

Planning Proposal

73 - 75 Gardeners Road, Eastlakes

Prepared for
Sydney Water

Date
28 September 2017

Architectus Group Pty Ltd
ABN 90 131 245 684

Nominated Architect
Managing Director
Ray Brown
NSWARB 6359

Adelaide
Lower Ground Floor
57 Wyatt Street
Adelaide SA 5000
Australia
T +61 8 8427 7300
adelaide@architectus.com.au

Melbourne
Level 25, 385 Bourke Street
Melbourne VIC 3000
Australia
T +61 3 9429 5733
F + 61 3 9429 8480
melbourne@architectus.com.au

Sydney
Level 18, MLC Centre
19 Martin Place
Sydney NSW 2000
Australia
T +61 2 8252 8400
F +61 2 8252 8600
sydney@architectus.com.au

architectus.com.au

Report Contact

Adrian Melo
Associate and Urban Planner
Adrian.melo@architectus.com.au

This report is considered a draft unless signed by a Director



September 2017

Michael Harrison

Director Urban Design and Planning

Revision history

| Issue Reference | Issue Date | Issue Status |
|-----------------|-------------------|-------------------------|
| A | 27 September 2017 | Draft for Client Review |
| B | 29 September 2017 | Final |
| | | |
| | | |
| | | |

Contents

| | |
|--|----|
| Executive summary | 6 |
| 1. Introduction | 13 |
| 1.1 Preliminary | 13 |
| 1.2 Structure of this report | 14 |
| 1.3 Preparation of the application | 14 |
| 1.4 Evolution of the design | 15 |
| 1.5 Project team | 18 |
| 2. The site and its context | 19 |
| 2.1 Regional context | 19 |
| 2.2 Local context and site surrounds | 20 |
| 2.3 Site details | 22 |
| 2.4 Legal description | 23 |
| 2.5 Land ownership | 23 |
| 2.6 Site photos | 24 |
| 2.7 Planning context | 25 |
| 2.8 Strategic planning context | 26 |
| 2.9 Current planning controls | 30 |
| 2.10 Other plans and policies | 36 |
| 2.11 Site context | 38 |
| 2.12 Demographic profile and trends | 41 |
| 3. The vision | 42 |
| 3.1 Need for redevelopment | 42 |
| 3.2 Design philosophy | 42 |
| 3.3 Master plan | 43 |
| 3.4 Voluntary Planning Agreement | 44 |
| 4. Objectives and intended outcomes | 45 |
| 4.1 Intended outcomes | 45 |
| 4.2 Objectives of the proposed controls | 46 |
| 4.3 Amendments to planning provisions | 47 |
| 4.4 Land use zoning | 47 |
| 4.5 Maximum building height | 49 |
| 4.6 Maximum floor space ratio | 49 |
| 5. Explanation of provisions | 51 |
| 5.1 Proposed amendments to the Botany Bay planning controls | 51 |
| 5.2 Understanding of site context | 52 |
| 5.3 Assessment | 53 |
| 6. Justification | 54 |
| 6.1 Section A – Need for the Planning Proposal | 54 |
| 6.2 Section B – Relationship to strategic planning framework | 56 |
| 6.3 Section C – Environmental, social and economic impact | 69 |
| 6.4 Section D – State and Commonwealth interests | 70 |
| 7. Mapping | 72 |
| 7.1 Existing and proposed LEP maps | 73 |
| 8. Consultation | 78 |
| 8.1 Bayside Council | 78 |
| 8.2 Randwick Council | 80 |
| 8.3 Sydney Water | 81 |
| 8.4 Golf Course | 81 |
| 8.5 Community | 81 |
| 9. Project timeline | 83 |
| 9.1 Timeline | 83 |
| 9.2 Staging | 83 |
| 10. Conclusion | 84 |

Figures & tables

List of figures

| | | |
|-----------|--|----|
| Figure 1 | Subject site – 73-75 Gardeners Road, Eastlakes | 7 |
| Figure 2 | Artists impression of Gardeners Road looking west | 12 |
| Figure 3 | Local context plan | 13 |
| Figure 14 | Aerial view of the subject site | 23 |
| Figure 15 | Entrance to 75 Gardeners Road showing level change | 24 |
| Figure 16 | Boundary to Gardeners Road showing level change | 24 |
| Figure 17 | Existing trees along corner Gardeners Road and Slattery Place | 24 |
| Figure 18 | Single storey dwellings and unit block across intersection at Gardeners Rd | 24 |
| Figure 19 | View of Water Board Depot | 24 |
| Figure 20 | View towards site from eastern boundary | 24 |
| Figure 21 | Five storey residential flat building at Slattery Place | 24 |
| Figure 22 | Western boundary from Slattery Place | 24 |
| Figure 23 | View north towards site from golf course fairway | 25 |
| Figure 24 | Southern boundary of site to golf course | 25 |
| Figure 27 | Land use zoning map | 32 |
| Figure 28 | Maximum building height map | 33 |
| Figure 29 | Maximum floor space ratio plan | 34 |
| Figure 31 | Foreshore Building Line, Terrestrial Biodiversity, Wetlands Map | 35 |
| Figure 22 | Proposed maximum building height map | 49 |
| Figure 23 | Proposed maximum floor space ratio | 50 |
| Figure 35 | Heritage map of the subject site | 70 |
| Figure 25 | Aerial view of the subject site | 72 |
| Figure 26 | Land use zoning map | 73 |
| Figure 27 | Proposed land use zoning map | 73 |
| Figure 27 | Proposed land use zoning map with deferred matter | 74 |
| Figure 28 | Maximum building height map | 74 |
| Figure 29 | Proposed maximum building height map | 75 |
| Figure 29 | Proposed maximum building height map | 75 |
| Figure 30 | Maximum floor space ratio plan | 76 |
| Figure 31 | Proposed maximum floor space ratio map | 76 |
| Figure 31 | Proposed maximum floor space ratio map | 77 |

List of tables

| | | |
|---------|--|----|
| Table 1 | Project team | 18 |
| Table 2 | A Plan for Growing Sydney | 56 |
| Table 3 | Draft Central District Plan | 57 |
| Table 4 | Botany Bay Planning Strategy 2031: Local Livability, Global Connection | 58 |
| Table 5 | Response to State Environmental Planning Policies | 59 |
| Table 6 | Response to Section 117 Directions | 61 |
| Table 7 | Project timeline | 83 |

Attachments

List of attachments

Attachment A – Urban Context Report, prepared by Architectus, dated September 2017
Attachment B – Site Survey, Prepared by Linker Surveying, dated August 2015
Attachment C – Site Survey, Prepared by Cardno, dated May 2017
Attachment D – Site Audit Statement, Prepared by Ramboll Environ Australia, dated June 2017
Attachment E – Transport Report, Prepared by Arup, dated September 2017
Attachment F – Draft Master Plan: Preliminary Heritage Review, Prepared by NBRSA Architects, dated September 2017
Attachment G – Flora and Fauna Surveys 73 Gardeners Road, Prepared by ACS Environmental Pty Ltd dated September 2017
Attachment H – Flora and Fauna Surveys 75 Gardeners Road, Prepared by ACS Environmental Pty Ltd, dated November 2015
Attachment I – Aeronautical Assessment, Prepared by Strategic Airspace, dated September 2017
Attachment J – Environmental Noise Impact Assessment, Prepared by Acoustic Logic, dated September 2017
Attachment K – Arboricultural Impact Appraisal and Method Statement, Prepared by Naturally Trees, dated September 2017
Attachment L – Geotechnical Assessment 73 Gardeners Road, Prepared by JK Geotechnics, dated July 2017
Attachment M – Geotechnical Assessment 75 Gardeners Road, Prepared by JK Geotechnics, dated May 2015
Attachment N – Hydrology, Stormwater and Creek Assessment 73-75 Gardeners Road, Prepared by Northrop Consulting, dated September 2017
Attachment O – Proposed Mapping Amendments, Prepared by Architectus, dated September 2017

Executive summary

This Planning Proposal is prepared by Architectus on behalf of Sydney Water for a vacant site located at 75 Gardeners Road and the neighbouring Sydney Water Depot at 73 Gardeners Road, in the suburb of Eastlakes. The Planning Proposal seeks Council support to progress an amendment to the land use zoning, maximum height of buildings and floor space ratio applicable to the site in the Botany Bay Local Environmental Plan (BBLEP) 2013.

Sydney Water are in the process of divesting surplus land to allow redevelopment and improved utilisation of this land within the Sydney Metropolitan area. For the subject sites, due to their location within the wider context of Eastlakes, it is proposed to seek a rezoning to allow for high density residential development and other appropriate supporting land uses such as small scale shops, retail or similar uses. The proposal will enable the future redevelopment of both sites for residential dwellings contained within buildings ranging in height between 6-14 storeys. No approval is sought for the master plan at this stage as it simply evidences that the proposed changes to the planning controls are appropriate.

The proposed amendments to the BBLEP 2013 include the following:

- Land use – rezone from SP1 Recreation Facility (Outdoor) and SP2 Infrastructure (Sydney Water Depot) to R4 High Density Residential (including amendments to the current Schedule 1 Additional Permitted Land Uses to permit low scale retail / commercial uses on site);
- Height of buildings – increase from 14 metres (in the existing SP1 zone) to a range from 29 metres to 50 metres across both sites; and
- Floor space ratio – increase from 1:1 (in the existing SP1 zone) to 1.65:1 for 75 Gardeners Road and implement an FSR of 1.95:1 to the site at 75 Gardeners Road.

However, the land zoning, HOB and FSR development standards for 73 Gardeners Road are proposed to be deferred until the current use of the site as a Sydney Water Operational Depot is no longer required by Sydney Water. During this time, it is proposed that the relevant maps in the BBLEP will identify 73 Gardeners Road as a 'deferred matter' and that the current zoning and development standards will continue to apply. It is intended at that both sites would be developed by one entity to achieve consistency and a better outcome, however the master plan has been developed to allow both sites to be developed independently from one another to allow for the ongoing use of the Sydney Water Depot until such time that it is surplus to their operational requirements.

The site

This report relates to the land at 75 Gardeners Road, Eastlakes (Lot 51 in DP 1216168) and the neighbouring Sydney Water Depot Site at 73 Gardeners Road (Lot 101 in DP 1232571), identified in **Figure 1**. The site is an irregular allotment. The site at 75 Gardeners Road is approximately 1.46 ha in area and is currently vacant but was previously occupied by the garden centre tenant Gardens-R-Us. The Sydney Water Operational Depot site is approximately 1.28 ha and currently

contains a carparking area, a concrete and metal warehouse and office building. A portion of the site is also currently occupied by a vacant residential dwelling to the east of 75a Gardeners Road.

The entire site area has a total area of approximately 2.75 ha.



Figure 1 Subject site – 73-75 Gardeners Road, Eastlakes
Site outlined and shaded in blue. Source: Six Maps, NSW Government

This Planning Proposal has been drafted in accordance with Section 55 of the Environmental Planning and Assessment Act 1979 (EP&A Act) and *A Guide to Preparing Planning Proposals*, NSW Department of Planning and Environment (2016). In line with these documents, this Planning Proposal explains the intended effect of the proposed instrument and sets out the justification for the making of the proposed instrument.

Strategic and planning context

The site is well located on Gardeners Road and is bound by land occupied by The Lakes Golf Club to the south and east. From its elevated position, the site enjoys expansive views over the golf course, Botany Wetlands and beyond towards Botany Bay.

To the north, the site is dominated by its boundary to Gardeners Road, which is also aligned with the boundary of Randwick LGA. The western boundary of the site borders the residential cul-de-sac Slattery Place.

The site is well located, with direct bus links to Sydney CBD, Mascot, Bondi Junction, Eastgardens and the University of NSW. There is also a future light rail station proposed at Kingsford, which is around 10-15 minutes' walk east along Gardeners Road.

There are two shopping centres within 800 metres (Eastlakes and Kingsford) and two schools within a 10-15 minute walk radius. There are also sports fields and public open spaces nearby, with the potential for links into and through the Botany Wetlands.

The site area of approximately 2.75 ha presents a unique opportunity in Eastlakes to provide for a higher density form of housing in the area to meet the needs of the existing and future residents of the LGA. A whole-of-site master plan has been prepared and tested, demonstrating the benefit of allowing a high density form of residential living in the area, to support the rezoning of the site.

No approval is sought for the master plan at this stage as it simply seeks to evidence that the proposed changes to the planning controls are appropriate. Any

future development of the site will be subject to future development applications lodged with Council. The master plan envisages that both sites will be developed, but ensures that each site can function independently from one another. At this stage, due to the current use of 73 Gardeners Road as a Sydney Water Depot, it is unknown whether both sites will be sold simultaneously, or whether both sites will be developed jointly. This will be subject to the outcomes of the Sydney Water Depot Optimization report which is still ongoing. It is envisaged that both sites will be sold to one entity to enable the sites to be developed in stages. The timing of the relocation of Sydney Water's operations at 73 Gardeners Road is subject to the finalisation of the Depot Optimisation report.

Strategic merit test

The proposed amendments to the BBLEP 2013 are consistent with relevant strategic plans, including the Sydney Metropolitan Strategy *A Plan for Growing Sydney*, the *Draft Central District Plan*, and the *Botany Bay Planning Strategy 2031*. Refer to **Section 2.5**.

The relevant strategic documents recognise the need to provide a range a housing choice for central Sydney to accommodate a reduction in household sizes, while ensuring housing is delivered in the right locations and with access to jobs:

- The *Draft Central District Plan* estimates that “there will be 61,100 more people living alone over the next 20 years, which will be the fastest growing household type between 2016 and 2036”; and
- The Bayside Council *Botany Bay Planning Strategy 2031* recognises the opportunity to provide more housing within close proximity to the Eastlakes commercial centre and the need to “enhance access to high quality open space assets” such as the Botany Wetlands.

The proposed amendments to the BBLEP 2013 will support the proposed master plan to redevelop the site to provide for more residential development in the suburb of Eastlakes. This will allow for an increase in apartment style living within close proximity to commercial centres, good quality open space and with connections to schools and jobs. Critically, the sites redevelopment will allow for its enhanced relationship with sites immediate surrounds through the delivery of residential units, publicly accessible open space and low scale supporting commercial / retail spaces.

Site specific merit test

Several master plan options were considered, based the following constraints and conditions to guide the planning for the site:

- Retain existing and valuable trees, especially to the perimeter of the site.
- Retain the existing intersection as the primary site access from Gardeners Road.
- Work with and improve existing retaining wall structures along the site frontage.
- Use internal vehicular circulation to provide an increased buffer/setback to Gardeners Road.
- Maintain a transition in building heights towards the existing apartments on Slattery Place.
- Create a series of communal open spaces.
- Orientate built form and open space to maximise solar access to communal space.
- Maximise views from open space to the south over the golf course.

- Provide an improved response for stormwater / flooding to provide usable public open space.
- Retain the existing landscape buffer to the golf course.
- Enhance site permeability through a defined pedestrian network.
- Minimise the impact on the golf course infrastructure particularly greens and fairway views.

This Planning Proposal has considered potential environmental impacts of the proposed redevelopment of 73-75 Gardeners Road, including impacts of the proposed redevelopment on residents from surrounding neighbourhoods and the unimpeded use of the adjacent golf course.

The heritage context of the site has been taken into consideration and has helped to shape the master plan for the site. The site is not a heritage item itself, and is not within close proximity to any heritage listed items. The nearest heritage item is within the Randwick LGA and is the St Spyridon Green Orthodox Church at 78 Gardeners Road, approximately 440 metres from the site. However, the Botany Wetlands are located to the south and east of the site. This area is identified on the Heritage Map of the BBLEP 2013 as being an item of environmental heritage.

Other supporting reports including transport, stormwater, acoustic, arboricultural, geotechnical, aeronautical, heritage and ecology have also been provided which have identified that the proposal is appropriate for the subject site.

Consultation with relevant stakeholders, including residents from the adjacent properties and the golf course has been undertaken including presentation of the preferred urban design option for the site. This consultation focused primarily on the 75 Gardeners Road as at that stage the Sydney Water Depot site was not identified for potential divestment. However, the critical findings of this initial consultation were considered and implemented as part of the master plan development for the Sydney Water Depot Site.

The master plan provides a holistic strategy to redevelop the currently vacant Sydney Water site at 75 Gardeners Road (formerly Gardens-R-U's) and the existing Sydney Water Depot at 73 Gardeners Road into high density residential to accommodate the growing population for the central Sydney district. The proposal will enable the future redevelopment of both sites resulting in approximately 744 units, 1417 parking spaces and a range of building heights between 6-14 storeys. It should be noted that subject to timing constraints for Sydney Water, the sites may be developed jointly or may be developed independently in separate stages.

Proposed amendments to the Botany Bay planning controls

The following amendments to the BBLEP 2013 are proposed to facilitate the preferred master plan option, evidencing design led planning:

- Land use – rezone from SP1 and SP2 to R4 High Density Residential, to facilitate redevelopment of the site to accommodate the growing population for Sydney and provide for high quality apartment housing stock for the Eastlakes residential area (including amendments to the current Schedule 1 Additional Permitted Land Uses to permit low scale retail / commercial uses on site and prohibit garden centres, hardware and building supplies, landscaping material supplies);
- Height of buildings – amend the BBLEP 2013 from 14 meters at 75 Gardeners Road (the Sydney Water Depot site does not currently have a maximum height control) of a range of 29 metres to 50 metres across the site. This will allow for optimal built form and public domain outcomes and to facilitate a redevelopment of the site; and
- Floor space ratio – amend the BBLEP 2013 to increase the maximum floor

space ratio permitted from 1:1 at 75 Gardeners Road (the Sydney Water Depot site does not currently have a maximum floor space ratio control) to 1.65:1 for 75 Gardeners Road and 1.95:1 for 73 Gardeners Road. This will allow for redevelopment of the site for high density residential, providing for optimal built form and excellent public domain outcomes.

This Planning Proposal addresses the whole of the site, however the rezoning of the existing Sydney Water Depot at 73 Gardeners Road is proposed to be deferred until the current use of the site as a water depot is no longer required. The timing of this is subject to the finalisation of a Depot Optimization Report currently being prepared by Sydney Water.

The planning for both sites has been undertaken together to ensure the orderly planning and coordinated design of the development, however the master plan has been designed to allow for the development of 75 Gardeners Road to occur independently of the Sydney Water Depot site at 73 Gardeners Road. The inclusion of 73 Gardeners Road creates an opportunity to provide a better design outcome for both the immediate surrounding area and the wider Eastlakes area.

Assessment

A number of assessments have been undertaken to accompany the Planning Proposal and investigate potential issues within the proposed legislative amendments, including transport, ecological, heritage, geotechnical, aeronautical and acoustic assessments, and an Urban Context Report.

These assessments demonstrate that the legislative amendments sought in this Planning Proposal and the preferred urban design concept would be feasible and have acceptable impacts.

Justification

We consider this Planning Proposal to be well justified on the following basis:

- The Planning Proposal is consistent with the objectives and actions of the NSW Government's Sydney Metropolitan Strategy, *A Plan for Growing Sydney*, as well as district and local strategic planning objectives;
- The proposed redevelopment of the site will be for the purpose of high density residential, and will therefore change the current use of the site to accommodate the growing demand for new and diverse range of housing in the Central Sydney District;
- The proposed rezoning of the site from SP1 and SP2 to R4 High Density Residential will enable the provision of new housing within close proximity with the Eastlakes and Kingsford commercial centres, the future Randwick Health and Education Precinct and with easy access to the Sydney CBD; and
- The proposed legislative amendments sought in this Planning Proposal and the preferred urban design concept are considered to be feasible and have acceptable environmental impacts.

Urban design testing has demonstrated that the proposed amendments to the BBLEP 2013 would result in a desirable urban design outcome for the site. Refer to the Urban Context Report at **Attachment A** where these options are illustrated and assessed.

It is considered that the site is well located to provide for high density residential development. The master plan for the site aims to provide for a range of apartment types that takes advantage of the surrounding environmental features and the stunning views to the south over the golf course. Six design principles have been identified to inform a master plan for the site, including:

- Provision of a generous landscape setback from Gardeners Road.
- Provision of a central open space area with views towards the golf course.
- Retention of mature trees.
- Orientation of buildings to address the public domain.
- Defined public and private open space areas.
- Maximisation of solar access to open space areas and apartments.

These principles aim to achieve a built form, which ensures delivery of a high quality urban development that encourages active and social living, while taking advantage of the stunning views and natural features of the area.

The master plan for 73 and 75 Gardeners Road is driven by the need to ensure:

- the delivery of a built form adequately responsive to the sites location;
- allow for the delivery of significant publicly accessible land at minimal cost to the community and development, whilst ensuring a financially feasible development outcome for future prospective purchasers;
- increase the opportunities for delivery of additional housing within Sydney;
- develop a holistic, considered response to the future development of both sites, notwithstanding their potential separate development at different times;
- undertake a holistic ensure and a need for additional housing within Sydney; and
- maximise the access to amenities such as local centres, open space and public transport for new dwellings within Sydney.

Given the site's location and size, it presents a unique opportunity to deliver high density housing in an area primarily occupied by low to medium density residential developments, with minimal impacts on surrounding properties. It also seeks to take advantage of important public open space and nearby environmental features.

Recommendation

This Planning Proposal is supported by evidence from an Urban Context Report, detailed master plan, transport assessment, ecological and heritage assessments, geotechnical, aeronautical and acoustic assessments.

The proposed scale of the development is appropriate for the area, and does not set an undesirable precedent for development in the neighbourhood because of its unique location adjacent to the golf course and on a main carriageway, with transport connections to key local and strategic centres.

The Planning Proposal is well justified and would deliver a diverse range of housing to meet the needs of Sydney's growing population and changing demographics. It is in line with Council's vision for the area and is supported by state and metropolitan strategic plans.

The Planning Proposal is therefore recommended for support by Council.



Figure 2 Artists impression of Gardeners Road looking west towards the development

Source: Architectus, September 2017

1. Introduction

1.1 Preliminary

This Planning Proposal is prepared by Architectus on behalf of Sydney Water for the vacant site located at 75 Gardeners Road and the neighbouring Sydney Water Depot at 73 Gardeners Road, in the suburb of Eastlakes. The subject site is located in the Bayside Local Government Area (LGA) (formerly the Botany Bay LGA). The Planning Proposal seeks an amendment to the BBLEP 2013 to enable the redevelopment of the site for residential purposes.

The site is bound by Gardeners Road to the north, which is aligned with the boundary of Randwick LGA. The site is bound to the south and east by land occupied by The Lakes Golf Club, and to the west by the residential cul-de-sac Slattery Place. The wider locality is characterized by low to medium density residential dwellings and established street trees. The area surrounding the Eastlakes Village to the west and including Slattery Place is zoned R4 High Density Residential.

The vegetation and wetlands network to the south and east of the site forms part of the Botany Wetlands corridor. The largest freshwater wetlands in the Sydney region and containing some of the area's remaining indigenous vegetation and significant native fauna.

Whilst the Planning Proposal is for the site in its entirety, the proposed amendments to the existing Sydney Water Depot site are proposed to be deferred until use of the site is no longer needed by Sydney Water.



Figure 3 Local context plan

Site highlighted in blue

Source: Six Viewer, NSW Government, September 2017

This Planning Proposal has been drafted in accordance with Section 55 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and *A Guide to Preparing Planning Proposals*, NSW Department of Planning and Environment (2016). In line with these documents, this Planning Proposal seeks to explain the intended effect of the proposed instrument and set out the justification for making the proposed amendments to the BBLEP 2013.

The subject site is located to the north of the Lakes Golf Club. From its elevated position, the site enjoys expansive views over the golf course, Botany Wetlands and beyond to Botany Bay.

The current land zoning does not permit residential development and the maximum height of building (HOB) controls and floor space ratio (FSR) for the site do not allow for a higher density form of development than that of the adjacent Slattery Place. Urban design testing demonstrates the site would be ideal for high density residential development due to its proximity to commercial centres, good transport options and access to open space.

This Planning Proposal therefore seeks to amend the land use zoning, maximum building height and floor space ratio controls to redevelop the site for high density residential and provide a good urban design and built form outcomes for the site.

1.2 Structure of this report

This report is prepared in accordance with the NSW Government's '*A Guide to Preparing Planning Proposals*' (2016), and is set out as follows:

- **Section 2: The site and context** – provides an overview of the site to which the Planning Proposal is intended to apply.
- **Section 3: The vision for 73 and 75 Gardeners Road** – outlines the design principles and built form philosophy that have been identified to inform the master plan for the redevelopment of the site.
- **Section 4: Objectives and intended outcomes** – provides a concise statement of the proposal objectives and intended outcomes.
- **Section 5: Explanation of provisions** – outlines the proposed amendments to the planning provisions within the BBLEP 2013 to achieve the proposal.
- **Section 6: Justification** – provides the urban planning justification to support the proposal.
- **Section 7: Mapping** – identification of the land subject to the Planning Proposal, existing land zoning and development standards and proposed land zoning and development standards.
- **Section 8: Consultation** – outlines the community consultation program that should be undertaken in respect of the proposal.
- **Section 9: Project Timeline** – outlines expectations for timeframe of the progression of the proposal.
- **Section 10: Conclusion** – concludes the report with a summary of findings and recommendations.

This report should be read in conjunction with **Attachments A to N**.

1.3 Preparation of the application

This Planning Proposal has been prepared by Geoff Kwok, Graduate Urban Planner, Haley Rich, Urban Planner and Adrian Melo, Associate and Urban Planner. The report has been reviewed by Rachael Nesbitt, Associate and Urban Planner and Michael Harrison, Director, Urban Design and Planning.

1.4 Evolution of the design

Extensive consultation with Bayside Council (formerly Botany Bay Council) has been undertaken as the Planning Proposal has been prepared, including initial discussions in September and October 2015. At this time, the proposal was for 75 Gardeners Road only and did not include planning for the Sydney Water Depot. The master plan for the site evolved and a number of changes were adopted at the request of Council, including:

- 1) Stepping the building height down towards the golf course;
- 2) Reduced building height to address overshadowing of golf course green;
- 3) Reducing the height of buildings adjacent to Slattery Place (14 to 9 storeys); and
- 4) Footprint adjustments to allow for greater tree retention.

Figure 4 and **Figure 5** below demonstrate the evolution of the design in response to Council's concerns.

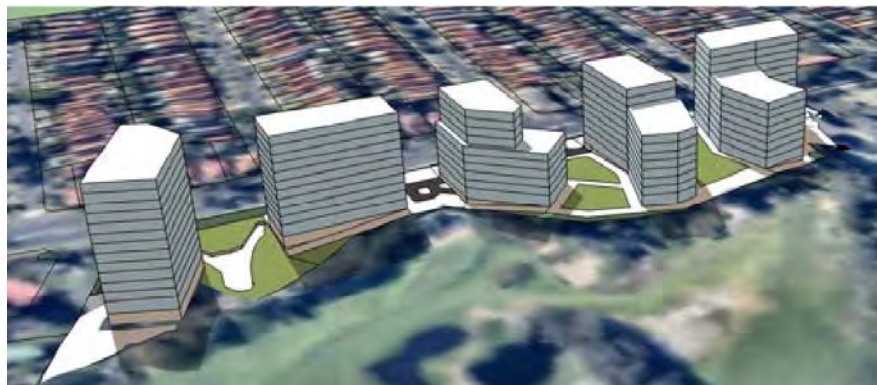


Figure 4 Initial design option presented to Council

The above is the master plan presented to Council in September 2015

Source: Architectus, dated September 2015

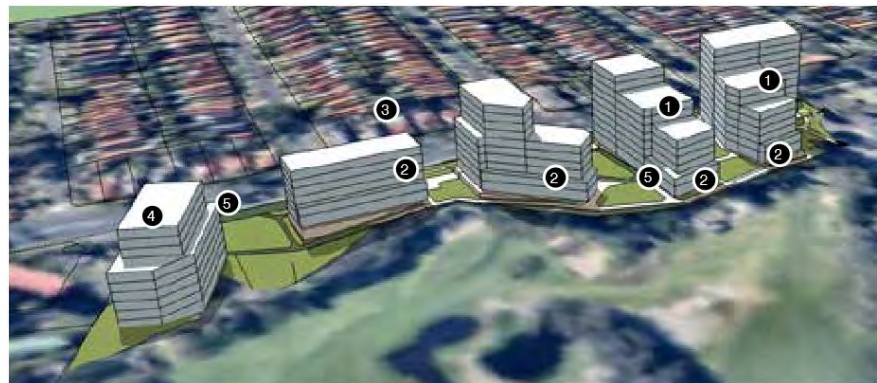


Figure 5 Previous proposal addressing Council comments

The above is the subsequent master plan presented to Council in October 2015.

Source: Architectus, dated October 2017

The scheme was amended to adopt all of Council's advice. Further, the new design introduced a 2 storey maisonette typology along the golf course, providing an even better transition down to the golf course and activating the public domain on the southern edge of the site.

Further consultation was undertaken with Council and key stakeholders. As a result a number of additional changes were made to design to incorporate feedback received. These changes include:

- 1) Built form adjusted to provide a large centrally located public open space (approx. 2,800m²);

- 2) Western building removed to provide improved open space and relationship to existing buildings at Slattery Place;
- 3) Enlarged public open space in the western portion of the site (approx. 1800m²);
- 4) Consolidated built form to maximise open space.

Following the above, as a result of the initial review of current assets owned by Sydney Water, it was determined that the site should be expanded to include the current Sydney Water Depot at 73 Gardeners Road. This part of the site is proposed to be deferred from the rezoning until the Depot site is closed, however the master planning has been undertaken for both sites together to provide a better design outcome.

Following the inclusion of 73 Gardeners Road, meetings were held with Bayside Council staff on 14 July 2017 and 15 August 2017 to further discuss the development of the site. At the initial meeting with Council, an overview of the site and history to date was discussed with the key points arising from the meeting as follows:

- Future development of the site is to be subject to sale and preparation of a Development Application by others;
- Sydney Water Depot is to be subject to a Deferred Matter zoning to allow for its ongoing use as a depot until such time that Sydney Water is ready to divest the site; and
- The Planning Proposal will need to be supported by a Voluntary Planning Agreement which will need to consider capturing some of the value uplift as public benefit. The finalisation of a VPA and its proposed outcomes is subject to negotiations between Council and Sydney Water.

The discussions were supported by a high level plan showing key principles which is provided at **Figure 6** below. A subsequent meeting was held 15 August 2017 to further discuss the progression of the planning proposal. Key points arising from this discussion were:

- Council were to review the heights of the proposal further and provide comments on the scale and massing of the development; and
- The planning proposal was to be circulated internally and seek comments from other internal stakeholders.

The discussions were supported by a high level plan showing key principles which is provided at **Figure 7** below. Sydney Water and Architectus would like to reaffirm their willingness to continue to discuss the proposal and master plan with Council as part of the initial assessment of the planning proposal by Council.



Figure 6 Indicative master plan principles for 75 Gardeners Road and 73 Gardeners Road

Source: Architectus, dated July 2017



Figure 7 Final indicative master plan for 75 Gardeners Road and Sydney Water Depot

The above is the final master plan presented to Council in August 2017.

Source: Architectus, dated August 2017

1.5 Project team

The Project team is set out below:

Table 1 Project team

| | |
|--------------------------------------|-----------------------------|
| Applicant and Project Manager | Sydney Water |
| Urban Planning | Architectus |
| Urban Design | Architectus |
| Heritage | NBRS Architecture |
| Surveyor | Linker Surveying and Cardno |
| Transport | ARUP |
| Ecology | ACS Environmental Pty Ltd |
| Stormwater | Northrop |
| Arboricultural | Naturally Trees |
| Aeronautical | Strategic Airspace |
| Geotechnical | JK Geotechnics |
| Acoustic | Acoustic Logic |
| Site Audit | Ramboll Environ Australia |

2. The site and its context

2.1 Regional context

The site is located around 3 kilometers by road from Mascot train station and around 4.3 kilometres from Sydney Airport. The University of NSW is around 1.5 kilometres and Prince of Wales Hospital is around 2.5 kilometres by road to the north-east. Regular buses for routes 302 to Eastgardens/Sydney CBD, 303 to Mascot, 343 to Kingsford/Chatswood, and 418 to Bondi Junction/Burwood, leave from the northern boundary of the site on Gardeners Road. The site is approximately 6.5 kilometers south of Sydney's city center.

The site is located within close proximity to the Strategic Centres of Randwick (approximately 3.5 kilometers) and Green Square (less than 4 kilometers) which are both identified in Sydney's metropolitan strategy, *A Plan for Growing Sydney*. Green Square is identified as part of the Urban Renewal Corridor for Sydney and Randwick is identified as an area for local renewal as a health and education precinct, which will benefit from the future connections to Sydney CBD with the South East Light Rail. The light rail is proposed to have services every 8 minutes to and from the Sydney CBD, Randwick and Kingsford.

The sites proximity to the above centres, and good public transport connections, make it an ideal location for high density residential living. It is noted that in addition to this, the master plan for 73 and 75 Gardeners Road proposes to improve the community's access to local public open space area and to provide significant areas of open space onsite, as well as additional associated uses such as retail and cafes. This will allow residents to experience village life, encourage social interaction and stimulate everyday wellbeing.

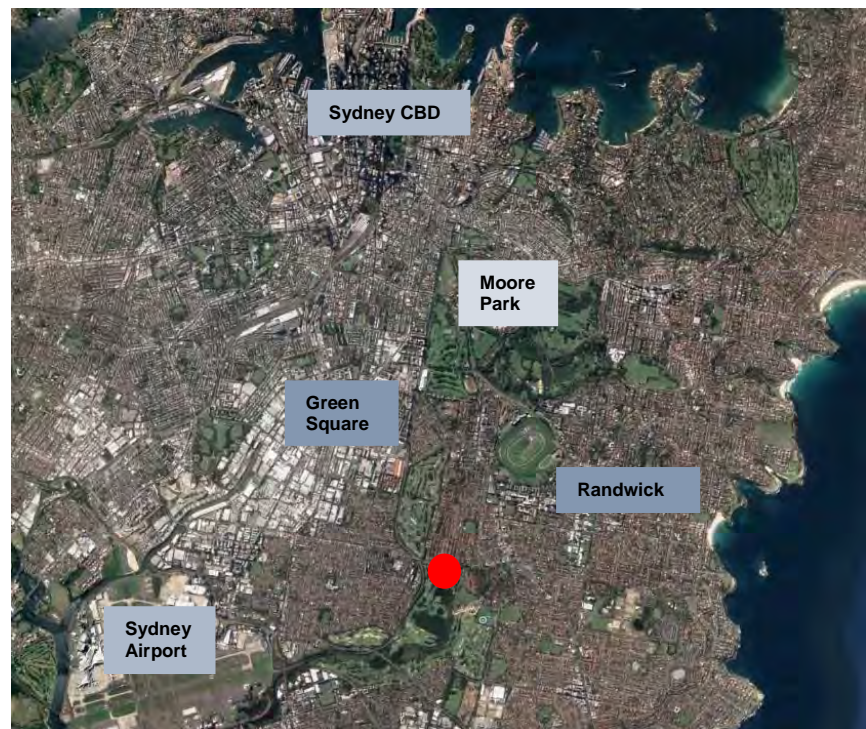


Figure 10 Regional context aerial view
 Location of site identified with a red dot
 Source: Google Earth, dated August 2017

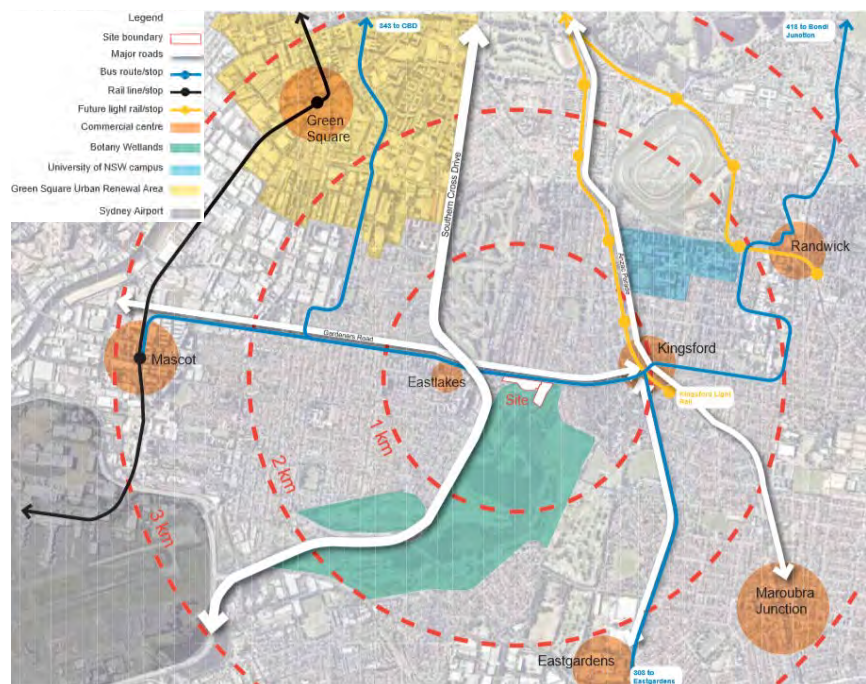


Figure 11 Strategic context plan
 Site identified in red
 Source: Architectus, dated September 2017

2.2 Local context and site surrounds

The site is situated along the northern extent of the suburb of Eastlakes, within the Bayside LGA.

The site is bound by Gardeners Road to the north, with low rise apartment blocks and single and two storey dwellings to the north of Gardeners Road; Slattery Place in the west, containing multi-level (1 to 5 storey) residential accommodation; and the Lakes Golf Club to the south and east, with the Botany

Wetlands surrounding. The Local Centres of Eastlakes and Kingsford are located within 800m, easy walking distance of the site and are also accessible by bus.

The locality is characterised by established low density detached residential dwellings with large established trees. There are also numerous sports fields and public open spaces within 5-10 minute walk of the site and two schools within a 10-15 minute walk.

The site has high level of amenity due to the adjacent golf course and nearby Botany Wetlands. The slope of the site allows for stunning views to the south over the golf course and open space areas.

Refer to photographs of the site at **Figure** below.



Figure 12 Local context aerial view
Site outlined in red
Source: Google Earth, dated August 2017



Figure 13 Local context plan
Site outlined in red
Source: Architectus, September 2017

2.3 Site details

Existing land use

75 Gardeners Road

The site at 75 Gardeners Road was previously used as a garden centre, known as Gardens-R-Us, however the site is now vacant.

The site enjoys a slightly elevated position compared to the surrounding area. The main access to 75 Gardeners Road is from the signalised intersection, with a level change of 2-3m up from street level into the site. A second site access exists from Slattery Place. There is a raised level area around the center of the site with the land falling away towards the golf course and to the west down towards Slattery Place.

There is an open stormwater feature to the west of the site with two channels joining and flowing south towards the golf course. This area also contains a number of established Paper Bark trees.

There are a number of established trees along the eastern boundary with Gardeners Road, including Eucalypts of between 10m and 25m in height. The southern boundary is characterized by a buffer of native re-vegetation to the golf course that varies in width of between 10 and 20m.

73 Gardeners Road (Sydney Water Depot)

The Sydney Water Depot at 73 Gardeners Road is located to the east of 75 Gardeners Road and remains operational. The main access to the Sydney Water Depot site is from Gardeners Road, which allows for left-in and left-out traffic movements only.

Along the north-eastern boundary with Gardeners Road there are a number of mature trees, ranging from 5-15m in height. To the west of the site is a landscaped buffer of trees and shrubs adjacent to the Lakes Golf Course. Along the eastern boundary of the site is a stormwater channel with steep embankments, with water flowing from two culverts that run beneath Gardeners Road towards the Botany Wetlands.

In the north-east corner of the site there is a 3m wide easement for high pressure sewer main, this is connected to an easement providing access to the sewer pump station. The pump house is contained in a brick building along the western boundary of the site and remains a critical piece of infrastructure.

The Sydney Water Depot is a 2 storey building of blue colorbond located in the centre of the site. There is surface carparking between Gardeners Road and the Depot building and a hard paved area south of the Depot building for truck parking and machinery.

Refer to the Urban Context Report prepared by Architectus (dated September 2017) at **Attachment A** for further detail regarding the site.

Surrounding land uses

The Lakes Golf Course

The Lakes Golf Course, located to the south of the site, is a privately owned golf club established in 1928. The club is one of the leading major tournament venues in Australia having recently hosted the 2010, 2011 and 2012 Men's Australian Opens. The land is leased from Sydney Water and makes up part of the Botany Wetlands.

The ongoing use of the site as a private golf club is expected to continue into the foreseeable future.

Eastlakes Golf Course

The Eastlakes Golf Course was established simultaneously with the Lakes Golf Course on the adjoining land to the east. The Eastlakes Golf Club is located to

the east the Sydney Water Depot site, with the course stretching down to the south-east. Unlike its neighbouring courses, Eastlake Golf Club is not a private Club and is open to members and the community.

77 Slattery Place

Immediately to the west of the site is land at 77 Slattery Place which is currently used as social housing, under the care and management of Land and Housing Corporation. It is understood that this land may be redeveloped to a greater level of density in the future by LAHC but the timing of this is unknown at this stage, although the land is currently zoned R4 under the BBLEP 2013.

Residential area Randwick

Adjacent to the site, to the north of Gardeners Road, is residential zoned land in the Randwick LGA. The area is predominately characterised by single and two storey dwellings. There are also a number of low rise residential flat buildings of 3-5 storeys along Gardeners Road.

2.4 Legal description

The subject site is an irregularly shaped allotment that consists of two lots, legally described as Lot 101 in DP 1232571 (73 Gardeners Road) & Lot 51 in DP 1216168 (75 Gardeners Road). A site survey has been provided at **Attachment B and C**.

The site has a total area of approximately 2.75 hectares.



Figure 14 Aerial view of the subject site

Lots highlighted in blue

Source: Six Viewer, NSW Government, dated September 2017

2.5 Land ownership

The land is owned by Sydney Water.

2.6 Site photos

Images of the site are provided in **Figure 15** to **Figure 14** below.



Figure 15 Entrance to 75 Gardeners Road showing level change



Figure 16 Boundary to Gardeners Road showing level change



Figure 17 Existing trees along corner Gardeners Road and Slattery Place



Figure 18 Single storey dwellings and unit block across intersection at Gardeners Rd



Figure 19 View of Water Board Depot



Figure 10 View towards site from eastern boundary



Figure 11 Five storey residential flat building at Slattery Place



Figure 12 Western boundary from Slattery Place



Figure 13 View north towards site from golf course fairway



Figure 14 Southern boundary of site to golf course



Figure 25 Entrance to 73 Gardeners Road



Figure 26 Operations pump house building

2.7 Planning context

The following primary legislation, planning instruments and planning controls are applicable to the proposal:

| | |
|--|--|
| Strategic plans | <ul style="list-style-type: none"> – Metropolitan Strategy for Sydney: <i>A Plan for Growing Sydney</i> – Draft Central District Plan – Botany Bay Planning Strategy 2031 – Directions Paper: A Draft Vision for the City of Botany Bay – 20 Year Randwick City Plan |
| Current planning controls and legislation | <ul style="list-style-type: none"> – Environmental Planning and Assessment Act 1979 (EP&A Act) <p><u>Environmental Planning Instruments:</u></p> <ul style="list-style-type: none"> – State Environmental Planning Policy No 55—Remediation of Land – State Environmental Planning Policy No 65 – Design Quality of Residential Apartment Development – Botany Bay Local Environmental Plan 2013 <p><u>Development Control Plans:</u></p> <ul style="list-style-type: none"> – Botany Bay Development Control Plan 2013 |
| Other plans and policies | <ul style="list-style-type: none"> – Green Web Sydney: <i>Vegetation Management Plan for the Sydney Region 1997</i> – NSW 2021: <i>A Plan to Make NSW Number One</i> – Premier's Priorities and State Priorities – Draft Planning Strategy for Kensington and Kingsford Town Centres |

The above legislation, planning instruments and planning controls are the primary considerations for this Planning Proposal. An assessment against all legislation is provide at **Section 6**.

2.8 Strategic planning context

Sydney Metropolitan Strategy: A Plan for Growing Sydney

Sydney's metropolitan strategy, *A Plan for Growing Sydney*, was released in December 2014 and is the NSW Government's 20-year plan for the Sydney Metropolitan Area. It provides direction for Sydney's productivity, environmental management, livability, and for the location of housing, employment, infrastructure and open space.

The Metropolitan Strategy's vision for Sydney is "a strong global city, a great place to live". The Strategy identifies goals, directions and principles which inform the future growth and development of Sydney. The key matters which relate to the subject site are as follows:

- Goal 2: A city of housing choice, with homes that meet our needs and lifestyles.
 - o Direction 2.1 – Accelerate housing supply across Sydney
 - Action 2.1.1 – Accelerate housing supply and local housing choices
 - o Direction 2.2 - Accelerate urban renewal across Sydney – providing homes closer to jobs
 - o Direction 2.3 – Improve housing choice to suit different needs and lifestyles
- Goal 3: A great place to live with communities that are strong, increasing housing choice around all centres through urban renewal in established areas;
 - Direction 3.1 – Revitalise existing suburbs
 - Direction 3.3 - Create healthy built environments

The proposal will generally support the intended outcome of the Strategy as:

- It seeks to increase the supply of **high quality apartment housing** in an area which is predominantly characterised by single detached dwellings and low rise residential flat buildings of around 4-5 storeys.
- The proposal is supported by consultants' reports, including an urban context study, transport assessment, ecological and heritage assessments, geotechnical, and aeronautical and acoustic assessments evidencing that the **site is suitable for the proposed uses.**
- Allows for the **redevelopment of surplus government land** for high density residential, including 5 residential flat buildings, two public parks and three community open space areas, with connections to a broader open space network.
- Seeks to provide for walking in and around the site by opening up the site and providing walking and cycling tracks along the southern boundary with the golf course, through to the Botany Wetlands. This will seek to **improve permeability and walkability** within and around the site.
- Seeks to provide for high density residential development on the site, in relatively **close proximity to a range of existing centres.**
- Seeks to enhance the existing community through the delivery of a more diverse range of dwelling types in an environment with **significant open space and improved links to important environmental features** of the area.
- Will revitalize the wider suburb and region through the redevelopment of the site.

Central District 2036 – Draft Central District Plan

In addition to the above, the site is identified as being within Greater Sydney's Central District. Sydney's Central District is centered on the Sydney City but stretches from beachside suburbs in the east, to Botany and Rockdale in the south, through the inner west and across to Strathfield, Burwood and Canada Bay. The continued growth of the Central District is vital to the future success and prosperity of Greater Sydney, New South Wales and Australia.

The draft District Plan describes the Central District as, *“the powerhouse of the NSW economy — home to commercial towers, financial and professional services, as well as a growing urban population attracted to all that the inner city has to offer.*

The Central District is home to over 1 million people, including Greater Sydney's largest concentration of 25-34 year olds. These young working age people bring buoyancy and vibrancy to the District, taking advantage of the District's great employment opportunities and globally competitive higher education institutions. With the Central District's population growing from almost one million in 2016 to an estimated 1.34 million by 2036, there is the vital need to plan for jobs, housing and essential services such as health and education.

There are many opportunities identified in the draft Central District Plan to enhance this part of Sydney, such as the renewal of government-owned land near Sydney City.

The draft Central District Plan was publicly exhibited until the end of March 2017 and will be finalised towards the end of this year.

The site is subject to the priorities and actions identified in the draft Central District Plan, which guide the proposed development, including:

- *Identify the opportunities to create the capacity to deliver 20-year strategic housing supply targets*
- *Increase housing capacity across the District*
- *Encourage housing diversity.*
- *Conserve and enhance environmental heritage including Aboriginal, European and natural*

This Planning Proposal seeks to amend the permissible planning controls applicable to the site to allow development which will increase the supply of housing to the area and provide for a more diverse range of high quality housing options including apartments. This will ensure the acceleration of housing supply, choice and affordability to the Central Sydney District.

A master plan proposes to create a quality built environment that focuses on promoting a healthy lifestyle. The plan provides improved pedestrian accessibility through and around the site where residents can experience an element of village life through the creation of a great place. It also includes the delivery of significant areas of publicly accessible land which will be used by the wider community.

The proposed development seeks to take advantage of the existing established trees onsite and the surrounding environmental setting through orientation of development and complimentary landscaping. The proposed development will benefit from stunning views over the golf course and improved connections to the Botany Wetlands. The submitted master plan identifies the retention of existing significant trees which will ensure that future development will protect and promote the sustainability and resilience of the natural environment.

Action L2 of the draft Central District Plan is 'Identify the opportunities to create the capacity to deliver 20-year strategic housing supply targets', Action L3 requires 'Councils to increase housing capacity across the District' and Action L4 is to 'Encourage housing diversity'. The aim of these actions is to identify opportunities for more good quality housing in specific areas and to support the development of housing diversity and improved affordability in the District. Action L3 lists specific actions for Council for the Bayside LGA, including:

- *monitor and support the delivery of Bayside's five-year housing target of 10,150 dwellings recognising significant growth in infill areas*
- *work with Land and Housing Corporation and Transport for NSW to investigate and coordinate urban renewal at Eastlakes and Eastgardens Shopping Centre and surrounds*
- *investigate local opportunities to address diversity and demand in the short to medium term at local centres and close to transport and other areas with high accessibility*

The proposal is to redevelop surplus government land into high density residential to help meet the demand for new housing in the Central District to accommodate the growing population. With a large number of young adults being drawn to Sydney Central to take advantage of employment opportunities, providing a range of housing types at different price points is important. The proposal includes apartment housing, in an area predominately characterised by detached and attached dwellings and low rise residential flat buildings.

Action L13 is 'Conserve and enhance environmental heritage including Aboriginal, European and natural'. Further, the draft Central District Plan proposes a number of priority projects. Priority Project 4 is the Mill Stream and Botany Wetlands Open Space Corridor Project. The corridor is home to two regionally rare vegetation communities, the Sydney Freshwater Wetlands and the Eastern Suburbs Banksia Scrub. Public use and access along this corridor is limited, and this Priority Project presents a significant opportunity for improved north south access and cross-district access.

The master plan for the redevelopment of the Eastlakes site is driven by the need to retain existing mature trees onsite and take advantage of the surrounding natural environment by linking the residential development to the wider area and enhancing interaction with the Botany Wetlands.

Botany Bay Planning Strategy 2031. Local Livability, Global Connections

The Botany Bay Planning Strategy 2031, Local Livability, Global Connection, was adopted in 2009. The strategy was prepared to address the dwelling and job targets identified in the previous Draft East Subregional Strategy and provides a framework for growth and development to 2031. It was used to guide the preparation of the BBLEP 2013. The strategy provides a set of principles to guide planning and direction for the LGA.

The Strategy Principles that relate to the Planning Proposal include:

- Enhance existing urban character, improve amenity and protect areas of cultural and environmental significance.
- Promote the sustainable use of resources and enhance natural ecosystems.
- Consolidate residential activity in and around existing centres.
- Ensure that future urban development is guided by principles of good urban design and built form.
- Improve quality of, and access to, open space in the LGA

The Strategy is the outcome of consultation with residents, community groups, business and agencies. The aim of the plan is to provide long term direction for

the delivery of community policies, programs and services. The following Strategy Directions have been considered throughout the design phase of the Planning Proposal.

1. Enhancing Housing Choice and Liveability

7. Protecting the Natural Environment

The master plan for the site has been designed to improve the urban and natural environment, while delivering a higher density housing product with limited impact on the surrounding established neighbourhoods. Good transport links provide access to jobs in the Sydney CBD the nearby Randwick and Green Square Strategic Centres and delivery of two new public parks and communal open space will provide improved lifestyle and health options for residents and the broader community. Shared pedestrian links into the Botany Wetlands will promote the use of this important natural feature and retention of existing established trees onsite and additional landscaping will improve flora and fauna corridors in the area.

Directions Paper: A Draft Vision for the City of Botany Bay

Botany Bay Council prepared a Directions Paper as part of the “Botany Bay 2040 Vision” process, which aims to create a vision for the City of Botany Bay for the next 25 years. The paper sets out six themes and 25 specific priorities that reflect the feedback received through surveys, community meetings and resident submissions during the consultation process.

The paper highlights the need to provide a diverse range of housing types to support Botany Bay’s diverse community, including residents with high or low incomes, single people or those with large families, and people at all phases of life.

Botany Wetlands are the largest freshwater wetlands in the Sydney region and contain some of the area’s remaining indigenous vegetation and significant native fauna. The paper proposes working to restore community access to the Botany Wetlands, including cycling and pedestrian connections from Gardeners Road through the golf course and throughout the wetlands. The Paper proposes creation of a new massive park, covering the Eastlakes Golf Course that will provide important open space for a growing population. Council recognises that as apartment living continues to increase, ready access to parks is essential to help people stay active. The new park with pedestrian and bicycle links would restore internal connections through our City from the Bay through to Gardeners Road.

Another key aim of the paper is to ensure that local streets are designed to promote safety and encourage pedestrian activity.

The proposed design of the master plan includes a range of apartment types to accommodate households of different sizes and promotes the high quality environmental setting of the site by orientating the buildings and public and communal open space areas to take advantage of the stunning views over the golf course. The master plan also includes pedestrian and cycle pathways through the site and into the Botany Wetlands to the south.

The Randwick City Plan: A 20 Year Plan

The Randwick City Plan was first published in 2006 following extensive consultation with the local community and was updated in 2011. This plan is organised into six broad interrelated themes, with ten outcomes arranged under those themes. The theme and outcomes most relevant to this planning proposal include:

3. Places for People

- *Excellence in urban design*
- *Excellence in recreation and lifestyle opportunities*

The master plan for the site proposes high quality apartment living in a natural setting that takes advantage of the stunning views over the adjacent golf courses. The provision of open space areas for the future residents and broader community onsite and the cycleways and pedestrian links into the Botany Wetlands to the south encourage recreation opportunities and improved lifestyle options for those living in the surrounding areas.

2.9 Current planning controls

State Environmental Planning Policy No 55—Remediation of Land (SEPP 55)

This policy applies to the whole state of New South Wales and aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment.

Clause 6 of SEPP 55 relates to 'Contamination and remediation to be considered in zoning or rezoning proposal'. The subject site is proposed to be rezoned as part of this Planning Proposal for the development of high density residential, this is a change from the existing zoning of SP1 Recreation Facility (Outdoor) and SP2 Infrastructure (Sydney Water Depot).

As the rezoning of the site will result in a change of land use a site audit was undertaken by Ramboll Environ Australia Pty Ltd, in accordance with SEPP 55 Planning Guidelines, and reported in accordance with the Office of Environment's Guidelines for Consultants Reporting on Contaminated Sites, dated 2011. The Site Audit Statement, dated June 2017, is included at **Attachment D**.

The investigations undertaken identified fill material on the former nursery, residential property and depot containing anthropogenic material such as brick, concrete and tile, including fragments of asbestos containing material. Laboratory analysis of fill samples identified elevated concentrations of metals, particularly lead, Total Recoverable Hydrocarbons and Polycyclic Aromatic Hydrocarbons (PAHs). Concentrations exceeded the adopted human health criteria, particularly at the depot site. Isolated detections of volatile contaminants were identified in the west of the site at 75 Gardeners Road and southwest of the depot at 73 Gardeners Road.

Groundwater investigations identified elevated concentrations of metals and nutrients, however these were representative of urban water quality and are not considered to present a risk to future occupants of the site. Elevated concentrations of PAHs identified during historical monitoring on the depot were considered to be representative of contaminated sediment in the wells.

The Site Audit Statement includes the following recommendations to ensure that the site is appropriate for the future use as high density residential:

- Further investigation of the site should be considered prior to remediation to address the data gaps identified in the conceptual site model. The need for and scope of further investigation would be dependent on the proposed development.
- Preparation of a remedial action plan (RAP) specific to any development.
- The RAP should be implemented prior to or during redevelopment of the site.
- Preparation of a Site Audit Statement certifying suitability for the proposed use, at the completion of remediation and validation.
- Groundwater to be assessed for its suitability for any proposed use prior to extraction.

Given the above, it is considered that the site is capable of being remediated for the purposes of residential development.

State Environmental Planning Policy No 65 – Design Quality of Residential Apartment Development (SEPP 65)

This policy applies to the whole state of New South Wales and aims to improve the design quality of residential apartment development across the state.

SEPP 65 applies to the determination of development applications for residential flat buildings and requires that the design of developments must be in accordance with the design quality principles set out in the SEPP and the Apartment Design Guide.

No approval is sought for the master plan at this stage as it simply seeks to evidence that the proposed changes to the planning controls are appropriate. Any future development of the site will be subject to future development applications lodged with Council.

Notwithstanding, the design principles and Apartment Design Guide have been considered throughout the design phase for the master plan, which sets the strategic planning context and will be used to inform a future DCP for the site, if considered necessary by Council. Any such sit specific DCP could be prepared jointly with Council once a gateway determination is issued and in advance of public exhibition of the application.

Botany Bay Local Environmental Plan 2013

The Botany Bay Local Environmental Plan 2013 applies to the site. Extracts of the critical sections of the BBLEP 2013 controls are provided below.

Zoning

The subject site is currently zoned **SP1 Special Activities - Recreation facility (Outdoor)** and **SP2 Infrastructure (Sydney Water Depot)** under the LEP.

SP1 Special Activities - Recreation Facility (Outdoor)

| | |
|----------------------------------|---|
| Objectives of the zone | <ul style="list-style-type: none">– To provide for special land uses that are not provided for in other zones.– To provide for sites with special natural characteristics that are not provided for in other zones.– To facilitate development that is in keeping with the special characteristics of the site or its existing or intended special use, and that minimises any adverse impacts on surrounding land. |
| Permitted without consent | <i>Environmental protection works</i> |
| Permitted with consent | <i>The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose</i> |
| Prohibited | <i>Any development not specified in item 2 or 3</i> |

SP2 Infrastructure – Sydney Water Depot

| | |
|----------------------------------|---|
| Objectives of the zone | <ul style="list-style-type: none"> – To provide for infrastructure and related uses. – To prevent development that is not compatible with or that may detract from the provision of infrastructure. |
| Permitted without consent | <i>Environmental protection works</i> |
| Permitted with consent | <i>Roads; The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose</i> |
| Prohibited | <i>Any development not specified in item 2 or 3</i> |

The land use zoning map of the site and the surrounding area is provided at **Figure 15**.

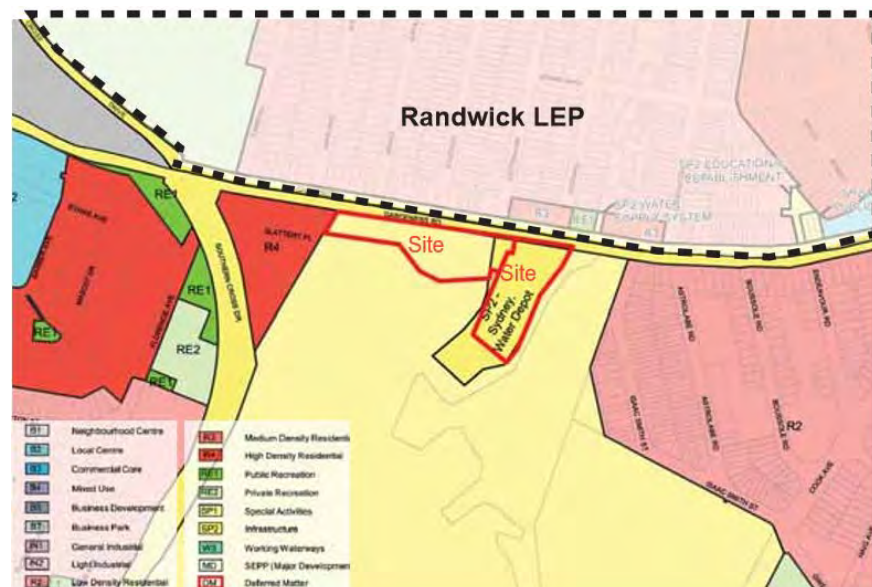


Figure 157 Land use zoning map

Site outlined in red

Source: Botany Bay LEP 2013, Sheet LZN_004

The objectives of the zones and the list of permitted uses do not allow for residential development. Therefore, to provide for the redevelopment of the site to high density residential a change to the land use zone for the site is required.

75 Gardeners Road, Eastlakes also benefits from Additional Permitted Uses under Schedule 1 of the BBLEP 2013. An extract of the relevant clause is provided below:

7 Use of certain land at 75 Gardeners Road, Eastlakes

- (1) *This clause applies to land at 75 Gardeners Road, Eastlakes, being Lot 1, DP 1116853 and identified as "7" on the Additional Permitted Uses Map.*
- (2) *Development for the purposes of entertainment facilities, food and drink premises, function centres, garden centres, hardware and building supplies, landscaping material supplies, recreation areas and recreation facilities (indoor) is permitted with development consent.*

It is also noted that 75 Gardeners Road is subject to additional permitted land uses under Schedule 1 Additional Permitted uses of the BBLEP 2013. This clause allows the use of the site for the purposes of entertainment facilities, food and drink premises, function centres, garden centres, hardware and building supplies, landscaping material supplies, recreation areas and recreation facilities (indoor).

Building height

The maximum building height for development on the site is controlled under Clause 4.3 of the BBLEP 2013. The BBLEP 2013 currently allows for heights of 14 meters on the part of the site zoned for SP1, however the Sydney Water Depot does not currently have a building height control.

The objectives of the maximum height of building controls under Clause 4.3 are as follows:

1) *The objectives of this clause are as follows:*

- (a) to ensure that the built form of Botany Bay develops in a coordinated and cohesive manner,*
- (b) to ensure that taller buildings are appropriately located,*
- (c) to ensure that building height is consistent with the desired future character of an area,*
- (d) to minimise visual impact, disruption of views, loss of privacy and loss of solar access to existing development,*
- (e) to ensure that buildings do not adversely affect the streetscape, skyline or landscape when viewed from adjoining roads and other public places such as parks, and community facilities.*

2) *The height of a building on any land is not to exceed the maximum height shown for the land on the Height of Buildings Map.*

2A) Despite subclause (2), if an area of land in Zone R3 Medium Density Residential or Zone R4 High Density Residential exceeds 2,000 square metres, the height of a building on that land may exceed the maximum height shown for the land on the Height of Buildings Map but must not exceed 22 metres.

(2B) Subclause (2A) does not apply to land identified as “Area 1” on the Height of Buildings Map.

(2C) Despite subclause (2), if an area of land identified as “Area 2” on the Height of Buildings Map has a site area exceeding 1,900 square metres, the maximum height for a building on that land may exceed the maximum height shown for the land on the Height of Buildings Map by no more than 2 metres.

The maximum building height plan for the site and the surrounding area is illustrated at **Figure 16**.



Figure 16 Maximum building height map
Site outlined in red
Source: Botany Bay LEP 2013, Sheet HOB_004

Floor space ratio

The maximum floor space ratio for development on the site is controlled under Clause 4.4 of the BBLEP 2013. The LEP permits maximum floor space ratios of 1:1 for 75 Gardeners Road (refer to **Figure 17**). There is no floor space ratio currently identified for the existing Sydney Water Depot.

The objectives of this clause are as follows:

- a) *to establish standards for the maximum development density and intensity of land use,*
- b) *to ensure that buildings are compatible with the bulk and scale of the existing and desired future character of the locality,*
- c) *to maintain an appropriate visual relationship between new development and the existing character of areas or locations that are not undergoing, and are not likely to undergo, a substantial transformation,*
- d) *to ensure that buildings do not adversely affect the streetscape, skyline or landscape when viewed from adjoining roads and other public places such as parks, and community facilities,*
- e) *to minimise adverse environmental effects on the use or enjoyment of adjoining properties and the public domain,*
- f) *to provide an appropriate correlation between the size of a site and the extent of any development on that site,*
- g) *to facilitate development that contributes to the economic growth of Botany Bay.*

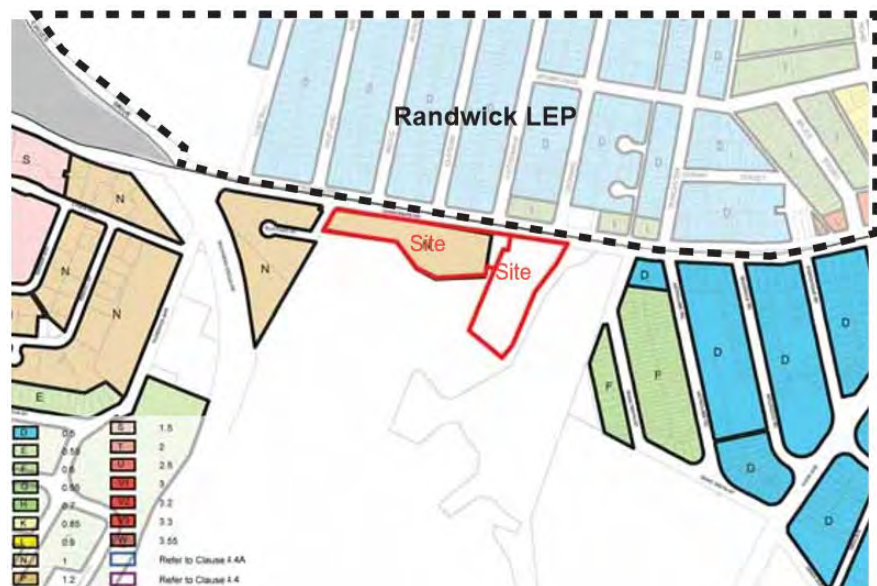


Figure 17 Maximum floor space ratio plan

Site outlined in red

Source: Botany Bay LEP 2013, Sheet FSR_004

Heritage

The subject site is not a heritage or landscape item and is not located in a heritage conservation area, however the Lakes Golf Course and the Botany Wetlands to the south and east of the site are identified on the Heritage Map in the LEP as being an item of environmental heritage, namely the Botany Water reserves. Under Schedule 5 of the BBLEP 2013 the area is described as an area of “about 200ha between Mascot and Botany extending from the northern shore of Botany Bay to Gardeners Road including the Lakes and Eastlakes Golf Courses and Mill and Engine Ponds”.

Refer to **Figure 30** below, and the Preliminary Heritage Review Report provided by NBR Architecture at **Attachment F**.

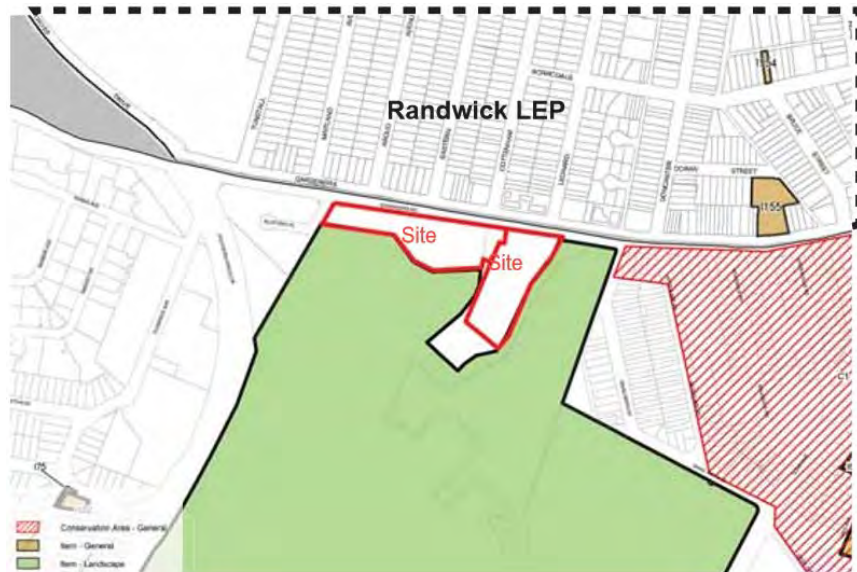


Figure 30 Heritage Map

Site outlined in red

Source: Botany Bay LEP 2013, Sheet HER_004

Wetland

The creek line to the east of the Sydney Water Depot is identified as “wetland” on the Foreshore Building Line, Terrestrial Biodiversity and Wetland Map in the LEP.

Refer to **Figure 18** below, **Section 2.9**, and the Ecological Assessment prepared by ACS Environmental Pty Ltd at **Appendix F**.

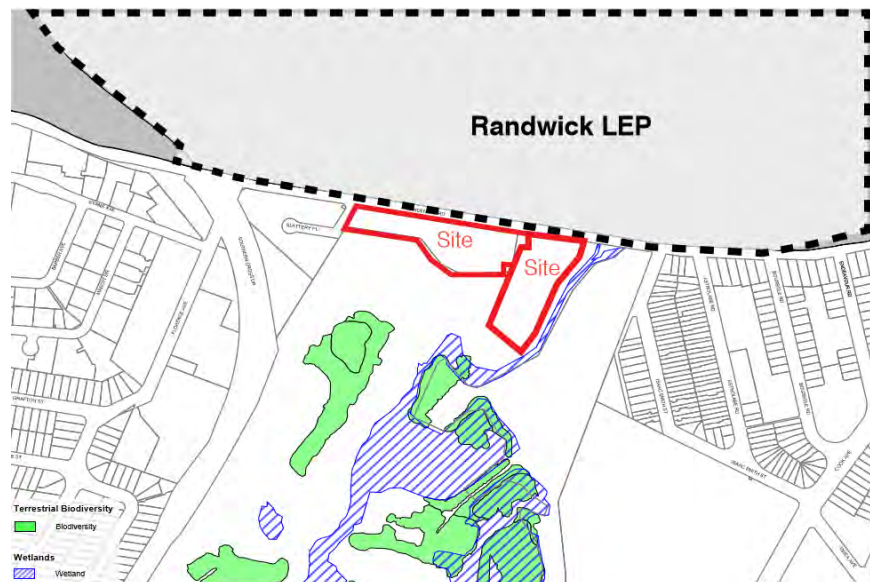


Figure 18 Foreshore Building Line, Terrestrial Biodiversity, Wetlands Map

Site outlined in red

Source: Botany Bay LEP 2013, Sheet CL1_004

Botany Bay Development Control Plan 2013

The Botany Bay Development Control Plan (BBDCP) 2013 applies to all sites within the LGA. The BBDCP was originally adopted by Council on 11 December 2013 and came into effect on 17 December 2013.

The BBDCP applies to the wider Botany LGA and provides for a range of controls relating to site suitability, built form, site density and other matters. The DCP sets out objectives aimed at creating a dynamic City, one that looks forward to a firm, prosperous and secure future. Developments should address the principles of ecologically sustainable development, be sensitive to the local environment, socially responsible and promote a safe living environment. The aim of the DCP is to help create a highly livable urban place through the promotion of design excellence and to minimise impacts to adjoining properties, while encouraging innovative housing, commercial and industrial design. The proposed master plan for the site considers the existing environmental setting of the site and surrounding area and proposes development to accommodate the growing future population of the area, which also connects residents and visitors with the natural environment.

This master plan identifies that the site should be developed for residential with supporting land uses such as small scale shops, retail or similar uses. The proposal will enable the future redevelopment of both sites resulting in approximately 744 units, 1,417 parking spaces and a range of building heights between 6-14 storeys. However, no approval is sought for the master plan at this stage as it simply evidences that the proposed changes to the planning controls are appropriate.

Any future development of the site will be subject to future development applications lodged with Council and would need to be assessed against the provision of the BBDCP 2013 accordingly.

2.10 Other plans and policies

NSW 2021: A Plan to Make NSW Number One

NSW 2021 was the NSW Government's 10-year plan to guide decision making and deliver priorities for communities. The plan's five key strategies are to "rebuild the economy, provide quality services, renovate infrastructure, restore government accountability, and strengthen our local environment and communities". These five strategies are supported by goals and targets. The targets addressed by this Planning Proposal include:

- *Goal 5, Target 1: Improve housing affordability and availability*
 - *Partner with local councils to ensure that targets for housing and growth and the priorities within the subregional plans and regional plans are reflected in relevant planning proposals and in local planning instruments (local environmental plans)*

The proposed redevelopment of 73-75 Gardeners Road will improve housing availability for a range of demographic groups that want apartment living in a high quality environmental setting within close proximity to local centres and the Sydney CBD.

Premier's Priorities and State Priorities

The NSW Premier has identified 12 priorities to help improve outcomes for the people of NSW. These Priorities reflect whole-of-government approaches to tackling important issues from helping vulnerable children and raising the performance of school students, to improving housing affordability and building local infrastructure.

State Priority – Increasing housing supply

Deliver more than 50,000 approvals every year

Premier's Priority – Making housing more affordable

Deliver 61,000 housing completions on average per year to 2021

A Plan for Growing Sydney estimates that Sydney will need 664,000 new homes over the next 20 years. By 2036, an extra 2.1 million residents will need somewhere to live. Increasing the supply of housing will put downward pressure on prices. The government is supporting future growth by establishing housing targets across NSW and ensuring enough homes are built to meet the needs of a growing population and at the same time, consider the unique character of our local neighbourhoods.

The Planning Proposal seeks the rezoning of surplus government land to allow for high density residential, within easy access to retail centres, education and healthcare facilities and with good transport connections to Greater Sydney and the Sydney CBD. The rezoning will deliver new dwellings to help meet the specified housing targets of the State and Premier's Priorities.

Green Web Sydney – A Vegetation Management Plan for the Sydney Region

The Green Web Strategy, prepared by Birgit Seidlich on behalf of the Sydney Regional Organisation of Council, dated 1997, aims to develop a coordinated approach by Local Government to bring about the protection and enhancement of the natural vegetation in the Sydney Metropolitan Region. The Strategy identifies remnant bushland, regional habitat corridors and revegetation sites as part of a green web to protect, enhance and expand vegetation, habitat and biodiversity in Sydney. It also proposes a vegetation management plan for Sydney and outlines a regional strategy for revegetation.

Green-Web Sydney proposes the establishment of a green web of native vegetation to protect, conserve and enhance remaining remnant bushland in the Sydney region. Central to the plan is the establishment of habitat corridors, which link fragmented patches of bushland to facilitate the migration of wildlife and natural dispersal of native plants.

The Green Web Sydney includes an action plan and recommendations on policies and projects that will help conserve biodiversity in Sydney.

The key action applicable to this proposal is:

8. Habitat Requirements in Landscape Design for new Developments

Incorporate habitat requirements in landscape design controls and guidelines for public and future private open space in new developments. Landscape design principles for biodiversity conservation need to protect, enhance and create habitat for indigenous plants and native animals and increase their habitat and opportunities for migration.

The proposed master plan seeks to retain existing established vegetation onsite, including a stand of large Eucalypt trees to the northwest of the site. The master plan proposes a comprehensive landscaping scheme, which includes the planting of new trees throughout the site.

However, any trees to be retained and the landscaping provided for the development will be confirmed as part of any future DA for the site.

The Randwick City Plan: A 20 Year Plan

Although the subject site is located in the Bayside LGA, the northern boundary of the site along Gardeners Road is also the northern boundary between Bayside and Randwick LGAs. Therefore, The Randwick City Plan, which guides planning and development in Randwick for the next 20 years has also been considered for this planning proposal.

The Randwick City Plan provides a number of directions to help achieve the key outcomes of the plan. The directions that are most applicable to the proposed rezoning of 73 and 75 Gardeners Road include:

4a. Improved design and sustainability across all development

5a. Maximise opportunities for residents and visitors to enjoy both active and passive open space uses

5c. New open space is created as opportunities arise

9a. A network of safe and convenient walking paths and cycleways linking major land uses and recreation opportunities

Residents living within the Randwick LGA to the north of the site will benefit from the two public parks proposed in the master plan and the pedestrian and cycle way access through the site into the broader open space areas to the south.

Draft Planning Strategy for Kensington and Kingsford Town Centres

The Draft Planning Strategy for Kensington and Kingsford Town Centres is Randwick Council's overarching vision for these centres and has been developed following extensive community consultation. The vision for Kingsford Town Centre includes:

Kingsford will develop into an exciting and dynamic town centre continuing to draw on its rich multicultural identity. The town centre will provide a diverse offer of restaurants, cafes and retail shopping, set within a rejuvenated public domain that supports activation and social interaction.

The town centre will be a safe and inclusive place to live, work and visit. Buildings will be designed to the highest quality incorporating a mix of apartments, laneway mews and affordable housing.

Highly connected and accessible, the town centre will foster hubs of activity focused around the terminus at Kingsford Junction and Kingsford Mid-Town, the old heart of the Kingsford.

The town centre will have a green focus and set a new performance benchmark for sustainability within the LGA through ESD targets, WSUD practices, public places with canopy trees and landscaping and support of sustainable transport modes such as the light rail, cycling and walking.

The integrity of existing heritage and contributory buildings will continue to be respected and integrated, through high quality architectural design. Innovative business start-ups will be encouraged to provide a 'bridge' between research and business".

Overall mid-rise building height limit of 31 metres for new development throughout both town centres is proposed. In addition, FSR changes will enable the density to be spread mainly through mid-rise buildings, providing a more human-scaled built form that supports a comfortable pedestrian environment while also enhancing opportunities for solar access. Within both town centres there are a number of prominent sites located at strategic nodes that could accommodate taller, slender buildings. A higher rise building typology of up to 60m in these locations would help create a distinctive urban form within the town centres, while facilitating activation around the light rail infrastructure.

The subject site is within walking distance to the Kingsford local centre. The proposal to rezone the site to R4 High Density Residential is considered appropriate for the site and would complement the proposed increase in density for the Kingsford town centre.

2.11 Site context

Heritage context

The subject site is not a heritage item itself and there are few listed heritage items within the local area. However, the Lakes Golf Course and the Botany Wetlands are identified as 'Landscape' areas in Heritage Map – Sheet HER_004 of the

BBLEP 2013. Refer to the BBLEP 2013 Heritage Map at **Figure 30** above. The Botany Wetlands (also known as the Botany Water Reserves) is also listed as a heritage item (Item No. 4570025) on the Sydney Water s170 Heritage Register. A Heritage Assessment has been prepared by NBRS Architecture and is included at **Attachment F**.

The master plan for the site has been designed to maximise solar access to the Botany Wetlands to the south and seeks to improve north-south view corridors through the site to the Botany Waters Reserve.

Traffic and transport

A Transport Assessment prepared by ARUP (September 2017) provides an assessment of the site's existing transport conditions, forecast traffic generation, road network impacts, parking provisions, access arrangements and public transport availability. Refer to the Transport Assessment at **Attachment E**.

There are currently two existing vehicular and pedestrian entries to the site. The main access to No. 73 is via a left-in left-out entry to Gardeners Road and the main access to No. 75 is via a signalised intersection with Eastern Avenue and Gardeners Road. Vehicles can enter and exit 75 Gardeners Road from any approach and the two Gardeners Road approaches have designated turning lanes.

Public transport servicing the site is via bus routes 302, 303, 418, and 343 which operate services to the Sydney CBD, Eastgardens San Souci, Burwood, Bondi Junction, Kingsford and Millers Point. All routes stop within 80m of the subject site along Gardeners Road and Eastern Avenue. The closest train stations to the site are Mascot Station, 3.2km to the west and Green Square Station, 3.6km to the north-west of the site. Public transport conditions in the vicinity of the site will significantly improve in 2019 following the opening of the CBD and South East Light Rail project. The future Kingsford light rail stop will be located approximately 800m to the east of the subject site.

The site is not located in an area that attracts significant pedestrian activity. There are footpaths running the length of Gardeners Road on each side, and signalised pedestrian crossings are provided at the intersection with Eastern Avenue. Pedestrian facilities are limited in some areas, with footpaths being overgrown in areas and uneven surfaces. There are limited cycle paths in the vicinity, with the closest existing paths located along Houston Road, around 800m to the east of the site, and along Southern Cross Drive around 500m west of the site.

The master plan divides the site into two distinct areas, 73 Gardeners Road and 75 Gardeners Road. The existing signalised intersection will be the primary access to 75 Gardeners Road and the existing access to the Sydney Water Depot site will be the primary access to 73 Gardeners Road. As the access into 73 Gardeners Road is restricted to left-in left-out only, vehicles travelling from the west (e.g. Mascot) are unable to turn right directly into the site. Instead vehicles will use the adjacent intersection at Isaac Smith Drive to access the site. Traffic modelling found that the Gardeners Road and Eastern Avenue intersection and the Gardeners Road and Isaac Smith Drive intersection will perform well in the future, following the full development of the site.

The master plan proposes parking at rates specified in the BBDCP, which results in 1,417 parking spaces. The development of the site will facilitate opportunities to significantly enhance the walking and cycling environment in the area. This will include the potential for a shared pedestrian link along the boundary of the site.

Ecology

An Ecological Assessment has been prepared by ACS Environmental Pty Ltd (November 2015 and September 2017) to undertake an ecological assessment and biodiversity survey at 73-75 Gardeners Road and is provided at **Attachments G and H**. The Assessment found that both sites do not contain any Endangered Ecological Communities or Threatened Species, primarily due to the disturbed nature of the sites.

Arboricultural

An Arboricultural Impact Appraisal and Method Statement has been prepared by Naturally Trees Arboricultural Consulting (September 2017) and provided at **Attachment K**. The Statement provides an assessment of 182 trees located within and adjacent to the subject site and includes a tree schedule that lists and maps all of the trees onsite and their level of significance, including whether they are proposed to be retained as part of the master plan. The Statement finds that the proposed master plan will necessitate the removal of 77 high category trees, which are considered moderate to high significance and display good health and condition. 76 trees of low and very low retention value will be removed as a result of the proposed development. The report also includes guidance on procedures for protecting trees and provides a program for ensuring the plan for the protection of trees is adequately considered during the DA phase of the development.

Geotechnical

A Geotechnical Assessment has been prepared by JK Geotechnics (July 2017) and provided at **Attachments L and M**. The Assessment makes recommendations on a range of geotechnical issues that will need to be addressed in the design and construction of the proposed development, including excavation conditions, techniques and support, dewatering, footings, basement floor slabs, and external pavements. A site specific geotechnical investigation will be completed prior to the DA phase of the development to assess the subsurface conditions for each proposed building.

Acoustic

An Environmental Noise Impact Assessment has been prepared by Acoustic Logic (September 2017) and provided at **Attachment J**. To the north of the site is Gardeners Road, which carries medium to high volumes of traffic. The site is also affected by noise from aircraft movements to and from the third runway at the Sydney Airport and lies between the ANEF 20 and 25 contours.

An assessment of traffic and aircraft noise was conducted with reference to:

- The City of Botany Bay Council Development Control Plan 2013
- NSW State Environmental Planning Policy Infrastructure (2007)
- AS2107 – 2000 Acoustics – Recommended design sound level and reverberation times for building interiors
- AS2021 – 2000 Acoustics – Aircraft noise intrusion – Building siting and construction

The assessment identifies that there are mitigating elements which can be implemented in the design of any future buildings which will ensure that future developments are capable of achieving an acceptable level of amenity which complies with the above controls.

Aeronautical

An Aeronautical Impact Assessment has been prepared by Strategic Airspace (September 2017) and provided at **Attachment I**. The assessment includes consideration of the appropriateness of building heights against the maximum permissible development heights for the site.

Due to proximity to the airport, any developments on the site will be subject to the Airports (Protection of Airspace) Regulations 1996, for the purpose of having building heights approved in relation to Sydney Airport's protected airspace. The two fundamental factors of the Airports Regulations that are used for assessment of development heights are the Obstacle Limitation Surfaces (OLS) and the PANS-OPS Surfaces (the latter to protect the actual instrument flight procedures).

The OLS limiting height across the site is 51m Australian Height Datum (AHD). Any development, including structures and cranes, that would exceed the relevant OLS height across the site would require a prior 'airspace height' approval from the Department of Infrastructure and Regional Development under the Airports (Protection of Airspace) Regulations (or APAR). The PANS-OPS height constraints across the site of 64-72m are regarded as the maximum permissible building heights that would be approved by the aviation authorities.

The proposed master plan has been designed to comply with these height limits.

Stormwater

A Hydrology, Stormwater and Creek Assessment has been prepared by Northrop Consulting (September 2017) and provided at **Attachment N**. This report identifies that notwithstanding the current flood affectation of the site and its proximity to an existing riparian corridor the site is capable of being developed in such a manner to ensure that future development is adequately responsive to the sites constraints.

Critically, it should be noted that any future development of the site will be subject to a Development Application which will ensure that the future proposal adequately responds to flooding, riparian corridor setbacks and appropriately manages stormwater in accordance with Council's requirements.

2.12 Demographic profile and trends

The Planning Proposal takes note of the population projections for the central district. The Australian Bureau of Statistics provides information regarding population demographics and existing housing diversity in the Bayside LGA and the suburb of Eastlakes. As of the 2016 census, the population of Eastlakes was 6,912 people. The median age of the population in Eastlakes is 36 years, which exceeds the Australian average. The percentage of people aged 65 and over was slightly lower than the Australian average.

The composition of dwelling structure in Eastlakes is predominantly flat or apartment housing (70.3%). Detached housing makes up most of the remaining dwellings (27%). There are very few semi-detached houses, row or terrace house, townhouses (2.4%).

The Department of Planning and Environment's *2016 NSW Population and household projections* provides population, age and household projection data in Sydney's LGA's between 2011 and 2036. The summary forecasts a 2.3% average annual population growth rate for the Botany Bay LGA, representing an increase of 31,200 people by 2036 (75.2%).

The proposed master plan for 73 and 75 Gardeners Road is an opportunity to provide a range of housing types for the growing population in the area.

3. The vision

3.1 Need for redevelopment

Sydney Water has a diverse property portfolio including depots, treatment plants, pumping stations and vacant lands. The agency continuously reviews this portfolio to ensure its properties provide best value. Sydney Water seeks to maintain land that is needed for operations and divests land which is surplus to operational needs.

Sydney Water continues to review its portfolio and ensure its operational land is located in areas ensuring that it can service its network efficiently. A Sydney Water Depot Optimisation report is being prepared, which will seek to optimise use and locations of depots to consolidate land holdings and divest those sites that are no longer required.

The Sydney Water Depot at 73 Gardeners Road has been identified as surplus to current needs and is identified for potential future relocation. However, further review of operations and timing for relocation is required, and as such the site will continue to operate as a water depot for the short to medium term until the report is finalised.

Due to this, the planning for the Sydney Water Depot at 73 Gardeners Road has been incorporated into the master plan for the site to ensure coordinated planning and design of the area. However, as the water depot will continue to operate into the foreseeable future, the rezoning of the site will be deferred until Sydney Water have finalised their optimisation process and are in a position to divest ownership of the land. The alternative is for the site to be zoned R4 as part of this proposal will result in the creation of existing use rights for the depot which is not considered appropriate. The deferred matter of 73 Gardeners Road has been discussed with Bayside Council and Department of Planning & Environment.

3.2 Design philosophy

The design principles for the master planning of the site include:

- 1) Generous landscape set-backs
- 2) Central open space with views
- 3) Retain mature trees
- 4) Address the public domain
- 5) Defined public and private space
- 6) Maximise solar access

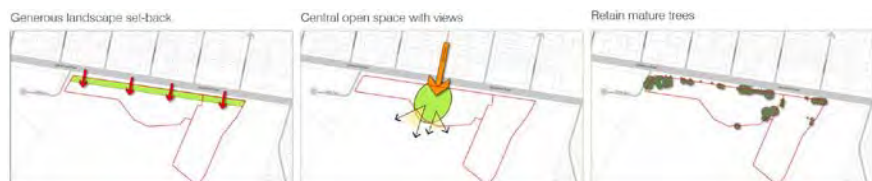




Figure 32 Design Principles to inform the master plan for 73-75 Gardeners Road, Eastlakes

It should be noted that the location of the vehicular access point to 73 Gardeners Road has been selected to allow for:

- retention and adequate access to the existing pumphouse to be retained on site;
- sufficient distance for the provision of a deceleration lane along Gardeners Road, whilst retaining the existing footpath and bridge over the existing stormwater culvert along the site's eastern most boundary;
- avoid impacting upon an existing high pressure sewer line from the pumphouse.

3.3 Master plan

An indicative master plan for the site has been prepared by Architectus. Refer to the master plan within the Urban Context Report attached at **Attachment A**.

The master plan has been informed by the six design principles detailed above. The final master plan for the site has been separated into two distinct areas, 75 Gardeners Road and 73 Gardeners Road. This is to ensure the sites can be developed independently of each other.

The design of the master plan includes:

- The existing signalised intersection with Gardeners Road and Eastern Avenue as the primary access for 75 Gardeners Road.
- The existing left-in-left-out access to Gardeners Road as the primary access for 73 Gardeners Road.
- A public park to the western portion of the 75 Gardeners Road with the retention of existing mature trees, providing a substantial setback and screening to the residential area at Slattery Place.
- A public park with play area and landscaping centrally located in 75 Gardeners Road, overlooking the golf course to the south.
- Five apartment buildings ranging in height from 6 to 14 storeys, spread across the two sites, with provision for 744 new dwellings. The buildings have been orientated towards the open space areas and to take advantage of views over the wetlands to the south.
- Basement and surface level parking with provision for 1,417 parking spaces across both sites.
- Generous setbacks to Gardeners Road and the boundary with the riparian corridor to the east of the site, including landscaping with native vegetation.
- Opportunities for ground floor retail and café space centrally located in 75 Gardeners Road.
- Shared pedestrian pathways throughout the site and along the boundary with Gardeners Road and the southern boundary with the golf course, providing opportunities for linkages into the Botany Wetlands.

The master plan for the site has been designed to improve the urban and natural environment, while delivering a higher density housing product with limited impact on the surrounding established neighbourhoods. The delivery of two new public

parks and communal open space will provide improved lifestyle and health options for residents and the broader community. Shared pedestrian links into the Botany Wetlands will promote the use of this important natural feature and retention of existing established trees onsite and additional landscaping will improve flora and fauna corridors in the area.

3.4 Voluntary Planning Agreement

It is understood that Bayside Council has adopted the informal policy of the former Rockdale City Council in considering Voluntary Planning Agreements in conjunction with development proposals which seek to increase the value of individual sites to capture a portion of the site as public benefit. It is noted that in the meeting on 14 July 2017, Council identified that they expect value uplift to be captured by way of public benefit. This is often referred to as value sharing mechanisms.

Currently under the NSW planning framework, there are three mechanisms through which this can be achieved:

- Voluntary Planning Agreements between Councils and developers / land owners which seek to include the dedication of land free of cost, the payment of monetary contributions or the provision of other material public benefits;
- Local contribution mechanisms under Section 94 or Section 94A of the EP&A Act 1979 (or alternatively affordable housing under s94F);
- Special Infrastructure Contributions through a Ministerial determination (currently in the Western Sydney Growth Centres, Warnervale Town Centre and Wyong Employment Zone)

Although Sydney Water currently own the land, the land will be divested to others for redevelopment following the rezoning of the sites. Accordingly, it should be recognised that any delivery of public benefits will be undertaken by others as part of the detailed design of future redevelopment of the site.

It is suggested to Council that an appropriate agreement be reached between both Sydney Water and Bayside Council as to a reasonable value sharing mechanisms which provides certainty for both parties in advance of the finalisation of the Planning Proposal, prior to public exhibition.

It is noted that this should include the consideration of:

- A base case for the development of the site under the existing controls;
- Recognition of the significant public benefit delivered by the proposed publicly open space including their ongoing maintenance and management;
- A reasonable application of value capture noting that Sydney Water is a state-owned corporation with a mandate to minimise cost to customers (the public) where possible;
- Sydney Water will not be responsible for the future redevelopment of the site but would be willing to discuss the registration of binding principles prior to the sale of the land;
- A multiple staged VPA between Council, Sydney Water and future buyers which provides certainty and clearly defined responsibilities for the delivery of public benefit and management of land by all parties.

Sydney Water and Architectus are willing to further discuss the above with Council as part of the assessment process for the planning proposal to ensure that Council are satisfied with the final outcomes for the site.

4. Objectives and intended outcomes

This section outlines the objectives of the Planning Proposal and provides detail on the proposed planning control provisions to achieve these objectives and outcomes.

4.1 Intended outcomes

Drawing on the Council and the State Government controls, plans and strategies, Architectus has developed a master plan for the site which will allow for the provision of high density residential apartment living for Eastlakes. This will allow for:

- Five apartment buildings of between 6 and 14 storeys, providing for 744 units;
- 2-3 levels of basement parking, providing for over 1417 parking spaces;
- Two public parks and three communal open space areas, totalling 7,529m²;
- Retention of existing established trees and native vegetation and a generous landscaped setback to Gardeners Road;
- Café and retail space on the ground floor to provide a village feel;
- Opportunities for communal roof gardens/green roofs with wide elevated views over the surroundings; and
- Pedestrian paths and cycleways throughout the site and into the Botany Wetlands.

Land use

The proposed land use zone for the site is R4 High Density Residential. Attached housing, multi-dwelling housing, residential flat buildings, neighborhood shops and shop top housing area permissible under the R4 zone of the BBLEP 2013.

This would be supported by amendments to the current Schedule 1 Additional Permitted Land Uses to permit low scale retail / commercial uses on site and prohibit garden centres, hardware and building supplies, landscaping material supplies. It is noted that under the current definition of shop top housing the whole of the ground floor would need to be utilised for business premises which is not considered appropriate given the sites location and potential to undermine the ongoing growth of surrounding centres. Whilst neighborhood shops are permissible in the R4 High Density Zone, the scale and nature of these permissible shops would not be capable of delivering a meaningful level of passive surveillance or activation of the proposed open spaces.

Built form

The Architectus master plan for 73-75 Gardeners Road provides for residential amenity internally and through public and communal open space facilities. Buildings are well separated, and the envelopes will provide for apartments that can achieve high quality living spaces. Buildings are designed to prioritise views towards the Botany Wetlands, and the large setbacks and the retention of established trees will provide a relaxed leafy surrounding and good transition to the high quality natural environment to the south. This built form could be further defined and supported by a site specific DCP supporting the Design Principles identified in the Urban Context Report.

Height

The existing maximum building height control restricts development to 14 meters for 75 Gardeners Road (there is currently no building height control for the Sydney Water Depot) which does not allow for the number of apartments needed to meet market expectation, while providing good quality open space for the future residents and broader community. The maximum building height control for the site is proposed to be amended to permit a range of building heights from 29 metres to 50 metres. It should be noted that the majority of the development is around 8 storeys, up to 29 metres in height.

FSR

Under current planning controls, the permissible maximum FSR for 75 Gardeners Road is restricted to 1:1. Similar to the above restriction, the control does not allow for development of a built form that would allow for the best design outcome including large areas of public and communal open space. The maximum FSR control for the site is proposed to be amended to permit an FSR of 1.65:1 for 75 Gardeners Road and 1.95:1 for 73 Gardeners Road.

While the master plan and associated assessments have been prepared for the entire site the amendments proposed to the zoning map and the HOB and FSR development standards for 73 Gardeners Road are proposed to be deferred until such time as the current use of the site as a Water Depot is no longer required by Sydney Water. During this time, the relevant maps in the BBLEP will identify 73 Gardeners Road as a 'deferred matter' and the current zoning and development standards will continue to apply.

4.2 Objectives of the proposed controls

The objectives of the Planning Proposal for the subject site are to facilitate the redevelopment of the site from surplus government land to high density residential.

Key objective of this proposal are:

- To provide opportunity for high quality apartment living to accommodate the growing population and allow for renewal of the subject site;
- To retain existing valuable and significant trees onsite and create a series of public and communal open spaces;
- To maximise views to the south over the golf course and Botany Wetlands;
- To provide pedestrian and cycle pathways through the site and into the Botany Wetlands and surrounding area;
- To orient built form and communal open spaces to maximise solar access; and
- To minimise the impact on the golf course infrastructure, particularly greens and fairway views.

The specific objectives are to:

- Land use – rezone from SP1 Special Activities and SP2 Infrastructure to R4 High Density Residential (including amendments to the Additional permitted uses under Schedule 1 of the BBLEP 2013) to facilitate redevelopment of the site to apartment and terrace style living, including some retail and associated commercial uses, to accommodate the current and future demand through providing diversity in housing;
- Height of buildings – amend the BBLEP 2013 from 14 meters to a range from 29 meters to 50 meters to increase the maximum height of buildings to allow for the optimal built form and public domain outcomes and to facilitate a redevelopment of the site to provide for the best design outcome; and
- Floor space ratio – amend the BBLEP 2013 to increase the maximum floor space ratio permitted from 1:1 to 1.65:1 for 75 Gardeners Road and 1.95:1 for 73 Gardeners Road to allow for redevelopment of the site providing for optimal built form and public domain outcomes.

4.3 Amendments to planning provisions

This Planning Proposal seeks to amend the following planning provisions:

- Amend the BBLEP 2013 Land Zoning Map Sheet LZN_004 from SP1 and SP2 to R4 High Density Residential (including amendments to the current Schedule 1 Additional Permitted Land Uses to permit low scale retail / commercial uses on site);
- Amend the BBLEP 2013 Height of Building Map, Sheet HOB_004 to permit the maximum permissible height of a range between 29 meters and 50 meters; and
- Amend the BBLEP 2013 Floor Space Ratio Map, Sheet FSR_004 to permit a maximum floor space ratio of 1.65:1 for Site 1 and 1.95:1 for Site 2.

The proposed amendments have been mapped in **Attachment O**.

As mentioned above land zoning, HOB and FSR development standards for 73 Gardeners Road are proposed to be deferred until such time as the current use of the site as a Water Depot is no longer required by Sydney Water. During this time, the relevant maps in the BBLEP 2013 will identify 73 Gardeners Road as a 'deferred matter' and the current zoning and development standards will continue to apply.

4.4 Land use zoning

The Land Use zoning is proposed to be changed from SP1 Special Activities and SP2 Infrastructure to R4 High Density Residential.

The objectives of the **R4 High Density Residential Zone** under BBLEP 2013 are:

- *To provide for the housing needs of the community within a high density residential environment.*
- *To provide a variety of housing types within a high density residential environment.*
- *To enable other land uses that provide facilities or services to meet the day to day needs of residents.*
- *To encourage development that promotes walking and cycling*

The following uses are permitted without consent:

- *Home occupations*

The following uses are permitted with consent:

Attached dwellings; Bed and breakfast accommodation; Boarding houses; Centre-based child care facilities; Community facilities; Dwelling houses; **Multi dwelling housing;** Neighbourhood shops; Places of public worship; **Residential flat buildings;** Respite day care centres; Roads; Semi-detached dwellings; **Shop top housing;** Any other development not specified in item 2 or 4

The following uses are prohibited:

Advertising structures; Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Biosolids treatment facilities; Boat building and repair facilities; Boat launching ramps; Boat sheds; Camping grounds; Car parks; Caravan parks; Cemeteries; Charter and tourism boating facilities; Commercial premises; Correctional centres; Crematoria; Depots; Eco-tourist facilities; Electricity generating works; Emergency services facilities; Entertainment facilities; Environmental facilities; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Forestry; Freight transport facilities; Function centres; Heavy industrial storage establishments; Helipads; Highway service centres; Home businesses; Home occupations (sex services); Industrial retail outlets; Industrial training facilities; Industries; Information and education facilities; Jetties; Marinas; Mooring pens; Moorings; Mortuaries; Open cut mining; Passenger transport facilities; Port facilities; Public administration buildings; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Registered clubs; Research stations; Residential accommodation; Restricted premises; Rural industries; Service stations; Sewage treatment plants; Sex services premises; Storage premises; Tourist and visitor accommodation; Transport depots; Truck depots; Vehicle body repair workshops; Vehicle repair stations; Veterinary hospitals; Warehouse or distribution centres; Waste or resource management facilities; Water recreation structures; Water recycling facilities; Water supply systems; Wharf or boating facilities; Wholesale supplies

The master plan for 73-75 Gardeners Road proposes to provide a combination of apartment housing, including dwellings of 1 to 3 bedrooms and penthouse apartments. The definitions of attached dwelling, multi-dwelling housing, residential flat buildings and shop top housing from the BBLEP 2013 are provided below. These uses would enable the redevelopment of the site in accordance with the master plan prepared by Architectus, dated September 2017.

attached dwelling means a building containing 3 or more dwellings, where:

- a) each dwelling is attached to another dwelling by a common wall, and
- b) each of the dwellings is on its own lot of land, and
- c) none of the dwellings is located above any part of another dwelling.

multi dwelling housing means 3 or more dwellings (whether attached or detached) on one lot of land, each with access at ground level, but does not include a residential flat building

residential flat building means a building containing 3 or more dwellings, but does not include an attached dwelling or multi dwelling housing.

shop top housing means one or more dwellings located above ground floor retail premises or business premises.

It is noted that under the current definition of shop top housing the whole of the ground floor would need to be utilised for business premises which is not considered appropriate given the sites location and potential to undermine the ongoing growth of surrounding centres. However, some small scale shops and commercial premises are considered appropriate for the site to allow for some activation and increased passive surveillance along the proposed open spaces. As such, it is also proposed to amend the BBLEP 2013 to incorporate the following changes:

7 Use of certain land at 75 Gardeners Road, Eastlakes

- (1) This clause applies to land at 75 Gardeners Road, Eastlakes, being Lot 1, DP 1116853 and identified as "7" on the Additional Permitted Uses Map.

- (2) Development for the purposes of entertainment facilities, food and drink premises, **and commercial premises** ~~function centres, garden centres, hardware and building supplies, landscaping material supplies, recreation areas and recreation facilities (indoor)~~ is permitted with development consent.

4.5 Maximum building height

The maximum building heights for the subject site will need to be amended in accordance with the built form set out as the illustrative master plan in the attached Urban Context Report.

The study identified heights of 6 – 14 storeys. The maximum building height in meters for these buildings should allow for:

- 35 meters for Building A;
- 35 meters for Building B;
- 50 meters for Building C; and
- 29 metres for Buildings D and E.

Accordingly, this Planning Proposal seeks to amend the maximum building heights ranging from 29 metres up to 50 meters.



Figure 19 Proposed maximum building height map
Source: Architectus, dated September 2017

4.6 Maximum floor space ratio

The maximum floor space ratio for the subject site will need to be amended in accordance with the built form set out as the illustrative master plan for the site. Accordingly, this Planning Proposal seeks to amend the maximum permissible floor space ratio to 1.65:1 for 75 Gardeners Road and 1.95:1 for 73 Gardeners Road.



Figure 20 Proposed maximum floor space ratio

Source: Architectus, September 2017

The total gross floor area under the master plan is 49,209m².

This amounts to a floor space ratio of 1.79:1 across the entire site. However, this FSR has been split across the two sites to limit any visual impacts of the development to the residential area at Slattery Place and the golf course to the south of the site. Accordingly, it is recommended that two new floor space ratio zones S1 and S2 are included under BBLEP 2013, which would permit a maximum floor space ratio of 1.65:1 for 75 Gardeners Road and 1.95:1 for 73 Gardeners respectively. This also reflects the extent of the proposed publicly accessible open space to be delivered across both sites.

Although it is acknowledged that this is an increase in density beyond that of the sites immediate surrounds, it is not inconsistent with the density of some areas surrounding the Eastlakes Local Centre and the proposed increase in height and density of the Kingsford Centre. Further, the increased density is required to afford a high quality outcome for future residents, and the Urban Context Report (refer to **Appendix A**) shows that this density can be achieved while maintaining the open and leafy character of the area and limit impacts to the golf course and important environmental value of the Botany Wetlands.

Furthermore, the delivery of high quality apartment and terrace style living with exceptional views and access to superior communal open space will revitalise this section of Gardeners Road and result in a positive outcome for the area.

5. Explanation of provisions

The objectives of this Planning Proposal are to amend the existing BBLEP 2013 to facilitate the redevelopment of surplus government land to meet the growing population for central Sydney. The specific objectives are to amend the existing land use zoning, maximum building height and maximum FSR to allow for the optimal built form and public domain outcomes, and to facilitate the redevelopment of the site.

5.1 Proposed amendments to the Botany Bay planning controls

The following amendments to the Botany Bay Local Environmental Plan 2013 are proposed to facilitate the preferred master plan option and the effective utilisation of the site:

- Land use – to facilitate redevelopment of surplus government land, through permitting apartment and terrace style housing on the site by rezoning to R4 High Density Residential (including amendments to the current Schedule 1 Additional Permitted Land Uses to permit low scale retail / commercial uses on site);
- Height of buildings – to amend the BBLEP 2013 to increase the maximum height of buildings to allow for the optimal built form and public domain outcomes, and to facilitate a redevelopment of the site through increasing building heights from 14m to a range between 29 meters and 50 meters; and
- Floor space ratio – to amend the BBLEP 2013 to increase the maximum floor space ratio to allow for the optimal built form and public domain outcomes, and to facilitate a redevelopment of the site through increasing the FSR from 1:1 to 1.65:1 for 75 Gardeners Road and 1.95:1 for 73 Gardeners Road.

Deferred Matter – Sydney Water Depot

Sydney Water proposes to continue the current use of 73 Gardeners Road as a Water Depot until such time as the site is no longer needed. Therefore, it is proposed to defer the proposed R4 High Density Residential zone and associated HOB and FSR controls from coming into effect until such time Sydney Water is ready to divest ownership of the site. The deferred matter will enable both sites to be developed in stages until the operations cease. If no deferred matter is proposed, it will result in the creation of existing use rights for the depot which is likely to cause significant issues in the ongoing operation of the depot until such time that the site is surplus to Sydney Waters requirements.

As the land at 73 Gardeners Road will be identified as a 'deferred matter' on the relevant LEP maps, the current zoning and development standards will continue to apply.

5.2 Understanding of site context

The master plan for the site has considered the context of proposing to rezone the site in relation to the surrounding land use zones and sensitivity of the community to increased density. Architectus and Sydney Water have considered Council's requests to reduce impacts to the neighbouring residential area at Slattery Place and ensure solar access to the golf course to the south of the site is maintained as much as possible. The master plan has also been designed to not only provide open space for the future residents of the site through the provision of three communal parks, but also provides open space opportunities for the broader community and cycleway links into the Botany Wetlands.

This Planning Proposal proposes to rezone the site to facilitate development under the R4 zone which is considered to be appropriate given the adjacent R3 and R4 land use zones and because residential flat buildings of an increased height are needed in order to ensure that the open space and solar access can be achieved.

The proposed amendment to the BBLEP 2013 HOB control of 29m, 45m and 50m, allows for a range of buildings heights across the site, which means that the buildings to be higher in certain areas closer to the busy main road and stepped down in height towards Slattery Place and the golf course.

The proposed amendment to the BBLEP 2013 FSR control sets an FSR of 1.65:1 for 75 Gardeners Road and an FSR of 1.95:1 for 73 Gardeners Road to enable the built form proposed under the master plan to be delivered in the right locations on the site, and to ensure the bulk and scale of the development does not negatively impact on the surrounding residential areas and golf course.

The proposed scale of the redevelopment is considered to be an appropriate scale for the reasons identified below:

- The site is unique in its location along a busy main road, with good transport connections to local and strategic centres, and adjacent to large open space areas. The bulk and scale of the future development will not impact on the character of existing residential areas in Bayside LGA or Randwick LGA, while providing an important opportunity for the delivery of increased housing supply for the Central Sydney District.
- Visual impacts to Slattery Place to the west of the site are limited due to the reduction in the height of the apartment building nearest the boundary to 8 storeys and provision of a large setback with the retention of existing mature trees to the north-west corner of the site.
- Visual impacts to the south of the site from the Lakes Golf Course are reduced by retaining the existing mature trees along the site boundary nearest to the 14th green and the orientation of the buildings ensure that solar access to the golf course is largely maintained. A landscaped buffer is also proposed to the southern boundary of the site to further limit visual impacts of the development from the golf course.
- Visual impacts of the development from Gardeners Road are reduced through the retention of existing trees along the northern boundary of the site and a provision of a 10 metre landscaped setback along the road frontage to improve the landscape amenity along the boundary and provide for a shared pathway setback further from the busy road edge.
- The proposed building heights allow for the proposed density in a reduced footprint, allowing for generous setbacks, substantial open space, narrow buildings that allow for views to the wetlands and solar access to the open space areas and golf course green.

5.3 Assessment

Expert assessments have been undertaken to accompany the Planning Proposal and are appended to this report. The assessments investigate potential issues resulting from the proposed legislative amendments, including urban context study, heritage assessment, transport assessment, ecological, geotechnical, aeronautical, arboricultural, and stormwater assessments.

These assessments demonstrate that the legislative amendments sought in this Planning Proposal and the preferred urban design concept would be feasible and have acceptable impacts.

6. Justification

This section provides justification of the Planning Proposal in line with the 'questions to consider when demonstration justification' set out within the NSW Government's 'A guide to preparing planning proposals'.

6.1 Section A – Need for the Planning Proposal

Is the planning proposal a result of any strategic study or report?

This Planning Proposal is the result of Sydney Water reviewing its property portfolio to identify any sites that are surplus to its needs. A report is being prepared, which will seek to optimise use and locations of depots to consolidate land holdings and divest those no longer required.

The Sydney Water Depot at 73 Gardeners Road has been identified as surplus to current needs at this stage and is identified for relocation. Further review of the operations and timing for relocation is required, as such the depot will remain in operation for the short to medium term.

This Planning Proposal has also resulted from the following strategic reports.

A Plan for Growing Sydney

Eastlakes falls within the Global Economic Corridor, identified in the Sydney Metropolitan Strategy, *A Plan for Growing Sydney* (the Plan). The Global Economic Corridor is defined as an area (corridor) of concentrated employment, economic activity and other uses in centres, transport gateways and industrial zoned land extending from Port Botany and Sydney Airport, through Sydney CBD, north-west through Macquarie Park, and towards Norwest, Parramatta and Sydney Olympic Park. The site is also within close proximity to the Randwick Education and Health Strategic Centre and the Green Square Strategic Centre, as well as the Sydney Airport Precinct and the Port Botany Precinct. Good transport links are proposed to service the area such as the Light Rail.

The Plan establishes priorities for the Global Economic Corridor, which focus on providing high skilled jobs by expanding employment opportunities, and investing in infrastructure to grow economic activity. Providing for high quality apartment and terrace style living in this area is important to ensure that sufficient housing is supplied to those working in and around the Sydney CBD, other nearby centres and industrial precincts within the Corridor.

The Sydney Metropolitan Strategy also sets directions for the Government to improve housing supply across Sydney, ensure that homes are provided closer to jobs, improve housing choice, and deliver well planned new areas of housing.

This Planning Proposal seeks to amend the planning controls applicable to the site to allow development which will increase the supply of housing in the Central Sydney district in close proximity to jobs. The proposal will provide for more housing choice and high quality housing that is competitive with market standards while achieving an increased yield of the site to ensure development feasibility. The master plan for the site proposes to deliver a quality built environment that focuses on community living and promoting the surrounding natural environment.

Draft Central District Plan

Eastlakes falls within the Central District under the Greater Sydney Commission's Draft District Plans, and as such the site is subject to the *Draft Central District Plan*.

The *Draft Central District Plan* describes the plan for the Central District as “an attractive place to live, with an increased diversity of housing choices that cater for all groups including people who live on their own, older residents, group households and families. Growth and development will allow improvements to public areas and better walking, cycling and public transport connections across the District. Cultural and environmental heritage will be celebrated.”

The key priorities and actions for the Central District include identifying opportunities to increase housing capacity across the District, encourage housing diversity and more affordable housing options to accommodate the growing population. The Plan also refers to providing design led planning to support high quality urban design and increasing the provision of community facilities, such as open space.

The Draft Central District Plan also identifies that there will be an increase of around 61,100 more single person households by 2036 (an increase of 44%) and the need to deliver 46,550 more dwellings by 2021.

This proposal presents an opportunity to respond to the *Draft Central District Plan* by increasing the supply and quality housing within the Bayside LGA and the Central Sydney District, anticipated to be released in late 2017.

Botany Bay Planning Strategy 2031: Local Livability, Global Connections

The Botany Bay Planning Strategy 2031, Local Livability, Global Connection, was adopted in 2009. The strategy provides a set of principles to guide planning and direction for the LGA, including enhancing existing urban character, protecting areas of environmental significance, and improving access to open space, consolidating residential activity in and around existing centres, and promoting principles of good urban design and built form.

The intended outcome of this Planning Proposal is to facilitate the delivery of high quality housing which will meet the needs of the existing and future community of Bayside LGA. The master plan for 73-75 Gardeners Road proposes rezoning surplus government land for high density residential development to cater for a growing population and provide good quality housing options.

It is considered that the site is well located on a main road and adjacent to open space and natural environmental features will provide attractive lifestyle options. The master plan proposes to improve access for residents and the broader community to improved and new open space areas.

Urban Context Report

The Urban Context Report prepared by Architectus (September 2017) is attached to this Planning Proposal at **Attachment A**. The Report provides a good understanding of the sites attributes, context and potential impacts and details a master plan for the site. It should be noted that the master plan is intended to provide an indication for the type of development that would be permissible under the proposed planning controls. Any future development would be subject to a separate DA to be lodged with Council at a later date.

Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

Yes. There are no alternative processes to achieve the intent of this Planning Proposal due to the current planning controls that apply to the site under the BBLEP 2013. The current controls do not allow for the redevelopment of the site for high density residential.

6.2 Section B – Relationship to strategic planning framework

This section provides a summary of the strategic planning framework within which the Planning Proposal outcomes for the site have been considered.

Is the planning proposal consistent with the objectives and actions of the applicable regional, sub-regional or district strategy (including any exhibited draft plans or strategies)?

Yes. The Planning Proposal is consistent with the objectives and actions of the following strategies.

Sydney Metropolitan Strategy

The applicable metropolitan strategy is the NSW Government's *A Plan for Growing Sydney*, discussed in further detail in Section A. Relevant directions from the Plan are noted at **Table 2** below.

Table 2 *A Plan for Growing Sydney*

| Strategy or Strategic Plan | Consistency | Comment |
|--|-------------|---|
| GOAL 2: A city of housing choice, with homes that meet our needs and lifestyles <i>Direction 2.1 – Accelerate housing supply across Sydney</i> <i>Direction 2.2 - Accelerate urban renewal across Sydney – providing homes closer to jobs</i> <i>Direction 2.3 – Improve housing choice to suit different needs and lifestyles</i> | Yes | The Planning Proposal seeks to redevelop surplus government land to grow the availability of high quality housing to support a growing population, in an area with good transport links and in close proximity to local and strategic centres. The proposed master plan for the site will provide apartment living in a range of dwelling sizes with public and communal open space. |
| GOAL 3: A great place to live with communities that are strong, healthy and well connected <i>Direction 3.1: Revitalise existing suburbs</i> <i>Direction 3.3: Create healthy built environments</i> | Yes | This Planning Proposal would achieve this goal by facilitating development of the site for housing to meet the growing demand for the Sydney area. The Planning Proposal also seeks to ensure the delivery of well-designed, high quality buildings to meet the needs of the future residents and also provide improved access for current residents access to superior open space and the natural environment, promoting enjoyment of these important natural features by residents and the wider community. |

Goal 1: “A competitive economy with world-class services and transport”, and Goal 4: “A sustainable and resilient city that protects the natural environment and has a balanced approach to the use of land and resources” are not considered to be directly relevant to this Planning Proposal.

This Planning Proposal seeks to amend the permissible planning controls applicable to the site to allow development which will increase the supply of high quality housing close to strategic centres and the Sydney CBD and with access to superior public and communal open space.

The master plan developed for the site proposes to create a quality built environment that focuses on community living and provides walking and cycleway access to the Botany Wetlands.

Through addressing the above goals, the proposal also addresses the actions and directions of the plan.

District Plan

The Draft District Plans were released for public comment on 21 November 2016. 73-75 Gardeners Road is located within the Central District and subject to the *Draft Central District Plan*, discussed in further detail in Section A.

Relevant directions from the Draft District Plans are noted at **Table 3**.

Table 3 *Draft Central District Plan*

| Strategy or Strategic Plan | Consistency | Comment |
|--|-------------|---|
| Liveability Priority 1: Deliver Central District's five-year housing supply target <ul style="list-style-type: none"> <i>Plan to provide sufficient capacity and monitor delivery of the five-year housing targets</i> | Yes | The proposed redevelopment of surplus government land at 73 and 75 Gardeners Road will improve housing capacity by providing more residential land to contribute to the housing target for the Bayside LGA, without impacting on established neighbourhoods. The masterplan demonstrates that the rezoning could facilitate in the order of 744 dwellings. |
| Liveability Priority 2: Deliver housing diversity <ul style="list-style-type: none"> <i>Address housing diversity that is relevant to the needs of the existing and future local housing market</i> <i>Deliver quality design outcomes for both buildings and places</i> | Yes | The subject site is located in close proximity to the local centres Eastlakes and Kingsford with good transport connections to the future Randwick and Green Square. It will help accommodate the growing Central Sydney population and cater for the projected increase in single person households. The principles that have guided the design of the master plan have focused around providing good quality design for the apartment buildings oriented to provide sufficient public and communal open space with good solar access. |
| Liveability Priority 5: Facilitate the delivery of safe and healthy places <ul style="list-style-type: none"> <i>Facilitate the development of healthy and safe built environments</i> | Yes | The master plan will increase the supply of new dwellings and improve housing choice in the Central District. The proposed development provides high quality apartment living with access to schools, open space and retail centres, and with links through the site into the adjacent golf course and the broader Botany Wetlands |
| Liveability Priority 6: Facilitate enhanced walking and cycling connections <ul style="list-style-type: none"> <i>Facilitate enhanced walking and cycling outcomes by giving due consideration to the delivery of district and regional connections and walkable neighbourhoods.</i> | Yes | <p>The proposed master plan for 73 and 75 Gardeners Road has been designed with the important surrounding natural environment in mind and proposes a shared pedestrian and cycleway link along the boundary of the site with great views over the golf course.</p> <p>The walkway and cycleway link would be publicly accessible.</p> |
| Liveability Priority 7: Conserve heritage and unique local characteristics <ul style="list-style-type: none"> <i>Protect Aboriginal, cultural and natural heritage and places, spaces and qualities valued by the local community.</i> | Yes | The master plan for the site has been developed to enhance and respect the natural heritage value of the Botany Wetlands to the south of the site. The retention of mature established trees and the proposed landscaping across two public parks and three communal open space areas will complement the natural beauty of the surrounding Wetlands. |

Is the planning proposal consistent with a Council's local strategy or other local strategic plan?

Yes. The Planning Proposal is consistent with the objectives and actions of the previous Botany Bay Council local strategic plan.

Local strategic plan

Botany Bay Council and Rockdale Council were amalgamated in 2016. The subject site is located in the previous Botany Bay LGA. Botany Bay Council's local strategy *The Botany Bay Planning Strategy 2031: Local Livability, Global Connection*, was adopted in 2009. The strategy was prepared to address the dwelling and job targets identified in the previous Draft East Subregional Strategy and provides a framework for growth and development to 2031.

The amendments to the BBLEP 2013 proposed in this Planning Proposal support the implementation of a master plan for the site. The master plan considers objectives defined in the Botany Bay Planning Strategy as noted at **Table 4** below.

Table 4 The Botany Bay Planning Strategy 2031: Local Livability, Global Connection

| Strategy or Strategic Plan | Consistency | Comment |
|---|-------------|--|
| <p><i>Objective 1.1 Improve the urban environment, particularly where additional development is proposed.</i></p> <ul style="list-style-type: none"> – <i>Ensure good quality, adequate local public open space in areas where dwelling numbers are planned to increase.</i> | Yes | <p>The master plan proposes five apartment buildings of between 6 and 14 storeys, providing for 744 units; as well as 1,417 parking spaces. To accommodate this increase in dwelling numbers the proposal also includes two public parks and three communal open space areas, totalling 7,529m².</p> |
| <p><i>Objective 1.4 Enhance access to high quality open space assets.</i></p> <ul style="list-style-type: none"> – <i>Investigate the redevelopment of Botany Bay Wetlands to create a major regional open space asset for the Botany Bay LGA and Eastern Subregion.</i> – <i>Use native and water efficient flora species for landscaping.</i> | Yes | <p>The master plan includes the retention of existing established trees and native vegetation to be incorporated into the landscaping for the site.</p> <p>It also proposes to provide pedestrian paths and cycleways throughout the site and into the Botany Wetlands to promote this important environmental feature of the area and encourage the redevelopment of the space as a major open space asset for the LGA.</p> |
| <p><i>Objective 1.5 Provide a greater range of housing types.</i></p> | Yes | <p>The delivery of a large number of apartments in a range of sizes will provide greater housing diversity in an area predominately characterised by single and two storey attached and detached dwellings and low rise residential flat buildings.</p> |
| <p><i>Objective 7.1 Protect and expand high quality flora and fauna corridors and foreshore vegetation.</i></p> <ul style="list-style-type: none"> – <i>7.1.1 Council to work with Sydney Water and tenants to protect and</i> | Yes | <p>The master plan promotes the retention of high value trees and proposes two public parks and three areas of communal open space totally 9,620m. These areas will be landscaped with native flora to</p> |

| | |
|--|---|
| <i>establish habitat corridors Botany Wetlands in Botany Wetlands including revitalisation of existing ESBS communities.</i> | enhance the biodiversity of the surrounding area. |
| – <i>Promote the use of indigenous, ‘water efficient’ flora in the landscaping of local parks and reserves.</i> | |

Is the planning proposal consistent with applicable State Environmental Planning Policies?

The State Environmental Planning Policy (Infrastructure) 2007 currently applies to the site. High density residential development is not a permissible use under the SP1 and SP2 zones. Therefore, this planning proposal seeks to amend the zoning for the site to R4 under the BBLEP 2013 to enable the development of high density residential development.

The State Environmental Planning Policy No 55—Remediation of Land is also applicable to this site. As the rezoning of the site will result in a change of land use a site audit was undertaken by Ramboll Environ Australia Pty Ltd, at **Attachment D**, in accordance with SEPP 55 Planning Guidelines. The Site Audit Statement makes recommendations for the remediation of the site subject to any proposed redevelopment.

No other State Environmental Planning Policies (SEPP) are applicable to this development.

Refer to the full assessment of SEPPs at **Table 5** below.

Table 5 Response to State Environmental Planning Policies

| State Environmental Planning Policy | Consistency | Comment |
|---|--------------------|----------------|
| State Environmental Planning Policy No 1—Development Standards | N/A | N/A |
| State Environmental Planning Policy No 14—Coastal Wetlands | N/A | N/A |
| State Environmental Planning Policy No 15—Rural Landsharing Communities | N/A | N/A |
| State Environmental Planning Policy No 19—Bushland in Urban Areas | N/A | N/A |
| State Environmental Planning Policy No 21—Caravan Parks | N/A | N/A |
| State Environmental Planning Policy No 26—Littoral Rainforests | N/A | N/A |
| State Environmental Planning Policy No 29—Western Sydney Recreation Area | N/A | N/A |
| State Environmental Planning Policy No 30—Intensive Agriculture | N/A | N/A |
| State Environmental Planning Policy No 32—Urban Consolidation (Redevelopment of Urban Land) | N/A | N/A |
| State Environmental Planning Policy No 33—Hazardous and Offensive Development | N/A | N/A |
| State Environmental Planning Policy No 36—Manufactured Home Estates | N/A | N/A |

| | | |
|---|-----|--|
| State Environmental Planning Policy No 39—Spit Island Bird Habitat | N/A | N/A |
| State Environmental Planning Policy No 44—Koala Habitat Protection | N/A | N/A |
| State Environmental Planning Policy No 47—Moore Park Showground | N/A | N/A |
| State Environmental Planning Policy No 50—Canal Estate Development | N/A | N/A |
| State Environmental Planning Policy No 52—Farm Dams and Other Works in Land and Water Management Plan Areas | N/A | N/A |
| State Environmental Planning Policy No 55—Remediation of Land | Yes | A site audit was undertaken in accordance with SEPP 55 Planning Guidelines. The Site Audit Statement includes recommendations to ensure that the site is appropriate for the future use as high density residential. |
| State Environmental Planning Policy No 59—Central Western Sydney Regional Open Space and Residential | N/A | N/A |
| State Environmental Planning Policy No 62—Sustainable Aquaculture | N/A | N/A |
| State Environmental Planning Policy No 64—Advertising and Signage | N/A | N/A |
| State Environmental Planning Policy No 65—Design Quality of Residential Apartment Development | Yes | The master plan for the site proposes five residential flat buildings of between 6 and 14 storeys. The design of the master plan has been prepared in accordance with the design principles of SEPP 65 and demonstrates that a built form compliant with the requirements of SEPP65 is achievable. However, the detail design of the apartment buildings will be subject to a future DA to be determined by Council. |
| State Environmental Planning Policy No 70—Affordable Housing (Revised Schemes) | N/A | N/A |
| State Environmental Planning Policy No 71—Coastal Protection | N/A | N/A |
| State Environmental Planning Policy (Affordable Rental Housing) 2009 | N/A | N/A |
| State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004 | N/A | N/A |
| State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 | N/A | N/A |
| State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 | N/A | N/A |
| State Environmental Planning Policy (Infrastructure) 2007 | Yes | Gardeners Road is a classified road. The site is currently accessed by a signalised intersection with Gardeners Road. The master plan proposed to |

| | | |
|---|-----|---|
| | | retain this access as the primary access to the site. The master plan includes apartment buildings containing more than 75 dwellings with access to a classified road. This planning proposal seeks to rezone the site to R4 High Density Residential, however approval for the development is not currently being sought. Any future development application will need to be referred to RMS when approval is being sought for the development (See transport Assessment at Attachment E). |
| State Environmental Planning Policy (Kosciuszko National Park—Alpine Resorts) 2007 | N/A | N/A |
| State Environmental Planning Policy (Kurnell Peninsula) 1989 | N/A | N/A |
| State Environmental Planning Policy (Major Development) 2005 | N/A | N/A |
| State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 | N/A | N/A |
| State Environmental Planning Policy (Miscellaneous Consent Provisions) 2007 | N/A | N/A |
| State Environmental Planning Policy (Penrith Lakes Scheme) 1989 | N/A | N/A |
| State Environmental Planning Policy (Rural Lands) 2008 | N/A | N/A |
| State Environmental Planning Policy (SEPP 53 Transitional Provisions) 2011 | N/A | N/A |
| State Environmental Planning Policy (State and Regional Development) 2011 | N/A | N/A |
| State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 | N/A | N/A |
| State Environmental Planning Policy (Sydney Region Growth Centres) 2006 | N/A | N/A |
| State Environmental Planning Policy (Three Ports) 2013 | N/A | N/A |
| State Environmental Planning Policy (Urban Renewal) 2010 | N/A | N/A |
| State Environmental Planning Policy (Western Sydney Employment Area) 2009 | N/A | N/A |
| State Environmental Planning Policy (Western Sydney Parklands) 2009 | N/A | N/A |

Is the planning proposal consistent with applicable Ministerial Directions (s.117 directions)?

A review of the consistency of the Planning Proposal with the Ministerial Directions for LEPs under Section 117 of the EP&A Act 1979 is discussed at **Table 6** below.

Table 6 Response to Section 117 Directions

| No. | Direction | Objectives | Consistency | Comment |
|----------|--|--|-------------|--|
| 1 | Employment and Resources | | | |
| 1.1 | Business and Industrial Zones | <ul style="list-style-type: none"> – Encourage employment growth in suitable locations; – Protect employment land in business and industrial zones; and – Support the viability of identified strategic centres. | N/A | The Planning Proposal does not affect land within an existing or proposed business or industrial zone. |
| 1.2 | Rural Zones | <ul style="list-style-type: none"> – Protect the agricultural production value of rural land. | N/A | The Planning Proposal does not affect land within an existing or proposed rural zone. |
| 1.3 | Mining, Petroleum Production and Extractive Industries | <ul style="list-style-type: none"> – Ensure that the future extraction of State or regionally significant reserves of coal, other minerals, petroleum and extractive materials are not compromised by inappropriate development. | N/A | The Planning Proposal does not relate to the mining of coal or other materials, production of petroleum or extractive materials. |
| 1.4 | Oyster Aquaculture | <ul style="list-style-type: none"> – Ensure that Priority Oyster Aquaculture Areas and oyster aquaculture outside such an area are adequately considered when preparing a planning proposal; and – Protect Priority Oyster Aquaculture Areas and oyster aquaculture outside such an area from land uses that may result in adverse impacts on water quality and consequently, on the health of oysters and oyster consumers. | N/A | The Planning Proposal does not relate to oyster aquaculture or impact Priority Oyster Aquaculture Areas. |
| 1.5 | Rural Lands | <ul style="list-style-type: none"> – Protect the agricultural production value of rural land; and – Facilitate the orderly and economic development of | N/A | The Planning Proposal does not apply to an existing or proposed rural or environmental protection zone. |

| | | | | | |
|----------|--|---|---|-----|--|
| | | | rural lands for rural and related purposes. | | |
| 2 | Environment and Heritage | | | | |
| 2.1 | Environment Protection Zones | – | Protect and conserve environmentally sensitive areas. | N/A | The Planning Proposal does not apply to land within an environmental protection zone or identified for environmental protection purposes. |
| 2.2 | Coastal Protection | – | Implement the principles in the NSW Coastal Policy. | N/A | The Planning Proposal does not apply to land within the coastal Zone. |
| 2.3 | Heritage Conservation | – | Conserve items, areas, objects and places of environmental heritage significance and indigenous heritage significance. | N/A | The Planning Proposal does not propose to amend the heritage status of any of the heritage items or conservation zones surrounding the site. |
| 2.4 | Recreation Vehicle Areas | – | Protect sensitive land or land with significant conservation values from adverse impacts from recreation vehicles. | N/A | The Planning Proposal does not seek to enable land to be developed for the purposes of a recreation vehicle area. |
| 3 | Housing, Infrastructure and Urban Development | | | | |
| 3.1 | Residential Zones | – | Encourage a variety and choice of housing types to provide for existing and future housing needs; | Yes | The Planning Proposal will facilitate the delivery of high quality apartment living to meet the growing population of Bayside LGA and the Central Sydney District. The development will increase housing supply and improve the choice of dwelling type available. |
| | | – | Make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services; and | | |
| | | – | Minimise the impact of residential development on the environment and resource lands. | | |

| | | | | |
|-----|---|--|-----|---|
| | | | | <p>Sydney Light Rail station at Kingsford.</p> <p>Increasing the density of housing on this site will help conserve the existing residential neighbourhoods of Eastlakes while contributing to the housing targets for the LGA and District.</p> <p>The proposed development has been designed to reduce impacts on the surrounding natural environment and improve connectivity through the Botany Wetlands.</p> |
| 3.2 | Caravan Parks and Manufactured Home Estates | <ul style="list-style-type: none"> – Provide for a variety of housing types; and – Provide opportunities for caravan parks and manufactured home estates. | N/A | The Planning Proposal does not relate to the location or provision for caravan parks or manufactured homes. |
| 3.3 | Home Occupations | <ul style="list-style-type: none"> – Encourage the carrying out of low-impact small businesses in dwelling houses. | Yes | The Planning Proposal does not seek to change the permissibility of home occupations in dwelling houses. |
| 3.4 | Integrating Land Use and Transport | <ul style="list-style-type: none"> – Improving access to housing, jobs and services by walking, cycling and public transport; – Increasing the choice of available transport and reducing dependence on cars; – Reducing travel demand including the number of trips generated by development and the distances travelled, especially by car; | Yes | <p>The site is located close to existing transport infrastructure including bus routes along Gardeners Road and the future light rail stop at Kingsford town centre. It is also located within close proximity to Sydney Airport.</p> <p>The Planning Proposal will enable the intensification of housing in a well-connected site and encourage use</p> |

| | | | | |
|-----|--------------------------------------|---|-----|--|
| | | <ul style="list-style-type: none"> – Supporting the efficient and viable operation of public transport services; and – Providing for the efficient movement of freight. | | of public transport. |
| 3.5 | Development Near Licensed Aerodromes | <ul style="list-style-type: none"> – Ensure the effective and safe operation of aerodromes; – Ensure that their operation is not compromised by development that constitutes an obstruction, hazard or potential hazard to aircraft flying in the vicinity; – Ensure development for residential purposes or human occupation, if situated on land within the Australian Noise Exposure Forecast (ANEF) contours of between 20 and 25, incorporates appropriate mitigation measures so that the development is not adversely affected by aircraft noise. | N/A | The Planning Proposal does not affect land in proximity to an aerodrome. |
| 3.6 | Shooting Ranges | <ul style="list-style-type: none"> – Maintain appropriate levels of public safety and amenity when rezoning land adjacent to an existing shooting range; – Reduce land use conflict arising between existing shooting ranges and rezoning of adjacent land; and – Identify issues that must be addressed when giving consideration to rezoning land adjacent to an existing shooting range. | N/A | The Planning Proposal does not seek to affect, create, alter or remove a zone or provision relating to land adjacent to or adjoining an existing shooting range. |

4 Hazard and risk

| | | | | |
|----------------------------|---------------------------------------|--|-----|---|
| 4.1 | Acid Sulfate Soils | <ul style="list-style-type: none"> – Avoid significant adverse environmental impacts from the use of land that has a probability of containing acid sulfate soils. | N/A | The Planning Proposal does not apply to land identified as having a probability of acid sulfate soils. |
| 4.2 | Mine Subsidence and Unstable Land | <ul style="list-style-type: none"> – Prevent damage to life, property and the environment on land identified as unstable or potentially subject to mine subsidence. | N/A | The Planning Proposal does not apply to land that is within a mine subsidence district or that has been identified as being unstable. |
| 4.3 | Flood Prone Land | <ul style="list-style-type: none"> – Ensure that development of flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005 – Ensure that the provisions of an LEP on flood prone land is commensurate with flood hazard and includes consideration of the potential flood impacts both on and off the subject land. | Yes | Although the proposal is on land affected by flooding, it has been supported by a preliminary review prepared by Northrop Consulting which has identified that the site is likely to be capable of being redeveloped for residential land uses, pending further consideration at the detailed design phase for provision of flooding and stormwater management. |
| 4.4 | Planning for Bushfire Protection | <ul style="list-style-type: none"> – Protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas; – Encourage sound management of bush fire prone areas. | N/A | The proposal is not located on or within a bushfire hazard area. |
| 5 Regional Planning | | | | |
| 5.1 | Implementation of Regional Strategies | <ul style="list-style-type: none"> – Give legal effect to the vision, land use strategy, policies, outcomes and actions contained in regional strategies. | N/A | The Planning Proposal does not apply to land subject to regional strategies. |

| | | | | |
|-----|--|---|-----|--|
| 5.2 | Sydney Drinking Water Catchment | <ul style="list-style-type: none"> – Protect water quality in the Sydney drinking water catchment. | N/A | The Planning Proposal does not apply to land in the Sydney drinking water catchment. |
| 5.3 | Farmland of State and Regional Significance on the NSW Far North Coast | <ul style="list-style-type: none"> – Ensure that the best agricultural land will be available for current and future generations to grow food and fibre; – Provide more certainty on the status of the best agricultural land, thereby assisting councils with their local strategic settlement planning; – Reduce land use conflict arising between agricultural use and non-agricultural use of farmland as caused by urban encroachment into farming areas. | N/A | The Planning Proposal does not apply to land in the nominated Council areas. |
| 5.4 | Commercial and Retail Development along the Pacific Highway, North Coast | <ul style="list-style-type: none"> – Protect the Pacific Highway's function, that is to operate as the North Coast's primary inter- and intra-regional road traffic route; – Prevent inappropriate development fronting the highway; – Protect public expenditure invested in the Pacific Highway; – Protect and improve highway safety and highway efficiency; – Provide for the food, vehicle service and rest needs of travellers on the highway; and – Reinforce the role of retail and commercial development in town centres, where they can best serve the | N/A | The Planning Proposal does not apply to land in Council areas on the north Coast. |

| | | | | | |
|----------------------------|--|---|---------------------------|--|---|
| | | | populations of the towns. | | |
| 5.5 | Development in the vicinity of Ellalong, Paxton and Millfield (Cessnock LGA) | | (Revoked 18 June 2010) | | |
| 5.6 | Sydney to Canberra Corridor | | (Revoked 10 July 2008) | | |
| 5.7 | Central Coast | | (Revoked 10 July 2008) | | |
| 5.8 | Second Sydney Airport: Badgerys Creek | – Avoid incompatible development in the vicinity of any future second Sydney Airport at Badgerys Creek | N/A | | The Planning Proposal does not apply to land in the vicinity of Badgerys Creek. |
| 5.9 | North West Rail Link Corridor Strategy | <ul style="list-style-type: none"> – Promote transit-oriented development and manage growth around the eight train stations of the North West Rail Link (NWRL) – Ensure development within the NWRL corridor is consistent with the proposals set out in the NWRL Corridor Strategy and precinct Structure Plans. | N/A | | The Planning Proposal does not apply to land within the Hornsby Shire, Hills Shire or Blacktown Council areas. |
| 6 Local Plan Making | | | | | |
| 6.1 | Approval and Referral Requirements | – Ensure that LEP provisions encourage the efficient and appropriate assessment of development. | Yes | | The Planning Proposal does not contravene the objectives of this direction. |
| 6.2 | Reserving Land for Public Purposes | <ul style="list-style-type: none"> – Facilitate the provision of public services and facilities by reserving land for public purposes; and – Facilitate the removal of reservations of land for public purposes where the land is no longer required for acquisition. | N/A | | The proposal includes delivery of two public parks and cycle and walkway links through to the Botany Wetlands. |
| 6.3 | Site Specific Provisions | – Discourage unnecessarily restrictive site specific planning controls. | N/A | | The Planning Proposal does not propose any unnecessarily restrictive site specific planning controls, and will use standard |

| | | | |
|----------|--|---|---|
| | | | built form controls to amend the LEP. |
| 7 | Metropolitan Planning | | |
| 7.1 | Implementation of <i>A Plan for Growing Sydney</i> | – Give legal effect to the planning principles; directions; and priorities for subregions, strategic centres and transport gateways contained in <i>A Plan for Growing Sydney</i> | The Planning Proposal will enable development that is consistent with the key directions of the Metropolitan Strategy. Refer to Sections 2 and 6 of this report. |
| 7.2 | Implementation of Greater Macarthur Land Release Investigation | – Ensure development within the Greater Macarthur Land Release Investigation Area is consistent with the Greater Macarthur Land Release Preliminary Strategy and Action Plan (the Preliminary Strategy) | The Planning Proposal does not apply to land in the vicinity of the Macarthur land release area. |

6.3 Section C – Environmental, social and economic impact

Is there any likelihood that critical habitat or threatened species, populations, or ecological communities, or their habitats, will be adversely affected as a result of the proposal?

There are no impacts envisaged. 75 Gardeners Road is currently vacant and 73 Gardeners Road is currently in use as the Sydney Water Depot. It is considered unlikely that the proposed changes to land use zoning, height or FSR will have adverse environmental impacts the site.

The subject site is located adjacent to the Botany Water Reserves, which is identified as a heritage item on the following registers and has heritage protection under the Heritage Act 1977 and the Environmental Planning and Assessment Act 1979:

- Botany Bay Local Environmental Plan 2013, Item No. I2.
- NSW State Heritage Register, Listing No. 01317.

However, the land to which this Planning Proposal applies is not identified as being of environmental significance. Notwithstanding, the final master plan for the site has increased the building separation from the earlier designs, improving solar access and north-south view corridors through the site to the Botany Water Reserves. Further, information is included in the Heritage Review for the site, prepared by NBRs Architecture and included at **Attachment F**.

Additionally, an ecological report has been prepared in support of the planning proposal and is provided at **Attachments G and H**.

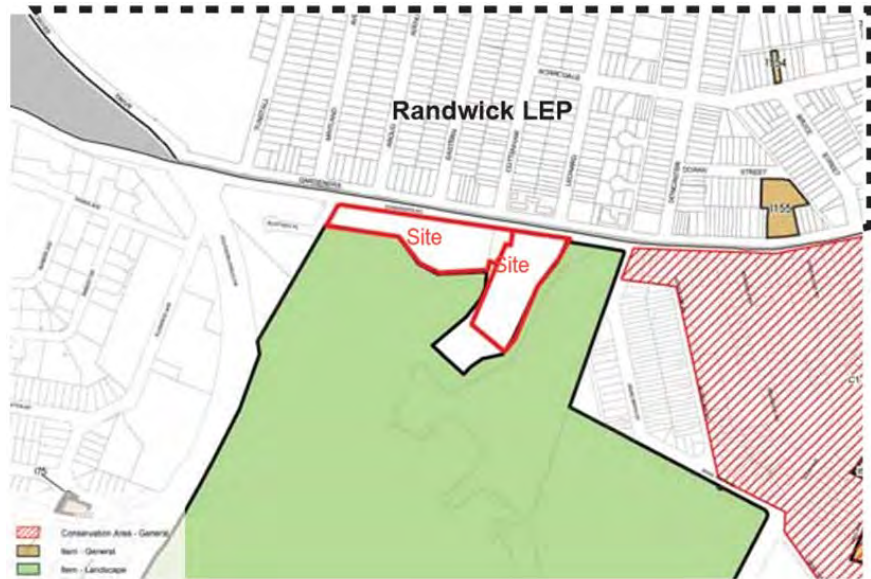


Figure 21 Heritage map of the subject site

Site outlined in red

Source: BBLEP – Heritage Map, Sheet HER_004

Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?

At this stage, the Planning Proposal will not likely result in any adverse environmental effects.

Any environmental effects that may arise during the design and development phase, or construction phase of the site should be addressed at the Development Application stage.

Has the planning proposal adequately addressed any social and economic effects?

The Planning Proposal will not have any adverse social or economic effects. The proposal seeks to rezone surplus government land for the development of high density residential to provide for quality apartment living, adjacent to valuable public open space and with good transport connections, to accommodate the growing population of the Central Sydney District. The proposal will enable greater housing diversity by delivering apartments in an area predominately characterised by single and two storey attached and detached dwellings and low rise residential flat buildings.

6.4 Section D – State and Commonwealth interests

Is there adequate public infrastructure for the planning proposal?

The Planning Proposal seeks to amend the land use zoning to R4 High Density Residential, and increase the maximum permissible building height and FSR controls, resulting in an increased number of residents living in the area. The master plan for the site proposes delivery of two new public parks and cycle and walkway linkages into the broader open space areas of the Botany Wetlands. The site is also within close proximity to several bus routes to local and strategic centres and the Sydney CBD, as well as the future Sydney Light Rail station at Kingsford.

Consultation will be required with Council, Transport for NSW and the RMS in relation to roads, traffic and transport at more detailed Development Application stages.

What are the views of State and Commonwealth public authorities consulted in accordance with the Gateway determination?

At this stage, no Gateway Determination has been issued as the Planning Proposal is submitted to Bayside Council for consideration. Notwithstanding this, preliminary discussions have taken place between Architectus and the Department of Planning and Environment with regards to the Deferred Matter zoning for the Sydney Water Depot site. At this early stage the Department has indicated preliminary support, pending further consideration of the planning proposal.

7. Mapping

The following maps identify the site, the subject of this Planning Proposal, the current development standards relating to the site, the proposed amendment to the zone and proposed development standards.

While the master plan and associated assessments have been prepared for the entire site the amendments proposed to the zoning map and the HOB and FSR development standards for 73 Gardeners Road are proposed to be deferred until such time as the current use of the site as a Water Depot is no longer required by Sydney Water. During this time, the relevant maps in the BBLEP will identify 73 Gardeners Road as a 'deferred matter' and the current zoning and development standards will continue to apply.

The maps provided below show the proposed mapping for the future use of the site as R4 High Density Residential with the associated development standards to enable the redevelopment, as well as maps that identify 73 Gardeners Road as a 'deferred matter'. It should be noted that in the proposed zoning map there is a remnant area zoned as SP2 which sits outside the sites boundaries. This is not intended to be rezoned at this stage as Sydney Water may still need this space in the future.

Subject site: 73-75 Gardeners Road, Eastlakes



Figure 22 Aerial view of the subject site

Site outlined in red

Source: Architectus, September 2017

7.1 Existing and proposed LEP maps

Land use zone

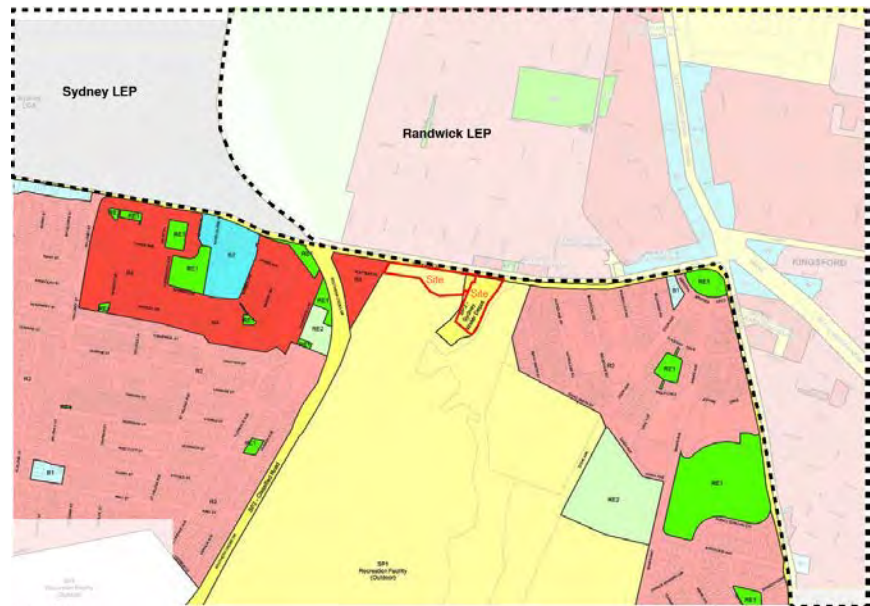


Figure 23 Land use zoning map

Site outlined in red

Source: Botany Bay LEP 2013, Sheet LZN_004



Figure 24 Proposed land use zoning map

Site outlined in black

Source: Architectus, September 2017

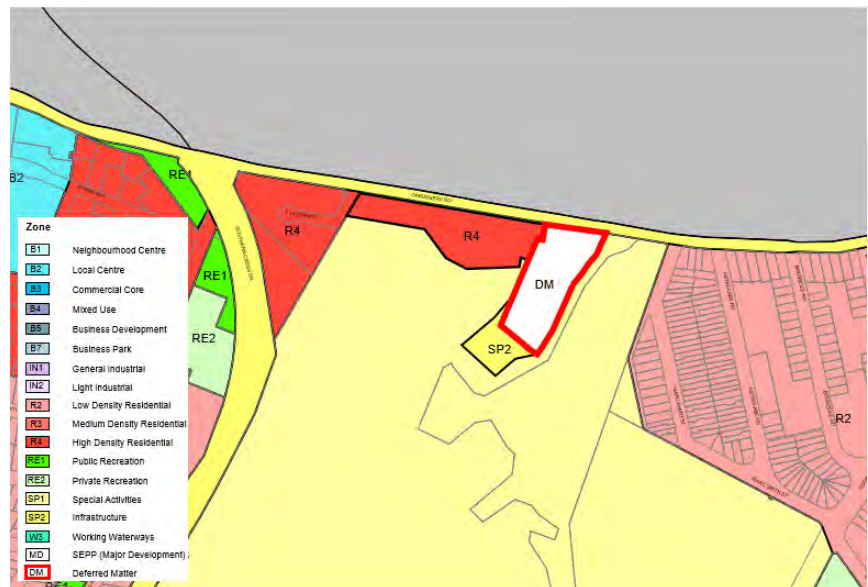


Figure 25 Proposed land use zoning map with deferred matter
 Site outlined in black with deferred matter in red
 Source: Architectus, September 2017

Building height



Figure 26 Maximum building height map
 Site outlined in red
 Source: Botany Bay LEP 2013, Sheet HOB_004



Figure 27 Proposed maximum building height map
 Site outlined in black
 Source: Architectus, September 2017



Figure 28 Proposed maximum building height map with deferred matter
 Site outlined in black with deferred matter in red
 Source: Architectus, September 2017

Floor Space Ratio

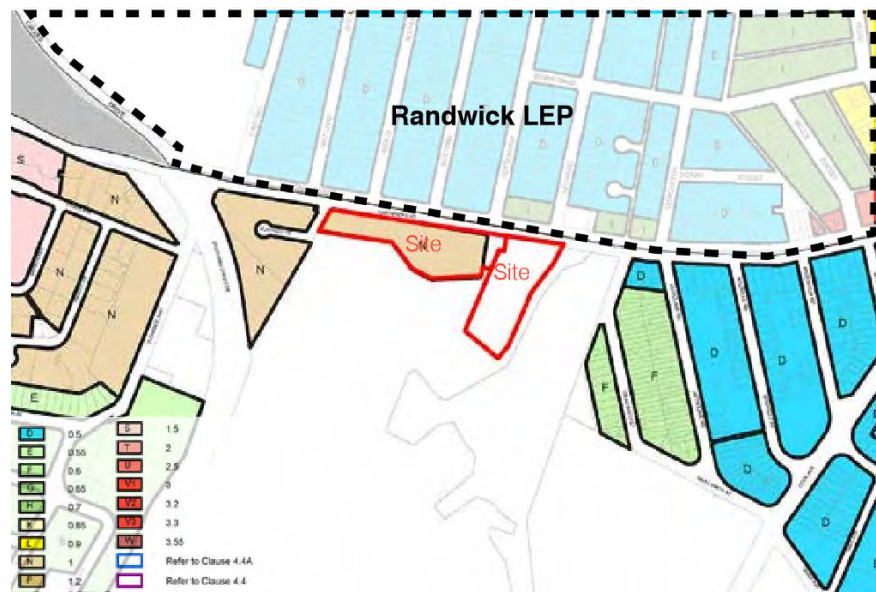


Figure 29 Maximum floor space ratio plan
 Site outlined in red
 Source: Botany Bay LEP 2013, Sheet FSR_004



Figure 30 Proposed maximum floor space ratio map
 Site outlined in black
 Source: Architectus, September 2017



Figure 31 Proposed maximum floor space ratio map with deferred matter
 Site outlined in black with deferred matter in red
 Source: Architectus, September 2017

8. Consultation

This section provides information regarding consultation with council, stakeholders, residents and the community which has informed the preparation of this Planning Proposal. Consultation was undertaken with stakeholders at a visioning level to support the preparation of the master plan for the site.

8.1 Bayside Council

Consultation with Bayside Council (formerly Botany Bay Council) has been undertaken as the Planning Proposal has been prepared, including initial discussions in September and October 2015. At this time, the proposal was for 75 Gardeners Road only and did not include planning for the Sydney Water Depot. The master plan for the site evolved and a number of changes were adopted at the request of Council, including:

- 1) Stepping the building height down towards the golf course;
- 2) Providing a two storey townhouse frontage to the southern boundary of the site adjoining the golf course;
- 3) Reduced building height to address overshadowing of golf course infrastructure;
- 4) Reducing the height of buildings adjacent to Slattery Place (14 to 9 storeys); and
- 5) Footprint adjustments to allow for greater tree retention.

Figure 4 and **Figure 5** below demonstrate the evolution of the design in response to Council's concerns.

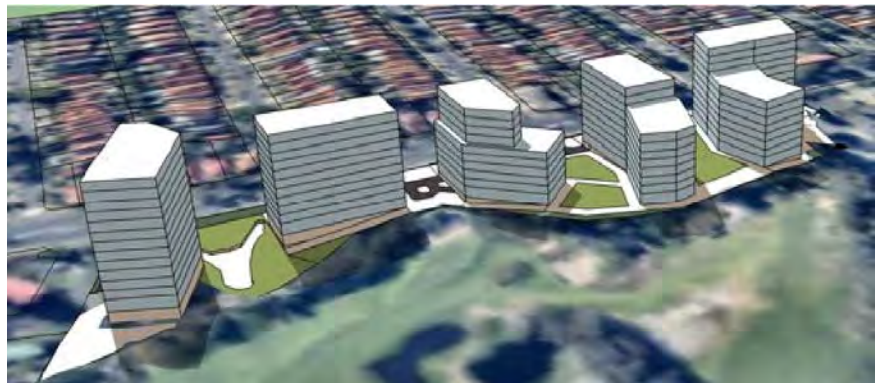


Figure 4 Initial design option presented to Council

The above is the master plan presented to Council in September 2015
Source: Architectus, dated September 2015

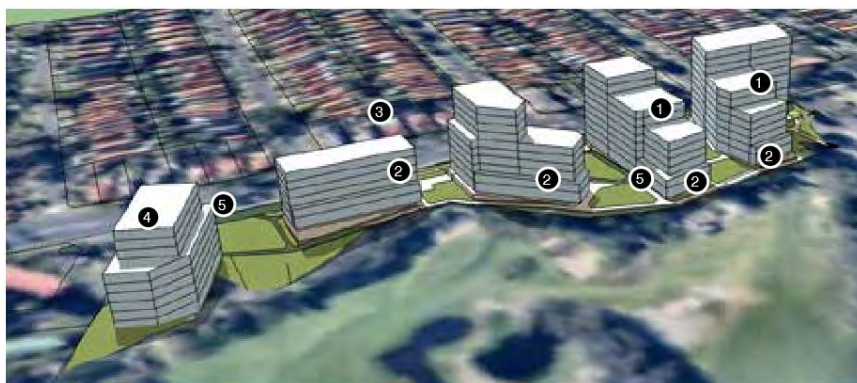


Figure 5 Previous proposal addressing Council comments

The above is the subsequent master plan presented to Council in October 2015.

Source: Architectus, dated October 2017

The scheme was amended to adopt all of Council's advice. Further, the new design introduced a 2 storey masonette typology along the golf course, providing an even better transition down to the golf course and activating the public domain on the southern edge of the site.

Further consultation was undertaken with Council and key stakeholders. As a result a number of additional changes were made to design to incorporate feedback received. These changes include:

- 1) Built form adjusted to provide a large centrally located public open space (approx. 2,800m²);
- 2) Western building removed to provide improved open space and relationship to existing buildings at Slattery Place;
- 3) Enlarged public open space in the western portion of the site (approx. 1800m²);
- 4) Consolidated built form to maximise open space.

Following the above, as a result of the initial review of current assets owned by Sydney Water, it was determined that the site should be expanded to include the current Sydney Water Depot at 73 Gardeners Road. This part of the site is proposed to be deferred from the rezoning until the Depot site is closed, however the master planning has been undertaken for both sites together to provide a better design outcome.

Following the inclusion of 73 Gardeners Road, meetings were held with Bayside Council staff on 14 July 2017 and 15 August 2017 to further discuss the development of the site. At the initial meeting with Council, an overview of the site and history to date was discussed with the key points arising from the meeting as follows:

- Future development of the site is to be subject to sale and preparation of a Development Application by others;
- Sydney Water Depot is to be subject to a Deferred Matter zoning to allow for its ongoing use as a depot until such time that Sydney Water is ready to divest the site; and
- The Planning Proposal will need to be supported by a Voluntary Planning Agreement which will need to consider capturing some of the value uplift as public benefit. This is to be discussed further with Council.

The discussions were supported by a high level plan showing key principles which is provided at **Figure 6** below. A subsequent meeting was held 15 August 2017 to further discuss the progression of the planning proposal. Key points arising from this discussion were:

- Council were to review the heights of the proposal further and provide comments on the scale and massing of the development; and
- The planning proposal was to be circulated internally and seek comments from other internal stakeholders.

The discussions were supported by a high level plan showing key principles which is provided at **Figure 7** below. Sydney Water and Architectus would like to reaffirm their willingness to continue to discuss the proposal and master plan with Council as part of the initial assessment of the planning proposal by Council.



Figure 6 Indicative master plan principles for 75 Gardeners Road and 73 Gardeners Road

Source: Architectus, dated July 2017



Figure 7 Final indicative master plan for 75 Gardeners Road and Sydney Water Depot

The above is the final master plan presented to Council in August 2017.

Source: Architectus, dated August 2017

8.2 Randwick Council

Consultation with Randwick Council was also undertaken. Council was generally supportive however they did raise the following concerns:

- Need to connect with the existing Cycling Strategy – opportunities for connections have been allowed for in the master plan;

- Respond to and manage the existing flooding originating upstream – this has been considered and addressed in Attachment N - Hydrology, Stormwater and Creek Assessment
- Impact on traffic along an existing rat run along Eastern Ave – This has been considered and addressed within Attachment E -Transport Report; and
- Respond to the existing character and transition along the northern side of Gardeners Road – This has been considered and addressed in Attachment A - Urban Context Report .

8.3 Sydney Water

Consultation with Sydney Waters operational team also took place to understand potential design constraints originating from the existing infrastructure on the site. This consultation has informed the current master plan and addressed in Attachment N.

8.4 Golf Course

Sydney Water consulted with the The Lakes Golf Club to the south of the site. It should be noted that this site is owned by Sydney Water but leased to the golf club. Key concerns identified included potential issues with safety and security with access to and from the golf course and overlooking from any future buildings.

The master plan detailed at Attachment A has responded to these concerns and it is noted that these issues will need further detailed design refinement and solution as part of any future Development Application for the site.

8.5 Community

In December 2015 Sydney Water invited the local community to comment on their early planning and visioning work for the site, to share their views, and to provide feedback on what should be considered when planning for this site.

Communication and community consultation was undertaken through:

- A newsletter to residents around the site
- Two community information and feedback sessions
- An interactive feedback exercise
- Feedback forms
- Project email address and 1800 info line
- The Sydneywatertalk.com.au consultation website

41 people attended two community information and feedback sessions held on 10 December 2015 and 12 December 2015. The sessions provided an opportunity for local residents to find out more about Sydney Water's vision for the site, to ask questions of the project team, and to provide feedback on what should be considered when planning for this site. In attendance were representatives from Sydney Water, Architectus and Elton Consulting.

At the community sessions, stakeholders raised the following concerns about the proposal:

- The impact on local traffic, particularly along Gardeners Road and Eastern Avenue
- Population growth and impacts to local community space and infrastructure
- Level of density and proposed building heights
- The street frontage and on-street parking impacts.

At the community sessions, stakeholders supported the following principles of the development:

- The provision of more open space and green corridors between buildings
- Retaining the café onsite and access to views

- Fixing the stormwater channel and flood issues
- More affordable and public housing
- Provision of shared pedestrian/cycleways through the site, into the wetlands, and along Gardeners Road

9. Project timeline

9.1 Timeline

The timeframe for amendment of the BBLEP 2013 is expected to be dependent on the consideration of Council of the Planning Proposal and progression of any additional information requested by Council.

It is considered that the technical studies required to progress the Planning Proposal to a Gateway determination have been submitted along with this Planning Proposal.

9.2 Staging

Detail on projected project timeframes are provided below.

Table 7 Project timeline

| Stage | Timing | Responsible Organisation |
|---|-------------------------|--|
| Lodgment of Planning Proposal to Council | September 2017 | Sydney Water / Architectus |
| Consideration by Council | October – December 2017 | Bayside Council |
| Lodgment for Gateway determination | December 2017 | Bayside Council |
| Anticipated commencement date (date of Gateway determination) | January 2018 | Minister (or delegate) |
| Anticipated timeframe for the completion of required technical information | January – February 2018 | Sydney Water / Architectus |
| Timeframe for government agency consultation (pre and post exhibition as required by Gateway determination) | January – February 2018 | Sydney Water / Architectus |
| Commencement and completion dates for public exhibition period | January – February 2018 | Bayside Council |
| Dates for public hearing (if required) | February 2018 | Bayside Council |
| Timeframe for the consideration of a proposal post exhibition | February 2018 | Bayside Council |
| Date of submission to the department to finalise the LEP | March 2018 | Department of Planning and Environment (DPE) |
| Anticipated date RPA will make the plan (if delegated) | April 2018 | Bayside Council |
| Anticipated date RPA will forward to the department for notification | April 2018 | Bayside Council / DPE |

10. Conclusion

This Planning Proposal has been prepared in accordance with Section 55 of the Environmental Planning and Assessment Act 1979 and *A Guide to Preparing Planning Proposals*, NSW Department of Planning and Environment (2016).

Key objectives of this proposal are:

- To provide opportunity for high quality apartment living to accommodate the growing population and allow for redevelopment of the subject site.
- To retain existing valuable and significant trees onsite and create a series of public and communal open spaces.
- To maximise views to the south of the site over the golf course and Botany Wetlands.
- To provide pedestrian and cycle pathways through the site and into the Botany Wetlands and surrounding area.
- To orient built form and communal open spaces to maximise solar access.
- To minimise the impact of the development on the golf course infrastructure, particularly greens and fairway views.

The master plan, appended at **Attachment A**, sets out the proposed structure plan for the redevelopment of the site.

To enable the redevelopment of the site, it is sought that the following legislation be amended:

- Amend the BBLEP 2013 Land Zoning Map Sheet LZN_004 from SP1 and SP2 to R4 High Density Residential (including amendments to the current Schedule 1 Additional Permitted Land Uses to permit low scale retail / commercial uses on site);
- Amend the BBLEP 2013 Height of Building Map, Sheet HOB_004 to permit the maximum permissible height of a range between 29 meters and 50 meters; and
- Amend the BBLEP 2013 Floor Space Ratio Map, Sheet FSR_004 to permit a maximum floor space ratio of 1.65:1 for 75 Gardeners Road and 1.95:1 for 73 Gardeners Road.

The list of proposed amendments above includes the final proposed zoning and development standards for the entire site. However, the land zoning, HOB and FSR development standards for 73 Gardeners Road are proposed to be deferred until the current use of the site as a as an operational site is no longer required by Sydney Water. During this time, it is proposed that the relevant maps in the BBLEP will identify 73 Gardeners Road as a 'deferred matter' and that the current zoning and development standards will continue to apply.

Further discussions will be held between Sydney Water and Bayside Council regarding a VPA to allow for the capturing of public benefit as part of the proposed value uplift.

The proposed use, scale and amenity of the proposed master plan are supportable because:

- The Planning Proposal is consistent with the objectives and actions of the NSW Government's Sydney Metropolitan Strategy, *A Plan for Growing Sydney*, as well as district and local strategic planning objectives;
- The proposed redevelopment of the site will be for high density residential to accommodate the growing demand for new and diverse range of housing in the Central Sydney District;
- The proposed rezoning of the site will enable the provision of new housing within close proximity with the Eastlakes and Kingsford commercial centres, the future Randwick Health and Education Precinct and with easy access to the Sydney CBD; and
- The proposed legislative amendments sought in this Planning Proposal and the preferred urban design concept are considered to be feasible and have acceptable environmental impacts.

Urban design testing has demonstrated that the proposed amendments to the BBLEP 2013 would result in a desirable urban design outcome for the site.

The Planning Proposal is therefore recommended for support by Council to proceed to a Gateway Determination.

Attachment A – Urban Context Report, prepared by Architectus, dated September 2017

Urban Context Report

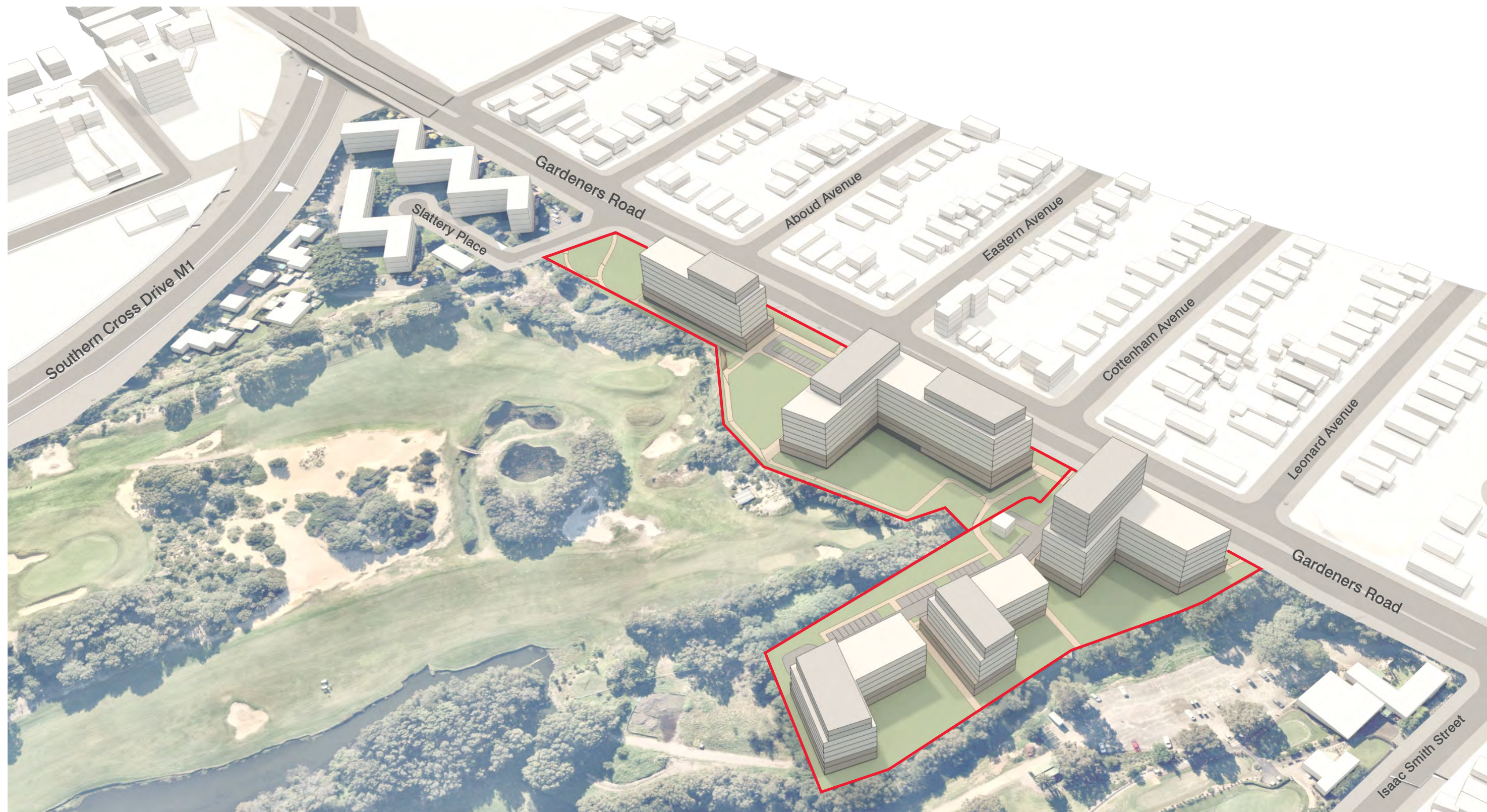
73-75 Gardeners Road, Eastlakes



Contents

| | | |
|---|--------------------------------|----|
| 1 | Introduction | 5 |
| 2 | Site & context analysis | 9 |
| 3 | Design principles | 29 |
| 4 | Alternative built form testing | 33 |
| 5 | The master plan | 37 |
| 6 | Master plan testing | 51 |
| 7 | Recommendations | 59 |

1 Introduction



Introduction

Purpose of this Report

Sydney Water have engaged Architectus to prepare a Master Plan for land at 73 and 75 Gardeners Road, Eastlakes for the purposes of informing a Planning Proposal which seeks to amend the current planning controls for the sites to allow residential development and supporting land uses.

Sydney Water are in the process of divesting surplus land to allow the redevelopment and improved utilisation of this land within Sydney Metropolitan area. For the subject sites, due to their location within the wider context of Eastlakes, it is proposed to seek their rezoning to allow for residential development or other appropriate supporting land uses.

In order to test and demonstrate the suitability of the sites for the proposed land uses, this Urban context Report and Master Plan has been prepared.

The Master Plan identifies that the site should be developed for residential with supporting land uses such as small scale shops, retail or similar uses. The proposal will enable the future redevelopment of both sites resulting in approximately 744 units, 1400 parking spaces and a range of building heights between 6-14 storeys. No approval is sought for the master plan at this stage as it simply seeks to evidence that the proposed changes to the planning controls are appropriate.

Any future development of the site will be subject to future development applications lodged with Council. Our review of the master plan has identified that the site is suitable for the proposed land uses as residential and supporting land uses including supporting commercial / retail uses.

The Sites

75 Gardeners Road

The site was formally occupied by a garden centre (Gardens R Us) which closed down and was demolished in 2016 and has been vacant since.

Its primary frontage and signalised access is to Gardeners Road with smaller secondary access points located at the eastern boundary of the site and on Slattery Place to the west. The southern boundary of the site is shared with a private golf course (The Lakes).

The site has some significant topography (+/- 8m) that rises to its south-eastern boundary with views of the golf course to the south. The topography drops to the western end of the site to a low point and an open drainage channel.

There are a number of mature native trees around the site particularly along its boundaries and around the open drainage channel.

73 Gardeners Road

This site is currently occupied by an operational Sydney Water depot. The building occupies the central portion of the site with car parking to the front accessed from Gardeners Road and a paved yard area to the rear and sides of the building. There is also an operational pump house located on the western side of the building to which an easment runs for a high pressure sewer main.

The site is bound to the west and south by a private golf course (The Lakes). Along eastern boundary an open stormwater channel flows south into the Botany Wetlands.

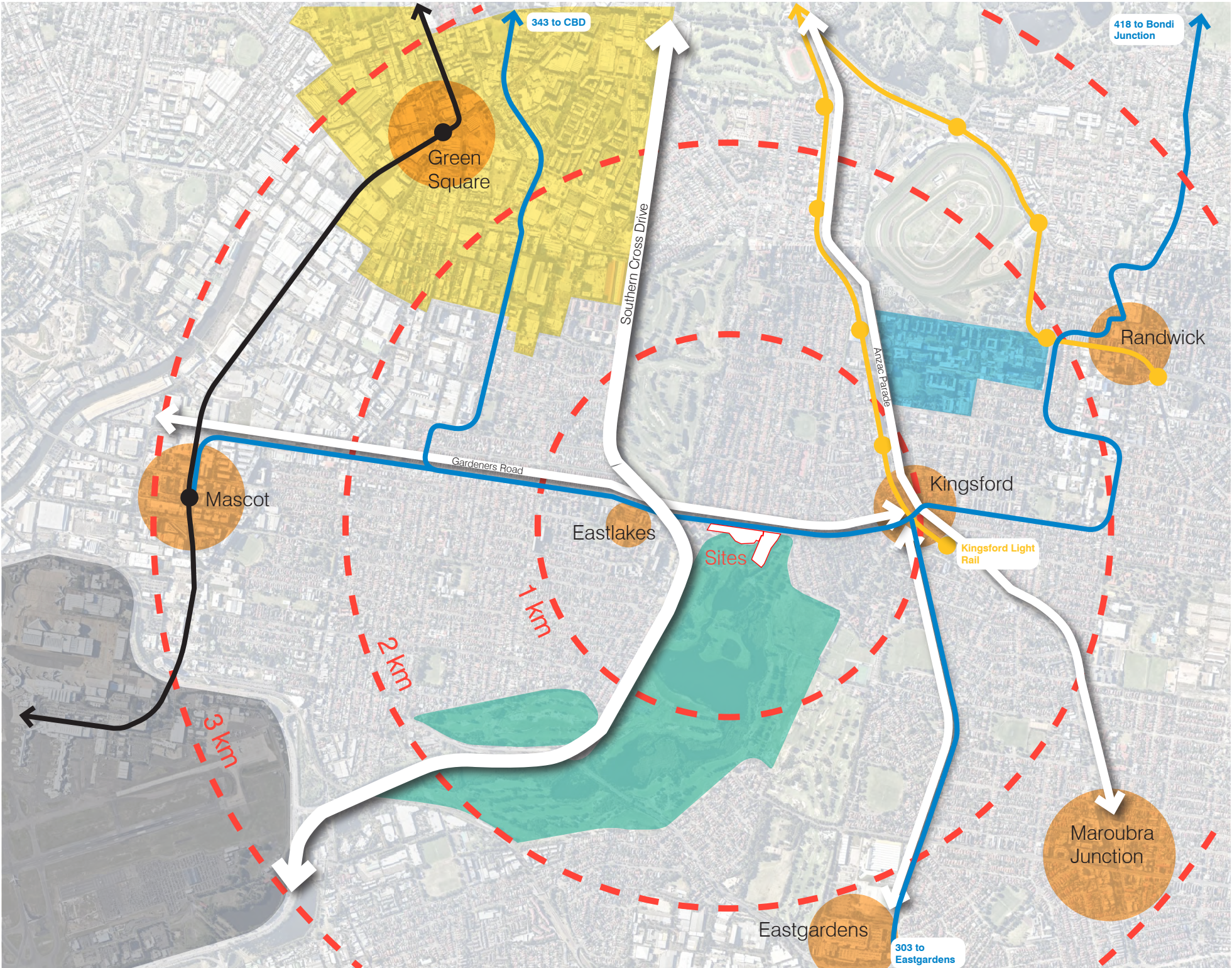
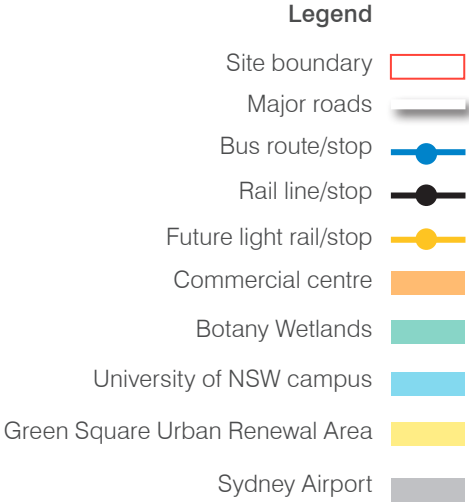
The side is predominantly flat with little vegetation except for a few trees along the northern boundary.



2 Site & context analysis

Strategic context

- Direct bus links into Sydney CBD, Mascot, Bondi Junction, Eastgardens and the University of NSW.
- Within 1km of 2 local centres and 3km of 5 other commercial centres.
- Within 2km of the Green Square Urban Renewal Precinct and 3km of the Mascot Urban Renewal Area.
- Within 3km of Mascot Train Station
- Approx 1km from the future Kingsford Light Rail station.



Local context

- Bus stops in both directions directly adjacent to site.
- 10-15min walk to future light rail station at Kingsford.
- Within 800m (10 mins walk) of two shopping/ commercial centres (Kingsford and Eastlakes).
- Two schools within a 10-15 minute walk radius.
- Numerous sports fields and public open spaces within a 5-10 minute walk radius.
- Existing cycle links with opportunities to link the site with schools, shops and open spaces.
- Potential links into and through the Botany wetlands.



Planning context

A Plan for Growing Sydney

The current Sydney Metropolitan Strategy, 'A Plan for Growing Sydney' identifies Eastlakes as being within the Global Economic Corridor, *an area of concentrated employment, economic activity and other uses in centres, transport gateways and industrial zoned land extending from Port Botany and Sydney Airport, through Sydney CBD to Macquarie Park, Sydney's North-West and Parramatta.*

The Plan also identifies the South East Light Rail alignment as forming part of the transport network within the Global Economic Corridor. The end of the proposed line (Kensington) will be within 1 km of the subject site.

The Strategy identifies goals, directions and principles which inform future growth and development in Sydney including:

- Accelerating housing choice and supply to suit different needs and lifestyles
- Accelerating urban renewal to provide homes closer to jobs
- Create healthy built environments

Any proposals for the site should strive to support the intended outcomes of the Strategy through providing high density residential development on a site which is in close proximity to a range of existing centres, while improving permeability and walkability by fostering cycling and pedestrian connections within and beyond the site



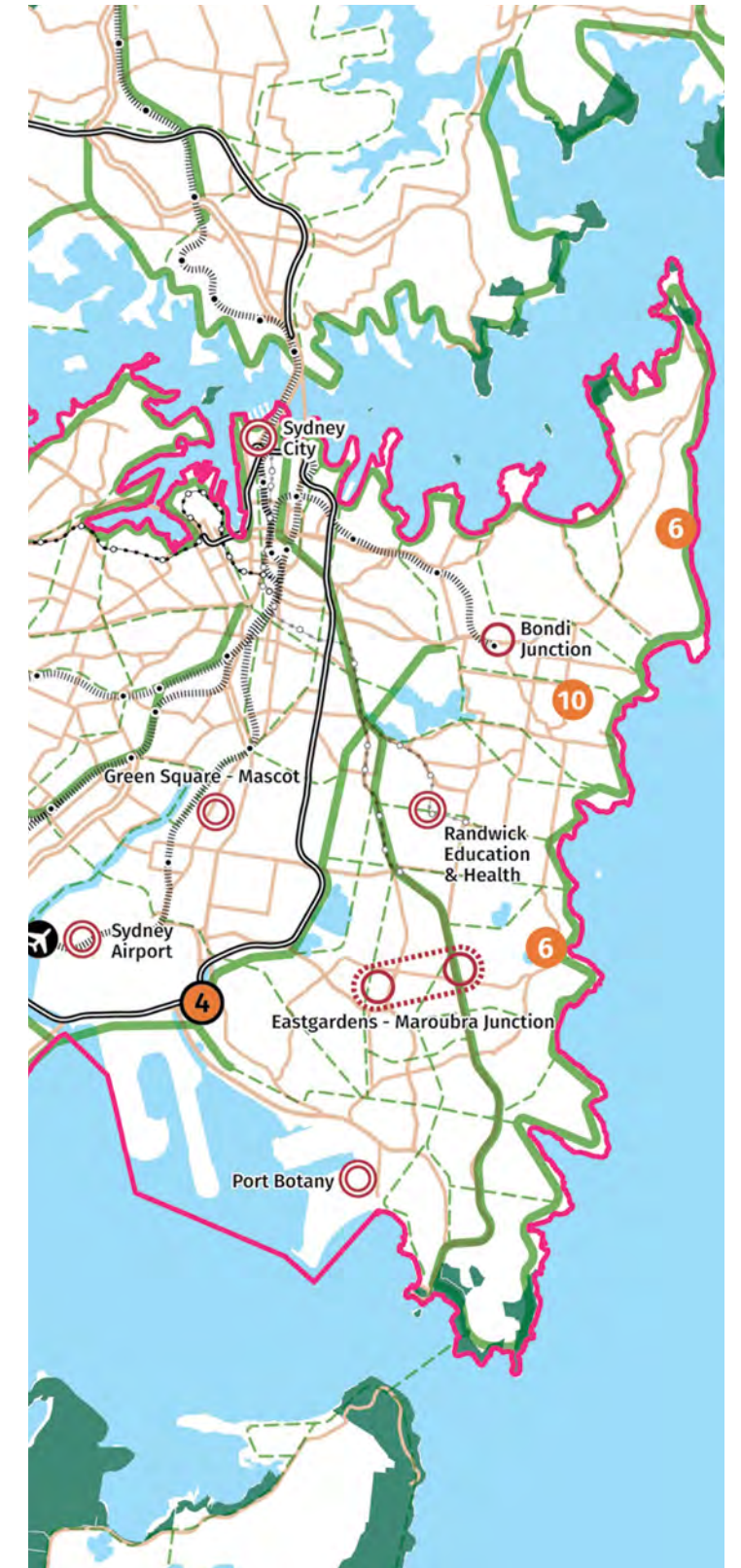
Extract from A Plan for Growing Sydney, NSW Department of Planning & Environment 2014

Draft Central District Plan

The site is also identified as being within Greater Sydney's Central District and is subject to the priorities and actions identified in the draft Central District Plan. These priorities and actions guide the proposed development by increasing housing capacity across the District and encouraging a diverse range of housing options. This will ensure the acceleration of housing supply, choice and affordability to the Central Sydney District.

Further, the draft Central District Plan proposes the priority project Mill Stream and Botany Wetlands Open Space Corridor. The corridor is home to two regionally rare vegetation communities, the Sydney Freshwater Wetlands and the Eastern Suburbs Banksia Scrub. Public use and access along this corridor is limited, and this Priority Project presents a significant opportunity for improved north south access and cross-district access.

The master plan for the redevelopment of the Eastlakes site should be driven by the need to retain existing mature trees onsite and take advantage of the surrounding natural environment by linking the future residential development to the wider area and enhancing interaction with the Botany Wetlands.



Extract showing the 'Green Grid' from Draft Central District Plan, Greater Sydney Commission, November 2016

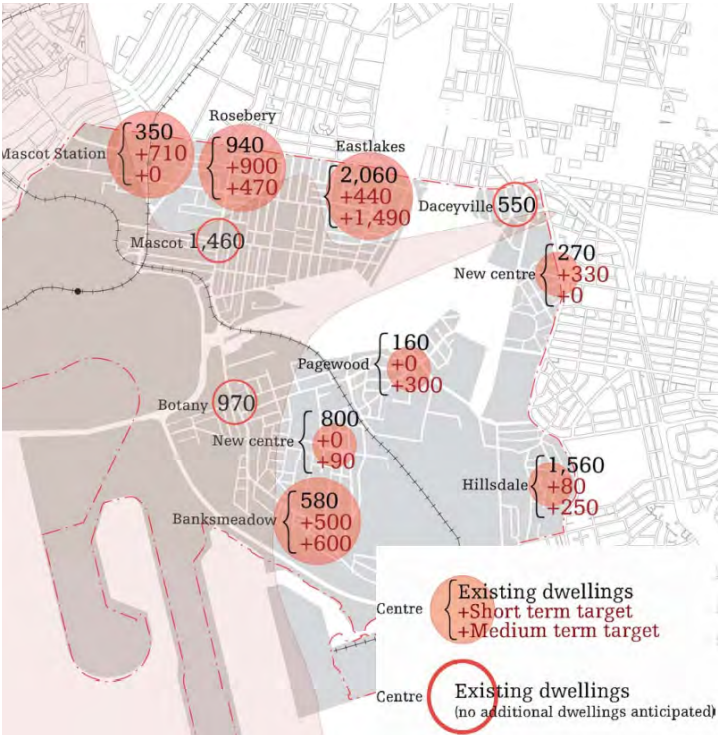
Botany Bay Planning Strategy 2031

The strategy was prepared to address the dwelling and job targets identified in the previous Draft East Subregional Strategy and provides a framework for growth and development to 2031. The Strategy was developed to guide the preparation of the BBLEP 2013 and provides a set of principles to guide planning and direction for the LGA.

The following Strategy Directions have been considered throughout the design phase of the Planning Proposal.

- Enhancing Housing Choice and Liveability
- Protecting the Natural Environment

The master plan for the site has been designed to improve the urban and natural environment, while delivering a higher density housing product with limited impact on the surrounding established neighbourhoods. The delivery of two new public parks and communal open space will provide improved lifestyle and health options for residents and the broader community. Future potential shared pedestrian links into the Botany Wetlands will promote the use of this important natural feature and retention of existing established trees onsite and additional landscaping will improve flora and fauna corridors in the area.



Extract from Botany Bay Planning Strategy 2031 showing projected dwelling distribution, City of Botany Bay Council



Extract from A Draft Vision for the City of Botany Bay, City of Botany Bay Council

Directions Paper: A Draft Vision for the City of Botany Bay

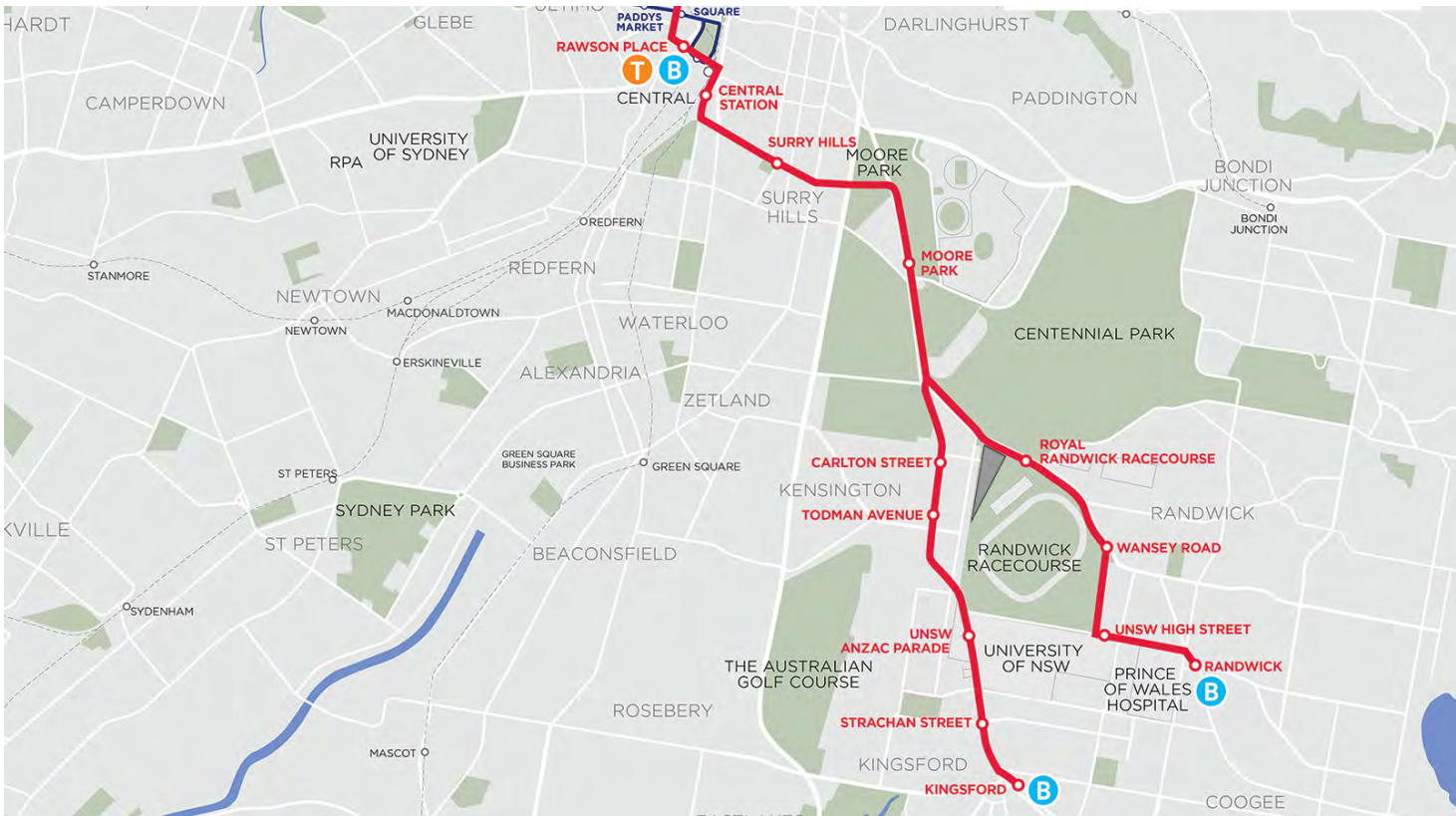
The Directions Paper was prepared as part of the “Botany Bay 2040 Vision”. The subject site is located adjacent to a corridor of parklands and green space. It is proposed to enhance connectivity through these spaces via a ‘Greenway Connect’. The site can contribute to enhancing connectivity south of Gardeners Road, into the parkland corridor. Other relevant directions include:

- Provide housing that supports a diverse community - low and high income households, single person and large families, and facilitate persons through various stages of their lives and of different abilities
- Provide for a range of active and recreational use opportunities throughout the city
- Create great local streets, with trees and human scale development at the street fronts

Sydney CBD and South East Light Rail

The subject site is approx. within 1 kilometre from the proposed Kingsford Light Rail Station, which will provide connections to Moore Park, Central Station and into Central Sydney.

Construction of the Light Rail line is currently underway, complete in early 2019. This will provide significant improvements to public transport accessibility for this site.



Extract showing Sydney CBD & South East Light Rail terminating at Kingsford, Transport for NSW

Planning context

Botany Bay Local Environmental Plan 2013

75 Gardeners Road

Land Use Zone

The subject site is zoned SP1: Special Activities. The prescribed special activity for this zone is ‘Recreation Facility (Outdoor)’. Additional permitted uses are specified under Schedule 1, and include:

- Entertainment facilities
- Food and drink premises
- Function centres
- Recreation areas
- Recreation facilities (indoor)

The objectives of this zone are:

- To provide for special land uses that are not provided for in other zones
- To provide for sites with special natural characteristics that are not provided for in other zones
- To facilitate development that is keeping with the special characteristics of the site or its existing or intended special use, and that minimises any adverse impacts on surrounding land

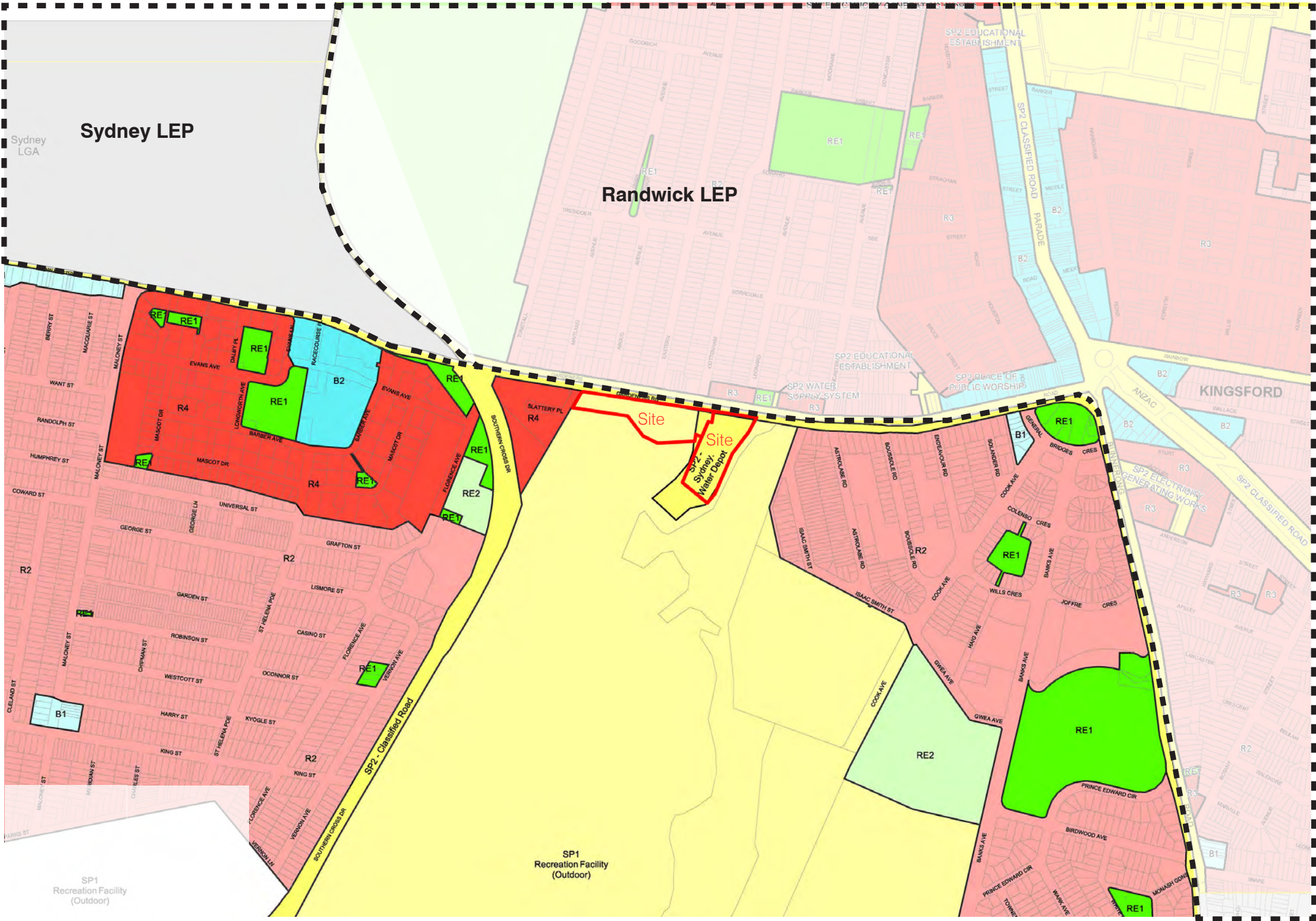
73 Gardeners Road

Land Use Zone

The subject site is zoned SP2: Infrastructure. The prescribed use for this zone is the Sydney Water Depot. Roads are the only use permitted with consent.

The objectives of the zone are:

- To provide for infrastructure and related uses
- To prevent development that is not compatible with or that may detract from the provision of infrastructure



Land Use Zoning

Planning context

Botany Bay Local Environmental Plan 2013

75 Gardeners Road

Building Height

The maximum building height for development on the site is 14 metres.

Floor Space Ratio

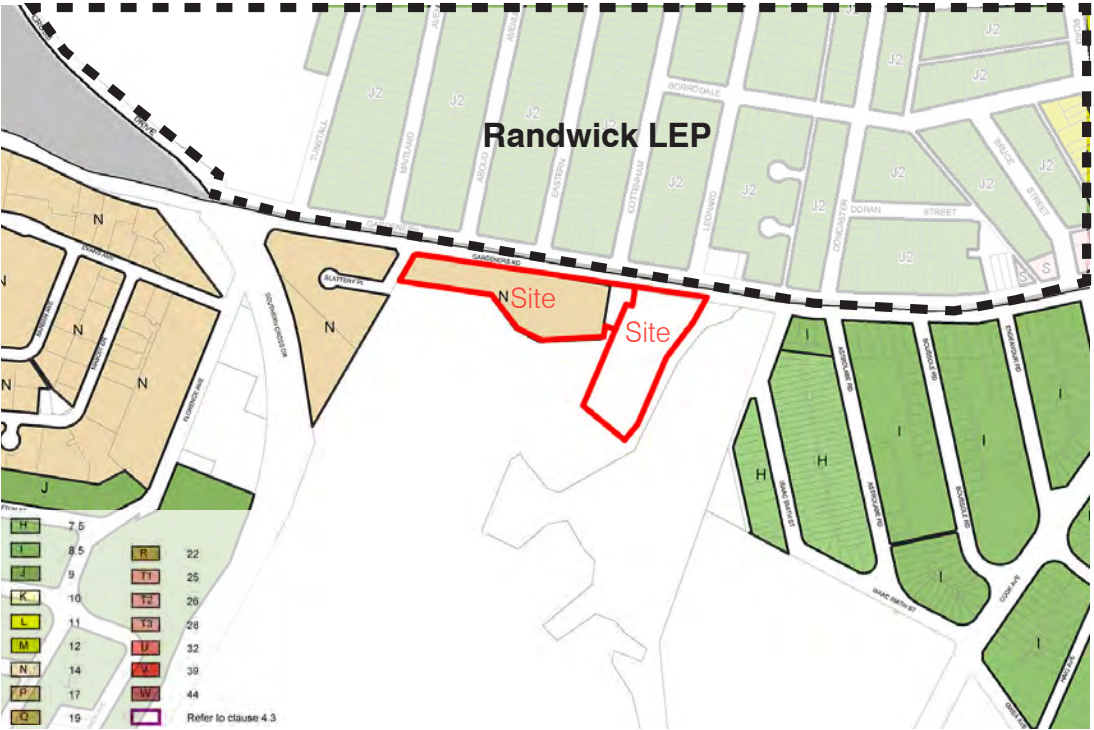
The maximum floor space ratio for development on the site is currently 1:1.

Heritage

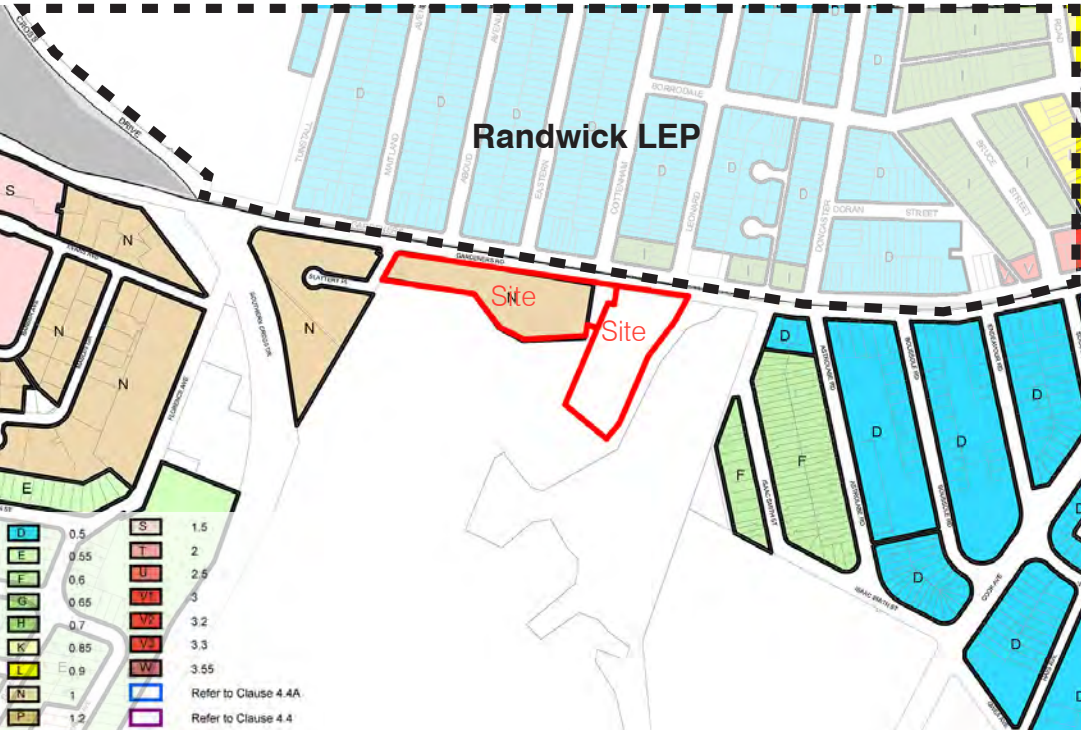
The site itself is not heritage listed, however is surrounded by a landscape heritage item, being the surrounding golf course and Botany Wetlands.

Wetlands & Terrestrial Biodiversity

The site itself is not identified to have wetlands or terrestrial biodiversity.



Building Height



Floor Space Ratio

73 Gardeners Road

Building Height

There is no maximum building height for the site due to its designated Land use.

Floor Space Ratio

There is no maximum building height for the site due to its designated Land use.

Heritage

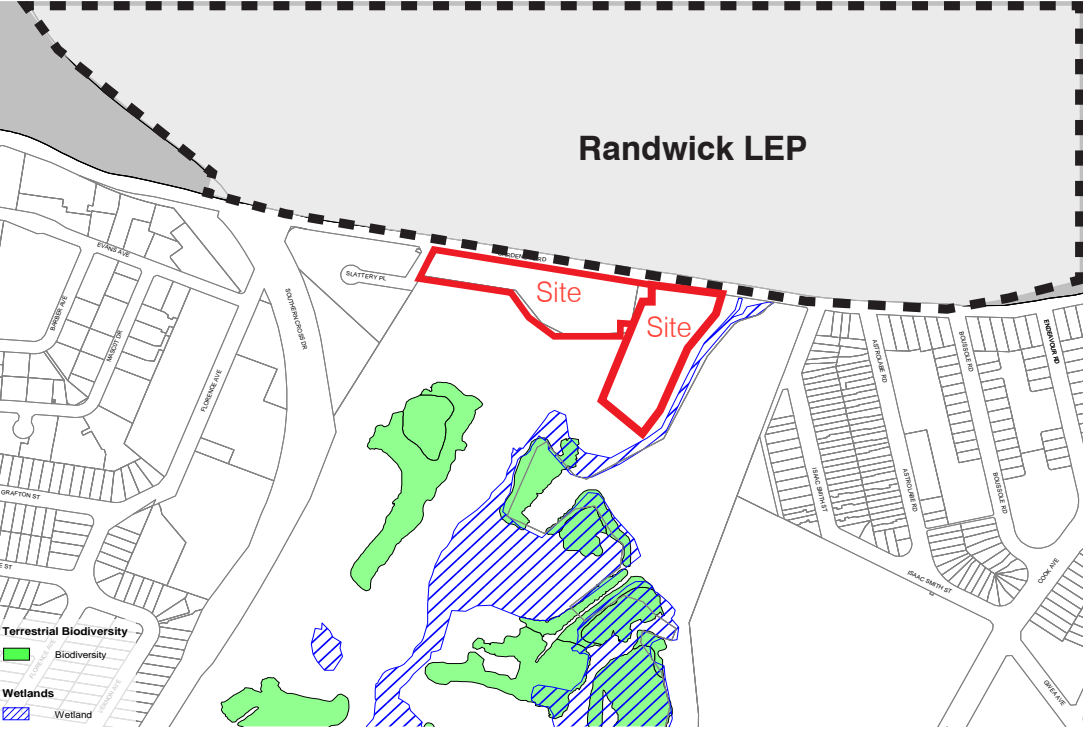
The site itself is not heritage listed, however is surrounded by a landscape heritage item, being the surrounding golf course and Botany Wetlands.

Wetlands & Terrestrial Biodiversity

The site itself is not identified to have wetlands or terrestrial biodiversity. However, the creek line to the east and south of the Sydney Water Depot is identified as “wetland”.



Heritage



Wetlands & Terrestrial Biodiversity

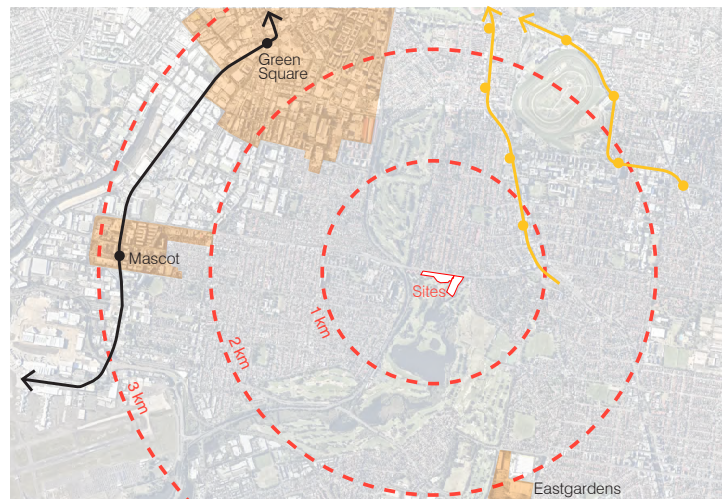
Built form context



'Mascot Central' currently under construction (By Meriton)



Photomontage of approved development at Green Square



Wider built form context map

Wider Built Form Context

The site sits within a 2-3km radius of several recent high density development areas including:

- Green Square Urban Renewal Area.
- The planned Mascot Urban Activation Precinct.
- Planned development at Eastgardens.

A number of high-rise residential towers have recently been approved and constructed around Green Square and Mascot with heights reaching in excess of 20 storeys.

Local Built form Analysis

The residential areas that fringe the immediate area along Gardeners Road to the east and west of the site contain a wide range of building typologies. These range from 1-2 storey detached and semi-detached houses, 3-5 storey walk-ups and taller apartment blocks up to 12 storeys.

The large proportion of the taller buildings appear to have been constructed in within the last 20-30 years.

77-81 Gardeners Road

Directly to the west of 75 Gardeners Road the adjoining site is owned by the NSW Land and Housing Corporation and contains a mix of 1-5 storey social housing buildings.

It is understood that the state government is keen to investigate the potential for redevelopment of this site as part of the 'Communities Plus' initiative. This will likely see proposed building heights significantly greater than the existing 5 storey walk-ups that currently occupy this site.



9 storeys



9 storeys



8 storeys



12 storeys



3 storeys



5 storeys



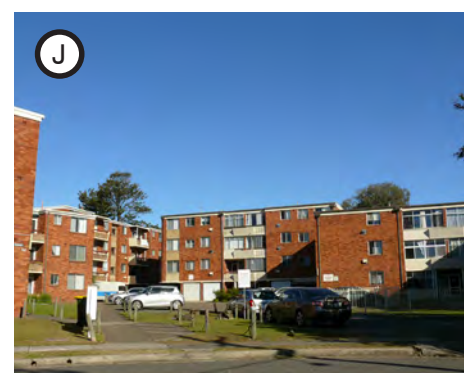
8 storeys



9 storeys



3 storeys



3 storeys

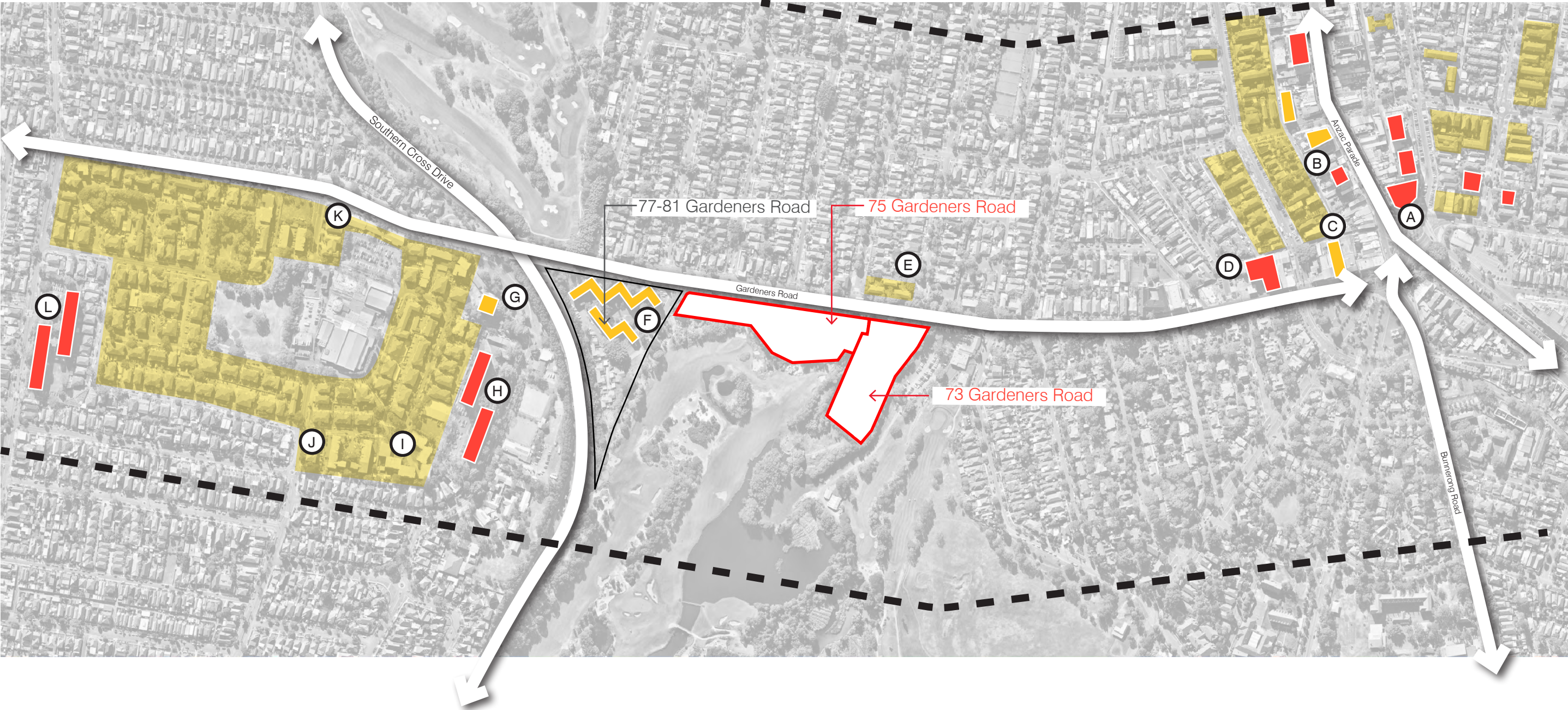


3 storeys

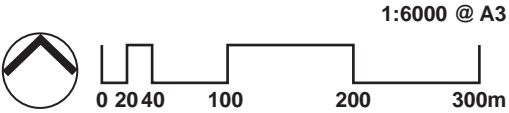


9 storeys

Built form context



- Legend
- Site boundary
 - Major roads
 - 400m corridor from Gardeners Road
 - Area of 3-4 storey buildings
 - Buildings between 5-8 storeys
 - Buildings over 9 storeys



Open space context

Private Open Space

The local area surrounding the sites does not at first glance appear to be short of open space. Immediately to the south there are large green spaces however these are occupied by golf courses. Whilst these provide a high amenity setting for any future development they are not freely accessible to the public. Private recreational open spaces in proximity the site include:

- The Lakes Golf Club
- The Australian Golf Club
- Eastlake Golf Club
- David Phillips Sports Complex

Public Open Space

There are currently no public open spaces, parks or play areas within a 5 minute walk of the site. Within a 10-15 minute walk it is possible to access a number of local parks and play areas and sports pitches including:

- Kensington Park
- Eastlakes Reserve
- Bridget Tight Reserve
- Astraloble Park
- Dacey Park
- Rowland Park

Sydney Green Grid and Potential Wetland Links

The Sydney Green Grid forms part of the Greater Sydney Commission's Draft District Plans. The Central District highlights a potential priority project as the Mill Stream and Botany Wetlands Corridor. As shown the map opposite left the route for this comes close to the subject sites.

The Botany Wetlands Plan of Management (Sydney Water 2014) highlights a potential wetlands link that could be accessed through the subject sites.

Opportunities for Public Open Space

The sites are strategically located to provide both improved pedestrian/cycle and green links as part of the wider (Green Grid) network as well as provision of additional local open space amenity in the form of informal green space, play and community facilities (such as BBQ's and shelters).



Kensington Park (John Calopedos Playground)



Kensington Park (Kensington Oval)



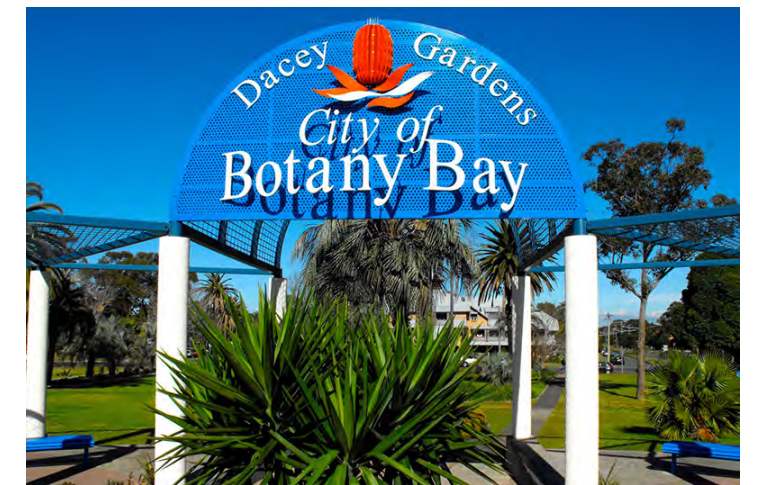
Bridget Tight Reserve



Eastlakes Reserve

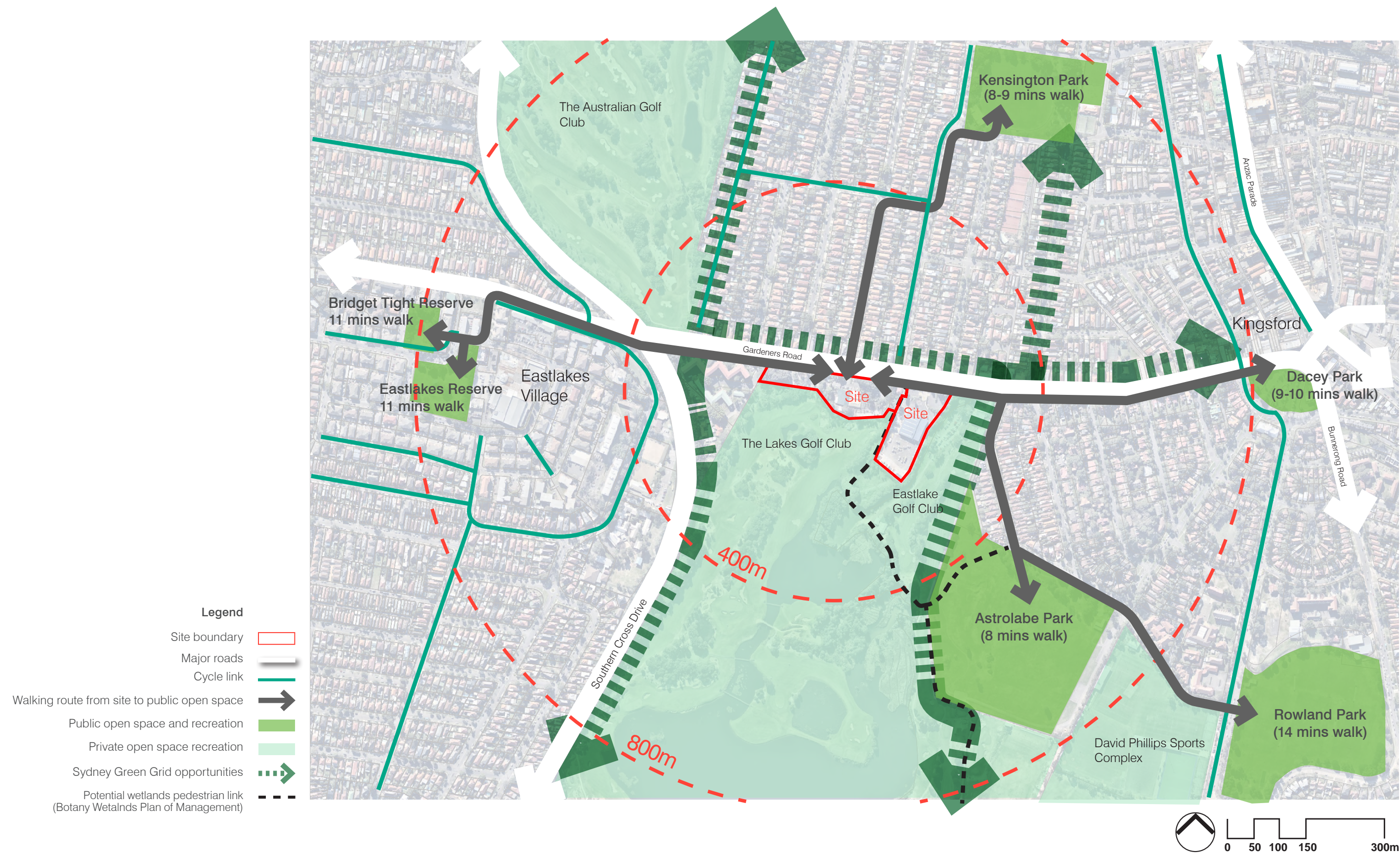


Astraloble Park



Dacey Gardens

Open space context



Site photos

75 Gardeners Road



① Site entry on Gardeners Road showing level change



② Gardeners Road frontage showing retaining wall



③ Existing trees along Gardeners Road frontage



④ View from the southern boundary across golf course



⑤ Stand of paper bark trees at the low point on the site



⑥ Open stormwater channel at the low point on site



⑦ Secondary gated access from Slattery Place



⑧ Southern boundary to the golf course

Site photos

73 Gardeners Road



1 Site entry on Gardeners Road



2 Gardeners Road frontage showing existing trees



3 Existing trees along Gardeners Road frontage



4 Operational pump house building



5 Western boundary of site and landscape buffer



7 Open grassland to the south of the site



7 Eastern boundary, showing vegetation along the embankment to the stormwater channel



8 Stormwater channel and vegetated embankment outside the eastern site boundary

Site interfaces

1. Gardeners Road



Gardeners Road is a busy arterial road that consists of 6 lanes of traffic and a central median.

The scale of the road reserve (approx 30m) is such that development along its northern and southern sides is visually separated.

The site boundaries along this road are characterised by several mature trees that could be retained to contribute to the visual amenity for existing and future residents, pedestrians and road users.

The development proposals will need to consider the effects of road noise and appropriate mitigation including building setbacks and acoustic design features.

2. Slattery Place



The western boundary of the site is onto Slattery Place which is shared with an existing 5 storey public housing development.

Slattery Place is a relatively quiet cul-de-sac with on-street parking.

Development proposals will need to consider the impacts on the character and scale of the street and adjacent development.

The retention of the existing mature boundary trees will help the mitigate any visual impacts of the proposed development on Slattery Place.

It should be noted that the NSW Land and Community Housing Corporation are currently investigating opportunities to redevelop this site as part of the 'Communities Plus' initiative. This will likely see significantly increased density and building heights on this site.

3. Stormwater Channel



Along the outside of the eastern boundary of the site a steep embankment falls towards an open stormwater channel.

The channel flows south to the Botany Dams and Wetlands through the adjacent golf course.

The development proposal must take into consideration the potential for flood risk and riparian controls for the water way.

4. The Lakes Golf Course



The development boundary is closest to the 13th green and the 14th tee (see digram to the right).

14th tee - Whilst this tee is close to the boundary of the proposed development the direction of play is away from the development. Grade separation, fencing and vegetation also help to increase safety.

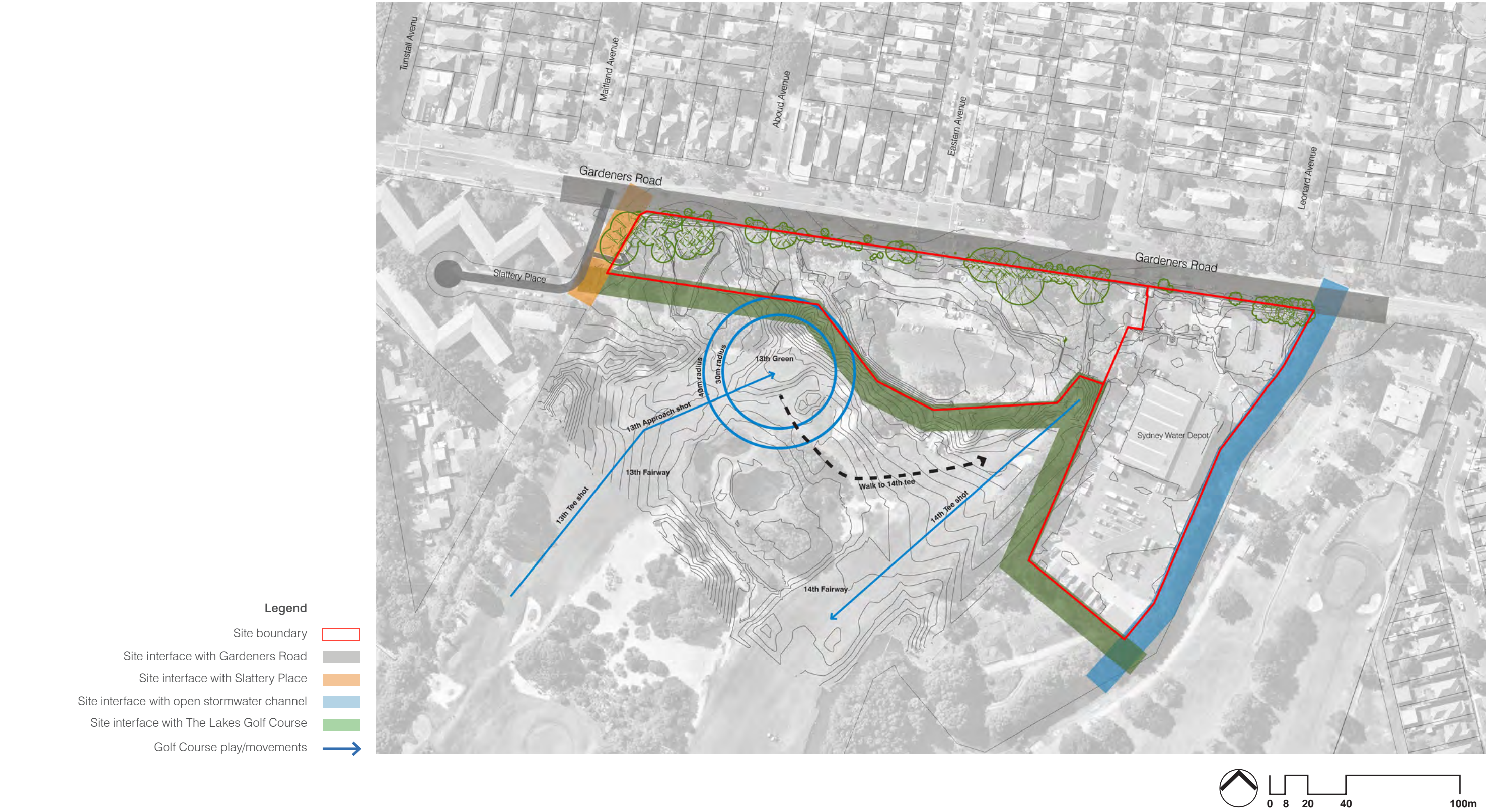
13th green - Whilst golf balls are played in the direction of the proposed development it is noted that there is a 40m off-set from the centre of the green to the site boundary. The boundary is elevated from the green by 3-4m which helps to increase safety.

It is noted that the approach shot to the 14th green is relativity short which will help to minimise risk to the development.

The development proposals will need to minimise overshadowing of the golf course and particularly the 13th green to ensure its ongoing health and condition.

Security around the perimeter of the golf course is of primary concern to the golf club.

Site interfaces



Site analysis

75 Gardeners Road

- 1

Site Entry
The existing primary access from Gardeners Road is a signalised intersection. There is a significant level change once entering the site - approx 2-3m up from the kerb level.
- 2

Retaining walls
The boundary to Gardeners Road includes a number of retaining walls that are in close proximity to establish trees.
- 3

Mature trees fronting Gardeners Road
The eastern boundary to Gardeners Road contains a row of mature trees including a number of large Eucalypts which vary in height from 10 - 25m.
- 4

Raised level area of site
The area where the main garden centre facilities currently sit is on the higher flatter ground within the site.
- 5

Slope to site low point
The site slopes towards a low point within its western quarter where there is an open stormwater channel.
- 6

Open stormwater channel
There is an open stormwater feature with 2 channels joining and flowing south towards the golf course. The channels are clogged with litter and the banks are poorly maintained. The channels sit within an area of established Paper Bark trees.
- 7

Gross pollutant trap
There is an existing gross pollutant trap on the southern boundary with the golf course.
- 8

Gated site access
There is a secondary gated access from Slattery Place.
- 9

Landscape Buffer
The southern boundary is characterised by a buffer of native re-vegetation to the golf course that varies in width between 10 and 20m.
- 10

Batter to Southern Boundary
There is a significant level change falling away from the southern boundary to the golf course of approximately 5-7m height.
- 11

Views over the golf course
The elevated position along the southern boundary affords good views south over the golf course from multiple locations.
- 12

Golf green and tees
The 14th green and 15th hole tees are in close proximity to the southern boundary.
- 13

Residential property access
In the north east corner of the site there is a driveway access for 73a Gardeners Road (left-in left-out movements only).

73 Gardeners Road

- 14

Site Entry
There is only 1 existing site entry from Gardeners Road. The entry is not signalised and allows for left-in left-out movements only.
- 15

Boundary trees
On the north east boundary with Gardeners Road there are a number of mature trees which range in height from 5 to 15m.
- 16

Sewer main easement
In the north east corner of the site there is a 3m easement for a high pressure sewer main.
- 17

Access easement
There is a 3m easement that allows for access to an existing sewer pump station.
- 18

Pump house
There is an existing brick building which has some moderate heritage value and is a pump house operated by Sydney Water.
- 19

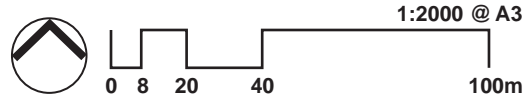
Existing depot building
At the centre of the site sits the Sydney Water depot. The building is 2 storeys in height with a blue colourbond style finish.
- 20

Car parking
Between Gardeners Road and the depot building the site is occupied by surface car parking on asphalt and concrete.
- 21

Landscape Buffer
To west of the site there is a landscape buffer of tree and shrub planting between The Lakes golf course and the site.
- 22

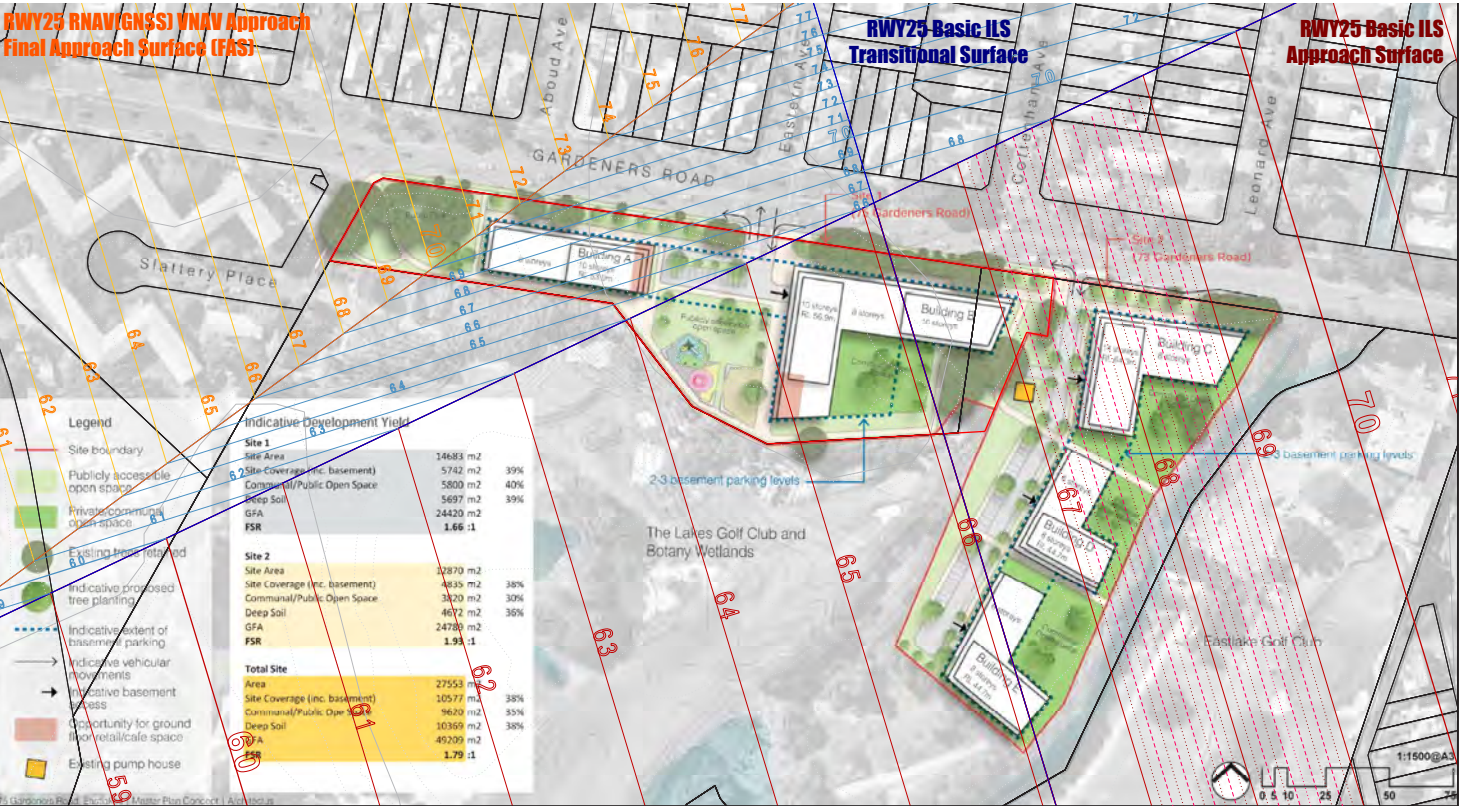
Stormwater channel
Alongside the eastern boundary of the site is a stormwater channel with steep embankments which emerges from two culverts beneath Gardeners Road and flows into the Botany Wetlands.

Site analysis



Specialist input summary

AERONAUTICAL (Strategic Airspace)



Due to proximity to Kingsford Smith Airport, any developments on the site will be subject to the Airports (Protection of Airspace) Regulations 1996, for the purpose of having building heights approved in relation to Sydney Airport's protected airspace. The two fundamental factors of the Airports Regulations that are used for assessment of development heights are the Obstacle Limitation Surfaces (OLS) and the PANS-OPS Surfaces (the latter to protect the actual instrument flight procedures).

The OLS limiting height across the site is 51m Australian Height Datum (AHD). Any proposed development which would exceed this height would need to gain airspace height approval from the federal Department of Infrastructure. An application can be made for each tower building separately, or a single application can be made for the all towers within the development that would exceed this height.

The most constraining height limits due to airspace protection surfaces against obstacles (including PANS-OPS surfaces) are related to approach procedures to Runway 25. These define the height limits that are most likely to be considered by the airport and the aviation agencies as the maximum possible heights for new buildings and cranes on the site. In this case, they are related to the Basic ILS surfaces, which comprise two sloping surfaces across the site (as illustrated above). The PANS-OPS height constraints slope across the site and range from approximately 64m AHD to 72m AHD.

Given the location of the site in relation to the airport and the flight paths, it is also highly likely that the PANS-OPS surface height constraints will also be considered by the aviation authorities as the maximum permissible heights for any cranes that would be required for construction.

For further detail refer to the 'Aeronautical Impact Assessment' prepared by Strategic Airspace - dated 22 September 2017

SITE AUDIT (Ramboll Environ Australia)

Purpose of the report is to determine if the nature and extent of contamination on the site has been adequately characterised for the purpose of future remediation or management planning during redevelopment.

Material used to fill areas of the site through remediation works in 2009 contain anthropogenic material, such as tile, brick, timber, metal and asbestos as bonded fragments of cement sheeting. Friable asbestos (comprising small fragments of asbestos cement sheeting) was identified at one location on the former nursery and three locations on the residential property. The distribution of asbestos in fill material on the depot is a data gap.

The fill material was identified in the west of the site (former mechanical shed area), in the north west of the site (former pot bazaar location) and in the south of the centre of the nursery (former clubhouse location) and across the residential property and depot.

Remediation of fill containing anthropogenic material would be required to make the site suitable for any proposed use.

- Further investigation of the site should be considered prior to remediation to address the data gaps identified in the CSM. The need for and scope of further investigation would be dependent on the proposed development.
- Preparation of a remedial action plan (RAP) specific to any development.
- The RAP should be implemented prior to or during redevelopment of the site.
- Preparation of a Site Audit Statement certifying suitability for the proposed use, at the completion of remediation and validation.
- Groundwater is assessed for its suitability for any proposed use prior to extraction.

For further detail refer to the 'Site Audit Report' prepared by Ramboll Environ Australia - dated 26 June 2017

GEOTECHNICAL (JK Geotechnics)

The purpose of the geotechnical assessment was to complete a walkover inspection of the site and to map relevant surface features. A review of the provided CH2M Hill borehole logs and subsurface information from previous nearby geotechnical investigations were also carried out by JK Geotechnics. Based on the above, preliminary comments and recommendations to address the likely range of geotechnical issues and constraints for the proposal were developed.

The 1:100,000 Geological Map of Sydney indicates the majority of 75-73 Gardeners Road is underlain by transgressive dunes, which comprise 'marine' sands of Quaternary age. The western end of 75 Gardeners Road (where the gully feature is present) is underlain by freshwater swamp, which comprises 'peat, sandy peat and mud'.

Based on the subsurface conditions encountered in the CH2M boreholes, previous investigations completed at the nearby Eastlakes Shopping Centre, and site observations, it is anticipated that the subsurface conditions at the site may comprise the following:

- Sandy fill of variable thickness across the site.
- The natural soils are expected to comprise predominantly fine to medium grained sand and silty sand. The density of the subsurface profile is expected to increase with depth to at least medium dense and possibly dense and very dense.
- At the western end of the site within the gully feature, peat and sandy clay is expected at relatively shallow depth.
- Groundwater is expected between depths of about 1.2m and 8.4m below existing surface levels. Hence groundwater may be at, or very close to, ground surface level within the gully and deepest just behind the crest of the sand 'dune' feature within the central portion of the site.

Bedrock is unlikely to be encountered at this site within at least 20m depth, possibly deeper.

For further detail refer to the 'Geotechnical Assessment' prepared by JK Geotechnics - dated 10 August 2015 (75 Gardeners Road) and 25 September 2017 (73 Gardeners Road)

TRAFFIC & TRANSPORT (ARUP)



Traffic counts have been undertaken for the Gardeners Road / Eastern Avenue intersection for the weekday AM and PM peak period and weekend peak period.

The intersection performance of Gardeners Road/ Eastern Avenue has been assessed using RMS approved software SIDRA.

The existing performance of the intersection has been modelled using the traffic volumes from the counts. The results show that the intersection currently operates with spare capacity during both weekday and Saturday peak periods. This indicates the intersection should have the capacity to accommodate additional traffic movements to support the development of the subject site.

Access into 73 Gardeners Road (Site 2) will be via the existing driveway into the Sydney Water depot via Gardeners Road. This will be in the form of a left in /

left out intersection with a deceleration lane provided to facilitate safe and efficient access for drivers entering the site.

The transport assessment has concluded the transport network can accommodate the increased activity associated with the proposal. Transport conditions in the vicinity of the site will significantly improve in future years following the opening of the CBD and South East Light Rail project.

Given the site is located in close proximity to bus stops on Gardeners Road and close to a 10 minute walk of the future light rail stops on Anzac Parade, it is considered that the parking rates specified in the Botany Bay DCP could be reduced as the design progresses. This reduction in parking will contribute to reducing the impact of the development on the wider road network.

For further detail refer to the 'Transport Assessment' prepared by ARUP - dated 25 September 2017

ACOUSTIC (Acoustic Logic)

The assessment of traffic and aircraft noise is conducted with reference to the following documents:

- The City of Botany Bay Council Development Control Plan 2013
- NSW State Environmental Planning Policy (Infrastructure) 2007
- AS2107 – 2000 Acoustics – Recommended design sound level and reverberation times for building interiors
- AS2021 – 2000 Acoustics – Aircraft noise intrusion – Building siting and construction

Traffic Noise Measurements - Traffic measurements were taken along the Gardeners Road façade of the proposed development. Both short term (attended) and long term (unattended) measurements were conducted.

Aircraft Noise Assessment - Aircraft noise levels at the site were determined using AS 2021. The Standard gives aircraft noise levels for various aircraft landing and taking off for locations near airports. The location of the runways was obtained from Sydney Airport 2029 ANEF.

Based on the distance from the site to the runways and an assessment of all the aircraft listed in AS 2021, the Standard predicts that the highest typical aircraft movement will be from a short range take off of a Boeing-767 taking off from the Third Runway. The noise level at the site as indicated by the standard is 76dB(A). This noise level will be used to predict the resultant internal noise levels.

Evaluation of Noise Intrusion - Internal noise levels will primarily be as a result of noise transfer through the windows and doors and roof, as these are relatively light building elements that offer less resistance to the transmission of sound. Any external walls and roof design that are proposed to be of heavy masonry elements will not require upgrading. Any lightweight constructions will need to be reviewed and assessed at a later stage.

For further detail refer to the 'DA Environmental Noise Impact Assessment' prepared by Acoustic Logic - dated 25 September 2017

STORMWATER & CREEK (Northrop)

Both 75 and 73 Gardeners Road have four distinct drainage sub catchments. Drainage to the southeast of 75 Gardeners Road is not clearly defined and Sydney Water have advised of the presence of a 600mm Stormwater pipe in this area, although not picked up in the site survey. 73 Gardeners Road is drained via piped stormwater outlets to the existing Sydney water channel that drains along the eastern boundary of the site.

Any flooding solution developed for 75 Gardeners Road should accommodate or allow for flood mitigation both on the site, and upstream of Gardeners Road. WMA Water have modelled various flood solutions and the results in relation to flood depths and extents are shown in the Report and Drawings in Appendix A. They concluded that amplification or duplication of the western conduit under Gardeners Road would have a beneficial effect. The communal open space areas proposed along the Sydney water channel (eastern boundary) covers an area approximately 2,500m². Reducing existing levels across these extents (by approx. 200-350mm) would sufficiently offset loss to flood storage.

It is understood that there will be a need for further investigation to develop stormwater and flooding strategies and responses for the site as part of a detailed design phase to underpin a Development Application.

For further detail refer to the 'Hydrology, Stormwater and Creek Assessment' prepared by Northrop - dated September 2017

HERITAGE (NBRIS Partners)



Neither site is identified as a heritage item attached to statutory legislation. Although the sewage pumping station building at 73 Gardeners Road is one of a group of utilitarian buildings demonstrating the development of the South and Western Sewer Ocean Outlet System in the early twentieth century, which is likely to meet the threshold for listing as a heritage item at the local level. The existing pumping station building should be retained, with a grassed area to enhance its setting.

The south boundary of the site adjoins Botany Water Reserves, which is identified as a heritage item on the following registers and has heritage protection under the Heritage Act 1977 and the Environmental Planning and Assessment Act 1979:

- Botany Bay Local Environmental Plan 2013, Item No. 12.
- NSW State Heritage Register, Listing No. 01317.

The Botany Water Reserves is listed as a heritage item (Item No. 4570025) on the Sydney Water s170 Heritage Register. Under the Heritage Act 1977, Sydney Water is obliged to maintain a register of environmental heritage assets that are of state and/or local significance or items that are of potential state and/or local heritage significance.

The additional area has enabled the buildings to be set further apart than in previous schemes for the site, thereby improving solar access and north-south view corridors through the site to the Botany Waters Reserve.

A heritage assessment found that the existing brick building located at 73a Gardeners Road does not demonstrate the identified heritage criteria at a level to warrant listing at state or local level.

For further detail refer to the 'Preliminary Heritage Review' prepared by NBRIS Partners - dated 27 September 2017

ECOLOGICAL (ACS Environmental)

The vegetative cover of the subject land is comprised of landscaped tree and shrub planting, the site being almost totally cleared of wooded vegetation prior to 1943. Currently the subject site contains landscaped mature and semi-mature trees of various species of Myrtaceae such as Bangalay and Sydney Red Gum, as well as Swamp Oak and small trees such as Weeping Bottlebrush among others.

None of the assemblages or distributions of trees or shrubs occurring in the subject area represent natural ecological communities confirming previous mapping undertaken by Office of Environment & Heritage (2013) and Botany Council DCP 2013. As such, it is considered that any impacts of potential development on the vegetation would not be significant.

In relation to locally occurring habitat which has been highly modified by clearing prior to 1943 and landscaped with a variety of locally and non-locally occurring indigenous species, as well as exotic ornamentals at the subject site, it is highly unlikely that any of the listed threatened flora species would occur in the surveyed area. Targeted searches for those species where records occur within a 5km radius failed to locate these, or any other threatened flora species at the subject sites.

Opportunistic fauna observations were made within the study site and in the vicinity of the drainage channel that courses alongside the study site at 673 Gardeners Road, Eastlakes.

The study site is rated as poor habitat for fauna due to its proximity to the busy Gardeners Road motorway and the long history of disturbance for commercial purposes. It is considered unlikely that any proposed development at the subject site would impact on the distribution or integrity of natural faunal populations in the area.

For further detail refer to the 'Flora & Fauna Surveys and Ecological Contribution' prepared by ACS Environmental - dated September 2017 (73 Gardeners Road) and November 2015 (75 Gardeners Road)

ABORICULTURAL (Naturally Trees)

A site Aboricultural Assessment has been undertaken which identified all of the existing trees, species, height and spread. The report investigates the impact of the proposed development on trees and provides the following guidelines for appropriate tree management and protective measures:

- A schedule of the relevant trees to include basic data and a condition assessment
- An appraisal of the impact of the proposal on trees and any resulting impact that has on local character and amenity
- A preliminary arboricultural method statement setting out appropriate protective measures and management for trees to be retained.

The TreeAZ method of assessment was used to determine the worthiness of trees in the planning process. Simplistically, trees assessed as potentially important are categorised as 'A' and those assessed as less important are categorised as 'Z'. In the context of new development all 'Z' trees are discounted as a material constraint in layout design. All 'A' trees are materially important and may dictate the design constraints. The information for each tree is recorded in the tree schedule of Appendix 2 of the Report.

If adequate precautions to protect the retained trees are specified and implemented through the arboricultural method statement included in this report, the development proposal will have moderate to high impact on the contribution of trees to local amenity or character.

Tree Preservation Order - The subject trees on the site are legally protected under The City of Botany Bay Council's Tree Preservation Order. It will be necessary to consult the council before any pruning or removal works other than certain exemptions can be carried out.

For further detail refer to the 'Arboricultural Impact Appraisal and Method Statement' prepared by Naturally Trees - dated 15 September 2017

3 Design principles

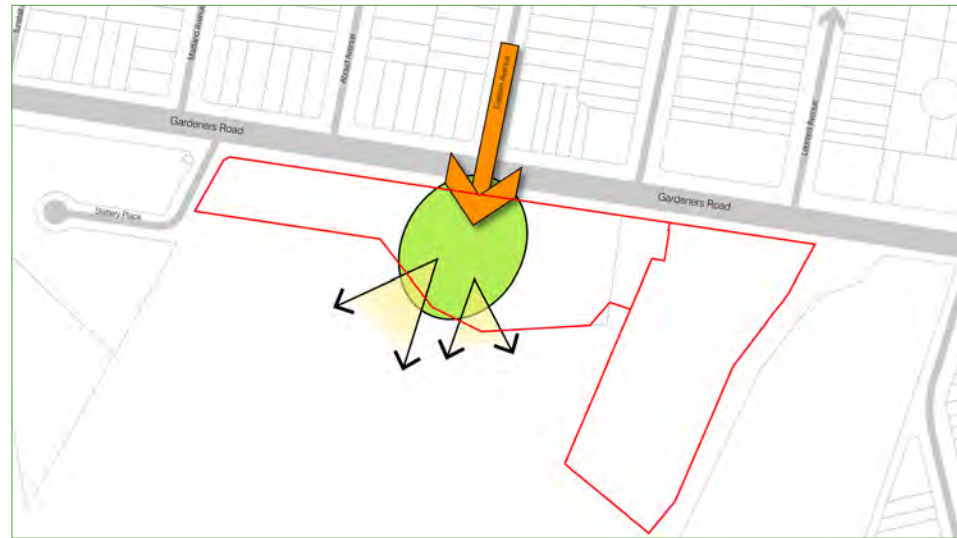
Design principles

Generous landscape set-back



- A 10m landscape setback along the Gardeners Road frontage to both sites.
- Allows for the retention of existing mature trees.
- Provides space for a new shared path set back further from the busy road edge.
- Provides the opportunity for an improved bus stop if required in the future
- Improved landscape amenity along Gardeners Road.

Central open space with views



- Provides a clear view corridor to open space along the axis of Eastern Avenue.
- A public address for the site.
- Additional open space and play to support new and existing communities.
- Public access to high quality views across the Botany Wetlands and golf course to the south.

Retain mature trees



- Retain mature native trees particularly at the site boundaries and along Gardeners Road.
- Ensure continuing 'green' feel of the site and parkland edge character is maintained.
- Maintain the existing stand of mature Paper Bark trees at the western end of the site as a key feature for future open space.

Design principles

Address the public domain



- Ensure new built form addresses the public domain.
- Create internal streets with clear addresses and public domain to all buildings.
- Ground floor apartments should have direct access/front doors to the street.
- Utilise a 2 storey terrace house character/typology for ground floor units fronting public domain.

Defined public and private space



- Clearly define private and communal open space.
- Maximise publicly accessible open space.
- Provide a clear and convenient footpath network.
- Provide a publicly accessible through site link that follows the southern open space boundary of the site.

Maximise solar access



- Orientate buildings to maximise solar access to apartments.
- Locate open space and built form to ensure high levels of solar access particularly to publicly accessible open spaces.

4 Alternative built form testing

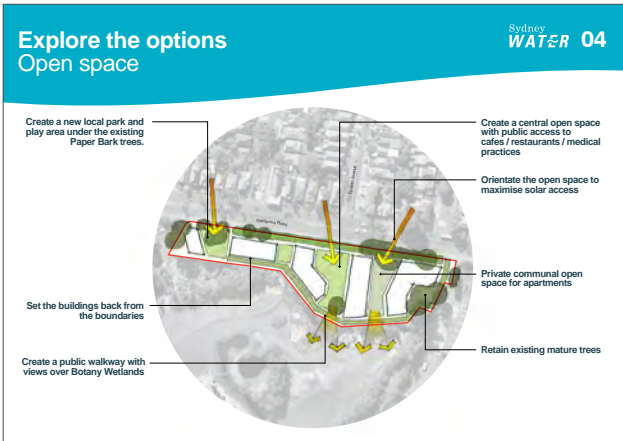
Alternative build form testing

Design process to date

75 Gardeners Road

In 2015 Sydney Water engaged Architectus to develop a master plan and urban design report for the 75 Gardeners Road site to support a planning proposal.

A preferred master plan was developed that considered the site constraints and a number of potential layout options (see Options 1-3 right). The preferred master plan was further developed with Council input along with some feedback from preliminary community consultation undertaken in December 2015 (see sample consultation board below).



Extract from community consultation on 75 Gardeners Road (December 2015)

73 and 75 Gardeners Road

In August 2017 Sydney Water engaged Architectus to review and amend the master plan for 75 Gardeners Road to also include the 73 Gardeners Road.

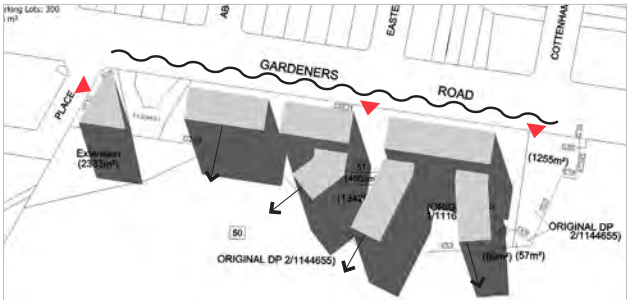
A number of design options were explored (see opposite page right) for the both sites with a view to retaining the intent of the previous master plan for 75 Gardeners Road and carrying these principles over to 73 Gardeners Road.

75 Gardeners Road

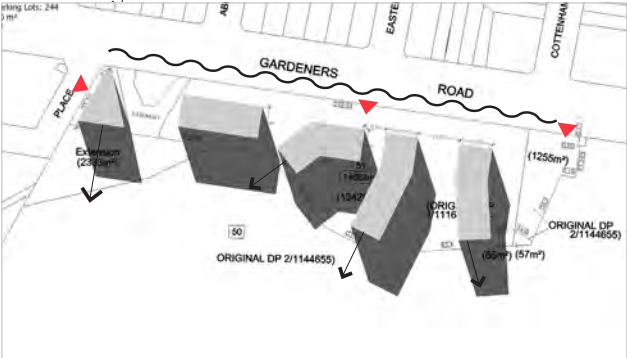
Initial Layout Option 1



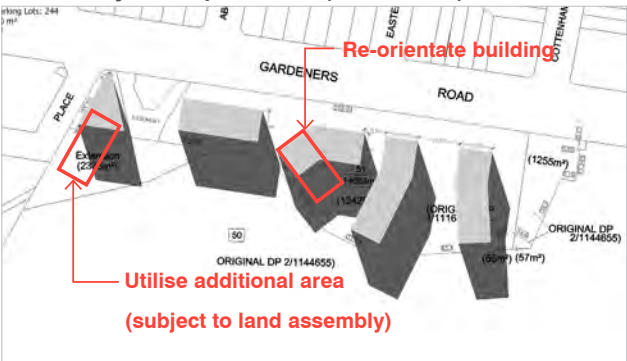
Initial Layout Option 2



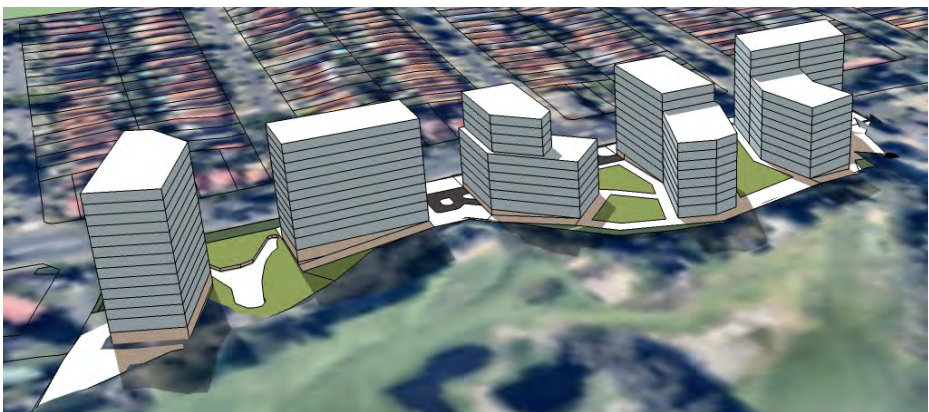
Initial Layout Option 3



Initial Layout Option 3a (Preferred)



Initial council consultation (September 2015)



In developing the preferred master plan the team has consulted with the following Council staff:

- Stormwater
- Landscape
- Arborist
- Traffic
- Planning

Council provided comments to the design team who addressed some of the key concerns raised as detailed below.

Key Changes following consultation with Council (October 2015)



- 1 Stepping of building heights towards the golf course.
- 2 2 storey town house frontage to golf course / southern boundary.
- 3 Reduced building height to address overshadowing of golf course infrastructure.
- 4 Reduced building height adjacent to Slattery Place (14 to 9 storeys)
- 5 Footprint adjustments to allow for greater tree retention.

Key Changes following public consultation (June 2016)



- 1 Built form adjusted to provide a large centrally located public open space (approx 2800m²).
- 2 Western building removed to provide improved open space and relationship to existing buildings located on Slattery Place.
- 3 Enlarged public open space in the western portion of the site (approx 1800m²)
- 4 Consolidated built form to maximise open space amenity.

73 and 75 Gardeners Road

Diagram to inform initial site planning discussion with Council



Option 2 - Internal road and open space parallel to Gardeners Road



Option 1 - Central access road option (73 Gardeners Road)



- Option not preferred due to:
- preference for a better street address for all buildings on 73 Gardeners Road site;
 - Does not allow for retention or access to the pumphouse;
 - does not allow sufficient space for deceleration lane; and
 - requires building over high pressure sewer line.

Option 3 - Preferred option



This was the preferred option due to a good street address, open space amenity and efficient building forms.

Option was not preferred due to reduced open space amenity and duplication of road infrastructure adjacent to an already wide arterial road (Gardeners Road).

5 The master plan

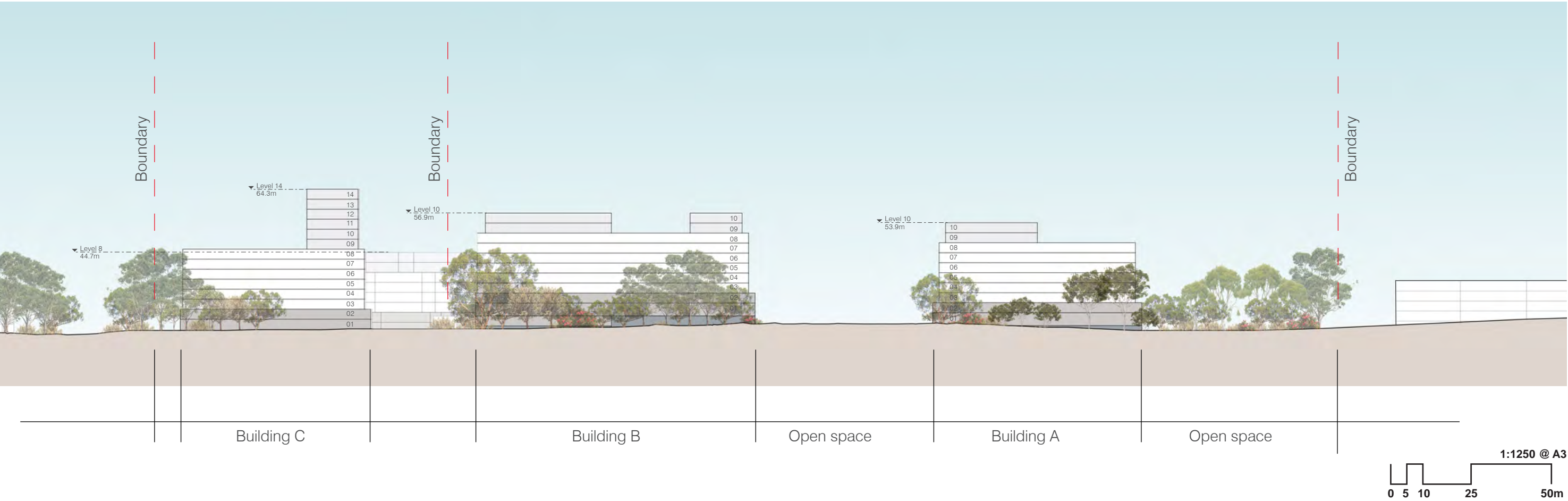
Indicative master plan



Indicative elevation



Elevation 1 (from Gardeners Road)



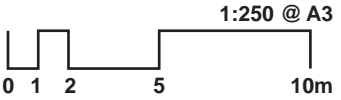
Indicative street sections

Section 1 (through building A)



Building A | 10m Setback | Verge | Carriageway | Verge | Existing development

Key Plan

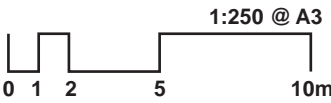


Indicative street sections

Section 2 (through building B)



Key Plan

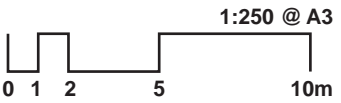


Indicative street sections

Section 3 (Through building C)



Key Plan



3D massing

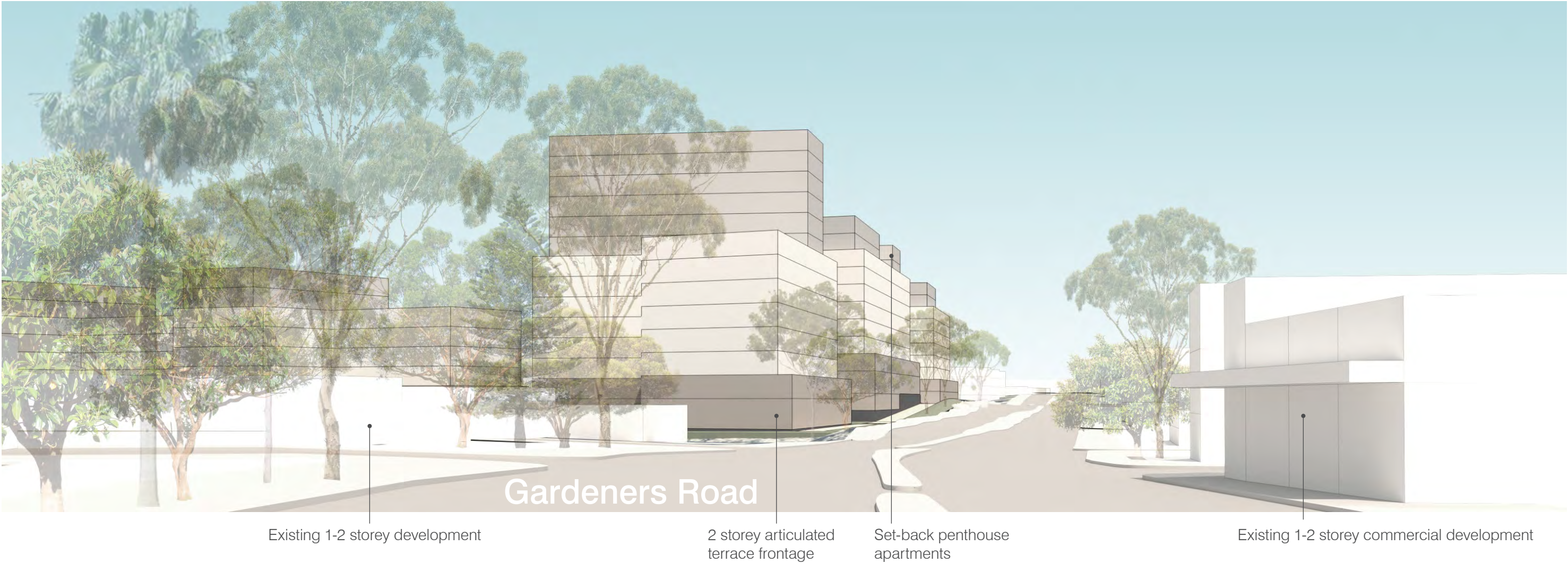
Photo from approximate location



Key Plan



Street view 1 - from Gardeners Road looking west with the development site on the left



3D massing

Photo from approximate location



Key Plan



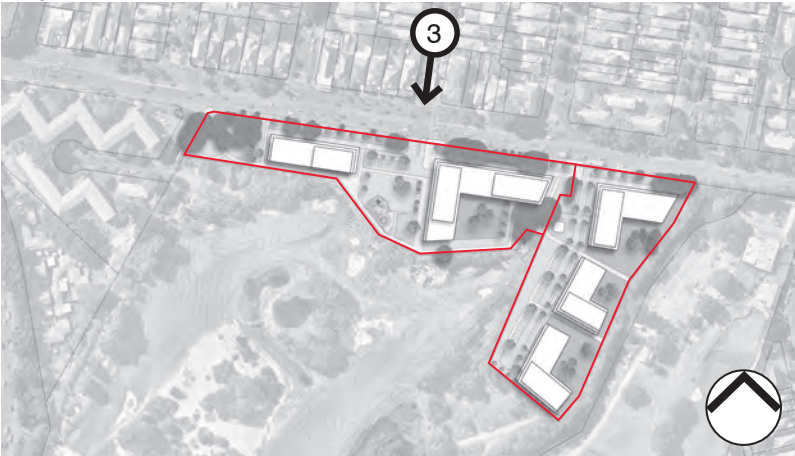
Street view 2 - from Gardeners Road looking east with the development site on the right



Photo from approximate location



Key Plan

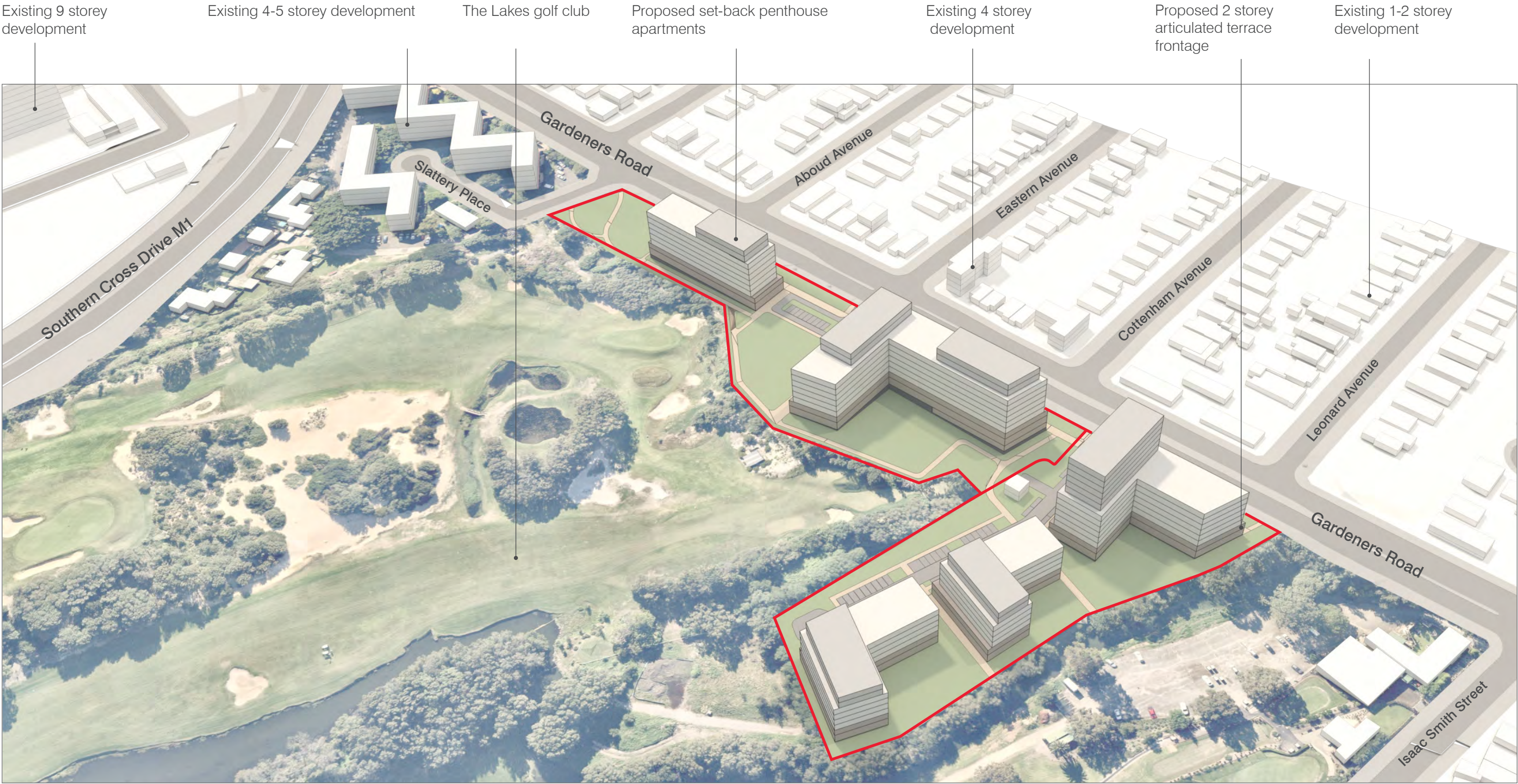


Street view 3 - from Eastern Avenue looking south towards the development



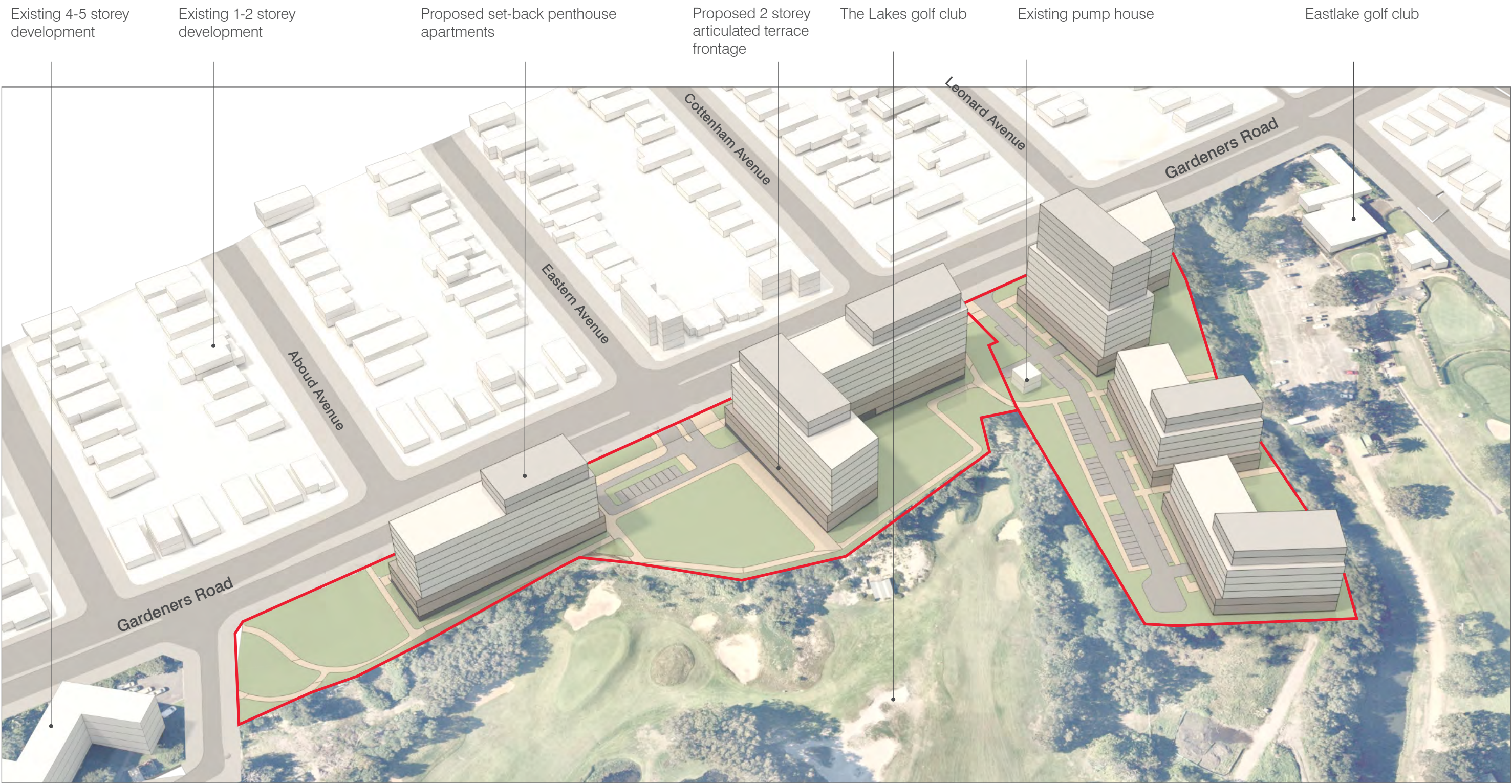
3D massing

Aerial view looking north-west towards the development sites



3D massing

Aerial view looking north-east towards the development sites



Landscape & open space strategy

Landscape Strategy

The master plan has been designed to make the most of the existing landscape assets including mature native trees and views to surrounding open space. Combining these with new open spaces, pedestrian connections and opportunities for new community access and facilities the master plan provides for a high quality parkland setting that will not only be a benefit to future residents but also the local neighbouring communities.

Key Landscape Elements:

- 1 Publicly accessible central green
- 2 Publicly accessible park - 'The Grove'
- 3 Communal residential gardens
- 4 Landscape setback to Gardeners Road
- 5 Shared through-site link
- 6 Opportunity for communal roof gardens
- 7 Publicly accessible linear green



Landscape & open space strategy

1 The Central Green

A central Park with large lawn, seating, childrens play, cafe spill-out space and views over the Botany Wetlands.



4 Landscape setback

Retention of existing mature trees and a generous landscaped setback to gardeners road with a new shared path for improved pedestrian amenity.



2 The Grove

A new publicly accessible park under the existing Paper Bark trees with community facilities such as BBQ's and adventure play equipment.



5 Through-site link

A shared pedestrian link along the boundary of the site with great views over the golf course.



6 Roof gardens

Opportunities for communal roof gardens/green roofs with wide elevated views over the surroundings.



3 Communal gardens

Communal ground floor gardens for residents to relax, enjoy and look out onto.



7 Linear green

Wide landscape setback with informal open lawn areas, tree planting, seating and communal BBQ's providing a green outlook.



6 Master plan testing

Communal / Public open space

Communal / publicly accessible open space



The master plan exceeds the minimum required area for communal open spaces (25%) by achieving 27% of the total site area (excluding potential roof gardens).

Communal / Publically accessible open space

| | | | |
|-----------------------------------|--------|----|-----|
| Site 1 (75 Gardeners Road) | | | |
| Site area | 14,683 | m2 | |
| Communal/Public Open Space | 4,298 | m2 | 29% |
| Site 2 (73 Gardeners Road) | | | |
| Site area | 12,870 | m2 | |
| Communal/Public Open Space | 3,231 | m2 | 25% |
| Total Site | | | |
| Site area | 27,553 | m2 | |
| Communal/Public Open Space | 7,529 | m2 | 27% |

NB. Roof gardens excluded from calculations

It should be noted that final compliance with the requirements of the ADG will be subjected to detailed design as part of any forthcoming Development Applications following the sale of the site by Sydney Water. This will be subject to assessment by Bayside Council as part of a standard Development Assessment process.

Public domain solar analysis - 21st of June 9am - 3pm



The master plan exceeds the minimum required solar access to communal open spaces (50%) by achieving 2 hours or more to 63% of the communal open space during the winter solstice.

Apartment Design Criteria

| | | | |
|-----------------------------------|-------|----|-----|
| Site 1 (75 Gardeners Road) | | | |
| Communal/Public Open Space | 4,298 | m2 | |
| ADG Compliant | 3,165 | m2 | 74% |
| Site 2 (73 Gardeners Road) | | | |
| Communal/Public Open Space | 3,231 | m2 | |
| ADG Compliant | 1,608 | m2 | 50% |
| Total Site | | | |
| Site area | 7,529 | m2 | |
| Communal/Public Open Space | 4,773 | m2 | 63% |

NB. Roof gardens excluded from calculations

Overshadowing

Winter solstice



9am



12pm

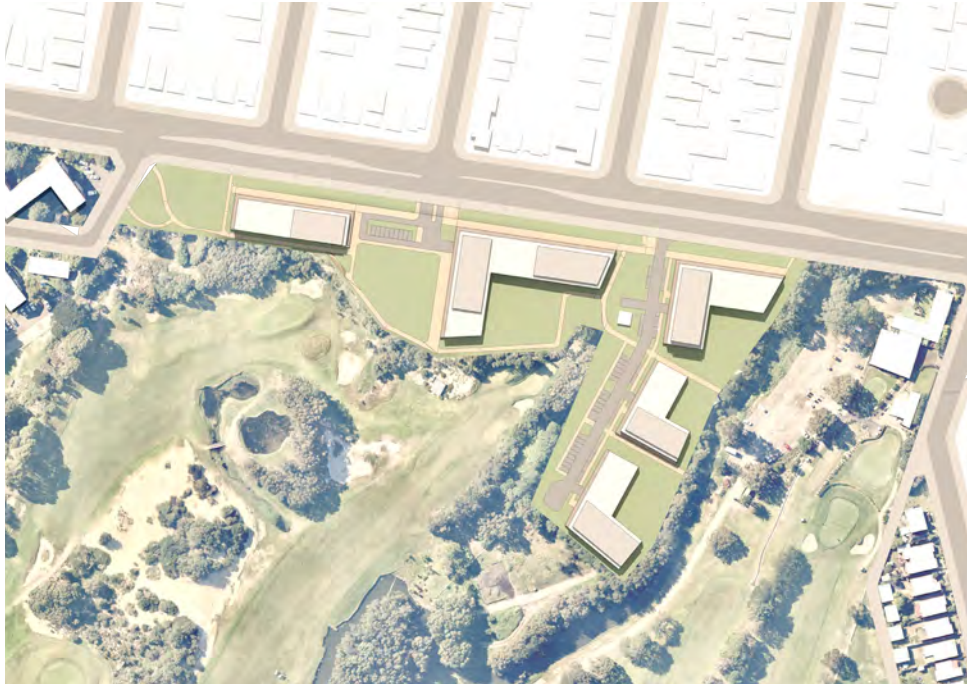


3pm

Summer solstice



9am



12pm



3pm

It should be noted that final compliance with the requirements of the ADG will be subjected to detailed design as part of any forthcoming Development Applications following the sale of the site by Sydney Water. This will be subject to assessment by Bayside Council as part of a standard Development Assessment process.

Building separation and deep soil zones

Building separation



The master plan observes minimum building separation requirements, or greater, in a number of locations as illustrated in the diagram above.

Deep soil zones



The area measurement of deep soil in the proposed master plan measures 32% of the total sites area which exceeds the minimum requirement of 7%.

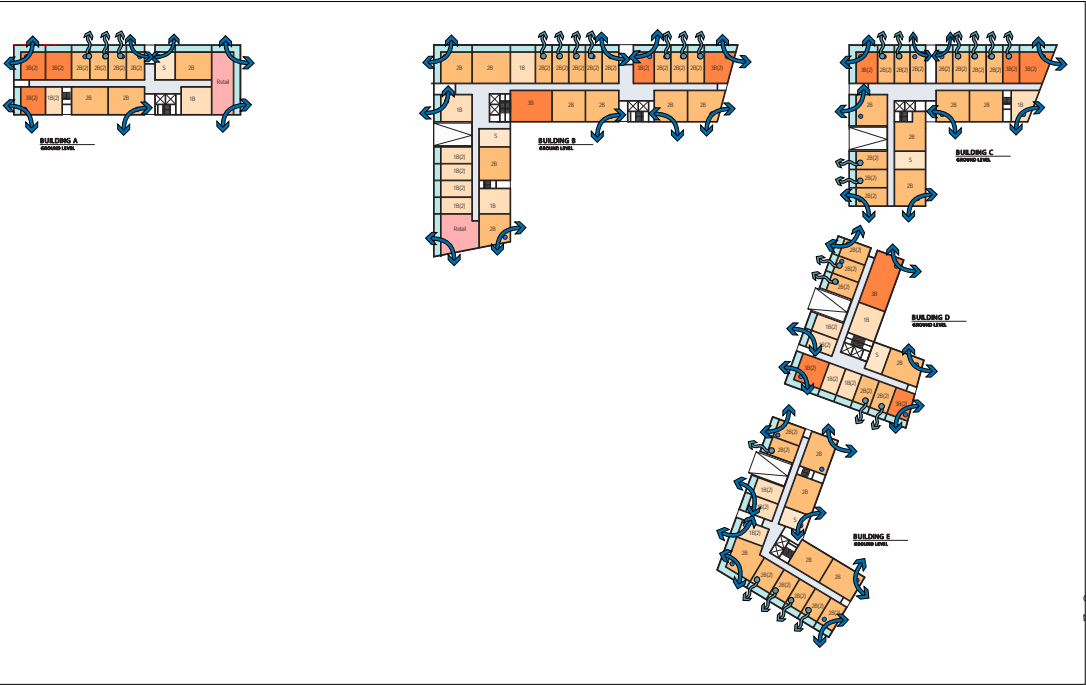
| | | | |
|-----------------------------------|--------|----|-----|
| Site 1 (75 Gardeners Road) | | | |
| Site area | 14,683 | m2 | |
| Deep soil area | 5,318 | m2 | 36% |
| Site 2 (73 Gardeners Road) | | | |
| Site area | 12,870 | m2 | |
| Deep soil area | 3,416 | m2 | 27% |
| Total Site | | | |
| Site area | 27,553 | m2 | |
| Deep soil area | 8,734 | m2 | 32% |

It should be noted that final compliance with the requirements of the ADG will be subjected to detailed design as part of any forthcoming Development Applications following the sale of the site by Sydney Water. This will be subject to assessment by Bayside Council as part of a standard Development Assessment process.

Natural ventilation

Based on indicative floor plans developed for the proposed building envelopes (see right) the master plan achieves 63% of dwellings with natural cross ventilation (minimum required 60%).

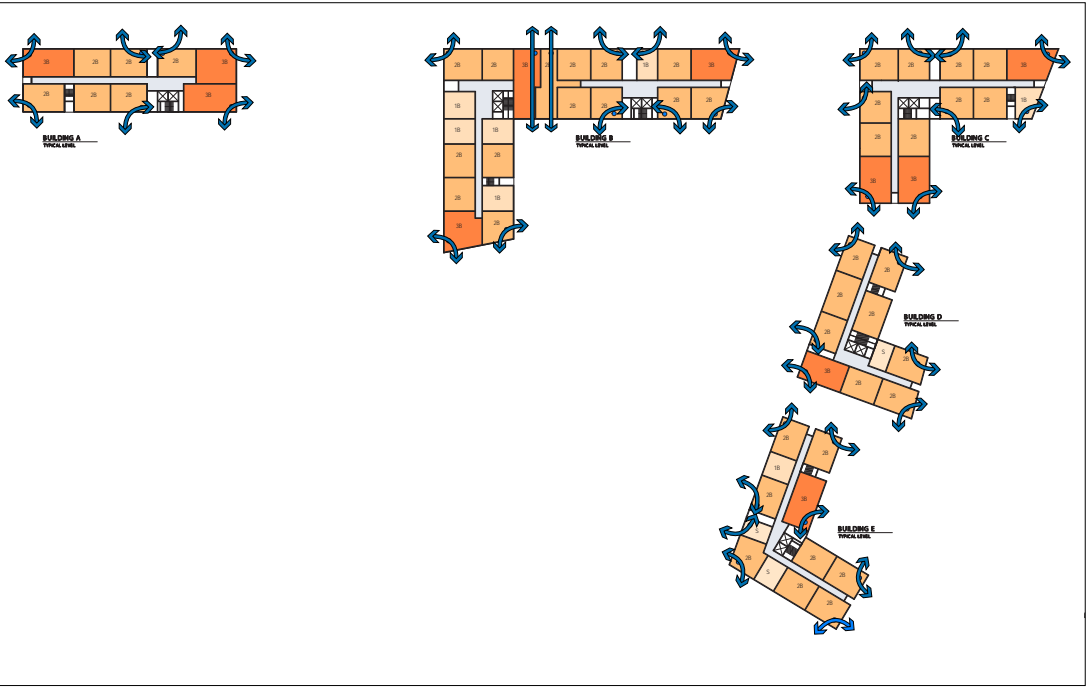
| SEPP65 Cross Ventilation Testing | | | | | | |
|----------------------------------|-------------------|---------|------------------------------------|---------|---------------|-------------------------|
| | Ventilation Study | Apt No. | Cross Ventilation (inc. roof vent) | Storeys | Total Apt No. | Total Cross Ventilation |
| Building A | Ground Floor | 13 | 8 | 1 | 13 | 8 |
| | Level 1 | 3 | 3 | 1 | 3 | 3 |
| | Typical Level | 9 | 7 | 6 | 54 | 42 |
| | Penthouse Level | 5 | 4 | 2 | 10 | 8 |
| Building B | Ground Floor | 27 | 15 | 1 | 27 | 15 |
| | Level 1 | 10 | 4 | 1 | 10 | 4 |
| | Typical Level | 22 | 11 | 6 | 132 | 66 |
| | Penthouse Level | 12 | 8 | 2 | 24 | 16 |
| Building C | Ground Floor | 20 | 17 | 1 | 20 | 17 |
| | Level 1 | 3 | 2 | 1 | 3 | 2 |
| | Typical Level | 13 | 9 | 6 | 78 | 54 |
| | Penthouse Level | 7 | 4 | 6 | 42 | 24 |
| Building D | Ground Floor | 15 | 9 | 1 | 15 | 9 |
| | Level 1 | 2 | 1 | 1 | 2 | 1 |
| | Typical Level | 10 | 6 | 6 | 60 | 36 |
| | Penthouse Level | 5 | 4 | 2 | 10 | 8 |
| Building E | Ground Floor | 16 | 13 | 1 | 16 | 13 |
| | Level 1 | 3 | 3 | 1 | 3 | 3 |
| | Typical Level | 12 | 8 | 6 | 72 | 48 |
| | Penthouse Level | 5 | 3 | 2 | 10 | 6 |
| | | | | | 604 | 383 |
| % Compliant with standards | | | | | 63% | |



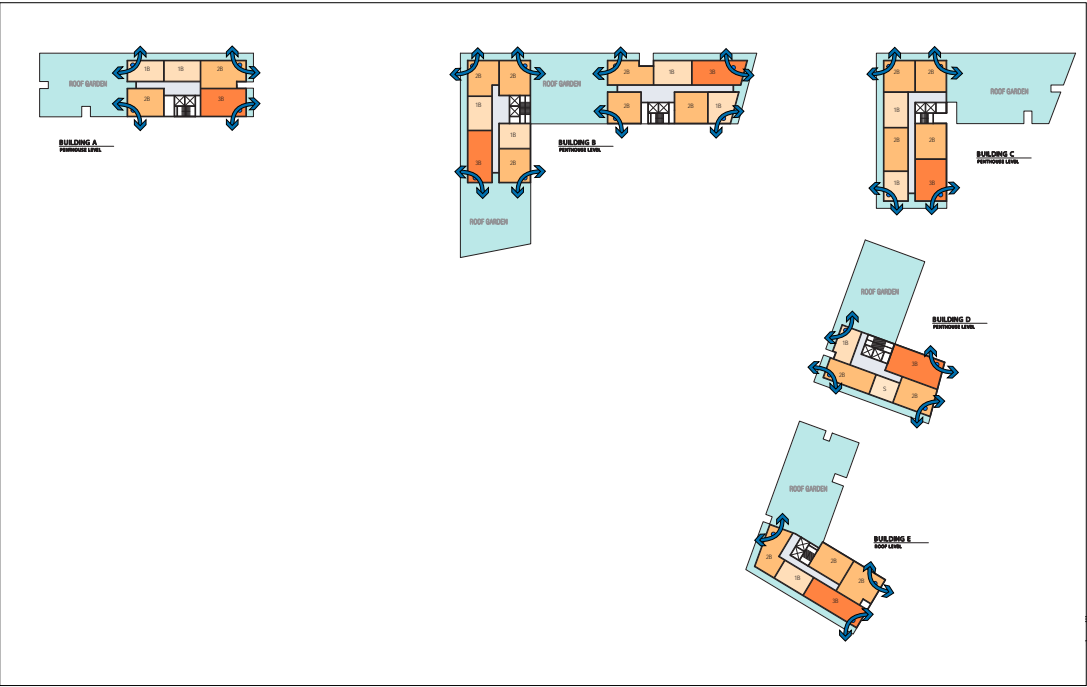
Indicative ground floor



Indicative first floor



Indicative mid Level



Indicative Penthouse

Legend

1 Bedroom

2 Bedroom

3 Bedroom

Corridor

Upper level

Private terrace

Ground floor retail

Cross ventilated

Wind path

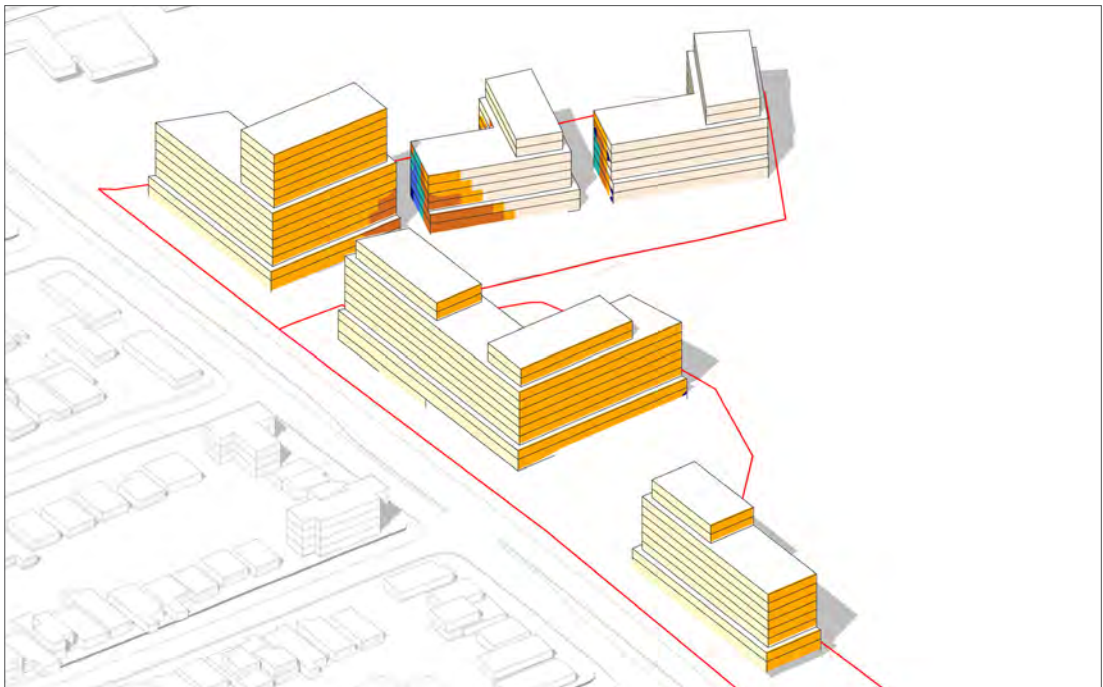
Wind path across multiple stories

It should be noted that final compliance with the requirements of the ADG will be subjected to detailed design as part of any forthcoming Development Applications following the sale of the site by Sydney Water. This will be subject to assessment by Bayside Council as part of a standard Development Assessment process.

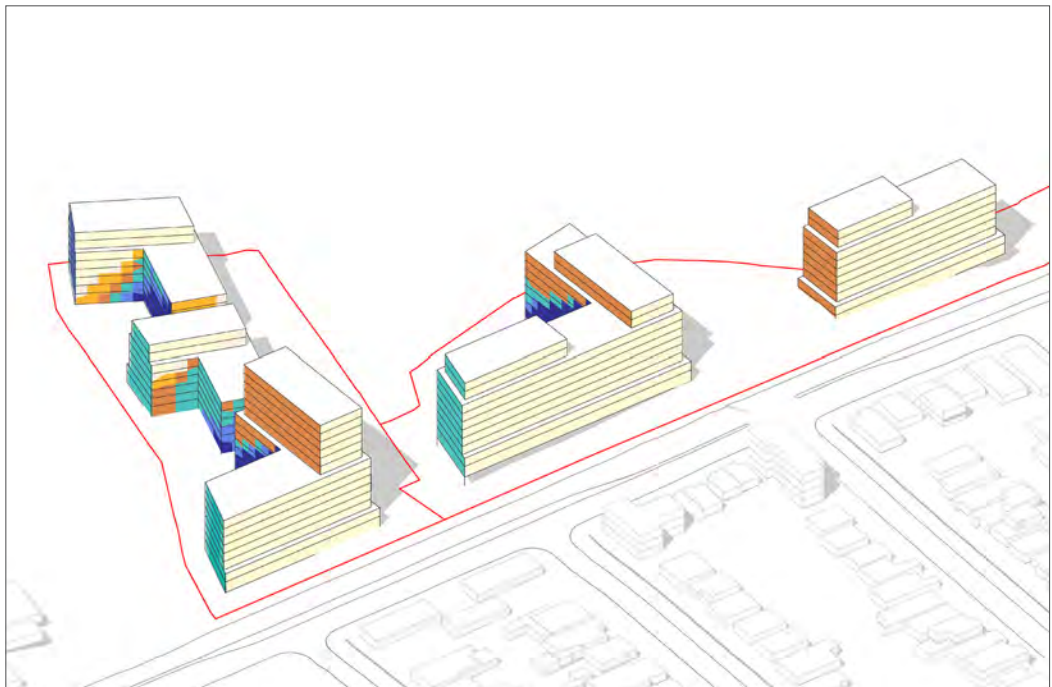
Solar and daylight access

Based on 3d modelling of sun hours to building façades during the winter solstice together with analysis against indicative floor plans the master plan building envelopes are capable of exceeding the minimum requirements (70%) for solar access.

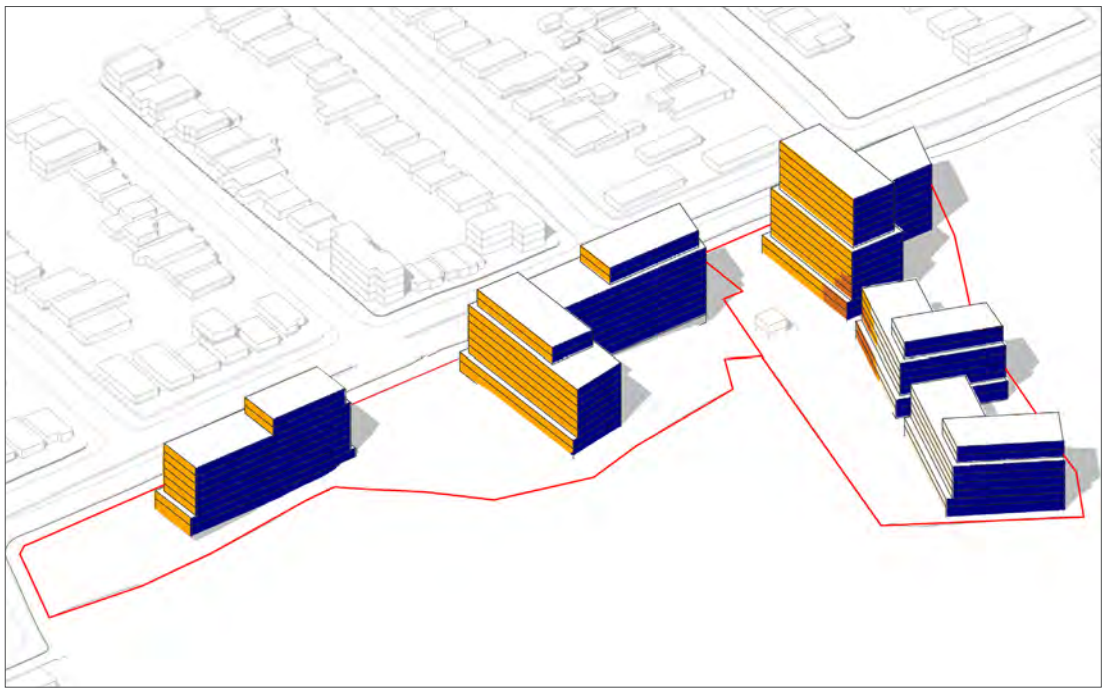
The images and calculations shown (see right and opposite) achieve 80% of apartments with the minimum 2hrs of sunlight to living rooms and private spaces during the winter solstice.



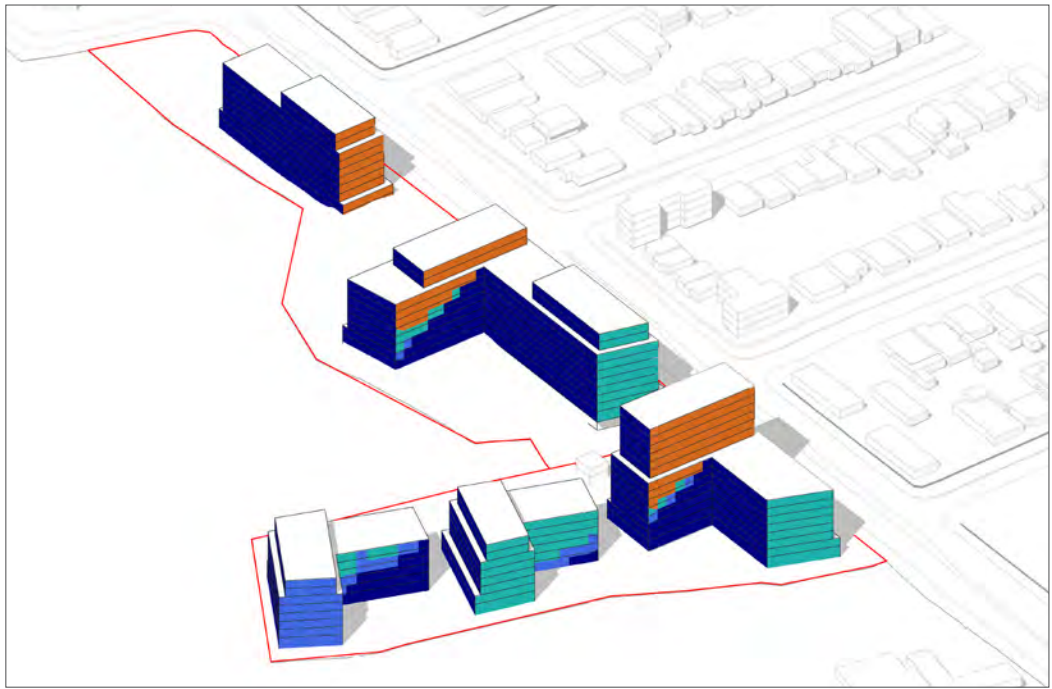
North west view



North east view



South West view



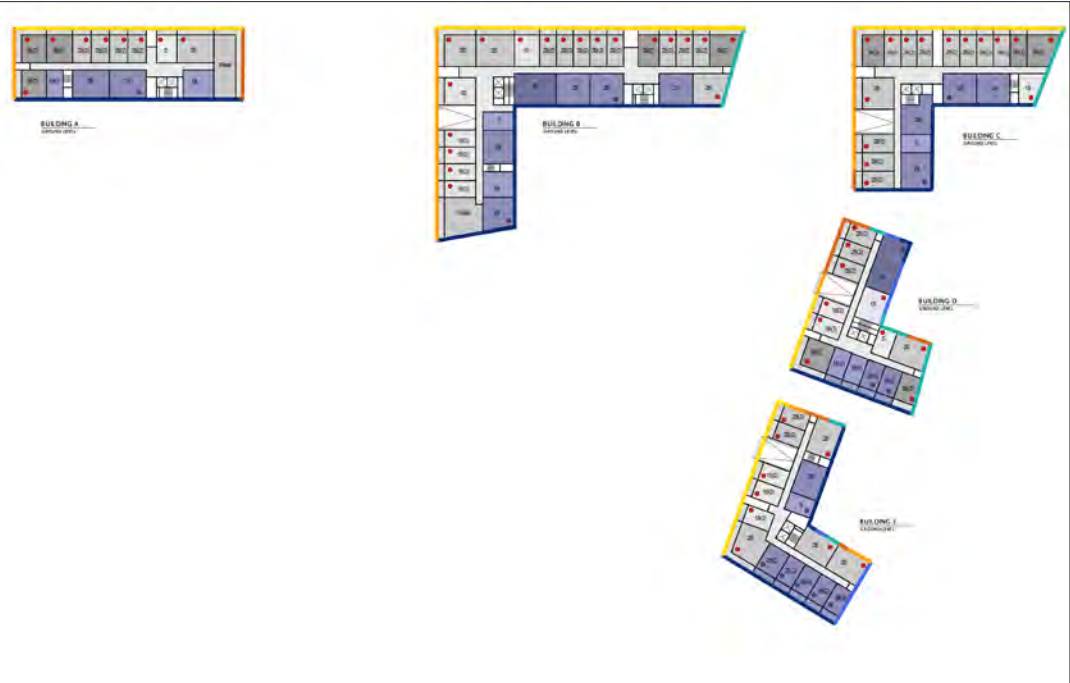
South east view

- Legend**
- > 5 hours
 - > 5 hours
 - 4-5 hours
 - 3-4 hours
 - 2-3 hours
 - 1-2 hours
 - < 1 hour

It should be noted that final compliance with the requirements of the ADG will be subjected to detailed design as part of any forthcoming Development Applications following the sale of the site by Sydney Water. This will be subject to assessment by Bayside Council as part of a standard Development Assessment process.

Solar and daylight access

| SEPP65 Solar Access Testing | | | | | |
|-----------------------------|-----------------|---------|---------------|---------|---------------|
| Solar Access Study | | Apt No. | Solar Access) | Storeys | Total Apt No. |
| Building A | Ground Floor | 13 | 9 | 1 | 13 |
| | Level 1 | 3 | 3 | 1 | 3 |
| | Typical Level | 9 | 7 | 6 | 54 |
| | Penthouse Level | 5 | 5 | 2 | 10 |
| Total | | | | | 80 |
| Total Solar Access | | | | | 64 |
| % Compliant with standards | | | | | 80% |
| Building B | Ground Floor | 27 | 19 | 1 | 27 |
| | Level 1 | 10 | 6 | 1 | 10 |
| | Typical Level | 22 | 18 | 6 | 132 |
| | Penthouse Level | 12 | 11 | 2 | 24 |
| Total | | | | | 193 |
| Total Solar Access | | | | | 155 |
| % Compliant with standards | | | | | 80% |
| Building C | Ground Floor | 20 | 15 | 1 | 20 |
| | Level 1 | 3 | 2 | 1 | 3 |
| | Typical Level | 13 | 10 | 6 | 78 |
| | Penthouse Level | 7 | 7 | 6 | 42 |
| Total | | | | | 143 |
| Total Solar Access | | | | | 119 |
| % Compliant with standards | | | | | 83% |
| Building D | Ground Floor | 15 | 10 | 1 | 15 |
| | Level 1 | 2 | 2 | 1 | 2 |
| | Typical Level | 10 | 9 | 6 | 60 |
| | Penthouse Level | 5 | 4 | 2 | 10 |
| Total | | | | | 87 |
| Total Solar Access | | | | | 74 |
| % Compliant with standards | | | | | 85% |
| Building E | Ground Floor | 16 | 9 | 1 | 16 |
| | Level 1 | 3 | 2 | 1 | 3 |
| | Typical Level | 12 | 9 | 6 | 72 |
| | Penthouse Level | 5 | 3 | 2 | 10 |
| Total | | | | | 101 |
| Total Solar Access | | | | | 71 |
| % Compliant with standards | | | | | 70% |
| Overall Total | | | | | 604 |
| Total Solar Access | | | | | 483 |
| % Compliant with standards | | | | | 80% |



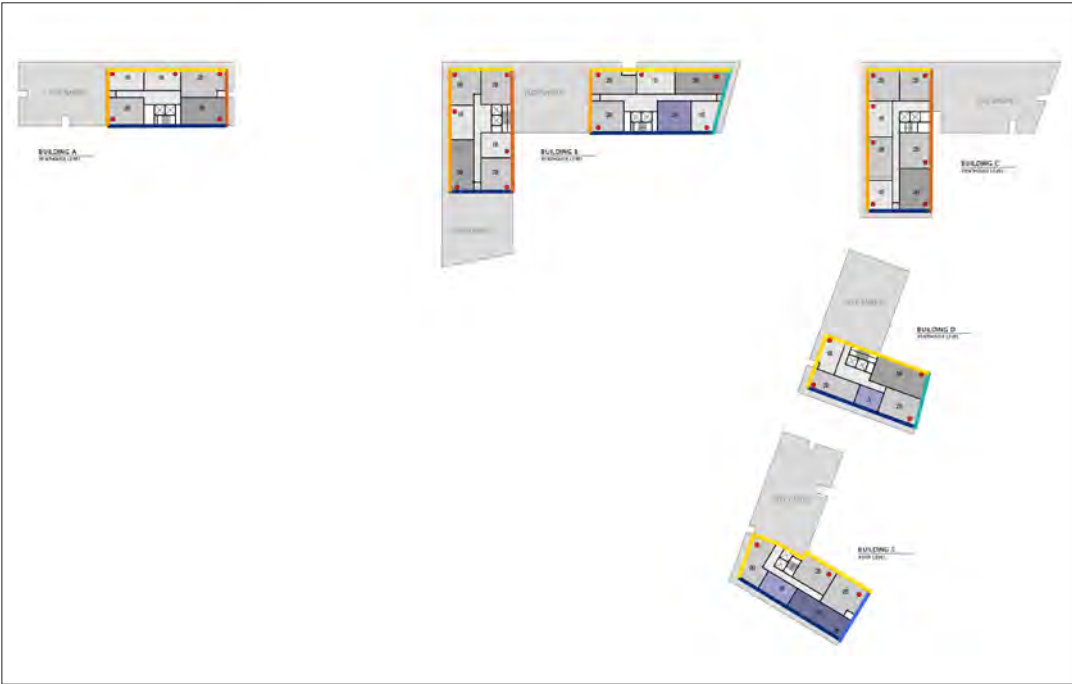
Indicative ground floor



Indicative first floor



Indicative typical mid level floor



Indicative penthouse

Legend

> 5 hours

4-5 hours

3-4 hours

2-3 hours

1-2 hours

< 1 hour

Complies

Does not comply

7 Recommendations

Recommended planning controls

The master plan developed for the site has been used to inform the proposed planning proposal. At this early stage, the master plan is simply indicative of the scale of development for the subject site which would be subject to sale of the sites by Sydney Water, detailed design of proposed buildings and the submission of a Development Application to Bayside Council following the finalisation of the amendments to the planning controls.

The master plan is for indicative purposes only and would be subject to further detailed design. Architectus and Sydney Water would be willing to discuss with Bayside Council the potential for the implementation of a Site Specific Development Control Plan to assist in the guidance and to provide increased certainty for development outcomes on the site. However, it is considered that this should be based on the Design Principles provided within this report. Sufficient flexibility and amendment should be retained within the proposal to ensure that as part of the detailed design development amendments to the master plan can be considered, where appropriate.

Sydney Water proposes to continue the current use of 73 Gardeners Road as a Depot until such time as the site is no longer needed. The timing for the ceasing of operations and subsequent sale of the site is subject to a further Depot Optimisation process currently being undertaken by Sydney Water.

As such, the sale of the sites may not be concurrent, given that 75 Gardeners Road is currently occupied with short term leases and capable of being sold for redevelopment in the short term. However it is intended that both sites will be developed in stages by one entity to ensure consistency and a better planning outcome.

Therefore, given that 73 Gardeners Road will continue is current uses as a Sydney Water Depot in the short term, it is proposed to defer the proposed R4 High Density Residential zone and associated HOB and FSR controls from coming into effect until such time Sydney Water is ready to divest ownership of the site.

As the land at 73 Gardeners Road will be identified as a ‘deferred matter’ on the relevant LEP maps, the current zoning and development standards will continue to apply. This will allow for the site to be developed in stages by a future purchaser if both sites are purchased concurrently.

Land Use

The proposed land use zone for 73-75 Gardeners Road is R4 High Density Residential which permits (with consent) attached housing, multi-dwelling housing, residential flat buildings, neighbourhood shops and shot top housing. This will provide opportunities for high quality apartment living to accommodate the growing population and allow for renewal of the subject site. It is also proposed to amend the current additional permitted uses listed under Schedule 1 as per the below:

7 Use of certain land at 75 Gardeners Road, Eastlakes

(1) This clause applies to land at 75 Gardeners Road, Eastlakes, being ~~Lot 1, DP 1116853~~ **Lot 51 in DP 1216168** and identified as “7” on the Additional Permitted Uses Map.

(2) Development for the purposes of entertainment facilities, food and drink premises, **and commercial premises** ~~garden centres, hardware and building supplies, landscaping material supplies, recreation areas and recreation facilities (indoor)~~ is permitted with development consent.

Inclusions to the above clause are shown in bold, with exclusions identified with strike through.

Building Heights

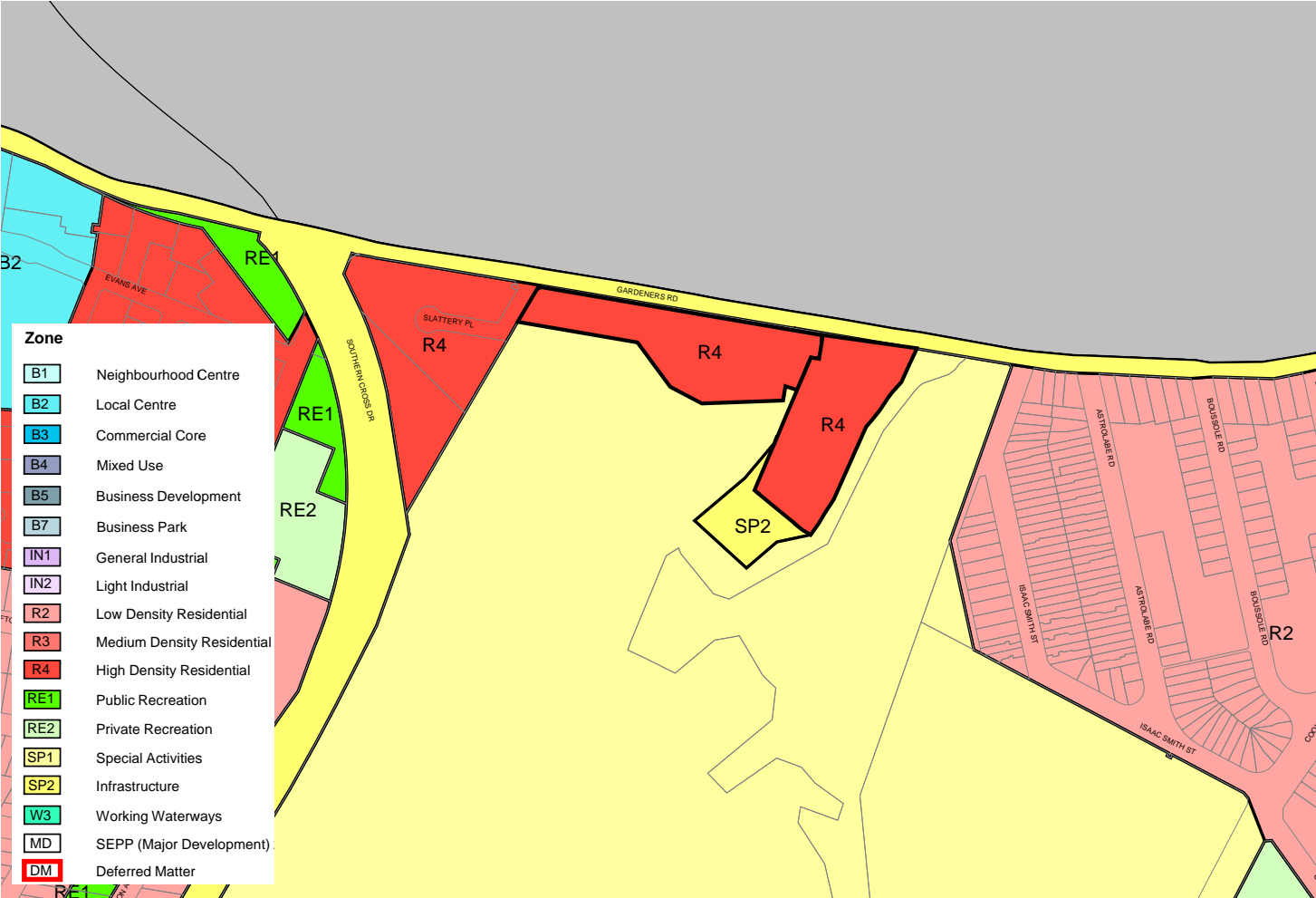
The existing maximum building height control restricts development to 14 meters for 75 Gardeners Road, while there are currently no building height controls for 73 Gardeners Road. These controls do not allow for an appropriate level of development density on the site in light of its location and surrounding context, while providing good quality open space for the future residents and broader community. The maximum

building height control for the site is proposed to be amended to permit a range of building heights from 29 metres to 50 metres. It should be noted that the greatest heights are limited to reduced widths along Gardeners Road and that the majority of the development is around 8- storeys, up to 29 metres in height.

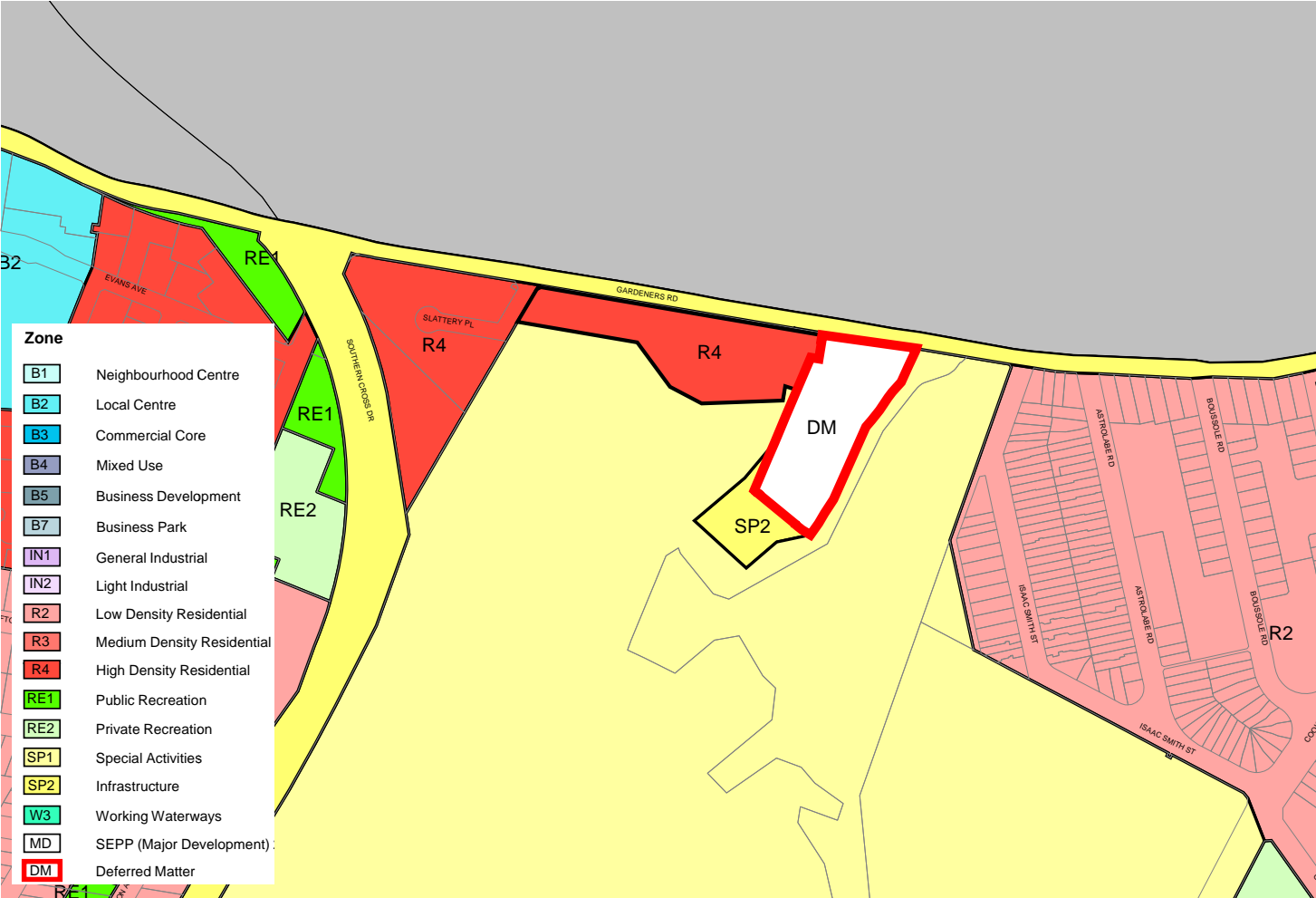
Floor Space Ratio

Under current planning controls, the permissible maximum FSR for 75 Gardeners Road is restricted to 1:1, with no maximum FSR provided for 73 Gardeners Road. Similar to the above restriction, the control does not allow for development of a built form that would allow for the best design outcome including large areas of public and communal open space. The maximum FSR control for the site is proposed to be amended to permit an FSR of 1.65:1 for 75 Gardeners Road and 1.95:1 for 73 Gardeners Road.

Recommended planning controls

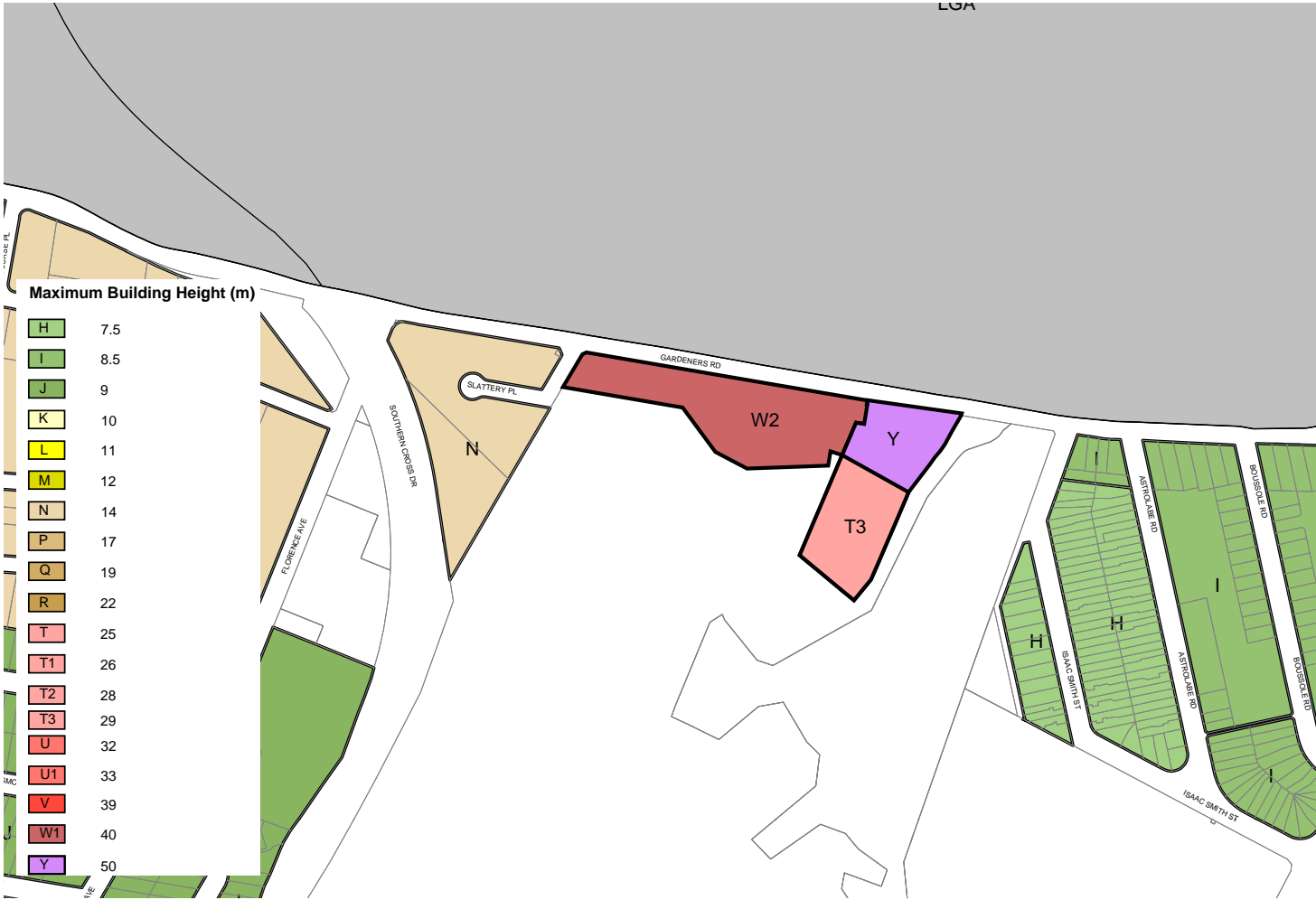


Land Use Zoning

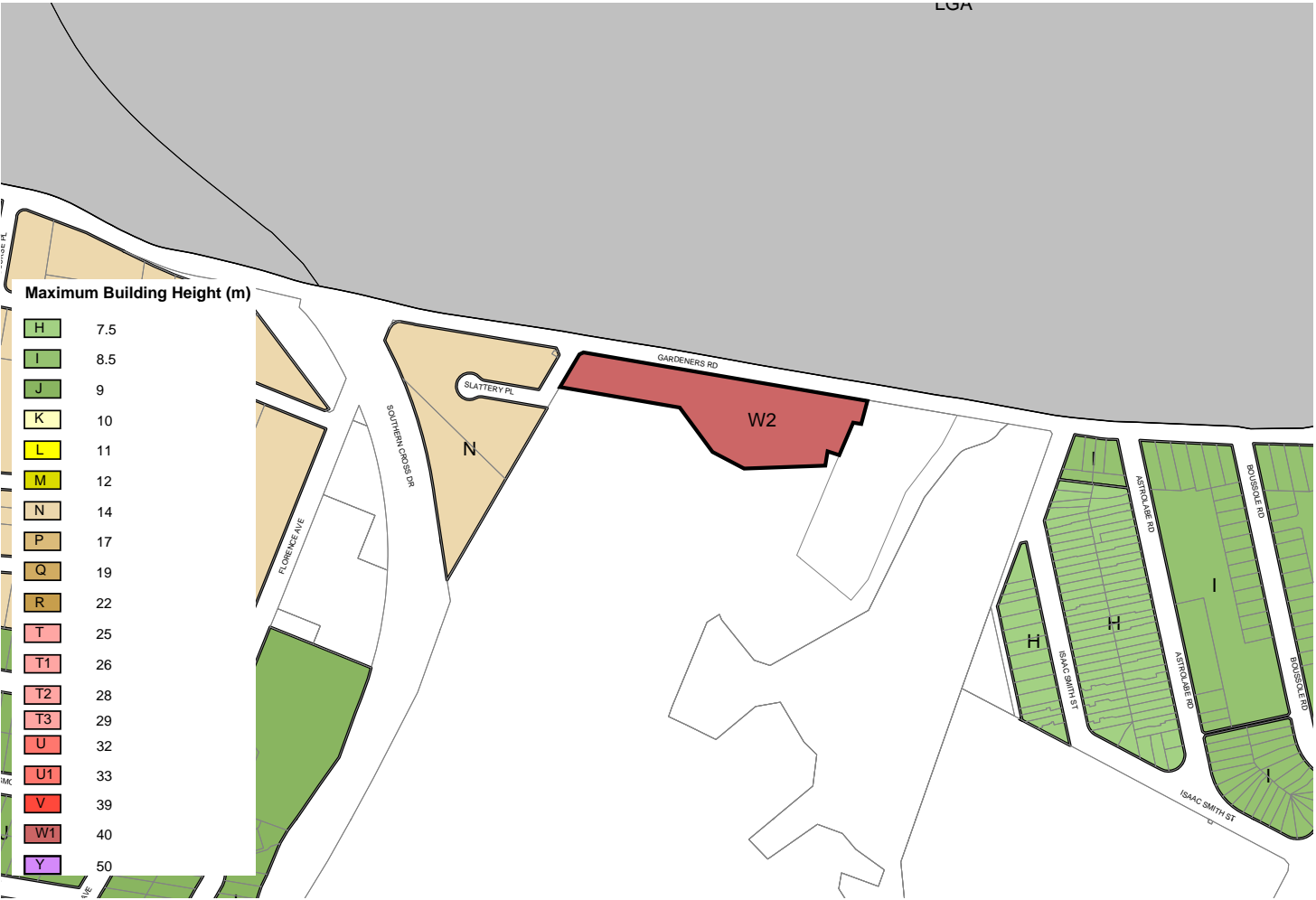


Land Use Zoning - Deferred Matter

Recommended planning controls

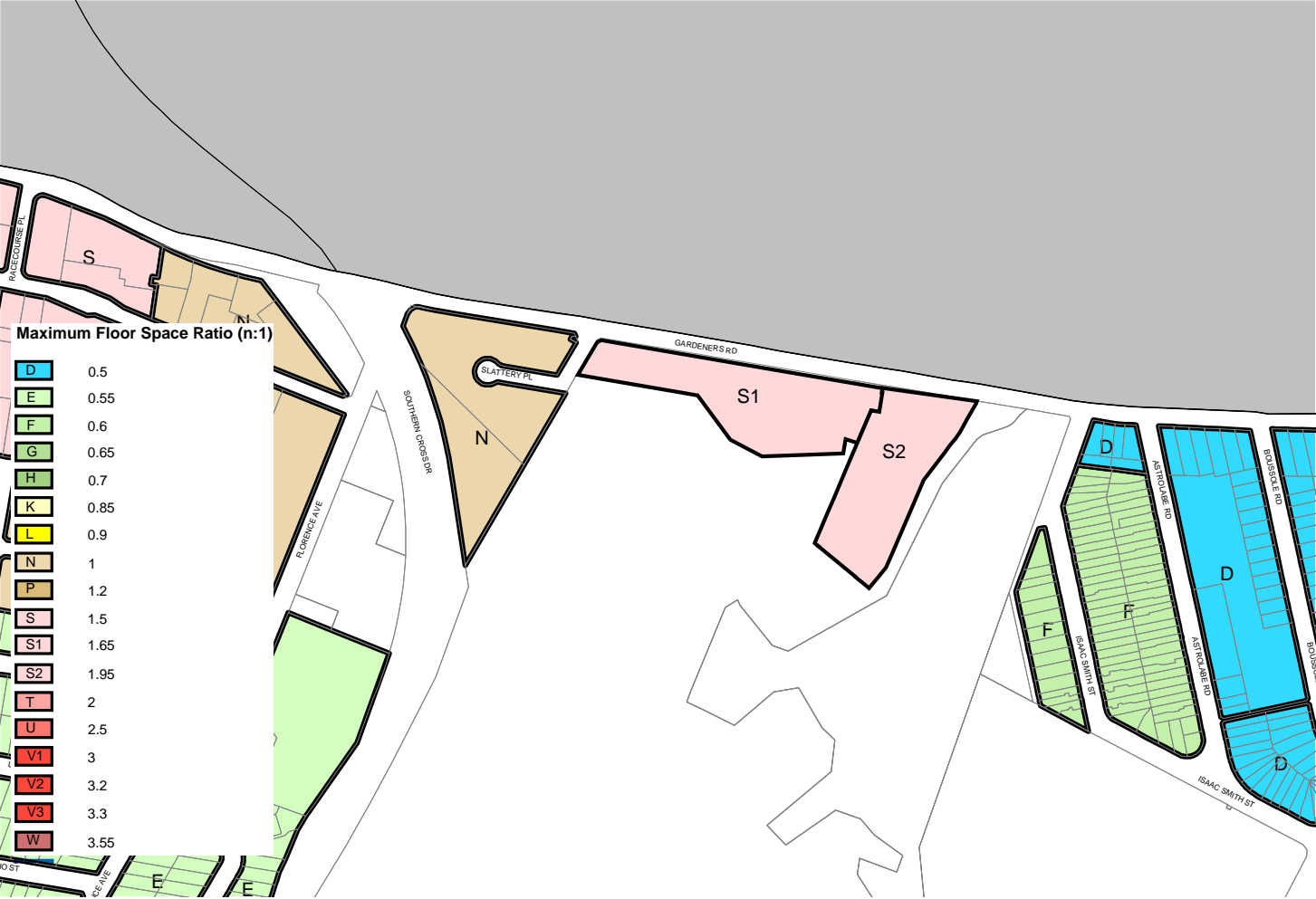


Building Heights

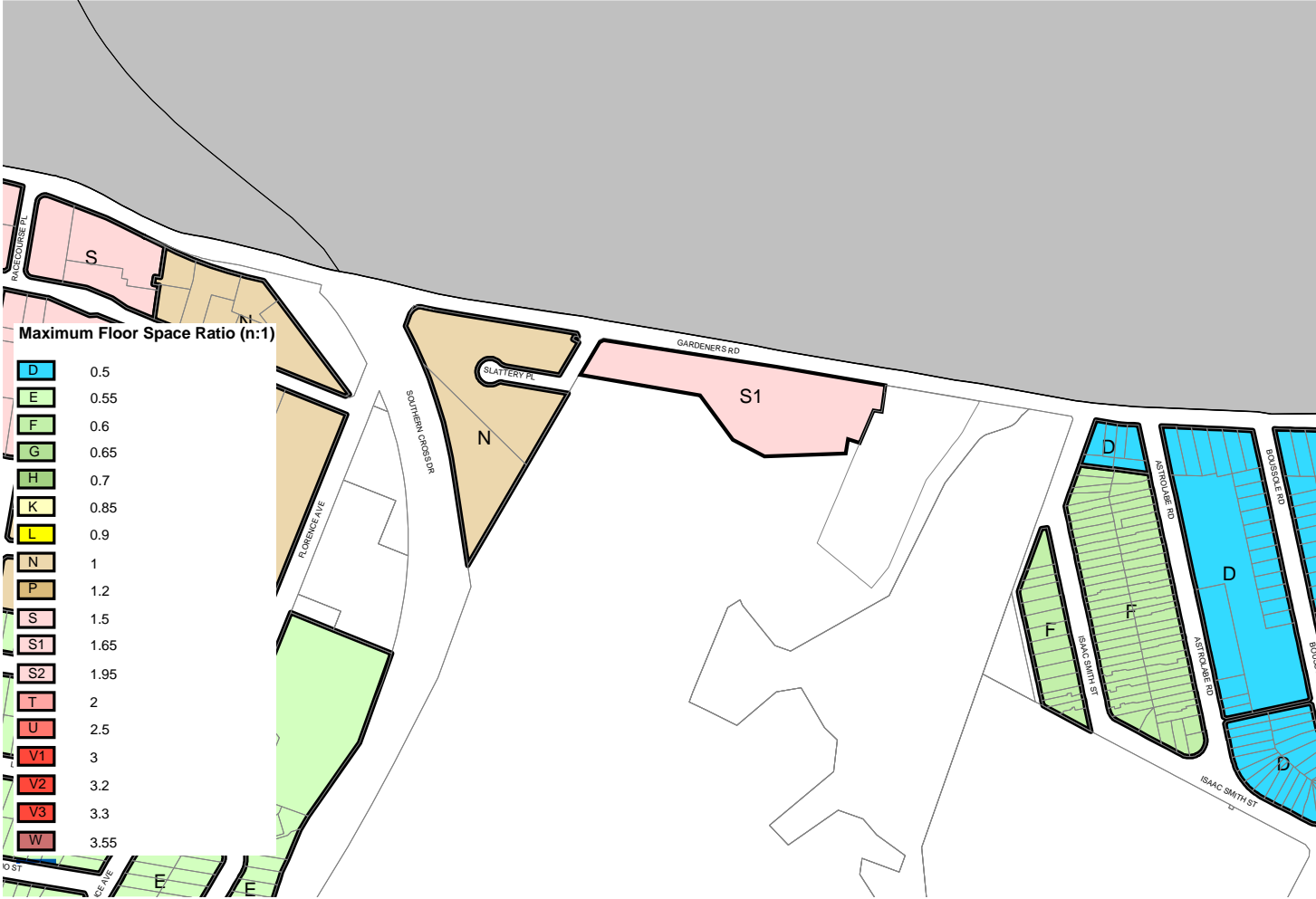


Building Heights - Deferred Matter

Recommended planning controls



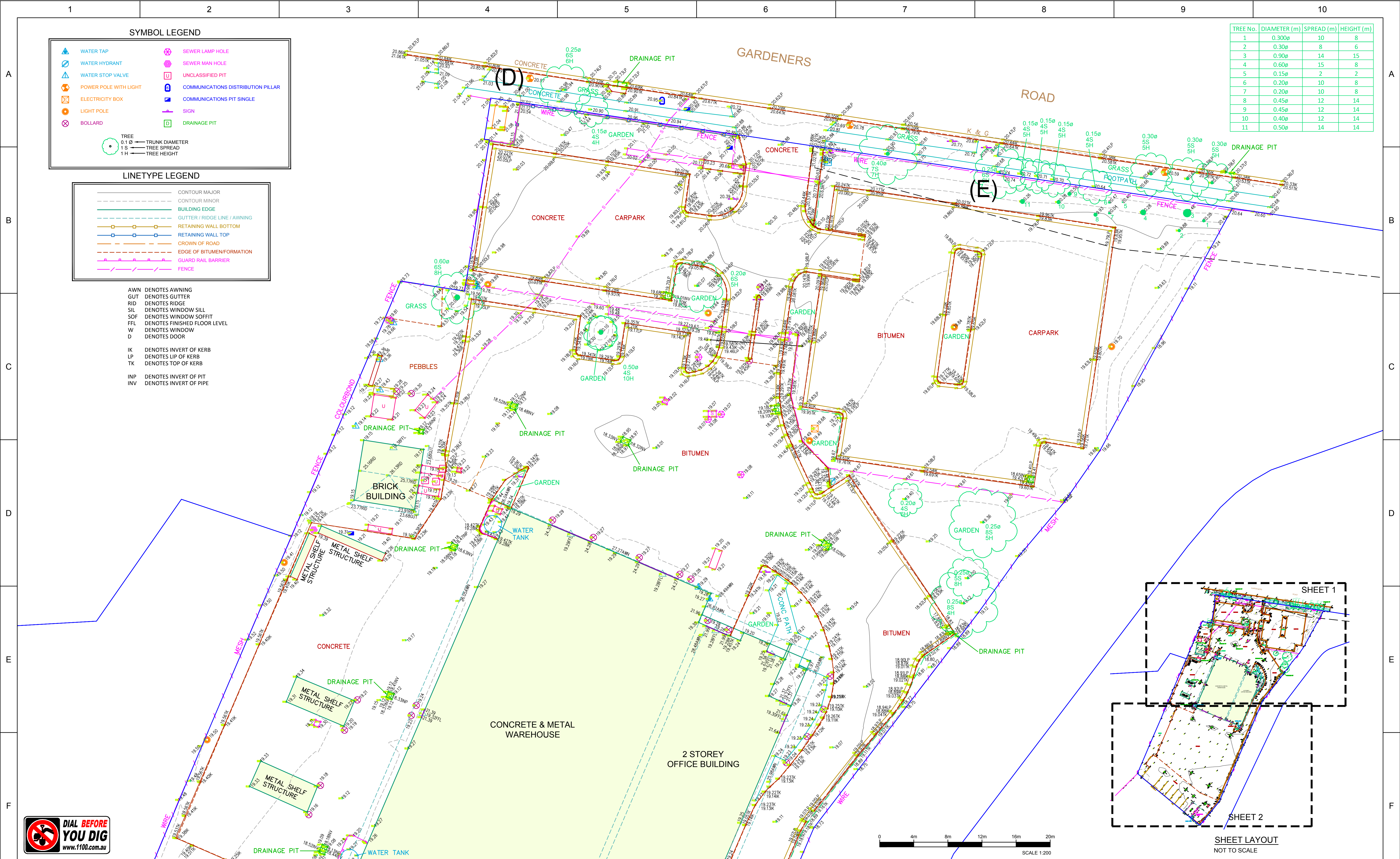
Floor Space Ratio



Floor Space Ratio - Deferred Matter

architectus™

**Attachment B – Site Survey,
Prepared by Linker Surveying,
dated August 2015**



| TREE No. | DIAMETER (m) | SPREAD (m) | HEIGHT (m) |
|----------|--------------|------------|------------|
| 1 | 0.300ø | 10 | 8 |
| 2 | 0.30ø | 8 | 6 |
| 3 | 0.90ø | 14 | 15 |
| 4 | 0.60ø | 15 | 8 |
| 5 | 0.15ø | 2 | 2 |
| 6 | 0.20ø | 10 | 8 |
| 7 | 0.20ø | 10 | 8 |
| 8 | 0.45ø | 12 | 14 |
| 9 | 0.45ø | 12 | 14 |
| 10 | 0.40ø | 12 | 14 |
| 11 | 0.50ø | 14 | 14 |

SYMBOL LEGEND

WATER TAP

WATER HYDRANT

WATER STOP VALVE

POWER POLE WITH LIGHT

ELECTRICITY BOX

LIGHT POLE

BOLLARD

SEWER LAMP HOLE

SEWER MAN HOLE

UNCLASSIFIED PIT

COMMUNICATIONS DISTRIBUTION PILLAR

COMMUNICATIONS PIT SINGLE

SIGN

DRAINAGE PIT

TREE

0.1 Ø — TRUNK DIAMETER

1 S — TREE SPREAD

1 H — TREE HEIGHT

LINETYPE LEGEND

CONTOUR MAJOR

CONTOUR MINOR

BUILDING EDGE

GUTTER / RIDGE LINE / AWNING

RETAINING WALL BOTTOM

RETAINING WALL TOP

CROWN OF ROAD

EDGE OF BITUMEN FORMATION

GUARD RAIL BARRIER

FENCE

- AWN

DENOTES AWNING
- GUT

DENOTES GUTTER
- RID

DENOTES RIDGE
- SIL

DENOTES WINDOW SILL
- SOF

DENOTES WINDOW SOFFIT
- FFL

DENOTES FINISHED FLOOR LEVEL
- W

DENOTES WINDOW
- D

DENOTES DOOR
- IK

DENOTES INVERT OF KERB
- LP

DENOTES LIP OF KERB
- TK

DENOTES TOP OF KERB
- INP

DENOTES INVERT OF PIT
- INV

DENOTES INVERT OF PIPE



IMPORTANT NOTE:
This plan is prepared for SYDNEY WATER from a combination of field survey and existing records for the purpose of designing new constructions on the land and should not be used for any other purpose.
The title boundaries shown hereon were not marked by the author at the time of survey and have been determined by plan dimensions only and not by field measurement.

A services search of the area surveyed above has not been undertaken. Visible services shown hereon have been located where possible by field survey. Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.
This note is an integral part of this plan.

| REVISION | DATE | DESCRIPTION | CCAD REF | MC APPROVED |
|----------|------------|----------------|----------|-------------|
| 00 | 25.05.2017 | ORIGINAL ISSUE | 118382AE | MC |

SCALE:
HORIZ. 1: 200

VERT.

CONTOUR INTERVAL:
MAJOR 1.0

MINOR 0.25

HORIZONTAL ORIGIN

COORD. SYSTEM

MARK ADOPTED: SSM 44932

COORDINATES:
E 335 554 289
N 6 244 709.516

MGA

VERTICAL DATUM

DATUM:
AHD

BM ADOPTED: SSM 44932

RL: 20.570

Cardno

Shaping the Future

23-25 Frederick Street
PO Box 175
Rockdale NSW 2216
t: (02) 9597 9700
f: (02) 9599 2146
e: surveynsw@cardno.com.au w: www.cardno.com.au

SURVEYED
HD / US

DRAWN
I.T.

CHECKED
HD / US

PASSED
M.C.

PROJECT: LOT 50 IN DP 1216168 GARDENERS ROAD EASTLAKES

PLAN SHOWING LEVELS DETAILS AND CONTOURS

CLIENT: SYDNEY WATER

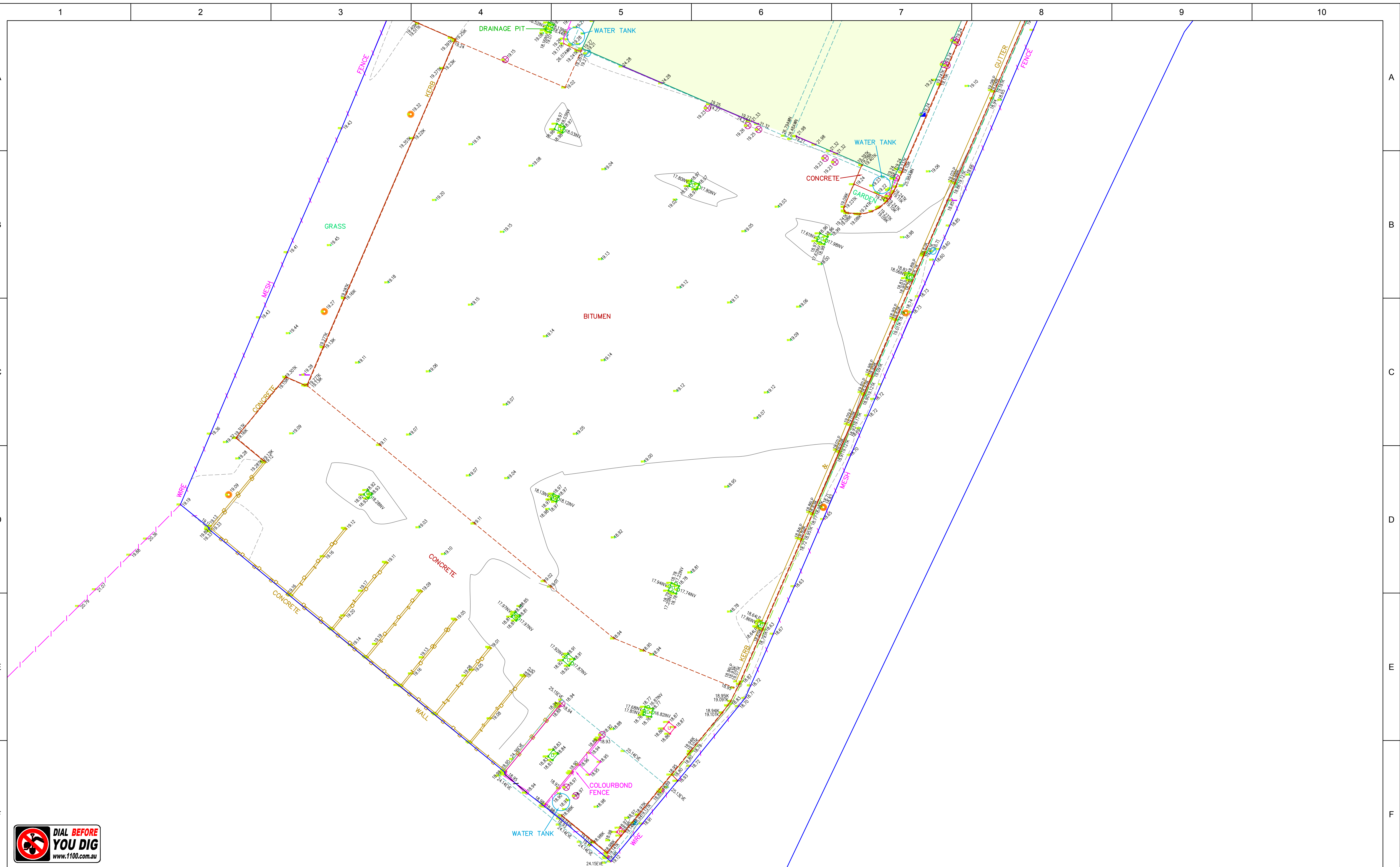
SHEET 1 OF 2

DRAWING NUMBER

118382500

REV

00



IMPORTANT NOTE:
This plan is prepared for
SYDNEY WATER
from a combination of field survey and
existing records for the purpose of
designing new constructions on the
land and should not be used for any
other purpose.
The title boundaries shown hereon were
not marked by the author at the time of
survey and have been determined by
plan dimensions only and not by
field measurement.

A services search of the area surveyed above has not been undertaken. Visible services shown hereon have been located where possible by field survey. Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

This note is an integral part of this plan.

| | | | | |
|----------|------------|----------------|----------|----------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 00 | 25.05.2017 | ORIGINAL ISSUE | 118382AE | MC |
| REVISION | DATE | DESCRIPTION | CCAD REF | APPROVED |

| | |
|-------------------|----------------------------------|
| SCALE: | |
| HORZ. 1:200 | VERT. |
| CONTOUR INTERVAL: | |
| MAJOR 1.0 | MINOR 0.25 |
| HORIZONTAL ORIGIN | |
| COORD. SYSTEM | MARK ADOPTED: SSM 44 |
| MGA | COORDINATES: |
| | N 335 554 289 E 6 244 709.516 |
| VERTICAL DATUM | |
| DATUM: | BM ADOPTED: SSM 4493 |
| AHD | RL: 20.570 |

A1



PROJECT: LOT 50 IN DP 1216168 GARDENERS
ROAD EASTLAKES

**PLAN SHOWING LEVELS DETAILS
AND CONTOURS**

CLIENT: SYDNEY WATER



| | | | |
|----------------|---|-----|---|
| SHEET | 2 | OF | 2 |
| DRAWING NUMBER | | REV | |

| | |
|-----------|----|
| 118382500 | 00 |
|-----------|----|

Attachment C – Site Survey,
Prepared by Cardno, dated
May 2017



(A) EASEMENT TO DRAIN WATER VARIABLE WIDTH (DP 1116853)
(B) EASEMENT FOR BATTER (P483286)

TECHNICAL NOTES:

1. ORIGIN OF LEVELS IN 26877, 41.19.285 (41.15)
2. BEAMS ARE ON LEVEL
3. RELATIONS OF IMPROVEMENTS AND DATE TO BOUNDARIES IS INDICATIVE ONLY AND SPECIFIC DETAILS, IF CRITICAL, WILL REQUIRE FURTHER SURVEY.
4. SPACING SHOWN ARE BASED ON VISIBLE SURFACE INDICATORS DETERMINED AT THE DATE OF SURVEY AND THE RELEVANT SURFACE, BEYOND THE 100000 ADVERTISED AS NOT BEING USED. WE WILL USE THIS PRIOR TO ANY WORK BEING UNDERTAKEN UNDER SURVEYING PTY LTD BEAR NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE SERVICES SHOWN.
5. RIDGE DATE & GUTTER HEIGHTS HAVE BEEN OBTAINED BY AN INQUIRY METHOD AND ARE NOT SUITABLE FOR PLANNING PURPOSES ONLY
6. ALLOWING BOUNDARIES AND DIMENSIONS HAVE BEEN PLOTTED FOR INDICATIVE PURPOSES ONLY AND SPECIFIC DETAILS, IF CRITICAL, WILL REQUIRE FURTHER SURVEY.
7. THE DIMETER (Ø), SPREAD (S) & HEIGHT (H) OF EACH TREE IS INDICATIVE ONLY AND SPECIFIC DETAILS, IF CRITICAL, WILL REQUIRE FURTHER SURVEY.
8. THE SPOT LEVELS OF THE TOPOGRAPHY ONLY. SPOT LEVELS SHOULD BE USED IF DETAILED DESIGN IS TO BE UNDERTAKEN.
9. CONTOUR INTERVAL, TO 1 METRE.

[illegible]

| | | | |
|------|--------------------------------------|-------|-----------------------|
| CSWP | CERAMIC STORMWATER PIPE | FWH | REDUCED WATER |
| E | UNDERGROUND ELECTRICITY CABLES | PSW | PRISING MAIN |
| AE | OVERHEAD ELECTRICITY & OPTICS CABLES | RDA | RACES & WATIME PIT |
| NO | OVERHEAD ELECTRICITY & OPTICS CABLES | S | SHOES |
| PS | PIPE SERVICE | SO | SHOES OUTLIFT |
| G | GAZ LINE | SHV | SHARED TRENCH |
| GE | GAZ LINE & ELECTRICITY CABLES | SN | STONE WATER |
| N | NATURAL GAS CABLE | SN-CK | STORMWATER CREEK |
| OT | OPTIC CABLE | TEL | TELESTRA CABLES |
| PE | PRIVATE ELECTRICITY | T | TELESTRA & GAS CABLES |
| PS | PRIVATE SEWER | U | UNKNOWN SERVICE |
| FW | PRIVATE WATER | W | WATER SUPPLY |
| | | WW | WATER MAIN |

1. ALL UNDERGROUND SERVICE INFORMATION INCLUSIVE OF GENERAL POSITION AND SURFACE COVER DEPTHS NOTED ON THE PLAN ARE APPROPRIATELY ONLY.
2. ALL UNDERGROUND SERVICE INFORMATION HAS BEEN COMPILED FROM SERVICE AUTHORITY PLANS PROVIDED BY THE AUTHORITIES.
3. THE LOCATION OF SERVICES BETWEEN SURVEYED POINTS (AS INDICATED) HAVE BEEN SHOWN DIAGRAMMATICALLY ONLY USING THE SERVICE (UNDERGROUND) AS PROVIDED. THE EXACT LOCATION OF THESE SERVICES BETWEEN THE SURVEYED POINTS MUST BE VERIFIED PRIOR TO ANY EXCAVATION OR PILING. NO WARRANTY IS GIVEN AGAINST THE POSSIBILITY OF THE EXISTENCE OF FURTHER UNIDENTIFIED SERVICES.
4. ALL CONTRACTORS, TRADESMEN, BUILDING & PROJECT CONSULTANTS MUST CONFIRM THE VARIOUS AUTHORITIES, IN ACCORDANCE WITH STANDARD TIAL BEFORE YOU DRY PROCEDURES PRIOR TO UNDERTAKING ANY WORKS WITHIN THE VICINITY OF THE SERVICE LINES TO VERIFY THE POSITION OF THE SERVICE LINES.

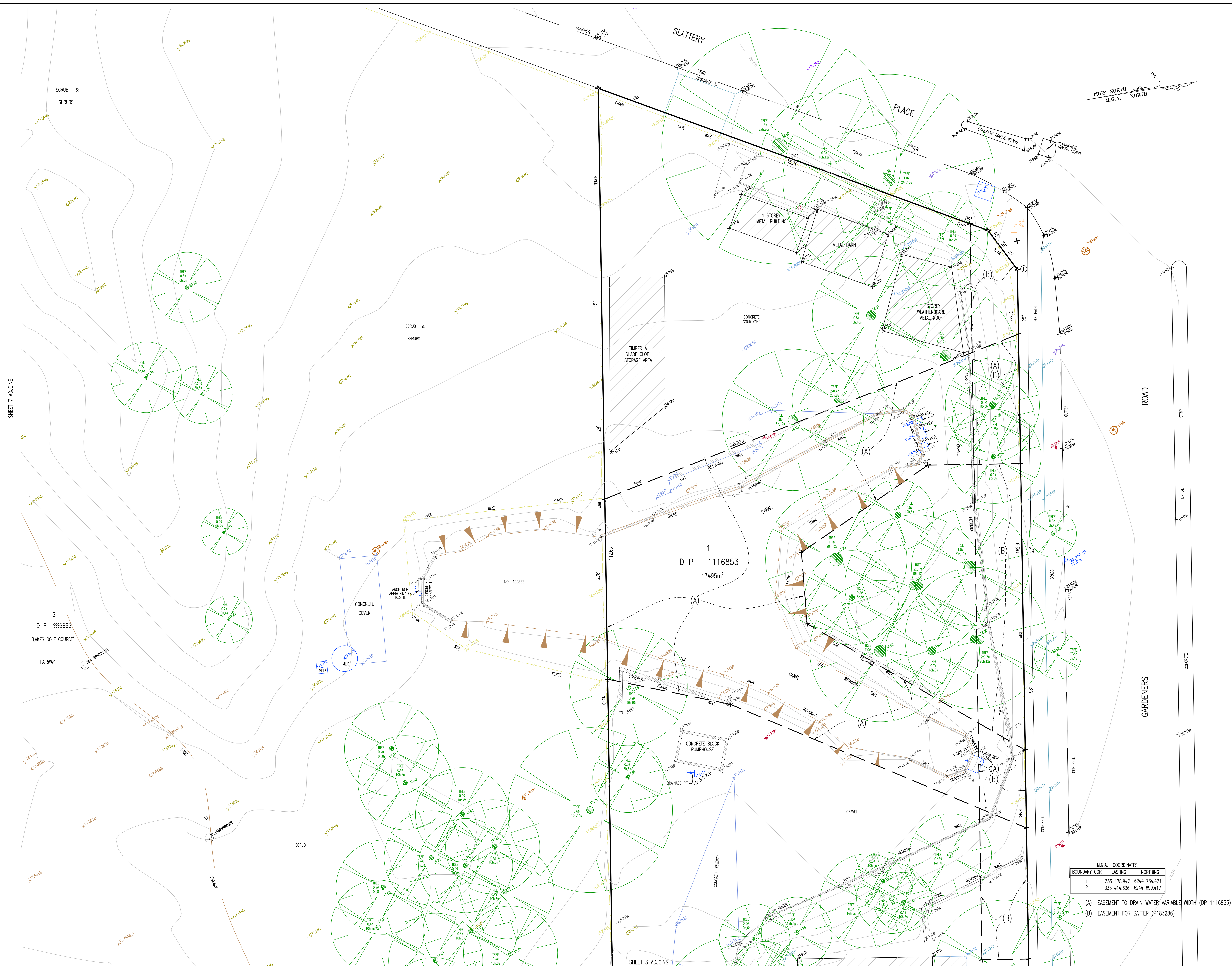
REDUCTION RATIO 1 : 100

0 5 10 15 20 25 30 35

LENGTHS ARE IN METRES

| | |
|--------------------------|----------------------|
| TITLE No: 1/1116853 | REF:150721 |
| DATUM: A.H.D. | ISSUE:2 |
| DATE OF SURVEY: 28.07.15 | ISSUE DATE: 01.08.15 |
| SURVEYOR: KB | SHEET SIZE: A0 |
| DRAFTER: PH | SHEET 1 OF 17 SHEETS |

 Suite 301, Level 3, 55 Holt Street
Surrey Hills NSW 2012
PO Box 1807
Surrey Hills NSW 2012
t: (02) 9212 6555
f: (02) 9212 5250
email: linker@linkersurveying.com.au
web site: www.linkersurveying.com.au

[illegible]

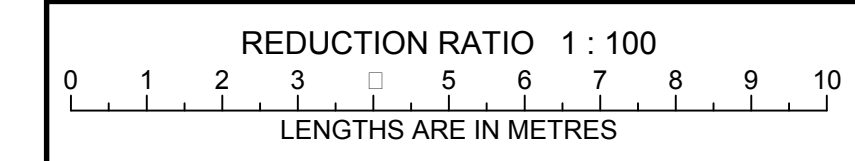
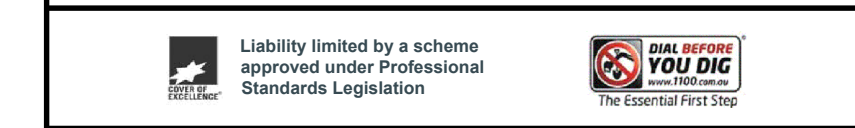
TYPICAL NOTES:

1. ORIGIN OF LEVELS FM 2967T, RL1.820 (AAL2)
2. READINGS ARE ON WGA NORTH
3. RELATIONSHIP OF MEASUREMENTS AND DATA TO BOUNDARIES IS DEMONSTRATIVE ONLY AND SPOT LEVELS ARE NOT TO BE USED TO REQUIRE FURTHER SURVEY
4. SPACES SHOWN ARE BASED ON VISIBLE SURFACE INDICATORS OUTSIDE AT THE DATE OF SURVEY AND THE FOLLOWING SKETCH DIAGRAMS OF THE WAGDOES AUTHORITY. ALL SURVEY DATA IS TO BE USED IN ORDER TO MAKE WORKING UNDERSTANDING. UNDERSTANDING PLY LID BEAR IN RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE SPACES SHOWN HEREIN.
5. SPOT LEVELS & OUTER BOUNDS HAVE BEEN DETERMINED BY AN IMPROVED METHOD AND ARE ACCURATE FOR PLANNING PURPOSES ONLY
6. ALLOWING BOUNDS AND OVERLAYS HAVE BEEN PROVIDED FOR DEMONSTRATIVE PURPOSES ONLY AND SPOT LEVELS ARE NOT TO BE USED TO REQUIRE FURTHER SURVEY
7. THE DIMENSIONS (L, S, SPREAD) OF A HEIGHT (H) OF EACH TIE IS INDICATIVE ONLY AND SPECIFIC TIE(S), IF AVAILABLE, SHOULD BE HEIGHT FURTHER SURVEY.
8. THE PRESENCE OF INDICATION OF SPOT LEVELS ONLY. SPOT LEVELS SHOULD BE USED IF CONSIDER DESIGN IS TO BE UNDERTAKEN.
9. REMARKS: DEMONSTRATIVE, 0.5 METRE.

[illegible]

| LEGEND OF TYPICAL SERVICES | |
|----------------------------|---------------------------------|
| — CSW | COSMIC STORMMASTER PIPE |
| — E | OVERHEAD ELECTRICITY CABLES |
| — HC | OVERHEAD HYDRO-PNEUMATIC CABLES |
| — IS | PIPE SERVICE |
| — PE | PIPE LINE |
| — GE | GAS LINE & ELECTRICITY CABLES |
| — NC | NATURAL GAS CABLES |
| — OH | OVERHEAD CABLES |
| — OPT | OPTIC CABLES |
| — PV | PRIVATE ELECTRICITY |
| — PS | PRIVATE SEWER |
| — PW | PRIVATE WATER |
| — RW | RECYCLED WATER |
| — RM | ROOFING MAN |
| — RFA | ROOF & WATERTIME PIPES |
| — S | SEWER |
| — SD | SEWER DITCH |
| — ST | STORM WATER |
| — SX | STORMMASTER CREEK |
| — T | TELESTRA CABLES |
| — TO | TELESTRA & GAS CABLES |
| — U | UNDERGROUND SERVICES |
| — V | VERSION CABLES |
| — W | WATER SUPPLY |
| — WM | WATER MAN |


1. ALL UNDERGROUND SERVICE INFORMATION INCLUDES OF GENERAL POSITION AND SURFACE COVER DEPTHS NOTED ON THE PLAN ARE APPROXIMATELY ONLY.
2. ALL UNDERGROUND SERVICE INFORMATION HAS BEEN COMPILED FROM SERVICE AUTHORITY PLANS PROVIDED BY THE AUTHORITIES.
3. THE LOCATION OF SERVICES BETWEEN SURVEYED POINTS (AS INDICATED) HAVE BEEN SHOWN UNBARRICADED ONLY (UNLESS THE SERVICE OWNERS AS PROVIDED). THE EXACT LOCATION OF THESE SERVICES BETWEEN THE SURVEYED POINTS MUST BE VERIFIED BY ANY EXCAVATION OR PLACING NO WARRANTY IS GIVEN REGARDING THE POSSIBILITY OF THE EXISTENCE OF FURTHER UNLOCATED SERVICES.
4. ALL CONTRACTORS, TRANSMISSION, BUILDING & PROJECT CONSULTANTS MUST CONTACT THE VARIOUS AUTHORITIES, IN ACCORDANCE WITH STANDARD TAP BEFORE YOU DO EXCAVATIONS PROCEDURE PRIOR TO UNDERSTANDING AND WORKS WITHIN THE VICINITY OF THE SERVICE LINES TO VERIFY THE POSITION OF THE SERVICE LINES.

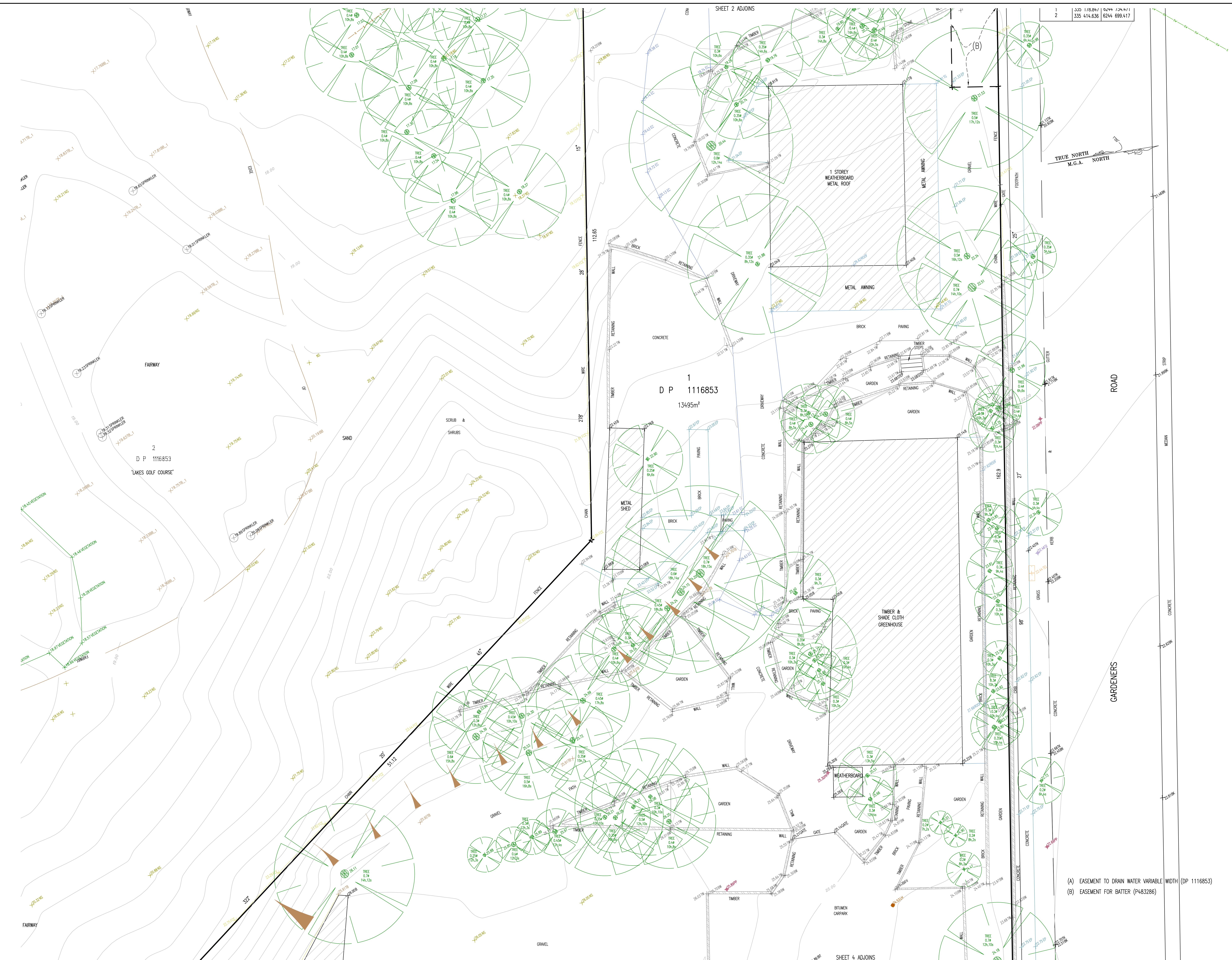


CLIENT: ARCHITECTUS GROUP

| | |
|--------------------------|----------------------|
| TITLE No: 1/1116853 | REF: 150721 |
| DATUM: A.H.D. | ISSUE: 2 |
| DATE OF SURVEY: 28.07.15 | ISSUE DATE: 01.08.15 |
| SURVEYOR: KB | SHEET SIZE: A0 |
| DRAFTER: PH | SHEET 2 OF 17 SHEETS |

PLAN OF DETAIL & LEVELS AT
No 75 GARDENERS ROAD
EASTLAKES

 Suite 301, Level 3, 55 Holt Street
Surry Hills NSW 2012
PO Box 1807
Strawberry Hills NSW 2012
t: (02) 9212 655
f: (02) 9212 525
email: linker@linkersurveying.com.au
web site: www.linkersurveying.com.au

[illegible]

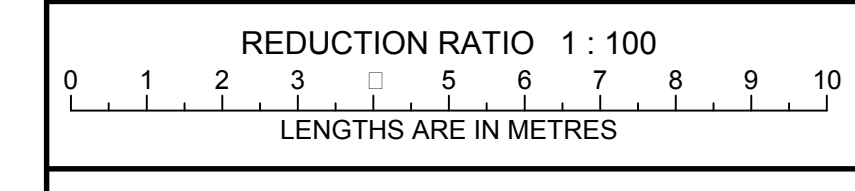
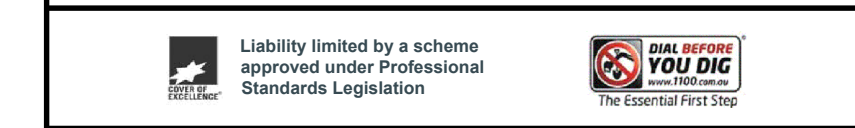
TYPICAL NOTES:

1. ORIGIN OF LEVELS FM 2967T, RL1,RL2 (A,RL)
2. READINGS ARE ON WGA NORTH
3. RELATIONSHIP OF MEASUREMENTS AND DETAIL TO BOUNDARIES IS ORNAMENTIC ONLY AND SPOT LEVELS ARE NOT REQUIRED. REQUIRE PLANNING PLOTS
4. SPACES SHOWN ARE BASED ON VISIBLE SURFACE INDICATORS OUTSIDE AT THE DATE OF SURVEY AND THE RELEVANT SCENES DRAWINGS OF THE WAGDOO AUTHORITY. ALL SCENES MUST BE BASED ON THE POWER TO TAKE WORKING UNDERGROUND. UNDER SURFACING PIT LID BEAR NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE SPACES SHOWN HEREIN.
5. SPOT LEVELS AND OUTTER HEIGHTS HAVE BEEN DETERMINED BY AN IMPROVED METHOD AND ARE ACCURATE FOR PLANNING PURPOSES ONLY
6. ALLOWING BOUNDS AND OVERLAYS HAVE BEEN PLOTTED FOR ORNAMENTIC PURPOSES ONLY. SPOT LEVELS, IF OFFICIAL, WILL BE REQUIRED EITHER SURVEY
7. THE LETTERS (A), SPREAD (B) AND HEIGHT (H) OF EACH TRACE IS INDICATIVE ONLY AND SPECIFIC DETAILS, IF OFFICIAL, WILL BE REQUIRED FURTHER SURVEY.
8. THE PRESENCE OF INDICATION OF SPOT LEVELS ONLY. SPOT LEVELS SHOULD BE USED IF DETAIL DESIGN IS TO BE UNDERTAKEN.
9. CONTAINMENT, 0.5 METRE.

[illegible]

| LEGEND OF TYPICAL SERVICES | |
|----------------------------|---------------------------------|
| — CSW | COSMIC STORMMASTER PIPE |
| — E | OVERHEAD ELECTRICITY CABLES |
| — HC | OVERHEAD HYDRO-PNEUMATIC CABLES |
| — IS | PIPE SERVICE |
| — MC | OVERHEAD CABLES |
| — PE | PIPE LINE |
| — QZ | GAS LINE & ELECTRICITY CABLES |
| — NC | NATURAL GAS CABLES |
| — OH | OVERHEAD CABLES |
| — OPT | OPTIC CABLES |
| — PV | PRIVATE ELECTRICITY |
| — PS | PRIVATE SEWER |
| — PW | PRIVATE WATER |
| — RW | RECYCLED WATER |
| — RM | ROOFING MAN |
| — RTA | ROADS & WATERSIDE PITS |
| — S | SEWER |
| — SD | SEWER OUTFALL |
| — ST | STORM DRAIN |
| — STW | STORM WATER |
| — SM | STORMMASTER CREEK |
| — T | TELESTRA CABLES |
| — TO | TELESTRA & GAS CABLES |
| — U | UNDERGROUND SERVICES |
| — V | VERSION CABLES |
| — W | WATER SUPPLY |
| — WM | WATER MAIN |

1. ALL UNDERGROUND SERVICE INFORMATION INCLUDES OF GENERAL POSITION AND SURFACE COVER DEPTHS NOTED ON THE PLAN ARE APPROXIMATELY ONLY.
2. ALL UNDERGROUND SERVICE INFORMATION HAS BEEN COMPILED FROM SERVICE AUTHORITY PLANS PROVIDED BY THE AUTHORITIES.
3. THE LOCATION OF SERVICES BETWEEN SURVEYED POINTS (AS INDICATED) HAVE BEEN SHOWN UNBARRICADED ONLY (UNLESS THE SERVICE OWNERS AS PROVIDED). THE EXACT LOCATION OF THESE SERVICES BETWEEN THE SURVEYED POINTS MUST BE VERIFIED BY ANY EXCAVATION OR PUNCH-NO WARRANTY IS GIVEN REGARDING THE POSSIBILITY OF THE EXISTENCE OF FURTHER UNLOCATED SERVICES.
4. ALL CONTRACTORS, TRANSMISSION, BUILDING & PROJECT CONSULTANTS MUST CONTACT THE VARIOUS AUTHORITIES, IN ACCORDANCE WITH STANDARD TALK BEFORE YOU GO! PROCEDURES PRIOR TO UNDERSTANDING AND WORKS WITHIN THE VICINITY OF THE SERVICE LINES TO VERIFY THE POSITION OF THE SERVICE LINES.

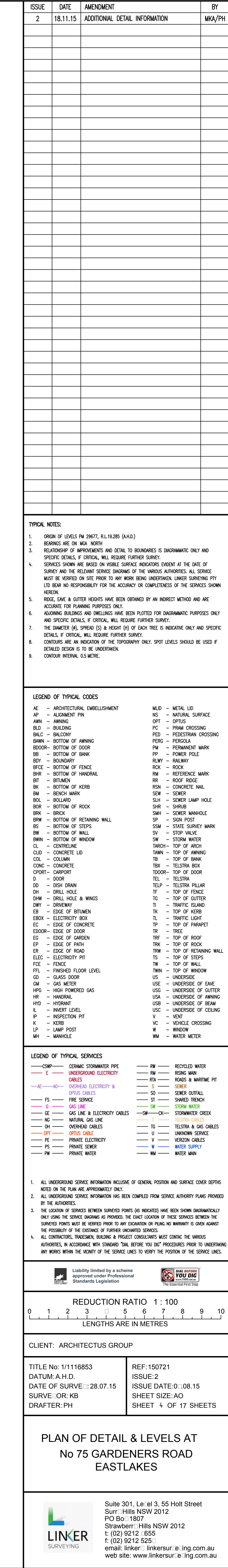


CLIENT: ARCHITECTUS GROUP

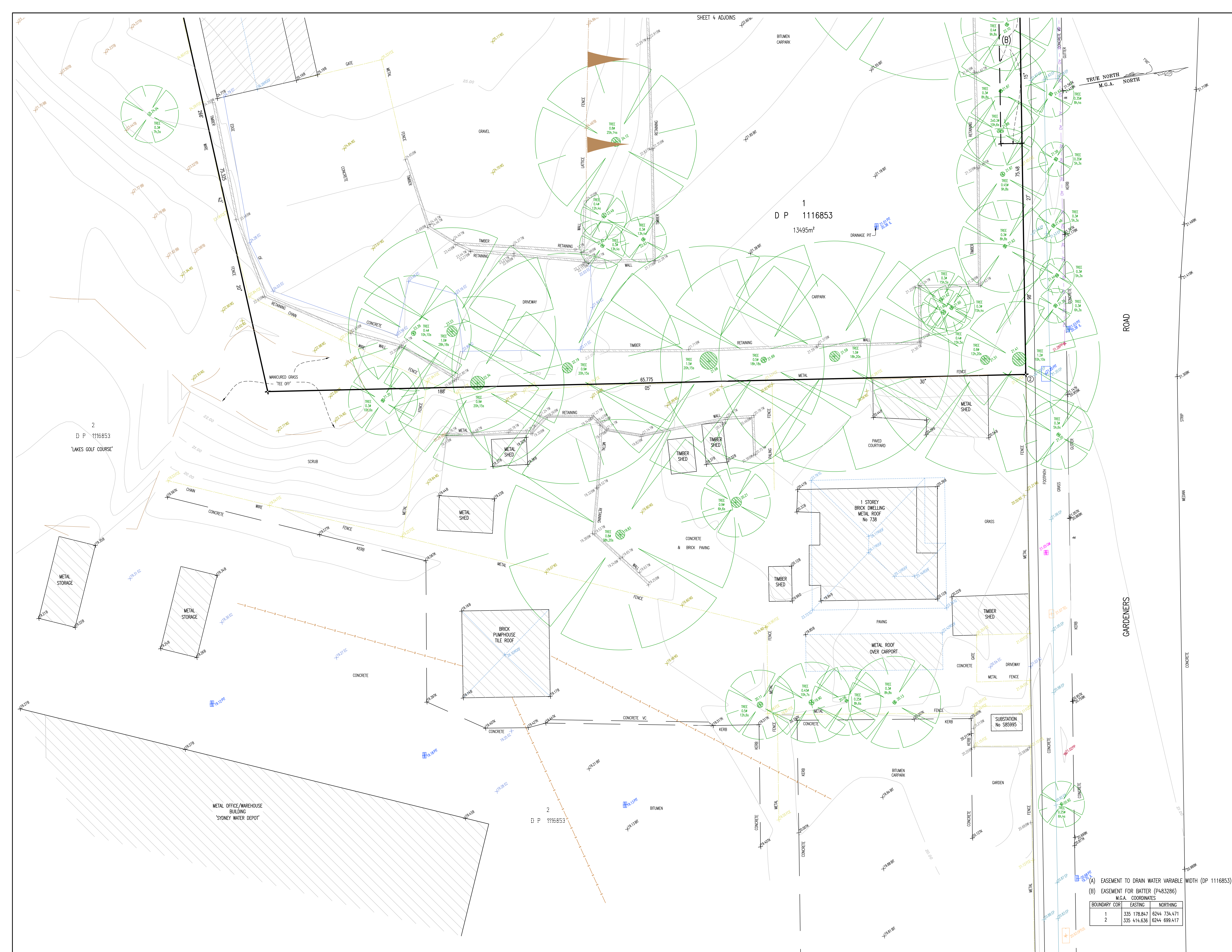
| | |
|--------------------------|----------------------|
| TITLE No: 1/1116853 | REF: 150721 |
| DATUM: A.H.D. | ISSUE: 2 |
| DATE OF SURVEY: 28.07.15 | ISSUE DATE: 01.08.15 |
| SURVEYOR: KB | SHEET SIZE: A0 |
| DRAFTER: PH | SHEET 3 OF 17 SHEETS |

PLAN OF DETAIL & LEVELS AT
No 75 GARDENERS ROAD
EASTLAKES

 Suite 301, Level 3, 55 Holt Street
Surry Hills NSW 2012
PO Box 1807
Strawberry Hills NSW 2012
t: (02) 9212 1655
f: (02) 9212 5252
email: linker@linkersurveysing.com.au
web site: www.linkersurveysing.com.au



(A) EASEMENT TO DRAIN WATER VARIABLE WIDTH (DP 1116853)
(B) EASEMENT FOR BATTER (P483286)

[illegible]

TYPICAL NOTES

1. ORIGIN OF LEVELS PM 26777, RL18,200 (H&M)
2. BEARING ARE ON MCA NORTH
3. RELATIONSHIP OF IMPROVEMENTS AND DATE TO BOUNDARIES IS DIAGNOSTIC ONLY AND SPECIFIC DETAILS, IF OFFICIAL, WILL REQUIRE FURTHER SURVEY.
4. SERVICES SHOWN ARE BASED ON VERBAL SURVEY INDICATIONS OBTAINED AT THE DATE OF SURVEY AND THE RELEVANT SURVEY DOCUMENTS OF THE VARIOUS AUTHORITIES. ALL LEVELS WILL BE VERIFIED ON SITE PRIOR TO ANY WORK BEING UNDERTAKEN UNDER SURVEYING PM LIT. LIT HAS NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE SERVICES SHOWN HEREIN.
5. PROSE, EAVE & OTHER HEIGHTS HAVE BEEN OBTAINED BY AN INDIRECT METHOD AND ARE ACCURATE FOR PLANNING PURPOSES ONLY.
6. ALTIMETER READINGS HAVE BEEN OBTAINED FOR DIAGNOSTIC PURPOSES ONLY AND SPECIFIC DETAILS, IF OFFICIAL, WILL REQUIRE FURTHER SURVEY.
7. THE DIAMETER (A), SPREAD (S) & HEIGHT (H) OF EACH TREE IS INDICATIVE ONLY AND SPECIFIC DETAILS, IF OFFICIAL, WILL REQUIRE FURTHER SURVEY.
8. THE POSITION OF INDICATORS OF THE TOPOGRAHY ONLY. SPOT LEVELS SHOULD BE USED IF DETAILED DESIGN IS TO BE UNDERTAKEN.
9. CONTOUR INTERVAL, 0.5 METRE.

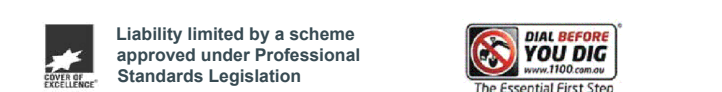
LEGEND OF TYPICAL CODES

[illegible]

LEGEND OF TYPICAL SERVICES

| | | | |
|------|-------------------------------------|-------|----------------------|
| CONF | CERAMIC STORMWATER PIPE | FW | RECYCLED WATER |
| E | UNDERGROUND ELECTRICITY CABLES | PM | PRISING MAIN |
| JE | JO | REA | ROADS & WASTIME PIT |
| | OVERHEAD ELECTRICITY & OPTIC CABLES | S | SEWER |
| FS | FIRE SERVICE | SO | SEWER OUTFALL |
| G | GAZ LINE | ST | STREET FRENCH |
| GE | GAZ LINE & ELECTRICITY CABLES | SW | STORM WATER |
| NG | NATURAL GAS LINE | SW-CK | STORMWATER CREEK |
| OH | OVERHEAD CABLES | T | TELSTRA CABLES |
| OPT | OPTIC CABLES | TO | TELSTRA & GAS CABLES |
| PC | PRIVATE MICRODRY | U | UNKNOWN SERVICE |
| PS | PRIVATE SEWER | V | VERBODEN CABLES |
| PW | PRIVATE WATER | W | WATER SUPPLY |
| | | NW | WATER MAIN |

1. ALL UNDERGROUND SERVICE INFORMATION INCLUSIVE OF GENERAL POSITION AND SURFACE COVER DEPTHS NOTED ON THE PLAN ARE APPROPRIATELY NOTED.
2. ALL UNDERGROUND SERVICE INFORMATION HAS BEEN COMPILED FROM SERVICE AUTHORITY PLANS PROVIDED BY THE AUTHORITIES.
3. THE LOCATION OF SERVICES BETWEEN POINTS (AS INDICATED) HAVE BEEN SHOWN ORIENTATIONALLY ONLY USING THE SERVICE UNKNOWN AS PROVIDED. THE EXACT LOCATION OF THESE SERVICES BETWEEN THE SURVEYED POINTS MUST BE VERIFIED PRIOR TO ANY EXCAVATION OR PILING NO WARRANTY IS GIVEN OTHER THAN THE RELIABILITY OF THE EXISTENCE OF THE SERVICE.
4. ALL CONTRACTORS, TRADESMEN, BUILDING & PROJECT CONSULTANTS MUST CONTACT THE RELEVANT AUTHORITIES, IN ACCORDANCE WITH STANDARD TALK BEFORE YOU DIG PROCEDURES PRIOR TO UNDERGROUND WORKS WITHIN THE VICINITY OF THE SERVICE LINES TO VERIFY THE POSITION OF THE SERVICE LINES.



REDUCTION RATIO 1 : 100

0 1 2 3 4 5 6 7 8 9 10

LENGTHS ARE IN METRES

| | |
|---------------------------|----------------------|
| CLIENT: ARCHITECTUS GROUP | |
| TITLE NO: 1/1116853 | REF: 150721 |
| DATUM: A.H.D. | ISSUE: 2 |
| DATE OF SURVEY: 28.07.15 | ISSUE DATE: 01.08.15 |
| SURVEYOR: KB | SHEET SIZE: A0 |
| DRAFTER: PH | SHEET 5 OF 17 SHEETS |

PLAN OF DETAIL & LEVELS AT
No 75 GARDENERS ROAD
EASTLAKES

| BOUNDARY COR | EASTING | NORTHING |
|--------------|-------------|--------------|
| 1 | 335 178.847 | 6244 734.471 |
| 2 | 335 414.636 | 6244 699.417 |

 Suite 301, Level 3, 55 Holt Street
Surrey Hills NSW 2012
PO Box 1807
Surrey Hills NSW 2012
t: (02) 9212 655
f: (02) 9212 525
email: linker@linkersurveying.com.au
web site: www.linkersurveying.com.au

[illegible]

TYPICAL NOTES:

1. ORDER OF LEVELS FM 20677, LR1,19,20 (A/L1)
2. BEARINGS ARE ON MAGN. NORTH
3. SPACING OF POINTS AND DISTANCE TO BOUNDARIES IS DIAGNOSTIC; ONLY IF SPECIFIC POINTS OR DISTANCES WILL REQUIRE FURTHER SURVEY
4. SERVICES SHOWN ARE BASED ON USUAL SURVEYING INDICATORS EVIDENT AT THE DATE OF SURVEY AND THE YELLOW SIGNS INDICATE THE VARIOUS ADJUSTMENTS ALL SERVICE PROVIDERS SHOULD PREPARE TO TAKE NOTE BEING UNDERSTOOD, UNLESS SURVEYING PARTY LIAR BEAR NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE SERVICES SHOWN
5. BOUNDARY OF OTHER HOUSINGS HAVE BEEN OBTAINED BY AN INDIRECT METHOD AND ARE ACCORDING TO PLANNING PURPOSSES ONLY
6. BOUNDARIES AND CHANGELINES HAVE BEEN PLOTTED FOR DIAGNOSTIC PURPOSES ONLY; IF OTHER INFORMATION WILL REQUIRE FURTHER SURVEY
7. THE DIMENSION (LR, SPREAD) OR A HEADPOINT OF EACH TRAIL IS INDICATIVE ONLY AND SPECIFIC DETAILS, IF OFFICIAL, WILL REQUIRE FURTHER SURVEY
8. LOCATION OF THE TYPHOGRAPHIC NOTE: SPOT LEVELS SHOULD BE USED IF COATED SURFACE IS 0.5 METRE.
9. DISTANCE, MEASURE, 0.5 METRE.

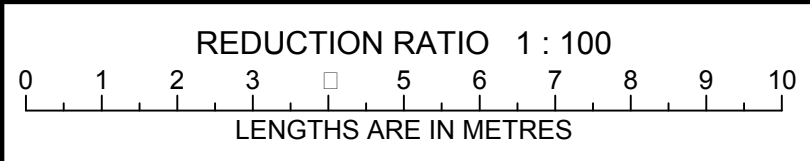
[illegible]

| LEGEND OF TYPICAL SERVICES | | | |
|----------------------------|-----------------------------------|-------|-----------------------|
| CSW | CESTRUM STORMWATER PIPE | FW | RECYCLED WATER |
| E | UNDERGROUND ELECTRICITY CABLES | FW | RESING MAN |
| ME | METAL ELECTRICITY & OPTIC CABLES | REA | REPAIR & MAINTAIN PIT |
| PS | PRIVATE SEWER | SE | SEWER |
| IS | IS GASE LINE & ELECTRICITY CABLES | SO | SEWER OUTLET |
| IS | IS GASE LINE | ST | SHAVED TRENCH |
| NG | NATURAL GAS LINE | STW | STORM WATER |
| OH | OVERHEAD CABLES | SW-CK | STORMWATER CHECK |
| OPT | OPTIC CABLE | TA | TELSTRA CABLES |
| PE | PRIVATE ELECTRICITY | TC | TELSTRA GAS CABLES |
| PS | PRIVATE SEWER | UN | UNIONBUSH SEWER |
| FW | PRIVATE WATER | V | VERLON CABLES |
| | | W | WATER SUPPLY |
| | | WW | WATER MAIN |

1. ALL UNDERGROUND SERVICE INFORMATION INCLUSIVE OF GENERAL POSITION AND SURFACE COVER DEPTHS NOTED ON THE PLAN ARE INFORMATION ONLY.
2. ALL UNDERGROUND SERVICE INFORMATION HAS BEEN CONSULTED FROM SERVICE AUTHORITY PLANS PROVIDED BY THE AUTHORITIES.
3. THE LOCATION OF SERVICES BETWEEN SURVEYED POINTS (AS INDICATED) HAVE BEEN SHOWN DIAGNOSTICALLY ONLY (USING THE SERVICE DIAGRAMS AS PROVIDED). THE EXACT LOCATION OF THESE SERVICES BETWEEN THE SURVEYED POINTS MUST BE VERIFIED PRIOR TO ANY EXCAVATION OR PLUNGING NO WARRANTY IS GIVEN AGAINST THE POSSIBILITY OF THE EXISTENCE OF FURTHER UNCHARTED SERVICES.
4. ALL CONDUITS, PIPES, CABLES, BUNDLES & PROJECT COMPONENTS MUST CONTACT THE RELEVANT AUTHORITIES, ACCORDANCE WITH STANDARD "BULB BEFORE YOU DIG" PROCEDURES PRIOR TO UNDOING ANY WORKS WITHIN THE VICINITY OF THE SERVICE LINES TO VERIFY THE POSITION OF THE SERVICE LINES.

 Liability limited by a scheme approved under Professional Standards Legislation


 The Essential First Step

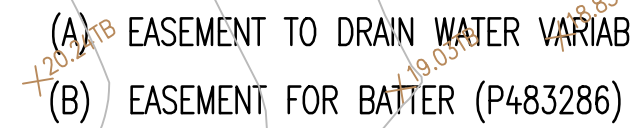


CLIENT: ARCHITECTUS GROUP

| | |
|--------------------------|----------------------|
| TITLE No: 1/1116853 | REF:150721 |
| DATUM: A.H.D. | ISSUE:2 |
| DATE OF SURVEY: 28.07.15 | ISSUE DATE: 01.08.15 |
| SURVEYOR: KB | SHEET SIZE: A0 |
| DRAFTER: PH | SHEET 6 OF 17 SHEETS |

PLAN OF DETAIL & LEVELS AT
No 75 GARDENERS ROAD
EASTLAKES

 Suite 301, Leiel 3, 55 Holt Street
Surr: Hills NSW 2012
PO Bo: 1807
Strawberr: Hills NSW 2012
t: (02) 9212 655
f: (02) 9212 525
email: linker@linkersur.e:ing.com.au
web site: www.linkersur.e:ing.com.au



TYPICAL NOTES:

1. OPENING OR LEVELS PER 20077, 181,192,205 (A&E)
2. RELATIONS OF HORIZONTALS AND VERTS TO BOUNDARIES IS DIMENSIONAL ONLY AND SPECIFIC DETAILS OF CRITICAL WALL REQUIRE FURTHER SURVEY
3. SURVEYED POINTS ARE BASED ON VISIBLE SURFACE ELEVATION EXCEPT AT THE BASE OF SLOPES AND AT THE RELATIVE SCENE CHANGING OF THE VARIOUS ADJACENT AREAS. SURVEY WILL BE VERIFIED ON SITE PRIOR TO THE WORK BEING UNDERTAKEN UNDER SURVEY. POINTS WILL BE RECORDED FOR THE ACCURACY OR COMPLETENESS OF THE SURVEYED POINTS HEREIN.
4. PROPOSED DRAIN & GUTTER DRAINAGE HAVE BEEN ESTIMATED BY AN INDEPENDENT ENGINEER AND FOR THE PURPOSE OF PRELIMINARY PURPOSES ONLY.
5. ALL EXISTING BUILDINGS AND CHIMNELS HAVE BEEN PLOTTED FOR DIMENSIONAL PURPOSES ONLY AND SPECIFIC DETAILS WILL REQUIRE FURTHER SURVEY
6. THE DIMENSIONS OF PROPOSED ROOF & HEIGHT OF WALLS ARE DIMENSIONAL ONLY AND SPECIFIC DETAILS & FINISHES WILL REQUIRE FURTHER SURVEY
7. DIMENSIONS ARE AN INDICATION OF THE TYPEDOWN ONLY. SPOT LEVELS SHOULD BE USED IF AVAILABLE SOONER IS TO BE DETERMINED.
8. CONSULT METEOR. CHARTS.

| LEGEND OF TYPICAL SERVICES | | | |
|----------------------------|-------------------------------------|------|----------------------------------|
| —SWP | OSWAMP STORMWATER PIPE | FW | RECYCLED WATER |
| — | UNDERGROUND ELECTRICITY CABLES | PR | PRING WATER |
| —AC—AC— | OVERHEAD ELECTRICITY & OPTIC CABLES | W | WATER & WASTEWATER POT S SERVICE |
| — | PIPE SERVICE | ST | SEWER OUTFALL |
| —G—G— | Gas LINE | ST | SHARED TRENCH |
| — | Gas LINE IN ELECTRICITY CABLES | —SW— | STORM WATER |
| —NG— | NATURAL GAS LINE | —SW— | STORMWATER CHECK |
| —OH— | OVERHEAD CABLES | TO | TELEST & GAS CABLES |
| —PE— | OPTIC CABLES | U | UNDERGROUND SERVICES |
| —PE— | PRIVATE ELECTRICITY | V | VERSION CABLES |
| —PS— | PRIVATE SEWER | W | WATER SUPPLY |
| FW | PRIVATE WATER | WM | WATER MAIN |

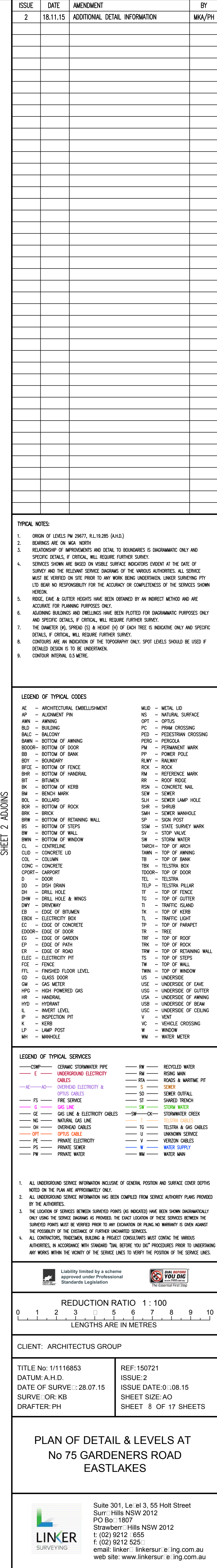
 Liability limited by a scheme approved under Professional Standards Legislation

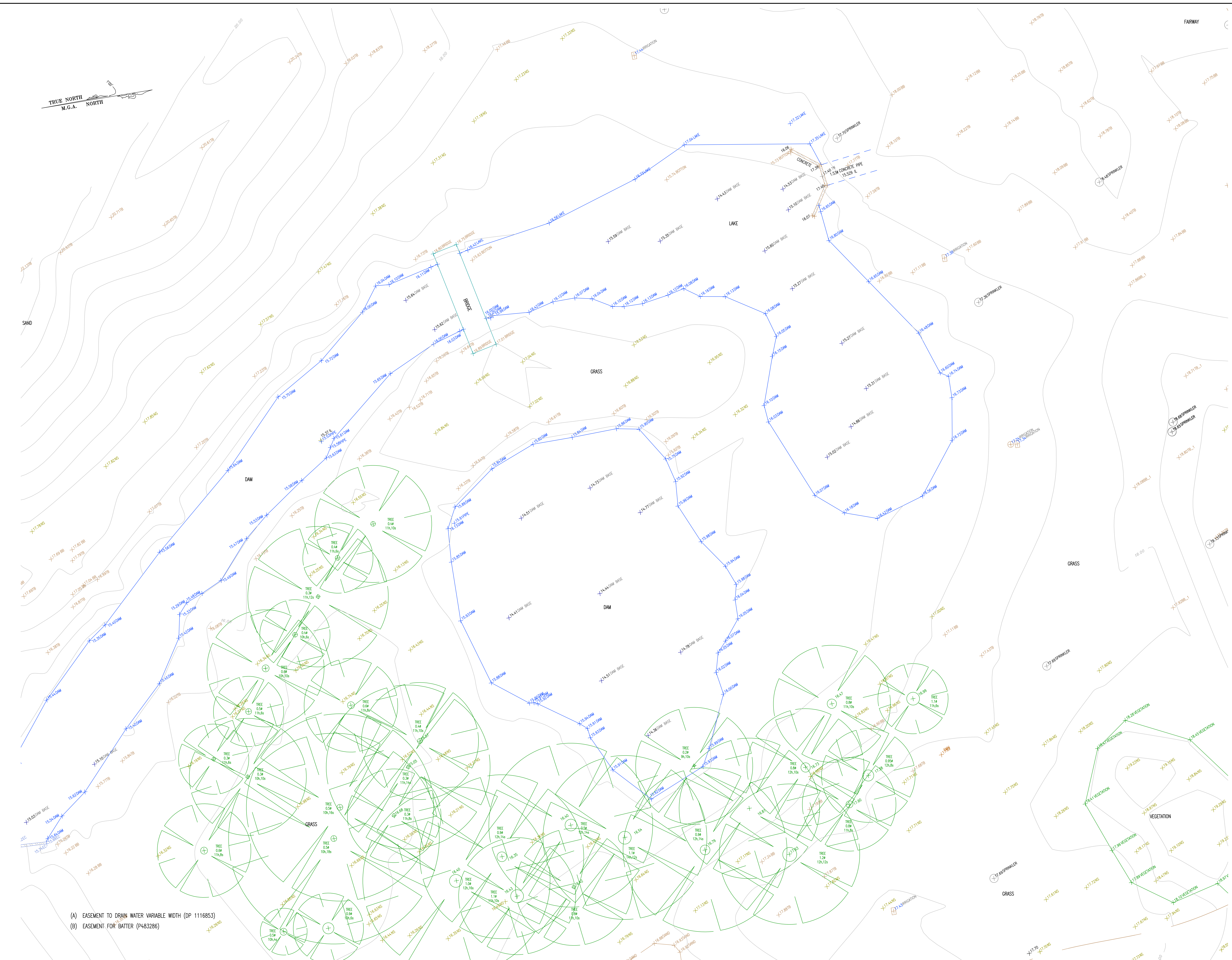
Don't Die BEFORE YOU DIE
 The Essential First Step

CLIENT: ARCHITECTUS GROUP

PLAN OF DETAIL & LEVELS AT
No 75 GARDENERS ROAD
EASTLAKES

Suite 301, Le 101 3, 55 Holt Street
Surr: Hills NSW 2012
PO Box 1807
Strawberry Hills NSW 2012
t: (02) 9212 655
f: (02) 9212 525
email: linker@linkersur.eing.com.au
web site: www.linkersur.eing.com.au



[illegible]

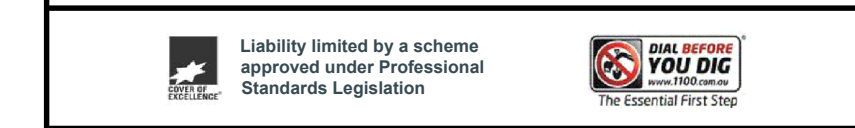
TYPICAL NOTES:

- 1. DESIGN OF LEVELS IN 2007, 1:10 (AASHTO)
- 2. REBARIES ARE IN W-8 HOISTS
- 3. RELATIONSHIP OF IMPROVEMENTS AND DETAIL TO BOUNDARIES IS DISAGREEMENT ONLY AND SPECIFIC DETAILS, IF REQUIRED, WILL REQUIRE FURTHER STUDY
- 4. THE NOTES ARE BASED ON VERBSE SURVEY MONITORING UNDERTAKEN AT THE DATE OF THE SURVEY AND THE RELEVANT SERVICE DIAGRAMS OF THE VARIOUS AUTHORITIES. ALL SERVICE MUST BE REFERRED TO THE SPOT IN AND WORK BEING UNDERTAKEN. LEVELS SURVEYING PUT ITS MARK IN RESPONSIBILITY FOR THE ACCURACY OF COMPLETIONS OF THE SPANNED SPAN IN
- 5. ROAD, LANE & BAYTER HEIGHTS HAVE BEEN DETERMINED BY AN INDEPENDENT METHOD AND ARE NOT TO BE USED FOR PLANNING PURPOSES ONLY
- 6. ALLOWING BOUNDARIES AND OVERLAYS HAVE BEEN PLOTTED FOR INFORMATION PURPOSES ONLY AND NOT TO BE USED FOR PLANNING PURPOSES ONLY
- 7. THE SPANNET (A, B, SPREAD) (D, H) OF EACH TYPE IS INDICATIVE ONLY AND SPECIFIC DETAILS, IF OFFICIAL, WILL REQUIRE FURTHER STUDY
- 8. THE PRESENCE OF A PROVISION OF THE APPROPRIATE ONLY. SPOT LEVELS SHOULD BE USED IF NECESSARY
- 9. DETAIL DESIGN IS TO BE UNDERTAKEN
- 10. CONTRACT NUMBER IS 0.5 METRE

[illegible]

| LEGEND OF TYPICAL SERVICES | | | |
|----------------------------|-------------------------------------|-----|---------------------------------|
| —SWP | OSWAK STEAMLOAN PIPE | FW | RECYCLED WATER |
| — | UNDERGROUND ELECTRICITY CABLES | PM | PEWING WATER |
| —AC | OVERHEAD ELECTRICITY & OPTIC CABLES | PM | SHOWER & WASHING POT S SERVICES |
| — | PIPE SERVICE | ST | SEWER OUTFALL |
| —G | Gas LINE | ST | SHARED DRAIN |
| — | Gas LINE & ELECTRICITY CABLES | —SW | STORM WATER |
| —NG | NATURAL GAS LINE | —SW | STORM WATER CHECK |
| —OH | OVERHEAD CABLES | U | TELEST & GAS CABLES |
| —PE | OPTIC CABLES | U | UNDERGROUND SERVICES |
| —PS | PRIVATE ELECTRICITY | V | VERSION CABLES |
| —PS | PRIVATE SEWER | W | WATER SUPPLY |
| —PW | PRIVATE WATER | WM | WATER MAIN |

1. ALL UNDERGROUND SERVICE INFORMATION INCLUDES OF GENERAL POSITION AND SURFACE COVER DEPTHS NOTED ON THE PLAN ARE APPROXIMATELY ONLY.
2. ALL UNDERGROUND SERVICE INFORMATION HAS BEEN COMPILED FROM SERVICE AUTHORITY PLANS PROVIDED BY THE AUTHORITIES.
3. THE LOCATION OF SERVICES BETWEEN SURVEYED POINTS (AS INDICATED) HAVE BEEN SHOWN UNBARRICADED ONLY (UNLESS THE SERVICE OWNERS AS PROVIDED). THE EXACT LOCATION OF THESE SERVICES BETWEEN THE SURVEYED POINTS MUST BE VERIFIED BY ANY EXCAVATION OR PUNCH-NO WARRANTY IS GIVEN REGARDING THE POSSIBILITY OF THE EXISTENCE OF FURTHER UNLOCATED SERVICES.
4. ALL CONTRACTORS, TRAVELERS, BUILDING & PROJECT CONSULTANTS MUST CONTACT THE VARIOUS AUTHORITIES, IN ACCORDANCE WITH STANDARD TAP BEFORE YOU GO! PROCEDURES PRIOR TO UNDERSTANDING AND WORKS WITHIN THE VICINITY OF THE SERVICE LINES TO VERIFY THE POSITION OF THE SERVICE LINES.



REDUCTION RATIO 1 : 100

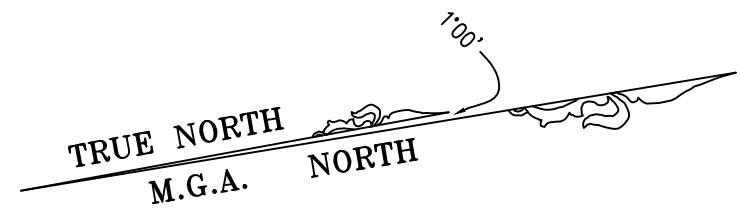
0 1 2 3 4 5 6 7 8 9 10

LENGTHS ARE IN METRES

CLIENT: ARCHITECTUS GROUP

| | |
|--------------------------|----------------------|
| TITLE No: 1/1116853 | REF: 150721 |
| DATUM: A.H.D. | ISSUE: 2 |
| DATE OF SURVEY: 28.07.15 | ISSUE DATE: 01.08.15 |
| SURVEYOR: KB | SHEET SIZE: A0 |
| DRAFTER: PH | SHEET 9 OF 17 SHEETS |



PLAN OF DETAIL & LEVELS AT
No 75 GARDENERS ROAD
EASTLAKES



TYPICAL NOTES:

1. ORIGIN OF LOSS/IN P/NO 20977, 1/12/2020 (A12)
2. BEHAVIOR ARE ON WAY HOME
3. RELATIONSHIP OF IMPROVEMENTS AND DETAILS TO ADJUDICATE IS DIAGNOSTIC ONLY AND SPECIFIC DETAILS, IF SPECIAL, WILL REQUIRE FURTHER SURVEY
4. CONDUCT SURVEY BASED ON REQUEST FOR INFORMATION AND REPORTED AT THE DATE OF SURVEY AND THE RELEVANT SURVEY RESULTS OF THE VARIOUS ADJUDICATE, ALL SURVEY WERE QUOTED ON SITE PRIOR TO ANY WORK BEING UNDERTAKEN UNDER SURVEYOR P/NO 1234 AND BE RESPONSIBLE FOR THE ACCURACY ON COMPLETION OF THE SURVEY SHOWN HEREIN
5. ADJUDICATE AND SITE PRIOR TO ANY WORK BEING UNDERTAKEN BY A INQUEST HEREIN AND ARE ACCURATE FOR PLANNING PURPOSES ONLY
6. ROOMS, WALLS AND OPENINGS HAVE BEEN PLANNED FOR DIAGNOSTIC PURPOSES ONLY AND SPECIFIC DETAILS OF FINISHES WILL REQUIRE FURTHER SURVEY
7. CONDUCT SURVEY BASED ON REQUEST FOR INFORMATION AND REPORTED AT THE DATE OF SURVEY (A12, P/NO 1234) TO REPORT (B) OF EACH TRACE IS DIAGNOSTIC ONLY AND SPECIFIC DETAILS, IF SPECIAL, WILL REQUIRE FURTHER SURVEY
8. CONDUCTING AN INVESTIGATION OF THE "TYPICALITY" ONLY. SPOT TESTS SHOULD BE USED TO DETERMINE IF RESULTS ARE TO BE INTERPRETED
9. CONTINUE INVESTIG. ON REVISION.

- ### LEGEND OF TYPICAL SERVICES
- | | | | |
|----|-------------------------------------|----|----------------------|
| — | OSWAG STORMMASTER PPE | FW | RECYCLED WATER |
| SW | UNDERGROUND ELECTRICITY CABLES | RM | RYING MAN |
| — | OSWAG ELECTRICITY & OPTICAL CABLES | PM | POSS & WHITING PIT |
| — | OSWAG GAS LINE | S | SECTOR |
| — | OSWAG GAS LINE & ELECTRICITY CABLES | SO | SHOWER OUTFALL |
| — | OSWAG NATURAL GAS LINE | SH | SHOWER TRENCH |
| — | OSWAG OVERHEAD CABLES | ST | STORM WATER |
| — | OSWAG OPTICAL CABLES | SW | STORMMASTER CREEK |
| — | OSWAG PPE | — | — |
| — | OSWAG PPE & OPTICAL CABLES | TO | TELSTRA & OPT CABLES |
| — | OSWAG PPE & POWER CABLES | U | UNDERGROUND SERVICES |
| — | OSWAG POWER CABLES | V | VERDEAN CABLES |
| — | OSWAG POWER WATER | W | WATER SUPPLY |
| — | OSWAG POWER WATER | WM | WATER MAIN |

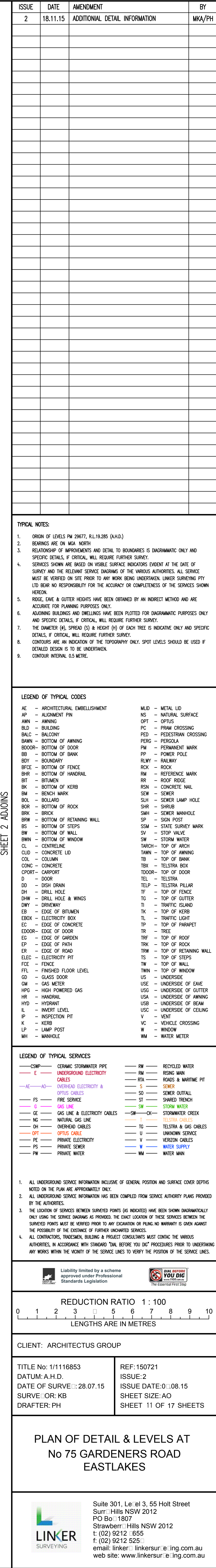
- 
 Liability limited by a scheme approved under Professional Standards Legislation
 
 The Essential First Step

CLIENT: ARCHITECTUS GROUP

PLAN OF DETAIL & LEVELS AT
No 75 GARDENERS ROAD
EASTLAKES

 Suite 301, Level 3, 55 Holt Street
Surry Hills NSW 2012
PO Box 1807
Strawberry Hills NSW 2012
t: (02) 9212 655
f: (02) 9212 525
email: linker@linkersurveying.com.au
web site: www.linkersurveying.com.au

(A) EASEMENT TO DRAIN WATER VARIABLE WIDTH (DP 1116853)
(B) EASEMENT FOR BATTER (P483286)



PLAN OF DETAIL & LEVELS AT
No 75 GARDENERS ROAD
EASTLAKES

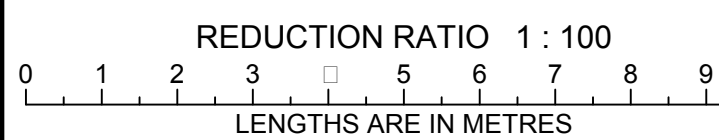
Suite 301, Le. #1, 3, 55 Holt Street
Surr: Hills NSW 2012
PO Bo : 1807
Sydney: Hills NSW 2012
t: (02) 9212 : 655
f: (02) 9212 525:
email: linker_ linkersur e_ ing.com.au
web site: www.linkersur e_ ing.com.au

1. ORIGIN OF LEVELS PM 26977, RL19.205 (HxH)
2. BEAMS ARE ON MCA NORTH
3. RELATIONSHIP OF IMPROVEMENTS AND DETAIL TO BOUNDARIES IS DIAGRAMMATIC ONLY AT SPECIFIC DETAILS. F.CITIZAL WILL REQUIRE FURTHER SURVEY.
4. SERVICES SHOWN ARE BASED ON VERBAL SURVEY INDICATORS EXTEND TO THE DATE OF SURVEY. THE FOLLOWING SURVEY DRAWINGS OF THE IMPROVEMENTS/DETAILS ALL SERVICES WERE VERIFIED ON SITE PRIOR TO ANY WORK BEING UNDERTAKEN UNDER SURVEY. LHD BORN NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE SERVICES HEREON
5. RIDGE, EAVE & GUTTER HEIGHTS HAVE BEEN OBTAINED BY AN INDIRECT METHOD AND ARE ADJUSTED FOR PLANNING PURPOSES ONLY.
6. ADDITIONAL BOUNDARIES AND DWELLINGS HAVE BEEN PLOTTED FOR DIAGNOSTIC PURPOSES AND SPECIFIC DETAILS. F.CITIZAL WILL REQUIRE FURTHER SURVEY.
7. THE DRAUGHTING OF THE DETAIL OF THE ROOF LINE IS INDICATIVE ONLY OF THE DETAIL. F.CITIZAL WILL REQUIRE FURTHER SURVEY.
8. CONTOURS ARE AN INDICATION OF THE TOPOGRAPHY ONLY. SPOT LEVELS SHOULD BE DEVELOPED DESIGN IS TO BE UNDERTAKEN.
9. CONTOUR INTERVAL: 0.5 METRE.

[illegible]

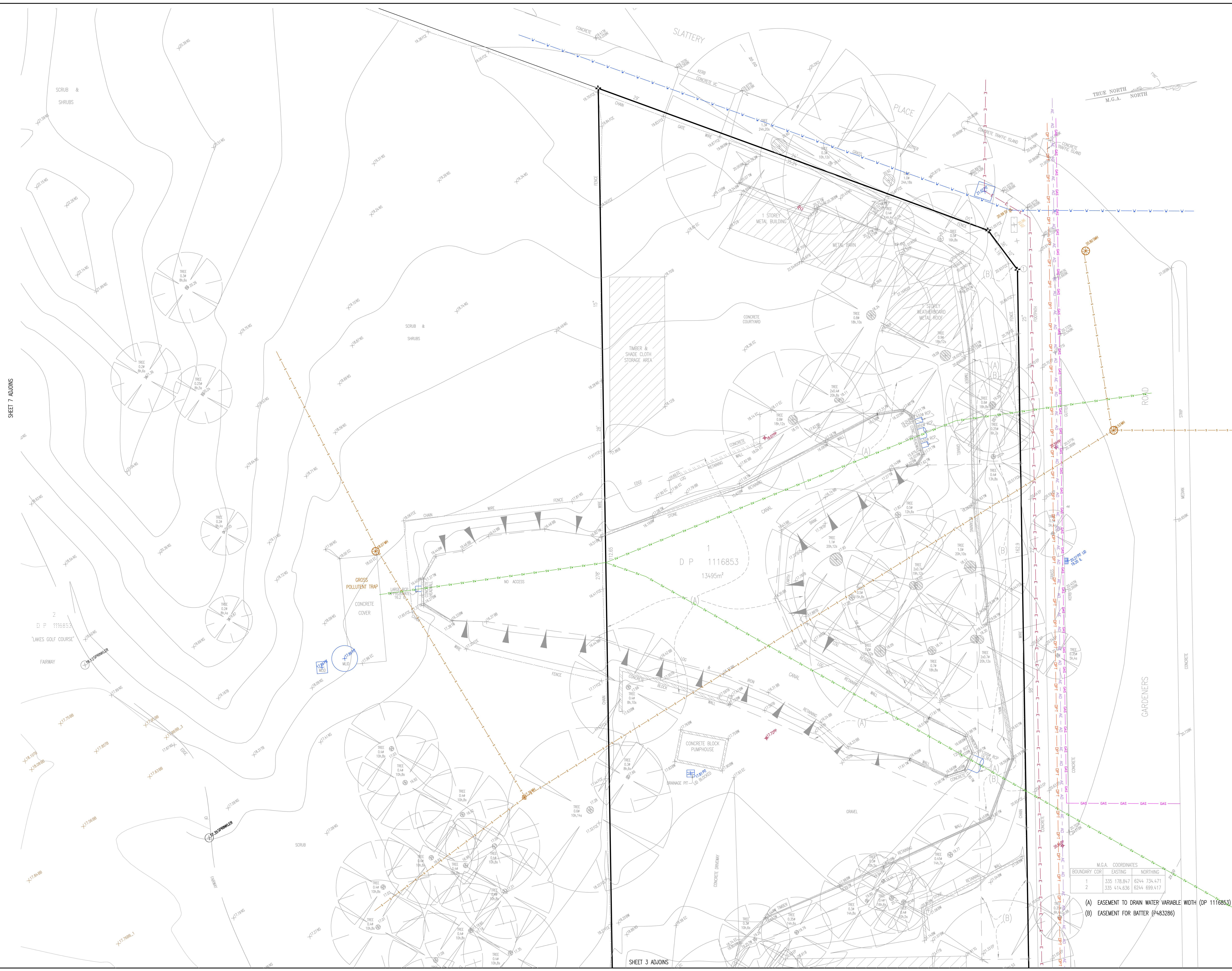
| | | | |
|------|--------------------------------------|-----|------------------|
| CSWP | CERAMIC STORMWATER PIPE | FW | RECYCLED WATER |
| E | ELECTRICITY | PSM | PRESSING MAN |
| EE | UNDERGROUND ELECTRICITY CABLES | REA | ROADS & MARINA |
| EC | OVERHEAD ELECTRICITY & OPTICS CABLES | S | SEWER |
| AD | ADDITIONAL | SO | SEWER OUTFALL |
| FS | FIRE SERVICE | ST | STREET LIGHTING |
| G | GAS LINE | SW | STORM WATER |
| GE | GAS LINE & ELECTRICITY CABLES | SW | STORMWATER OIL |
| NC | NATURAL GAS LINE | TE | TELESTRA CABLES |
| OE | OVERHEAD CABLE | TO | TELESTRA & CABLE |
| OH | OVERHEAD CABLE | U | UNKNOWN SERVICE |
| OPT | OPTICS CABLE | V | VERIZON CABLES |
| PE | PRIVATE ELECTRICITY | W | WATER SUPPLY |
| PS | PRIVATE SEWER | WW | WATER MAIN |
| PW | PRIVATE WATER | | |

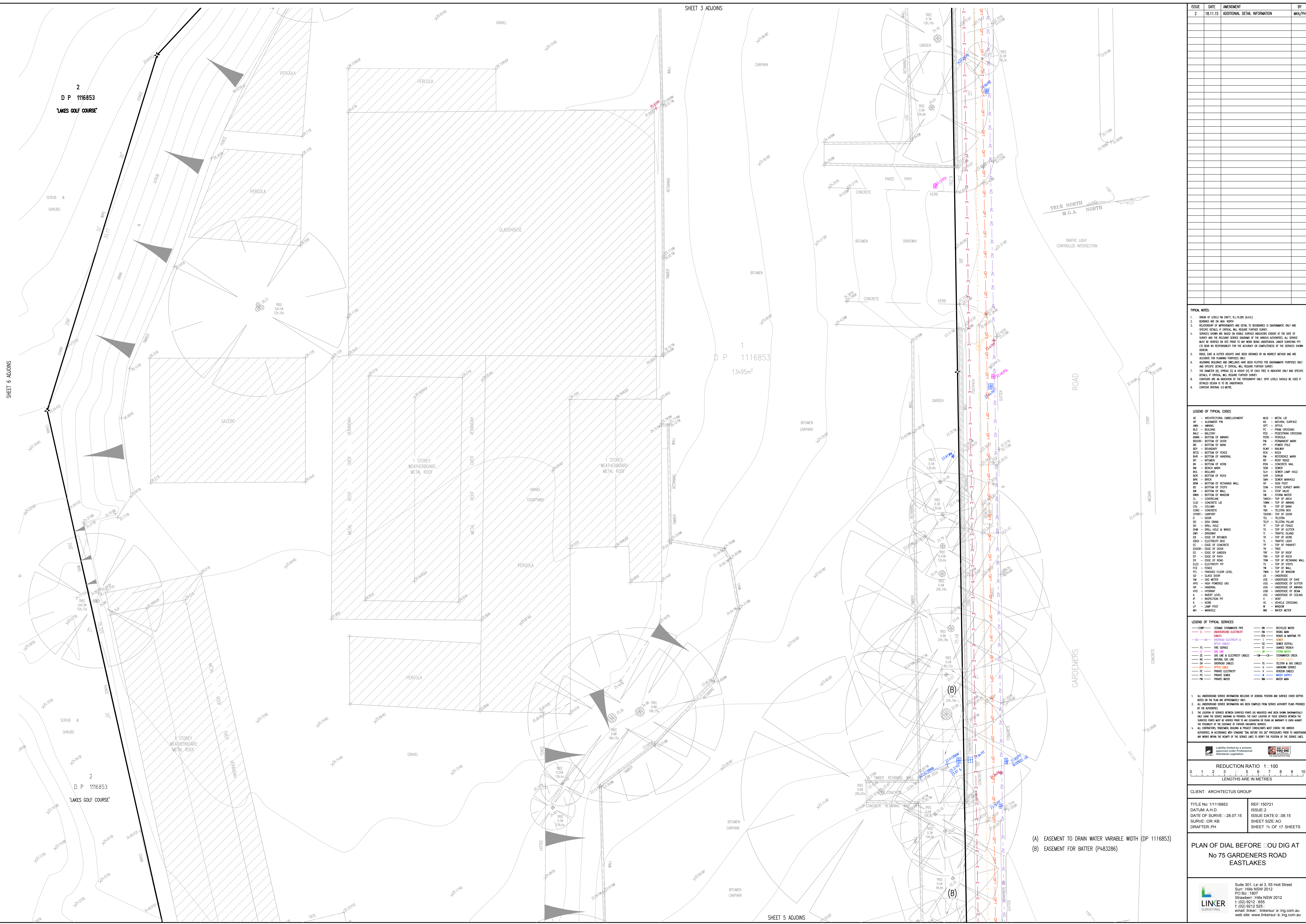
1. ALL UNDERGROUND SERVICE INFORMATION INCLUSIVE OF GENERAL POSITION AND SURFACE COVER NOTED ON THE PLAN ARE APPROXIMATELY ONLY.
2. ALL UNDERGROUND SERVICE INFORMATION HAS BEEN COMPILED FROM SERVICE AUTHORITY PLANS BY THE AUTHORITIES.
3. THE LOCATION OF SERVICES BETWEEN SURVEYED POINTS (AS INDICATED) HAVE BEEN SHOWN DIAGNOSTIC ONLY USING THE SERVICE DATA AS PROVIDED. THE EXACT LOCATION OF THESE SERVICES BETWEEN SURVEYED POINTS MUST BE VERIFIED PRIOR TO ANY EXCAVATION OR PILING, NO WARRANTY IS GIVEN THE POSSIBILITY OF THE EXISTENCE OF FURTHER UNCOVERED SERVICES.
4. ALL CONTRACTORS, TRADESMEN, BUILDING & PROJECT CONSULTANTS MUST CONTACT THE VARIOUS AUTHORITIES, IN ACCORDANCE WITH STANDARD TAP, BEFORE YOU DIG" PROCEDURES PRIOR TO ANY WORKS WITHIN THE VICINITY OF THE SERVICE LINES TO VERIFY THE POSITION OF THE SERV

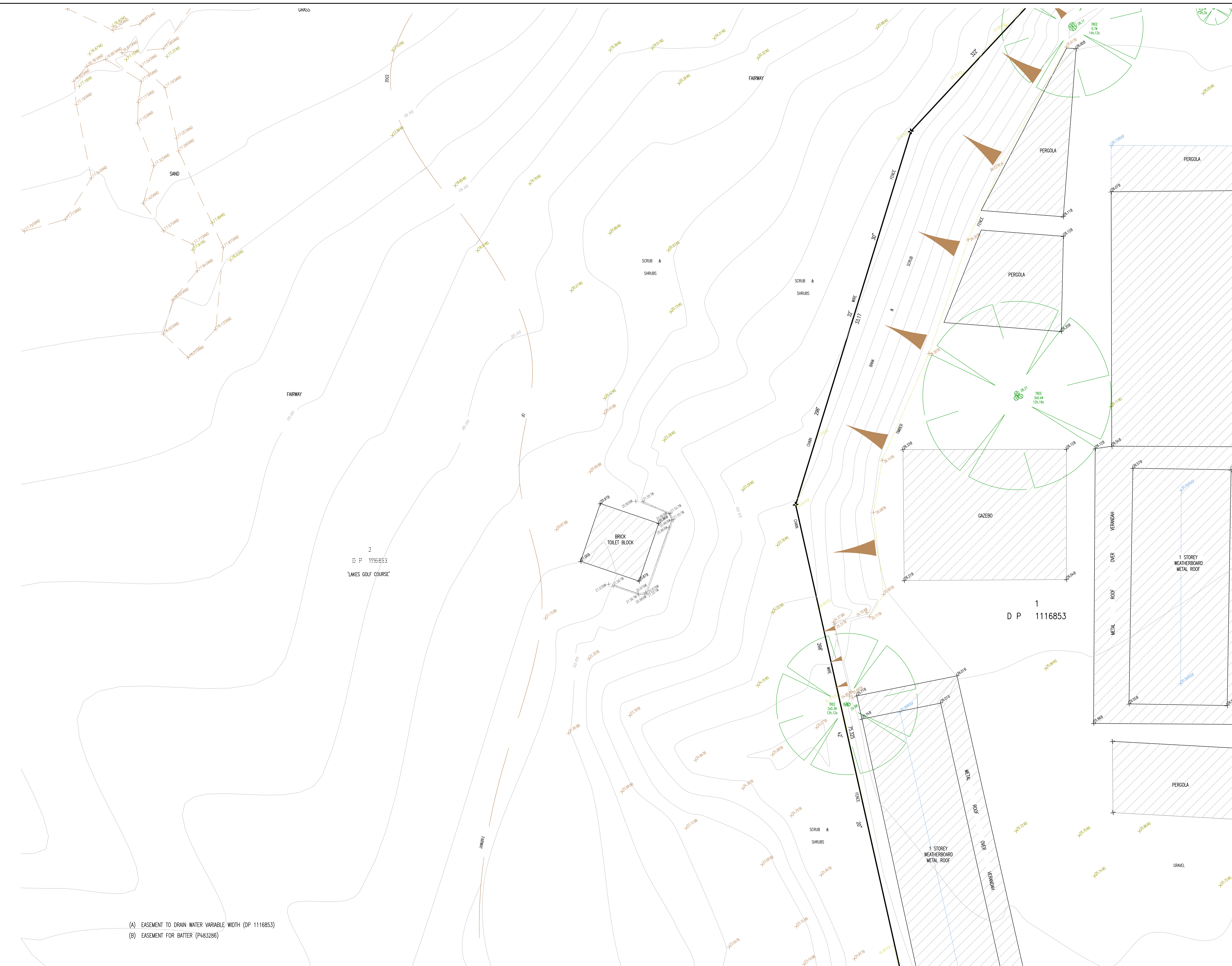


| | |
|--------------------------|-----------------------|
| TITLE No: 1/1116853 | REF:150721 |
| DATUM: A.H.D. | ISSUE:2 |
| DATE OF SURVEY: 28.07.15 | ISSUE DATE: 01.08.15 |
| SURVEYOR: KB | SHEET SIZE: AO |
| DRAFTER: PH | SHEET 12 OF 17 SHEETS |

 Suite 301, Level 3, 55 Holt Street
Surrey Hills NSW 2012
PO Box 1807
Surrey Hills NSW 2012
t: (02) 9212 1655
f: (02) 9212 5255
email: linker@linkersurveying.com
web site: www.linkersurveying.com



[illegible][illegible][illegible][illegible][illegible][illegible][illegible]



(A) EASEMENT TO DRAIN WATER VARIABLE WIDTH (DP 1116853)
(B) EASEMENT FOR BATTER (P483286)

[illegible]

TYPICAL NOTES

1. ORDER OF LEVELS PM 20777, 8.11.2020 (AHLR)
2. BEARINGS ARE ON WCA NORTH
3. REASONING OF IMPROVEMENTS AND DETAILS TO BOUNDARIES IS DIAGNOSTIC ONLY AND
4. SPECIFIC DETAILS OF FURTHER DETAILS WILL BE PROVIDED
5. SOMEWHERE DETAILS ARE BASED ON VISIBLE SURFACE INDICATORS TAKEN AT THE DATE OF
6. SURVEY AND THE RELEVANT SERVICE (DIAGRAMS OF THE WORKS AUTHORITY). ALL SERVICE
7. MUST BE VERIFIED ON SITE PRIOR TO ANY WORKING UNDERGROUND. LUNING SURVEYING
8. WILL BE THE RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE SERVICES SHOWN
9. HEREIN.
10. RIDGE, DUNE & OTHER HEIGHTS HAVE BEEN OBTAINED BY AN INDIRECT METHOD AND ARE
11. APPROPRIATE FOR PLANNING PURPOSES ONLY
12. SURFACE BOUNDARIES AND ELEVATIONS HAVE BEEN PROVIDED FOR DIAGNOSTIC PURPOSES ONLY
13. AND SPECIFIC DETAILS OF FURTHER DETAILS WILL BE PROVIDED
14. THE DIMENSION (L) SPREAD (S) & HEIGHT (H) OF EACH TREE IS INDICATIVE ONLY AND SPECIFIC
15. DETAILS OF FURTHER DETAILS WILL BE PROVIDED
16. CONTOUR LINES ARE INDICATIVE ONLY. THE TOPOGRAPHY ONLY. SPOT LEVELS SHOULD BE USED
17. TO DETERMINE DESIGN IS TO BE UNDERSTOOD.
18. CONTOUR DEVISION IS 0.3 METRE.

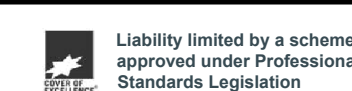
LEGEND OF TYPICAL CODES

[illegible]

LEGEND OF TYPICAL SERVICES

| | | | |
|-------|--------------------------------|-------|----------------------|
| C | COSMIC STORMWATER PUMP | FW | RECYCLED WATER |
| CP | PEISING MAN | FM | PEISING MAN |
| EC | UNDERGROUND ELECTRICITY CABLES | HTA | PODS & W/RTIME PPT |
| EC-AO | OVERHEAD ELECTRICITY & CABLES | SS | SEWERS |
| FS | OPTIC CABLES | SE | SEWER OUTLET |
| G | FIRE SERVICE | ST | SHARED TRENCH |
| GS | GAS LINE | SW | STORM WATER |
| GS | GAS LINE & ELECTRICITY CABLES | SW-CK | STORMWATER CREEK |
| NG | NATURAL GAS LINE | | TELESTRA CABLES |
| NC | OVERHEAD CABLES | TS | TELSTRA & GAS CABLES |
| OPT | OPTIC CABLES | UN | UNDERGROUND SERVICE |
| PE | PRIVATE ELECTRICITY | V | VERDEAN CABLE |
| PS | PRIVATE SEWER | W | WATER SUPPLY |
| PW | PRIVATE WATER | WW | WATER MAIN |

1. ALL UNDERGROUND SERVICE INFORMATION INCLUSIVE OF GENERAL POSITION AND SURFACE COVER DEPTHS NOTED ON THE PLAN ARE APPROXIMATELY ONLY.
2. ALL UNDERGROUND SERVICE INFORMATION HAS BEEN COMPILED FROM SERVICE AUTHORITY PLANS PROVIDED BY THE AUTHORITIES.
3. THE LOCATION OF SERVICES BETWEEN SURVEYED POINTS (AS INDICATED) HAVE BEEN SHOWN DIAGRAMMATICALLY ONLY USING THE SERVICE (S) AS PROVIDED. THE EXACT LOCATION OF THESE SERVICES BETWEEN THE SURVEYED POINTS SHOULD BE VERIFIED PRIOR TO ANY EXCAVATION OR PILING NO WARRANTY IS GIVEN AGAINST THE LOCATION OF THE EXISTING OR FUTURE UNMADE SERVICES.
4. ALL CONTRACTORS, TRADESMEN, BUILDING & PROJECT CONSULTANTS MUST CONTACT THE CANNES AUTHORITIES, IN ACCORDANCE WITH STANDARD TAP, BEFORE ANY DIT PROCEDURES PRIOR TO UNDERSTAND ANY WORKS WITHIN THE VICINITY OF THE SERVICE LINES TO VERIFY THE POSITION OF THE SERVICE LINES.



REDUCTION RATIO 1 : 100

LENGTHS ARE IN METRES

CLIENT: ARCHITECTUS GROUP

| | |
|--------------------------|-----------------------|
| TITLE No: 1/1116853 | REF: 150721 |
| DATUM: A.H.D. | ISSUE: 2 |
| DATE OF SURVEY: 28.07.15 | ISSUE DATE: 08.15 |
| SURVEYOR: KB | SHEET SIZE: AO |
| DRAFTER: PH | SHEET 16 OF 17 SHEETS |

PLAN OF DIAL BEFORE YOU DIG AT
No 75 GARDENERS ROAD
EASTLAKES



Suite 301, Level 3, 55 Holt Street
Surrey Hills NSW 2012
PO Box 1807
Surrey Hills NSW 2012
t: (02) 9212 655
f: (02) 9212 525
email: linker@linkersurrounding.com.au
web site: www.linkersurrounding.com.au

[illegible]

TYPICAL NOTES:

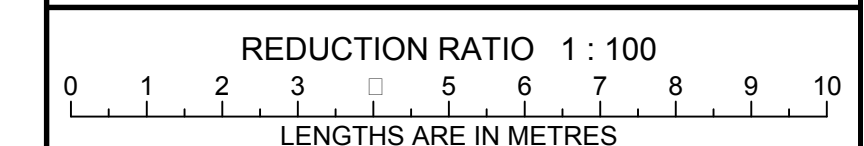
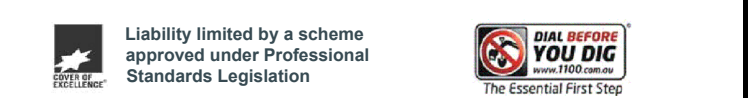
1. RECORD OF LEVELS FM 2677, 8.11.2005 (A1) & (A2)
2. BEARING LIES ON HIGH WATER
3. DIMENSION OF IMPROVEMENTS AND TOLERANCE IS INDICATIVE ONLY AND SPECIFIC DETAILS, IF CRITICAL, WILL REQUIRE FURTHER SURVEY
4. THE QUANTITIES ARE BASED ON AN ASSUMED CONCENTRATION OF MATERIAL AT THE DATE OF SURVEY AND THE RELEVANT SURVEY DRAWINGS OF THE VARIOUS AUTHORITIES, ALL SURVEYS MUST BE VERIFIED ON SITE PRIOR TO ANY WORK BEING UNDERTAKEN, LEVELS SURVEYING PLY WILL BE THE BASIS FOR RESPONSIBILITY FOR THE ACCURACY OF DIMENSIONS OF THE SERVICES SHOWN HEREON.
5. HOSE, DRAIN & GUTTER HEADINGS HAVE BEEN OBTAINED BY A PROPOSED METHOD AND APPROXIMATELY TO THE FOLLOWING PLANNING POSITION
6. ALLOWING BOLLARDS AND DOWELLINGS HAVE BEEN INSET FOR DIMANSITIVE PURPOSES ONLY
7. SPECIFIC DETAILS, IF CRITICAL, WILL REQUIRE FURTHER SURVEY
8. THE QUANTITIES (AS STATED) OF A SERVICE ARE INDICATIVE ONLY AND SPECIFIC DETAILS, IF CRITICAL, WILL REQUIRE FURTHER SURVEY
9. CONTOURS ARE IN PLACE TO INDICATION OF THE TYPICALITY ONLY. SPOT LEVELS MUST BE USED IF TOTAL SURVEY IS TO BE UNDERTAKEN.
10. CONTOR REVISION, AS NOTED.

[illegible]

LEGEND OF TYPICAL SERVICES

| | | | |
|-------|-------------------------------------|-----|-----------------------|
| —CWF— | COSWIC STORMWATER PIPE | FW | RECYCLED WATER |
| —CWF— | UNDERGROUND ELECTRICITY CABLES | FW | SEWING MAIN |
| —CWF— | OVERHEAD ELECTRICITY & OPTIC CABLES | FWA | ROADS & MAINLINE PAVT |
| —CWF— | PAVE SERVICES | S | SEWER |
| —CWF— | GAZ LINE | SW | SHEDS |
| —CWF— | GAZ LINE & ELECTRICITY CABLES | SW | STORM TRENCH |
| —CWF— | NATURAL GAS LINE | SW | STORM WATER |
| —CWF— | OVERHEAD CABLE | SW | STORMWATER DRAIN |
| —CWF— | OPTIC CABLE | TO | TELSTRA & GAS CABLES |
| —CWF— | POWER ELECTRICITY | U | UNIFORM SERVICE |
| —CWF— | POWER SOWER | W | WATER CABLES |
| —CWF— | PRIVATE WASTEWATER | W | WATER SUPPLY |
| —CWF— | | WW | WATER MAIN |

1. ALL UNDERGROUND SERVICE INFORMATION INCLUDING OF GENERAL POSITION AND SURFACE COVER DEPICTS INFORMATION ON THE PLAN IS APPROPRIATELY OBTAINED.
2. ALL UNDERGROUND SERVICE INFORMATION HAS BEEN COMPILED FROM SERVICE AUTHORITY PLANS PROVIDED BY THE AUTHORITIES.
3. THE LOCATION OF SERVICES BETWEEN SURVEYED POINTS (AS INDICATED) HAVE BEEN SHOWN ORNAMENTALLY ONLY USING THE SERVICE ORNAMENTS AS PROVIDED. THE EXACT LOCATION OF THESE SERVICES BETWEEN THE SURVEYED POINTS WILL BE REQUIRED FOR A FURTHER ON LOCATION OR PLUNG NO WARRANTY IS GIVEN CHANGING THE POSSIBILITY OF THE LOCATION OF SERVICES BEING EITHER HIDDEN OR SHOWN.
4. ALL COMPASSINGS, TRAVELS, DRAWING & PROJECT CONSULTANTS MUST CONTACT THE VARIOUS AUTHORITIES, IN ACCORDANCE WITH STANDARD "TALK BEFORE YOU DIG" PROCEDURES PRIOR TO UNDERTAKING ANY WORKS WITHIN THE VICINITY OF THE SERVICE LINES TO VERIFY THE POSITION OF THE SERVICE LINES.



CLIENT: ARCHITECTUS GROUP

| | |
|--------------------------|-----------------------|
| TITLE No: 1/1116853 | REF:150721 |
| DATUM: A.H.D. | ISSUE:2 |
| DATE OF SURVEY: 28.07.15 | ISSUE DATE: 01.08.15 |
| SURVEYOR: KB | SHEET SIZE: A0 |
| DRAFTER: PH | SHEET 17 OF 17 SHEETS |

PLAN OF DIAL BEFORE YOU DIG AT
No 75 GARDENERS ROAD
EASTLAKES



(A) EASEMENT TO DRAIN WATER VARIABLE WIDTH (DP 1116853)
(B) EASEMENT FOR BATTER (P483286)

**Attachment D – Site Audit
Statement, prepared by
Ramboll Environ Australia,
dated June 2017**

Prepared for

Sydney Water Corporation

Prepared by

Ramboll Environ Australia Pty Ltd

Date

June 2017

Project Number

AS122114

Audit Number

TO-019

SITE AUDIT REPORT

71-75 GARDENERS ROAD, EASTLAKES

26 June 2017

Sydney Water Corporation
Attn.: Emma Bradbeer
Level 5, 1 Smith Street
Parramatta NSW 2150

Dear Emma,

SITE AUDIT REPORT - 71-75 GARDENERS ROAD, EASTLAKES

I have pleasure in submitting the Site Audit Report for the subject site. The Site Audit Statement, produced in accordance with the NSW *Contaminated Land Management Act 1997*, follows this letter. The Audit was commissioned by Sydney Water Corporation to determine if the nature and extent of contamination at the site has been adequately characterised for the purpose of future remediation, management and redevelopment planning.

This Site Audit Report is not currently required by regulation or legislation and is therefore a non-statutory audit.

Thank you for giving me the opportunity to conduct this Audit. Please call me on 9954 8100 if you have any questions.

Ramboll Environ Australia
Level 3, 100 Pacific Highway
PO Box 560
North Sydney NSW 2060

T +61 2 9954 8100
F +61 2 9954 8150
www.ramboll-environ.com

Yours faithfully,
Ramboll Environ Australia Pty Ltd



Tom Onus
EPA Accredited Site Auditor 1505

Ref AS122114

NSW Site Auditor Scheme SITE AUDIT STATEMENT



A site audit statement summarises the findings of a site audit. For full details of the site auditor's findings, evaluations and conclusions, refer to the associated site audit report.

This form was approved under the Contaminated Land Management Act 1997 on 31st October 2012. For more information about completing this form, go to Part IV.

PART I: Site audit identification

Site audit statement no. TO-019

This site audit is a ~~statutory audit~~/non-statutory audit* within the meaning of the *Contaminated Land Management Act 1997*.

Site auditor details (as accredited under the *Contaminated Land Management Act 1997*)

Name: Tom Onus Company: Ramboll Environ Australia Pty Ltd

Address: Level 3, 100 Pacific Highway (PO Box 560)

North Sydney NSW

Postcode: 2060

Phone: 02 9954 8100

Fax: 02 9954 8150

Site details

Address: 71-75 Gardeners Road, Eastlakes

Postcode: 2018

Property description (*attach a list if several properties are included in the site audit*)

Part Lot 50 DP1216168 and Lot 51 DP1216168 (see Attachment 1)

Local Government Area: Botany Bay City Council

Area of site (e.g. hectares): Approximately 2.75 ha

Current zoning: SP1 Special

Activities (recreation Facility) and SP2 Infrastructure.

To the best of my knowledge, the site ~~is~~/is not* the subject of a declaration, order, agreement or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.

Declaration/Order/Agreement/Proposal/Notice* no(s): N/A

**Strike out as appropriate*



***Strike out as appropriate**

Site audit commissioned by

Name: Emma Bradbeer

Company: Sydney Water Corporation

Address: Level 5, 1 Smith Street, Parramatta

Postcode: 2150

Phone: 8849 3766

Fax: N/A

Name and phone number of contact person (if different from above)

N/A

Purpose of site audit

☐ ~~A. To determine land use suitability (please specify intended use[s])~~

OR

☒ B(i) To determine the nature and extent of contamination, and/or

☐ ~~B(ii) To determine the appropriateness of an **investigation/remedial action/management plan***, and/or~~

☐ ~~B(iii) To determine if the land can be made suitable for a particular use or uses by implementation of a specified **remedial action plan/management plan*** (please specify intended use[s])~~

Information sources for site audit

Consultancy(ies) which conducted the site investigation(s) and/or remediation

- Australian Water Technologies (AWT)
- Consulting Earth Scientists Pty Ltd (CES)
- ENSR Australia Pty Ltd (ENSR)
- Geotechnique
- AECOM
- Coffey Environments Australia Pty Ltd (Coffey)
- CH2M HILL Australia Pty Ltd (CH2M)
- Parsons Brinckerhoff (PB)
- WSP|Parsons Brinckerhoff (WSP PB).

Title(s) of report(s) reviewed:

- 'Phase 2 Environmental Site Assessment, Daceyville Nursery Site', November 2001, AWT.
- 'Site Management Plan: 75 Gardeners Road, Daceyville', 6 July 2006 (Draft), CES.
- 'Additional Environmental Site Assessment: 73 Gardeners Road, Eastlakes, NSW', dated 16 May 2007, CES.

***Strike out as appropriate**

- 'Remediation Action Plan, Daceyville Depot, Gardeners Road, Daceyville, NSW', dated 7 April 2008, ENSR.
- 'Proposed Sewerage Treatment Plant, Gardeners Road, Daceyville - Geotechnical Investigation', dated 2 June 2008, Geotechnique.
- 'Classification of Stockpiled Material, SWC Depot, Daceyville, NSW', dated 28 September 2009, AECOM.
- 'Site Condition Report, Daceyville Depot, Gardeners Road, Daceyville, NSW', dated 18 February 2010, AECOM.
- 'Environmental Management Plan, Daceyville Depot, Gardeners Road, Daceyville, NSW', dated 19 February 2010 and a previous version dated 7 April 2009, AECOM.
- 'Environmental Management Plan, Sydney Water Daceyville Depot, Gardeners Road, Daceyville, NSW', dated 25 May 2015, Coffey.
- 'Stage 1 Detailed Site Investigation, 73-75 Gardeners Road, Eastlakes', 15 July 2015, CH2M.
- '73-75 Gardeners Road, Eastlakes Addendum Stage 2 Detailed Site Investigation - Sydney Water', 28 July 2016, CH2M.
- 'Combined Stage 1 and 2 Detailed Site Investigation, Sydney Water 73 Gardeners Road, Eastlakes NSW', dated 15 April 2016, PB.
- 'Environmental Management Plan, Sydney Water Property, 73 Gardeners Road, Eastlakes NSW', dated 29 September 2016, WSP PB.

Other information reviewed (including previous site audit reports and statements relating to the site)

'Site Audit Report, 0301-0439, Sydney Water Corporation, 75 Gardeners Road, Daceyville NSW', 1 August 2006, James Davis of JBS Environmental Pty Ltd.

'Site Audit Report, 73-75 Gardeners Road, Eastlakes', October 2016, Melissa Porter of Ramboll Environ Australia Pty Ltd.

Site audit report

Title: Site Audit Report – 71-75 Gardeners Road, Eastlakes

Report no. TO-019 (Ramboll Environ Ref: AS122114)

Date: June 2017

PART II: Auditor's findings

Please complete either Section A or Section B, **not** both. *(Strike out the irrelevant section.)*

Use Section A where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land use(s).

Use Section B where the audit is to determine the nature and extent of contamination and/or the appropriateness of an investigation or remedial action or management plan and/or whether the site can be made suitable for a specified land use or uses subject to the successful implementation of a remedial action or management plan.

Section A

☐ I certify that, in my opinion, the site is **SUITABLE** for the following use(s) *(tick all appropriate uses and strike out those not applicable):*

- ☐ Residential, including substantial vegetable garden and poultry
- ☐ Residential, including substantial vegetable garden, excluding poultry
- ☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- ☐ Day care centre, preschool, primary school
- ☐ Residential with minimal opportunity for soil access, including units
- ☐ Secondary school
- ☐ Park, recreational open space, playing field
- ☐ Commercial/industrial
- ☐ Other *(please specify)*

subject to compliance with the following environmental management plan *(insert title, date and author of plan)* **in light of contamination remaining on the site:**

OR

☐ I certify that, in my opinion, the site is **NOT SUITABLE** for any use due to the risk of harm from contamination.

Overall comments:

Section B

Purpose of the plan¹ which is the subject of the audit is to determine if the nature and extent of contamination has been adequately characterised for the purpose of future remediation or management planning during redevelopment of the site.

I certify that, in my opinion:

- ☒ the nature and extent of the contamination HAS/HAS NOT* been appropriately determined

AND/OR

- ☐ the investigation/remedial action plan/management plan* IS/IS NOT* appropriate for the purpose stated above

AND/OR

- ☐ the site CAN BE MADE SUITABLE for the following uses (tick all appropriate uses and strike out those not applicable):

- ☐ Residential, including substantial vegetable garden and poultry
- ☐ Residential, including substantial vegetable garden, excluding poultry
- ☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- ☐ Day care centre, preschool, primary school
- ☐ Residential with minimal opportunity for soil access, including units
- ☐ Secondary school
- ☐ Park, recreational open space, playing field
- ☐ Commercial/industrial
- ☐ Other (please specify)

if the site is remediated/managed* in accordance with the following remedial action plan/management plan* (insert title, date and author of plan)

...

subject to compliance with the following condition(s):

...

¹ For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

Overall comments

The site comprises a former nursery, a residential building and a Sydney Water works depot.

The structures on the nursery have been demolished. The nursery previously contained a clubhouse near the centre of the site that was destroyed by fire prior to 1976. The depot was remediated during redevelopment in 2009, with a capping layer placed over contaminated fill material to make it suitable for ongoing use as a depot.

Material used to fill areas of the site contains anthropogenic material, such as tile, brick, timber, metal and asbestos as bonded fragments of cement sheeting. Friable asbestos (comprising small fragments of asbestos cement sheeting) was identified at one location on the former nursery and three locations on the residential property. The distribution of asbestos in fill material on the depot is a data gap.

The fill material was identified in the west of the site (former mechanical shed area), in the northwest of the site (former pot bazaar location) and in the south of the centre of the nursery (former clubhouse location) and across the residential property and depot. The material has not been well delineated vertically and laterally in some areas. Remediation of fill containing anthropogenic material would be required to make the site suitable for any proposed use.

There were isolated instances of volatile contaminants exceeding the human health criteria for vapour intrusion. These were in the west of the site beneath the former mechanical shed and in the south of the depot. Further investigation of the nursery area by CH2M did not identify significantly elevated lead concentrations. Further investigation of the depot by CES did not identify lead concentrations significantly exceeding the human health criteria, however the location of the previous exceedance was not targeted for further investigation. It is understood that these areas are currently paved with asphalt, therefore the contamination is expected to present a low risk under current site conditions. Further investigation and/or remediation would be required in the event of a change in the site surfacing in these areas or a change in land use.

The Auditor recommends that the following be undertaken should the site be redeveloped:

- Further investigation of the site should be considered prior to remediation to address the data gaps identified in the CSM. The need for and scope of further investigation would be dependent on the proposed development.
- Preparation of a remedial action plan (RAP) specific to any development.
- The RAP should be implemented prior to or during redevelopment of the site.
- Preparation of a Site Audit Statement certifying suitability for the proposed use, at the completion of remediation and validation.
- Groundwater is assessed for its suitability for any proposed use prior to extraction.

PART III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority under the *Contaminated Land Management Act 1997* (Accreditation No. 1505).

I certify that:

- I have completed the site audit free of any conflicts of interest as defined in the *Contaminated Land Management Act 1997*, and
- with due regard to relevant laws and guidelines, I have examined and am familiar with the reports and information referred to in Part I of this site audit, and
- on the basis of inquiries I have made of those individuals immediately responsible for making those reports and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete, and
- this statement is, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties under the *Contaminated Land Management Act 1997* for wilfully making false or misleading statements.

Signed...



Date...

26 June 2017

PART IV: Explanatory notes

To be complete, a site audit statement form must be issued with all four parts.

How to complete this form

Part I identifies the auditor, the site, the purpose of the audit and the information used by the auditor in making the site audit findings.

Part II contains the auditor's opinion of the suitability of the site for specified uses or of the appropriateness of an investigation, or remedial action or management plan which may enable a particular use. It sets out succinct and definitive information to assist decision-making about the use(s) of the site or a plan or proposal to manage or remediate the site.

The auditor is to complete either Section A or Section B of Part II, **not** both.

In **Section A** the auditor may conclude that the land is *suitable* for a specified use(s) OR *not suitable* for any beneficial use due to the risk of harm from contamination.

By certifying that the site is *suitable*, an auditor declares that, at the time of completion of the site audit, no further remediation or investigation of the site was needed to render the site fit for the specified use(s). Any **condition** imposed should be limited to implementation of an environmental management plan to help ensure the site remains safe for the specified use(s). The plan should be legally enforceable: for example a requirement of a notice under the *Contaminated Land Management Act 1997* (CLM Act) or a development consent condition issued by a planning authority. There should also be appropriate public notification of the plan, e.g. on a certificate issued under s.149 of the *Environmental Planning and Assessment Act 1979*.

Auditors may also include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

In **Section B** the auditor draws conclusions on the nature and extent of contamination, and/or suitability of plans relating to the investigation, remediation or management of the land, and/or whether land can be made suitable for a particular land use or uses upon implementation of a remedial action or management plan.

By certifying that a site *can be made suitable* for a use or uses if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the specified use(s) of the site in the future.

For a site that *can be made suitable*, any **conditions** specified by the auditor in Section B should be limited to minor modifications or additions to the specified plan. However, if the auditor considers that further audits of the site (e.g. to validate remediation) are required, the auditor must note this as a condition in the site audit statement.

Auditors may also include **comments** which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

In **Part III** the auditor certifies his/her standing as an accredited auditor under the CLM Act and makes other relevant declarations.

Where to send completed forms

In addition to furnishing a copy of the audit statement to the person(s) who commissioned the site audit, statutory site audit statements must be sent to:

EPA (NSW)

Contaminated Sites Section
PO Box A290, SYDNEY SOUTH NSW 1232
nswauditors@epa.nsw.gov.au

AND

the **local council** for the land which is the subject of the audit.

CONTENTS

| | | |
|------------|---|-----------|
| 1. | INTRODUCTION | 1 |
| 1.1 | Background | 1 |
| 1.2 | Scope of the Audit | 2 |
| 2. | SITE DETAILS | 4 |
| 2.1 | Location | 4 |
| 2.2 | Zoning | 4 |
| 2.3 | Adjacent Uses | 4 |
| 2.4 | Site Condition | 4 |
| 2.5 | Proposed Development | 6 |
| 3. | SITE HISTORY | 7 |
| 3.1 | Auditor's Opinion | 8 |
| 4. | CONTAMINANTS OF CONCERN | 9 |
| 4.1 | Auditor's Opinion | 9 |
| 5. | STRATIGRAPHY AND HYDROGEOLOGY | 10 |
| 5.1 | Stratigraphy | 10 |
| 5.2 | Hydrogeology | 11 |
| 5.3 | Auditor's Opinion | 11 |
| 6. | EVALUATION OF QUALITY ASSURANCE AND QUALITY CONTROL | 12 |
| 7. | ENVIRONMENTAL QUALITY CRITERIA | 22 |
| 8. | EVALUATION OF SOIL ANALYTICAL RESULTS | 24 |
| 8.1 | Former Nursery | 24 |
| 8.2 | Residential Property | 26 |
| 8.3 | Depot | 29 |
| 8.4 | Auditor's Opinion | 32 |
| 9. | EVALUATION OF SEDIMENT ANALYTICAL RESULTS | 33 |
| 9.1 | Auditor's Opinion | 34 |
| 10. | EVALUATION OF WATER ANALYTICAL RESULTS | 35 |
| 10.1 | Groundwater | 35 |
| 10.2 | Surface Water | 36 |
| 10.3 | Auditor's Opinion | 36 |
| 11. | EVALUATION OF CONCEPTUAL SITE MODEL | 38 |
| 12. | CONTAMINATION MIGRATION POTENTIAL | 41 |
| 13. | ASSESSMENT OF RISK | 42 |
| 14. | COMPLIANCE WITH REGULATORY GUIDELINES AND DIRECTIONS | 43 |

| | | |
|------------|--|-----------|
| 15. | CONCLUSIONS AND RECOMMENDATIONS | 44 |
| 16. | OTHER RELEVANT INFORMATION | 45 |

LIST OF TABLES

| | |
|---|----|
| Table 3.1: Site History | 7 |
| Table 4.1: Nursery Contaminants of Concern | 9 |
| Table 5.1: Stratigraphy | 10 |
| Table 6.1: Summary of Investigations..... | 12 |
| Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment | 13 |
| Table 6.3: QA/QC – Field and Lab Quality Assurance and Quality Control..... | 18 |
| Table 8.1: Evaluation of Fill Material Analytical Results – Former Nursery - Summary Table (mg/kg) | 24 |
| Table 8.2: Evaluation of Natural Soil Analytical Results – Former Nursery - Summary Table (mg/kg) | 25 |
| Table 8.3: Evaluation of Fill Material Analytical Results – Residential Property - Summary Table (mg/kg) | 26 |
| Table 8.4: Evaluation of Natural Soil Analytical Results - Residential Property – Summary Table (mg/kg) | 28 |
| Table 8.5: Evaluation of Fill Material Analytical Results – Depot - Summary Table (mg/kg)..... | 29 |
| Table 8.6: Evaluation of Capping Material – Depot – Summary Table (mg/kg)..... | 30 |
| Table 9.1: Evaluation of Sediment Analytical Results – Summary Table (mg/kg)..... | 33 |
| Table 10.1: Evaluation of Groundwater Analytical Results – Summary Table (µg/L) | 35 |
| Table 11.1: Review of the Conceptual Site Model | 38 |

APPENDICES

Appendix A

Attachments

- Attachment 1: Site Location
- Attachment 2: Site Survey
- Attachment 3: Former Site Layout
- Attachment 4: Former Nursery Layout
- Attachment 5: Residential Property Investigation Locations
- Attachment 6: Depot Former Layout and Investigation Locations

Attachment 7: Depot Current Layout

Attachment 8: AWT Site Investigation Locations

Attachment 9: Nursery Exceedances of Adopted Criteria

Attachment 10: CH2M Stage 1 DSI Investigation Locations

Attachment 11: CH2M Stage 2 DSI Investigation Locations

Attachment 12: Depot Imported Material Locations

LIST OF ABBREVIATIONS

Measures

| | |
|-------------------|--------------------------------|
| % | per cent |
| µg/L | Micrograms per Litre |
| µg/m ³ | Micrograms per Cubic Metre |
| ha | Hectare |
| km | Kilometres |
| m | Metre |
| mAHD | Metres Australian Height Datum |
| mbgl | Metres below ground level |
| mg/kg | Milligrams per Kilogram |
| mg/L | Milligrams per Litre |
| mg/m ³ | Milligrams per Cubic Metre |
| mm | Millimetre |
| m ² | Square Metres |
| m ³ | Cubic Metres |
| ng/L | Nanograms per Litre |
| ppm | Parts Per Million |

General

| | |
|---------|---|
| ABC | Added Background Concentrations |
| ACL | Added Contaminant Limit |
| ACM | Asbestos Containing Material |
| ADWG | Australian Drinking Water Guidelines |
| AF | Asbestos Fines |
| AHD | Australian Height Datum |
| ANL | Australian Native Landscapes |
| ANZECC | Australian and New Zealand Environment and Conservation Council |
| ASS | Acid Sulfate Soil |
| AST | Aboveground Storage Tank |
| AWT | Australian Water Technologies |
| BTEX | Benzene, Toluene, Ethylbenzene, Xylenes & Naphthalene |
| CES | Consulting Earth Scientists Pty Ltd |
| CH2M | CH2M HILL Australia Pty Ltd |
| CLM Act | NSW Contaminated Land Management Act 1997 |
| COC | Chain of Custody |
| Coffey | Coffey Environments Australia Pty Ltd |
| Council | Botany Bay City Council |
| CSM | Conceptual Site Model |
| DP | Deposited Plan |
| DQI | Data Quality Indicator |
| DQO | Data Quality Objective |
| EIL | Ecological Investigation Level |
| EMP | Environmental Management Plan |
| ENSR | ENSR Australia Pty Ltd |
| EPA | Environment Protection Authority (NSW) |
| ESL | Ecological Screening Level |
| FA | Fibrous Asbestos |
| GIL | Groundwater Investigation Level |
| HIL | Health Investigation Level |
| HSL | Health Screening Level |
| IAA | Interim Audit Advice |
| ISQG | Interim Sediment Quality Guideline |
| LCS | Laboratory Control Sample |
| LEP | Local Environment Plan |
| Mercury | Inorganic mercury unless noted otherwise |
| Metals | As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury |
| ML | Management Limits |
| MS | Matrix Spike |
| NATA | National Association of Testing Authorities |
| NC | Not Calculated |
| ND | Not Detected |

| | |
|--------|--|
| NEHF | National Environmental Health Forum |
| NEPM | National Environment Protection Measure |
| NHMRC | National Health and Medical Research Council |
| NL | Non-Limiting |
| n | Number of Samples |
| OCPs | Organochlorine Pesticides |
| OEH | Office of Environment and Heritage |
| OPPs | Organophosphorus Pesticides |
| PAHs | Polycyclic Aromatic Hydrocarbons |
| PB | Parsons Brinckerhoff |
| PCBs | Polychlorinated Biphenyls |
| pH | A measure of acidity, hydrogen ion activity |
| PID | Photoionisation Detector |
| PQL | Practical Quantitation Limit |
| PVC | Polyvinyl Chloride |
| QA/QC | Quality Assurance/Quality Control |
| RAP | Remediation Action Plan |
| RPD | Relative Percent Difference |
| SAQP | Sampling Analysis and Quality Plan |
| SAR | Site Audit Report |
| SAS | Site Audit Statement |
| SILs | Soil Investigation Levels |
| SVOCs | Semi Volatile Organic Compounds |
| SWL | Standing Water Level |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TPHs | Total Petroleum Hydrocarbons |
| TRHs | Total Recoverable Hydrocarbons |
| TV | Trigger Value |
| USEPA | United States Environmental Protection Agency |
| VENM | Virgin Excavated Natural Material |
| VOCs | Volatile Organic Compounds |
| WSP PB | WSP Parsons Brinckerhoff |
| - | On tables is "not calculated", "no criteria" or "not applicable" |

1. INTRODUCTION

A site contamination audit has been conducted in relation to the site at 71-75 Gardeners Road, Eastlakes. The site comprised a Sydney Water Corporation (Sydney Water) works depot, former nursery and residential property.

The Audit was conducted to provide an independent review by an EPA Accredited Auditor of the nature and extent of any contamination of the land i.e. a "Site Audit" as defined in Section 4 (1) (b) (i) of the *NSW Contaminated Land Management Act 1997* (the CLM Act).

It is understood that Sydney Water plan to divest the site.

1.1 Background

The site comprises a works depot in the east of the site (referred to as 71 Gardeners Road), a residential property in the centre of the site (73 Gardeners Road) and a former nursery in the west of the site (75 Gardeners Road).

The nursery was subject to a previous site audit in August 2006 by James Davis as detailed in:

- 'Site Audit Report, 0301-0439, Sydney Water Corporation, 75 Gardeners Road, Daceyville NSW', 1 August 2006, James Davis of JBS Environmental Pty Ltd.
- Site Audit Statement, SAS No. 0301-0439, signed 1 August 2006.

The audit was undertaken to determine the suitability of a portion of the site for commercial use and permissible recreational open space land use. The area under Audit comprised the former nursery, however excluded the residential property located to the east. Based on the results of a Phase 2 Environmental Site Assessment (AWT, 2001), the SAS certified that the site is suitable for secondary school, open space and commercial/industrial uses subject to compliance with an environmental management plan (EMP). The EMP (CES, 2006) was prepared for management of lead contaminated fill material identified at one location in the car park in the northeast of the former nursery.

The nursery and residential property were subject to a previous site audit by Melissa Porter in October 2016 (MP 067), as detailed in:

- 'Site Audit Report 73-75 Gardeners Road, Eastlakes' referenced as MP 067, dated 4 October 2016, Melissa Porter of Ramboll Environ Australia Pty Ltd.
- Site Audit Statement SAS No. MP067, signed 4 October 2016.

The SAS concluded that the nature and extent of contamination had been appropriately determined on the former nursery and residential property. Further investigation of the residential property was subsequently undertaken by PB (2016) and an EMP prepared (WSP PB, 2016). The site investigation reports relevant to the nursery and residential property have therefore been reviewed as part of this Audit.

The depot portion of the site was subject to a previous audit by Tony Scott, however was not completed. Correspondence from Tony Scott was provided, which detailed comments on various reports prepared for the depot. The following correspondence from Tony Scott was reviewed as part of this Audit:

- 'Site Auditor Comments – HLA ENSR Position Paper Daceyville Depot', 23 October 2007
- 'Site Auditor – Review of AWT (2001), CES (2005) and Addendum to Position Paper (2007)', 21 February 2008
- 'Site Auditor Review of ENSR (2008a) and ENSR (2008b), Daceyville Depot, NSW', 27 June 2008
- 'Sydney Water Daceyville Site', 7 July 2008
- 'Site Auditor Review of RAP ENSR (2009) and EMP ENSR (2009), Daceyville Depot, NSW', 12 May 2009

- 'Sydney Water Daceyville Site Environmental Management Plan', 21 December 2009
- 'Site Auditor Review of Revised RAP AECOM (2010) and EMP AECOM (2010), Daceyville Depot, NSW', 19 March 2010

1.2 Scope of the Audit

Details of the Audit are:

| | |
|----------------------------|---|
| Requested by: | Emma Bradbeer on behalf of Sydney Water Corporation |
| Request/Commencement Date: | 23 May 2017 |
| Auditor: | Tom Onus |
| Accreditation No.: | 1505 |

The scope of the Audit included:

- Review of the following reports:
 - 'Phase 2 Environmental Site Assessment, Daceyville Nursery Site', November 2001, Australian Water Technologies (AWT) (*the AWT Phase 2 ESA*).
 - 'Site Management Plan: 75 Gardeners Road, Daceyville', 6 July 2006 (Draft), Consulting Earth Scientists Pty Ltd (CES).
 - 'Additional Environmental Site Assessment: 73 Gardeners Road, Eastlakes, NSW', dated 16 May 2007, CES.
 - 'Remediation Action Plan, Daceyville Depot, Gardeners Road, Daceyville, NSW', dated 7 April 2008, ENSR Australia Pty Ltd (ENSR).
 - 'Proposed Sewerage Treatment Plant, Gardeners Road, Daceyville - Geotechnical Investigation', dated 2 June 2008, Geotechnique.
 - 'Classification of Stockpiled Material, SWC Depot, Daceyville, NSW', dated 28 September 2009, AECOM.
 - 'Site Condition Report, Daceyville Depot, Gardeners Road, Daceyville, NSW', dated 18 February 2010(a), AECOM.
 - 'Environmental Management Plan, Daceyville Depot, Gardeners Road, Daceyville, NSW', dated 19 February 2010(b) and a previous version dated 7 April 2009, AECOM.
 - 'Environmental Management Plan, Sydney Water Daceyville Depot, Gardeners Road, Daceyville, NSW', dated 25 May 2015, Coffey Environments Australia Pty Ltd (Coffey).
 - 'Stage 1 Detailed Site Investigation, 73-75 Gardeners Road, Eastlakes', 15 July 2015, CH2M HILL Australia Pty Ltd (CH2M) (*the Stage 1 DSI*).
 - '73-75 Gardeners Road, Eastlakes Addendum Stage 2 Detailed Site Investigation - Sydney Water', 28 July 2016, CH2M (*the Stage 2 DSI*).
 - 'Combined Stage 1 and 2 Detailed Site Investigation, Sydney Water 73 Gardeners Road, Eastlakes NSW', dated 15 April 2016, Parsons Brinckerhoff (PB) (*PB Stage 1 and 2 DSI*).
 - 'Environmental Management Plan, Sydney Water Property, 73 Gardeners Road, Eastlakes NSW', dated 29 September 2016, WSP|Parsons Brinckerhoff (WSP PB).
- Review of the SAR and SAS prepared by James Davis (SAS No. 0301-0439) and Melissa Porter (MP067).
- A site visit by the Auditor on 21 June 2017.
- Discussions with Sydney Water.

The investigations were completed prior to the Auditor's engagement and no discussion with the consultants was undertaken.

Given the Audit was undertaken to confirm the nature and extent of contamination, an assessment of the adequacy of the various EMPs prepared for different areas of the site (CES 2006, AECOM 2009, Coffey 2015 and WSP PB 2016) was not undertaken.

2. SITE DETAILS

2.1 Location

The site locality is shown on Attachment 1, Appendix A.

The site details are as follows:

| | |
|-------------------|--|
| Street address: | 71-75 Gardeners Road, Eastlakes NSW 2018 |
| Identifier: | Part Lot 50 DP1216168 and Lot 51 DP1216168 |
| Local Government: | Botany Bay City Council |
| Owner: | Sydney Water |
| Site Area: | Approximately 2.75 ha |

The boundaries of the site are defined by Gardeners Road to the north, Slattery Place to the west, Mill Stream to the east and a golf course to the south. A survey figure of the site is presented as Attachment 2 in Appendix A.

2.2 Zoning

The Auditor reviewed the Botany Bay Local Environmental Plan 2013, which gives the zoning of the former nursery as SP1 Special Activities (Recreation Facility) and the residential property and depot as SP2 Infrastructure (Sydney Water Depot).

2.3 Adjacent Uses

The site is located within an area of mixed residential and recreational use (Attachment 3, Appendix A). The surrounding site use includes:

North: Gardeners Road, then residential properties.

East: Mill Stream, then Eastlakes Golf Club, then residential properties.

South: The Lakes Golf Club.

West: Slattery Place, then residential properties.

Nearby sensitive receptors include Mill Stream and surface water features of the adjacent golf courses.

AWT reported that areas to the south of the site had historically been subject to sand mining and filling. These areas are located downgradient of the site and are therefore not considered to be potential sources of contamination to the site. No other potential offsite sources of contamination were identified in close proximity to the site.

2.4 Site Condition

The condition of the different areas of the site based on consultant reports and Auditor observations during the site visit on 21 June 2017 is provided below.

Former Nursery

Following demolition of buildings on the former nursery in 2016, CH2M (2016) reported the following with respect to the condition:

- The site is undulating, with a crest located near the centre of the site. The western portion of the site slopes down to an open stormwater channel and then slopes back up to the western boundary of the site at Slattery Place.
- The open stormwater channel in the west of the site is concrete lined. It flows towards surface water features in the golf courses to the south of the site.
- A groundwater abstraction bore was located in the west of the site, adjacent to the stormwater channel.

- An asphalt paved car park was present in the northwest of the site.

The layout of the former nursery prior to demolition of buildings is presented in Attachment 4, Appendix A.

At the time of the Auditor's site visit on 21 June 2017, a portion of the site comprising the former nursery was being used as a works depot by a telecommunication company. The depot included a small demountable office, vehicles, skip bins of water and stockpiles of different materials (concrete pieces, roadbase, sandstone, asphalt, sand and gravel, crushed concrete, brick and tile). The remainder of the former nursery was vacant and included landscaped gardens, asphalt and concrete paving, and retaining walls.

Residential Property

PB (2016) reported the following during their investigation of the residential property in October 2015:

- The residential property comprises a single storey brick building, garden shed and paved and grassed areas. A caravan and temporary 'lean-to' were in the south of the site. The property was fenced.
- Fragments of asbestos containing material (ACM) were noted on the ground surface in the south of the site.

The layout of the residential property is presented in Attachment 5, Appendix A.

At the time of the Auditor's site visit on 21 June 2017, the residential property was not occupied. The building and other structures remained around the building and in the south of the site. The site surface was obscured by leaf litter, long grass and weeds. A retaining wall was present along the western boundary of the property. It had collapsed in one area, revealing approximately 0.5 m of fill material comprising sand, gravel, mulch, plastic, asphalt and Styrofoam.

Depot

The AECOM (2010a) validation report and Coffey (2015) EMP noted the following features on the depot following its redevelopment in 2009:

- Two car park were present in the north of the site either side of an access road from Gardeners Road.
- Two storey office and amenities building, with an attached warehouse was present near the centre of the site.
- Open storage areas paved with concrete and asphalt in the south and west of the site. Material stored in these areas were not specified.
- A sewage pumping station is present in the northwest of the site. The surrounding ground surface was gravel.
- Landscaped areas were present around carparks in the north of the site and along the eastern and western boundaries.
- The depot has been capped with new buildings, bitumen and concrete paving, and 350 mm of imported material and a marker mesh in landscaped areas.
- The stormwater canal to the east of the site is concrete lined for the northern 40 m adjoining the site. The canal discharged to Lachlan Swamp, which discharges into Mill Pond. Geotechnique (2008) reported that the canal was *"...about 12 m wide and 3.5 m deep with bank slopes of about 45 to 60 degrees"*.

The layout of the depot prior to remediation and redevelopment is presented in Attachment 6, Appendix A. The layout following redevelopment is presented in Attachment 7, Appendix A.

Prior to the redevelopment, the depot extended further south. CES reported that the portion of the former depot area located off-site to the south was vacant except for stockpiles of waste material.

At the time of the Auditor's site visit on 21 June 2017, the depot was in use and had a layout similar to that described by AECOM and Coffey. Material storage bays in the south of the site were concrete paved and contained sand, roadbase, topsoil, asphalt or fill. A truck wash and dangerous good store were present in the southeast corner.

2.5 Proposed Development

The site is currently zoned SP1 Special Activities (Recreation Facility) and SP2 Infrastructure under the Botany Bay Local Environmental Plan 2013.

The future use of the site is unknown. CH2M (2016) report that the future use may include medium density residential land use. Given the surrounding residential land use, the 'residential with minimal access to soil' exposure scenario was adopted for the Audit.

3. SITE HISTORY

AWT (2001) summarised the site history of the nursery, PB (2016) summarised the site history of the residential property and CES (2007) summarised the site history of the depot. The site histories were typically based on historical aerial photographs, planning certificates, NSW EPA records, WorkCover dangerous goods records, Certificates of Title and Sydney Water records.

The Auditor's summary of the site history is presented in Table 3.1.

| Table 3.1: Site History | |
|--------------------------------|--|
| Date | Activity |
| 1908-1913 | Private individuals own the land and the activities at the site are unknown. |
| 1913/1914 | The Minister of Public Works resumes the land. |
| 1926 | The Metropolitan Water Sewage and Drainage Board (now Sydney Water) become the registered proprietor. |
| 1926-1970 | <p>The nursery area of the site is leased to the Lakes Golf Club and was the location of the club house and pro-shop.</p> <p>The 1930 aerial photograph showed the residential property and depot were vacant. The 1943 aerial photograph shows the residential building is present, and is surrounded by numerous smaller structures to the south and east (including within a portion of the area currently occupied by the depot). The structures appear to be sheds and/or equipment associated with the depot. The depot portion of the site was used as a sewage pumping station, offices and for storage of materials and equipment. The east of the site was vegetated and included Mill Stream to the east.</p> <p>Aerial photographs from 1951, 1961 and 1970 appeared to show the depot area expanding to the south through filling. The residential property appeared to remain part of the depot facility during this period.</p> |
| 1970-1976 | The Jockey and Associates Club leased the club house and surrounding land. The club house was destroyed by fire prior to 1976 and the lease was terminated. |
| 1976-2015 | <p>The nursery area of the site was leased to Panama Developments Pty Ltd and remained vacant until 1982.</p> <p>At some time between 1982 and 1999 the western portion of the site was developed for use as a nursery.</p> <p>Aerial photographs from 2001-2009 showed that the depot portion of the site included a number of structures and a car park in the north, a storage area in the central area and vacant area in the south that often contained a large stockpile. CES report that the buildings were an office and amenities.</p> |
| 2009 | Redevelopment of the depot appeared to commence in the 2009 aerial photograph and was complete by the 2011 aerial photograph. The resulting site layout appeared to be the current layout. |
| 2015-2017 | <p>The western portion of the site was vacated by the nursery and buildings demolished in late 2015 and early 2016.</p> <p>The depot was occupied at the time of the Auditor's site visit in June 2017. A portion of the former nursery was being used as a works depot, with the remainder vacant. The residential property was vacated.</p> |

The summary indicates that the western portion of the site has been used for recreational purposes (club house) and as a nursery for the last 90 years, whilst the eastern portion of the site has remained a depot with changes to the layout over time, particularly as a result of redevelopment in 2009.

Prior to redevelopment of the depot, CES report that it included three office buildings in the north with an adjacent car park. A sewage pumping station was present in the northwest of the site (which remains). The centre of the site was asphalt sealed and used to temporarily store stockpiles of raw materials and asphalt. A concrete pit (6x2 m) of unknown use was present along the western boundary, however there was no evidence of staining or contamination. The old depot layout extended off-site to the south and was vacant except for stockpiles of waste material (Attachment 3, Appendix A).

CES (2007) report that a 2,000 litre diesel aboveground storage tank (AST) was previously located in the southern portion of the depot. The AST was decommissioned and removed in 1996. Remediation and validation of the AST area was not reported.

3.1 Auditor's Opinion

The Auditor considers that the site history is broadly understood. There were no indicators of significant industrial uses on-site and surrounds that would have the potential to contaminate the site. The uncertainties include filling history, the demolition of the club house that was destroyed by fire, remediation and validation of the AST, and sources of contamination associated with former activities and operations on the depot.

Historical fuel and equipment storage on the depot and activities with the potential to impact the site were not identified in the site history. It is therefore not known if site investigations have adequately characterised potential point sources of contamination. The sampling density undertaken on the depot was considered sufficient to identify significant widespread contamination, however may not have identified hotspots related to points sources of contamination.

4. CONTAMINANTS OF CONCERN

On the depot portion of the site, CES (2007) identified total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs) and metals as contaminants of concern in fill material based on previous investigations by AWT and CES (reports not provided to the Auditor for review). Other contaminants, including benzene, toluene, ethylbenzene and xylene (BTEX), organochlorine pesticides (OCPs), organophosphorus pesticides (OPPs), polychlorinated biphenyls (PCB) and asbestos had been previously assessed and not found to be contaminants of concern in fill material.

Sources of contamination associated with the depot were not identified by CES (2007). CES (2007) considered that PAHs identified in fill material were associated with "...ash, slag and black coal-like fragments" rather than activities or operations on the depot.

CH2M (2015b) and PB (2016) provided a list of the contaminants of concern and potentially contaminating activities associated with the nursery and residential property. These have been tabulated in Table 4.1.

| Table 4.1: Nursery Contaminants of Concern | | |
|--|------------------------------------|---|
| Area | Activity | Potential Contaminants |
| Various areas of the site | Fill material from unknown sources | Metals, petroleum hydrocarbons (total recoverable hydrocarbons (TRH) and BTEX), PAHs, OCPs, OPPs, PCBs and asbestos |
| Former club house | Destroyed by fire and demolished | Metals, PAHs, PCBs and asbestos |
| Various areas of the site | Use of pesticides and herbicides | OCPs, OPPs and herbicides |
| Former mechanical shed in the west of the nursery | Storage of oil, paint and diesel | Petroleum hydrocarbons (TRH and BTEX), PAHs, metals |
| Maintenance area near the centre of the nursery | Maintenance of shopping carts | Petroleum hydrocarbons (TRH and BTEX) |
| Hazardous building materials on the residential property | Deterioration of buildings | Asbestos and lead |

4.1 Auditor's Opinion

The Auditor considers that the analyte list used by AWT, CH2M and PB for assessment of the nursery and residential property adequately reflects the site history and condition.

The analyte list used by CES to assess fill material on the depot was limited based on the results of previous investigations. Previous investigations included asbestos analysis at a low density (5 fill samples) and identified asbestos in one borehole (D20) at a depth of 1 mbgl. Logs of boreholes undertaken during previous investigations were not provided, however it is assumed that the sample was from fill material given the presence of fill to depths of 2-3 mbgl in nearby areas. Asbestos was not identified as a contaminant of concern by CES and samples of fill material were not assessed for asbestos. It is also noted that asbestos was subsequently identified in landscaped areas during remediation of the site by AECOM (2010a).

5. STRATIGRAPHY AND HYDROGEOLOGY

Following a review of the reports provided, a summary of the site stratigraphy and hydrogeology was compiled as follows.

5.1 Stratigraphy

CH2M (2016) reported that the geology of the site comprises Botany Sands underlain by Hawkesbury Sandstone. Botany Sand was described as consisting of four units, which largely comprised sand with some silt, clay and discontinuous peat lenses at depths. The geology was consistent with that reported by other consultants.

AECOM (2010a) reviewed the Soil landscape series sheet, which indicated that the site is underlain by Aeolian Tuggerah soil (coastal dune fields) and disturbed terrain.

CES (2007) reviewed the acid sulfate soil (ASS) risk map, which reported no known occurrences of ASS. Limited investigation of the depot by CES identified potential ASS as being present. Investigation of ASS on the residential property and nursery was not undertaken.

The sub-surface profile of the site based on investigations of the nursery, residential property and depot is summarised in Table 5.1.

| Table 5.1: Stratigraphy | |
|--|---|
| Depth (mbgl) | Subsurface Profile |
| Variable, range 0.1 – 4, typically <1 mbgl on the nursery, 0.3 mbgl on the residential property and 3 mbgl on the depot. | <p>Fill material was present across the majority of the site.</p> <p>On the nursery it comprised sand and sandstone. It included roadbase gravels, tile, brick, timber and metal in south of the site near the former clubhouse and in the northwest of the site (east of the stormwater channel). Fragments of ACM were noted in fill material in these areas. Plastic, PVC pipe, hessian and glass were noted at one location in the west of the nursery.</p> <p>Fill material on the residential property typically comprised silty sand. Ash, tile, bitumen, cement, bricks and glass was identified in three locations. ACM was observed on the ground surface in the south of the property.</p> <p>Fill material on the depot prior to remediation and redevelopment was variable and consisted of sand, clay, silt, gravel, bitumen, ash, sandstone, coal, concrete, bricks, metal, terracotta, plastic, timber, slag, shale, charcoal, glass and carbonaceous materials. CES identified significant layering in the fill material, which varied in composition and thickness. Field logs from previous investigations of the depot were not provided.</p> <p>Following remediation in 2009, the depot was capped. The capping layer composition and thickness varied across the site, however generally comprised: 350 mm of bitumen paving and underlying roadbase; 350 mm of concrete paving and underlying roadbase; or 350 mm of imported material and a marker mesh in landscaped areas.</p> |
| Variable depending on the thickness of overlying fill material, extends to 37 mbgl | Natural sand with sporadic peat layers |
| 37 mbgl to depth | Sandstone bedrock |

mbgl – metres below ground level

5.2 Hydrogeology

AWT (2001) and CES (2007) reported that the site is located within the Botany Sands aquifer, which is mainly unconfined, although peat, clay and indurated ferruginous layers produce semi-confined and confined groundwater in some areas.

A search of registered bores by PB (2016) identified 45 within 500 m of the site, with most registered for domestic or recreational use to the northwest of the site. A bore for irrigation purposes was located on the site at the former nursery.

Groundwater monitoring wells installed on the former nursery identified groundwater at a depth of approximately 5-10 m below ground level (mbgl), with the groundwater flow direction considered to be southerly by AWT and easterly by CH2M.

Groundwater on the depot was present at between 2.5 and 4.4 mbgl (approximately 15.0-15.9 mAHD), with a groundwater flow direction towards the adjacent Mill Stream to the east and south. AECOM (2010a) reported that groundwater levels were "...*relatively stable, with minor fluctuations*". CES (2007) undertook hydraulic conductivity testing at two wells (BH102 and BH106) and presented results of 7.7×10^{-5} ms to 8×10^{-4} ms, which were considered typical for sand.

CES (2007) report that the regional groundwater flow was towards Botany Bay in the south, with local flow direction influenced by topography and surface drainage features.

Parameters measured during sampling events on the nursery identified groundwater to be slightly acidic (pH 5.5-6.5), aerobic (dissolved oxygen 1.7-5.6 mg/L), oxidising (269-320 mV) and with low salinity (<0.5 mS/cm). Groundwater on the depot was found to be similar, with slightly higher electrical conductivity (up to 2 mS/cm) and low dissolved oxygen reported (0.1-2.1 mg/L).

The stormwater channel in the west of the site is concrete lined. During sampling by AWT it was reported to be isolated pools of water. During the Stage 1 DSI, the channel contained slow flowing water. At the time of the Auditor's site visit (June 2017), it was isolated pools of water.

Mill Stream to the east of the site is concrete lined for the northern 40 m. AECOM (2010a) reported that Mill Stream received stormwater from upgradient areas, and had an oily-sheen and debris/detritus following rainfall events.

The stormwater channels flow towards surface water features on the golf courses to the south of the site.

5.3 Auditor's Opinion

The Auditor considers that the depth and lateral extent of fill material was not well delineated in some areas, which is likely to result in some uncertainty regarding the volume of material requiring management and/or remediation.

The Auditor considers that the hydrogeology reported is sufficient to characterise the site.

6. EVALUATION OF QUALITY ASSURANCE AND QUALITY CONTROL

The Auditor has assessed the overall quality of the data by review of the information presented in the referenced reports, supplemented by field observations. The data sources are summarised in Table 6.1.

| Table 6.1: Summary of Investigations | | |
|---|--|--|
| Investigations | Field Investigations | Analytical Data Obtained |
| AWT (2001) | Investigation of the former nursery by pushtube drilling, hand auger and hollow flight auger at 24 locations (N1-N21) (Attachment 8, Appendix A). Groundwater monitoring at three wells (GN1-GN3) and surface water sampling from the stormwater drain at one location (SW1). | Soil: TPH, BTEX, PAHs, metals, OCP and PCB Water: nutrients, cations, anions, metals, OCP, PAHs, TPH and BTEX |
| CES (2007) Additional Environmental Site Assessment | Investigation of the depot by pushtube drilling at five locations (BH101-BH105) (Attachment 6, Appendix A), with a further five locations offsite to the southwest (BH106-BH110). The locations were converted into groundwater monitoring wells. Groundwater monitoring from five existing (GD1, GD5, BH12, BH14, BH22) and ten new wells (BH101-BH110) located on the depot and offsite to the southwest (Attachment 6, Appendix A). Surface water sampling from Mill Stream at an upstream and downstream location (SW1 and SW2). | Soil: TPH, BTEX, PAHs and metals Water: TPH, PAHs and metals |
| Geotechnique (2008) Geotechnical Investigation | Geotechnical boreholes (8) and test pits (6) undertaken on the depot. | No samples were collected for analysis. |
| AECOM (2010) Site Condition Report | Validation of virgin excavated natural material (VENM) imported to the depot from construction sites. A stockpile of material present on the site was validated for reuse onsite (SP1-SP8). Assessment of fill material in landscaped areas (SS1-SS4). Groundwater monitoring from ten wells (GD3, GD5, BH12, BH101, BH102, BH105-BH108 and BH110) located on the depot and offsite to the southwest (Attachment 6, Appendix A). | Soil: Typically TPH, BTEX, PAHs, asbestos, metals, OCP, OPP and PCB. Water: TPH, BTEX and PAHs |

| | | |
|-----------------------------|--|---|
| CH2M (2015b) Stage 1 DSI | <p>Investigation of the former nursery and residential property by boreholes (EL01-EL45) (Attachment 9, Appendix A).</p> <p>Surface water from one location within the stormwater drain (SW01) on the nursery (Attachment 10, Appendix A).</p> <p>Sediment from two locations within the stormwater drain (SS01 and SS02) on the nursery (Attachment 10, Appendix A).</p> <p>Groundwater from five wells (GN1A, GN2A, GN3A, GN4 and GN5) and the bore (BS01) on the nursery (Attachment 10, Appendix A).</p> | <p>Soil: TRH, BTEX, PAHs, asbestos, metals, OCP, OPP, PCB, phenol and herbicides</p> <p>Water: TRH, BTEX, PAHs, metals, OCPs, PCBs and inorganics</p> <p>Sediment: TRH, BTEX, PAHs, metals and phenol</p> |
| CH2M (2016) Stage 2 DSI | <p>Investigation of the former nursery and residential property by test pits and surface samples at 51 locations (EL46-EL96) (Attachment 11, Appendix A).</p> <p>Groundwater at four locations (GN1A, GN2A, GN4 and GN5) on the nursery (Attachment 11, Appendix A).</p> | <p>Soil: TRH, BTEX, PAHs, asbestos and metals</p> <p>Water: TRH, BTEX, PAHs, metals, OCPs, OPPs, PCBs, phenols and inorganics</p> |
| PB (2016) Stage 1 and 2 DSI | <p>12 hand auger locations (HA02-HA05, HA07-HA10 and HA12-HA15) on the residential property (Attachment 5, Appendix A).</p> | <p>TRH, BTEX, PAHs, asbestos, metals, OCP, OPP, PCB and herbicides</p> |

The Auditor's assessment follows in Tables 6.2 and 6.3.

| Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment | |
|--|---|
| Sampling and Analysis Plan and Sampling Methodology | Auditor's Opinion |
| <p>Data Quality Objectives (DQO)</p> <p>AWT and CES defined specific DQOs in accordance with the seven step process outlined in DEC (2006) <i>Guidelines for the NSW Site Auditor Scheme</i>.</p> <p>CH2M defined DQOs for the Stage 1 DSI in the SAQP (2015a) and for the Stage 2 DSI in the investigation report (2016).</p> <p>PB (2016) defined DQOs for the Stage 1 and 2 DSI.</p> <p>ENSR (2008) defined DQOs for the remediation of the depot.</p> | <p>These were considered appropriate for the investigations and validation conducted.</p> |
| <p>Sampling pattern and locations</p> <p><i>Soil:</i> AWT investigation locations were spaced to gain coverage of the majority of the site (Attachment 8, Appendix A). The residential property in the east of the site was not included in the AWT investigation.</p> <p>CH2M investigation locations were a combination of grid based and targeted to areas of potential concern,</p> | <p>In the Auditor's opinion these investigation locations adequately target the main areas of concern and adequate coverage of other areas of the site.</p> |

Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment

| Sampling and Analysis Plan and Sampling Methodology | Auditor's Opinion |
|--|---|
| <p>including sheds, maintenance areas, former clubhouse and retaining walls (Attachments 10 and 11, Appendix A).</p> <p>PB investigation locations were in accessible areas of the residential property not previous targeted by CH2M (Attachment 5, Appendix A).</p> <p>CES collected soil samples from the depot using a judgemental sampling pattern. The locations were predominantly along the property boundaries and offsite to the southwest (Attachment 6, Appendix A).</p> <p>AECOM collected samples from fill material within landscaped areas prior to capping, and from material proposed for importation to the depot for use in the capping layer.</p> <p><i>Groundwater:</i> Monitoring wells were spaced across the site at an adequate density, including upgradient and downgradient locations.</p> <p>Groundwater on the residential property was not investigated.</p> | |
| <p>Sampling density</p> <p><i>Soil:</i> The site is approximately 2.75 ha. The EPA (1995) <i>Sampling Design Guidelines</i> require a minimum of 40 locations for site characterisation based on hotspot detection. A total of approximately 142 samples have been undertaken across the site, comprising: 24 locations on the nursery by AWT; 96 locations on the nursery and residential property by CH2M; 12 locations on the residential property by PB and 10 locations on the depot by CES.</p> <p>Stockpile sampling undertaken by AECOM was at a rate of 1/50 m³ for material proposed for reuse on the depot during redevelopment, and 1/500-650 m³ for VENM material proposed for importation to the depot.</p> <p>Sediment samples were collected from the stormwater channel in the west of the site. The channel was reported to be concrete lined, therefore the sample is assumed to have been collected from sediment accumulated in the channel.</p> <p><i>Groundwater:</i> A total of 5 groundwater wells were installed at the nursery. A total of 19 wells were installed on the depot, however only ten remained at the time of the final groundwater monitoring event in 2009. No wells were installed on the residential property.</p> <p><i>Surface water:</i> AWT and CH2M collected one surface water sample from water within the stormwater channel</p> | <p>The sampling density on the depot portion of the site was low (5 locations on 1.3 ha), however previous investigations by AWT and CES included approximately 60 locations. The results of these investigations were summarised by CES (2007), however complete reports were not provided for review. The total sampling density (65 locations) exceeded the minimum required for hotspot detection (25 locations).</p> <p>The sampling density and rate of analysis for asbestos on the depot was low and represents a data gap.</p> <p>Recycled aggregate (DGB20 and DGB40), landscaping material (topsoil and mulch) and quarried material were not analysed by AECOM prior to or following importation to the site.</p> <p>The sampling density for other areas of the site, and for groundwater, sediment and surface water was considered adequate.</p> |

| Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment | |
|--|---|
| Sampling and Analysis Plan and Sampling Methodology | Auditor's Opinion |
| in nursery. CES collected surface water samples from upstream and downstream locations in Mill Stream. | |
| <p>Sample depths</p> <p>Samples were collected and analysed from a range of depths, with the primary intervals being within the shallow fill (0-0.2 mbgl) and 0.5 m intervals and from underlying natural material.</p> <p>PB collected samples from a depth of up to 1 mbgl on the residential property, however samples selected for analysis were typically from the ground surface or 0.3 mbgl.</p> | <p>In the Auditor's opinion, this sampling strategy was largely adequate to characterise the primary material types present on site.</p> <p>Fill material on the depot had significant layering (up to 13 layers over 3 m), with variable composition and thickness. Three to four samples were collected per borehole by CES, with one to two analysed by the laboratory. The sample depths are therefore not sufficient to characterise all fill material on the depot.</p> |
| <p>Well construction</p> <p>AWT wells were installed to depths of 8-12 mbgl, with 4 or 6 m screen intervals. The wells were constructed of 50 mm uPVC. A bentonite seal of approximately 1 m thick was placed above the screen.</p> <p>CH2M installed five wells (GN1-GN5), three replacing the AWT wells that were lost or destroyed, plus two additional wells (GN4 and GN5). The wells were installed to depths of 4-10 mbgl, with 3 m screen intervals. Wells were constructed of 50 mm PVC screen and casing. The annulus was filled with 2 mm filter sand around the screen, with 0.5 m of bentonite pellets used to seal the well and cement slurry used to backfill the well to the ground surface.</p> <p>CES installed five wells on the site (BH101-BH105) and five wells offsite to the southwest (BH106-BH110). Wells were constructed of 40 mm uPVC pipe, with 1.5 m stainless steel screen intervals typically installed at a depths of either 2-3.5 mbgl or 3.5-4 mbgl. The screen interval was backfilled with gravel to 0.5-1 m above the screen. Bentonite chips were used to fill the well to the ground surface.</p> | <p>In the Auditor's opinion the well construction was acceptable.</p> |
| <p>Sample collection method</p> <p><i>Soil:</i> AWT predominantly collected soil samples by pushtube, with some samples collected by hand auger and hollow flight auger.</p> <p>During the CH2M Stage 1 DSI, soil samples were collected by hand auger for the first 1.2 mbgl, with deeper bores advanced by pushtube or solid stem auger. Pushtubes were fitted with clear PVC sleeves and sand</p> | <p>Sample collection by auger and test pit has the potential to result in loss of volatiles. Volatiles were contaminants of concern at the shed and maintenance areas, however were not detected above the PQL. The sampling methods are unlikely to have resulted in significant volatile loss.</p> |

| Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment | |
|--|--|
| Sampling and Analysis Plan and Sampling Methodology | Auditor's Opinion |
| <p>catchers to prevent loss of sample. During the CH2M Stage 2 DSI, samples were mostly collected by test pit excavation, with some surface soil samples collected using hand tools.</p> <p>Sampling undertaken by PB was by hand auger.</p> <p>CES (2007) collected soil samples by pushtube.</p> <p>AECOM collected soil samples by hand using disposable gloves.</p> <p><i>Sediment:</i> Samples were collected using a petite ponar sampling mechanism.</p> <p><i>Groundwater:</i> AWT purged wells with a submersible pump. The method of sample collection was not reported, however is likely to have been via the submersible pump.</p> <p>CH2M collected samples by low flow peristaltic with dedicated sample tubing during the Stage 1 DSI and Micropurge sampling kit during the Stage 2 DSI.</p> <p>AECOM collected groundwater samples using low flow methodology, comprising either micro-purge pump or peristaltic pump with dedicated tubing.</p> <p><i>Surface Water:</i> Grab samples were collected from surface water features on the site.</p> | Overall the sample collection method was found to be acceptable. |
| <p>Decontamination procedures</p> <p>AWT report that all soil and groundwater sampling equipment was washed in a solution of detergent and rinsed with deionised water between samples.</p> <p>CH2M report that a new set of gloves were used to collect each sample. Reusable sampling equipment was decontaminated with a solution of Decon 90 and tap water.</p> <p>PB report that dedicated disposable nitrile gloves were worn for each sample. Decontamination of the hand auger was not expressly reported, however PB report that it was "<i>undertaken after each sampling episode where equipment used was not dedicated</i>".</p> <p>CES report that disposable nitrile gloves and push tube liners were used to collect soil samples.</p> <p>AECOM used disposable nitrile gloves for soil sampling. Dedicated sample tubing and bladder were used for groundwater sampling.</p> | Acceptable |
| <p>Sample handling and containers</p> <p>Samples were placed into prepared and preserved sampling containers provided by the laboratory and chilled during storage and subsequent transport to the</p> | Acceptable |

| Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment | |
|--|--|
| Sampling and Analysis Plan and Sampling Methodology | Auditor's Opinion |
| <p>labs. Samples for asbestos analysis were placed in plastic zip-lock bags.</p> <p>The laboratory noted that some samples supplied for asbestos analysis by CH2M were less than 500 mL, however they also noted that samples were sub-sampled for analysis.</p> <p>Groundwater samples to be analysed for heavy metals were field filtered.</p> | |
| <p>Chain of Custody (COC)</p> <p>Completed chain of custody forms were provided in the reports.</p> | Acceptable |
| <p>Detailed description of field screening protocols</p> <p><i>Soil:</i> Field screening for volatiles was undertaken by AWT, CH2M, PB, CES and AECOM using a photoionisation detector (PID). PB and CES report that a duplicate sample was placed in a zip lock bag for screening. The field screening procedure was not reported by AWT and CH2M.</p> <p>Field screening for ACM was undertaken by CH2M and PB in accordance with the NEPM (2013) methodology. A 10 L sample of soil was collected and screened through a 7 mm sieve, with the collected ACM weighed to quantify asbestos content. Field screening for asbestos was not undertaken by AWT, CES and AECOM as they were prior to release of NEPM (2013).</p> <p><i>Groundwater:</i> Field parameters were measured during well sampling by AWT, CH2M and AECOM. Measurement of parameters during well development by AWT and CH2M was not reported.</p> | Acceptable given the analytical results and observations were consistent with field screening results. |
| <p>Calibration of field equipment</p> <p>AWT did not report calibration of the PID and water quality meter during the Phase 2 ESA.</p> <p>CH2M provide equipment calibration records from the equipment rental company for the water quality meter and PID. Field check records were provided for the PID during the Stage 2 DSI.</p> <p>PB report that the PID was calibrated at the beginning of each day. Records were not provided.</p> <p>CES report that calibration of the PID was undertaken. Records for calibration of the PID were provided.</p> <p>AECOM provided field calibration records for the water quality meter and PID. A certificate from the equipment supplier was also provided in most instances.</p> | Acceptable given that the AWT and PB field results are largely consistent with laboratory analytical results and investigations by CH2M. |
| <p>Sampling logs</p> | Acceptable |

| Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment | |
|---|--------------------------|
| Sampling and Analysis Plan and Sampling Methodology | Auditor's Opinion |
| <p>Soil logs are provided within the AWT, CH2M, PB and CES reports, indicating sample depth, PID readings and lithology.</p> <p>Groundwater field sampling records were not provided by AWT, however field parameters and depth to groundwater were provided in summary tables.</p> <p>CH2M and AECOM provided groundwater field sampling records indicating SWL, field parameters, methodology and observations.</p> | |

| Table 6.3: QA/QC – Field and Lab Quality Assurance and Quality Control | |
|---|--|
| Field and Lab QA/QC | Auditor's Opinion |
| <p>Field quality control samples</p> <p>Field quality control samples generally including trip blanks, trip spikes, rinsate blanks, field intra-laboratory and inter-laboratory duplicates were undertaken.</p> <p>AWT report that field duplicates for metals were homogenised in a stainless steel tray. Duplicates for organic compounds were placed directly into sample containers.</p> <p>No trip spikes were analysed by AWT. This was not considered to affect the usability of the data since volatile compounds (including BTEX and TRH C₆-C₁₀) were not detected in the soil samples analysed.</p> <p>CES did not collect rinsate blanks as dedicated and disposable equipment was used.</p> <p>AECOM did not collect trip blanks and trip spikes. It is not clear why the rinsate was collected given that disposable sampling equipment was used.</p> | <p>Overall, considered acceptable given the contaminants of concern, methodology adopted and results presented.</p> |
| <p>Field quality control results</p> <p>The results of field quality control samples were generally within appropriate limits. The following exceptions were noted:</p> <ul style="list-style-type: none"> Relative Percent Differences (RPDs) for soil duplicate samples for metals ranged from 0 to 180%. AWT reported that the exceedances were a result of low contaminant concentrations and difficulties in collecting representative samples from fill material. Elevated RPDs for PAHs were reported for soil duplicates and triplicates during the Stage 2 DSI. These were typically in samples with low contaminant concentrations. | <p>Overall, in the context of the dataset reported, the issues identified are not considered significant and the field quality control results are acceptable.</p> |

| Table 6.3: QA/QC – Field and Lab Quality Assurance and Quality Control | |
|--|---|
| Field and Lab QA/QC | Auditor's Opinion |
| <ul style="list-style-type: none"> Zinc (0.014 mg/L) was detected in a rinsate blank during the AWT investigation. Zinc was also detected in rinsate and trip blanks analysed during the Stage 1 DSI. Copper was detected in the trip blanks, but not in the rinsate blanks. Elevated RPDs were reported for DDE, benz(a)anthracene and benzo(g,h,i)perylene in soil duplicates and triplicates during the PB Stage 1 and 2 DSI. These were attributed to low concentrations. Elevated RPDs were reported by CES in duplicate and triplicate samples for TPH, PAHs and nickel. CES considered these to be due to heterogeneity of the fill material and the highest result was adopted. | |
| <p>NATA registered laboratory and NATA endorsed methods</p> <p>Laboratories used included the following:</p> <ul style="list-style-type: none"> AWT - AWT (metals) and Amdel (organics). CH2M - SGS (primary) and Envirolab (secondary). PB – ALS (primary) and Envirolab (secondary). CES – ALS (primary) and LabMark (secondary). AECOM – LabMark (primary) and ALS (secondary). <p>Laboratory certificates were NATA stamped. Analysis of soil samples for asbestos in accordance with the NEPM (2013) requirements was not NATA accredited.</p> | Acceptable |
| <p>Analytical methods</p> <p>Analytical methods references and descriptions were included in the laboratory test certificates.</p> | Acceptable |
| <p>Holding times</p> <p>Review of the COCs and laboratory certificates indicate that the holding times had generally been met.</p> <p>CH2M report that pH was outside of holding time by two days in 13 samples. VOC and SVOC analysis was outside the holding time by one day for one sample (EL55_0.1) during the Stage 2 DSI. The non-conformance was considered minor and on a non-critical sample.</p> | Acceptable The Auditor notes that VOC and SVOC results for sample EL55_0.1 were not included in the data set. |
| <p>Practical Quantitation Limits (PQLs)</p> <p><i>Soil:</i> PQLs were less than the threshold criteria for the contaminants of concern.</p> <p><i>Groundwater:</i> The following trigger values were less than the PQLs:</p> <ul style="list-style-type: none"> Mercury 0.1 µg/L, trigger value 0.06 µg/L Cadmium 0.1 µg/L, trigger value 0.06 µg/L | <p><i>Soil:</i> Overall the soil PQLs are acceptable.</p> <p><i>Groundwater:</i> The elevated PQLs were only marginally elevated above the trigger values. Overall these discrepancies do not materially affect the outcome of the audit.</p> |

| Table 6.3: QA/QC – Field and Lab Quality Assurance and Quality Control | |
|--|---|
| Field and Lab QA/QC | Auditor's Opinion |
| <ul style="list-style-type: none"> • Anthracene 0.1-1 µg/L, trigger value 0.01 µg/L • Phenanthrene 0.1-1 µg/L, trigger value 0.6 µg/L • Benzo(a)pyrene 0.1-1 µg/L, trigger value 0.1 µg/L | |
| <p>Laboratory quality control samples</p> <p>Laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks, internal standards and duplicates were undertaken by the laboratory.</p> <p>No quality control samples were undertaken during asbestos analysis.</p> | Acceptable |
| <p>Laboratory quality control results</p> <p>The results of laboratory quality control samples were generally within appropriate limits, with the following exceptions:</p> <ul style="list-style-type: none"> • Elevated RPDs for PAHs and metals were reported in soil laboratory duplicates with low concentrations. The laboratories cited heterogeneity of the samples as the reason for the elevated RPDs. • Low matrix spike recoveries for mercury and zinc were reported during analysis for the CH2M Stage 1 ESA. • A marginally elevated surrogate recovery (131%) was reported in one sample during the PB Stage 1 and 2 DSI. • CES reported low laboratory control sample recovery for PAHs and high surrogate recoveries for volatile TRH/BTEX in three samples. | In the context of the dataset reported, the issues identified are not considered significant and the laboratory quality control results are acceptable. |
| <p>Data Quality Indicators (DQI) and Data Evaluation (completeness, comparability, representativeness, precision, accuracy)</p> <p>AWT undertook a QA/QC data evaluation against the five category areas and concluded that the data was adequately precise, accurate, representative, comparable and complete.</p> <p>CH2M undertook a QA/QC data evaluation against the five category areas during the Stage 1 DSI and Stage 2 DSI and concluded that <i>"the data is considered to be of sufficient quality to meet the objectives of the investigation"</i>.</p> <p>PB undertook a QA/QC data evaluation against the five category areas. Based on the review they concluded that <i>"...the data were considered representative and appropriate for use in this assessment"</i>.</p> <p>CES undertook a data usability assessment against the five category areas and concluded <i>"...that data are of acceptable quality for this assessment"</i>.</p> | An assessment of the data quality with respect to the five category areas has been undertaken by the auditor and is summarised below. |

| Table 6.3: QA/QC – Field and Lab Quality Assurance and Quality Control | |
|---|--------------------------|
| Field and Lab QA/QC | Auditor's Opinion |
| During the GME, AECOM assessed QA/QC data against the five category areas. A number of minor issues were identified. They did not provide an overall conclusion on the quality of the data. During validation of remediation, AECOM undertook an assessment of the QA/QC data and concluded that <i>"...the reported results are considered to be reliable and representative of the stockpiled material and the overall quality of the analytical data produced is acceptably reliable for the purpose of the investigation"</i> . | |

In considering the data as a whole the Auditor concludes that:

- The data is likely to be representative of the different material types present and the overall site conditions.
- The data is not complete. Data gaps identified include the low density of asbestos analysis of fill material on the depot. Imported recycled aggregate, landscaping material and quarried material was not analysed.
- There is a reasonable degree of confidence that data is comparable for each sampling and analytical event. Some sampling methodology varied between the different investigations, however this is not considered to have resulted in significant uncertainty in the data.
- The data is considered to be of sufficient precision. The analytical results of field and laboratory duplicates indicate that fill material is heterogeneous.
- The data is likely to be accurate.

7. ENVIRONMENTAL QUALITY CRITERIA

The Auditor has assessed **soil** data with reference to criteria from National Environmental Protection Council (NEPC) *National Environmental Protection (Assessment of Site Contamination) Measure 1999*, as Amended 2013 (NEPM, 2013).

Based on the likely future land use (medium to high density residential), the Tier 1 (screening) criteria for 'residential with minimal opportunities for soil access' or an Urban Residential setting were referred to.

- Human Health Assessment
 - Health Based Investigation Levels (HIL B)
 - Soil Health Screening Levels (HSL A and HSL B) for Vapour Intrusion. The most conservative criteria were adopted i.e. assumed depth to source <1 m and sand.
 - CRC CARE (2011) Direct Contact (HSL B and intrusive maintenance worker)
 - Asbestos Health Screening Levels (HSL B).
- Terrestrial Ecological Assessment
 - Ecological Screening Levels (ESL Urban Residential) assuming coarse soil.
 - Ecological Investigation Levels (EIL Urban Residential). Site specific EILs have been derived assuming the contamination is "aged", low traffic volume, 1% clay content and using a site specific pH value of 7. The most conservative cation exchange capacity (CEC) value was adopted.
- Management Limits (ML Residential) assuming coarse soil.
- Aesthetics
 - The Auditor has considered the need for remediation based on the 'aesthetic' contamination as outlined in the NEPM (2013).

The Auditor has assessed the **groundwater** and **surface water** data provided with reference to Tier 1 (screening) criteria from the following:

- Human Health Assessment
 - NEPM (2013) Groundwater Health Screening Levels (HSL A and HSL B) for vapour intrusion (sand, 4 to <8 m)
 - ADWG (2011) criteria with a factor of 10 for recreational use (for non-volatiles).
- Ecological Assessment
 - Groundwater Investigation Levels (GILs) listed in NEPM (2013) for protection of aquatic ecosystems referenced in ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Trigger values (TVs) provided are concentrations that, if exceeded, indicate a potential environmental problem at the point of use and 'trigger' further investigation. The freshwater 95% level of protection was adopted. Some have been modified based on bioaccumulation or acute-toxicity or potential toxicity to particular species.

Registered bores identified within 500 m of the site are for domestic, recreational or irrigation purposes. Groundwater may therefore be used for these purposes, however potable use is considered unlikely given that a reticulated water supply is present in the area. The NHMRC and NRMMC (2011) *Australian Drinking Water Guidelines* have therefore not been adopted.

Criteria for **asbestos** are provided in the NEPM (2013). Criteria considered by the Auditor are for residential B and are summarised as follows:

- Less than 0.04% asbestos as asbestos containing material (ACM)

- Less than 0.001% asbestos as asbestos fines (AF) or fibrous asbestos (FA)
- No visible asbestos on the surface

The Auditor has assessed the **sediment** data against the ANZECC (2000) sediment quality guidelines in accordance with the decision tree in Figure 3.5.1 of the guidelines. ANZECC (2000) provides Interim Sediment Quality Guideline (ISQG)-Low (less than 10% probability of effects) and ISQG-High concentrations (> 50% probability of effects). The criteria apply to 'slightly to moderately' and highly disturbed ecosystems.

The ANZECC (2000) assessment uses a decision process where:

- The concentrations are initially compared to the ISQG low concentrations; if above these
- The concentrations are compared to background sediment concentrations; if above these
- Factors controlling bioavailability need to be considered before the process continues (factors include solid phase speciation and pore water concentration).

Given that bioavailability studies have not been completed, where the concentrations detected are above the ISQG-low values, it is not possible to reach a conclusion about the risk to the ecosystem using the ANZECC (2000) guidelines.

The environmental quality criteria referenced by the Auditor are largely consistent with those adopted by CH2M and PB, however they adopted criteria protective of residents with accessible soil.

The criteria adopted by AWT, CES and AECOM referenced the superseded NEPM (1999) and NSW EPA (1994) *Guidelines for Assessing Service Station Sites*. The Auditor has referred to the adopted guidelines above in interpreting the AWT, CES and AECOM results.

8. EVALUATION OF SOIL ANALYTICAL RESULTS

The analytical results from the investigations summarised in Table 6.1 have been assessed against the environmental quality criteria. Analytical results were separated based on the material type and area.

8.1 Former Nursery

The results of investigations of the former nursery area by AWT and CH2M are summarised in Table 8.1 (fill material) and Table 8.2 (natural material). The investigation locations are shown on Attachments 9-11 in Appendix A.

| Table 8.1: Evaluation of Fill Material Analytical Results – Former Nursery - Summary Table (mg/kg) | | | | | |
|---|----------|-------------------|----------------|--|--|
| Analyte | n | Detections | Maximum | n > Human Health Screening Criteria (NEPM, 2013) | n > Terrestrial Ecological Screening Criteria (NEPM, 2013) |
| Asbestos as AF&FA (%) | 14 | 1 | 0.017% | 1 | - |
| Asbestos as ACM (%) | 6 | 6 | 0.236% | 4 | - |
| Arsenic | 95 | 51 | 47 | 0 | 0 |
| Cadmium | 95 | 44 | 1.54 | 0 | - |
| Total Chromium | 95 | 94 | 174 | 0 | 0 |
| Copper | 95 | 95 | 540 | 0 | 3 |
| Lead | 95 | 94 | 4,880 | 1 | 1 |
| Mercury (inorganic) | 95 | 77 | 110 | 0 | - |
| Nickel | 95 | 92 | 161 | 0 | 21 |
| Zinc | 95 | 95 | 390 | 0 | 2 |
| TRH (C ₆ -C ₁₀ - BTEX) | 66 | 1 | 5 | 0 | 0 |
| TRH (>C ₁₀ -C ₁₆ - naphthalene) | 66 | 3 | 3,600 | 0 | 1 |
| TRH (>C ₁₆ -C ₃₄) | 66 | 11 | 2,900 | 1 | 3 |
| TRH (>C ₃₄ -C ₄₀) | 66 | 4 | 160 | 0 | 0 |
| BTEX | 62 | 0 | <PQL | 0 | 0 |
| Naphthalene | 74 | 0 | <PQL | 0 | 0 |
| Total PAHs | 66 | 35 | 21 | 0 | - |
| Carcinogenic PAHs | 66 | 27 | 3.1 | 0 | - |
| Benzo(a)pyrene | 66 | 27 | 2.1 | - | 5 |
| OCP | 16 | 0 | <PQL | 0 | 0 |
| OPP | 9 | 0 | <PQL | 0 | - |
| Phenol | 9 | 0 | <PQL | 0 | - |
| PCB | 17 | 0 | <PQL | 0 | - |
| Herbicides | 8 | 0 | <PQL | - | - |

n number of samples
- No criteria available/used

NL Non-limiting
<PQL Less than the practical quantitation limit

Analytical results for natural material in the nursery portion of the site are summarised in Table 8.2.

| Table 8.2: Evaluation of Natural Soil Analytical Results – Former Nursery - Summary Table (mg/kg) | | | | | |
|--|----------|-------------------|----------------|--|--|
| Analyte | n | Detections | Maximum | n > Human Health Screening Criteria (NEPM, 2013) | n > Terrestrial Ecological Screening Criteria (NEPM, 2013) |
| Asbestos as AF&FA (%) | 0 | - | - | 0 | - |
| Asbestos as ACM (%) | 0 | - | - | 0 | - |
| Arsenic | 45 | 25 | 24 | 0 | 0 |
| Cadmium | 45 | 18 | 0.3 | 0 | - |
| Total Chromium | 45 | 43 | 20 | 0 | 0 |
| Copper | 45 | 38 | 31.4 | 0 | 0 |
| Lead | 45 | 40 | 75 | 0 | 0 |
| Mercury (inorganic) | 45 | 26 | 3.7 | 0 | - |
| Nickel | 45 | 37 | 54.2 | 0 | 1 |
| Zinc | 45 | 41 | 160 | 0 | 0 |
| TRH (C ₆ -C ₁₀ - BTEX) | 20 | 0 | <PQL | 0 | 0 |
| TRH (>C ₁₀ -C ₁₆ - naphthalene) | 20 | 0 | <PQL | 0 | 0 |
| TRH (>C ₁₆ -C ₃₄) | 20 | 2 | 220 | 0 | 0 |
| TRH (>C ₃₄ -C ₄₀) | 20 | 0 | <PQL | 0 | 0 |
| BTEX | 19 | 0 | <PQL | 0 | 0 |
| Naphthalene | 17 | 0 | <PQL | 0 | 0 |
| Total PAHs | 17 | 5 | 23.9 | 0 | - |
| Carcinogenic PAHs | 17 | 5 | 2.7 | 0 | - |
| Benzo(a)pyrene | 17 | 5 | 2.1 | - | 2 |
| OCP | 1 | 0 | <PQL | 0 | 0 |
| PCB | 1 | 0 | <PQL | 0 | - |

n number of samples
- No criteria available/used
NL Non-limiting
<PQL Less than the practical quantitation limit

In reviewing the analytical results, the Auditor notes the following:

- Fill material at the nursery is variable and appears to be from a number of different sources.
- Fill material containing anthropogenic material such as brick, concrete and tile typically contained elevated concentrations of metals and PAHs and fragments of ACM. The material

was identified in the west (former mechanical shed), in the northwest beneath the old pot bazaar, and in the south of the central area (former clubhouse).

- ACM concentrations above the adopted criteria were identified in fill material in the south and northwest of the site. Field quantification of ACM was undertaken at a low density, and is likely to be present throughout material containing anthropogenic material in these areas. Field quantification of asbestos was not undertaken in the west of the site as no fragments of ACM were observed during the test pit investigation. Given the presence of anthropogenic material in the west of the site, there is considered to be high likelihood of some ACM.
- Friable asbestos was detected in one sample of fill material collected from the south of the central area (former clubhouse). The asbestos was present as asbestos fines and fibrous asbestos (AF and FA) measuring >2 mm to <7 mm.
- Elevated semi-volatile TRH concentrations were reported in shallow fill material (0.4 mbgl) in the west of the former nursery beneath the former mechanical shed and battery storage area. The F2 concentration (TRH C₁₀-C₁₆ minus naphthalene) exceeded the HSL (110 mg/kg) for vapour intrusion. The TRH concentration was less than the direct contact HSLs, being 4,200 mg/kg for medium density residential and 62,000 mg/kg for intrusive maintenance workers. The extent of the contamination has not been well defined to the east and south, however is likely to be fairly localised considering the potential source.
- A significantly elevated lead concentration (4,880 mg/kg) was reported in a sample of fill material collected by AWT in the carpark (N2). The lead exceeds the HIL by more than 250%. Further investigation of the area by CH2M did not identify significantly elevated lead concentrations and were less than the human health criteria.
- Concentrations of benzo(a)pyrene and some metals (copper, lead, nickel and zinc) exceeded the adopted ecological criteria in material also containing anthropogenic material and ACM that would not be suitable for use.
- Fill material in other areas of the former nursery comprised sand and sandstone, with no or limited anthropogenic material. This material did not contain contaminant concentrations exceeding the adopted human health criteria and no fragments of ACM were observed.
- Natural sand underlying the fill material had low metals concentrations, with a limited number of PAH detections below the adopted human health criteria. It is not clear if this represents cross contamination from overlying fill material or leaching through the soil profile. It is noted that samples of natural material containing PAHs were collected during the Stage 1 DSI and were often collected from the interface with overlying fill material. CH2M undertook testing of leachability for waste disposal, however this was undertaken using acidic conditions and is therefore not representative of conditions on the site.

8.2 Residential Property

The results of investigations of the residential property by CH2M and PB are summarised in Table 8.3 (fill material) and Table 8.4 (natural material). The investigation locations are shown on Attachment 5 in Appendix A.

| Table 8.3: Evaluation of Fill Material Analytical Results – Residential Property - Summary Table (mg/kg) | | | | | |
|---|----------|-------------------|----------------|--|--|
| Analyte | n | Detections | Maximum | n > Human Health Screening Criteria (NEPM, 2013) | n > Terrestrial Ecological Screening Criteria (NEPM, 2013) |
| Asbestos as FA&FA (%) | 17 | 3 | 0.004% | 3 | 0 |
| Asbestos as ACM (%) | 12 | 5 | 0.3% | 5 | 0 |
| Arsenic | 16 | 7 | 17 | 0 | 0 |

Table 8.3: Evaluation of Fill Material Analytical Results – Residential Property - Summary Table (mg/kg)

| Analyte | n | Detections | Maximum | n > Human Health Screening Criteria (NEPM, 2013) | n > Terrestrial Ecological Screening Criteria (NEPM, 2013) |
|---|----|------------|--------------|---|---|
| Cadmium | 16 | 3 | 5 | 0 | - |
| Total Chromium | 16 | 15 | 39 | 0 | 0 |
| Copper | 16 | 16 | 1,000 | 0 | 4 |
| Lead | 16 | 16 | 539 | 0 | 0 |
| Mercury (inorganic) | 16 | 13 | 0.94 | 0 | - |
| Nickel | 16 | 15 | 34 | 0 | 0 |
| Zinc | 16 | 16 | 871 | 0 | 6 |
| TRH (C ₆ -C ₁₀ - BTEX) | 16 | 0 | <PQL | 0 | 0 |
| TRH (>C ₁₀ -C ₁₆ - naphthalene) | 16 | 0 | <PQL | 0 | 0 |
| TRH (>C ₁₆ -C ₃₄) | 16 | 6 | 380 | 0 | 2 |
| TRH (>C ₃₄ -C ₄₀) | 16 | 2 | 210 | 0 | 0 |
| Benzene | 16 | 0 | <PQL | 0 | 0 |
| Toluene | 16 | 0 | <PQL | 0 | 0 |
| Ethylbenzene | 16 | 0 | <PQL | 0 | 0 |
| Xylenes | 16 | 1 | 0.8 | 0 | 0 |
| Naphthalene | 15 | 0 | <PQL | 0 | 0 |
| Total PAHs | 15 | 14 | 30.9 | 0 | - |
| Carcinogenic PAHs | 15 | 9 | 5 | 1 | - |
| Benzo(a)pyrene | 15 | 9 | 3.4 | - | 6 |
| OCP | 12 | 3 | 0.79* | 0 | 0 |
| OPP | 12 | 0 | <PQL | 0 | - |
| Phenol | 1 | 0 | <PQL | 0 | - |
| PCB | 12 | 0 | <PQL | 0 | - |
| Herbicides | 12 | 0 | <PQL | - | - |

n number of samples
 - No criteria available/used
 NL Non-limiting
 <PQL Less than the practical quantitation limit
 * Detections were DDT+DDE+DDD

Analytical results for natural material are summarised in Table 8.2.

Table 8.4: Evaluation of Natural Soil Analytical Results - Residential Property – Summary Table (mg/kg)

| Analyte | n | Detections | Maximum | n > Human Health Screening Criteria (NEPM, 2013) | n > Terrestrial Ecological Screening Criteria (NEPM, 2013) |
|---|----|------------|-------------|--|--|
| Asbestos as FA&FA (%) | 1 | 0 | <PQL | 0 | - |
| Asbestos as ACM (%) | 1 | 0 | <PQL | 0 | - |
| Arsenic | 13 | 1 | 13 | 0 | 0 |
| Cadmium | 13 | 0 | <PQL | 0 | - |
| Total Chromium | 13 | 8 | 12 | 0 | 0 |
| Copper | 13 | 8 | 38 | 0 | 0 |
| Lead | 13 | 8 | 139 | 0 | 0 |
| Mercury (inorganic) | 13 | 3 | 0.1 | 0 | - |
| Nickel | 13 | 6 | 7 | 0 | 0 |
| Zinc | 13 | 11 | 247 | 0 | 0 |
| TRH (C ₆ -C ₁₀ - BTEX) | 13 | 0 | <PQL | 0 | 0 |
| TRH (>C ₁₀ -C ₁₆ - naphthalene) | 13 | 0 | <PQL | 0 | 0 |
| TRH (>C ₁₆ -C ₃₄) | 13 | 2 | 1600 | 0 | 1 |
| TRH (>C ₃₄ -C ₄₀) | 13 | 1 | 600 | 0 | 0 |
| BTEX | 13 | 0 | <PQL | 0 | 0 |
| Naphthalene | 13 | 0 | <PQL | 0 | 0 |
| Total PAHs | 13 | 6 | 23.8 | 0 | - |
| Carcinogenic PAHs | 13 | 2 | 3.3 | 1 | - |
| Benzo(a)pyrene | 13 | 2 | 2.5 | - | 1 |
| OCP | 11 | 0 | <PQL | 0 | 0 |
| OPP | 11 | 0 | <PQL | 0 | - |
| PCB | 11 | 0 | <PQL | 0 | - |
| Herbicides | 1 | 0 | <PQL | - | - |

n number of samples
 - No criteria available/used
 NL Non-limiting
 <PQL Less than the practical quantitation limit

In reviewing the analytical results, the Auditor notes the following:

- Fill material on the residential property was typically 0.3 m thick and comprised silty sand with occasional ash, glass, brick, concrete, tile and ACM. The anthropogenic material was mostly identified in the south of the residential property and typically contained elevated concentrations of metals and PAHs and bonded and friable asbestos as fragments of ACM and AF&FA.
- Asbestos concentrations were above the adopted criteria in fill material. Field quantification of ACM and laboratory analysis for AF&FA identified concentrations exceeding the criteria in the

west and south of the site where anthropogenic material was observed in fill material (Attachment 5, Appendix A). The laboratory reported that bonded and friable fragments of ACM were identified in soil samples.

- Asbestos is associated with fill material containing anthropogenic material. There is a high likelihood of asbestos being present where fill material containing anthropogenic material is present. Asbestos was also identified in building material in the structures present on the site.
- Elevated TRH >C₁₆-C₃₄ concentrations were reported in fill and natural sand from the south of the residential property. The reported concentrations exceeded the ecological criteria (300 mg/kg), however were less than the management limits (2,500 mg/kg). The source of the elevated TRH concentrations is not known.
- Carcinogenic PAHs exceeded the human health criteria in fill material (HA13) and natural soil (HA10) in the south of the site. The sample of natural material was collected from the interface with overlying fill material. It is not clear if this represents cross contamination from overlying fill material or leaching through the soil profile. CH2M and PB undertook testing of leachability for waste disposal, however this was undertaken using acidic conditions and is therefore not representative of conditions on the site.
- Concentrations of benzo(a)pyrene and some metals (copper and zinc) exceeded the adopted ecological criteria. Detections were often in material also containing anthropogenic material and ACM that would not be suitable for use.
- OCPs were detected in samples of fill material on the residential property. The reported concentrations were orders of magnitude below the human health and ecological criteria.

8.3 Depot

Investigation of the site was undertaken by CES (2007) in 2006, with additional investigations undertaken by AWT and CES however the reports were not provided to the Auditor for review. A summary was provided by CES (2007), which has been considered in assessing the analytical results for the depot below.

Remediation and validation of the depot was undertaken during redevelopment in 2009. Remediation involved capping of contaminated fill material to make the depot suitable for ongoing commercial/industrial land use. Capping comprised new buildings, bitumen and concrete paving, and 350 mm of imported material and a marker mesh in landscaped areas.

The results of the CES investigation undertaken prior to remediation and redevelopment of the depot are presented in Table 8.5 below. The results are considered to be representative of material present below the capping layer. The investigation locations are shown on Attachment 6 in Appendix A.

| Table 8.5: Evaluation of Fill Material Analytical Results – Depot - Summary Table (mg/kg) | | | | | |
|--|----------|-------------------|----------------|--|--|
| Analyte | N | Detections | Maximum | n > Human Health Screening Criteria (NEPM, 2013) | n > Terrestrial Ecological Screening Criteria (NEPM, 2013) |
| Asbestos | 4 | 1 | Detection | - | - |
| Arsenic | 24 | 7 | 19 | 0 | 0 |
| Cadmium | 24 | 6 | 3 | 0 | - |
| Total Chromium | 24 | 23 | 25 | 0 | 0 |
| Copper | 24 | 21 | 344 | 0 | 0 |
| Lead | 24 | 22 | 1,510 | 1 | 1 |
| Mercury (inorganic) | 24 | 15 | 1.1 | 0 | - |

| Table 8.5: Evaluation of Fill Material Analytical Results – Depot - Summary Table (mg/kg) | | | | | |
|--|----------|-------------------|----------------|--|--|
| Analyte | N | Detections | Maximum | n > Human Health Screening Criteria (NEPM, 2013) | n > Terrestrial Ecological Screening Criteria (NEPM, 2013) |
| Nickel | 24 | 21 | 20 | 0 | 0 |
| Zinc | 24 | 21 | 1,220 | 0 | 5 |
| TPH (C ₆ -C ₉) | 17 | 1 | 8 | 0 | 0 |
| TPH (C ₁₀ -C ₁₄) | 17 | 4 | 900 | 2 | 2 |
| TPH (C ₁₅ -C ₂₈) | 17 | 11 | 25,200 | 5 | 5 |
| TPH (C ₂₉ -C ₃₆) | 17 | 12 | 11,700 | 5 | 5 |
| Benzene | 13 | 1 | 3 | 1 | 0 |
| Toluene | 13 | 1 | 1.5 | 0 | 0 |
| Ethylbenzene | 13 | 1 | 0.6 | 0 | 0 |
| Xylenes | 13 | 1 | 3.8 | 0 | 0 |
| Naphthalene | 24 | 4 | 23.7 | 1 | 0 |
| Total PAHs | 24 | 23 | 2,704 | 3 | - |
| Carcinogenic PAHs | 24 | 20 | 316 | 8 | - |
| Benzo(a)pyrene | 24 | 20 | 213 | - | 19 |

n number of samples
 - No criteria available/used
 NL Non-limiting
 <PQL Less than the practical quantitation limit
 * Detections were DDT+DDE+DDD

Analytical results for material used in capping layers beneath concrete and asphalt hardstand are summarised in Table 8.6. The results include material stockpiled on the depot that was reused onsite to backfill service trenches, and imported VENM from development sites. AECOM did not sample material imported to the site from commercial suppliers, including recovered aggregate, quarried products, topsoil and mulch.

The thickness and composition of the capping layer varied depending on the proposed use of the area. The extent of the different capping layers is shown on Attachments 7 and 12 in Appendix A.

| Table 8.6: Evaluation of Capping Material – Depot – Summary Table (mg/kg) | | | | | |
|--|----------|-------------------|----------------|--|--|
| Analyte | n | Detections | Maximum | n > Human Health Screening Criteria (NEPM, 2013) | n > Terrestrial Ecological Screening Criteria (NEPM, 2013) |
| Asbestos | 20 | 0 | Not detected | - | - |
| Arsenic | 20 | 12 | 8 | 0 / 500 | 0 / 100 |
| Cadmium | 20 | 0 | <PQL | 0 / 150 | - |
| Total Chromium | 20 | 20 | 19 | 0 / 500 | 0 / 190 |
| Copper | 20 | 12 | 32 | 0 / 30000 | 0 / 560 |

Table 8.6: Evaluation of Capping Material – Depot – Summary Table (mg/kg)

| Analyte | n | Detections | Maximum | n > Human Health Screening Criteria (NEPM, 2013) | n > Terrestrial Ecological Screening Criteria (NEPM, 2013) |
|--|----|------------|---------|---|---|
| Lead | 20 | 20 | 22 | 0 | 0 |
| Mercury (inorganic) | 20 | 2 | 0.07 | 0 | - |
| Nickel | 20 | 6 | 23 | 0 | 0 |
| Zinc | 20 | 15 | 124 | 0 | 0 |
| TRH (C ₆ -C ₁₀ - BTEX) | 20 | 0 | <PQL | 0 | 0 |
| TRH (>C ₁₀ -C ₁₆ - naphthalene) | 20 | 0 | <PQL | 0 | 0 |
| TRH (>C ₁₆ -C ₃₄) | 20 | 0 | <PQL | 0 | 0 |
| TRH (>C ₃₄ -C ₄₀) | 20 | 0 | <PQL | 0 | 0 |
| BTEX | 20 | 0 | <PQL | 0 | 0 |
| Naphthalene | 20 | 0 | <PQL | 0 | 0 |
| Total PAHs | 20 | 1 | 1.6 | 0 | - |
| Carcinogenic PAHs | 20 | 2 | 0.5 | 0 | - |
| Benzo(a)pyrene | 20 | 0 | <PQL | - | 0 |
| OCP | 20 | 0 | <PQL | 0 | 0 |
| OPP | 20 | 0 | <PQL | 0 | - |
| PCB | 20 | 0 | <PQL | 0 | - |

n number of samples
 - No criteria available/used
 NL Non-limiting
 <PQL Less than the practical quantitation limit

In reviewing the analytical results, the Auditor notes the following:

- Fill material on the depot was typically >3 m thick and variable in composition. It was variously noted to consist of sand, clay, silt, gravel, bitumen, ash, sandstone, coal, concrete, bricks, metal, terracotta, plastic, timber, slag, shale, charcoal, glass and carbonaceous materials.
- Asbestos was detected in one sample (SS1) of fill material within a landscaped area in the northeast of the depot. The sample contained a fragment of ACM. Previous investigations included asbestos analysis at a low density (5 fill samples) and identified asbestos in one borehole (D20) in the south of the depot at a depth of 1 mbgl. Fragments of ACM were not noted in the borehole logs, however the investigation methodology (pushtube) would have limited the potential to observe fragments of ACM. Test pits undertaken by Geotechnique did not note observations of ACM fragments, however these were undertaken for geotechnical purposes. Given the presence of anthropogenic material, the low sampling density for asbestos and the investigation methodology adopted, there is a high likelihood of asbestos being present in fill material on the depot.
- Fill material contained elevated concentrations of some metals, particularly lead and zinc. Lead exceeded the adopted human health criteria (1,200 mg/kg) in a sample of fill material from BH105 in the south of the site, which was noted to be "*gravel, black, PAH odour*". Previous investigation by AWT and CES identified an elevated lead concentration

(6,840 mg/kg) in the southwest of the site at a depth of 0.3 mbgl. Other samples were less than the human health criteria, however a number of exceedances of the ecological criteria were reported for nickel, zinc and lead.

- The highest TPH and PAH concentrations and the only detections of BTEX were in the sample of fill material from BH105. The benzene, naphthalene and TPH C₁₀-C₁₄ concentrations exceeded the human health criteria for vapour intrusion (assuming the source is between 0 and 1 mbgl). Concentrations of total PAHs and carcinogenic PAHs exceeded the human health criteria for direct contact and ingestion. The source of the volatile hydrocarbons was not identified by CES, however the Auditor does not consider it to be indicative of widespread contamination given that previous investigation of the depot by AWT did not identify volatile contaminants above the detection limit (including one location adjacent to BH105), and groundwater investigations have not identified elevated concentrations of BTEX and TPH C₆-C₁₀.
- Elevated TPH and PAH concentrations were also reported in shallow fill material and deeper natural soil in BH103 and BH104 in the southeast of the depot. The borehole logs report that the samples of natural material were from clayey silt at the depth where groundwater was intercepted and appears to be associated with peaty materials. The samples were from approximately 0.5 m below the interface with overlying fill material. Previous investigations by AWT and CES also identified elevated PAH concentrations in samples of fill material across the depot, from the ground surface to depths of up to 4 mbgl.
- Fill material was not analysed by CES for OCPs, OPPs and PCBs, however previous investigations typically did not detect them at concentrations above the PQL.
- Roadbase used beneath concrete and asphalt in capping layers was recycled material. AECOM inspected the source site and did not note odours, staining or anthropogenic inclusions (including ACM). Test results provided by the product supplier (Boral) indicate that metals and foreign material. Samples of material imported to the site were not collected for analysis.
- Imported VENM from quarries and construction sites used beneath concrete and asphalt capping layers. The material was inspected upon importation and noted to be free from visual evidence of contamination. Sampling of material from construction sites indicated that it was VENM. Samples of VENM imported from quarries were not collected for analysis.
- Imported topsoil and mulch used in landscaped areas was sourced from Australian Native Landscapes (ANL). The material was not sampled for analysis and records of inspections of imported material were not provided by AECOM (2010a).

8.4 Auditor's Opinion

The Auditor is satisfied that the site has been adequately characterised to allow planning for remediation/management to allow future medium density residential land use. The major source of contamination on the site is fill material containing anthropogenic material (including asbestos fragments) and elevated concentrations of some contaminants, particularly PAHs and TPHs on the depot portion of the site. Asbestos, as bonded and friable fragments of ACM, was identified in fill material on the nursery, residential property and depot. The extent of asbestos contamination on the depot is a data gap, however is likely to be present where fill material containing anthropogenic material is present. The vertical and lateral extent of fill material has not been precisely delineated in some areas, however is largely known.

Imported recycled aggregate and landscaping material was not sampled upon importation to the depot during remediation and redevelopment in 2009. The contamination status of the material represents a data gap.

9. EVALUATION OF SEDIMENT ANALYTICAL RESULTS

CH2M collected two samples (SS01 and SS02) of sediment from the stormwater drain within the nursery during the Stage 1 DSI (Attachment 10, Appendix A). The samples were analysed for metals, TRH, BTEX and PAHs. The analytical results are summarised in Table 9.1.

| Table 9.1: Evaluation of Sediment Analytical Results – Summary Table (mg/kg) | | | | | |
|---|----------|-------------------|----------------|---|--|
| Analyte | n | Detections | Maximum | n > ISQG Low (ANZECC, 2000) | n > ISQG High (ANZECC, 2000) |
| Arsenic | 2 | 1 | 6 | 0 | 0 |
| Cadmium | 2 | 1 | 0.5 | 0 | 0 |
| Total Chromium | 2 | 2 | 19 | 0 | 0 |
| Copper | 2 | 2 | 83 | 1 | 0 |
| Lead | 2 | 2 | 170 | 1 | 0 |
| Mercury (inorganic) | 2 | 1 | 0.09 | 0 | 0 |
| Nickel | 2 | 2 | 12 | 0 | 0 |
| Zinc | 2 | 2 | 280 | 1 | 0 |
| TRH (C ₆ -C ₁₀ - BTEX) | 2 | 1 | 57 | - | - |
| TRH (>C ₁₀ -C ₁₆ - naphthalene) | 2 | 1 | 260 | - | - |
| TRH (>C ₁₆ -C ₃₄) | 2 | 1 | 1,200 | - | - |
| TRH (>C ₃₄ -C ₄₀) | 2 | 1 | 450 | - | - |
| BEX | 2 | 0 | <PQL | - | - |
| Toluene | 2 | 1 | 2.4 | - | - |
| Naphthalene | 2 | 0 | <PQL | 0 | 0 |
| Benzo(a)pyrene | 2 | 1 | 0.6 | 1 | 0 |
| Benz(a)anthracene | 2 | 1 | 0.6 | 1 | 0 |
| Chrysene | 2 | 1 | 0.7 | 1 | 0 |
| Fluoranthene | 2 | 2 | 1 | 1 | 0 |
| Phenanthrene | 2 | 1 | 0.3 | 1 | 0 |
| Pyrene | 2 | 2 | 1.1 | 1 | 0 |
| Total PAHs | 2 | 1 | 7.4 | 1 | 0 |

n number of samples
 - No criteria available/used
 NL Non-limiting
 <PQL Less than the practical quantitation limit

Concentrations of copper, lead, zinc and select PAHs exceed the ISQG Low guideline value, however are below the upper value. ANZECC (2000) requires reported concentrations to be assessed against background concentrations, followed by an examination of factors controlling bioavailability. This was not undertaken by CH2M.

9.1 Auditor's Opinion

The Auditor notes that the drain is concrete lined, and considers that the elevated contaminant concentrations identified in the sediment are likely to be largely from up gradient sources and representative of background concentrations.

10. EVALUATION OF WATER ANALYTICAL RESULTS

10.1 Groundwater

Groundwater monitoring has been undertaken on the depot and nursery by AWT (both), CES (depot), AECOM (depot) and CH2M (nursery).

The groundwater monitoring well network varied over the investigations, with wells installed by AWT on the nursery (GN1-GN3) (Attachment 8, Appendix A) and depot (GD1-GD5) (Attachment 6, Appendix A). The nursery wells could not be located by CH2M and were therefore replaced (GN1-GN5) (Attachment 10, Appendix A). CES installed additional wells on the depot (BH1, BH12, BH14, BH22 and BH101-BH105), and offsite to the southwest of the depot (BH106-BH110) (Attachment 6, Appendix A).

The results of the most recent monitoring rounds undertaken on the nursery (CH2M) and depot (AECOM) are summarised below in Table 10.1. The results of previous monitoring rounds undertaken by AWT and CES are discussed below.

| Table 10.1: Evaluation of Groundwater Analytical Results – Summary Table (µg/L) | | | | | | | | |
|--|--|-------------------|--------------|--------------------------------|---|-------------------|-------------|--------------------------------|
| Analyte | Nursery (CH2M, 2016) April 2016 | | | | Depot (AECOM, 2010a) February 2009 | | | |
| | n | Detections | Max. | n > Adopted Criteria | n | Detections | Max. | n > Adopted Criteria |
| Arsenic | 4 | 0 | <PQL | 0 | 0 | - | - | - |
| Cadmium | 4 | 0 | <PQL | 0 | 0 | - | - | - |
| Total Chromium | 4 | 0 | <PQL | 0 | 0 | - | - | - |
| Copper | 4 | 0 | <PQL | 0 | 0 | - | - | - |
| Lead | 4 | 0 | <PQL | 0 | 0 | - | - | - |
| Mercury | 4 | 0 | <PQL | 0 | 0 | - | - | - |
| Nickel | 4 | 4 | 16 | 2 | 0 | - | - | - |
| Zinc | 4 | 4 | 17 | 3 | 0 | - | - | - |
| TRH C ₆ -C ₁₀ | 4 | 0 | <PQL | 0 | 10 | 0 | <PQL | 0 |
| TRH C ₁₀ -C ₄₀ | 4 | 0 | <PQL | 0 | 10 | 0 | <PQL | 0 |
| BTEX | 4 | 0 | <PQL | 0 | 10 | 0 | <PQL | 0 |
| Fluoranthene | 4 | 0 | <PQL | 0 | 10 | 1 | 2 | 1 |
| Other PAHs | 4 | 0 | <PQL | 0 | 10 | 0 | 3 | 0 |
| Phenols | 4 | 0 | <PQL | 0 | 0 | - | - | - |
| OCP | 4 | 0 | <PQL | 0 | 0 | - | - | - |
| OPP | 4 | 0 | <PQL | 0 | 0 | - | - | - |
| PCB | 4 | 0 | <PQL | 0 | 0 | - | - | - |
| Nitrate | 4 | 3 | 6,000 | 0 | 0 | - | - | - |
| Nitrite | 4 | 1 | 9 | - | 0 | - | - | - |
| Nitrogen | 4 | 4 | 7,600 | 4 | 0 | - | - | - |
| Cyanide | 4 | 0 | <PQL | - | 0 | - | - | - |
| Phosphorus | 4 | 0 | <PQL | 0 | 0 | - | - | - |

| | |
|------|------------------------------|
| n | number of samples |
| Max. | Maximum concentration |
| - | No criteria available/used |
| PQL | Practical quantitation limit |
| NL | Non-limiting |

In assessing the analytical results, the Auditor makes the following observations:

- Contaminant concentrations were less than the human health criteria for vapour intrusion and recreational use. Elevated TPH C₁₀-C₃₆ and PAH concentrations were reported in historical groundwater monitoring on the depot, however results were less than the human health criteria. The highest results were reported in BH22 on the depot, which was lost or destroyed and therefore not able to be sampled by AECOM. Wells located upgradient and downgradient of BH22 were sampled and did not contain detectable concentrations of TRH and PAHs.
- Historical groundwater monitoring on the depot did not detect VOCs, BTEX or volatile TPH.
- Concentrations of some metals (copper, nickel and zinc) and nutrients (nitrogen and phosphorus) exceeded the ecological criteria in wells located on the nursery. In most instances these were marginally above the adopted criteria. Fill material and fertilisers are potential sources of contamination. Given that concentrations in wells located on the expected up gradient and down gradient boundaries of the site were similar, the results are considered to be indicative of regional groundwater conditions in an urban environment. The potential for significant groundwater contamination is considered to be low.
- Metals and nutrients were not analysed by AECOM during sampling of wells located on the depot. Previous monitoring for metals by AWT and CES identified concentrations of some metals (mostly copper, nickel and zinc) exceeding the ecological criteria. The results were of a similar range to those reported on the nursery.
- The groundwater analytical results are not considered to present a risk to future site users if the site were to be developed for residential use with minimal soil access.

10.2 Surface Water

AWT collected a surface water sample (SW1) from water present as small pools in the stormwater drain on the former nursery (Attachment 8, Appendix A) and from upstream and downstream locations in the stormwater canal to the east of the site (Mill Stream). The nursery sample contained elevated levels of nitrogen (3.6 mg/L) and total phosphorus (0.63 mg/L) and some metals (copper, lead and zinc) marginally above the guidelines concentrations. Naphthalene was detected at a low concentration (3 µg/L) in the upstream location of Mill Stream, which was less than the ecological criteria.

CH2M collected a surface water sample (SW01) from the stormwater drain on the nursery during the Stage 1 DSI (Attachment 10, Appendix A). The sample was analysed for metals, TRH, BTEX, PAHs, OCPs and PCB. Low concentrations of TRH C₁₀-C₁₆, arsenic, copper, nickel, zinc, phosphorus, potassium and nitrogen were reported. Concentrations of copper and zinc marginally exceeded the freshwater guideline concentrations.

CES collected surface water samples from Mill Stream to the east of the site at an upstream (SW2) and downstream (SW1) location (Attachment 6, Appendix A). Samples were analysed for total metals, TPH, BTEX, OCPs and PAHs. Copper and zinc concentrations marginally exceeded the freshwater guideline concentrations, and were fairly consistent between upstream and downstream samples. Concentrations of TPH, OCP and other PAHs were less than the detection limit.

10.3 Auditor's Opinion

In the Auditor's opinion, the groundwater and surface water monitoring undertaken was adequate to assess the potential for contamination from on-site sources. The results appear to be consistent with the site history and no significant contamination was identified.

Elevated semi-volatile TPH and PAH concentrations were reported in groundwater on the depot during historical monitoring. The results reported did not exceed criteria protective of human

health, and the most recent groundwater monitoring round undertaken on the depot did not identify PAHs or TRH above the PQL. The source of the elevated PAHs is likely to be fill material present on the depot. The results may represent PAHs adsorbed to colloidal particles, which is supported by the fact that concentrations were less than the PQL during the most recent monitoring round by AECOM when low flow methodology was adopted to minimise disturbance of sediment in the well.

Elevated concentrations of metals and nutrients were identified, however these are considered to be representative of urban water quality and are not considered to present a risk to future occupants of the site.

11. EVALUATION OF CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is a representation of the source, pathway and receptor linkages at a site. A CSM encompassing the entire site has not been prepared by the consultants.

CH2M developed a CSM for the former nursery and residential property and PB (2016) presented a CSM for the residential property. A CSM has not been prepared for the depot, however the Coffey (2015) EMP presents a summary of contamination present on the depot, exposure pathways and receptors based on ongoing use of the site as a depot.

Table 11.1 provides the Auditors summary and review of the CSM.

| Table 11.1: Review of the Conceptual Site Model | | |
|--|--|--|
| Element of CSM | Consultant | Auditor Opinion |
| Contaminant source and mechanism | <p>Not identified by CH2M with respect to the nursery and residential property.</p> <p>PB identified uncontrolled fill materials and weathering of hazardous building materials as likely sources on the residential property.</p> <p>Coffey identified fill material containing fragments of bitumen, ash, coal, slag, and charcoal as the source of contamination on the depot. Contamination in natural soil may be associated with peaty material.</p> | <p>The Auditor considers these to include:</p> <ul style="list-style-type: none"> Leaks or spills from the items stored in the former mechanical shed located in the west of the site resulting in elevated TRH in underlying fill material. Fill material containing anthropogenic material and ACM. Demolition waste from the former clubhouse present in the central south of the site, including ACM. Weathering of hazardous building materials. Activities on the depot prior to redevelopment were not identified by consultants as potential sources of contamination, however an AST was previously present and undocumented storage of other chemicals may have occurred. Peat was identified as a potential source of elevated PAH and TPH concentrations in natural soil on the depot. |
| Affected media | CH2M, PB and Coffey identified fill material as the affected media. | Fill material is impacted with fragments of ACM on the nursery, residential property and depot. Fill on the depot is also impacted with PAHs and TPH, with volatile |

| Table 11.1: Review of the Conceptual Site Model | | |
|--|--|--|
| Element of CSM | Consultant | Auditor Opinion |
| | | <p>hydrocarbons identified at one location.</p> <p>Underlying natural sand was typically not impacted, however elevated PAH and TPH concentrations were reported in peaty material.</p> <p>Assessment of sediment, surface water and groundwater identified elevated concentrations of metals, however these are considered representative of the urban environment rather than contamination from the site. Elevated concentrations of PAHs and TPH in groundwater on the depot were considered to represent adsorption to colloidal particles.</p> |
| Receptor identification | <p>Receptors identified by CH2M based on future residential development included: local flora and fauna; site workers; and future residents.</p> <p>PB identified residential users of the site and construction works as receptors.</p> <p>Coffey identified the receptors on the depot as maintenance workers and construction workers whilst the EMP is enforced.</p> | <p>The receptors identified by CH2M and PB are appropriate.</p> <p>The receptors identified by Coffey are based on ongoing commercial/industrial use of the site as a depot and enforcement of the EMP.</p> |
| Exposure pathways | <p>Exposure pathways identified by CH2M included: direct contact with soils; inhalation of vapour; and inhalation of asbestos fibres.</p> <p>PB identified inhalation of dust, ingestion of soil and dermal contact with soil as exposure pathways.</p> <p>Coffey identified inhalation of dust, dermal contact with soil or groundwater, and ingestion of soil or</p> | <p>The pathways identified are appropriate.</p> |

| Table 11.1: Review of the Conceptual Site Model | | |
|--|---|---|
| Element of CSM | Consultant | Auditor Opinion |
| | groundwater as exposure pathways. | |
| Presence of preferential pathways for contaminant movement | Not assessed by CH2M, PB and Coffey. | No preferential pathways are obvious based on the current site layout. Preferential pathways should be considered prior to redevelopment of the site. |
| Evaluation of data gaps | <p>No significant data gaps identified on the nursery.</p> <p>PB noted that the volume of impacted fill material on the residential property was estimated based on the assessment and could be refined following further investigation.</p> <p>Data gaps were not identified by Coffey (2015) with respect to the depot.</p> | <p>The Auditor considers that the lateral and vertical extent of fill has not been determined in all areas of the site. The volume of fill material is therefore considered to be uncertain.</p> <p>Analysis of fill on the depot was undertaken at a low density, particularly for asbestos (which was also not in accordance with current guidelines). The presence, distribution and concentration of asbestos in fill material on the depot is considered a data gap.</p> <p>Imported recycled aggregate and landscaping material was not tested. The contamination status of the imported material is therefore considered a data gap.</p> |

12. CONTAMINATION MIGRATION POTENTIAL

The nursery is largely unsealed. Elevated concentrations of metals, PAHs and TRH in fill material may migrate offsite in dust or surface water. The significantly elevated lead concentration identified by AWT in the carpark of the nursery appears to be isolated in extent. Elevated lead concentrations were not identified by CH2M in subsequent investigations in this area. It is understood that the area is currently sealed with asphalt pavement. There is therefore a low potential for migration of lead contamination from this area under current site conditions.

Larger fragments of ACM in fill material have a low potential to migrate as dust or with surface water. Friable asbestos (degraded ACM) was identified in fill material on the residential property and at one sample location on the nursery. The asbestos was identified in surface fill material in unsealed areas of the site and has the potential to migrate as dust or with surface water. If the nursery and residential property were redeveloped, remediation of the fill material would be required to make the site suitable for the proposed use.

Elevated concentrations of lead, PAHs and TRHs, and fragments of ACM identified in fill material on the depot have a low potential to migrate under current site conditions. The site was capped during remediation of the site by AECOM in 2009 and is subject to ongoing management under an EMP (Coffey, 2015). If the depot was redeveloped, remediation or management of the fill material would be required to make the site suitable for the proposed use.

Elevated concentrations of metals and nutrients in sediment, surface water and groundwater were considered to be indicative of the local urban environment. The contaminants are likely to have migrated onto the site from up gradient sources and will continue to migrate through the site to the ultimate receptors (i.e. surface water features within the golf courses to the south of the site).

13. ASSESSMENT OF RISK

Site investigations identified fill containing anthropogenic material in large areas of the site, which included fragments of ACM and AF/FA and elevated contaminant concentrations (mostly lead, TRHs and PAHs). The ACM, AF/FA, lead, TRH and PAH concentrations exceed the adopted human health criteria for residential use. PB considered carcinogenic PAHs and asbestos on the residential property *"...to represent a potential risk to the current residential occupants of the site through direct contact or inhalation of dust during normal use or maintenance of the property"*. Remediation of the fill material on the former nursery, residential property and depot would be required to make the site suitable for medium density residential use.

There were isolated instances of volatile contaminants exceeding the human health criteria for vapour intrusion. These were in the west of the site beneath the former mechanical shed (TRH C₁₀-C₁₆ minus naphthalene) and in the south of the depot (benzene, naphthalene and TRH C₁₀-C₁₆ minus naphthalene). Given that there are no structures present in these areas of the site and the contamination was found to be localised, there is currently a low risk from vapour intrusion. Further investigation would be required to determine the risk in the event of a change in land use. The TRH identified in the south of the depot may also present a risk to construction works, maintenance workers or occupants of a medium density residential development by direct contact.

The elevated lead concentration in the nursery car park and southwest of the depot significantly exceeds the human health criteria for direct contact. Further investigation of the nursery area by CH2M did not identify significantly elevated lead concentrations. Further investigation of the depot by CES did not identify lead concentrations significantly exceeding the human health criteria, however the location of the previous exceedance was not targeted for further investigation. It is understood that these areas are currently paved with asphalt, therefore the contamination is expected to present a low risk under current site conditions. Further investigation and/or remediation would be required in the event of a change in the site surfacing in these areas or a change in land use.

Elevated concentrations of metals, TRH and benzo(a)pyrene in fill material may present a risk to ecological receptors. It is noted that the elevated concentrations also exceeded the human health criteria or were present in fill material containing asbestos, which would require remediation to make the site suitable for any proposed use.

14. COMPLIANCE WITH REGULATORY GUIDELINES AND DIRECTIONS

The Auditor has used guidelines currently approved by the EPA under section 105 of the NSW *Contaminated Land Management Act 1997*.

The investigations were generally conducted in accordance with SEPP 55 Planning Guidelines and reported in accordance with the OEH (2011) *Guidelines for Consultants Reporting on Contaminated Sites*. The checklist included in that document has been referred to. The EPA's *Checklist for Site Auditors using the EPA Guidelines for the NSW Site Auditor Scheme 1998* (December 1999) has also been referred to.

AWT, CES and CH2M do not report whether well licences were obtained from NSW Office of Water. Interim advice from the NSW Office of Water indicates that wells licences are not required.

It is understood that a Notification of 73 Gardeners Road (residential property) was made by Sydney Water to the EPA under s.60 of the Contaminated Land Management Act 1997 (CLM Act) on 7 January 2016. It is not clear why 75 Gardeners Road (the nursery) was not also notified, however may have been due to the fact that it was vacant at the time. Notification of the depot has not occurred.

The Auditor considers that given the investigations completed to date and the current and approved uses that the site can be managed under the planning process. Recommendations are provided by the Auditor in Section 15.

15. CONCLUSIONS AND RECOMMENDATIONS

The investigations undertaken have identified fill material on the former nursery, residential property and depot containing anthropogenic material, including fragments of ACM. Laboratory analysis of fill samples identified elevated concentrations of metals, particularly lead, TRHs and PAHs. Concentrations exceeded the adopted human health criteria, particularly on the depot. Isolated detections of volatile contaminants were identified in the west of the nursery and southwest of the depot.

Groundwater investigations identified elevated concentrations of metals and nutrients, however these are considered to be representative of urban water quality and are not considered to present a risk to future occupants of the site. Elevated concentrations of PAHs identified during historical monitoring on the depot were considered to be representative of contaminated sediment in the wells. Remedial planning would need to consider the potential for PAHs to leach from fill material on the depot.

Due to the investigation methods adopted and the low density of sampling on the depot, asbestos and anthropogenic material is likely to be present at a greater density than indicated by the field observations and analytical results. Sampling of recycled aggregate and landscaping material at the time of importation was not undertaken and represents a data gap.

Based on the information presented in the reports reviewed, including collation of data from previous investigations, the Auditor concludes that the nature and extent of contamination has been adequately determined for the purpose of planning future remediation or management during redevelopment of the site.

The Auditor recommends that the following be undertaken should the site be redeveloped:

- Further investigation of the site should be considered prior to remediation to address the data gaps identified in the CSM. The need for and scope of further investigation would be dependent on the proposed development.
- Preparation of a remedial action plan (RAP) specific to any development.
- The RAP should be implemented prior to or during redevelopment of the site.
- Preparation of a Site Audit Statement certifying suitability for the proposed use, at the completion of remediation and validation.
- Groundwater is assessed for its suitability for any proposed use prior to extraction.

16. OTHER RELEVANT INFORMATION

This Audit was conducted on the behalf of Sydney Water Corporation to provide an independent review by an EPA Accredited Auditor of the nature and extent of any contamination of the land i.e. a "Site Audit" as defined in Section 4 (1) (b) (i) of the *NSW Contaminated Land Management Act 1997* (the CLM Act).

This summary report may not be suitable for other uses. The consultants included limitations in their report. The Audit must also be subject to those limitations. The Auditor has prepared this document in good faith, but is unable to provide certification outside of areas over which the Auditor had some control or is reasonably able to check.

The Auditor has relied on the documents referenced in Section 1 of the Site Audit Report in preparing the Auditors' opinion. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change.

It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

APPENDIX A

ATTACHMENTS

Attachment 1: Site Location

Attachment 2: Site Survey

Attachment 3: Former Site Layout

Attachment 4: Former Nursery Layout

Attachment 5: Residential Property Investigation Locations

Attachment 6: Depot Former Layout and Investigation Locations

Attachment 7: Depot Current Layout

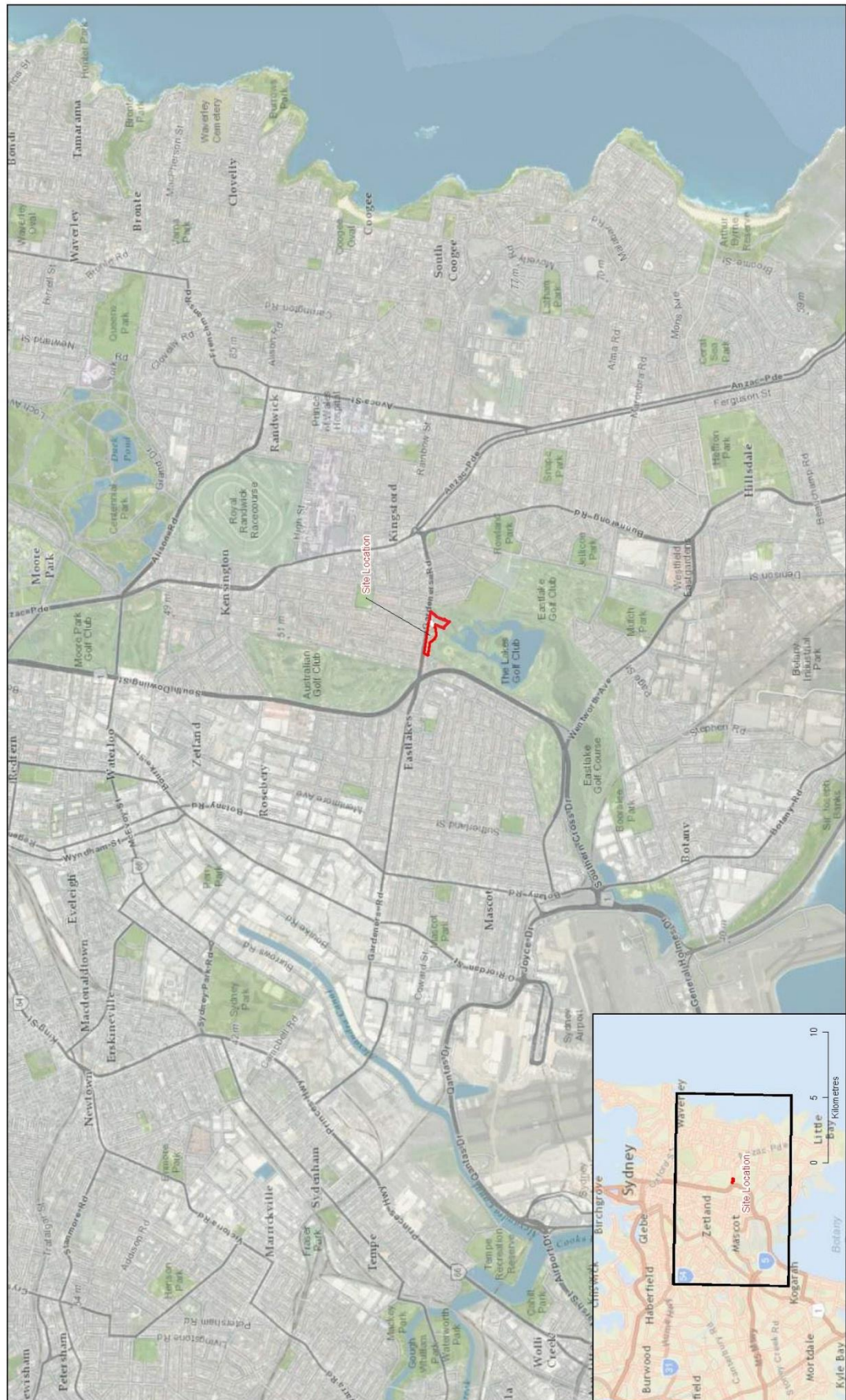
Attachment 8: AWT Site Investigation Locations

Attachment 9: Nursery Exceedances of Adopted Criteria

Attachment 10: CH2M Stage 1 DSI Investigation Locations

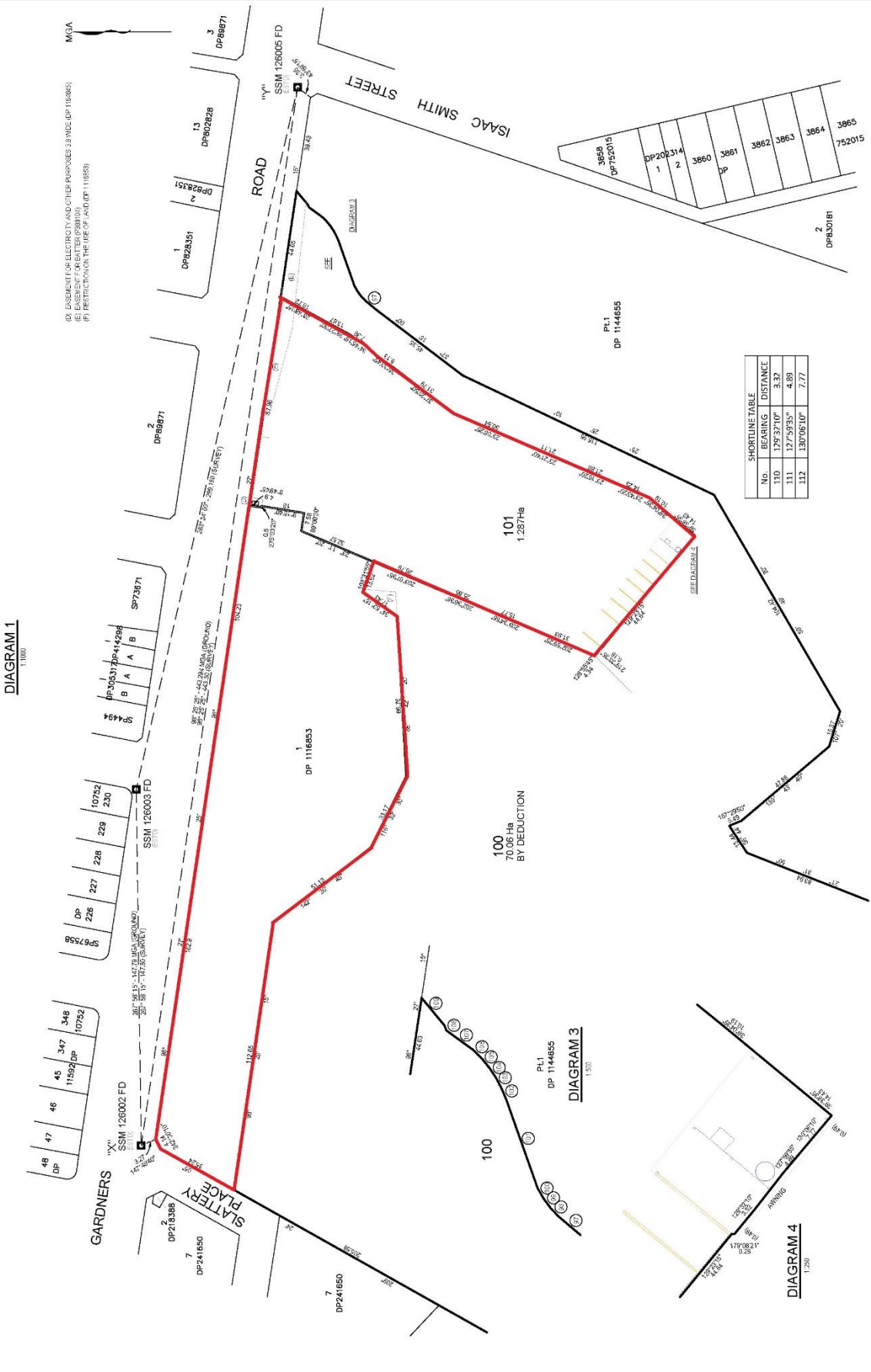
Attachment 11: CH2M Stage 2 DSI Investigation Locations

Attachment 12: Depot Imported Material Locations



WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

PLAN FORM 2



| | | | | |
|-------------|------------|---|---|---|
| PPN 1232571 | Registered | L.G.A. BAYSIDE Locality: EASTLAKES Subdivision No. Lengths are in metres. (Reduction Ratio 1:1000) | PLAN OF SUBDIVISION OF LOT 50 IN DP 1216168 | Surveyor: SHAUN MATIONEY Date of Survey: MAY 2017 Surveyor's Ref: 110305500 |
|-------------|------------|---|---|---|





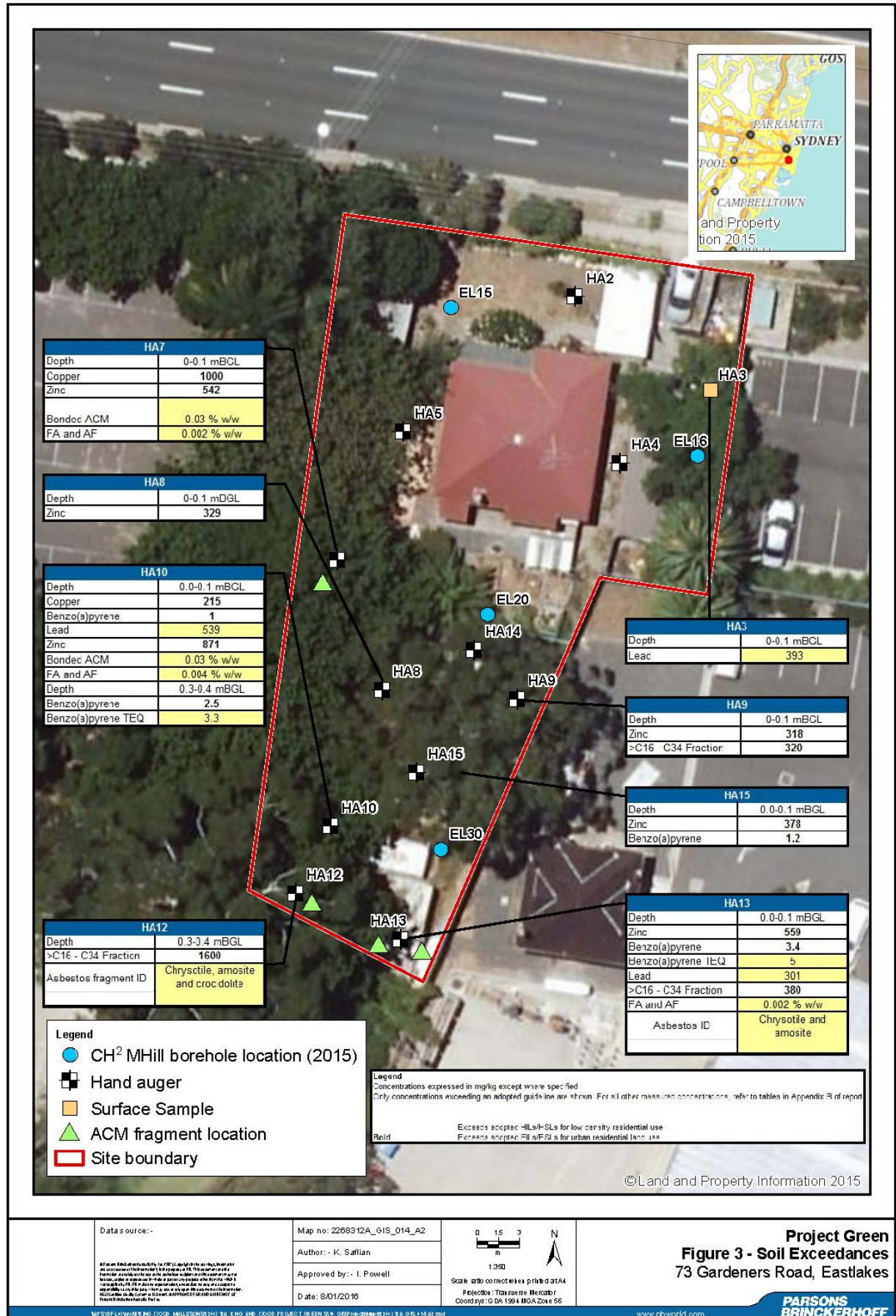


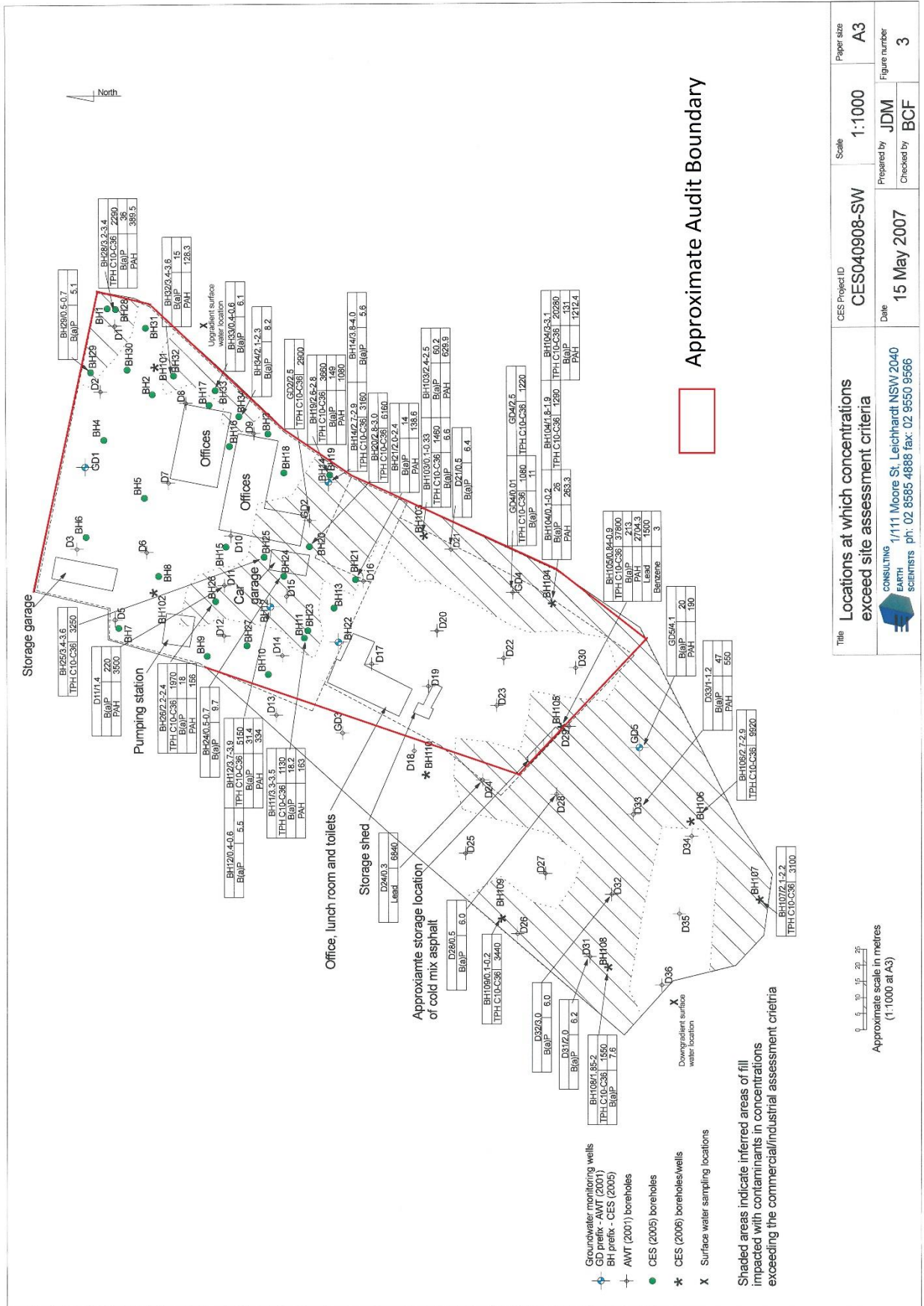
Figure 2
Site Layout
Detailed Site Investigation, 73-75 Gardeners Road, Eastlakes
Sydney Water

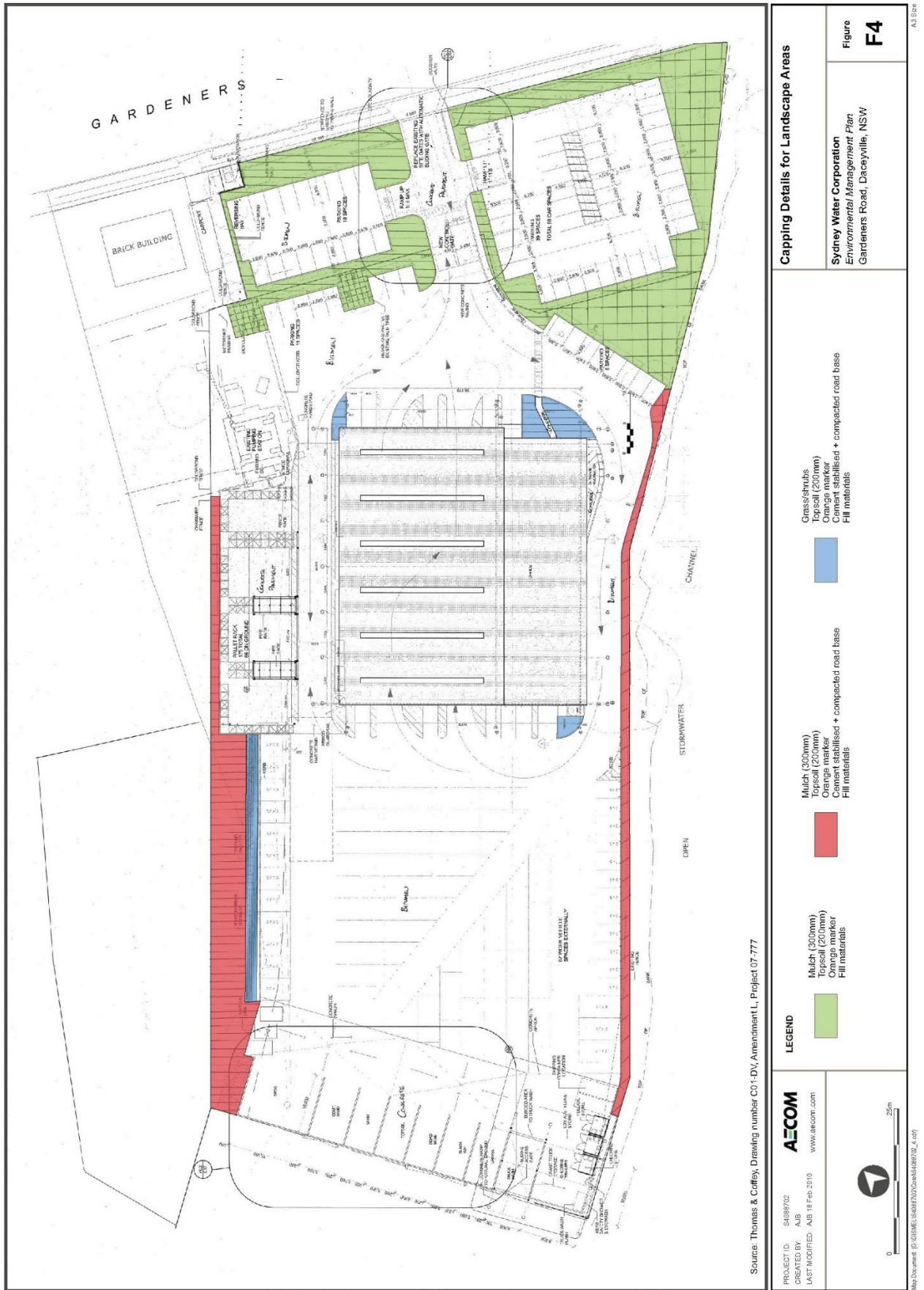
Update: Aerial image source: Neamap 2015

 Approximate Site Boundary
 Site Building
 Open Storm Water Channel

A vertical scale bar labeled "Metres" with markings at 0, 15, and 30.







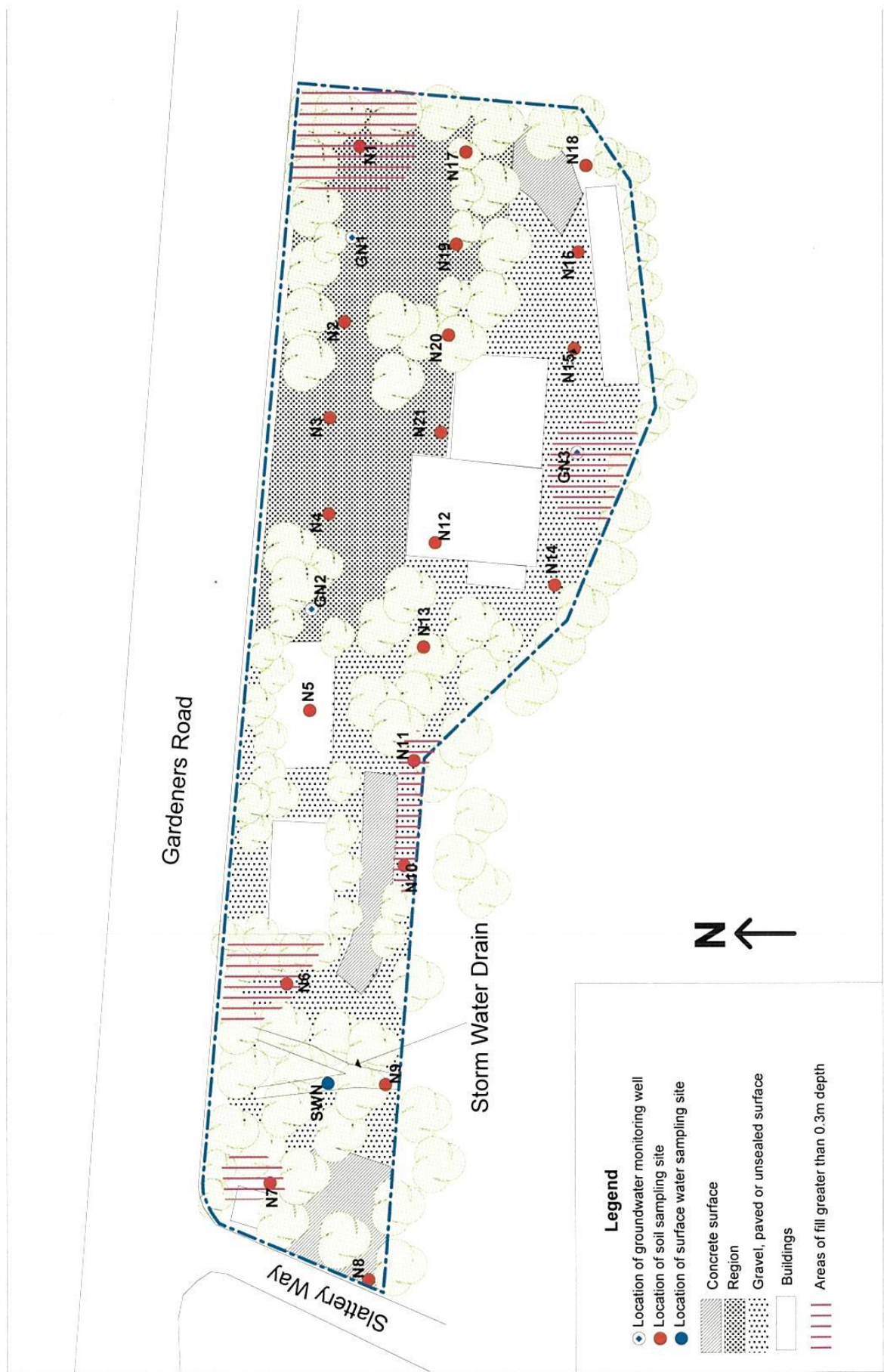


Figure 3. Location of sampling sites

Attachment 9: Nursery Exceedances of Adopted Criteria

Health Screening Exceedance
 Force

Stage No Ex

ening Exce

- Ecologic

boundary

Pit
face Sample
roximate S

1

WATERD01C101BBO IECT01869650101CMADP01 EQSTAGE2 DQNSTAGE2001 SOI EXCEEDANCES STAGE1 3 MVD CSEITE06/20/2016 6:17:37 PM



Figure 3
Sample Locations
Detailed Site Investigation, 73-75 Gardeners Road, Eastlakes
Sydney Water
73-75 Gardeners Road, Eastlakes, NSW

Note:
1. Aerial image source: Neamap 2015

Approximate Site Boundary

- Abstraction Bore
- Groundwater Monitoring Well
- Surface Water Sample
- Sediment Sample
- Soil Sample





Figure 2
 Stage 2 DSI Sample Locations
 Stage 2 DSI, 73-75 Gardeners Road, Eastlakes
 Sydney Water
 73-75 Gardeners Road, Eastlakes, NSW

Note:
 1. Aerial image source: Nearmap, 2015.

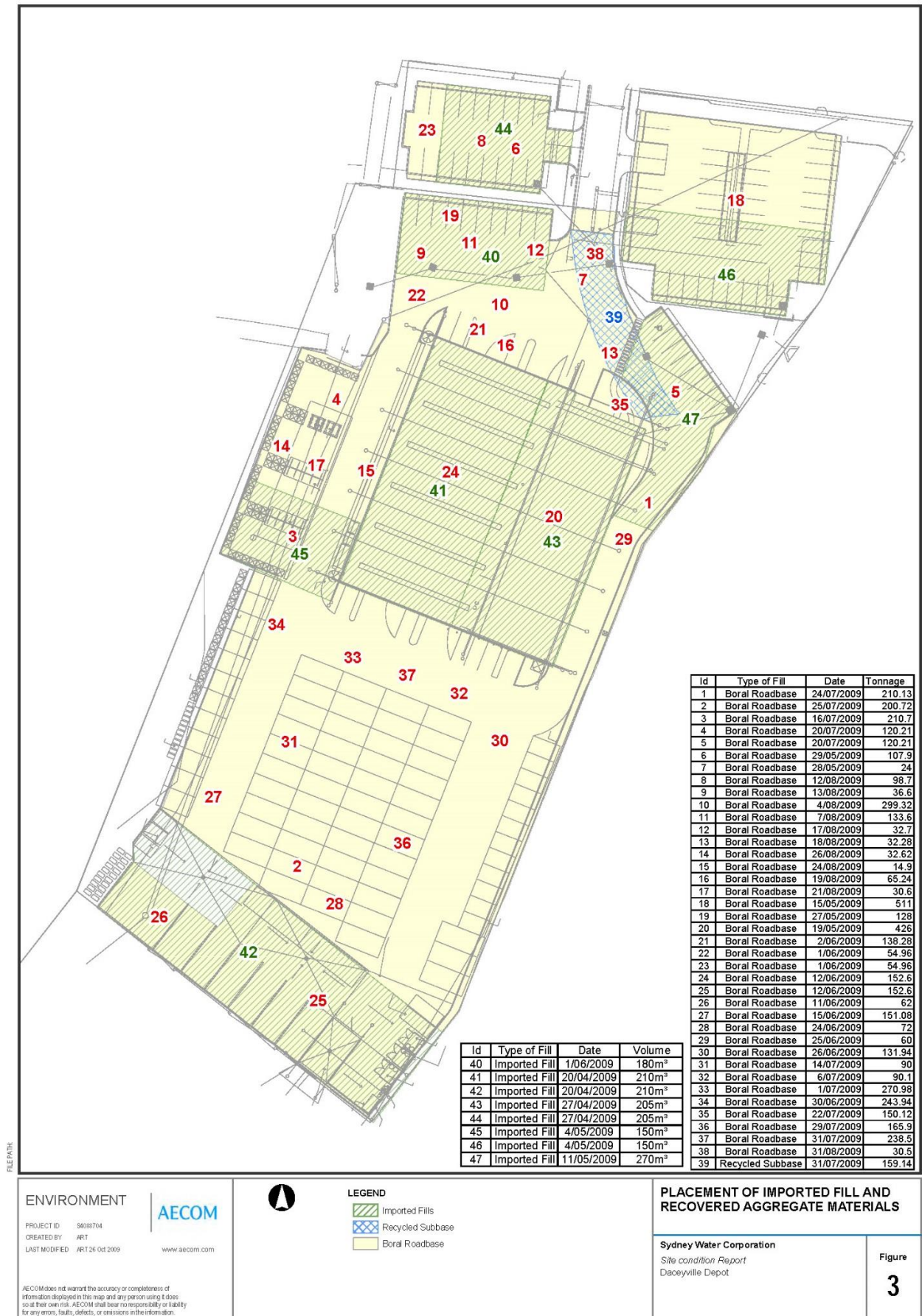
Legend:
 Test Pit
 Groundwater Monitoring Well
 Surface Water Sample
 Trench
 Approximate Site Boundary
 Site Area

Scale: 0 15 30 Metres

File Path: \\WATERLOG\PROJECTS\88809\GIS\MAPFILES\STAGE2_DSI\STAGE208_SAMPLELOCATIONS.MXD, CSINTES 4/19/2016 7:27:14 PM

ch2m

Attachment 12: Depot Imported Material Locations



Attachment E – Transport Report, Prepared by Arup, dated September 2017

Sydney Water
**73 & 75 Gardeners Road,
Eastlakes**
Transport Assessment

Final | 25 September 2017

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 244786

Arup
Arup Pty Ltd ABN 18 000 966 165



Arup
Level 10 201 Kent Street
PO Box 76 Millers Point
Sydney 2000
Australia
www.arup.com

ARUP

Contents

| | Page |
|--|-----------|
| 1 Introduction | 1 |
| 2 Existing Transport Conditions | 2 |
| 2.1 Subject site | 2 |
| 2.2 Traffic volumes | 2 |
| 2.3 Road Network Performance | 4 |
| 2.4 Parking Conditions | 5 |
| 2.5 Pedestrian and Bicycle Accessibility | 5 |
| 2.6 Public Transport Accessibility | 7 |
| 3 Masterplan | 9 |
| 3.1 Site masterplan | 9 |
| 3.2 Potential development yields | 9 |
| 4 Transport Assessment | 10 |
| 4.1 Site access | 10 |
| 4.2 Person trip generation | 11 |
| 4.3 Traffic generation | 12 |
| 4.4 Traffic Modelling | 13 |
| 4.5 Parking | 15 |
| 4.6 Public transport | 16 |
| 4.7 Walking and cycling | 16 |
| 5 Summary | 17 |

Appendices

Appendix A

SIDRA modelling outputs

1 Introduction

Sydney Water have engaged Architectus to prepare a Master Plan for land at 73 and 75 Gardeners Road, Eastlakes for the purposes of informing a Planning Proposal which seek to amend the current planning controls for the site to allow residential development and supporting land uses.

Sydney Water are in the process of divesting surplus land to allow redevelopment and improved utilisation of this land within the Sydney Metropolitan area. For the subject sites, due to their location within the wider context of Eastlakes, it is proposed to seek their rezoning to allow for residential development or other appropriate supporting land uses.

In order to test and demonstrate the suitability of the site for the proposed land uses, a master plan has been prepared by Architectus and considered by Arup. This master plan identifies that the site should be developed for residential with supporting land uses such as small scale shops, retail or similar uses. The proposal will enable the future redevelopment of both sites resulting in approximately 750 units and 1,400 parking spaces, and a range of building heights between 6-14 storeys. No approval is sought for the master plan at this stage as it simply seeks to evidence that the proposed changes to the planning controls are appropriate.

Any future development of the site will be subject to future development applications lodged with Council. Our review of the master plan has identified that the site is suitable for the proposed land uses as residential and supporting land uses including supporting commercial / retail uses.

This transport assessment considers the potential level of traffic generated by the site and the implications for the local road network.

2 Existing Transport Conditions

2.1 Subject site

The site is located on the south side of Gardeners Road, opposite Eastern Avenue (see Figure 1). Current access to the site is via a signalised intersection with Eastern Avenue and Gardeners Road. Vehicles can enter and exit from any approach and the two Gardeners Road approaches have designated turning lanes.



Figure 1 – Subject site

Source: Architectus

2.2 Traffic volumes

Traffic counts have been undertaken for the Gardeners Road / Eastern Avenue intersection for the weekday AM and PM peak period and weekend peak period. Weekday AM peak period traffic counts were taken between 8:00am and 9:00am (see Figure 2) and the PM peak period traffic counts between 5:15pm and 6:15pm (see Figure 3). The weekend peak period was taken on a Saturday afternoon between 12:00-1:00pm (Figure 4).

It should be noted this traffic count was undertaken while the Gardens R Us site was operational.

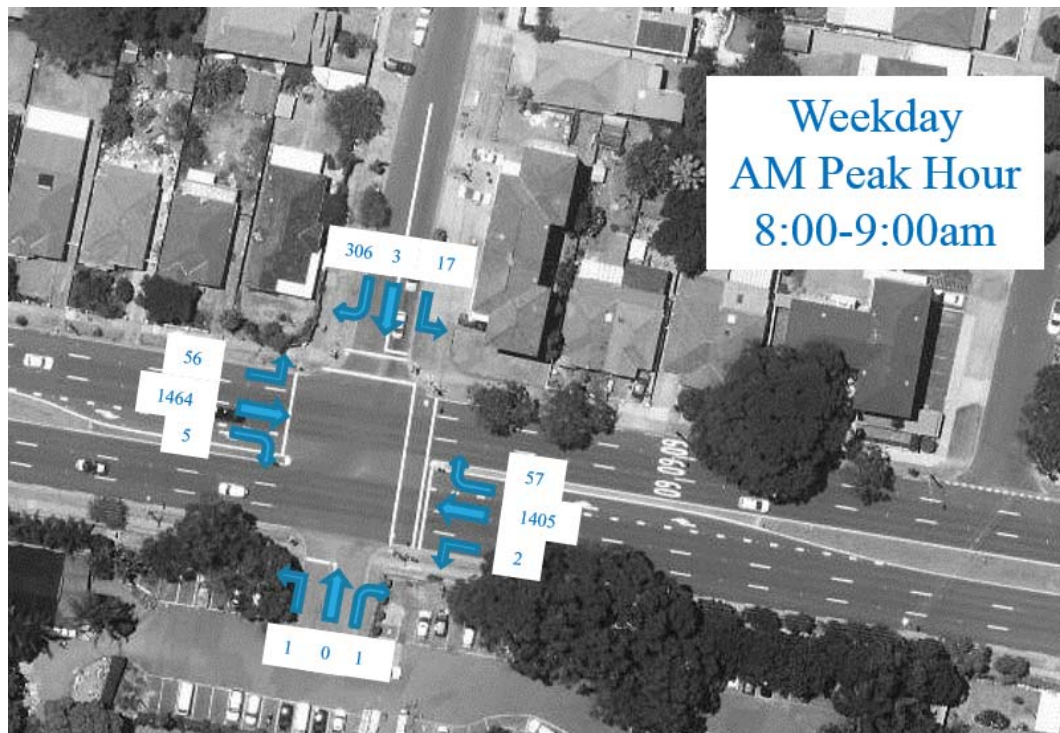


Figure 2 Weekday AM peak hour traffic counts

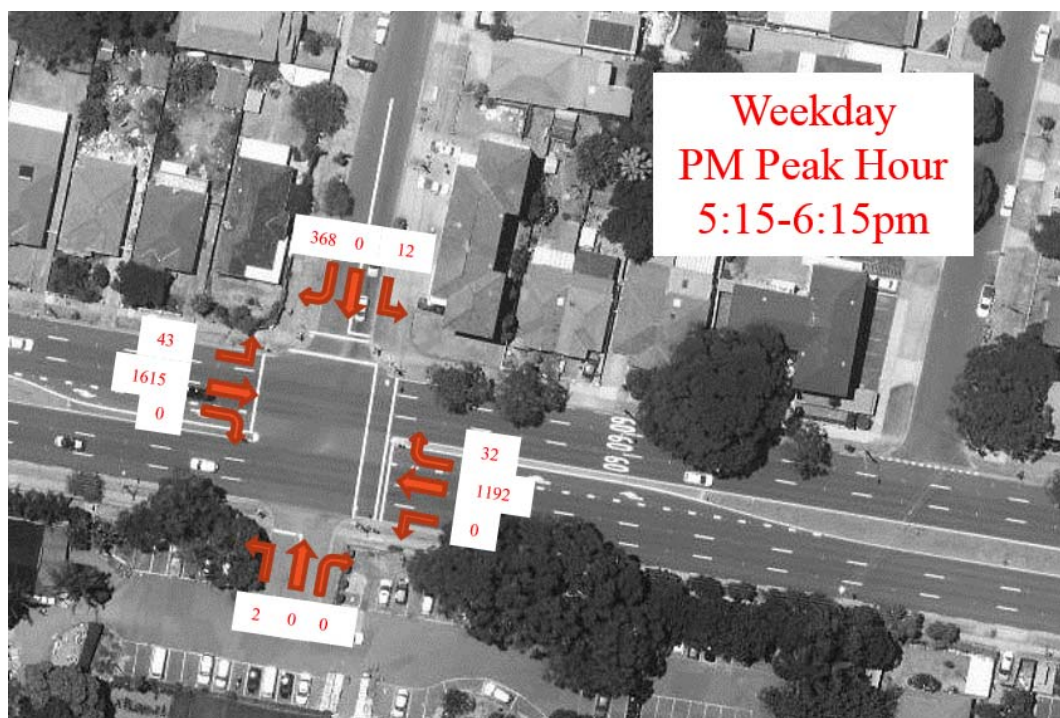


Figure 3 Weekday PM peak hour traffic counts



Figure 4 Saturday peak hour traffic counts

2.3 Road Network Performance

The intersection performance of Gardeners Road / Eastern Avenue has been assessed using RMS approved software SIDRA.

In urban areas, the traffic capacity of the major road network is generally a function of the performance of key intersections. This performance is quantified in terms of Level of Service (LOS), is based on the average delay per vehicle. LOS ranges from A = very good to F = unsatisfactory.

Another common measure of intersection performance is the degree of saturation (DOS), which provides an overall measure of the capability of the intersection to accommodate additional traffic. A DOS of 1.0 indicates that an intersection is operating at capacity. The desirable maximum degree of saturation for an intersection is 0.9.

The existing intersection performance is assessed in this report in terms of the following three factors for each intersection.

- Degree of Saturation
- Average Delay (Seconds per vehicle)
- Level of Service

The existing performance of the intersection has been modelled using the traffic volumes from section 2.2, with the results presented in Table 1. The results show that the intersection currently operates with spare capacity during both weekday and Saturday peak periods.

Table 1 SIDRA Intersection results for the existing conditions

| Scenario | Traffic Volume (veh/hr) | AVD (s) | LoS | DoS |
|----------------------|-------------------------|---------|-----|------|
| Weekday AM Peak Hour | 3,493 | 13.9 | B | 0.84 |
| Weekday PM Peak Hour | 3,441 | 18.1 | B | 0.88 |
| Saturday Peak Hour | 3,043 | 9.5 | A | 0.72 |

LOS - Intersection Traffic Level of Service, DOS - Degree of Saturation, AVD - Average Delay per vehicle

2.4 Parking Conditions

On-street parking is provided on Gardeners Road during off-peak periods, with all day parking available on local streets north of Gardeners Road.

2.5 Pedestrian and Bicycle Accessibility

The site is not located in an area that attracts significant pedestrian activity, although this may increase following the completion of the Sydney CBD and South East light rail project. The major pedestrian generators and attractors in the vicinity of the study are as follows:

- Kingsford shops at the Anzac Parade / Gardeners Road / Rainbow Street intersection, 1km east of the site. This is the end of the proposed Sydney CBD and South East light rail.
- Greek Orthodox Church, 600m east on Anzac Parade
- St Spyridon College Primary, 600m east on Anzac Parade
- The Lakes Golf Course, bordering the site to the south
- Eastlakes Shopping Centre
- Eastlakes Golf Club

There are footpaths running the length of Gardeners Road on each side, and signalised pedestrian crossings are provided at the intersection with Eastern Avenue. Pedestrian facilities are limited in some areas, with footpaths overgrown in areas and uneven surfaces (see Figure 5).

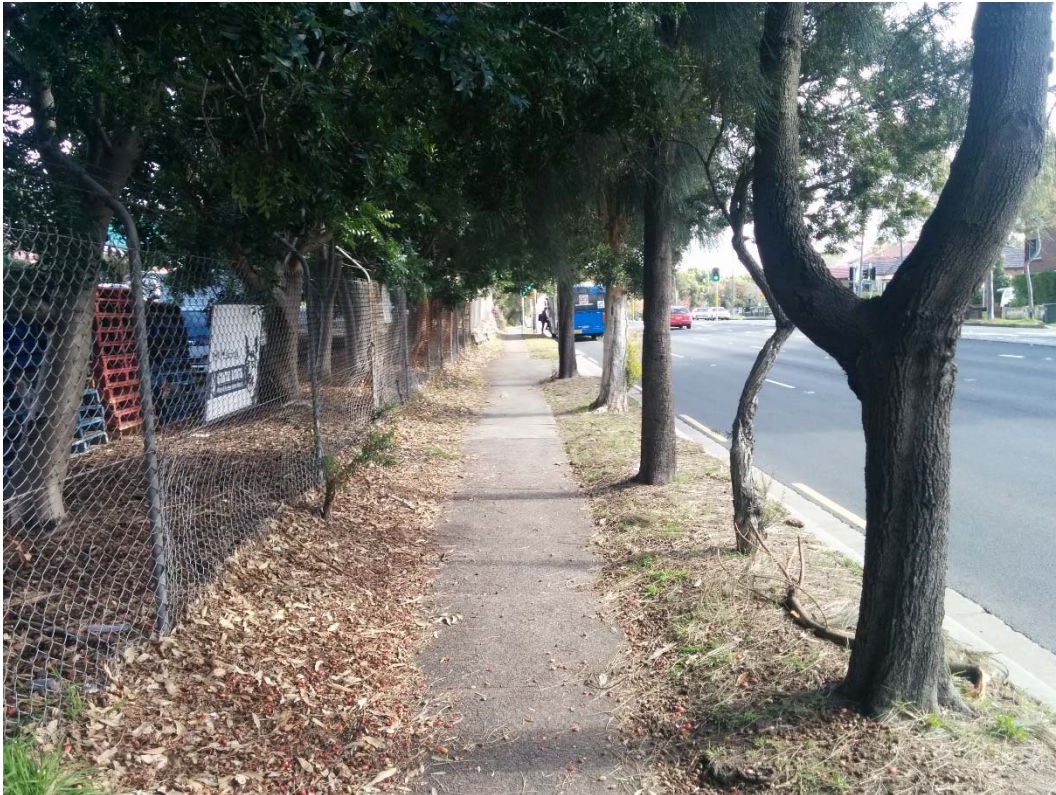


Figure 5 - South side of Gardeners Road, 100m east of site.

There are limited cycle paths in the vicinity. The closest existing paths (Figure 6) are along Houston Road, around 800m to the east of the site, and along Southern Cross Drive (overpass 500m to west of site, wide shoulder often used by cyclists).

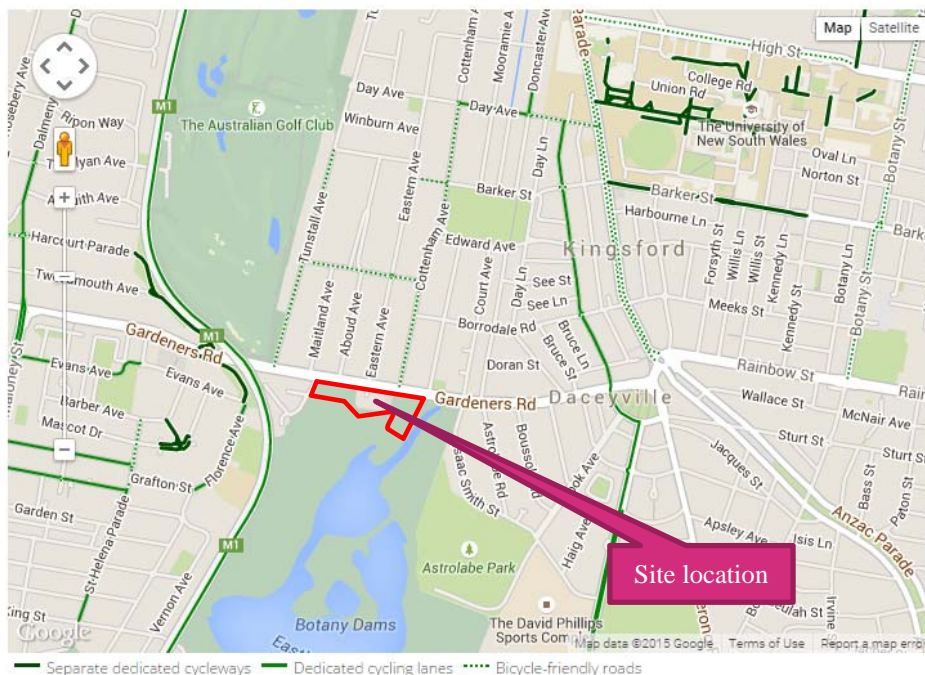


Figure 6 Bicycle routes in the vicinity of site.

Source: Sydney Cycleways <http://www.sydneycycleways.net/map/>

2.6 Public Transport Accessibility

2.6.1 Rail

The closest train stations to the site are:

- Mascot Station, 3.2km to the west of the site
- Green Square Station, 3.6km to the north-west of the site.

The frequency of trains to these stations is shown below in Table 2.

Table 2 - Train service frequencies. Source: Sydney Trains

| Time period | Frequency | |
|------------------------|--------------|----------------|
| | Towards City | Away from City |
| Morning Peak (8am-9am) | 10 | 9 |
| Evening Peak (5pm-6pm) | 8 | 9 |
| Sunday (1pm-2pm) | 4 | 4 |

Bus access from each station is via the following services:

- Mascot – 418.
- Green Square – 303, 343

2.6.2 Bus

A number of bus routes service the site, the most regular of which is the 343. A bus stop for the 343 route is located immediately adjacent to the site. There are a number of other bus routes that run along Anzac Parade very frequently (the 390 series) but the closest stop is at the Rainbow Street / Gardeners Road roundabout about a kilometre to the east of the site. Bus frequency is given below in Table 3, with routes shown in Figure 7.

Table 3 - Bus Frequencies

| Service | Route | Distance to nearest stop | Frequency (each direction) | | | |
|---------|----------------------------|--------------------------|----------------------------|------------------|------------------|----------------|
| | | | Week day peak (8-9am) | Off-peak (1-2pm) | Saturday (1-2pm) | Sunday (1-2pm) |
| 302 | Eastgardens to City | 80m | 0 | 1 | 1 | 1 |
| 303 | Sans Souci to City | 80m | 8 | 1 | 1 | 1 |
| 418 | Burwood to Bondi Junction | 60m | 2 | 2 | 2 | 2 |
| 343 | Kingsford to Millers Point | 60m | 12 | 4 | 4 | 3 |

Source: Sydney Buses



Figure 7 Bus services in the vicinity of the site

3 Masterplan

3.1 Site masterplan

The site masterplan is shown in Figure 8 below, and divides the site into two distinct areas – 75 Gardeners Road and 73 Gardeners Road.

The 75 Gardeners Road site takes the footprint of the old Gardens R Us site and is currently zoned as SP1 (Special Activities). The 73 Gardeners Road site is the current Sydney Water depot site and is currently zoned as SP2 (Infrastructure). Both sites directly front Gardeners Road.

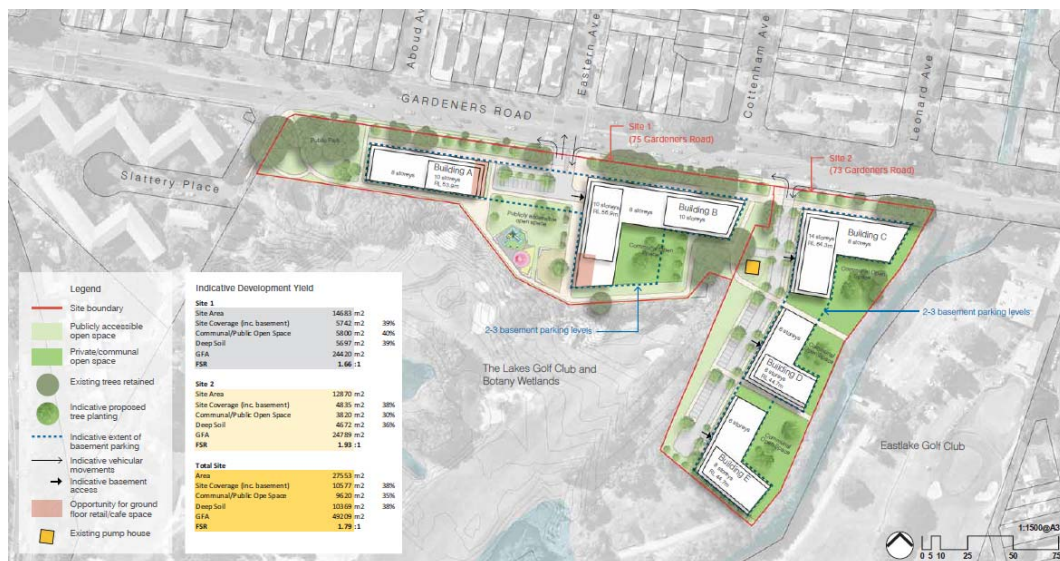


Figure 8 Site masterplan

Source: Architectus

3.2 Potential development yields

The masterplan proposal will enable the future redevelopment of both sites resulting in approximately 750 units and 1,400 parking spaces, and a range of building heights between 6-14 storeys. Approximately 400m² of ancillary retail floor space is also proposed for 75 Gardeners Road. The potential breakdown of dwellings for both 75 Gardeners Road and 73 Gardeners Road is summarised in Table 4.

Table 4 Potential dwelling yields

| Site Number | Number of residential dwellings | | | |
|-------------------|---------------------------------|------------|-----------|------------|
| | 1 bed / studio | 2 bed | 3 bed | Total |
| 75 Gardeners Road | 120 | 206 | 40 | 366 |
| 73 Gardeners Road | 124 | 212 | 41 | 378 |
| Total | 244 | 418 | 81 | 744 |

4 Transport Assessment

4.1 Site access

Access into 75 Gardeners Road will be via the existing signalised intersection at Gardeners Road / Eastern Avenue. This intersection accommodates traffic movements in all directions and is the subject of further traffic modelling in Section 4.4 of this document.

Access into 73 Gardeners Road will be via the existing driveway into the Sydney Water depot via Gardeners Road. This will be in the form of a left in / left out intersection with a deceleration lane provided to facilitate safe and efficient access for drivers entering the site.

As the access into 73 Gardeners Road is restricted to left in / left out only, vehicles travelling from the west (e.g. Mascot) are unable to turn right directly into the site. Instead vehicles will use the adjacent intersection at Isaac Smith Drive to access the site.



Figure 9 Site access

4.2 Person trip generation

The person peak hour trip generation rates that have been adopted for the proposed development are as follows, which are based on the average rates for high density residential developments as outlined in RMS Technical Direction TDT 2013/04a.

- AM peak hour: 0.66 trips / dwelling
- PM peak hour: 0.57 trips / dwelling

Based on the likely person trip generation rates and forecast mode split, the total travel demand by mode has been analysed and are presented in Table 5.

Table 5 Mode Share and peak period person trips and

| Mode Share | | AM Peak Trips | PM Peak Trips |
|---------------|------|---------------|---------------|
| Car Driver | 38% | 187 | 161 |
| Car Passenger | 5% | 25 | 21 |
| Light rail | 25% | 123 | 106 |
| Bus | 20% | 98 | 85 |
| Walk | 9% | 44 | 38 |
| Cycling/Other | 3% | 15 | 13 |
| Total | 100% | 491 | 424 |

4.3 Traffic generation

Given the location of the site outside an 800m walk from the light rail stop, Arup undertook peak hour traffic surveys of comparable residential developments in order to derive a suitable traffic generation rate for the proposed development. The sites selected were all new, high density residential developments which were generally located between 400m and 1200m from a railway station.

A summary of the results of the surveys are provided in Table 6 below.

Table 6 Residential traffic generation surveys

| Address | No. Units | Peak hour traffic (vehicles) | | Generation rate (vehicles / dwelling) | |
|--------------------------------------|-------------|------------------------------|--------------|---------------------------------------|--------------|
| | | AM peak hour | PM peak hour | AM peak hour | PM peak hour |
| 22-24 Gertrude St, Wolli Creek | 86 | 16 | 12 | 0.19 | 0.14 |
| 24-26 Levey St, Wolli Creek | 219 | 69 | 40 | 0.32 | 0.18 |
| 18 Bonar St, Arncliffe | 307 | 44 | 52 | 0.14 | 0.17 |
| 89-99 Princes Highway, Kogarah | 121 | 19 | 33 | 0.16 | 0.27 |
| 458 Forest Road, Hurstville | 371 | 53 | 68 | 0.14 | 0.18 |
| 2-8 Ashton Street, Rockdale | 234 | 76 | 43 | 0.32 | 0.18 |
| 141 Bowden Street, Meadowbank | 98 | 22 | 26 | 0.22 | 0.27 |
| 55 Hill Rd, Wentworth Point | 252 | 65 | N/A | 0.26 | N/A |
| 57 Hill Rd, Wentworth Point | 332 | 64 | N/A | 0.19 | N/A |
| 10 Wentworth Drive, Liberty Grove | 64 | 18 | 26 | 0.28 | 0.41 |
| 2 Bobbin Head Road, North Turramurra | 50 | 15 | 14 | 0.30 | 0.28 |
| 2 Mooramba Road, Dee Why | 70 | 35 | 35 | 0.50 | 0.50 |
| 2 Artarmon Rd, Willoughby | 161 | 41 | 52 | 0.25 | 0.32 |
| Total | 2365 | 537 | 401 | 0.25 | 0.26 |

Therefore for the purposes of this study, the traffic generation rates adopted for the residential component of the development are as follows:

- AM peak hour: 0.25 trips / dwelling
- PM peak hour: 0.26 trips / dwelling
- Weekend peak hour: 0.25 trips / dwelling

The following directional splits were applied:

- 20% inbound, 80% outbound during the morning peak
- 80% inbound, 20% outbound during the evening peak
- 50% inbound, 50% outbound during the weekend peak

These assumptions yield the following traffic volumes shown below in Table 7.

Table 7 Forecast peak hour traffic generation

| Access point | AM Peak Hour | | PM Peak Hour | | Weekend Peak Hour | |
|---|--------------|------------|--------------|------------|-------------------|------------|
| | <i>In</i> | <i>Out</i> | <i>In</i> | <i>Out</i> | <i>In</i> | <i>Out</i> |
| 75 Gardeners Road (Eastern Avenue) | 18 | 73 | 76 | 19 | 46 | 46 |
| 73 Gardeners Road (left in / left out) | 19 | 76 | 79 | 20 | 47 | 47 |
| Total | 37 | 149 | 155 | 39 | 93 | 93 |

4.4 Traffic Modelling

4.4.1 Methodology

The intersections have been assessed using RMS approved software SIDRA software (version 7).

In urban areas, the traffic capacity of the major road network is generally a function of the performance of key intersections. This performance is quantified in terms of Level of Service (LOS), is based on the average delay per vehicle. LOS ranges from A = very good to F = unsatisfactory.

4.4.2 Results

Table 8 below shows the results of the traffic modelling undertaken for the Gardeners Road / Eastern Avenue intersection, taking into consideration the dwelling yields and traffic generation previously outlined in this report. The modelling indicates that the intersection performs well in the future, with all queues clearing within one signal cycle. This results in a good overall level of service of the intersection across all time periods.

Table 8 Eastern Avenue access preliminary traffic assessment

| Time period | 95 th Percentile queue length (veh) | Level of service | Degree of saturation |
|----------------------|--|------------------|----------------------|
| Weekday AM peak hour | 27 | B | 75% |
| Weekday PM peak hour | 38 | C | 86% |
| Weekend peak hour | 21 | B | 64% |

Table 9 below shows the intersection modelling results for the Gardeners Road / Isaac Smith Drive intersection. Level of service assessment does not apply to priority controlled (unsignalised) intersections and so queue length and degree of saturation were considered. It was assumed that the traffic approaching on Gardeners Road arrives in platoons due to the nearby traffic signals, which increases available opportunities for vehicles to turn into and out of Isaac Smith Drive. The modelling indicates the intersection operates well following the full development of the site, with spare capacity available in all peak periods assessed. The maximum queue length in the right turn bay into Isaac Smith Drive does not exceed the available storage capacity of 70m.

Table 9 Isaac Smith Drive traffic assessment

| Time period | 95 th Percentile queue length (m) | Degree of saturation |
|----------------------|--|----------------------|
| Weekday AM peak hour | 6 | 28% |
| Weekday PM peak hour | 16 | 58% |
| Weekend peak hour | 10 | 37% |

Full intersection modelling results are provided in Appendix A.

4.5 Parking

At this stage of the assessment it is proposed to provide car parking at the rates previously specified in the Botany Bay Council DCP, those being:

- Studio / 1 bed: 1 space / dwelling
- 2+ bed: 2 spaces / dwelling
- Visitor: 1 space / 5 dwellings
- Retail - Food/Drink (Café): 1 space / 10m²
- Retail – Business premises: 1 space / 40m²

Given the site is located in close proximity to bus stops on Gardeners Road and close to a 10 minute walk of the future light rail stops on Anzac Parade, it is considered that these parking rates could be reduced in future as the design progresses. This reduction in parking will contribute to reducing the impact of the development on the wider road network.

It is important to note that the actually supply of parking will have an influencing factor on traffic generation. Though this statement may seem obvious, current guidance does not correlate these two factors. Arup recently undertook research which considered the influencing factors that contribute to the level of traffic generated by high density residential developments. The research specifically considered how the provision of on-site parking and site location may influence traffic generation rates.

Key findings of the research was that the rate at which parking is provided within residential developments was found to influence the overall level of traffic generated by that development. Figure 10 shows the relatively positive correlation between peak hour traffic generation and parking provision.

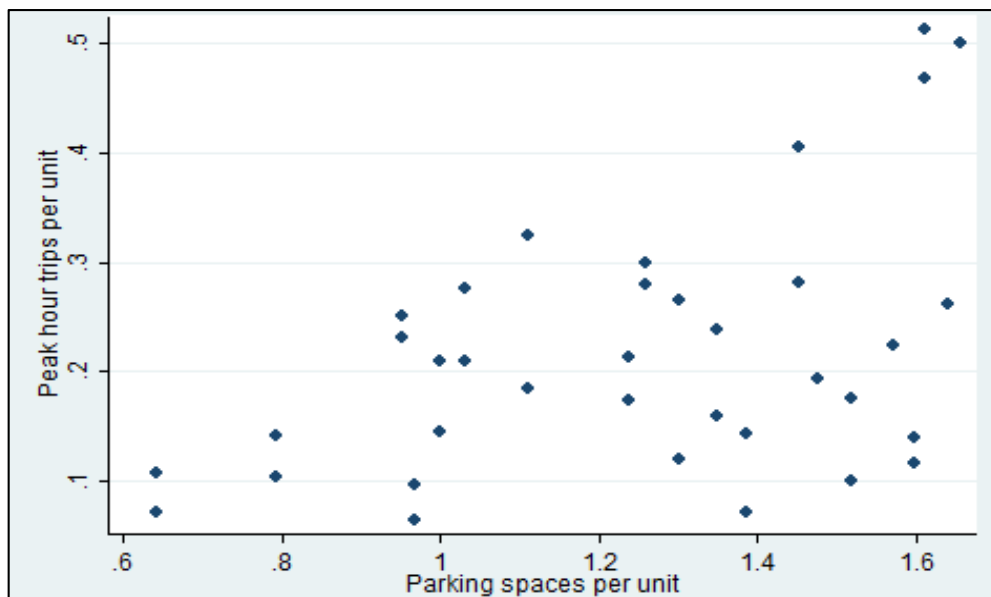


Figure 10: Correlation between peak traffic generation and parking spaces per unit

4.6 Public transport

Public transport conditions in the vicinity of the site will significantly improve in 2019 following the opening of the CBD and South East Light Rail project. As shown in Figure 11, the site is just outside a 10 minute walk from the future light rail stops on Anzac Parade. A number of bus stops are also located in close proximity to the site which will benefit future residents and visitors.



Figure 11 Public transport accessibility

4.7 Walking and cycling

The development of the site will facilitate opportunities to significantly enhance the walking and cycling environment in the area. This will include the potential for a shared pedestrian link along the boundary of the site.

5 Summary

This transport assessment supports a planning proposal for land at 73 and 75 Gardeners Road, Eastlakes. The proposal will enable the future redevelopment of both sites resulting in approximately 750 units and 1,400 parking spaces, and a range of building heights between 6-14 storeys. No approval is sought for the master plan at this stage as it simply seeks to evidence that the proposed changes to the planning controls are appropriate.

The transport assessment has concluded the transport network can accommodate the increased activity associated with the proposal. Transport conditions in the vicinity of the site will significantly improve in future years following the opening of the CBD and South East Light Rail project.

Appendix A

SIDRA modelling outputs

MOVEMENT SUMMARY



Site: Gardeners_Eastern_Weekday_AM_dev

New Site

Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

| Movement Performance - Vehicles | | | | | | | | | | | |
|---------------------------------|--------|--------------------------|------|---------------|-------------------|------------------|--------------------------------|------------|--------------|-----------------------------|--------------------|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Access | | | | | | | | | | | |
| 1 | L2 | 45 | 0.0 | 0.180 | 28.3 | LOS B | 3.0 | 21.3 | 0.76 | 0.72 | 35.9 |
| 2 | T1 | 5 | 0.0 | 0.180 | 23.8 | LOS B | 3.0 | 21.3 | 0.76 | 0.72 | 36.2 |
| 3 | R2 | 45 | 0.0 | 0.180 | 28.3 | LOS B | 3.0 | 21.3 | 0.76 | 0.72 | 36.1 |
| Approach | | 96 | 0.0 | 0.180 | 28.1 | LOS B | 3.0 | 21.3 | 0.76 | 0.72 | 36.0 |
| East: Gardeners Road E | | | | | | | | | | | |
| 4 | L2 | 12 | 0.0 | 0.500 | 19.3 | LOS B | 14.4 | 100.9 | 0.67 | 0.60 | 44.8 |
| 5 | T1 | 1479 | 0.0 | 0.500 | 13.5 | LOS A | 14.4 | 100.9 | 0.66 | 0.59 | 49.1 |
| 6 | R2 | 60 | 0.0 | 0.496 | 41.0 | LOS C | 2.5 | 17.6 | 0.91 | 0.79 | 33.7 |
| Approach | | 1551 | 0.0 | 0.500 | 14.6 | LOS B | 14.4 | 100.9 | 0.67 | 0.59 | 48.2 |
| North: Eastern Avenue | | | | | | | | | | | |
| 7 | L2 | 18 | 0.0 | 0.753 | 37.2 | LOS C | 14.5 | 101.2 | 0.95 | 0.90 | 34.5 |
| 8 | T1 | 1 | 0.0 | 0.753 | 32.7 | LOS C | 14.5 | 101.2 | 0.95 | 0.90 | 33.2 |
| 9 | R2 | 322 | 0.0 | 0.753 | 37.2 | LOS C | 14.5 | 101.2 | 0.95 | 0.90 | 34.7 |
| Approach | | 341 | 0.0 | 0.753 | 37.2 | LOS C | 14.5 | 101.2 | 0.95 | 0.90 | 34.7 |
| West: Gardeners Road W | | | | | | | | | | | |
| 10 | L2 | 59 | 0.0 | 0.059 | 15.7 | LOS B | 1.2 | 8.4 | 0.49 | 0.68 | 43.8 |
| 11 | T1 | 1541 | 0.0 | 0.750 | 16.6 | LOS B | 26.5 | 185.5 | 0.82 | 0.74 | 47.1 |
| 12 | R2 | 12 | 0.0 | 0.069 | 25.9 | LOS B | 0.3 | 2.4 | 0.66 | 0.69 | 39.2 |
| Approach | | 1612 | 0.0 | 0.750 | 16.7 | LOS B | 26.5 | 185.5 | 0.81 | 0.74 | 46.9 |
| All Vehicles | | 3599 | 0.0 | 0.753 | 18.0 | LOS B | 26.5 | 185.5 | 0.76 | 0.69 | 45.5 |

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

| Movement Performance - Pedestrians | | | | | | | | | |
|------------------------------------|---------------------|-------------------|-------------------|------------------|--------------------------------------|------------|--------------|-----------------------------|--|
| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Distance m | Prop. Queued | Effective Stop Rate per ped | |
| P1 | South Full Crossing | 53 | 12.8 | LOS B | 0.1 | 0.1 | 0.53 | 0.53 | |
| P2 | East Full Crossing | 53 | 34.7 | LOS D | 0.1 | 0.1 | 0.88 | 0.88 | |
| P3 | North Full Crossing | 53 | 12.3 | LOS B | 0.1 | 0.1 | 0.52 | 0.52 | |
| All Pedestrians | | 158 | 20.0 | LOS B | | | 0.65 | 0.65 | |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 6.1 | Copyright © 2000-2015 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: ARUP PTY LTD | Processed: Tuesday, 15 November 2016 8:09:01 AM

Project: J:\244000\244786-00 75 Gardeners Rd\Work\Internal\Oct 2016 Update\Gardeners_Eastern_SIDRA\Eastern avenue access\Eastern ave_AM.sip6

MOVEMENT SUMMARY



Site: **Gardeners_Eastern_Weekday_PM_dev**

New Site

Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

| Movement Performance - Vehicles | | | | | | | | | | | |
|---------------------------------|--------|--------------------------|------|---------------|-------------------|------------------|--------------------------------|------------------|--------------|-----------------------------|--------------------|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Access | | | | | | | | | | | |
| 1 | L2 | 12 | 0.0 | 0.044 | 22.5 | LOS C | 0.6 | 4.5 | 0.70 | 0.66 | 38.1 |
| 2 | T1 | 1 | 0.0 | 0.044 | 17.9 | LOS B | 0.6 | 4.5 | 0.70 | 0.66 | 38.3 |
| 3 | R2 | 12 | 0.0 | 0.044 | 22.4 | LOS C | 0.6 | 4.5 | 0.70 | 0.66 | 38.3 |
| Approach | | 24 | 0.0 | 0.044 | 22.2 | LOS C | 0.6 | 4.5 | 0.70 | 0.66 | 38.2 |
| East: Gardeners Road E | | | | | | | | | | | |
| 4 | L2 | 45 | 0.0 | 0.425 | 18.0 | LOS B | 11.5 | 80.8 | 0.62 | 0.57 | 45.3 |
| 5 | T1 | 1255 | 0.0 | 0.425 | 12.2 | LOS B | 11.5 | 80.8 | 0.62 | 0.55 | 49.8 |
| 6 | R2 | 34 | 0.0 | 0.330 | 45.7 | LOS D | 1.5 | 10.2 | 0.93 | 0.75 | 32.3 |
| Approach | | 1334 | 0.0 | 0.425 | 13.3 | LOS B | 11.5 | 80.8 | 0.62 | 0.55 | 49.0 |
| North: Eastern Avenue | | | | | | | | | | | |
| 7 | L2 | 13 | 0.0 | 0.859 | 46.6 | LOS D | 20.1 | 140.5 | 1.00 | 1.01 | 31.8 |
| 8 | T1 | 5 | 0.0 | 0.859 | 42.0 | LOS D | 20.1 | 140.5 | 1.00 | 1.01 | 30.6 |
| 9 | R2 | 387 | 0.0 | 0.859 | 46.6 | LOS D | 20.1 | 140.5 | 1.00 | 1.01 | 31.9 |
| Approach | | 405 | 0.0 | 0.859 | 46.5 | LOS D | 20.1 | 140.5 | 1.00 | 1.01 | 31.9 |
| West: Gardeners Road W | | | | | | | | | | | |
| 10 | L2 | 45 | 0.0 | 0.044 | 15.2 | LOS B | 0.9 | 6.2 | 0.48 | 0.67 | 44.2 |
| 11 | T1 | 1700 | 0.0 | 0.855 | 23.7 | LOS C | 38.4 | 268.7 | 0.87 | 0.87 | 43.2 |
| 12 | R2 | 45 | 0.0 | 0.211 | 23.6 | LOS C | 1.3 | 9.2 | 0.66 | 0.73 | 40.2 |
| Approach | | 1791 | 0.0 | 0.855 | 23.5 | LOS C | 38.4 | 268.7 | 0.85 | 0.86 | 43.1 |
| All Vehicles | | 3554 | 0.0 | 0.859 | 22.3 | LOS C | 38.4 | 268.7 | 0.78 | 0.76 | 43.3 |

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

| Movement Performance - Pedestrians | | | | | | | | | |
|------------------------------------|---------------------|-------------------|-------------------|------------------|--------------------------------------|------------------|--------------|-----------------------------|--|
| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Queue Distance m | Prop. Queued | Effective Stop Rate per ped | |
| P2 | East Full Crossing | 53 | 35.6 | LOS D | 0.1 | 0.1 | 0.89 | 0.89 | |
| P3 | North Full Crossing | 53 | 11.8 | LOS B | 0.1 | 0.1 | 0.51 | 0.51 | |
| All Pedestrians | | 105 | 23.7 | LOS C | | | 0.70 | 0.70 | |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY



Site: Gardeners_Eastern_Saturday_dev

New Site

Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

| Movement Performance - Vehicles | | | | | | | | | | | |
|---------------------------------|--------|--------------------------|------|---------------|-------------------|------------------|--------------------------------|------------|--------------|-----------------------------|--------------------|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Access | | | | | | | | | | | |
| 1 | L2 | 28 | 0.0 | 0.131 | 26.7 | LOS C | 1.8 | 12.7 | 0.78 | 0.71 | 36.5 |
| 2 | T1 | 3 | 0.0 | 0.131 | 22.1 | LOS C | 1.8 | 12.7 | 0.78 | 0.71 | 36.7 |
| 3 | R2 | 28 | 0.0 | 0.131 | 26.7 | LOS C | 1.8 | 12.7 | 0.78 | 0.71 | 36.7 |
| Approach | | 60 | 0.0 | 0.131 | 26.4 | LOS C | 1.8 | 12.7 | 0.78 | 0.71 | 36.6 |
| East: Gardeners Road E | | | | | | | | | | | |
| 4 | L2 | 28 | 0.0 | 0.336 | 14.6 | LOS B | 8.4 | 59.0 | 0.52 | 0.48 | 47.4 |
| 5 | T1 | 1161 | 0.0 | 0.336 | 9.1 | LOS A | 8.4 | 59.0 | 0.52 | 0.47 | 52.1 |
| 6 | R2 | 63 | 0.0 | 0.405 | 30.3 | LOS C | 2.2 | 15.7 | 0.78 | 0.77 | 37.4 |
| Approach | | 1253 | 0.0 | 0.405 | 10.3 | LOS B | 8.4 | 59.0 | 0.54 | 0.48 | 51.0 |
| North: Eastern Avenue | | | | | | | | | | | |
| 7 | L2 | 20 | 0.0 | 0.620 | 36.4 | LOS D | 9.2 | 64.5 | 0.94 | 0.83 | 34.8 |
| 8 | T1 | 3 | 0.0 | 0.620 | 31.8 | LOS C | 9.2 | 64.5 | 0.94 | 0.83 | 33.5 |
| 9 | R2 | 212 | 0.0 | 0.620 | 36.4 | LOS D | 9.2 | 64.5 | 0.94 | 0.83 | 35.0 |
| Approach | | 235 | 0.0 | 0.620 | 36.3 | LOS D | 9.2 | 64.5 | 0.94 | 0.83 | 35.0 |
| West: Gardeners Road W | | | | | | | | | | | |
| 10 | L2 | 51 | 0.0 | 0.045 | 12.9 | LOS B | 0.9 | 6.1 | 0.42 | 0.66 | 45.4 |
| 11 | T1 | 1435 | 0.0 | 0.635 | 11.6 | LOS B | 20.7 | 145.0 | 0.67 | 0.61 | 50.4 |
| 12 | R2 | 28 | 0.0 | 0.107 | 18.3 | LOS B | 0.7 | 4.7 | 0.54 | 0.69 | 42.7 |
| Approach | | 1514 | 0.0 | 0.635 | 11.7 | LOS B | 20.7 | 145.0 | 0.66 | 0.61 | 50.0 |
| All Vehicles | | 3061 | 0.0 | 0.635 | 13.3 | LOS B | 20.7 | 145.0 | 0.63 | 0.58 | 48.4 |

Level of Service (LOS) Method: Delay (HCM 2000).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

| Movement Performance - Pedestrians | | | | | | | | | |
|------------------------------------|---------------------|-------------------|-------------------|------------------|--------------------------------------|------------|--------------|-----------------------------|--|
| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Distance m | Prop. Queued | Effective Stop Rate per ped | |
| P2 | East Full Crossing | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 | |
| P3 | North Full Crossing | 53 | 9.4 | LOS A | 0.1 | 0.1 | 0.46 | 0.46 | |
| All Pedestrians | | 105 | 24.3 | LOS C | | | 0.70 | 0.70 | |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 6.1 | Copyright © 2000-2015 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: ARUP PTY LTD | Processed: Tuesday, 15 November 2016 8:12:04 AM

Project: J:\244000\244786-00 75 Gardeners Rd\Work\Internal\Oct 2016 Update\Gardeners_Eastern_SIDRA\Eastern avenue access\Eastern ave_weekend.sip6

MOVEMENT SUMMARY

▽ Site: AM dev

New Site
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---------------------------------|--------|--------------------------|------|---------------|-------------------|------------------|--------------------------------|------------|--------------|-----------------------------|--------------------|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Isaac Smith Dr | | | | | | | | | | | |
| 1 | L2 | 57 | 0.0 | 0.047 | 6.8 | LOS A | 0.2 | 1.2 | 0.34 | 0.60 | 52.6 |
| Approach | | 57 | 0.0 | 0.047 | 6.8 | LOS A | 0.2 | 1.2 | 0.34 | 0.60 | 52.6 |
| East: Gardners Rd (East) | | | | | | | | | | | |
| 4 | L2 | 14 | 0.0 | 0.261 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.02 | 58.2 |
| 5 | T1 | 1514 | 0.0 | 0.261 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.01 | 59.9 |
| Approach | | 1527 | 0.0 | 0.261 | 0.1 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 59.9 |
| West: Gardners Rd (west) | | | | | | | | | | | |
| 11 | T1 | 1607 | 0.0 | 0.275 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.9 |
| 12 | R2 | 14 | 0.0 | 0.042 | 15.4 | LOS B | 0.1 | 0.8 | 0.74 | 0.89 | 46.9 |
| Approach | | 1621 | 0.0 | 0.275 | 0.2 | NA | 0.1 | 0.8 | 0.01 | 0.01 | 59.8 |
| All Vehicles | | 3205 | 0.0 | 0.275 | 0.2 | NA | 0.2 | 1.2 | 0.01 | 0.02 | 59.7 |

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6.1 | Copyright © 2000-2015 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: ARUP PTY LTD | Processed: Monday, 18 September 2017 8:29:40 AM

Project: J:\244000\244786-00 75 Gardeners Rd\Work\Internal\Sep17\Isaac Smith.sip6

MOVEMENT SUMMARY

▽ Site: PM dev

New Site
Giveaway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | |
|---------------------------------|--------|--------------------------|------|---------------|-------------------|------------------|--------------------------------|------------|--------------|-----------------------------|--------------------|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Isaac Smith Dr | | | | | | | | | | | |
| 1 | L2 | 114 | 0.0 | 0.093 | 6.8 | LOS A | 0.3 | 2.4 | 0.34 | 0.61 | 52.5 |
| Approach | | 114 | 0.0 | 0.093 | 6.8 | LOS A | 0.3 | 2.4 | 0.34 | 0.61 | 52.5 |
| East: Gardners Rd (East) | | | | | | | | | | | |
| 4 | L2 | 105 | 0.0 | 0.301 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.11 | 57.4 |
| 5 | T1 | 1648 | 0.0 | 0.301 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.03 | 59.6 |
| Approach | | 1754 | 0.0 | 0.301 | 0.4 | NA | 0.0 | 0.0 | 0.00 | 0.04 | 59.5 |
| West: Gardners Rd (west) | | | | | | | | | | | |
| 11 | T1 | 1768 | 0.0 | 0.302 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 59.9 |
| 12 | R2 | 149 | 0.0 | 0.580 | 25.8 | LOS B | 2.2 | 15.7 | 0.90 | 1.05 | 41.4 |
| Approach | | 1918 | 0.0 | 0.580 | 2.0 | NA | 2.2 | 15.7 | 0.07 | 0.08 | 57.9 |
| All Vehicles | | 3785 | 0.0 | 0.580 | 1.4 | NA | 2.2 | 15.7 | 0.05 | 0.08 | 58.4 |

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6.1 | Copyright © 2000-2015 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: ARUP PTY LTD | Processed: Monday, 18 September 2017 8:29:40 AM

Project: J:\244000\244786-00 75 Gardeners Rd\Work\Internal\Sep17\Isaac Smith.sip6

MOVEMENT SUMMARY



Site: Gardeners_Eastern_Weekday_AM_dev

New Site

Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

| Movement Performance - Vehicles | | | | | | | | | | | |
|---------------------------------|--------|--------------------------|------|---------------|-------------------|------------------|--------------------------------|------------|--------------|-----------------------------|--------------------|
| Mov ID | OD Mov | Demand Flows Total veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
| South: Access | | | | | | | | | | | |
| 1 | L2 | 45 | 0.0 | 0.180 | 28.3 | LOS B | 3.0 | 21.3 | 0.76 | 0.72 | 35.9 |
| 2 | T1 | 5 | 0.0 | 0.180 | 23.8 | LOS B | 3.0 | 21.3 | 0.76 | 0.72 | 36.2 |
| 3 | R2 | 45 | 0.0 | 0.180 | 28.3 | LOS B | 3.0 | 21.3 | 0.76 | 0.72 | 36.1 |
| Approach | | 96 | 0.0 | 0.180 | 28.1 | LOS B | 3.0 | 21.3 | 0.76 | 0.72 | 36.0 |
| East: Gardeners Road E | | | | | | | | | | | |
| 4 | L2 | 12 | 0.0 | 0.500 | 19.3 | LOS B | 14.4 | 100.9 | 0.67 | 0.60 | 44.8 |
| 5 | T1 | 1479 | 0.0 | 0.500 | 13.5 | LOS A | 14.4 | 100.9 | 0.66 | 0.59 | 49.1 |
| 6 | R2 | 60 | 0.0 | 0.496 | 41.0 | LOS C | 2.5 | 17.6 | 0.91 | 0.79 | 33.7 |
| Approach | | 1551 | 0.0 | 0.500 | 14.6 | LOS B | 14.4 | 100.9 | 0.67 | 0.59 | 48.2 |
| North: Eastern Avenue | | | | | | | | | | | |
| 7 | L2 | 18 | 0.0 | 0.753 | 37.2 | LOS C | 14.5 | 101.2 | 0.95 | 0.90 | 34.5 |
| 8 | T1 | 1 | 0.0 | 0.753 | 32.7 | LOS C | 14.5 | 101.2 | 0.95 | 0.90 | 33.2 |
| 9 | R2 | 322 | 0.0 | 0.753 | 37.2 | LOS C | 14.5 | 101.2 | 0.95 | 0.90 | 34.7 |
| Approach | | 341 | 0.0 | 0.753 | 37.2 | LOS C | 14.5 | 101.2 | 0.95 | 0.90 | 34.7 |
| West: Gardeners Road W | | | | | | | | | | | |
| 10 | L2 | 59 | 0.0 | 0.059 | 15.7 | LOS B | 1.2 | 8.4 | 0.49 | 0.68 | 43.8 |
| 11 | T1 | 1541 | 0.0 | 0.750 | 16.6 | LOS B | 26.5 | 185.5 | 0.82 | 0.74 | 47.1 |
| 12 | R2 | 12 | 0.0 | 0.069 | 25.9 | LOS B | 0.3 | 2.4 | 0.66 | 0.69 | 39.2 |
| Approach | | 1612 | 0.0 | 0.750 | 16.7 | LOS B | 26.5 | 185.5 | 0.81 | 0.74 | 46.9 |
| All Vehicles | | 3599 | 0.0 | 0.753 | 18.0 | LOS B | 26.5 | 185.5 | 0.76 | 0.69 | 45.5 |

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

| Movement Performance - Pedestrians | | | | | | | | | |
|------------------------------------|---------------------|-------------------|-------------------|------------------|--------------------------------------|------------|--------------|-----------------------------|--|
| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Distance m | Prop. Queued | Effective Stop Rate per ped | |
| P1 | South Full Crossing | 53 | 12.8 | LOS B | 0.1 | 0.1 | 0.53 | 0.53 | |
| P2 | East Full Crossing | 53 | 34.7 | LOS D | 0.1 | 0.1 | 0.88 | 0.88 | |
| P3 | North Full Crossing | 53 | 12.3 | LOS B | 0.1 | 0.1 | 0.52 | 0.52 | |
| All Pedestrians | | 158 | 20.0 | LOS B | | | 0.65 | 0.65 | |

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 6.1 | Copyright © 2000-2015 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: ARUP PTY LTD | Processed: Tuesday, 15 November 2016 8:09:01 AM

Project: J:\244000\244786-00 75 Gardeners Rd\Work\Internal\Oct 2016 Update\Gardeners_Eastern_SIDRA\Eastern avenue access\Eastern ave_AM.sip6

**Attachment F – Master Plan:
Preliminary Heritage Review,
Prepared by NBRS Architects,
dated September 2017**

DRAFT MASTER PLAN: PRELIMINARY HERITAGE REVIEW

73 - 75 Gardeners Road Eastlakes



Sydney Water Site
73 - 75 Gardeners Road
EASTLAKES NSW 2018
28 SEPTEMBER 2017

NBR&PARTNERS PTY LTD

Level 3, 4 Glen Street,
Milsons Point NSW 2061 Australia
nbsarchitecture.com

ABN 16 002 247 565

Sydney: +61 2 9922 2344
Melbourne: +61 3 8676 0427
architects@nbsarchitecture.com

DIRECTORS

Geoffrey Deane NSW reg. 3766, Rodney Drayton NSW reg. 8632,
Andrew Duffin NSW reg. 5602, Garry Hoddinett NSW reg. 5286,
Andrew Leuchars LA reg. 035, James Ward

ASSOCIATE DIRECTORS

Trevor Eveleigh, Samantha Polkinghorne, Brett Sherson, Andrew Tripet,
Jonathan West **SENIOR ASSOCIATES** Barry Flack
ASSOCIATES Derek Mah, Hung-Ying Foong Gill, Sophie Orrock,

NBRS & PARTNERS Pty Ltd
Level 3, 4 Glen Street
Milsons Point
NSW 2061 Australia

Telephone +61 2 9922 2344 - Facsimile +61 2 9922 1308

ABN: 16 002 247 565

Nominated Architects
Geoffrey Deane: Reg No. 3766; Andrew Duffin: Reg No. 5602; Garry Hoddinett: Reg No 5286

This report has been prepared under the guidance of the Expert Witness Code of Conduct in the Uniform Civil Procedure Rules and the provisions relating to expert evidence

This document remains the property of NBRS & PARTNERS Pty Ltd.
The document may only be used for the purposes for which it was produced.
Unauthorised use of the document in any form whatsoever is prohibited.

| ISSUED | REVIEW | ISSUED BY |
|-------------------|---------------|-----------|
| 25 September 2017 | Draft | P Jeffery |
| 27 September 2017 | Amended draft | P Jeffery |
| 28 September 2017 | Final | P Jeffery |

DRAFT MASTER PLAN: PRELIMINARY HERITAGE REVIEW

73 - 75 GARDENERS ROAD, EASTLAKES NSW 2018

CONTENTS

| | | |
|------------|--|-----------|
| 1.0 | INTRODUCTION | 1 |
| 1.1 | Background | 1 |
| 1.2 | The Site | 1 |
| 1.3 | Authorship | 2 |
| 1.4 | Sources | 2 |
| 2.0 | HISTORICAL CONTEXT | 3 |
| 2.1 | Pre-European History | 3 |
| 2.2 | Early European Settlement | 3 |
| 2.3 | History of the Subject Site | 4 |
| 3.0 | RELEVANT HERITAGE LEGISLATION | 17 |
| 3.1 | Heritage Status of the Subject Site | 17 |
| 3.1.1 | Generally | 17 |
| 3.1.2 | 73a and 75 Gardeners Road | 17 |
| 3.1.3 | 73 Gardeners Road | 18 |
| 3.2 | Heritage items in the vicinity | 18 |
| 4.0 | HERITAGE ASSESSMENT OF 73A GARDENERS ROAD | 22 |
| 4.1 | Description | 22 |
| 4.1.1 | Generally | 22 |
| 4.1.2 | Setting | 22 |
| 4.1.3 | Exterior Fabric | 25 |
| 4.1.4 | Interior Fabric | 26 |
| 4.2 | Evaluation Criteria | 27 |
| 4.2.1 | Application of the Criteria to 73a Gardeners Road | 28 |
| 4.2.1 | Heritage Significance of 73a Gardeners Road, Eastlakes | 31 |
| 5.0 | POTENTIAL HERITAGE IMPACTS | 32 |
| 5.1 | Description of the proposed development | 32 |
| 5.2 | Potential heritage issues | 32 |
| 5.2.1 | Sewage Pumping Station | 32 |
| 5.2.2 | Brick Residence (73A Gardeners Road) | 32 |
| 5.2.3 | Vegetation and water courses | 32 |
| 5.2.4 | Potential Archaeology Generally | 33 |
| 5.3 | Conclusions | 33 |
| 5.4 | Heritage Recommendations | 34 |
| 6.0 | APPENDICES | 35 |
| 6.1 | Miscellaneous Photographs | 35 |

| | |
|--|----|
| 6.1.1 73 Gardeners Road, Eastlakes | 35 |
| 6.1.2 75 Gardeners Road | 39 |
| 6.2 NSW State Heritage Register Listing: Botany Water Reserves (SHR No. 01317) | 40 |

LIST OF FIGURES

| | |
|--|----|
| Figure 1 – Aerial photograph showing the location and context of 73 and 73 Gardeners Road, Eastlakes. Source: Architectus 2017. | 2 |
| Figure 2 – AO Map 191, Parish of Botany, undated. Winder's land grant shaded pink. (Source: NSW Land & Property Information, Historic Land Records Viewer) | 5 |
| Figure 3 – Sketch showing the Water Reserve and the Country Between Sydney and Botany, 1850 / William Henry Wells. (Source: State Library of New South Wales, Digital Order No. a1595001h) | 7 |
| Figure 4 – Plan shewing the various localities and Works referred to in the report of the Special Committee on the subject of procuring permanent supply of water in the City of Sydney, 1852. (Source: State Library of New South Wales, Digital Order No. c015770001) | 8 |
| Figure 5 – Parish of Botany [Lachlan and Botany watersheds], 1853. (Source: State Library of New South Wales, Z/M2 811.186/1853/1) | 9 |
| Figure 6 – Plan of the Botany and Lachlan Watersheds [cartographic material] / comp. by L. Blackwell, 1875. (Source: State Library of New South Wales, Digital Order No a1602001) | 10 |
| Figure 7 - View of the northwest corner of the existing sewage pumping station located at 73 Gardeners Road, Eastlakes. The building appears to one of a group constructed in c1920 as part of the SWS00S expansion works. | 12 |
| Figure 8 – Building and Construction: A Fine Golf House for the Lakes Golf Club. (Source: Sydney Morning Herald, 10 December 1929, p8) | 13 |
| Figure 9 – Municipality of Mascot, 22 December 1932. (Source: State Library of New South Wales, Digital Order No. a136027) | 13 |
| Figure 10 – Aerial view of Lakes Golf Course / Hall & Co., ca. 193-? Club house circled yellow thereon. (Source: State Library of NSW, PXE 889) | 14 |
| Figure 11 – Lakes Golf Club, Sam Hood, 1936. (Source: State Library of NSW, Digital Order No. hood_13442) | 15 |
| Figure 12 – Extract from 1943 aerial survey of Sydney showing subject site shaded yellow. (Source: NSW Land & Property Information, SIX Maps) | 15 |
| Figure 13 - Extract from mapHER_004 attached to Botany Local Environmental Plan 2013, showing the location of the site. The area shaded green is the Botany Water Reserve. Source: https://www.legislation.nsw.gov.au/maps/53bc85e6-6c49-434a-891b-2a5581939ddc/1100_COM_HER_004_010_20150722.pdf | 17 |
| Figure 14 - Plan showing the heritage curtilage identified in the Sydney Water s170 Heritage Register listing of Botany Waters Reserve. Source: Sydney Water. | 19 |
| Figure 15 - Draft master plan prepared for 73 and 75 Gardeners Road, Eastlakes. Source: Architectus, August 2017. | 21 |

| | |
|--|-----------|
| <i>Figure 16 - Street view of 73A Gardeners Road, looking southwards. Source: Google street view, September 2017.....</i> | <i>22</i> |
| <i>Figure 17 - The existing garden (northern) frontage to 73A Gardeners Road.....</i> | <i>23</i> |
| <i>Figure 18 – View looking north along the eastern side of the house.</i> | <i>23</i> |
| <i>Figure 19 – View looking southeast towards the pumping station building from the rear of the house.</i> | <i>23</i> |
| <i>Figure 20 – View looking south west from the rear of the house.</i> | <i>23</i> |
| <i>Figure 21 – Brick paving and paling fence installed c2000.....</i> | <i>23</i> |
| <i>Figure 22 – Surviving outbuilding c1930, located to the west of the house.</i> | <i>23</i> |
| <i>Figure 23 – Structure located to the west of the house.....</i> | <i>23</i> |
| <i>Figure 24 – Garage located to the northeast of the house.....</i> | <i>23</i> |
| <i>Figure 25 - Aerial photograph of 73a Gardeners Road, c1943, showing the original driveway to the pumping station building and site of the existing free-standing residence prior to the widening of Gardeners Road. (Source: SIX Maps, NSW Land and Property Information).</i> | <i>24</i> |
| <i>Figure 26 - Aerial photograph showing 73a Gardeners Road, c2014, showing the existing free-standing house. (Source: SIX Maps, NSW Land and Property Information).</i> | <i>24</i> |
| <i>Figure 27 – the north elevation of 73A Gardeners Road.....</i> | <i>25</i> |
| <i>Figure 28 – The front verandah, looking west.....</i> | <i>25</i> |
| <i>Figure 29 – Detail of the deteriorated terrazzo treads.</i> | <i>26</i> |
| <i>Figure 30 – View of the western elevation of the house.</i> | <i>26</i> |
| <i>Figure 31 – The asbestos annex located on the southern side of the house.</i> | <i>26</i> |
| <i>Figure 32 – General view of the southeast corner of the house.</i> | <i>26</i> |
| <i>Figure 33 – General view of the sitting room, looking west.</i> | <i>27</i> |
| <i>Figure 34 – Partial view of the kitchen fit out, installed c1995.</i> | <i>27</i> |
| <i>Figure 35 – Ceilings throughout the building were replaced c2000 with painted plasterboard and coved cornices.</i> | <i>27</i> |
| <i>Figure 36 – View of bathroom fit out, installed c1995.</i> | <i>27</i> |

1.0 INTRODUCTION

1.1 BACKGROUND

Sydney Water have engaged Architectus to prepare a Master Plan for land at 73 and 75 Gardeners Road, Eastlakes for the purposes of informing a Planning Proposal which seek to amend the current planning controls for the site to allow residential development and supporting land uses.

Sydney Water are in the process of divesting surplus land to allow redevelopment and improved utilisation of this land within the Sydney Metropolitan area. For the subject sites, due to their location within the wider context of Eastlakes, it is proposed to seek their rezoning to allow for residential development or other appropriate supporting land uses.

In order to test and demonstrate the suitability of the site for the proposed land uses, a master plan has been prepared by Architectus and considered by **NBRS**ARCHITECTURE. This master plan identifies that the site can be developed for residential with supporting land uses such as small-scale shops, retail or similar uses. The proposal will enable the future redevelopment of both sites as medium- and high-rise residential development ranging from six to fourteen storeys with extensive open areas, ground floor café/retail tenancies and basement parking. No approval is sought for the master plan at this stage as it simply seeks to evidence that the proposed changes to the planning controls are appropriate.

Any future development of the site will be subject to future development applications lodged with Council. Our review of the master plan has identified that the site is suitable for the proposed land uses as residential and supporting land uses including supporting commercial/retail uses.

1.2 THE SITE

The site comprises two parcels of land addressing Gardeners Road, Eastlakes NSW 2018, namely:

- 73 Gardeners Road, described as Lot 101 in a plan of subdivision of Lot 50 in DP1216168 (Parish of Botany, County of Cumberland) currently zoned SP2 – Sydney Water; and
- 73A and 75 Gardeners Road, described as Lot 51 in DP 11216168 (Parish of Botany, County of Cumberland), comprises 1.35ha, includes a drainage easement, currently zoned SP1 – Recreation facility (outdoor).

The site is bounded on the north by Gardeners Road and the Municipality of Randwick, on the east by a drainage canal and Eastlakes Golf Club, and to the west by Slattery Place. The south boundary of the site adjoins the Botany Water Reserve, which is listed as a heritage item on the NSW State Heritage Register. The Botany Water Reserve is part of the Botany Wetlands, which comprises a surface and ground water system, fed by the Botany Sands aquifer and surface run-off from the surrounding areas¹.

The areas to the north and east are characterised by one- and two-storey residential development, while the area to the west contains a five-storey residential development.

¹ Sydney Water, Implementation of Botany Wetlands Plan of Management-Annual Report 2003-2004. September 2004.

The Daceyville Garden Suburb Heritage Conservation Area (C1), located to the east of the subject site, is identified as an item of 'Local' significance on the Botany LEP 2013. The conservation area is separated by the Eastlake Golf Club clubhouse, an open parking area, and greens maintenance storage areas.



Figure 1 – Aerial photograph showing the location and context of 73 and 75 Gardeners Road, Eastlakes. Source: Architectus 2017.

1.3 AUTHORSHIP

The following staff of **NBR**SARCHITECTURE were engaged in the preparation of this report:

- Pam Jeffery, Senior Heritage Consultant
- Leonie Masson, Historian

Illustrations and photographs contained in this report are the work of **NBR**SARCHITECTURE unless otherwise noted.

1.4 SOURCES

The main documentary sources consulted in the research for this report are listed below:

- *Mitchell Library: State Library of NSW – Maps, Plans and Small Pictures File*
- *NSW Department of Lands*
- *Sydney Water Plan Room*
- *City of Botany Bay Council - Local Studies and History Collection*

2.0 HISTORICAL CONTEXT

2.1 PRE-EUROPEAN HISTORY

At the time of European settlement there were three main aboriginal tribes based on Linguistic groups, in the Sydney Region. The Kameygal people set up camps along the banks of the Cooks River and on the shores of Botany Bay, hunting, fishing and gathering food. Trees and plants provided the raw material for food, medicine, implements and weapons. In the mild Sydney climate, the Aboriginal people thrived. Their way of life was undisturbed until the English mariner and explorer, James Cook, sailed into Botany Bay on the Endeavour in April 1770. His arrival set in train events which eventually culminated in the establishment of a penal colony nearby at Sydney Cove.²

Although there is evidence of aboriginal occupation within the Municipality of Botany, there is no physical evidence of any such occupation within the subject site.

2.2 EARLY EUROPEAN SETTLEMENT

Cook named the bay Stingray Harbour, but this was later changed to Botany Bay because of the many exotic plants botanist Sir Joseph Banks collected there. In his journals, Cook wrote enthusiastically of the well-watered fertile meadows he had seen. His descriptions helped to convince the British government that New South Wales would be the ideal place to set up a penal colony.³ When Captain Arthur Phillip followed 18 years later with the First Fleet he found the bay lacked sufficient shelter and ready supplies of fresh water, so he moved his settlement to Sydney Cove.

Although settlers visited the area regularly in hunting parties it would be another 30 years before the first free settlers made their homes on the western shores of Botany Bay. The lack of access across the swamps and marshlands of the lower reaches of the Cook River made communication with the area almost impossible. The thick woods made it a paradise for escaped convicts and bushrangers who could sustain themselves by the abundance of wild life and water. So dense were the forests that the possibility of recapture was extremely remote.

When the first settlers arrived in the area they felt quite threatened by these escapes and in 1820 petitioned the government for a resident district constable.

The alienation of much of this region was by way of land grants between 1804 and 1830. This coupled with the realisation that enormous supplies of timber and shells for lime making were available in the region, gave the area great economic potential as there were no identified deposits of limestone in the Sydney region.

Soldiers, ex-convicts and free immigrants were among the early grantees in the Botany area. Two of the earliest settlers in the region were Andrew Byrne and Edward Redmond, who had been transported for life for their part in the Irish Rebellion of 1798. They cut down trees, sold the timber, and began to raise horses and farm the land. They also collected oyster shells left by the Aboriginal people on the banks of the Cooks River, and burnt them to make lime for building.

In 1815, ex-convict Simeon Lord took advantage of the natural landscape of Botany, when he dammed a stream close to Botany Bay and established the first privately run woollen mill on

² www.botanybay.nsw.gov.au/city/contents/history

³ www.botanybay.nsw.gov.au/city/contents/history

its banks. A short distance away, he also built a flour mill. The two ponds he created are now local landmarks, known as the Mill Pond and the Engine Pond. Lord also received other land in the Botany area, which relates directly to this study.⁴

Simeon Lord was not the only one to recognise the value of Botany's water. In the 1830s, market gardeners arrived in the area. They cut trenches in the soft soil to irrigate their crops, and sold fruit and vegetables to the nearby city and suburbs. Fishing villages sprang up to cater for the demands of a growing population.

In the 1850s, as the colony's streams became clogged and polluted, the government turned to Botany to supply Sydney with water. From 1859 to 1886 pumps carried water from the Botany Swamps to the city and surrounding suburbs. At the same time, more and more industries set up factories in and around the Botany Water Reserve. Tanneries, wool scourers, fellmongers, and boiling down works all drained the natural swamp, till by 1869, the area was no longer considered to be a reliable source of water.

John Geddes who was closely associated with the establishment of the Botany Presbyterian Church, established his tannery and fellmongers businesses along Botany Road in the later decades of the 19th century. By 1886 the Sands Directory records three factories owned by Geddes, J.H. Geddes & Co (associated with the wool trade), Floodvale Fellmongery and Geddes Bros Fellmongers & Glue workers.

In 1921, Mascot was chosen as the site of what was to become Australia's largest international airport. Less than ten years later, a port was established on the shores of Botany Bay. These developments now dominate the landscape of Botany. After more than ten years of planning and manoeuvring, the Sydenham to Botany Railway Line was finally opened in 1925 but only as a goods line. The line still carries goods to and from local industrial sites.

In the Botany area industry and housing have always been located alongside one another. Modern day Botany is a mixture of old and new, with flats and medium density housing interspersed with more traditional brick and wooden cottages. Recent housing developments have taken the place of run down factories.

Following construction of the new wharf road, Botany Road traffic was reduced and some residential redevelopment of the area has occurred with medium density apartments, mostly to the south of Botany Road. The area to the north of Botany Road remains a mainly light industrial with some residential uses interspersed.

In recent years Botany has developed one of the most ethnically diverse populations in Sydney, with over forty percent of residents coming from a non-English speaking background. The influence of the post war generation is evident in the daily life of the community. Restaurants and businesses catering for wide multicultural tastes are attracting a growing number of customers.

2.3 HISTORY OF THE SUBJECT SITE

The subject site is located on part of 417 acres granted to Thomas (Tom) White Melville Winder on 27 May 1823. That land is illustrated in the map at Figure 2, known as Portion 151 of the Parish of Botany.

⁴ www.botanybay.nsw.gov.au/city/contents/history

In August 1820, with Samuel Terry, Winder established the Lachlan Flour Mills at Kensington. He and Terry entered into partnership with William Hutchinson, Daniel Cooper, George Williams and William Leverton and renamed the mill the Lachlan and Waterloo Flour Mills. Winder sold and conveyed his share in the business to the remaining partners in February 1823. In January 1825, Winder conveyed his land grant by lease and release to Daniel Cooper and Solomon Levey and Robert Cooper for the sum of £5000.⁵

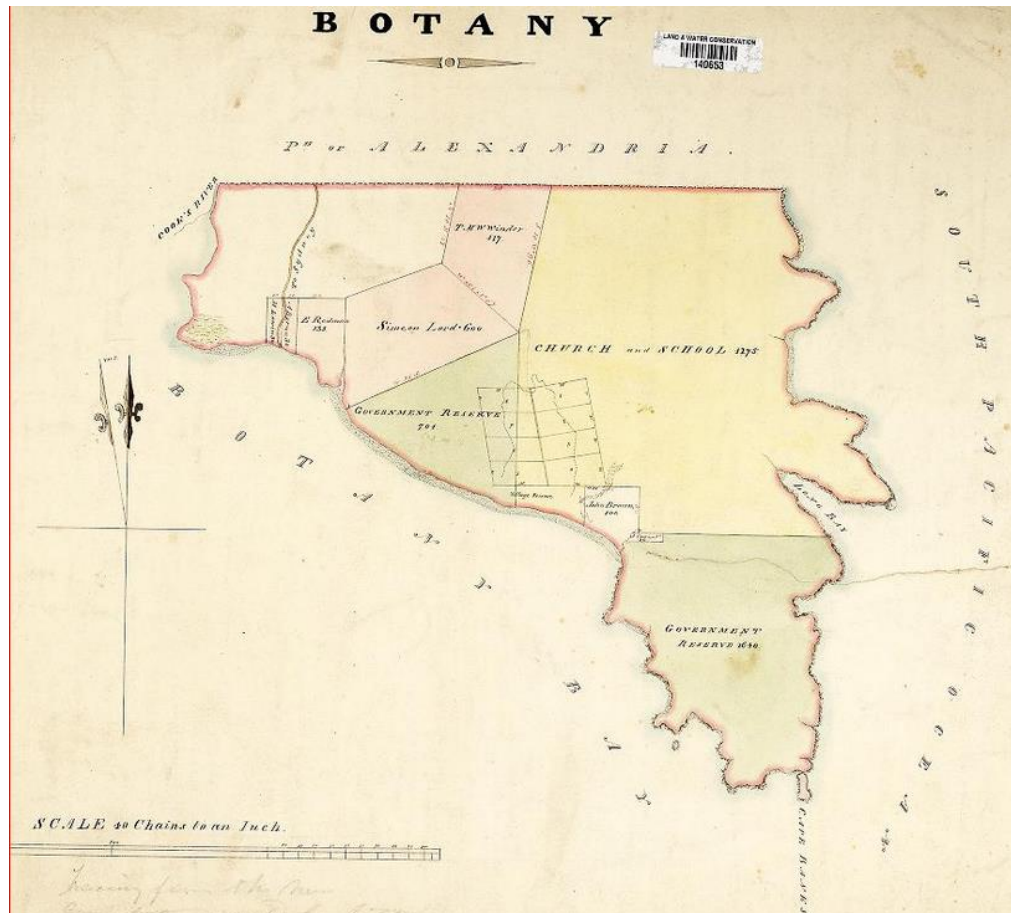


Figure 2 — AO Map 191, Parish of Botany, undated. Winder's land grant shaded pink. (Source: NSW Land & Property Information, Historic Land Records Viewer)

The subject site was originally located within the Lachlan Swamps, which lands were later developed as part of the Botany Water Reserve.

The Sydney Water Works were established in Botany in 1858 and were fed by the many springs in the area. In 1886, the last year of full pumping, 1864 million gallons of water were supplied to Sydney from these water works. Although the scheme was Sydney's major source of water for 30 years, it did not supply water in the Botany area, whose residents depended on natural sources and tanks. (Pollen, 1988, pp.35-6)

Following European colonisation, the first substantial interventions in the area occurred in 1815 when the enterprising merchant Simeon Lord had a dam constructed to the west of the present Botany Road to assist him in establishing the colony's first woollen mill. A second dam was constructed near the present Engine House ruins for a flour mill (refer to 1869 Water

⁵ Old System Deed Bk Q No 19, NSW Land & Property Information.

Commission Plan). This mill continued operating until about 1847 while the textile factory was closed by about 1856.

From 13 July, 1855 the City Council began resuming land around, and including, the Botany wetlands for the city's main water supply scheme - the first-time land resumptions were made for this purpose. (The land was transferred to the Water Board in 1888.) Of this land about 75 acres of Lord's estate was resumed which included his house (demolished in the 1930s though the site of which is near the present heliport), the mill sites, various cottages and the earthworks associated with Lord's mill dams.

The initial water supply scheme of the mid-1850s, by the City Engineer WB Rider, was abandoned with the appointment of Edward Bell to the position. The surviving Engine House and chimney date from the implementation, in the late 1850s, of Bell's scheme while the stone retaining walls for the Engine Pond and outlet sluice probably date from the 1870s work on the Engine Pond augmentation. Between 1866 and the mid-1870s six dams were constructed, and reconstructed for various reasons, from the Mill Pond to Gardeners Road using piling of sheet timber facing filled with sand forming a core of a turfed bank. In 1859 a 30" sand-cast iron main was completed between the Engine House and the Crown Street reservoir. The pipes were made in Scotland in 1856 and machined with such remarkably fine tolerance that, of the total length of 4 miles (6.4 km), the outside diameter varied by only 6mm and allowed the pipes to be laid without jointing material. Part of this easement coincides with the present study area near that Engine House.

Drawing on a 1982 thesis of Margaret Simpson, the Thorp et al study indicates that about 80 trees - "Norfolk Pines, Morton Bay Figs, Weeping Figs, Sweet Scented Pines and Stone Pines" - were planted along the access road from Botany and elsewhere on the site in 1869. Works for the augmentation of water storage at Botany continued throughout the 1870s including the addition of water stored in the Bunnerong Dam (1876-1877) by way of a pipe to the No 4 Pond. The then Bunnerong Road was moved and ran along the top of this dam wall.

By the early 1880s the Upper Nepean Scheme was well underway and in November 1886 the Nepean-supplied water effectively ended the general supply of Sydney's water from the Botany system. Even intermittent emergency use of the system ceased by 1893 so that the Engine House machinery was finally decommissioned with pumping equipment and boilers sold at auction in 1896. In 1894 various local industrial uses - such as wool scourers and tanners - were permitted to return to the wetland vicinity through leases until 1947.



Figure 3 – Sketch showing the Water Reserve and the Country Between Sydney and Botany, 1850 / William Henry Wells. (Source: State Library of New South Wales, Digital Order No. a1595001h)

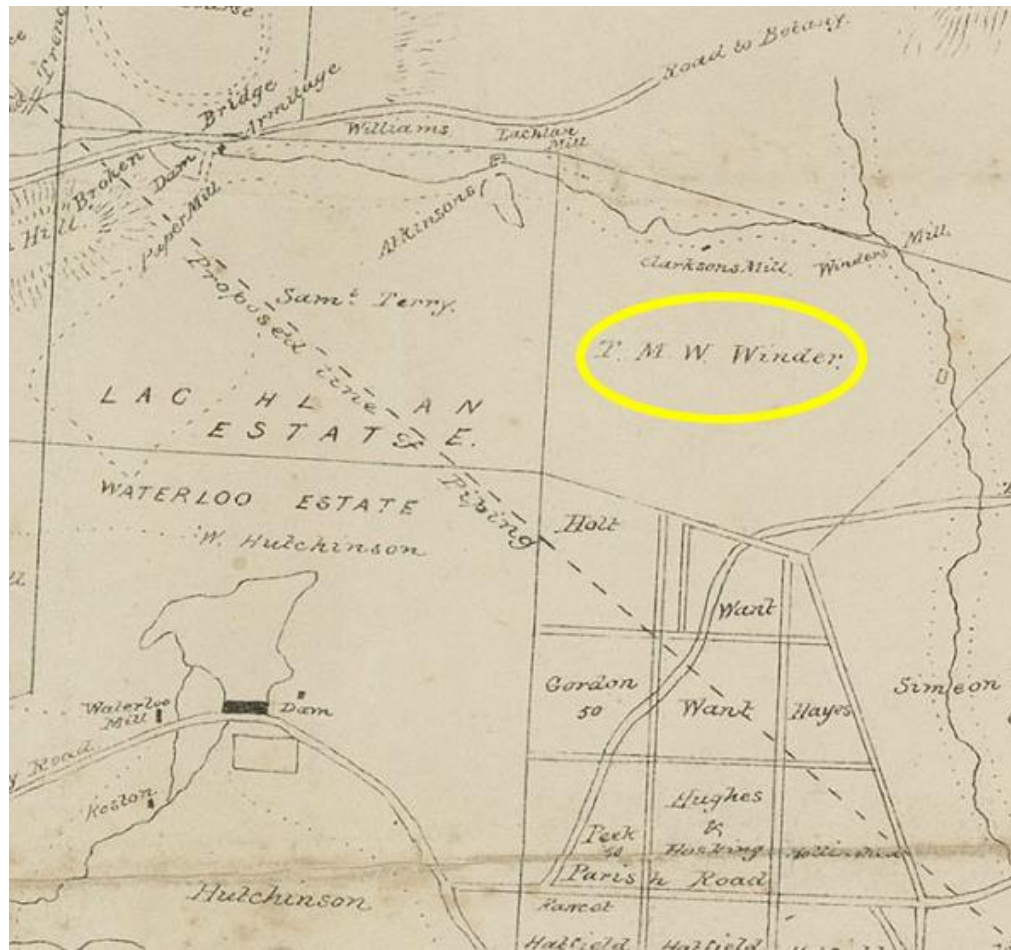


Figure 4 – Plan shewing the various localities and Works referred to in the report of the Special Committee on the subject of procuring permanent supply of water in the City of Sydney, 1852. (Source: State Library of New South Wales, Digital Order No. c015770001)

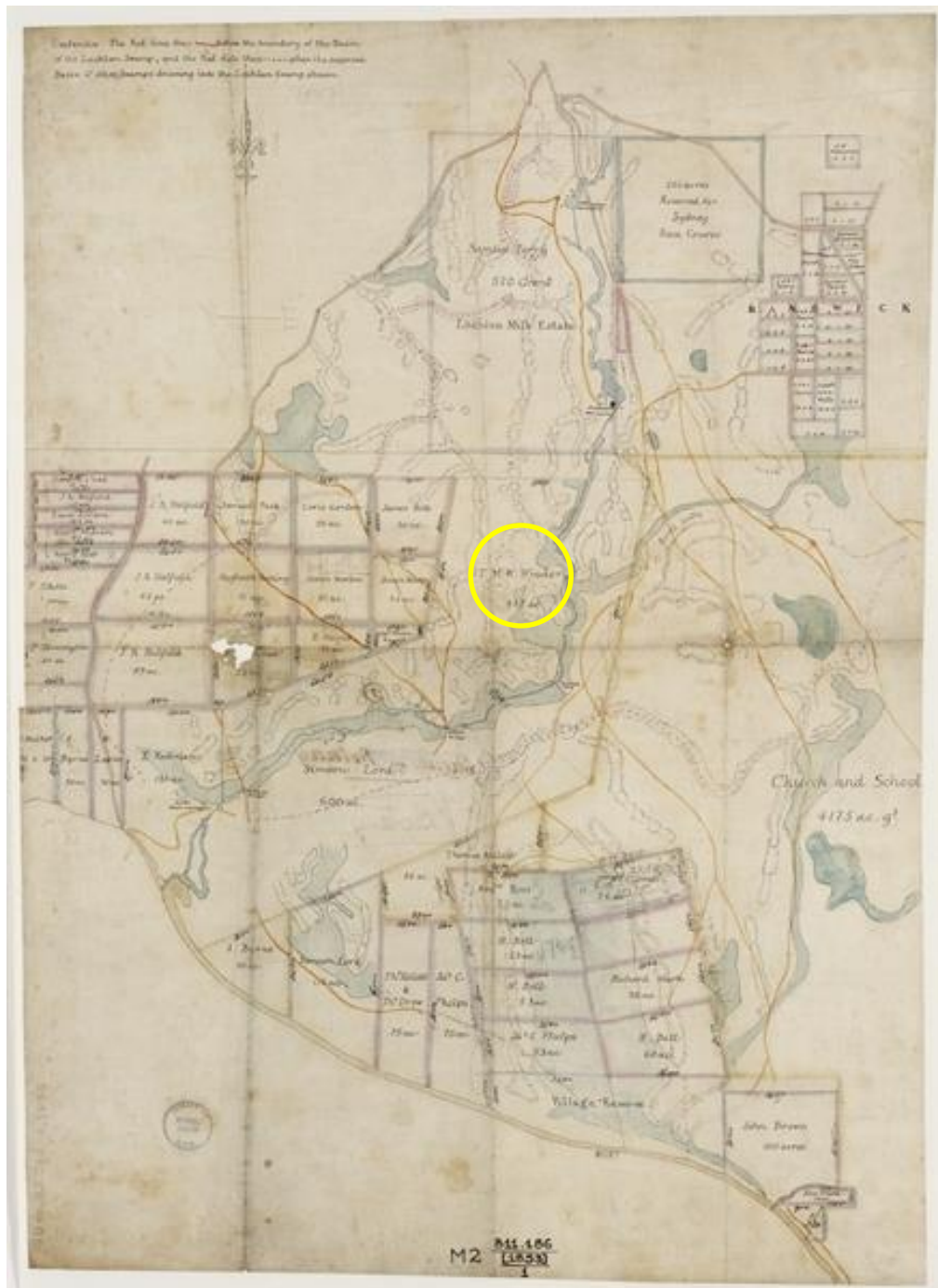


Figure 5 – Parish of Botany [Lachlan and Botany watersheds], 1853. (Source: State Library of New South Wales, Z/M2 811.186/1853/1)

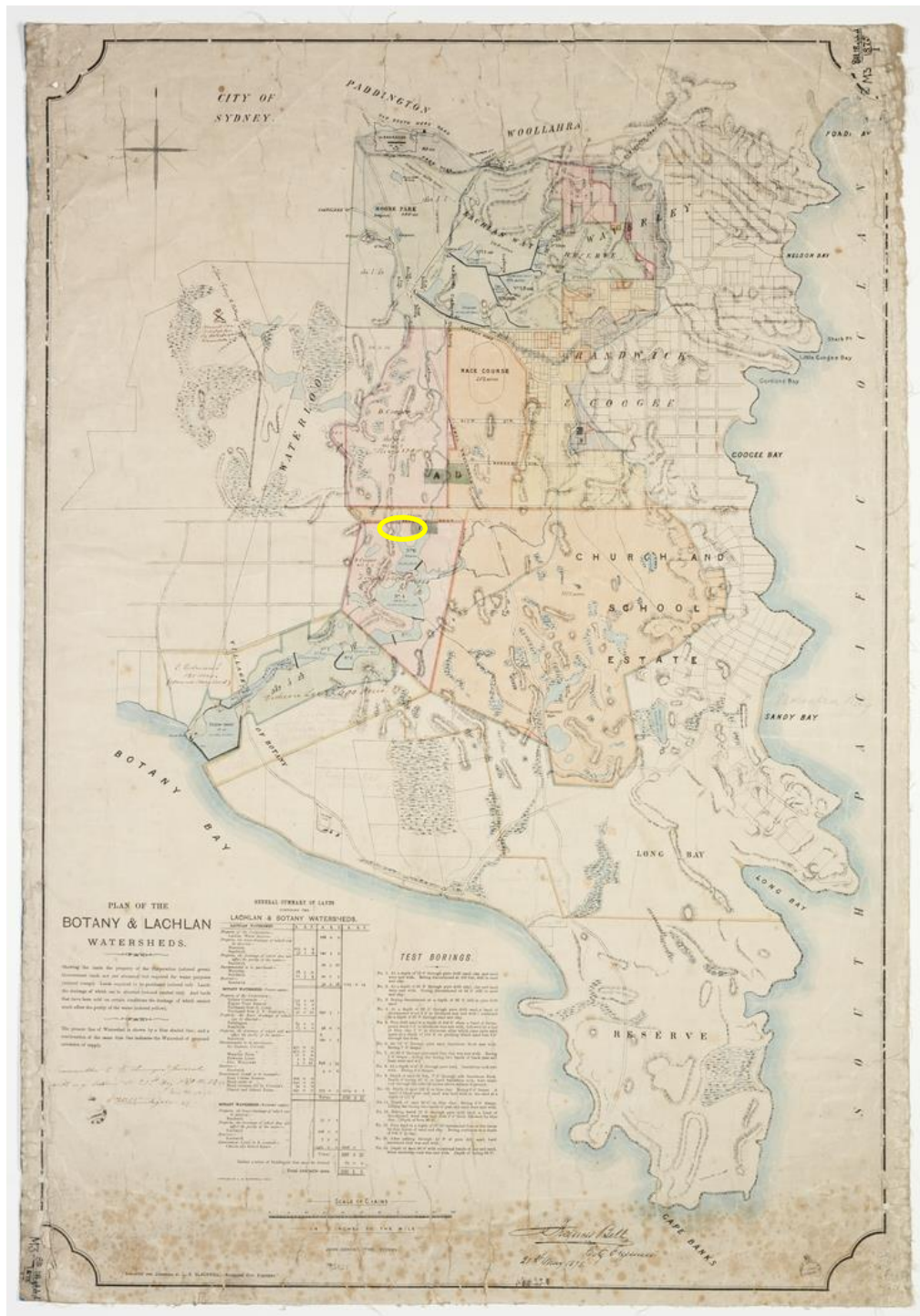


Figure 6 — Plan of the Botany and Lachlan Watersheds [cartographic material] / comp. by L. Blackwell, 1875. (Source: State Library of New South Wales, Digital Order No a1602001)

While these major improvement programs for Sydney's water supply were being put into place it also became clear - chiefly from an increasingly polluted harbour - that substantial works were needed to deal with the sewage of Sydney and its immediate suburbs. After the Board of Water Supply and Sewerage was formed in 1888 the basis of what is presently Sydney's largest sewerage system was commenced. As part of its responsibilities the new Board

assumed control of various recent works of the Public Works Department, one of which was the first of the new sewer mains from the City to the Botany Sewage Farm established about 1886. Another main was added in 1898 which linked various western suburbs to the Sewage Farm. However, by the turn of the century the usefulness of the Farm was fast diminishing such that the southern and western sewerage systems were amalgamated and extended, from 1909, to a new ocean outfall at Malabar while the much-expanded Botany Sewage Farm was closed. This work - known as the Southern and Western Sewer Ocean Outfall System or, usually, SWSOOS No 1 - was completed in 1916 under the direction of Chief Engineer EM de Burgh.

Further growth of Sydney's suburbs and resultant extensions to this sewerage network necessitated an augmentation of the system, by duplication known as SWSOOS No 2, during 1936 to 1941. Both mains were required to cross the Cooks River by inverted syphons. The current SWSOOS network represents Sydney's largest sewerage system and envelops mains that were constructed from the 1880s through the 1890s, 1900s, 1910s to 1940s. Other individually significant components of the SWSOOS network located near the present site include the twin major inverted syphons and syphonic overflows (now under Sydney Airport) (part of ID No SW 33?) and the 1896 sewer vent at West Botany Street, Arncliffe (ID No SW 31 - SHI 4571725).

Within the site the existing engine house chimney was retired for water supply use in 1888, left unused for 28 years then, after being shortened, re-used as a vent in 1916 as part of the work for the new SWSOOS. Various buildings, associated with the new sewerage system, were added to the west. During the 1940s the chimney was further truncated to its present height along with the diversion of the mouth of the Cooks River into Botany Bay and substantial filling of the Engine and Mill Ponds as part of a major expansion and upgrade of airport facilities. From the 1970s a greater appreciation of the special historical and environmental values of the place was apparent through the commissioning of a range of studies to record and assess its significance. However further incursions continued with the 1988 construction of Southern Cross Drive through the middle of the Engine Pond, reclamation by the DMR and more recent works associated with the pre-Olympics upgrade of the airport.⁶

⁶ "Botany Water Reserves", NSW Heritage Register, <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=5051418>, accessed 27 August 2015.



Figure 7 - View of the northwest corner of the existing sewage pumping station located at 73 Gardeners Road, Eastlakes. The building appears to one of a group constructed in c1920 as part of the SWSOOS expansion works.

In January 1923 the Metropolitan Board of Water Supply and Sewerage advertised tenders to golf clubs *"for the lease for golf purposes only of about 281 acres of land extending from Kensington to Botany, being part of the area known as the Botany Water reserve. The area to be leased does not include the chain of ponds which exist on the land. The Lease will be for a term ending 30th December 1947."*⁷ Despite keen interest from Sir Denison Miller, Governor of the Commonwealth Bank, a member of a syndicate interested in leasing the land, the matter was deferred pending progress on the proposed Botany railway. One year later the Water Board began drawing up a lease of the subject lands⁸ with approval given in June for the final clauses in same, prior to consultations with the Railway Commissions in regard to a proposed tramway route in the vicinity of the subject land.⁹ A syndicate comprising Sir Hugh Denison, HA Russell, TR Raine and James Kell, entered into negotiations with the Water Board to lease the 283 acres of land stretching from Kensington to Botany (the unoccupied portion of the Botany water reserve lands) to construct two golf courses.¹⁰ In August 1927, following the receipt of a new offer for the area, the president of the Water Board "recommended that public tenders be invited for the use of this area for a golf course or courses, and this was agreed to".¹¹ In mid-1928 the tender of George Solomon, representing a syndicate, was accepted by the Water Board: *"The land comprises 283 acres and the offer of the successful tenderer is £2 per acre per annum"*.¹²

At the end of June 1929 the *Sydney Morning Herald* reported *"Sydney will have another very fine golf links ready for play in a few months...The club is fortunate in having 280 acres at its disposal and already plans have been made, and a start has been made with the construction of a public course."*¹³ The same article discussed plans for the club house to be erected on Gardeners Road comprising a one-storey building of colonial type designed by Messrs Wright and Apperly, "who specialise in club-house designs". The club house was in course of erection in December 1929 and a detailed description of the architecture and facilities of same were

⁷ *Sydney Morning Herald*, 17 January 1923, p22.

⁸ "New Links", *Sydney Morning Herald*, 21 February 1924, p6.

⁹ "New Club Established", *Sydney Morning Herald*, 5 June 1924, p12.

¹⁰ "New Golf Links, Kensington and Botany", *Newcastle Sun*, 29 October 1925, p3.

¹¹ "Golf New Links Botany and Wollongong, Water Board Decision", *Sydney Morning Herald*, 25 August 1927, p13.

¹² "New Links at Botany, tender let to syndicate", *Sydney Morning Herald*, 21 June 1928, p13.

¹³ "The Lakes Club, splendid links at South Kensington", *Sydney Morning Herald*, 25 June 1929, p16.

furnished in the Building and Construction column of the *Sydney Morning Herald* on 10 December, accompanied by the illustration shown below in Figure 8.

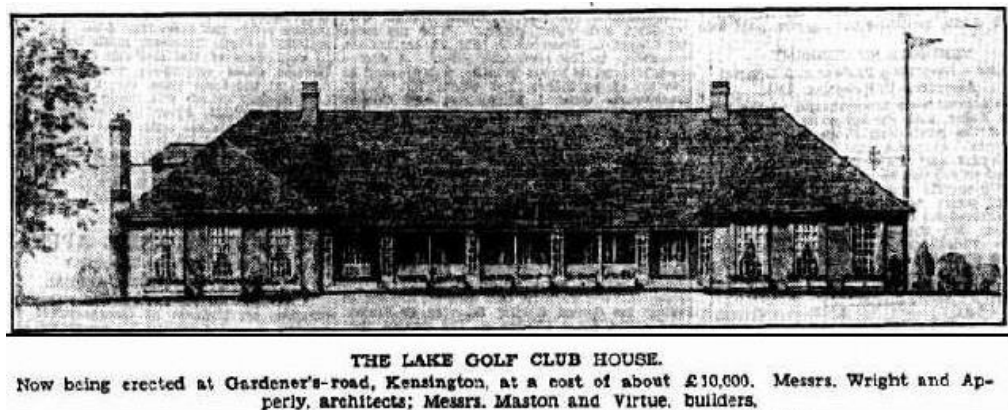


Figure 8 – Building and Construction: A Fine Golf House for the Lakes Golf Club. (Source: *Sydney Morning Herald*, 10 December 1929, p8)

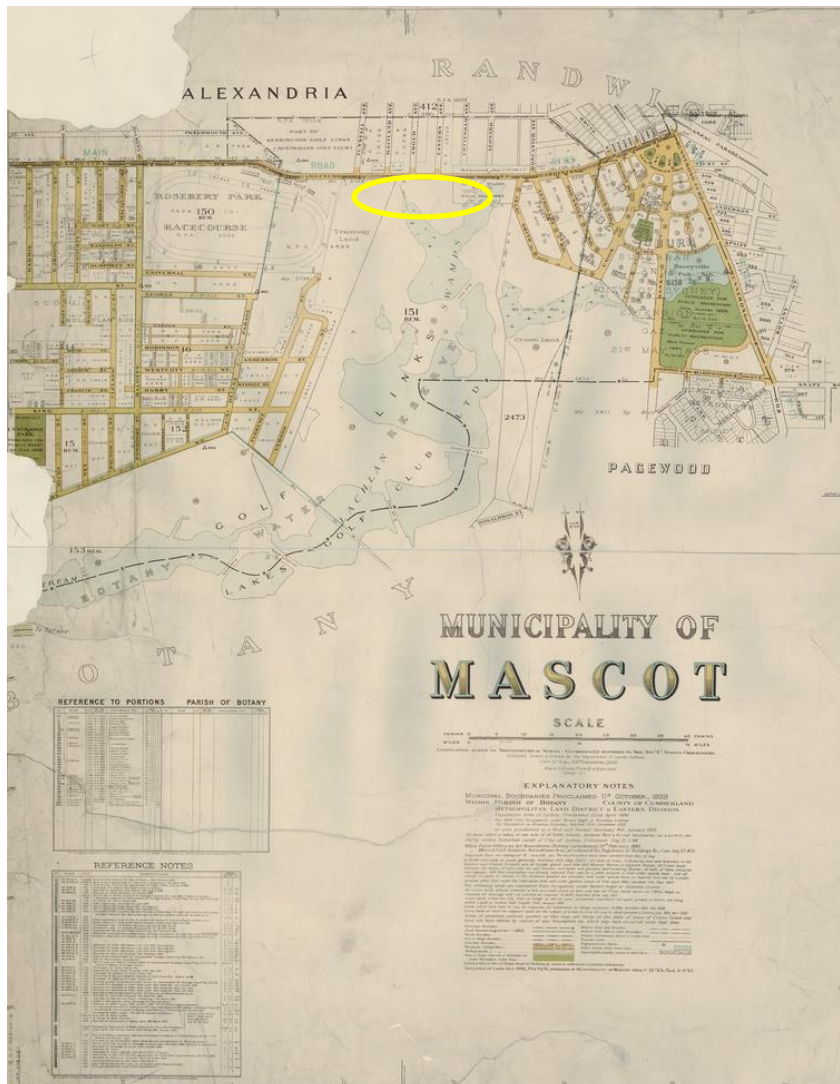


Figure 9 – Municipality of Mascot, 22 December 1932. (Source: State Library of New South Wales, Digital Order No. a136027)

The golf links is shown on the 1932 map of the Municipality of Mascot (Figure 9) and the approximate location of the subject site (former Golf Club House) circled yellow thereon. The club house is visible in the [193?] aerial view of the golf course shown at Figure 10 and in the background shots in 1936 and 1938 (Figure 11). The area to the west of the Club House was used for workshops, storage, generally associated with greens management and maintenance.



Figure 10 – Aerial view of Lakes Golf Course / Hall & Co., ca. 193-? Club house circled yellow thereon. (Source: State Library of NSW, PXE 889)



Figure 11 – Lakes Golf Club, Sam Hood, 1936. (Source: State Library of NSW, Digital Order No. hood_13442)



Figure 12 – Extract from 1943 aerial survey of Sydney showing subject site shaded yellow. (Source: NSW Land & Property Information, SIX Maps)

Following the relocation of the Eastlake Golf Club House to a new site in the 1970s, the Metropolitan Water Sewerage and Drainage Board leased part of Lot 51 of DP1216168 in March 1977 to Panama Developments Pty Limited for the yearly sum of \$3000.¹⁴

Investments Pty Limited, a company managing retail nurseries and garden stores, (founded in 1973) leased Lot 51 of DP1216168 commencing in December 1977. The former golf club was demolished to make way for the present Gardens R Us store and carpark.

In c2015 the nursery owner surrendered its lease of 75 Gardeners Road (Lot 51 of DP1216168), and the structures were cleared from the site.

¹⁴ Memorandum of Lease Q133299, NSW Land & Property Information. The portion of land excluded the land resumed for road widening purposes.

3.0 RELEVANT HERITAGE LEGISLATION

3.1 HERITAGE STATUS OF THE SUBJECT SITE

3.1.1 GENERALLY

The site is not identified as a heritage item attached to statutory legislation. It does however adjoin the heritage-listed Botany Wetlands site, and the consent authority is required to assess the impact of potential development on the heritage significance of items of environmental significance in proximity to the development.

However, archaeological deposits are protected under the 'relics' provisions of the *NSW Heritage Act 1977*.

Indigenous archaeology, where located, is protected under the *NSW National Parks and Wildlife Act 1974*.



Figure 13 - Extract from mapHER_004 attached to Botany Local Environmental Plan 2013, showing the location of the site. The area shaded green is the Botany Water Reserve. Source: https://www.legislation.nsw.gov.au/maps/53bc85e6-6c49-434a-891b-2a5581939ddc/1100_COM_HER_004_010_20150722.pdf

3.1.2 73A AND 75 GARDENERS ROAD

Timber and metal structures associated with the former use of the site as a nursery and garden centre were demolished in 2016. A canal located in the western section of 75 Gardeners Road has been formalised, includes remnant sections of stone and brick walls that warrant further archaeological investigation to confirm its significance.

The site contains several mature trees, including a group of paper bark trees situated at the western end of the site adjacent to the drainage canal.

A free-standing, one storey residence constructed in c1930, is situated at the eastern section of the site, and is given the street address of 73a Gardeners Road.

NBR SARCHITECTURE inspected the building and its setting in 2015, and undertook a preliminary heritage assessment at that time (refer to Section 4.0 of this report).

3.1.3 73 GARDENERS ROAD

This site is currently situated within the existing legal boundary of the Botany Wetlands Reserves site, but has been not included from the heritage curtilage of the Botany Wetlands site which is identified as a heritage item on the following registers:

- Botany Bay Local Environmental Plan 2013, Item No. I2.
- Sydney Water s170 Heritage Register, Item No. 4570025
- NSW State Heritage Register, Listing No. 01317.

The site is currently occupied by Sydney Water, and contains a free-standing office and maintenance storage building constructed c1990.

73 Gardeners Road includes a free-standing sewage pumping station, which would be retained and remained operational as part of the scheme. No formal heritage assessment has been undertaken in respect of this building, however it is likely to demonstrate historic significance at a local level as part of a group of buildings and as evidence of the expansion of the sewage system undertaken in the 1920s to service residential areas in Kingsford and Daceyville.

The electrical substation and the sewage pumping station are located on easements within the proposed boundary of 73 Gardeners Road (Lot 101).

3.2 HERITAGE ITEMS IN THE VICINITY

The south boundary of the subject site, 73 - 75 Gardeners Road, adjoins Botany Water Reserves, which is identified as a heritage item on the following registers and has heritage protection under the *Heritage Act 1977* and the *Environmental Planning and Assessment Act 1979*:

- *Botany Bay Local Environmental Plan 2013*, Item No. I2.
- NSW State Heritage Register, Listing No. 01317.

The 'Botany Water Reserves' is listed as a heritage item (Item No. 4570025) on the Sydney Water s170 Heritage Register. Under the *Heritage Act 1977*, Sydney Water is obliged to maintain a register of environmental heritage assets that are of state and/or local significance or items that are of potential state and/or local heritage significance.

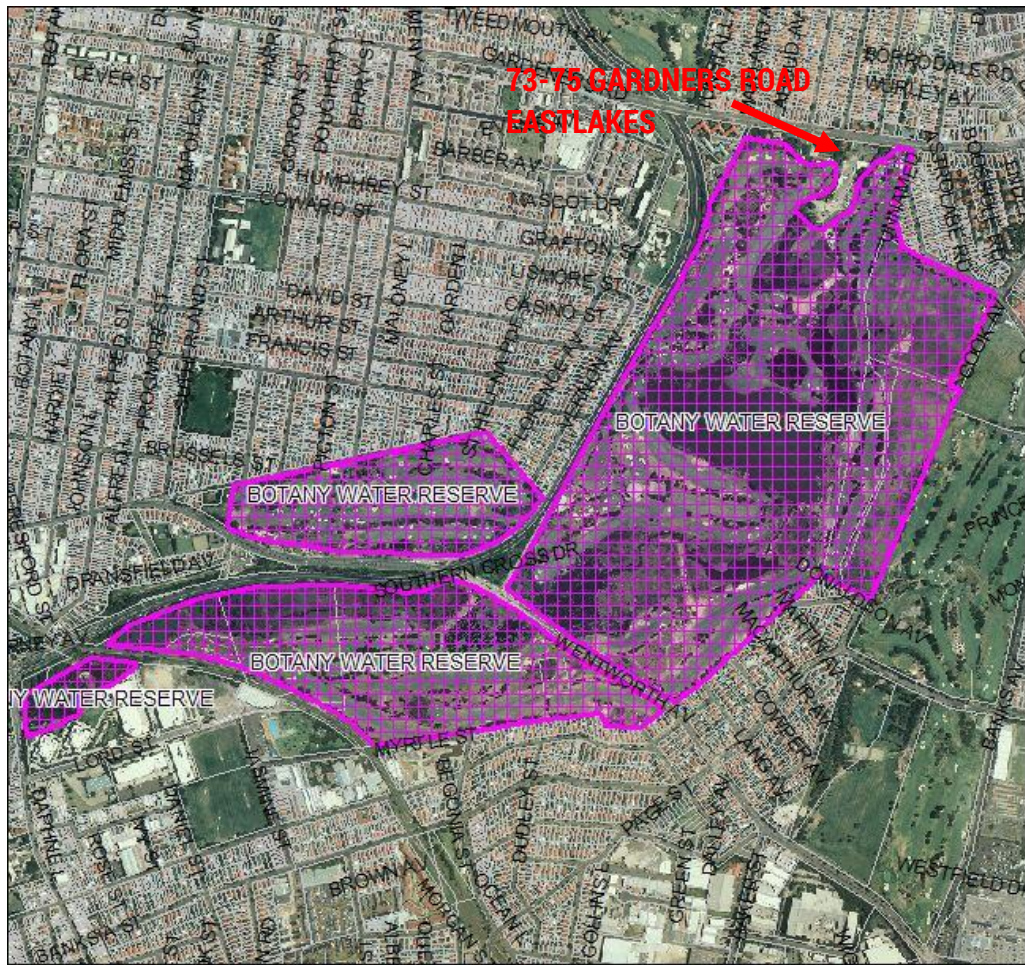


Figure 14 - Plan showing the heritage curtilage identified in the Sydney Water s170 Heritage Register listing of Botany Waters Reserve. Source: Sydney Water.

The following statement of significance for the Botany Water Reserves taken from the NSW State Heritage Register online listing provides some historical context: of the site generally, it states:

Botany Water Reserve holds considerable value for Sydney and NSW because it contains the only remaining major components - substantial layout and other important physical evidence from the 1850s through to the 1870s - of the unique water supply system that supported the expansion of the Sydney metropolis for most of the latter half of the 19th century, representing Sydney's third main water supply system since colonisation; and on account of the surviving remnants of the early 19th century industries associated with the prominent emancipist merchant Simeon Lord. The site includes land which, in 1855, was the subject of the first resumptions for the purpose of a water supply system by a government in Australia. Part of the original 1850s sand-cast iron water supply pipe remains within the site representing a remnant of the State's oldest main.

This extant remnant of the water supply system also has high collective value as important evidence likewise remains of the two principal Sydney water supply systems (The Tank Stream and Busby's Bore) that predated the Botany system along with those superseding it (The Upper Canal and regional dam systems).

The open space areas encompassed by the item include two regionally rare and distinct remnant vegetation communities known as Sydney Freshwater Wetlands and Eastern Suburbs Banksia Scrub that are both potentially of State significance and are the subject of separate listings as an Endangered Ecological Community under the NSW Threatened Species Conservation Act 1995. The wetlands also have recognised regional ecological value as native animal habitat and movement corridors, and may include animal species of conservation significance.

The item is of regional environmental importance as a major recharge source for the Sydney basin aquifer.

It likely holds special interest as a landmark cultural and recreational landscape for the regional community.

It also has regional importance on account of the substantial infrastructure it contains of the 1910s Southern and Western Suburbs Ocean Outfall Sewer System (SWSOOS No 1) - since augmented during 1936-1941 by SWSOOS No 2 - representing one of the first major separate sewers in Sydney as well as incorporating new ventilation technologies. This infrastructure includes use of the former Engine House chimney as a sewer vent, the viaduct to carry the vent pipe, Sewage Pumping Station No 38 of 1916 near the Engine House ruins and part of the SWSOOS Nos 1 and 2 mains. The overall SWSOOS network remains Sydney's largest sewer system.

The Daceyville Garden Suburb Heritage Conservation Area (C1), located to the east of the subject site, is identified as an item of 'Local' significance on the Botany LEP 2013



Figure 15 - Draft master plan prepared for 73 and 75 Gardeners Road, Eastlakes. Source: Architectus, August 2017.

4.0 HERITAGE ASSESSMENT OF 73A GARDENERS ROAD

4.1 DESCRIPTION

4.1.1 GENERALLY

The free-standing residence was constructed by the Metropolitan Water and Sewage Board in 1928-30 as accommodation for its staff until c1990. It was subsequently leased as affordable housing. The building and its setting have been compromised by the construction of ad hoc structures adjacent to the building and removal of original building fabric.

73A Gardeners Road was constructed in the 1930s as a residence by Sydney Water to accommodate staff. The original internal layout and external configuration of the house is apparent to visitors, although the interior of the building has been compromised by previous alterations and replacement of original finishes.

4.1.2 SETTING

73A Gardeners Road is a single-storey, face-brick residence located to the south of Gardeners Road. The house is access directly from Gardeners Road, and is screened from the street by a high fence (paling and corrugated steel) and vegetation. The area is characterised by one- and two-storey development to the north and east of the site, and open areas to its south and west. The south boundary of the site abuts Botany Water Reserve (The Lakes Golf Course) and sites to the west of Slattery Place contain five-storey public housing.

The trees located to the south of the house were planted in the latter twentieth century. The front garden area has been irreversibly altered by the widening of Gardeners Road, and the replacement of outbuildings adjacent to the house.



Figure 16 - Street view of 73A Gardeners Road, looking southwards. Source: Google street view, September 2017.



Figure 17 - The existing garden (northern) frontage to 73A Gardeners Road.



Figure 18 – View looking north along the eastern side of the house.



Figure 19 – View looking southeast towards the pumping station building from the rear of the house.



Figure 20 – View looking south west from the rear of the house.



Figure 21 – Brick paving and paling fence installed c2000.



Figure 22 – Surviving outbuilding c1930, located to the west of the house.



Figure 23 – Structure located to the west of the house.



Figure 24 – Garage located to the northeast of the house.



Figure 25 - Aerial photograph of 73a Gardeners Road, c1943, showing the original driveway to the pumping station building and site of the existing free-standing residence prior to the widening of Gardeners Road. (Source: SIX Maps, NSW Land and Property Information).

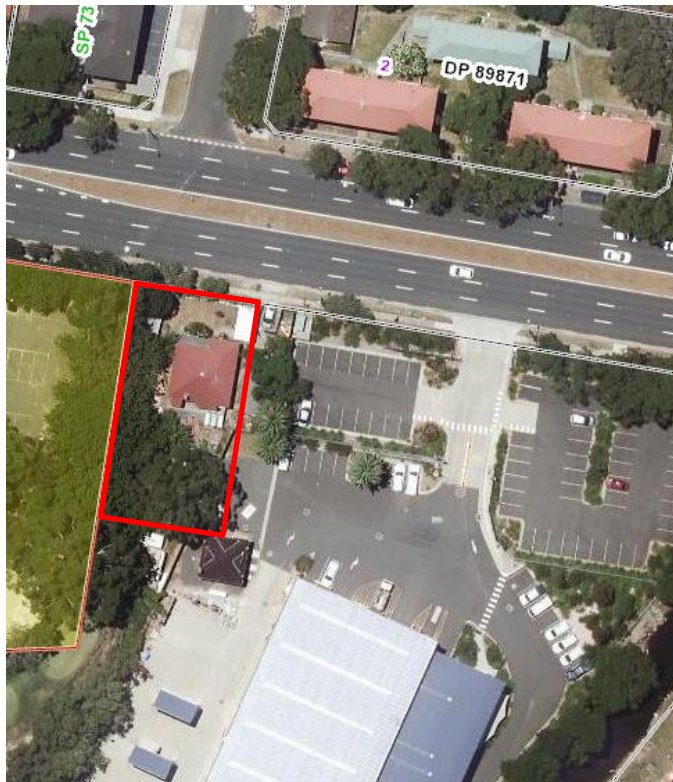


Figure 26 - Aerial photograph showing 73a Gardeners Road, c2014, showing the existing free-standing house. (Source: SIX Maps, NSW Land and Property Information).

4.1.3 EXTERIOR FABRIC

73A Gardeners Road is a free-standing, single storey brick cavity house, oriented on site to address Gardeners Road.

Roof

Colourbond corrugated steel roof with quad mould gutters and round downpipes. The metal roofing was installed in c2000, following hail damage to the former terra cotta tile finish, and the roof fan was installed in c2013. The soffit of the boxed eaves is lined with v-jointed boards. The verandah roof is separate to the main roof.

External walls

The exterior walls are face brick with rendered cement detailing at window lintels and the foundation wall. The building includes original external joinery, although there is evidence of localised damage to timber and deteriorated paint finishes.

The north elevation is arranged asymmetrically with an open verandah covering the front entrance door and the northern windows of the sitting room.

There is a timber structure attached to the south elevation of the house containing a former laundry. The external walls are lined with compressed asbestos sheeting and cover battens, and glass louvred windows. Wall vents are unpainted terracotta.

North verandah

The north and west side are formed by half-height brick balustrade walls. The roof is painted timber with exposed rafters and racking lining boards. Boards are v-jointed. The northwest corner of the roof is supported by a painted, cast concrete column. The verandah floor is painted concrete, with cast terrazzo treads, with rendered risers at the entrance.



Figure 27 – the north elevation of 73A Gardeners Road.



Figure 28 – The front verandah, looking west.

Joinery

The surviving original windows are generally double-hung, with each sash comprising two glass panes. Glass is generally clear or 'Kosciusko' pattern.



Figure 29 – Detail of the deteriorated terrazzo treads.



Figure 30 – View of the western elevation of the house.



Figure 31 – The asbestos annex located on the southern side of the house.



Figure 32 – General view of the southeast corner of the house.

4.1.4 INTERIOR FABRIC

Ceilings

Original ceilings and cornices were replaced throughout the house in 2000, following hail damage. The south annex and the front verandah are lined with painted, v-jointed timber boards.

Walls

Internal walls are painted plaster, with a timber picture rail and skirting

Floors

Floors and sub-floor areas were not visible at the time of inspection. We assume the floors and sub-floors throughout the building are timber, however neither was visible at the time of inspection.

Existing floor finishes, including carpet, resilient finishes, and ceramic floor tiles, were installed after 1995, and do not have heritage significance.



Figure 33 – General view of the sitting room, looking west.



Figure 34 – Partial view of the kitchen fit out, installed c1995.



Figure 35 – Ceilings throughout the building were replaced c2000 with painted plasterboard and coved cornices.



Figure 36 – View of bathroom fit out, installed c1995.

4.2 EVALUATION CRITERIA

This assessment of heritage is based on the methodology and guidelines set by the NSW Office of Environment and Heritage (Heritage Division). It considers the standard values or criteria which arise from the history, construction and use of the building and its site as well as any levels of esteem by recognised groups for the site.

Heritage significance, cultural significance and cultural value are all terms used to describe an item's value or importance to our own society. This value may be contained in the fabric of an item, its setting and its relationship to other items, the response that the item stimulates to those who value it now and in the historical record that allow us to understand it in its own context. An assessment of what is significant is not static. Significance may increase as more is learnt about the past and as items become rare, endangered or are found to document or illustrate aspects that achieve a new recognition of importance.

Determining cultural value is the basis of all planning for places of historic value. Determination of significance enables informed decisions or future planning that ensures that the expressions of significance are retained, enhanced or at least minimally impacted upon. A clear understanding of the nature and degree of significance will determine the parameters for flexibility of future planning and development.

The historical analysis provides the context for assessing significance, which is made by applying standard evaluation criteria to the development and associations of an item. The NSW Heritage Manual has produced standard evaluation criteria that are compatible with the criteria used by the Australian Heritage Council in assessing items, and with those included in The Burra Charter.

State heritage significance, in relation to a place, building, work, relic, moveable object or precinct, means significance to the State in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item (Section 4A(1), *Heritage Act, 1977*). Those values relate to specific criteria used by the Heritage Division, of the NSW Office of Environment and Heritage, to evaluate the cultural significance of a place as follows:

- Criterion A** *An item is important in the course, or pattern, of NSW's cultural or natural history (Historical value).*
- Criterion B** *An item has strong or special association with the life or works of a person, or a group of persons, of importance in NSW's cultural or natural history (Historical value).*
- Criterion C** *An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (Aesthetic value).*
- Criterion D** *An item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons (Social value).*
- Criterion E** *An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (Technical/research value).*
- Criterion F** *An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural History (Rarity).*
- Criterion G** *An item is important in demonstrating the principal characteristics of a class of NSW's*
- *Cultural or natural places: or*
 - *Cultural or natural environments (Representativeness)*

4.2.1 APPLICATION OF THE CRITERIA TO 73A GARDENERS ROAD

The following assessment of heritage significance has been prepared in accordance with 'Assessing Heritage Significance' (2001) guideline prepared by the NSW Heritage Manual.

| CRITERIA | SIGNIFICANCE ASSESSMENT |
|--|--|
| Criterion A - Historical Significance <i>An item is important in the course, or pattern, of the local area's cultural or natural history.</i> | The free-standing residence located at 73a Gardeners Road, Eastlakes, was constructed for the Metropolitan Water Sewerage and Drainage |

| CRITERIA | SIGNIFICANCE ASSESSMENT |
|--|--|
| | Board c1930 to provide on-site accommodation for staff adjacent to the Pumping Station. |
| <p>Guidelines for inclusion</p> <ul style="list-style-type: none"> Shows evidence of a significant human activity. <input type="checkbox"/> Is associated with a significant activity or historical phase. <input type="checkbox"/> Maintains or shows continuity of a historical process or activity. <input type="checkbox"/> | <p>Guidelines for Exclusion</p> <ul style="list-style-type: none"> Has incidental or unsubstantiated connections with historically important activities or processes. <input checked="" type="checkbox"/> Provides evidence of activities or processes that are of dubious historical importance. <input type="checkbox"/> Has been so altered that it can no longer provide evidence of a particular association. <input checked="" type="checkbox"/> |
| <p>Criterion B - Associative Significance</p> <p><i>An item has strong or special association with the life or works of a person, or group of persons, of importance in the cultural or natural history of the local area.</i></p> | <p>The free-standing residence at 73a Gardeners Road Eastlakes does not demonstrate this criterion at a level to warrant listing at State or Local level. The residence was constructed for the Metropolitan Water Sewerage and Drainage Board in the 1920s to accommodate on-site staff between c1930 and c1975. However it was not a significant element in the development of that organisation and the place is not noted for its association with significant people (occupants or designers).</p> |
| <p>Guidelines for inclusion</p> <ul style="list-style-type: none"> Shows evidence of a significant human occupation. <input type="checkbox"/> Is associated with a significant event, person, or group of persons. <input type="checkbox"/> | <p>Guidelines for Exclusion</p> <ul style="list-style-type: none"> Has incidental or unsubstantiated connections with historically important people or events. <input checked="" type="checkbox"/> Provides evidence of people or events that are of dubious historical importance. <input type="checkbox"/> Has been so altered that it can no longer provide evidence of a particular association. <input type="checkbox"/> |
| <p>Criterion C - Aesthetic values</p> <p><i>An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area.</i></p> | <p>The free-standing residence at 73a Gardeners Road Eastlakes does not demonstrate this criterion at a level to warrant listing at State or Local level. The building is not an important architectural feature of the Botany Municipality of metropolitan Sydney generally, not does it demonstrate a high degree of creative or technical achievement. Substantial sections of original fabric within the building were replaced in c2000 following storm damage to the roof and water damage to internal finishes.</p> |
| <p>Guidelines for inclusion</p> <ul style="list-style-type: none"> Shows or is associated with, creative or technical innovation or achievement. <input type="checkbox"/> Is the inspiration for a creative or technical innovation or achievement. <input type="checkbox"/> Is aesthetically distinctive. <input type="checkbox"/> | <p>Guidelines for Exclusion</p> <ul style="list-style-type: none"> Is not a major work by an important designer or artist. <input checked="" type="checkbox"/> Has lost its design or technical integrity. <input checked="" type="checkbox"/> Its positive visual or sensory appeal or landmark or scenic qualities have been more than temporarily degraded. <input type="checkbox"/> |

| CRITERIA | SIGNIFICANCE ASSESSMENT |
|---|---|
| <ul style="list-style-type: none"> Has landmark qualities. <input type="checkbox"/> Exemplifies a particular taste, style or technology. <input type="checkbox"/> | <ul style="list-style-type: none"> Has only a loose association with a creative or technical achievement. Is not a major work by an important designer or artist. <input type="checkbox"/> Has lost its design or technical integrity. <input type="checkbox"/> Its positive visual or sensory appeal or landmark or scenic qualities have been more than temporarily degraded. <input type="checkbox"/> Has only a loose association with a creative or technical achievement. <input checked="" type="checkbox"/> |
| <p>Criterion D - Social significance</p> <p><i>An item has strong or special association with a particular community or cultural group in the area for social, cultural or spiritual reasons.</i></p> | <p>The free-standing residence at 73a Gardeners Road Eastlakes does not demonstrate this criterion at a level to warrant listing at State or Local level. The residence was constructed to accommodate staff of the Metropolitan Water Sewerage and Drainage Board in the 1930s, but has been leased to tenants since the late 1990s.</p> |
| <p>Guidelines for inclusion</p> <ul style="list-style-type: none"> Is important for its associations with an identifiable group. <input type="checkbox"/> Is important to a community's sense of place. <input type="checkbox"/> | <p>Guidelines for Exclusion</p> <ul style="list-style-type: none"> Is only important to the community for amenity reasons. <input type="checkbox"/> Is retained only in preference to a proposed alternative. <input checked="" type="checkbox"/> |
| <p>Criterion E - Technical / Research value</p> <p><i>An item has potential to yield information that will contribute to an understanding of the area's cultural or natural history.</i></p> | <p>The free-standing residence at 73a Gardeners Road Eastlakes does not demonstrate this criterion at a level to warrant listing at State or Local level. The building is typical brick cavity domestic construction, built to accommodate staff rather than as a key element in the development of the water and sewerage system of Sydney.</p> |
| <p>Guidelines for inclusion</p> <ul style="list-style-type: none"> Has the potential to yield new or further substantial scientific and/or archaeological information. <input type="checkbox"/> Is an important benchmark or reference site or type. <input type="checkbox"/> Provides evidence of past human cultures that is unavailable. <input type="checkbox"/> | <p>Guidelines for Exclusion</p> <ul style="list-style-type: none"> Has little archaeological potential. <input checked="" type="checkbox"/> Only contains information that is readily available from other resources or archaeological sites. <input type="checkbox"/> The knowledge gained would be irrelevant to research on science, human history or culture. <input checked="" type="checkbox"/> |
| <p>Criterion F - Rarity</p> <p><i>An item possesses uncommon, rare or endangered aspects of the area's cultural or natural history.</i></p> | <p>The free-standing residence at 73a Gardeners Road Eastlakes does not demonstrate this criterion at a level to warrant listing at State or Local level.</p> |
| <p>Guidelines for inclusion</p> <ul style="list-style-type: none"> Provides evidence of a defunct custom, way of life or process. <input type="checkbox"/> | <p>Guidelines for Exclusion</p> <ul style="list-style-type: none"> Is not rare. <input checked="" type="checkbox"/> Is numerous but under threat. <input type="checkbox"/> |

| CRITERIA | SIGNIFICANCE ASSESSMENT |
|---|--|
| <ul style="list-style-type: none"> • Demonstrates a process, custom or other human activity that is in danger of being lost. <input type="checkbox"/> • Shows unusually accurate evidence of a significant human activity. <input type="checkbox"/> • Is the only example of its type. <input type="checkbox"/> • Demonstrates designs or techniques of exceptional interest. <input type="checkbox"/> • Shows rare evidence of a significant human activity important to a community. <input type="checkbox"/> | |
| <p>Criterion G - Representativeness <i>An item is important in demonstrating the principal characteristics of a class of the area's - cultural or natural places; or - cultural or natural environments.</i></p> | <p>The free-standing residence at 73a Gardeners Road Eastlakes does not demonstrate this criterion at a level to warrant listing at State or Local level.</p> |
| <p>Guidelines for inclusion</p> <ul style="list-style-type: none"> • Is a fine example of its type. <input type="checkbox"/> • Has the principal characteristics of an important class or group <input type="checkbox"/> • Has attributes typical of a particular way of life, philosophy, custom, significant process, design, technique or activity. <input type="checkbox"/> • Is a significant variation to a class of items. <input type="checkbox"/> • Is part of a group which collectively illustrates a representative type. <input type="checkbox"/> • Is representative because of its setting, condition or type. <input type="checkbox"/> • Is outstanding because of its integrity or the esteem in which it is held. <input type="checkbox"/> | <p>Guidelines for Exclusion</p> <ul style="list-style-type: none"> • poor example of its type. <input checked="" type="checkbox"/> • Does not include or has lost the range of characteristics of a type. <input checked="" type="checkbox"/> • Does not represent well the characteristics that make up a significant variation of a type. <input checked="" type="checkbox"/> |

4.2.1 HERITAGE SIGNIFICANCE OF 73A GARDENERS ROAD, EASTLAKES

This preliminary assessment concludes the existing brick building located at 73a Gardeners Road does not demonstrate the identified heritage criteria at a level to warrant listing at state or local level.

5.0 POTENTIAL HERITAGE IMPACTS

5.1 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed development comprises five separate residential buildings within a landscaped setting. Buildings are situated to provide north-south view corridors and solar access. Development includes basement carparking, landscaped areas including publicly accessible open space and ground floorspaces for retail or café tenancies.

The five towers are located above a podium, with the upper levels stepping back from the face of the two lowest levels, to reduce the impact of the scale of buildings to visitors, and to relate to residential development near the site. The development would include a range of apartments to accommodate both families and individuals to compliment the predominately free-standing residential development in the area.

The indicative development yield for the total combined site is:

| | | |
|------------------------------|---------------------|-----|
| Area | 27553m ² | |
| Site Coverage (inc basement) | 10577m ² | 38% |
| Communal/Public Open Area | 9620m ² | 35% |
| Deep Soil | 10369m ² | 38% |
| GFA | 49209 | |
| FSR | 1.79:1 | |

5.2 POTENTIAL HERITAGE ISSUES

5.2.1 SEWAGE PUMPING STATION

The existing building is operational, and will remain operational for the foreseeable future.

Potential issues include:

- Heritage significance of the sewage pump station building, assumed to be constructed as part of the works carried out in c1928 connecting residential properties in the area to the sewer.
- Curtilage associated with the sewage pump station building.
- Operational and security required for the building by Sydney Water including access to the building.
- Potential noise issues associated with the ongoing use of the pumping station.

5.2.2 BRICK RESIDENCE (73A GARDENERS ROAD)

The free-standing residence was constructed by the Metropolitan Water and Sewage Board in 1928-30 as accommodation for its staff until c1990. It was subsequently leased as affordable housing. The building and its setting have been compromised by the construction of ad hoc structures adjacent to the building and removal of original building fabric. The building can continue to be used as a residence, but would require substantial repair and upgrading of kitchen and bathroom facilities.

Our preliminary assessment concludes the existing brick building located at 73a Gardeners Road has some historical significance, but does not demonstrate the identified heritage criteria at a level to warrant listing at either State or Local level.

5.2.3 VEGETATION AND WATER COURSES

The site forms part of the geological feature known as the Botany Water Reserves, although 75 Gardeners Road and 73 Gardeners Road are located on separate parcels of land, and are

not included in the heritage curtilage identified in the State Heritage Register Listing (see Section 6.2).

The proposed scheme incorporates surface features, such as the western drainage canal as features of the public landscaping, providing opportunities for interpretation of the accessible areas.

Development of 73 - 75 Gardeners Road would take into consideration the objects and intent of the Botany Wetlands Environmental Management Plan including maintenance of:

- environmental quality (i.e. sufficient water flows);
- riparian vegetation; and
- impacts of exotic species.

5.2.4 POTENTIAL ARCHAEOLOGY GENERALLY

Surviving sandstone and brick retaining walls located in the western section of the site may include fabric dating from the nineteenth century, and associated with the earlier European occupation of the site. Council may require an archaeological impact statement as part of the planning proposal or development application.

There are no known Indigenous archaeological deposits within the boundary of the site. Should Indigenous archaeology be uncovered on the site, it would be protected under the *National Parks and Wildlife Act 1974*.

5.3 CONCLUSIONS

The site is located to the north of the State heritage-listed Botany Water Reserves site, which is currently used as The Lakes Golf Club. The scheme has taken into consideration the heritage significance of the adjacent site, the statutory requirements attached to the existing site and the owners' requirements. The proposed scheme is limited to the area immediately to the north of the heritage-listed Botany Wetlands and would not be located within the identified heritage curtilage of the Botany Wetlands (refer to the SHR plan included in Section 6.2).

The scheme was informed by a feasibility study undertaken by Architectus in 2015-16 to assess opportunities for residential development on the site given its location and proximity to shops, transport and educational facilities. The proposed options have been devised to retain and provide public access and views through the site to the open space of the Botany Wetlands.

There are no heritage listings attached to the subject site, although the sewage pumping station building, situated at 73 Gardeners Road, is one of a group of utilitarian buildings demonstrating the development of the South and Western Sewer Ocean Outlet System in the early twentieth century, which in our opinion is likely to meet the threshold for listing as a heritage item at the local level. The existing pumping station building should be retained, with a grassed area to enhance its setting. Service access to the building would be maintained through the internal circulation via Gardeners Road. Views from Gardeners Road to the Pumping Station would be maintained and enhanced by landscaping and new garden areas.

The electrical substation is not identified as having heritage significance.

The current scheme includes 73 Gardeners Road, increasing the previous site area from 14,683 m² to a total of 27,553m². The additional area would enable the buildings to be set further apart than in previous schemes for the site, thereby improving solar access and north-south view corridors through the site to the Botany Waters Reserve.

Landscaping would include open space and walkways immediately to the north of the reserve and linking the eastern and western drainage canals. Public areas would be relatively level and provide opportunities to include interpretive signage.

Buildings would be set back from all boundaries to enable existing trees to be retained and augmented with new plantings to reinforce the original vegetation in the area. The scheme would include open public landscaped areas, together with café and or small retail areas at ground level would provide additional local facilities to residents of the subject site and the adjacent residential areas.

The scheme would re-use existing vehicular access to the sites. Visitor parking would continue to be accessed from Gardeners Road. Resident parking would be located below ground level to maximise the open landscaped area around the proposed buildings.

The scheme is generally acceptable in heritage terms subject to resolution of detail and materials. It balances client requirements in terms of residential development with spacious public and communal spaces, offering various spatial qualities such as play areas and passive activity areas.

5.4 HERITAGE RECOMMENDATIONS

A development application would require a Statement of Heritage Impact to assess the impact of development on the Botany Water Reserves, as required under the Botany LEP 2013 and *Environmental Planning and Assessment Act 1979*.

Stone and brick walls assisted with the canal at the western section of 75 Gardeners Road should be retained and interpreted to occupants and visitors to the site.

Given the proximity of the Building C tower to the one-storey residential development of the Daceyville Conservation Area and the eastern drainage canal, we recommend the design of the podium of Building C should be reduced in height to form a visual transition to single-storey Daceyville housing and to reduce overshadowing of the water reserve generally.

6.0 APPENDICES

6.1 MISCELLANEOUS PHOTOGRAPHS

6.1.1 73 GARDENERS ROAD, EASTLAKES



Entrance to the existing Sydney Water building located at 73 Gardeners Road. Note the entrance is flanked by remnant cast iron sewer vents.



View of the northern section of the site, looking west across the carpark towards 75 Gardeners Road.



General view (looking west) of the Sewage Pump Station and the northwest section of the Sydney Water offices and workshop building.



The eastern elevation of the Pumping Station building.



The north elevation of the pumping station building.



View of the southeast section of the carpark situated in the southern section of 73 Gardeners Road.



View looking southwest over the existing carpark and maintenance storage area.



The drainage channel located to the east of the 73 Gardeners Road site. Note the timber and wire mesh shown on the right-hand side of the photograph marks the eastern boundary of the 73 Gardeners Road site.

6.1.2 75 GARDENERS ROAD



Section of the surviving stone wall adjacent to the drainage easement located in the western section of 75 Gardeners Road, Eastlakes.

6.2 NSW STATE HERITAGE REGISTER LISTING: BOTANY WATER RESERVES (SHR NO. 01317)

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

Page 1 of 14



Home > Topics > Heritage places and items > Search for heritage

Botany Water Reserves

Item details

| | |
|---|---|
| Name of item: | Botany Water Reserves |
| Other name/s: | Botany Swamps, Botany Wetlands, Mills Stream, Bridge Pond, Lakes Golf Course, Eastlakes Golf Course, Bonnie Doon Golf Course |
| Type of item: | Landscape |
| Group/Collection: | Landscape - Cultural |
| Category: | Historic Landscape |
| Location: | Lat: -33.9354575348 Long: 151.2122125490 |
| Primary address: | 1024 Botany Road, Mascot, NSW 2020 |
| Parish: | Botany |
| County: | Cumberland |
| Local govt. area: | Botany Bay |
| Local Aboriginal Land Council: | La Porous |

Property description

| Lot/Volume Code | Lot/Volume Number | Section Number | Plan/Folio Code | Plan/Folio Number |
|-----------------|-------------------|----------------|-----------------|-------------------|
| LOT | 1 | | DP | 1039418 |
| LOT | 2 | | DP | 1039418 |
| PART LOT | 2 | | DP | 1144655 |
| LOT | 1 | | DP | 233011 |
| LOT | 1 | | DP | 241650 |
| LOT | 2473 | | DP | 752015 |
| LOT | 2825 | | DP | 752015 |
| LOT | 5 | | DP | 780391 |
| LOT | 6 | | DP | 780391 |
| LOT | 7 | | DP | 780391 |

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

31/08/2017

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

Page 2 of 14

| | | | | |
|-----|----|--|----|--------|
| LOT | 3 | | DP | 780392 |
| LOT | 2 | | DP | 854374 |
| LOT | 13 | | DP | 87663 |
| LOT | 4 | | DP | 87663 |

All addresses

| Street Address | Suburb/town | LGA | Parish | County | Type |
|--|-------------|------------|--------|------------|-------------------|
| King Street | Eastlake | Botany Bay | | | |
| Southern Cross Drive | Eastlakes | Botany Bay | | | |
| 1024 Botany Road | Mascot | Botany Bay | Botany | Cumberland | Primary Address |
| Between Botany and Mascot, including Eastlakes | Botany | Botany Bay | | | Alternate Address |

Owner/s

| Organisation Name | Owner Category | Date Ownership Updated |
|-------------------|------------------|------------------------|
| Sydney Water | State Government | 27 Nov 98 |

Statement of significance:

Botany

Water Reserve holds considerable value for Sydney and NSW because it contains the only remaining major components - substantial layout and other important physical evidence from the 1850s through to the 1870s - of the unique water supply system that supported the expansion of the Sydney metropolis for most of the latter half of the 19th century, representing Sydney's third main water supply system since colonisation; and on account of the surviving remnants of the early 19th century industries associated with the prominent emancipist merchant Simeon Lord. The site includes land which, in 1855, was the subject of the first resumptions for the purpose of a water supply system by a government in Australia. Part of the original 1850s sand-cast iron water supply pipe remains within the site representing a remnant of the State's oldest main.

This extant

remnant of the water supply system also has high collective value as important evidence likewise remains of the two principal Sydney water supply systems (The Tank Stream and Busby's Bore) that predated the Botany system along with those superseding it (The Upper Canal and regional dam systems).

The open space areas encompassed by the item include two regionally rare and distinct remnant vegetation communities known as Sydney Freshwater Wetlands and Eastern Suburbs Banksia Scrub that are both potentially of State significance and are the subject of separate listings as an Endangered Ecological Community under the NSW Threatened Species Conservation Act 1995. The wetlands also have recognised regional ecological value as native animal habitat and movement corridors, and may include animal species of conservation significance.

The item is

of regional environmental importance as a major recharge source for the Sydney basin aquifer.

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

31/08/2017

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

Page 3 of 14

It likely holds special interest as a
landmark cultural and recreational landscape for the regional community.

It also has regional importance on account of the substantial
infrastructure it contains of the 1910s Southern and Western Suburbs Ocean
Outfall Sewer System (SWSOOS No 1) - since augmented during 1936-1941 by
SWSOOS No 2 - representing one of the first major separate sewers in
Sydney as well as incorporating new ventilation technologies. This
infrastructure includes use of the former Engine House chimney as a sewer
vent, the viaduct to carry the vent pipe, Sewage Pumping Station No 38 of
1916 near the Engine House ruins and part of the SWSOOS Nos 1 and 2 mains.
The overall SWSOOS network remains Sydney's largest sewer
system.

Date
significance updated: 23 Jul 04

*Note: There are incomplete details for a number
of items listed in NSW. The Heritage Division intends to develop or
upgrade statements of significance and other information for these items
as resources become
available.*

Description

Designer/Maker: City Engineers WB Rider; E.Bell (1856 - 1871) & F. Bell (No
relation 1871 -1878)

Builder/Maker: Convicts for Simeon Lord
(1815)

**Construction
years:** 1815-1870

**Physical
description:** This item is comprised of an extensive tract of open
space/parkland, with 58 ha of wetlands, including Sydney Airport, The
Australian Golf Course, Lakes Golf Course, Eastlakes Golf Course, Bonnie
Doon Golf Course and Mutch Park. Other areas of wetlands in the vicinity
are substantially smaller in extent - the Eve Street wetlands, Arncliffe
(south of Kogarah Golf Club) and the chain of ponds in Sir Joseph Banks
Park, Botany.

Important surviving elements of non-indigenous
heritage include remnants of the water supply Engine House and chimney
(late 1850s) (no longer owned by Sydney Water); spillway/weir, remnants of
the Engine and Mill Ponds; the sequence of ponds between the Mill Pond and
Gardeners Road; 1915 Sewer Pumphouse; twin sewer syphons and easements;
partial evidence of old Cooks River edge (evident through comparing early
and recent aerial photography; 1869 plantings of Norfolk Island Pines
(*Araucaria heterophylla*), Moreton Bay Fig Trees (*Ficus macrophylla*) and
Port Jackson Fig Trees (*Ficus rubiginosa*). Given the period, important
government institutional use and the choice of tree species there is
strong circumstantial evidence for the involvement of Charles Moore -
Director of the Royal Botanic Gardens (1848-1896) in advising on these
plantings. Canary Island Date Palms (*Phoenix canariensis*) also survive
near the Engine Pond and may be remnants - or progeny - of 1910s plantings
associated with the reuse of the site for the main southern sewer system.
There is likewise strong circumstantial evidence for the involvement of
Joseph Henry Maiden - Director of the Royal Botanic Gardens (1896-1924) in
recommending the choice of these plantings.

A comparison of
current aerial photographs and the Sydney Water Commission's 1869
topographic plan of the Lachlan Swamp from No 6 Dam to Botany Bay shows
that there is a substantial degree of correlation between the layouts of
many of the dams. Despite the bisection of the Engine Pond by Southern
Cross Drive, it is still possible to appreciate the basic outline of the
earlier pond. A similar observation holds for the former Bridge Pond as

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

31/08/2017

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

Page 4 of 14

the present Mill Pond and the western half of the 'New Pond' retain the earlier basic form. The embankment separating the Mill and New Ponds preserves part of the alignment of the old Sydney-Botany road (shown on the 1869 SWC plan) with its tollhouse site just south of the embankment. (Archaeological evidence of the former tollhouse may still exist.) The present Nos 1 and 2 Ponds closely reflect the earlier form of the 1869 No 1 Pond while most of the present Nos 3a, 3 and 4/5 Ponds almost exactly retain the earlier form of the 1869 Nos 2, 3, 4 and 5 Ponds respectively. The northern part of the old No 6 Pond has been filled. Generally, the present wetland layout retains a close indication of the original 1860s dam forms. Earlier pond formations existed some decades before, and were absorbed into, this system however surviving evidence is difficult to discern from both (non-intrusive) site inspections and an analysis of aerial photography. Archaeological investigations - if ever required - may reveal evidence of these early 19th century structures.

A 'Plan of the Botany & Lachlan Watersheds' signed by Francis Bell in June, 1875 shows that the Lachlan Water Supply (Centennial Park) links with the Botany Pond system as does the area of land containing the present Australian Golf Course.

Several remnant areas of the famous and now rare Eastern Suburbs Banksia Scrub (still featuring the trademark Grass Trees [*Xanthorrhoea resinosa*]) as well as various communities of reed and sedgeland species are represented within the open space boundaries. Other important indigenous vegetation vestiges include areas of Paperbark swamp featuring *Melaleuca quinquenervia*, marshland and wet heath and large areas of the aquatic herb *Ludwigia*.

Physical condition and/or Archaeological potential:

Major elements (the sequence of ponds) of Sydney's third main water supply system are substantially intact. Particular elements of the system - its architectural and planted elements - are only partially intact.

Generally good

Date condition updated: 21 May 04

Modifications and dates:

Although the pre-European wetland ecosystem was modified during the 1860s and 1870s pond construction, there has been only limited major modification - mainly for the expansion of the airport and construction of new arterial roadways - since then. Major elements (the sequence of ponds) of Sydney's third main water supply system are substantially intact. Particular elements of the system - its architectural and planted elements - are only partially intact. Yet the little that remains of these are particularly poignant and serve as important local landmarks.

Further information:

Busby's Bore; Lachlan Swamps; Crown Street Reservoir; Paddington Pumping Station.

Current use:

Golf Courses; Water reserve

Former use:

Industry; Water supply system

History

Historical notes:

On 29 April 1770 Captain James Cook made his first landfall in Australia at Botany Bay. His ship the *Endeavour's* botanist, Sir Joseph Banks, and his Swedish assistant, Daniel Solander, spent several days ashore collecting vast numbers of previously unknown plants. Cook was in two minds about a suitable name for the Bay - his journal first refers to it as Stingray's Harbour, then as Botanist Bay, then both were crossed out and the present Botany Bay inserted, no doubt because of Banks and Solander's work. Since its name comes from the Bay on which it

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

31/08/2017

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

Page 5 of 14

stands, Botany can well claim to have the oldest (English) place name in Australia.

Cook's recommendation and Banks' enthusiasm were largely responsible for the British Government's decision to found a penal settlement at Botany Bay. When Governor Phillip arrived in mid-summer in 1788 however, he found the harbour shallow and exposed, and the shore swampy and lacking sources of fresh water. As a result the First Fleet sailed on to Port Jackson, finding a more suitable site for settlement at Sydney Cove.

Botany was first planned as an agricultural district, and the principal industry was to be market gardening. Instead it became an industrial area, boasting a fellmonger's yard and a slaughter works. As early as 1809, Mr E Redmond came to settle in the district, but the first important developer was Simeon Lord (1771-1840), who built a fulling mill in 1815 on the site that later became that of the old water works. In 1823 he received a grant of 600 acres, followed by further grants. Part of the estate was subdivided by 1887. Lord, the 'merchant prince of Botany Bay', manufactured fine wool cloth, and was also one of the merchants instrumental in the founding of Sydney Hospital. He gave land for the sites of 2 early churches in Botany, and Lord Street is named after him. Banksia Street, Sir Joseph Banks Park and Booralee Park all commemorate those early days.

The Sydney Water Works were established in Botany in 1858 and were fed by the many springs in the area. In 1886, the last year of full pumping, 1864 million gallons of water were supplied to Sydney from these water works. Although the scheme was Sydney's major source of water for 30 years, it did not supply water in the Botany area and local residents depended on natural sources and tanks. (Pollen, 1988, pp.35-6).

Following European colonisation the first substantial interventions in the area occurred in 1815 when the enterprising merchant Simeon Lord had a dam constructed to the west of the present Botany Road for the purpose of establishing the colony's first woollen mill. A second dam was constructed near the present Engine House ruins for a flour mill (refer to 1869 Water Commission Plan). This mill continued operating until about 1847 while the textile factory was closed by about 1856.

From 13 July, 1855 the City Council began resuming land around, and including, the Botany wetlands for the city's main water supply scheme - the first time land resumptions were made for this purpose. (The land was transferred to the Water Board in 1888.) Of this land about 75 acres of Lord's estate was resumed which included his house (demolished in the 1930s though the site of which is in the vicinity of the present heliport), the mill sites, various cottages and the earthworks associated with Lord's mill dams.

The initial water supply scheme of the mid-1850s, by the City Engineer WB Rider, was abandoned with the appointment of Edward Bell to the position. The surviving Engine House and chimney date from the implementation, in the late 1850s, of Bell's scheme while the stone retaining walls for the Engine Pond and outlet sluice probably date from the 1870s work on the Engine Pond augmentation. Between 1866 and the mid-1870s six dams were constructed, and reconstructed for various reasons, from the Mill Pond to Gardeners Road using piling of sheet timber facing filled with sand forming a core of a turfed bank. In 1859 a 30" sand-cast iron main was completed between the Engine House and the Crown Street reservoir. The pipes were made in Scotland in 1856 and machined with such remarkably fine tolerance that, of the total length of 4 miles (6.4 km), the outside diameter varied by only 6mm and allowed the pipes to be laid without jointing material. Part of this easement coincides with the present study area in the vicinity of the Engine House.

Drawing on a 1982 thesis of Margaret Simpson, the Thorp et al study indicates that about 80 trees - "Norfolk Pines, Moreton Bay Figs, Weeping Figs, Sweet Scented Pines and Stone Pines" - were planted along the access road from Botany and elsewhere on the site in 1869. Works for the augmentation of water storage at Botany continued throughout the 1870s including the addition of water stored in the Bunnerong Dam (1876-1877) by way of a pipe to the No 4 Pond. The then Bunnerong Road was moved and ran along the top of this dam wall.

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

31/08/2017

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

Page 6 of 14

By the early 1880s the Upper Nepean Scheme was well underway and in November 1886 the Nepean-supplied water effectively ended the general supply of Sydney's water from the Botany system. Even intermittent emergency use of the system ceased by 1893 so that the Engine House machinery was finally decommissioned with pumping equipment and boilers sold at auction in 1896. In 1894 various local industrial uses - such as wool scourers and tanners - were permitted to return to the wetland vicinity through leases until 1947.

While these major improvement programs for Sydney's water supply were being put into place it also became clear - chiefly from an increasingly polluted harbour - that substantial works were needed to deal with the sewage of Sydney and its immediate suburbs. After the Board of Water Supply and Sewerage was formed in 1888 the basis of what is presently Sydney's largest sewerage system was commenced. As part of its responsibilities the new Board assumed control of various recent works of the Public Works Department, one of which was the first of the new sewer mains from the City to the Botany Sewage Farm established about 1886. Another main was added in 1898 which linked various western suburbs to the Sewage Farm. However by the turn of the century the usefulness of the Farm was fast diminishing such that the southern and western sewerage systems were amalgamated and extended, from 1909, to a new ocean outfall at Malabar while the much expanded Botany Sewage Farm was closed. This work - known as the Southern and Western Sewer Ocean Outfall System or, usually, SWSOOS No 1 - was completed in 1916 under the direction of Chief Engineer EM de Burgh.

Further growth of Sydney's suburbs and resultant extensions to this sewerage network necessitated an augmentation of the system, by duplication known as SWSOOS No 2, during 1936 to 1941. Both mains were required to cross the Cooks River by inverted syphons. The current SWSOOS network represents Sydney's largest sewerage system and envelops mains that were constructed from the 1880s through the 1890s, 1900s, 1910s to 1940s. Other individually significant components of the SWSOOS network that occur in the vicinity of the present site include the twin major inverted syphons and syphonic overflows (now under Sydney Airport)(part of ID No SW 33?) and the 1896 sewer vent at West Botany Street, Arncliffe (ID No SW 31 - SHI 4571725).

Within the site the existing engine house chimney was retired for water supply use in 1888, left unused for 28 years then, after being shortened, re-used as a vent in 1916 as part of the work for the new SWSOOS. Various buildings, associated with the new sewerage system, were added to the west. During the 1940s the chimney was further truncated to its present height along with the diversion of the mouth of the Cooks River into Botany Bay and substantial filling of the Engine and Mill Ponds as part of a major expansion and upgrade of airport facilities. From the 1970s a greater appreciation of the special historical and environmental values of the place was apparent through the commissioning of a range of studies to record and assess its significance. However further incursions continued with the 1988 construction of Southern Cross Drive through the middle of the Engine Pond, reclamation by the DMR and more recent works associated with the pre-Olympics upgrade of the airport.

The Lakes Golf Club (1928)

In 1928 construction of a clubhouse near Gardeners Road was commenced for the Lakes Golf Club with the course - to the west and north of the chain of ponds - opening in 1930.

About 1960 the Eastlakes Golf Club was established with an 18-hole course on the eastern and southern side of the ponds. The neighbouring course to the northeast, the Australian Golf Club, was established in 1904 and in the same year it was host for the first Australian open golf title which was won by Michael Scott. Both the Lakes and Australian golf courses have been consistently ranked in the top five golf courses in New South Wales for many years.

The Lakes Golf Club practice precinct (east of the club house)

The practice precinct was excavated on a number of occasions from 1928 to 1970. In the early 1970s the south-eastern area of this land was bulldozed and redeveloped as part of the overall golf course design as a direct result of the state government requiring some of the golf course land to construct Southern

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

31/08/2017

<http://www.environment.nsw....> <http://www.environment.nsw....>

Page 7 of 14

Cross Drive. This included extensive excavation of the area of the practice precinct of the golf course. In the mid-1970s some of the practice precinct area formed part of the tennis court construction which required bulldozing the area to prepare the ground for new tennis courts. This was conducted as part of construction of the golf course clubhouse (Kirkman, 2016, 4)

In the early 2000s the practice precinct was renovated as part of a plan to improve course facilities for practice, and to have the course fit with the natural contours and appearance of the sandy dunes and lakes that dominate its site. This included extensive disturbance of the practice precinct area. In 2005 a new club house was built and this resulted in removal of the tennis courts. The practice precinct and some of the driving range tee was bulldozed to remove the tennis courts and then construct the practice chipping area (ibid, 2016, 4-5).

From 2007-09 the entire Lakes Golf Course underwent a comprehensive renovation which included extensive construction works to the south-western section of the practice precinct area. This involved use of a bulldozer and other construction equipment to construct the 10th tees and the area in front of them. This included the small ridge between the driving range tee and the front of the current 10th hole tees (ibid, 2016, 4).

Historic themes

| Australian theme (abbrev) | New South Wales theme | Local theme |
|--|--|--|
| 1. Environment-Tracing the evolution of a continent's special environments | Environment - naturally evolved-Activities associated with the physical surroundings that support human life and influence or shape human cultures. | Cultural: Lakes and wetlands supporting human activities- |
| 1. Environment-Tracing the evolution of a continent's special environments | Environment - naturally evolved-Activities associated with the physical surroundings that support human life and influence or shape human cultures. | Cultural: Rivers and water bodies important to humans- |
| 1. Environment-Tracing the evolution of a continent's special environments | Environment - naturally evolved-Activities associated with the physical surroundings that support human life and influence or shape human cultures. | Cultural: Conserving and protecting natural features- |
| 1. Environment-Tracing the evolution of a continent's special environments | Environment - naturally evolved-Activities associated with the physical surroundings that support human life and influence or shape human cultures. | Natural - site important native fauna habitat or food source- |
| 2. Peopling-Peopling the continent | Convict-Activities relating to incarceration, transport, reform, accommodation and working during the convict period in NSW (1788-1850) - does not include activities associated with the conviction of persons in NSW that are unrelated to the imperial 'convict system'; use the theme of Law & Order for such activities | Demonstrating emancipists' entrepreneurial activities- |
| 3. Economy-Developing local, regional and national economies | Agriculture-Activities relating to the cultivation and rearing of plant and animal species, usually for commercial purposes, can | Farming with convict labour- |

<http://www.environment.nsw....> <http://www.environment.nsw....>

31/08/2017

| | | |
|--|--|---|
| | include aquaculture | |
| 3. Economy-Developing local, regional and national economies | Agriculture-Activities relating to the cultivation and rearing of plant and animal species, usually for commercial purposes, can include aquaculture | Clearing land for farming- |
| 3. Economy-Developing local, regional and national economies | Agriculture-Activities relating to the cultivation and rearing of plant and animal species, usually for commercial purposes, can include aquaculture | Market gardening- |
| 3. Economy-Developing local, regional and national economies | Environment - cultural landscape-Activities associated with the interactions between humans, human societies and the shaping of their physical surroundings | (none)- |
| 3. Economy-Developing local, regional and national economies | Environment - cultural landscape-Activities associated with the interactions between humans, human societies and the shaping of their physical surroundings | Landscapes drowned beneath dam waters- |
| 3. Economy-Developing local, regional and national economies | Environment - cultural landscape-Activities associated with the interactions between humans, human societies and the shaping of their physical surroundings | Landscapes of industrial production- |
| 3. Economy-Developing local, regional and national economies | Industry-Activities associated with the manufacture, production and distribution of goods | Processing meat- |
| 3. Economy-Developing local, regional and national economies | Industry-Activities associated with the manufacture, production and distribution of goods | Manufacturing textiles- |
| 3. Economy-Developing local, regional and national economies | Science-Activities associated with systematic observations, experiments and processes for the explanation of observable phenomena | Researching native flora- |
| 3. Economy-Developing local, regional and national economies | Science-Activities associated with systematic observations, experiments and processes for the explanation of observable phenomena | Researching botany and botanical processes- |
| 3. Economy-Developing local, regional and national economies | Technology-Activities and processes associated with the knowledge or use of mechanical arts and applied sciences | (none)- |
| 3. Economy-Developing local, regional and national economies | Technology-Activities and processes associated with the knowledge or use of mechanical arts and applied sciences | Technologies for reticulated water supply- |

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

Page 9 of 14

| | | |
|--|---|---|
| 4. Settlement-Building settlements, towns and cities | Land tenure-Activities and processes for identifying forms of ownership and occupancy of land and water, both Aboriginal and non-Aboriginal | Sub-division of large estates- |
| 4. Settlement-Building settlements, towns and cities | Land tenure-Activities and processes for identifying forms of ownership and occupancy of land and water, both Aboriginal and non-Aboriginal | Changing land uses - from rural to suburban- |
| 4. Settlement-Building settlements, towns and cities | Land tenure-Activities and processes for identifying forms of ownership and occupancy of land and water, both Aboriginal and non-Aboriginal | Resuming private lands for public purposes- |
| 4. Settlement-Building settlements, towns and cities | Land tenure-Activities and processes for identifying forms of ownership and occupancy of land and water, both Aboriginal and non-Aboriginal | Naming places (toponymy)- |
| 4. Settlement-Building settlements, towns and cities | Towns, suburbs and villages-Activities associated with creating, planning and managing urban functions, landscapes and lifestyles in towns, suburbs and villages | Planning relationships between key structures and town plans- |
| 4. Settlement-Building settlements, towns and cities | Towns, suburbs and villages-Activities associated with creating, planning and managing urban functions, landscapes and lifestyles in towns, suburbs and villages | Developing towns in response to topography- |
| 4. Settlement-Building settlements, towns and cities | Towns, suburbs and villages-Activities associated with creating, planning and managing urban functions, landscapes and lifestyles in towns, suburbs and villages | Creating landmark structures and places in regional settings- |
| 4. Settlement-Building settlements, towns and cities | Utilities-Activities associated with the provision of services, especially on a communal basis | (none)- |
| 4. Settlement-Building settlements, towns and cities | Utilities-Activities associated with the provision of services, especially on a communal basis | Providing drinking water- |
| 5. Working-Working | Labour-Activities associated with work practises and organised and unorganised labour | Working in factories- |
| 7. Governing-Governing | Government and Administration-Activities associated with the governance of local areas, regions, the State and the nation, and the administration of public programs - includes both principled and corrupt activities. | Local and municipal self-governance- |

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

31/08/2017

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

Page 10 of 14

| | | |
|---|--|--|
| 7. Governing-Governing | Government and Administration-Activities associated with the governance of local areas, regions, the State and the nation, and the administration of public programs - includes both principled and corrupt activities. | Building and operating public infrastructure- |
| 7. Governing-Governing | Government and Administration-Activities associated with the governance of local areas, regions, the State and the nation, and the administration of public programs - includes both principled and corrupt activities. | Developing roles for government - public water supply- |
| 8. Culture-Developing cultural institutions and ways of life | Creative endeavour-Activities associated with the production and performance of literary, artistic, architectural and other imaginative, interpretive or inventive works; and/or associated with the production and expression of cultural phenomena; and/or environments that have inspired such creative activities. | Landscaping - 20th century interwar- |
| 8. Culture-Developing cultural institutions and ways of life | Creative endeavour-Activities associated with the production and performance of literary, artistic, architectural and other imaginative, interpretive or inventive works; and/or associated with the production and expression of cultural phenomena; and/or environments that have inspired such creative activities. | Landscaping - 20th century post WW2- |
| 8. Culture-Developing cultural institutions and ways of life | Creative endeavour-Activities associated with the production and performance of literary, artistic, architectural and other imaginative, interpretive or inventive works; and/or associated with the production and expression of cultural phenomena; and/or environments that have inspired such creative activities. | Building in response to natural landscape features.- |
| 8. Culture-Developing cultural institutions and ways of life | Sport-Activities associated with organised recreational and health promotional activities | badminton- |
| 9. Phases of Life-Marking the phases of life | Persons-Activities of, and associations with, identifiable individuals, families and communal groups | Associations with Simeon Lord, industrialist and emancipist- |
| 9. Phases of Life-Marking the phases of life | Persons-Activities of, and associations with, identifiable individuals, families and communal groups | Associations with Sir Joseph Banks - naturalist/botanist- |
| 9. Phases of Life-Marking the phases | Persons-Activities of, and associations with, identifiable | Associations with Daniel Solander, assistant |

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

31/08/2017

| | | |
|---------|---|---|
| of life | individuals, families and communal groups | at the British Museum, naturalist - botanist- |
|---------|---|---|

Assessment of significance

SHR Criteria

a)

[Historical significance]

The

Item contains substantial remnants of structures and layout from Sydney's third main water supply system which supported the growth of Australia's largest city for most of the latter half of the 19th century. The 1850s water supply pipeline represents the oldest main in the State. The site contains important components of Sydney's main southern sewerage system from the 1910s and 1930s to 1940s supporting the expansion and consolidation of inner Sydney from the late 19th century to the present.

It also demonstrates the growth in demand for golf courses throughout the 20th century with the establishment of four separate courses including the Australian (est. 1904) and the Lakes Golf Course (est. 1928) - two of the State's oldest and most highly regarded.

The place also has strong and direct associations with prominent individuals - including Colonial entrepreneur Simeon Lord; the naval officer, surveyor and pastoralist Thomas Woore; City Engineers WB Rider, Edward Bell and Francis Bell; and Board engineers including EM de Burgh. Passing, though telling, early European references to the former landscape character of the area were made by many noted travellers including Captain James Cook in 1770 and Francois Peron in 1802.

As surviving elements of Sydney's third main water supply system it is rare if not unique.

As a modified/remnant wetland system it is representative of a once extensive vegetation community that included sites from Jewells Swamp, near Lake Macquarie to Coomaditchy Lagoon south of Sydney, yet as remnant sites within the Sydney Basin are now only of a small size and are threatened with extinction the wetlands should be considered rare. Similarly the areas of Eastern Suburbs Banksia Scrub are rare - of their total estimated area at the beginning of European colonisation less than 1% remains.

SWSOOS is rare as the largest of Sydney's sewerage networks.

Although the pre-European wetland ecosystem was modified during the 1860s and 1870s pond construction, there has been only limited major modification - mainly for the expansion of the airport and construction of new arterial roadways - since then. Major elements (the sequence of ponds) of Sydney's third main water supply system are substantially intact. Particular elements of the system - its architectural and planted elements - are only partially intact. Yet the little that remains of these are particularly poignant and serve as important local landmarks.

SHR Criteria c)

[Aesthetic significance]

The site represents a substantial tract of greenspace with important landscape attributes - extensive areas of water, wetlands, plantings, archaeological features, dunes, remnant indigenous vegetation and fauna - providing notable scenery and, remarkably, within 6 km of the Sydney CBD.

SHR

Criteria d)
[Social significance]

The large tract of open space is probably highly valued as a local or even regional asset while the uses associated with the various golf courses would likely guarantee a special interest in the wetlands landscape by patrons. The ruinous water supply structures and remnant 1869 plantings along with the 1915 sewerage Pump House are well appreciated features and function as important cultural references within the parkland associated with the remnant Engine Pond.

SHR Criteria e)

[Research potential]

The place is of importance for its archaeological research potential pertaining to the early 19th century use of the wetlands for industry, Sydney's third main water supply system and aspects of Sydney's sewerage provision. Direct evidence of the

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

Page 12 of 14

construction of the original Lord dam walls, his house and outbuildings or other structures, other industrial structures and the former Sydney-Botany Tollhouse may still remain under the later fill.

The wetlands are of well recognised ecological value (flora/fauna [including benthos, zooplankton, macroinvertebrates and amphibians] habitat and corridor) and environmental value (major Sydney basin aquifer recharge).

SHR Criteria f)
[Rarity]

As surviving elements of Sydney's third main water supply system it is rare.

SHR Criteria g)
[Representativeness]

As a modified wetland system it is representative.

Integrity/Intactness:

Major elements (the sequence of ponds) of Sydney's third main water supply system are substantially intact.

Assessment criteria:

Items are assessed against the  **State Heritage Register (SHR) Criteria** to determine the level of significance. Refer to the Listings below for the level of statutory protection.

Procedures /Exemptions

| Section of act | Description | Title | Comments | Action date |
|----------------|---|--|---|-------------|
| 21(1)(b) | Conservation Plan submitted for endorsement | Botany Wetlands Conservation Management Plan | CMP received for information purposes only, not endorsed, 21 June 2005 | Jun 21 2005 |
| 57(2) | Exemption to allow work | Standard Exemptions | <p>SCHEDULE OF STANDARD EXEMPTIONS HERITAGE ACT 1977</p> <p>Notice of Order Under Section 57 (2) of the Heritage Act 1977</p> <p>I, the Minister for Planning, pursuant to subsection 57(2) of the Heritage Act 1977, on the recommendation of the Heritage Council of New South Wales, do by this Order:</p> <p>1. revoke the Schedule of Exemptions to subsection 57(1) of the Heritage Act made under subsection 57(2) and published in the Government Gazette on 22 February 2008; and</p> <p>2. grant standard exemptions from subsection 57(1) of the Heritage Act 1977, described in the Schedule attached.</p> <p>FRANK SARTOR Minister for Planning</p> <p>Sydney, 11 July 2008</p> <p>To view the schedule click on the Standard Exemptions for Works Requiring Heritage Council Approval</p> | Sep 5 2008 |


<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

31/08/2017

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

Page 13 of 14

| | | | | |
|--|--|--|----------------|--|
| | | | link below. | |
|--|--|--|----------------|--|

 **Standard exemptions** for works requiring Heritage Council approval

Listings

| Heritage Listing | Listing Title | Listing Number | Gazette Date | Gazette Number | Gazette Page |
|---|---|----------------|--------------|----------------|--------------|
| Heritage Act - State Heritage Register | | 01317 | 18 Nov 99 | | |
| Heritage Act - s.170 NSW State agency heritage register | | 415101 | 30 Jun 02 | | |
| National Trust of Australia register | Botany/Iachlan Swamps Water Supply Former | 6813 | | | |
| Register of the National Estate - Interim | Botany Swamps | 17854 | | | |

Study details

| Title | Year | Number | Author | Inspected by | Guidelines used |
|-----------------------------|------|--------|----------------------------|--------------|-----------------|
| Sydney Water Heritage Study | 1996 | 00640 | Graham Brooks & Associates | | No |

References, internet links & images

| Type | Author | Year | Title | Internet Links |
|-------------------------------|---|------|---|----------------|
| Written | Abel Ecology | 2006 | Revegetation Plan, Bonnie Doon Golf Course | |
| Written | Abel Ecology | 2005 | Environmental Assessment, Bonnie Doon Golf Course | |
| Management Plan (HC endorsed) | Asset Management, Sydney Water Corporation. | 2003 | Botany Wetlands draft conservation management plan | |
| Written | Eco Logical Australia P/L | 2008 | Eastern Suburbs Banksia Scrub Monitoring Report - June 2008 | |
| Written | Kirkman, Andrew, General Manager, The Lakes Golf Club | 2016 | Application for a heritage exemption - Practice Precinct Renovation, at the Lakes Golf Club | |
| Written | Pollen, Francis (ed.) | 1988 | Botany, in 'The Book of Sydney Suburbs' | |

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

31/08/2017

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

Page 14 of 14

| | | | | |
|---------|--|------|---|--|
| Written | Ross Watson Golf Course Architecture P/L | 2005 | Heritage Impact Statement, Bonnie Doon Golf Course | |
| Written | Ross Watson Golf Course Architecture P/L | 2002 | Statement of Environmental Effects, Bonnie Doon Golf Course | |

Note: internet links may be to web pages, documents or images.



(Click on thumbnail for full size image and image details)

Data source

The information for this entry
comes from the following source:

Name: Heritage Office

**Database
number:** 5051418

File number: 10/14814; H06/00076

[Return to previous page](#)

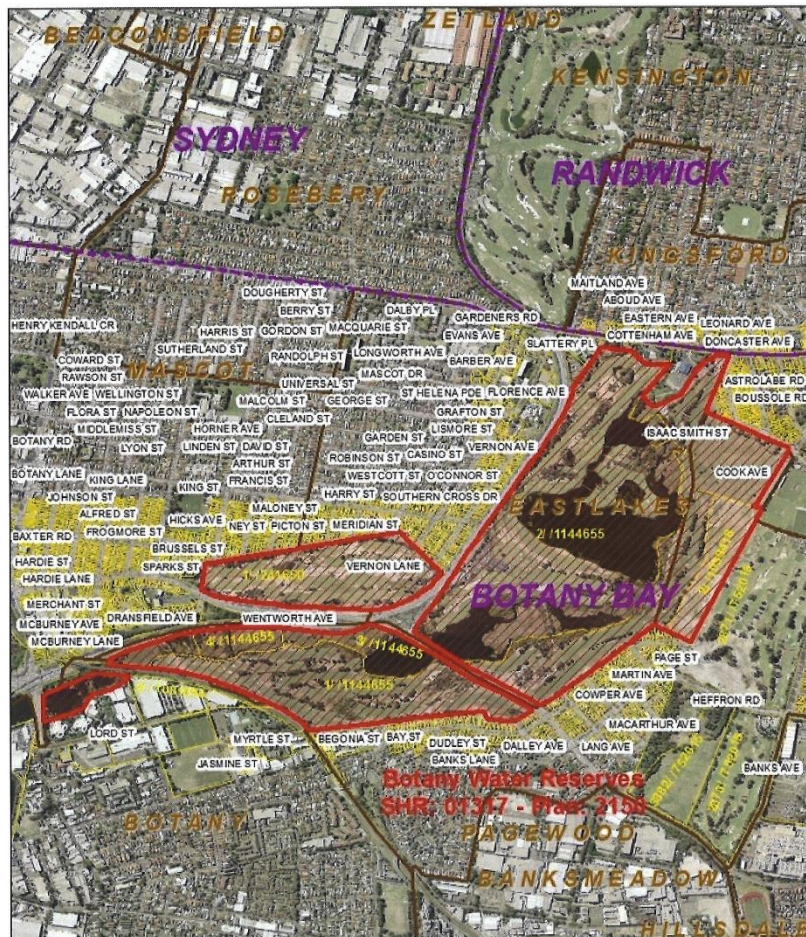
Every effort has been made to ensure that information contained in the State Heritage Inventory is correct. If you find any errors or omissions please send your comments to the **Database Manager**.

All information and pictures on this page are the copyright of the Heritage Division or respective copyright owners.

<http://www.environment.nsw.gov.au> <http://www.environment.nsw.gov.au>

31/08/2017

Heritage Council of New South Wales



State Heritage Register - SHR 01317, Plan 2150

Botany Water Reserves

Gazettal Date: 18 November 1999

0 250 500 750 1,000 Metres

Scale: 1:18,000

Datum/Projection: GCS GDA 1994



Legend

- SHR Curtilage
- Land Parcels
- LGAs
- Suburbs
- Roads

**Attachment G – Flora and
Fauna Surveys 73 Gardeners
Road, Prepared by ACS
Environmental Pty Ltd dated
September 2017**



FLORA & FAUNA SURVEYS

AND

ECOLOGICAL CONTRIBUTION TO THE

PREPARATION OF A MASTER PLAN FOR A SYDNEY

WATER DEPOT SITE AT

73 GARDENERS ROAD, EASTLAKES, SYDNEY

Prepared for:

**ARCHITECTUS SYDNEY
Level 18 MLC Centre
19 Martin Place
Sydney NSW 2000 Australia**

SEPTEMBER 2017

ACS Environmental P/L

Flora and Fauna Surveys, Biodiversity Impact Assessment & Bushfire

Hazard Assessment Services

Australian Business Number (ABN) 24 154 491 120

3/28 Tullimbar Rd, Cronulla NSW. 2230

Tel: 9527 5262; Mob: 0403 081902

Email: acs@actinotus.com

Web: [www@actinotus.com](http://www.actinotus.com)

ACS Environmental Consultants

Peter Stricker BSc. (Hons) (Syd) ^α



^α Member Ecological Consultants Association NSW Inc

Consultants experience

The director of 'Actinotus Consultancy Services (ACS) – Environmental P/L' (formerly Actinotus Environmental Consultants) has worked in the area of biodiversity impact and bushfire hazard assessment services for a period of greater than 20 years. He also have over 20 years of experience in scientific research (ecological) and teaching in biological science at UNSW.

The principal of the former 'Actinotus Environmental Consultants' has completed the NSW Consulting Planners Bushfire Training Course organised by the Planning Institute of Australia NSW Division for planning consultants and allied professionals relating to the implementation of 'Planning for Bushfire Protection', in June 2003.

| CONTENTS | page No. |
|--|-----------------|
| EXECUTIVE SUMMARY | vi |
| 1 INTRODUCTION | 1 |
| 1.1 <i>Proposed development</i> | 1 |
| 1.2 <i>Documents provided</i> | 2 |
| 1.3 <i>Statutory and legislative requirements</i> | 2 |
| 1.4 <i>Objectives and scope of the study</i> | 3 |
| 2 EXISTING ENVIRONMENT | 4 |
| 2.1 <i>Topography, geology and soils</i> | 4 |
| 2.2 <i>Existing vegetation – local plant assemblage</i> | 4 |
| 2.3 <i>Current and surrounding land use</i> | 8 |
| 3 FLORA AND FAUNA SURVEY AND ASSESSMENT | 9 |
| 3.1 <i>Methods</i> | 9 |
| 3.1.1 <i>Literature review</i> | 9 |
| 3.1.2 <i>Site survey</i> | 9 |
| 3.1.2.1 <i>Flora survey</i> | 9 |
| 3.1.2.2 <i>Fauna survey</i> | 10 |
| 3.1.2.3 <i>Limitations of the study</i> | 11 |
| 3.2 <i>Results - Flora</i> | 11 |
| 3.2.1 <i>Indigenous and exotic species</i> | 11 |
| 3.2.2 <i>Ecological communities</i> | 12 |
| 3.2.2.1 <i>Previous mapping</i> | 12 |
| 3.2.2.2 <i>Ground-truthing and assessment</i> | 14 |
| 3.2.3 <i>Conservation status of vegetation</i> | 14 |
| 3.2.4 <i>Flora species of conservation significance</i> | 15 |
| 3.3 <i>Results - Fauna</i> | 16 |
| 3.3.1 <i>Summary of habitats present</i> | 16 |
| 3.3.2 <i>Fauna recorded</i> | 16 |
| 3.3.3 <i>Fauna species of conservation significance</i> | 18 |
| 3.3.4 <i>Species listed by the OEH Atlas of NSW Wildlife database 2015 as Potential migratory inhabitants of the site.</i> | 21 |
| 3.3.5 <i>Migratory species listed by the Commonwealth DoE (Commonwealth Protected Matters Search Tool) as potential inhabitants of the site.</i> | 21 |
| 3.3.6 <i>Terrestrial species listed by the Commonwealth DoE (Commonwealth Protected Matters Search Tool) as potential inhabitants of the site.</i> | 21 |

| | |
|-----------------|-----------------|
| CONTENTS | page No. |
|-----------------|-----------------|

| | |
|----------------------------------|----|
| 3.3.7 <i>Conclusions – fauna</i> | 21 |
|----------------------------------|----|

| | |
|--|-----------|
| 4 REFERENCES & LITERATURE REVIEWED | 23 |
|--|-----------|

FIGURES

| | |
|--|----|
| 1. Aerial image of subject area of Sydney Water Depot at 73 Gardeners Road, Eastlakes (boundary marked by red line) | 1 |
| 2. Aerial view of subject site in 1943 showing a mostly cleared landform though apparently including low growing shrubs or unmanaged grassland, with few tall shrubs or trees | 5 |
| 3. View within front area of Sydney water Depot at 73 Gardeners Road, Eastlakes, the landscaped vegetation including Bangalay, Sydney Red Gum, Swamp Oak, Weeping Bottlebrush and the tall ground cover Spiny-headed Mat-rush | 6 |
| 4. Clumps of Weeping Bottlebrush occur at the front and rear of the landscaped areas at the Sydney Water Depot | 7 |
| 5. Shrub of Sydney Golden Wattle occurring along eastern boundary of landscaped gardens | 7 |
| 6. Vegetation mapping by OEH (2013) of patches of urban natives and exotics at the Sydney Water Depot (Code: URE/N but not labelled on map), mapped in yellow shading. A patch of Coastal Bangalay Forest occurs about 60m down-slope to the south-west of the Sydney Water Depot site, this patch shaded in green with red border denoting its occurrence as an Endangered Ecological Community | 13 |
| 7. Excerpt of vegetation mapping in the vicinity of the subject land (from Botany Bay Council DCP 2013). | 14 |
| 8. Drainage channel flowing in a southerly direction, located to the east of the subject site, draining into the series of ponds at the Lakes Golf Course | 20 |

TABLES

| | |
|--|----|
| 1 Records for 3 species of conservation significance recorded within a 5km radius of the subject site at Eastlakes within the last 25 years | 15 |
| 2 Fauna species recorded or expected to occur at 73 Gardeners Road, Eastlakes | 17 |

APPENDICES

| | | |
|---|--|----|
| 1 | Floristic species assemblages recorded at subject site at 73 Gardeners Road, Eastlakes and at northern section of Lakes Golf Course | 26 |
| 2 | Plant species of conservation significance recorded within a 5km radius of the surveyed area since 1992 where potential habitat may occur (OEH Atlas of NSW Wildlife 2017 ^α) or where potential habitat is deemed to potentially occur (Commonwealth DoEE Protected matters Environmental Reporting Tool 2017 ^β) | 29 |
| 3 | Threatened fauna species recorded previously within a 5km radius of the subject sites at 73 Gardeners Road, Eastlakes since 1992 (Source: OEH NSW Atlas of Wildlife 2015) | 33 |
| 4 | Likelihood of occurrence in surveyed area of fauna species of conservation significance recorded within a 5km radius of the Study Area at 73 Gardeners Road, Eastlakes since 1992 (OEH Atlas of NSW Wildlife 2017) or where potential habitat is deemed to potentially occur | 34 |

EXECUTIVE SUMMARY

'ACS (Actinotus Consultancy Services) – Environmental' were commissioned by Naturally Trees on behalf of Architectus to undertake a comprehensive biodiversity survey of an area of land of about 1.5 ha at 73 Gardeners Road, Eastlakes as part of the assessment of ecological values occurring at the land for a proposed Masterplan services for the site.

The landscape consists of ridgetop topography sloping gently southwards to The Lakes Golf Course.

The vegetative cover of the subject land at is comprised of landscaped tree and shrub planting, the site being almost totally cleared of wooded vegetation prior to 1943. Currently the subject site contains landscaped mature and semi-mature trees of various species of Myrtaceae such as Bangalay and Sydney Red Gum, as well as Swamp Oak and small trees such as Weeping Bottlebrush among others (Scales 2017).

No natural indigenous species appear to occur in the subject area except for some sparse shrubs of Sydney Golden Wattle and small trees of Sweet Pittosporum that have naturalised in the area, the open tree canopy having all been planted around the fenced boundaries of the site in a landscape plan since 1943. A total number of 30 tree species, including mature and semi-mature individuals has been documented as occurring within the subject site by Scales (2017). Most of these trees will be removed as part of the proposed development, although 3 individuals of Sydney Red Gum occurring along the north-eastern boundary will be retained (Scales 2017).

A total of 9 exotic environmental weeds, including low frequencies of 2 species of 'biosecurity weeds', occur within the subject site (Appendix 1).

Many of the landscaped planted trees are fairly mature and attain heights to 18m, the tree plantings being mixed throughout the area, apart from distinct monocultures of some species that occur such as Swamp Oak along the northern boundary with Gardeners Road (Scales 2017).

None of the assemblages or distributions of trees or shrubs occurring in the subject area at 73 Gardeners Road, Eastlakes, represent natural ecological communities confirming previous mapping undertaken by OEH (2013) and Botany Council DCP 2013.

As such, it is considered that any impacts of potential development on the vegetation would not be significant.

A patch of the Endangered Ecological Community, Coastal Sand Bangalay Forest, occurs on natural sand-based substrates about 60m downslope to the south-west of the subject site,

but with appropriate construction environmental management plans undertaken for the development, will not be impacted by the proposal.

Current Atlas of NSW Wildlife data (Bionet - October 2015) indicates that 3 threatened flora species have been recorded in the locality within the last 25 years (Table 1). Habitat for another 8 threatened flora species is deemed likely or potentially to occur as qualified by the DoEE 'Protected Matters Search Tool' (2017) and these are listed in Appendix 2.

In relation to locally occurring habitat which has been highly modified by clearing prior to 1943 and landscaped with a variety of locally and non-locally occurring indigenous species, as well as exotic ornamentals at the subject site, it is highly unlikely that any of the listed threatened flora species would occur in the surveyed area. Targeted searches for those species listed in Table 1 where records occur within a 5km radius, failed to locate these, or any other threatened flora species at the subject sites.

Opportunistic fauna observations were made within the study site and in the vicinity of the drainage channel that courses alongside the study site at 673 Gardeners Road, Eastlakes.

Birds recorded at the subject site included the Magpie-lark (*Grallina cyanoleuca*), Noisy Miner (*Manorina melanocephala*), Common Myna (*Sturnus tristis*), Rainbow Lorikeet (*Trichoglossus haematodus*), and Australian Raven (*Corvus coronoides*).

The Welcome Swallow (*Hirundo neoxena*) was recorded flying overhead.

Reptiles observed on the near the subject site were the Dark-flecked Garden Sunskink (*Lampropholis delicata*) and Eastern Water Skink (*Eulamprus quoyii*), with the Eastern Water Dragon (*Physignathus lesueurii*) having been occasionally observed by the personnel at the Depot.

The OEH Atlas of NSW Wildlife database 2015 listed twenty-three (23) species of terrestrial and avifauna considered threatened under the TSC Act within a 5 km radius of the site (Appendix 3).

Four of these threatened fauna species have been recorded within 1km of the study site. These are the Green and Golden Bell Frog, Freckled Duck, Eastern Bentwing Bat and the Grey-headed Flying-fox.

Whilst no individuals of these avian and mammalian species were recorded, an assessment of habitats concluded that potential exists for them to potentially forage near to the study site. An Assessment of Significance to determine any potential impact to any proposed development was not necessary as all these species are likely overhead foragers that have large foraging ranges and their life-cycles, foraging, roosting and breeding behaviours would not be impacted upon in relation to any proposed development at the study site.

None of the recorded species of birds recorded at the subject site are listed as threatened or appear on migratory bird agreement lists.

The study site is rated as poor habitat for fauna due to its proximity to the busy Gardeners Road motorway and the long history of disturbance for commercial purposes. It is considered unlikely that any proposed development at the subject site would impact on the distribution or integrity of natural faunal populations in the area.

It should be noted that the current proposal is for a master plan only which seeks to inform the proposed future planning controls for the site. Any future development of the site will be subject to sale by Sydney Water and preparation by detailed design Development Applications which will need to undergo further assessment under the planning approval framework. At this stage, it will need to once again consider impacts on flora and fauna in further more specific detail.

ACRONYMS & GLOSSARY

CCPD – Crown Canopy Projective Density

CEEC – Critically Endangered Ecological Community

DEC – State Department of Environment and Conservation

DECCW – State Department of Environment, Climate Change and Water

DoEE – Commonwealth Department of Energy and Environment

EEC – Endangered Ecological Community

EPA Act – Environment Protection Act

EPBC Act – Environment Protection and Biodiversity Conservation Act

LEP - Local Environment Plan

NPWS – State National Parks and Wildlife Service

OEH – Office of the Environment and Heritage

RoTAP – Rare and Threatened Australian Plants

SMCMA – Sydney Metropolitan Catchment Management Authority

TSC Act – Threatened Species Conservation Act

INTRODUCTION

1.1 Proposed development

'ACS (Actinotus Consultancy Services) – Environmental' was commissioned by Naturally Trees on behalf of Architectus to undertake a comprehensive biodiversity survey of an area of land of 1.5 ha currently used as a Sydney Water Depot at 73 Gardeners Road, Eastlakes. The survey forms part of the assessment of ecological values occurring at the subject land for a proposed Masterplan services for the site. Figure 1 is an aerial image of the subject land.

A previous report addressed the ecological values of land to the west at 75 Gardeners Road, including the northernmost section of the Lakes Golf Course (ACS Environmental 2015).

The landscape consists of ridgetop topography sloping gently southwards to The Lakes Golf Course (Figure 1).



Figure 1 - Aerial image of subject area of Sydney Water Depot at 73 Gardeners Road, Eastlakes (boundary marked by red line)

1.2 Documents provided

Scales, A. (2017) Draft Arboricultural Impact Appraisal and Method Statement for 73 Gardeners Road, Eastlakes

1.3 Statutory and legislative requirements

Planning controls that need to be addressed in any comprehensive biodiversity studies on the subject land are listed below.

Planning controls provided by State and Commonwealth Legislation include the following:

- ◆ *Environmental Planning and Assessment Act (EP & A Act)(1979),*
- ◆ *Commonwealth Environment Protection and Biodiversity Conservation Act (EPBC Act)(1999),*
- ◆ *Threatened Species Conservation Act (TSC Act)(1995).* The *Threatened Species Conservation Act (TSC Act)(1995)* includes Preliminary Determinations of the NSW Scientific Committee (to September 2017) as well as Provisional Listings of Endangered Species on an emergency basis (to September 2017),
- ◆ *Noxious Weeds Act 1993 (NW Act) (NSW)*
- ◆ *Biosecurity Act (NSW) 2015*

Other relevant legislation that were implemented to restrict the uncontrolled development of bushland in urban areas include:

- ◆ SEPP 19 (Bushland in Urban Areas), and
- ◆ *Local Government Act (1993)*

Biodiversity conservation planning principles promoted by DECCW (2011) that apply to tracts of natural bushland are outlined in *Mid North Coast Regional Conservation Plan (Draft DECCW 2011)*.

Local Council planning controls and other relevant local and State planning documents that relate to the proposed development include the following:

- ◆ *Botany Bay Local Environmental Plan 2013*
- ◆ *Botany Bay Comprehensive Development Control Plan 2013*

1.4 Objectives and scope of the study

The objectives and scope of the study are:

- To identify, locate and describe the biodiversity values of the Study Area and its environmental context in the region by undertaking detailed flora and fauna field surveys.

Current and detailed information will be obtained on the following:

- Identification of the flora and fauna that occur within the Study Area including documentation of species lists and mapping of identifiable plant communities;
 - Identification of Threatened (Endangered and Vulnerable) species, populations, communities and habitats as listed in Schedules 1 & 2 of the Threatened Species Conservation Act 1995 (TSC Act), including Preliminary Determinations of the NSW Scientific Committee, and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), RoTAP species (Briggs & Leigh 1996) and regionally and locally significant species;
 - Identification of fauna species including amphibians, reptiles, birds and mammals, not directly recorded during surveys but that could potentially occur in the Study Area as indicated by the presence of associated habitat;
 - Description of the identifiable vegetation communities occurring within the Study Area indicating their current condition, conservation value and level of degradation; and
 - Recording of the area and extent of Noxious (and other significant) weed species in the Study Area;
- To prepare a comprehensive flora and fauna biodiversity report to document the ecological values occurring at the subject site.

Specific details of methodology relating to floristic and fauna habitat survey and assessment are documented in following sections of this report.

2 EXISTING ENVIRONMENT

2.1 Topography, geology and soils

The site has a south to south-westerly aspect. The topography of the subject site is a hillcrest on Gardeners Road gently sloping southwards (Figure 1) to the northern landscaped section of the Lakes Golf Course with gradients from about 2 to 5° (Figure 1).

The local substrate geology of the hillcrest of the subject area is a tongue of deposits of Quaternary Sand overlying an expanse of Quaternary Dune Sand sediments (Herbert 1983).

The lithology of the Quaternary sand deposits include peat, sandy peat and mud overlying the Quaternary Dune deposits which are comprised of medium to fine-grained 'marine' sand with podsols (Herbert 1983).

The soil landscape particular to the hillcrest of the surveyed area is 'Disturbed Terrain' (Chapman & Murphy 1983). The soil material has been disturbed by human activity including removal or burial of soil, as well as infilling with various landfill substrates (Chapman & Murphy 1983).

2.2 Existing vegetation – local plant assemblages

The vegetative cover of the subject land is comprised of landscaped tree and shrub planting (Figure 1). Imagery of the subject land prior to 1943 indicates that low growing vegetation occurred at the site at that time, appearing as low scattered shrubland or grassland with few large shrubs and no trees evident (Figure 2).

Currently the subject land contains landscaped mature trees such as Bangalay and Swamp Oak (Figure 3) as well as small trees and shrubs including Weeping Bottlebrush (Figure 4) and Sydney Golden Wattle (Figure 5).



Figure 2 - Aerial view of subject site in 1943 showing a mostly cleared landform though apparently including low growing shrubs or unmanaged grassland, with few tall shrubs or trees



Figure 3 - View within front area of Sydney water Depot at 73 Gardeners Road, Eastlakes, the landscaped vegetation including Bangalay, Sydney Red Gum, Swamp Oak, Weeping Bottlebrush and the tall ground cover Spiny-headed Mat-rush.



Figure 4 - Clumps of Weeping Bottlebrush occur at the front and rear of the landscaped areas at the Sydney Water Depot



Figure 5 - Shrub of Sydney Golden Wattle occurring along eastern boundary of landscaped gardens

2.3 *Current and surrounding land use*

On the eastern boundary of the subject land, a stormwater drainage channel originating from the catchment area on the northern side of Gardeners Road, forms a well defined creek (Figures 1 & 2) flowing southwards into the series of ponds located within the Lakes Golf Course (ACS Environmental 2015).

Established urban development occurs to the north of Gardeners Road, a former landscaped nursery occurred to the west (now a construction zone) and the managed Lakes Golf Course extends to the south of the subject land (Figure 1).

3 FLORA AND FAUNA SURVEY AND ASSESSMENT

3.1 Methods

3.1.1 Literature review

Existing information on 'Threatened Flora and Fauna of the Locality', defined as an area of 5km radius around the site, was accessed from the OEH Bionet Atlas of NSW Wildlife (1:100,000 map sheets 9130 Sydney - September 2017), Commonwealth DoE Protected Matters Environmental Reporting Tool (September 2017) and RoTAP (Briggs & Leigh, 1996) databases. Searches of JAMBA (Japan and Australia Migratory Bird Agreement), CAMBA (China and Australia Migratory Bird Agreement) and ROKAMBA (Republic of Korea Migratory Bird Agreement) databases were also consulted in regard to the distribution of migratory bird species

Other literature detailing locally threatened flora and fauna, as well as endangered populations and plant communities of the Study Area included NSW Scientific Committee Final Determinations (1996-2017), The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area – (OEH 2013), Botany Bay Planning Strategy (2013) and Botany Bay Council Development Control Plan Mapping (2013).

3.1.2 Site survey

The subject site was inspected by 'ACS Environmental P/L' on 6th July 2017.

3.1.2.1 Flora Survey

Comprehensive surveys of the Study Area undertaken on foot by the diversity search method of Cropper (1993) and DEC 'Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities' (2004) to identify the existence of extant and exotic flora.

Survey methods include a complete floristic inventory of indigenous and exotic species and an assessment of the presence, or likelihood of occurrence, of any threatened, rare (RoTAP), regionally or locally significant species or ecological plant community occurring in the Study Area.

Survey design

The relative occurrence of indigenous and exotic flora (modified Braun-Blanquet frequency-of-occurrence ranking) occurring over the site and distinct ecological communities were mapped.

3.1.2.2 Fauna Survey

A dedicated ground search was undertaken within the subject land as was a census of extant birds. The survey involved different search strategies and protocols and all extant fauna or evidence of fauna was recorded. Threatened fauna species not recorded in the survey but with the potential to be present as indicated by habitat are considered in the final assessment.

Strategies employed for the field investigation of the Study Area:

Assessment of the value of habitat suitable for native fauna species and specific habitat structures/resources considered important in life cycles. These structures or resources include:

- Mature trees with hollows for breeding, roosting and/or nesting;
- Particular foraging resources such as certain tree or shrub species;
- Dispersal, migratory or foraging corridors for fauna;
- Leaf litter and ground search for reptiles, frogs and threatened invertebrates;
- Identification of scats and other indirect evidence to suggest fauna utilisation such as tracks, scratch marks or diggings;

Recording Methods

The search strategy employed for diurnal birds is based on utilising periodic observation stations or “point counts” as described by York *et al.*, (1991). Searches undertaken included recording and observing location of potential roost sites and accessible tree hollows. Scat searches and pellet analysis were conducted to ascertain the species present.

Appropriate sampling methodologies were employed where habitat attributes are present that provide microhabitat for cavity dependent fauna. If no cavities or hollows are present, then indirect evidence is relied upon to show fauna utilisation of the survey site.

3.1.2.3 Limitations of the study

Limitations of the study may arise where certain cryptic species of plants may occur as soil-stored seed or as subterranean vegetative structures. Some species are identifiable above-ground only after particular environmental circumstances occur that may be related to factors such as periodic fire frequency, intensity or seasonality, soil moisture regime, grazing pressure, biological life-cycle patterns as in the case of small geophytic taxa such as species of orchids etc.

Diurnal surveys at one time of the year cannot be expected to detect the presence of all species occurring, or likely to occur, in the Study Area. This is because some species may (a) occur seasonally, (b) utilise different areas periodically (as a component of a more extensive home range), or (c) become dormant during specific periods of the year. Rather, the survey provides the opportunity to sample the area, search specifically for species likely to be encountered within the available time frame, and assess the suitability of habitat for particular species.

These potential limitations to the location of certain cryptic or diurnally active species are not expected to cause any significant constraints to the purposes of this assessment.

3.2 Results - Flora

3.2.1 Indigenous and exotic species

Appendix 1 is a floristic species list of terrestrial indigenous and exotic species recorded and compiled as a census of species throughout the subject site. The landscaped area contains extended plantings of locally indigenous, and non-locally indigenous species, these well documented in Scales (2017).

Species nomenclature follows that of Harden (1990 – 2002; 2017 online).

Most natural locally-occurring indigenous species that were recorded in the subject area occur as a result of landscaping, these including such species as Swamp Oak, Bangalay, Sydney Red Gum and Spiny-headed Mat-rush, the open tree and shrub canopy having all been planted in a landscape plan since 1943 (Figure 2). Sydney Golden Wattle and Sweet Pittosporum may have possibly naturalised in the area. A total number of 30 individuals of mature or semi-mature trees, including locally occurring and non-locally occurring species, has been documented within the subject site by Scales (2017).

A total of 9 exotic environmental weeds, including 2 species of Biosecurity Act (2015) listed weeds, Lantana and African Olive, occur in low frequency within the subject land (Appendix 1).

3.2.2 Ecological communities

3.2.2.1 Previous mapping

The local ecological plant communities that occur at and in the environs of the Study Area have been mapped by OEH (2013) compiling data from API and environmental attributes of geology, average annual rainfall, topography, elevation, Soil Landscape Series type and extent of disturbance (condition), and including some ground-truthing (OEH 2013).

Figure 6 indicates that the lineal distributions of vegetation occurring at the existing Sydney Water Depot location is mapped as 'Urban Native and Exotics' and does not form a natural ecological community.

Vegetation mapping documented in Botany Bay DCP 2013 (Adopted 09/12/2014) indicates that no ecological communities of any significance status occur at the subject site, though also indicating the presence of the patch of Coastal Sand Bangalay Forest occurring about 60m down-slope of the Sydney Water Depot land (Figure 7).

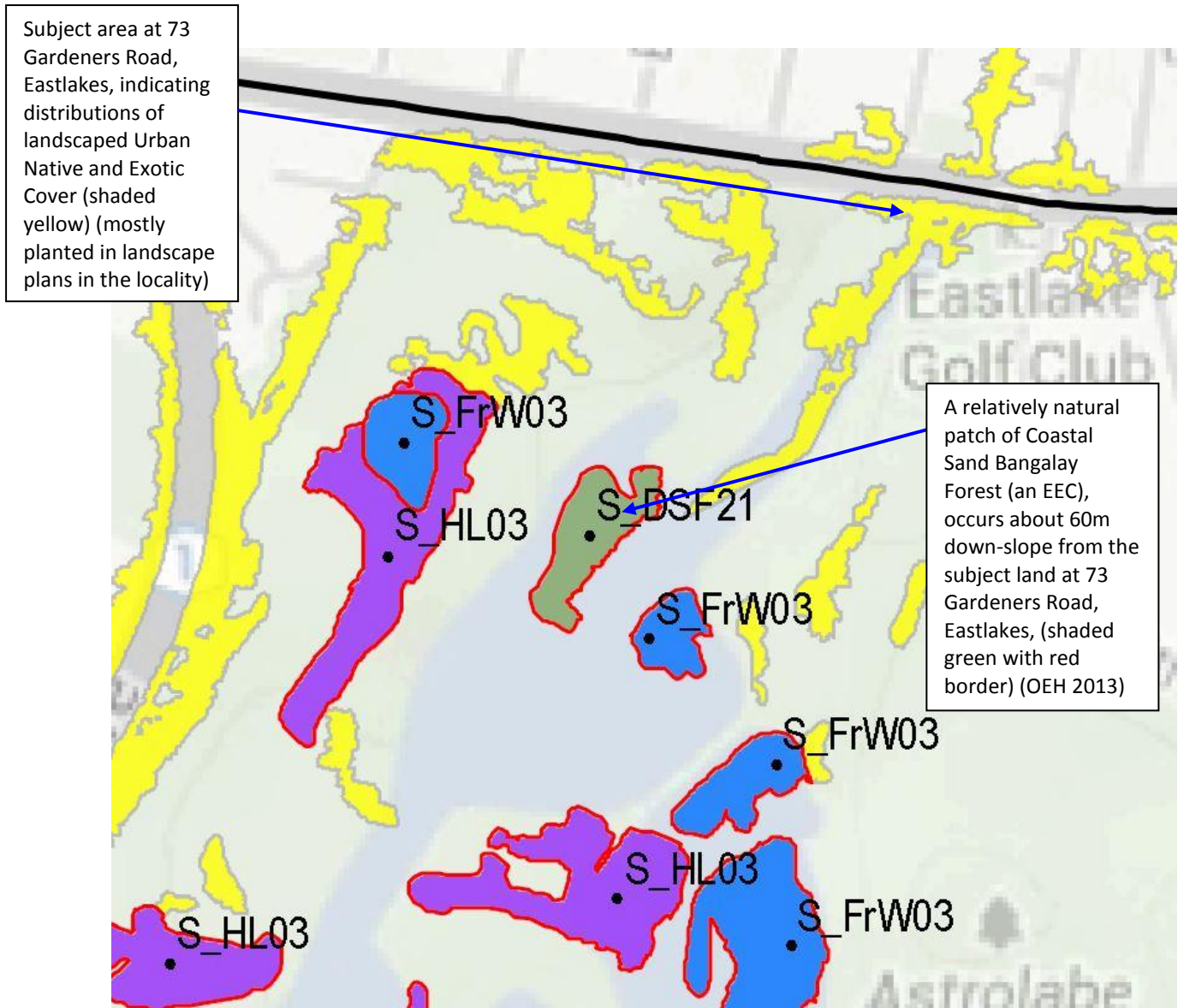


Figure 6 – Vegetation mapping by OEH (2013) of patches of urban natives and exotics at the Sydney Water Depot (Code: URE/N but not labeled on map), mapped in yellow shading. A patch of Coastal Bangalay Forest occurs about 60m down-slope to the south-west of the Sydney Water Depot site, this patch shaded in green with red border denoting its occurrence as an Endangered Ecological Community.

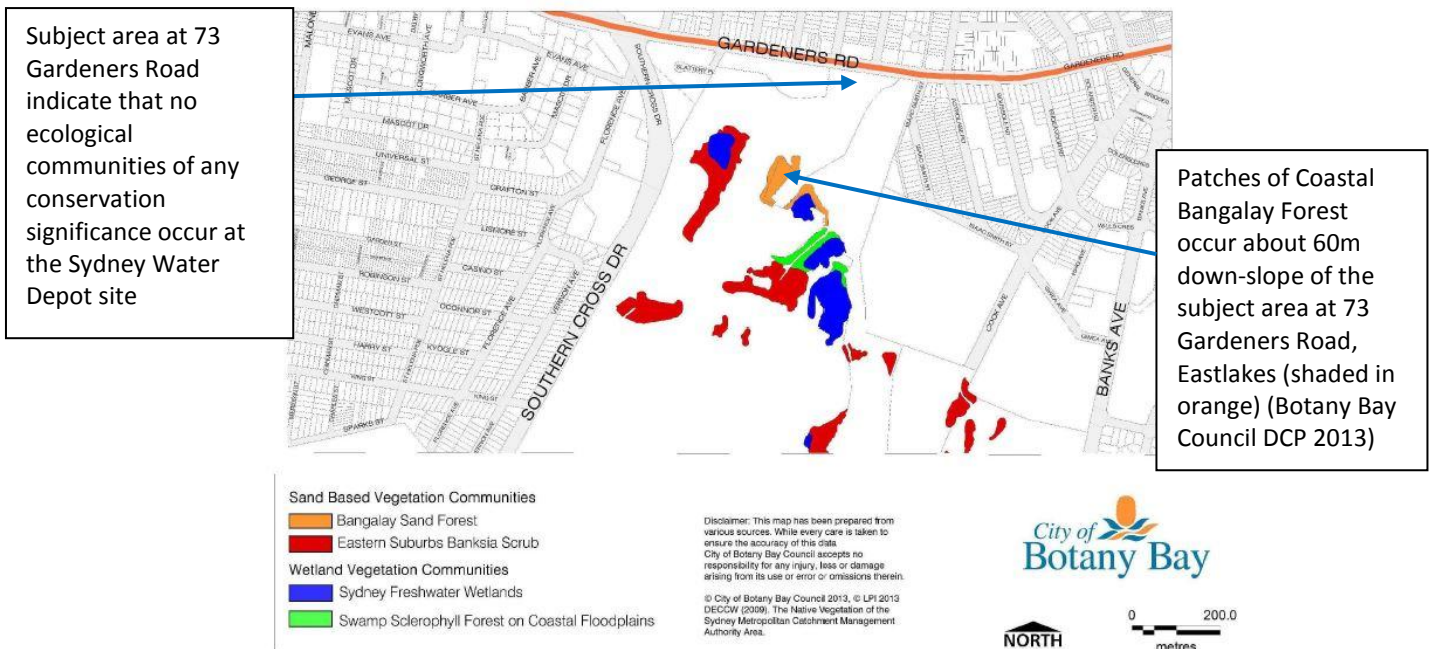


Figure 7 - Excerpt of vegetation mapping in the vicinity of the subject land (from Botany Bay Council DCP 2013).

3.2.2.2 Ground-truthing and assessment

The surveyed area has been historically modified by extensive clearing (Figure 2) and landscaped planting of 30 species of indigenous and exotic ornamental trees (Scales 2017), forming woodland patches and lineal distributions of small trees, shrubs and tall ground cover plants along fence-lines (Figures 1, 3, 4 & 5).

Some of the trees are relatively mature, such as some individuals of Bangalay attaining heights to 18m, but these are mixed with smaller landscaped trees and shrubs throughout the area (Scales 2017).

None of the assemblages or distributions of trees or shrubs in this area represent natural ecological communities and confirm previous mapping as shown in Figures 6 & 7.

3.2.3 Conservation status of vegetation

None of the discrete patches of often species-specific vegetation represents any assemblages of conservation significance or heritage (Figures 2, 3, 4, 5, 6 & 7).

As such, any impacts of potential development will not be significant in relation to existing vegetation distributions at the subject land.

3.2.4 Flora species of conservation significance

Threatened species

Current Atlas of NSW Wildlife data (Bionet - September 2017) was accessed to indicate threatened flora species that have been recorded in the locality within the last 25 years. Records for an area of 5km radius around the subject site indicate that 3 species of conservation significance have been recorded within the last 25 years (Table 1). Appendix 2 lists these 3 species with an account of their threatened status, geographical range, physiognomic attributes, habitat features, and likelihood of occurrence in the surveyed area. Habitat for another 8 threatened species is deemed likely or potentially to occur as qualified by the DoEE 'Protected Matters Search Tool' (2017) and these are also listed in Appendix 2.

| Family | Common name | Scientific name | <u>NSW status</u> | <u>Comm. status</u> | No. of records |
|----------------------------------|---------------------|--|-------------------|---------------------|----------------|
| Asteraceae | Coast Groundsel | <i>Senecio spathulatus</i> | E1,P | | 1 |
| Fabaceae (Mimosoidae) | Sunshine Wattle | <i>Acacia terminalis</i> subsp. <i>terminalis</i> | E1,P | E | 30 |
| Myrtaceae | Magenta Lilly Pilly | <i>Syzygium paniculatum</i> | E1,P | V | 4 |

Table 1 - Records for 3 species of conservation significance recorded within a 5km radius of the subject site at Eastlakes within the last 25 years.

In relation to locally occurring habitat which has been highly modified by clearing prior to 1943 (Figure 2), and landscaped with a variety of locally and non-locally occurring indigenous species, it is highly unlikely that any of the threatened flora species would occur at the subject site (Appendix 2).

Targeted searches for those species listed in Table 1 where records occur within a 5km radius, failed to locate these, or any other threatened flora species, at the subject site.

3.3 Results - Fauna

3.3.1 Summary of habitats present

The quality of fauna habitat may be categorised by the presence of certain features that include:

- a predator free environment,
- whether the vegetation provides shelter, food resources and nesting or roosting opportunity for native fauna species,
- the presence of tree hollows, dead and fallen timber, rock crevices and caves, and
- the contribution an area has towards a fauna movement corridor.

Terrestrial areas of the site (Figure 1) are rated poor as fauna habitat due to:

- (i) limited canopy coverage with low numbers of indigenous ground cover species;
- (ii) limited mid-storey coverage;
- (iii) no nesting structures, fallen timber, hollow logs or tree hollows; and
- (iv) no contribution to a fauna movement corridor.

The aquatic environment represented by the stormwater drainage channel that occurs to the east of the subject site, draining from north to south to the pond system at The Lakes Golf Course (Figures 1 & 2).

The channel is polluted with rubbish and stormwater pollutants from surrounding urban development to the north. Reptiles expected to be associated with the drainage course include the Eastern Water Dragon (observed by personnel at the Depot site) and the Eastern Water Skink.

3.3.2 Fauna recorded

Opportunistic fauna observations were made within the study site and vicinity (Figure 1). Species recorded and expected to occur at the subject site are listed Table 2.

Birds recorded at the Sydney Water Depot site included the Magpie-lark (*Grallina cyanoleuca*), Noisy Miner (*Manorina melanocephala*), Noisy Miner (*Manorina melanocephala*), Common Myna (*Sturnus tristis*), Rainbow Lorikeet (*Trichoglossus haematodus*) and Australian Raven (*Corvus coronoides*) (Table 2).

Reptiles observed and expected to occur at the Sydney Water Depot site included Dark-flecked Garden Sunskink (*Lampropholis delicata*), Eastern Water Skink (*Eulamprus quoyii*) and Eastern Water Dragon (*Physignathus lesueurii*).

No scats were collected from any area of the study site. Being close to the golf course it is probable that invasive species such as the rabbit is chemically controlled. The Common Ringtail Possum may be present at times. It is the favoured prey species for the Powerful Owl. The scarcity of habitat for the Ring-tailed Possum would be expected to limit the potential of the Powerful Owl to occur in the immediate area as there are more favourable habitats in more wooded areas in the locality. The subject site does not contain trees with hollows of sufficient size to accommodate nesting for mammal or bird species and no possum dreys were located. All birds recorded are likely diurnal visitors. Bird species are more likely to roost in dense vegetation that occurs more coastal to the survey site.

The Eastern Dwarf Tree Frog is expected to occur around the edges of the drainage channel. The Plague Minnow (*Gambusia holbrooki*) is expected to occur in the drainage channel.

| Family | Scientific Name | Common Name | Subject site |
|-------------------|---------------------------------|------------------------------|--------------|
| BIRDS | | | |
| Artamidae | <i>Cracticus torquatus</i> | Grey Butcherbird | e |
| | <i>Gymnorhina tibicen</i> | Australian Magpie | e |
| Cacatuidae | <i>Cacatua galerita</i> | Sulphur-crested Cockatoo | e |
| Campephagidae | <i>Coracina novaehollandiae</i> | Black-faced Cuckoo Shrike | e |
| Corvidae | <i>Corvus coronoides</i> | Australian Raven | 1 |
| Dicruridae | <i>Grallina cyanoleuca</i> | Magpie-lark | 1 |
| | <i>Rhipidura leucophrys</i> | Willie Wagtail | e |
| Hirundinidae | <i>Hirundo neoxena</i> | Welcome Swallow | 4 OH |
| Meliphagidae | <i>Manorina melanocephala</i> | Noisy Miner | 2 |
| Psittacidae | <i>Trichoglossus haematodus</i> | Rainbow Lorikeet | 3 |
| Sturnidae | <i>Acridotheres tristis</i> | Common Myna* | 2 |
| MAMMALS | | | |
| Muridae | <i>Rattus rattus</i> | Black Rat* | e |
| Pteropodidae | <i>Pteropus poliocephalus</i> | Grey-headed Flying Fox | e |
| REPTILES | | | |
| Agamidae | <i>Physignathus lesuerii</i> | Eastern Water Dragon | e |
| Scincidae | <i>Lampropholis delicata</i> | Dark-flecked Garden Sunskink | 1 |
| | <i>Eulamprus quoyii</i> | Eastern Water Skink | e |
| AMPHIBIANS | | | |
| Myobatrachidae | <i>Litoria falax</i> | Eastern Tree-frog | e |

Code

OH – overhead

e – expected to visit occasionally

* - introduced species

Table 2 –Fauna species recorded and expected to occur at the Sydney Water Depot site at 73 Gardeners Road, Eastlakes

3.3.3 Fauna species of conservation significance

Threatened species

The criteria used to assess the likelihood of threatened species occurring in the Study Area included the specificity of habitat features such as tree canopy cover, relative soil moisture regime, relative soil nutrient regimes, historical disturbance and degradation of vegetation and known occurrences of threatened species in the immediate locality.

If all or most of these collective criteria deemed optimal for the occurrence of a particular threatened species occur in relation to the habitat of the Study Area, then the likelihood of its potential occurrence in the habitat of the Study Area could be assessed as being relatively high. If only some of these collective criteria deemed suitable for the occurrence of a particular threatened species occur in the habitat of the Study Area, then its potential occurrence in the area of study may be deemed moderate at best. If few of these collective criteria deemed suitable for the occurrence of a particular threatened species occur in the habitat of the Study Area, then the likelihood of its occurrence would be assessed as being low to very unlikely.

The OEH Atlas of NSW Wildlife database 2015 listed twenty-three (23) species of terrestrial and avifauna considered threatened under the TSC Act within a 5 km radius of the site (Appendix 3). One of these species is critically endangered and five are designated as endangered by the NSW Scientific Committee with the remainder designated as vulnerable. Under the EPBC Act 1999, one is listed as critically endangered, two listed as endangered and two listed as vulnerable.

Appendix 4 lists these threatened species with descriptions of suitable habitats and the likelihood of occurrence at the subject site.

Four of these threatened fauna species have been recorded within 1km of the study site. These are the Green and Golden Bell Frog, Freckled Duck, Eastern Bentwing Bat and the Grey-headed Flying-fox.

The Freckled Duck is a very rare bird to occur in the area and could be classified as a 'vagrant', occurring out of its normal range.

The Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*). Foraging habitat is present over the survey area, however it is highly unlikely that the bat would roost within the site, as no deep caves are present. Although no roosting habitat is available in the subject area, they may occasionally overfly the area whilst foraging.

The Grey-headed Flying-fox (*Pteropus poliocephalus*). The species congregates in large camps and is found in a variety of habitats including rainforest, mangroves, Melaleuca

swamps, wet and dry sclerophyll forests as well as in cultivated areas. At night the Grey-headed Flying-fox searches for food and may travel 50 km to its feeding areas. It eats fruit from a range of native and introduced species, particularly figs, and for this reason it is sometimes called 'Fruit Bat'. It also feeds on nectar and pollen from native trees.

An individual was noted to have been electrocuted on nearby overhead transmission lines, and an assessment of habitats concluded that potential exists for it to forage within and in the vicinity of the study site. An Assessment of Significance to determine any potential impact to any proposed development was not necessary as all these species are likely overhead foragers that have large foraging ranges and the development proposal would not likely impact on their lifestyle.

The Green and Golden Bell Frog (GGBF) (*Litoria aurea*) has previously been recorded immediately to the east of the study area some 24 years ago in 1993 (OEH NSW Atlas of Wildlife 2017). No further studies have identified it as present in the area. OEH has since listed the frog as extinct within the Lakes Golf Course at Eastlakes (OEH 2017).

From previous surveys (ACS Environmental 2015), it would be expected that extensive populations of the Plague Minnow, also known as Mosquito Fish (*Gambusia holbrooki*) would occur within the ponds. *Gambusia* has been listed as a KEY THREATENING PROCESS on Schedule 3 of the *Threatened Species Conservation Act 1995* [29 January 1999] for survival of the GGBF. *Gambusia* is a small freshwater fish originally introduced into Australia in the 1920s where some were released into creeks around Sydney, Melbourne and Brisbane, the species being now widespread throughout NSW. It is an aggressive and voracious predator of native fauna, particularly the eggs and tadpole stages of frog development.

With regard to the Green and Golden Bell Frog, Morgan and Buttemer (1996) conducted predation experiments examining the impact upon survival of tadpoles and the influence of aquatic vegetation on the predatory impact of *Gambusia*. They found that in the absence of aquatic vegetation, *Gambusia* was able to significantly reduce tadpole survival within 24 hours. In the presence of aquatic vegetation, the effect was substantially reduced.

Studies by Pyke and White (1996) surveyed waterbodies in the Sydney region for the Green and Golden Bell Frog, examining the association between evidence of breeding, occurrence of introduced fish and quality of habitat. They found that successful breeding was most strongly associated with ephemeral rather than permanent water bodies, followed by the absence of *Gambusia*, and speculated that this fish was a major cause of decline of the Green and Golden Bell Frog.

Hamer *et al* (2002) however, experimentally demonstrated that the growth of Green and Golden Bell Frog tadpoles was more favourable in permanent, rather than ephemeral

water bodies and importantly found that tadpoles did not respond to the presence of *Gambusia* which made them more vulnerable to predation. The authors concluded that predation from *Gambusia* may have reduced the suitability of permanent water bodies as optimal breeding habitat for Green and Golden Bell Frogs and that the long-term use of less favourable ephemeral habitats may have contributed to the decline of this species.

The flow rate in the drainage channel that courses alongside the north-south boundary to the east of the subject site varies from relatively slow to relatively fast flowing after significant rainfall events. As such, and with the level of toxic pollutants carried from stormwater as well as the lack of fringing reed embankments (Figure 8), is not considered suitable for the occurrence of this species.



Figure 8 - Drainage channel flowing in a southerly direction, located to the east of the subject site, draining into the series of ponds at the Lakes Golf Course

In light of these findings, OEH records and relevant documentation, it is concluded that the Green and Golden Bell Frog, even if it were to occur, would not be impacted upon by any potential development at 73 Gardeners Road, Eastlakes (Appendix 4).

3.3.4 Species listed by the OEH Atlas of NSW Wildlife database 2017 as potential migratory inhabitants of the site.

The OEH Atlas of NSW Wildlife database 2017 listed twenty-three (23) migratory species of avifauna covered by bi-lateral bird agreements, recorded within a 5 km radius of the site.

Two species, the Sharp-tailed Sandpiper and the Little Tern may on occasion utilise resources on the golf course, but would not be impacted by any potential development at 73 Gardeners Road, Eastlakes.

Most of the migratory species listed were recorded within the Botany Swamp, well to the south of the subject site.

3.3.5 Migratory species listed by the Commonwealth DoEE (Commonwealth Protected Matters Search Tool) as potential inhabitants of the site.

Migratory species listed by the Commonwealth DoEE was reviewed in relation to the distribution, habitat and likelihood of occurrence. None of the migratory species listed has potential to occur and would not be impacted by any potential development at 73 Gardeners Road, Eastlakes.

3.3.6 Terrestrial species listed by the Commonwealth DoEE (Commonwealth Protected Matters Search Tool) as potential inhabitants of the site.

Threatened terrestrial fauna species listed by the Commonwealth DoE were reviewed in relation to the distribution, habitat and likelihood of occurrence. The current study concluded that the Grey-headed Flying Fox is likely to forage in eucalypt trees when in flower. However, the species is more likely to forage within the many golf courses of the locality where foraging resources occur in larger tracts of woodland.

3.3.7 Conclusion – fauna

The OEH Atlas of NSW Wildlife database 2015 listed twenty-three (23) species of terrestrial and avifauna considered threatened under the TSC Act within a 5 km radius of the site.

The Green and Golden Bell Frog (*Litoria aurea*) has been recorded some 22 years previously immediately to the east of the study area in 1993 (OEH NSW Atlas of Wildlife 2015). No further studies have identified it as present in the area. OEH has since listed the frog as extinct within Eastlakes Golf Course (OEH 2015).

The Freckled Duck is a very rare bird to occur in the area and could be classified as a 'vagrant', occurring out of its normal range.

The Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*) may forage over the surveyed areas, however it is unlikely that the bat roosts within it as no deep caves are present.

The Grey-headed Flying-fox (*Pteropus poliocephalus*) congregates in large camps and is found in a variety of habitats. At night the Grey-headed Flying-fox searches for food and may travel 50 km to its feeding areas. A dead animal, electrocuted on transmission lines on Gardeners Road, is evidence that this species forages and over-flies in the locality. It is however more likely to be found foraging within the large groves of trees within the golf course.

None of the recorded animals, or those expected to occur at or near to the subject site, are listed as threatened or appear on migratory bird agreement lists.

The study site is rated as poor habitat for fauna due to its proximity to the busy Gardeners Road motorway and the long history of disturbance for commercial purposes. It is unlikely that any proposed development at the subject site will impact on the natural fauna of the area.

4 REFERENCES & LITERATURE REVIEWED

- ACS Environmental P/L (2015) Flora and fauna surveys for an ecological contribution to the preparation of a Master Plan for a site at 75 Gardeners Road, Eastlakes, Sydney (prepared for Natural Trees 2015)
- Barker, J., G.C. Grigg. & M.J. Tyler (1995). *A Field Guide to Australian Frogs*. Chipping Norton, NSW: Surrey Beatty & Sons.
- Benson, D. and Howell, J. (1994) The natural vegetation of the Sydney 1: 100,000 map sheet. *Cunninghamia* **3**:677 – 787.
- Briggs, J.D. and Leigh, J.H.C. (1996) Rare or Threatened Australian Plants: CSIRO Division of Plant Industry/Australian National Parks and Wildlife Service. CSIRO Publishing, Melb.
- Churchill, S., (1998). *Australian Bats*. Reed New Holland Publishers.
- Chapman, G.A. and Murphy, C.L. (1989) *Soil landscapes of the Sydney 1:100 000 sheet*. (Soil Conservation Service of N.S.W.: Sydney).
- Cogger, H. G. (2000). Reptiles and Amphibians of Australia. 6th ed. Reed New Holland, Sydney.
- Commonwealth DoEE Protected Matters Environmental Search Tool (2017)
- Cropper, S (1993) *Management of Endangered Plants* CSIRO Pub. East Melbourne
- DEC (2004) Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities
- Department of the Environment (2017). *Litoria aurea* in Species Profile and Threats Database, Department of the Environment, Canberra.
- Dwyer, P.D. (1995) Common Bentwing-bat *Miniopterus schreibersii* Pp. 494-5 in Strahan, R. (ed.) *The Mammals of Australia*. Reed Books, Sydney.
- Harden, G. J. (ed.) (1990 – 2002; 2017 online) *Flora of New South Wales*, Royal Botanic Gardens, Sydney NSW.

- Harris, K. (1995). *Is there a negative relationship between Gambusia and tadpoles on the northern tablelands?* B. Sc. Honours thesis, University of New England, Armidale, NSW.
- Marchant & Higgins 1990 'Handbook of Australian, New Zealand and Antarctic Birds'
- Morgan, L.A. and Buttemer, W.A. (1996). Predation by the non-native fish *Gambusia holbrooki* on small *Litoria aurea* and *L. dentata* tadpoles., pp. 143-49. In: G.H. Pyke and W.S. Osborne (eds.), *The Green and Golden Bell Frog (Litoria aurea): Biology and Conservation*. Royal Zoological Society of NSW.
- Noxious Weed List for Botany Council (2017) National Weeds Strategy Executive Committee.
- NSW Scientific Committee. Final Determinations (1996 – 2017) Determinations relating to listings of threatened species, populations, ecological communities and key threatening processes in the Schedules of the *Threatened Species Conservation Act 1995*.
- OEH Atlas of NSW Wildlife (2017). NPWS Geographic Information Systems Division, Hurstville NSW, 2220.
- OEH (2013) 'The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area'.
- Pyke, G.H. and White, A.W. (2000). Factors influencing predation on eggs and tadpoles of the endangered green and golden bell frog *Litoria aurea* by the introduced Plague Minnow *Gambusia holbrooki*. *Australian Zoologist*, **31**(3): 496-505.
- Pizzey, G. and Knight, F. (2003). *The Field Guide to the Birds of Australia*. Angus and Robinson Publs.
- Reynolds, S.J. (1995). *The impact of introduced mosquito fish (Gambusia holbrooki) on mortality of premetamorphic anurans*. B.Sc. Honours thesis, University of Western Australia in Department of the Environment (2015). *Litoria aurea* in Species Profile and Threats Database, Department of the Environment, Canberra.
- Specht, R. L., Specht, A., Whelan, M.B., Hegarty, E. E. (1995) Conservation Atlas of Plant Communities in Australia. Southern Cross Univ Press Lismore

Scales, A. (2017) Arboricultural Impact Assessment and Method Statement for 73 Gardeners Road, Eastlakes. Prepared for Sydney Water.

Strahan, R. 1995 *Complete Book of Australian Mammals*, Second Edition. Sydney: ReedBooks.

Tidemann, C.R., Eby, P., Parry-Jones, K.A. and Vardon, M. (1999). Grey-headed Flying-fox. In The Action Plan for Australian Bats. Duncan, A., Baker, G.B. and Montgomery, N. (eds). Environment Australia, Canberra.

Webb, C. and Joss, J. (1997). Does predation by the fish *Gambusia holbrooki* (Atheriniformes: Poeciliidae) contribute to declining frog populations. *Australian Zoologist*, **30** (3): 316-326

Appendix 1: Floristic species assemblage recorded at 73 Gardeners Road, Eastlakes**KEY****Status:**

*- Exotic species

RMM - Weeds classified as Regional Recommended Measures in the Randwick Council LGA

MM - Weeds classified as Mandatory Measures in the Randwick Council LGA

pl - planted indigenous and ornamental species

nat - naturalised

Vegetation

The vegetation of the subject site has been largely derived from landscaped plantings. The plantings include both locally and non-locally occurring indigenous species as well as some exotic ornamentals

Relative ranked frequency of occurrence (modified Braun-Blanquet rank scale)

1 – uncommon or rare

2 – relatively uncommon but occasional individuals <5% cover

3 – abundant individuals but cover <5%

4 - Cover abundance from 5 – 10%

| STATUS | SCIENTIFIC NAME | COMMON NAME | SUBJECT SITE AT 73 GARDENERS ROAD |
|-----------|--|-----------------|--------------------------------------|
| | MAGNOLIOPSIDA: MAGNOLIDAE | | |
| * | Asclepiadaceae <i>Araujia sericifera</i> | Moth Plant | 3 |
| Mostly pl | Casuarinaceae <i>Casuarina glauca</i> | Swamp Oak | 4 |
| * | Convolvulaceae <i>Ipomoea indica</i> | Morning Glory | 3 |
| pl | Lamiaceae <i>Westringia fruticosa</i> | Native Rosemary | 3 |
| *pl | Lauraceae <i>Persea americana</i> | Avocado | 3 |

| STATUS | SCIENTIFIC NAME | COMMON NAME | SUBJECT SITE AT 73 GARDENERS ROAD |
|-------------------|---|-----------------------|--------------------------------------|
| | Mimosaceae | | |
| Pl and /or nat | <i>Acacia longifolia</i> ssp <i>longifolia</i> | Sydney Golden Wattle | 3 |
| Pl and /or nat | <i>Acacia longifolia</i> ssp <i>longifolia</i> | Sydney Golden Wattle | 3 |
| | Myrtaceae | | |
| *pl | <i>Agonis flexuosa</i> | Willow Myrtle | 3 |
| pl | <i>Angophora costata</i> | Sydney Red Gum | 3 |
| pl | <i>Callistemon viminalis</i> | Weeping Bottlebrush | 4 |
| *pl | <i>Corymbia ficifolia</i> | Red Flowering Gum | 1 |
| pl | <i>Eucalyptus botryoides</i> | Coast Mahogany | 3 |
| | Oleaceae | | |
| RRM | <i>Olea europea</i> var <i>cuspidata</i> | African Olive | 2 |
| | Papaveraceae | | |
| * | <i>Fumaria muralis</i> | Wall Fumitory | 3 |
| | Pittosporaceae | | |
| nat | <i>Pittosporum undulatum</i> | Sweet Pittosporum | 3 |
| | Ulmaceae | | |
| * | <i>Celtis occidentale</i> | Hackberry | 3 |
| | Urticaceae | | |
| * | <i>Parietaria judaica</i> | Pellitory | 3 |
| | Verbenaceae | | |
| MM | <i>Lantana camara</i> | Lantana | 3 |
| | MAGNOLOPSIDA: LILIDAE | | |
| | Arecaceae | | |
| * | <i>Phoenix canariensis</i> | Canary Island Palm | 3 |
| | Lomandraceae | | |
| pl | <i>Lomandra longifolia</i> | Spiny-headed Mat-rush | 4 |
| | Phormiaceae | | |
| pl | <i>Dianella revoluta</i> | Blue Flax Lily | 3 |

LEGEND TO APPENDIX 1 - BIOSECURITY WEEDS IN RANDWICK COUNCIL LGA

RMM - *The plant or parts of the plant are not traded, carried, grown or released into the environment. Exclusion zone: The plant is eradicated from the land and the land kept free of the plant. Core infestation area: Land managers prevent spread from their land where feasible.*

MM - *Must not be imported into the State or sold*

Appendix 2: Plant species of conservation significance recorded within a 5km radius of the subject area since 1990 where potential habitat may occur (OEH Atlas of NSW Wildlife 2017^α) or where potential habitat is deemed to potentially occur (Commonwealth DoEE Protected Matters Environmental Reporting Tool 2017^β)

| Scientific Name | Status (EPBC Act 1999) | Status (TSC Act 1995) | RoTAP | Habit/potential habitat/general geographic location | Likelihood of occurrence in subject area | Reference material derived from 'Final Determinations' (NSW Scientific Committee) and others listed below: |
|---|------------------------|-----------------------|-------|--|---|--|
| <i>Acacia terminalis</i> ssp <i>terminalis</i> ^{α β} | E* | E1 | | Erect or spreading shrub or small tree to 6m tall. Dry sclerophyll forest in coastal Sydney region. Occurs in coastal scrub and dry sclerophyll woodland in sandy soils | Highly unlikely – Subject habitat highly modified and landscaped. Nearest record appears about 2km to the east along Anzac Parade at Kingsford. Absence of distinct life-form individuals in area of study deemed to indicate non-occurrence. No further assessment required | OEH Atlas of NSW Wildlife (2017); Fairley & Moore (2004) |
| <i>Allocasuarina glareicola</i> ^β | | E1 (2E) | | Slender open shrub to 1 - 2m high. Occurs in clay soils derived from alluvial gravels in woodland comprised of the tree species <i>Angophora bakeri</i> and <i>Eucalyptus sclerophylla</i> . | Highly unlikely - habitat unsuitable. No records of occurrence in locality. Absence of relatively distinct life-form individuals in small area of study deemed to indicate non-occurrence. No further assessment required | OEH Atlas of NSW Wildlife (2017); Harden (2000); Fairley (2004) |
| <i>Caladenia tessellata</i> ^β | V* | E1 | 3V | Terrestrial herb. Clay or sandy soils in moist forests or scrubs on coastal ridgetops | Highly unlikely –Subject habitat highly modified and landscaped. No records of occurrence in locality. No further assessment required | OEH Atlas of NSW Wildlife (2017); Robinson (2000) |
| <i>Cryptostylis hunteriana</i> ^β | V* | V | 3VC- | No leaf, flowers only in Dec-Feb, saprophytic. Known from a range of swamp-heath and woodland communities with poorly drained soils. | Highly unlikely - Habitat unsuitable, cleared and highly modified. No records within 5km of subject site. No further assessment required | OEH Atlas of NSW Wildlife (2017); Robinson (2003); Bishop (2000) |
| <i>Genoplesium baueri</i> ^β | | V | 3RC- | Terrestrial orchid to 15cm tall, occurs in sparse sandy dry sclerophyll forest habitat and moss outcrops over sandstone. | Highly unlikely - Habitat unsuitable, cleared and highly modified. No records within 5km of subject areas. No further assessment | OEH Atlas of NSW Wildlife (2017), Robinson (2000), Fairley (2004). |

| Scientific Name | Status (EPBC Act 1999) | Status (TSC Act 1995) | RoTAP | Habit/potential habitat/general geographic location | Likelihood of occurrence in subject area | Reference material derived from 'Final Determinations' (NSW Scientific Committee) and others listed below: |
|--|------------------------|-----------------------|-------|--|---|--|
| <i>Melaleuca biconvexa</i> ^β | V* | V | | Shrub or small tree to 10m, occurring in damp places, often near streams or low lying areas on alluvial soils of low slopes or sheltered aspects. <i>Melaleuca biconvexa</i> may occur in dense stands forming a narrow strip adjacent to watercourses, in association with other <i>Melaleuca</i> species or as an understorey species in wet forest types. | Highly unlikely – Subject habitat highly modified and landscaped. No records within 5km of subject sites. Absence of distinct life-form individuals in area of study deemed to indicate non-occurrence. No further assessment required | OEH Atlas of NSW Wildlife (2017) |
| <i>Pimelea curviflora</i> var <i>curviflora</i> ^β | V* | V | | Much-branched subshrub or shrub 20 to 100cm. Occurs in woodlands of the northern area of Sydney on shale-sandstone transition areas and laterite soils. | Not likely – Habitat unsuitable, highly modified and landscaped, absence of relatively distinct life-form individuals in area of study indicates non-occurrence. No further assessment required | OEH Atlas of NSW Wildlife (2017); James et al (1999) |
| <i>Senecio spathulatus</i> | | E1 | | A low-growing daisy forming hummocks to 30cm tall. Grows on primary sand dunes between Kurnell and Myall Lakes National Park. | Highly Unlikely – Habitat is unsuitable, grows on primary soil dunes. Nearest records are some 3.6km to the south at Port Botany. Absence of relatively distinct life-form individuals in area of study indicates non-occurrence. No further assessment required | OEH Atlas of NSW Wildlife (2017) |
| <i>Syzygium paniculatum</i> ^α | V* | V | 3VCi | Shrub or small tree to 8m tall, occurs in or near rainforest from littoral sands to sheltered gullies, especially near watercourses on sandy soils | Highly unlikely – Habitat unsuitable, highly modified and landscaped. Nearest OEH record about 500m to the north at Erskineville, probably also a landscaped planting. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted | OEH Atlas of NSW Wildlife (2017); Robinson (2000), Fairley & Moore (2004) |

| | | | | | | |
|--------------------------------------|----|---|--|---|---|---|
| | | | | | mainly to remnant stands of littoral (coastal) rainforest. Habitat cleared highly modified and landscaped. Absence of relatively distinct large life-form individuals in area of study indicates non-occurrence. No further assessment required | |
| <i>Thesium australe</i> ^β | V* | V | | Herb to 40cm high. Occurs in grassland and woodland, often in damp situations | Highly unlikely – habitat highly modified and landscaped. Rare, not recently recorded. No records within 5km of subject areas. No further assessment required. | OEH Atlas of NSW Wildlife (2017); Harden (1992) |

Key:

Department of the Environment (DoE) Threatened species status ^β

EX – Presumed extinct

E* - Endangered

V* - Vulnerable

OEH Threatened species status ^α

E4A – presumed extinct, recently recorded

E1 - Endangered

E2 - Endangered Population

V - Vulnerable

Key to Conservation Status:

Commonwealth legislation

Environmental Protection and Biodiversity Conservation Act, 1999

EX – Presumed extinct

E* - Endangered

V* - Vulnerable

NSW legislation

Threatened Species Conservation Act, 1995

E4A – Schedule 1 Part 1 – Presumed extinct, recently recorded

E1 Schedule 1 Part 1 – Endangered

V Schedule 2 - Vulnerable

RoTAP

Conservation code

2 - geographic range <100km

3 - geographic range >100km

Conservation status

E - endangered to point of extinction if current land use and other threats continue to operate

V - vulnerable, at risk of depletion over 20-50- years if land use that threatens survival is maintained

C - at least one population conserved in a national park or proclaimed conservation area

Size class of reserved populations

a - >1000 plants in conservation reserve

i - < 1000 plants in conservation reserve

- reserved population size not accurately known

Appendix 3: Threatened fauna species recorded previously within a 5km radius of the subject sites at 73 Gardeners Road, Eastlakes since 1992 (Source: OEH Atlas of NSW Wildlife 2017)

| Common Name | Scientific Name | NSW Status | COMM Status | Number of Records |
|----------------------------|--|------------|-------------|-------------------|
| Green and Golden Bell Frog | <i>Litoria aurea</i> | E1 | V | 11 |
| Freckled Duck | <i>Stictonetta naevosa</i> | V | | 1 |
| Superb Fruit-Dove | <i>Ptilinopus superbus</i> | V | | 2 |
| Bush Stone-curlew | <i>Burhinus grallarius</i> | E1 | | 1 |
| Pied Oystercatcher | <i>Haematopus longirostris</i> | E1 | | 3 |
| Lesser Sand-plover | <i>Charadrius mongolus</i> | V | | 3 |
| Sanderling | <i>Calidris alba</i> | V | | 3 |
| Curlew Sandpiper | <i>Calidris ferruginea</i> | E1 | | 41 |
| Great Knot | <i>Calidris tenuirostris</i> | V | | 4 |
| Black-tailed Godwit | <i>Limosa limosa</i> | V | | 2 |
| Terek Sandpiper | <i>Xenus cinereus</i> | V | | 3 |
| Little Tern | <i>Sternula albifrons</i> | E1 | | 313 |
| Glossy Black-Cockatoo | <i>Calyptorhynchus lathami</i> | V | | 2 |
| Swift Parrot | <i>Lathamus discolor</i> | E1 | E | 1 |
| Orange-bellied Parrot | <i>Neophema chrysogaster</i> | E4A | CE | 1 |
| Eastern Ground Parrot | <i>Pezoporus wallicus wallicus</i> | V | | 2 |
| Powerful Owl | <i>Ninox strenua</i> | V | | 9 |
| Scarlet Robin | <i>Petroica boodang</i> | V | | 1 |
| Diamond Firetail | <i>Stagonopleura guttata</i> | V | | 2 |
| Spotted-tailed Quoll | <i>Dasyurus maculatus</i> | V | E | 1 |
| Grey-headed Flying-fox | <i>Pteropus poliocephalus</i> | V | V | 73 |
| Eastern Bentwing-bat | <i>Miniopterus schreibersii oceanensis</i> | V | | 10 |
| Southern Myotis | <i>Myotis macropus</i> | V | | 464 |

Appendix 4: Likelihood of occurrence in surveyed area of fauna species of conservation significance recorded within a 5km radius of the Study Area at 73 Gardeners Road, Eastlakes since 1992 (OEH Atlas of NSW Wildlife 2017) or where potential habitat is deemed to potentially occur

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|----------------------------|----------------------------|---------|----------|-------------------------------------|---|---|--|
| Green and Golden Bell Frog | <i>Litoria aurea</i> | E1 | V | 11 (One record 10m east in 1993) | Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria where it extends into east Gippsland. It inhabits marshes, dams and stream-sides, particularly ones with bullrushes (<i>Typha orientalis</i> . spp.) or spikerushes (<i>Eleocharis</i> spp.). | Unlikely Habitat may be present in ponds within the golf course but the presence of (<i>Gambusia holbrookii</i>) which predated on the tadpoles limits its presence. Now deemed to be extinct in the area (OEH 2015). No further assessment required. | OEH Atlas of NSW Wildlife (2017), Cogger 200 Barker et al 1995 |
| Freckled Duck | <i>Stictonetta naevosa</i> | V | | 1 One record 2013 500m south | The Freckled Duck is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters.. | Not likely - Suitable habitat present but it is such a rare occurrence that it is unlikely to occur within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2017), Pizzey & Knight (2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|-------------------|----------------------------|---------|----------|-----------------|---|---|---|
| Superb Fruitdove | <i>Ptilinopus superbus</i> | V | | 2 | The Superb Fruit-dove occurs principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. Part of the population is migratory or nomadic | Not likely – No suitable habitat present but it is such a rare occurrence that it is unlikely to occur within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2017), Pizzey & Knight (2003). |
| Bush Stone-curlew | <i>Burhinus grallarius</i> | E1 | | 1 | The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania (Pizzey & Knight 2003). In general, habitat occurs in open woodlands with few, if any, shrubs, and short, sparse native grasses, scattered fallen timber, leaf litter and bare ground present. In coastal areas, structurally similar elements of tidal and estuarine areas provide suitable habitat, for example Bush Stone-curlews are recorded within Casuarina woodlands, saltmarsh and mangroves. The presence of fallen tree debris appears critical to the selection of day roost sites. Largely nocturnal, being especially active on moonlit nights. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2017), Pizzey & Knight (2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|--------------------|--------------------------------|---------|----------|-----------------|--|--|---|
| Pied Oystercatcher | <i>Haematopus longirostris</i> | E1 | | 3 | The species is distributed around the entire Australian coastline, although it is most common in coastal Tasmania and parts of Victoria, such as Corner Inlet (Pizzey & Knight 2003). In NSW the species is thinly scattered along the entire coast. Favours intertidal flats of inlets and bays, open beaches and sandbanks. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2017), (Pizzey & Knight 2003). |
| Lesser Sand-plover | <i>Charadrius mongolus</i> | V | | 3 | This species is strongly migratory, wintering on sandy beaches in east Africa, south Asia and Australasia. The lesser sand plover's food is insects, crustaceans and annelid worms, which are obtained by a run-and-pause technique, rather than the steady probing of some other wader groups | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2017), (Pizzey & Knight 2003). |
| Sanderling | <i>Calidris acuminata</i> | V | | 3 | A regular summer migrant from Siberia and other Arctic breeding grounds to most of the Australian coastline. It is uncommon to locally common, arriving from September and leaving by May (some may overwinter in Australia). Sanderlings occur along the NSW coast, with occasional inland sightings. They are often found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands. They breed in Siberia. In Australia it roosts on bare sand, behind clumps of beach-cast kelp or in coastal dunes. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2017), (Pizzey & Knight 2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|------------------|----------------------------|---------|----------|-----------------|---|--|---|
| Curlew Sandpiper | <i>Calidris ferruginea</i> | E1 | | 41 | The Curlew Sandpiper is a common visitor during the Australian summer, congregating in large flocks at sheltered intertidal mudflats and also at the muddy margins of terrestrial wetlands. They, peck at invertebrates on the surface of the mud or making shallow probes below its surface, sometimes wading in belly-deep water while probing. Feeding becomes more intense before their long flight back to their breeding grounds in Siberia. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2017), (Pizzey & Knight 2003). |
| Great Knot | <i>Calidris</i> | V | | 4 | In NSW, the species has been recorded at scattered sites along the coast to about Narooma. It has also been observed inland at Tullakool, Armidale, Gilgandra and Griffith (Pizzey & Knight 2003). It occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2017), (Pizzey & Knight 2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|---------------------|----------------------|---------|----------|-----------------|---|--|---|
| Black-tailed Godwit | <i>Limosa limosa</i> | V | | 2 | The Black-tailed Godwit is a migratory wading bird that breeds in Mongolia and Eastern Siberia (Palearctic) and flies to Australia for the southern summer, arriving in August and leaving in March. In NSW, it is most frequently recorded at Kooragang Island (Hunter River estuary), with occasional records elsewhere along the north and south coast, and inland. Habitat is found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Individuals have been recorded in wet fields and sewerage treatment works. Forages for insects, crustaceans, molluscs, worms, larvae, spiders, fish eggs, frog eggs and tadpoles in soft mud or shallow water. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2017), (Pizzey & Knight 2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|-----------------|---------------------------|---------|----------|-----------------|--|--|---|
| Terek Sandpiper | <i>Xenus cinereus</i> | V | | 3 | A rare migrant to the eastern and southern Australian coasts, being most common in northern Australia, and extending its distribution south to the NSW coast in the east. The two main sites for the species in NSW are the Richmond River estuary and the Hunter River estuary. In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools. Generally roosts communally amongst mangroves of dead trees, often with related wader species. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2017), (Pizzey & Knight 2003). |
| Little Tern | <i>Sternula albifrons</i> | E1 | | 313 | Little terns migrate from eastern Asia, and in Australia is found on the north, east and south-east Australian coasts, from Shark Bay in Western Australia to the Gulf of St Vincent in South Australia. In NSW, it arrives from September to November, occurring mainly north of Sydney, with smaller numbers found south to Victoria. Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). | Not likely - No suitable habitat present within survey area. Recorded within 1km of the site within the larger expanse of the Golf Course No further assessment required. | OEH Atlas of NSW Wildlife (2017), (Pizzey & Knight 2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|-----------------------|---------------------------------|---------|----------|-----------------|--|---|---|
| Glossy Black-cockatoo | <i>Calyptorhynchus lathamii</i> | V | | 2 | The Glossy Black-Cockatoo inhabits eucalypt woodland, forest or timbered watercourses where casuarinas (She-oaks) are common. In NSW, the Glossy Black-Cockatoo occurs in coastal and mountain districts. They feed almost exclusively on the seeds of She-oaks, mostly Forest She-oak <i>Allocasuarina torulosa</i> and Black She-oak <i>A. littoralis</i> although they are also known to eat the seeds of Shrub She-oak <i>A. distyla</i> at times. | Not likely - No suitable habitat present within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2017), (Pizzey & Knight 2003). |
| Swift Parrot | <i>Lathamus discolor</i> | E1 | E | 1 | Autumn – winter migrant to coastal NSW. In NSW mostly occurs on the coast and south west slopes where eucalypts are flowering profusely or where there are abundant lerp infestations. Will feed in the following trees; Swamp Mahogany (<i>E. robusta</i>), Forest Redgum (<i>E. tereticornus</i>), Spotted Gum (<i>Corymbia maculata</i>), Red Bloodwood (<i>Corymbia gummifera</i>). | Not likely - No suitable habitat present within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2017), (Pizzey & Knight 2003). |
| Orange-bellied Parrot | <i>Neophema chrysogaster</i> | E4 | CE | 1 | The Orange-bellied Parrot breeds in Tasmania and migrates northward during winter. On the mainland they spend winter mostly within 3 km of the coast in sheltering in bays, lagoons, estuaries, coastal dunes and saltmarshes. They also inhabit small islands and golf courses. Birds forage in herbland or taller coastal shrubland. Recent records from Shellharbour and Maroubra suggest that the species may be expanding their selection of habitats and foraging plant species. | Not likely - No suitable habitat present within survey area. More likely in the Malabar peninsula. No further assessment required. | OEH Atlas of NSW Wildlife (2017), (Pizzey & Knight 2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|-----------------------|------------------------------------|---------|----------|-----------------|--|---|---|
| Eastern Ground Parrot | <i>Pezoporus wallicus wallicus</i> | V | | 2 | In NSW populations have declined and contracted to islands of coastal or subcoastal heathland and sedgeland habitats. The species is found in small numbers on the north coast (Broadwater, Bundjalung, Yuraygir NPs) and Myall Lakes on the central coast. The largest populations occur on the NSW south coast. The Ground Parrot occurs in high rainfall coastal and near coastal sedgelands, generally below one metre in height and very dense (up to 90% projected foliage cover). Home ranges of adult birds is typically 10 ha. There is no evidence of regular long-distance dispersal or migration events. | Not likely - No suitable habitat present within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2017), (Pizzey & Knight 2003). |
| Powerful Owl | <i>Ninox strenua</i> | V | | 9 | Endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands. Now uncommon throughout its range where it occurs at low density. Inhabits woodland and open sclerophyll forest to tall open wet forest and rainforest. | Not likely - No suitable prey species available. No further assessment required | OEH Atlas of NSW Wildlife (2017), Pizzey & Knight (2003). |
| Scarlet Robin | <i>Petroica bodang</i> | V | | 1 | The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs and usually contains abundant logs and fallen timber: these are important components of its habitat. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees. | Not likely – This shy bird is more likely to occur further south. Although vagrants do occur as far north as Eastlakes, the habitat present is considered sub-optimal. | OEH Atlas of NSW Wildlife (2017), Pizzey & Knight (2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|------------------------|-------------------------------|---------|----------|--------------------------------------|---|--|---|
| Diamond Firetail | <i>Tagonopleura guttata</i> | V | | 2 | The Diamond Firetail is endemic to south-eastern Australia, ranging from Carnarvon Ranges in Queensland to the Eyre Peninsula and Kangaroo Island in South Australia. Diamond Firetails are found in open grassy woodland, heath and farmland or grassland with scattered trees. Diamond Firetails feed on the ground and generally eat ripe or partially ripe seeds and can be seen hopping around on the ground. They occasionally eat insects and their larvae. They are prone to predation by Currawongs. | Not likely - No suitable habitat present within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2017), Pizzey & Knight (2003). |
| Spotted-tail Quoll | <i>Dasyurus maculatus</i> | V | E | 1 | Recorded across a range of habitat types, including rainforest, open forest, forest, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. | Not likely - No suitable habitat present within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2017), Strahan (1995); Menkhorst and Knight 2001 |
| Grey-headed Flying-Fox | <i>Pteropus poliocephalus</i> | V | V | 73 One recorded in 2007 1km south | Occurs along the east coast of Australia from Gladstone in Qld. to south Gippsland and Melbourne in Vic (Strahan 1995; Churchill 1998). The species congregates in large camps and is found in a variety of habitats including rainforest, mangroves, Melaleuca swamps, wet and dry sclerophyll forests and also cultivated areas. | Likely - The Grey-Headed Flying-Fox may fly overhead to forage in trees surrounding the golf course. No impact is expected by the development proposal. | OEH Atlas of NSW Wildlife (2017), Churchill (1998), Tidemann et al 1999 |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|----------------------|--|---------|----------|-----------------|---|--|---|
| Eastern Bentwing-bat | <i>Miniopterus schreibersii oceanensis</i> | V | | 10 | Occurs along the coast and ranges, from north Queensland to the far south-eastern corner of South Australia (Strahan 1995; Churchill 1998). Recorded in a wide range of habitats from grasslands through to subtropical rainforests, but it is typically found in well-timbered valleys Dwyer (1995). Known roost sites include caves, disused mines, storm-water drains, culverts and buildings. | Likely - The Eastern Bentwing Bat may fly overhead to forage for insects over the golf course. No impact is expected by the development proposal. | OEH Atlas of NSW Wildlife (2017), Strahan (1995); Churchill (1998), Dwyer (1995). |
| Southern Myotis | <i>Myotis macropus</i> | V | | 464 | The Southern Myotis is generally recorded in the coastal regions from south-eastern South Australia, through Victoria, New South Wales, Queensland, Northern Territory and the top of WA (Strahan 1995; Churchill 1998). Prefers permanent and/or flowing water. The Southern Myotis is commonly a cave dwelling microchiropteran, but will utilise tree hollows, mines, stormwater drains, bridges and dense vegetation (Churchill 1998). Roosting sites can be located within a wide variety of habitats, usually located in close proximity to permanent, slow flowing water. Breeding occurs between November and December, with young being weaned after three to four weeks (Churchill 1998). | Not likely - No suitable habitat present within survey area. More likely over the large ponds within the golf course. No further assessment required. | OEH Atlas of NSW Wildlife (2017), Strahan (1995); Churchill (1998), Dwyer (1995). |

**Attachment H – Flora and
Fauna Surveys 75 Gardeners
Road, Prepared by ACS
Environmental Pty Ltd, dated
November 2017**



FLORA & FAUNA SURVEYS

AND

ECOLOGICAL CONTRIBUTION TO THE

PREPARATION OF A MASTER PLAN FOR A SITE AT

75 GARDENERS ROAD, EASTLAKES, SYDNEY

Prepared for:

ARCHITECTUS SYDNEY
Level 18 MLC Centre
19 Martin Place
Sydney NSW 2000 Australia

NOVEMBER 2015

ACS Environmental P/L

Flora and Fauna Surveys, Biodiversity Impact Assessment & Bushfire

Hazard Assessment Services

Australian Business Number (ABN) 24 154 491 120

3/28 Tullimbar Rd, Cronulla NSW. 2230

7 Townsend Avenue, Frenchs Forest NSW. 2086

Tel: 9527 5262, 9453 9397; Mob: 0403 081902, 0412 217896; Fax: 9527 7454

Email: acs@actinotus.com

Web: www.actinotus.com

ACS Environmental Consultants

Peter Stricker BSc. (Hons) (Syd) ^α



Anthony Smith-White BSc. (Syd), CertHEd., MSc., PhD. (UNSW) ^α



^α Member Ecological Consultants Association NSW Inc

Consultants experience

The directors of 'Actinotus Consultancy Services (ACS) – Environmental P/L' (formerly Actinotus Environmental Consultants) have collectively worked in the area of biodiversity impact and bushfire hazard assessment services for a period of greater than 20 years. They also have over 30 years of experience in scientific research (ecological, genetic) and teaching in biological science.

The principals of the former 'Actinotus Environmental Consultants' have completed the NSW Consulting Planners Bushfire Training Course organised by the Planning Institute of Australia NSW Division for planning consultants and allied professionals relating to the implementation of 'Planning for Bushfire Protection', in June 2003.

| CONTENTS | page No. |
|--|-----------------|
| EXECUTIVE SUMMARY | vii |
| 1 INTRODUCTION | 1 |
| 1.1 <i>Proposed development</i> | 1 |
| 1.2 <i>Statutory and legislative requirements</i> | 2 |
| 1.3 <i>Objectives and scope of the study</i> | 2 |
| 2 EXISTING ENVIRONMENT | 4 |
| 2.1 <i>Topography, geology and soils</i> | 4 |
| 2.2 <i>Existing vegetation – local plant assemblage</i> | 4 |
| 2.3 <i>Current and surrounding land use</i> | 7 |
| 3 FLORA AND FAUNA SURVEY AND ASSESSMENT | 8 |
| 3.1 <i>Methods</i> | 8 |
| 3.1.1 <i>Literature review</i> | 8 |
| 3.1.2 <i>Site survey</i> | 8 |
| 3.1.2.1 <i>Flora survey</i> | 8 |
| 3.1.2.2 <i>Fauna survey</i> | 9 |
| 3.1.2.3 <i>Limitations of the study</i> | 10 |
| 3.2 <i>Results - Flora</i> | 10 |
| 3.2.1 <i>Indigenous and exotic species</i> | 10 |
| 3.2.2 <i>Ecological communities</i> | 11 |
| 3.2.2.1 <i>Previous mapping</i> | 11 |
| 3.2.2.2 <i>Ground-truthing and assessment</i> | 13 |
| 3.2.3 <i>Conservation status of vegetation</i> | 14 |
| 3.2.4 <i>Flora species of conservation significance</i> | 14 |
| 3.3 <i>Results - Fauna</i> | 15 |
| 3.3.1 <i>Summary of habitats present</i> | 15 |
| 3.3.2 <i>Fauna recorded</i> | 17 |
| 3.3.3 <i>Fauna species of conservation significance</i> | 20 |
| 3.3.4 <i>Species listed by the OEH Atlas of NSW Wildlife database 2015 as Potential migratory inhabitants of the site.</i> | 22 |
| 3.3.5 <i>Migratory species listed by the Commonwealth DoE (Commonwealth Protected Matters Search Tool) as potential inhabitants of the site.</i> | 23 |
| 3.3.6 <i>Terrestrial species listed by the Commonwealth DoE (Commonwealth Protected Matters Search Tool) as potential inhabitants of the site.</i> | 23 |

| | |
|-----------------|-----------------|
| CONTENTS | page No. |
|-----------------|-----------------|

| | |
|--|-----------|
| 3.3.7 <i>Conclusions – fauna</i> | 24 |
| 4 REFERENCES & LITERATURE REVIEWED | 25 |

FIGURES

| | |
|--|----|
| 1. Subject areas at Nursery Facility at 75 Gardeners Road, Eastlakes (AREA 1) and areas of landscaped bushland/grassland to the south within The Lakes Golf Course (AREA 2) | 1 |
| 2. Aerial view of subject site showing a cleared landform except for some planted trees along the road frontage | 5 |
| 3. View within nursery facility at 75 Gardeners Road, Eastlakes showing an array of mature landscaped trees. | 5 |
| 4. Areas of re-profiled low dunes and landscaped low woodland in Area 2 | 6 |
| 5. Areas of mature Broad-leaved Paperbark woodland occurring in Area 2 | 6 |
| 6. Vegetation mapping by OEH (2013) of patches of scrub/woodland at the existing nursery facility and northern section of The Lakes Golf Course (Code: URE/N but not labelled on map), mapped in yellow shading | 12 |
| 7. Excerpt of vegetation mapping from Botany Bay Council DCP 2013 | 12 |
| 8. Mapping of some discrete clumps of vegetation in the subject sites at Eastlakes (also from Scales 2015) | 13 |
| 9. View towards the plant nursery showing open the canopy and large areas with no ground cover for fauna to seek refuge | 15 |
| 10. View of the drainage channel that feeds overflows at times of heavy rainfall events onto the golf course from Gardeners Road. It is heavily polluted with rubbish and stormwater pollutants from urban surrounds | 16 |
| 11. An aerial view of the study site (red outline) to the north and the Lakes Golf Course to the south. The arrow indicates the pond that was examined for the presence of frog species | 17 |

FIGURES

12. An aerial view of the position of the study area (red flag) in relation to the coastal areas of Botany Bay to the south where there are established wetlands where large numbers of migratory birds forage. Most migratory species were recorded within the Botany Wetlands 22

TABLES

- 1 Records for 3 species of conservation significance recorded within a 5km radius of the subject site at Eastlakes within the last 25 years 14
- 2 Fauna species recorded at 75 Gardeners Road, Eastlakes and northern section of Golf Course 19

APPENDICES

- 1 Floristic species assemblages recorded at subject site at 75 Gardeners Road, Eastlakes and at northern section of Lakes Golf Course 28
- 2 Plant species of conservation significance recorded within a 5km radius of the surveyed area since 1990 where potential habitat may occur (OEH Atlas of NSW Wildlife 2015^a) or where potential habitat is deemed to potentially occur (Commonwealth DoE Protected matters Environmental Reporting Tool 2015^b) 34
- 3 Threatened fauna species recorded previously within a 5km radius of the subject sites at 75 Gardeners Road, Eastlakes since 1990 (Source: OEH NSW Atlas of Wildlife 2015) 38
- 4 Likelihood of occurrence in surveyed area of fauna species of conservation significance recorded within a 5km radius of the Study Area at 75 Gardeners Road, Eastlakes since 1990 (OEH Atlas of NSW Wildlife 2015) or where potential habitat is deemed to potentially occur 39
- 5 Migratory fauna species recorded within a 5km radius of the Study Area at 75 Gardeners Road, Eastlakes, since 1990 (OEH Atlas of NSW Wildlife 2015) 49
- 6 Likelihood of occurrence in surveyed area of migratory avifauna species recorded within a 5km radius of the Study Area at 75 Gardeners Road, Eastlakes, since 1990 (OEH Atlas of NSW Wildlife 2015) or where potential habitat is deemed to potentially occur 50
- 7 Migratory Species Listed by Commonwealth Department of the Environment (DoE) as having habitat within the survey area 58

APPENDICES

- | | | |
|---|--|----|
| 8 | Threatened Species Listed by Commonwealth Department of the Environment, (DoE) as having habitat within the survey area | 60 |
|---|--|----|

EXECUTIVE SUMMARY

'ACS (Actinotus Consultancy Services) – Environmental' were commissioned by Naturally Trees on behalf of Architectus to undertake a comprehensive biodiversity survey of an area of land of 1.45 ha at Lot 1 in DP 1116853 at 75 Gardeners Road, Eastlakes (AREA 1), as well as an existing area of landscaped low woodland/grassland occurring at the Lakes Golf Course site immediately to the south (AREA 2), as part of the assessment of ecological values occurring at the land for proposed Masterplan services for the site.

The landscape consists of ridgetop topography sloping southwards to The Lakes Golf Course.

The vegetative cover of the subject land at the hillcrest site in Area 1 is comprised of landscaped tree and shrub planting, the site being almost totally cleared of vegetation prior to 1943. Currently the hillcrest site contains landscaped mature trees of various species of eucalypts such as Sydney Blue Gum and Lemon-scented Gum, as well as palms such as Queen Palm and Alexandra Palm, Broad-leaved Paperbark, River Sheoak and Kaffir Plum among others (Scales 2015).

No natural indigenous species occur in this section of the subject area (Area 1) except for some sparse shrubs of Sydney Golden Wattle that have naturalised in the area, the open tree canopy having all been planted in a landscape plan since 1943. A total number of 30 tree species has been documented as occurring within the subject site by Scales (2015).

A total of 23 exotic environmental weeds, including low frequencies of 7 species of noxious weed, occur within the subject site in Area 1 (Appendix 1).

Many of the landscaped planted trees are mature and attain heights to 30m, the tree plantings being mixed throughout the area, apart from distinct monocultures of some species that occur such as Broad-leaved Paperbark in the western section and Queen Palm along the northern central section of Area 1 (Scales 2015).

None of the assemblages or distributions of trees or shrubs occurring in Area 1 represent natural ecological communities confirming previous mapping undertaken by OEH (2013) and Botany Council DCP 2013.

Parts of Area 2 have recently (2008) been re-profiled and landscaped mostly with species typical of coastal sand-based woodland vegetation (Lakes Golf Course personnel *pers comm.*) though some low lying sections of the area include patches of mature vegetation such as Broad-leaved Paperbark woodland.

Indigenous shrub and small tree species have been planted and established in Area 2. A total number of 8 tree species have been planted on low profiled sand dunes, some such as Sydney Red Gum, Coast Mahogany, Coast Banksia, Black Sheoak and Broad-leaved Scribbly Gum representing former assemblages of Coastal Sand Apple-Bloodwood Forest that would have occurred in the locality before extensive clearing (OEH 2013).

A total of 28 exotic environmental weeds and grasses, including low frequencies of 5 species of noxious weed, occur within the subject site at Area 2 (Appendix 1).

Area 2 has been historically modified by earlier extensive clearing and low dune re-profiling, with areas landscaped to include patches of low trees in discrete clumps such as Coast Mahogany, Coast Banksia and Sydney Red Gum, with the area also including a mature copse of Broad-leaved Paperbark (Figure 8).

In relation to conservation significance of the vegetation occurring within Areas 1 & 2, none of the discrete patches of often species-specific vegetation represents any assemblages of conservation significance or heritage (Figure 8).

As such, it is considered that any impacts of potential development would not be significant. The landscaping of the re-profiled low dune landforms within Area 2 may nominally partly resemble that which may have occurred prior to clearing and it is recommended to enhance these plantings, maintain weed control and protect this vegetation from indirect impacts to any potential development that may occur upslope.

Current Atlas of NSW Wildlife data (Bionet - October 2015) indicates that 3 threatened flora species have been recorded in the locality within the last 25 years (Table 1). Habitat for another 8 threatened flora species is deemed likely or potentially to occur as qualified by the DoE 'Protected Matters Search Tool' (2015) and these are listed in Appendix 2.

In relation to locally occurring habitat which has been highly modified by clearing prior to 1943 and landscaped with a variety of locally and non-locally occurring indigenous species, as well as exotic ornamentals at the nursery site, it is highly unlikely that any of the listed threatened flora species would occur at the subject sites. Targeted searches for those species listed in Table 1 where records occur within a 5km radius, failed to locate these, or any other threatened flora species at the subject sites.

Opportunistic fauna observations were made within the study site and in the vicinity of the small ponds downslope of the study site at The Lakes Golf Course. Species recorded included 1 amphibian, 23 birds and 3 reptiles.

Birds recorded at the nursery site included the Magpie-lark (*Grallina cyanoleuca*), Noisy Miner (*Manorina melanocephala*), Common Myna (*Sturnus tristis*) and Australian Raven (*Corvus coronoides*).

Several water birds were recorded near the ponds, the most prolific being the Australian White Ibis (*Threskiornis moluccus*). The Welcome Swallow (*Hirundo neoxena*) and Tree Martin (*Petrochelidon nigricans*) were recorded flying around and over the pond.

Reptiles observed on the near the nursery were the Dark-flecked Garden Sunskink (*Lampropholis delicata*), Eastern Water Skink (*Eulamprus quoyii*) and Eastern Water Dragon (*Physignathus lesueurii*).

The OEH Atlas of NSW Wildlife database 2015 listed twenty-three (23) species of terrestrial and avifauna considered threatened under the TSC Act within a 5 km radius of the site (Appendix 3).

Four of these threatened fauna species have been recorded within 1km of the study site. These are the Green and Golden Bell Frog, Freckled Duck, Eastern Bentwing Bat and the Grey-headed Flying-fox.

Whilst no individuals of these avian and mammalian species were recorded, an assessment of habitats concluded that potential exists for them to potentially forage near to the study site. An Assessment of Significance to determine any potential impact to any proposed development was not necessary as all these species are likely overhead foragers that have large foraging ranges and would not have their lifestyle impacted upon were there any development likely to occur at the study sites..

The Green and Golden Bell Frog (GGBF) (*Litoria aurea*) has previously been recorded immediately to the east of the study area some 22 years ago in 1993 (OEH NSW Atlas of Wildlife 2015) but no further studies have identified its present in the area. OEH has since listed the frog as extinct within the Lakes Golf Course at Eastlakes (OEH. 2015).

This survey identified extensive populations of the Plague Minnow or Mosquito Fish (*Gambusia holbrooki*) within the ponds. *Gambusia* has been listed as a KEY THREATENING PROCESS on Schedule 3 of the *Threatened Species Conservation Act 1995* [29 January 1999] for survival of the GGBF. The plague Minnow is an aggressive and voracious predator of native fauna, particularly the eggs and tadpole stages of frog development.

Whilst twenty-three species of bird were recorded within the subject sites, none are listed as threatened or appear on migratory bird agreement lists.

The study site is rated as poor habitat for fauna due to its proximity to the busy Gardeners Road motorway and the long history of disturbance for commercial purposes. It is considered unlikely that any proposed development at the subject site would impact on the distribution or integrity of natural faunal populations in the area.

ACRONYMS & GLOSSARY

CCPD – Crown Canopy Projective Density

CEEC – Critically Endangered Ecological Community

DEC – State Department of Environment and Conservation

DECCW – State Department of Environment, Climate Change and Water

DoE – Commonwealth Department of Environment

EEC – Endangered Ecological Community

EPA Act – Environment Protection Act

EPBC Act – Environment Protection and Biodiversity Conservation Act

LEP - Local Environment Plan

NPWS – State National Parks and Wildlife Service

OEH – Office of the Environment and Heritage

RoTAP – Rare and Threatened Australian Plants

SMCMA – Sydney Metropolitan Catchment Management Authority

TSC Act – Threatened Species Conservation Act

INTRODUCTION

1.1 Proposed development

'ACS (Actinotus Consultancy Services) – Environmental' were commissioned by Naturally Trees on behalf of Architectus to undertake a comprehensive biodiversity survey of an area of land of 1.45 ha at Lot 1 in DP 1116853 at 75 Gardeners Road, Eastlakes (AREA 1), as well as an existing area of landscaped low woodland/grassland occurring at the Lakes Golf Course site immediately to the south (AREA 2), as part of the assessment of ecological values occurring at the land for proposed Masterplan services for the site. Figure 1 is an aerial image of the subject land.

The landscape consists of ridgetop topography sloping southwards to The Lakes Golf Course (Figure 1).

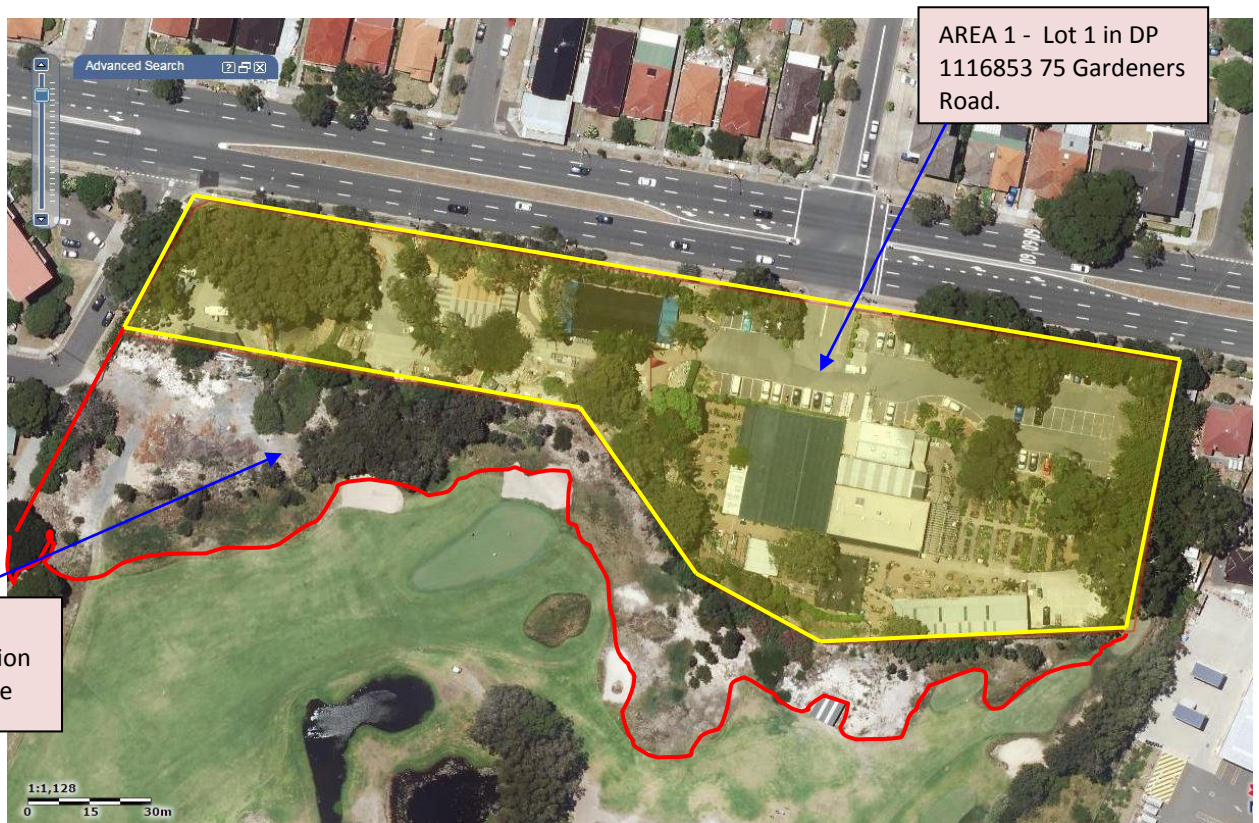


Figure 1 - Subject areas at Nursery Facility at 75 Gardeners Road, Eastlakes (AREA 1) and areas of landscaped bushland/grassland to the south within The Lakes Golf Course (AREA 2)

1.2 Statutory and legislative requirements

Planning controls that need to be addressed in any comprehensive biodiversity studies on the subject land are listed below.

Planning controls provided by State and Commonwealth Legislation include the following:

- ◆ *Environmental Planning and Assessment Act (EP & A Act)(1979),*
- ◆ *Commonwealth Environment Protection and Biodiversity Conservation Act (EPBC Act)(1999),*
- ◆ *Threatened Species Conservation Act (TSC Act)(1995).* The *Threatened Species Conservation Act (TSC Act)(1995)* includes Preliminary Determinations of the NSW Scientific Committee (to November 2015) as well as Provisional Listings of Endangered Species on an emergency basis (to November 2015),
- ◆ *Noxious Weeds Act 1993 (NW Act) (NSW)*

Other relevant legislation that were implemented to restrict the uncontrolled development of bushland in urban areas include:

- ◆ SEPP 19 (Bushland in Urban Areas), and
- ◆ *Local Government Act (1993)*

Biodiversity conservation planning principles promoted by DECCW (2011) that apply to tracts of natural bushland are outlined in *Mid North Coast Regional Conservation Plan (Draft DECCW 2011)*.

Local Council planning controls and other relevant local and State planning documents that relate to the proposed development include the following:

- ◆ *Botany Bay Local Environmental Plan 2013*
- ◆ *Botany Bay Comprehensive Development Control Plan 2013*

1.3 Objectives and scope of the study

The objectives and scope of the study are:

- To identify, locate and describe the biodiversity values of the Study Area and its environmental context in the region by undertaking detailed flora and fauna field surveys. Current and detailed information will be obtained on the following:

- Identification of the flora and fauna that occur within the Study Area including documentation of species lists and mapping of identifiable plant communities;
 - Identification of Threatened (Endangered and Vulnerable) species, populations, communities and habitats as listed in Schedules 1 & 2 of the Threatened Species Conservation Act 1995 (TSC Act), including Preliminary Determinations of the NSW Scientific Committee, and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), RoTAP species (Briggs & Leigh 1996) and regionally and locally significant species;
 - Identification of fauna species including amphibians, reptiles, birds and mammals, not directly recorded during surveys but that could potentially occur in the Study Area as indicated by the presence of associated habitat;
 - Description of the identifiable vegetation communities occurring within the Study Area indicating their current condition, conservation value and level of degradation; and
 - Recording of the area and extent of Noxious (and other significant) weed species in the Study Area;
- To prepare a comprehensive flora and fauna biodiversity report to document the ecological values occurring at the subject site.

Specific details of methodology relating to floristic and fauna habitat survey and assessment are documented in following sections of this report.

2 EXISTING ENVIRONMENT

2.1 *Topography, geology and soils*

The site has a south to south-westerly aspect. The topography of the subject site in 'Area 1' (Figure 1) is a hillcrest on Gardeners Road gently sloping southwards to the 'Area 2' (Figure 1) in the northern landscaped section of the Lakes Golf Course with gradients from about 5 to 7° (Figure 1).

The local substrate geology of the hillcrest of the subject area is an expanse of Quaternary Dune Sand sediments contiguous with low lying deposits of Quaternary Sand deposited in low lying swamp areas in the northern sections of the Golf Course (Herbert 1983).

The lithology of the overlying Quaternary Dune deposits are comprised of medium to fine-grained 'marine' sand with podsoles, whereas the low lying Quaternary sand deposits include peat, sandy peat and mud (Herbert 1983).

The soil landscape particular to the hillcrest of the surveyed area is the aeolian 'Tuggerah' Soil Landscape Series (Chapman & Murphy 1983). This soil landscape is characterised by gently to rolling coastal dunefields (Chapman & Murphy 1983).

Original soil material derived from these sandy dunefield substrates include deep podsoles on dunes and podsol/humus podsol intergrades on swales (Chapman & Murphy 1983).

Further down the gentle slope, the soil material has been disturbed by human activity including removal or burial of soil, as well as various landfill substrates (Chapman & Murphy 1983).

2.2 *Existing vegetation – local plant assemblages*

Area 1 - Hillcrest site

The vegetative cover of the subject land at the hillcrest site in Area 1 (Figure 1) is comprised of landscaped tree and shrub planting, the site being almost totally cleared of vegetation prior to 1943 (Figure 2).

Currently the hillcrest site contains landscaped mature trees of various species of eucalypts such as Sydney Blue Gum and Lemon-scented Gum, as well as palms such as Queen Palm and Alexandra Palm, Broad-leaved Paperbark, River Sheoak and Kaffir Plum (Figure 3) (Scales 2015).



Figure 2 - Aerial view of subject site showing a cleared landform except for some planted trees along the road frontage



Figure 3 - View within nursery facility at 75 Gardeners Road, Eastlakes showing an array of mature landscaped trees.

Area 2 - Downslope site at northern section of Lakes Golf Course.

Parts of this area (Figure 1) have recently (2008) been re-profiled and landscaped mostly with species typical of coastal sand-based woodland vegetation (Lakes Golf Course personnel *pers comm.*) (Figure 4), though some low lying sections of the area include patch of mature vegetation such as Broad-leaved Paperbark woodland (Figure 5).



Figure 4 - Areas of re-profiled low dunes and landscaped low woodland in Area 2



Figure 5 - Areas of mature Broad-leaved paperbark woodland occurring in Area 2

2.3 *Current and surrounding land use*

Area 1 - 75 Gardeners Road, Eastlakes

The nursery facility is surrounded on its eastern, northern and western sides by established residential housing development and on its southern aspect by the Lakes Golf Course (Figure 1).

Area 2 - Northern section of Lakes Golf Course

This area is contiguous with the nursery facility to the north, expanded areas of golfing facilities to the east and south and apartment-style residential development to the west (Figure 1).

3 FLORA AND FAUNA SURVEY AND ASSESSMENT

3.1 Methods

3.1.1 Literature review

Existing information on 'Threatened Flora and Fauna of the Locality', defined as an area of 5km radius around the site, was accessed from the OEH Bionet Atlas of NSW Wildlife (1:100,000 map sheets 9130 Sydney - November 2015), Commonwealth DoE Protected Matters Environmental Reporting Tool (November 2015) and RoTAP (Briggs & Leigh, 1996) databases. Searches of JAMBA (Japan and Australia Migratory Bird Agreement), CAMBA (China and Australia Migratory Bird Agreement) and ROKAMBA (Republic of Korea Migratory Bird Agreement) databases were also consulted in regard to the distribution of migratory bird species

Other literature detailing locally threatened flora and fauna, as well as endangered populations and plant communities of the Study Area included NSW Scientific Committee Final Determinations (1996-2015), The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area – (OEH 2013), Botany Bay Planning Strategy (2013) and Botany Bay Council Development Control Plan Mapping (2013).

3.1.2 Site survey

The subject site was inspected by 'ACS Environmental P/L' on 29th October and 12th November 2015.

3.1.2.1 Flora Survey

Comprehensive surveys of the Study Area undertaken on foot by the diversity search method of Cropper (1993) and DEC 'Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities' (2004) to identify the existence of extant and exotic flora.

Survey methods include a complete floristic inventory of indigenous and exotic species and an assessment of the presence, or likelihood of occurrence, of any threatened, rare (RoTAP), regionally or locally significant species or ecological plant community occurring in the Study Area.

Survey design

The relative occurrence of indigenous and exotic flora (modified Braun-Blanquet frequency-of-occurrence ranking) occurring over the site and distinct ecological communities were mapped.

3.1.2.2 Fauna Survey

A dedicated ground search was undertaken within the subject land as was a census of extant birds. The survey involved different search strategies and protocols and all extant fauna or evidence of fauna was recorded. Threatened fauna species not recorded in the survey but with the potential to be present as indicated by habitat are considered in the final assessment.

Strategies employed for the field investigation of the Study Area:

Assessment of the value of habitat suitable for native fauna species and specific habitat structures/resources considered important in life cycles. These structures or resources include:

- Mature trees with hollows for breeding, roosting and/or nesting;
- Particular foraging resources such as certain tree or shrub species;
- Dispersal, migratory or foraging corridors for fauna;
- Leaf litter and ground search for reptiles, frogs and threatened invertebrates;
- Identification of scats and other indirect evidence to suggest fauna utilisation such as tracks, scratch marks or diggings;
- Identification of frog calls from a library of calls.

Recording Methods

The search strategy employed for diurnal birds is based on utilising periodic observation stations or “point counts” as described by York *et al.*, (1991). Counts were conducted only during periods of relatively high activity (early morning or late afternoon). Searches undertaken included recording and observing location of potential roost sites and accessible tree hollows. Roost trees are delineated by evidence of white wash around the base of a tree or tree trunk. Scat searches and pellet analysis were conducted to ascertain the species present.

Appropriate sampling methodologies were employed where habitat attributes are present that provide microhabitat for cavity dependent fauna. If no cavities or hollows are present, then indirect evidence is relied upon to show fauna utilisation of the survey site. Scats are collected in resealable plastic bags for later examination.

Opportunistic hand searches were undertaken for reptilian fauna when temperatures were optimal, ensuring maximum activity. Specific habitat searches were undertaken within the wetter areas of the survey site for amphibian fauna.

A bat detector was not set up due to the unsecured area of the study site.

Analysis of scat collected and contents examined of composite matter e.g. vegetative material, bone fragments, feathers etc, was undertaken with particular reference to hair type. Hair identity was determined mainly from scale and banding pattern with the aid of software (Brunner, Triggs and Ecobyte Pty. Ltd., 2002). Scat identity was determined from gross morphology in association with all internal elements.

3.1.2.3 Limitations of the study

Limitations of the study may arise where certain cryptic species of plants may occur as soil-stored seed or as subterranean vegetative structures. Some species are identifiable above-ground only after particular environmental circumstances occur that may be related to factors such as periodic fire frequency, intensity or seasonality, soil moisture regime, grazing pressure, biological life-cycle patterns as in the case of small geophytic taxa such as species of orchids etc.

Diurnal surveys at one time of the year cannot be expected to detect the presence of all species occurring, or likely to occur, in the Study Area. This is because some species may (a) occur seasonally, (b) utilise different areas periodically (as a component of a more extensive home range), or (c) become dormant during specific periods of the year. Rather, the survey provides the opportunity to sample the area, search specifically for species likely to be encountered within the available time frame, and assess the suitability of habitat for particular species.

These potential limitations to the location of certain cryptic or diurnally active species are not expected to cause any significant constraints to the purposes of this assessment.

3.2 Results - Flora

3.2.1 Indigenous and exotic species

Area 1 - 75 Gardeners Road, Eastlakes

Appendix 1 is a floristic species list of terrestrial indigenous and exotic species recorded and compiled as a census of species throughout the subject sites. Area 1 contains a nursery facility with extended plantings of exotic and ornamental trees, these well documented in Scales (2015). As such, though most ornamental tree species are included in Appendix 1 particularly where abundant, some exotic or ornamental species such as

Kaffir Plum, Chinese Hackberry and others occurring infrequently or in low abundance, are not listed in Appendix 1.

Species nomenclature follows that of Harden (1990 – 2002; 2015 online).

No natural indigenous species occur in this section of the subject area except for some sparse shrubs of Sydney Golden Wattle that have naturalised in the area, the open tree canopy having all been planted in a landscape plan since 1943 (Figure 2). A total number of 30 tree species has been documented as occurring within the subject site by Scales (2015).

A total of 23 exotic environmental weeds, including 7 species of noxious weed occurring in low frequency, occur within the subject site in Area 1 (Appendix 1).

Area 2 - Northern section of Lakes Golf Course, Eastlakes

Area 2 is a partially landscaped area of low bushland interspersed with exotic grassland (Figure 4).

Indigenous shrub and small tree species have been planted and established in this area, some sections as recently as about 2007 (Lakes Golf Course personnel *pers comm*). A total number of 8 tree species have been planted on low profiled sand dunes, some such as Sydney Red Gum, Coast Mahogany, Coast Banksia, Black Sheoak and Broad-leaved Scribbly Gum, representing former assemblages of Coastal Sand Apple-Bloodwood Forest that would have occurred in the locality before extensive clearing (OEH 2013).

A total of 28 exotic environmental weeds and grasses, including 5 species of noxious weed occurring in low frequency, occur within the subject site at Area 2 (Appendix 1).

3.2.2 Ecological communities

3.2.2.1 Previous mapping

The local ecological plant communities that occur at and in the environs of the Study Area have been mapped by DEC (2002) compiling data from API and environmental attributes of geology, average annual rainfall, topography, elevation, Soil Landscape Series type and extent of disturbance (condition), and including some ground-truthing (DEC 2002).

Figure 6 indicates that the ecological plant community occurring at the existing RHAC location is mapped as Cumberland Shale Plains Woodland (Code: S_GW03; DEC 2002). The subject area at 37 Worcester Road that is not shaded in the mapping occurs predominantly as exotic grassland.

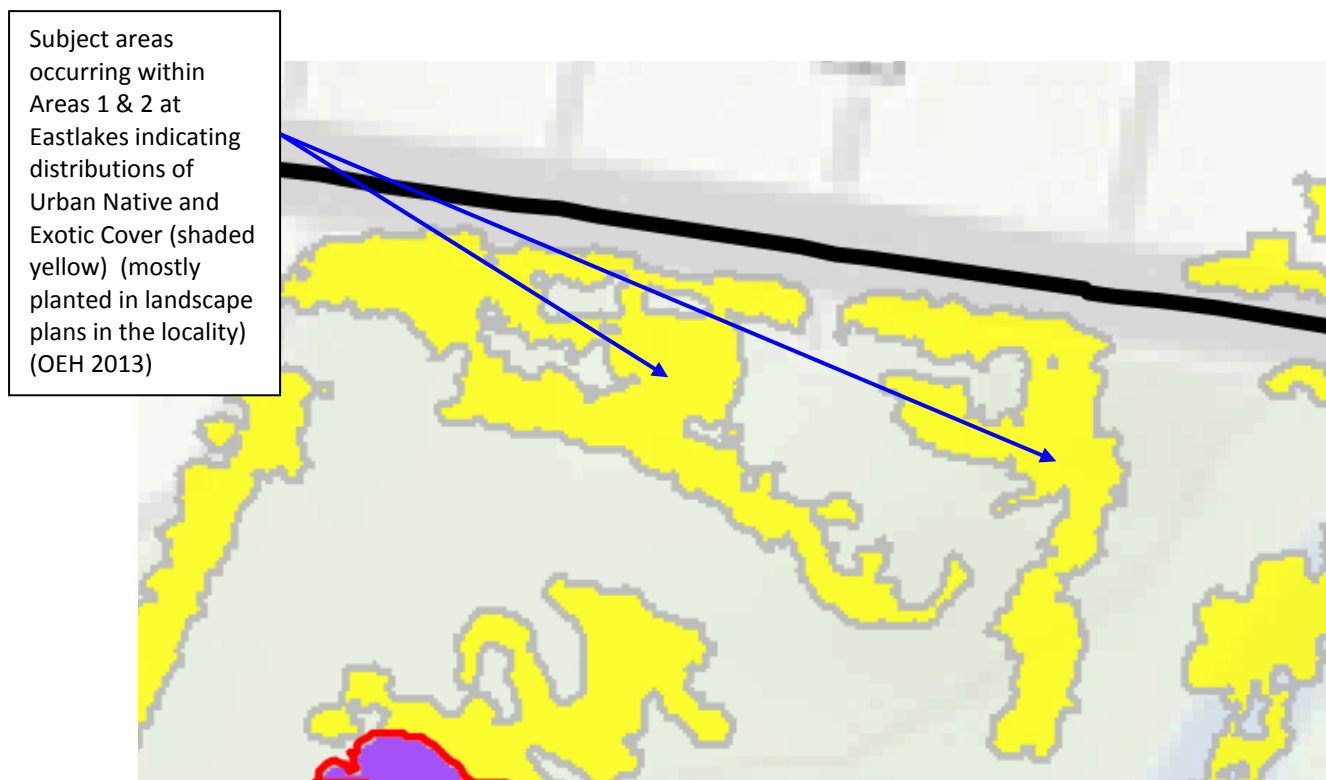


Figure 6 – Vegetation mapping by OEH (2013) of patches of scrub/woodland at the existing nursery facility and northern section of The Lakes Golf Course (Code: URE/N but not labelled on map), mapped in yellow shading.

Vegetation mapping documented in Botany Bay Development Control Plan 2013 (Adopted 09/12/2014) indicates that no ecological communities of any significance status occur at the subject sites (Figure 7).

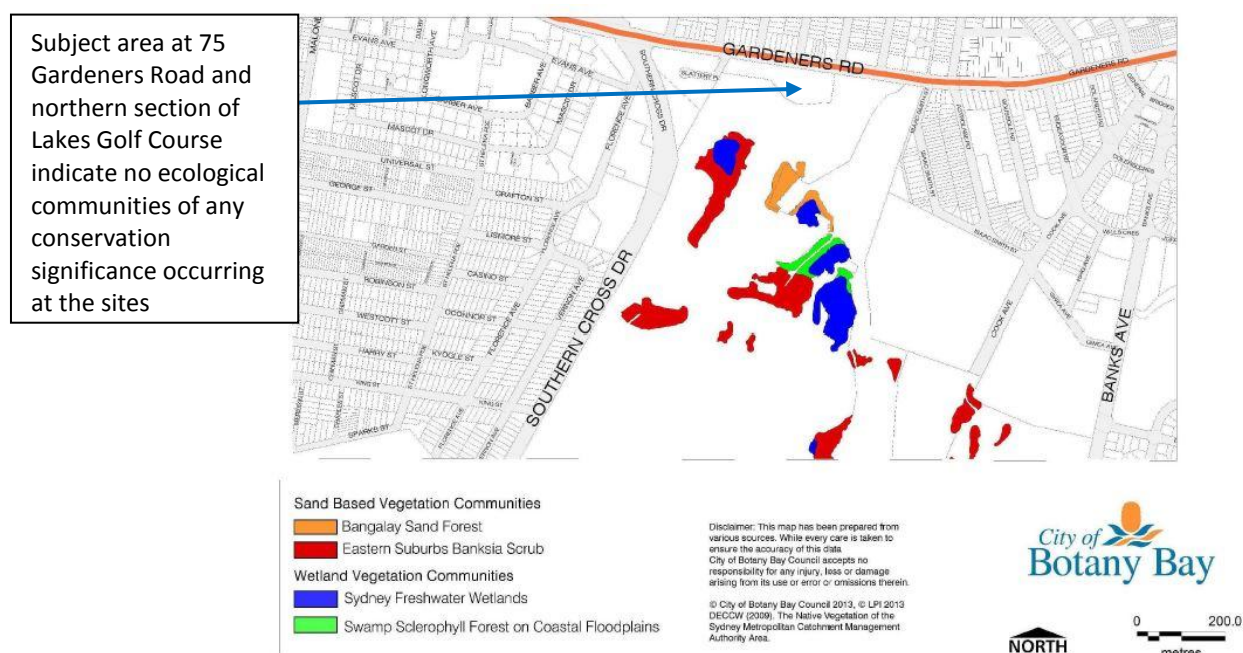


Figure 7 - Excerpt of vegetation mapping in Botany Bay Council DCP 2013.

3.2.2.2 Ground-truthing and assessment

Area 1 - Nursery facility at 75 Gardeners Road, Eastlakes

This section of the surveyed area has been historically modified by extensive clearing (Figure 2) and landscaped planting of 30 species of indigenous and exotic ornamental trees (Scales 2013), forming woodland patches and lineal distributions of trees along fence-lines (Figure 1).

Many of the trees are mature and attain heights to 30m but are mixed throughout the area, apart from distinct monocultures of some species that occur such as Broad-leaved Paperbark in the western section of Area 1 (Scales 2015).

None of the assemblages or distributions of trees or shrubs in this area represent natural ecological communities confirming previous mapping shown in Figures 6 & 7.

Area 2 - Northern section of Lakes Golf Course

This section of the surveyed area has been historically modified by extensive clearing (Figure 2) and low dune re-profiling, with areas landscaped as recently as in 2008 (Lakes Golf Course personnel *pers comm*). Patches of low trees in discrete clumps include Coast Mahogany, mature copse of Broad-leaved Paperbark, Coast Banksia, and Sydney Red Gum (Figure 8).

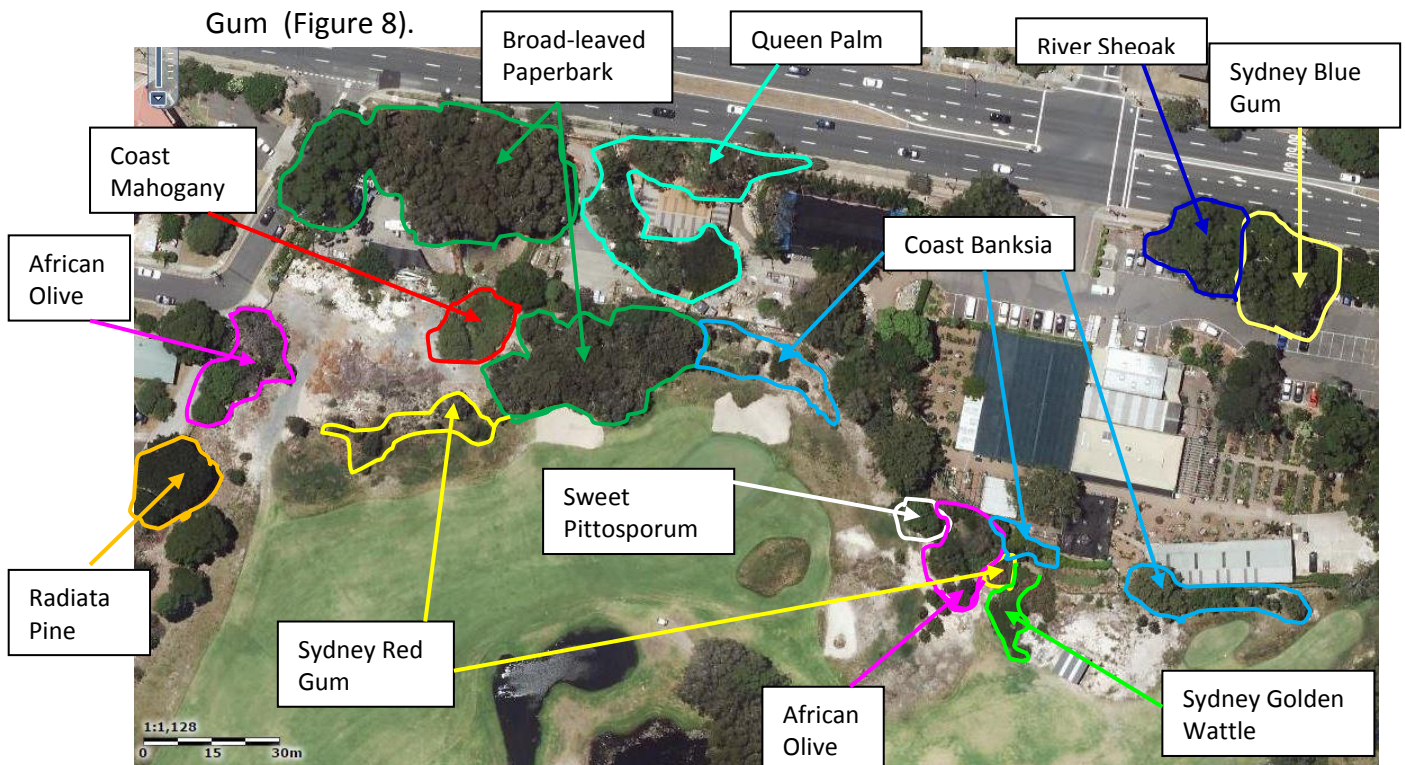


Figure 8 - Mapping of some discrete clumps of vegetation in the subject sites at Eastlakes (also from Scales 2015)

3.2.3 Conservation status of vegetation

None of the discrete patches of often species-specific vegetation represents any assemblages of conservation significance or heritage (Figures 6, 7 & 8).

As such, any impacts of potential development will not be significant. The landscaping of the re-profiled low dune landforms within the Area 2 may nominally partly resemble that which may have occurred prior to clearing and it is recommended to enhance these plantings, maintain weed control and protect this vegetation from indirect impacts to any potential development that may occur upslope.

3.2.4 Flora species of conservation significance

Threatened species

Current Atlas of NSW Wildlife data (Bionet - October 2015) was accessed to indicate threatened flora species that have been recorded in the locality within the last 25 years. Records for an area of 5km radius around the subject site indicate that 3 species of conservation significance have been recorded within the last 25 years (Table 1). Appendix 2 lists these 3 species with an account of their threatened status, geographical range, physiognomic attributes, habitat features, and likelihood of occurrence in the surveyed area. Habitat for another 8 threatened species is deemed likely or potentially to occur as qualified by the DoE 'Protected Matters Search Tool' (2015) and these are also listed in Appendix 2.

| Family | Common name | Scientific name | NSW status | Comm. status | No. of records |
|--------------------------|---------------------|--|------------|--------------|----------------|
| Asteraceae | Coast Groundsel | <i>Senecio spathulatus</i> | E1,P | | 1 |
| Fabaceae (Mimosoidae) | Sunshine Wattle | <i>Acacia terminalis</i> subsp. <i>terminalis</i> | E1,P | E | 30 |
| Myrtaceae | Magenta Lilly Pilly | <i>Syzygium paniculatum</i> | E1,P | V | 4 |

Table 1 - Records for 3 species of conservation significance recorded within a 5km radius of the subject site at Eastlakes within the last 25 years.

In relation to locally occurring habitat which has been highly modified by clearing prior to 1943 (Figure 2), re-profiled in some sections and landscaped with a variety of locally and non-locally occurring indigenous species, as well as exotic ornamentals at the nursery site, it is highly unlikely that any of the threatened flora species would occur at the subject sites (Appendix 2). Targeted searches for those species listed in Table 1 where records

occur within a 5km radius, failed to locate these, or any other threatened flora species at the subject sites.

3.3 Results - Fauna

3.3.1 Summary of habitats present

The quality of fauna habitat may be categorised by the presence of certain features that include:

- a predator free environment,
- whether the vegetation provides shelter, food resources and nesting or roosting opportunity for native fauna species,
- the presence of tree hollows, dead and fallen timber, rock crevices and caves., and
- the contribution an area has towards a fauna movement corridor.

Terrestrial areas of the site which included the plant nursery (Figure 9) and growing areas related to nursery workings are rated poor as fauna habitat due to;

- (i) limited canopy coverage with low numbers of indigenous ground cover species;
- (ii) limited mid-storey coverage;
- (iii) no nesting structures, fallen timber, hollow logs or tree hollows; and
- (iv) no contribution to a fauna movement corridor.



Figure 9 - View towards the plant nursery showing open the canopy and large areas with no ground cover for fauna to seek refuge.

The aquatic environment represented by the two ‘fluctuating level’ ponds situated just beyond the southern boundary of the survey area within the Lakes Golf Course. These water bodies were examined for the potential for threatened amphibian species such as The Green and Golden Bell Frog to inhabit these ponds, these frogs potentially foraging up to 1km from the water. Any impact on foraging habitat must be addressed.

The ponds have the appearance of fair wetland habitat for native frogs and birds due to gently sloping banks and grassy verges, though there is limited establishment of fringing water reeds and there appears to be an abundance of Mosquito Fish or Plague Minnow throughout the water-bodies.

The ponds during times of heavy rainfall experience overflow from a storm water channel situated to the north (Figure 10.. The channel is heavily polluted from rubbish and stormwater accumulated during times of heavy flow from surrounding urban development to the north.

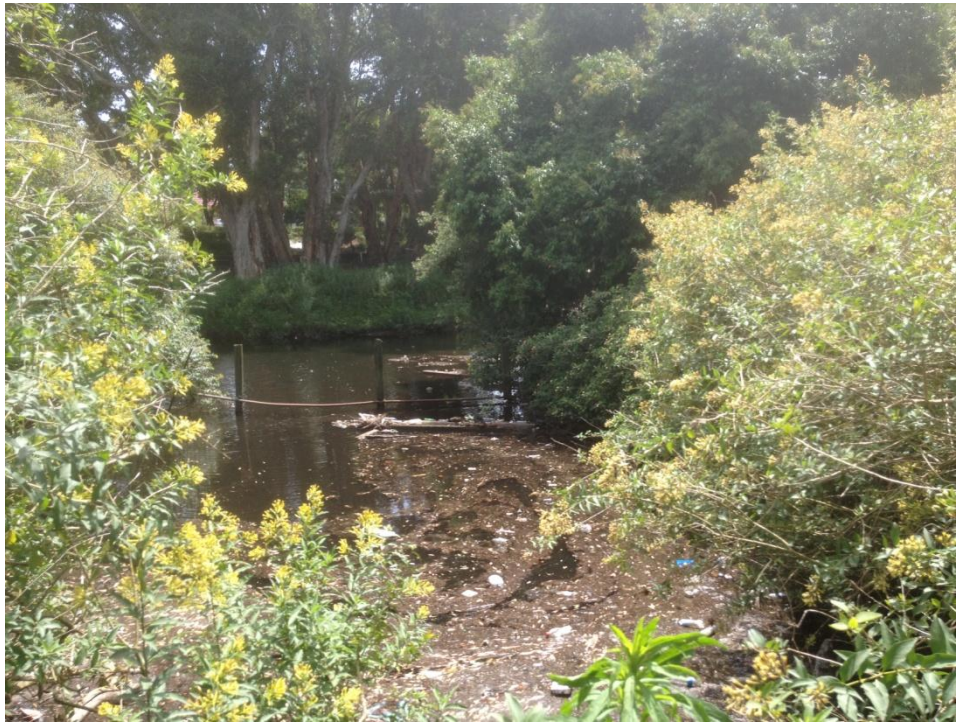


Figure 10 - View of the drainage channel that feeds overflows at times of heavy rainfall events onto the golf course from Gardeners Road. It is heavily polluted with rubbish and stormwater pollutants from urban surrounds.



Figure 11 An aerial view of the study site (red outline) to the north and the Lakes Golf Course to the south. The arrow indicates the pond that was examined for the presence of frog species.

3.3.2 Fauna recorded

Opportunistic fauna observations were made within the study site and in the vicinity of the small ponds downslope of the study site at The Lakes Golf Course (Figures 1 & 11). Species recorded included 1 amphibian, 23 birds and 3 reptiles (Table 2).

Birds recorded at the nursery site included the Magpie-lark (*Grallina cyanoleuca*), Noisy Miner (*Manorina melanocephala*), Common Myna (*Sturnus tristis*) and Australian Raven (*Corvus coronoides*).

Several water birds were recorded near the ponds. The most prolific was the Australian White Ibis (*Threskiornis moluccus*). The Welcome Swallow (*Hirundo neoxena*) and Tree Martin (*Petrochelidon nigricans*) were recorded flying around and over the pond. Tree Martins were noted nesting within the drainage channel tunnel connecting the water retention basin within the nursery facility to the nearest pond.

Reptiles observed on the near the nursery were one Dark-flecked Garden Sunskink (*Lampropholis delicata*), several Eastern Water Skink (*Eulamprus quoyii*) and one Eastern Water Dragon (*Physignathus lesueurii*).

No reptiles were observed near the ponds.

No scats were collected from any area of the study site. Being close to the golf course it is probable that invasive species such as the rabbit is chemically controlled. The Common Ringtail Possum may be present at times. It is the favoured prey species for the Powerful Owl. The scarcity of habitat for the Ring-tailed Possum may be limiting the potential of the Powerful Owl occurring in the immediate area. The area does not contain trees with hollows of sufficient size to accommodate nesting for mammal or bird species and no possum dreys were located. All birds recorded are likely diurnal visitors. Bird species are more likely to roost in dense vegetation that occurs more coastal to the survey site.

The Eastern Dwarf Tree Frog was audible around the edges of the first pond and drainage channel. The Plague Minnow (*Gambusia holbrooki*) was present in large numbers within the ponds. Several species of water bird were present around the pond. Other frogs expected to be present are listed in Table 2.

| Family | Scientific Name | Common Name | Nursery facility | Lakes Golf Course within 20m of subject site |
|---------------|---------------------------------|------------------------------|------------------|--|
| BIRDS | | | | |
| Accipitridae | <i>Haliastur sphenurus</i> | Whistling Kite | | e |
| Anatidae | <i>Anas platyrhynchos</i> | Mallard* | | 1 male 4 females |
| | <i>Anas superciliosa</i> | Pacific Black Duck | | 2 |
| | <i>Cygnus atratus</i> | Black Swan | | 4 |
| Artamidae | <i>Cracticus torquatus</i> | Grey Butcherbird | | 1 |
| | <i>Gymnorhina tibicen</i> | Australian Magpie | | 2 |
| | <i>Strepera graculina</i> | Pied Currawong | | 1 |
| Cacatuidae | <i>Calyptorhynchus funereus</i> | Yellow-tailed Black Cockatoo | | e |
| Campephagidae | <i>Coracina novaehollandiae</i> | Black-faced Cuckoo Shrike | | 1 |
| Charadriidae | <i>Vanellus miles</i> | Masked Lapwing | | 1 |
| Columbidae | <i>Columba livia</i> | Rock Pigeon* | | 1 |
| Corvidae | <i>Corvus coronoides</i> | Australian Raven | | 15 |
| Dicruridae | <i>Grallina cyanoleuca</i> | Magpie-lark | | 2 |
| | <i>Rhipidura leucophrys</i> | Willie Wagtail | | e |
| Halcyonidae | <i>Dacelo novaeguineae</i> | Laughing Kookaburra | | 1 |

| Family | Scientific Name | Common Name | Nursery facility | Lakes Golf Course within 20m of subject site |
|-------------------|--|------------------------|------------------|--|
| Hirundinidae | <i>Hirundo neoxena</i> | Welcome Swallow | | 5 OH |
| | <i>Petrochelidon nigricans</i> | Tree Martin | | 20 OH + nests |
| Laridae | <i>Chroicocephalus novaehollandiae</i> | Silver Gull | | 1 |
| Meliphagidae | <i>Manorina melanocephala</i> | Noisy Miner | 2 | 10 |
| Pardalotidae | <i>Pardalotus punctatus</i> | Spotted Pardalote | | e |
| Podargidae | <i>Podargus strigoides</i> | Tawny Frogmouth | | e |
| Psittacidae | <i>Trichoglossus haematodus</i> | Rainbow Lorikeet | | 5 |
| Rallidae | <i>Fulica atra</i> | Eurasian Coot | | 10 |
| | <i>Gallinula tenebrosa</i> | Dusky Moorhen | | 5 |
| | <i>Porphyria porphyria</i> | Purple Swamphe | | 1 |
| Sturnidae | <i>Acridotheres tristis</i> | Common Myna* | 2 | |
| Threskiornithidae | <i>Threskiornis moluccus</i> | Australian White Ibis | | 7 |
| | <i>Platylea regia</i> | Royal Spoonbill | | 1 |
| MAMMALS | | | | |
| Muridae | <i>Rattus rattus</i> | Black Rat* | | e |
| | <i>Mus musculus</i> | House Mouse* | | e |
| Pteropodidae | <i>Pteropus poliocephalus</i> | Grey-headed Flying Fox | | e |
| Vespertilionidae | <i>Chalinolobus gouldii</i> | Goulds Wattled Bat | | e |
| | <i>Vespadelus vulturnus</i> | Little Forest Bat | | e |
| REPTILES | | | | |
| Agamidae | <i>Physignathus lesuerii</i> | Eastern Water Dragon | 1 | |
| Scincidae | <i>Lampropholis delicata</i> | Dark-flecked Garden | | 1 |
| | <i>Eulamprus quoyii</i> | Eastern Water Skink | 10 | 2 |
| AMPHIBIANS | | | | |
| Myobatrachidae | <i>Litoria falax</i> | Eastern Dwarf Tree- | | h |
| | <i>Limnodynastes peronii</i> | Striped Marsh Frog | | e |
| FISH | | | | |
| Poeciliidae | <i>Gambusia holbrooki</i> | Eastern Gambusia* | | >200 |
| Anguillidae | <i>Anguilla australis</i> | Short-finned Eel | | e |

Code

h - heard

OH – overhead

e – expected to visit occasionally

* - introduced species

Table 2 –Fauna species recorded at 75 Gardeners Road, Eastlakes and northern section of Golf Course

3.3.3 Fauna species of conservation significance

Threatened species

The criteria used to assess the likelihood of threatened species occurring in the Study Area included the specificity of habitat features such as tree canopy cover, relative soil moisture regime, relative soil nutrient regimes, historical disturbance and degradation of vegetation and known occurrences of threatened species in the immediate locality.

If all or most of these collective criteria deemed optimal for the occurrence of a particular threatened species occur in relation to the habitat of the Study Area, then the likelihood of its potential occurrence in the habitat of the Study Area could be assessed as being relatively high. If only some of these collective criteria deemed suitable for the occurrence of a particular threatened species occur in the habitat of the Study Area, then its potential occurrence in the area of study may be deemed moderate at best. If few of these collective criteria deemed suitable for the occurrence of a particular threatened species occur in the habitat of the Study Area, then the likelihood of its occurrence would be assessed as being low to very unlikely.

The OEH Atlas of NSW Wildlife database 2015 listed twenty-three (23) species of terrestrial and avifauna considered threatened under the TSC Act within a 5 km radius of the site (Appendix 3). One of these species is critically endangered and five are designated as endangered by the NSW Scientific Committee with the remainder designated as vulnerable. Under the EPBC Act 1999, one is listed as critically endangered, two listed as endangered and two listed as vulnerable.

Appendix 4 lists these threatened species with descriptions of suitable habitats and likelihood of occurrence at the subject sites.

Four of these threatened fauna species have been recorded within 1km of the study site. These are the Green and Golden Bell Frog, Freckled Duck, Eastern Bentwing Bat and the Grey-headed Flying-fox.

The Freckled Duck is a very rare bird to occur in the area and could be classified as a 'vagrant', occurring out of its normal range.

The Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*). Foraging habitat is present over the survey area, however it is unlikely that the bat roosts within it, as no deep caves are present. Although no roosting habitat is available in the subject area, they may overfly the area whilst foraging.

The Grey-headed Flying-fox (*Pteropus poliocephalus*). The species congregates in large camps and is found in a variety of habitats including rainforest, mangroves, Melaleuca

swamps, wet and dry sclerophyll forests as well as in cultivated areas. At night the Grey-headed Flying-fox searches for food and may travel 50 km to its feeding areas. It eats fruit from a range of native and introduced species, particularly figs, and for this reason it is sometimes called 'Fruit Bat'. It also feeds on nectar and pollen from native trees.

Whilst no individuals of these above listed species were recorded, an assessment of habitats concluded that potential exists for it to forage near to the study site. An Assessment of Significance to determine any potential impact to any proposed development was not necessary as all these species are likely overhead foragers that have large foraging ranges and would not have their lifestyle impacted upon.

The Green and Golden Bell Frog (GGBF) (*Litoria aurea*) has previously been recorded immediately to the east of the study area some 22 years ago in 1993 (OEH NSW Atlas of Wildlife 2015). No further studies have identified it as present in the area. OEH has since listed the frog as extinct within the Lakes Golf Course at Eastlakes (OEH. 2015).

This survey identified extensive populations of the Plague Minnow, also known as Mosquito Fish (*Gambusia holbrooki*) within the ponds. *Gambusia* has been listed as a KEY THREATENING PROCESS on Schedule 3 of the *Threatened Species Conservation Act 1995* [29 January 1999] for survival of the GGBF. *Gambusia* is a small freshwater fish originally introduced into Australia in the 1920s. The fish was imported as an aquarium fish but some were released into creeks around Sydney, Melbourne and Brisbane, the species being now widespread throughout NSW. It is an aggressive and voracious predator of native fauna, particularly the eggs and tadpole stages of frog development.

In several studies, the presence of *Gambusia* has been linked to the decline of many Australian frog species, such as the Spotted Grass Frog (*Limnodynastes tasmaniensis*), Leseuer's Frog (*Litoria leseueuri*) and the Bleating Tree Frog (*Litoria dentata*) (Harris 1995), Sign-bearing Froglet (*C. insignifera*), Glauert's Froglet (*C. glauerti*) (Reynolds 1995), Green and Golden Bell Frog (*L. aurea*) (Morgan and Buttemer 1996), Striped Marsh Frog *Limnodynastes peronii* and signbearing froglet (*C. insignifera*) (Webb and Joss 1997).

With regard to the Green and Golden Bell Frog, Morgan and Buttemer (1996) conducted predation experiments examining the impact upon survival of tadpoles and the influence of aquatic vegetation on the predatory impact of *Gambusia*. They found that in the absence of aquatic vegetation, *Gambusia* was able to significantly reduce tadpole survival within 24 hours. In the presence of aquatic vegetation, the effect was substantially reduced.

Studies by Pyke and White (1996) surveyed waterbodies in the Sydney region for Green and Golden Bell Frogs examining the association between evidence of breeding, occurrence of introduced fish and quality of habitat. They found that successful breeding was most strongly associated with ephemeral rather than permanent or 'fluctuating'

ponds, followed by the absence of *Gambusia*, and speculated that this fish was a major cause of decline of the Green and Golden Bell Frog.

Hamer *et al* (2002) however, experimentally demonstrated that the growth of Green and Golden Bell Frog tadpoles was more favourable in permanent, rather than ephemeral water bodies and importantly found that tadpoles did not respond to the presence of *Gambusia* which made them more vulnerable to predation. The authors concluded that predation from *Gambusia* may have reduced the suitability of permanent water bodies as optimal breeding habitat for Green and Golden Bell Frogs and that the long-term use of less favourable ephemeral habitats may have contributed to the decline of this species.

In light of these findings, OEH records and relevant documentation, it is concluded that the Green and Golden Bell Frog, if it were to occur, would not be impacted upon by the any potential development at 75 Gardeners Road, Eastlakes (Appendix 4).

3.3.4 Species listed by the OEH Atlas of NSW Wildlife database 2015 as potential migratory inhabitants of the site.

The OEH Atlas of NSW Wildlife database 2015 listed twenty-three (23) migratory species of avifauna covered by bi-lateral bird agreements, recorded within a 5 km radius of the site (Appendix 5). Habitat for these birds is assessed and documented in Appendix 6. Two species, the Sharp-tailed Sandpiper and the Little Tern may on occasion utilise resources on the golf course but would not be impacted by any potential development at 75 Gardeners Road, Eastlakes.

Most of the migratory species listed were recorded within the Botany Swamp to the south (Figure 12).

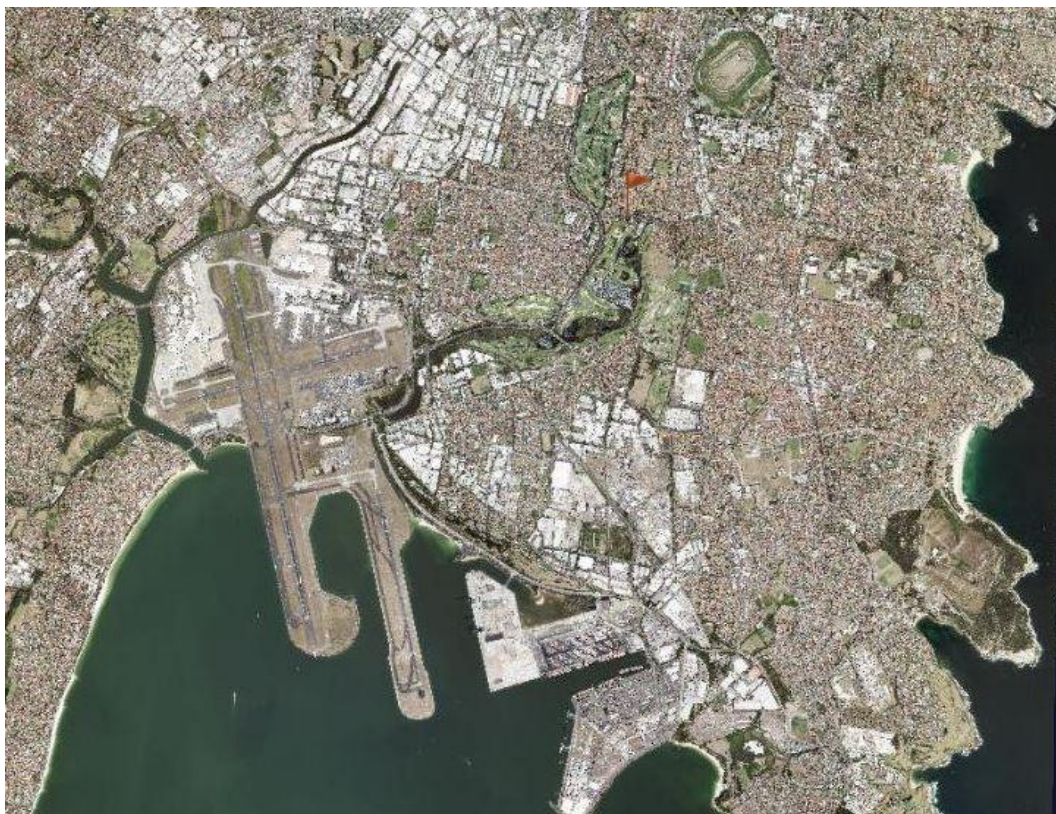


Figure 12 - An aerial view of the position of the study area (red flag) in relation to the coastal areas of Botany Bay to the south where there are established wetlands where large numbers of migratory birds forage. Most migratory species were recorded within the Botany Wetlands.

3.3.5 Migratory species listed by the Commonwealth DoE (Commonwealth Protected Matters Search Tool) as potential inhabitants of the site.

Migratory species listed by the Commonwealth DoE was reviewed in relation to the distribution, habitat and likelihood of occurrence (Appendix 7). None of the migratory species listed has potential to occur and would not be impacted by any potential development at 75 Gardeners Road, Eastlakes.

3.3.6 Terrestrial species listed by the Commonwealth DoE (Commonwealth Protected Matters Search Tool) as potential inhabitants of the site.

Threatened terrestrial fauna species listed by the Commonwealth DoE were reviewed in relation to the distribution, habitat and likelihood of occurrence (Appendix 8). The current study concluded that the Grey-headed Flying Fox is likely to forage in eucalypt trees when in flower. However, the species is more likely to forage within the many golf courses of the locality where foraging resources occur in larger tracts of woodland.

3.3.7 Conclusion – fauna

The OEH Atlas of NSW Wildlife database 2015 listed twenty-three (23) species of terrestrial and avifauna considered threatened under the TSC Act within a 5 km radius of the site.

The Green and Golden Bell Frog (*Litoria aurea*) has been recorded some 22 years previously immediately to the east of the study area in 1993 (OEH NSW Atlas of Wildlife 2015). No further studies have identified it as present in the area. OEH has since listed the frog as extinct within Eastlakes Golf Course (OEH 2015).

The Freckled Duck is a very rare bird to occur in the area and could be classified as a 'vagrant', occurring out of its normal range.

The Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*) may forage over the surveyed areas, however it is unlikely that the bat roosts within it as no deep caves are present.

The Grey-headed Flying-fox (*Pteropus poliocephalus*) congregates in large camps and is found in a variety of habitats. At night the Grey-headed Flying-fox searches for food and may travel 50 km to its feeding areas. It is however more likely to be found foraging within the large groves of trees within the golf course.

Whilst twenty-three species of bird were recorded within the subject sites, none are listed as threatened or appear on migratory bird agreement lists.

The study site is rated as poor habitat for fauna due to its proximity to the busy Gardeners Road motorway and the long history of disturbance for commercial purposes. It is unlikely that any proposed development at the subject site will impact on the natural fauna of the area.

4 REFERENCES & LITERATURE REVIEWED

- Bannerman, S.M. & Hazelton, P.A. (1989) *Soil landscapes of the Penrith 1:100 000 sheet*. (Soil Conservation Service of N.S.W.: Sydney).
- Barker, J., G.C. Grigg. & M.J. Tyler (1995). *A Field Guide to Australian Frogs*. Chipping Norton, NSW: Surrey Beatty & Sons.
- Benson, D. and Howell, J. (1994) The natural vegetation of the Sydney 1: 100,000 map sheet. *Cunninghamia* **3**:677 – 787.
- Briggs, J.D. and Leigh, J.H.C. (1996) Rare or Threatened Australian Plants: CSIRO Division of Plant Industry/Australian National Parks and Wildlife Service. CSIRO Publishing, Melb.
- Brunner, H., Triggs, B. and Ecobyte Pty. Ltd. (2002). Hair ID – An Interactive Tool for Identifying Australian mammalian Hair. CSIRO Publishing
- Churchill, S., (1998). *Australian Bats*. Reed New Holland Publishers.
- Chapman, G.A. and Murphy, C.L. (1989) *Soil landscapes of the Sydney 1:100 000 sheet*. (Soil Conservation Service of N.S.W.: Sydney).
- Cogger, H. G. (2000). Reptiles and Amphibians of Australia. 6th ed. Reed New Holland, Sydney.
- Commonwealth DoE Protected Matters Environmental Search Tool (2015)
- Cropper, S (1993) *Management of Endangered Plants* CSIRO Pub. East Melbourne
- DEC (2004) Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities
- Department of the Environment (2015). *Litoria aurea* in Species Profile and Threats Database, Department of the Environment, Canberra.
- Dwyer, P.D. (1995) Common Bentwing-bat *Miniopterus schreibersii* Pp. 494-5 in Strahan, R. (ed.) The Mammals of Australia. Reed Books, Sydney.

- Harden, G. J. (ed.) (1990 – 2002; 2015 online) Flora of New South Wales, Royal Botanic Gardens, Sydney NSW.
- Harris, K. (1995). *Is there a negative relationship between Gambusia and tadpoles on the northern tablelands?* B. Sc. Honours thesis, University of New England, Armidale, NSW.
- Marchant & Higgins 1990 'Handbook of Australian, New Zealand and Antarctic Birds'
- Morgan, L.A. and Buttemer, W.A. (1996). Predation by the non-native fish *Gambusia holbrooki* on small *Litoria aurea* and *L. dentata* tadpoles., pp. 143-49. In: G.H. Pyke and W.S. Osborne (eds.), *The Green and Golden Bell Frog (Litoria aurea): Biology and Conservation*. Royal Zoological Society of NSW.
- Noxious Weed List for Botany Council (2015) National Weeds Strategy Executive Committee.
- NSW Scientific Committee. Final Determinations (1996 – 2015) Determinations relating to listings of threatened species, populations, ecological communities and key threatening processes in the Schedules of the *Threatened Species Conservation Act 1995*.
- OEH Atlas of NSW Wildlife (2015). NPWS Geographic Information Systems Division, Hurstville NSW, 2220.
- OEH (2013) 'The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area'.
- Pyke, G.H. and White, A.W. (2000). Factors influencing predation on eggs and tadpoles of the endangered green and golden bell frog *Litoria aurea* by the introduced Plague Minnow *Gambusia holbrooki*. *Australian Zoologist*, **31**(3): 496-505.
- Pizzey, G. and Knight, F. (2003). *The Field Guide to the Birds of Australia*. Angus and Robinson Publs.
- Reynolds, S.J. (1995). *The impact of introduced mosquito fish (Gambusia holbrooki) on mortality of premetamorphic anurans*. B.Sc. Honours thesis, University of Western Australia in Department of the Environment (2015). *Litoria aurea* in Species Profile and Threats Database, Department of the Environment, Canberra.

- Specht, R. L., Specht, A., Whelan, M.B., Hegarty, E. E. (1995) Conservation Atlas of Plant Communities in Australia. Southern Cross Univ Press Lismore
- Scales, A. (2015) Arboricultural Impact Assessment and Method Statement for 75 Gardeners Road, Eastlakes. Prepared for Sydney Water.
- Strahan, R. 1995 *Complete Book of Australian Mammals*, Second Edition. Sydney: ReedBooks.
- Tidemann, C.R., Eby, P., Parry-Jones, K.A. and Vardon, M. (1999). Grey-headed Flying-fox. In The Action Plan for Australian Bats. Duncan, A., Baker, G.B. and Montgomery, N. (eds). Environment Australia, Canberra.
- Webb, C. and Joss, J. (1997). Does predation by the fish *Gambusia holbrooki* (Atheriniformes: Poeciliidae) contribute to declining frog populations. *Australian Zoologist*, **30** (3): 316-326

Appendix 1: Floristic species assemblages recorded at subject site at 75 Gardeners Road, Eastlakes and at northern section of Lakes Golf Course.

KEY

Status:

*- Exotic species

C4 - Noxious Weeds in the Botany Council LGA

pl - planted indigenous and ornamental species

nat - naturalised

Vegetation

The vegetation of both areas has been largely derived from landscaped plantings. In the nursery area at 75 Gardeners Road, the plantings include both locally and non-locally occurring indigenous species as well as exotic ornamentals, whereas the low woodland areas occurring at the northern section of the Lakes Golf Course include vegetation that may resemble Coastal Sand Apple-Bloodwood Forest assemblages.

Relative ranked frequency of occurrence (modified Braun-Blanquet rank scale)

1 – uncommon or rare

2 – relatively uncommon but occasional individuals <5% cover

3 – abundant individuals but cover <5%

4 - Cover abundance from 5 – 10%

5 - Cover abundance from 10 – 25%

| STATUS | SCIENTIFIC NAME | COMMON NAME | NURSERY FACILITY - 75 GARDENERS ROAD (AREA 1) | LANDSCAPED WOODLAND/EXOTIC GRASSLAND - NTH END OF LAKES GOLF COURSE (AREA 2) |
|--------|---|--------------|---|--|
| | GYMNOSPERMAE: CONIFERALES | | | |
| *pl | Cupressaceae <i>Cupressus sp.</i> | Cypress Pine | 1 tree | |
| *pl | Pinaceae <i>Pinus radiata</i> | Radiata Pine | 2 trees | 2 trees |

| STATUS | SCIENTIFIC NAME | COMMON NAME | NURSERY FACILITY - 75 GARDENERS ROAD (AREA 1) | LANDSCAPED WOODLAND/EXOTIC GRASSLAND - NTH END OF LAKES GOLF COURSE (AREA 2) |
|--------|---|--------------------------|---|---|
| | MAGNOLIOPSIDA: MAGNOLIDAE | | | |
| pl | Aizoaceae <i>Carpobrotus glaucescens</i> | Pigface | | 3 |
| *pl | Apocynaceae <i>Nerium oleander</i> | Oleander | | 2 |
| *pl | <i>Plumeria acutifolia</i> | Frangipani | 1 | |
| * | Araliaceae <i>Hedera helix</i> | English Ivy | | 2 |
| * | Asclepiadaceae <i>Araujia sericifera</i> | Moth Plant | 3 | 3 |
| * | Asteraceae <i>Bidens pilosa</i> | Cobblers Pegs | 3 | 3 |
| * | <i>Conyza sumatrensis</i> | Tall Fleabane | 3 | 3 |
| * | <i>Hypochaeris radicata</i> | Cats Ears | | 3 |
| * | <i>Lactuca serriola</i> | Prickly Lettuce | | 3 |
| * | <i>Roldana petasitis</i> | Roldana | 2 | |
| C4 | <i>Senecio madagascariensis</i> | Fireweed | | 3 |
| * | <i>Sonchus oleraceous</i> | Common Sowthistle | | 3 |
| * | <i>Vellereophyton dealbatum</i> | White Cudweed | | 3 |
| * | Brassicaceae <i>Brassica juncea</i> | Indian Mustard | 3 | |
| | Campanulaceae <i>Wahlenbergia gracilis</i> | Spreading Bluebell | | 3 |
| * | Caryophyllaceae <i>Cerastium glomeratum</i> | Mouse-eared Chickweed | | 3 |
| * | <i>Paronychia brasiliensis</i> | Chilean Whitlow Wort | | 3 |

| STATUS | SCIENTIFIC NAME | COMMON NAME | NURSERY FACILITY - 75 GARDENERS ROAD (AREA 1) | LANDSCAPED WOODLAND/EXOTIC GRASSLAND - NTH END OF LAKES GOLF COURSE (AREA 2) |
|--------|--|---------------------------|---|--|
| pl | Casuarinaceae <i>Allocasuarina littoralis</i> | Black Sheoak | | 2 |
| pl | <i>Casuarina cunninghamiana</i> | River Oak | 12 trees | |
| C4 | Convolvulaceae <i>Ipomoea indica</i> | Morning Glory | 2 | 2 |
| C4 | Euphorbiaceae <i>Ricinus communis</i> | Castor Oil Plant | 2 | 2 |
| * | Lauraceae <i>Cinnamomum camphora</i> | Camphor Laurel | 3 | |
| *pl | Malaceae <i>Eriobotrya japonica</i> | Loquat | 1 | |
| * | Malvaceae <i>Sida rhombifolia</i> | Paddys Lucerne | 3 | |
| | Meliaceae <i>Melia azederach</i> | White Cedar | | 1 |
| nat | Mimosaceae <i>Acacia longifolia</i> ssp <i>longifolia</i> | Sydney Golden Wattle | 2 | 3 |
| * | Moraceae <i>Morus alba</i> | White Mulberry | 2 | 2 |
| pl | Myrtaceae <i>Angophora costata</i> | Sydney Red Gum | 1 tree | 3 |
| pl | <i>Corymbia citriodora</i> | Lemon-scented Gum | 3 trees | |
| pl | <i>Eucalyptus botryoides</i> | Coast Mahogany | 3 trees | Small clump |
| pl | <i>Eucalyptus haemastoma</i> | Broad-leaved Scribbly Gum | | 2 |
| pl | <i>Eucalyptus punctata</i> | Grey Gum | 1 tree | |
| pl | <i>Eucalyptus robusta</i> | Swamp Mahogany | 2 | 2 |

| STATUS | SCIENTIFIC NAME | COMMON NAME | NURSERY FACILITY - 75 GARDENERS ROAD (AREA 1) | LANDSCAPED WOODLAND/EXOTIC GRASSLAND - NTH END OF LAKES GOLF COURSE (AREA 2) |
|--------|--|------------------------|---|--|
| | Myrtaceae (cont) | | | |
| pl | <i>Eucalyptus saligna</i> | Sydney Bluegum | 15 trees | |
| pl | <i>Eucalyptus scoparia</i> | Wallangarra White Gum | 1 tree | |
| | <i>Kunzea ambigua</i> | Tick Bush | | 2 |
| pl | <i>Lophostemon conferta</i> | Brush Box | 2 trees | |
| pl | <i>Melaleuca quinquinervia</i> | Broad-leaved Paperbark | Large copse (4) | Large copse (4) |
| pl | <i>Syzygium sp.</i> | Lilly Pilly | 2 trees | |
| | Oleaceae | | | |
| C4 | <i>Ligustrum sinense</i> | Small-leaved Privet | 3 | |
| * | <i>Olea europea</i> var <i>cuspidata</i> | African Olive | 2 | 3 |
| | Pittosporaceae | | | |
| nat | <i>Pittosporum undulatum</i> | Sweet Pittosporum | | 3 |
| | Polygonaceae | | | |
| * | <i>Acetosa sagittata</i> | Turkey Rhubarb | 2 | 3 |
| | Proteaceae | | | |
| pl | <i>Banksia aemula</i> | Old Man Banksia | | 1 |
| pl | <i>Banksia integrifolia</i> | Coast Banksia | | Scattered (4) |
| | Rutaceae | | | |
| *pl | <i>Murraya paniculata</i> | Orange Jessamine | 3 | |
| | Salicaceae | | | |
| *pl | <i>Populus nigra</i> | Cottonwood | 1 tree | |
| | Solanaceae | | | |
| C3 | <i>Cestrum parqui</i> | Green Poisonberry | 3 | 3 |
| | Urticaceae | | | |
| * | <i>Parietaria judaica</i> | Pellitory | 3 | 3 |

| STATUS | SCIENTIFIC NAME | COMMON NAME | NURSERY FACILITY - 75 GARDENERS ROAD (AREA 1) | LANDSCAPED WOODLAND/EXOTIC GRASSLAND - NTH END OF LAKES GOLF COURSE (AREA 2) |
|--------|----------------------------------|-----------------------|---|--|
| C4 | Verbenaceae | | | |
| * | <i>Lantana camara</i> | Lantana | 2 | 2 |
| | <i>Verbena bonariensis</i> | Purple Top | 3 | |
| | MAGNOLOPSIDA: LILIDAE | | | |
| | Alliaceae | | | |
| * | <i>Nothoscordum borbonicum</i> | Onion Weed | | 3 |
| | Arecaceae | | | |
| * | <i>Phoenix canariensis</i> | Canary Island Palm | 3 trees | |
| *pl | <i>Syagrus romanzoffianum</i> | Queen Palm | 35 trees | |
| | Asparagaceae | | | |
| C4 | <i>Asparagus aethiopicus</i> | Asparagus Fern | 2 | |
| | Commelinaceae | | | |
| * | <i>Tradescantia fluminensis</i> | Wandering Jew | | 3 |
| | Cyperaceae | | | |
| * | <i>Cyperus eragrostis</i> | Umbrella Sedge | | 2 |
| | Iridaceae | | | |
| *pl | <i>Agapanthus praecox</i> | Agapanthus | 2 | |
| | Lomandraceae | | | |
| pl | <i>Lomandra longifolia</i> | Spiky-headed Mat-rush | | 2 |
| | Poaceae | | | |
| * | <i>Andropogon virginicus</i> | Whiskey Grass | | 3 |
| * | <i>Bromus catharticus</i> | Brome | 2 | 3 |
| * | <i>Cynodon dactylon</i> | Couch | 4 | 5 |
| | <i>Dichelachne micrantha</i> | Short-hair Plumegrass | | 3 |
| * | <i>Ehrharta erecta</i> | African Veldt Grass | 4 | |
| | <i>Eragrostis brownii</i> | Browns Lovegrass | | 3 |
| * | <i>Eragrostis curvula</i> | African Lovegrass | 3 | 3 |

| STATUS | SCIENTIFIC NAME | COMMON NAME | NURSERY FACILITY - 75 GARDENERS ROAD (AREA 1) | LANDSCAPED WOODLAND/EXOTIC GRASSLAND - NTH END OF LAKES GOLF COURSE (AREA 2) |
|--------|---|--------------------|---|--|
| | Poaceae (cont) | | | |
| * | <i>Imperata cylindrica</i> | Blady Grass | | 3 |
| * | <i>Lolium perenne</i> | Perennial Ryegrass | | 3 |
| * | <i>Melinis repens</i> | Red Natal Grass | | 3 |
| * | <i>Pennisetum clandestinum</i> | Kikuyu | 4 | |
| *pl | Strelitzaceae <i>Strelitzia reginae</i> | Crane Flower | Planted row | |

LEGEND TO APPENDIX 1 - NOXIOUS WEEDS IN BOTANY COUNCIL LGA

C3 - A noxious weed the presence of which must be fully and continuously suppressed and destroyed

C4 - A noxious weed the growth and spread of which must be controlled according to the measures specified in a management plan published by the local control authority

Appendix 2: Plant species of conservation significance recorded within a 5km radius of the subject area since 1990 where potential habitat may occur (OEH Atlas of NSW Wildlife 2015^α) or where potential habitat is deemed to potentially occur (Commonwealth DoE Protected Matters Environmental Reporting Tool 2015^β)

| Scientific Name | Status (EPBC Act 1999) | Status (TSC Act 1995) | RoTAP | Habit/potential habitat/general geographic location | Likelihood of occurrence in subject area | Reference material derived from 'Final Determinations' (NSW Scientific Committee) and others listed below: |
|---|------------------------|-----------------------|-------|--|--|--|
| <i>Acacia terminalis</i> ssp <i>terminalis</i> ^{α β} | E* | E1 | | Erect or spreading shrub or small tree to 6m tall. Dry sclerophyll forest in coastal Sydney region. Occurs in coastal scrub and dry sclerophyll woodland in sandy soils | Highly unlikely – all subject habitats have been highly modified, some re-profiled and landscaped. Nearest record appears about 2km to the east along Anzac Parade at Kingsford. Absence of distinct life-form individuals in area of study deemed to indicate non-occurrence. No further assessment required | OEH Atlas of NSW Wildlife (2015); Fairley & Moore (2004) |
| <i>Allocasuarina glareicola</i> ^β | | E1 (2E) | | Slender open shrub to 1 - 2m high. Occurs in clay soils derived from alluvial gravels in woodland comprised of the tree species <i>Angophora bakeri</i> and <i>Eucalyptus sclerophylla</i> . | Highly unlikely - habitat unsuitable. No records of occurrence in locality. Absence of relatively distinct life-form individuals in small area of study deemed to indicate non-occurrence. No further assessment required | OEH Atlas of NSW Wildlife (2015); Harden (2000); Fairley (2004) |
| <i>Caladenia tessellata</i> ^β | V* | E1 | 3V | Terrestrial herb. Clay or sandy soils in moist forests or scrubs on coastal ridgetops | Highly unlikely – all subject habitats have been highly modified, some re-profiled and landscaped. No records of occurrence in locality. No further assessment required | OEH Atlas of NSW Wildlife (2015); Robinson (2000) |

| Scientific Name | Status (EPBC Act 1999) | Status (TSC Act 1995) | RoTAP | Habit/potential habitat/general geographic location | Likelihood of occurrence in subject area | Reference material derived from 'Final Determinations' (NSW Scientific Committee) and others listed below: |
|--|------------------------|-----------------------|-------|---|--|--|
| <i>Cryptostylis hunteriana</i> ^β | V* | V | 3VC- | No leaf, flowers only in Dec-Feb, saprophytic. Known from a range of swamp-heath and woodland communities with poorly drained soils. | Highly unlikely - Habitat unsuitable, cleared and highly modified. No records within 5km of subject site. No further assessment required | OEH Atlas of NSW Wildlife (2015); Robinson (2003); Bishop (2000) |
| <i>Genoplesium baueri</i> ^β | | V | 3RC- | Terrestrial orchid to 15cm tall, occurs in sparse sandy dry sclerophyll forest habitat and moss outcrops over sandstone. | Highly unlikely - Habitat unsuitable, cleared and highly modified. No records within 5km of subject areas. No further assessment required | OEH Atlas of NSW Wildlife (2015), Robinson (2000), Fairley (2004). |
| <i>Melaleuca biconvexa</i> ^β | V* | V | | Shrub or small tree to 10m, occurring in damp places, often near streams or low lying areas on alluvial soils of low slopes or sheltered aspects. <i>Melaleuca biconvexa</i> may occur in dense stands forming a narrow strip adjacent to watercourses, in association with other <i>Melaleuca</i> species or as an understorey species in wet forest types. | Highly unlikely – all subject habitats have been highly modified, some re-profiled and landscaped. No records within 5km of subject sites. Absence of distinct life-form individuals in area of study deemed to indicate non-occurrence. No further assessment required | OEH Atlas of NSW Wildlife (2015) |
| <i>Pimelea curviflora</i> var <i>curviflora</i> ^β | V* | V | | Much-branched subshrub or shrub 20 to 100cm. Occurs in woodlands of the northern area of Sydney on shale-sandstone transition areas and laterite soils. | Not likely – Habitat unsuitable, highly modified, cleared and landscaped, absence of relatively distinct life-form individuals in area of study indicates non-occurrence. No further assessment required | OEH Atlas of NSW Wildlife (2015); James et al (1999) |

| Scientific Name | Status (EPBC Act 1999) | Status (TSC Act 1995) | RoTAP | Habit/potential habitat/general geographic location | Likelihood of occurrence in subject area | Reference material derived from 'Final Determinations' (NSW Scientific Committee) and others listed below: |
|--|------------------------|-----------------------|-------|--|--|--|
| <i>Senecio spathulatus</i> | | E1 | | A low-growing daisy forming hummocks to 30cm tall. Grows on primary sand dunes between Kurnell and Myall Lakes National Park. | Highly Unlikely – Habitat is unsuitable, grows on primary soil dunes. Nearest records are some 3.6km to the south at Port Botany. Absence of relatively distinct life-form individuals in area of study indicates non-occurrence. No further assessment required | OEH Atlas of NSW Wildlife (2015) |
| <i>Syzygium paniculatum</i> ^α | V* | V | 3VCi | Shrub or small tree to 8m tall, occurs in or near rainforest from littoral sands to sheltered gullies, especially near watercourses on sandy soils | Highly unlikely – Habitat unsuitable, highly modified, cleared and landscaped. May occur as landscaped plantings at nursery site. Nearest OEH record about 500m to the north at Erskineville, probably also a landscaped planting. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. Habitat cleared highly modified and landscaped. Absence of relatively distinct large life-form individuals in area of study indicates non-occurrence. No further assessment required | OEH Atlas of NSW Wildlife (2015); Robinson (2000), Fairley & Moore (2004) |
| <i>Thesium australe</i> ^β | V* | V | | Herb to 40cm high. Occurs in grassland and woodland, often in damp situations | Highly unlikely – habitat highly modified and landscaped. Rare, not recently recorded. No records within 5km of subject areas. No further assessment required. | OEH Atlas of NSW Wildlife (2015); Harden (1992) |

Key:

Department of the Environment (DoE) Threatened species status ^β

EX – Presumed extinct

E* - Endangered

V* - Vulnerable

OEH Threatened species status ^α

E4A – presumed extinct, recently recorded

E1 - Endangered

E2 - Endangered Population

V - Vulnerable

Key to Conservation Status:

Commonwealth legislation

Environmental Protection and Biodiversity Conservation Act, 1999

EX – Presumed extinct

E* - Endangered

V* - Vulnerable

NSW legislation

Threatened Species Conservation Act, 1995

E4A – Schedule 1 Part 1 – Presumed extinct, recently recorded

E1 Schedule 1 Part 1 – Endangered

V Schedule 2 - Vulnerable

RoTAP

Conservation code

2 - geographic range <100km

3 - geographic range >100km

Conservation status

E - endangered to point of extinction if current land use and other threats continue to operate

V - vulnerable, at risk of depletion over 20-50- years if land use that threatens survival is maintained

C - at least one population conserved in a national park or proclaimed conservation area

Size class of reserved populations

a - >1000 plants in conservation reserve

i - < 1000 plants in conservation reserve

- reserved population size not accurately known

Appendix 3: Threatened fauna species recorded previously within a 5km radius of the subject sites at 75 Gardeners Road, Eastlakes since 1990 (Source: OEH NSW Atlas of Wildlife 2015)

| Common Name | Scientific Name | NSW Status | COMM Status | Number of Records |
|----------------------------|--|------------|-------------|-------------------|
| Green and Golden Bell Frog | <i>Litoria aurea</i> | E1 | V | 11 |
| Freckled Duck | <i>Stictonetta naevosa</i> | V | | 1 |
| Superb Fruit-Dove | <i>Ptilinopus superbus</i> | V | | 2 |
| Bush Stone-curlew | <i>Burhinus grallarius</i> | E1 | | 1 |
| Pied Oystercatcher | <i>Haematopus longirostris</i> | E1 | | 3 |
| Lesser Sand-plover | <i>Charadrius mongolus</i> | V | | 3 |
| Sanderling | <i>Calidris alba</i> | V | | 3 |
| Curlew Sandpiper | <i>Calidris ferruginea</i> | E1 | | 41 |
| Great Knot | <i>Calidris tenuirostris</i> | V | | 4 |
| Black-tailed Godwit | <i>Limosa limosa</i> | V | | 2 |
| Terek Sandpiper | <i>Xenus cinereus</i> | V | | 3 |
| Little Tern | <i>Sternula albifrons</i> | E1 | | 313 |
| Glossy Black-Cockatoo | <i>Calyptorhynchus lathami</i> | V | | 2 |
| Swift Parrot | <i>Lathamus discolor</i> | E1 | E | 1 |
| Orange-bellied Parrot | <i>Neophema chrysogaster</i> | E4A | CE | 1 |
| Eastern Ground Parrot | <i>Pezoporus wallicus wallicus</i> | V | | 2 |
| Powerful Owl | <i>Ninox strenua</i> | V | | 9 |
| Scarlet Robin | <i>Petroica boodang</i> | V | | 1 |
| Diamond Firetail | <i>Stagonopleura guttata</i> | V | | 2 |
| Spotted-tailed Quoll | <i>Dasyurus maculatus</i> | V | E | 1 |
| Grey-headed Flying-fox | <i>Pteropus poliocephalus</i> | V | V | 73 |
| Eastern Bentwing-bat | <i>Miniopterus schreibersii oceanensis</i> | V | | 10 |
| Southern Myotis | <i>Myotis macropus</i> | V | | 464 |

Appendix 4: Likelihood of occurrence in surveyed area of fauna species of conservation significance recorded within a 5km radius of the Study Area at 75 Gardeners Road, Eastlakes since 1990 (OEH Atlas of NSW Wildlife 2015) or where potential habitat is deemed to potentially occur

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|----------------------------|----------------------------|---------|----------|-------------------------------------|---|---|--|
| Green and Golden Bell Frog | <i>Litoria aurea</i> | E1 | V | 11 (One record 10m east in 1993) | Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria where it extends into east Gippsland. It inhabits marshes, dams and stream-sides, particularly ones with bullrushes (<i>Typha orientalis</i> . spp.) or spikerushes (<i>Eleocharis</i> spp.). | Unlikely Habitat may be present in ponds within the golf course but the presence of (<i>Gambusia holbrookii</i>) which predated on the tadpoles limits its presence. Now deemed to be extinct in the area (OEH 2015). No further assessment required. | OEH Atlas of NSW Wildlife (2015), Cogger 200 Barker et al 1995 |
| Freckled Duck | <i>Stictonetta naevosa</i> | V | | 1 One record 2013 500m south | The Freckled Duck is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters.. | Not likely - Suitable habitat present but it is such a rare occurrence that it is unlikely to occur within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2015), Pizzey & Knight (2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|-------------------|----------------------------|---------|----------|-----------------|---|---|---|
| Superb Fruitdove | <i>Ptilinopus superbus</i> | V | | 2 | The Superb Fruit-dove occurs principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. Part of the population is migratory or nomadic | Not likely – No suitable habitat present but it is such a rare occurrence that it is unlikely to occur within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2015), Pizzey & Knight (2003). |
| Bush Stone-curlew | <i>Burhinus grallarius</i> | E1 | | 1 | The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania (Pizzey & Knight 2003). In general, habitat occurs in open woodlands with few, if any, shrubs, and short, sparse native grasses, scattered fallen timber, leaf litter and bare ground present. In coastal areas, structurally similar elements of tidal and estuarine areas provide suitable habitat, for example Bush Stone-curlews are recorded within Casuarina woodlands, saltmarsh and mangroves. The presence of fallen tree debris appears critical to the selection of day roost sites. Largely nocturnal, being especially active on moonlit nights. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2015), Pizzey & Knight (2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|--------------------|--------------------------------|---------|----------|-----------------|--|--|---|
| Pied Oystercatcher | <i>Haematopus longirostris</i> | E1 | | 3 | The species is distributed around the entire Australian coastline, although it is most common in coastal Tasmania and parts of Victoria, such as Corner Inlet (Pizzey & Knight 2003). In NSW the species is thinly scattered along the entire coast. Favours intertidal flats of inlets and bays, open beaches and sandbanks. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2012), (Pizzey & Knight 2003). |
| Lesser Sand-plover | <i>Charadrius mongolus</i> | V | | 3 | This species is strongly migratory, wintering on sandy beaches in east Africa, south Asia and Australasia. The lesser sand plover's food is insects, crustaceans and annelid worms, which are obtained by a run-and-pause technique, rather than the steady probing of some other wader groups | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2015), (Pizzey & Knight 2003). |
| Sanderling | <i>Calidris acuminata</i> | V | | 3 | A regular summer migrant from Siberia and other Arctic breeding grounds to most of the Australian coastline. It is uncommon to locally common, arriving from September and leaving by May (some may overwinter in Australia). Sanderlings occur along the NSW coast, with occasional inland sightings. They are often found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands. They breed in Siberia. In Australia it roosts on bare sand, behind clumps of beach-cast kelp or in coastal dunes. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2015), (Pizzey & Knight 2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|------------------|----------------------------|---------|----------|-----------------|---|--|---|
| Curlew Sandpiper | <i>Calidris ferruginea</i> | E1 | | 41 | The Curlew Sandpiper is a common visitor during the Australian summer, congregating in large flocks at sheltered intertidal mudflats and also at the muddy margins of terrestrial wetlands. They, peck at invertebrates on the surface of the mud or making shallow probes below its surface, sometimes wading in belly-deep water while probing. Feeding becomes more intense before their long flight back to their breeding grounds in Siberia. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2015), (Pizzey & Knight 2003). |
| Great Knot | <i>Calidris</i> | V | | 4 | In NSW, the species has been recorded at scattered sites along the coast to about Narooma. It has also been observed inland at Tullakool, Armidale, Gilgandra and Griffith (Pizzey & Knight 2003). It occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2015), (Pizzey & Knight 2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|---------------------|----------------------|---------|----------|-----------------|---|--|---|
| Black-tailed Godwit | <i>Limosa limosa</i> | V | | 2 | The Black-tailed Godwit is a migratory wading bird that breeds in Mongolia and Eastern Siberia (Palearctic) and flies to Australia for the southern summer, arriving in August and leaving in March. In NSW, it is most frequently recorded at Kooragang Island (Hunter River estuary), with occasional records elsewhere along the north and south coast, and inland. Habitat is found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Individuals have been recorded in wet fields and sewerage treatment works. Forages for insects, crustaceans, molluscs, worms, larvae, spiders, fish eggs, frog eggs and tadpoles in soft mud or shallow water. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2015), (Pizzey & Knight 2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|-----------------|---------------------------|---------|----------|-----------------|--|--|---|
| Terek Sandpiper | <i>Xenus cinereus</i> | V | | 3 | A rare migrant to the eastern and southern Australian coasts, being most common in northern Australia, and extending its distribution south to the NSW coast in the east. The two main sites for the species in NSW are the Richmond River estuary and the Hunter River estuary. In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools. Generally roosts communally amongst mangroves of dead trees, often with related wader species. | Not likely - No suitable habitat present within survey area. More likely within Botany Wetlands No further assessment required. | OEH Atlas of NSW Wildlife (2015), (Pizzey & Knight 2003). |
| Little Tern | <i>Sternula albifrons</i> | E1 | | 313 | Little terns migrate from eastern Asia, and in Australia is found on the north, east and south-east Australian coasts, from Shark Bay in Western Australia to the Gulf of St Vincent in South Australia. In NSW, it arrives from September to November, occurring mainly north of Sydney, with smaller numbers found south to Victoria. Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). | Not likely - No suitable habitat present within survey area. Recorded within 1km of the site within the larger expanse of the Golf Course No further assessment required. | OEH Atlas of NSW Wildlife (2012), (Pizzey & Knight 2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|-----------------------|---------------------------------|---------|----------|-----------------|--|---|---|
| Glossy Black-cockatoo | <i>Calyptorhynchus lathamii</i> | V | | 2 | The Glossy Black-Cockatoo inhabits eucalypt woodland, forest or timbered watercourses where casuarinas (She-oaks) are common. In NSW, the Glossy Black-Cockatoo occurs in coastal and mountain districts. They feed almost exclusively on the seeds of She-oaks, mostly Forest She-oak <i>Allocasuarina torulosa</i> and Black She-oak <i>A. littoralis</i> although they are also known to eat the seeds of Shrub She-oak <i>A. distyla</i> at times. | Not likely - No suitable habitat present within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2015), (Pizzey & Knight 2003). |
| Swift Parrot | <i>Lathamus discolor</i> | E1 | E | 1 | Autumn – winter migrant to coastal NSW. In NSW mostly occurs on the coast and south west slopes where eucalypts are flowering profusely or where there are abundant lerp infestations. Will feed in the following trees; Swamp Mahogany (<i>E. robusta</i>), Forest Redgum (<i>E. tereticornus</i>), Spotted Gum (<i>Corymbia maculata</i>), Red Bloodwood (<i>Corymbia gummifera</i>). | Not likely - No suitable habitat present within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2015), (Pizzey & Knight 2003). |
| Orange-bellied Parrot | <i>Neophema chrysogaster</i> | E4 | CE | 1 | The Orange-bellied Parrot breeds in Tasmania and migrates northward during winter. On the mainland they spend winter mostly within 3 km of the coast in sheltering in bays, lagoons, estuaries, coastal dunes and saltmarshes. They also inhabit small islands and golf courses. Birds forage in herbland or taller coastal shrubland. Recent records from Shellharbour and Maroubra suggest that the species may be expanding their selection of habitats and foraging plant species. | Not likely - No suitable habitat present within survey area. More likely in the Malabar peninsula. No further assessment required. | OEH Atlas of NSW Wildlife (2015), (Pizzey & Knight 2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|-----------------------|------------------------------------|---------|----------|-----------------|--|---|---|
| Eastern Ground Parrot | <i>Pezoporus wallicus wallicus</i> | V | | 2 | In NSW populations have declined and contracted to islands of coastal or subcoastal heathland and sedgeland habitats. The species is found in small numbers on the north coast (Broadwater, Bundjalung, Yuraygir NPs) and Myall Lakes on the central coast. The largest populations occur on the NSW south coast. The Ground Parrot occurs in high rainfall coastal and near coastal sedgelands, generally below one metre in height and very dense (up to 90% projected foliage cover). Home ranges of adult birds is typically 10 ha. There is no evidence of regular long-distance dispersal or migration events. | Not likely - No suitable habitat present within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2015), (Pizzey & Knight 2003). |
| Powerful Owl | <i>Ninox strenua</i> | V | | 9 | Endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands. Now uncommon throughout its range where it occurs at low density. Inhabits woodland and open sclerophyll forest to tall open wet forest and rainforest. | Not likely - No suitable prey species available. No further assessment required | OEH Atlas of NSW Wildlife (2015), Pizzey & Knight (2003). |
| Scarlet Robin | <i>Petroica bodang</i> | V | | 1 | The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs and usually contains abundant logs and fallen timber: these are important components of its habitat. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees. | Not likely – This shy bird is more likely to occur further south. Although vagrants do occur as far north as Eastlakes, the habitat present is considered sub-optimal. | OEH Atlas of NSW Wildlife (2015), Pizzey & Knight (2003). |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|------------------------|-------------------------------|---------|----------|--------------------------------------|---|--|---|
| Diamond Firetail | <i>Tagonopleura guttata</i> | V | | 2 | The Diamond Firetail is endemic to south-eastern Australia, ranging from Carnarvon Ranges in Queensland to the Eyre Peninsula and Kangaroo Island in South Australia. Diamond Firetails are found in open grassy woodland, heath and farmland or grassland with scattered trees. Diamond Firetails feed on the ground and generally eat ripe or partially ripe seeds and can be seen hopping around on the ground. They occasionally eat insects and their larvae. They are prone to predation by Currawongs. | Not likely - No suitable habitat present within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2015), Pizzey & Knight (2003). |
| Spotted-tail Quoll | <i>Dasyurus maculatus</i> | V | E | 1 | Recorded across a range of habitat types, including rainforest, open forest, forest, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. | Not likely - No suitable habitat present within survey area. No further assessment required. | OEH Atlas of NSW Wildlife (2015), Strahan (1995); Menkhorst and Knight 2001 |
| Grey-headed Flying-Fox | <i>Pteropus poliocephalus</i> | V | V | 73 One recorded in 2007 1km south | Occurs along the east coast of Australia from Gladstone in Qld. to south Gippsland and Melbourne in Vic (Strahan 1995; Churchill 1998). The species congregates in large camps and is found in a variety of habitats including rainforest, mangroves, Melaleuca swamps, wet and dry sclerophyll forests and also cultivated areas. | Likely - The Grey-Headed Flying-Fox may fly overhead to forage in trees surrounding the golf course. No impact is expected by the development proposal. | OEH Atlas of NSW Wildlife (2015), Churchill (1998), Tidemann et al 1999 |

| Common Name | Scientific Name | TSC Act | EPBC Act | Number recorded | Distribution, Habitat | Likelihood of occurrence in surveyed areas and requirement for further assessment | Reference material derived from 'Final Determinations' |
|----------------------|--|---------|----------|-----------------|---|--|---|
| Eastern Bentwing-bat | <i>Miniopterus schreibersii oceanensis</i> | V | | 10 | Occurs along the coast and ranges, from north Queensland to the far south-eastern corner of South Australia (Strahan 1995; Churchill 1998). Recorded in a wide range of habitats from grasslands through to subtropical rainforests, but it is typically found in well-timbered valleys Dwyer (1995). Known roost sites include caves, disused mines, storm-water drains, culverts and buildings. | Likely - The Eastern Bentwing Bat may fly overhead to forage for insects over the golf course. No impact is expected by the development proposal. | OEH Atlas of NSW Wildlife (2015), Strahan (1995); Churchill (1998), Dwyer (1995). |
| Southern Myotis | <i>Myotis macropus</i> | V | | 464 | The Southern Myotis is generally recorded in the coastal regions from south-eastern South Australia, through Victoria, New South Wales, Queensland, Northern Territory and the top of WA (Strahan 1995; Churchill 1998). Prefers permanent and/or flowing water. The Southern Myotis is commonly a cave dwelling microchiropteran, but will utilise tree hollows, mines, stormwater drains, bridges and dense vegetation (Churchill 1998). Roosting sites can be located within a wide variety of habitats, usually located in close proximity to permanent, slow flowing water. Breeding occurs between November and December, with young being weaned after three to four weeks (Churchill 1998). | Not likely - No suitable habitat present within survey area. More likely over the large ponds within the golf course. No further assessment required. | OEH Atlas of NSW Wildlife (2015), Strahan (1995); Churchill (1998), Dwyer (1995). |

Appendix 5: Migratory fauna species recorded within a 5km radius of the Study Area at 75 Gardeners Road, Eastlakes, since 1990 (OEH Atlas of NSW Wildlife 2015)

| Common Name | Scientific Name | NSW STATUS | COMM STATUS | Number of Records |
|-------------------------|----------------------------------|------------|-------------|-------------------|
| Wedge-tailed Shearwater | <i>Ardenna pacificus</i> | | J | 1 |
| Cattle Egret | <i>Ardea ibis</i> | | C,J | 5 |
| White-bellied Sea-Eagle | <i>Haliaeetus leucogaster</i> | | C | 2 |
| Lesser Sand-plover | <i>Charadrius mongolus</i> | V | C,J,K | 3 |
| Pacific Golden Plover | <i>Pluvialis fulva</i> | | C,J,K | 39 |
| Grey Plover | <i>Pluvialis squatarola</i> | | C,J,K | 5 |
| Common Sandpiper | <i>Actitis hypoleucos</i> | | C,J,K | 4 |
| Ruddy Turnstone | <i>Arenaria interpres</i> | | C,J,K | 3 |
| Sharp-tailed Sandpiper | <i>Calidris acuminata</i> | | C,J,K | 31 |
| Sanderling | <i>Calidris alba</i> | V | C,J,K | 3 |
| Red Knot | <i>Calidris canutus</i> | | C,J,K | 24 |
| Curlew Sandpiper | <i>Calidris ferruginea</i> | E1 | CE,C,J,K | 41 |
| Red-necked Stint | <i>Calidris ruficollis</i> | | C,J,K | 66 |
| Great Knot | <i>Calidris tenuirostris</i> | V | C,J,K | 4 |
| Latham's Snipe | <i>Gallinago hardwickii</i> | | C,J,K | 4 |
| Bar-tailed Godwit | <i>Limosa lapponica</i> | | C,J,K | 117 |
| Black-tailed Godwit | <i>Limosa limosa</i> | V | C,J,K | 2 |
| Eastern Curlew | <i>Numenius madagascariensis</i> | | CE,C,J,K | 1 |
| Grey-tailed Tattler | <i>Tringa brevipes</i> | | C,J,K | 14 |
| Terek Sandpiper | <i>Xenus cinereus</i> | V | C,J,K | 3 |
| Caspian Tern | <i>Hydroprogne caspia</i> | | C,J | 15 |
| Common Tern | <i>Sterna hirundo</i> | | C,J,K | 24 |
| Little Tern | <i>Sternula albifrons</i> | E1 | C,J,K | 313 |

Appendix 6: Likelihood of occurrence in surveyed area of migratory avifauna species recorded within a 5km radius of the Study Area at 75 Gardeners Road, Eastlakes, since 1990 (OEH Atlas of NSW Wildlife 2015) or where potential habitat is deemed to potentially occur.

| Name | Distribution | Preferred Habitat | Number of Sightings in the area | Likelihood of occurrence in surveyed areas and requirement for further assessment |
|--|--|--|---------------------------------|---|
| Wedge-tailed Shearwater <i>Ardeana pacificus</i> C | The Wedge-tailed Shearwater breeds on the east and west coasts of Australia and on off-shore islands. The species is common in the Indian Ocean, the Coral Sea and the Tasman Sea (Lindsey 1986). | The Wedge-tailed Shearwater is a pelagic, marine bird known from tropical and subtropical waters. The species tolerates a range of surface-temperatures and salinities. In tropical zones the species may feed over cool nutrient-rich waters. The species has been recorded in offshore waters of eastern Victoria and southern NSW, mostly over continental slope. | 1 | No suitable habitat present within survey area. More likely to occur along the coastline beaches. No further assessment required. |
| Cattle Egret <i>Ardea ibis</i> C, J | Originally found in Africa, Europe and Asia, the Cattle Egret is now found on nearly every continent, with birds in Australia originating from Asia. In Australia it is most widespread and common in north-eastern Western Australia across the Top End, Northern Territory, and in south-eastern Australia from Bundaberg, Queensland to Port Augusta, South Australia, including Tasmania. The Cattle Egret is partially migratory, moving during winter. | The Cattle Egret is found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where drainage is poor. Will also forage at garbage dumps, and is often seen with cattle and other stock. | 5 | No suitable habitat present within survey area. More likely to occur at Towra Point nature reserve. No further assessment required. |
| White-bellied Sea Eagle <i>Haliaeetus leucogaster</i> J | White-bellied Sea-Eagles are a common sight in coastal and near coastal areas of Australia. In addition to Australia, the species is found in New Guinea, Indonesia, China, south-east Asia and India | White-bellied Sea-Eagles are normally seen perched high in a tree, or soaring over waterways and adjacent land. Birds form permanent pairs that inhabit territories throughout the year | 2 | May overfly the survey area on occasion but unlikely to utilise resources on site. No further assessment required. |

| Name | Distribution | Preferred Habitat | Number of Sightings in the area | Likelihood of occurrence in surveyed areas and requirement for further assessment |
|---|---|--|---------------------------------|---|
| Pacific Golden Plover <i>Pluvialis fulva</i> C, J, R | The Pacific Golden Plover breeds on the Arctic tundra in western Alaska. It winters in South America and islands of the Pacific Ocean to India, Indonesia and Australia. In Australia it is widespread along the coastline. | The Pacific Golden Plover is found on muddy, rocky and sandy wetlands, shores, paddocks, saltmarsh, coastal golf courses, estuaries and lagoons. | 39 | No suitable habitat present within survey area. More likely to occur at Towra Point nature reserve. No further assessment required. |
| Grey Plover <i>Pluvialis squatarola</i> C, J, R | The Grey Plover breeds around the Arctic regions and migrates to the southern hemisphere, being a regular summer migrant to Australia, mostly to the west and south coasts. It is generally sparse but not uncommon in some areas. It is occasionally found inland. | The Grey Plover is almost entirely coastal, being found mainly on marine shores, inlets, estuaries and lagoons with large tidal mudflats or sandflats for feeding, sandy beaches for roosting, and also on rocky coasts. | 5 | No suitable habitat present within survey area. No further assessment required. |
| Common Sandpiper <i>Actitis hypoleucos</i> C, J, R | The Common Sandpiper breeds in Europe and Asia. In Australasia it visits New Guinea and Australia, mainly in the north and west. It is less often seen in New Zealand. The Common Sandpiper is migratory, breeding in Eurasia. Most of the western breeding populations winter in Africa and eastern breeding populations winter in Australia and south Asia to Melanesia. Some birds do not return to Eurasia to breed, but remain in the north of Australia throughout the Australian winter. | In Australia, the Common Sandpiper is found in coastal or inland wetlands, both saline or fresh. It is found mainly on muddy edges or rocky shores. During the breeding season in the northern hemisphere, it prefers freshwater lakes and shallow rivers. | 4 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |

| Name | Distribution | Preferred Habitat | Number of Sightings in the area | Likelihood of occurrence in surveyed areas and requirement for further assessment |
|---|---|---|---------------------------------|---|
| Ruddy Turnstone <i>Arenaria interpres</i> C, J, R | In Australia, Ruddy Turnstones are widespread around the coast of the mainland and off-shore islands. They breed on the northern coasts of Europe, Asia and North America. They are found on coastlines around the world, when not breeding or on passage. After breeding in the northern hemisphere, they migrate south. There are five breeding populations. The birds migrating to Australia breed in east Siberia and west Alaska, moving through south-east Asia then south to Australia.. They visit Australia from about September to May. | The Ruddy Turnstone is found singly or in small groups along the coastline and only occasionally inland. They are mainly found on exposed rocks or reefs, often with shallow pools, and on beaches. In the north, they are found in a wider range of habitats, including mudflats. | 3 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |
| Sharp-tailed Sandpiper <i>Calidris acuminata</i> C, J, R | The Sharp-tailed Sandpiper is a summer migrant from Arctic Siberia, being found on wetlands throughout Australia. It is also found in Indonesia, Papua New Guinea, the Solomon Islands, New Caledonia and New Zealand. It is a vagrant to India, Europe, western North America, Fiji and other parts of the central Pacific region. | The Sharp-tailed Sandpiper prefers the grassy edges of shallow inland freshwater wetlands. It is also found around swage farms, flooded fields, mudflats, mangroves, rocky shores and beaches. Its breeding habitat in Siberia is the peat-hummock and lichen tundra of the high Arctic. | 31 | Recorded within 1km of the survey area within the larger expanse of the Golf Course. More likely to occur at Botany Wetlands. No further assessment required. |
| Sanderling <i>Calidris alba</i> C, J, R | A regular summer migrant from Siberia and other Arctic breeding grounds to most of the Australian coastline. It is uncommon to locally common, arriving from September and leaving by May (some may overwinter in Australia). Sanderlings occur along the NSW coast, with occasional inland sightings. | They are often found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands. They breed in Siberia. In Australia it roosts on bare sand, behind clumps of beach-cast kelp or in coastal dunes. | 1 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |

| Name | Distribution | Preferred Habitat | Number of Sightings in the area | Likelihood of occurrence in surveyed areas and requirement for further assessment |
|--|---|--|---------------------------------|---|
| Red Knot <i>Calidris canutus</i> C, J, R | Red Knots are widespread around the Australian coast, less in the south and with few inland records. Small numbers visit Tasmania and off-shore islands. It is widespread but scattered in New Zealand. They breed in North America, Russia, Greenland and Spitsbergen. Red Knots are a non-breeding visitor to most continents. This is a migratory species, breeding in the high Arctic, then migrating south. The subspecies <i>rogersi</i> breeds in north-eastern Siberia and migrates mainly to New Zealand and Australia. The nominate subspecies also flies to Australia. They fly long non-stop flights and the route to Australia is not well known. Most arrive in north west Australia at the end of August to September and leave south east Australia from March to early April. Some young non-breeders may remain here. | Red Knots gather in large flocks on the coast in sandy estuaries with tidal mudflats. Red Knots gather in large flocks with other waders. They walk fast, probing rapidly in soft sand and mud for worms, bivalves and crustaceans and also eat spiders, insects, seeds and shoots. They feed by day and night, regulated by the tide. | 24 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |
| Curlew Sandpiper <i>Calidris ferruginea</i> C, J, R | The Curlew Sandpiper is a common summer migrant from north-eastern Siberia and Alaska, found in many Australian coastal sites and may also be seen inland in suitable habitats. It is most common in the far south-east and north-west of Australia. It is also found in Africa, across southern Asia to Indonesia and New Guinea, and in New Zealand. | The Curlew Sandpiper is found on intertidal mudflats of estuaries, lagoons, mangroves, as well as beaches, rocky shores and around lakes, dams and floodwaters. Its breeding habitat is the lowland tundra of Siberia. | 41 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |

| Name | Distribution | Preferred Habitat | Number of Sightings in the area | Likelihood of occurrence in surveyed areas and requirement for further assessment |
|--|---|--|---------------------------------|---|
| Red-necked Stint <i>Calidris ruficollis</i> C, J, R | The Red-necked Stint breeds in north-eastern Siberia and northern and western Alaska. It follows the the East Asian-Australasian Flyway to spend the southern summer months in Australia. It is found widely in Australia, except in the arid inland. The Red-necked Stint is a migratory wader arriving in Australia from late August to September and leaving early March to mid-April. | In Australia, Red-necked Stints are found on the coast, in sheltered inlets, bays, lagoons, estuaries, intertidal mudflats and protected sandy or coralline shores. They may also be seen in saltworks, sewage farms, saltmarsh, shallow wetlands including lakes, swamps, riverbanks, waterholes, soaks and pools in saltflats, flooded paddocks or damp grasslands. They are often in dense flocks, feeding or roosting. | 66 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |
| Great Knot <i>Calidris tenuirostris</i> C, J, R | Their breeding habitat is tundra in northeast Siberia. They are strongly migratory wintering on coasts in southern Asia through to Australia. This species forms enormous flocks in winter. Great Knot leave Australian shores during March and April for their breeding grounds in far northern Siberia. They return to us in August and September. | Found feeding on the mudflats of inlets, estuaries and lagoons, then roosting on sand-bars, beaches etc. | 4 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |
| Latham's Snipe <i>Gallinago hardwickii</i> C, J, R | Latham's Snipe is a non-breeding migrant to the south east of Australia including Tasmania, passing through the north and New Guinea on passage. Latham's Snipe breed in Japan and on the east Asian mainland. Latham's Snipe is a migratory wader, moving to Australia in our warmer months. They leave their breeding areas from August to November, arriving in Australia mainly in September. | Latham's Snipe are seen in small groups or singly in freshwater wetlands on or near the coast, generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration. They also use crops and pasture. They are omnivorous, eating seeds and plant material, worms and insects, some molluscs, isopods and centipedes | 4 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |

| Name | Distribution | Preferred Habitat | Number of Sightings in the area | Likelihood of occurrence in surveyed areas and requirement for further assessment |
|--|--|---|---------------------------------|---|
| Bar-tailed Godwit <i>Limosa lapponica</i> C, J, R | Bar-tailed Godwits arrive in Australia each year in August from breeding grounds in the northern hemisphere. Birds are more numerous in northern Australia. While most birds leave Australia in April and May, to return to their breeding grounds, some birds (mostly young birds) remain all year round. | Bar-tailed Godwits inhabit estuarine mudflats, beaches and mangroves. They are common in coastal areas around Australia. They are social birds and are often seen in large flocks and in the company of other waders. Bar-tailed Godwits feed on molluscs, worms and aquatic insects. Birds wade through the probe their long bills rapidly into the bottom to find food. | 117 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |
| Black-tailed Godwit <i>Limosa limicola</i> C, J, R | The Black-tailed Godwit is a migratory wading bird that breeds in Mongolia and Eastern Siberia (Palearctic) and flies to Australia for the southern summer, arriving in August and leaving in March. In NSW. it is most frequently recorded at Kooragang Island (Hunter River estuary), with occasional records elsewhere along the north and south coast, and inland. | Habitat is found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. | 2 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |
| Eastern Curlew <i>Numenius madagascariensis</i> C, J, R | The Eastern Curlew is widespread in coastal regions in the north-east and south of Australia, including Tasmania, and scattered in other coastal areas. It is rarely seen inland. It breeds in Russia and north-eastern China. leaving breeding areas from mid-July to late September. They arrive in eastern Australia mainly in August. Large numbers appear on the east coast from September to November. Most leave again from late February to March. | The Eastern Curlew is found on intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons. | 1 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |

| Name | Distribution | Preferred Habitat | Number of Sightings in the area | Likelihood of occurrence in surveyed areas and requirement for further assessment |
|---|--|---|---------------------------------|---|
| Grey-tailed Tattler <i>Tringa brevipes</i> C, J, R | Grey-tailed Tattlers breed in Siberia and on passage are seen along the East Asian-Australasian Flyway (the migration route to Australia). When non-breeding they are found in China, Philippines, Taiwan, Vietnam, Malay Peninsula, Indonesia, New Guinea, Micronesia, Fiji, New Zealand and Australia. They are more commonly seen in the north of Australia. | Grey-tailed Tattlers are usually seen in small flocks on sheltered coasts with reefs and rock platforms or with intertidal mudflats. They are also found in intertidal rocky, coral or stony reefs, platforms and islets that are exposed at high tide, also shores of rock, shingle, gravel and shells and on intertidal mudflats in embayments, estuaries and coastal lagoons, especially those fringed with mangroves. | 14 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |
| Terek Sandpiper <i>Xenus cinereus</i> C, J, R | Terek Sandpipers are more common on the northern and eastern Australian coasts than in the south, but nowhere in large numbers. They breed mainly in Russia and Finland and migrate to coastal Africa, India, the Malayan peninsula and Australia. | Terek Sandpipers are found on the coast in mangrove swamps, tidal mudflats and the seashore. | 3 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |
| Caspian Tern <i>Hydroprogne caspia</i> C, J | Their breeding habitat is large lakes and ocean coasts in North America (including the Great Lakes), and locally in Europe (mainly around the Baltic Sea and Black Sea), Asia, Africa, and Australasia (Australia and New Zealand). North American birds migrate to southern coasts, the West Indies and northernmost South America. European and Asian birds spend the non-breeding season in the Old World tropics. African and Australasian birds are resident or disperse over short distances | They may fly up to 60 km from the breeding colony to catch fish; it often fishes on freshwater lakes as well as at sea. They feed mainly on fish, which they dive for, hovering high over the water and then plunging. They also occasionally eat large insects, the young and eggs of other birds and rodents. | 15 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |

| Name | Distribution | Preferred Habitat | Number of Sightings in the area | Likelihood of occurrence in surveyed areas and requirement for further assessment |
|--|---|---|---------------------------------|---|
| Common Tern <i>Sterna hirundo</i> C, J, R | In Australia the Common Tern is a regular non-breeding visitor. It breeds across much of northern North America, Europe and Asia as far east as the Pacific coast of Siberia, and as far south as the Mediterranean, North Africa and Central Asia. It is almost cosmopolitan (worldwide) at other times. | The Common Tern is mainly coastal when not breeding and found in offshore waters, ocean beaches, estuaries and large lakes. Common Terns are occasionally seen in freshwater swamps, floodwaters, sewage farms and brackish and saline lakes. | 24 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |
| Little tern <i>Sternula albifrons</i> C, J, R | The Little Tern breeds in North America, Eurasia, Western Africa and Australasia and winters in northern South America, Africa, Southern Asia and Australasia. In Australia, it breeds from Tasmania to the Gulf of Carpentaria and has bred in the Coorong and near Adelaide, South Australia. It has been recorded across Northern Australia to Shark Bay, Western Australia. | The Little Tern is mainly coastal, being found on beaches, sheltered inlets, estuaries, lakes, sewage farms, lagoons, river mouths and deltas. | 313 | No suitable habitat present within survey area. More likely to occur at Botany Wetlands No further assessment required. |

Birds listed under CAMBA (C), and JAMBA (J), ROCKAMBA (R)

Reference material: Pizzey & Knight 2003 'A Field Guide to the birds of Australia'

\Appendix 7 - Migratory Species Listed by Commonwealth Department of the Environment (DoE) as having habitat within the survey area.

birds listed under CAMBA (C), and JAMBA (J), ROCKAMBA (R)

| Species | Species Distribution | Preferred Habitat | Presence on site |
|---|---|--|--|
| White-bellied Sea-eagle <i>Haliaeetus leucogaster</i> C | Coastal mainland Australia and Tasmania and large waterbodies and rivers inland | Major rivers, inshore seas and large estuaries as well as upper reaches of rivers and large inland waterbodies | UNLIKELY- but may overfly the area as part of a greater range. |
| White-throated Needletail <i>Hirundapus caudacutus</i> C,J,R | Summer migrant to coastal and sub-coastal eastern Australia | Range of habitats where it forages in the airspace over forests, woodlands, urban areas, grasslands and water | UNLIKELY- but may overfly the area as part of a greater range. |
| Black-faced Monarch <i>Monarcha melanopsis</i> | Summer migrant to east coast of NSW. Coastal eastern Australia from Cape York to far eastern Victoria mostly east of Great Divide | Rainforests, eucalypt woodlands, coastal scrubs, wet gullies and woodlands. Prefers to feed in the middle layers of rainforest and wet eucalypt forest. Also prefers a dense understorey tangle where it feeds into the cracks and crevices. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species. |
| Rainbow Bee-eater <i>Merops ornatus</i> | The Rainbow Bee-eater is found throughout mainland Australia, as well as eastern Indonesia, New Guinea and, rarely, the Solomon Islands. In Australia it is widespread, except in desert areas, and breeds throughout most of its range, although southern birds move north to breed. | The Rainbow Bee-eater is most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. It will be found on farmland with remnant vegetation and in orchards and vineyards. It will use disturbed sites such as quarries, cuttings and mines to build its nesting tunnels. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species. |
| Satin Flycatcher <i>Myiagra cyanoleuca</i> | Breeding Queensland to Tasmania, they migrate north to Torres Strait and New Guinea in winter. | Winters in northern Australia. Occupies rolling plains and steep heavily vegetated mountain gullies in forests, woodlands. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species. |

| Species | Species Distribution | Preferred Habitat | Presence on site |
|---|---|--|--|
| Rufous Fantail <i>Rufous rufifons</i> | Breeds north as far as Cooktown in Queensland and down to south-western Victoria. They travel north during March April. September-October to winter in north-eastern Queensland and Northern New Guinea, returning September-October. | Undergrowth of wet forests and scrubs, monsoon forests and paperbarks, coastal scrubs, mangroves and watercourses. | UNLIKELY-suitable habitat present within survey area but too disturbed for this cryptic species. May occur within river areas. The proposed development should have no impact on this migratory species. |
| Regent Honeyeater <i>Xanthomyza phrygia</i> | Autumn – winter migrant to coastal NSW. Southern and central tablelands through north-western slopes. | Prefers well shrubbed eucalypt woodland and open forest flanking the Great Dividing Range. Forage in box ironbark woodlands and mistletoe-infested areas. Forages coastally in Swamp Mahogany. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species |

Reference material: Pizzey & Knight 2003 'A Field Guide to the birds of Australia'

Marchant & Higgins 1990 'Handbook of Australian, New Zealand and Antarctic Birds'

Appendix 8- Threatened Species Listed by Commonwealth Department of the Environment, (OoE) as having habitat within the survey area.

| Species | Species Distribution | Preferred Habitat | Presence on site |
|--|--|--|--|
| Regent Honeyeater <i>Anthochaera phrygia</i> | Autumn – winter migrant to coastal NSW. Southern and central tablelands through north-western slopes. | Prefers well shrubbed eucalypt woodland and open forest flanking the Great Dividing Range. Forage in box ironbark woodlands and mistletoe-infested areas. Forages coastally in Swamp Mahogany. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species. |
| Australasian Bittern <i>Botaurus poiciloptilus</i> | The Australasian Bittern is found in coastal and sub-coastal areas of south-eastern and south-western mainland Australia, and the eastern marshes of Tasmania. | Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.). Hides during the day amongst dense reeds or rushes. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species. |
| Eastern Bristlebird <i>Dasyornis brachypterus</i> | A central population, occurs on the central coast of NSW, and consists of extant local populations at Budderoo National Park and adjoining Barren Grounds Nature Reserve, in the Morton National Park-Red Rocks Nature Reserve area, and at Jervis Bay. | Dense coastal, mountain heath, taller swamps, stream thickets. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species. |
| Red Goshawk <i>Erythrorhynchus radiatus</i> | The Red Goshawk is endemic to Australia. It is very sparsely dispersed across approximately 15% of coastal and sub-coastal Australia, from western Kimberley Division (north of 19°S) to northeastern NSW (north of 33°), and occasionally on continental islands. | In NSW favoured habitat is mixed subtropical rainforest and Melaleuca forest along coastal rivers, often in rugged terrain . | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species. |
| Swift Parrot <i>Lathamus discolor</i> | Autumn – winter migrant to coastal NSW. In NSW mostly occurs on the coast and south west slopes (Pizzey & Knight 2003). | Occurs on the mainland in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Will feed in the following trees; Swamp Mahogany (<i>E. robusta</i>), Forest Redgum (<i>E. tereticornus</i>), Spotted Gum (<i>Corymbia maculata</i>), Red Bloodwood (<i>Corymbia gummiifera</i>). | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species. |
| Australian Painted Snipe <i>Rostratula australis</i> | The Australian race of Painted Snipe appears non-migratory, but nomadic, occurring across eastern and northern Australia, mainly inland in muddy, freshwater swamps in Murray-Darling and Great Artesian Basins. | Prefers shallow freshwater swamps and marsh with adequate cover. | UNLIKELY-No suitable wetland habitat present within survey area. The proposed development should have no impact on this species. |

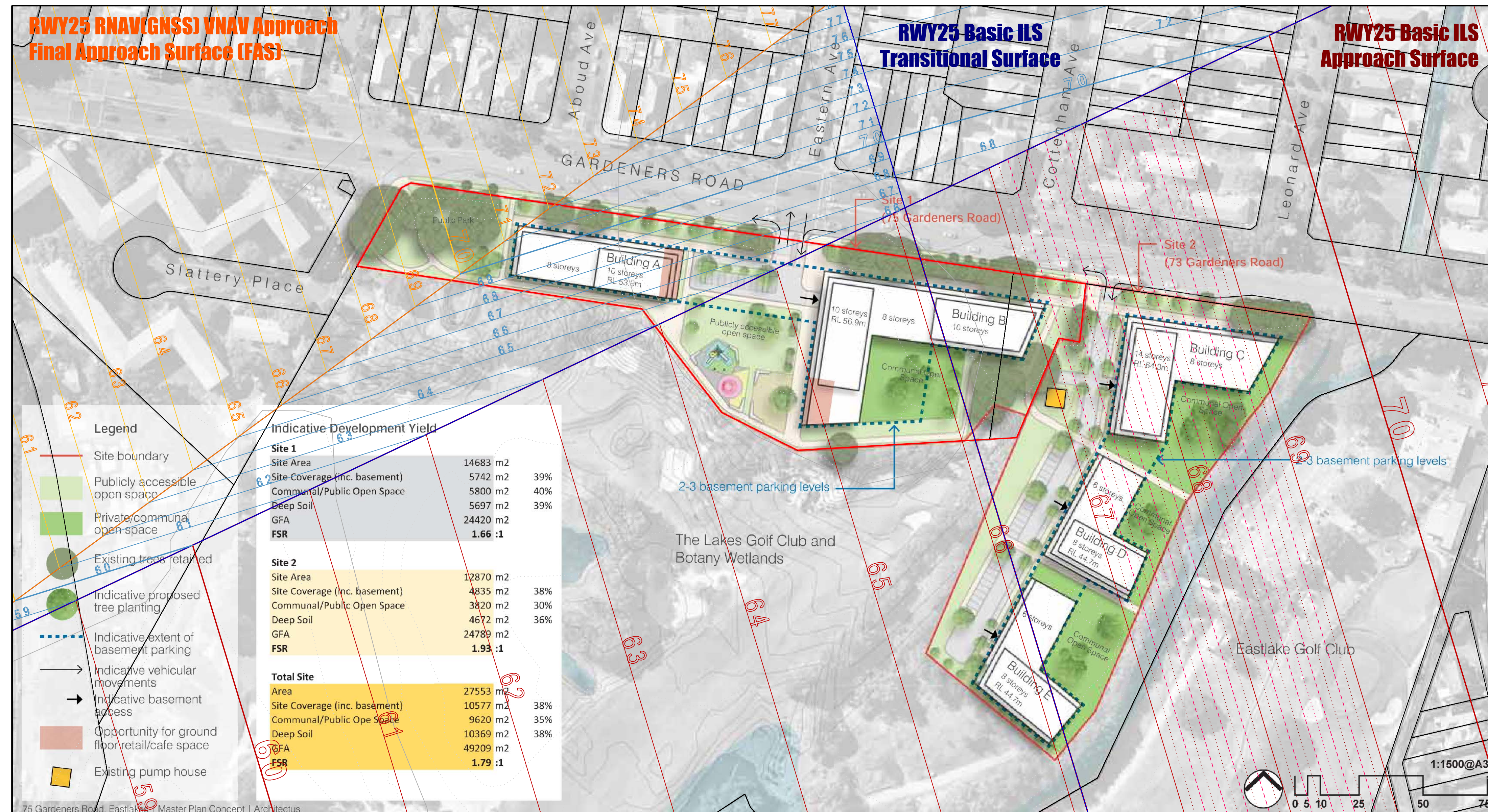
| Species | Species Distribution | Preferred Habitat | Presence on site |
|--|---|--|---|
| Giant Burrowing Frog <i>Heleioporus australiacus</i> | This species is found from the central coast of NSW to eastern Victoria (Cogger 2000). Habitat restricted to Hawkesbury Sandstone. | Usually found in sandy creek beds with crayfish burrows in the area. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species. |
| Green and Golden Bellfrog <i>Litoria aurea</i> | Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria. Records from west to Bathurst, Tumut and the ACT region. Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast. Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (<i>Gambusia holbrooki</i>), | Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (<i>Typha</i> | UNLIKELY- Habitat present in ponds within the golf course but the presence of (<i>Gambusia holbrooki</i>) which predate on the tadpoles limits its presence. The Office of the Environment has listed the frog as extinct within Eastlakes Golf Course. |
| Giant-barred Frog <i>Mixophyes iteratus</i> | Distribution: Coast and ranges from south-eastern Queensland to the Hawkesbury River in NSW. North-eastern NSW, particularly the Coffs Harbour-Dorrigo area, is now a stronghold. | Giant Barred Frogs forage and live amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000 m. They breed around shallow, flowing rocky streams from late spring to summer. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species. |
| Large-eared Pied Bat <i>Chalinolobus dwyeri</i> | South-eastern Queensland to New South Wales from the coast to the western slopes of the Divide. Endemic to Australia. | These bats roost in shallow caves in escarpments, particularly in sandstone and forage in remnant native dry and wet open forests, woodlands and rainforests. | UNLIKELY-As no suitable roosting habitat is available on site individuals are likely to visit during foraging only. No impact is expected on this species as a result of the proposed development. |
| Spotted-tailed Quoll <i>Dasyurus maculatus</i> | Sparsely distributed from Fraser Island to south-western Victoria and widespread in Tasmania. | Inhabits rainforest, wet and dry sclerophyll forest, coastal heath and scrub, often found associated with Forest Red Gum along inland rivers. The species dens in tree hollows, hollow logs or rock crevices. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species |

| Species | Species Distribution | Preferred Habitat | Presence on site |
|--|--|--|--|
| Long-nosed Potoroo <i>Potorous tridactylus tridactylus</i> | Locally common in Tasmania, patchy distribution from coastal south-west Victoria to south-east Queensland. | Inhabits moist sclerophyll forest with a dense shrub layer to coastal heath woodland. Prefers dense cover for shelter adjacent to open foraging sites. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species |
| Koala <i>Phascolarctos cinereus</i> | The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the western region. | They inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Primary food trees in the region of the subject land are <i>Eucalyptus parramattensis</i> , <i>E. tereticornis</i> , <i>E. viminalis</i> , <i>E. robusta</i> and <i>E. amplifolia</i> . Some secondary food sources include but are not limited to <i>Eucalyptus punctata</i> , <i>E. moluccana</i> and <i>E. macrocarpa</i> . | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species |
| Brush-tailed Rock Wallaby <i>Petrogale penicillata</i> | The Brush-tailed Rock-wallaby was once widespread and abundant in southeastern Australia. It was formerly found along the Great Dividing Range from Nanango in south-east Queensland through to east Gippsland in Victoria. | This species prefers rocky habitats, including loose boulder-piles, rocky outcrops, steep rocky slopes, cliffs, gorges and isolated rock stacks. It also utilises tree limbs. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species |
| New Holland Mouse <i>Pseudmys novaehollandiae</i> | The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, NSW and Queensland. In NSW, the New Holland Mouse is known from: Royal National Park (Menkorst & Knight 2001) | The New Holland Mouse has been found from coastal areas and up to 100 km inland on sandstone country with deeper topsoils for digging burrows. Due to the grain diet of the species, areas high in floristic diversity, are essential. | UNLIKELY-No suitable habitat present within survey area. The proposed development should have no impact on this species |
| Grey-headed flying Fox <i>Pteropus poliocephalus</i> | East coast of Australia from Rockhampton in Queensland to western Victoria. Endemic to Australia (Churchill 1998). | Found in a variety of habitats, including rainforest, mangroves, paperbark swamps, wet and dry sclerophyll forests and cultivated areas. | LIKELY-The survey area does contain some food trees suitable for the Grey-headed Flying Fox but the species is more likely to forage within Bicentennial Park. The proposed development should have no impact. |

Attachment I – Aeronautical Assessment, Prepared by Strategic Airspace, dated September 2017

73-75 Gardeners Rd, Eastlakes Sydney Water Project

Aviation-related Airspace Height Limits (PANS-OPS Surfaces) Maximum Permissible Development Heights (Metres AHD)



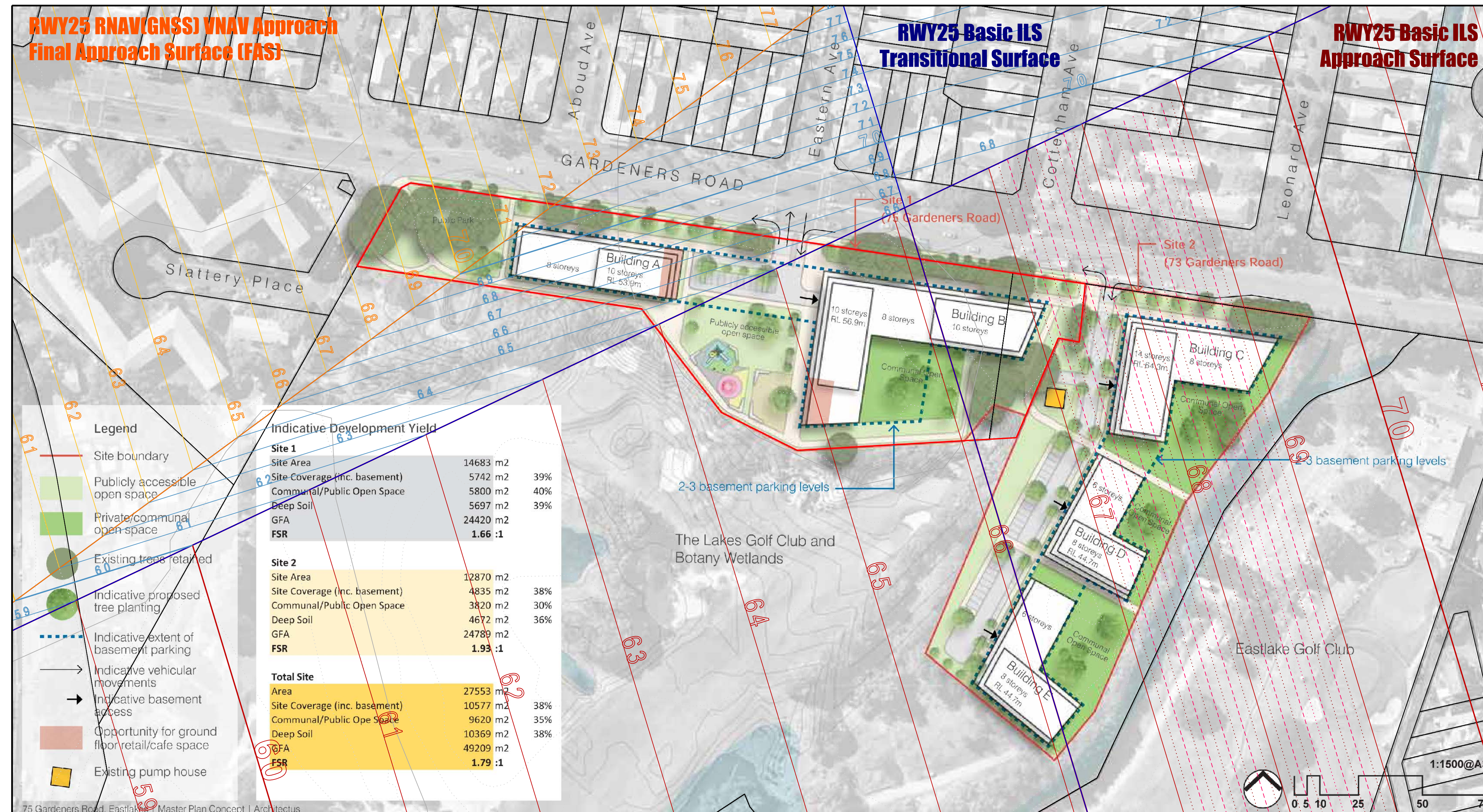
Scale: 1:1000 at A1

...lyssyols0_17012-75Gard_SurfacesOverSite_2017_v1-1.dgn 14/09/2017

**strategic
airspace**

73-75 Gardeners Rd, Eastlakes Sydney Water Project

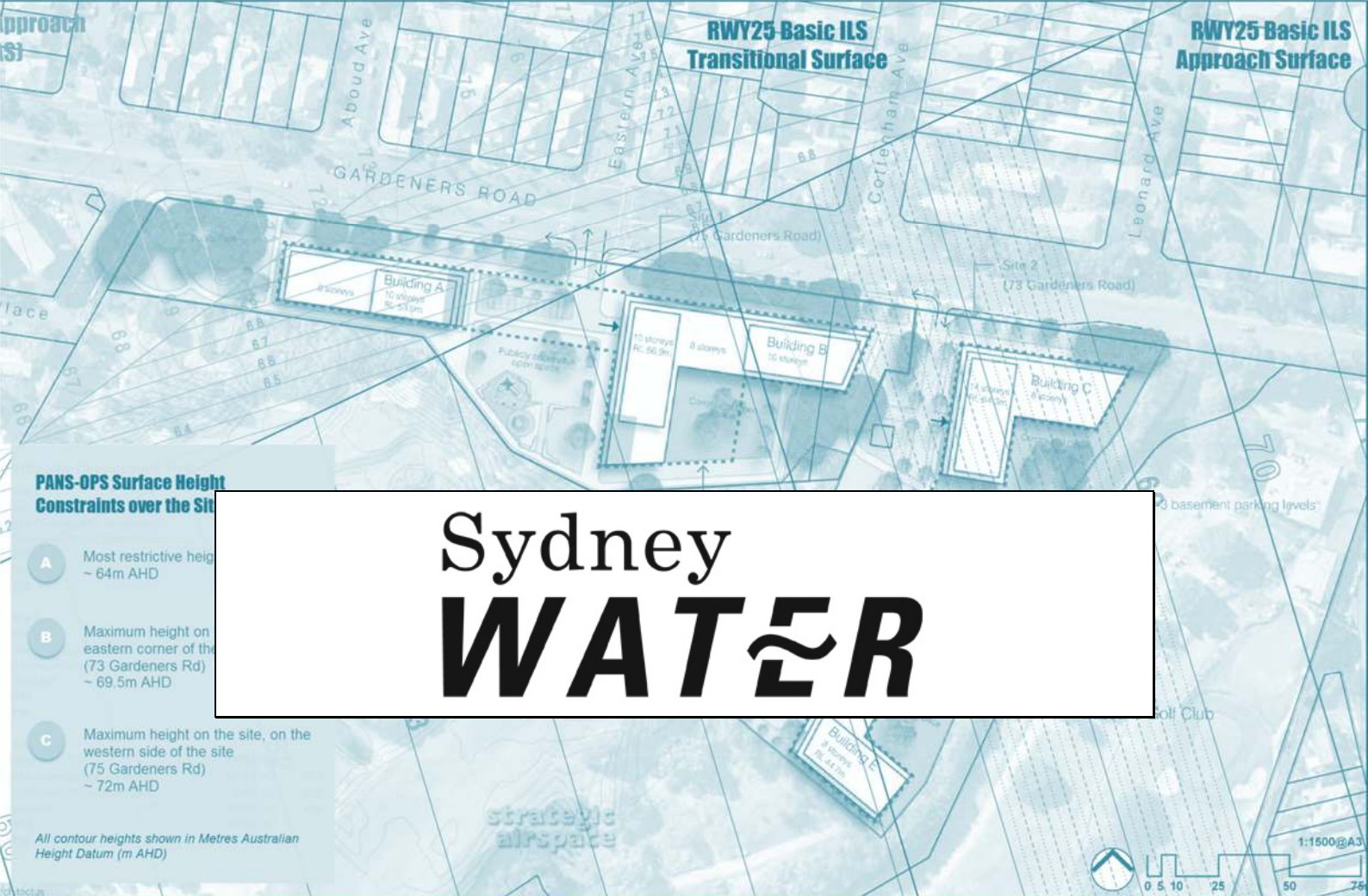
Aviation-related Airspace Height Limits (PANS-OPS Surfaces) Maximum Permissible Development Heights (Metres AHD)



Scale: 1:1000 at A1

...lyssyols0_17012-75Gard_SurfacesOverSite_2017_v1-1.dgn 14/09/2017

**strategic
airspace**



73-75 Gardeners Rd, Eastlakes — Aeronautical Impact Assessment for Planning Proposal

Version 1.1
22 September 2017

**strategic
airspace**

Prepared by Consultants:



Strategic Airspace Pty Limited
ABN: 60 097 857 415

PO Box 774, Potts Point NSW 1335
Australia

Tel: +61.2.9211.0085

Email - Attn: Cathy.PakPoy@StrategicAirspace.com

Client:

Sydney Water

Document Control

Document Number: **17.012-01-001**

Version: **1.1**

Document Title: **73-75 Gardeners Rd, Eastlakes — Aeronautical Impact Assessment for Planning Proposal**

Purpose / Abstract: *This report has been commissioned by Sydney Water to support the planning processes for the land at 73 and 75 Gardeners Rd, Eastlakes.*

This report assesses the current regulated airspace height constraints over the project site to inform the planning process and ongoing master planning being conducted by Architectus. The airspace constraints are examined in relation to the maximum building envelope proposed and the additional airspace that would be required for cranes necessary to enable the development.

Contract: -

StratAir Ref: 17.012

Change History

| <i>Version</i> | <i>Versn Date</i> | <i>Version By</i> | <i>QA By</i> | <i>Version / Change Description</i> |
|----------------|-------------------|-------------------|--------------|---|
| 1.0.x Drafts | Aug-2017 | C. Pak-Poy | J. McCarthy | Preliminary versions for internal review |
| 1.1 Draft | 10-Sep-2017 | C. Pak-Poy | J. McCarthy | Include impact of RWY25 RNAV(GNSS) Baro-VNAV procedure on PANS-OPS surface constraints over the site. |
| 1.1 | 22-Sep-2017 | C. Pak-Poy | J. McCarthy | Editorial – repair document |
| 1.2 Final | 27-Sep-2017 | J. McCarthy | | Minor amendment following review by client |

Distribution Control

| | | |
|-----------------------|--|--|
| <u>Legend:</u> | <i>Uncont</i> Uncontrolled Document | <i>SACL</i> Sydney Airport Limited |
| | <i>Client</i> Sydney Water | <i>StratAir</i> Strategic Airspace |
| | <i>APT</i> Sydney Airport | <i>AsA</i> Airservices (formerly Airservices Australia) |
| | <i>CASA</i> Civil Aviation Safety Authority | <i>Infrastructure, DIRD</i> Department of Infrastructure & Regional Development |

| <i>Issue Version</i> | <i>Issue Date</i> | <i>Issue Purpose / Description</i> | <i>Copy No</i> | <i>Copy Recipient</i> |
|----------------------|-------------------|---|----------------|---------------------------|
| 1.1 | 24-Aug-2017 | Distribution to client for distribution | Uncont | StratAir internal, Client |
| 1.2 | 27-Sep-2017 | Final version for client | Uncont | Client |

This document was prepared by **Strategic Airspace** Pty Limited on behalf of client **Sydney Water**
Copyright © Strategic Airspace Pty Limited, 2017

All Rights Reserved. No part of this document or its entirety may be divulged, commercialised, translated, reproduced and/or copied in any form or by any means without the express and prior written permission of the copyright holder.

Whilst this document has been prepared using all due and customary care, StratAir reserves the right to correct any errors, omissions or misrepresentations.

The authorised recipient of the this document is hereby granted permission to use the contents of this document and to make and transmit copies in a secure manner for the purposes of evaluation or the report contents; liaison with its consultants and relevant State and/or international authorities for the purposes of verification, regulatory and operational impact, and/or approvals; and any pursuant negotiation with StratAir as part of its project evaluation and completion processes.

In the event of translation for this purpose and any discrepancies between the translated and original versions, this original text will prevail.

Contents

| | |
|---|-----------|
| Change History..... | iv |
| Distribution Control..... | iv |
| 1. Executive Summary | 1 |
| 2. Introduction | 5 |
| 3. Background | 6 |
| 3.1 The Project | 6 |
| 3.2 Previous Aeronautical Studies..... | 6 |
| 4. Aeronautical Impact Context..... | 7 |
| 4.1 Location of the Proposed Development | 7 |
| 4.2 Methodology | 8 |
| 4.2.1 Airspace Regulations | 8 |
| 4.2.2 Prescribed Airspace..... | 8 |
| 4.2.3 Note about Heights: Australian Height Datum (AHD) vs Above Ground Level (AGL)..... | 9 |
| 4.2.4 Making an Application for an Aviation-related Airspace Height Approval | 9 |
| 5. Analysis..... | 10 |
| 5.1 OLS Analysis | 10 |
| 5.2 PANS-OPS Analysis..... | 11 |
| 5.2.1 Current Procedures..... | 11 |
| 5.2.2 “Area” Procedures..... | 12 |
| A Minimum Sector Altitudes (MSAs) | 12 |
| B Circling Minima..... | 12 |
| 5.2.3 Instrument Approaches & Missed Approaches | 13 |
| A Approach Procedures to RWY 25..... | 13 |
| B Missed Approach Segments of Approach Procedures for RWY 07 and RWY 34R | 14 |
| 5.2.4 Departures | 14 |
| 5.3 Other Assessment Considerations | 14 |
| 5.4 Summary of Maximum Permissible Heights..... | 15 |
| 6. Considerations for Cranes | 16 |
| 7. Conclusion | 17 |

Tables

| | |
|--|----|
| Table 1 — Summary — Airspace Height Constraints (as per Table 4) | 3 |
| Table 2 — PANS-OPS Height Limit Summary | 12 |
| Table 3 — Other Assessable Height Limitations | 14 |
| Table 4 — Summary — Airspace Height Constraints..... | 15 |

| | |
|--|---|
| Table 5 — PANS OPS Instrument Flight Procedure Charts for Sydney Airport (AIP Amendment 152 – Effective 17-Aug-2017 to 08-Nov-2017)..... | 2 |
|--|---|

Figures

| | |
|---|----|
| Figure 1 — Sydney Water Master Plan Concept – Gardeners Rd, Eastlakes | 1 |
| Figure 2 — Project Site in relation to Sydney Airport | 2 |
| Figure 3 — Maximum Permissible Development Heights — Restrictive Surface Heights from the PANS-OPS Surface Limits (as per Figure 8) | 3 |
| Figure 4 — Sydney Water Sites — Gardeners Rd, Eastlakes | 5 |
| Figure 5 — Sydney Water Master Plan Concept in 3D – Gardeners Rd, Eastlakes | 6 |
| Figure 6 — Project Site in relation to Sydney Airport (Large Format) | 7 |
| Figure 7 — Site in relation to Sydney Airport’s OLS | 10 |
| Figure 8 — PANS-OPS Height Constraints across the Site (Large Format)..... | 12 |

Appendices

Appendix 1 — Abbreviations

Appendix 2 — PANS-OPS Procedures

1. Executive Summary

Sydney Water is in the process of divesting surplus land to allow redevelopment and improved utilisation of this land within the Sydney Metropolitan area. For the subject sites, due to their location within the wider context of Eastlakes, it is proposed to seek their rezoning to allow for residential development or other appropriate supporting land uses.

This report — which focuses on the existing conditions and airspace constraints — has been commissioned by Sydney Water to inform and support ongoing planning for the two land parcels at **73 and 75 Gardeners Rd, Eastlakes**.

To this end, Sydney Water has also engaged Architectus to prepare a Master Plan for the site for the purposes of informing a Planning Proposal which seek to amend the current planning controls for the site to allow residential development and supporting land uses. This aeronautical impact report is to be considered as a contribution to the Master Plan and for the consideration of the appropriateness of height limits in planning controls.



Figure 1 — Sydney Water Master Plan Concept – Gardeners Rd, Eastlakes

This report has been prepared having regard to the Prescribed Airspace of Sydney Airport. It examines the current regulated airspace height limits constraints overhead the site that are related to aviation airspace protection requirements and which, under the Airports (Protection of Airspace) Regulations 1996 (APAR), would:

- a) Trigger the requirement to apply for an airspace height approval;
- b) Constrain the maximum permissible building envelope heights; and
- c) Constrain the maximum permissible heights for cranes that would be required to enable construction of the proposed development.

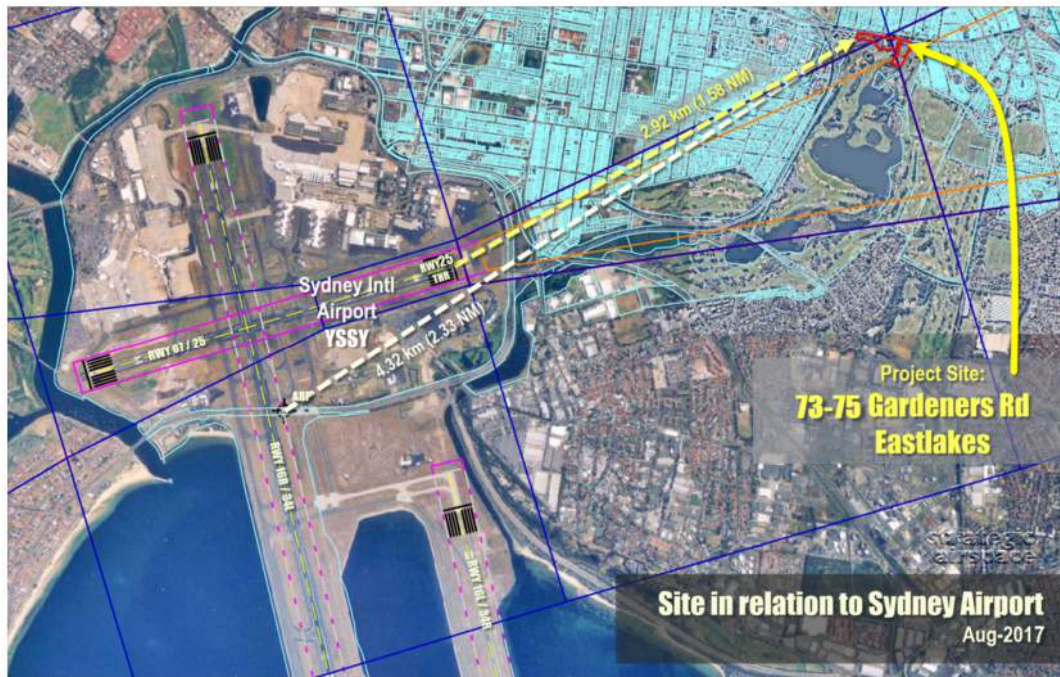


Figure 2 — Project Site in relation to Sydney Airport

The study area is located approximately 4.3km (2.3 Nautical Miles, NM) from the Aerodrome Reference Point of Sydney Airport and approximately 2.9km (1.6NM) from the Runway (RWY) 25 landing threshold, as indicated in Figure 2 above.

In this location, the site is:

- Subject to Obstacle Limitation Surface (OLS) height limits which, over the site, is a horizontal limit of 51m Australian Height Datum (AHD).

OLS heights can be considered threshold heights; any building or crane which would exceed the relevant height would need to gain airspace height approvals from the Commonwealth Department of Infrastructure and Regional Development (DIRD), under the Airports (Protection of Airspace) Regulations (APAR) prior to construction or erection.

- Constrained by PANS-OPS approach procedures, which impose various sloping surfaces across the site.

PANS-OPS surface heights are based on the heights related to the protection requirements of the various PANS-OPS Instrument Flight Procedures for Sydney Airport. These define the potential maximum permissible heights for buildings (including all overruns) under the APAR, except where another aviation safety-related airspace constraint is lower. Cranes may also be permitted up to these surface heights.

- All other surfaces which overlay the site are higher than the PANS-OPS surfaces and therefore considered irrelevant for the purposes of this study.

Cranes are may not be permitted at heights which exceed the PANS-OPS surface limits indicated herein.

The relevant airspace constraints overhead the study area are summarised as follows:

For: Sydney Water

Table 1 — Summary — Airspace Height Constraints (as per Table 4)

| Height Limits (AHD) | Height Limit Detail | Comment |
|---------------------|--|--|
| 51m | OLS Outer Horizontal Surface | <p>THRESHOLD HEIGHT limits (depicted in Figure 7, p10)</p> <p>Any development that would exceed the relevant OLS height across the site would require a prior 'airspace height' approval from the Department of Infrastructure and Regional Development under the Airports (Protection of Airspace) Regulations (or APAR).</p> <p>An application can be made for each tower building separately, or a single application can be made for the all towers within the development that would exceed this height.</p> |
| ~64 – 72m | Various PANS-OPS RWY25 Basic ILS Approach & Transitional & RWY25 RNAV(GNSS)-Z VNAV Final Approach Surface — All sloping surfaces | <p>The PANS-OPS height constraints across the site will be regarded as the maximum permissible building heights that would be approved by the aviation authorities in the relevant areas (see Figure 8, p12)</p> <p>Cranes may be permitted up to the relevant PANS-OPS heights, taking crane boom length and swing into effect.</p> <p>Cranes may potentially be approved at heights that exceed the applicable PANS-OPS surface height constraints shown, subject to the specific location and a risk analysis, and acceptability to Sydney Airport.</p> |
| NA | Other Surfaces | The study area is not constrained by any airspace protection requirements related to other approach procedures, departure procedures, Radar Terrain Clearance Chart (RTCC) surfaces, Sydney Airport's Navigation and Airport Lighting and Visual Guidance facilities, as well as those related to Airline Engine Inoperative contingency take-off procedures. |

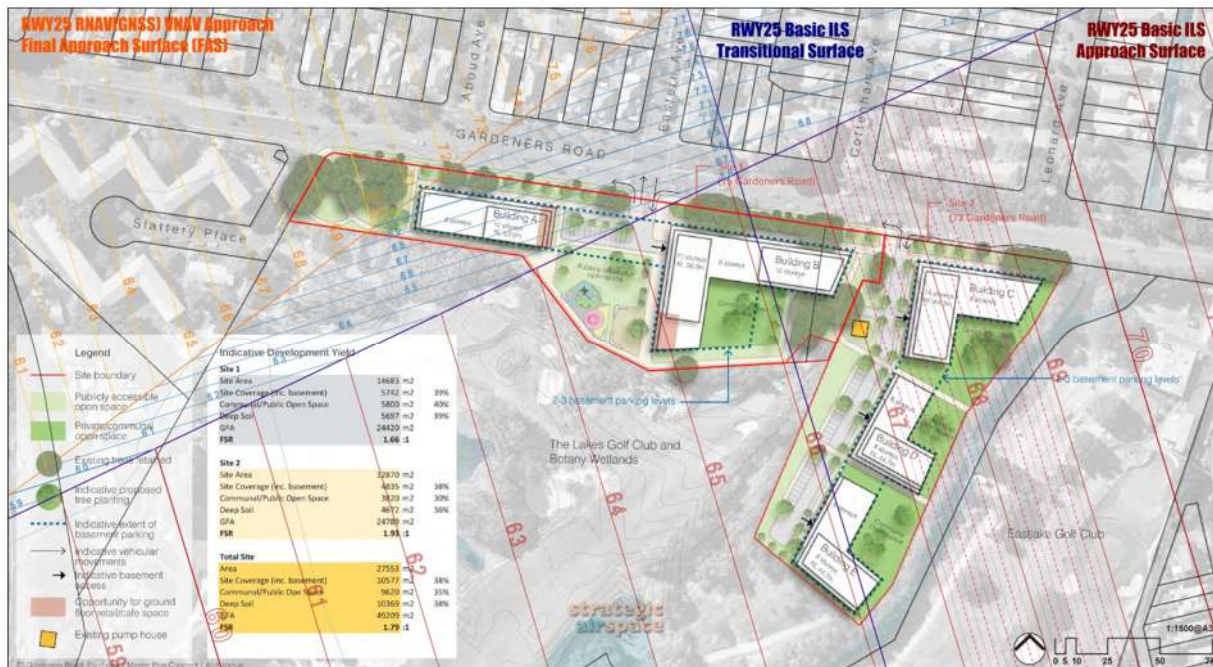


Figure 3 — Maximum Permissible Development Heights — Restrictive Surface Heights from the PANS-OPS Surface Limits (as per Figure 8)

Any building, structure or crane which would exceed the OLS height of 51m AHD would be subject to the Airports (Protection of Airspace) Regulations and would require prior height approval under these regulations.

As can be seen from the Table 1 and Figure 3 above, the maximum heights of buildings (including overruns) is quite constrained by a range of sloping PANS-OPS surfaces that are related to approaches from the east towards Runway (RWY) 25, the eastern end of the east-west cross runway. The height contours depicted in the PANS-OPS surfaces diagram should be considered the maximum possible heights (in metres Australian Height Datum (AHD)) that would be considered permissible under the airspace regulations.

Further, due to the proximity of the site to the airport and to the nominal straight-in / straight-out flight path for RWY 07/25, it is also highly likely that these same height constraints would be applicable to cranes required for construction.

Taking these factors into consideration, as well as the location of the site in relation to the airport, **there is no technical impediment to the proposed master plan for the Sydney Water Gardeners Rd sites** providing the maximum heights of buildings and cranes do not exceed the current PANS-OPS Height Constraints documented herein, **and we consider that a future application under the Airports (Protection of Airspace) Regulations 1996 (APAR), supported by a full aeronautical assessment and safety case would be approved by the Department of Infrastructure and Regional Development.** This would need to be considered and assessed further as part of any subsequent detailed Development Application under the proposed amendments to the current planning controls.

2. Introduction

Sydney Water is in the process of divesting surplus land to allow redevelopment and improved utilisation of this land within the Sydney Metropolitan area. For the subject sites, due to their location within the wider context of Eastlakes, it is proposed to seek their rezoning to allow for residential development and supporting land uses.

This report — which focuses on the existing conditions and airspace constraints — has been commissioned by Sydney Water to inform and support ongoing planning for the two land parcels at **73 and 75 Gardeners Rd, Eastlakes**.

To this end, Sydney Water has also engaged Architectus to prepare a Master Plan for the site for the purposes of informing a Planning Proposal which seek to amend the current planning controls for the site to allow residential development and supporting land uses. This aeronautical impact report is to be considered as a contribution to the Master Plan and for the consideration of the appropriateness of height limits in planning controls.



Figure 4 — Sydney Water Sites — Gardeners Rd, Eastlakes

The airspace constraints are examined in relation to the maximum building envelope proposed and the additional airspace that would be required for cranes necessary to enable development on the site.

This report has been prepared having regard to the Prescribed Airspace of Sydney Airport. It examines the current regulated airspace height limits constraints overhead the site that are related to aviation airspace protection requirements and which, under the Airports (Protection of Airspace) Regulations 1996 (APAR), would:

- Trigger the requirement to apply for an airspace height approval;
- Constrain the maximum permissible building envelope heights; and
- Constrain the maximum permissible heights for cranes that would be required to enable construction of the proposed development.

It is also understood that any future development of the site will be subject to future development applications to be lodged with Council. Separate DAs are likely to require their own airspace height applications under APAR.

3. Background

3.1 The Project

In order to test and demonstrate the suitability of the current project area, incorporating both 73 and 75 Gardeners Rd Eastlakes, a master plan has been prepared by Architectus and considered by it and its project sub-consultants. This master plan identifies that the site should be developed for residential, with supporting land uses such as small scale shops, retail or similar uses. The proposal will enable the future redevelopment of both sites, resulting in a range of building heights between 6-14 storeys.

No approval is sought for the master plan at this stage as it simply seeks to evidence that the proposed changes to the planning controls are appropriate.



Figure 5 — Sydney Water Master Plan Concept in 3D – Gardeners Rd, Eastlakes

3.2 Previous Aeronautical Studies

Aeronautical studies have previously been conducted for the site at 75 Gardeners Rd. This study now includes the adjacent lot at 73 Gardeners Rd and is based on the airspace surfaces that currently overlay the expanded site area.

4. Aeronautical Impact Context

4.1 Location of the Proposed Development

The site lies to the north of Sydney Airport, approximately 4.3 km (2.3 Nautical Miles, NM) from the aerodrome reference point (ARP) at a bearing of at 060° True (T). The closest point of the site, the south-western corner, is 2.9 km (1.6NM) at 061°T from the RWY25 threshold.

The southern-most point of the site boundary lies approximately 0.37km (0.2NM) perpendicular from the RWY 07/25 extended centreline.

The other airports in the Sydney Basin are too distant from the study area to have any impact on the airspace overhead it.

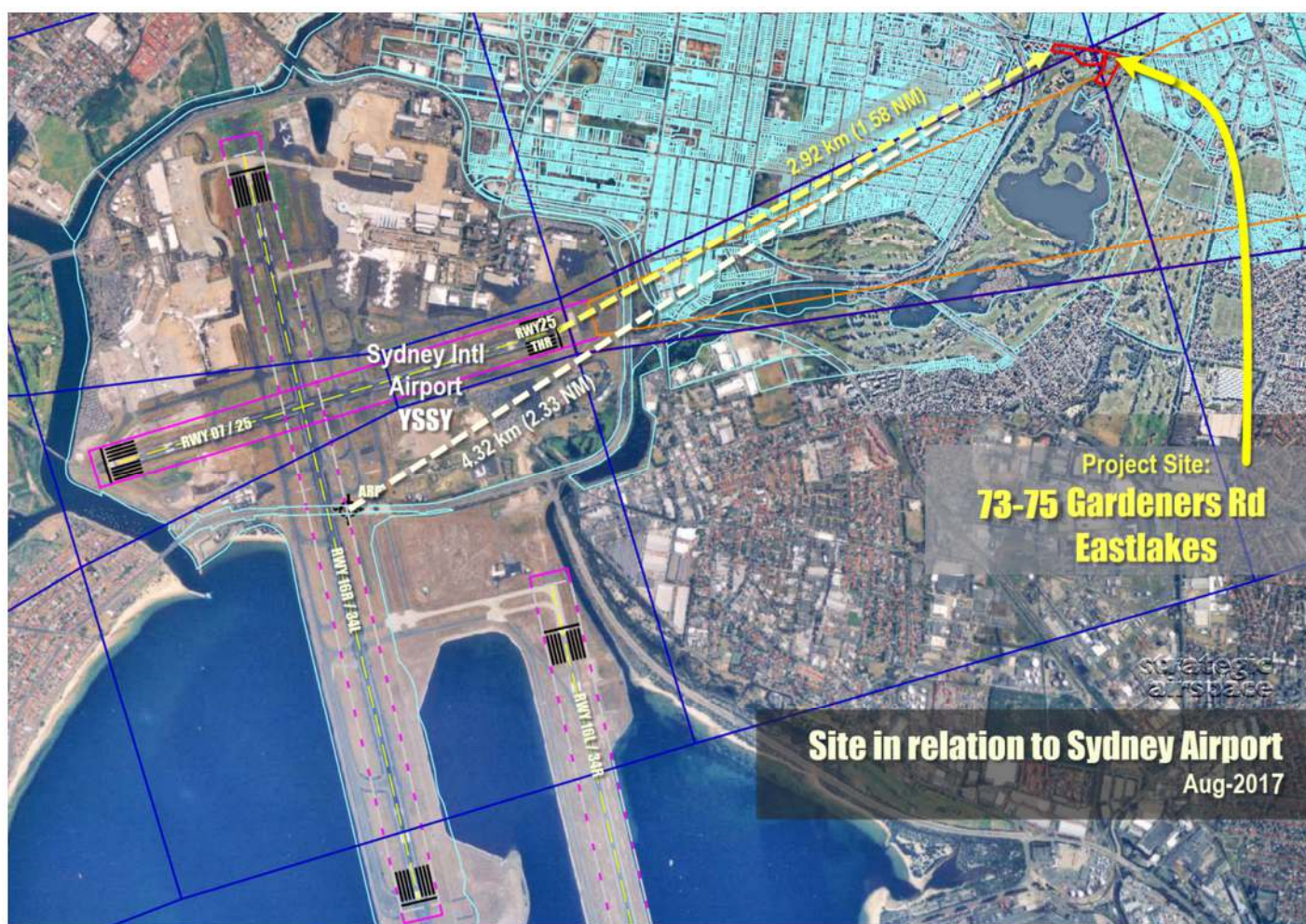


Figure 6 — Project Site in relation to Sydney Airport (Large Format)

4.2 Methodology

The methodology used to determine the maximum building height (or minimum airspace height limitation) above the development site takes into consideration each of the following.

4.2.1 Airspace Regulations

The proposed development site is subject to the Airports (Protection of Airspace) Regulations (APAR), under the Commonwealth's Airports Act, 1996), because of its proximity to Sydney Airport and because of its proposed height. These regulations define both: how building height limitations due to airspace safety can be determined; and the process for gaining approval of the proposed development under the regulations.

The Prescribed Airspace Regulations, and their impact upon building height limitations, are described below.

4.2.2 Prescribed Airspace

Prescribed airspace, under these regulations, includes at minimum:

■ Obstacle Limitation Surfaces (OLS)

- The OLS surfaces are used to identify buildings and other structures that may have an impact upon the safety or regularity of aircraft operations at an airport. This impact depends upon both the type of operations at the aerodrome and which OLS surfaces are penetrated by a (proposed) building or structure.
- The OLS are flat and rising (invisible) surfaces around the airport. They are based on the geometry of the airport and its runways and therefore they rarely change.
- If a permanent building development (or temporary crane) that is proposed at a height that will penetrate (exceed) the height limit of an OLS surface, then an application must be made to the Commonwealth Department of Infrastructure and Regional Development (DIRD) — via the closest airport, and with copies to any other potentially affected airport — for an airspace height approval prior to construction of the permanent development &/or erection of the temporary crane obstacle. Such applications should demonstrate the proposed building development does not penetrate or adversely affect surfaces protecting: instrument flight procedures (PANS-OPS surfaces); radar vectoring; navigation infrastructure; or anything else that might affect the safety or regularity of operations at the airport.

■ PANS-OPS Surfaces

- PANS-OPS surfaces represent the protection surfaces for published instrument flight procedures to and from the airport. These surfaces comprise flat, sloping and complex surface components.
- PANS-OPS surfaces must not be penetrated by either permanent or temporary buildings or structures. However, for a variety of reasons, PANS-OPS surfaces can and do change over time.
- As flight procedures are changed from time to time (usually by Airservices), the PANS-OPS Surface Plan published by an airport may not reflect the current situation — which is why we not only reference the airport's plans but also review the published charts for current (or pending) instrument flight procedures and evaluate the associated PANS-OPS height limits. The regulations also make a provision for any factor which may be deemed to adversely affect the safety, regularity or efficiency of aircraft operations at an airport. In light of this, it is necessary to consider the following factors.

■ Other Considerations

- **Sydney Airport's Declared Airspace Plans** additionally include:
 - Radar Terrain Clearance Charts (RTCC), which depict the areas and height limits related to the Minimum Vector Altitudes (MVAs) used by Air Traffic Controllers when vectoring aircraft;
 - Lighting and visual guidance protection plans — used for approach guidance by aircraft, especially at night and in times of poor visibility; and
 - Navaid and radar evaluation / protection surface plans.
- **Other Factors**
 - Protection for other Instrument Flight Procedure surfaces, where the procedures are not classified as PANS-OPS and/or have been omitted from Sydney Airport's declared PANS-OPS surfaces charts. These may include a variety of Required Navigation Procedures (RNP).
 - Airline Engine-Out (Contingency) Take-Off Splays (as per Civil Aviation Order 20.7 1b)
These are generally assessed independently by the airlines as part of their own evaluations of any given airspace height application, but it is prudent to evaluate any potential impact in advance.
 - Other miscellaneous factors that may be considered as potential safety issues by any of the key stakeholders, and the Civil Aviation Safety Authority (CASA) in particular.
- **Note:** Airspace that is approved by the Department of Infrastructure and Regional Development as Declared Airspace is considered part of an airport's Prescribed Airspace.

4.2.3 Note about Heights: Australian Height Datum (AHD) vs Above Ground Level (AGL)

All "heights" provided in this document are elevations expressed in metres in the Australian Height Datum (AHD) — and thus they are true elevations, and NOT heights above ground level (AGL).

For estimating maximum development heights AGL, the ground elevation^{AHD} should be subtracted from the airspace height limits^{AHD}.

Note also for aviation-related airspace height limits, any building height approval under the Airports (Protection of Airspace) Regulations is regarded as inclusive of the building itself plus all rooftop furniture and overruns (plant buildings, lift risers, etc).

4.2.4 Making an Application for an Aviation-related Airspace Height Approval

All applications under APAR must be submitted to DIRD, at the appropriate time, through the closest relevant airport — in this case, Sydney Airport. Applications should include aeronautical impact assessment reports — such as this, but which are based on the most current plans for the proposed development available at the time. For major developments, such reports should include consideration of cranes that will be required for construction: this information will be used for assessment of the feasibility of constructing the buildings if approved at the maximum heights sought. Safety impact assessments and mitigation strategies may need to be included in the aeronautical study, depending on the nature and location of the development in relation to the airspace restrictions and other aeronautical impact factors.

Separate applications for cranes will also be required at the appropriate times during the construction period, prior to their installation and operation.

The impact of the various building height limitations, from lowest to highest, is summarised in the following table.

The height limit of Sydney Airport's OLS overhead the precinct is defined by the Inner Horizontal Surface, which applies across the entire precinct, as depicted in Figure 7 below.

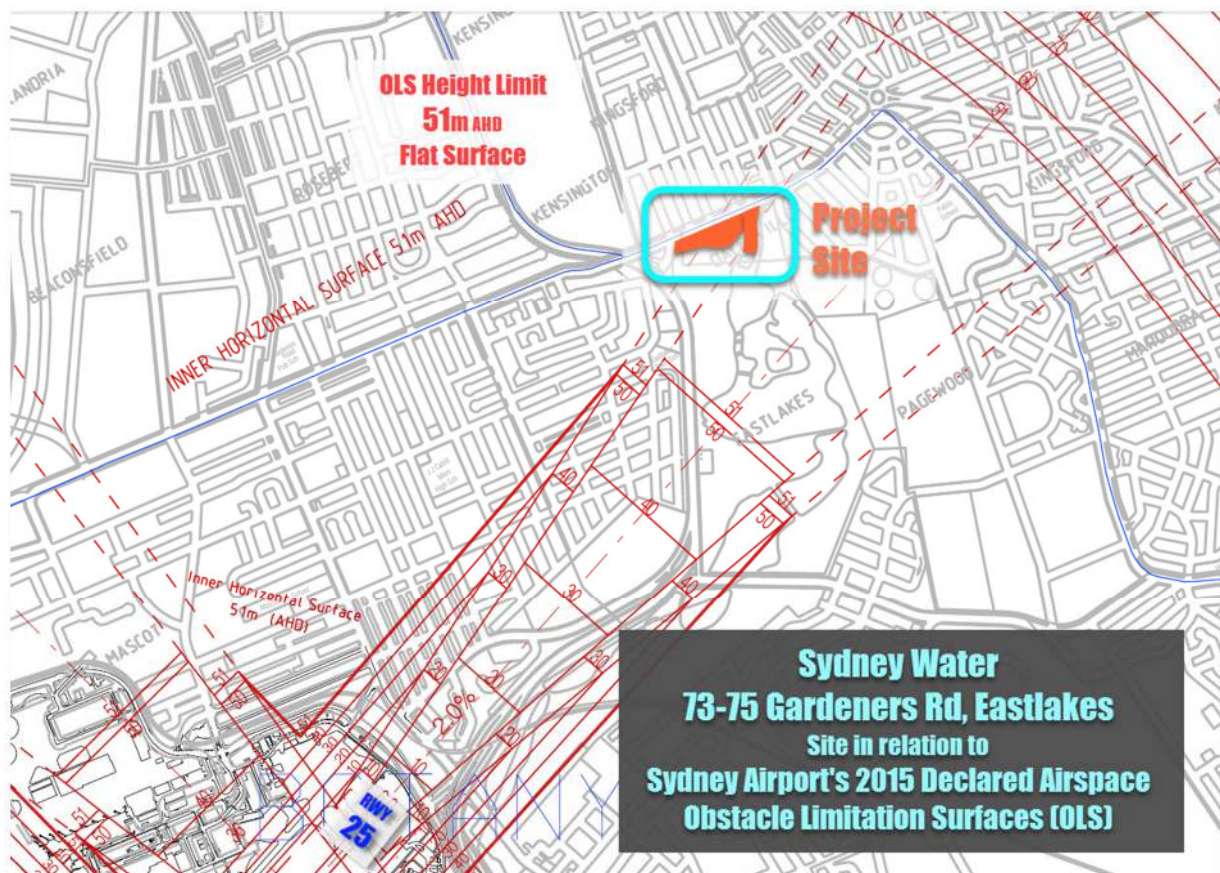


Figure 7 — Site in relation to Sydney Airport's OLS

Buildings and cranes may exceed the OLS height limits, but if planned as such an application for the aviation-related airspace approval for the proposed development must be submitted to Commonwealth Department of Infrastructure and Regional Development (DIRD), via Sydney Airport. Failure to obtain such approval before construction commences can result in significant penalties under the Airports Act (1996).

Conversely, airspace height approvals are not required for any buildings or cranes that would not exceed the OLS height limits.

The Sydney Airport Master Plan to 2033 does not forecast any changes to the aerodrome that would occasion a change to the OLS. Thus, the current OLS is anticipated to remain in force for the planning horizon of the project site.

5.2 PANS-OPS Analysis

5.2.1 Current Procedures

In addition to reviewing the PANS-OPS Surfaces chart of Sydney Airport's Prescribed Airspace (as declared and approved by DIRD in 2015), assessment was conducted of the following instrument (non-visual) procedure types for Sydney Airport, as published by Airservices Australia in the Australian Aeronautical Information Publication (AIP) Departure and Approach Procedures (DAP), up to Amendment 152 (effective 17-Aug-2017 to 08-Nov-2017).

- The Circling Minima and Minimum Sector Altitudes (MSAs) for existing PANS-OPS procedures
"Area" procedures, which provide protection for aircraft manoeuvring or circling within defined areas above the airport and surrounds
- The discrete minima for the Instrument Approach Procedures.
- Missed Approaches — as part of the evaluation of Approach Procedures
- The existing Standard Instrument Departure Procedures (SIDs)

Of the approach and departure procedures, only procedures that might be relevant to the study area are included in this report. Principally these are procedures for the eastern East-West "cross" runway, RWY 07/25, as well as the "area" procedures.

The Sydney Airport Master Plan to 2033 was also reviewed for potential future impact. The Master Plan does not forecast any changes to procedures that would, to our best knowledge, make the airspace above the study area any more constraining than that resulting from analysis of the combination of the current PANS-OPS surfaces.

Analysis determined that the precinct is constrained by only a few procedures, the major ones of impact being surfaces related to the RWY25 Basic ILS (which are related to the ILS precision approach procedures to RWY25) and the Baro-VNAV component of the RWY25 RNAV(GNSS) approach.

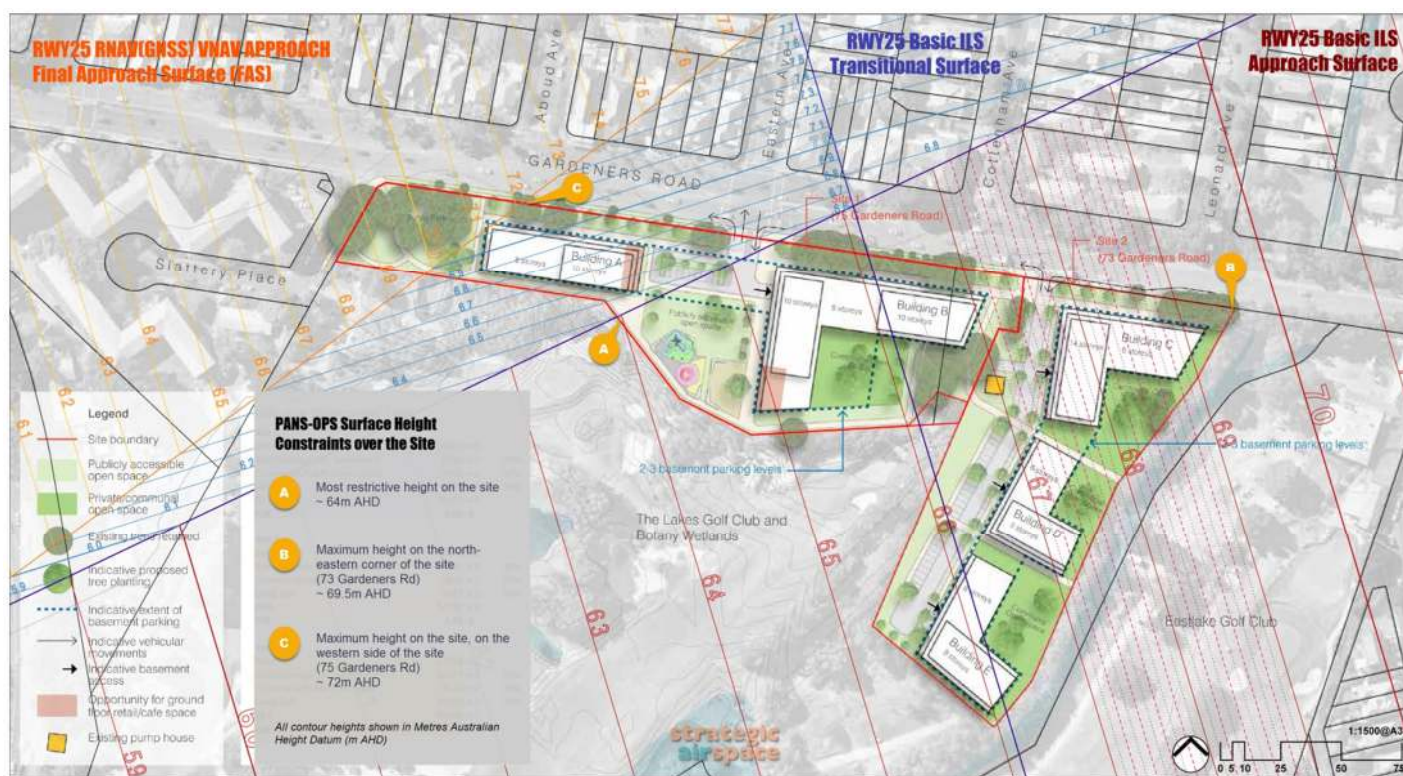


Figure 8 — PANS-OPS Height Constraints across the Site (Large Format)

Table 2 — PANS-OPS Height Limit Summary

| Procedure | Height Limit (m AHD) | Description |
|-------------------------------|----------------------|--|
| Approaches to Runway 25 | ~64 – ~72 | The height constraints vary across the site due to the interaction of various sloping surfaces : the Basic ILS (protecting the ILS Precision Approach) and the RNAV(GNSS)-Z approach (Baro-VNAV minima only). See Figure 8, above. |
| Departures | >90 | Where protection surfaces overlay the study area, they vary across the site and are higher than those related to RWY25 approach and RWY07 missed approach procedures. |
| Circling | 126.4 | Restriction due to the Cat A&B Circling minima. The No Circling Area in that sector commences beyond the site, at 3DME (5.6km). |
| Minimum Sector Altitude (MSA) | 335.2 | 10NM Inner MSA of 2100ft. |

Further details are provided in the following sections.

5.2.2 “Area” Procedures

A Minimum Sector Altitudes (MSAs)

The height restrictions imposed by Minimum Sector Altitudes are higher than the limits imposed by approach procedures.

B Circling Minima

The site is inside the permitted circling area defined for Sydney Airport, before the No Circling Area in that sector which only comes into effect beyond the site (at 3DME or 5.6km from the ARP).

The constraining surface height relates to the Cat A & B Circling altitude minima of 710ft.

5.2.3 Instrument Approaches & Missed Approaches

The impact of each of the relevant PANS-OPS protection surfaces for current approach and departure procedures for Sydney Airport are provided below. The lateral extent of restrictions is shown in the diagrams (where appropriate) and contours shown where the surfaces are sloping in nature.

Note also that where specific guideline height limits are provided, they are relevant only to the specific procedure. Other procedures mentioned in this report may impose more restrictive height limits over the same location.

The height restrictions due to the instrument approach procedures vary across the site.

A Approach Procedures to RWY 25

A.1 RWY25 ILS Precision Approach & RWY25 Basic ILS Approach Surfaces

The Basic ILS surfaces related to the RWY 25 ILS precision approach procedures cover the entire site area, with the approach surface component covering the majority of the site (east and south-eastern two-thirds) and the transitional covering the planned built area towards the western side along the Gardeners Rd frontage.

It is highly unlikely that any proposed development that would infringe this Approach Surface would be approved, and hence it should be regarded as a firm height constraint (as per the slope depicted by the contours in Figure 8 above).

The Transitional Surface over the western part of the site slopes up away from the Approach Surface. Due to the difference between different technical methods of calculating the safe landing minima for precision approaches, it is possible that the development of a building that is higher than the height contours of the Transitional Surface would not negatively affect the safety, efficiency or regularity of the precision approaches to RWY25, and therefore an application for buildings which penetrate this surface (to some extent) may potentially be considered approvable. However, given the proximity to the airport and the proximity of any buildings on the western half of the site to the Approach Surface, it is strongly recommended that in this case the Transitional Surface is also considered as a firm limit with regard to planning building heights.

Due to the slightly greater flexibility of the Transitional Surfaces, cranes used for construction which would exceed the Transitional Surface height limits across the western half of the site may potentially be approved — but only up to the next most limiting procedure surface, and only for a maximum of 3 months.

A Safety Case would need to be developed to help justify a case for penetrating the Transitional Surface — for a proposed building and/or for a temporary obstacle such as a crane.

A.2 RNAV(GNSS)-Z Approach to RWY25

The PANS-OPS surfaces for the RNAV(GNSS)-Z approach to RWY25 also cover the entire site. The Final Approach Surface (FAS) of this procedure, which relates to the Baro-VNAV component of the procedure (ie, that relevant to the LNAV/VNAV minima only), is the surface most relevant to the

site. This is constraining over a relatively small portion of the total site only, at the western edge (refer also Figure 8 above).

If any development or temporary crane was sought at a height exceeding the Basic ILS surface constraints, then the lowest of the sloping FAS and the horizontal surface (at a height of 83.49m AHD) that protects the LNAV component of the RNAV(GNSS) procedure would be the next highest effective constraint. A separate study would be required to determine the constraints in this case, and a safety study would also be required to support any height application to the aviation authorities.

B Missed Approach Segments of Approach Procedures for RWY 07 and RWY 34R

The precinct is unconstrained by the following procedures, either because the limiting heights are so high (higher than other more restrictive surfaces) or the site is laterally outside the protection surfaces.

5.2.4 Departures

The surfaces of departure procedures from both RWY07 and RWY34R overlay the site, but the limiting heights overhead the site area are higher than those of Approach and Missed Approach Procedures and therefore not restrictive.

Note that the Sydney Airport 2015 Declared Airspace Omnidirectional Radar Departures Chart is now obsolete due to an increase in the minimum turn height of the procedures (eg, RWY25 now has a minimum turn height of 600ft for non-jet aircraft) and a change in the PANS-OPS design criteria (reduction of Minimum Obstacle Clearance (MOC) from 90m to 75m). Calculations in a 2015 report for this site, after the change of minimum turn height but before the change in PANS-OPS criteria) indicated that the height limit due to the RWY07 departure would be above 90m AHD at that time. The change in MOC may serve to further increase this height constraint.

5.3 Other Assessment Considerations

The following table provides a brief assessment of other considerations.

Table 3 — Other Assessable Height Limitations

| Procedure | Height Limit (m AHD) | Description |
|--|----------------------|---|
| Radar Terrain Clearance Chart (RTCC) / Minimum Vector Altitude (MVA) | 152.4 | The entire site is covered by the 1500 RTCC sector. This is the limit related to the Minimum Vectoring Altitude (MVA), which is used by air traffic controllers. This information is sourced from the RTCC published as part of Sydney Airport's Prescribed Airspace Plans. |
| Navigation Infrastructure | N/A | The proposed site is outside the lateral extent of surfaces protecting navigation aids shown in SACL's published Prescribed Airspace Plans. |
| HIAL Light Planes | N/A | The development site is outside the lateral extent of surfaces shown in SACL's published Prescribed Airspace Plans. |
| PAPI Light Planes Surface | N/A | The PAPI Light Planes Surface covers a portion of the site (at the south) but is less constraining than the Basic ILS Approach Surface — and so not applicable. |

| <i>Procedure</i> | <i>Height Limit (m AHD)</i> | <i>Description</i> |
|--------------------------------|---------------------------------|--|
| Airlines Engine Out Procedures | N/A | Engine Out procedures (from RWY 34R, the most relevant take-off runway end) are designed and maintained by each of the passenger transport aircraft operators in accordance with the relevant regulations. All such procedures necessarily take into account Sydney Tower Eye, which is closer to the airport and taller than the proposed development. As such this proposal will not adversely affect any contingency procedures. |

There are no other considerations that might limit the building height at the project site.

5.4 Summary of Maximum Permissible Heights

Table 4 — Summary — Airspace Height Constraints

| <i>Height Limits (AHD)</i> | <i>Height Limit Detail</i> | <i>Comment</i> |
|--------------------------------|--|---|
| 51m | OLS Outer Horizontal Surface | THRESHOLD HEIGHT limits (depicted in Figure 7, p10) Any development that would exceed the relevant OLS height across the site would require a prior 'airspace height' approval from the Department of Infrastructure and Regional Development under the Airports (Protection of Airspace) Regulations (or APAR). An application can be made for each tower building separately, or a single application can be made for the all towers within the development that would exceed this height. |
| ~64 – 72m | Various PANS-OPS RWY25 Basic ILS Approach & Transitional & RWY25 RNAV(GNSS)-Z VNAV Final Approach Surface — All sloping surfaces | The PANS-OPS height constraints across the site will be regarded as the maximum permissible building heights that would be approved by the aviation authorities in the relevant areas (see Figure 8, p12) Cranes may be permitted up to the relevant PANS-OPS heights, taking crane boom length and swing into effect. Cranes may potentially be approved at heights that exceed the applicable PANS-OPS surface height constraints shown, subject to the specific location and a risk analysis, and acceptability to Sydney Airport. |
| NA | Other Surfaces | The study area is not constrained by any airspace protection requirements related to other approach procedures, departure procedures, Radar Terrain Clearance Chart (RTCC) surfaces, Sydney Airport's Navigation and Airport Lighting and Visual Guidance facilities, as well as those related to Airline Engine Inoperative contingency take-off procedures. |

6. Considerations for Cranes

Under the Regulations, cranes are considered to be Temporary Controlled Activities, which may be permitted to penetrate PANS-OPS and other surfaces for up to three months under certain circumstances. They are permitted to penetrate an existing PANS-OPS surface only if the procedure which the surface is protecting can be temporarily changed without affecting safety or regularity. Thus, not all PANS-OPS surfaces can be penetrated temporarily by cranes.

The three-month time limit is a major impediment to using cranes that penetrate PANS-OPS surfaces. The Department is reluctant to approve cranes that penetrate existing PANS-OPS surfaces unless it can be proven, to the satisfaction of the airport and the Department, that the crane will be needed for less than three months. This is because, in recent times, some cranes have penetrated PANS-OPS surfaces for much longer than 3 months; this extended time period has caused problems for Air Traffic Control procedures at the airport.

In some cases, the height of the cranes needed to construct a development has further limited the height of proposed buildings. Some developers have tackled this problem by altering the type of construction for the top part of buildings and/or using cranes, or other methods of lifting materials and equipment, that do not require significant additional height above the building height.

In the case of the Gardeners Road development site, the limiting surfaces are the Basic ILS Surfaces for the ILS approach to RWY 25. The ILS approach to RWY 25 cannot be modified but it may be possible to argue that these surfaces can be penetrated temporarily up to the limit of the next most limiting PANS-OPS surface (the RNAV-Z GNSS approach to RWY25) — and this is likely to be only possible where the Obstacle Assessment Surfaces (OAS) for this ILS approach are substantially higher than the Basic ILS Surface heights, on the western half of the site. The other condition would be that the penetration by cranes was for no more than 3 months duration.

Finally also note that Sydney Airport now accepts applications for cranes that exceed the PANS-OPS surface limits for single-night-at-a-time operations — during curfew hours only — for the purposes of cranes that will be used for installing or removing other cranes. If considered acceptable by the airport, such applications will be approved by the Department of Infrastructure.

The airport and the Department will require that issue cranes be satisfactorily addressed in the application for approval prior to approving any building development for the Gardeners Road site.

This preliminary report is for the purpose of supporting further planning and exploring a maximum development height at the site that may be considered as technically and probably approvable under the Airports (Protection of Airspace) Regulations 1996 (APARs). The results and opinions are based on preliminary data only and would be subject to confirmation in a complete aeronautical impact study, based on survey data and firm building footprints and proposed heights.

7. Conclusion

The entire study area is situated under the OLS surface at a height of 51m AHD (refer Figure 7 (p10)). Any building, structure or crane which would exceed that height would require a prior airspace height approval under the Airports (Protection of Airspace) Regulations 1996 (APAR).

Further, the project site is located relatively close to the airport and close to the nominal straight-in / straight-out flight path for RWY 07/25 — and therefore under the protection surfaces related to the approaches to RWY25. As such, the PANS-OPS surfaces overhead impose fairly limiting maximum permissible building heights (inclusive of overruns, rooftop furniture, roof-mounted antennae and so forth). The PANS-OPS height constraints slope across the site and range from approximately 64m AHD to 72m AHD, as indicated in Figure 8 (p12).

Given the location of the site in relation to the airport and the flight paths, it is also highly likely that the PANS-OPS surface height constraints will also be considered by the aviation authorities as the maximum permissible heights for any cranes that would be required for construction.

Taking these factors into consideration, as well as the location of the site in relation to the airport, **there is no technical impediment to the proposed master plan for the Sydney Water Gardeners Rd sites** providing the maximum heights of buildings and cranes do not exceed the current PANS-OPS Height Constraints documented herein, **and we consider that an application under the Airports (Protection of Airspace) Regulations, supported by a full aeronautical assessment and safety case would be approved by the Department of Infrastructure and Regional Development.** This would need to be considered and assessed further as part of any subsequent detailed Development Application under the proposed amendments to the current planning controls.

APPENDICES

APPENDIX 1 — ABBREVIATIONS

Abbreviations used in this report and/or associated reference documents, and the meanings assigned to them for the purposes of this report are detailed in the following table:

| Abbreviation | Meaning |
|--------------------|--|
| AC | Advisory Circular (document supporting CAR 1998) |
| ACFT | Aircraft |
| AD | Aerodrome |
| AGL | Above Ground Level (Height) |
| AHD | Australian Height Datum |
| AHT | Aircraft Height |
| AIP | Aeronautical Information Publication |
| Airports Act | Airports Act 1996, as amended |
| AIS | Aeronautical Information Services |
| ALARP | As Low As Reasonably Practicable |
| ALC | Airport Lease Company |
| Alt | Altitude |
| AMAC | Australian Mayoral Aviation Council |
| AMSL | Above Minimum Sea Level |
| ANEF | Australian Noise Exposure Forecast |
| ANSP | Airspace and Navigation Service Provider |
| APACL | Australia Pacific Airports Corporation Limited, owner of Melbourne and Launceston Airports |
| APCH | Approach |
| APARs, or A(PofA)R | Airports (Protection of Airspace) Regulations, 1996 as amended |
| ARP | Aerodrome Reference Point |
| AsA | Airservices Australia |
| ASDA | Accelerated Stop Distance Available |
| ATC | Air Traffic Control(ler) |
| ATM | Air Traffic Management |
| BA (Planning) | Building Application or Building Approval (Planning) |
| BAC | Brisbane Airport Corporation |
| BCC | Brisbane City Council |
| CAO | Civil Aviation Order |
| CAR | Civil Aviation Regulation |
| CASA | Civil Aviation Safety Authority |
| CASR | Civil Aviation Safety Regulation |
| Cat | Category |
| CBD | Central Business District |
| CG | Climb Gradient |
| CNS/ATM | Communications, Navigation, Surveillance / Air Traffic Management |
| CPA | Cairns Port Authority, Operators Of Cairns Airport |
| DA (Aviation) | Decision Altitude (Aviation) |
| DA (Planning) | Development Application or Development Approval (Planning) |
| DAH | Designated Airspace Handbook |
| DAP | Departure and Approach Procedures (published by AsA) |
| DEP | Departure |
| DER | Departure End (of the) Runway |
| DEVELMT | Development |
| DH | Decision Height |
| DIRD | Department of Infrastructure and Regional Development (sometimes also abbreviated as Infrastructure) |
| DME | Distance Measuring Equipment |
| Doc nn | ICAO Document Number nn |
| DoD | Department of Defence |
| DODPROPS | Dependent Opposite Direction Parallel Runway Operations |
| EIS | Environmental Impact Study |
| ELEV | Elevation (above mean sea level) |

| <i>Abbreviation</i> | <i>Meaning</i> |
|---------------------|---|
| ENE | East North East |
| ERSA | EnRoute Supplement Australia |
| ESE | East South East |
| FAF | Final Approach Fix |
| FAP | Final Approach Point |
| Ft | Feet |
| GBAS | Ground-Based Augmentation System, a GNSS augmentation system to provide vertical guidance and additional precision to non-precision approaches — permits GLS Approaches |
| GLS | GNSS Landing System – a precision landing system like ILS but based on augmented GNSS using ground and satellite systems. |
| GNSS | Global Navigation Satellite System |
| GP | Glide Path |
| HIAL | High Intensity Approach Light |
| HLS | Helicopter Landing Site |
| IAS | Indicated Air Speed |
| ICAO | International Civil Aviation Organisation |
| IFR | Instrument Flight Rules |
| IHS | Inner Horizontal Surface, an Obstacle Limitation Surface |
| ILS | Instrument Landing System, a precision approach landing system |
| IMC | Instrument Meteorological Conditions |
| IPA | Integrated Planning Act 1997, Queensland State Government |
| ISA | International Standard Atmosphere |
| IVA | Independent Visual Approach |
| Km | Kilometres |
| Kt | Knot (one nautical mile per hour) |
| LAT | Latitude |
| LDA | Landing Distance Available |
| LEP | Local Environment Plan (Planning |
| LLZ | Localizer |
| LONG | Longitude |
| LSALT | Lowest Safe ALTitude |
| M | Metres |
| MAPt | Missed Approach Point |
| MDA | Minimum Descent Altitude |
| MDH | Minimum Descent Height |
| MDP | Major Development Plan |
| MGA94 | Map Grid Australia 1994 |
| MOC | Minimum Obstacle Clearance |
| MOCA | Minimum Obstacle Clearance Altitude |
| MOS | Manual Of Standards, published by CASA |
| MP | Master Plan |
| MSA | Minimum Sector Altitude |
| MVA | Minimum Vector Altitude |
| NASF | National Airports Safeguarding Framework |
| NDB | Non-Directional Beacon |
| NE | North East |
| NM | Nautical Mile (= 1.852 km) |
| nnDME | Distance from the DME (in Nautical Miles) |
| NNE | North North East |
| NNW | North North West |
| NOTAM | NOTice to AirMen |
| NPR | New Parallel Runway (Project, Brisbane Airport) |
| OAR | Office of Airspace Regulation |
| OCA | Obstacle Clearance Altitude (in this case, in AMSL) |
| OCH | Obstacle Clearance Height |

| Abbreviation | Meaning |
|----------------|---|
| ODPROPS | Opposite Direction Parallel Runway Operations |
| OHS | Outer Horizontal Surface, an Obstacle Limitation Surface |
| OLS | Obstacle Limitation Surface, defined by ICAO Annex 14; refer also CASA MOS Part 139 |
| PANS-OPS | Procedures for Air Navigation – Operations, ICAO Doc 8168; refer also CASA MOS Part 173 |
| PAPI | Precision Approach Path Indicator (a form of VGSI) |
| PBN | Performance Based Navigation |
| PRM | Precision Runway Monitor |
| RAAF | Royal Australian Air Force |
| RAPAC | Regional Airspace users Advisory Committee |
| REF | Reference |
| RL | Relative Level |
| RNAV | aRea NAVigation |
| RNP | Required Navigation Performance |
| RPA | Rules and Practices for Aerodromes — replaced by the MOS Part 139 — Aerodromes |
| RPT | Regular Public Transport |
| RTCC | Radar Terrain Clearance Chart (refer also MVA) |
| RWY | Runway |
| SACL | Sydney Airport Corporation Limited |
| SID | Standard Instrument Departure |
| SODPROPS | (Independent) Simultaneous Opposite Direction Parallel Runway Operations |
| SPP | State Planning Policy, Queensland (specifically SPP 1/02: Development in the Vicinity of Certain Airports and Aviation Facilities) |
| SSDA | State Significant Development Application |
| SSP | State Significant Precinct |
| SSR | Secondary Surveillance Radar |
| STAR | STandard Arrival |
| TAR | Terminal Approach Radar |
| TAS | True Airspeed |
| THR | THReshold (of Runway) |
| TMA | TerMinal Area |
| TNA | Turn Altitude |
| TODA | Take-off Distance Available |
| TORA | Take-Off Runway Available |
| VFR | Visual Flight Rules |
| VIS | Visual |
| VMC | Visual Meteorological Conditions |
| V _n | Aircraft critical velocity reference |
| VOR | Very high frequency Omni-directional Range |
| VSS | Visual Segment Surface |
| WAC | Westralia Airports Corporation, operators of Perth Airport |
| WAM | Wide-Area Multilateralation |
| WNW | West North West |
| WSW | West South West |
| WGS84 | World Geodetic System 1984 |
| WSA | Western Sydney Airport – the proposed second international airport for the Sydney Basin |

APPENDIX 2 — PANS-OPS PROCEDURES

The latest versions of the IFPs consulted were from the current AIP Amendment 152, effective from 17-Aug-2017 to 08-Nov-2017 — as indicated in Table 5 below.

Table 5 — PANS OPS Instrument Flight Procedure Charts for Sydney Airport (AIP Amendment 152 – Effective 17-Aug-2017 to 08-Nov-2017)

SYDNEY (YSSY)

| <i>Name of Chart</i> | <i>Effective Date (Amendment No)</i> |
|--|--------------------------------------|
| AERODROME CHART PAGE 1 | 2-Mar-2017 (Am 150) |
| AERODROME CHART PAGE 2 | 10-Nov-2016 (Am 149) |
| APRON CHART - INTERNATIONAL PAGE 1 | 13-Nov-2014 (Am 141) |
| APRON CHART - INTERNATIONAL PAGE 2 | 25-May-2017 (Am 151) |
| APRON CHART - DOMESTIC PAGE 1 | 26-May-2016 (Am 147) |
| APRON CHART - DOMESTIC PAGE 2 | 26-May-2016 (Am 147) |
| APRON CHART - DOMESTIC PAGE 3 | 26-May-2016 (Am 147) |
| STANDARD DOMESTIC TAXI ROUTES - ARRIVALS | 21-Aug-2014 (Am 140) |
| STANDARD DOMESTIC TAXI ROUTES - DEPARTURES | 6-Mar-2014 (Am 138) |
| NOISE ABATEMENT PROCEDURE PAGE 1 | 17-Nov-2011 (Am 129) |
| NOISE ABATEMENT PROCEDURE PAGE 2 | 17-Aug-2017 (Am 152) |
| NOISE ABATEMENT PROCEDURE PAGE 3 | 3-Mar-2016 (Am 146) |
| NOISE ABATEMENT PROCEDURE PAGE 4 | 3-Mar-2016 (Am 146) |
| NOISE ABATEMENT PROCEDURE PAGE 5 | 2-Mar-2017 (Am 150) |
| NOISE ABATEMENT PROCEDURE PAGE 6 | 3-Mar-2016 (Am 146) |
| NOISE ABATEMENT PROCEDURE PAGE 7 | 3-Mar-2016 (Am 146) |
| NOISE ABATEMENT PROCEDURE PAGE 8 | 3-Mar-2016 (Am 146) |
| NOISE ABATEMENT PROCEDURE PAGE 9 | 3-Mar-2016 (Am 146) |
| NOISE ABATEMENT PROCEDURE PAGE 10 | 3-Mar-2016 (Am 146) |
| AIRPORT EFFICIENCY PROCEDURES | 18-Aug-2016 (Am 148) |
| IVA USER GUIDE PAGE 1 | 10-Nov-2016 (Am 149) |
| IVA USER GUIDE PAGE 2 | 6-Mar-2014 (Am 138) |
| SID SYDNEY ONE DEP (RADAR) - ALL RWYS | 17-Aug-2017 (Am 152) |
| SID RWY 34L SOUTH WEST DEP (JET) | 10-Nov-2016 (Am 149) |
| SID RWY 16R & 34L SOUTH DEP (NON-JET) (RNAV) | 10-Nov-2016 (Am 149) |
| SID RWY 16R DEENA SEVEN (JET) (RNAV) | 17-Aug-2017 (Am 152) |
| SID RWY 34R ENTRA FIVE (JET) (RNAV) | 10-Nov-2016 (Am 149) |
| SID RWY 07 FISHA EIGHT (JET) (RNAV) | 17-Aug-2017 (Am 152) |
| SID KAMBA DEP RWYS 07 & 16L (NON-JET) (RNAV) | 10-Nov-2016 (Am 149) |
| SID RWY 16R KAMPI FOUR (JET) (RNAV) | 17-Aug-2017 (Am 152) |
| SID RWY 16L KEVIN FIVE (JET) (RNAV) | 10-Nov-2016 (Am 149) |
| SID RWY 16L ABBEY THREE (JET) (RNAV) | 10-Nov-2016 (Am 149) |
| SID RWY 34R MARUB SIX (JET) (RNAV) | 17-Aug-2017 (Am 152) |
| SID RWY 34L RICHMOND FIVE DEP (JET) | 17-Aug-2017 (Am 152) |
| SID RWY 16L BOTANY BAY EIGHT (VISUAL) (RNAV) | 10-Nov-2016 (Am 149) |
| SID RWY 16R CURFEW FIVE (RNAV) | 10-Nov-2016 (Am 149) |
| STAR BOREE SIX ARRIVAL (RNAV) | 10-Nov-2016 (Am 149) |
| STAR MEPIL ONE ARRIVAL (RNAV) | 10-Nov-2016 (Am 149) |
| STAR MARLN TWO ARRIVAL (RNAV) | 10-Nov-2016 (Am 149) |
| STAR ODALE SIX ARRIVAL (RNAV) | 17-Aug-2017 (Am 152) |
| STAR RIVET TWO ARRIVAL (RNAV) | 10-Nov-2016 (Am 149) |
| ILS-Z OR LOC-Z RWY 07 | 10-Nov-2016 (Am 149) |

| <i>Name of Chart</i> | <i>Effective Date (Amendment No)</i> |
|--|--------------------------------------|
| ILS-Y OR LOC-Y RWY 07 | 10-Nov-2016 (Am 149) |
| ILS-Z OR LOC-Z RWY 16L | 10-Nov-2016 (Am 149) |
| ILS-Y OR LOC-Y RWY 16L | 10-Nov-2016 (Am 149) |
| ILS-Z OR LOC-Z RWY 16R PAGE 1 | 17-Aug-2017 (Am 152) |
| ILS-Z RWY 16R PAGE 2 | 17-Aug-2017 (Am 152) |
| ILS-Y OR LOC-Y RWY 16R | 2-Mar-2017 (Am 150) |
| ILS OR LOC RWY 25 | 10-Nov-2016 (Am 149) |
| ILS-Z OR LOC-Z RWY 34L PAGE 1 | 17-Aug-2017 (Am 152) |
| ILS-Z RWY 34L PAGE 2 | 17-Aug-2017 (Am 152) |
| ILS-Y OR LOC-Y RWY 34L | 25-May-2017 (Am 151) |
| ILS-Z OR LOC-Z RWY 34R | 10-Nov-2016 (Am 149) |
| ILS-Y OR LOC-Y RWY 34R | 10-Nov-2016 (Am 149) |
| RNAV-Z (GNSS) RWY 07 | 17-Aug-2017 (Am 152) |
| RNAV-Z (GNSS) RWY 16L | 17-Aug-2017 (Am 152) |
| RNAV-Z (GNSS) RWY 16R | 17-Aug-2017 (Am 152) |
| RNAV-Z (GNSS) RWY 25 | 17-Aug-2017 (Am 152) |
| RNAV-Z (GNSS) RWY 34L | 17-Aug-2017 (Am 152) |
| RNAV-Z (GNSS) RWY 34R | 17-Aug-2017 (Am 152) |
| GLS RWY 07 | 10-Nov-2016 (Am 149) |
| GLS RWY 16L | 10-Nov-2016 (Am 149) |
| GLS RWY 16R | 2-Mar-2017 (Am 150) |
| GLS RWY 25 | 10-Nov-2016 (Am 149) |
| GLS RWY 34L | 25-May-2017 (Am 151) |
| GLS RWY 34R | 10-Nov-2016 (Am 149) |
| ILS PRM USER INSTRUCTIONS PAGE 1 | 10-Nov-2016 (Am 149) |
| ILS PRM USER INSTRUCTIONS PAGE 2 | 20-Aug-2015 (Am 144) |
| ILS-Z RWY 16L PRM | 10-Nov-2016 (Am 149) |
| ILS-Y RWY 16L PRM | 10-Nov-2016 (Am 149) |
| ILS-Z (CAT I & II) RWY 16R PRM | 2-Mar-2017 (Am 150) |
| ILS-Y RWY 16R PRM | 2-Mar-2017 (Am 150) |
| ILS-Z (CAT I & II) RWY 34L PRM | 10-Nov-2016 (Am 149) |
| ILS-Y RWY 34L PRM | 10-Nov-2016 (Am 149) |
| ILS-Z RWY 34R PRM | 10-Nov-2016 (Am 149) |
| ILS-Y RWY 34R PRM | 10-Nov-2016 (Am 149) |

Source: AIP Book (17-Aug-2017) via <http://www.airservicesaustralia.com/aip/aip.asp?pg=10>

**Attachment J –
Environmental Noise Impact
Statement, Prepared by
Acoustic Logic, dated
September 2017**

MANAGING DIRECTORS

MATTHEW PALAVIDIS
VICTOR FATTORETTO

DIRECTORS

MATTHEW SHIELDS
BEN WHITE



73-75 Gardeners Road, Eastlakes

DA Environmental Noise Impact Assessment

SYDNEY

A: 9 Sarah St Mascot NSW 2020

T: (02) 8339 8000

F: (02) 8338 8399

SYDNEY MELBOURNE BRISBANE CANBERRA

LONDON DUBAI SINGAPORE GREECE

www.acousticlogic.com.au

ABN: 11 068 954 343

The information in this document is the property of Acoustic Logic Consultancy Pty Ltd ABN 11 068 954 343 and shall be returned on demand. It is issued on the condition that, except with our written permission, it must not be reproduced, copied or communicated to any other party nor be used for any purpose other than that stated in particular enquiry, order or contract with which it is issued.

DOCUMENT CONTROL REGISTER

| | |
|---------------------------|--|
| Project Number | 20150926.1 |
| Project Name | 73-75 Gardeners Road, Eastlakes |
| Document Title | DA Environmental Noise Impact Assessment |
| Document Reference | 20150926.1/2509A/R3/GC |
| Issue Type | Email |
| Attention To | Architectus Sydney Ms Jane Anderson |

| Revision | Date | Document Reference | Prepared By | Checked By | Approved By |
|-----------------|-------------|---------------------------|------------------------|-----------------------|------------------------|
| 0 | 12/08/2015 | 20150926.1/1208A/R0/GC | GC | | BW |
| 1 | 12/08/2015 | 20150926.1/1208A/R1/GC | GC | | BW |
| 2 | 26/07/2017 | 20150926.1/2607A/R2/GC | GC | | BW |
| 3 | 25/09/2017 | 20150926.1/2509A/R3/GC | GC | | BW |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

TABLE OF CONTENTS

| | | |
|------------|--|-----------|
| 1 | INTRODUCTION | 4 |
| 2 | SITE DESCRIPTION AND MAJOR ACOUSTIC ISSUES | 4 |
| 3 | NOISE DESCRIPTORS | 6 |
| 4 | NOISE INTRUSION ASSESSMENT | 7 |
| 4.1 | PROJECT ACOUSTIC OBJECTIVES | 7 |
| 4.1.1 | The City of Botany Bay Council DCP | 7 |
| 4.1.2 | Botany Bay LEP | 8 |
| 4.1.3 | Australian Standards Criteria | 8 |
| 4.1.4 | State Environmental Planning Policy 2007 | 9 |
| 4.1.5 | Australian Standard 2021:2000 (Aircraft Noise Intrusion) | 10 |
| 4.1.6 | Summary of Criteria | 10 |
| 4.2 | TRAFFIC NOISE MEASUREMENTS | 11 |
| 4.2.1 | Measurement Location | 11 |
| 4.2.2 | Measurement Period | 11 |
| 4.2.3 | Measurement Equipment | 11 |
| 4.2.4 | Measurement Results | 11 |
| 4.2.4.1 | Unattended Noise Monitor Results | 11 |
| 4.2.4.2 | Attended Noise Measurements | 12 |
| 4.3 | AIRCRAFT NOISE ASSESSMENT | 12 |
| 4.3.1 | Site Evaluation | 12 |
| 4.3.2 | External Aircraft Noise Levels | 13 |
| 4.4 | EVALUATION OF NOISE INTRUSION | 14 |
| 4.1 | MECHANICAL VENTILATION | 15 |
| 5 | NOISE EMISSION ASSESSMENT | 16 |
| 5.1 | BACKGROUND NOISE MONITORING | 16 |
| 5.2 | NOISE EMISSION OBJECTIVES | 17 |
| 5.2.1 | City of Botany Bay Council DCP | 17 |
| 5.2.2 | EPA Industrial Noise Policy | 17 |
| 5.2.2.1 | Intrusiveness Criterion | 17 |
| 5.2.2.2 | Amenity Criterion | 18 |
| 5.2.3 | Sleep Arousal | 18 |
| 5.2.4 | Protection of the Environmental Operation Act Regulation | 19 |
| 5.2.5 | Summary of Noise Emission Objectives | 19 |
| 5.3 | ASSESSMENT OF NOISE EMISSION | 20 |
| 5.3.1 | Noise – Air-conditioners | 20 |
| 6 | CONCLUSION | 21 |

1 INTRODUCTION

This report presents our preliminary acoustic assessment for the masterplan of a proposed development at 73-75 Gardeners Road, Eastlakes. The purpose of this master plan is to inform the appropriate planning controls for the site to demonstrate that the site is suitable for residential development. Any future development will be subject to divestment of the site by Sydney Water and further detailed design and assessment by others as required by the NSW planning system.

This report will:

- Conduct an external noise intrusion assessment (primarily traffic noise and aircraft noise) and recommend acoustic treatments to ensure that a reasonable level of amenity is achieved for future occupants. Traffic noise at the site have been measured and assessed in accordance with the requirements of City of Botany Council DCP, Australian Standard 2107:2000 and NSW State Environmental Planning Policy (Infrastructure) 2007. Aircraft noise on site has been assessed in accordance with Australian Standard 2021:2000.
- Conduct background noise monitoring to determine noise emission goals for future use of the development to meet the requirements of City of Botany Council DCP and NSW EPA Industrial Noise Policy.

2 SITE DESCRIPTION AND MAJOR ACOUSTIC ISSUES

The subject site is located on Gardeners Road, Eastlakes and currently operates as a commercial site. Approximately 4 metres to the north of the site lies Gardeners Road, which carries medium to high volumes of traffic. Slattery Way, which bounds the west of the site, carries low volumes of traffic and mainly acts as a conduit for residents accessing local streets. Southern boundaries are bounded by existing golf course whilst the eastern boundaries is bounded by the existing golf course car park and club house site which carries low volumes of traffic and is predominantly utilised by employees and customers accessing the site.

In addition, the site is affected by noise from aircraft movements to/from the third runway at Sydney Airport, and lies between the ANEF 20 and 25 contours.

Figure 1 shows the site surroundings and measurement locations.

.



Figure 1: Site Map and Measurement Locations

3 NOISE DESCRIPTORS

Traffic noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level. To accurately determine the effects of traffic noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In the case of environmental noise three principle measurement parameters are used, namely L_{10} , L_{90} and L_{eq} .

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced at the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of traffic noise.

Current practice favours the L_{eq} parameter as a means of measuring traffic noise, whereas the L_{10} parameter has been used in the past and is still incorporated in some codes. For the reasons outlined above, the L_{90} parameter is not used to assess traffic noise intrusion.

LA_{max} refers to the maximum noise level occurring during a measurement period, and is used when assessing sleep disturbance impacts.

4 NOISE INTRUSION ASSESSMENT

4.1 PROJECT ACOUSTIC OBJECTIVES

The assessment of traffic and aircraft noise is conducted with reference to the following documents:

- The City of Botany Bay Council Development Control Plan 2013
- NSW State Environmental Planning Policy Infrastructure (2007).
- AS2107 – 2000 Acoustics – Recommended design sound level and reverberation times for building interiors.
- AS2021 – 2000 Acoustics – Aircraft noise intrusion – Building siting and construction.

4.1.1 The City of Botany Bay Council DCP

Botany Council DCP states the following:

“C1 New dwellings shall be designed and constructed to comply with the criteria specified in Table 6 for all noise intrusion from external noise sources (including mechanical services noise from within the development itself).

C2 An acoustic report prepared by a certified acoustic consultant must be submitted with the development application addressing the requirements detailed in C1 and C3.

C3 Where multiple dwellings are provided within the same building, the building shall be designed and constructed to comply with the requirements of the BCA regarding acoustic insulation and noise transmission of walls and floors. In order to meet these requirements, the following design measures are to be incorporated in the development:

(i) Buildings are to be designed and rooms positioned to reduce noise transmission within and between dwellings;

(ii) Bedrooms should be designed so that wardrobes act as sound buffers between rooms or dwellings;

(iii) Windows and doors should be located away from external noise sources, or buffers used where separation cannot be achieved;

(iv) Materials with low noise penetration properties should be used where practical;

(v) Locate bedrooms and private open spaces away from noise sources such as garages, driveways, mechanical equipment and recreation areas; and (vi) Mechanical equipment, such as pumps, lifts or air conditioners should not be located adjacent to bedrooms or living rooms of dwellings on adjoining properties.

C4 Habitable rooms must be orientated away from arterial roads and other traffic noise sources, to the extent possible. “

Table 6 of the Residential Flat Buildings DCP states the following:

| <i>Internal Area</i> | <i>Time</i> | <i>Repeatable Maximum LAeq (1 Hour) with closed windows and doors</i> | <i>Repeatable Maximum LAeq (1 Hour) with open windows and doors</i> |
|-----------------------|---------------------|---|---|
| <i>Living Areas</i> | <i>Day or Night</i> | < 40 dBA | <50dBA |
| <i>Sleeping Areas</i> | <i>Day or Night</i> | < 40 dBA | <50dBA |

4.1.2 Botany Bay LEP

Botany Bay LEP section 6.9 requires that for developments located in the ANEF 20 contour or greater, that the consent authority must be satisfied that the indoor design sound levels in table 3.3 of AS2021 will be met.

4.1.3 Australian Standards Criteria

The Australian Standards recommend maximum design sound levels for different areas of occupancy in the residential development while AS 3671 -1989 "Road Traffic Noise Intrusion - Building Siting and Construction" recommends that an appropriate L_{eq} for traffic noise descriptor be used for the occupancy being assessed.

Based on AS2107-2000 and AS 3671-1989 the following assessment criteria would apply to the proposed development based on developments near major roads.

Table 1 - AS2107:2000 Internal Traffic Noise Criteria

| Space Activity Type | Noise Level dB(A) $L_{eq}(1hr)$ | |
|----------------------------|---|---------|
| | Satisfactory | Maximum |
| Living Areas | 35 | 45 |
| Sleeping Areas | 30 | 40 |
| Retail/Commercial | 45 | 50 |
| Lobby | 45 | 55 |

4.1.4 State Environmental Planning Policy 2007

The NSW Department of Planning's policy, Development Near Rail Corridors And Busy Roads – Interim Guideline, sets out internal noise level criteria adapted from the State Environmental Planning Policy (Infrastructure) 2007 (the 'Infrastructure SEPP') for developments with the potential to be impacted by traffic or rail noise and vibration.

The Infrastructure SEPP defines busy roads that are subject to an acoustic assessment as:

"Clause 102: development for any of the following purposes that is on land in or adjacent to a road corridor for a freeway, a tollway or a transit way or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data available on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

- *building for residential use*
- *a place of public worship*
- *a hospital*
- *an educational establishment or childcare."*

The Infrastructure SEPP sets out the following criteria for internal noise levels from airborne traffic noise:

"For Clauses 87 (Rail) and 102 (Road):

"If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:

in any bedroom in the building : 35dB(A) at any time 10pm–7am

anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time."

Internal requirements are for residential spaces and are measured internally with windows closed.

4.1.5 Australian Standard 2021:2000 (Aircraft Noise Intrusion)

As the proposed site is located between ANEF 20 and 25 contours, AS2021 states that a full evaluation of internal noise levels is carried out. This evaluation requires an examination of the likely levels of internal noise from aircraft flyovers.

AS2021 stipulates the internal noise levels listed in the Table 2 below for residential buildings. These levels will be used to assess aircraft noise intrusion into the residential levels of the development.

Table 2 – Indoor Design Sound Levels for Aircraft Noise Reduction Assessment

| ACTIVITY | INDOOR DESIGN SOUND LEVEL FROM AIRCRAFT FLYOVER, dB (A) |
|-----------------------------------|---|
| Sleeping areas, dedicated lounges | 50 dB (A) |
| Other habitable spaces | 55 dB (A) |
| Bathrooms, toilets, laundries | 60 dB (A) |

4.1.6 Summary of Criteria

The governing project criteria are presented in the Table 3 and 4 below.

Table 3 – Internal Noise Level Criteria

| Location | Criteria | |
|-----------------|---|--------------------------|
| | Traffic Noise Intrusion | Aircraft Noise Intrusion |
| Bedroom | 35 dB(A) $L_{eq(15\text{hour})}$ – SEPP 40 dB(A) $L_{eq(1\text{hour})}$ – AS2107 | 50 dB(A) |
| Habitable Space | 40 dB(A) $L_{eq(9\text{hour})}$ – SEPP 45 dB(A) $L_{eq(1\text{hour})}$ – AS2107 | 55 dB(A) |
| Bathrooms | N/A | 60 dB(A) |

Table 4 - AS2107:2000 Internal Noise Level Criteria for Other Areas

| LOCATION | TIME OF DAY | CRITERIA | |
|-------------------|-------------|---------------------------------|---------------------------------|
| | | SATISFACTORY | MAXIMUM* |
| Retail/Commercial | 24 Hours | 45dB(A) $L_{eq(1\text{ hour})}$ | 50dB(A) $L_{eq(1\text{ hour})}$ |
| Lobby | 24 Hours | 45dB(A) $L_{eq(1\text{hour})}$ | 55dB(A) $L_{eq(1\text{hour})}$ |

***Recommendations nominated in section 4.4 below will comply with the Maximum design criterion above.**

Compliance with the criteria in table 3 and 4 above will result in compliance with Botany Council DCP's and LEP, AS2021 and SEPP Infrastructure.

4.2 TRAFFIC NOISE MEASUREMENTS

Traffic measurements were taken along the Gardeners Road façade and Bourke Road of the proposed development. Both short term (attended) and long term (unattended) measurements were conducted.

4.2.1 Measurement Location

The long-term noise monitor was setup on Gardeners Road, the monitor had a full view of the road without any obstructions, as indicated in Figure 1.

Supplementary attended measurements were taken at various locations of the site, as shown in Figure 1.

4.2.2 Measurement Period

The long-term noise monitor was conducted from 27th July until the 4th August 2015.

The attended measurements were taken on 20th July 2015 and 28th June 2017.

4.2.3 Measurement Equipment

The long term monitoring was conducted using an Acoustic Research Laboratories Pty Ltd noise logger. The logger was set to A-weighted fast response and was programmed to store 15-minute statistical noise levels throughout the monitoring period. The monitor was calibrated at the start and end of the monitoring period using a Rion NC-73 calibrator. No significant drift was noted.

Attended measurements were undertaken using a Norsonic 140 sound level analyser, set to A-weighted fast response. The sound level analyser was calibrated before and after the measurements, no significant drift was noted.

4.2.4 Measurement Results

4.2.4.1 Unattended Noise Monitor Results

Table 5 below shows measured results from unattended noise monitoring on the proposed site. For detailed location see Figure 1. Detailed results from noise monitoring can be found in Appendix A.

Table 5 – Unattended Noise Monitor Results

| Location | Time Period | Traffic Noise Level |
|---|--------------------|---|
| 75 Gardeners Road, Eastlakes (Approximately 4m from the kerb) | Day - (7am-10pm) | 70 dB(A) _{L_{Aeq}} (15hr) |
| | Night – (7am-10pm_ | 64 dB(A) _{L_{Aeq}} (9hr) |
| | Day - (7am-10pm) | 71 dB(A) _{L_{Aeq}} (worst 1hr) |
| | Night - (10pm-7am) | 69 dB(A) _{L_{Aeq}} (worst 1hr) |

4.2.4.2 Attended Noise Measurements

Table 6 below shows measured results from Attended traffic measurements which were conducted around the proposed site. For detailed location see Figure 1.

Table 6 – Attended Noise Measurements- Site 2

| Location | Time | Measured Results |
|--|-----------------|--|
| 75 Gardeners Road, Eastlakes (Approximately 4m from the kerb at north east boundary) | 5:00pm – 6:00pm | 72 dB(A) _{L_{aq}(15mins)} |
| 75 Gardeners Road, Eastlakes (Approximately 4m from the kerb at north west boundary) | | 69 dB(A) _{L_{aq}(15mins)} |

Table 7 – Attended Noise Measurements- Site 3

| Location | Time | Measured Results |
|--|-----------------|--|
| 73 Gardeners Road, Eastlakes (Approximately 4m from the kerb at north east boundary) | 5:00pm – 6:00pm | 72 dB(A) _{L_{aq}(15mins)} |
| 73 Gardeners Road, Eastlakes (Approximately 4m from the kerb at north west boundary) | | 72 dB(A) _{L_{aq}(15mins)} |

4.3 AIRCRAFT NOISE ASSESSMENT

4.3.1 Site Evaluation

Assessing the acceptability of aircraft noise exposure is done so using Australian Standard AS 2021-2000 "Aircraft Noise Intrusion – Building Siting and Construction". The standard sets the criteria for the allowable levels of aircraft noise exposure dependant on the situation and use of the development.

The acceptability of a site in terms of aircraft noise exposure is assessed using the Australian Noise Exposure Forecast System (ANEF). ANEF was produced to provide a rating system that reflects actual human response to different aspects of aircraft noise, allowing the noise exposure of a particular location to be readily assessed. The three fundamental factors that influence the perception of aircraft noise are as follows; the frequency of aircraft movements overhead, the noise level and duration of individual aircraft movements and the time of the day in which they occur.

The proposed site is located near the ANEF 20 contour, based on the Sydney Airport 2029 ANEF plan. For any sites located on or near the 20 ANEF contour, it is recommended that the proposed site be assessed to ensure that internal noise levels are limited to those recommended in AS2021.

4.3.2 External Aircraft Noise Levels

Aircraft noise levels at the site were determined using AS 2021. The Standard gives aircraft noise levels for various aircraft landing and taking off for locations near airports. The location of the runways was obtained from Sydney Airport 2029 ANEF.

Based on the distance from the site to the runways and an assessment of all the aircraft listed in AS 2021, the Standard predicts that the highest typical aircraft movement will be from a short range take off of a Boeing-767 taking off from the Third Runway. The noise level at the site as indicated by the standard is 76dB(A). This noise level will be used to predict the resultant internal noise levels. The maximum noise levels in the table below will be used to predict the resultant internal noise levels for each runway option.

Table 8 – Aircraft Noise Levels at the Proposed Site

| Boeing 767 Aircraft | East/West Runway | Third Runway |
|---------------------------------|------------------------------------|--|
| Sideline Distance (DS), m | 571m for landings | 520m for take offs 2000m for landings |
| Distance for Take Offs (DT), m* | N/A | 6750m |
| Distance for Landings (DL), m* | 2750m | 3250m |
| 767 Take Off dB (A) | N/A | <76 |
| 767 Landing dB (A) | <72 | <54 |
| ANR 767 Take Off dB (A) | N/A | 21 Living 26 Sleeping 16 Wet |
| ANR 767 Landing dB (A) | 17 Living 22 Sleeping 12 Wet | 0 Living 4 Sleeping 0 Wet |

* These distances have been adjusted to take into account land height correction pursuant to AS2021.

4.4 EVALUATION OF NOISE INTRUSION

Internal noise levels will primarily be as a result of noise transfer through the windows and doors and roof, as these are relatively light building elements that offer less resistance to the transmission of sound. **Any external walls and roof design that are proposed to be of heavy masonry elements will not require upgrading. Any lightweight constructions will need to be reviewed and assessed at a later stage.**

The predicted noise levels through windows and doors for typical developments are discussed below. The predicted noise levels have been based on the measured level and spectral characteristics of the external noise, the area of building elements exposed to traffic noise, the absorption characteristics of the rooms and the noise reduction performance of the building elements.

Calculations were performed taking into account the orientation of windows, barrier effects (where applicable), the total area of glazing, facade transmission loss and the likely room sound absorption characteristics. In this way the likely interior noise levels can be predicted.

Table 9 – Typical Glazing Construction Recommendations – Site 2 and 3

| Boundary | Room | Glazing requirements* |
|---------------------------------------|--------------|---------------------------------------|
| North (Gardeners Road) | Bedrooms | 10.38mm Laminated with acoustic seals |
| | Living Rooms | 10.38mm Laminated with acoustic seals |
| Southern (Golf Course) | Bedrooms | 10.38mm Laminated with acoustic seals |
| | Living Rooms | 6.38mm Laminated with acoustic seals |
| Eastern Boundary (Slattery Way) | Bedrooms | 10.38mm Laminated with acoustic seals |
| | Living Rooms | 6.38mm Laminated with acoustic seals |
| Western Boundary (Golf Club House) | Bedrooms | 10.38mm Laminated with acoustic seals |
| | Living Rooms | 6.38mm Laminated with acoustic seals |

Note: These glazing thicknesses are to be reviewed at CC stage when plans are finalised.

Table 10 – Typical Retail/Commercial Glazing Recommendations

| Facade | Area | Glazing requirements |
|--------|-------------------|-----------------------------------|
| All | Retail/Commercial | 6mm toughened with acoustic seals |

The glazing thicknesses recommended are those needed to satisfy acoustic requirements and do not take into account other requirements such as structural, safety or other considerations. These additional considerations may require the glazing thickness to be increased beyond the acoustic requirement. **These glazing thicknesses are to be reviewed at CC stage when plans are finalised.**

Noise intrusion through the masonry walls will be negligible and will not contribute to internal noise levels. Similarly, noise intrusion through the concrete slab roof construction will not be significant.

4.1 MECHANICAL VENTILATION

AS2021-2000 requires the installation of ventilation or air conditioning system where aircraft noise exposure exceeds ANEF 20. As internal noise levels cannot be achieved with windows open it is required that an alternative outside air supply system or air conditioning be installed in accordance with AS 1668.2 requirements. Any mechanical ventilation system that is installed should be acoustically designed such that the acoustic performance of the recommended constructions are not reduced by any duct or pipe penetrating the wall/ceiling/roof. Noise emitted to the property boundaries by any ventilation system shall comply with Council requirements.

5 NOISE EMISSION ASSESSMENT

Detailed mechanical equipment selection and layouts are not available at this stage. The external noise emission criteria are set up in this section of the report to ensure that the amenities of nearby land users are not adversely affected.

The nearest potentially affected residential receivers are the residential properties located on the western side of Slattery Way and on the northern side of Gardeners Road from the subject development. The nearest affected commercial receivers are the Eastlake Golf Club and shop on the eastern boundary and the golf course on the southern boundary adjacent to the site.

5.1 BACKGROUND NOISE MONITORING

Long-term unattended monitors were used for background noise measurements supplemented with attended measurements at the eastern and northern boundary of the site. Detailed noise monitoring results can be found in Appendix 1.

The long-term noise monitoring was conducted from 27th July until the 4th August 2015.

The long term monitoring was conducted using Acoustic Research Laboratories Pty Ltd noise loggers. The loggers were set to A-weighted fast response and were programmed to store 15-minute statistical noise levels throughout the monitoring period. The monitors were calibrated at the start and end of the monitoring period using a Rion NC-73 calibrator. No significant drift was noted. See Figure 1 for Monitor Locations.

Table 10 – Measured Background Noise Levels

| Location | Period/Time | Background Noise Level dB(A) L ₉₀ (period) |
|---|-------------------|--|
| 75 Gardeners Road, Eastlakes (Northern Boundary) | Day (7am-6pm) | 57 |
| | Evening(6pm-10pm) | 53 |
| | Night(10pm-7am) | 41 |
| Sydney Water, Eastlakes (73 Gardeners Road Location) | Day (7am-6pm) | 48 |
| | Evening(6pm-10pm) | 49 |
| | Night(10pm-7am) | 41 |

5.2 NOISE EMISSION OBJECTIVES

The following documents are used to establish the noise emission criteria for the development site:

- City of Botany Bay Council DCP
- EPA Industrial Noise Policy
- Protection of Environmental Operation Act Regulation

5.2.1 City of Botany Bay Council DCP

The City of Botany Bay Council states:

“C18 The noise level from air conditioning systems is not to exceed the $L_{Aeq\ 15\ minute}$ by 5dBA measured at the property Boundary.

5.2.2 EPA Industrial Noise Policy

The EPA Industrial Noise Policy, has two criteria which need to be satisfied namely Intrusiveness and Amenity.

The EPA Industrial Noise Policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. Under the policy the nearest residence would be assessed against the urban criteria.

Noise levels are to be assessed at the property boundary or nearby dwelling, or at the balcony or façade of an apartment.

5.2.2.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted are presented in the table below. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

Table 11– Allowable Intrusive Noise Levels

| Location | Intrusiveness Noise Goals dB(A) $L_{eq}(15\ minutes)$ | | |
|--------------------------|---|-------------------------|----------------------------|
| | Daytime (7am – 6pm) | Evening (6pm – 10pm) | Night-time (10pm – 7am) |
| Northern Boundary | 62 | 58 | 46 |
| All Remaining Boundaries | 53 | 54 | 46 |

5.2.2.2 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The EPA's Industrial noise policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. This site is categorised by the residential receivers as suburban.

For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

Table 12 – EPA Amenity Noise Levels

| Type of Receiver | Time of day | Recommended Acceptable Noise Level dB(A) $L_{eq}(\text{period})$ |
|------------------------|--------------------|--|
| Residential – Suburban | Day (7am-6pm) | 55 |
| | Evening (6pm-10pm) | 45 |
| | Night (10pm-7am) | 40 |
| Commercial Premises | When in use | 65 |

5.2.3 Sleep Arousal

To minimise the potential for sleep arousal the L_1 (1 minute) noise level of any specific noise source does not exceed the background noise level (L_{90}) by more than 15 dB(A) outside a resident's bedroom window between the hours of 10pm and 7am.

The L_1 noise level is the level exceeded for 1 per cent of the time and approximates the typical maximum noise level from a particular source. Where the typical repeatable existing L_1 levels exceed the above requirement then the existing L_1 levels form the basis for, sleep disturbance criteria.

5.2.4 Protection of the Environmental Operation Act Regulation

Protection of the Environmental Operations regulation limits the noise levels associated within the operation of domestic air conditioning criteria during night time periods which is presented below:

Protection of the Environmental Operations (Noise Control) Regulation 2000-Sect 52

52 Air Conditioners

(1) A person must not cause or permit an air conditioner to be used on residential premises in such a manner that it emits noise that can be heard within a habitable room in any other residential premises (regardless of whether any door or window to that room is open):

- (a) before 8 am or after 10 pm on any Saturday, Sunday or public holiday, or*
- (b) before 7 am or after 10 pm on any other day.*

5.2.5 Summary of Noise Emission Objectives

Based on the requirements stated in the sections above, the Table 13 and 14 below provides a summary of the assessment criteria applicable to the future residential development at the project site. The assessment criteria are also based on the ambient noise monitoring conducted at the site.

Table 13 – Environmental Noise Emission Criteria (Northern Boundary)

| Time of day | Measured Background Noise Level dB(A) L ₉₀ (15minutes) | Amenity Criteria dB(A) L _{eq} (period) | Intrusiveness Criteria Background + 5 dB(A) L _{eq} (15minutes) | EPA Criteria for Residential Condensers | EPA Criteria for Sleep Disturbance dB (A) L ₁ (1minute) |
|-------------|--|---|--|---|---|
| Day | 57 | 55 | 63 | N/A | N/A |
| Evening | 53 | 45 | 58 | N/A | N/A |
| Night | 41 | 40 | 46 | Inaudible within neighbouring premises | 56 |

Table 14 – Environmental Noise Emission Criteria (Remaining Boundaries)

| Time of day | Measured Background Noise Level dB(A) L ₉₀ (15minutes) | Amenity Criteria dB(A) L _{eq} (period) | Intrusiveness Criteria Background + 5 dB(A) L _{eq} (15minutes) | EPA Criteria for Residential Condensers | EPA Criteria for Sleep Disturbance dB (A) L ₁ (1minute) |
|-------------|--|---|--|---|---|
| Day | 48 | 55 | 53 | N/A | N/A |
| Evening | 49 | 45 | 54 | N/A | N/A |
| Night | 41 | 40 | 46 | Inaudible within neighbouring premises | 56 |

5.3 ASSESSMENT OF NOISE EMISSION

As mechanical plant has not yet been selected at this stage, a complete assessment of mechanical noise emissions can not be conducted at this time. Generally, this is undertaken at CC stage, once the plant selections have been undertaken. Notwithstanding, compliance with the mechanical noise emission criteria presented in section 5.2.5 is both practical and reasonable with the use of one or more of (but not limited to) the following:

- Acoustic Barriers/Screens;
- Internally lined ductwork;
- External Lagging;
- Silencers etc.

5.3.1 Noise – Air-conditioners

As air conditioning plant has not yet been selected, a complete assessment of air-conditioning noise emissions can not be conducted at this time. Generally, this is undertaken at CC stage, once the plant selections have been undertaken. Notwithstanding, compliance with the air conditioning noise emission criteria presented in section 5.2.5 is both practical and reasonable with the use of one or more of (but not limited to) the following acoustic treatments:

- Acoustic Barriers/Screens;
- Internally lined ductwork;
- External Lagging;
- Silencers etc.

6 CONCLUSION

This report presents preliminary acoustic assessment for the masterplan of a potential development at 73-75 Gardeners Road, Eastlakes.

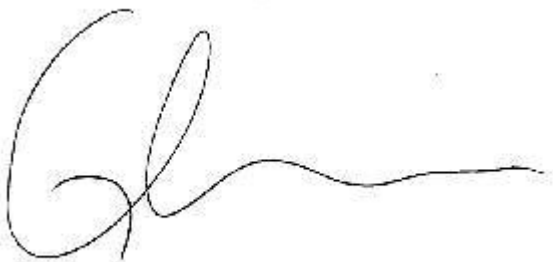
Noise intrusion impact from traffic and aircraft noise onto the future occupants of the development has been assessed in accordance with State of Environment Planning Policy (Infrastructure), Botany Bay Council DCP's and Australian Standards 2021:2000 and 2107:2000 . The typical acoustic treatments in principle necessary to achieve these guidelines have been presented within this report.

Noise emission criteria for the development site have been determined based on the site noise logging and Botany Bay Council DCP, NSW EPA Industrial Noise Policy and Protection of the Environmental Operation Act Regulation. These requirements have been presented in Section 5.2.

It must be noted that any future development will be subject to a separate Development Application lodged with Bayside Council which will need to undergo detailed assessment against the relevant criteria identified in this report. The assessment of the master plan identifies that the site is appropriate for residential development with regards to acoustic impacts, subject to detailed design and further assessment as part of any future development application.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'Glen Campbell', with a long horizontal flourish extending to the right.

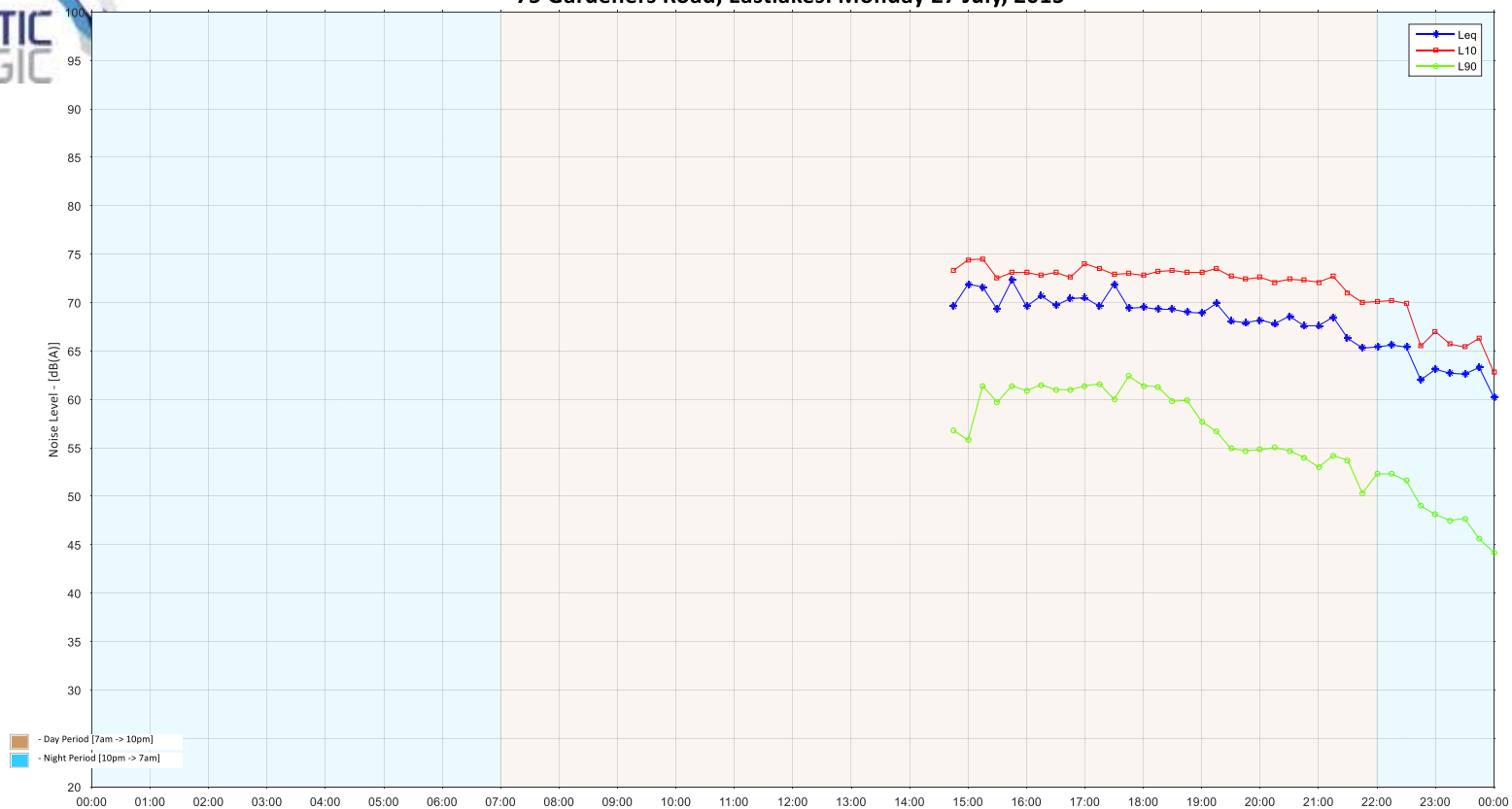
Acoustic Logic Consultancy Pty Ltd
Glen Campbell

APPENDIX 1

Unattended Noise Monitoring Data

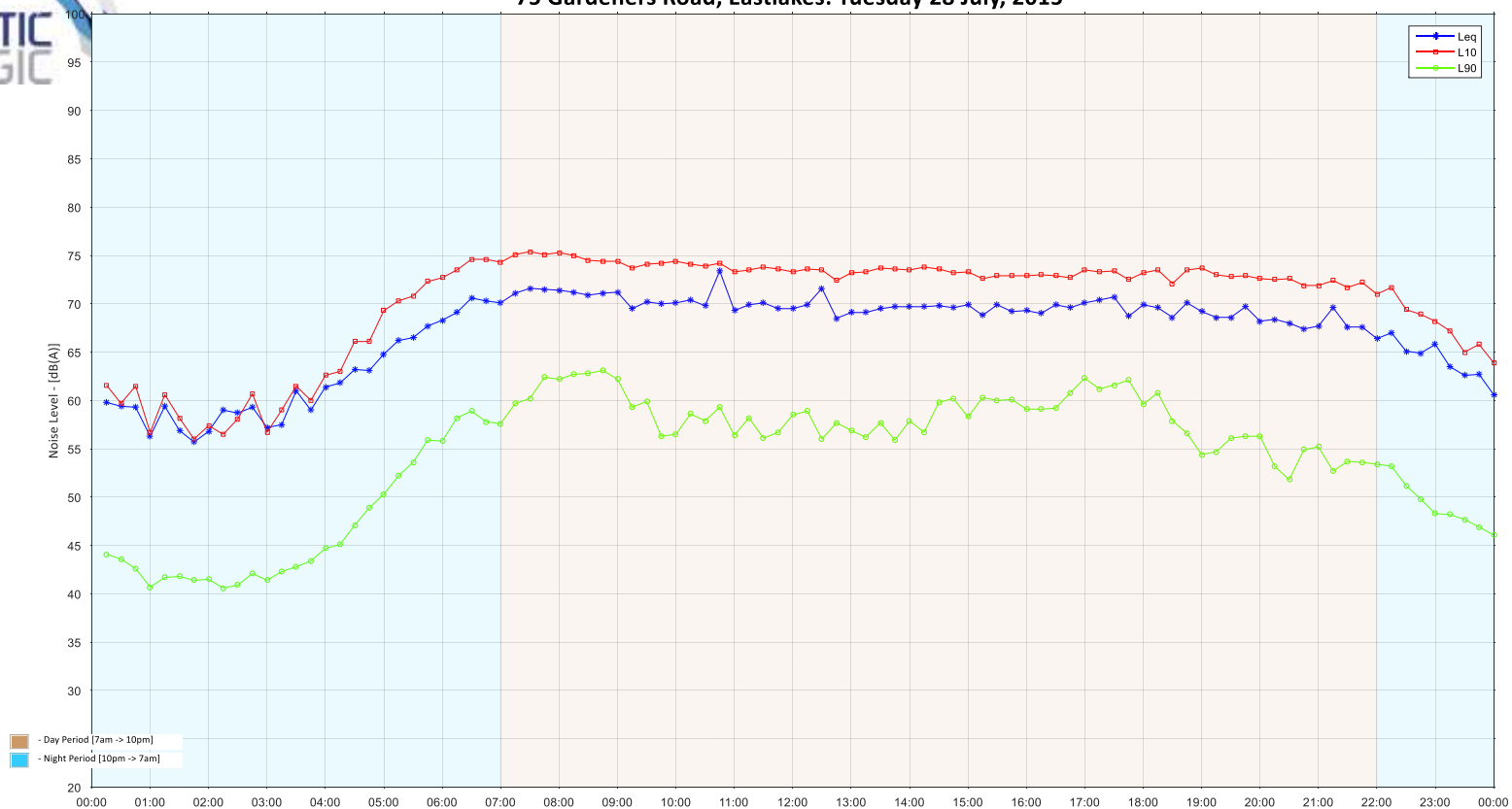


75 Gardeners Road, Eastlakes: Monday 27 July, 2015

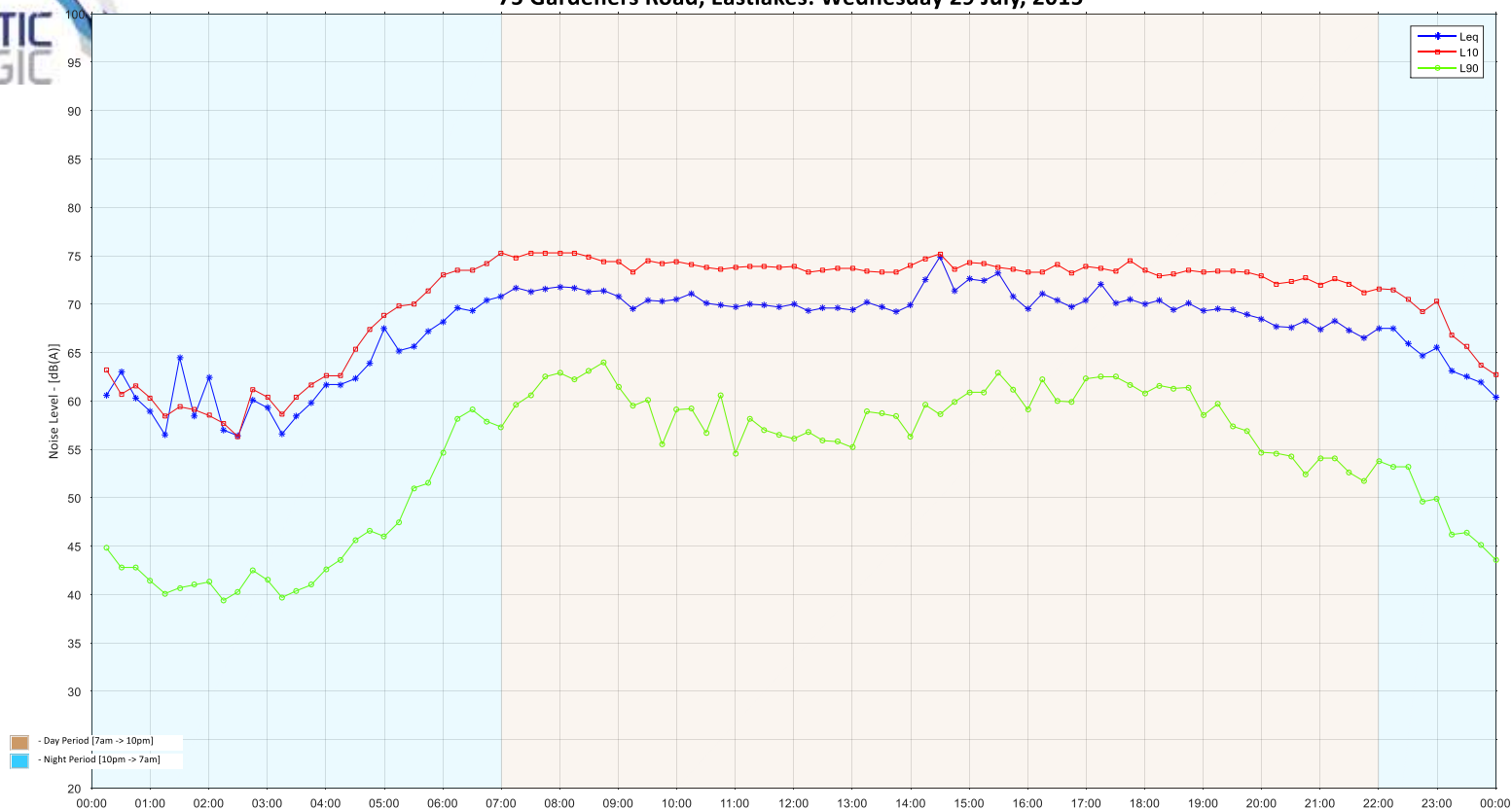




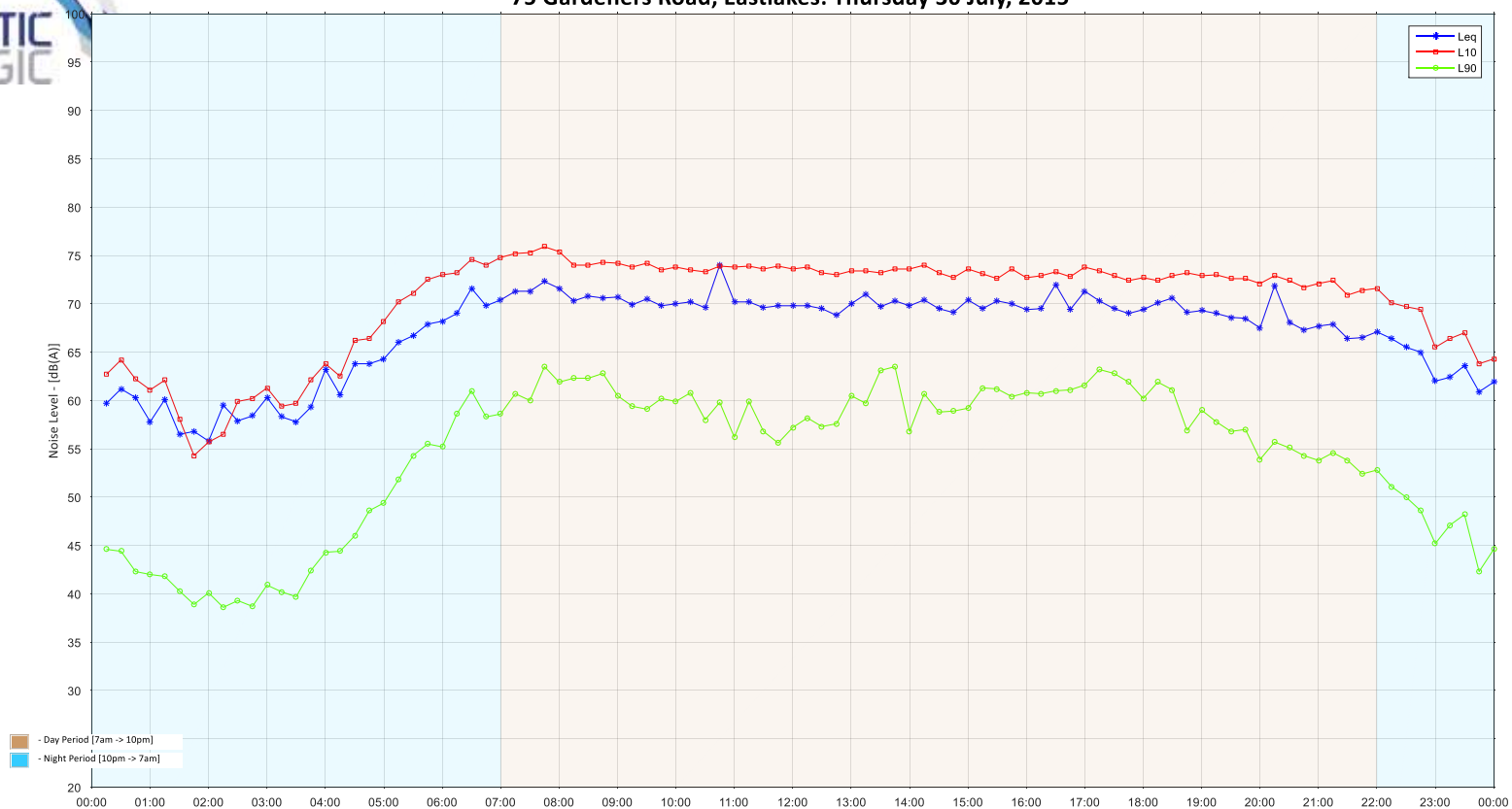
75 Gardeners Road, Eastlakes: Tuesday 28 July, 2015



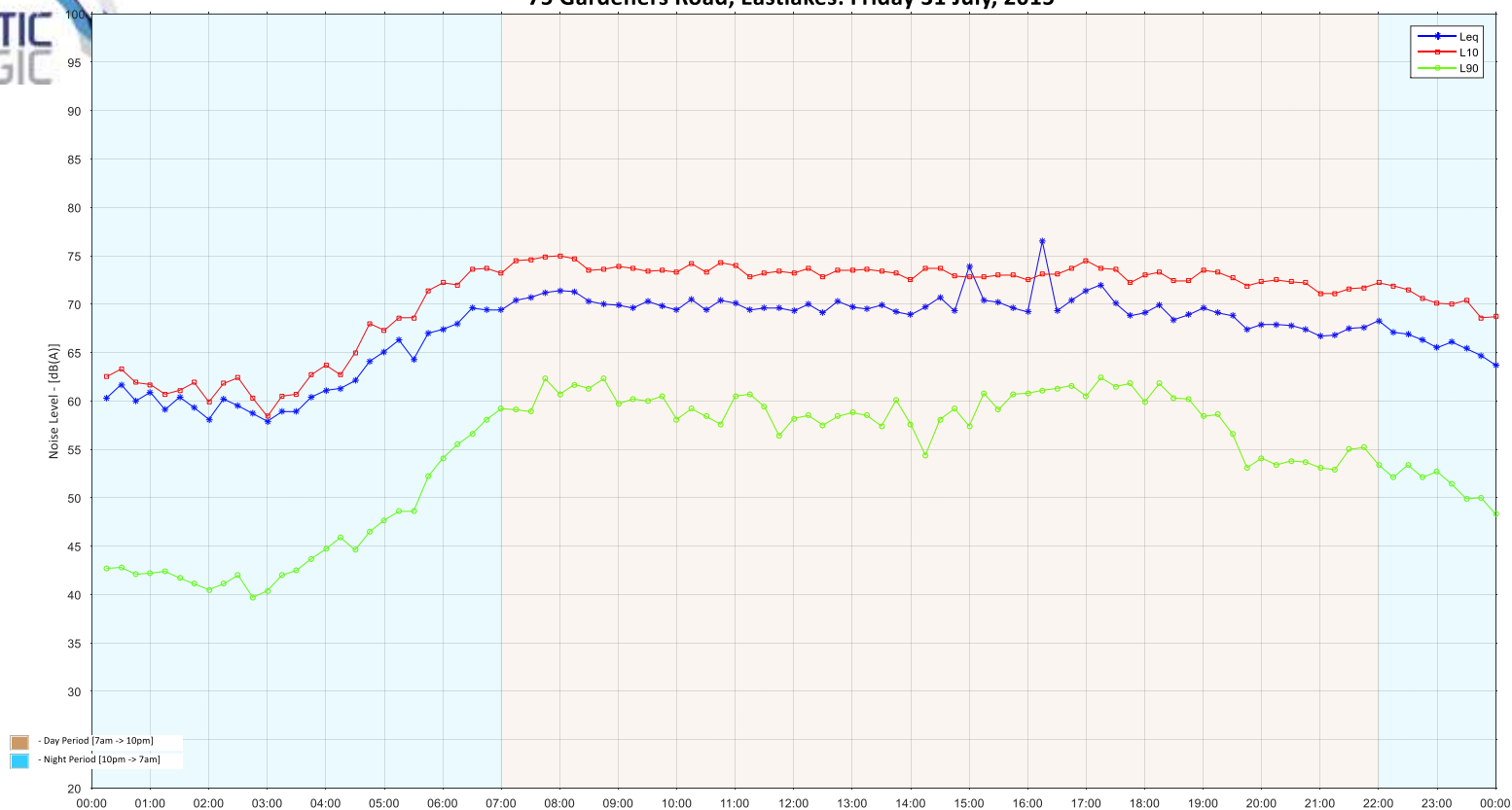
75 Gardeners Road, Eastlakes: Wednesday 29 July, 2015



75 Gardeners Road, Eastlakes: Thursday 30 July, 2015

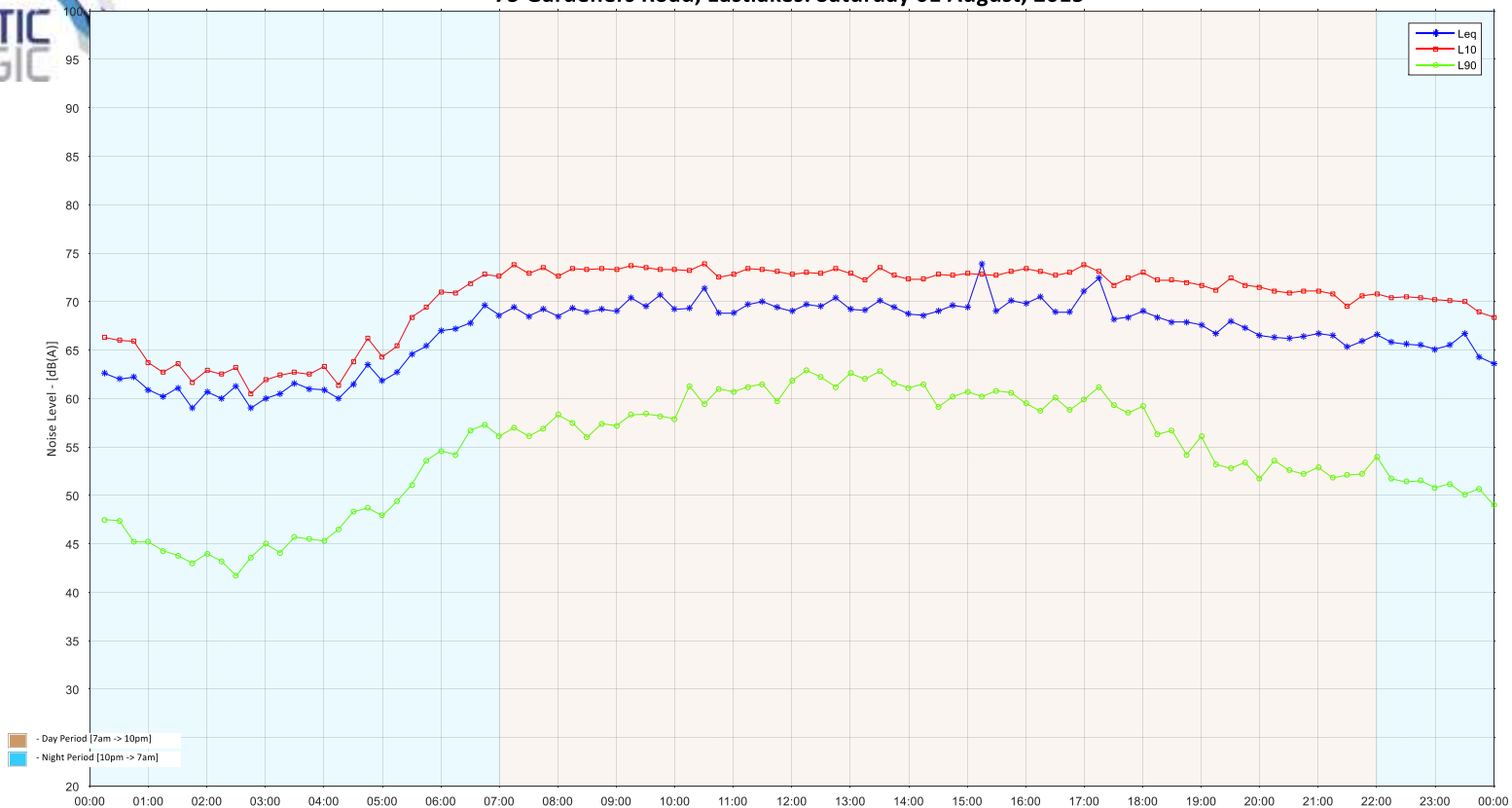


75 Gardeners Road, Eastlakes: Friday 31 July, 2015



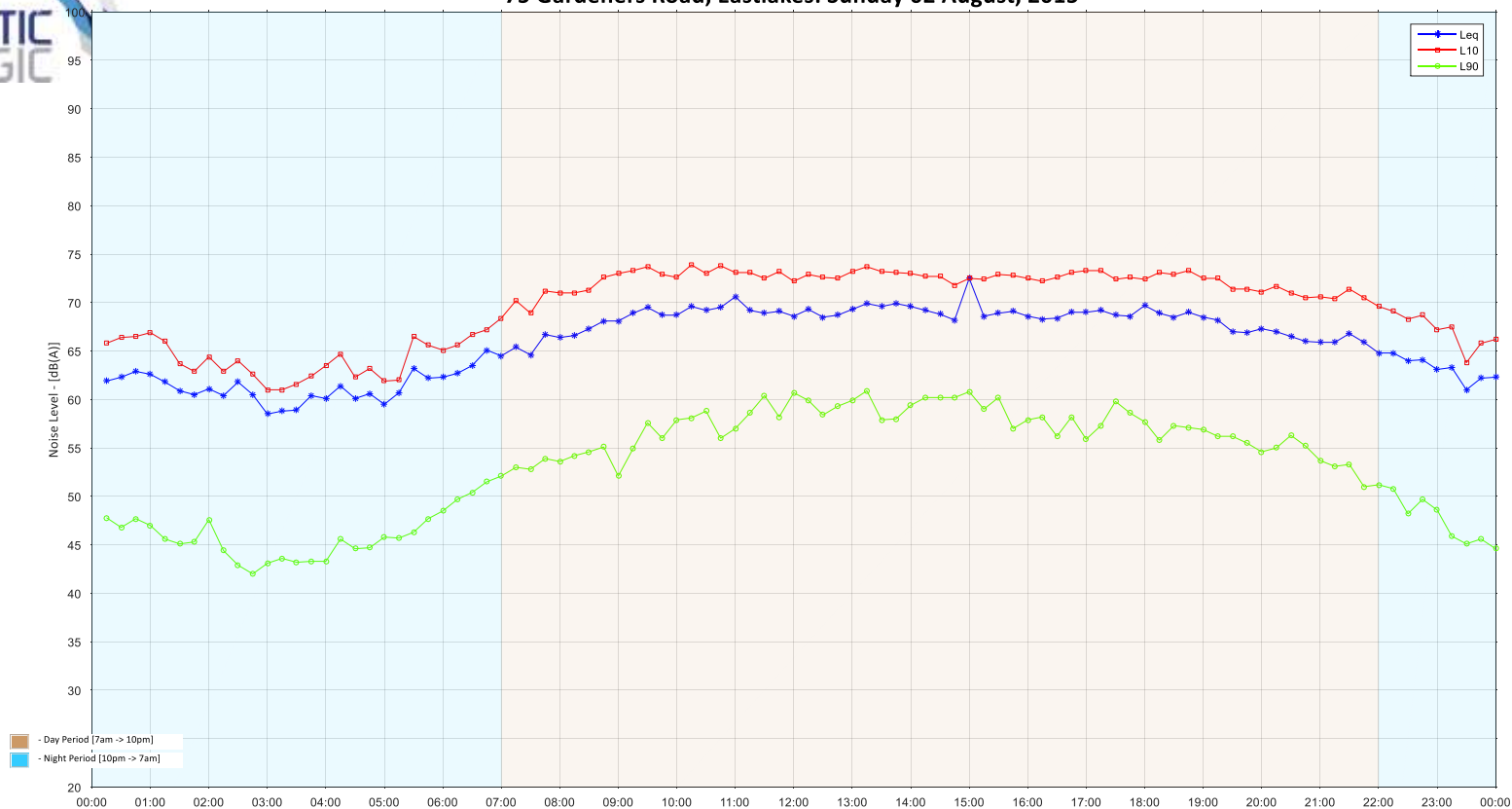


75 Gardeners Road, Eastlakes: Saturday 01 August, 2015



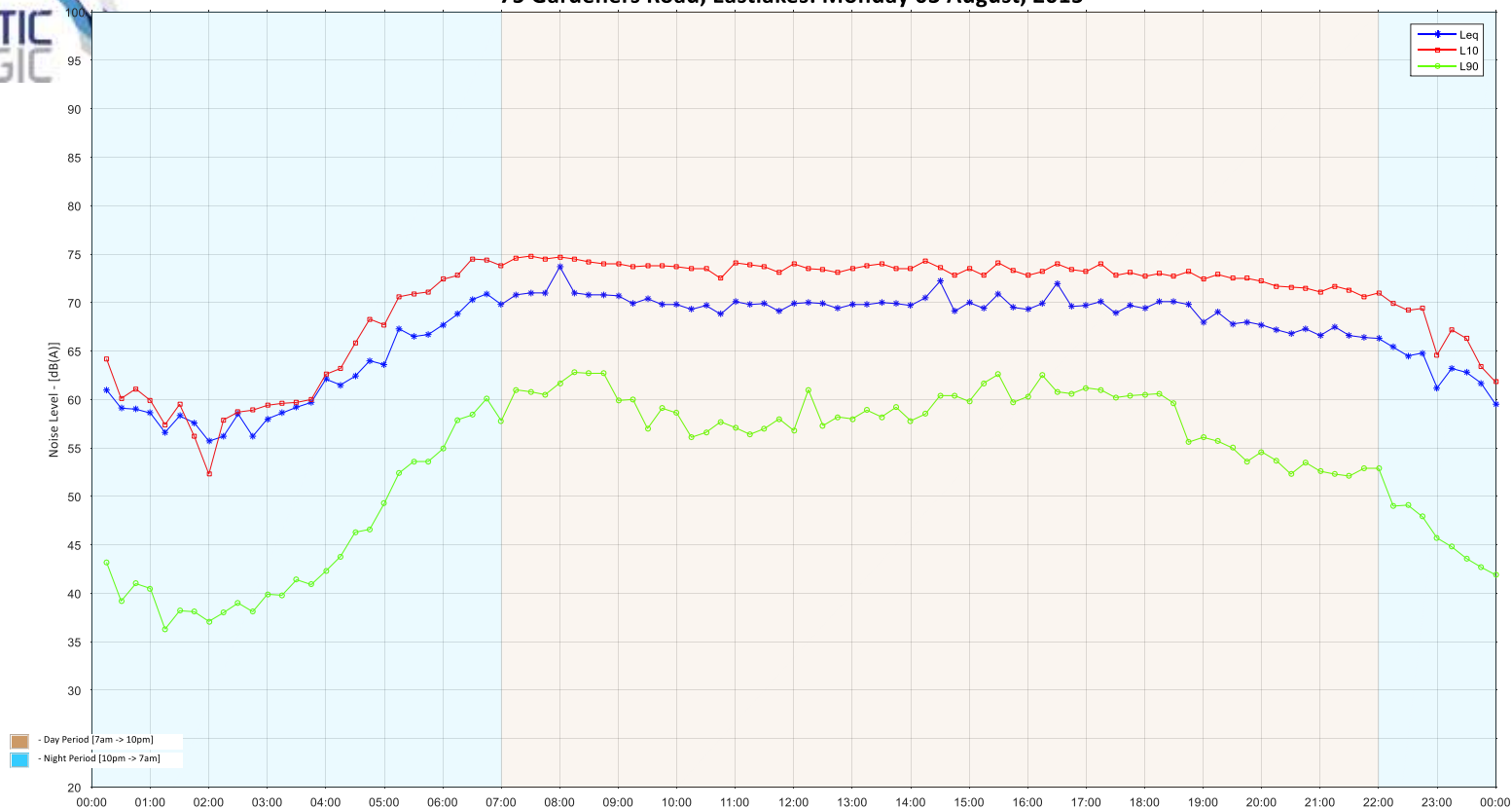


75 Gardeners Road, Eastlakes: Sunday 02 August, 2015



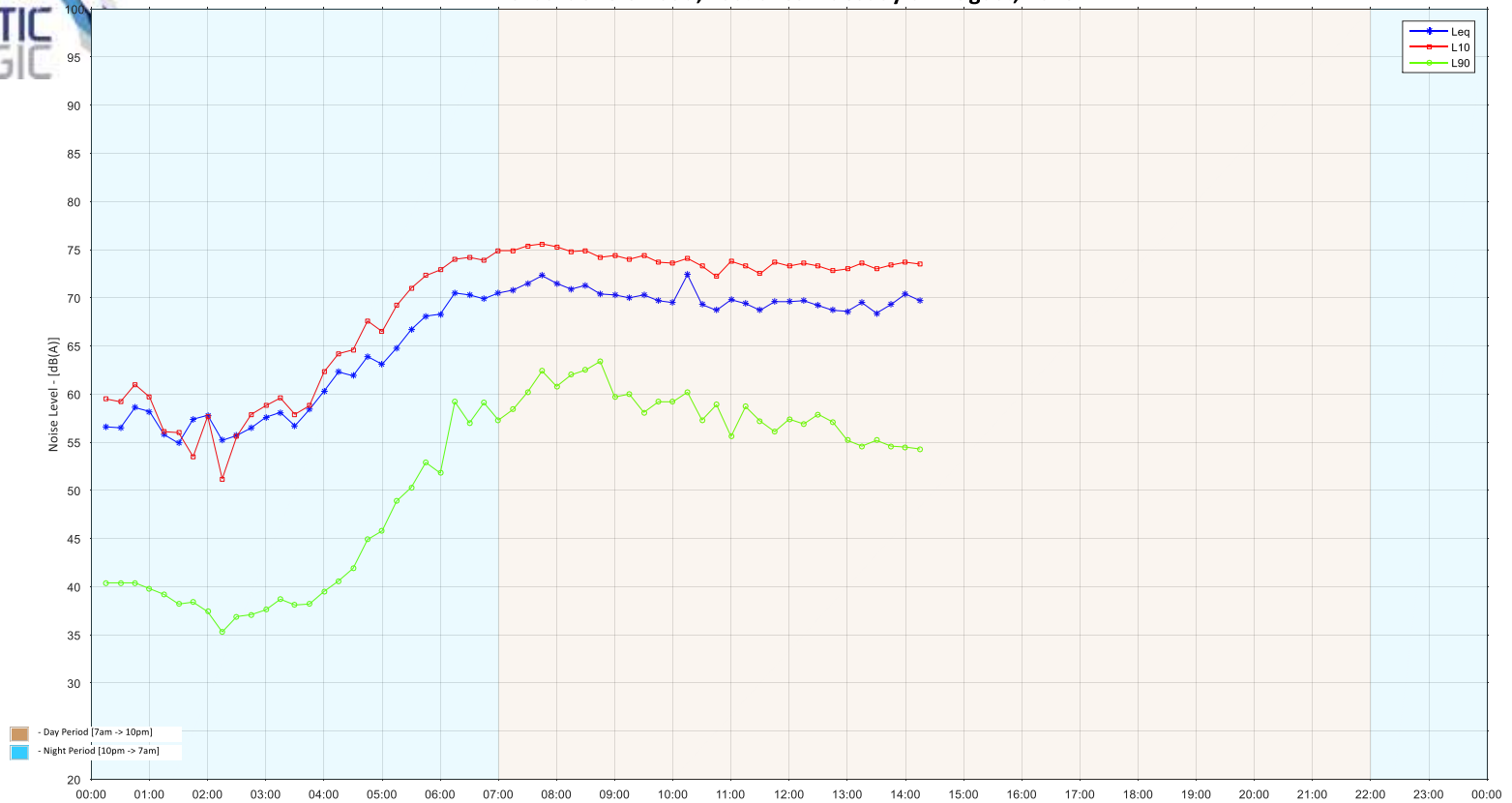


75 Gardeners Road, Eastlakes: Monday 03 August, 2015



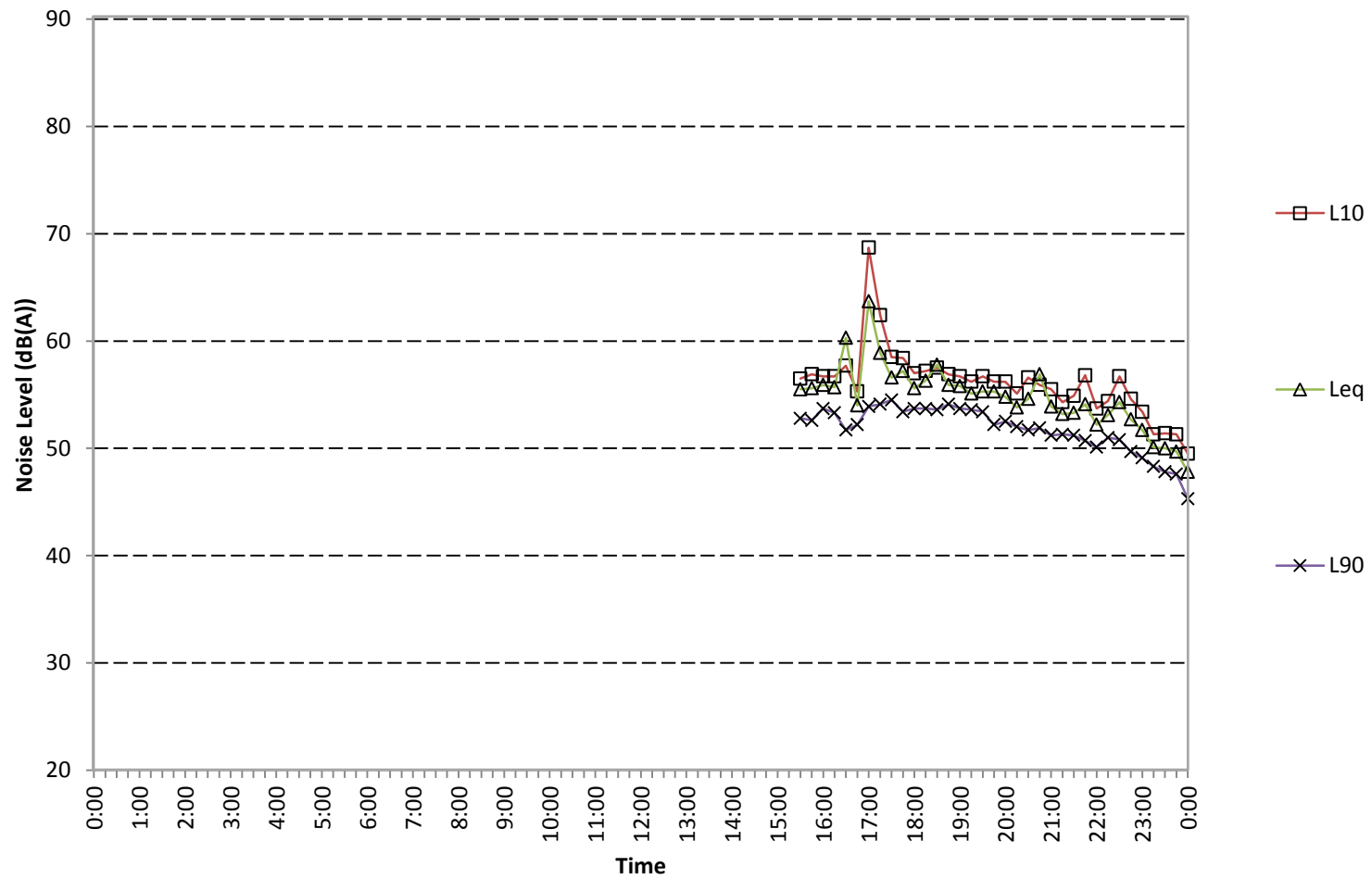


75 Gardeners Road, Eastlakes: Tuesday 04 August, 2015



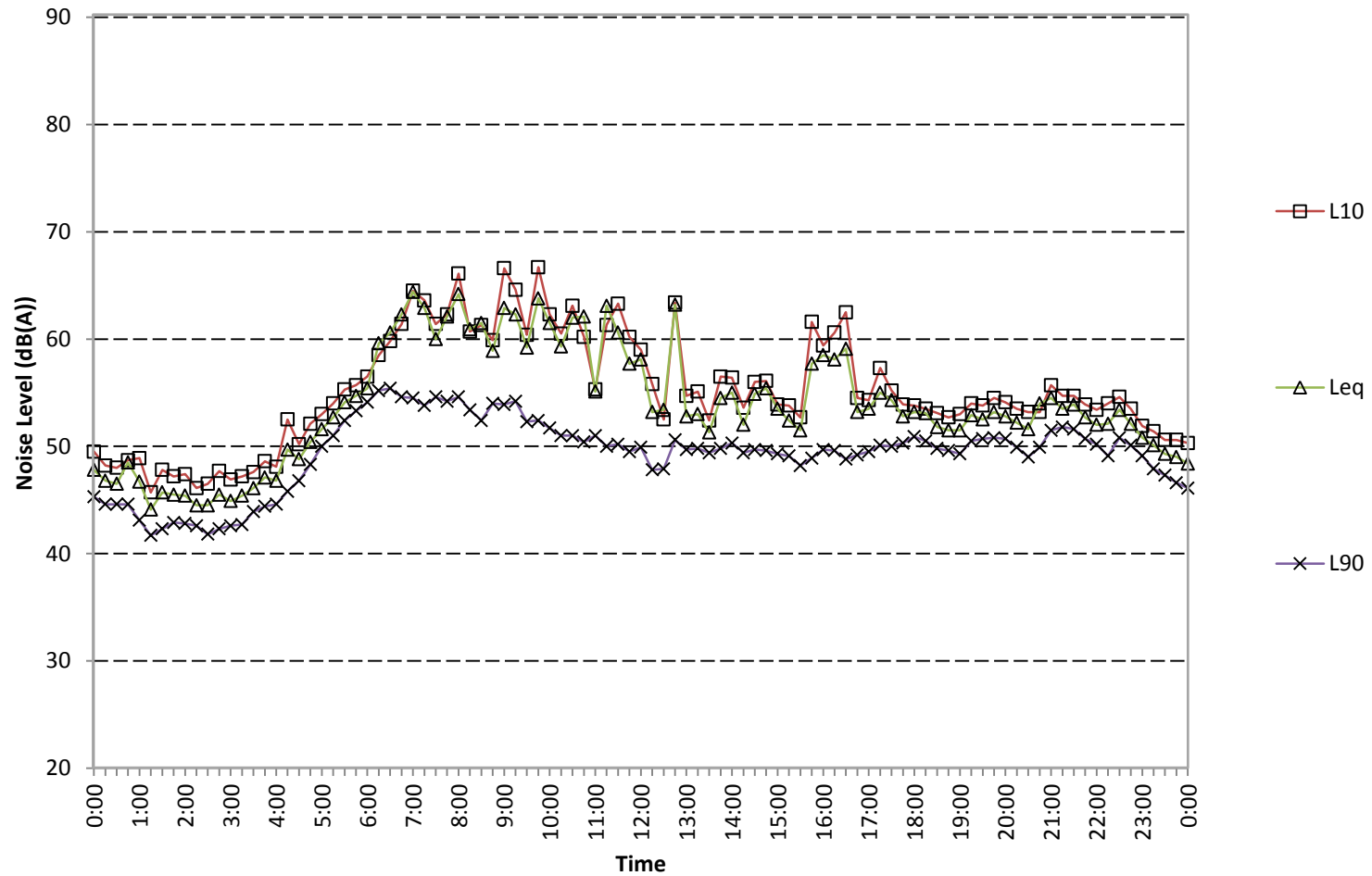
75 Gardeners Road, Eastlakes (Western Boundary) - Background Noise

Monday July 27, 2015



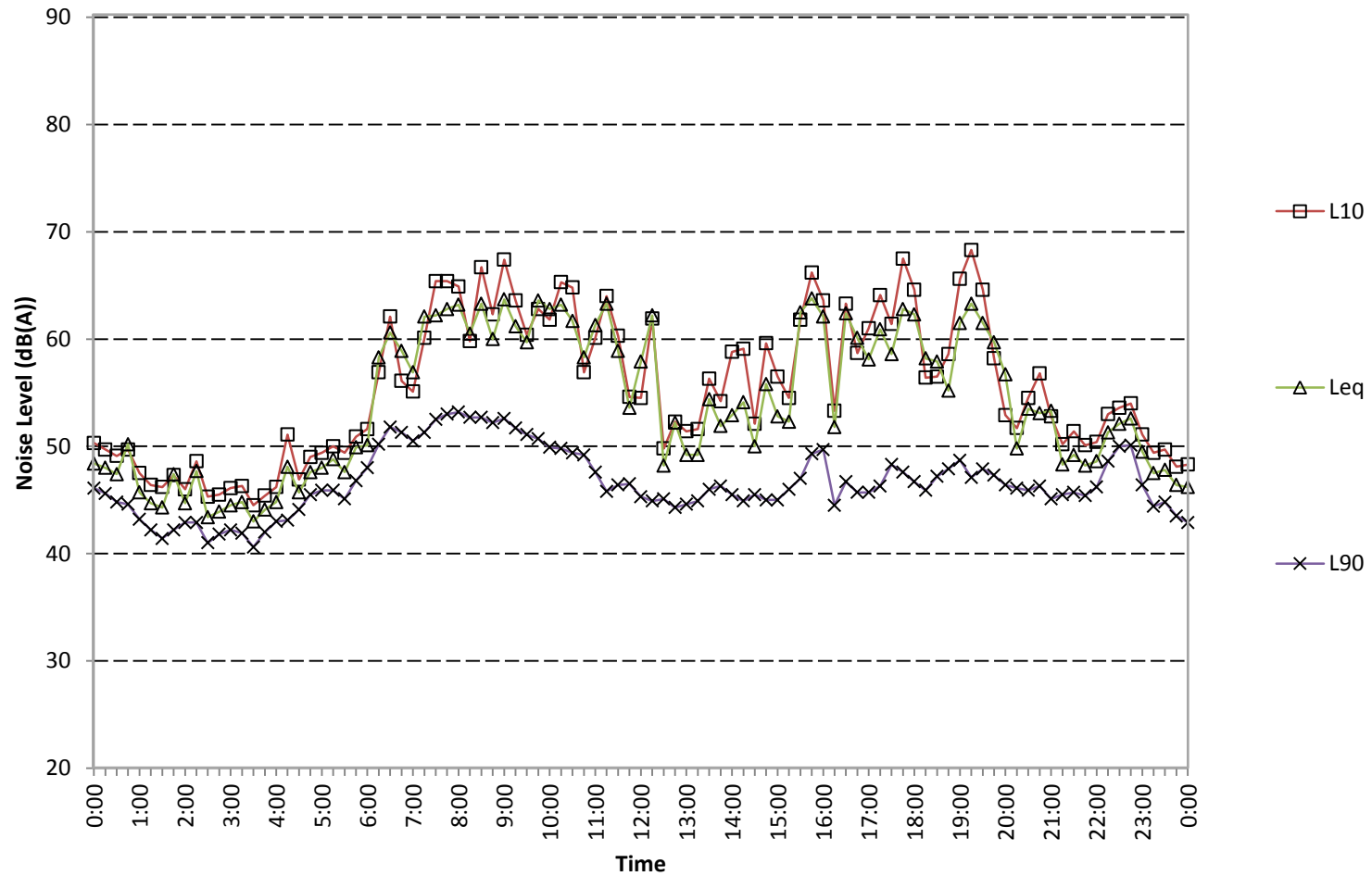
75 Gardeners Road, Eastlakes (Western Boundary) - Background Noise

Tuesday July 28, 2015



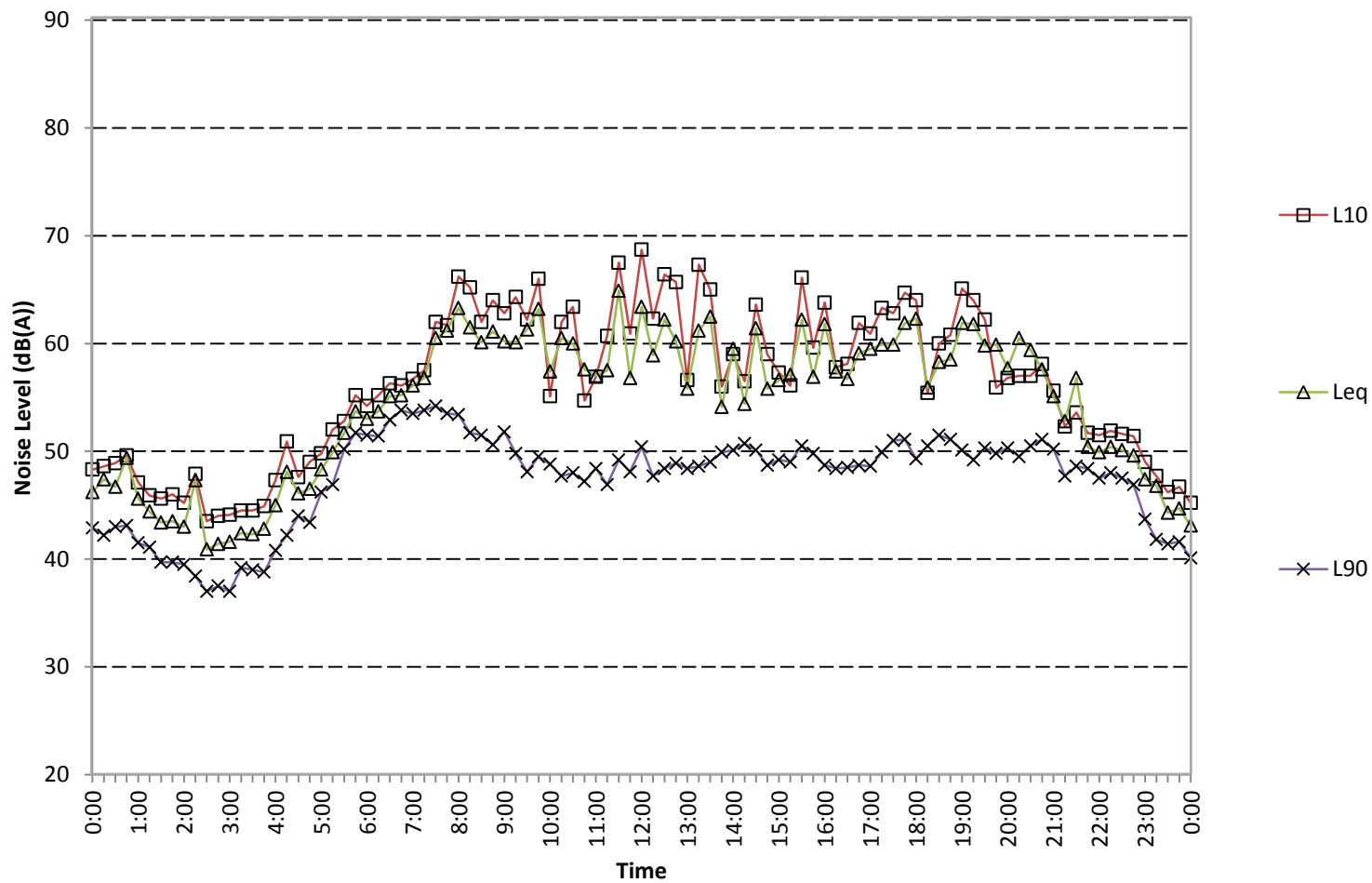
75 Gardeners Road, Eastlakes (Western Boundary) - Background Noise

Wednesday July 29, 2015



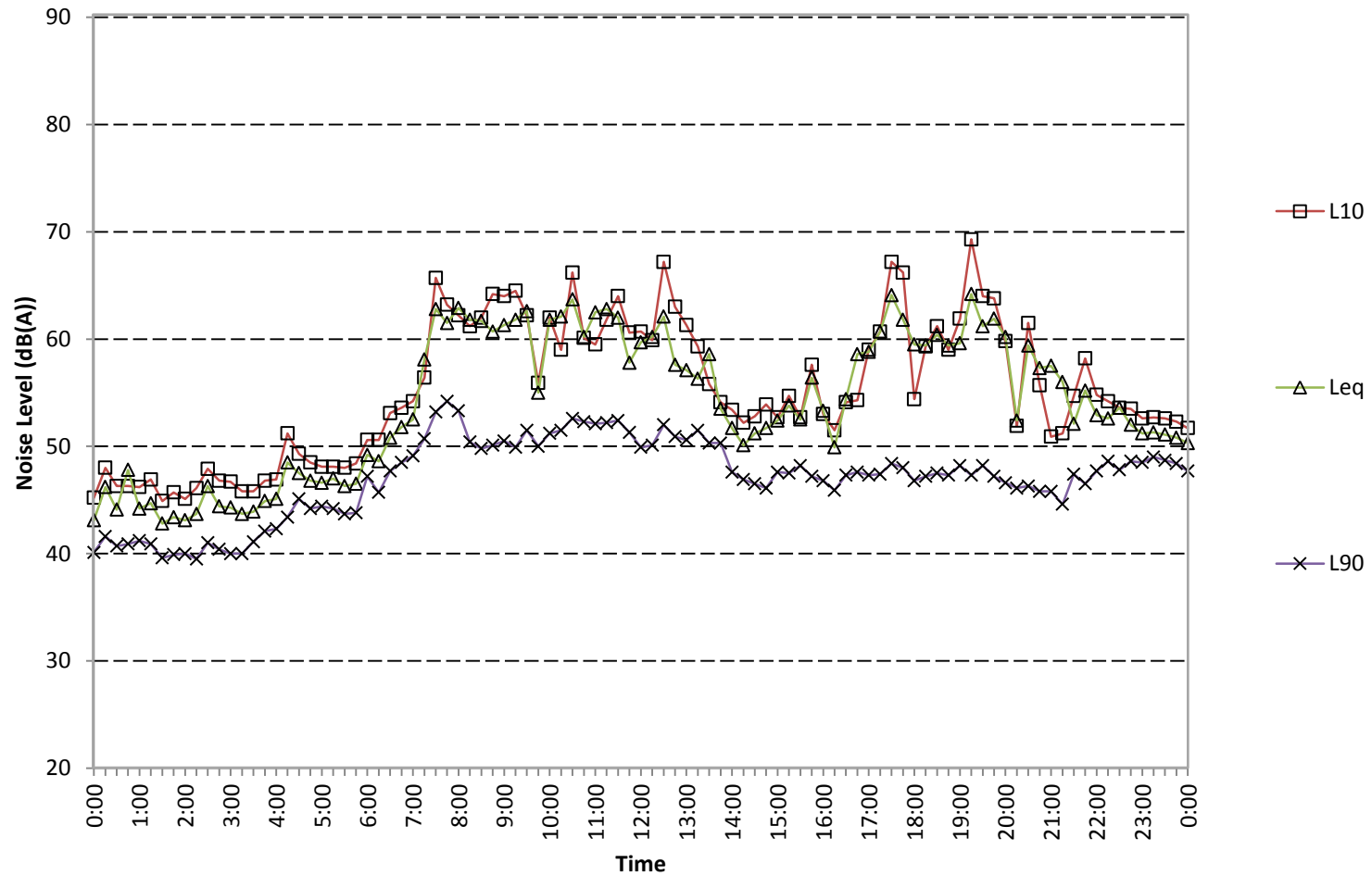
75 Gardeners Road, Eastlakes (Western Boundary) - Background Noise

Thursday July 30, 2015



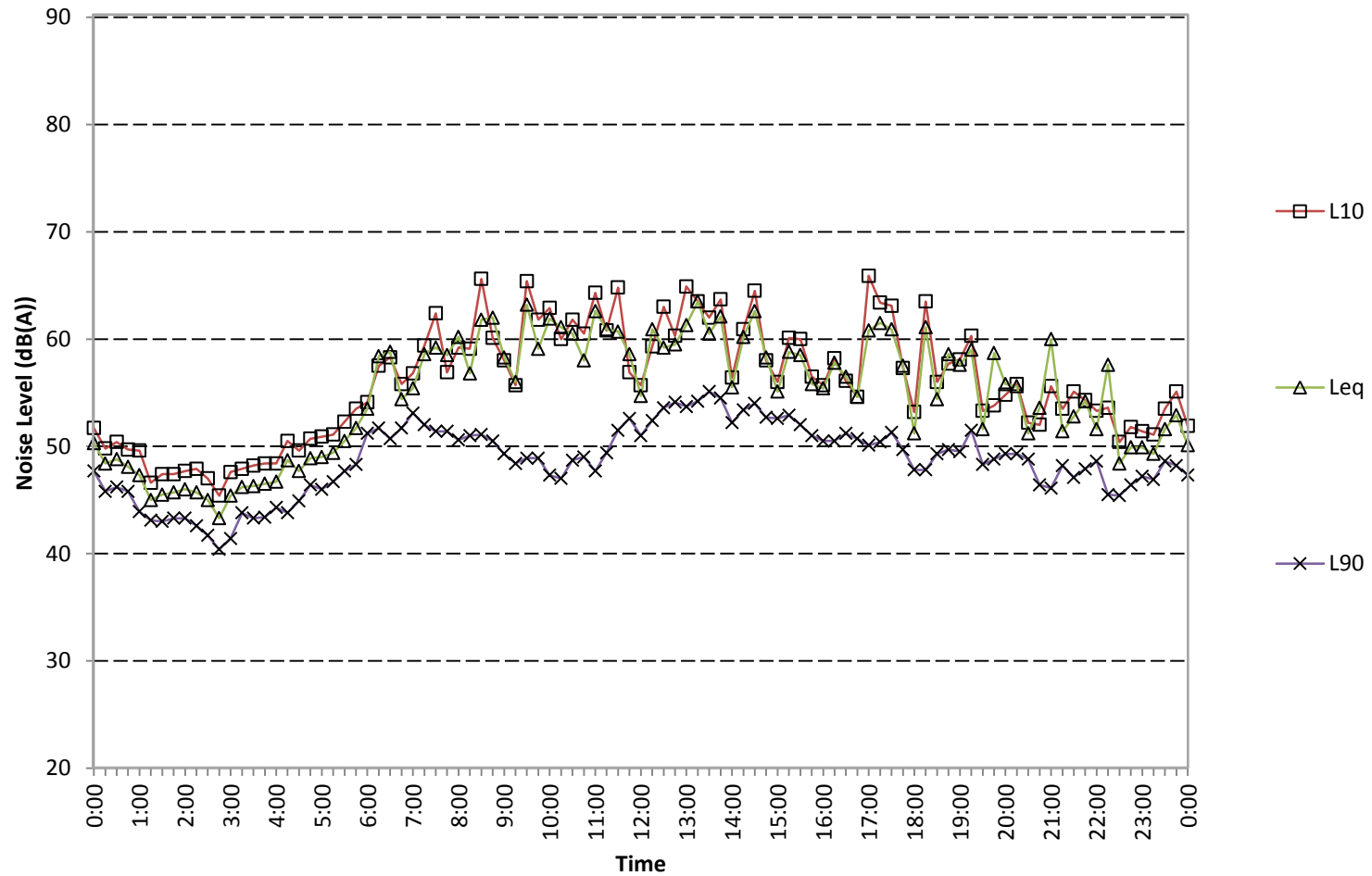
75 Gardeners Road, Eastlakes (Western Boundary) - Background Noise

Friday July 31, 2015



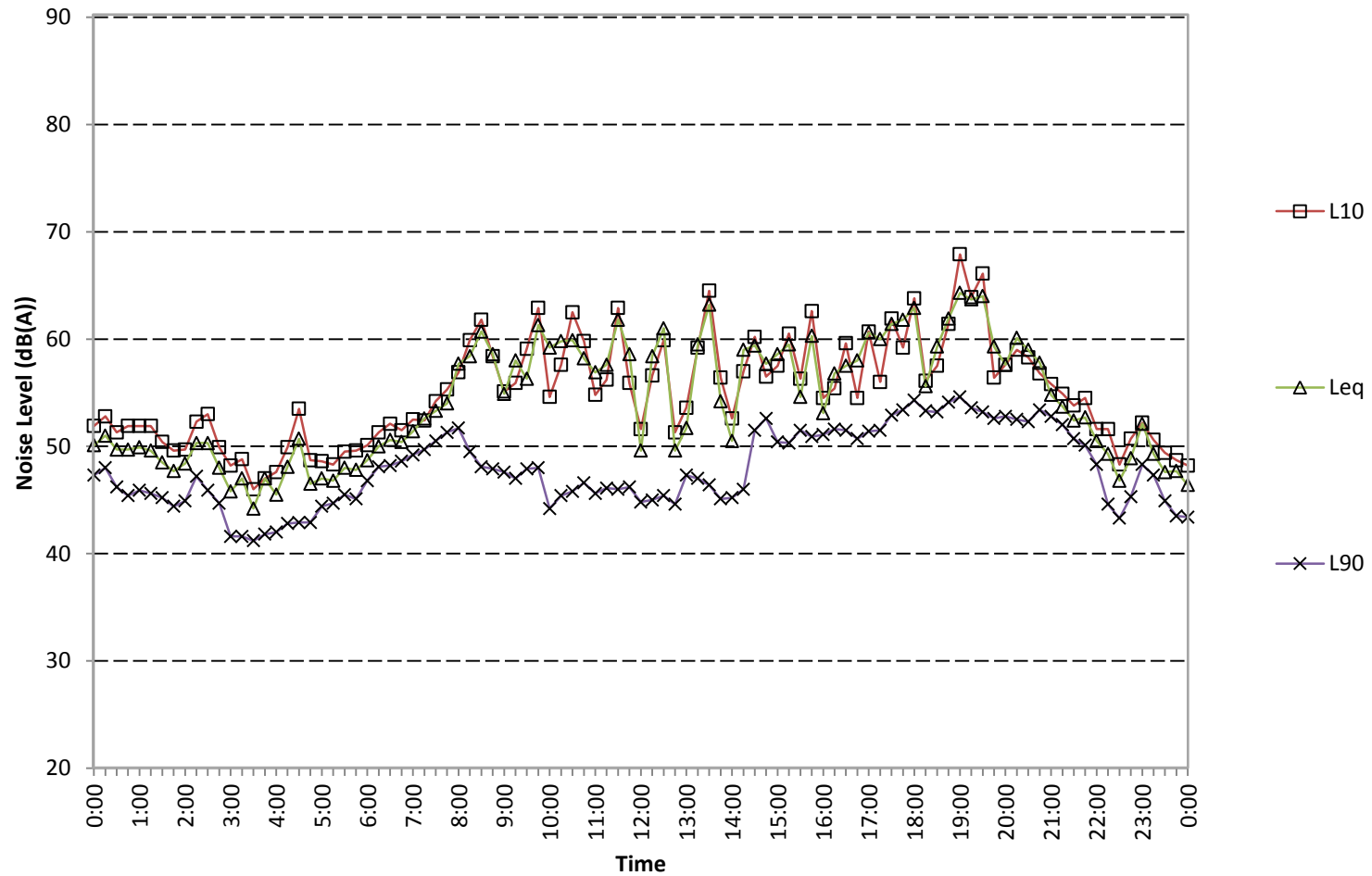
75 Gardeners Road, Eastlakes (Western Boundary) - Background Noise

Saturday August 1,2015



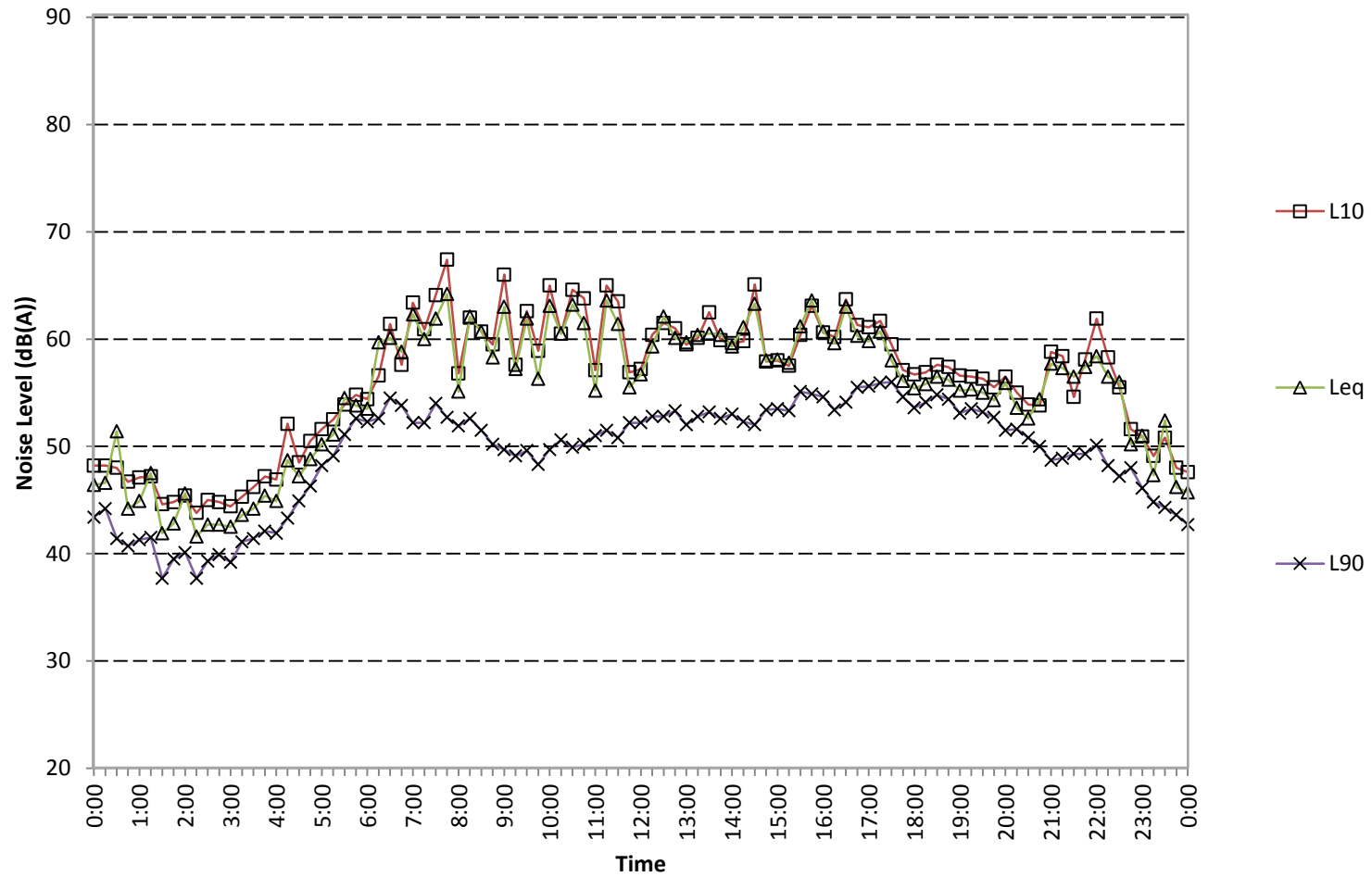
75 Gardeners Road, Eastlakes (Western Boundary) - Background Noise

Sunday August 2, 2015



75 Gardeners Road, Eastlakes (Western Boundary) - Background Noise

Monday August 3, 2015



75 Gardeners Road, Eastlakes (Western Boundary) - Background Noise

Tuesday August 4, 2015

