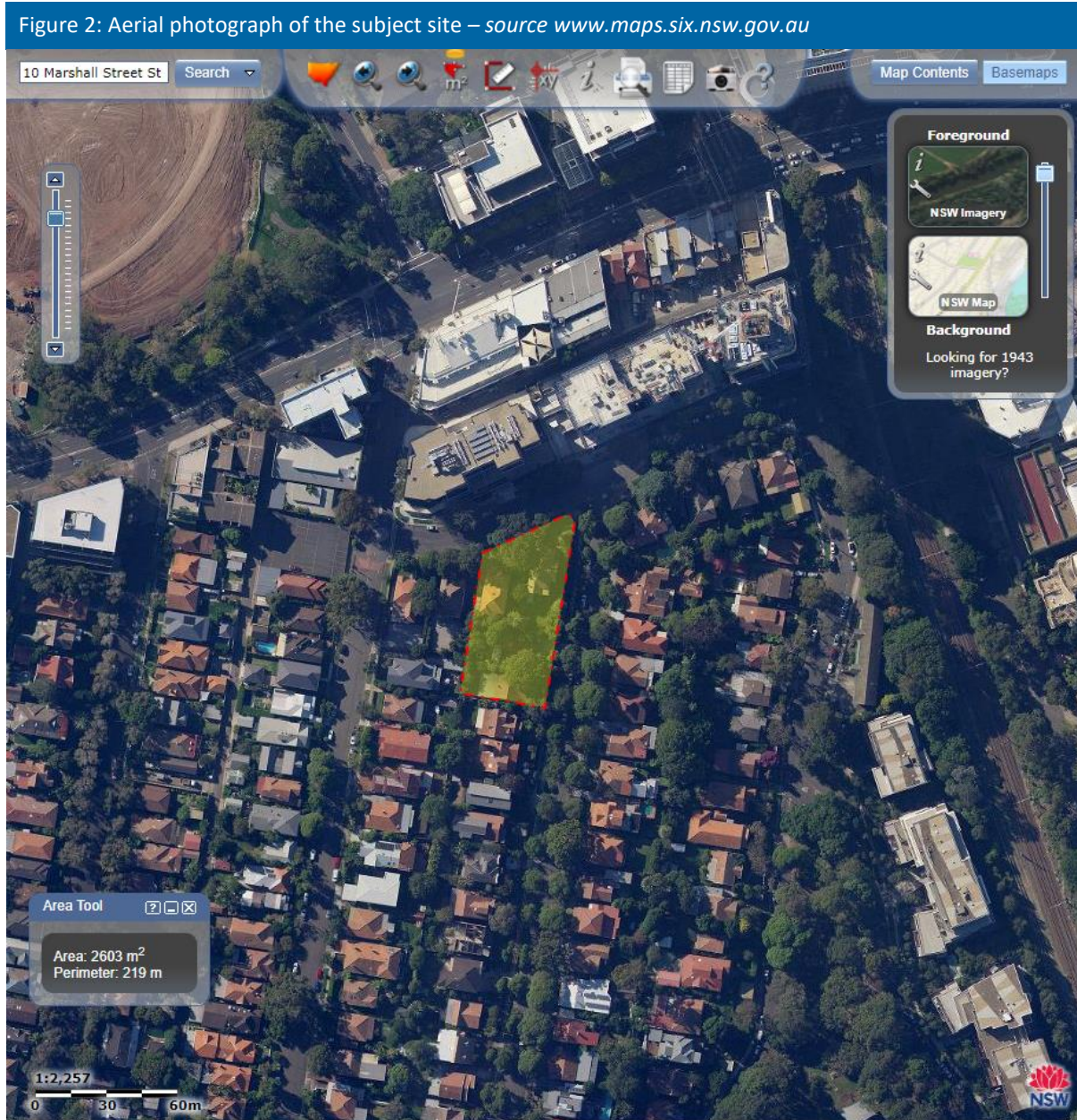
REF: 20-1082 Hazardous Material Assessment, Marshall Street & Holdsworth Ave, St Leonards NSW - ©2021 ECON Environmental Pty Ltd

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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



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.

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- 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.
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- 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.

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 (m²) 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

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.

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.

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

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.

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.

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:

- 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:

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.

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

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.

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.

APPENDIX A: HAZARDOUS MATERIALS REGISTER

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 Negligible

Likelihood: A Almost Certain/ B likely/ C Possible/ D Unlikely/ E Rare / F Negligible

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.																						

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



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.



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.



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



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



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



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



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.



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.



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



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



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



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

APPENDIX C: UNEXPECTED ASBESTOS FINDS PROTOCOL

