FPDplanning

4 May 2023

Brendon Roberts
Agile Planning
Department of Environment and Planning
brendon.roberts@planning.nsw.gov.au

Re: Lourdes Retirement Village Planning Proposal – EHG Response

Dear Brendon,

I refer to your request to prepare a response to the issues raised by the Department's Environment and Heritage Group in its letter dated 28 February 2023.

To respond to the issues raised the applicant has undertaken a review of key documentation which formed part of the response to submissions submitted in December 2022 to ensure consistency and to address all issues raised by EHG.

To support this response the following updated documents are provided:

- Arboricultural Impact Assessment which has been updated to reflect the current master plan layout
- Urban Design Report with updates to Section 6 to align with amended Arboricultural Impact Assessment
- Biodiversity Development Assessment Report (BDAR) which has been updated to align with the current master plan and updated Arboricultural Impact Assessment and address all issues raised by EHG. This includes a restructure of the document in accordance with Appendix K BAM 2020 which will require its consideration as a new BDAR.

We are confident this provides a detailed and robust response to all issues raised and seek EHGs further review and consideration of the updated documentation.

We look forward to continuing to work with you in finalising the Planning Proposal. Please contact me if you require any clarification.

Yours sincerely,

Anna Johnston
Associate
0401 330 707
anna.johnston@fileplanning.com

Naturally Trees

'Expert Arboricultural planning, advice and care since 1998'

**Arborist Reports, Landscape Design, Flora and Fauna Surveys,
Biodiversity and Ecological Impact Assessments &
Bushfire Protection Assessment Services**

Naturally Trees
PO Box 5085
Elanora Heights
NSW 2101, Australia
Phone: 0417250420
info@naturallytrees.com.au
www.naturallytrees.com.au
ABN: 58 359 914 843

Arboricultural Impact Appraisal and Method Statement

(Revision B)

95 Stanhope Road
Killara, NSW

Prepared for
Lourdes Retirement Village

---

20 April 2023

by Andrew Scales
Dip. Horticulture / Dip. Arboriculture AQF5

PO Box 5085, Elanora Heights NSW 2101
E: info@naturallytrees.com.au M: 0417 250 420

Summary

The proposed development is to demolish a number of single and two-story buildings and replace them with a number of multi-story buildings and a single-story chapel. The proposed development also involves the re-arrangement of some of the surrounding roadways and associated services. I have inspected all the trees that could be affected and list their details in Appendix 2. Based on this information, I provided guidance to project architect on the constraints these trees impose on the use of the site.

Eighty-two high category trees and one hundred and fifty-seven low category trees will be lost because of this proposal. However, sixty-nine of the low category trees are exempt from Ku-Ring-Gai Council's Tree Preservation Order and a comprehensive landscaping scheme to mitigate these losses is proposed that will include the planting of new trees.

The proposed changes may adversely affect a further eighty-two high category trees and fifty-eight low category trees if appropriate protective measures are not taken. However, if adequate precautions to protect the retained trees are specified and implemented through the arboricultural method statement included in this report, the development proposal is expected to have a moderate to high impact on the contribution of trees to local amenity or character.

Table of Contents

Appendices

1. INTRODUCTION

1.1 **Instruction:** I am instructed by Levande Lourdes to inspect the tree population at 95 Stanhope Road, Killara and to provide an arboricultural report to accompany a development application. This 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

1.2 **Purpose of this report**: This report provides an analysis of the impact of the development proposal on trees with additional guidance on appropriate management and protective measures. Its primary purpose is for the council to review the tree information in support of the planning submission and use as the basis for issuing a planning consent or engaging in further discussions towards that end. Within this planning process, it will be available for inspection by people other than tree experts, so the information is presented to be helpful to those without a detailed knowledge of the subject.

1.3 **Qualifications and experience:** I have based this report on my site observations and the provided information, and I have come to conclusions in the light of my experience. I have experience and qualifications in arboriculture and include a summary in Appendix 1.

1.4 **Documents and information provided:** Levande Lourdes provided me with copies of the following documents:

- Survey Plan, Dwg No. 21388 (Sheet S1 to S11), by Norton Survey Partners dated 22 April 2015; and
- Master Plan, Dwg No. 20576, by Plus Architecture dated 14 December 2022.

1.5 **Scope of this report:** This report is only concerned with three hundred and seventy-nine trees located within and adjacent to the subject site. It takes no account of other trees, shrubs or groundcovers within the site unless stated otherwise. It includes a preliminary assessment based on the site visit and the documents provided, listed in 1.4 above.

2. THE LAYOUT DESIGN

2.1 **Tree AZ method of tree assessment:** The TreeAZ assessment method determines the worthiness of trees in the planning process. TreeAZ is based on a systematic method of assessing whether individual trees are important and how much weight they should be given in management considerations. Simplistically, trees assessed as potentially important are categorised as '**A**' and those assessed as less important are categorised as '**Z**'. Further explanation of TreeAZ can be found in Appendix 3.

In the context of new development, all the Z trees are discounted as a material constraint in layout design. All the A trees are potentially important and they dictate the design constraints. This relatively simple constraints information is suitable for use by the architect to optimise the retention of the best trees in the context of other material considerations.

2.2 Site visit and collection of data

2.2.1 **Site visit:** I carried out an unaccompanied site visit on 24 May 2021 and 28 March 2023. All my observations were from ground level and I estimated all dimensions unless otherwise indicated. Aerial inspections, root or soil analysis, exploratory root trenching and internal diagnostic testing was not undertaken as part of this assessment. I did not have access to trees on other private properties and have confined observations of them to what was visible from within the property. The weather at the time of inspection was clear and dry with good visibility.

2.2.2 **Brief site description:** 95 Stanhope Road is located in the residential suburb of Killara (refer figure 1). The site is on the southern side of the road and surrounded by residential development. The property consists of the existing Lourdes Retirement Village that is currently occupied. A variety of ornamental, coniferous and local indigenous trees are scattered throughout the site and around the site boundaries.

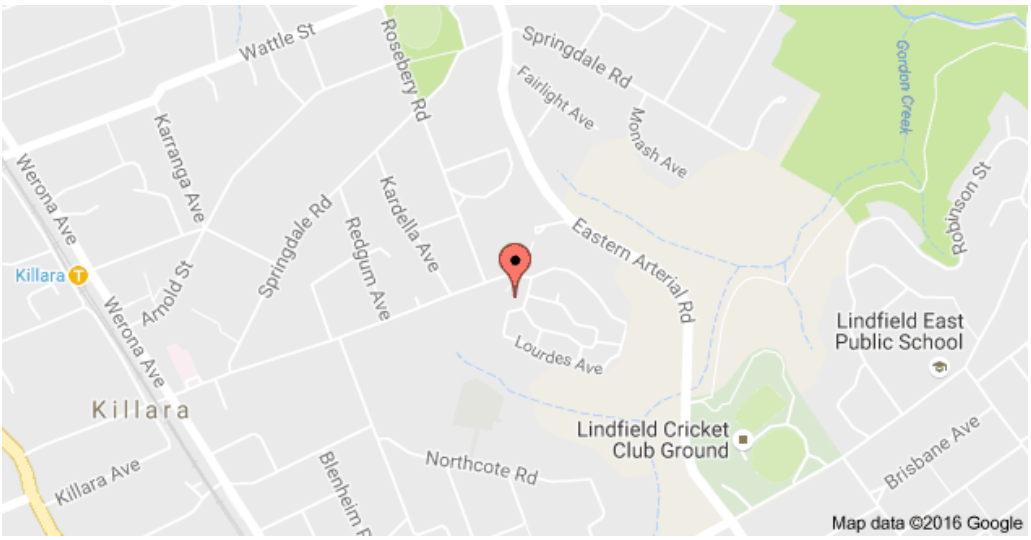


Figure 1: The location of the subject site (www.googlemaps.com).

2.2.3 **Collection of basic data:** I inspected each tree and have collected information on species, height, diameter, maturity and potential for contribution to amenity in a development context. I have recorded this information in the tree schedule included, with explanatory notes, in Appendix 2. Each tree was then allocated to one of four categories (**AA**, **A**, **Z** or **ZZ**), which reflected its suitability as a material constraint on development.

2.2.4 **Identification and location of the trees:** I have illustrated the locations of the significant trees on the Tree Management Plan (Plan TMP01) included as Appendix 8. This plan is for illustrative purposes only and it should not be used for directly scaling measurements.

2.2.5 **Advanced interpretation of data:** Australian Standard *Protection of trees on development sites* (AS4970-2009), recommends that the trunk diameter measurement for each tree is used to calculate the tree protection zone (TPZ), which can then be interpreted to identify the design constraints and, once a layout has been consented, the exclusion zone is to be protected by barriers.

2.2.6 **Plan updates:** During my site visit, I noted five trees (Trees 121, 175, 176, 200 and 236) that were not shown on the land survey. I have illustrated their approximate locations on plan TMP01 but these positions have not been accurately surveyed. I do not consider that this has affected the conclusions of this report but if their locations are considered important, they should be accurately surveyed. Additionally, a number of trees were no longer present on site and have been removed from the plan.

2.3 **The use of the tree information in layout design:** Following my inspection of the trees, the information listed in Appendix 2 was used to provide constraints guidance based on the locations of all the A trees. All the Z trees were discounted because they were not considered worthy of being a material constraint. This guidance identified two zones of constraint based on the following considerations:

- **The tree protection zone** (TPZ) is an area where ground disturbance must be carefully controlled. The TPZ was established according to the recommendations set out in AS4970-2009 and is the radial offset distance of twelve (x12) times the trunk diameter. In principle, a maximum encroachment of 10% is acceptable within the TPZ and a high level of care is needed during any activities that are authorised within it if important trees are to be successfully retained.

- **The structural root zone** (SRZ) is a radial distance from the centre of a tree's trunk, where it is likely that structural, woody roots would be encountered. The distance is calculated on trunk flare diameter at ground level. The SRZ may also be influenced by natural or built structures, such as rocks and footings. The SRZ only needs to be calculated when major encroachment (>10%) into a TPZ is proposed.

3. ARBORICULTURAL IMPACT APPRAISAL

3.1 **Summary of the impact on trees:** I have assessed the impact of the proposal on trees by the extent of disturbance in TPZs and the encroachment of structures into the SRZ (as set out briefly in 2.3 above and more extensively in Appendix 2). All the trees that may be affected by the development proposal are listed in Table 1

Table 1: Summary of existing trees and trees that may be affected by development

Impact	Reason	Important trees		Unimportant trees	
		AA	A	Z	ZZ
Retained trees that may be affected through disturbance to TPZs	Removal of existing surfacing/structures/ landscaping and/or installation of new surfacing/structures/ landscaping	TOTAL 16	TOTAL 66	TOTAL 49	TOTAL 9
Trees to be removed	Building and civil construction and/or level variations within TPZ	TOTAL 7	TOTAL 75	TOTAL 133	TOTAL 24

3.2 **Detailed impact appraisal**

3.2.1 **Category AA and A trees to be removed:** The proposed development will necessitate the removal of eighty-two high category trees. These trees will be directly or indirectly impacted by the proposed works and are considered moderate to high significance with good health and condition. In order to compensate for loss of amenity, consideration should be given to replacement planting within the site.

3.2.2 **Category AA and A trees that could potentially be adversely affected through TPZ disturbance:** Eighty-two category A and AA trees could potentially be adversely affected through disturbance to their TPZs as follows:

- **Trees 8, 9, 10, 22, 25, 60, 103, 165, 175, 176, 189, 196, 201, 231, 232, 262, 263, 264, 280, 283, 309, 319, 320, 322, 332, 338, 358 and 369:** These are important trees with a high potential to contribute to amenity so any adverse impacts on them should be minimised. The proposed demolition and construction works will come within close proximity to these and will cause harm if not carried out with care. I have reviewed the situation carefully and my experience is that these trees could be successfully retained without any adverse effects if appropriate protective measures are properly specified and controlled through a detailed arboricultural method statement.

- **The Remaining Trees:** The remaining high category trees are positioned away from the proposed development. Although, the changes may cause harm if not carried out with care, I have reviewed the situation carefully and my experience is that these trees could be successfully retained without any adverse effects if appropriate protective measures are properly specified and controlled through a detailed arboricultural method statement.

3.2.3 **Low category trees to be retained:** Fifty-eight low category trees remain outside the works areas and can be retained successfully retained without any adverse effects if appropriate protective measures are properly specified and controlled through a detailed arboricultural method statement.

3.2.4 **Low category trees to be removed:** The proposed development will necessitate the removal of one hundred and fifty-seven trees of low and very low retention value. None of these trees are considered significant or worthy of special measures to ensure their preservation. It should be noted that Trees 2, 15, 23, 35, 49, 50, 51, 76, 85, 87, 88, 91, 92, 93, 94, 98, 99, 100, 130, 132, 134, 143, 145–161, 171, 188, 191, 207, 209, 210, 214, 215, 216, 217, 220–228, 234, 235, 247, 250, 251, 254, 255, 260, 270, 293, 330 and 331 are exempt from Ku-Ring-Gai Council's Tree Preservation Order.

3.3 Proposals to mitigate any impact

3.3.1 **Protection of retained trees:** The successful retention of trees within the site will depend on the quality of the protection and the administrative procedures to ensure protective measures remain in place throughout the development. An effective way of doing this is through an arboricultural method statement that can be specifically referred to in the planning condition. An arboricultural method statement for this site is set out in detail in Section 4.

3.3.2 **New planting:** In the context of the loss of trees, a comprehensive new landscaping scheme is proposed including semi-mature trees to be planted within available areas in prominent locations. The new trees should have the potential to reach a significant height without excessive inconvenience and be sustainable into the long term, significantly improving the potential of the site to contribute to local amenity and character.

3.3.3 **Summary of the impact on local amenity:** Eighty-two high category trees and one hundred and fifty-seven low category trees will be lost because of this proposal. However, sixty-nine of the low category trees are exempt from Ku-Ring-Gai Council's Tree Preservation Order and a comprehensive landscaping scheme to mitigate these losses is proposed that will include the planting of new trees. The proposed changes may adversely affect a further eighty-two high category trees and fifty-eight low category trees if appropriate protective measures are not taken. However, if adequate precautions to protect the retained trees are specified and implemented through the arboricultural method statement included in this report, the development proposal is expected to have a moderate to high impact on the contribution of trees to local amenity or character.

4. ARBORICULTURAL METHOD STATEMENT

4.1 Introduction

4.1.1 **Terms of reference:** The impact appraisal in Section 3 identified the potential impacts on trees caused by proposed development. Section 4 is an arboricultural method statement setting out management and protection details that must be implemented to secure successful tree retention. It has evolved from Australian Standard AS4970-2009 *Protection of trees on development sites*.

4.1.2 **Plan TMP01:** Plan TMP01 in Appendix 8 is illustrative and based entirely on provided information. This plan should only be used for dealing with the tree issues and all scaled measurements must be checked against the original submission documents. The precise location of all protective measures must be confirmed at the pre-commencement meeting before any demolition or construction activity starts. Its base is the existing land survey, which has the proposed layout superimposed so the two can be easily compared. It shows the existing trees numbered, with high categories (A) highlighted in green triangles and low categories (Z) highlighted in blue rectangles. It also shows the locations of the proposed protective measures.

4.2 Tree protection with fencing and ground protection

4.2.1 **Protection fencing:** Tree protection fencing must comply with AS4970 (section 4.3) recommendations. An illustrative guide is included as Appendix 4. The approximate location of the barriers and the TPZs is illustrated on plan TMP01. The precise location of the fencing must be agreed with the project Arborist before any development activity starts.

4.2.2 **Ground protection:** Any TPZs outside the protective fencing must be covered in ground protection based on AS4970 recommendations until there is no risk of damage from the demolition and construction activity. An illustrative specification for this ground protection is included as Appendix 5. On this site, it must be installed near retained trees as illustrated on plan TMP01 before any demolition and construction starts.

4.3 **Precautions when working in TPZs:** Any work in TPZs must be done with care as set out in Appendix 6. On this site, special precautions must be taken near the trees that are in close proximity to the development of the buildings and new roadways as illustrated on plan TMP01 and summarised below:

- **Removal of existing surfacing/structures and replacement with new surfacing/structures:** Retained trees, including •Trees 8, 9, 10, 22, 25, 60, 103, 165, 175, 176, 189, 196, 201, 231, 232, 262, 263, 264, 280, 283, 309, 319, 320, 322, 332, 338, 358 and 369, may be adversely affected by the demolition and construction works or the installation of a small area of new surfacing. Any adverse impact must be minimised by following the guidance set out in Appendix 6.

- **Installation of new soft landscaping:** All landscaping activity within TPZs has the potential to cause severe damage and any adverse impact must be minimised by following the guidance set out in Section 7 of Appendix 6.

- **Installation of new services or upgrading of existing services:** It is often difficult to clearly establish the detail of services until the construction is in progress. Where possible, it is proposed to use the existing services into the site and keep all new services outside TPZs. However, where existing services within TPZs require upgrading or new services have to be installed in TPZs, great care must be taken to minimise any disturbance. Trenchless installation should be the preferred option but if that is not feasible, any excavation must be carried out by hand according to the guidelines set out in Section 6 of Appendix 6. If services do need to be installed within TPZs, consultation must be obtained from the project Arborist and/or council before any works are carried out.

- **Damage to street trees:** Any damage to street trees as a result of erection of hoardings, scaffolding or due to the loading/unloading of vehicles adjacent the site must be immediately reported to the Council's Street Tree Contract Coordinator, in order to determine the appropriate action for maintaining the health and structural integrity of any damaged street tree.

4.4 Other tree related works

4.4.1 **Site storage, cement mixing and washing points:** All site storage areas, cement mixing and washing points for equipment and vehicles must be outside TPZs unless otherwise agreed with the project Arborist and/or council. Where there is a risk of polluted water run off into TPZs, heavy-duty plastic sheeting and sandbags must be used to contain spillages and prevent contamination.

4.4.2 **Pruning:** Any pruning that is required to accommodate hoardings, scaffolding or to accommodate the unloading/loading of vehicles and has been approved by Council shall be carried out by a qualified Arborist (AQF3) and must be in accordance with AS4373 Australian Standards 'Pruning of Amenity Trees'.

4.5 Programme of tree protection and supervision

4.5.1 **Overview:** Tree protection cannot be reliably implemented without arboricultural input. The nature and extent of that input varies according to the complexity of the issues and the resources available on site. For this site, a summary of the level of arboricultural input that is likely to be required is set out in Appendix 7. The project arborist must be instructed to work within this framework to oversee the implementation of the protective measures and management proposals set out in this arboricultural method statement.

The framework in Appendix 7 must form the basis for the discharge of planning conditions through site visits by the project arborist. These supervisory actions must be confirmed by formal letters circulated to all relevant parties. These permanent records of each site visit will accumulate to provide the proof of compliance and allow conditions to be discharged as the development progresses. The developer must instruct the project arborist to comply with the supervision requirements set out in this document before any work begins on site.

4.5.2 **Phasing of arboricultural input:** Trees can only be properly budgeted for and factored into the developing work programmes if the overall project management takes full account of tree issues once consent is confirmed. The project arborist must be involved in the following phases of the project management:

1. **Administrative preparation before work starts on site:** It is normal for a development proposal to vary considerably from the expectations before consent as the detailed planning of implementation evolves. The early instruction of the project arborist ensures that tree issues are factored into the complexities of site management and can often help ease site pressures through creative approaches to tree protection. Pre-commencement discussions between the project arborist and the developer's team is an effective means of managing the tree issues with difficult constraints.

2. **Pre-commencement site meeting:** A pre-commencement meeting must be held on site before any of the demolition and construction work begins. This must be attended by the site manager and the project arborist. Any clarifications or modifications to the consented details must be recorded and circulated to all parties in writing. This meeting is where the details of the programme of tree protection will be agreed and finalised by all parties, which will then form the basis of any supervision arrangements between the project arborist and the developer.

3. **Site supervision:** Once the site is active, the project arborist must visit at an interval agreed at the pre-commencement site meeting. The supervision arrangement must be sufficiently flexible to allow the supervision of all sensitive works as they occur. The project arborist's initial role is to liaise with developer to ensure that appropriate protective measures are designed and in place before any works start on site. Once the site is working, that role will switch to monitoring compliance with arboricultural conditions and advising on any tree problems that arise or modifications that become necessary.

4.6 **Site management:** It is the developer's responsibility to ensure that the details of this arboricultural method statement and any agreed amendments are known and understood by all site personnel. Copies of the agreed documents must be kept on site at all times and the site manager must brief all personnel who could have an impact on trees on the specific tree protection requirements. This must be a part of the site induction procedures and written into appropriate site management documents.

5. HOW TO USE THIS REPORT

5.1 **Limitations:** It is common that the detail of logistical issues such as site storage and the build programme are not finalised until after consent is issued. As this report has been prepared in advance of consent, some of its content may need to be updated as more detailed information becomes available once the post-consent project management starts. Although this document will remain the primary reference in the event of any disputes, some of its content may be superseded by authorised post-consent amendments.

5.2 **Suggestions for the effective use of this report:** Section 4 of this report, including the relevant appendices, is designed as an enforcement reference. It is constructed so the council can directly reference the detail in a planning condition. Referencing the report by name and relating conditions to specific subsections is an effective means of reducing confusion and facilitating enforcement in the event of problems during implementation. More specifically, the following issues should be directly referenced in the conditions for this site:

1.	Pre-commencement meeting	4.5
2.	Protection fence	4.2.1 and Appendix 4
3.	Ground protection	4.2.2 and Appendix 5
4.	Removal of surfacing/structures	4.3 and Appendix 6 (Section 4)
5.	Installation of surfacing/structures	4.3 and Appendices 6 (Section 5)
6.	Services	4.3 and Appendix 6 (Section 6)
7.	Landscaping	4.3 and Appendix 6 (Section 7)
8.	Programming of tree protection	4.5 and Appendix 7
9.	Arboricultural supervision	4.5 and Appendix 7

Each of the above matters shall be supervised by the project arborist and the relevant conditions can only be discharged once that supervision has been confirmed in writing to the relevant parties. The last column of the table in Appendix 7 is to be used so that the various supervision issues can be recorded as they are confirmed by supervision letters. It is intended to act as a summary quick reference to help keep track of the progress of the supervision.

6. OTHER CONSIDERATIONS

6.1 **Trees subject to statutory controls:** The subject trees (excluding Trees 2, 15, 23, 35, 49, 50, 51, 76, 85, 87, 88, 91, 92, 93, 94, 98, 99, 100, 130, 132, 134, 143, 145–161, 171, 188, 191, 207, 209, 210, 214, 215, 216, 217, 220–228, 234, 235, 247, 250, 251, 254, 255, 260, 270, 293, 330 and 331) are legally protected under Ku-ring-gai 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. The works specified above are necessary for reasonable management and should be acceptable to the council. However, tree owners should appreciate that the council may take an alternative point of view and have the option to refuse consent.

6.2 **Trees outside the property:** Trees located in the adjacent properties effectively out of the control of the owners of 95 Stanhope Road, Killara. It will not be possible to easily carry out the recommended works without the full co-operation of the tree owners. The implications of non-cooperation require legal interpretation and are beyond the scope of this report.

7. BIBLIOGRAPHY

7.1 **List of references:**

Australian Standard AS4373-2007 *Pruning of Amenity Trees*.
Standards Australia.

Australian Standard AS4970-2009 *Protection of trees on development sites*.
Standards Australia.

Barrell, J (2009) Draft for Practical Tree AZ version 9.02 A+NZ
Barrel Tree Consultancy, Bridge House, Ringwood BH24 1EX

Brooker, M. Kleinig, D (1999) Field guide to eucalypts – South eastern Aust.
Blooming Books, Hawthorn Vic.

Matheny, N.P. & Clark, J.R. (1998) Trees & Development: A Technical Guide to Preservation of Trees During Land Development
International Society ofArboriculture, Savoy, Illinois.

Mattheck, Dr. Claus R., Breloer, Helge (1995) The Body Language of Trees - A Handbook for Failure Analysis;
The Stationery Office, London. England.

Robinson, L (1994) Field Guide to the Native Plants of Sydney
Kangaroo Press, Kenthurst NSW

8. DISCLAIMER

8.1 Limitations on use of this report:

This report is to be utilized in its entirety only. Any written or verbal submission, report or presentation that includes statements taken from the findings, discussions, conclusions or recommendations made in this report, may only be used where the whole of the original report (or a copy) is referenced in, and directly attached to that submission, report or presentation.

ASSUMPTIONS

Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible: however, Naturally Trees can neither guarantee nor be responsible for the accuracy of information provided by others.

Unless stated otherwise:

- *Information contained in this report covers only those trees that were examined and reflects the condition of those trees at time of inspection: and*
- *The inspection was limited to visual examination of the subject trees without dissection, excavation, probing or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject trees may not arise in the future.*

Yours sincerely

Andrew Scales
Dip. Horticulture
Dip. Arboriculture AQF5

APPENDIX 1

Brief qualifications and experience of Andrew Scales

1. Qualifications:

Associate Diploma Horticulture	Northern Sydney Institute of TAFE	1998
Certificate in Tree Surgery	Northern Sydney Institute of TAFE	1998
Diploma of Horticulture (Arboriculture)	Northern Sydney Institute of TAFE	2006
Diploma of Arboriculture AQF5	Northern Sydney Institute of TAFE	2019

2. Practical experience: Being involved in the arboricultural/horticultural industry for in excess of 20 years, I have developed skills and expertise recognized in the industry. Involvement in the construction industry and tertiary studies has provided me with a good knowledge of tree requirements within construction sites.

As director of Naturally Trees, in this year alone I have undertaken hundreds of arboricultural consultancy projects and have been engaged by a range of clients to undertake tree assessments. I have gained a wide range of practical tree knowledge through tree removal and pruning works.

3. Continuing professional development:

Visual Tree Assessment (Prof. Dr. Claus Mattheck)	Northern Sydney Institute of TAFE 2001
Wood Decay in Trees (F.W.M.R.Schwarze)	Northern Sydney Institute of TAFE 2004
Visual Tree Assessment (Prof. Dr. Claus Mattheck)	Carlton Hotel, Parramatta NSW 2004
Tree A-Z / Report Writing (Jeremy Barrell)	Northern Sydney Institute of TAFE 2006
Up by Roots – Healthy Soils and Trees in the Built Environment (James Urban)	The Sebel Parramatta NSW 2008
Tree Injection for Insect Control (Statement of Attainment)	Northern Sydney Institute of TAFE 2008
Quantified Tree Risk Assessment (QTRA) Registered Licensee #1655	South Western Sydney Institute TAFE 2011
Practitioners Guide to Visual Tree Assessment	South Western Sydney Institute TAFE 2011
Quantified Tree Risk Assessment (QTRA) Registered Licensee #1655	Richmond College NSW TAFE 2014
VALID Approach to Likelihood of Failure (David Evans)	Centennial Park NSW 2017

APPENDIX 2
Tree schedule

NOTE: Colour annotation is AA & A trees with green background; Z & ZZ trees with blue background; trees to be removed in red text.

No.	Genus species	Height	Spread	DBH	TPZ	Foliage cover	Age Class	Defects	Location	Services	Significance	Tree AZ
1	*Cedrus deodara*	12	9	500	**6**	80%	M	Nil	Grass	Nil	M	**A1**
2	*Acer negundo*	4	3	200	**2.4**	70%	S	Topped	Garden bed	Adjacent building	L	**Z3**
4	*Melaleuca quinquenervia*	14	7	350	**4.2**	80%	M	Nil	Garden bed	Nil	M	**A1**
5	*Melaleuca quinquenervia*	14	7	350	**4.2**	80%	M	Nil	Garden bed	Nil	M	**A1**
7	*Melaleuca quinquenervia*	14	7	350	**4.2**	80%	M	Co-dominant	Garden bed	Nil	M	**A1**
8	*Melaleuca quinquenervia*	14	7	350	**4.2**	80%	M	Nil	Garden bed	Nil	M	**A1**
9	*Melaleuca quinquenervia*	14	7	350	**4.2**	80%	M	Nil	Garden bed	Nil	M	**A1**
10	*Melaleuca quinquenervia*	14	7	350	**4.2**	80%	M	Nil	Garden bed	Nil	M	**A1**
11	*Phoenix canariensis*	8	5	500	**6**	90%	M	Nil	Garden bed	Nil	M	**A1**
12	*Phoenix canariensis*	8	5	500	**6**	90%	M	Nil	Garden bed	Nil	M	**A1**
13	*Phoenix canariensis*	8	5	500	**6**	90%	M	Nil	Garden bed	Nil	M	**A1**
14	*Phoenix canariensis*	8	5	500	**6**	90%	M	Nil	Garden bed	Nil	M	**A1**
15	*Acer negundo*	4	3	100	**1.2**	60%	S	Nil	Garden bed	Nil	L	**ZZ1**
16	*Melaleuca quinquenervia*	14	7	350	**4.2**	80%	M	Nil	Garden bed	Nil	M	**A1**
17	*Melaleuca quinquenervia*	14	7	350	**4.2**	80%	M	Nil	Garden bed	Nil	M	**A1**
18	*Araucaria heterophylla*	12	5	300	**3.6**	80%	S	Nil	Garden bed	Nil	M	**A1**
19	*Melaleuca quinquenervia*	14	7	350	**4.2**	80%	M	Nil	Garden bed	Nil	M	**A1**
20	*Melaleuca quinquenervia*	14	7	350	**4.2**	80%	M	Nil	Garden bed	Nil	M	**A1**
21	*Melaleuca quinquenervia*	14	7	350	**4.2**	80%	M	Nil	Garden bed	Nil	M	**A1**
22	*Araucaria heterophylla*	20	9	500	**6**	80%	M	Nil	Garden bed	Nil	H	**A1**
23	*Gordonia axillaris*	4	4	100	**1.2**	70%	M	Nil	Grass	Nil	L	**Z1**
24	*Liquidambar styraciflua*	26	26	1200	**14.4**	80%	M	Lopped crown, Large epicormic growth	Grass	LV wires	H	**Z9**
25	*Corymbia gummifera*	12	5	300	**3.6**	70%	S	Nil	Garden bed	Nil	M	**A1**
26	*Araucaria heterophylla*	28	10	700	**8.4**	80%	M	Nil	Grass	Nil	H	**AA1**
27	*Magnolia grandiflora*	9	8	500	**6**	80%	M	Nil	Garden bed	Nil	M	**A1**
28	*Syncarpia glomulifera*	16	14	400	**4.8**	90%	M	Four similar trees	Garden bed	Nil	M	**A1**
29	*Phoenix canariensis*	8	5	500	**3**	90%	M	Nil	Garden bed	Nil	M	**A1**
30	*Araucaria heterophylla*	20	9	500	**6**	80%	M	Nil	Garden bed	Nil	H	**A1**

No.	Genus species	Height	Spread	DBH	TPZ	Foliage cover	Age Class	Defects	Location	Services	Significance	Tree AZ
31	*Cupressus sp.*	18	9	700	**8.4**	50%	O	Major failure, Leaning	Garden bed	LV wires	M	**ZZ9**
32	*Corymbia gummifera*	8	5	300	**3.6**	80%	M	Nil	Grass	Nil	L	**A1**
33	*Melaleuca linariifolia*	8	6	300	**3.6**	80%	M	Nil	Grass	Nil	L	**A1**
34	*Corymbia gummifera*	9	5	300	**3.6**	80%	M	Nil	Grass	Nil	L	**A1**
35	*Olea europaea*	5	6	250	**3**	80%	M	Nil	Garden bed	Nil	L	**Z3**
37	*Jacaranda mimosifolia*	4	4	200	**2.4**	60%	S	Lopped under powerlines	Grass	LV wires	L	**ZZ9**
38	*Acacia baileyana*	4	3	150	**1.8**	50%	S	Lopped under powerlines, Borer	Grass	LV wires	L	**ZZ9**
39	*Corymbia gummifera*	7	8	300	**3.6**	70%	M	Lopped under powerlines	Grass	LV wires	M	**Z10**
40	*Eucalyptus robusta*	8	7	300	**3.6**	70%	M	Nil	Grass	Nil	L	**Z10**
41	*Melaleuca linariifolia*	8	6	300	**3.6**	80%	M	Nil	Grass	Nil	L	**A1**
42	*Eucalyptus robusta*	8	7	300	**3.6**	70%	M	Nil	Grass	Nil	L	**A1**
43	*Melaleuca linariifolia*	8	6	300	**3.6**	80%	M	Nil	Grass	Nil	L	**A1**
44	*Syncarpia glomulifera*	10	6	350	**4.2**	70%	M	Lopped central leader	Grass	Nil	M	**ZZ9**
45	*Pittosporum undulatum*	5	5	250	**3**	70%	M	Nil	Grass	Nil	L	**Z1**
46	*Syncarpia glomulifera*	12	10	400	**4.8**	80%	M	Nil	Grass	Underground services	M	**A1**
47	*Syncarpia glomulifera*	10	8	350	**4.2**	70%	M	Nil	Grass	Nil	M	**A1**
48	*Jacaranda mimosifolia*	5	3	100	**1.2**	70%	S	Nil	Garden bed	Nil	L	**Z1**
49	*Syagrus romanzoffiana*	9	3	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**Z10**
50	*Syagrus romanzoffiana*	9	3	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**Z10**
51	*Syagrus romanzoffiana*	9	3	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**Z10**
52	*Melaleuca quinquenervia*	7	4	250	**3**	80%	S	Nil	Garden bed	Nil	L	**Z1**
53	*Melaleuca quinquenervia*	7	4	250	**3**	80%	S	Nil	Garden bed	Nil	L	**Z1**
54	*Melaleuca quinquenervia*	6	3	200	**2.4**	80%	S	Nil	Garden bed	Nil	L	**Z1**
55	*Acer palmatum*	5	6	250	**3**	90%	M	Nil	Garden bed	Nil	L	**Z1**
56	*Jacaranda mimosifolia*	12	9	350	**4.2**	80%	M	Nil	Grass	Nil	M	**A1**
57	*Jacaranda mimosifolia*	10	7	300	**3.6**	80%	M	Nil	Grass	Nil	M	**A1**
59	*Araucaria heterophylla*	14	6	350	**4.2**	80%	M	Nil	Grass	Nil	M	**A1**
60	*Liquidambar styraciflua*	16	12	400	**4.8**	80%	M	Nil	Grass	Nil	M	**A1**
61	*Melaleuca quinquenervia*	7	4	250	**3**	80%	S	Nil	Garden bed	Nil	L	**Z1**
62	*Allocasuarina torulosa*	6	5	300	**3.6**	80%	M	Nil	Garden bed	Nil	L	**Z1**
63	*Melaleuca quinquenervia*	7	4	250	**3**	80%	S	Nil	Garden bed	Nil	L	**Z1**
64	*Melaleuca quinquenervia*	7	4	250	**3**	80%	S	Nil	Garden bed	Nil	L	**Z1**
65	*Melaleuca quinquenervia*	7	4	250	**3**	80%	S	Nil	Garden bed	Nil	L	**Z1**

No.	Genus species	Height	Spread	DBH	TPZ	Foliage cover	Age Class	Defects	Location	Services	Significance	Tree AZ
66	*Pittosporum undulatum*	7	5	250	**3**	70%	M	Nil	Garden bed	Nil	L	**Z1**
67	*Eucalyptus pilularis*	20	20	600	**7.2**	80%	M	Nil	Garden bed	Nil	H	**AA1**
68	*Syzygium paniculatum*	7	5	250	**3**	80%	S	Nil	Garden bed	Adjacent structure	M	**Z1**
69	*Syzygium paniculatum*	7	5	250	**3**	80%	S	Nil	Garden bed	Adjacent structure	M	**Z1**
70	*Syzygium paniculatum*	7	5	250	**3**	80%	S	Nil	Garden bed	Adjacent structure	M	**Z1**
71	*Syzygium paniculatum*	7	5	250	**3**	80%	S	Nil	Garden bed	Adjacent structure	M	**Z1**
72	*Cupressus sp.*	14	9	400	**4.8**	80%	M	Co-dominant	Garden bed	Adjacent structure	M	**A1**
73	*Phoenix canariensis*	6	4	600	**7.2**	90%	M	Nil	Garden bed	Nil	L	**Z1**
74	*Corymbia citriodora*	12	6	300	**3.6**	80%	M	Nil	Garden bed	Nil	L	**A1**
75	*Melaleuca stypheliodes*	7	5	250	**3**	70%	M	Nil	Garden bed	Nil	L	**Z1**
76	*Pittosporum undulatum*	3	3	100	**1.2**	50%	S	Borer, Failures throughout canopy	Garden bed	Nil	L	**ZZ10**
77	*Lophostemon confertus*	10	5	300	**3.6**	80%	M	Nil	Steep slope	Nil	M	**A1**
78	*Eucalyptus pilularis*	12	6	300	**3.6**	80%	M	Nil	Steep slope	Nil	M	**A1**
79	*Angophora costata*	14	7	350	**4.2**	80%	M	Nil	Steep slope	Nil	M	**A1**
80	*Angophora costata*	14	7	350	**4.2**	80%	M	Nil	Steep slope	Nil	M	**A1**
81	*Corymbia citriodora*	10	6	300	**3.6**	80%	M	Nil	Garden bed	Nil	L	**A1**
82	*Sapium sebiferum*	7	7	400	**4.8**	80%	M	Nil	Garden bed	Nil	M	**A1**
83	*Jacaranda mimosifolia*	10	9	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
84	*Jacaranda mimosifolia*	8	5	250	**3**	70%	M	Nil	Garden bed	Nil	L	**Z10**
85	*Camellia sp.*	3	3	100	**1.2**	80%	S	Nil	Garden bed	Nil	L	**Z1**
87	*Brugmansia sp.*	3	3	100	**1.2**	80%	M	Nil	Garden bed	Nil	L	**ZZ1**
88	*Melaleuca quinquenervia*	8	5	250	**3**	80%	S	Nil	Garden bed	Adjacent building	L	**Z10**
89	*Melaleuca quinquenervia*	12	8	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
90	*Phoenix canariensis*	8	7	600	**7.2**	90%	M	Nil	Grass	Nil	M	**A1**
91	*Callistemon sp.*	2	2	100	**1.2**	40%	S	Topped	Grass	Nil	L	**ZZ1**
92	*Callistemon sp.*	2	2	100	**1.2**	40%	S	Nil	Grass	Nil	L	**ZZ1**
93	*Prunus sp.*	3	3	100	**1.2**	70%	M	Nil	Grass	Nil	L	**ZZ1**
94	*Callistemon sp.*	4	4	150	**1.8**	80%	M	Nil	Garden bed	Nil	L	**Z1**
95	*Robinia pseudoacacia*	9	9	300	**3.6**	70%	M	Co-dominant, Topped upper canopy	Grass	Nil	M	**Z9**
96	*Callistemon sp.*	5	4	150	**1.8**	80%	M	Nil	Garden bed	Nil	L	**Z1**
97	*Callistemon sp.*	5	4	150	**1.8**	80%	M	Nil	Garden bed	Nil	L	**Z1**
98	*Callistemon sp.*	4	4	150	**1.8**	80%	M	Nil	Garden bed	Nil	L	**Z1**
99	*Callistemon sp.*	2	2	100	**1.2**	40%	S	Topped	Grass	Nil	L	**ZZ1**

No.	Genus species	Height	Spread	DBH	TPZ	Foliage cover	Age Class	Defects	Location	Services	Significance	Tree AZ
100	*Callistemon sp.*	2	2	100	**1.2**	40%	S	Topped	Grass	Nil	L	**ZZ1**
101	*Sapium sebiferum*	9	7	250	**3**	80%	M	Nil	Grass	Nil	L	**Z10**
102	*Cupressus sp.*	12	10	400	**4.8**	80%	M	Nil	Garden bed	Nil	M	**A1**
103	*Angophora costata*	22	16	400	**4.8**	80%	M	Nil	Natural ground	Nil	H	**AA1**
104	*Acer palmatum*	3	4	100	**1.2**	80%	M	Nil	Garden bed	Nil	L	**Z1**
105	*Melaleuca quinquenervia*	8	8	350	**4.2**	90%	M	Nil	Garden bed	Nil	M	**A1**
106	*Melaleuca armillaris*	9	8	250	**3**	80%	M	Nil	Garden bed	Nil	M	**A1**
107	*Melaleuca quinquenervia*	12	8	400	**4.8**	80%	M	Nil	Garden bed	Nil	M	**A1**
108	*Corymbia maculata*	18	14	450	**5.4**	90%	M	Nil	Garden bed	Adjacent building	H	**A1**
109	*Melaleuca quinquenervia*	7	4	250	**3**	80%	S	Nil	Garden bed	Nil	L	**Z1**
110	*Casuarina cunninghamiana*	20	16	600	**7.2**	80%	M	Nil	Garden bed	Nil	H	**A1**
111	*Melaleuca quinquenervia*	10	6	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
112	*Melaleuca quinquenervia*	7	4	250	**3**	80%	S	Nil	Garden bed	Nil	L	**Z1**
113	*Melaleuca quinquenervia*	7	4	250	**3**	80%	S	Nil	Garden bed	Nil	L	**Z1**
114	*Corymbia maculata*	24	14	450	**5.4**	80%	M	Nil	Garden bed	Nil	H	**A1**
115	*Eucalyptus pilularis*	26	12	450	**5.4**	80%	M	Nil	Garden bed	Nil	H	**A1**
116	*Eucalyptus pilularis*	26	12	450	**5.4**	80%	M	Nil	Garden bed	Nil	H	**A1**
117	*Melaleuca quinquenervia*	10	6	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
118	*Eucalyptus pilularis*	20	15	450	**5.4**	80%	M	Nil	Garden bed	Nil	H	**A1**
120	*Jacaranda mimosifolia*	12	8	250	**3**	80%	M	Co-dominant base	Gravel	Nil	M	**Z9**
121	*Banksia integrifolia*	12	7	300	**3.6**	90%	M	Nil	Garden bed	Nil	M	**A1**
123	*Araucaria heterophylla*	14	7	300	**3.6**	80%	S	Nil	Garden bed	Nil	M	**A1**
124	*Angophora costata*	20	12	450	**5.4**	70%	M	Nil	Garden bed	Nil	H	**A1**
125	*Grevillea robusta*	22	10	500	**6**	80%	M	Nil	Garden bed	Nil	H	**A1**
126	*Leptospermum petersonii*	8	6	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**Z10**
127	*Lophostemon confertus*	18	14	500	**6**	90%	M	Nil	Garden bed	Adjacent building	H	**A1**
128	*Lophostemon confertus*	18	14	450	**5.4**	90%	M	Nil	Garden bed	Adjacent building	H	**A1**
129	*Pittosporum undulatum*	7	5	250	**3**	60%	M	Borer	Garden bed	Nil	L	**Z1**
130	*Prunus sp.*	4	3	100	**1.2**	80%	M	Nil	Garden bed	Nil	L	**Z1**
131	*Corymbia gummifera*	16	9	350	**4.2**	80%	M	Nil	Garden bed	Nil	M	**A1**
132	*Schefflera actinophylla*	5	3	100	**1.2**	80%	S	Nil	Garden bed	Adjacent building	L	**Z3**
133	*Cupressus sp.*	7	3	150	**1.8**	80%	S	Nil	Garden bed	Nil	L	**Z1**
134	*Magnolia × soulangeana*	3	3	100	**1.2**	70%	M	Nil	Garden bed	Nil	L	**Z1**

No.	Genus species	Height	Spread	DBH	TPZ	Foliage cover	Age Class	Defects	Location	Services	Significance	Tree AZ
136	*Callistemon sp.*	5	5	100	**1.2**	70%	M	Nil	Grass	Nil	L	**Z1**
137	*Prunus sp.*	5	4	200	**2.4**	70%	M	Nil	Garden bed	Nil	M	**Z3**
138	*Angophora costata*	10	10	450	**5.4**	90%	M	Nil	Garden bed	Adjacent structure	M	**A1**
139	*Allocasuarina torulosa*	10	6	300	**3.6**	70%	M	Nil	Garden bed	Adjacent building	M	**Z10**
140	*Callistemon sp.*	5	3	100	**1.2**	70%	M	Nil	Garden bed	Nil	L	**Z1**
141	*Melaleuca armillaris*	8	6	250	**3**	80%	M	Nil	Garden bed	Nil	M	**A1**
142	*Melaleuca armillaris*	8	6	250	**3**	80%	M	Nil	Garden bed	Nil	M	**A1**
143	*Camellia sp.*	3	3	100	**1.2**	90%	S	Nil	Garden bed	Nil	L	**Z1**
144	*Eucalyptus haemastoma*	8	6	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
145	*Schefflera actinophylla*	3	3	100	**1.2**	80%	S	Nil	Garden bed	Nil	L	**Z1**
146	*Schefflera actinophylla*	3	3	100	**1.2**	80%	S	Nil	Garden bed	Nil	L	**Z1**
147	*Cotoneaster sp.*	5	7	150	**1.8**	80%	M	Nil	Garden bed	Nil	L	**Z3**
148	*Callistemon sp.*	4	3	100	**1.2**	70%	M	Nil	Garden bed	Nil	L	**Z1**
149	*Buckinghamia celsissima*	3	3	100	**1.2**	90%	S	Nil	Garden bed	Nil	L	**Z1**
150	*Buckinghamia celsissima*	3	3	100	**1.2**	90%	S	Nil	Garden bed	Nil	L	**Z1**
151	*Buckinghamia celsissima*	3	3	100	**1.2**	90%	S	Nil	Garden bed	Nil	L	**Z1**
152	*Buckinghamia celsissima*	3	3	100	**1.2**	90%	S	Nil	Garden bed	Nil	L	**Z1**
153	*Buckinghamia celsissima*	3	3	100	**1.2**	90%	S	Nil	Garden bed	Nil	L	**Z1**
154	*Buckinghamia celsissima*	3	3	100	**1.2**	90%	S	Nil	Garden bed	Nil	L	**Z1**
155	*Buckinghamia celsissima*	3	3	100	**1.2**	90%	S	Nil	Garden bed	Nil	L	**Z1**
156	*Camellia sp.*	3	3	100	**1.2**	90%	M	Nil	Garden bed	Nil	L	**Z1**
157	*Prunus sp.*	3	3	100	**1.2**	90%	M	Nil	Garden bed	Nil	L	**Z1**
158	*Camellia sp.*	3	3	100	**1.2**	90%	M	Nil	Garden bed	Nil	L	**Z1**
159	*Camellia sp.*	3	3	100	**1.2**	90%	M	Nil	Garden bed	Nil	L	**Z1**
160	*Duranta repens*	3	3	100	**1.2**	90%	M	Nil	Garden bed	Nil	L	**Z1**
161	*Hibiscus sp.*	2	2	100	**1.2**	60%	M	Nil	Garden bed	Nil	L	**Z1**
162	*Melaleuca quinquenervia*	16	10	500	**6**	80%	M	Co-dominant	Grass	Adjacent building	H	**A1**
163	*Melaleuca quinquenervia*	10	7	250	**3**	70%	M	Nil	Grass	Nil	L	**Z10**
164	*Melaleuca quinquenervia*	16	10	500	**6**	80%	M	Nil	Grass	Adjacent building	H	**A1**
165	*Melaleuca quinquenervia*	16	10	500	**6**	80%	M	Nil	Grass	Adjacent building	H	**A1**
166	*Melaleuca quinquenervia*	7	3	200	**2.4**	80%	S	Nil	Grass	Nil	L	**Z1**
167	*Archontophoenix alexandrae*	7	3	200	**2.4**	90%	M	Nil	Garden bed	Nil	L	**Z1**
168	*Archontophoenix alexandrae*	7	3	200	**2.4**	90%	M	Nil	Garden bed	Nil	L	**Z1**

No.	Genus species	Height	Spread	DBH	TPZ	Foliage cover	Age Class	Defects	Location	Services	Significance	Tree AZ
169	*Ulmus glabra*	5	5	150	**1.8**	60%	M	Lopped, Epicormic growth	Garden bed	Adjacent structure	L	**Z9**
170	*Melaleuca quinquenervia*	9	5	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
171	*Cyathea cooperi*	4	3	100	**1.2**	90%	M	Nil	Garden bed	Nil	L	**Z1**
172	*Melaleuca quinquenervia*	9	5	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
173	*Eucalyptus piperita*	18	16	450	**5.4**	80%	M	Cambium damage, Borer throughout base	Natural ground	Nil	H	**Z9**
174	*Angophora costata*	20	16	400	**4.8**	80%	M	Nil	Natural ground	Nil	H	**A1**
175	*Casuarina cunninghamiana*	16	9	450	**5.4**	80%	M	Nil	Garden bed	Adjacent structure	H	**A1**
176	*Casuarina cunninghamiana*	16	9	450	**5.4**	80%	M	Nil	Garden bed	Adjacent structure	H	**A1**
177	*Melaleuca armillaris*	8	4	100	**1.2**	70%	M	Nil	Garden bed	Nil	L	**Z10**
178	*Pittosporum undulatum*	8	6	250	**3**	70%	M	Nil	Garden bed	Nil	L	**Z10**
179	*Melia azedarach*	7	4	200	**2.4**	70%	M	Nil	Garden bed	Nil	L	**Z1**
180	*Pittosporum undulatum*	6	5	100	**1.2**	70%	S	Nil	Garden bed	Nil	L	**Z1**
181	*Pittosporum undulatum*	6	5	100	**1.2**	70%	S	Nil	Garden bed	Nil	L	**Z1**
182	*Acacia elata*	18	9	400	**4.8**	80%	M	Nil	Garden bed	Nil	H	**A1**
183	*Angophora costata*	20	18	500	**6**	90%	M	Nil	Garden bed	Nil	H	**A1**
185	*Melia azedarach*	10	7	300	**3.6**	70%	M	Nil	Garden bed	Nil	M	**Z10**
186	*Allocasuarina torulosa*	8	5	250	**3**	70%	M	Nil	Garden bed	Nil	L	**Z10**
187	*Ficus benjamina*	5	3	200	**2.4**	50%	M	Lopped, Epicormic growth	Garden bed	Adjacent building	L	**ZZ9**
188	*Prunus sp.*	3	3	100	**1.2**	80%	M	Nil	Grass	Nil	L	**Z1**
189	*Melaleuca quinquenervia*	18	14	600	**7.2**	80%	M	Nil	Garden bed	Adjacent driveway	H	**A1**
190	*Cupressus sp.*	8	5	200	**2.4**	70%	M	Co-dominant	Garden bed	Adjacent driveway	L	**Z10**
191	*Callistemon sp.*	2	2	100	**1.2**	70%	M	Nil	Garden bed	Nil	L	**ZZ1**
192	*Macadamia sp.*	5	4	100	**1.2**	90%	M	Nil	Grass	Nil	L	**Z1**
193	*Melaleuca quinquenervia*	10	6	350	**4.2**	80%	M	Lopped at 2m, Epicormic growth only	Garden bed	Nil	M	**Z9**
194	*Melaleuca quinquenervia*	10	6	350	**4.2**	80%	M	Lopped at 2m, Epicormic growth only	Garden bed	Nil	M	**Z9**
195	*Melaleuca quinquenervia*	10	6	350	**4.2**	80%	M	Lopped at 2m, Epicormic growth only	Garden bed	Nil	M	**Z9**
196	*Melaleuca quinquenervia*	8	5	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
197	*Melaleuca quinquenervia*	10	6	350	**4.2**	80%	M	Lopped at 2m, Epicormic growth only	Garden bed	Nil	M	**Z9**
198	*Melaleuca quinquenervia*	6	4	150	**1.8**	70%	M	Nil	Garden bed	Nil	L	**Z1**
199	*Melaleuca quinquenervia*	6	4	150	**1.8**	70%	M	Nil	Garden bed	Nil	L	**Z1**
200	*Melaleuca quinquenervia*	6	4	150	**1.8**	70%	M	Nil	Garden bed	Nil	L	**Z1**
201	*Melaleuca quinquenervia*	16	9	450	**5.4**	80%	M	Nil	Garden bed	Nil	H	**A1**
202	*Melaleuca quinquenervia*	16	9	400	**4.8**	80%	M	Nil	Garden bed	Nil	H	**A1**

No.	Genus species	Height	Spread	DBH	TPZ	Foliage cover	Age Class	Defects	Location	Services	Significance	Tree AZ
203	*Casuarina cunninghamiana*	14	6	250	**3**	80%	M	Nil	Garden bed	Nil	M	**Z10**
204	*Melaleuca quinquenervia*	16	9	450	**5.4**	80%	M	Nil	Garden bed	Nil	H	**A1**
205	*Melaleuca quinquenervia*	16	9	400	**4.8**	80%	M	Nil	Garden bed	Nil	H	**A1**
206	*Acer palmatum*	5	6	150	**1.8**	80%	M	Nil	Garden bed	Nil	L	**Z1**
207	*Unknown shrub*	4	4	100	**1.2**	70%	M	Co-dominant	Garden bed	Nil	L	**Z1**
208	*Callistemon sp.*	6	6	200	**2.4**	70%	M	Nil	Garden bed	Nil	L	**Z1**
209	*Citrus × sinensis*	2	3	100	**1.2**	80%	M	Nil	Grass	Nil	L	**Z1**
210	*Citrus × sinensis*	2	3	100	**1.2**	80%	M	Nil	Grass	Nil	L	**Z1**
211	*Jacaranda mimosifolia*	7	7	200	**2.4**	70%	M	Lopped at 1m, Epicormic growth only	Garden bed	Nil	M	**Z9**
212	*Melaleuca quinquenervia*	14	9	600	**7.2**	80%	M	Nil	Grass	Adjacent driveway	H	**A1**
213	*Pittosporum eugenioides 'Variegatum'*	6	4	100	**1.2**	70%	M	Borer	Garden bed	Adjacent building	L	**Z4**
214	*Camellia sp.*	5	3	100	**1.2**	90%	M	Nil	Garden bed	Nil	L	**Z1**
215	*Camellia sp.*	3	3	100	**1.2**	90%	M	Nil	Garden bed	Nil	L	**Z1**
216	*Camellia sp.*	3	3	100	**1.2**	90%	M	Nil	Garden bed	Nil	L	**Z1**
217	*Camellia sp.*	3	3	100	**1.2**	90%	M	Nil	Garden bed	Nil	L	**Z1**
218	*Corymbia gummifera*	20	14	400	**4.8**	80%	M	Nil	Garden bed	Adjacent building	H	**A1**
219	*Alnus jorullensis*	12	12	450	**5.4**	80%	M	Nil	Garden bed	Adjacent structure	M	**Z3**
220	*Tibouchina sp.*	4	4	100	**1.2**	90%	M	Nil	Grass	Nil	L	**Z1**
221	*Callistemon sp.*	2	2	100	**1.2**	60%	S	Lopped at 2m	Garden bed	Nil	L	**ZZ1**
222	*Callistemon sp.*	5	4	100	**1.2**	80%	M	Nil	Garden bed	Nil	L	**Z1**
223	*Magnolia × soulangeana*	3	4	100	**1.2**	70%	M	Nil	Garden bed	Nil	L	**Z1**
224	*Elaeocarpus reticulatus*	4	3	100	**1.2**	80%	S	Nil	Garden bed	Nil	L	**Z1**
225	*Pittosporum eugenioides 'Variegatum'*	2	2	100	**1.2**	50%	M	Topped	Garden bed	Nil	L	**ZZ1**
226	*Callistemon sp.*	2	2	100	**1.2**	50%	M	Topped	Garden bed	Nil	L	**ZZ1**
227	*Callistemon sp.*	2	2	100	**1.2**	50%	M	Topped	Garden bed	Nil	L	**ZZ1**
228	*Citrus × sinensis*	2	3	100	**1.2**	80%	M	Nil	Grass	Nil	L	**Z1**
229	*Yucca sp.*	5	3	200	**2.4**	80%	M	Nil	Garden bed	Nil	L	**Z1**
231	*Angophora costata*	20	14	450	**5.4**	80%	M	Nil	Natural ground	Nil	H	**A1**
232	*Lophostemon confertus*	12	10	300	**3.6**	70%	M	Nil	Grass	Nil	M	**A1**
233	*Callistemon sp.*	5	4	200	**2.4**	80%	M	Nil	Garden bed	Nil	L	**Z1**
234	*Citrus × sinensis*	2	3	100	**1.2**	80%	M	Nil	Grass	Nil	L	**Z1**
235	*Callistemon sp.*	2	2	100	**1.2**	50%	M	Topped	Garden bed	Nil	L	**ZZ1**
236	*Banksia serrata*	5	4	150	**1.8**	80%	M	Nil	Garden bed	Nil	L	**Z1**

No.	Genus species	Height	Spread	DBH	TPZ	Foliage cover	Age Class	Defects	Location	Services	Significance	Tree AZ
237	*Casuarina cunninghamiana*	12	8	350	**4.2**	70%	M	Splits along upper boughs	Garden bed	Adjacent structure	M	**Z9**
238	*Banksia serrata*	5	4	150	**1.8**	80%	M	Nil	Garden bed	Nil	L	**Z1**
239	*Acacia sp.*	5	6	250	**3**	80%	M	Nil	Garden bed	Nil	L	**Z1**
240	*Banksia serrata*	5	4	150	**1.8**	80%	M	Nil	Garden bed	Nil	L	**Z1**
241	*Banksia serrata*	7	5	250	**3**	80%	M	Nil	Garden bed	Nil	L	**Z1**
242	*Camellia sp.*	5	4	100	**1.2**	90%	M	Nil	Garden bed	Nil	L	**Z1**
243	*Callistemon sp.*	6	5	200	**2.4**	80%	M	Nil	Garden bed	Nil	M	**Z1**
244	*Angophora floribunda*	22	16	600	**7.2**	80%	M	Nil	Grass	Adjacent building	H	**AA1**
245	*Angophora costata*	16	14	500	**6**	80%	M	Nil	Garden bed	Adjacent building	H	**A1**
246	*Callistemon sp.*	4	3	100	**1.2**	80%	M	Nil	Garden bed	Nil	L	**Z1**
247	*Grevillea spinosa*	3	3	100	**1.2**	80%	M	Nil	Garden bed	Nil	L	**Z1**
248	*Cupressus sp.*	6	4	150	**1.8**	80%	M	Nil	Garden bed	Nil	L	**Z1**
249	*Tibouchina sp.*	5	5	100	**1.2**	90%	M	Nil	Grass	Nil	L	**Z1**
250	*Acer negundo*	5	5	200	**2.4**	80%	M	Nil	Grass	Adjacent structure	L	**Z1**
251	*Ficus benjamina*	3	3	100	**1.2**	50%	M	Topped	Garden bed	Nil	L	**ZZ9**
252	*Syzygium paniculatum*	12	9	400	**4.8**	90%	M	Nil	Garden bed	Nil	M	**A1**
253	*Eucalyptus haemastoma*	9	12	700	**8.4**	80%	M	Cambium damage	Garden bed	Adjacent building	M	**Z9**
254	*Acer negundo*	9	10	350	**4.2**	80%	M	Nil	Garden bed	Adjacent structure	M	**Z3**
255	*Acer negundo*	9	10	350	**4.2**	80%	M	Nil	Garden bed	Adjacent structure	M	**Z3**
256	*Corymbia gummifera*	20	14	500	**6**	80%	M	Nil	Garden bed	Nil	H	**A1**
257	*Callistemon sp.*	5	5	100	**1.2**	80%	M	Nil	Garden bed	Adjacent building	L	**Z1**
258	*Banksia serrata*	5	4	150	**1.8**	80%	M	Nil	Garden bed	Nil	L	**Z1**
259	*Callistemon sp.*	6	5	200	**2.4**	80%	M	Nil	Garden bed	Nil	L	**Z1**
260	*Citrus × sinensis*	2	3	100	**1.2**	80%	M	Nil	Grass	Nil	L	**Z1**
261	*Callistemon sp.*	6	5	200	**2.4**	80%	M	Nil	Garden bed	Nil	L	**Z1**
262	*Corymbia gummifera*	22	12	400	**4.8**	80%	M	Nil	Garden bed	Nil	H	**A1**
263	*Lophostemon confertus*	22	14	450	**5.4**	80%	M	Nil	Grass	Nil	H	**A1**
264	*Lophostemon confertus*	20	10	300	**3.6**	80%	M	Nil	Grass	Adjacent driveway	M	**A1**
265	*Liquidambar styraciflua*	18	14	450	**5.4**	90%	M	Nil	Garden bed	Adjacent structure	H	**A1**
266	*Liquidambar styraciflua*	14	10	400	**4.8**	80%	M	Nil	Grass	Nil	M	**A1**
268	*Jacaranda mimosifolia*	10	9	250	**3**	80%	M	Co-dominant	Grass	Nil	M	**A1**
269	*Eucalyptus haemastoma*	22	14	600	**7.2**	80%	M	One dead bough, should be ok	Garden bed	Nil	H	**A1**
270	*Cinnamomum camphora*	8	8	300	**3.6**	70%	M	Lopped under powerlines, Epicormic growth	Garden bed	LV wires	M	**ZZ9**

No.	Genus species	Height	Spread	DBH	TPZ	Foliage cover	Age Class	Defects	Location	Services	Significance	Tree AZ
271	*Corymbia gummifera*	20	8	350	**4.2**	70%	M	Heavily pruned from powerlines, Slender habit	Garden bed	HV wires	M	**Z10**
272	*Lophostemon confertus*	14	9	300	**3.6**	70%	M	Nil	Garden bed	HV wires	M	**A1**
273	*Lophostemon confertus*	14	9	300	**3.6**	70%	M	Nil	Garden bed	HV wires	M	**A1**
274	*Eucalyptus scoparia*	8	5	200	**2.4**	70%	M	Nil	Garden bed	Nil	L	**Z10**
275	*Tristaniopsis laurina*	6	4	150	**1.8**	70%	M	Nil	Garden bed	HV wires	L	**Z1**
276	*Lophostemon confertus*	14	10	350	**4.2**	80%	M	Co-dominant	Garden bed	Nil	M	**A1**
278	*Banksia serrata*	5	3	200	**2.4**	70%	M	Nil	Garden bed	Nil	L	**Z1**
279	*Banksia serrata*	5	3	200	**2.4**	70%	M	Nil	Garden bed	Nil	L	**Z1**
280	*Lophostemon confertus*	16	14	450	**5.4**	80%	M	Nil	Garden bed	Nil	H	**A1**
282	*Eucalyptus botryoides*	14	8	250	**3**	60%	M	Heavily pruned from powerlines	Garden bed	HV wires	M	**ZZ9**
283	*Lophostemon confertus*	10	7	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
284	*Eucalyptus robusta*	18	16	600	**7.2**	80%	M	Nil	Garden bed	Nil	H	**A1**
285	*Acacia elata*	7	5	250	**3**	30%	O	Borer	Garden bed	Nil	L	**ZZ4**
286	*Eucalyptus robusta*	22	14	400	**4.8**	70%	M	Nil	Garden bed	Nil	M	**A1**
287	*Acacia elata*	7	5	250	**3**	30%	O	Borer	Garden bed	Nil	L	**ZZ4**
288	*Eucalyptus sp.*	20	14	350	**4.2**	70%	M	Nil	Garden bed	Nil	H	**A1**
289	*Eucalyptus robusta*	14	7	300	**3.6**	80%	M	Nil	Steep slope	Nil	M	**A1**
290	*Allocasuarina torulosa*	7	4	200	**2.4**	60%	M	Failures	Steep slope	Nil	L	**Z10**
291	*Corymbia gummifera*	18	12	400	**4.8**	80%	M	Nil	Garden bed	Adjacent structure	H	**A1**
292	*Cupressus sp.*	6	1	100	**1.2**	80%	M	Nil	Garden bed	Nil	L	**Z1**
293	*Washingtonia robusta*	2	2	200	**2.4**	90%	S	Nil	Garden bed	Nil	L	**Z1**
294	*Banksia serrata*	6	5	150	**1.8**	80%	S	Nil	Garden bed	Adjacent building	L	**Z1**
295	*Acacia baileyana*	7	5	200	**2.4**	80%	M	Nil	Garden bed	Nil	L	**Z1**
296	*Eucalyptus botryoides*	22	14	500	**6**	80%	M	Nil	Grass	Nil	H	**A1**
297	*Eucalyptus botryoides*	16	8	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
298	*Eucalyptus haemastoma*	4	4	150	**1.8**	80%	S	Nil	Grass	Nil	L	**Z1**
299	*Eucalyptus botryoides*	10	5	200	**2.4**	80%	S	Nil	Garden bed	Nil	L	**Z1**
300	*Eucalyptus botryoides*	16	8	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
301	*Pittosporum undulatum*	4	4	150	**1.8**	70%	S	Failures	Garden bed	Nil	L	**Z1**
302	*Casuarina cunninghamiana*	6	4	150	**1.8**	70%	S	Nil	Garden bed	Nil	L	**Z1**
303	*Casuarina cunninghamiana*	6	4	150	**1.8**	70%	S	Nil	Garden bed	Nil	L	**Z1**
304	*Elaeocarpus reticulatus*	6	3	100	**1.2**	80%	S	Nil	Garden bed	Nil	L	**Z1**
305	*Corymbia gummifera*	9	3	100	**1.2**	10%	S	Failures	Garden bed	Nil	L	**ZZ4**

No.	Genus species	Height	Spread	DBH	TPZ	Foliage cover	Age Class	Defects	Location	Services	Significance	Tree AZ
306	*Corymbia gummifera*	10	4	150	**1.8**	80%	S	Nil	Garden bed	Nil	L	**Z1**
307	*Corymbia gummifera*	10	4	150	**1.8**	80%	S	Nil	Garden bed	Nil	L	**Z1**
308	*Acacia implexa*	8	3	150	**1.8**	80%	S	Nil	Garden bed	Nil	L	**Z1**
309	*Eucalyptus microcorys*	12	7	250	**3**	80%	M	Nil	Grass	Nil	M	**A1**
310	*Eucalyptus scoparia*	10	6	150	**1.8**	70%	S	Nil	Garden bed	Nil	M	**A1**
311	*Eucalyptus microcorys*	12	7	250	**3**	80%	M	Nil	Grass	Nil	M	**A1**
312	*Eucalyptus sp.*	8	7	250	**3**	0%	O	Nil	Garden bed	Nil	L	**ZZ4**
313	*Eucalyptus microcorys*	12	7	250	**3**	80%	M	Nil	Grass	Nil	M	**A1**
314	*Eucalyptus microcorys*	12	7	250	**3**	80%	M	Nil	Grass	Nil	M	**A1**
315	*Eucalyptus microcorys*	9	5	150	**1.8**	80%	S	Nil	Garden bed	Nil	L	**Z1**
316	*Eucalyptus microcorys*	9	5	150	**1.8**	80%	S	Nil	Garden bed	Nil	L	**Z1**
317	*Eucalyptus microcorys*	9	5	150	**1.8**	80%	S	Nil	Garden bed	Nil	L	**Z1**
318	*Eucalyptus microcorys*	9	5	150	**1.8**	80%	S	Nil	Garden bed	Nil	L	**Z1**
319	*Eucalyptus microcorys*	18	12	400	**4.8**	80%	M	Nil	Garden bed	Nil	H	**A1**
320	*Eucalyptus microcorys*	24	14	450	**5.4**	80%	M	Nil	Garden bed	Nil	H	**AA1**
321	*Eucalyptus microcorys*	9	5	150	**1.8**	80%	S	Nil	Grass	Nil	L	**Z1**
322	*Eucalyptus microcorys*	24	14	450	**5.4**	80%	M	Nil	Garden bed	Nil	H	**AA1**
323	*Eucalyptus microcorys*	24	14	450	**5.4**	80%	M	Co-dominant	Garden bed	Nil	H	**AA1**
324	*Eucalyptus microcorys*	24	16	500	**6**	80%	M	Included bark	Garden bed	Nil	H	**Z9**
325	*Eucalyptus microcorys*	24	16	500	**6**	80%	M	Nil	Garden bed	Nil	H	**AA1**
326	*Eucalyptus pilularis*	24	16	600	**7.2**	80%	M	Nil	Grass	Adjacent building	H	**AA1**
327	*Corymbia gummifera*	14	9	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
328	*Eucalyptus saligna*	20	12	350	**4.2**	80%	M	Nil	Garden bed	Nil	H	**A1**
330	*Acer negundo*	8	8	300	**3.6**	80%	M	Nil	Grass	Adjacent building	M	**Z3**
331	*Cinnamomum camphora*	7	5	150	**1.8**	80%	S	Nil	Garden bed	Nil	L	**Z3**
332	*Eucalyptus saligna*	22	12	450	**5.4**	80%	M	Nil	Garden bed	Nil	H	**A1**
333	*Casuarina cunninghamiana*	14	9	350	**4.2**	80%	M	Included bark	Garden bed	Adjacent building	M	**ZZ5**
334	*Casuarina cunninghamiana*	14	6	300	**3.6**	80%	M	Splits throughout base	Garden bed	Nil	M	**Z9**
335	*Casuarina cunninghamiana*	14	6	300	**3.6**	80%	M	Splits throughout base	Garden bed	Nil	M	**Z9**
336	*Corymbia maculata*	9	4	200	**2.4**	80%	S	Nil	Garden bed	Nil	M	**Z1**
337	*Casuarina cunninghamiana*	16	7	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
338	*Casuarina cunninghamiana*	16	7	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
339	*Casuarina cunninghamiana*	14	6	300	**3.6**	80%	M	Splits throughout base	Garden bed	Nil	M	**Z9**

No.	Genus species	Height	Spread	DBH	TPZ	Foliage cover	Age Class	Defects	Location	Services	Significance	Tree AZ
340	*Corymbia gummifera*	14	6	300	**3.6**	70%	M	Heavily pruned	Garden bed	Nil	M	**A1**
341	*Corymbia gummifera*	24	14	500	**6**	0%	O	Nil	Garden bed	Nil	H	**ZZ4**
342	*Angophora costata*	14	9	350	**4.2**	60%	M	Borer, Heavily pruned	Garden bed	HV wires	M	**Z10**
343	*Eucalyptus sp.*	8	5	250	**3**	80%	S	Nil	Garden bed	Nil	M	**Z1**
345	*Casuarina cunninghamiana*	14	6	300	**3.6**	80%	M	Splits throughout base	Garden bed	Nil	M	**Z9**
346	*Eucalyptus saligna*	24	12	450	**5.4**	80%	M	Major storm failures	Garden bed	Nil	H	**ZZ4**
347	*Eucalyptus saligna*	24	12	400	**4.8**	80%	M	Major storm failures	Garden bed	Nil	H	**ZZ4**
348	*Banksia serrata*	5	3	150	**1.8**	80%	S	Nil	Garden bed	Nil	L	**Z1**
349	*Corymbia gummifera*	18	12	400	**4.8**	80%	M	Nil	Garden bed	Kerb	M	**A1**
350	*Eucalyptus paniculata*	24	10	400	**4.8**	70%	M	Heavily pruned	Garden bed	HV wires	H	**A1**
351	*Angophora costata*	10	5	200	**2.4**	70%	S	Borer	Garden bed	Nil	L	**Z4**
352	*Angophora costata*	16	12	350	**4.2**	60%	M	Nil	Garden bed	Nil	M	**A1**
353	*Eucalyptus saligna*	22	7	250	**3**	70%	M	Borer in base, Slender habit	Garden bed	Nil	M	**Z9**
354	*Eucalyptus paniculata*	24	14	450	**5.4**	80%	M	Included bark at co-dominant	Garden bed	HV wires	H	**Z9**
355	*Eucalyptus saligna*	20	8	200	**2.4**	80%	S	Slender habit	Garden bed	Nil	M	**A1**
356	*Eucalyptus saligna*	22	9	300	**3.6**	80%	M	Nil	Garden bed	Nil	H	**A1**
357	*Eucalyptus saligna*	22	9	300	**3.6**	80%	M	Nil	Garden bed	Nil	H	**A1**
358	*Angophora costata*	18	12	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
359	*Eucalyptus saligna*	9	4	100	**1.2**	80%	S	Nil	Garden bed	Nil	L	**Z1**
360	*Eucalyptus pilularis*	28	26	1000	**12**	80%	M	Nil	Garden bed	Nil	H	**AA1**
361	*Eucalyptus microcorys*	26	22	800	**9.6**	80%	M	Co-dominant	Garden bed	HV wires	H	**AA1**
362	*Allocasuarina torulosa*	4	4	150	**1.8**	0%	O	Dead tree	Garden bed	Nil	L	**ZZ4**
363	*Eucalyptus microcorys*	26	22	800	**9.6**	80%	M	Co-dominant	Garden bed	HV wires	H	**AA1**
364	*Eucalyptus microcorys*	18	9	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
365	*Eucalyptus microcorys*	14	7	200	**2.4**	70%	S	Nil	Garden bed	Nil	M	**Z1**
366	*Eucalyptus microcorys*	18	9	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
367	*Eucalyptus microcorys*	20	18	600	**7.2**	70%	M	Topped, Central leader removed, Leaning across road	Garden bed	HV wires	H	**Z10**
368	*Eucalyptus microcorys*	18	9	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
369	*Eucalyptus microcorys*	18	9	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
370	*Eucalyptus microcorys*	14	7	200	**2.4**	70%	S	Cambium damage	Garden bed	Nil	M	**Z10**
371	*Eucalyptus microcorys*	30	26	800	**9.6**	80%	M	Nil	Garden bed	Nil	H	**AA1**
372	*Eucalyptus microcorys*	28	20	600	**7.2**	80%	M	Nil	Garden bed	Nil	H	**AA1**

No.	Genus species	Height	Spread	DBH	TPZ	Foliage cover	Age Class	Defects	Location	Services	Significance	Tree AZ
373	*Eucalyptus microcorys*	18	9	350	**4.2**	80%	M	Nil	Garden bed	Nil	M	**A1**
374	*Eucalyptus microcorys*	30	22	600	**7.2**	80%	M	Nil	Garden bed	Nil	H	**AA1**
375	*Eucalyptus microcorys*	30	22	600	**7.2**	80%	M	Nil	Garden bed	Nil	H	**AA1**
376	*Eucalyptus microcorys*	22	14	400	**4.8**	80%	M	Nil	Garden bed	Nil	H	**AA1**
377	*Eucalyptus microcorys*	24	16	450	**5.4**	80%	M	Nil	Garden bed	Nil	H	**AA1**
378	*Eucalyptus microcorys*	30	22	600	**7.2**	80%	M	Nil	Garden bed	Nil	H	**AA1**
379	*Eucalyptus microcorys*	30	22	600	**7.2**	80%	M	Nil	Garden bed	Nil	H	**AA1**
380	*Eucalyptus microcorys*	14	7	200	**2.4**	80%	S	Nil	Garden bed	Nil	M	**A1**
381	*Eucalyptus saligna*	22	12	500	**6**	50%	M	Heavily pruned, Only one lateral branch remaining	Garden bed	HV wires	M	**ZZ10**
382	*Eucalyptus microcorys*	20	18	600	**7.2**	70%	M	Topped, Central leader removed, Leaning across road	Garden bed	HV wires	H	**Z10**
383	*Eucalyptus microcorys*	20	18	600	**7.2**	70%	M	Topped, Central leader removed, Leaning across road	Garden bed	HV wires	H	**Z10**
384	*Eucalyptus microcorys*	14	10	350	**4.2**	70%	M	Topped, Central leader removed, Leaning across road	Garden bed	HV wires	M	**Z10**
385	*Eucalyptus microcorys*	28	14	400	**4.8**	80%	M	Nil	Garden bed	HV wires	H	**AA1**
386	*Eucalyptus microcorys*	18	9	300	**3.6**	80%	M	Nil	Garden bed	Nil	M	**A1**
387	*Eucalyptus saligna*	30	28	1100	**13.2**	80%	M	Bracket fungi in base, Further investigation required	Garden bed	Nil	H	**AA2**
388	*Eucalyptus sp.*	12	3	500	**6**	0%	O	Nil	Garden bed	HV wires	L	**ZZ4**
389	*Eucalyptus robusta*	26	20	1000	**12**	80%	M	Co-dominant	Garden bed	HV wires	H	**AA1**
390	*Eucalyptus sp.*	20	16	400	**4.8**	70%	M	Nil	Garden bed	Nil	H	**A1**
391	*Eucalyptus sp.*	14	10	300	**3.6**	70%	M	Nil	Garden bed	HV wires	M	**A1**
392	*Eucalyptus robusta*	16	8	300	**3.6**	70%	M	Nil	Garden bed	HV wires	M	**A1**
393	*SUGAR GUM*	14	9	300	**3.6**	60%	M	Heavily pruned	Garden bed	HV wires	M	**Z4**
394	*Angophora costata*	14	6	250	**3**	70%	S	Heavily pruned, Hazard beam	Garden bed	HV wires	M	**Z9**

Explanatory Notes

- **Measurements/estimates:** All dimensions are estimates unless otherwise indicated. Measurements taken with a tape or clinometer are indicated with a '*'. Less reliable estimated dimensions are indicated with a '?'.
- **Species:** The species identification is based on visual observations and the botanical name. In some instances, it may be difficult to quickly and accurately identify a particular tree without further detailed investigations. Where there is some doubt of the precise species of tree, it is indicated with a '?' after the name in order to avoid delay in the production of the report. The botanical name is followed by the abbreviation sp if only the genus is known. The species listed for groups and hedges represent the main component and there may be other minor species not listed.
- **Tree number:** relates to the reference number used on site diagram/report.
- **Height:** Height is estimated to the nearest metre.
- **Spread:** The average crown spread is visually estimated to the nearest metre from the outermost tips of the live lateral branches.
- **DBH:** These figures relate to 1.4m above ground level and are recorded in millimetres. If appropriate, diameter is measured with a diameter tape. 'M' indicates trees or shrubs with multiple stems.
- **Foliage Cover:** Percent of estimated live foliage cover for particular species range.
- **Age class:**

Y	Young = recently planted
S	Semi-mature (<20% of life expectancy)
M	Mature (20-80% of life expectancy)
O	Over-mature (>80% of life expectancy)

- **TPZ:** The Tree Protection Zone (TPZ) is the radial offset distance of twelve times the trunk diameter in meters.
- **Tree AZ:** See reference for Tree AZ categories in Appendix 3.
- **Significance:** A tree's significance/value in the landscape takes into account its prominence from a wide range of perspectives. This includes, but is not limited to neighbour hood perspective, local perspective and site perspective. The significance of the subject trees has been categorized into three groups, such as: High, Moderate or Low significance.

APPENDIX 3

TreeAZ Categories (Version 10.04-ANZ)

Z Category Z: Unimportant trees not worthy of being a material constraint

Local policy exemptions: Trees that are unsuitable for legal protection for local policy reasons including size, proximity and species

Z1	Young or insignificant small trees, i.e. below the local size threshold for legal protection, etc
Z2	Too close to a building, i.e. exempt from legal protection because of proximity, etc
Z3	Species that cannot be protected for other reasons, i.e. scheduled noxious weeds, out of character in a setting of acknowledged importance, etc

High risk of death or failure: Trees that are likely to be removed within 10 years because of acute health issues or severe structural failure

Z4	Dead, dying, diseased or declining
Z5	Severe damage and/or structural defects where a high risk of failure cannot be satisfactorily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, overgrown and vulnerable to adverse weather conditions, etc
Z6	Instability, i.e. poor anchorage, increased exposure, etc

Excessive nuisance: Trees that are likely to be removed within 10 years because of unacceptable impact on people

Z7	Excessive, severe and intolerable inconvenience to the extent that a locally recognised court or tribunal would be likely to authorise removal, i.e. dominance, debris, interference, etc
Z8	Excessive, severe and intolerable damage to property to the extent that a locally recognised court or tribunal would be likely to authorise removal, i.e. severe structural damage to surfacing and buildings, etc

Good management: Trees that are likely to be removed within 10 years through responsible management of the tree population

Z9	Severe damage and/or structural defects where a high risk of failure can be temporarily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, vulnerable to adverse weather conditions, etc
Z10	Poor condition or location with a low potential for recovery or improvement, i.e. dominated by adjacent trees or buildings, poor architectural framework, etc
Z11	Removal would benefit better adjacent trees, i.e. relieve physical interference, suppression, etc
Z12	Unacceptably expensive to retain, i.e. severe defects requiring excessive levels of maintenance, etc

NOTE: Z trees with a high risk of death/failure (Z4, Z5 & Z6) or causing severe inconvenience (Z7 & Z8) at the time of assessment and need an urgent risk assessment can be designated as ZZ. ZZ trees are likely to be unsuitable for retention and at the bottom of the categorisation hierarchy. In contrast, although Z trees are not worthy of influencing new designs, urgent removal is not essential and they could be retained in the short term, if appropriate.

A Category A: Important trees suitable for retention for more than 10 years and worthy of being a material constraint

A1	No significant defects and could be retained with minimal remedial care
A2	Minor defects that could be addressed by remedial care and/or work to adjacent trees
A3	Special significance for historical, cultural, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years
A4	Trees that may be worthy of legal protection for ecological reasons (Advisory requiring specialist assessment)

NOTE: Category A1 trees that are already large and exceptional, or have the potential to become so with minimal maintenance, can be designated as AA at the discretion of the assessor. Although all A and AA trees are sufficiently important to be material constraints, AA trees are at the top of the categorisation hierarchy and should be given the most weight in any selection process.

TreeAZ is designed by Barrell Tree Consultancy (www.treeaz.com/tree_az/)

APPENDIX 4

Tree protection fencing and signs - Illustrative specification

Protective fencing: Protective 1.8m high fencing should be installed at the location illustrated on the Tree Management Plan before any site works start. All uprights should be fixed in position for the duration of the development activity. The fixings must be able to withstand the pressures of everyday site work.

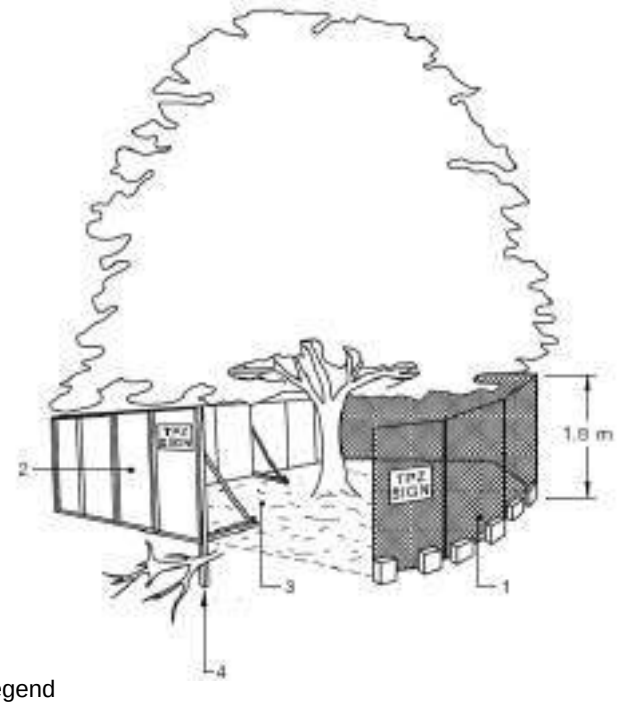
Inside the protective fencing, the following rules must be strictly observed:

- **No vehicular access**
- **No storage of excavated debris, building materials or fuels**
- **No excessive cultivation for landscape planting**
- **No fires**
- **No mixing of cement**
- **No service installation or excavation**

Once erected, protective fencing must not be removed or altered without consulting first with the project Arborist.

Shade cloth or similar should be attached to reduce the transport of dust, other particulate matter and liquids into the protected area and signage must be attached to outside of fencing.

Signage: All signs are to provide clear and readily accessible information to indicate that a TPZ has been established. Signage identifying the TPZ must be attached to outside of fencing and be visible from within the development site.



Signage example:

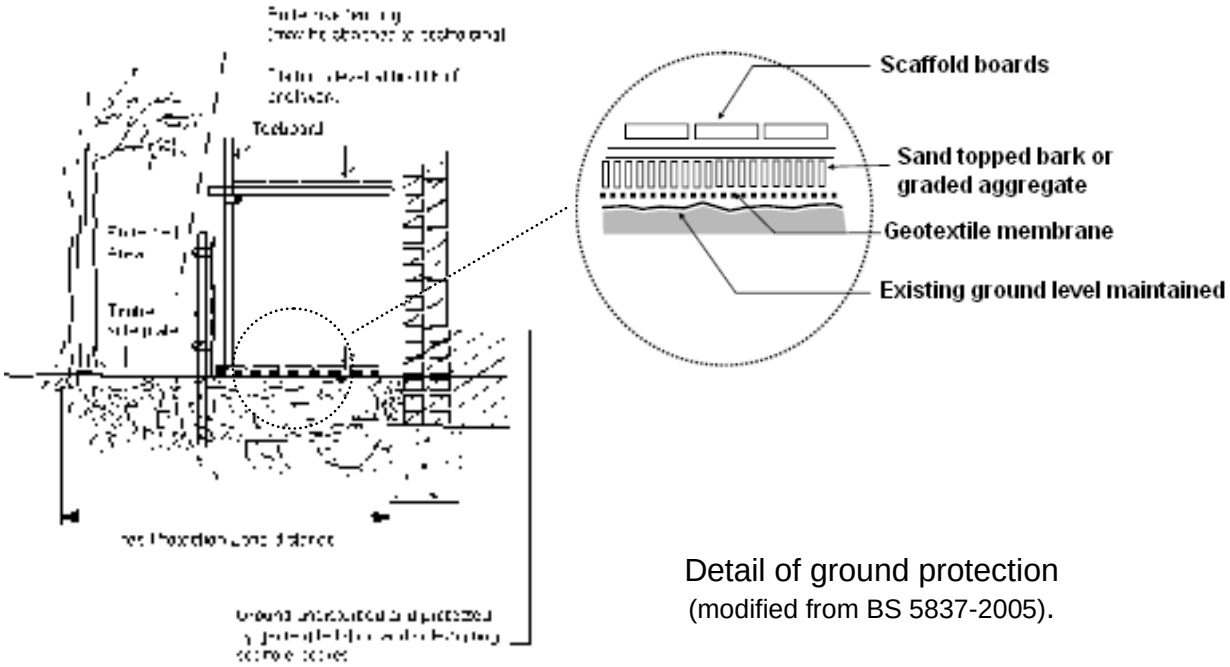
Legend

1. Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2. Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3. Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4. Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

APPENDIX 5

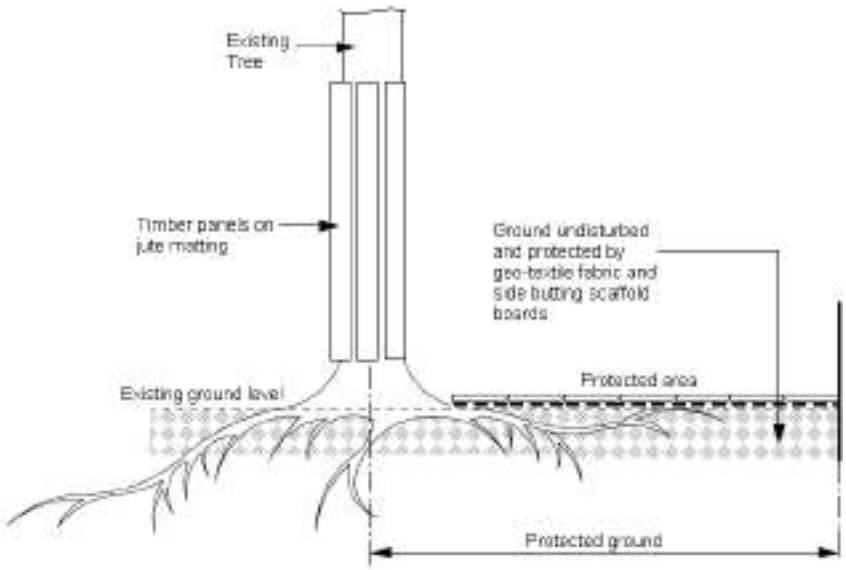
Root zone and trunk protection - Illustrative specification

Root zone protection: Where necessary, access through the TPZ can be achieved by laying aggregate and timber boards (or similar) over the root zone to protect roots. The ground beneath the boarding should be left undisturbed and should be protected with a porous geo-textile fabric covered with sand or mulch.



Detail of ground protection
(modified from BS 5837-2005).

Trunk protection: Where fencing cannot be installed, the vertical trunk of exposed trees shall be protected by the placement of 3.6m lengths of 50 x 100mm hardwood timbers, spaced vertically, at 150mm centres and secured by 2mm wire at 300mm wide spacing over suitable protective padding material e.g. Jute Matting. The trunk protection shall be maintained intact until the completion of all work on site.



Detail of trunk protection.

APPENDIX 6

General guidance for working in TPZ

1 PURPOSE OF THIS GUIDANCE

This guidance sets out the general principles that must be followed when working within a TPZ. Where more detail is required, it will be supplemented by illustrative specifications in other appendices in this document (refer Appendix 4 and 5).

This guidance is based on the Australian Standards (2009) AS4970: *Protection of Trees on Construction Sites*.

Once the site works start, this guidance is specifically for the site personnel to help them understand what has been agreed and explain what is required to fully meet their obligations to protect trees. All personnel working in TPZs must be properly briefed about their responsibilities towards important trees based on this guidance.

This guidance should always be read in conjunction with the Tree Management Plan (TMP01) illustrating the areas where specific precautions are necessary. Each area where precautions are required is explained on the plan as identified on the legend. All protective measures should be installed according to the prevailing site conditions and agreed as satisfactory by the Project Arborist before any demolition or construction work starts.

2 TREE PROTECTION

2.1 Tree Protection Zone (TPZ)

The TPZ is a radial setback, extending outwards from the centre of the trunk, where disturbance must be minimised if important trees are to be successfully retained. The TPZ area is illustrated on the Tree Management Plan (TMP01) accompanying this guidance.

- The TPZ is a radial setback extending outwards from the centre of the trunk equal to the DBH x 12.
- This area shall be protected by tree protective fencing (refer Appendix 4).
- Any part of the TPZ outside of the tree protective fencing area must be isolated from the work operations by protective barriers and/or root zone protection for the duration of the work (refer Appendix 5).
- The Project Arborist shall approve the extent of the TPZ prior to commencement of works.
- The TPZ shall be mulched to a depth of 90mm with approved organic mulch e.g. leaf and wood chip where possible.
- Supplementary watering shall be provided in dry periods to reduce water or construction stress, particularly to those trees which may incur minor root disturbance.

The following activities shall be excluded within the TPZ:

- Excavation, compaction or disturbance of the existing soil.
- The movement or storage of materials, waste or fill.
- Soil level changes
- Disposal/runoff of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids
- Movement or storage of plant, machinery, equipment or vehicles.
- Any activity likely to damage the trunk, crown or root system.

2.2 Arboricultural supervision

Any work within TPZs requires a high level of care. Qualified arboricultural supervision is essential to minimise the risk of misunderstanding and misinterpretation. Site personnel must be properly briefed before any work starts. Ongoing work must be inspected regularly and, on completion, the work must be signed off by the Project Arborist to confirm compliance by the contractor.

2.3 Tree protection fencing, root zone and trunk protection

Prior to site establishment, tree protection fencing and root zone and trunk protection shall be installed to establish the TPZ for trees to be retained in accordance with site conditions. These protective barriers shall be maintained entire for the duration of the construction program (refer Appendix 4 and 5).

Tree protection fencing and trunk and root zone protection shall be removed following completion of construction. The mulch layer in the TPZ shall be retained and replenished where required to maintain a 75mm thickness

2.4 Pruning

All pruning work required (including root pruning) should be in accordance with Australian Standard No 4373-1996 - Pruning of Amenity Trees.

2.5 Tree Damage

In the event of damage to a tree or the TPZ, the Project Arborist shall be engaged to inspect and provide advice on remedial action. This should be implemented as soon as practicable and certified by the Project Arborist.

2.6 Post construction maintenance

In the event of any tree deteriorating in health after the construction period, the Project Arborist shall be engaged to provide advice on any remedial action. Remedial action shall be implemented as soon as practicable and certified by the Project Arborist.

3 EXCAVATION AND FILL IN TPZ

3.1 Excavation within TPZ

If excavation within the TPZ is required the following shall be applied to preserve tree root systems:

- Excavation within TPZ must be carried out under the instruction and supervision of the Project Arborist.
- A root mapping exercise is to be undertaken and certified by the Project Arborist. Root mapping shall be undertaken by either ground penetrating radar, air spade, water laser or by hand excavation using hand tools, taking care not to damage the bark and wood of any roots.
- The purpose of the root mapping shall be to locate woody structural roots greater than 40mm in diameter. Where possible, flexible clumps of smaller roots, including fibrous roots, should be retained if they can be displaced temporarily or permanently beyond the excavation without damage.
- If digging by hand, a fork shall be used to loosen the soil and help locate any substantial roots.
- Once roots have been located, the trowel shall be used to clear the soil away from them without damaging the bark.
- Exposed roots to be removed shall be cut cleanly with a sharp saw or secateurs.
- Roots temporarily exposed shall be protected from direct sunlight, drying out and extremes of temperature by appropriate covering.

3.2 Fill within TPZ

Placement of fill material within the Tree Protection Zone of trees to be retained should be avoided where possible. However, where fill cannot be avoided:

- All fill material to be placed within the TPZ should be approved by Project Arborist and consist of a course, gap-graded material to provide aeration and percolation to the root zone. Materials containing a high percentage of ‘fines’ is unacceptable for this purpose.
- The fill material should be consolidated with a non-vibrating roller to minimise compaction of the underlying soil.
- No fill material should be placed in direct contact with the trunk.

4 DEMOLITION OF SURFACING/STRUCTURES IN TPZ

4.1 Definitions of surfacing and structures

For the purposes of this guidance, the following broad definitions apply:

• **Surfacing:** Any hard surfacing used as a vehicular road, parking or pedestrian path including tarmac, solid stone, crushed stone, compacted aggregate, concrete and timber decking.

• **Structures:** Any man-made structure above or below ground including service pipes, walls, gate piers, buildings and foundations. Typically, this would include drainage structures, services, car-ports, bin stores and concrete slabs that support buildings.

4.2 Demolition and access

Roots frequently grow adjacent to and beneath existing surfacing/structures so great care is needed during access and demolition. Damage can occur through physical disturbance of roots and/or the compaction of soil around them from the weight of machinery or repeated pedestrian passage. This is not generally a problem whilst surfacing/structures are in place because they spread the load on the soil beneath and further protective measures are not normally necessary. However, once they are removed and the soil below is newly exposed, damage to roots becomes an issue and the following guidance must be implemented:

- No vehicular or repeated pedestrian access into TPZ permitted unless on existing hard surfacing or root zone protection.
- Regular vehicular and pedestrian access routes must be protected from compaction with temporary root zone protection as set out in Appendix 5.
- Where a TPZ is exposed by the work, it must be protected as set out in AS4970 until there is no risk of damage from the development activity.

4.3 Removal of surfacing/structures

Removing existing surfacing/structures is a high-risk activity for any adjacent roots and the following guidance must be observed:

- Appropriate tools for manually removing debris may include a pneumatic breaker, crow bar, sledgehammer, pick, mattock, shovel, spade, trowel, fork and wheelbarrow.
- Machines with a long reach may be used if they can work from outside the TPZ or from protected areas within the TPZ.
- Debris to be removed from the TPZ manually must be moved across existing hard surfacing or temporary root zone protection in a way that prevents compaction of soil. Alternatively, it can be lifted out by machines provided this does not disturb the TPZ.
- Great care must be taken throughout these operations not to damage roots.

5 INSTALLATION OF SURFACING/STRUCTURES IN TPZ

5.1 **Basic principles:** New surfacing/structures in a TPZ are potentially damaging to trees because they may disturb the soil and disrupt the existing exchange of water and gases in and out of it. Adverse impact on trees can be reduced by minimising the extent of these changes within the TPZ.

- **Surfacing:** Suitable surfacing should be relatively permeable to allow water and gas movement, load spreading to avoid localised compaction and require little or no excavation to limit direct damage. The actual specification of the surfacing is an engineering issue that needs to be considered in the context of the bearing capacity of the soil, the intended loading and the frequency of loading. The detail of product and specification are beyond the scope of this guidance and must be provided separately by the appropriate specialist.

- **Structures:** Where possible structures are to be constructed above ground level on piled supports and redirecting water to where it is needed. The detailed design and specification of such structures is an engineering issue that should be informed and guided by the Project Arborist. Conventional strip foundations in the TPZ for any significant structure may cause excessive root loss and are unlikely to be acceptable. However, disturbance can be significantly reduced by supporting the above ground part of the structures on small diameter piles/piers or

cast floor slabs set above ground level. The design should be sufficiently flexible to allow the piles to be moved if significant roots are encountered in the preferred locations.

5.2 Establishing the depth of roots

The precise location and depth of roots within the soil is unpredictable and will only be known when careful digging starts on site. Ideally, all new surfacing within a TPZ should be no-dig, i.e. requiring no excavation whatsoever, but this is rarely possible on undulating surfaces.

New surfacing normally requires an evenly graded sub-base layer, which can be made up to any high points with granular, permeable fills such as crushed stone or sharp sand. This sub-base must not be compacted as would happen in conventional surface installation. Some limited excavation is usually necessary to achieve this and need not be damaging to trees if carried out carefully and large roots are not cut.

Tree roots and grass roots rarely occupy the same soil volume at the top of the soil profile, so the removal of a turf layer up to 50mm is unlikely to be damaging to trees. It may be possible to dig to a greater depth depending on local conditions but this would need to be assessed by the Project Arborist.

6 SERVICES IN TPZ

For the purposes of this guidance, services are considered as structures. Excavation to upgrade existing services or to install new services within a TPZ may damage retained trees and should only be chosen as a last resort. In the event that excavation emerges as the preferred option, the decision should be reviewed by the Project Arborist before any work is carried out. If excavation is agreed, all digging should be done carefully and follow the guidance set out in 3.1 above.

7 SOFT LANDSCAPING IN TPZ

For the purposes of this guidance, soft landscaping includes the re-profiling of existing soil levels and covering the soil surface with new plants or an organic covering (mulch). It does not include the installation of solid structures or compacted surfacing.

Soft landscaping activity after construction can be extremely damaging to trees.

No significant excavation or cultivation shall occur within the TPZ (e.g. planting holes). Where new designs require levels to be increased to tie in with new structures or surrounding ground level, good quality and relatively permeable top soil should be used for the fill. It should be firmed into place but not over compacted in preparation for turfing or careful shrub planting.

All areas close to tree trunks should be kept at the original ground level and have a mulched finish rather than grass to reduce the risk of mowing damage.

APPENDIX 7

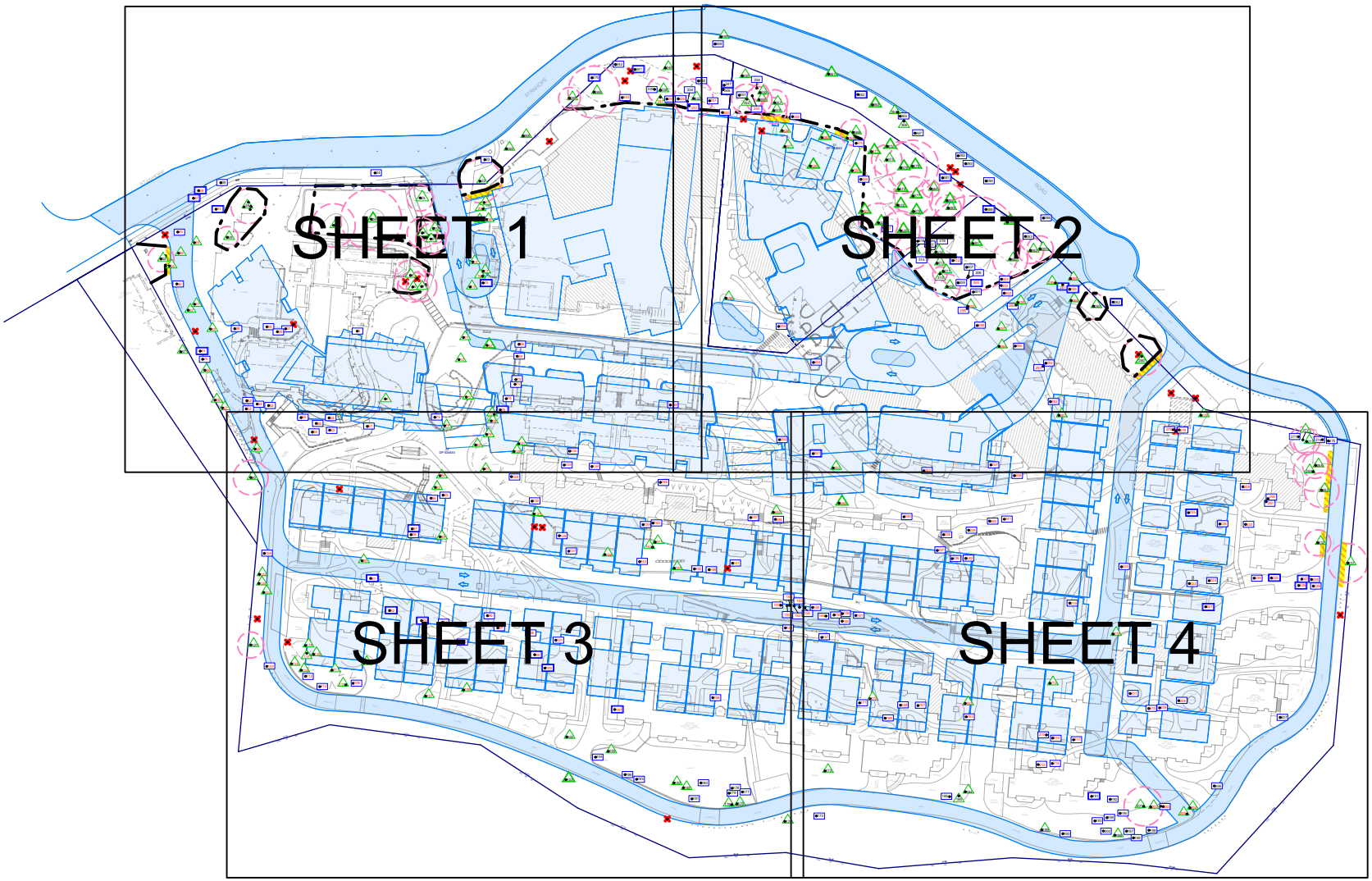
Schedule of works and responsibilities

Hold Point	Task	Responsibility	Certification	Timing of Inspection
1	Indicate clearly (with spray paint) trees approved for removal only	Principal Contractor	Project Arborist	Prior to demolition and site establishment
2	Establishment of tree protection fencing and additional root, trunk and/or branch protection	Principal Contractor	Project Arborist	Prior to demolition and site establishment
3	Supervise all excavations works proposed within the TPZ	Principal Contractor	Project Arborist	As required prior to the works proceeding adjacent to the tree
4	Inspection of trees by Project Arborist	Principal Contractor	Project Arborist	Monthly during construction period
5	Final inspection of trees by Project Arborist	Principal Contractor	Project Arborist	Prior to the issue of Occupation Certificate

APPENDIX 8

Tree management plan

-refer attached Tree Management Plan, Dwg No. TMP01,
by Naturally Trees dated 20 April 2023



LEGEND:

- 01 Category AA — Trees worthy of being a constraint
- 01 Category A — Trees worthy of being a constraint
- 01 Category Z — Trees not worthy of being a constraint
- 01 Category ZZ — Trees not worthy of being a constraint
- Existing layout
- Proposed layout
- Tree protection zone (TPZ) boundaries
- Protective fencing and TPZ area within
- TPZ where ground protection must be installed. Retain all existing levels.
- 01 Tree to be removed
- Tree no longer on site

N

ISSUE	DATE	REVISION

NOTE DO NOT SCALE FROM DRAWING. USE FIGURED DIMENSIONS ONLY.
CHECK ALL DIMENSIONS ON SITE BEFORE ANY MANUFACTURE OR CONSTRUCTION

PROJECT
95 Stanhope Road, Killara NSW

CLIENT
Lourdes Retirement Village

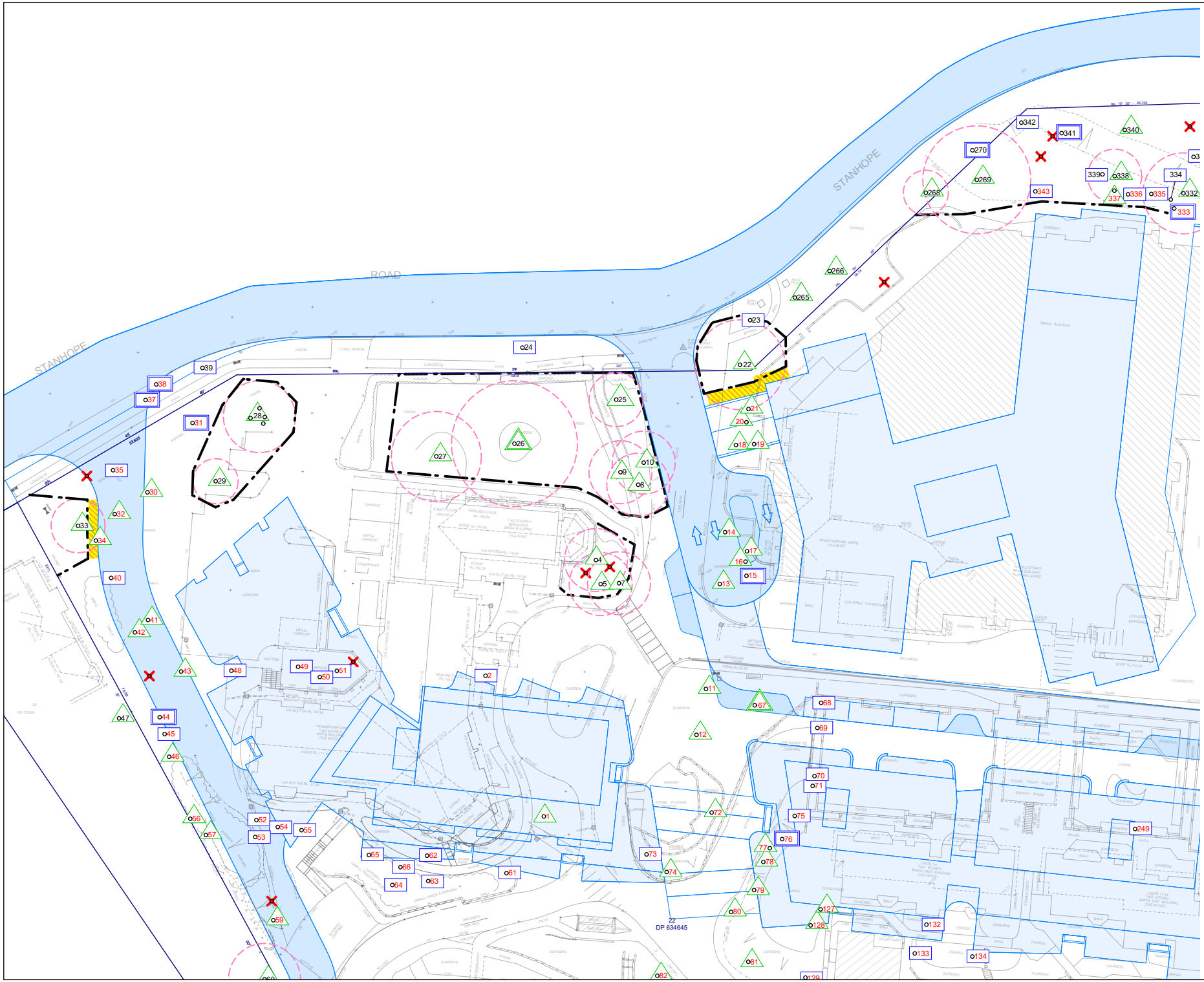
DRAWING
Tree Management Plan

Naturally Trees

PROJECT #	DWG #	REV
	TMP01	B

DATE 20/04/2023
SCALE @ A1 NTS
DRAWN AS
Cover Sheet

Naturally Trees Arboricultural Consulting
PO Box 5085 Elanora Heights NSW 2101 Australia
T: 0417 250 420 W: www.naturallytrees.com.au E: info@naturallytrees.com.au



LEGEND:

- 01 — Category AA — Trees worthy of being a constraint
- 01 — Category A — Trees worthy of being a constraint
- 01 — Category Z — Trees not worthy of being a constraint
- 01 — Category ZZ — Trees not worthy of being a constraint
- Existing layout
- Proposed layout
- Tree protection zone (TPZ) boundaries
- Protective fencing and TPZ area within
- TPZ where ground protection must be installed. Retain all existing levels.
- 01 — Tree to be removed
- Tree no longer on site

N

0 10 20m

ISSUE	DATE	REVISION

NOTE DO NOT SCALE FROM DRAWING. USE FIGURED DIMENSIONS ONLY. CHECK ALL DIMENSIONS ON SITE BEFORE ANY MANUFACTURE OR CONSTRUCTION

PROJECT
95 Stanhope Road, Killara NSW

CLIENT
Lourdes Retirement Village

DRAWING
Tree Management Plan

Naturally Trees

PROJECT # DWG # REV

DATE 20/04/2023

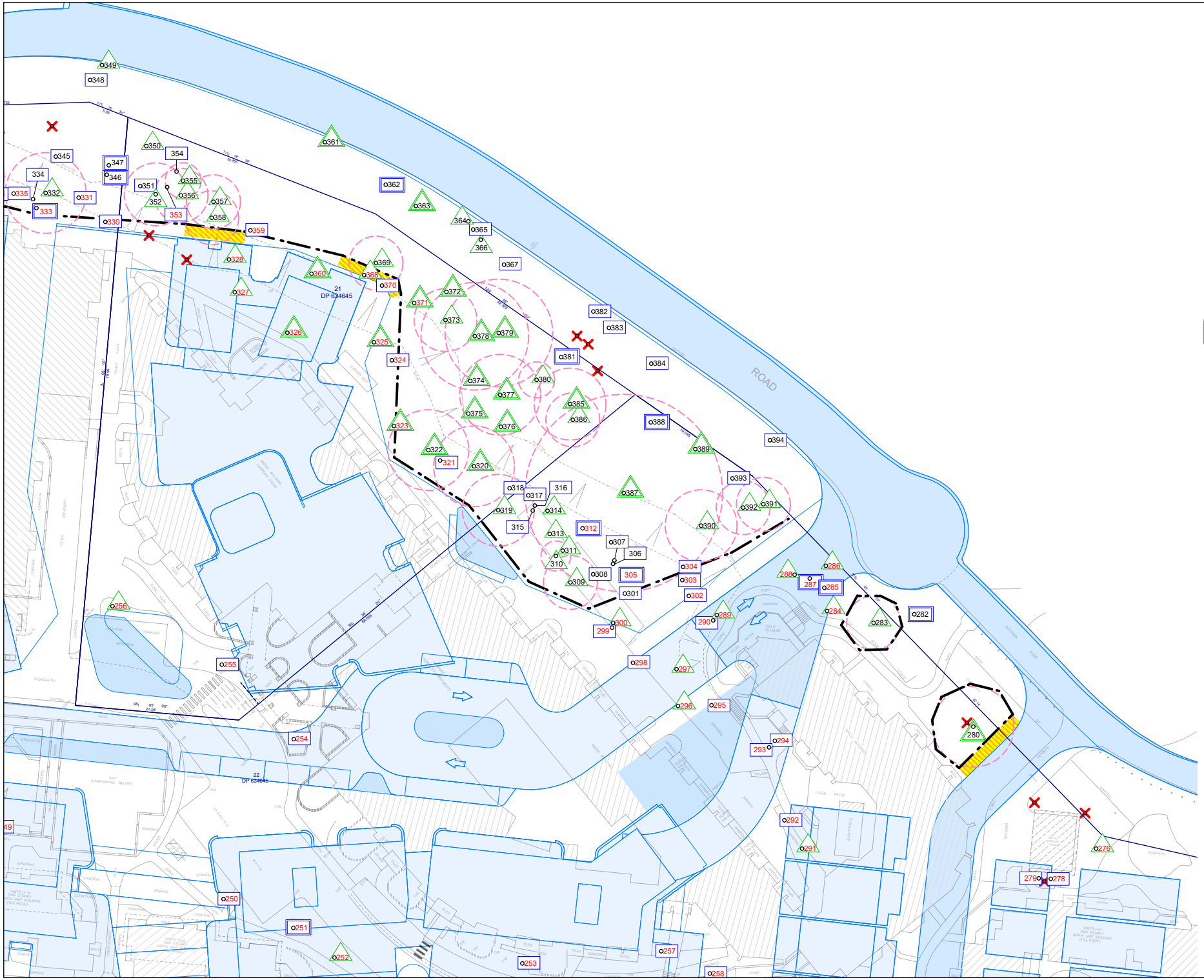
SCALE @ A1 **1:650**

DRAWN AS

TMP01 B

Sheet 1 of 4

Naturally Trees Arboricultural Consulting
PO Box 5085 Elanora Heights NSW 2101 Australia
T: 0417 250 420 W: www.naturallytrees.com.au E: info@naturallytrees.com.au



LEGEND:

- 01 — Category AA — Trees worthy of being a constraint
- 01 — Category A — Trees worthy of being a constraint
- 01 — Category Z — Trees not worthy of being a constraint
- 01 — Category ZZ — Trees not worthy of being a constraint
- Existing layout
- Proposed layout
- Tree protection zone (TPZ) boundaries
- Protective fencing and TPZ area within
- TPZ where ground protection must be installed. Retain all existing levels.
- 01 — Tree to be removed
- Tree no longer on site

N

0 10 20m

ISSUE	DATE	REVISION

NOTE DO NOT SCALE FROM DRAWING. USE FIGURED DIMENSIONS ONLY. CHECK ALL DIMENSIONS ON SITE BEFORE ANY MANUFACTURE OR CONSTRUCTION

PROJECT
95 Stanhope Road, Killara NSW

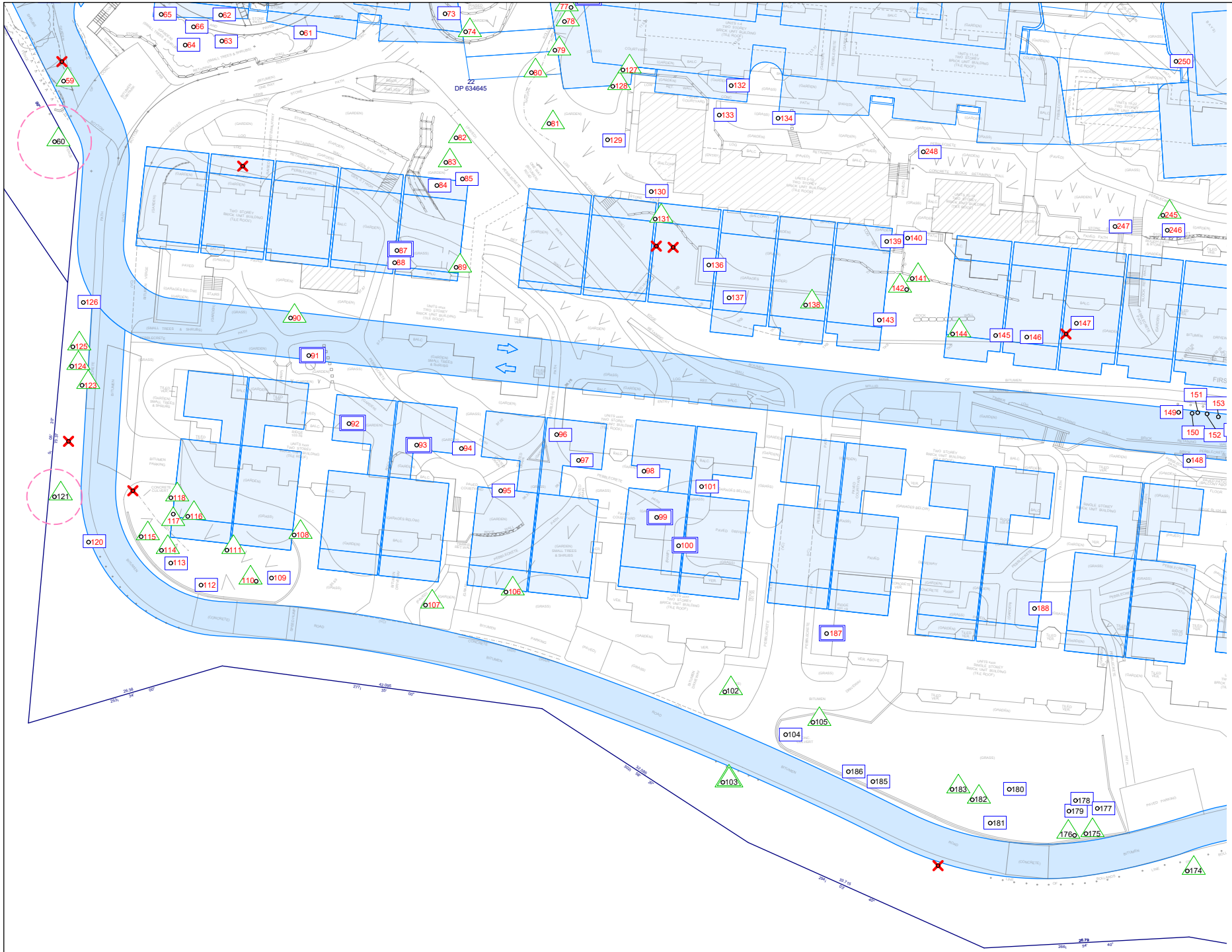
CLIENT
Lourdes Retirement Village

DRAWING
Tree Management Plan

Naturally Trees

PROJECT #	DWG #	REV
DATE	20/04/2023	
SCALE @ A1	1:650	TMP01 B
DRAWN	AS	Sheet 2 of 4

Naturally Trees Arboricultural Consulting
PO Box 5085 Elanora Heights NSW 2101 Australia
T: 0417 250 420 W: www.naturallytrees.com.au E: info@naturallytrees.com.au



LEGEND:

- 01 — Category AA — Trees worthy of being a constraint
- 01 — Category A — Trees worthy of being a constraint
- 01 — Category Z — Trees not worthy of being a constraint
- 01 — Category ZZ — Trees not worthy of being a constraint
- Existing layout
- Proposed layout
- Tree protection zone (TPZ) boundaries
- Protective fencing and TPZ area within
- TPZ where ground protection must be installed. Retain all existing levels.
- 01 — Tree to be removed
- Tree no longer on site

N

0 10 20m

ISSUE	DATE	REVISION

NOTE DO NOT SCALE FROM DRAWING. USE FIGURED DIMENSIONS ONLY. CHECK ALL DIMENSIONS ON SITE BEFORE ANY MANUFACTURE OR CONSTRUCTION

PROJECT
95 Stanhope Road, Killara NSW

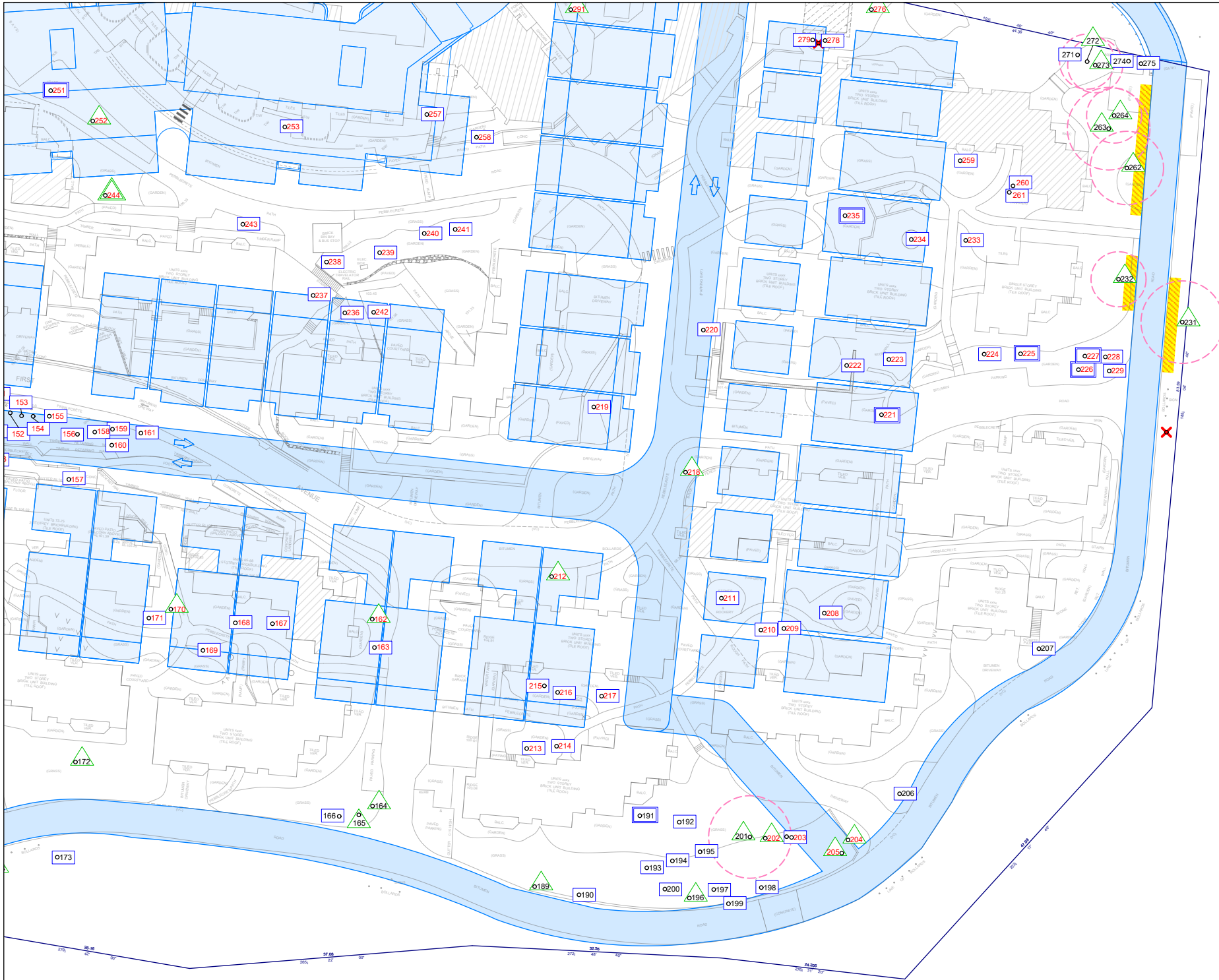
CLIENT
Lourdes Retirement Village

DRAWING
Tree Management Plan

Naturally Trees

PROJECT #	DWG #	REV
DATE 20/04/2023	TMP01	B
SCALE @ A1 1:650		
DRAWN AS	Sheet 3 of 4	

Naturally Trees Arboricultural Consulting
PO Box 5085 Elanora Heights NSW 2101 Australia
T: 0417 250 420 W: www.naturallytrees.com.au E: info@naturallytrees.com.au



LEGEND:

- 01 Category AA — Trees worthy of being a constraint
- 01 Category A
- 01 Category Z — Trees not worthy of being a constraint
- 01 Category ZZ
- Existing layout
- Proposed layout
- Tree protection zone (TPZ) boundaries
- Protective fencing and TPZ area within
- TPZ where ground protection must be installed. Retain all existing levels.
- 01 Tree to be removed
- Tree no longer on site

N

0 10 20m

ISSUE	DATE	REVISION

NOTE DO NOT SCALE FROM DRAWING. USE FIGURED DIMENSIONS ONLY. CHECK ALL DIMENSIONS ON SITE BEFORE ANY MANUFACTURE OR CONSTRUCTION

PROJECT
95 Stanhope Road, Killara NSW

CLIENT
Lourdes Retirement Village

DRAWING
Tree Management Plan

Naturally Trees

PROJECT # DWG # REV

DATE 20/04/2023

SCALE @ A1 **1:650**

DRAWN AS

TMP01 B

Sheet 4 of 4

Naturally Trees Arboricultural Consulting
PO Box 5085 Elanora Heights NSW 2101 Australia
T: 0417 250 420 W: www.naturallytrees.com.au E: info@naturallytrees.com.au

LOURDES RETIREMENT VILLAGE
95 STANHOPE ROAD, KILLARA

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

Prepared for

Levande Pty Ltd

C/- Bec Mahoney
Project Manager
Essence Project Management Pty. Ltd.

4 May 2023

Flora and Fauna Surveys, Biodiversity and Ecological Impact Assessment and Bushland Plans of Management Services

Australian Company Number (ACN) 154 491 120

Australian Business Number (ABN) 24 154 491 120

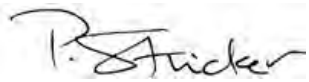
3/28 Tullimbar Road, Cronulla NSW. 2230

Tel: 9527 5262. Mob: 0403 081 902.

Email: acs@actinotus.com Web: www.actinotus.com

Director

Peter Stricker BSc. (Hons) (Syd)



Member Ecological Consultants Association NSW Inc

[#]Accredited Biodiversity Assessment Assessor (Biodiversity Conservation Act 2016) - (Accreditation Number BAAS 18125)

*ACS Environmental is an accredited Animal Research Establishment certified by the NSW Dept of Primary industries

^ Scientific Biodiversity Conservation Act Licence BSL100855 (DPE 2023 in progress)

The principal of 'ACS Environmental P/L has worked in the area of floristic and faunal impact assessment services for a period of greater than 20 years. He also has over 30 years of experience in scientific research (ecological) and teaching in biological science.

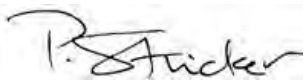
LOURDES RETIREMENT VILLAGE - BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

prepared for

Levande Pty Ltd

Certification

I certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act).

Signature: 

Date: 4 May 2023

BAM Assessor Accreditation no: BAAS 18125

Project team members:

Peter Stricker	BAAS18125	Field data collection, BDAR author
Kat Duchatel	BAAS17054	Field inspection, BDAR peer review
Geraldine Dalby-Ball	BAAS19008	BDAR peer review

Revision Schedule

Rev No	Date	Title	Issued to
1	04.05.2023	BDAR for submission	Levande Pty Ltd

Contents

Tables

Figures

Executive Summary

Background

Lourdes Retirement Village is a 5.6 hectares (ha) estate located at 95 Stanhope Road, Killara, in the Ku-ring-gai Local Government Area. The site has been developed throughout various uses since 1910's, however, the current retirement village arrangement commenced construction in 1983 and continued throughout the 1980's. Levande Pty Ltd proposes to redevelop the village to bring the facility into the modern era and expand the current facility to meet the growing demand for seniors' accommodation.

The proposed redevelopment will involve the following:

- Demolition of single and two storey residential buildings;
- Construction of multi-storey residential buildings and a single storey chapel;
- Realignment of internal roadways and associated services;
- Vegetation clearing; and
- Landscaping.

This Biodiversity Development Assessment Report (BDAR) has been prepared to support a Planning Proposal that will enable the redevelopment.

Biodiversity values

Native vegetation within the site is largely present as landscaped plantings in managed curtilage with some areas that are potentially of remnant origin.

Potential impacts on biodiversity values have been assessed using the Biodiversity Assessment Method (BAM) Streamlined assessment module – Planted native vegetation (Appendix D of the BAM). Application of this module has been justified through the following:

- Review of State Vegetation Type Mapping (OEH, 2022), which does not indicate native vegetation on the subject land;
- An arboricultural assessment (Naturally Trees 2023), which assessed over 390 individual tree from seventy-two (72) different species, which comprise:
  - 15 local native species
  - 12 local native species not expected to occur at the site (i.e., habitat for the species absent);
  - 15 non-local native species; and
  - 30 exotic species.
- Assessment of historical imagery from which it has been possible to determine areas of vegetation that pre-date the existing development as far back as 1943.

  However, the presence (and abundance) of non-local trees within these areas suggests that vegetation evident in 1943 is a combination of regrowth and planting that occurred following clearing in the 1910s. Nothwithstanding, vegetation that was present in 1943 has been adopted as remnant for this assessment.

- Site investigations, which found vegetation to cover approximately 2.6 ha of the subject land, comprising the following:
  - 1.5 ha of landscaping (including native and exotic plantings, lawns, garden beds, hedges etc) – assessed through application of the Streamlined BAM module; and
  - 1.2 ha of planted locally occurring native vegetation and remnant vegetation (i.e., native vegetation that pre-dates the existing development as far back as 1943) – assessed through application of the full BAM.

Planted locally occurring and remnant native vegetation was allocated to the Sydney Coastal Enriched Sandstone Forest plant community type (PCT 3592). PCT 3592 was determined to be the 'best fit' based on the presence of diagnostic species found in the Bionet Vegetation Classification Database.

The subject land's planted and remnant vegetation was found to not provide habitat for any threatened species, due to the following:

- A lack of habitat features that would support threatened species, such as remnant hollow bearing trees, bush rock, large woody debris, and watercourses/drainage lines.
- Site surveys of the subject land did not find any incidental sightings or evidence of threatened species (e.g., scats, stick nests, diggings, burrows, scratches/runways on trees, faecal matter).
- Man-made structures within the subject land were also inspected for evidence of any potential use by threatened birds and microbat species and none detected.

Avoidance and minimisation

In accordance with Section 7.1.2 of the BAM, the proposal is, as far as practical, located as follows:

- In areas that have no biodiversity values; and
- In vegetated areas that:
  - are in the poorest condition, and/or
  - do not contain habitat for threatened species.

The proposal has sought to avoid significant native vegetation where possible with 0.94ha of a total 1.5ha of PCT 3592 to be retained.

Up to 0.58 ha of PCT 3592 will be unavoidably impacted, which is largely made up of planted vegetation of non-local and exotic planting origins as follows:

Origin	Area (m^2)
Remnant native	894
Planted local native	237
Planted native/non-local native mixture	2,782
Planted native/exotic mixture	1,906
	5,819

The redevelopment of the Lourdes Village is necessary as the existing aging buildings which were original constructed in 1983 are in need of renewal to provide modern seniors housing. The existing housing is dated and has limited accessibility with many of the dwellings not having lift access and the gradient of streets and pathways providing poor pedestrian connectivity.

The dwellings are accessed via a network of narrow internal paths and stairways making pedestrian movement across the site difficult, with some streets too steep to walk. The building stock is aging and does not provide services and facilities that are competitive with market demand nor compliant with current Building Codes or Bushfire standards. Accordingly, major renewal of the housing and infrastructure is required which has resulted in the development of the Planning Proposal and master plan.

For the most part, the master plan seeks to locate proposed buildings within the existing development footprint minimising impacts on significant vegetation. However, unavoidable direct impacts will occur being largely on peripheral native vegetated areas as a result of the proposal's access roads, the location of proposed building footprints and required curtilage to heritage buildings.

Proposed building footprints near the northern boundary and central to the site will impact on small areas of PCT 3592. The building footprints have been located with the view to minimising vegetation impacts wherever possible. However, locations and building footprints have also been driven by the need to meet the requirements of the Apartment Design Guide for building separation and solar access and to provide generous communal space at the ground level as well as to achieve suitable building floorplates to accommodate modern seniors housing necessitating some impacts on PCT 3592.

The proposed changes to the internal road network seek to establish a separate access network for the private town house development to the south of the site and the seniors housing (independent living units and residential aged care) at the north of the site. This necessitates a new site access point to Stanhope Road at the west of the site and a new access road along the western boundary as well as a new site access connecting to the existing roundabout at Stanhope Road which will impact on small areas of PCT 3592.

This ensures safe and efficient access to the proposed land uses and locates access to the basement and loading areas for the seniors housing as close as possible to Stanhope Road limiting the intrusion of vehicles into the site as much as feasible and also by extension serving to limit the effect of vehicle movements from a noise and pollution perspective within the local context. It also allows for a low traffic environment for the internal road serving the townhouses providing for a high level of pedestrian safety and amenity and minimal noise impacts in these areas.

The location of townhouses at the south of the site will also impact on small areas of PCT 3592 along the southern boundary at the eastern end of the site. Impacts on significant native vegetation on the southern bushland interface have almost entirely been avoided. The minor impacts in this area provide for a consistent street address for the townhouses fronting the internal road network and a substantial vegetated buffer will be maintained the adjacent bushland.

Impact assessment

No ecosystem or candidate species credit species (including SAII entities) have been incidentally recorded or were detected on the subject land, and the proposal is not considered to represent a prescribed impact.

Six (6) ecosystem credits must be retired to offset the clearing of PCT 3592 as determined by the BAM calculator.

A total area of 1.2 ha occurs as planted/landscaped non-native vegetation or native vegetation that is not local to the locality or to the habitat of the subject land. This vegetation is not representative of any formal PCT and does not incur an offsetting obligation.

Mitigation of indirect impacts on biodiversity values during construction will be specified within a project Construction and Environmental Management Plan (CEMP), which at a minimum shall include the following:

- Erosion and sediment controls;
- Dust and noise suppression;
- Pre-clearance and clearance processes to achieve the following, but not limited to, objectives:
    - protection of retained native vegetation and habitat
    - prevention of injury/mortality to all fauna
    - prevention of the spread and/or introduction of weeds and pathogens

Mitigation of operational indirect impacts on biodiversity values will be integrated into the detailed design of the proposal, which includes, but may not be limited to:

- Stormwater management and protection of downstream aquatic ecosystems
- Light spill into the adjacent bushland and native fauna habitat
- Landscape management (including native landscaping establishment and ongoing weed control)

Future development assessment

Prior to commencement of the proposed development, development consent is required. As the proposed development including seniors living housing, the development application will be submitted as a State Significant Development (SSD).

An updated BDAR will be prepared for submission with the SSD application. At this time, further detail will be possible as it relates to mitigation and management of impacts in accordance with BAM Sections 8.4 and 8.5 and the minimum information requirements in Appendix K of the BAM.

Glossary

APZ	Asset protection zone
BAM	NSW Biodiversity Assessment Method
BAM-C	BAM calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BC Reg.	NSW *Biodiversity Conservation Regulation 2017*
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	NSW *Biodiversity Security Act 2015*
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
CEMP	Construction Environmental Management Plan
DA	Development Application
DBH	Diameter at breast height
DCP	Development Control Plan
DCCEEW	Federal Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment
EHG	Environment Heritage and Conservation Group of the DPE
EPBC Act	Commonwealth *Environment Protection Biodiversity and Conservation Act 1999*
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
FM Act	NSW *Fisheries Management Act 1994*
HTW	High threat weed
IBRA	Interim Biogeographic Regionalisation of Australia
KTP	Key threatening process
LEP	Local environment Plan
LGA	Local government area
MNES	Matters of National Environmental Significance
PCT	Plant community type
SAII	Serious and Irreversible Impact
SEARs	Secretary's Environmental Assessment Requirements
SEPP	NSW State Environment Protection Policy
TEC	Threatened Ecological Community
TBDC	Threatened Biodiversity Data Collection

1. Introduction

1.1 Background

Lourdes Retirement Village is a 5.6 hectares (ha) estate nestled beside the bushland of Garigal National Park at the end of Stanhope Road, Killara.

The site has been developed throughout various uses since 1910's, however, the current retirement village arrangement commenced construction in 1983 and continued throughout the 1980's. The village now requires significant renewal to provide modern seniors housing. The existing housing is dated and has limited accessibility with many of the dwellings not having lift access and the gradient of streets and pathways providing poor pedestrian connectivity.

Levande Pty Ltd (the proponent) proposes to redevelop the village to bring the facility into the modern era and expand the current facility to meet the growing demand for seniors' accommodation.

This Biodiversity Development Assessment Report (BDAR) has been prepared to support a Planning Proposal that will enable the redevelopment.

1.2 The Proposal

The proposed redevelopment will involve the following:

- Demolition of single and two storey residential buildings;
- Construction of multi-storey residential buildings and a single storey chapel;
- Realignment of internal roadways and associated services;
- Vegetation clearing; and
- Landscaping.

The proposal's current masterplan is shown in Figure 1-1.

1.3 Subject land

The subject land is located at 95 Stanhope Road, Killara, which is legally identified as Lot 21 and Lot 22 in Deposited Plan 634645, in the Ku-ring-gai Local Government Area (LGA) (see Figure 1-2).

The subject land has been extensively modified in relation to natural vegetation structure and floristics. The subject land currently contains existing independent living units and other retirement and nursing home facilities in an area of managed curtilage with formal garden beds and landscaped areas of planted and established trees. However, some individuals and patches of remnant tree and shrub species have also been retained within the landscape.

Landscaped trees have been planted mainly along the surrounding boundaries of internal roadways and grassy garden areas and include local and non-local native species as well as exotic ornamental species.

Figure 1-1. Proposal layout

Lourdes Retirement Village

Figure 1-1. Subject land

Legend

Subject_site

N

0 30 60 120

M

Coordinate System: MGA Zone 56 (GDA 2020)

Image source: Nearmap 16 March 2023

Data drawn: 1 May 2023

1.4 Information sources

The following information sources were used in the preparation of this BDAR:

1.4.1 Data and Imagery

- Imagery:
  - Aerial imagery: NearMap 16 March 2023
  - NSW Spatial Services – Historical imagery viewer: 1943 to 1985
  - NSW Soil landscapes\ Sydney_SL100K_v1_GDA94.shp
- Australian Government Department of the Environment and Energy
  - Protected Matters Search Tool http://www.environment.gov.au/epbc/pmst/index.html
  - Species Profiles and Threats Database (SPRAT) http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl
  - Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (Department of the Environment, Water, Heritage, and the Arts, 2013 EPBC Act Policy Statement)
  - Interim Biogeographic Regionalisation for Australia (IBRA) version 7.0
- NSW Department of Planning and Environment (DPE)
  - NSW (Mitchell) Landscapes – version 3.1
  - BVMap_BV13_Web.gdb
  - Biodiversity Values Map and Threshold Tool
  - The Native Vegetation of the Sydney Metropolitan Area - Version 3_1 (OEH, 2016) VIS_ID 4489 (SydneyMetroArea_v3_2016_E_4489)
  - BioNet Vegetation Classification Database and Threatened Biodiversity Data Collection
  - Biodiversity Investment Opportunities Map: Mapping Priority Investment Areas for the Cumberland Subregion (2018)
- NSW DPE Environment Heritage Group (EHG)
  - Advice PP-2022-658 95-97 Stanhope Road Killara_Ref-1539 (1) (27 September 2022)
  - Advice PP-2022-658 95-97 Stanhope Road Killara Amended Plans (28 March 2023)
- FPD Planning (23 December 2022) Lourdes Retirement Village Planning Proposal - Response to Submissions
- Naturally Trees (20 April 2023) Lourdes Retirement Village Arborist Report - Rev B
- Plus Architecture (03 May 2023) Lourdes Retirement Village – Urban Design Report, Response to Council.

2. Landscape Context

2.1 Topography, geology and soils

The topography of the subject land slopes from a hillcrest gently to the south-east over gradients of from 2 - 5^0.

The local underlying geology of the subject area occurs across the boundaries of the Ashfield Shale Series of the Wianamatta Group of Shales (Herbert 1983) and Hawkesbury Sandstone (Herbert 1983).

The Soil Landscape type in the north-western section of the site is the 'residual 'Lucas Heights' Soil landscape Series that is characterised by gently undulating crests and ridges on plateau surfaces of the Mittagong Formation where rock outcropping is usually absent (Chapman & Murphy 1989).

The lower and eastern sections of the subject land appear to be more associated with Hawkesbury Sandstone sediments where the colluvial 'Hawkesbury' Soil Landscape Series is characterised by rolling hills on Hawkesbury Sandstone including rock outcropping with rocky benches, broken scarps and boulders (Chapman & Murphy 1989).

See Figure 2-1.

2.2 Landscape features

Landscape features relevant to the proposal have been assessed from within a 1500m buffer zone (the BDAR assessment area) around the proposed development site (subject land).

In accordance with Sections 3.1 and 3.2 of the BAM (2020) assessment and mapping of the following landscape features are required:

- IBRA bioregions and subregions;
- NSW (Mitchell) landscapes;
- Rivers and streams classified according to stream order;
- Wetlands within, adjacent to and downstream of the site;
- Connectivity of different areas of habitat;
- Geological features such as karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features;
- Areas of outstanding biodiversity value occurring on the subject land and assessment area; and
- Percent native vegetation cover in the assessment area.

2.2.1 IBRA bioregions and IBRA subregions

The subject land occurs wholly within the Sydney Basin IBRA region and the Cumberland IBRA Subregion. The Pittwater IBRA Subregion occurs within the BDAR assessment area, which is distanced approximately 370m to the northeast of the subject land (see Figure 2-2).

2.2.2 NSW landscape regions (Mitchell Landscapes)

Mitchell landscape mapping indicates that most of the subject land is located in the Pennant Hills Ridges landscape with a smaller eastern site portion located in the Belrose Coastal Slopes landscape (see Figure 2-2).

2.2.3 Rivers / streams

The subject land does not contain any drainage lines. As shown in Figure 2-4 there are several watercourses within the BDAR assessment area, which include Little Bluegum Creek, Stoney Creek, Rocky Creek and Gordons Creek.

The subject land is located upslope approximately 100m from a first order tributary of Gordons Creek, which rises in Swain Gardens. The confluence of this stream and another first order stream that flows from the south is located approximately 150m southeast of the subject land (see Figure 2-2).

2.2.4 Wetlands

No wetlands of local, regional, national or international significance are located within the subject land or BDAR assessment area.

Gordon Creek is a tributary of Middle Harbour, which is located outside of the BDAR assessment area.

2.2.5 Connectivity

As shown in Figure 2-4, the subject land is juxtaposed at the edge of extensive existing developed land and remnant bushland. The latter contained within the Garigal National Park, which extends to Middle Harbour and provides substantial connectivity.

The proposal does not impact on the remnant bushland adjacent to the subject land and will not result in the isolation or fragmentation of native vegetation and/or connectivity.

2.2.6 Geological features of significance

No karsts, caves, crevices, cliffs or areas of geological significance have been identified within the BDAR assessment area.

2.2.7 Soil hazards

The managed curtilage on the slopes of the subject land are currently stabilised by vegetative cover including managed exotic grassland and no soil creep or landslip features are apparent.

2.2.8 Outstanding biodiversity values

Areas of Outstanding Biodiversity Values (AOBV) are special areas that contain irreplaceable biodiversity values that are considered important to NSW, Australia or globally. No listed AOBVs occur within the subject land or BDAR assessment area.

2.3 Determining site context

2.3.1 Assessing native vegetation cover

Native vegetation cover on the subject land must be assessed in relation to native vegetation cover across a broader area.

The cover of native vegetation within the BDAR assessment area is required to determine the context of the site. The cover of native vegetation in the BDAR assessment area, was assessed as follows:

- Clipping the extent of SydneyMetroArea_v3_2016_E_4489 (OEH, 2016) shapefile within the BDAR assessment area using ArcMap v10.8.2.

  Note the NSW State Vegetation Type Map (DPE 2022) shapefile was also clipped and reviewed, but the SydneyMetroArea_v3_2016_E_4489 shapefile was found to more accurately represent the extent of native vegetation cover.

- Editing the shapefile to remove areas of vegetation no longer evident and increase areas or add new polygons where vegetation is not represented in mapping.

Figure 2-4 illustrates the extent of native vegetation within the BDAR assessment area adopted for this assessment.

The BDAR assessment area including the subject land is 851.6 ha. The total of native vegetation cover within the BDAR assessment area is estimated at 196.5 ha, which equates to 23% and an assignment to the 10-30% cover class (in accordance with the BAM Section 3.2).

In contrast, the total of native vegetation cover mapped under the SVTM (DPE 2022) was only 50.9 ha or less than 6% cover.

Figure 2-4 shows both DPE (2022) and OEH (2016) mapping layers.

Legend

Subject_site

Soil landscape

GYMEA

HAWKESBURY

LUCAS HEIGHTS

N

0 37.5 75 150

m

Lourdes Retirement Village

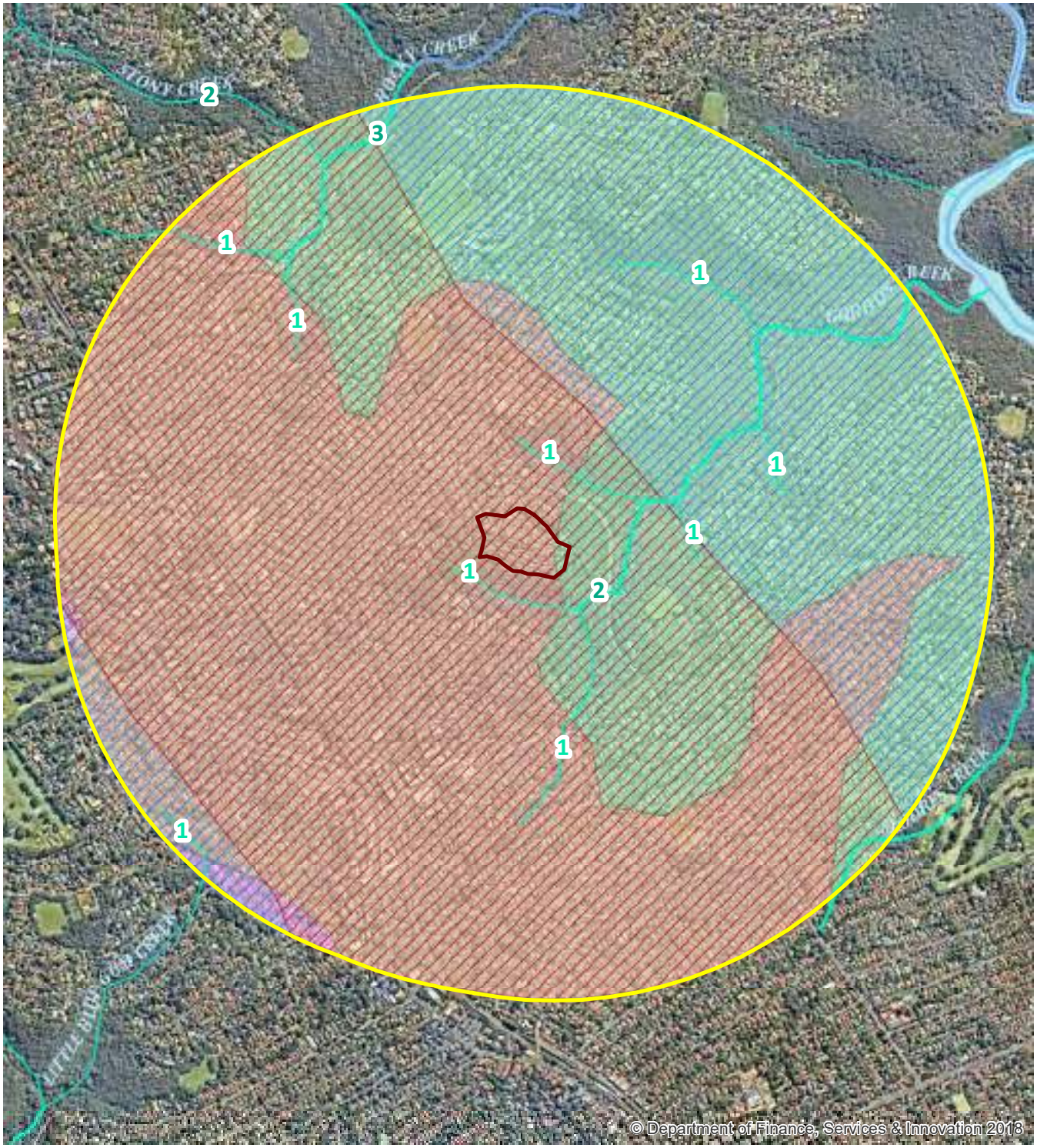
Figure 2-1. Subject land soil landscapes

Coordinate System: MGA Zone 56 (GDA 2020)

Image source: Nearmap 16 March 2023

Data source: Sydney Soil Landscapes\ Sydney_GIS_data\Sydney_SL100K_v4_GDA94.shp

Data drawn: 20 April 2023



Legend

BDAR_assessment_area

Subject_site

IBRA subregion

Cumberland

Pittwater

Mitchell landscape

Belrose Coastal Slopes

Pennant Hills Ridges

Port Jackson Basin

N

0 345 690 1,380

m

Lourdes Retirement Village

Figure 2-2. Landscape assessment

Coordinate System: MGA Zone 56 (GDA 2020)

Image source: Nearmap 16 March 2023

Data source: IBRA7 Subregions; Land_Mitchell_Landscapes_v3

Data drawn: 20 April 2023

Legend

- BDAR_assessment_area
- Subject_site
- <all other values>
- NV cover (DPE, 2022)
- NV cover (OEH, 2016)

N

0 345 690 1,380

m

Lourdes Retirement Village

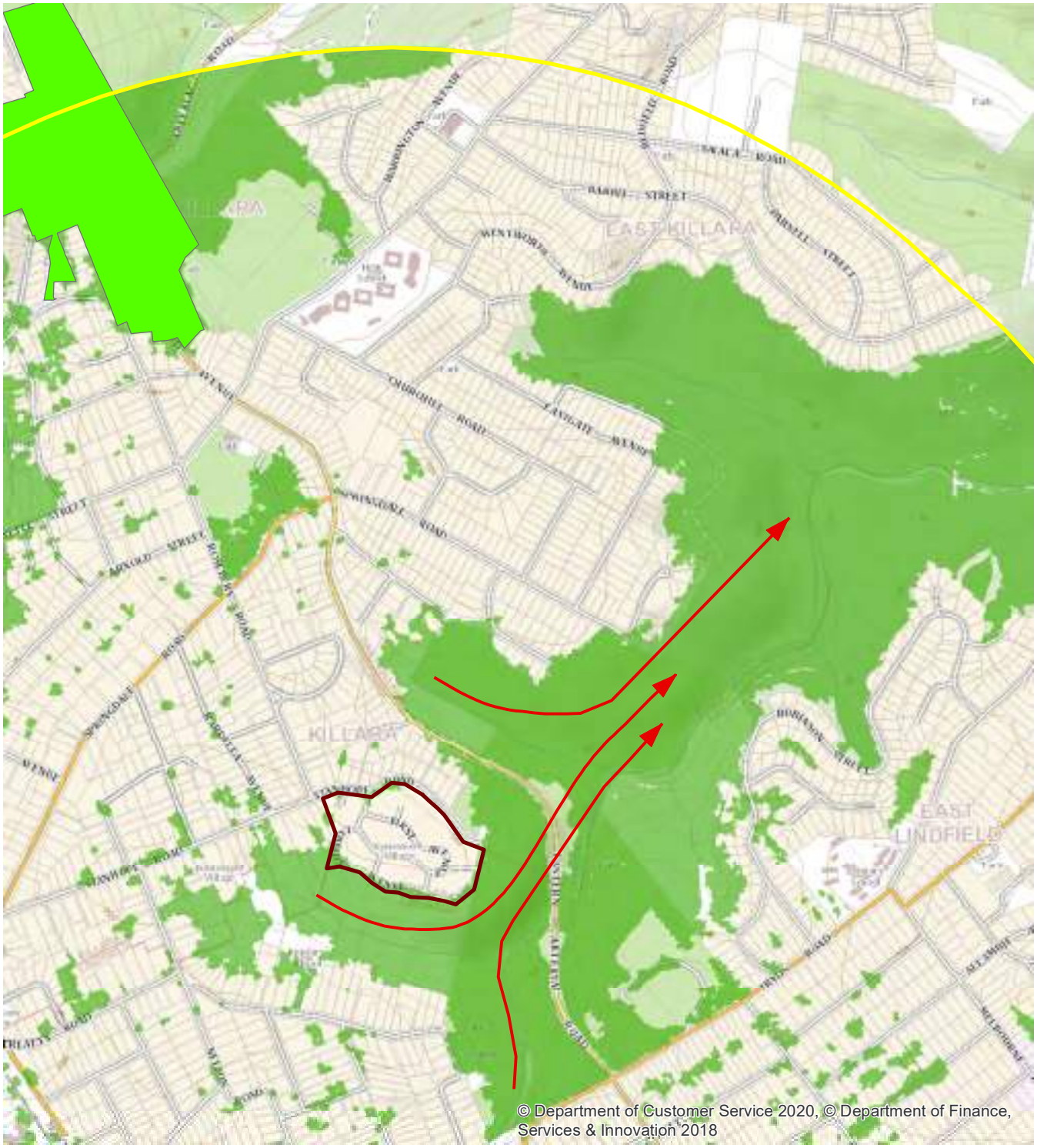
Figure 2-3. Native vegetation cover

Coordinate System: MGA Zone 56 (GDA 2020)

Image source: Nearmap 16 March 2023

Data source: SVTM (DPE 2022)
SydneyMetroArea_v3_2016_E_4489

Data drawn: 20 April 2023



Legend

- BDAR_assessment_area
- Subject_site
- Regional Corridor
- Connectivity

N

0 200 400 800

m

Lourdes Retirement Village

Figure 2-4. Connectivity

Coordinate System: MGA Zone 56 (GDA 2020)

Data drawn: 20 April 2023

3. Native Vegetation

3.1 Assessment background

Vegetation cover within the subject land extends over approximately 3.0 ha, which is dominated by planted tree species overlying mown grass or in garden beds.

Unless eligible to be assessed in accordance with Appendix D of the BAM (refer Section 3.2) all planted native vegetation must be allocated to the most likely plant community type (PCT).

Identification of plant community types (PCTs) within the subject land was undertaken with reference to the following resources:

- Native vegetation mapping (Section 3.1.1);
- Arboricultural assessment (Section 3.1.2);
- Historical imagery (Section 3.1.3);
- Site survey/floristic data collection (Section 3.3); and
- The BioNet Vegetation Classification database (Section 3.3)

3.1.1 Vegetation mapping

State Vegetation Type Mapping (DPE 2022) indicates the subject as 'not native vegetation' with PCTs immediately adjacent to the site mapped as:

- Sydney Coastal Enriched Sandstone Forest (PCT 3592)
- Sydney Coastal Sandstone Gully Forest (PCT 3595)
- Blue Gum High Forest (PCT 3136)

OEH's SydneyMetroArea_v3_2016_E_4489 mapping similarly indicates the subject land to be dominated by "Urban Exotic/Native" vegetation, however it also has mapped small patches of Sydney Turpentine Ironbark Forest (PCT 3262) and one small patch of Sydney Coastal Shale-Sandstone Forest (PCT 3259).

With the exception of PCT 3262 none of the above PCTs were ground truthed during these mapping projects. The location of PCT 3262 coincides with where specimens of *Syncarpia glomulifera* (turpentine) occur (see Figure 3-1).

3.1.2 Arboricultural assessment

Naturally Trees (2023) assessed just over 390 individual tree specimens from seventy-two (72) different species, which comprise:

- 15 local native species
- 12 local native species not expected to occur at the site (i.e., habitat for the species absent);
- 15 non-local native species; and
- 30 exotic species.

Table 3-1 lists all native species identified, whether they are local or non-local species and their habitat requirements. Distribution and habitat requirements have been sourced from the Flora of New South Wales (PlantNET).

Table 3-1. Subject land vegetation

Botanical name	Scientific name	Habitat or distribution
Local native		
Acacia implexa	Hickory wattle	Widespread, grows in a variety of communities
Allocasuarina littoralis	Black Sheoak	Understorey species in open forest, generally on moderate-nutrient soils and drier moisture situations
Allocasuarina torulosa	Forest oak	Understorey species in open forest to tall open forest, generally on higher-nutrient soils and moister situations
Angophora costata	Smooth-barked apple	Locally abundant, on deep sandy soils or sandy soils on sandstone; often coastal
Banksia integrifolia	Coastal banksia	Widespread, chiefly from coastal sites to the ranges on a broad range of habitats
Banksia serrata	Old-man banksia	Usually in dry sclerophyll forest or woodland on sandstone or consolidated sand dunes
Corymbia gummifera	Red bloodwood	Abundant, in dry sclerophyll forest or woodland on low fertility sand or sandstone
Corymbia maculata	Spotted gum	Community dominant, in open forest on somewhat infertile and drier sites on shales and slates
Elaeocarpus reticulatus	Blueberry ash	Mostly in gullies or along watercourses, often in tall eucalypt forest or in or near rainforest
Eucalyptus haemastoma	Scribbly gum	Locally frequent, in dry sclerophyll woodland on shallow infertile sandy soil on sandstone
Eucalyptus paniculata	Grey ironbark	Dry sclerophyllous woodland, locally found on shale capped ridges and plateaus, on heavy shale derived soil
Eucalyptus pilularis	Blackbutt	Widespread and often dominant, in wet sclerophyll or grassy coastal forest on lighter soils of medium fertility
Eucalyptus piperita	Sydney peppermint	Locally frequent, in dry sclerophyll forest or woodland on moderately fertile often alluvial sandy soil
Melaleuca armillaris	Bracelet honey-myrtle	Widespread in heath communities, often on headlands or coastal ranges
Pittosporum undulatum	Sweet pittosporum	Rainforest and wet sclerophyll forest and sheltered situations in dry sclerophyll forest or woodland
Syncarpia glomulifera	Turpentine	Often grows as an emergent near the margins of rainforest or in wet sclerophyll forest, often on heavier soils
Local native - habitat absent		
Acacia elata		Rainforest and wet sclerophyll forest
Angophora floribunda	Rough-barked apple	Widely scattered and locally abundant, usually on deep alluvial sandy soils
Casuarina cunninghamiana	River oak	Occurs along permanent freshwater streams
Eucalyptus botryoides	Bangalay, southern mahogany	Locally abundant, in dry sclerophyll forest or woodland on alluvial flats or old beach dunes
Eucalyptus robusta	Swamp mahogany	Locally abundant in heath on low swampy sites on sandy soils
Eucalyptus saligna	Sydney bluegum	Widespread and abundant, in wet forest on soils of moderate fertility
Melaleuca linariifolia	Flax-leaved paperbark	Heath and dry sclerophyll forest in moist or swampy ground
Melaleuca quinquenervia	Broad leaved paperbark	Widespread in coastal swamps and around lake margins
Melaleuca styphelioides	Prickly leaved	Grows in moist situations, often along stream banks

Botanical name	Scientific name	Habitat or distribution
	paperbark	
Melia azedarach	White cedar	Grows in subtropical and dry rainforest, mostly on margins
Syzygium paniculatum	Magenta lilly pilly	Subtropical and littoral rainforest on sandy soils or stabilized dunes, often near the sea
Tristaniopsis laurina	Water gum	Rainforest and sclerophyll forest usually along banks of streams
Non-local native or local cultivar		
Acacia baileyana	Cootamundra wattle	Endemic to the Temora-Cootamundra district; widely cultivated
Araucaria heterophylla	Norfolk Island pine	Endemic on Norfolk Island, widely cultivated
Archontophoenix alexandrae	Alexandra palm	Native range of this species is north-east and central-east Queensland, widely cultivated
Callistemon viminalis	Weeping bottlebrush	Occurs north from the Gloucester area. Widely cultivated species
Corymbia citriodora	Lemon-scented gum	A tall tree from temperate and tropical eastern Australia
Cyathea cooperi	Straw/scaly/lacy treefern	Occurs in gullies in warm coastal rainforest; north from Durras Mtn
Eucalyptus cladocalyx (?)	Sugar gum	Endemic to South Australian native species
Eucalyptus microcorys	Tallowood	North from about the Gosford area, to Hervey Bay in Qld and including Fraser Island.
Eucalyptus scoparia	Wallangarra white gum	Known from only three locations near Tenterfield, including Bald Rock National Park.
Ficus benjamina	Weeping fig	One of the most cultivated in the world, found in Northern Qld and NT
Grevillea robusta	Silky oak	Grows on the coast and inland ranges north of Coffs Harbour district. Widely cultivated species
Grevillea spinosa	Tjiilka-tjiilka	Endemic to inland Western Australia
Leptospermum petersonii	Lemon-scented teatree	North from Port Macquarie. Naturalised in NSW, cultivated for landscaping
Lophostemon confertus	Brushbox	North from the Hunter Valley; sparingly naturalised around Sydney, commonly planted as a street tree
Macadamia sp.		Macadamia genus is indigenous to Australia, native to northeastern NSW and central and southeastern Qld

3.1.3 Historical imagery

Historical imagery from 1943 to current day provides insight into land-use changes over time. This method of assessment is particularly useful when an area of interest (such as the subject land) contains numerous non-local native and exotic planted species.

Historical imagery suggests that parts of the north western, western, north and north eastern site portions have the potential to retain remnant native vegetation. These areas are denoted in blue on the 1985 imagery in Table 3-2.

However, the presence (and abundance) of non-local trees within these areas suggests that vegetation evident in 1943 is a combination of regrowth and planting that occurred following clearing in the 1910s. This is particularly the case along the north and north eastern boundary of the site where there is an abundance of mature native species that are either not local to the area or occur outside of their natural habitat. Nothwithstanding, vegetation that was present in 1943 has been adopted as remnant for this assessment.

Table 3-2. Historical imagery

	
1943: pre-existing development with central-north site portion and land to north of subject land cleared	**1960:** pre-existing development with regrowth from surround ing bushland evident

	
1977: pre-existing development regrowth evident as denser bushland	**1982:** development of existing retirement village underway with central and eastern site portion vegetation clearance evident

1985: current day development evident with southern site portion vegetation clearance completed, areas denoted delineated in blue show vegetation located within the subject land's boundary that existed pre-development. It should be noted that vegetation evident along the eastern and southern boundaries is largely canopy cover from vegetation that does not occur on the subject land or will not be impacted by the proposal.

3.2 Planted native vegetation

3.2.1 D.1 Decision-making key

The Planted Native Vegetation Module includes a decision-making key to identify whether a streamlined assessment can be applied to part or all of the subject land.

The first 3 questions of the decision-making key are used to evaluate if the proposed impacts to the vegetation require assessment under the standard BAM. A 'yes' to any of these questions requires the vegetation to be assigned to a plant community type (PCT) and assessed using the standard BAM.

If all responses are 'no', the remainder of the questions apply, with Questions 4–6 used to evaluate the reasons for application of D.2. Under D.2, the planted native vegetation is assessed for threatened species habitat only and biodiversity credits are not calculated.

Table 3-2 outlines how the decision-making key has been applied and photographic plates 1 to 12 show various areas of planted native vegetation.

Table 3-3. D1 Decision-making key

Key	Decision
1. Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?	Most of the subject land's planted native vegetation does not occur within a mosaic of planted and remnant native vegetation and cannot be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal.
i. Yes .... The planted native vegetation must be allocated to the best fit PCT and the BAM must be applied.	0.58 ha of planted native vegetation has been allocated to PCT 3592 - Sydney Coastal Enriched Sandstone Forest (refer to (Section 3.3).
ii. No..... Go to 2.	1.3 ha of planted native trees and landscaping is further assessed herein.
2. Is the planted native vegetation:	
a. planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and	No
b. the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat?	No
i. Yes .... The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM.	Not applicable
ii. No..... Go to 3.	
3. Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following:	
a. a species recovery project	No
b. *Saving our Species* project	No
c. other types of government funded restoration project	No

Key	Decision
d. condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat	No
e. legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g., Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act)	No
f. ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or	No
g. approved vegetation management plan (e.g., as required as part of a Controlled Activity Approval for works on waterfront land under the NSW *Water Management Act 2000*)?	No
i. Yes .... The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM.	Not applicable
ii. No..... Go to 4.	
4. Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation?	No
i. Yes..... Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied).	Not applicable
ii. No..... Go to 5.	
5. Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or tea-tree farms?	Yes
i. Yes .... Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied).	

Photo plate 1: *Pittosporum undulatum, Allocasuarina torulosa* and exotics planted in garden bed

Photo plate 2: *Leptospermum petersonsii* (non-local native) specimens planted with exotic understorey in roadside garden bed

Photo plate 3: *Araucaria heterophylla* and Grevillea robusta (non-local natives) and *Angophora costata* (local native) with exotic understorey in roadside garden bed

Photo plate 4: *Lophostemon confertus* and *Eucalyptus scoparia* (non-local natives) and *Corymbia gummifera* (local native) with exotic understorey in garden bed

Photo plate 5: *Melaleuca quinquenervia* and *Casuarina cunninghamiana* (local natives – natural habitat absent) planted in rain garden

Photo plate 6: drainage pit and mixture of native and introduced groundlayer species in rain garden

Photo plate 7: *Banksia serrata* (local native) plantings in residential garden beds (on left) and road side garden bed (on right)

Photo plate 8: Example of residential area with planted local natives (Angophora floribunda in background) and non-local natives (Callistemon viminalis) in foreground

Photo plate 9: planted *Melaleuca quinquenervia, Araucaria heterophylla* and *Phoenix canariensis* either side of entrance road

Photo plate 10: stand of the non-local native *Eucalyptus microcorys* planted along northern boundary of subject land

Photo plate 11: *Acacia baileyana* (non-local native), native groundcovers planted along Stanhope Road. Semi-mature Casuarina cunninghamiana specimens in background on left (local native - habitat absent)

Photo plate 12: non-local native *Eucalyptus microcorys* planted along Stanhope Road – managed canopy and lower electricity easement. Note: upward canopy growth stunted and instead extending north over road.

3.2.1 D.2 Assessment of planted native vegetation for threatened species habitat

An assessment of the potential for the planted native vegetation to provide habitat for threatened species is required. If there is evidence that threatened species are using the planted native vegetation as habitat, the assessor must apply Section 8.4 of the BAM to mitigate and manage impacts on these species. Species credits are not required to offset the proposed impacts.

Records of threatened species from a 10km radius of the subject land (the locality) were generated from the NSW Bionet threatened species database[1].

The subject land's planted native vegetation was found to not provide habitat for any threatened species recorded from the locality, due to the following:

- A lack of habitat features that would support threatened species, such as remnant hollow bearing trees, bush rock, large woody debris, and watercourses/drainage lines.
- Site surveys of the subject land did not find any incidental sightings or evidence of threatened species (e.g., scats, stick nests, diggings, burrows, scratches/runways on trees, faecal matter).
- Man-made structures within the subject land were also inspected for evidence of any potential use by threatened birds and microbat species and none detected.

An assessment of threatened species habitat requirements is provided in Section 4.2.

3.3 Plant community types

Identification of plant community types (PCTs) within the subject land was confirmed during site surveys with reference to the BioNet Vegetation Classification database and data collected from floristic and site integrity plot/transects in accordance with Section 2 of the BAM.

Data collected from four BAM floristic plots (see Figure 3-1) when analysed by the PCT Analysis Program (DPE 2023) indicated that the closest or best fit PCT Sydney Coastal Enriched Sandstone Forest (PCT 3592). This analysis is consistent with the latest version of mapping by DPE (2022) in Figure 3-1.

PCT 3592 was found to contain more diagnostically positive species than other mapped PCTs mapped (refer Section 3.1.1), which include:

- Sydney Turpentine Ironbark Forest (PCT 3262);
- Sydney Coastal Sandstone Gully Forest (PCT 3595);
- Blue Gum High Forest (PCT 3136); and
- Sydney Coastal Shale-Sandstone Forest (PCT 3259).

[1] In addition to the list of candidate threatened species generated by the BAM calculator for the PCTs assessed under the BAM in this assessment.

3.3.1 Sydney Coastal Enriched Sandstone Forest (PCT 3592)

PCT 3592 is a tall to very tall shrubby sclerophyll open forest found on slightly enriched Hawkesbury sandstone soils on sheltered slopes and occasionally crests on the Sydney coastal sandstone plateaus. The tree canopy very frequently includes a high cover of *Angophora costata* commonly in combination with *Corymbia gummifera* and *Eucalyptus piperita,* with *Eucalyptus pilularis* occasionally locally abundant. A taller mid-stratum is characterised by very frequent however sparse cover of *Pittosporum undulatum* and *Allocasuarina littoralis* or *Allocasuarina torulosa*. A mid-dense lower shrub layer is comprised of dry sclerophyll species that commonly include *Leptospermum trinervium, Persoonia levis, Lomatia silaifolia, Acacia ulicifolia and Dodonaea triquetra*, with *Banksia serrata* and *Banksia spinulosa* recorded occasionally. The ground layer is typically a sparse cover of graminoids that almost always includes *Dianella caerulea* and *Lomandra longifolia* with the grass *Entolasia stricta* and fern *Pteridium esculentum*, with frequent occurrences of climbers such as *Smilax australis.*

This PCT is primarily distributed at elevations of less than 200 metres asl downslope of shale soils on the north shore of Sydney and Sutherland and on the Narrabeen sandstone escarpment along the Pittwater Peninsular. It grades into a heathy forest Sydney Coastal Sandstone Gully Forest (PCT 3595) on rocky Hawkesbury sandstone gullies or moist shrub and fern forests with increased shelter in deeper gullies.

Location of sampled BAM plots at the subject site:

Some planted native vegetation growing within a mosaic of planted and remnant native vegetation could reasonably be assigned to PCT 3592 which is known to occur in the same IBRA subregion as the proposal.

Data was collected from four floristic and three site integrity plots and transects. To collect BAM data compliantly, plots and transects were variously shaped to avoid areas of hardstand as far as practical.

The location and approximate shape of plots is shown in Figure 3-1 and BAM data is provided in Appendix A.

Table 3-5 provides a summary of the selection process for the allocation of PCT 3592.

Table 3-4. Selection process for PCT 3592

Criteria	Description
IBRA Region/ Subregion	Sydney Basin / Cumberland Plain
Mitchell Landscape	Pennant Hills Ridges and Belrose Coastal Slopes
Keith Formation and Class	Sydney Coastal Dry Sclerophyll Forests / Dry Sclerophyll Forests (Shrubby sub-formation)
Confirmed in vegetation mapping	OEH (2013) and DPE (2022) confirm PCT 3592 occurring at this locality
Percent cleared values	60.82
Native species present (% frequency)	Canopy species: *Angophora costata (79%), Corymbia gummifera (69%), Elaeocarpus reticulatus (64%), Eucalyptus pilularis (45%), Corymbia maculata, Eucalyptus piperata (48%), Syncarpia glomulifera (39%)* Midstrata species: *Pittosporum undulatum (77%), Allocasuarina littoralis (69%), Banksia spinulosa (44%), Banksia serrata (41%), Acacia longifolia (40%), Allocasuarina torulosa (23%), Banksia integrifolia (15%), Acacia parramattensis (11%),*

Criteria	Description
	Groundlayer species: *Lomandra longifolia (96%), Dianella caerulea (96%), Pteridium esculentum (87%), Microlaena stipoides (61%), Imperata cylindrica (39%), Oplismenus aemulus (14%), Dichondra repens (7%), Centella asiatica (6%)*
TEC	Not applicable

Photographic plates 13 to 22 illustrate PCT 3592 within and adjacent to the subject land.

Photo plate 13: Remnant PCT 3592 on southern boundary of subject land (will not be disturbed)

Photo plate 14: Remnant PCT 3592 on southern boundary of subject land (will not be disturbed)

Photo plate 15: Plot 1 - Indicating individuals of *S.glomulifera*, *Allocasuarina torulosa* and Eucalyptus robusta overlying managed lawn

Photo plate 16: Plot 1 - showing two individuals of *S.glomulifera* and *P. undulatum* in a remnant/planted assemblage within managed curtilage

Photo plate 17: Plot 2 - Indicating individuals of *Eucalyptus piluaris* in planted assemblage within managed curtilage

Photo plate 18: Plot 2 - Indicating individuals of *Banksia integrifolia* and *Angophora costata* in planted assemblage within managed curtilage

Photo plate 19: rain garden included in Plot 2, containing *E.pilularis, Corymbia maculata, M.quinqenervia, Lomandra longifolia*

Photo plate 20: adjacent PCT 3592 – southeast corner of site

Photo plate 21: Plot 3 - Indicating individuals of *Banksia serrata* in a planted assemblage within managed curtilage

Photo plate 22: Plot 3 - Indicating planted individuals of *B. serrata* and *B. spinulosa* in planted assemblage

3.4 Threatened ecological communities

A small area of Sydney Turpentine Ironbark Forest (PCT 3262) had previously been mapped for a patch of vegetation at the north-western corner of the subject land but this patch is not present on more recent, updated versions of the mapping (Figure 3-1).

Even though the number of locally occurring native species at each plot was very low, the number of diagnostic species found in plots and across the subject land (including observations of remnant vegetation along the southern boundary) indicate the presence of PCT 3592 rather than PCT 3262.

PCT 3262 is not associated with any threatened ecological communities.

Ground-truthing stands of natural vegetation in nearby Soldiers Memorial Park confirms that the vegetation that originally occurred at the subject site would have included intergrades of Coastal Enriched Dry Forest and Hornsby Enriched Sandstone Exposed Woodland nearer the crests and upper slopes of the landforms with Coastal Sandstone Gully Forest occurring on steeper slopes and gullies in the vicinity.

Photographic plates 23 to 26 show the location of OEH (2016) mapping of PCT 3262.

Photo plate 23: *S.glomulifera* located in car park garden amongst exotic plantings

Photo plate 24: *S.glomulifera* located in car park garden amongst exotic plantings viewed from Stanhope Road

Photo plate 25: area in northwestern corner of site where PCT 3262 was mapped – contains the non-local native *C. viminalis, Melaleuca linariifolia* (local native -habitat absent) and *C. gummifera (*local native) overlying lawn.

Photo plate 26: *S.glomulifera* located in plot 1 along northwestern boundary

3.5 Patch size

Patch size is an area of native vegetation that occurs on the development site and has a gap of less than 100m from the next area of native vegetation (including planted landscaped native vegetation) that may occur on adjoining land that is not part of the development site (Figure 2-4) (BAM 2020).

Figure 3-2 indicates that the patch size associated with the subject development site is 118 ha (>100ha).

Subject land vegetation

- Landscaping
- PCT 3592
- BAM_plots

SVTM mapping

- Blue Gum High Forest (PCT 3136)
- Sydney Coastal Sandstone Gully Forest (PCT 3595)
- Sydney Coastal Enriched Sandstone Forest (PCT 3592)

Sydney Metro mapping

- Sydney Turpentine Ironbark Forest (PCT 3262)
- Sydney Coastal Shale-Sandstone Forest (PCT 3259)
- Syncarpia glomulifera

N

0 25 50 100

m

Lourdes Retirement Village

Figure 3-1. Subject land vegetation

Coordinate System: MGA Zone 56 (GDA 2020)
Image source: Nearmap 16 March 2023
Data sources: SydneyMetroArea_4489 (2016); SVTM_NSW_Extant_PCT (2022)
Data drawn: 1 May 2023

Lourdes Retirement Village

Figure 3-2. Patch size

Legend

- Subject_site
- Patch_size

N

0 140 280 560

m

Coordinate System: MGA Zone 56 (GDA 2020)

Image source: Nearmap 16 March 2023

Data source: SydneyMetroArea_v3_2016_E_4489

Data drawn: 28 April 2023

4. Threatened Species

4.1 Assessing habitat suitability for threatened species

The Threatened Biodiversity Data Collection (TBDC) identifies the threatened species that are likely to occur on or use the subject land and thereby predicts the species that may require assessment. This is automatically populated in the BAM-C based on the information collected from assessing the subject land.

Threatened species are categorised in the BAM-C as ecosystem, candidate species, or dual, credit species.

4.1.1 Ecosystem credit species

Ecosystem credit species are those threatened species where the likelihood of occurrence of a species or elements of the species' habitat can be predicted by vegetation surrogates and landscape features, or for which targeted survey has a low probability of detection.

The TBDC identifies the threatened species assessed for ecosystem credits. A targeted survey is not required to identify or confirm the presence of ecosystem credit species.

4.1.2 Species credit species

Species credit species are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. These species are identified in the TBDC. A targeted survey or an expert report is required to confirm the presence of these species on the subject land. Alternatively, for a development, activity, clearing or biodiversity certification proposal only, the proponent may elect to assume the species is present.

4.1.3 Dual credit species

Dual credit species are threatened species that the TBDC identifies as both ecosystem credits and species credit species. Dual credit species are generally highly mobile species that rely on particular habitat components for breeding or require particular areas in the landscape important for their survival. For dual credit species, part of the habitat is assessed as a species credit. The remaining habitat components for the species are assessed as an ecosystem credit (e.g., foraging habitat).

4.2 Identify candidate species for further assessment

4.2.1 Ecosystem credit species

Table 4-1 provides a list of the ecosystem credit species derived from the BAM-C and identifies the ecosystem credit type, i.e., ecosystem (foraging) indicates the species is a dual species and also considered in Section 4.2.2.

Table 4-2 lists ecosystem credit species that have not been maintained in the BAM-C and their habitat requirements, which are absent from the subject land.

Table 4-1. Ecosystem credit species maintained in the BAM-C

Species Name	Common name	Credit type
Aves		
Anthochaera phrygia	Regent honeyeater	Ecosystem (foraging)
Artamus cyanopterus cyanopterus	Dusky woodswallow	Ecosystem
Callocephalon fimbriatum	Gang-gang cockatoo	Ecosystem (foraging)
Calyptorhnchus lathami	Glossy black cockatoo	Ecosystem (foraging)
Chthonicola sagittata	Speckled warbler	Ecosystem
Climacteris picumnus victoriae	Brown treecreeper	Ecosystem
Daphoenositta chrysoptera	Varied sitella	Ecosystem
Glossopsitta pusilla	Little lorikeet	Ecosystem
Hieraaetus morphnoides	Little eagle	Ecosystem (foraging)
Hirundapus caudacutus	White-throated needletail	Ecosystem
Lathamus discolor	Swift parrot	Ecosystem (foraging)
Lophoictinia isura	Square-tailed kite	Ecosystem (foraging)
Melanodryas cucullata cucullata	Hooded robin	Ecosystem
Melithreptus gularis gularis	Black-chinned honeyeater	Ecosystem
Neophema pulchella	Turquoise parrot	Ecosystem
Ninox connivens	Barking owl	Ecosystem (foraging)
Ninox strenua	Powerful owl	Ecosystem (foraging)
Petroica boodang	Scarlet robin	Ecosystem
Petroica phoenicea	Flame robin	Ecosystem
Pandion cristatus	Eastern osprey	Ecosystem
Tyto novaehollandiae	Masked owl	Ecosystem (foraging)
Bats		
Miniopterus australis	Little bent-winged bat	Ecosystem (foraging)
Miniopterus orianae oceanensis	Large bent-winged bat	Ecosystem (foraging)
Saccolaimus flaviventris	Yellow-bellied sheathtail bat	Ecosystem
Scoteanax rueppellii		Ecosystem
Pteropus poliocephalus	Grey-headed flying-fox	Ecosystem (foraging)
Marsupials		
Dasyurus maculatus	Spotted-tailed quoll	Ecosystem
Reptiles		
Varanus rosenbergi	Rosenberg's goanna	Ecosystem

Table 4-2. Ecosystem credit species not maintained in the BAM-C

Species Name	Common name	Habitat requirements
Botaurus poiciloptilus	Black bittern	Requires freshwater wetland habitat with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleocharis spp.).
Ephippiorhynchus asiaticus	Black-necked stork	Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the

Species Name	Common name	Habitat requirements
		Black-necked Stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries.
Grantiella picta	Painted honeyeater	Inhabits Boree/ Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias.
Haliaeetus leucogaster	White-bellied sea eagle	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion.

4.1.2 Species Credit Species

Species credit species are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat.

Table 4-2 provides a list of the species credit species derived from the BAM-C, and identifies the following:

- The PCTs in which each species is predicted to occur in;
- The species credit type, i.e., species (breeding) indicates the species is a dual species and also considered in Section 4.2.1;
- Whether they have been retained within the assessment (yes or no); and
- Justification for the species not retained within the assessment (i.e., following consideration of any habitat constraints, absence of habitat, geographic limitations, and habitat quality.

Table 4-3. Species credit species

Species name	Common name	Credit type	Retained	Justification in BAM C if not retained
Amphibians				
Heleioporus australiacus	Giant burrowing frog[2]	Species	No	**Habitat degraded:** i.e., within its broad distribution, this species will occupy various habitat types ranging from heaths, woodlands, dry sclerophyll and even moist forest types but not rainforest. Usually live along clear, small slowly flowing water courses which traverse plateaus and broad upland gullies. They also live adjacent to stream headwaters where they prefer permanently moist soaks and pondages. Many breeding sites have been found to be associated with shallow temporary ponds receiving seepage and the ponded sections of slow flowing creeks that drain ridges and plateaus. Have not been recorded breeding in waters that are even mildly polluted and are adversely affected by small pH changes. Burrows are excavated into the earth around, or associated with rocks fissures or boulders, probably to take advantage of water run-off from outcroppings. It has also been reported that yabbie holes are utilised along the beds and banks of drying creeks. Opportunistic use of the excavations of small mammals may also be made. Such habitat is absent from the subject land.
Litoria aurea	Green and golden bell frog	Species	No	**Habitat absent:** i.e., inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.). Optimum habitat includes waterbodies that are unshaded, free of predatory fish such as Plague Minnow (Gambusia holbrooki), have a grassy area nearby and diurnal sheltering sites available. Such habitat is absent from the subject land.
Pseudophryne australis	Red-crowned toadlet	Species	No	**Habitat degraded:** i.e., occur in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Red-crowned Toadlets have not been recorded breeding in waters that are even mildly polluted or with a pH outside the range 5.5 to 6.5. Such habitat is absent from the subject land.

[2] Bionet record, not generated from BAM C

Species name	Common name	Credit type	Retained	Justification in BAM C if not retained
Bats				
Chalinolobus dwyeri	Large-eared pied bat	Species	Yes	Not detected
Miniopterus australis	Little bent-winged bat	Species (breeding)	No	**Breeding habitat constraint:** i.e., only five nursery sites /maternity colonies are known in Australia Maintained as ecosystem credit species in BAM C.
Miniopterus orianae oceanensis	Large bent-winged bat	Species (breeding)	No	**Breeding habitat constraint:** i.e., maternity caves with specific temperature and humidity regimes. Maintained as ecosystem credit species in BAM C.
Myotis macropus	Southern myotis	Species	Yes	Not detected
Pteropus poliocephalus	Grey-headed flying fox	Species (breeding)	No	**Breeding habitat constraint:** i.e., subject land located about 2 km to the north-west of the Ku-ring-gai Flying-fox Reserve, which is a nationally significant roosting and maternity habitat for the species. This needs to be considered but the prospect of the species forming a maternity habitat at the populated area of the subject land is considered highly unlikely. Maintained as ecosystem credit species in BAM C.
Birds				
Anthochaera phrygia	Regent honeyeater	Species (breeding)	No	**Breeding habitat constraint:** i.e., subject land not within a mapped breeding area for the species (which is only known to breed at three locations). Maintained as ecosystem credit species in BAM C.
Burhinus grallarius	Bush stone curlew	Species	No	**Habitat absent:** i.e., inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber and nests on the ground in a scrape or small bare patch. Subject land lacks fallen timber and nesting habitat.
Callocephalon fimbriatum	Gang-gang cockatoo	Species (breeding)	No	**Breeding habitat constraint:** i.e., hollows that are 10 cm in diameter or larger and at least 9m above the ground in eucalypts. Maintained as ecosystem credit species in BAM C.
Calyptorhynchus lathami	Glossy black cockatoo	Species (breeding)	No	**Breeding habitat constraint:** i.e., dependent on large hollow-bearing eucalypts for nest sites Maintained as ecosystem credit species in BAM C.
Haliaeetus leucogaster	White-bellied sea eagle	Species (breeding)	No	**Breeding habitat constraint:** i.e., nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.

Species name	Common name	Credit type	Retained	Justification in BAM C if not retained
				No tall emergent trees or stick nests evident within the subject land.
Hieraaetus morphnoides	Little eagle	Species (breeding)	No	**Breeding habitat constraint:** i.e., nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. No tall emergent trees or stick nests evident within the subject land. Maintained as ecosystem credit species in BAM C.
Lathamus discolor	Swift parrot	Species (breeding)	No	**Breeding habitat constraint:** i.e., subject land is located adjacent BAM important area for the species. Subject land is not located on land mapped in BAM as an important area for the species (albeit immediately adjacent to mapped important area, however the proposal will not impact on this area) Maintained as ecosystem credit species in BAM C.
Lophoictinia isura	Square tailed kite	Species (breeding)	No	**Breeding habitat constraint:** i.e., nest sites generally located along or near watercourses, in a fork or on large horizontal limbs. Maintained as ecosystem credit species in BAM C.
Ninnox connivens	Barking owl	Species (breeding)	No	**Breeding habitat constraint:** i.e., hollows of large, old trees. Living eucalypts are preferred though dead trees are also used. Maintained as ecosystem credit species in BAM C.
Ninnox strenua	Powerful owl	Species (breeding)	No	**Breeding habitat constraint:** i.e., nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. Maintained as ecosystem credit species in BAM C.
Pandion cristatus	Eastern osprey	Species (breeding)	No	**Breeding habitat constraint:** i.e., nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea. Maintained as ecosystem credit species in BAM C.
Tyto novaehollandiae	Masked owl	Species (breeding)	No	**Breeding habitat constraint:** i.e., Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Maintained as ecosystem credit species in BAM C.
Invertebrates				
Pommerhelix duralensis	Dural land snail	Species	No	**Habitat degraded:** i.e., the species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris. The subject land is located within this interface region but has been substantially modified and good native cover and woody debris absent.

Species name	Common name	Credit type	Retained	Justification in BAM C if not retained
Marsupials				
Cercartetus nanus	Eastern pygmy possum	Species	No	**Habitat degraded:** i.e., found in a broad range of habitats, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities. Feed largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes; an important pollinator of heathland plants such as banksias; soft fruits are eaten when flowers are unavailable. Also feeds on insects throughout the year; this feed source may be more important in habitats where flowers are less abundant such as wet forests. Shelter in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (Pseudocheirus peregrinus) dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Such habitat is either absent or highly degraded due to the managed curtilage within the subject land.
Petaurus norfolcensis	Squirrel glider	Species	No	**Habitat degraded:** i.e., inhabits mature or old growth Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Require abundant tree hollows for refuge and nest sites, which are absent from the subject land.
Phascolarctos cinereus	Koala	Species	No	**Habitat degraded:** i.e., the subject land is a highly modified environment which comprises noise, light and traffic disturbance that the species would avoid. Records of the species are located within bushland >5kms and fragmented from the subject land by major roads, including the arterial Eastern Valley Way.
Flora				
Acacia prominens - endangered population	Gosford wattle, Hurstville and Kogarah LGAs	Species	Yes	Species not found – subject land not in LGAs where known populations occur
Acacia pubescens	Downy wattle	Species	Yes	Species not found
Callistemon linearifolius	Netted bottlebrush	Species	Yes	Species not found
Darwinia biflora		Species	Yes	Species not found

Species name	Common name	Credit type	Retained	Justification in BAM C if not retained
Deyeuxia appressa		Species	No	Given that *D. appressa* hasn't been seen in over 60 years, almost nothing is known of the species' habitat and ecology except that the species flowers in spring to summer and is mesophytic (grows in moist conditions). The species is an erect perennial grass to 0.9 m high. Natural moist habitat is lacking from the subject land and rain gardens are only temporarily wet and lack tall native grasses.
Dillwynia tenuifolia		Species	Yes	Species not found
Epacris purpurascens var. *purpurascens*		Species	Yes	Species not found
Eucalyptus camfieldii	Camfield's stringybark	Species	Yes	Species not found
Genoplesium baueri	Bauer's midge orchid	Species	No	**Habitat degraded:** i.e., the species grows in dry sclerophyll forest and moss gardens over sandstone. The subject land's original landform has been substantially modified such that the species is unlikely to have subsisted in managed garden beds, rain gardens and turfed areas.
Grevillea parviflora subsp. *parviflora*		Species	Yes	Species not found
Haloragodendron lucasii		Species	No	**Habitat absent:** i.e., the species is reported to grow in moist sandy loam soils in sheltered aspects, and on gentle slopes below cliff-lines near creeks in low open woodland. Such habitat is absent from the subject land.
Hibbertia puberula		Species	Yes	Species not found
Hibbertia spanatha		Species	Yes	Species not found
Hibbertia superans		Species	Yes	Species not found
Lasiopetalum joyceae		Species	Yes	Species not found
Leucopogon fletcheri subsp. *fletcheri*		Species	No	**Geographic limitation:** i.e., restricted to north-western Sydney between St Albans in the north and Annangrove in the south, within the local government areas of Hawkesbury, Baulkham Hills and Blue Mountains.
Melaleuca deanei	Deane's paperbark	Species	Yes	Species not found
Persoonia hirsuta		Species	Yes	Species not found
Persoonia mollis subsp. *maxima*		Species	Yes	Species not found

Species name	Common name	Credit type	Retained	Justification in BAM C if not retained
Pimelea curviflora var. *curviflora*		Species	Yes	Species not found
Pomaderris brunnea	Brown pomaderris	Species	Yes	Species not found
Pomaderris prunifolia – endangered population		Species	No	**Geographic limitation:** i.e., subject land is not located in the Parramatta, Auburn, Strathfield and Bankstown LGAs.
Rhizanthella slateri	Eastern Australian underground orchid	Species	No	**Habitat degraded:** the species' habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore, usually located only when the soil is disturbed. The subject land's original landform has been substantially modified such that the species is unlikely to have subsisted in managed garden beds, rain gardens and turfed areas.
Tetratheca glandulosa		Species	Yes	Species not found
Wahlenbergia multicaulis – endangered population		Species	No	**Geographic limitation:** i.e., subject land is not located in the Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield LGAs.

4.3 Targeted field surveys

4.3.1 Threatened flora species

Eight threatened flora species were not discounted from having a marginal potential to occur within the subject land. Table 4-4 identifies details of the surveys conducted and Table 4-5 identifies the species surveyed. Figure 4-1 illustrates the general areas in which surveys were undertaken in all vegetation identified as PCT 3592.

Table 4-4. Survey details

Date	Precinct	Weather conditions	Survey technique(s)
27/10/2022	All areas where tree removal is proposed	Fine conditions, no rainfall, slight wind. 9am Temp: 17.7^0; Wind ENE 11km/hr 3pm Temp. 18.2^0; Wind NE 15km/hr No Rainfall	Areas of landscaped and remnant native vegetation occurring either in natural areas or in garden beds or any other areas where threatened species may have established were searched in targeted surveys for all 8 threatened flora species listed in Table 4-4.
23/03/2023	North-eastern section of woodland/forest along Stanhope Road	Fine conditions, no rainfall, slight wind. 9am Temp: 19.9^0; Wind WNW 6km/hr 3pm Temp. 25.5^0; Wind SSW 13km/hr No Rainfall	

Table 4-5. Targeted threatened flora species

Species name	Survey requirements	Biodiversity Risk Weighting
Flora		
Acacia prominens	All year round	High
Acacia pubescens	All year round	High
Callistemon linearifolius	October-January	Moderate
Darwinia biflora	All year round	High
Dillwynia tenuifolia	August-October	High
Epacris purpurascens var. purpurascens	September-October	High
Eucalyptus camfieldii	All year round	High
Grevillea parviflora subsp. *parviflora*	August-November	High
Hibbertia puberula	October-December	High
Hibbertia spanantha	October-November	High
Lasiopetalum joyceae	September- November	Moderate
Melaleuca deanei	All year round	Very High
Persoonia hirsuta	All year round	High
Persoonia mollis subsp. *maxima*	All year round	High
Pimelea curviflora var. *curviflora*	October-March	High

Species name	Survey requirements	Biodiversity Risk Weighting
Pomaderris brunnea	August-October	High
Tetratheca glandulosa	August-November	High
Zieria involucrata	All year round	High

No threatened flora species were found during surveys conducted on 27/10/2022 and 23/03/2023.

An additional site inspection conducted on 10/04/2023 also did not detect any native species of conservation significance (see Figure 4-1).

4.3.2 Threatened fauna species

Fauna surveys conducted within the subject land included the following:

Table 4-6. Threatened fauna species surveyed

Fauna group	Date	Survey technique(s)	Survey effort
Diurnal birds	27/10/2022 23/03/2023 10/04/2023	20-minute dedicated surveys were conducted within each of 6 native vegetation patches including those sampled floristically and along Stanhope Road and in central locations of the subject land	360 min
Bats	21/11/2022 - 24/11/2022	A dedicated mirochiropteran survey (4 evening sampling surveys) was undertaken from 21/11/2022 - 24/11/2022 to record the presence of microbats across the subject area. **Methodology:** Two SongMeter Minibat ultrasonic recorders were set at 95 Stanhope Rd, Killara for four consecutive nights during fair, warm temperature conditions. Afternoon temperatures varied from 25.9^0 - 26.3^0, with wind speeds varying from 17kmh (South on Wednesday 23rd) to 33kmh (West on Monday 21st). The detectors were placed at the northeast (NE) and southwest (SW) corners of the subject land within areas of open vegetation as indicated in Figure 4-1.	8 nights

Bird survey results

No threatened bird species were detected, with commonly found species evident.

Bat survey results

Surveys were completed compliantly for the large eared pied bat and southern myotis (i.e., November to January and October to March respectively). The large bent-winged bat and little bent-winged bat should be surveyed in December to February to be compliant with the BAM.

Survey results from bat surveys are provided in Table 4-7.

Table 4-7. Results of bat surveys (A. Rowles 2022)

Species	Common name	Identification Confidence (no. of passes of individuals)	
		Detector 1 (SW)	Detector 2 (NE)
Austronomus australis	White-striped freetailed bat	D (7)	D (6)
Chalinolobus gouldii	Gould's wattle bat	Pr (2)	D (9); Pr (9)
Miniopterus orianae oceanensis	Large bent-winged bat	D (1)	D (1); Pr (1)
Miniopterus australis	Little bent-winged bat		D (2)

Legend: D - definite identification | Pr - Probable identification (high likelihood)

SW – southwest | NE - northeast

Results indicate that over the survey period, microbat activity was very low, recording only four species of microchiropterans despite suitable weather conditions.

Two common species, the white-striped freetailed bat and Gould's wattle bat appear to be foraging at both sites with several passes at each location (Table 4-7). Some species, including the Gould's wattle bat, will travel several kilometres from roost sites to reach preferred foraging habitat (Lumsden, 2004).

Two threatened species were recorded, these being the large bent-winged bat and little bent-winged bat. However only a few passes of each were recorded and are considered to most likely be individuals passing through the subject land and not foraging (Rowles 2022).

Both these species have been maintained in the BAM C as ecosystem credit species but discounted as species credit species due to the absence of breeding habitat can be discounted due to the absence of maternity caves and known nursery sites.

Lourdes Retirement Village

Figure 4-1. Targeted surveys

Coordinate System: MGA Zone 56 (GDA 2020)

Image source: Nearmap 16 March 2023

Data drawn: 1 May 2023

5. Prescribed impacts

Prescribed additional biodiversity impacts (prescribed impacts) must be assessed as per clause 6.1 of the BC Reg. Prescribed impacts include those impacts on the habitat of threatened species or ecological communities from development that is not directly caused as a result of vegetation clearing.

Table 5-1 lists the prescribed impacts, which are identified in Clause 6.1 of the BC Reg and the relevance of each prescribed impact in relation to the proposal.

Table 5-1. Prescribed and Uncertain Impacts

Will there be impacts on any of the following	Yes/No	If Yes, address the assessment questions from section 9.2.1 of the BAM
a. Development on the habitat of threatened species or ecological communities associated with: ▪ karst, caves, crevices, cliffs, rock outcrops and other geological features of significance; ▪ human-made structures; ▪ non-native vegetation.	NO	▪ No karst, caves, crevices, cliffs and other features of geological significance occur on or near the subject land. ▪ Existing human-made structures do not provide habitat. ▪ Non-native vegetation within the subject land has been assessed as not providing habitat for any threatened species
b. On areas connecting threatened species habitat, such as movement corridors	NO	The subject land is not mapped within any connecting threatened species habitat movement corridors. As shown in Figure 2 4, the subject land is juxtaposed at the edge of extensive existing developed land and remnant bushland. The latter contained within the Garigal National Park, which extends to Middle Harbour and provides substantial connectivity. The proposal does not impact on the remnant bushland adjacent to the subject land and will not result in the isolation or fragmentation of native vegetation and/or connectivity.
c. That affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)	NO	The proposal will not result in impacts to water quality, water bodies and hydrological processes that sustain threatened entities. The subject land does not contain watercourses and stormwater runoff will be managed on-site prior to discharge to the existing stormwater network.
d. On threatened and protected animals from turbine strikes from a wind farm	NO	No wind turbines are proposed

Will there be impacts on any of the following	Yes/No	If Yes, address the assessment questions from section 9.2.1 of the BAM
e. On threatened species or fauna that are part of a TEC from vehicle strikes	NO	The proposal will not impact on any threatened or other fauna as a result of vehicle strikes, above that which potentially already exists The subject land does not provide habitat for any land dwelling threatened fauna species. Obligatory slow speeds 10km/hr and shared pedestrian /car roadways

6. Avoid and minimise impacts

6.1 Avoidance of direct impacts

In accordance with Section 7.1.2 of the BAM, the proposal is, as far as practical, located as follows:

- In areas that have no biodiversity values; and
- In vegetated areas that:
  - are in the poorest condition, and/or
  - do not contain habitat for threatened species.

The proposal has sought to avoid significant native vegetation where possible with 0.94ha of a total 1.5ha of PCT 3592 to be retained.

Up to 0.58 ha of PCT 3592 will be unavoidably impacted, which is largely made up of planted vegetation of non-local and exotic planting origins as follows:

Origin	**Area (m^2)**
Remnant native	894
Planted local native	237
Planted native/non-local native mixture	2,782
Planted native/exotic mixture	1,906
	5,819

The redevelopment of the Lourdes Village is necessary as the existing ageing buildings which were original constructed in 1983 are in need of renewal to provide modern seniors housing. The existing housing is dated and has limited accessibility with many of the dwellings not having lift access and the gradient of streets and pathways providing poor pedestrian connectivity.

The dwellings are accessed via a network of narrow internal paths and stairways making pedestrian movement across the site difficult, with some streets too steep to walk. The building stock is aging and does not provide services and facilities that are competitive with market demand nor compliant with current Building Codes or Bushfire standards. Accordingly, major renewal of the housing and infrastructure is required which has resulted in the development of the Planning Proposal and master plan.

For the most part, the master plan seeks to locate proposed buildings within the existing development footprint minimising impacts on significant vegetation. However, unavoidable direct impacts will occur being largely on peripheral native vegetated areas as a result of the proposal's access roads, the location of proposed building footprints and required curtilage to heritage buildings.

Proposed building footprints near the northern boundary and central to the site will impact on small areas of PCT 3592. The building footprints have been located with the view to minimising

vegetation impacts wherever possible. However, locations and building footprints have also been driven by the need to meet the requirements of the Apartment Design Guide for building separation and solar access and to provide generous communal space at the ground level as well as to achieve suitable building floorplates to accommodate modern seniors housing necessitating some impacts on PCT 3592.

The proposed changes to the internal road network seek to establish a separate access network for the private town house development to the south of the site and the seniors housing (independent living units and residential aged care) at the north of the site. This necessitates a new site access point to Stanhope Road at the west of the site and a new access road along the western boundary as well as a new site access connecting to the existing roundabout at Stanhope Road which will impact on small areas of PCT 3592.

This ensures safe and efficient access to the proposed land uses and locates access to the basement and loading areas for the seniors housing as close as possible to Stanhope Road limiting the intrusion of vehicles into the site as much as feasible and also by extension serving to limit the effect of vehicle movements from a noise and pollution perspective within the local context. It also allows for a low traffic environment for the internal road serving the townhouses providing for a high level of pedestrian safety and amenity and minimal noise impacts in these areas.

The location of townhouses at the south of the site will also impact on small areas of PCT 3592 along the southern boundary at the eastern end of the site. Impacts on significant native vegetation on the southern bushland interface have almost entirely been avoided. The minor impacts in this area provide for a consistent street address for the townhouses fronting the internal road network and a substantial vegetated buffer will be maintained the adjacent bushland.

6.1.1 Direct impacts

The proposal will unavoidably impact on approximately 1.88 ha of native vegetation with approximately 1.12 ha of vegetation being retained (see Figure 6-1 and Table 6-1).

Table 6-1. Vegetation clearing and retention

Description	Areas (ha)		
	To be cleared	To be retained	Total
PCT 3592 (remnant & planted native allocated)	0.58	0.94	1.52
Landscaping/planted native vegetation (including exotic trees, lawns, hedges etc)	1.31	0.18	1.48
Totals	**1.88**	**1.12**	**3.00**

6.1.2 Indirect impacts

Mitigation of indirect impacts on biodiversity values during construction will be specified within a project Construction and Environmental Management Plan (CEMP), which at a minimum shall include the following:

- Erosion and sediment controls;
- Dust and noise suppression;
- Pre-clearance and clearance processes to achieve the following, but not limited to, objectives:
    - protection of retained native vegetation and habitat
    - prevention of injury/mortality to all fauna
    - prevention of the spread and/or introduction of weeds and pathogens

Mitigation of operational indirect impacts on biodiversity values will be integrated into the detailed design of the proposal, which includes, but may not be limited to:

- Stormwater management and protection of downstream aquatic ecosystems
- Light spill into the adjacent bushland and native fauna habitat
- Landscape management (including native landscaping establishment and ongoing weed control)

An assessment of indirect impacts is provided in Table 6-2.

NOTE: It is important to note that this BDAR has been prepared to support a planning proposal only. The proposal's design is not yet advanced enough for all indirect impacts to be described. It is envisioned that this BDAR will be finalised and reissued for assessment as a State Significant Development (SSD).

6.2 Avoiding and minimising prescribed impacts

Prescribed impacts are processes that have the potential to indirectly impact threatened ecological communities and/or species that are reliant on caves, rocky outcrops, flyways, surface hydrology and groundwater processes.

The subject land does not contain caves, rocky outcrops or flyways and as discussed in Section 5 and the proposal will not result in any prescribed impacts.

Lourdes Retirement Village

Figure 6-1. Areas of vegetation avoided

Coordinate System: MGA Zone 56 (GDA 2020)
Image source: Nearmap 16 March 2023
Data drawn: 4 May 2023

Table 6-2. Indirect impacts

Indirect impact	Duration	Biodiversity values impacted	Consequence
Inadvertent impacts on adjacent habitat or vegetation, such as:			
Increased sedimentation	Short term during construction	General environment	Vegetation clearing and earthworks can expose soils and subsoils, which following rainfall may erode and mobilise soils in runoff, potentially smothering ground layer vegetation (in turn affecting health through a decrease in photosynthesis) or impact on water quality in downstream aquatic ecosystems (in turn affecting aquatic organisms that may provide a food resource for native fauna). Providing that best practices in erosion and sedimentation management are implemented in accordance with the project's Erosion and Sediment Control Plan (ESCP) the consequence of this impact is considered to be a low risk.
Introduction of weeds and pathogens	Short term during construction	General environment	Construction activities have the potential to both spread existing weed infestations, introduce new weed species, and introduce or spread soil borne pathogens on machinery and equipment. As a consequence, the condition (e.g., site integrity values) of retained and neighbouring vegetation could be decreased. Providing that the mitigation measures recommended in Section 8 are implemented the consequence of this impact is considered to be a low risk.
Trampling or other damage to remnant vegetation, including threatened species	Short term during construction	Retained vegetation	Retained vegetation will be protected in accordance with the project arborist's recommendations and mitigation measures recommended in Section 8. Allowance for construction impacts outside of the design footprint have been included in the total area of clearing being offset under the Scheme.
Fertiliser drift	N/A	N/A	Fertiliser will not be used

Indirect impact	Duration	Biodiversity values impacted	Consequence
Rubbish dumping, wood collection, removal and disturbance of rocks, including bush rock	N/A	N/A	The subject lands will not be accessible by the public (through security fencing) and the consequence of this impact is considered to be a low risk.
Reduced viability of adjacent habitat due to:			
Dust	Short term during construction	Retained native vegetation	Dust generation during construction activities will be managed through the following measures: ▪ Construction staging, ▪ Minimising material stockpiles, ▪ Cleaning (water suppression) of construction haul roads, ▪ Speed restrictions, and ▪ Implementation of the project's ESCP, and ▪ Implementation of mitigations measures prescribed within the Construction Environmental Management Plan (CEMP). The proposal is considered unlikely to reduce viability of retained native vegetation due to dust generation.
Light spill	Long term	Retained native vegetation	The proposal will result in an increase in light levels above that which already exists. Light spill will be mitigated during the design phase in accordance with available standards and guidelines for mitigating impacts on fauna habitat, which include but may not be limited to the following: ▪ Commonwealth of Australia (2020) National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds; and ▪ AS/NZS 4282:2019 Control of the obtrusive effects of outdoor lighting recognises the impact of artificial light on biota. T The above guidelines provide a range of measures to minimise light spill impacts on fauna and fauna habitat. Examples include: ▪ The use of recent advances in smart control technology options for better controlled and

Indirect impact	Duration	Biodiversity values impacted	Consequence
			targeted artificial light management; ▪ Ensuring that lighting is shielded and directed only to the intended object or area; ▪ Ensuring that light intensity is appropriate for the target area using only the minimum number and intensity of lights needed to provide safe and secure illumination for the area at the time required to meet the lighting objectives; and ▪ Consideration of the following lighting aspects: - high quality, low glare lighting, which enhances visibility for the user at night, reduces eye fatigue, improves night vision and delivers light where it is needed, - non-reflective, dark coloured surfaces, - reduced or filtered out blue, violet and ultraviolet wavelengths, which wildlife are sensitive to. Providing the design of the village's lighting installations incorporates the above and current best practice measures, the likelihood of light spill impacts on fauna and fauna habitat will be minimised as far as practical.
Noise	Short term during construction	Retained native vegetation	All construction works are proposed to be undertaken during standard construction hours: ▪ Monday to Friday, 7am to 6pm; ▪ Saturday 8am to 1pm; and ▪ No work on Sundays or public holidays. The proposed construction will be temporary in nature and the risk of consequence is considered low. Long term operation: ▪ The proposal will not result in a significant increase in noise levels above that which already exists; ▪ Resident fauna within the vicinity of the proposed development would already be accustomed to ambient noise levels from existing development. The consequence of increased noise impacts is considered a low risk.

Indirect impact	Duration	Biodiversity values impacted	Consequence
Increased risk of starvation, exposure, loss of shade or shelter	N/A	N/A	The proposal would not result in any significant changes to existing food resources, shade or shelter. Existing vegetation within the subject land does not provide any important habitat (in terms of foraging, shade and shelter). Therefore, the proposed development is considered a low risk in this respect.
Loss of breeding habitat	N/A	N/A	Breeding habitat for threatened species is absent from subject land.
Habitat connectivity			
Habitat connectivity	N/A	N/A	The proposal does not impact on the remnant bushland adjacent to the subject land and will not result in the isolation or fragmentation of native vegetation and/or connectivity.
Water bodies, water quality and hydrological processes			
Water bodies, water quality and hydrological processes	Short and long term	Gordon Creek	The proposal's civil engineering strategy will provide a best practice solution within the constraints of the existing landform and proposed development layout. Within this strategy a stormwater quantity and quality management strategy will be developed to consider peak flows and reduce pollutant loads in stormwater leaving this site. A hydrological assessment will be required to show that local post development flows from the site will be consistent with pre-development flows and demonstrate that the site discharge will not adversely affect any land, drainage systems or watercourse as a result of the development. During the construction phase, a Sediment and Erosion Control Plan will be in place to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff.

7. Assessment of impacts

7.1 Impacts on serious and irreversible impacts

There are no serious and irreversible impact entities identified within the subject land.

7.2 Impacts that require offsetting

The total area of PCT 3592 that would be removed is estimated at 0.58 ha and this area was entered into the BAM-C to determine the offsets required for the proposed impacts.

Figure 7-1 illustrates the areas of native vegetation that incurs an offsetting obligation.

Six (6) ecosystem credits are required to offset the clearing of the planted native vegetation allocated to PCT 3592 (as shown in Table 7-1).

The BAM credit summary report provided in Appendix B.

Table 7-1. Offsetting requirements

Zone	Area of impact (ha)	Current Vegetation integrity score	Change in Vegetation integrity (loss/gain)	Biodiversity risk weighting	Credits required
3592_MANAGED	0.58	24.6	-24.6	1.75	6

7.3 Impacts that do not require an offset

There is a total area of 1.2ha that occurs as planted/landscaped non-native vegetation or native vegetation that is not local to the locality or to the habitat of the subject land. The clearing of this vegetation is not representative of any formal PCT and does not require an offset.

Figure 7-1 illustrates the areas of native vegetation that does not incur an offsetting obligation.

Lourdes Retirement Village

Figure 7-1. Offset requirements

Coordinate System: MGA Zone 56 (GDA 2020)
Image source: Nearmap 16 March 2023
Data drawn: 1 May 2023

8. Mitigation and management of impacts

Table 8-1 summarises the typical mitigation measures that would be implemented to avoid or minimise accidental direct impacts and indirect impacts.

NOTE: prior to commencement of the proposal a development application will be submitted as a State Significant Development (SSD). An updated BDAR will be prepared for submission with the SSD application. At this time, further detail will be possible as it relates to mitigation and management of impacts in accordance with BAM Sections 8.4 and 8.5 and the minimum information requirements in Appendix K of the BAM (i.e., as the detailed design is completed).

Table 8-1 Summary of mitigation measures for impacts to native vegetation and habitat

Mitigation measure	Proposed technique	Timing	Frequency	Responsibility	Risk of Failure	Risk and consequences of residual impacts
Delineation of clearing limits	Clearing limits are delineated with high visibility tape, temporary fencing, or other appropriate boundary markers. Materials and methods of marking trees to be removed or retained and protected will be agreed to prior to their employment.	Pre-construction	Once	Contractor	High	Unauthorised clearing and/or damage to vegetation to be retained
Erosion and sediment controls	Implementation of Erosion and Sediment Control Plan (ESCP) measures	Pre-construction	Ongoing	Contractor	High	Sedimentation of native vegetation and downstream aquatic environment.
Pre-clearance surveys	Refer Section 6.1.2	Pre-construction	Once	Contractor / Project Ecologist	Moderate	Habitat features not identified Harm / death of fauna

Mitigation measure	Proposed technique	Timing	Frequency	Responsibility	Risk of Failure	Risk and consequences of residual impacts
						Woody weeds inadvertently chipped and reused on site as mulch
Clearance	Refer Section 6.1.2	Pre-construction	Once	Contractor / Project Ecologist	Moderate	Harm / death of fauna
Biosecurity management	Implementation of hygiene measures to prevent the introduction and / or spread of introduced flora and fauna species, pathogens and / or disease.	Throughout	Ongoing	Contractor / Principal /	Moderate	Introduction and/or spread of pest species, pathogens, disease, and in turn harm death of adjacent flora and fauna

8.1 Adaptive management for uncertain impacts

Not applicable as the proposal is considered unlikely to result in any uncertain impacts that require adaptive management. Irrespective contingency management is outlined in Table 8-2.

Table 8-2. Contingency Management Plan

Key Element	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Native vegetation clearance	Trigger	Clearing limits are demarcated and disturbance is restricted to the delineated clearance areas. No stockpiling of equipment, soil, or machinery occurs beyond the clearance boundary. No encroachment of vehicles, equipment or works occurs beyond the clearance boundary.	Monitoring verifies that demarcation of clearing limits is not functioning in accordance with their design intent, OR Works activities / vehicle or plant movements have encroached beyond clearing limits.	Monitoring verifies clearing of native vegetation has occurred beyond clearing limits, OR Works activities / vehicle or plant movements that have encroached beyond clearing limits have caused damage to protected areas of vegetation.
	Response	No response required. Continue monitoring program.	Remediate immediately, OR Review work practices of contractors / personnel responsible and provide further site induction to ensure responsibilities are understood.	Reporting to government agencies. Implement relevant responses and undertake immediate review to determine source of issues and implement remediation measures identified as soon as practicable.
Fauna protection	Trigger	Clearing of native vegetation and habitat features is completed in accordance with Clearance protocols. All fauna species encountered during construction are handled humanely in accordance with industry standards	Monitoring/review of reporting procedures verifies that Clearing of habitat features is undertaken in the absence of Clearance protocols, but no fauna species encountered	Monitoring/review of reporting procedures verifies that clearing of habitat features is undertaken in the absence of Clearance protocols, and results in death or injury of fauna species encountered

Key Element	Trigger/ Response	Condition Green	Condition Amber	Condition Red
	Response	No response required	Review work practices of contractors / personnel responsible. Further clearance of native vegetation is to cease until further site induction undertaken to ensure responsibilities are understood.	Reporting to government agencies. Implement relevant responses and undertake immediate review to determine source of issues and implement remediation measures identified as soon as practicable.
Native vegetation protection	Trigger	Exclusion fencing and protection measures are installed and are functioning in accordance with their design intent.	Monitoring verifies that exclusion fencing and protection measures are not functioning in accordance with their design intent.	Monitoring verifies that works activities / vehicle or plant movements have impacted on areas of native vegetation to be protected.

9. References

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.

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).

Churchill, S., (1998). Australian Bats. Reed New Holland Publishers.

Cogger, H. G. (2000). Reptiles and Amphibians of Australia. 6th ed. Reed New Holland, Sydney.

Commonwealth DCCEEW Protected Matters Environmental Search Tool (2022) Cropper, S (1993) Management of Endangered Plants CSIRO Pub. East Melbourne

DEC (2004) Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities

DPE (2020) Biodiversity Assessment Method (BAM)

DPE Bionet Atlas of NSW Wildlife (2022). NPWS Geographic Information Systems Division, Hurstville NSW, 2022.

DPIE (2019), 'Guidance to assist a decision-maker to determine a serious and irreversible impact', Environment, Energy and Science.

Fairley, A. & Moore, P. (2010) Native Plants of the Sydney District – An Identification Guide. Kangaroo Press, Kenthurst, Sydney.

Fairley, A. (2004) Seldom Seen – Rare Plants of Greater Sydney. New Holland Publ Sydney, Aust.

Gibbons P, Lindenmayer D (2000) 'Tree Hollows and Wildlife Conservation in Australia'. (CSIRO Publishing: Canberra)

Harden, G. J. (ed.) (1990 – 2002; 2022 online) Flora of New South Wales, Royal Botanic Gardens, Sydney NSW.

Herbert, C. (1983) 'Geology of the 1:100 000 Sheet 9130'. Geological Survey of NSW, Sydney.

Levande Plus Architecture (2022) Drawing Schedule for Development Application or Lourdes Retirement Village, 95 Stanhope Road, Killara

Menkhorst, P & F Knight (2001). A field guide to the Mammals of Australia. Victoria: Oxford University Press.

National Parks and Wildlife Service (NPWS) (2003), Bioregions of New South Wales: Sydney Basin, Chapter 15, p.185-196

NSW Scientific Committee. Final Determinations (1996 – 2022) Determinations relating to listings of threatened species, ecological communities and key threatening processes in the Schedules of the Biodiversity Conservation Act 1995.

OEH (2016) 'The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area'.

Pizzey, G. and Knight, F. (2003). The Field Guide to the Birds of Australia. Angus and Robinson Publs.

Scales (2023) Arboricultural Impact Appraisal and Method Statement for Lourdes Retirement Village, 95 Stanhope Road, Killara

APPENDIX A. BAM Data

Plot	Zone	Coordinates		Bearing
1	56H	-33.766133	151.172986	10 N
2	56H	-33.7967007	151.173245	250 N
3	56H	-33.766838	151.17532	2950 W
4	56H	-33.765757	151.1747648	1300 SE

Composition

Plot	Tree	Shrub	Grass	Forb	Fern	Other
1	3	2	0	4	0	0
2	3	0	1	3	0	0
3	3	3	0	1	1	0
4	4	2	1	4	0	0

Structure

Plot	Tree	Shrub	Grass	Forb	Fern	Other
1	50	10	0	6	0	0
2	58	0	15	7	0	0
3	15	15	0	2	2	0
4	22	3	1	2.3	0	0

Function

Plot	Stem classes (cm)					
	<5	5-9	10-19	20-29	30-49	>50
1	0	0	2	4	0	0
2	0	2	0	1	3	3
3	0	1	0	4	4	0

Plot	HBTs	Litter cover	LWD (m)	HTW
1	0	15	0	0
2	0	58	0	2
3	0	5	0	0

GF	Species name	Common name	Plot 1	Plot 2	Plot 3	Plot 4
TG	Angophora costata	Smooth-barked apple		X	X	X
TG	Angophora floribunda	Rough-barked apple			X	
TG	Banksia integrifolia	Coastal banksia		X		
TG	Banksia serrata	Old-man banksia			X	
TG	Corymbia gummifera	Red bloodwood				X
TG	Corymbia maculata	Spotted gum		X		
TG	Eucalyptus pilularis	Blackbutt		X		X
TG	Eucalyptus robusta	Swamp mahogany	X			
TG	Eucalyptus saligna	Sydney bluegum				X
TG	Syncarpia glomulifera	Turpentine	X	X		
SG	Acacia longifolia	Black sheoak	X			
SG	Allocasuarina torulosa	Forest oak	X			
SG	Banksia spinulosa	Hairpin banksia			X	
SG	Callistemon citrinus	Crimson bottlebrush			X	
SG	Elaeocarpus reticulatus	Blueberry ash			X	X
SG	Ozothamnus diosmifolius	Rice flower				X
SG	Pittosporum undulatum	Sweet pittosporum	X			
GG	Lachnagrostis filiformis	Blown grass		X		
GG	Lomandra longifolia	Spiny mat rush			X	
GG	Microlaena stipoides	Weeping meadow grass			X	X
GG	Oplismenus aemulus	Basket grass			X	
FG	Centella asiatica	Indian pennywort, Gotu Cola	X	X		X
FG	Commelina cyanea	Scurvy weed	X			X
FG	Dianella caerulea	Native flax lily			X	X
FG	Dichondra repens	Kidney weed	X	X		X
FG	Geranium homeanum	Native geranium	X	X		
OG	Calochalena dubia	False bracken			X	

APPENDIX B. BAM SUMMARY REPORTS

BAM Credit Summary Report

Proposal Details

Assessment Id
00036553/BAAS18125/23/00040204

Proposal Name
LOURDES RETIREMENT VILLAGE
95 STANHOPE ROAD KILLARA

BAM data last updated *
14/04/2023

Assessor Name
PETER STRICKER

Report Created
28/04/2023

BAM Data version *
58

Assessor Number
BAAS18125

BAM Case Status
Finalised

Date Finalised
28/04/2023

Assessment Revision
14

Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Sydney Coastal Enriched Sandstone Forest												
1	3592_MANAGED	Not a TEC	24.6	24.6	0.58	PCT Cleared - 61%	High Sensitivity to Gain			1.75		6
											Subtotal	**6**
											Total	**6**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id 00036553/BAAS18125/23/00040204	Proposal Name LOURDES RETIREMENT VILLAGE 95 STANHOPE ROAD KILLARA	BAM data last updated * 14/04/2023
Assessor Name PETER STRICKER	Assessor Number BAAS18125	BAM Data version * 58
Proponent Names Nathan Donn	Report Created 28/04/2023	BAM Case Status Finalised
Assessment Revision 14	Assessment Type Major Projects	Date Finalised 28/04/2023

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Nil

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Ephippiorhynchus asiaticus / Black-necked Stork
Grantiella picta / Painted Honeyeater
Ixobrychus flavicollis / Black Bittern
Haliaeetus leucogaster / White-bellied Sea-Eagle

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3592-Sydney Coastal Enriched Sandstone Forest	Not a TEC	0.6	0	6	6

BAM Biodiversity Credit Report (Like for like)

3592-Sydney Coastal Enriched Sandstone Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Sydney Coastal Dry Sclerophyll Forests This includes PCT's: 3583, 3592, 3594	Sydney Coastal Dry Sclerophyll Forests >=50% and <70%	3592_MANAGED	No	6	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

LOURDES RETIREMENT VILLAGE
95 STANHOPE RD, KILLARA

URBAN DESIGN REPORT

RESPONSE TO COUNCIL SUBMISSION

PREPARED FOR LEVANDE
PLUS ARCHITECTURE

3/05/2023

The Purpose Of The Report

The proposed master plan presented in the Planning Proposal report envisaged redevelopment of the entirety of the Lourdes Retirement Village and the existing independent living units in the southern part of the site. The proposed master plan provided solutions to the existing site issues and recommended new planning controls that allow for the development of the site.

In response to Ku-ring-gai Council Submission, the masterplan was amended to develop a more holistic urban design strategy and provide a more detailed urban design analysis that has taken into full consideration the established landscaped setting and built form character of the surrounding context.

This report provides an analysis of the site, its opportunities and constraints as well as the updated master plan for development of the village, whilst manitaining the new planning controls that allow for realization of the master plan.

1
INTRODUCTION

EXHIBITED MASTER PLAN

The exhibited master plan presented in the Planning Proposal report demonstrates a robust structure plan that carefully establishes land uses, public and private open spaces, facilities, site features and road networks based on a range of key design drivers that reflect the findings of a site analysis and provides improved community infrastructure that are already experiencing a decline in their useful life.

The master plan for Lourdes Retirement Village provides a new seniors housing development consisting of approximately 110 suites as well as approximately 141 new independent living units arranged within a series of buildings ranging from 3 to 6 storeys in height. Additionally, the redevelopment of the southern portion of the site provides approximately 63 townhouses with a separate road network and private amenities.

The adjacent plan shows the proposed locations of the new community facilities in the northern portion of the site off the proposed Main Street interface. The Headfort House which is to be retained under this Planning Proposal will continue to serve as a Chapel for the community.

INDICATIVE DWELLING YIELD

141
INDEPENDENT LIVING UNITS

110
RESIDENTIAL AGED CARE FACILITY BEDS

63
TOWN HOUSES

1. New Entry to Stanhope Road
2. Headfort House Gardens
3. Lady of the Lourdes Grotto
4. RAC drop-off
5. Main Street
6. The Village Green
7. Dementia Garden
8. RAC Courtyard Landscape
9. Terraced Landscape
10. Pedestrian Connection
11. Landscape Mounding
12. Green Corridors
13. Service Trail
14. Existing Landscape
15. NewRoad Connection

UPDATED MASTER PLAN

The master plan has undergone further amendment to address key points and recommendations that were raised by Ku-ring-gai Council as part of their assessment of the Planning Proposal. The key features of the updated master plan include:

- A reduction in the perceived scale of the proposal by accommodating the ILU programme within four smaller buildings, rather than three, increasing visual permeability and the potential for through-site links.

- A further reduction in building height from 4 storeys to 3 storeys for the building adjacent to the western boundary, minimising impacts on the adjoining neighbour.

- The introduction of variations in built form and height, length, architectural expression and upper level setbacks across the development that serve to increase solar amenity and reduce the visual presence of the proposal.

- The further integration of the proposal with the existing levels on site through the use of stepped building forms to ensure that the design is appropriately embedded within the landscape.

- The proposed principal entry into the basement carpark (including loading and servicing vehicle docks) moved to the eastern portion of the site to reduce any perceived impacts to the developments western neighbours.

- A proposed new road connection from Stanhope Road to the townhouse precinct, allowing for the creation of precincts within the development that have a greater sense of urban identity.

- The unique bushland setting serving as the inspiration of an evolved landscape design response.

- The identification through further resolution of the design to retain a greater number of existing trees.

- The articulation of massing envelopes to ensure buildings that are fine-grain and in their expression and materiality reflective of the residential context that they sit within.

- The use of apartments at the interface of the ILU carpark and the townhouses to minimise the visual impact of the basement carpark.

- More granular building expression at the interfaces of the townhouse precinct with the surrounding bushland by creating a staggered built form.

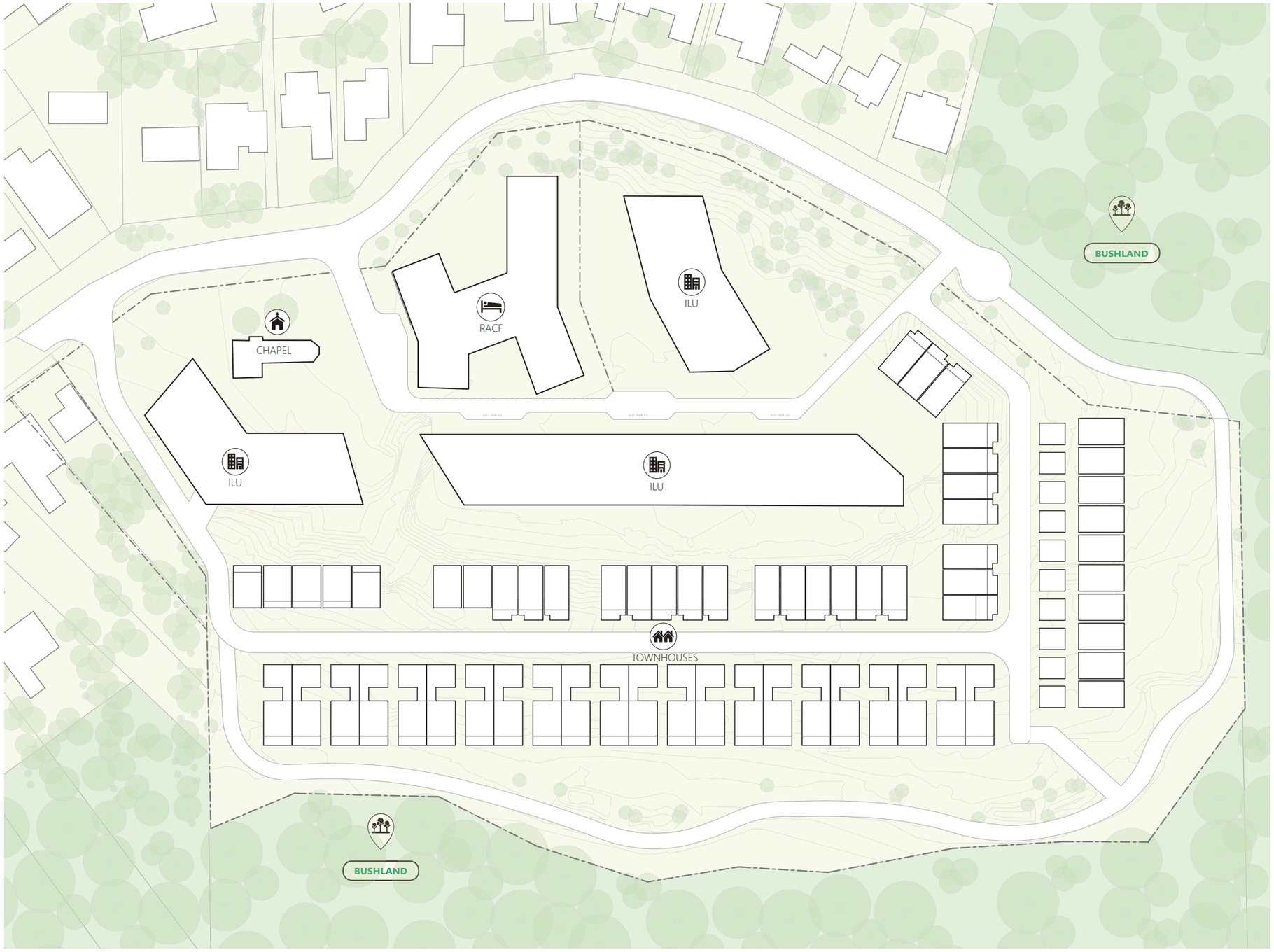
- The total floor space and indicative yield has not changed as a result of the amended master plan.

1. RAC drop-off
2. Headfort House Gardens
3. Lady of the Lourdes Grotto
4. Main Street
5. Dementia Garden
6. The Village Square
7. ILU drop-off
8. The Village Green
9. Green Corridors
10. Road Connections

2
PROPOSED MASTERPLAN

2 PROPOSED MASTER PLAN

PLANNING PROPOSAL ENVELOPE



The master plan provided on this page, demonstrates the building envelope that was proposed in the Planning Proposal report.

Key points that were raised by Ku-ring-gai Council to consider are as follows:

- More balanced approach with respect to adjacent heritage, bushland and bushfire hazard.

- A reduction in built form by incorporating smaller building footprints and reducing the building heights.

- Greater deep soil areas along the ridgeline and between buildings.

- Reduction of noise and pollution from vehicles entering the basement carpark from western driveway.

- Continuous hard edge on the bushland fringe.

OVERALL FORM BREAKUP

The indicative plan shown here, describes a reduction in built form by breaking the bulk of the building at the centre of the development into smaller building footprints. The physical break in the built form also provides better visual connectivity and permeability throughout the village, via the linear park located at the interface of the ILUs and the townhouse precinct as well as the green corridors between the townhouses through to the surrounding bushland.

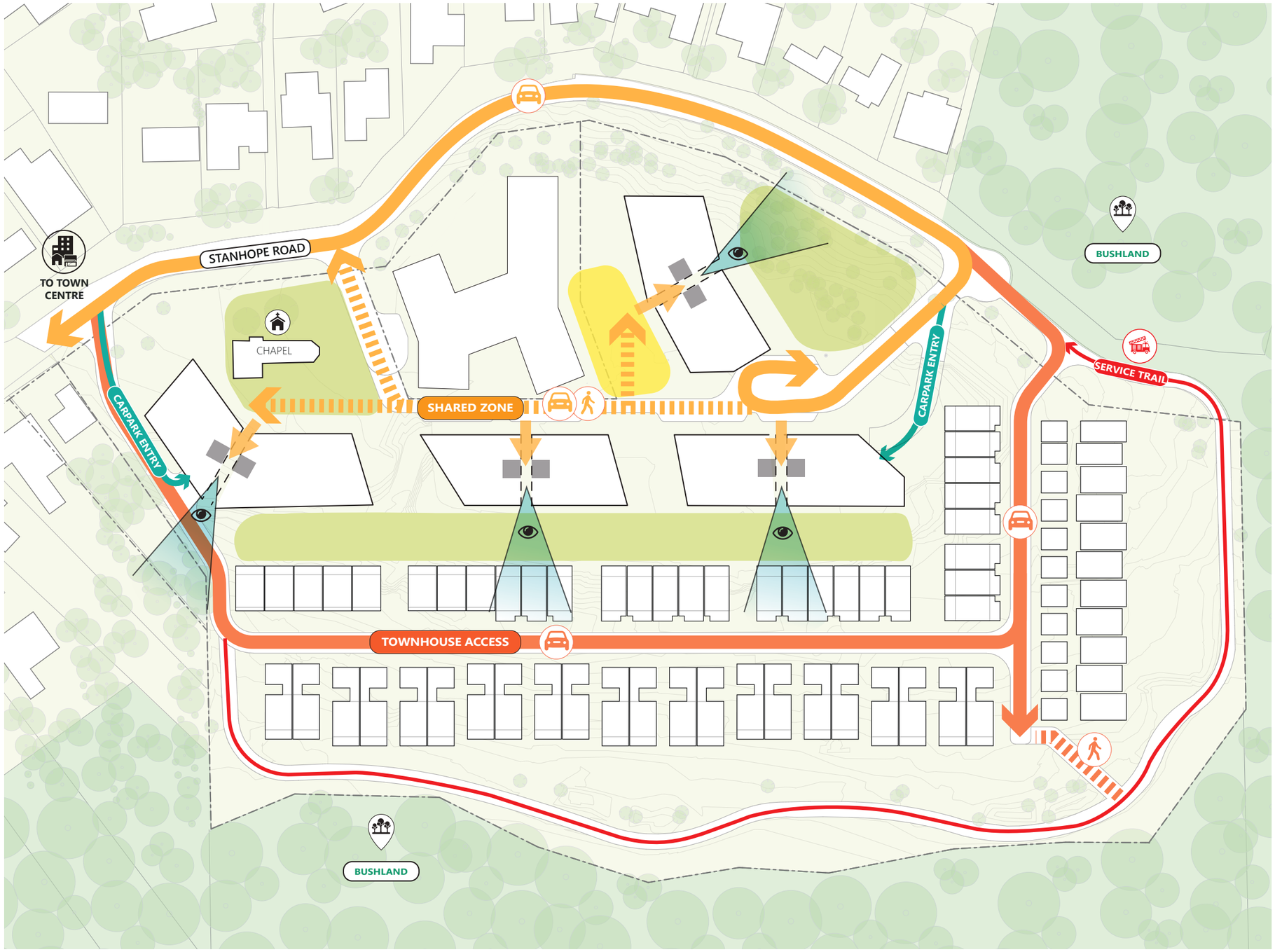
Staggering the townhouses located along the bushland and at the internal road within the townhouse precinct has created a more fine-grain building expression that conforms better with the local character of the existing context.

RELIEF AT THROUGH LINKS

The exisiting pockets of green with their established landscaped character have been retained to create a natural buffer to the immediate context that surround the site. The built form is then naturally established around these green pockets to reinforce the key tree clusters and create through-site links that create legible composition of built form that frame the open space.

The landscaped pockets are shaped to provide natural relief to the built form while creating amenity for the development and the community. The through-site links also provide a sense of visual connecticvity and permeability throughout the village, that serve as walkable laneways that connect the Main Street to the linear park and the townhouse precinct located at the south of ILU buildings.

ACCESS & SERVICING



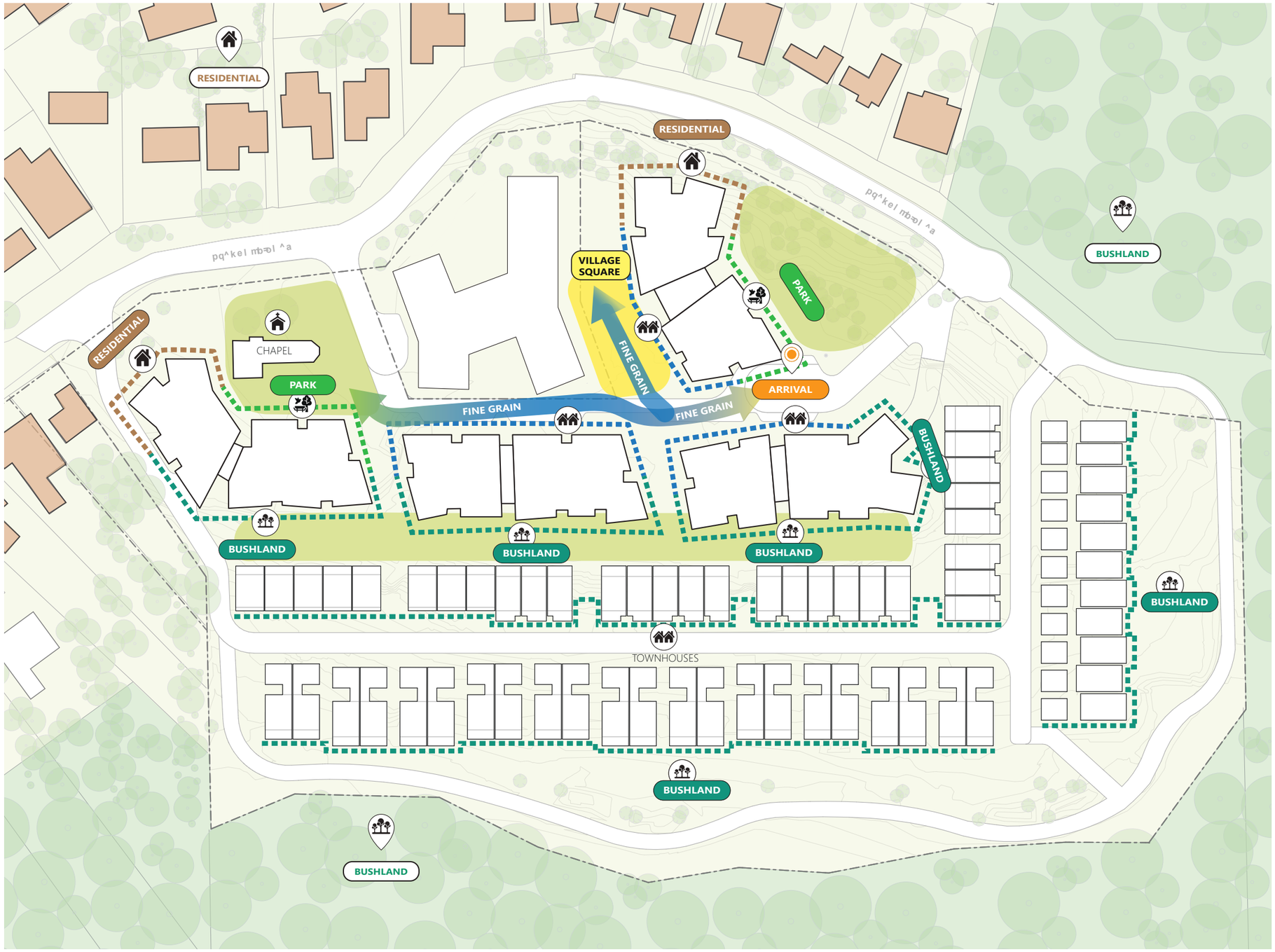
New road connections from east of Stanhope Road to both ILU and townhouse precinct create a sense of arrival and identity for each precinct while Main Street remains to operate as a one-way street that is shared between RACF and ILUs for visitors drop-off and public bus route.

The new road connection provides an opportunity for additional basement entry to ILU buidling which reduces the impact of western driveway to the adjacent property by relocating the main point of access for servicing and loading/unloading to the eastern portion of the retirement village.

LEGEND

- Retirement Village Access
- Townhouse Precinct Access
- Service Trail
- Carpark Access

ARTICULATION RESPONDING TO LOCAL CONTEXT



The proposed buildings range in height, length and scale to create a variety of built form that is then transformed into smaller building bulks that are orientated towards predominant views including the adjacent heritage Chapel, the local residential buildings and the bushland.

Further facade articulations and fine-grain building expressions have been utilised to create legible built forms that clearly respond to the immediate context that surround the built form.

UPPER LEVEL SETBACKS

The built form has been scaled down to 3-4 storey buildings at Stanhope Road to reduce the perceived height of buildings while providing better solar amenity for the Headfort House and the open spaces that are loacted at the side of the Chapel and the Clubhouse building.

Upper level setbacks have been utilised for the ILU buildings at the centre of the village to create a transition in height and scale which reduces the percieved height of built form to consistent 5-storey buildings when viewed from Main Street or from the linear park to the south of ILUs.

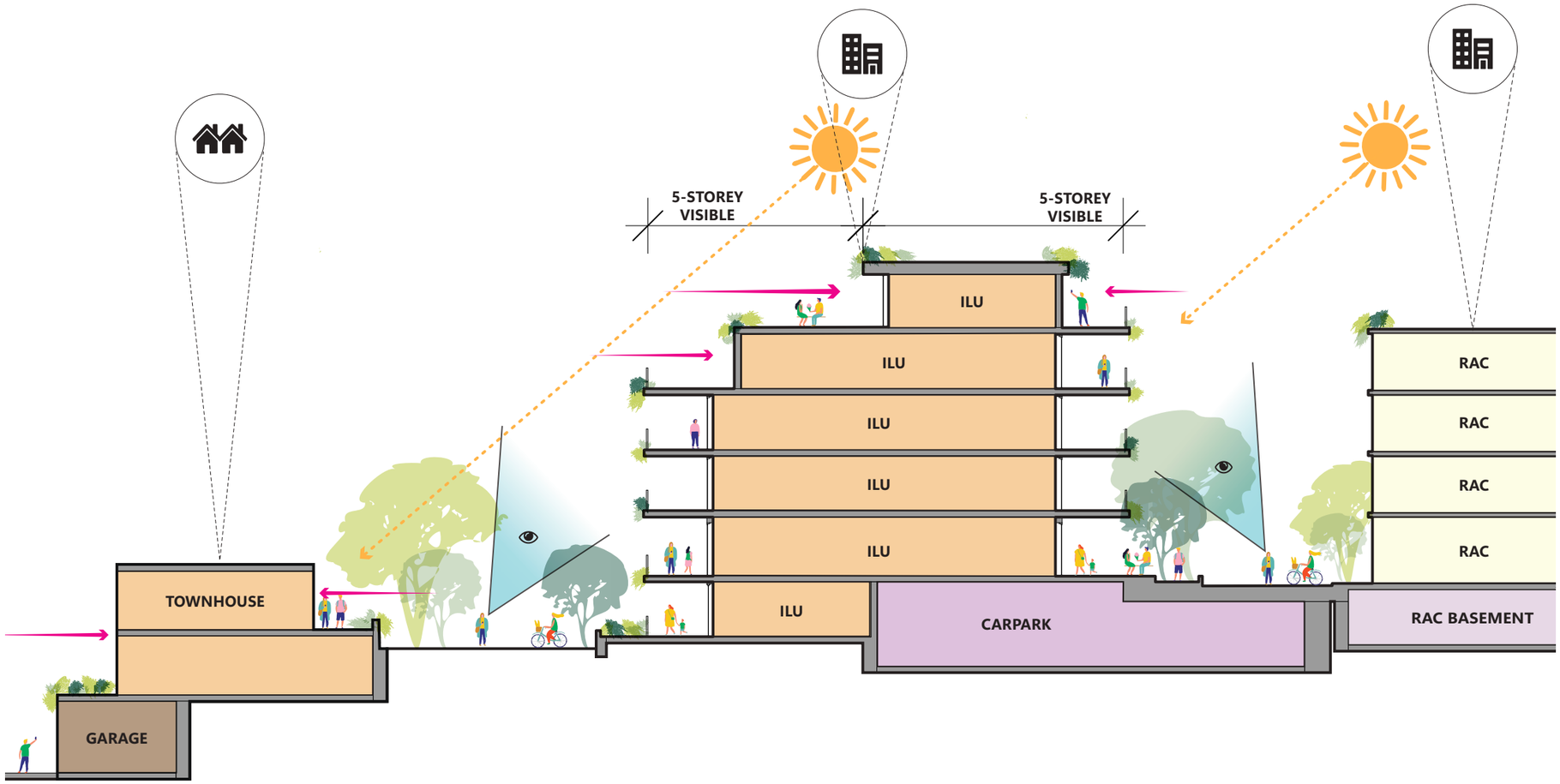
Upper level setbacks enhance solar amenity to the townhouse precinct and the linear park that would have been otherwise overshadowed by the east-west orientation of the ILU buildings.

LEGEND

- 3-Storey
- 4-Storey
- 5-Storey
- 6-Storey

2 PROPOSED MASTER PLAN

BUILDING SCALE

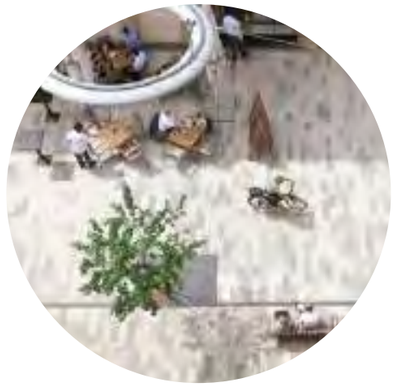


The diagrammatic section demonstrate how the proposed develoment has utilised existing site levels to create a transition in scale that respond to the surrounding character and is embedded in the landscaped setting of the site.

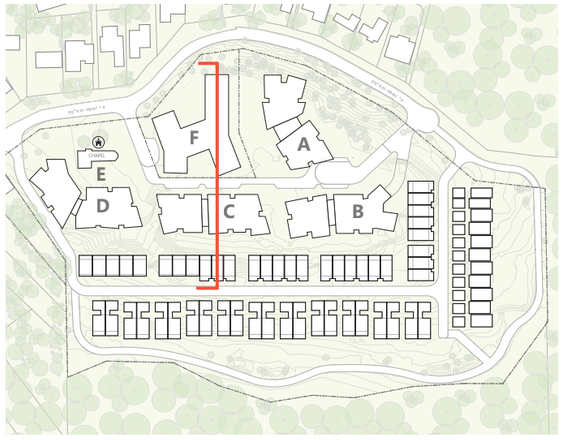
Building blocks adjacent to neighbouring context are envisaged to step down to conform better to the streetscape character of Stanhope Road while upper level setbacks reduce the perceived height of built form and enhance solar amenity.

RESIDENTIAL

MAIN STREET



VILLAGE SQUARE

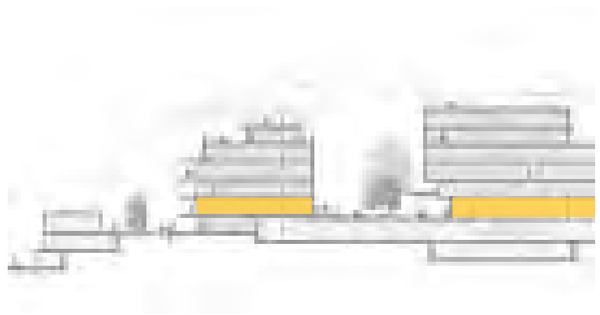


3
PLANS

BASEMENT 2 PLAN

BASEMENT 1 PLAN

GROUND FLOOR PLAN



LEVEL 1 PLAN

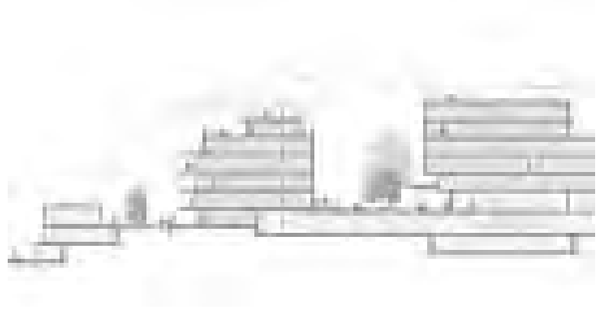
LEVEL 2 PLAN

LEVEL 3 PLAN

LEVEL 4 PLAN

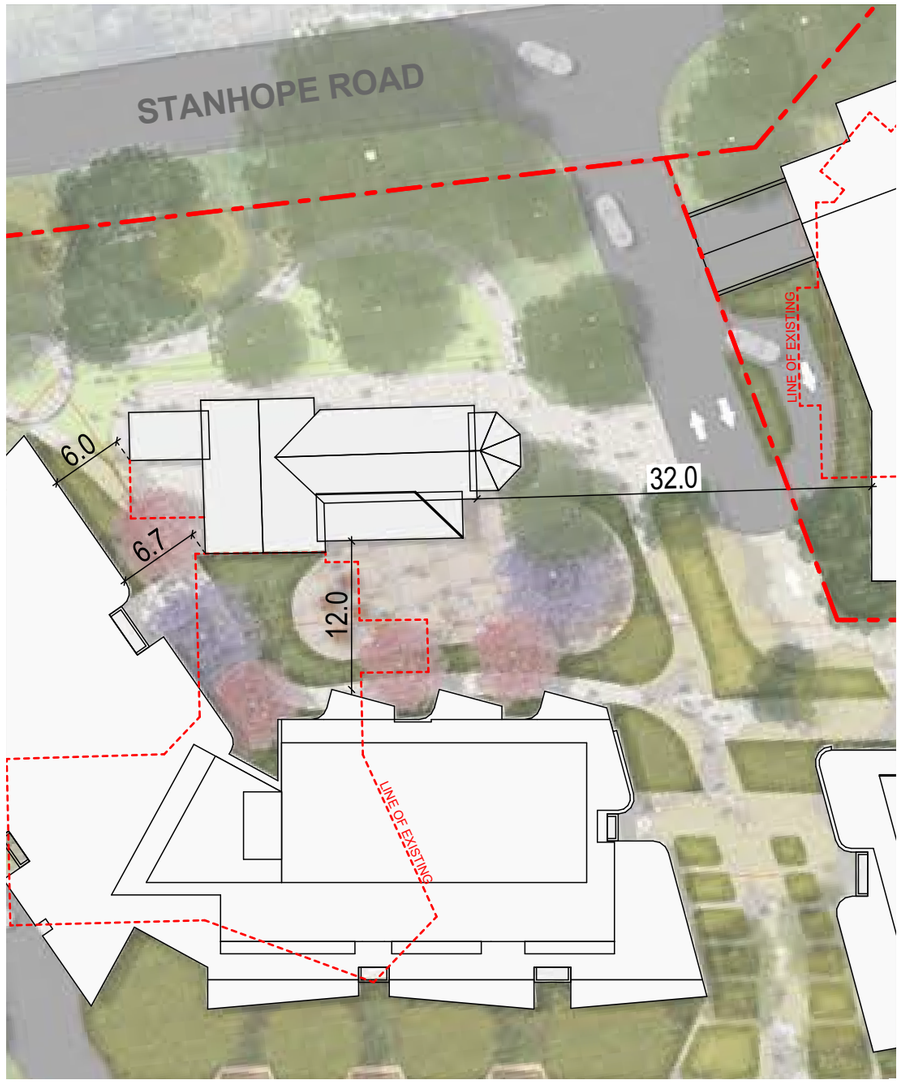
LEVEL 5 PLAN

ROOF PLAN



HEADFORT HOUSE TREATMENT

SEPARATION TO HEADFORT HOUSE - EXISTING



SEPARATION TO HEADFORT HOUSE - PROPOSED

Treatment of Headfort House

The principles that shaped the built form response were:

- The re-invigoration of Headfort House as an integral part of a revised overall masterplan, acting as a communal focus for the western part of the site and contributing to the social life of the village.

- The proposed removal of the built form around the existing building to ensure an appropriate and generous landscape curtilage on all sides, thereby improving the current situation.

- The retention of a significant number of mature trees around the building as an integral component of the landscape curtilage.

- The proposed relocation of the site significant Lady of the Lourdes Grotto to sit adjacent to Headfort House, allowing for the opportunity to enjoy a cohesive response to the history of the site.

- Proposed separation to new built form to be equal to or greater than that currently existing on site.

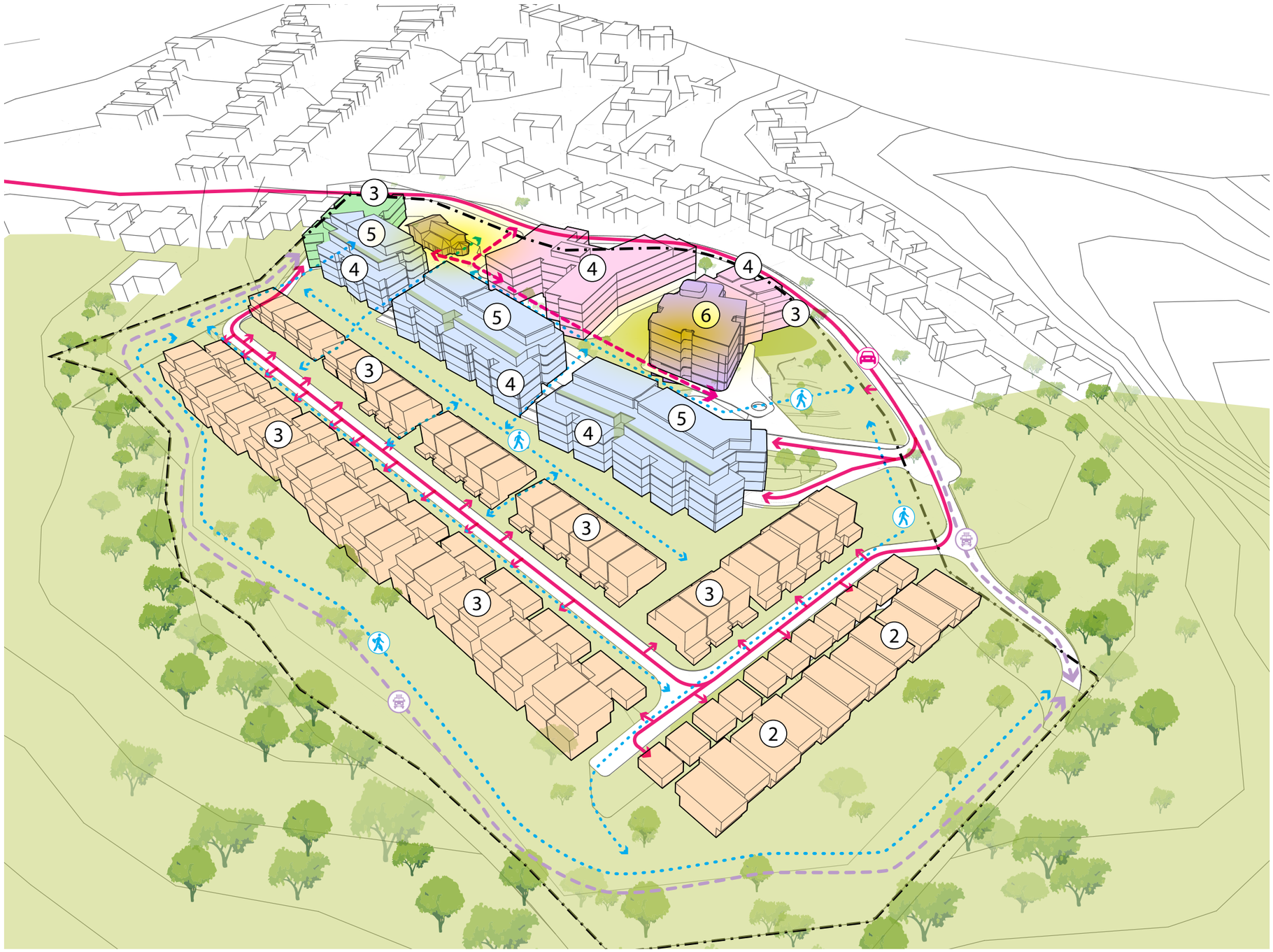
- Approx. 32m separation proposed to the east, currently varying separation - ranges from 26m to 28m (approx.).
- 12m separation proposed to the south, currently no separation.
- Varying separation proposed to the west due to the angled nature of the proposed new built form – generally an average of 6m separation.

- The proposed new building immediately adjacent to Headfort House to act as an appropriate and sensitive neighbour in its scale and architectural expression. The portion of the building to the south of Headfort House intended to form a calm 'backdrop' to the view from Stanhope Road and the portion of the building to the west to step down to reflect a scale and building envelope that is complementary.

4

URBAN FORM & MASSING

BUILDING SCALE (NUMBER OF STOREYS)



The proposed master plan has adopted a scale transition in building heights to respond to the surrounding character of the site. Blocks adjacent to neighbouring context are envisaged to step down to conform better to the streetscape character of Stanhope Road.

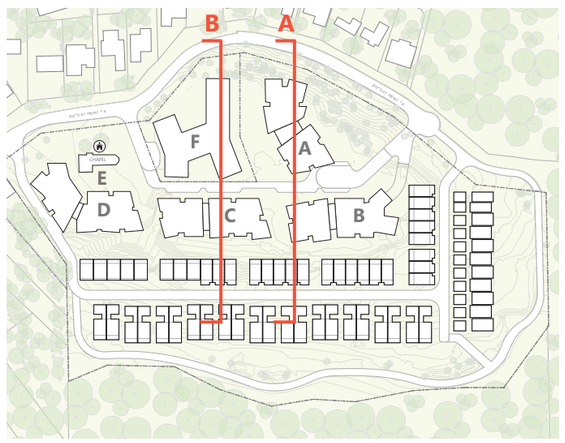
Upper level setbacks have created a scale transition from the north of the retirement village towards the townhouse precinct. The site topography has been utilised to reduce the perceived number of storeys from five to four when viewing the independent living buildings from the south.

SITE SECTIONS

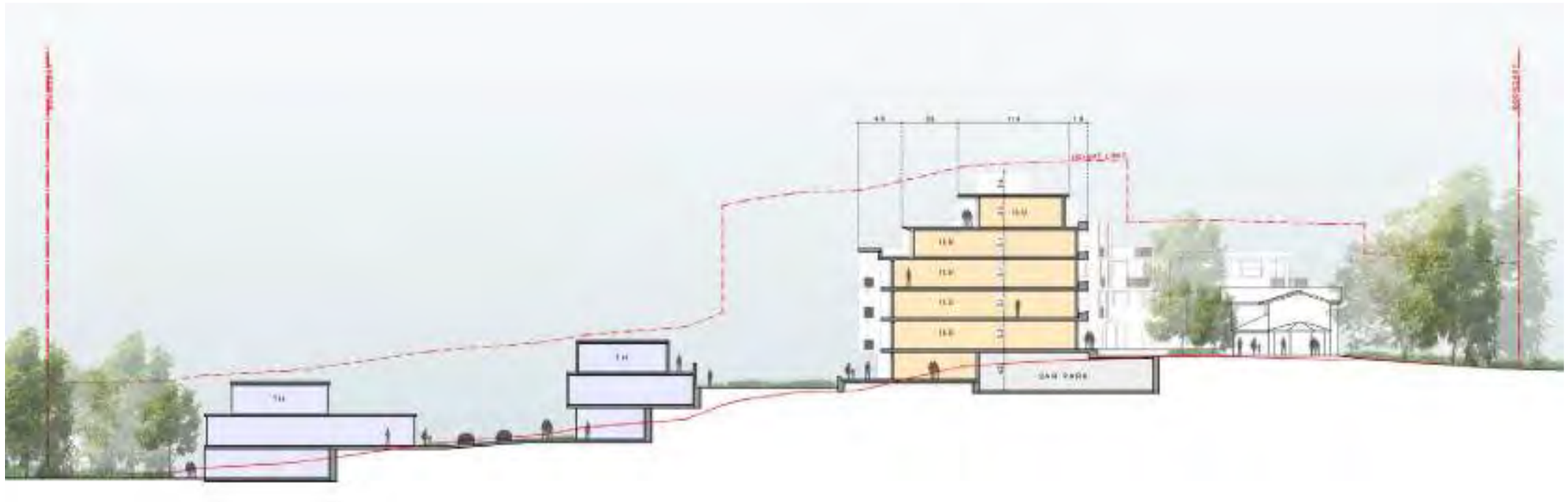
SECTION A

SECTION B

The sections demonstrate how the proposed develoment has been scaled to respond to the surrounding character of the site. Blocks adjacent to neighbouring context are envisaged to step down to conform better to the streetscape character of Stanhope Road.



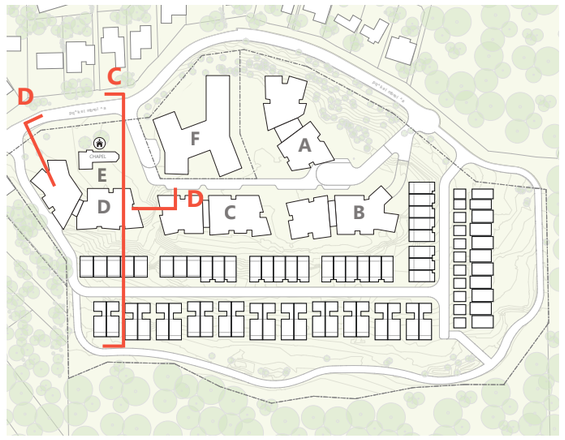
SITE SECTIONS



SECTION C

SECTION D

Upper level setbacks create a scale transition from the north of the retirement village towards the townhouse precinct. The site topography also provides variation in height which reduces the perceived number of storeys from five to four when viewing the independent living buildings from the south.



SENIORS LIVING ARRIVAL

SENIORS LIVING ARRIVAL

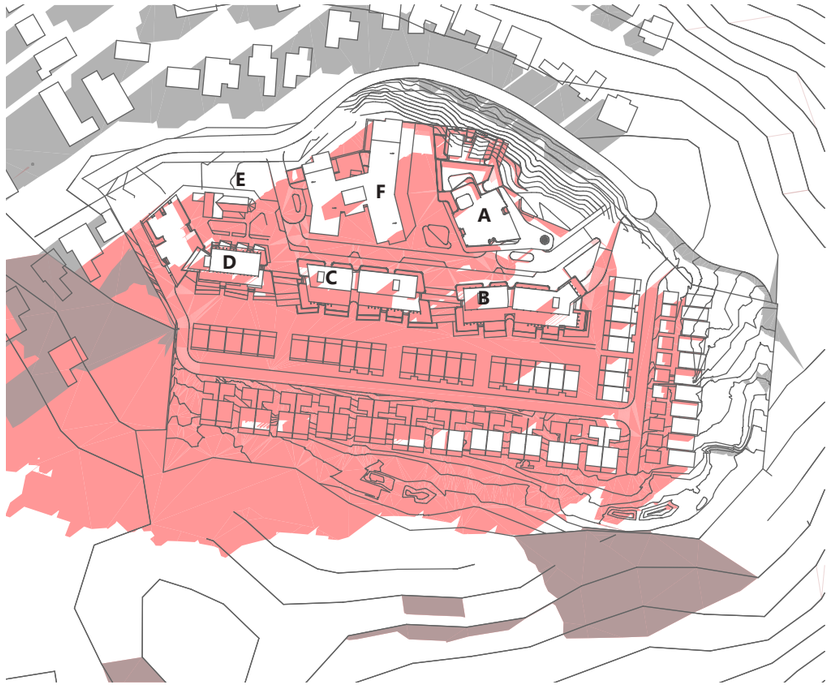
THROUGH LINKS

CHAPEL GREEN

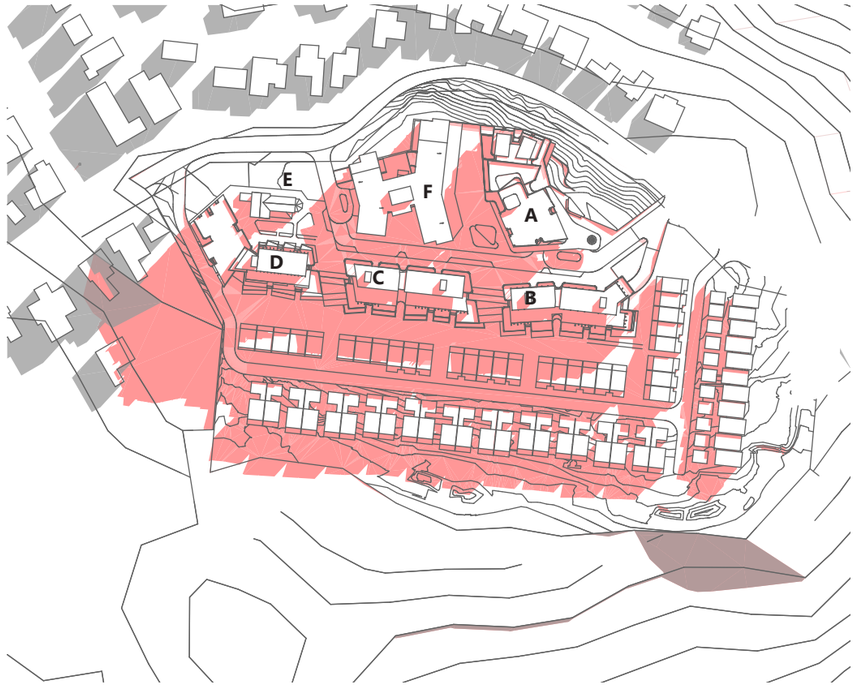
5

COMPLIANCE

SHADOW ANALYSIS



21st June - 8AM



21st June - 9AM

21st June - 10AM

21st June - 11AM

Shadow Diagrams

Following the path of the sun at winter solstice, 21 June, the overshadowing impact of the independent living buildings can be studied.

Within the retirement village, the proposed built form has been oriented such that the majority of open spaces will receive more than two hours of sunlight during the winter solstice.

Overshadowing occurs along the southern portion of the site from the taller independent living buildings over the lower scale residential townhouse precinct.

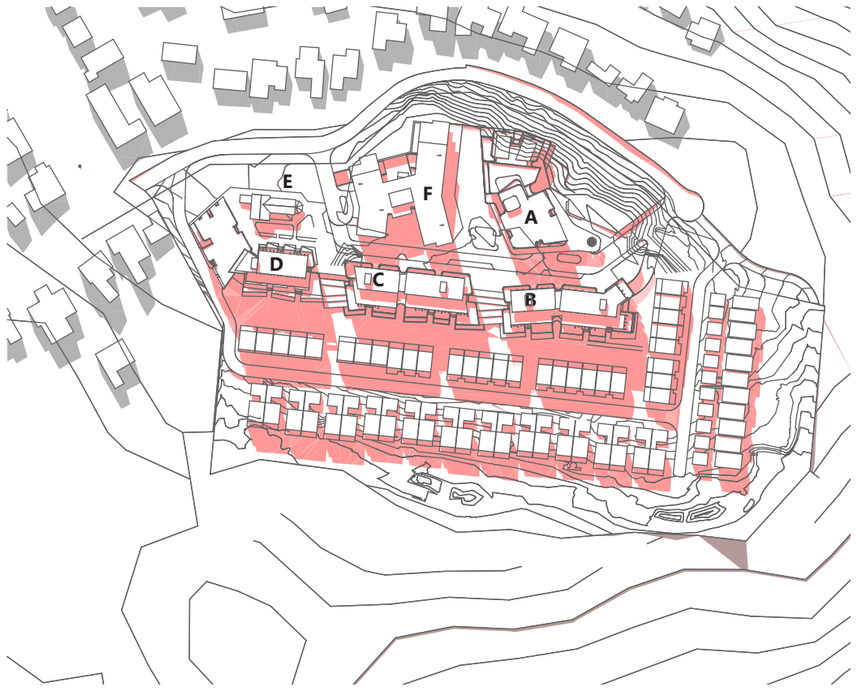
The majority of independent living units receive more than two hours of solar access between the hours of 9am-3pm.

Legend

- Shadow cast by new development
- Shadow cast by existing context

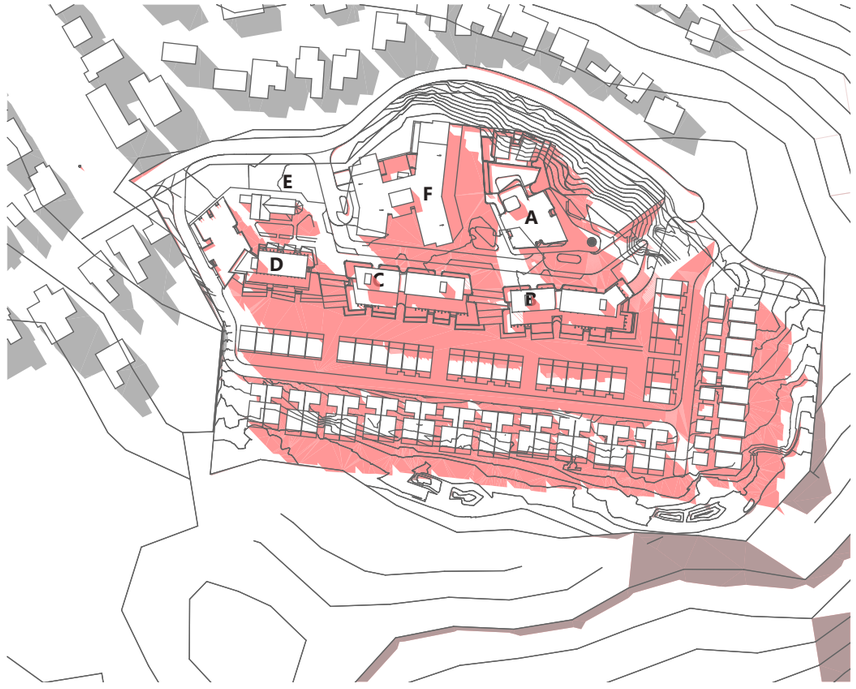
SHADOW ANALYSIS

21st June - 12PM



21st June - 13PM

21st June - 14PM

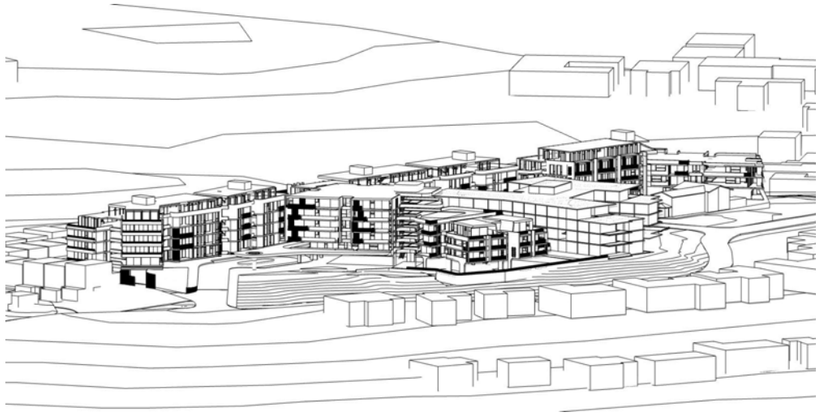


21st June - 15PM

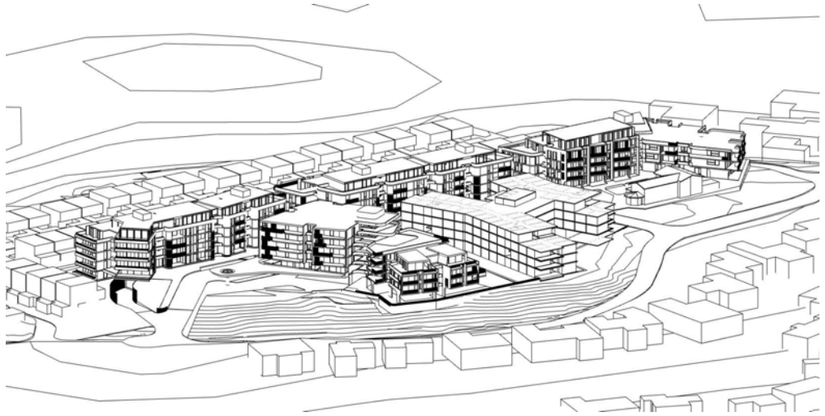
Legend

- Shadow cast by new development
- Shadow cast by existing context

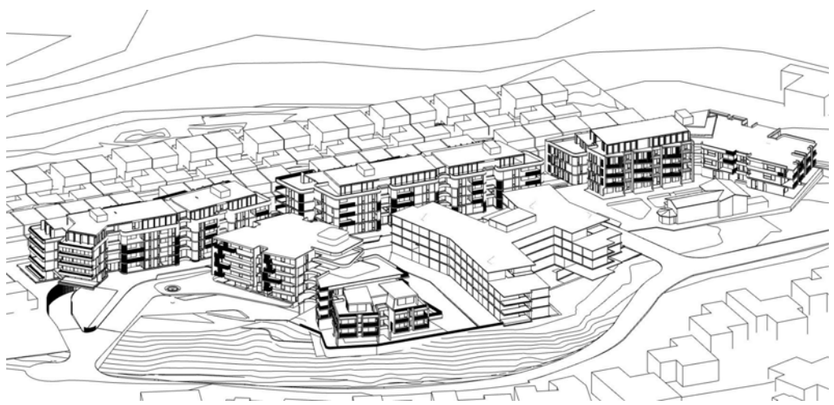
SOLAR ACCESS



21st June - 8AM



21st June - 9AM



21st June - 10AM

21st June - 11AM

Solar Access to Retirement Village

The built form in the amended master plan is oriented to maximise the number of north facing apartments receiving direct sunlight within living areas and private open spaces. Upper level setbacks and building indentations have enhanced solar access to single aspect south facing apartments. In addition, high elevation of the site allows south-facing units to enjoy significant amenity through bushland views.

TOTAL ILUS

2-HOUR **70.7%**

NO SOLAR **22.0%**

BLDG A

2-HOUR **70.0%**

NO SOLAR **6.7%**

BLDG B

2-HOUR **70.7%**

NO SOLAR **24.4%**

BLDG C

2-HOUR **70.7%**

NO SOLAR **29.3%**

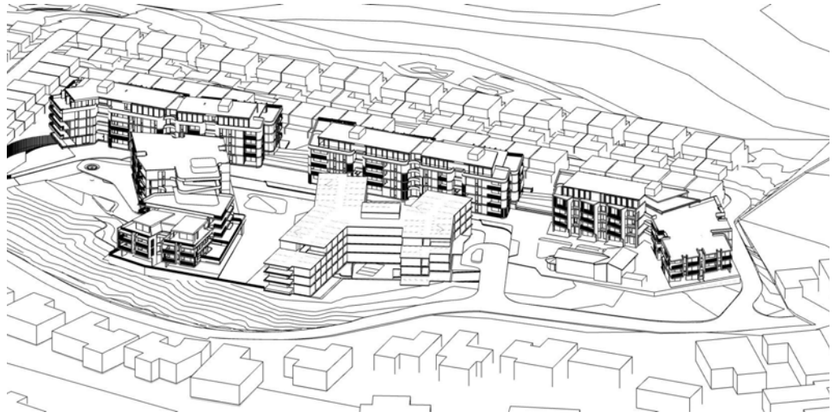
BLDG D

2-HOUR **71.1%**

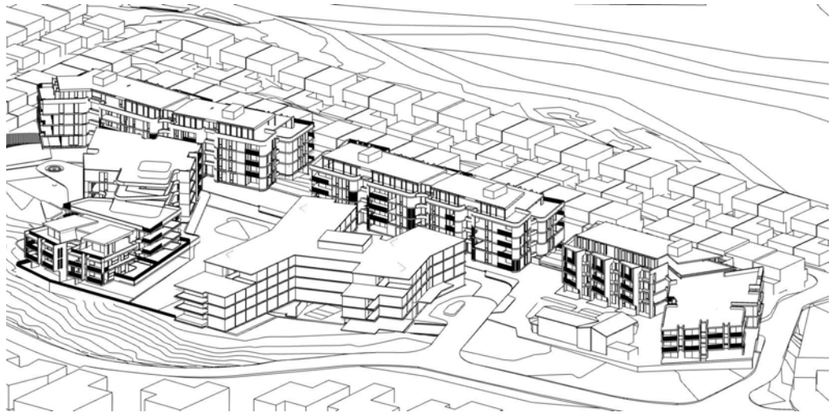
NO SOLAR **23.7%**

SOLAR ACCESS

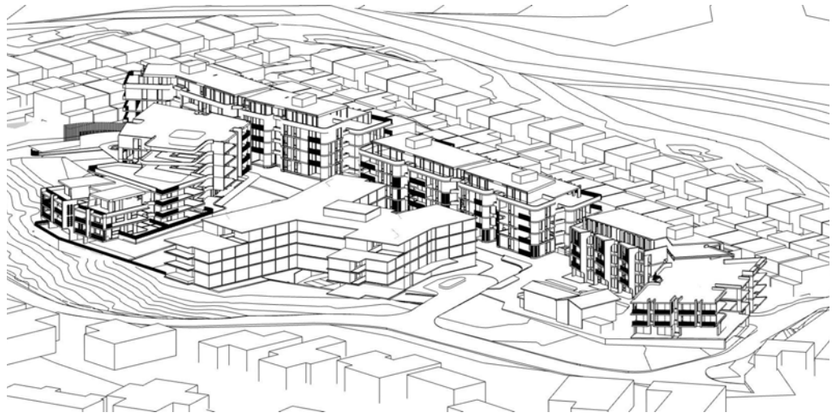
21st June - 12PM



21st June - 13PM

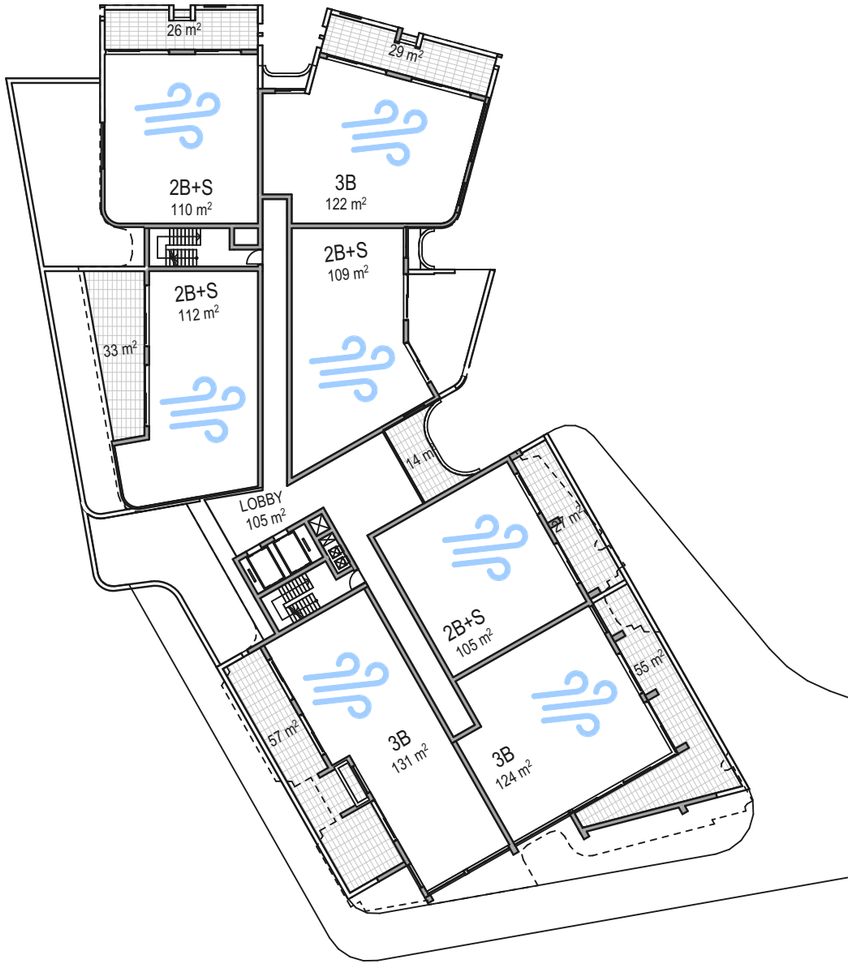


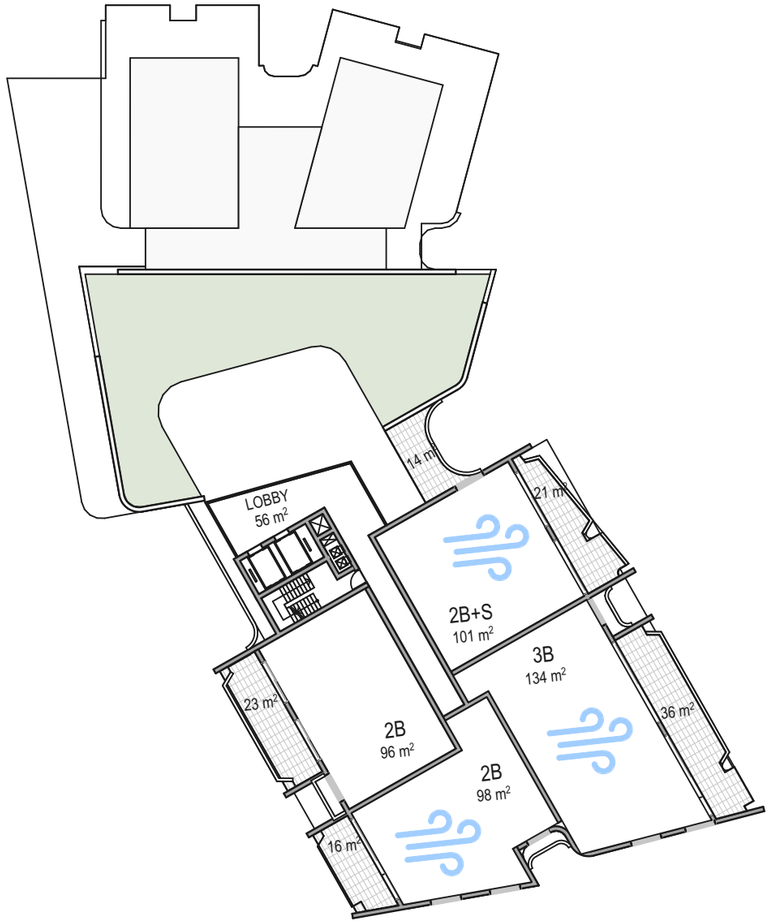
21st June - 14PM



21st June - 15PM

NATURAL VENTILATION - BUILDING A





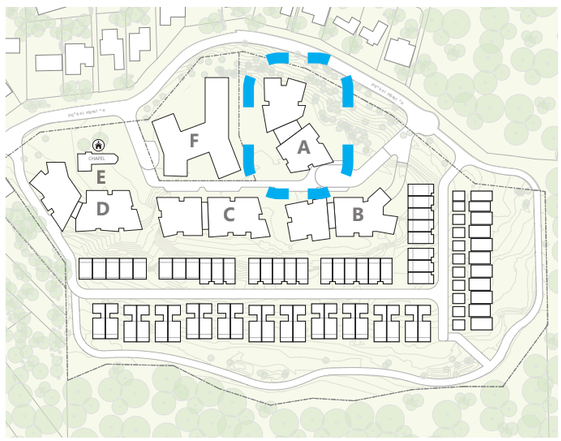
Natural Ventilation to Retirement Village

Building floorplate is designed such that dual aspect apartments with direct exposure to the prevailing winds are maximised within each building. Effective building indentations as well as articulation of the corners and balconies have been considered to enhance natural cross ventilation.

Amenity to the apartment corridors is ensured by providing windows at each lift lobby and core. As residents step out of the lift onto their home floor, natural light and a visual connection to the outside is maintained.

BLDG A

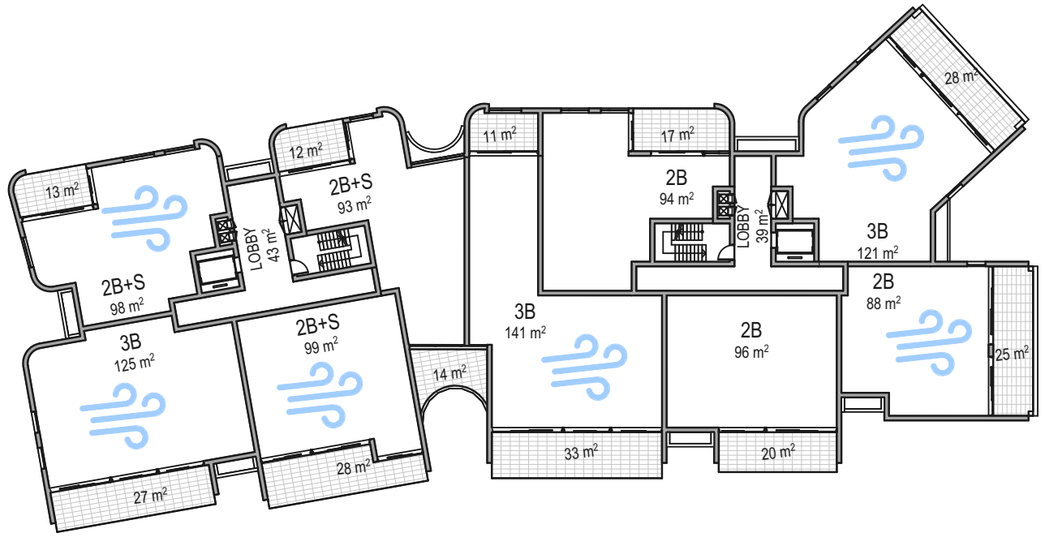
86.7%

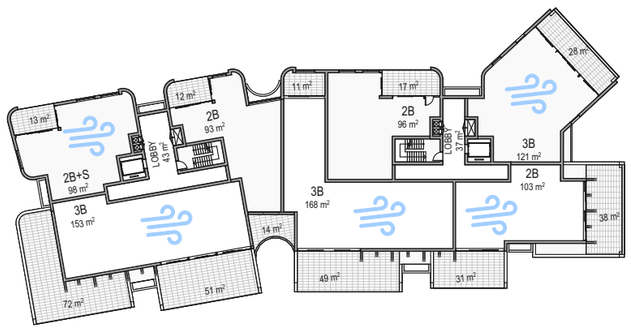


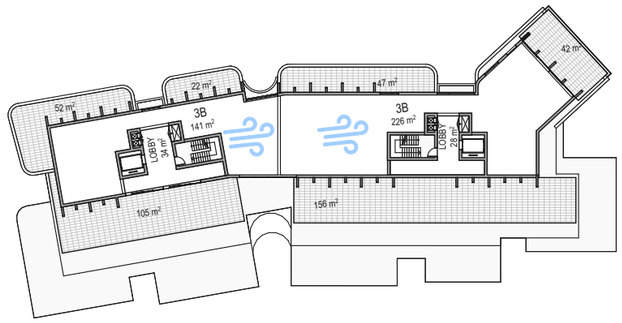
NATURAL VENTILATION - BUILDING B

BLDG B

70.7%



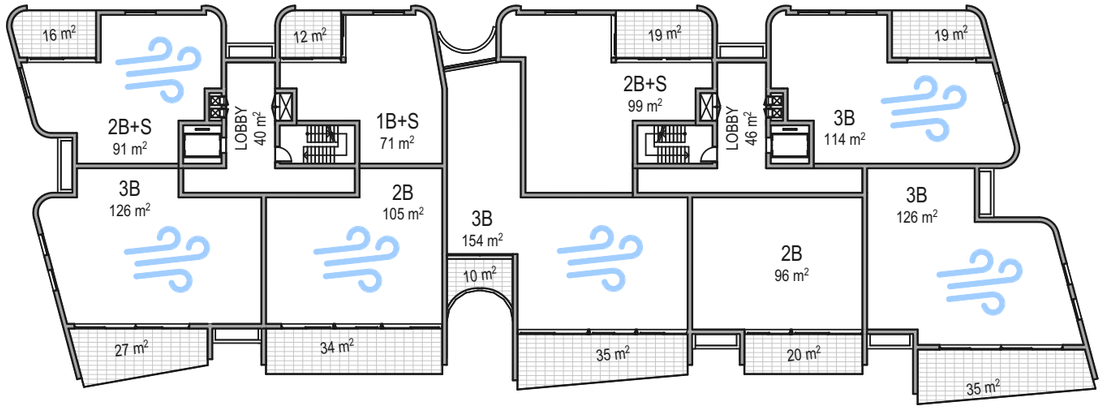


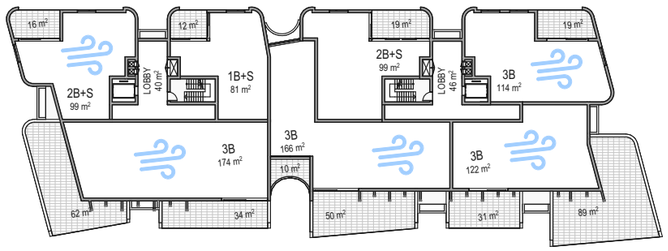


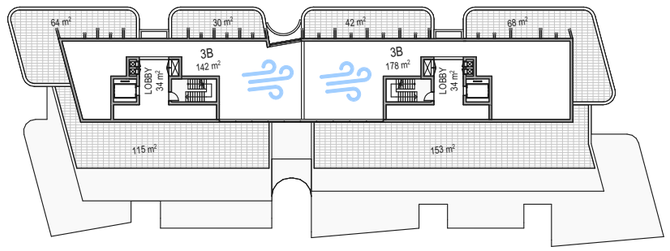
NATURAL VENTILATION - BUILDING C

BLDG C

70.7%

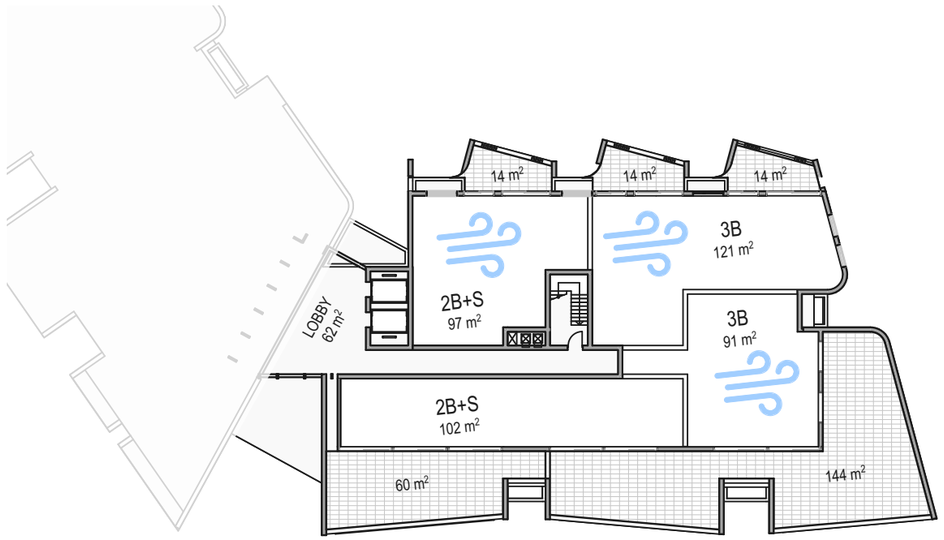






5 COMPLIANCE

NATURAL VENTILATION - BUILDING D



BLDG D

73.7%

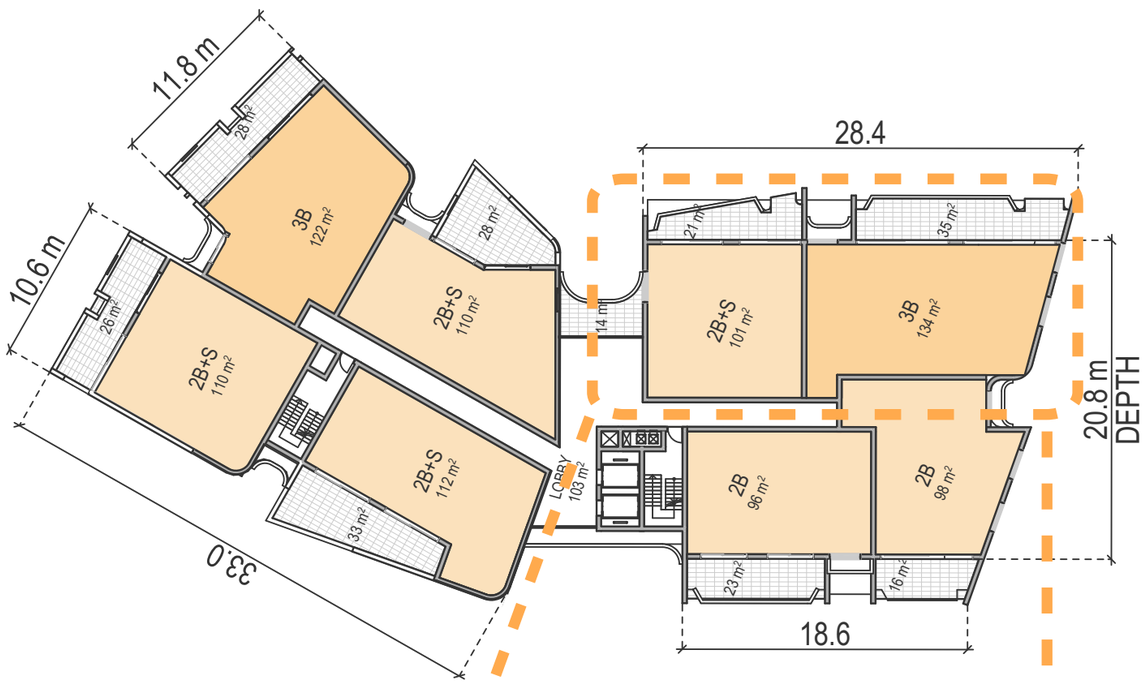
BUILDING SEPARATION

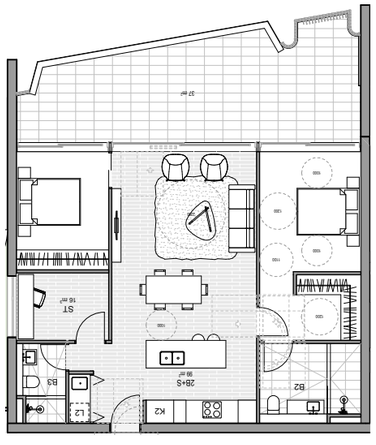
Building Separation to Retirement Village

ADG compliant building separation has been established throughout the retirement village between ILU buildings and between apartments and RACF building.

Amenity to the apartments as well as communal and private open spaces is ensured by providing adequate building separation that increases proportionally to the building height.

BUILDING DEPTH - BUILDING A



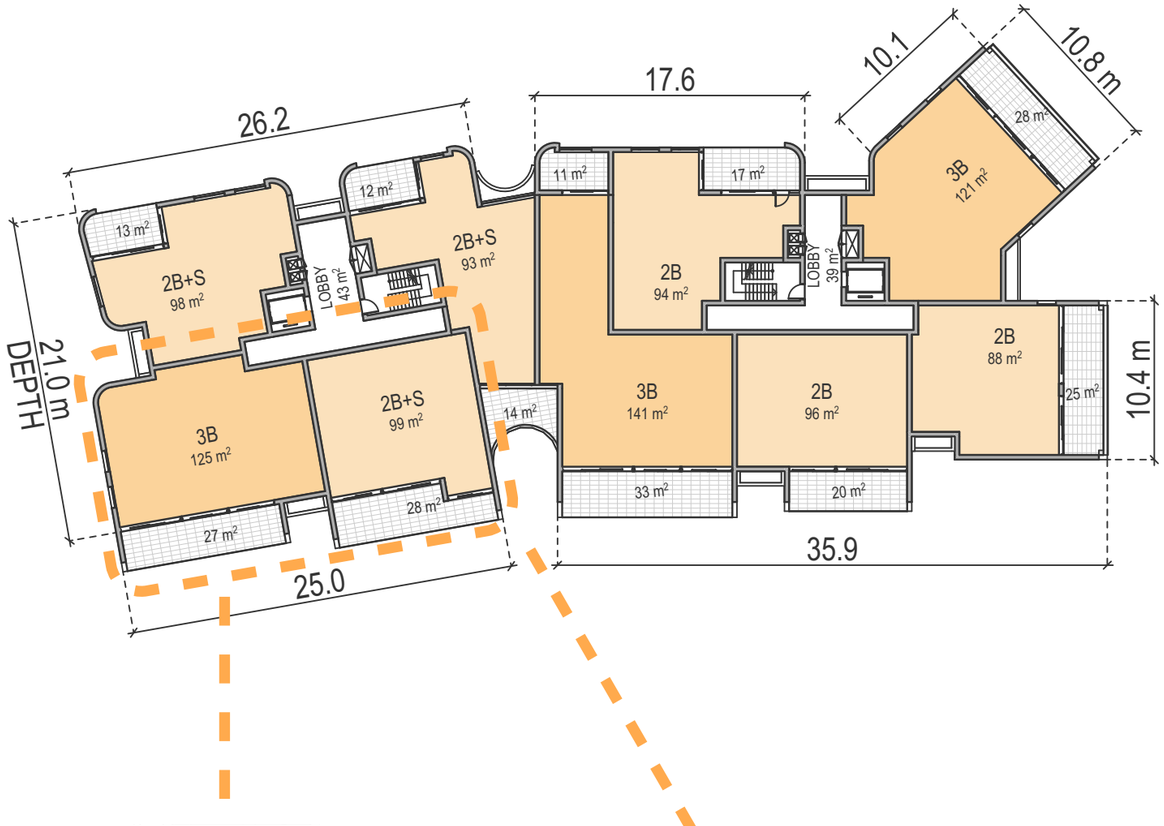


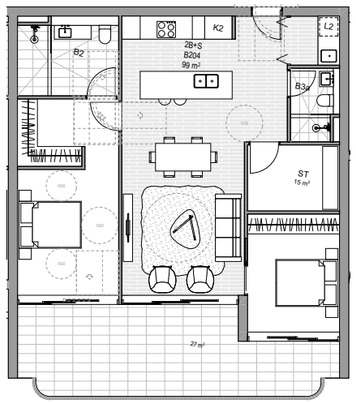
Building Depths & ADG Compliance

Indicative apartment plan layouts are shown to illustrate how the building depth has been considered such that ADG objectives relating to amenity, size and layout are met for each unit.

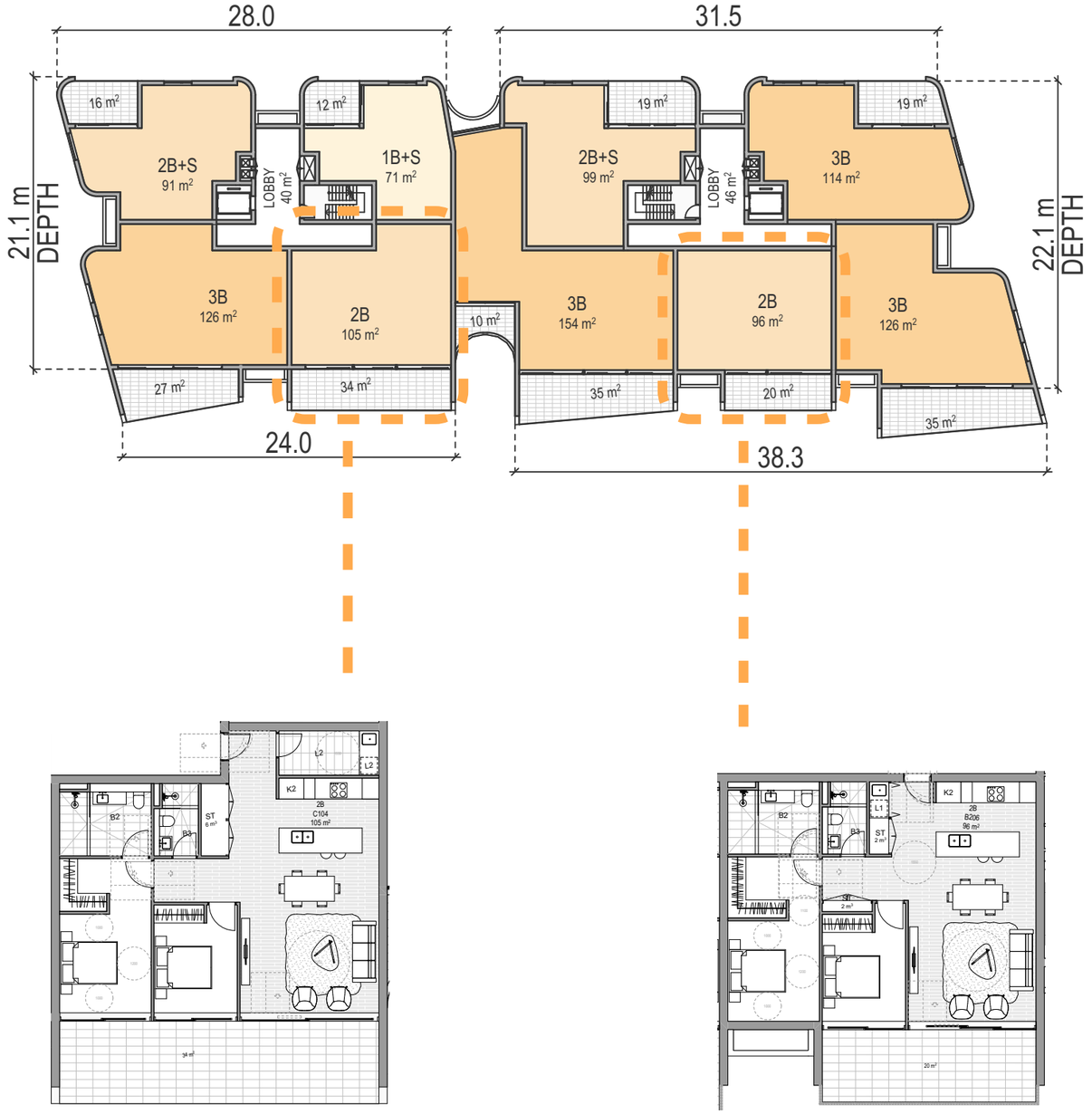
The building massing has been articulated such that each building reads as a series of elevations no longer than 40m in length.

BUILDING DEPTH - BUILDING B

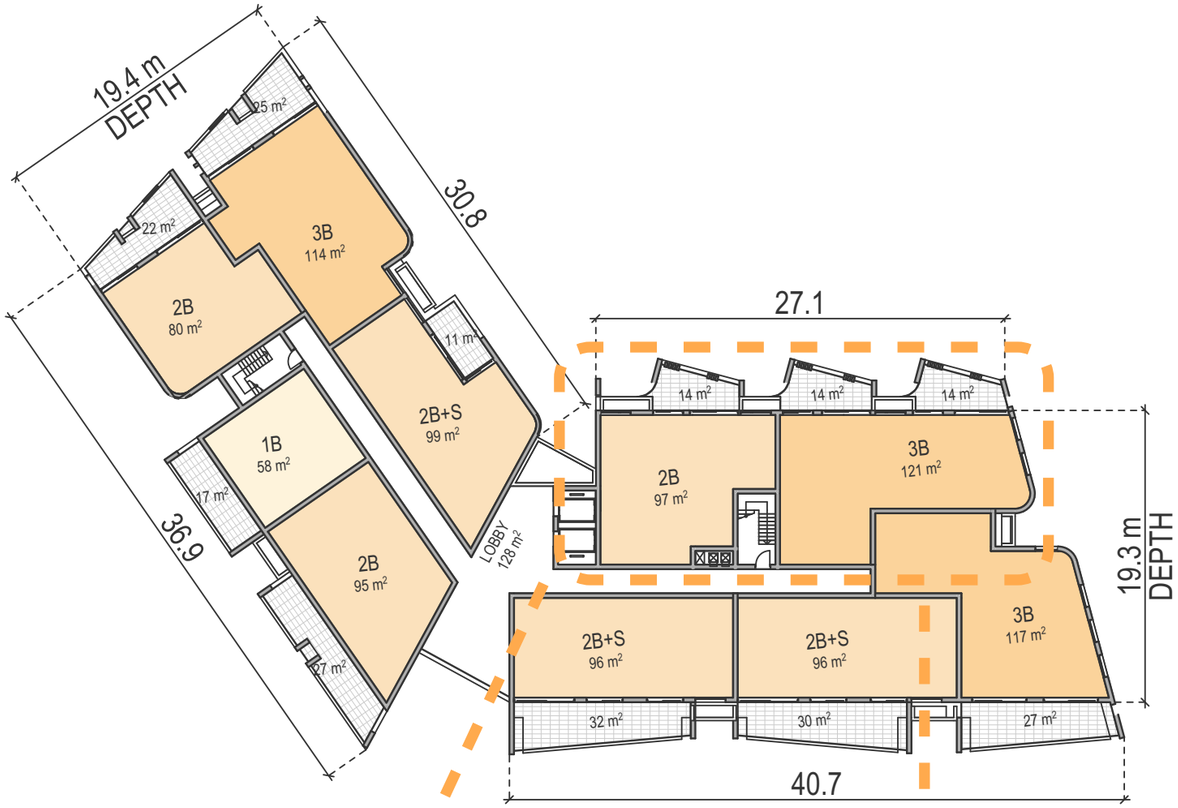


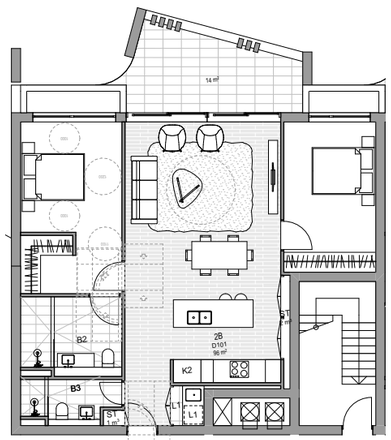


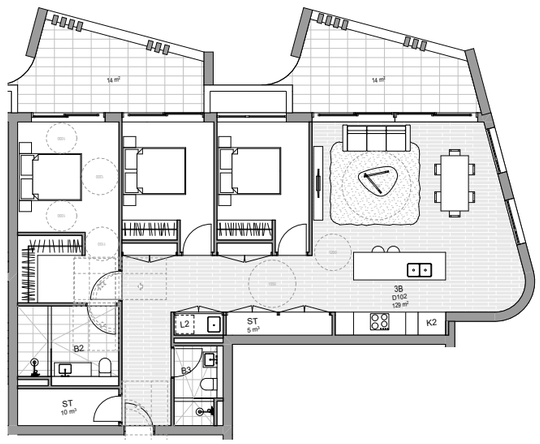
BUILDING DEPTH - BUILDING C



BUILDING DEPTH - BUILDING D







6
LANDSCAPE RESPONSE

LOCAL CHARACTER








LANDSCAPE CHARACTER

Swain Gardens + Gordon Creek + Lane Cove + Garigal National Park

Killara is located within the Lower East of Ku-ring-gai council area and is surrounded by vegetation corridors distinctive of Sydney's bushland. Within close vicinity to the site you have Swain Gardens, Seven Little Australians Park, Gordon Creek, Lane Cove National Park and Garigal National Park National Park.

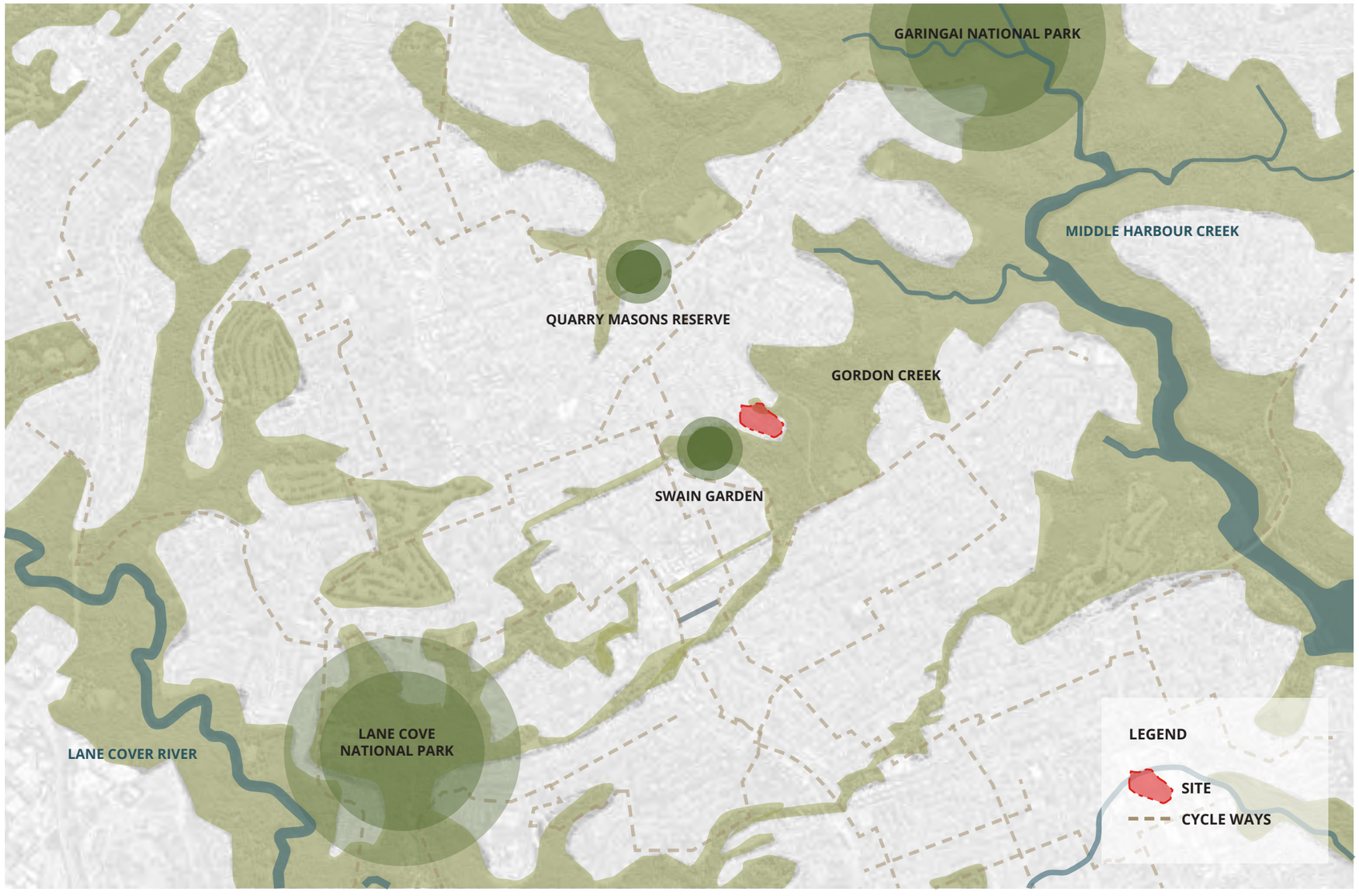
Detahed houses on large lots within garden settings feature heavily in the north of the Lower East. Complemented by mature well-planted streets, these areas are synonymous with the idea of the idyllic and leafy North Shore.

URBAN CHARACTER

Killara Neighourhood

Key characteristics of the Lower East Killara neighbourhood include:
- Streets running perpendicular to the Pacific Highway
- High amount of heritage items
- Consistent street layout reflecting the urban development of the early 1900's
- Large residential lots with considerable private open space
- Many houses with pools and tennis courts
- Archbold and Eastern Arterial roads bisect this area as a major traffic cartery
- Dense tree canopy
- Undulating topography that drops away quickly from the Pacific Highway to Middle Harbour
- Excellent areas of flora and fauna habitat

GREENERY CONNECTIONS




SWAIN GARDEN


GORDON CREEK


QUARRY MASONS RESERVE


LANE COVE NATIONAL PARK


GARINGAI NATIONAL PARK

TOPOGRAPHY & VIEWS

The site's topography is a defining characteristic which falls approximately 13 meters from the northern boundary with Stanhope Road to the southern boundary along Lourdes Avenue and the bushland edge. This level change and elevation provides valuable views of Chatswood and Sydney city skylines. Many existing roads and access paths are steep. Our design will make use of this challenge in creating safe access and movement for residents.

1 View of bushland to southern site boundary

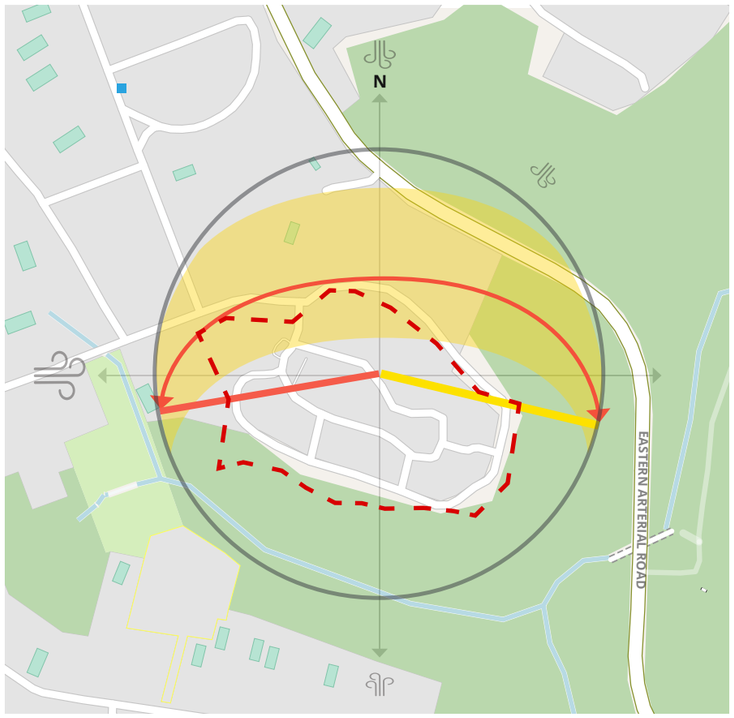
2 View from First Avenue

3 View of embankment along Stanhope Avenue

4 Access road along eastern site boundary

LOCAL ANALYSIS

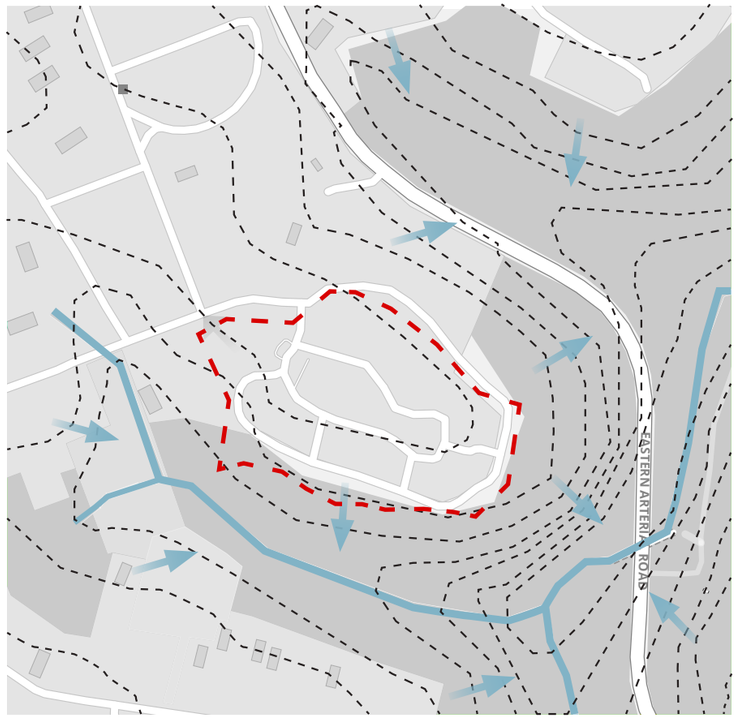
Solar Access



KEY

- SUNRISE
- SUNSET
- SOLAR PATH
- PREVAILING WINDS

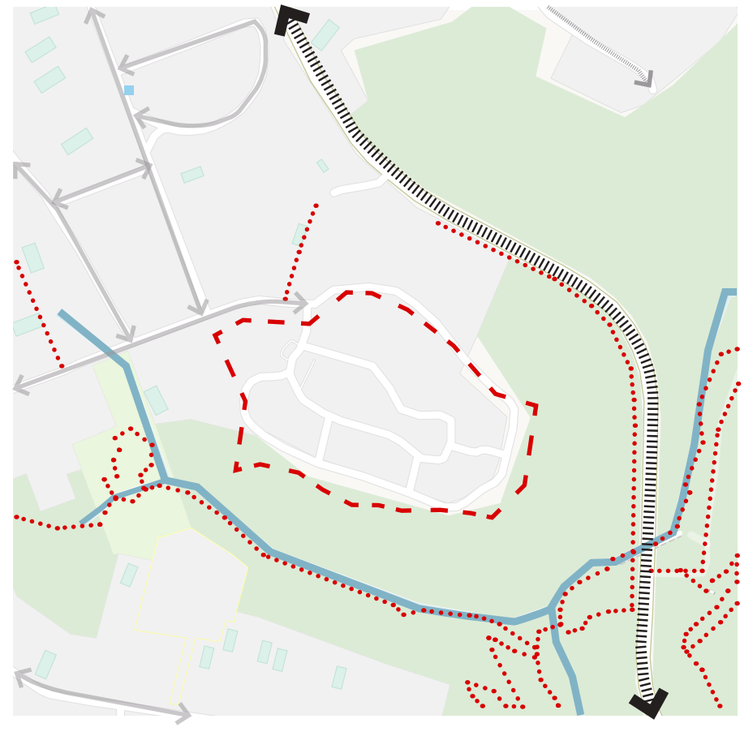
Hydrology



KEY

- 10M CONTOURS
- WATER FLOW
- WATER BODY

Circulation



KEY

- WALKING TRAILS
- WATER FLOW
- WATER BODY

LANDSCAPE MASTER PLAN

TREE CANOPY AREA = 25% OF SITE

TOTAL SITE AREA = 52,906m²

KEY

1. **POCKET PARK OPPORTUNITY**
2. **SHAREWAY**
3. **VILLAGE HEART**
4. **WALKING TRACK**
5. **GREEN CORRIDORS WITH DRAINGE SWALES**
6. **SWALE**
7. **SEATING/ REST AREA**
8. **GROTTO**
9. **CENTRAL BUSH WALKING SPINE**

EXISTING TREE CANOPY

LEGEND

TREE CANOPY AREA = 11,518m² (22% OF SITE)

TOTAL SITE AREA = 52,906m²

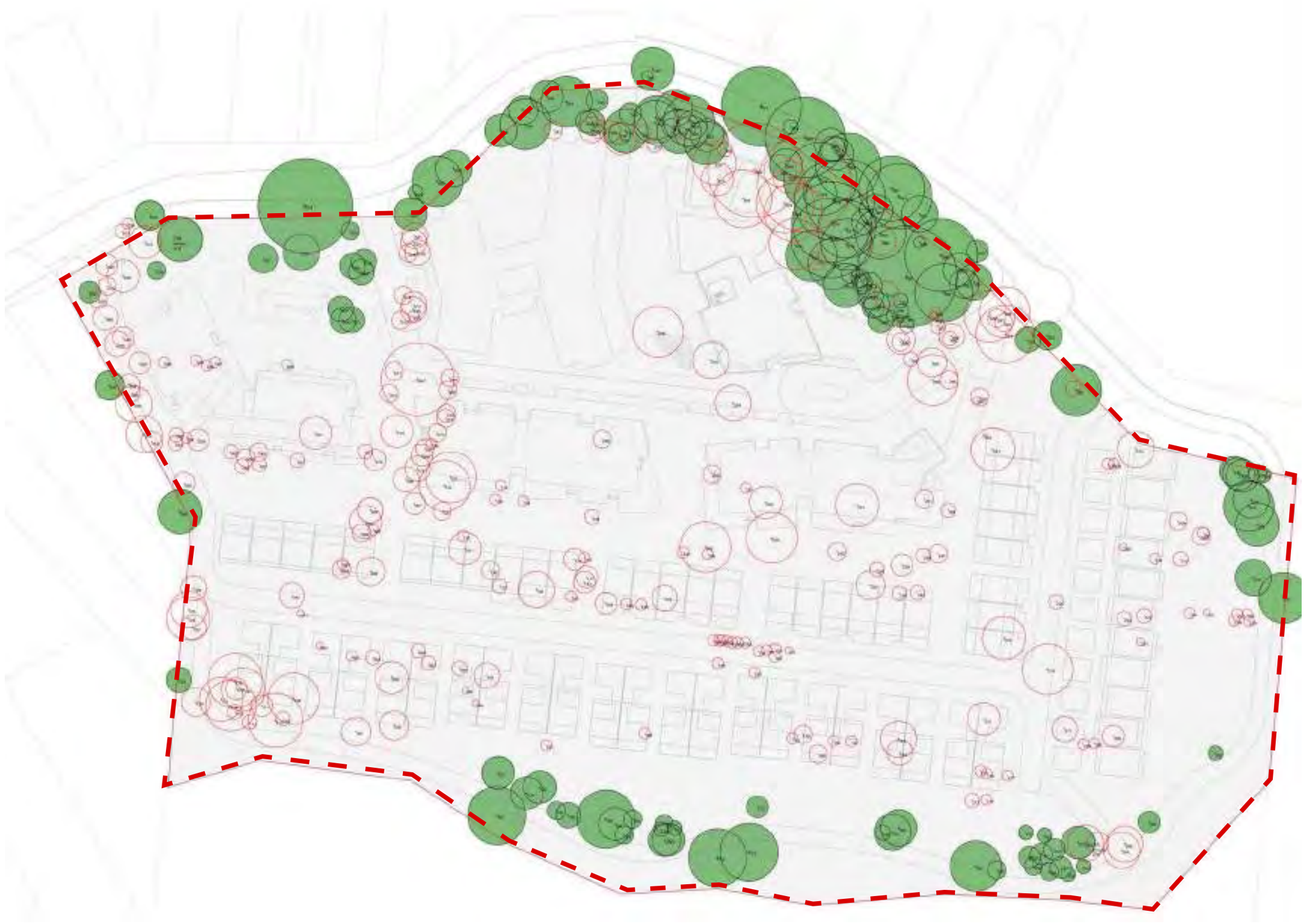
PROPOSED TREE RETENTION

LEGEND

TOTAL TREES RETAINED = 140

TOTAL TREES REMOVED = 239

TOTAL TREES ON-SITE = 379



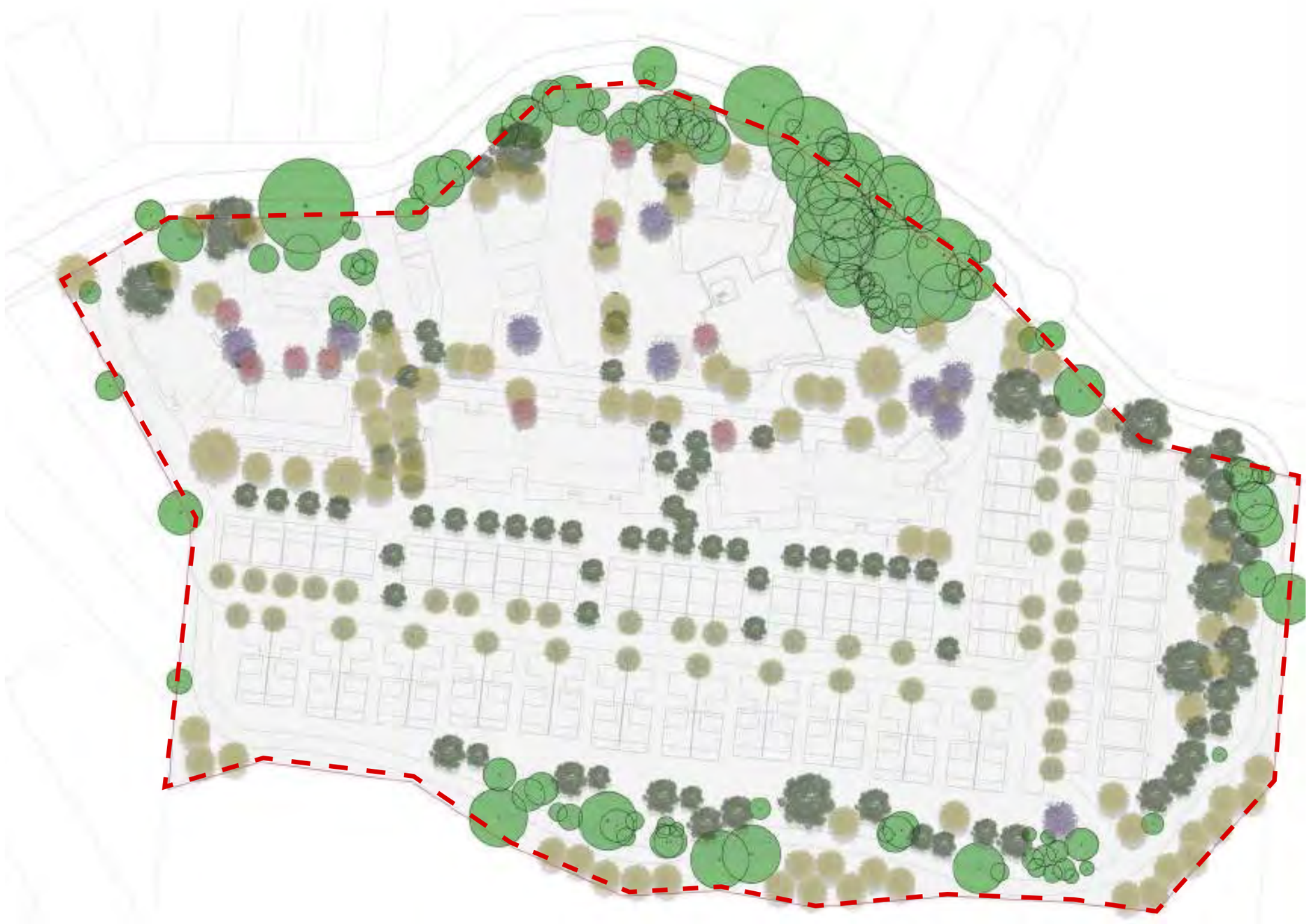
PROPOSED TREES

LEGEND

- **NATIVE TREES = 87**
- **NATIVE FEATURE TREES = 83**
- **NATIVE FEATURE TREES = 9**
- **EXOTIC FEATURE TREES = 9**
- **STREET TREES = 51**
- **TOTAL TREES RETAINED = 140**

TOTAL PROPOSED = 239

TOTAL = 379



PROPOSED DEEP SOIL

LEGEND

DEEP SOIL ZONE = 23,804m² (40% OF SITE)

PROPOSED COMMUNAL OUTDOOR SPACES

LEGEND

- **COMMUNAL OUTDOOR SPACE = 6,540m²**
- **COMMUNAL OUTDOOR SPACE = 6,000m² (25% OF SENIOR LIVING)**
- **COMMUNAL OUTDOOR SPACE (TOWNHOUSES) = 540m² (min. 144m² required)**
- **SENIOR LIVING SITE AREA = 23,876m²**
- **TOTAL SITE AREA = 52,906m²**

SOLAR ACCESS TO COMMUNAL OUTDOOR SPACES

21st June - 10AM

21st June - 11AM

21st June - 12PM

21st June - 13PM

Solar Access to Communal Outdoor Spaces

The village enjoys significant open space amenity as well as large pockets of green that receive generous, compliant soalr access year-round to the principal usable part of the communal outdoor spaces.

SENIORS LIVING

2-HOUR

~80.0%

TOWNHOUSES

3-HOUR

100.0%

VILLAGE HEART

Open, flexible landscape for active and social activities including opportuntity for covered BBQ area, outdoor exercise equipment and level lawn areas.

KEY

1. **OUTDOOR DINING OPPORTUNITY**
2. **VIEWING LAWN**
3. **EXISTING CLUSTER OF TREES**
4. **OPPORTUNITY FOR UNDERCOVER BBQ AND SOCIAL AREA**
5. **OPPORTUNITY FOR OUTDOOR EXERCISE/PLAY**
6. **CLUBHOUSE DROP OFF/TURNING CIRCLE**

VILLAGE HEART

As the centre of the Lourdes development, the 'Village Heart' is to be programmed as a community hub for flexible usage and cultural exchange, whilst maintaining a sensitive approach to surrounding ecologies. The character and programming should have a familiar, village feel and provide community facilities such as play, flexible opportunities for outdoor activities and picnic facilities.


Natural paving elements


Sheltered/shaded zones


Nightime amenity and security


Utilisation of natural land features to create interest & character

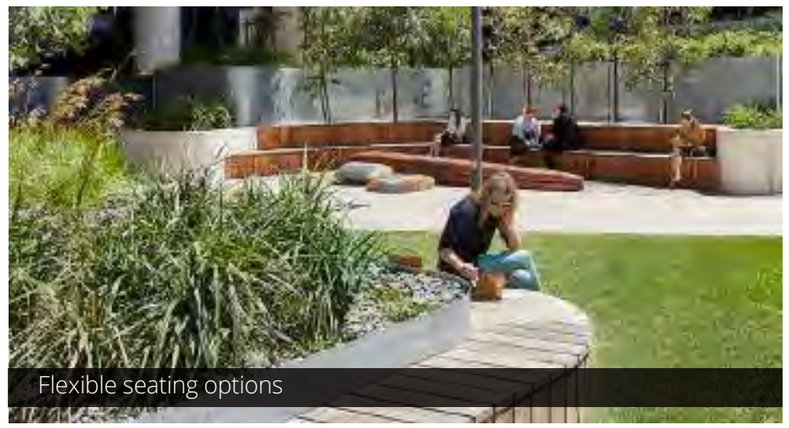

Petanque court


Activated centre


Native species


Opportunity for outdoor exercise

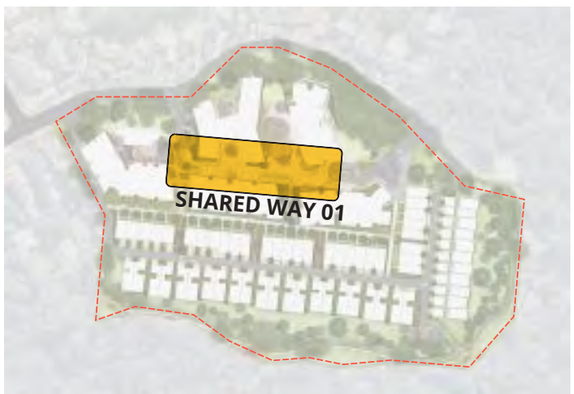

Open lawn amenity for flexible use


Flexible seating options

MAIN STREET

The new main street becomes the heart of the development; encouraging cycling, sitting, standing and walking activities based on a pedestrian focussed public domain.

KEY PLAN



SHARED WAY 01

KEY

1. **SHARED WAY**
2. **DROP OFF CAR PARKING**
3. **RAC ADMIN COURTYARD**
4. **CLUBHOUSE DROP OFF/TURNING CIRCLE**

MAIN STREET & ROADS

Cars and people co-exist. The paved shared way and roads on site creates a shared ground plane experience with new street trees and well placed street furniture. These elements compress the perceived width of the street and slows motorists down. Street furniture and planters create a friendly pedestrian environment and brings people to the street.


Shade trees over shared way to reduce heat effect


Permeable paving


Laying out shared ways around existing mature tree species

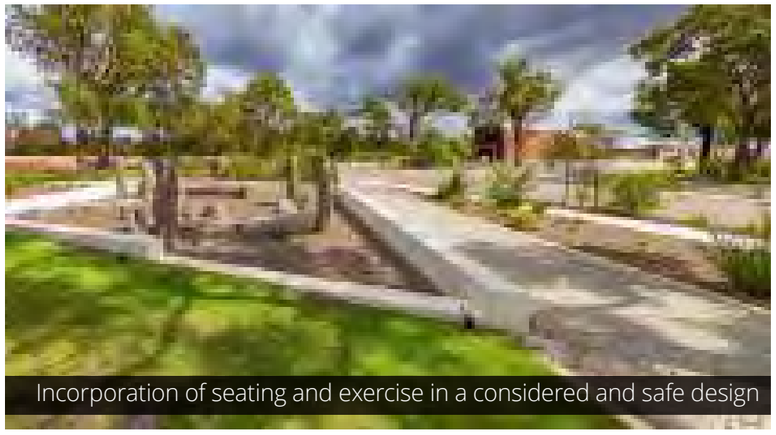

Retainment of existing mature tree species


Incorporation of WSUD principles with native drainage swales

Wayfinding signage


Native grass species


Use of natural materials to suit the surrounding bush setting


Incorporation of seating and exercise in a considered and safe design

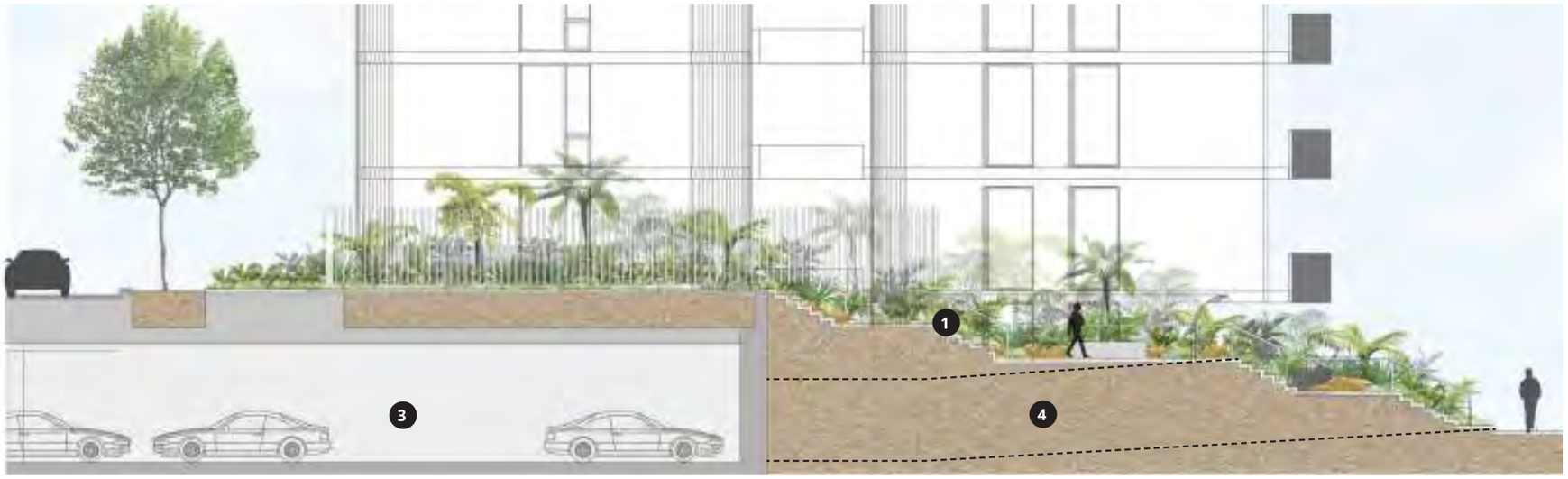
GREEN CORRIDORS

Water and ecological management is an integral part of the Lourdes development which is highlighted in the design through green corridors working through the banking site topography. These linear strips of land support the diverse ecological communities of the area and are comprised of vegetation, soils and topography.

Not only do these corridors promote a health ecosystem they are also eye-catching initiative that provide aesthetic and recreational advantages for the senior's community. They furthermore provide recreation and active transport opportunities through pedestrian pathways. Where appropriate, pathways are proposed in the landscape that are sensitively designed and consider the potential impacts to the existing landscape, existing mature trees, natural topography and drainage courses.

KEY

1. **TERRACED LANDSCAPING**
2. **STEPPED PATH**
3. **BASEMENT UNDER**
4. **BASEMENT CONNECTION**



GREEN CORRIDORS

The landscape character of the ephemeral corridors will take on a distinctly ecological, natural bushland feel with filtered visual links through. Opportunity to slow and filter the water through drainage swales will occur through these corridors, mitigating flood levels and allowing users to connect with natural systems - both urban and naturalised. Furthermore, there is the opportunity to restore natural habitat and remove noxious weeds and invasive planting.

Staggered stair immersed in nature

Feathered stairs integrated with planting

Drainage swales

Sensory appeal

Secluded garden nooks and areas of immersion along trail

Elevated walkways to allow water flow under

TYPICAL SECTION - SWALE / OVERLAND FLOW

MATERIALITY

A practical and robust proposal of materials sympathetic with the natural surroundings and local ecotones of the Lourdes Development Site...

The materials strategy will curate a range of finishes which will express the unique characteristics of the Site. Priority will be given to materials of local provenance, visibly grounding the development in its connection to the surrounding bushland which defines the landscape character.

Feature finishes will be used to elevate key outdoor areas and provide definition to active and passive open spaces, and express a journey through a narrative of diverse and inter-connected web of landscape typologies.

In addition, the materials and finishes will be:

- Locally sourced from Australia and sustainable
- Durable and age gracefully over time
- Low maintenance solutions that can also minimise waste and reduce carbon footprint where possible
- Where possible, have high Solar Reflectance Index (SRI) value and/or lighter coloured materials to mitigate heat island effect.
- Robust, self-finished materials
- Considered materials that are non-combustible and protect from bushfire threat

SURFACES

Natural materials reinforcing the bush character

Decomposed gravel

Permeable trihex treatment to shared ways

Decking

Warmer tones in pavement types

Concrete pavements

Coherent and safe pathway design

FURNITURE

Loose furniture to hardstand

Precast concrete seat

Rocks as incidental seating and wayfinding

PLANTING

Proposed plants that generate 'cooler' spaces, define areas, highlight views, create visual interest and provide shade...

The site is surrounded by ecologically rich bushland. The landscape design will incorporate appropriate plant species and design where land is managed as an Asset Protection Zone (APZ). The APZ Planting Palette will aim to aid reduction of potential bush fire impacts in nominated zones.

The strategic distribution of the Architecture will enable landscaping to be spaced around and between building form, delivering:

- Easy to maintain soft landscaping
- Uncomplicated landform and landscape structure - native trees and open grassland
- Plants the require minimal water and will generate 'cooler' green spaces, which in turn assist in transforming the urban heat island effect
- Level grass areas for flexible use
- Use of tree planting to provide visual interest, define areas, highlight views and provide shade
- Utilisation of locally native species to reinforce key landscape character zones
- Utilisation of native species to support year-round comfort to outdoor spaces

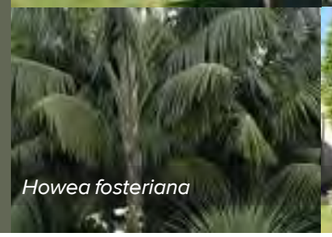
Trees

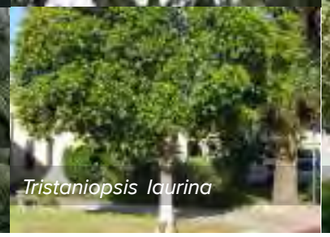

Cupaniopsis anacardioides


Callicoma serratifolia


Lophostemon confertus


Elaeocarpus reticulatus


Howea fosteriana


Tristaniopsis laurina

Grasses


Lomandra longifolia


Liriope muscari

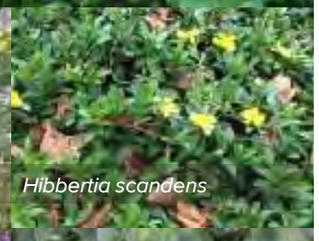

Dianella revoluta


Dianella utopia

Groundcovers + Climbers


Viola hederacea


Grevillea juniperina 'Gold Cluster'


Hibbertia scandens


Limonium perezii


Dichondra 'silver falls'

Shrubs + Accents


Hardenbergia violacea


Bauera rubioides


Grevillea sericea


Chrysocephalum apiculatum


Arthropodium cirratum


Philodendron xanadu


Anigozanthus flavidus

Suite 602, L6, 150 Karangahape Road
AUCKLAND 1010
New Zealand

Tel +64 9 281 3800
aucklan d@plusarchitecture.com.au

Ground Floor, 102 Adelaide Street
BRISBANE QLD 4000
Australia

Tel +61 7 3067 3599
brisbane@plusarchitecture.com.au

Level 1, 60 Cashel Street
CHRISTCHURCH 8013
New Zealand

Tel +64 3 337 9481
christchurch@plusarchitecture.com.au

Suite 5, 18 Tedder Avenue
MAIN BEACH QLD 4217
Australia

Tel +61 7 5610 1913
goldcoast@plusarchitecture.com.au

5/107 Elizabeth Street
MELBOURNE VIC 3004
Australia

Tel +61 3 8696 3999
melbourne@plusarchitecture.com.au

160 Beaufort Street
PERTH WA 6000
Australia

Tel +61 8 6500 6490
perth@plusarchitecture.com.au

Level 4, 222 Clarence Street
SYDNEY NSW 2000
Australia

Tel +61 2 8823 7000
sydney@plusarchitecture.com.au

NOMINATED ARCHITECT (NSW)

Amit Julka 10002,
Rido Pin 11286

plus
architecture