Hill Thalis
Architecture + Urban Projects

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Project No. 10.34

Urban Design – Dual Occupancy Lot Size Study

for

Ku-ring-gai Council

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Acknowledgement of Country

Hill Thalis acknowledges the unceded lands of the First Nations people on which this work has been carried out. We pay our respects to past and present ancestors and custodians and recognise their continuing connection to land, waters, sky and culture.

Urban policy that cares for Country is cognoscente of place, seeks to avoid and minimise impacts as a public responsibility to our cities so that how we structure our cities prioritises respect for the lands and seeks to avoid impacts.

1.0 Introduction

1.1 Scope

Hill Thalis Architecture and Urban Projects has been engaged by Ku-ring-gai Council to investigate and identify Lot Sizes in response to the *Explanation of Intended Effect: Changes to create low-and mid-rise housing* that will permit dual occupancy housing in all R2 Low-Density Residential land use zones across NSW as proposed by the Department of Planning, Housing and Infrastructure (DPHI / the Department).

The Department has nominated a minimum lot size of 450m2 on which dual occupancy will be permitted on R2 zoned land where local councils have not otherwise set their own minimum lot sizes within their Local Environment Plans. The Department guidance is that establishing a minimum lot size is to:
- be based on the LGA's median lot size of R2 zoned lots;
- capture at least 50% of R2 lots across the LGA.

The Department has also mandated the minimum 450 m2 lot size for the following 'Local Housing Areas'. These are associated with local centres, transport linked and facilities in Ku-ring-gai:

- Roseville 400-800m from the station – excludes TOD SEPP areas
- Killara 400-800m from the station – excludes TOD SEPP areas
- Lindfield from edge of E1 zone to 800m – excludes TOD SEPP areas
- Gordon from edge of E1 zone to 800m – excludes TOD SEPP areas
- Turramurra from edge of E1 zone to 800m
- Pymble 0-800m from the station
- Wahroonga 0-800m from the station
- St Ives from edge of E1 zone to 800m

Note: for the purpose of this Study, Warrawee is excluded as there is no E1 (Local Centre) zoning at this location.

1.2 Strategy

While the proposal for increasing dual occupancy housing is consistent with Ku-ring-gai's LSPS Local Planning Priorities for Liveability (K3 to K11), of particular interest to Ku-ring-gai is establishing lot sizes that also will be consistent with achieving Planning Priorities for Liveability (K12, K13 and K16) and for Sustainability (K27 to K43), the LEP, and Development Control Plan that applies to all development within the LGA. See Appendix 1 - Summary of Ku-ring-gai's LSPS Planning Priorities.

Ku-ring-gai's current public policies have been established to ensure that as our cities increase in density, all development occurs through a well-coordinated and evidence-based framework that:
- protects existing biodiversity and its connectivity between the Ku-ring-gai Chase, Garigal, and Lane Cove National Parks, which define the eastern, western and northern boundaries of the LGA.
- retains and protects existing urban canopy[1]
- facilitates urban canopy repair (where needed)
- recognises the importance of urban heat mitigation with intensified urban development, and

[1] *Draft Urban Forest Strategy, 2022,* - prepared by ArborCarbon

- recognises and enhances the unique qualities of the seven identified Local Character Areas for all development.[2]

Housing typology is important to understand because of the impacts on urban canopy. Paired dwellings (commonly known as semi-detached) where both dwellings have a full exposure to a public road on lots of a size that facilitate meaningful deep soil for canopy trees result in superior urban and biodiversity outcomes. Well-considered and well-aligned development standards and controls are needed to avoid long-term poor outcomes.

Housing typologies /multiple subdivisions that require long driveways and battle-axe housing configurations result in poor outcomes including excessive areas of hard-stand due to limited/no direct exposure to a public road with dwellings being located behind each other.

This study seeks to determine lot sizes and locations to enable continued alignment with Council's policies and strategic plans. This includes the protection of ecology, movement towards minimising and mitigating urban heat island effects and net zero targets, ensuring high quality liveability standards of access to public transport and facilities, and maintaining Ku-ring-gai character of buildings within garden setting that include tall canopy trees.

Ku-ring-gai's existing suite of provisions within the KLEP 2015 and DCP 2024 continue to represent exemplars in NSW for balancing density and effective deep soil and canopy.

2.0 Methodology

2.1 Base information

Ku-ring-gai Council has provided the base information used for this investigation. This includes general cadastre mapping, TOD SEPP mapping, access to Urban Canopy mapping (prepared by ArborCarbon), land-use information, geo-referenced spatial information for topography, biodiversity, riparian, flood mapping, bushfire prone land, and heritage.

Ku-ring-gai Council has provided and required alignment with its LSPS which looks to focus increased densities close to the Local and Neighbourhood Centres and ensuring a considered approach to the social and environmental issues of housing delivery.

2.2 Methodology

Hill Thalis conducted the investigation in three parts as relates to dual occupancy:

<u>Stage 1: Analysis</u>
- Reviewed:
  - Dual occupancy in the *Explanation of Intended Effects* (December 2023) *SEPP (Exempt and Complying Development Codes) 2008, and SEPP (Housing) 2021*
  - Sought to understand overlaps for dual occupancy including clarifications where further Department guidance may be required.
  - Mapped the urban context of the EIE
  - Context of Ku-ring-gai's LEP for existing minimum lot size (and FSR if applicable).
  - Context of Ku-ring-ai's existing DCP controls for urban character including deep soil, landscape, site coverage.

<u>Stage 2: Investigated median lot size scenarios across the LGA</u>
- Carried out under three categories consistent with the Department's EIE and Ku-ring-gai's LSPS:
  - Department's identified 'Local Housing Areas' located in proximity to centres with transport and facilities

[2] *Ku-ring-gai Local Character Background Study Broad Local Character Areas Character Area Statements - As Adopted by Council in June 2021* – prepared by SJB

- Ku-ring-gai's Neighbourhood Centres identified in the LSPS for future investigations being suitable for increasing density
- Remaining R2 zoned lots across the LGA where EIE dual occupancy may be permitted.

Stage 3: Investigated and tested development scenarios within the Ku-ring-gai street and subdivision pattern

- Using existing lot and canopy mapping:
  - applied the EIE, *SEPP (Exempt and Complying Development Codes) 2008*, *SEPP (Housing) 2021* Chapter 3 Part 12 provisions
  - to understand implications for Ku-ring-gai's unique and valued urban character, urban canopy and biodiversity connectivity in context of the LSPS and existing local planning instruments
  - to determine appropriate lot sizes related to location that manage loss of canopy, deep soil and streetscape values
  - to determine lot sizes that deliver the Department's minimum of 50% of available R2 lots across the Ku-ring-gai LGA.

3.0 Assumptions

The EIE proposes the following:

- *SEPP (Exempt and Complying Development Codes) 2008* will apply for dual occupancy on R2 (Low Density Residential) land across the LGA subject to the minimum lot size in the KLEP 2015. The standards of the *SEPP (Exempt and Complying Development Codes) 2008* will apply to any CDC applications.
- *SEPP (Housing) 2021* will apply to all land within the 'Local Housing Areas' subject to the 450sqm minimum lot size requirement. The standards for dual occupancy development seeking a development application within the 'Local Housing Areas' will be guided by the *Low Rise Housing Diversity Design Guide*.
- KLEP 2015 minimum lot size will apply to all land outside the 'Local Housing Areas'. The standards for dual occupancy development seeking a development application outside the 'Local Housing Areas' will be guided by Ku-ring-gai's DCP.
- Dual occupancy development standards for inclusion into *SEPP (Housing) 2021* are expected to be released by the Department in early 2025. Development standards utilised for this investigation are based on the standards of *SEPP (Exempt and Complying Development Codes) 2008* with the basic standards of the EIE taking precedent.

- R2 land exempt from the policy is:
  - Bushfire Prone Lane
  - Heritage Items (and land on which the item is located)
  - TOD SEPP areas
  - all other land use zones.

  Note: the EIE identified some areas of flood prone land as exempt, however, none of Ku-ring-gai's mapped flood prone land is identified.

- Proposed non-refusal development standards and landscape provisions for dual occupancy within the 'Local Housing Areas' are as follows:

Non-refusal standards for dual occupancies within the 'Local Housing Areas'

Proposed non-refusal standards for dual occupancies in Greater Sydney:

- Maximum building height: 9.5 m
- Maximum floor space ratio: 0.65:1
- Minimum site area: 450 m2
- Minimum lot width: 12 m
- Minimum car parking: 1 space per dwelling

The non-refusal standards will apply to any dual occupancy in Greater Sydney where it is currently permitted or proposed to be permitted under these proposals.

Table 1: EIE Development Standards (p31)

Parent Lot size	Tree canopy target	Deep soil target	Tree-planting rate
<300m2	15%	15%	At least 1 small tree per dwelling
300-600m2	20%	20%	For every 200 m2 of site area, or part thereof, at least one small tree
>600m2	25%	25%	For every 225 m2 of site area, or part thereof, at least one medium tree

Table 2: EIE Landscape Provisions (Appendix C - p40)

The *Low Rise Housing Diversity Design Guide* continues to apply to dual occupancy development within the Local Housing Areas.

Note:
The above landscape standards should be understood in a wider context of research into canopy and the heat island effect in our cities[3]. Also reported by the Sydney Morning Herald 20th November 2024, research continues to reinforce that minimum required canopy cover needed to mitigate the urban heat island effect is 30% based on international research.

This is an international minimum, which Sydney currently does not achieve with only 17% of buildings found to be sufficiently shaded by canopy. Further context of the 30% minimum is considering a city's specific climate conditions where more canopy may be required to mitigate against increasingly hot and/or dry conditions.

Placing Ku-ring-gai into this context, parts of the LGA do have canopy cover of more than 50% that is exceeding best performers Singapore and Seattle at 45%. The lowest performing suburbs in Ku-ring-gai currently sit closer to the minimum of 30%.

Ku-ring-gai has in place DCP controls that remain exemplars for delivering the canopy needed to sustain increasing density that is supported by evidence. This can only be delivered via the development application pathway, which is discussed further within this study.

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[3] https://www.nature.com/articles/s41467-024-53402-2 ***Acute canopy deficits in global cities exposed by the 3-30-300 benchmark for urban nature,*** Dr Thami Croeser, Roshan Sharma Wolfgang W Weisser and Sarah A Bekessy, Nature Communications 15, Article: 9333 (2024)
Australian Bureau of Statistics. *Statistical Area Level 1.* https://www.abs.gov.au/statistics/standards/australian-statistical-geography-standard-asgs-edition-3/jul2021-jun2026/main-structure-and-greater-capital-city-statistical-areas/statistical-area-level-1 (2021).
Cities need the cool of trees, Bianca Hall, Sydney Morning Herald (p11), 20.11.2024

The NSW suite of SEPP development standards continue to facilitate the erosion of essential long-term canopy cover. While some progress has been made, the existing one-size-fits-all standards for deep soil and canopy are resulting in the intensifying of our cities where too much deep soil is replaced by roofs and hard stand/impervious surfaces.

3.1 Clarifications and interaction of development standards

The interaction of the *Explanation of Intended Effects* (December 2023) (EIE) with different Divisions within the *SEPP (Exempt and Complying Development Codes) 2008* (Codes SEPP) and EIE provisions for dual occupancy will require further guidance.

Dual occupancy
This is a form of attached dwellings, which may have differing provisions compared to the EIE:

Codes SEPP:

> ***dwelling house*** *means a building containing one dwelling, an attached dwelling or a semi-detached dwelling, but does not include any part of the building that is ancillary development, attached development, detached development or exempt development under this Policy.*

EIE and *Low Rise Housing Diversity Design Guide*:
These specifically identify dual occupancy as paired dwellings both facing a *public* street, rather than dwellings that may be one on top of another, or one behind another (battle-axe type - the subtly is 'lawful access' rather than 'facing a public road'). Under Codes SEPP 3B.1 (3):

> ***(3) Lot requirements*** *Complying development specified for this code may only be carried out on a lot that meets the following requirements—*
> *(a) the lot must be in Zone RU5, Zone R1, Zone R2 or Zone R3,*
> *(b) the lot must have lawful access to a public road at the completion of the development.*

Bushfire Prone Land
It is understood that when *SEPP (Housing) 2021* excludes Bushfire Prone Land making dual occupancy not permissible, it will supersede the existing *SEPP (Exempt and Complying Development Codes) 2008* provisions at s1.19A *Land on which complying development may not be carried out—bush fire prone land* and s3B.4 *Complying development on bush fire prone land.*

Note: For the purposes of this study, lots on bushfire prone land have been excluded (along with the other EIE identified exclusions). Exclusion of lots on any bushfire prone land is supported due to the increased fire protection required, BFPL generally being located where topography is steep and more costly to construct, often have riparian and biodiversity considerations making them more complex and less likely to result in dual occupancy development.

Facing a public road
The *Low Rise Housing Diversity Design Guide* for dual occupancy clearly states that the dwellings must both face a 'public road' and cannot be located behind each other. This is supported as generally sound policy that supports housing types more conducive to positive urban outcomes.

The Codes SEPP appears to have a similar approach with dual occupancies requiring 'legal access to a public road' as described above at 3B.1 (3) *Lot requirements and in the below definitions:*

Codes SEPP:

> ***3B.3 Determining lot type***
> *In this code, a reference to a lot is a reference to any of the following lots—*
> *(a) standard lot,*
> *(b) corner lot,*
> *(c) parallel road lot.*
> ***Note 1—Corner lot, lane, parallel road lot*** *and* ***standard lot*** *are defined in clause 1.5.*
> ***Note 2—****A lot that adjoins a lane is not a parallel road lot or a corner lot. The lot type depends on which other roads it fronts (if any).*

Codes SEPP Clause 1.5:

> ***corner lot***

means a lot that has 2 contiguous boundaries with a road or roads (other than a lane) that intersect at an angle of 135 degrees or less (whether or not the lot has any other boundaries with a road)

lane

means a public road, with a width greater than 3m but less than 7m, that is used primarily for access to the rear of premises, and includes a nightsoil lane.

parallel road

means, in the case of a lot that has boundaries with parallel roads, the road that is not the primary road.

parallel road lot

means a lot that has boundaries with 2 parallel roads, not including a lane.

Battle-axes are not permitted by the EIE. This is supported.

In our experience, battle-axe types are generally undesirable. They require larger lot size and lot width controls to mitigate their inherent undesirable urban and spatially inefficient outcomes caused by long driveways and vehicle turning circles that extend deep into a parent lot.

Subdivision

Multiple subdivisions are not facilitated as a pathway for quasi 'villa' housing arrangements of dual occupancies behind each other. This is supported. It is noted that subdivisions may occur on larger lots where the lot width and depth enable a dual occupancy lot addressing a street with a battle-axe behind (either for a single dwelling house or development applications pathway.

Villa housing is widely considered as a failed urban typology due to their poor amenity, poor deep soil and landscape outcomes.

All battle-axe housing types should be fully controlled via local planning instruments, which are best placed to suit the specific block patterns and lot subdivisions. Dual occupancy if permitted on multiple small lot battle-axes leads to similar traits as villa housing. Both are significantly impactful housing types due to accommodating vehicles and their manoeuvring within a site.

Development standards that avoid outcomes similar to villa housing are supported.

3.2 Deep soil and landscape provisions – testing the standards

Current deep soil and landscape settings within *SEPP (Exempt and Complying Development Codes) 2008* and Parts 2, 3 and 5 of *SEPP (Housing) 2021* are resulting in significant cumulative losses of existing urban canopy with little opportunity for replacement or urban repair. This is coupled with housing typologies with very poor resident amenity.

Housing typology is intimately related to whether or not NSW urban canopy policies can be achieved.

Existing complying development standards are generally poorly aligned between FSR, site coverage and deep soil landscape provisions resulting in long-term and potentially catastrophic urban canopy loss with no opportunity for replacement or repair to mitigate increasing urban heat. Examples are 'villa' type housing, battle-axe dual occupancy on smaller lots and/or wherever at-grade carparking results in extensive areas of a site being covered with hardstand. Smaller lot sizes must minimise the impacts of vehicles within a site.

The following examples at Figures 1 and 2 demonstrate poor housing typologies. While these are not dual occupancy, they are relevant in demonstrating the impacts of enabling housing types with poorly aligned development standards and where multiple subdivisions and dwellings can be located behind each other. Relevance to dual occupancy is dependent on the permitted subdivision permeations of larger parent lots once the final EIE provisions are released in end 2024/early 2025.

Figure 1 – **Comparison of existing low density housing** with Codes SEPP development standards. Loss of deep soil is evident with newer development that allows on-grade car parking with associated extensive hardstand and roof coverage with little to no deep soil areas remaining.

Figure 1a – **Cumulative impacts** on urban canopy and conditions that increase urban heat. The loss of potential deep soil opportunities where Codes SEPP development standards are applied demonstrating cumulative impacts of poor-quality resident amenity.

Figure 2 – **Canopy under local planning controls** for R2 low density housing with adequate setback controls.

Figure 2a – **Canopy loss** after Codes SEPP development standards applied in R2 low density zoned lots with poor quality deep soil, landscape and setback controls.

3.3 Considering Heritage

The study has sought to understand Ku-ring-gai's existing subdivision patterns, which presents a post-colonial layering of time. Mapping of heritage items and heritage conservation area with the spatial mapping of lot sizes reveals locations where the EIE and *SEPP (Exempt and Complying Development Codes) 2008* provisions for minimum lot sizes require attention. Interrogating the implications for future subdivision patterns where dual occupancy may significantly alter historic subdivisions if permitted via a CDC pathway.

3.4 Testing Assumptions

For the purposes of this study, Hill Thalis has set a consistent baseline of assumptions. This has assumed that Part 3 clauses 3B.1 to 3B.19 of *SEPP (Exempt and Complying Development Codes) 2008* will apply under the EIE.

Ku-ring-gai's unique canopy, biodiversity connectivity and deep soil urban character is currently supported and consistently delivered by its local statutory environmental planning instruments and accompanying policies. This is evidenced by existing canopy mapping across the LGA, noting there are existing areas below Ku-ring-gai's targets and at further risk with the imposition of development standards applying to the 'Local Housing Areas' and/or where minimum lot sizes are inadequate to deliver the fundamental quantum of consolidated deep soil in the private domain, and implications for the public domain where the number of driveway crossovers and their frequency risks street tree viability.

Therefore, testing has considered the need to increase density through dual occupancy housing via lot size and site requirements that can protect existing and enhance future urban canopy, maintain biodiversity corridors while minimising impacts of current NSW State Environmental Planning Policies that in general are leading to the cumulative clearance of existing urban canopy with little or no provision for repair or replacement.

Ku-ring-gai's canopy targets are listed within Ku-ring-gai's *Draft Urban Forest Strategy, 2022.*

4.0 Testing

4.1 R2 Lot numbers and median lot sizes

NOTE: Some variation between macro analysis of mapping and spreadsheets is expected due to inconsistencies in base information sourcing multiple cadastre data-sets and record formats. These are considered unlikely to be statistically significant in context of the multiple testing scenarios investigated, and site-specific conditions which can be expected to result in slight increases of available lots across some metrics, while slight decreases of available lots for other metrics when the controls are applied at the micro site-by-site level. Hill Thalis has endeavoured to best standardise the information tested.

Expanded excerpts of spreadsheet raw data can be found at Appendix 2 sheet 5.01.

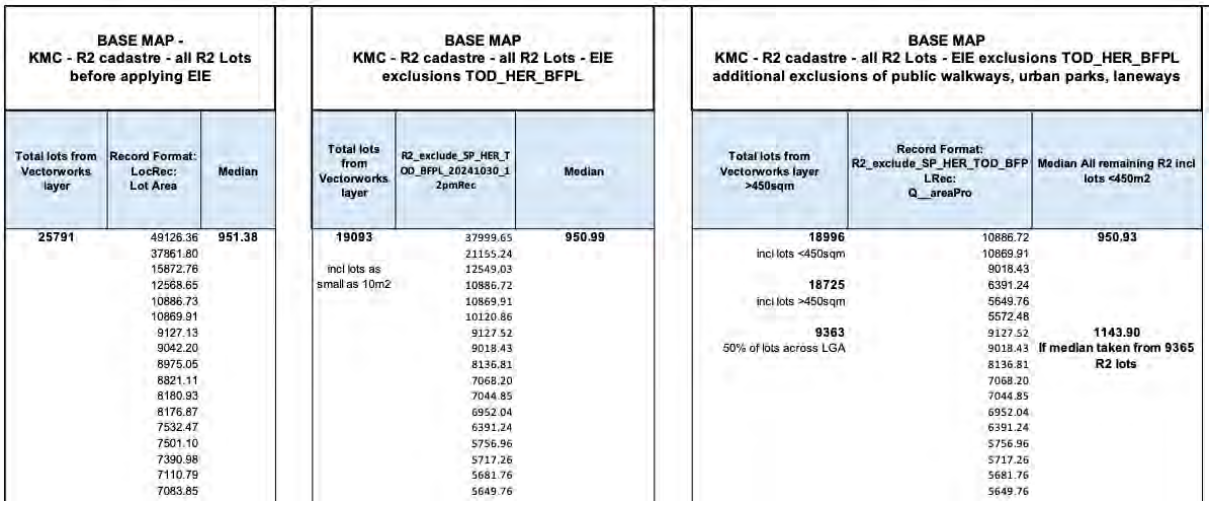
Testing indicates that the median lot size of all R2 lots across the LGA is 951sqm before the EIE exclusions are overlaid and available lots after the EIE exclusions are applied. Table 3 excerpts of the raw data.

Table 3 summarises the R2 context across Ku-ring-gai noting numbers are approximated based on available information applying the EIE assumptions. This excludes lots unsuitable for dual occupancy under the EIE being TOD SEPP, Bushfire Prone Land, and Heritage Items. Lots that are public walkways, urban parks and laneways are excluded due to their importance in the overall urban structure and general lack of walkability across much of the LGA. Approximately 97 lots fall into this category which is not considered to make statistical differences to the overall testing due to their low number and lot characteristics – often very narrow dimensions and/or small areas.

Spatial mapping of these R2 lot distributions is shown at Appendix 2 sheets 3.01 and 3.02. The mapping identifies the E1 centres in light blue with identified R2 lots within specific lots size ranges located in dark blue.

As can be seen, there is no specific concentrated distribution of lot sizes that can be simply categorised and cleanly aligned with the LSPS density focus areas. One might expect to see smaller lots within the R2 low density zones around E1 Local and neighbourhood centres or stations. However, this is not the pattern of subdivision and block structure within Ku-ring-gai.

Smaller lots within the 450-650 sqm range are relatively few representing 3% of R2 lots. These are interspersed throughout the LGA and generally comprise existing lots approved, constructed and/or identified within the KLEP 2015 for dual occupancies or may be remnant lots of subdivisions.



BASE MAP - KMC - R2 cadastre - all R2 Lots before applying EIE		
Total lots from Vectorworks layer	Record Format: LocRec: Lot Area	Median
25791	49126.36	951.38
	37861.80	
	15872.76	
	12568.65	
	10886.73	
	10869.91	
	9127.13	
	9042.20	
	8975.05	
	8821.11	
	8180.93	
	8176.87	
	7532.47	
	7501.10	
	7390.98	
	7110.79	
	7083.85	

BASE MAP KMC - R2 cadastre - all R2 Lots - EIE exclusions TOD_HER_BFPL		
Total lots from Vectorworks layer	R2_exclude_SP_HER_TOD_BFPL_20241030_12pmRec	Median
19093	37999.65	950.99
	21155.24	
incl lots as small as 10m2	12549.03	
	10886.72	
	10869.91	
	10120.86	
	9127.52	
	9018.43	
	8136.81	
	7068.20	
	7044.85	
	6952.04	
	6391.24	
	5756.96	
	5717.26	
	5681.76	
	5649.76	

BASE MAP KMC - R2 cadastre - all R2 Lots - EIE exclusions TOD_HER_BFPL additional exclusions of public walkways, urban parks, laneways		
Total lots from Vectorworks layer >450sqm	Record Format: R2_exclude_SP_HER_TOD_BFPL LRec: Q__areaPro	Median All remaining R2 incl lots <450m2
18996	10886.72	950.93
incl lots <450sqm	10869.91	
	9018.43	
18725	6391.24	
incl lots >450sqm	5649.76	
	5572.48	
9363	9127.52	1143.90
50% of lots across LGA	9018.43	If median taken from 9365 R2 lots
	8136.81	
	7068.20	
	7044.85	
	6952.04	
	6391.24	
	5756.96	
	5717.26	
	5681.76	
	5649.76	

Excerpt from spreadsheet Appendix 2 sheet 5.01

	Number of R2 lots	Median lot size sqm
Total number of R2 lots across the LGA	25751	951 sqm
Total number of R2 lots to EIE – excluding TOD SEPP, Bushfire Prone Land, and Heritage items	18725 50% = 9363	954 sqm 1144sqm

Table 3: R2 zone – lot context across Ku-ring-gai

The DPHI mandated 450sqm minimum parent lot size to all Local Housing Areas (areas around rail and key local centres) will significantly alter the subdivision pattern, potential heritage values and character of these areas. Ku-ring-gai's large lot size has afforded the ability to deliver built form within garden settings, including tall canopy trees, on private lands. The lot sizes have enabled the provision of deep soil able to sustain canopy trees and protect the existing Critically Endangered Ecological Communities (CEEC) Blue Gum High Forest and Sydney Turpentine Ironbark Forest, both restricted to geology and soil types that occur along the ridge lines in the Ku-ring-gai LGA.

As these communities are critically endangered, and individual trees can be recognised and protected as CEEC, it is essential that any development recognises the space and deep soil required in order to maintain any large remnant trees that are left, and where possible provide enhancements in terms of further canopy, midstory and groundcover planting. This is essential in providing the genetic diversity and landscape connectivity that will help ensure these CEECs are not further degraded, particularly recognising the isolation of remnant patches and stands caused by development.

Ku-ring-gai's Terrestrial Biodiversity Map and the Greenweb map in the DCP identifies the key areas of concern and should be used to help strategically plan development that is appropriate for and helps to support Ku-ring-gai's local environmental assets.

Note: Duffy's Forest is another Endangered Ecological Community associated with ridgetop areas in the LGA (mostly around St Ives) and although individual remnant trees are not usually recognised for protection as part of this community, it would be beneficial for planning to recognise the importance of remnant trees in providing biological connectivity and habitat stepping stones across areas of development, between existing reserves.

Three options are presented in this Study with all options able to deliver the required 50% of lots for dual occupancy development across the LGA:

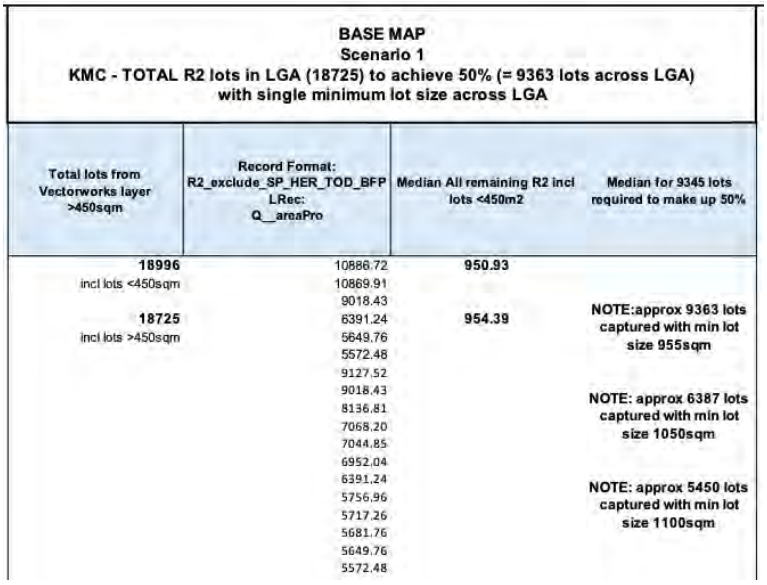
- Option 1 – one minimum lot size across the LGA, seeking to remove DPHI's minimum 450sqm parent lot size to Local Housing Areas.

- Option 2 - DPHI's minimum 450sqm minimum lot size to Local Housing Areas, and a larger minimum lot size across the remaining LGA.
- Option 3 - DPHI's minimum 450sqm minimum lot size to Local Housing Areas, a larger minimum lot size to certain Neighbourhood Centres identified in the LSPS, and an even larger minimum lot size across the remaining LGA.

This approach seeks to deliver the required additional housing whilst protecting Ku-ring-gai's key assets of biodiversity links, critically endangered trees, canopy cover, streetscape and character.

Table 4, Table 5 and Table 6 below investigated the median lots sizes of three different scenarios that can be cross-referenced with the Ku-ring-gai Local Strategic Planning Statement (LSPS) so the application of EIE can be coordinated.

Table 4 - Option 1 - considers all R2 lots available under the EIE provisions across the LGA to capture 50% of R2 lots for dual occupancy more broadly.



BASE MAP
Scenario 1
KMC - TOTAL R2 lots in LGA (18725) to achieve 50% (= 9363 lots across LGA) with single minimum lot size across LGA

Total lots from Vectorworks layer >450sqm	Record Format: R2_exclude_SP_HER_TOD_BFP LRec: Q__areaPro	Median All remaining R2 incl lots <450m2	Median for 9345 lots required to make up 50%
18996 incl lots <450sqm	10886.72	**950.93**	
	10869.91		
	9018.43		
18725 incl lots >450sqm	6391.24	**954.39**	**NOTE:approx 9363 lots captured with min lot size 955sqm**
	5649.76		
	5572.48		
	9127.52		
	9018.43		**NOTE: approx 6387 lots captured with min lot size 1050sqm**
	8136.81		
	7068.20		
	7044.85		
	6952.04		
	6391.24		**NOTE: approx 5450 lots captured with min lot size 1100sqm**
	5756.96		
	5717.26		
	5681.76		
	5649.76		
	5572.48		

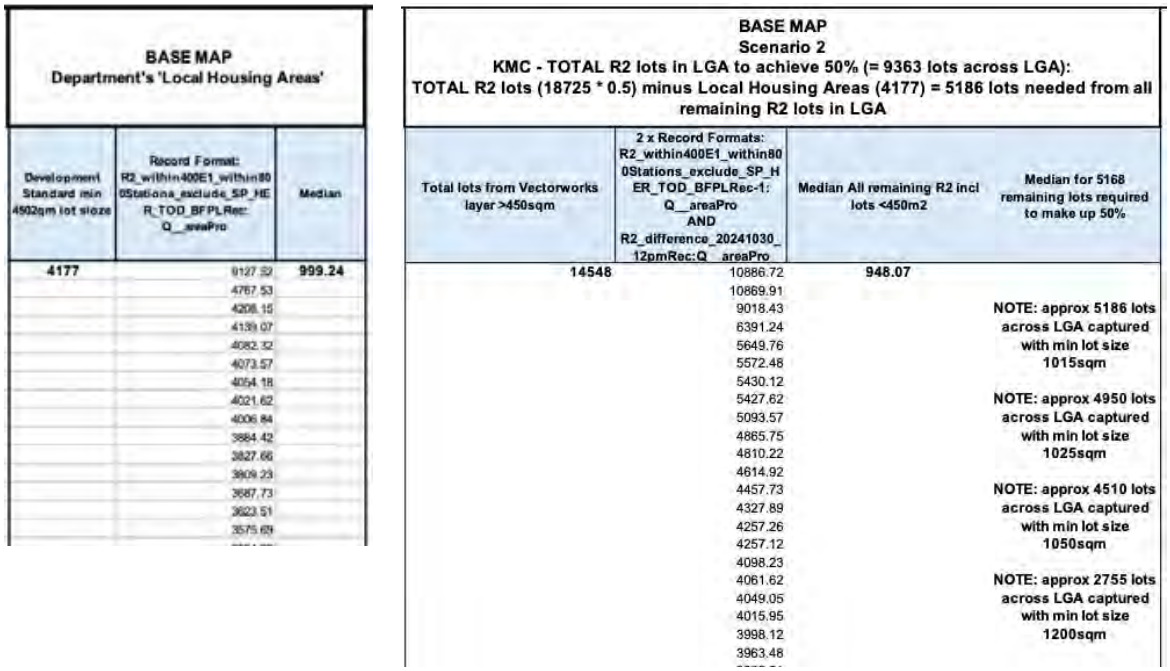
Excerpt from spreadsheet Appendix 2 sheet 5.01

	Number of R2 lots	Median lot size sqm
Total number of R2 lots across the LGA	25751	951 sqm
Total number of R2 lots to EIE - excluding TOD SEPP, Bushfire Prone Land, and Heritage items	18725	954 sqm
Total number of lots needed to achieve 50% of available R2 across the LGA	9363	1144 sqm raw data Requires a minimum lot size of 955 sqm to capture sufficient lots for 50% of the LGA

Table 4: Option 1 – One-tiered hierarchy - Single minimum lot size to whole LGA

Table 5 – Option 2 considers the LGA in a hierarchy of two 'zones' to capture 50% of R2 lots for dual occupancy more broadly while further master planning and urban testing of Neighbourhood Centres continues under the LSPS including for future upzoning. This hierarchy is established as follows:

- Local Housing Areas = EIE minimum lot size 450 sqm applies
- Remaining R2 lot in the wider LGA = KLEP 2015 general application for minimum lot size for dual occupancy



BASE MAP
Department's 'Local Housing Areas'

Development Standard min 450sqm lot size	Record Format: R2_within400E1_within800Stations_exclude_SP_HER_TOD_BFPLRec: Q__areaPro	Median
4177	9127.52	999.24
	4767.53	
	4208.15	
	4139.07	
	4082.32	
	4073.57	
	4054.18	
	4021.62	
	4006.84	
	3884.42	
	3827.66	
	3809.23	
	3687.73	
	3623.51	
	3575.69	

BASE MAP
Scenario 2
KMC - TOTAL R2 lots in LGA to achieve 50% (= 9363 lots across LGA):
TOTAL R2 lots (18725 * 0.5) minus Local Housing Areas (4177) = 5186 lots needed from all remaining R2 lots in LGA

Total lots from Vectorworks layer >450sqm	2 x Record Formats: R2_within400E1_within800Stations_exclude_SP_HER_TOD_BFPLRec-1: Q__areaPro AND R2_difference_20241030_12pmRec:Q__areaPro	Median All remaining R2 incl lots <450m2	Median for 5168 remaining lots required to make up 50%
14548	10886.72	948.07	
	10869.91		
	9018.43		NOTE: approx 5186 lots across LGA captured with min lot size 1015sqm
	6391.24		
	5649.76		
	5572.48		
	5430.12		
	5427.62		NOTE: approx 4950 lots across LGA captured with min lot size 1025sqm
	5093.57		
	4865.75		
	4810.22		
	4614.92		
	4457.73		NOTE: approx 4510 lots across LGA captured with min lot size 1050sqm
	4327.89		
	4257.26		
	4257.12		
	4098.23		
	4061.62		NOTE: approx 2755 lots across LGA captured with min lot size 1200sqm
	4049.05		
	4015.95		
	3998.12		
	3963.48		

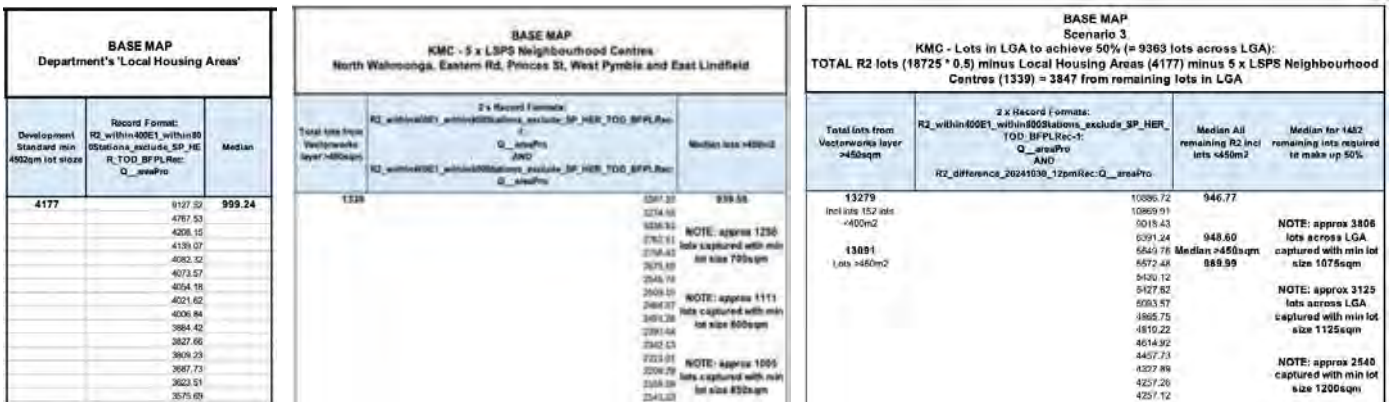
Excerpts from spreadsheet Appendix 2 sheet 5.01

	Number of R2 lots	Median lot size sqm
Total number of R2 lots across the LGA	25751	951 sqm
Total number of R2 lots to EIE – excluding TOD SEPP, Bushfire Prone Land, and Heritage items	18725 50% = 9363	954 sqm 955 sqm
Total number R2 lots available within the identified 'Local Housing Areas'	4177	1000 sqm (permissible min lot size of 450 sqm applies)
Total number of lots outside Local Housing Areas needed to achieve 50% of available R2 across the LGA	5186	Requires a minimum lot size of 1015 sqm to capture sufficient lots for 50% of the LGA

Table 5: Option 2 – Two-tiered hierarchy - Local Housing Areas; Remaining R2 lots in the wider LGA

Table 6 – Option 3 considers the LGA in a hierarchy of three 'zones' to capture a total of minimum 50% of R2 lots for dual occupancy intending to align in principle with the LSPS. This hierarchy is established as follows:

- Local Housing Areas = EIE minimum lot size 450 sqm applies
- Neighbourhood Centres = KLEP 2015 'Special Areas' for minimum lot size
- Remaining R2 lot in the wider LGA = KLEP 2015 general application for minimum lot size for dual occupancy



Excerpts from spreadsheet Appendix 2 sheet 5.01

	Number of R2 lots	Median lot size sqm
Total number of R2 lots across the LGA	25751	951 sqm
Total number of R2 lots to EIE – excluding TOD SEPP, Bushfire Prone Land, and Heritage items	18690 50% = 9363	954 sqm 955 sqm
Total number R2 lots available within the identified 'Local Housing Areas'	4177	1000 sqm (permissible min lot size of 450 sqm applies)
Total number of lots within Ku-ring-gai's LSPS identified five (5) Neighbourhood Centres within 400m walking distance of E1	1339	940 sqm Requires minimum lot size of 700 sqm to capture sufficient lots
Total number of lots outside Local Housing Areas and the 5 Neighbourhood Centres needed to achieve 50% of available R2 across the LGA	3847	949 sqm Requires a minimum lot size of 1075 sqm to capture sufficient lots for 50% of the LGA

Table 6: Option 3 – Three-tiered hierarchy - Local Housing Areas; Neighbourhood Centres; Remaining R2 lots in wider LGA

Spreadsheet excerpts of extended raw data median lot sizes needed to achieve 50% of available R2 lots for dual occupancy and total number of lots comprising each median tested is provided in Appendix 2 sheet 5.01.

Distilling the median lot sizes needs visual distribution mapping to understand where concentrations of smaller and larger lots are located and to understand implications across the LGA and Neighbourhood Centres for establishing lot sizes of the quantum required by the EIE for dual occupancy.

The risk is of a lot size strategy that may cause conflicts with the LSPS for achieving Ku-ring-gai's wider canopy, sustainability, ecology and urban character objectives, infrastructure and social policies, and in managing how neighbourhood centres intensify their use over time.

The smaller the lot size generally, the more canopy will be lost due to inadequate space to accommodate Ku-ring-gai's deep soil and/or as the experience with the existing one-size-fits-all development standards within SEPPs, too many have poorly aligned FSR, height and landscape metrics and housing typologies.

Generally, the mapping shows the existing range of R2 lot sizes as being quite broadly distributed across the LGA with several exceptions where there are areas with concentrations of lots that are significantly smaller or larger than the wider LGA median as reflections of specific historical subdivisions.

- Smaller lots of 650-750sqm are predominantly in Roseville East and West Lindfield.
- Lots of 850-950sqm dominate edge parts of the 'Green Fingers' character areas generally in the northern half of the LGA.
- Larger lots of 1500-3000sqm (see 3.02) are generally concentrated to the northern half of the LGA and within the older subdivisions around the railway stations noting many are within the identified 'Local Housing Areas'.

Visual representation of the distributions as Lot Distribution mapping is provided within Appendix 2 at sheets 3.01 to 3.02.

These represent the numbers of lots also as percentages of all R2 lots within the LGA.

4.2 Canopy

The *Ku-ring-gai Urban Forest Strategy 2022* prepared by Arbor Carbon specifically investigated urban canopy within Ku-ring-gai. It excludes C1 zoned land – national parks managed by NPWS – and similar bushland reserves managed by Ku-ring-gai Council to best understand the extent of urban canopy within the public and private domain.

Existing canopy at the time of the study was a healthy 45% which is consistent with canopy coverage needed to support Ku-ring-gai's biodiversity and for mitigating risks of increasing urban heat.

The range of canopy levels varies across Ku-ring-gai between a high of 57.9% (South Turramurra) and low of 37.1% (East Lindfield). Interestingly, both these areas are within the 'Green Fingers' Character Areas. While they share topographic and biodiversity-adjacency conditions being on ridgelines and are directly adjacent to the surrounding national parks, they are performing very differently in urban canopy cover.

Generally, the northern half of the LGA comprises suburbs with the highest canopy levels compared to suburbs within the southern half. See Figure 3 noting only the National Parks C1 zoned areas have been masked out.

Ku-ring-gai has specific conditions where biodiversity and canopy corridors need to be retained to ensure fauna can move freely through the LGA from east-to-west-and-north to maintain both flora and fauna health and particularly to protect plants and animal populations during times of bushfire as essential escape routes across the ridgeline.

Intensified development under the TOD SEPP and EIE will place additional pressures on retaining and protecting existing wildlife corridors to avoid creating a barrier between movement east and west. It will also place pressures on Ku-ring-gai's established urban character.

Achieving minimum required canopy is best managed via development applications and local planning policies for deep soil and tree planting rather than one-size-fits-all complying development.

In context of these new policies sits Ku-ring-gai's urban canopy targets. A summary of the *Ku-ring-gai Urban Forest Strategy 2022* is at Figure 4. It is highly unlikely that the canopy targets will be met under the housing reforms. The proposed standards will systematically erode the existing canopy across the LGA and particularly along ridgelines where minimum 450sqm parent lot sizes are proposed by State government.

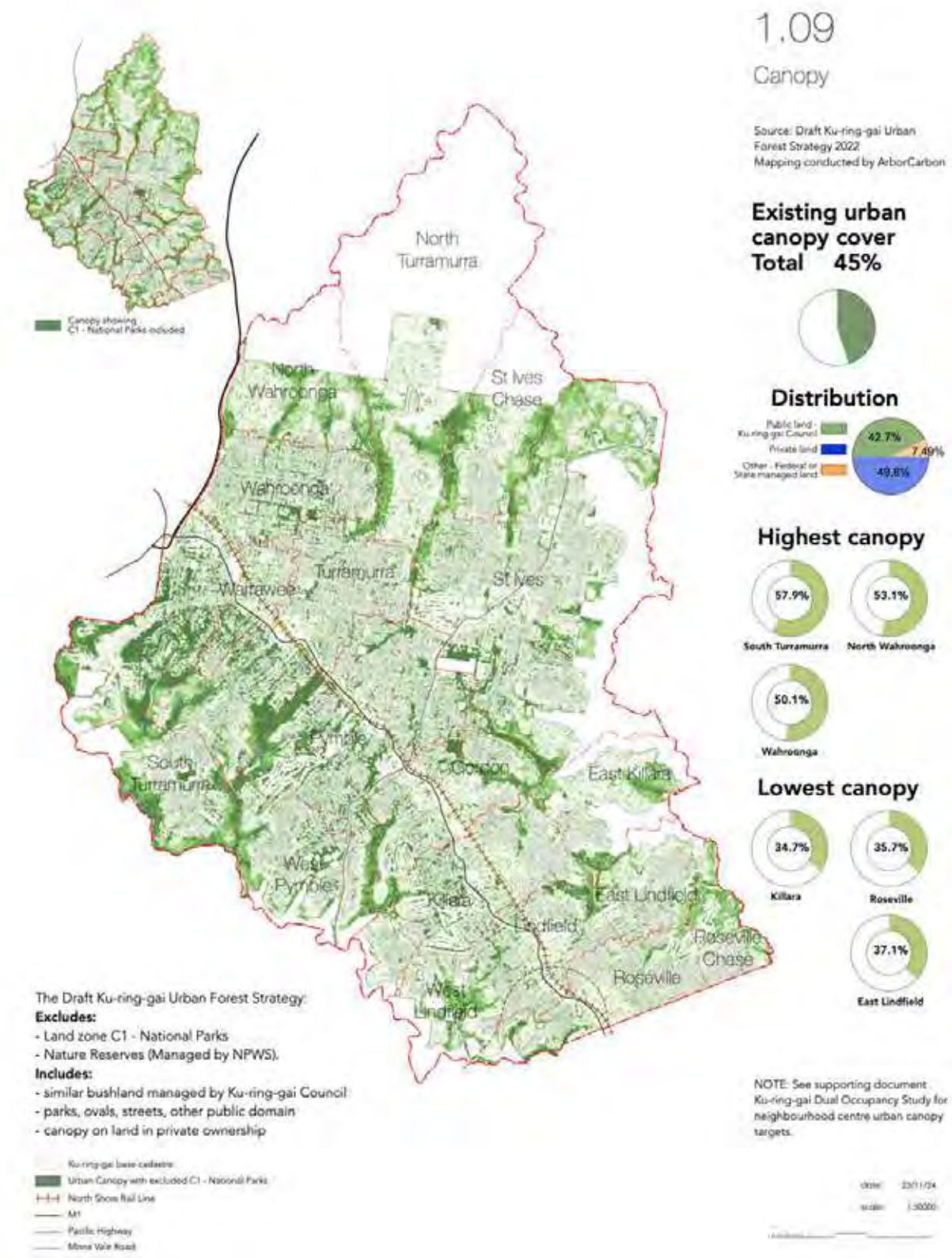


Figure 3: Ku-ring-gai urban canopy mapping and distribution

Suburb	Current Canopy (%)	Canopy Target (%)	Trees* required to achieve target
East Killara	43.1	54.1	3286
East Lindfield	37.1	49.6	3657
Gordon	45	47.7	1443
Killara	34.7	41.7	4514
Lindfield	41.5	45.9	2843
North Turramurra	44.3	53.3	4814
NORTH WAHROONGA	53.1	65.1	4314
Pymble	46.3	46.5	186
Roseville Chase	44	55.5	2043
Roseville	35.7	43.6	3357
South Turramurra	57.9	60.4	1000
St Ives Chase	49.7	56.2	2043
St Ives	43.5	49.2	8671
Turramurra	47	47.2	171
Wahroonga	50.1	50.4	329
Warrawee	41.7	42.1	86
West Pymble	48.6	51.4	1300

Table 3: Canopy targets for each suburb.
*Average tree crown area of 70m²

Local Centre	Current Canopy (%)	Canopy Target (%)	Trees* required to achieve target
Gordon	34	38.4	1331
Killara	33.6	33.6	0
Lindfield	34.5	39.1	1396
Pymble	41.4	42.2	157
Roseville	35.1	39.7	649
St Ives	34.5	44.3	3590
Turramurra	43.9	44.9	344
Wahroonga	36	36.5	76

Table 4: Canopy targets for each Local Centre. *Average tree crown area of 70m²

Figure 4: Urban canopy targets for all suburbs and for Local Centres

4.3 Canopy testing of the EIE provisions

Hill Thalis's study has applied the *SEPP (Exempt and Complying Development Codes) 2008* and EIE development standards assuming the dual occupancies typology is attached pairs of dwellings with both directly addressing a public street.

The study found a conservative estimation of canopy loss as a cumulative impact across large areas of R2 zoned lots ranged between approximately 12% to greater than 24% on land in private ownership where multiple subdivision occurs. These impacts can be expected to increase with the inclusion of secondary dwellings permitted under *SEPP (Exempt and Complying Development Codes) 2008*.

Subdivision permutations become more important in understanding where canopy may be more impacted than other areas. Generally, where existing lots are retained in their current form to allow for two dwellings, impacts are within the 10% to 12% range. This is in context of the canopy targets at Figure 4 particularly in Neighbourhood Centres where existing canopy is at the lower end of the existing coverage and further loss of

a minimum 10% would leave significant deficits to the current targets adopted by Council and long-term urban performance and liveability outcomes.

In context, East Lindfield's existing canopy of 37.1% could see a loss to 27.1% leaving a deficit of 22.5% to be delivered elsewhere in the neighbourhood putting further pressure on available public domain spaces.

Similar impacts might be expected within the Roseville Chase, North Wahroonga and St Ives Chase Neighbourhood Centre areas. Within the Local Centres, the canopy targets are more modest. However, St Ives currently has a 9.8% deficit that could see further loss resulting in a deficit closer to 19% to be found.

The wide application of the provisions in the 'Local Housing Areas' will start to introduce new deficits to current canopy in areas that are currently on target or close to target. This will be increasingly difficult to replace in the public domain where existing areas of public open spaces are limited and opportunities for increasing public open space is challenging.

Public streets are a critical, connected public space network. However, opportunities for retaining street trees and replacement are hampered by multiples of driveway cross-overs, existing above-ground electricity infrastructure, and utilities' pruning requirements that are consistently criticised for the damage to canopy cover and streetscape quality that is caused. Where subdivision enables multiple small lots, the impacts of canopy loss further increase.

Appendix 2 figure 4.02 takes a larger parent lot to test an indicative subdivision that appears possible under the EIE provisions in a 'Local Housing Area' or more widely if no minimum lot size is set within KLEP 2015.

The example uses a typical lot condition found in Ku-ring-gai where a parent lot might be approximately 1050 sqm with a frontage of 18 to 20 metres to a primary road. Small trees can be accommodated in the dual occupancy lots, while one or two medium trees could be possible for the battle-axe detached dwelling lot. No landscape is achieved along the battle-axe driveway. Of note is that using a typical lot type, both subdivided lots will be greater than the EIE development standard's minimum lot size. Thes larger lot sizes assist in providing opportunities to replace some lost canopy albeit with smaller and/or fewer trees, while still generally resulting in loss of existing canopy.

Impacts to streetscape character and urban heat require further focus where multiple driveway cross-overs are proposed. The less opportunity for deep soil and canopy, the more the risk for increasing the urban heat effect. Where nature strips are not of adequate consolidated deep soil due to multiple driveway crossovers, larger trees will not be viable. This is an increased risk where cumulative impacts of the Figure 7 subdivisions occur. Similar to the cumulative impacts of villa housing development, this subdivision is overlaid on a canopy image which resulted in a canopy loss of 24%.

Appendix 2 figures 4.04-4.07 apply dual occupancy provisions via CDC on existing lot subdivisions. Multiple subdivision of parent lots is possible for frontages greater than 30 metres. This permutation enables 4 dwellings on a single parent lot all with direct frontage to a primary public road. In each of the scenarios, the resulting lots are proportionally very narrow to their length with the FSR distributed in elongated building footprints. These studies have overlaid Council's existing canopy mapping to understand the comparison of existing conditions and effects on canopy applying the CDC dual occupancy provisions as cumulative smaller lot subdivisions. Again, all parent lots are significantly larger than the EIE minimum, however it is foreseeable that driveway crossovers and lot proportions play a role in limiting or facilitating tree planting – small trees only possible in some instances, and medium tress where lots are very deep, front setbacks can be greater and the location of driveways enables a consolidated deep soil area.

4.4 Streetscape character and heritage

The EIE minimum lot size provisions and lot width provisions are intended to facilitate subdivision. Development via CDC pathways in heritage conservation areas may be problematic where insufficient provision is made within the EIE and *SEPP (Exempt and Complying Development Codes) 2008* to sensitively consider the role that fine existing buildings may make as positive contributory items to heritage items in the vicinity.

The EIE provisions requiring one car space for each dual occupancy dwelling is supported. However, this should be set as a maximum under a CDC pathway due to the impacts of dominant garages across single frontage lots. This study has assumed a single car metric as a maximum because the minimum lot widths cannot accommodate double garages and meaningfully address the street. It assumes setback provisions can be set to accommodate tandem parking within a driveway for a second vehicle.

Ku-ring-gai's suite of DCP controls have a focus on minimising impacts of driveways – the number and width of driveway crossovers to maximise the retention of street trees, ensuring landscape is provided along all side boundaries to avoid unrelieved hardstand, and in achieving pragmatic outcomes, ensure that on-street parking is retained. The loss of on-street parking is a common theme for residents of housing close to main transport links.

Ku-ring-gai's existing block structures and subdivision patterns face significant challenges for urban repair. Creating new streets to allow for improved connectivity and walkability is often contested and takes time to deliver. Recent successes at Gordon with the completion of Beans Farm Road and Hanson Way have delivered important public infrastructure and pedestrian amenity for blocks on the western side of the Pacific Highway that were largely impermeable. Both new streets provide added amenity for higher density housing (apartments and multi-dwelling housing) with a new street address, improved daylight access, outlook, improved visual privacy and high quality emerging character in a transitioning streetscape.

The overwhelming character of much of the LGA is of very deep, large perimeter block types with few networks of laneways that characterise much of inner Sydney's terrace housing. Higher density development is needed to facilitate mechanisms to deliver new streets. It is therefore not likely the existing large block subdivision patterns can be repaired by dual occupancy development. The implications for Ku-ring-gai's streetscape character and heritage conservation areas are that there are limited solutions for accommodating more vehicles with increased dwellings and that it may further entrench the lack of permeability making future through-block connections more challenging. This impacts on achieving the intended walkability where what might be a short direct distance becomes a trip to the local shops by car.

Corner lots and lots with a dual street frontage/rear lane vehicle access generally achieve desirable streetscape outcomes. They result in fewer driveway cross-overs in primary streets, which supports existing street trees, the potential new tree planting, and allows for efficient on-street car parking. Retaining existing street trees, replacing lost canopy and increasing overall urban canopy commensurate with increased density will be more challenging where housing typologies result in multiple driveway cross-overs.

Ku-ring-gai's absence of finer grain laneway street layouts in combination with excessively large perimeter block patterns has a flow-on effect of reducing the number of lots with either: dual street frontages; and corner lots whose dual frontage has one regular lot width and one long boundary facing a street allowing more flexibility for locating driveways. The dominant subdivision pattern of lots with only a single street frontage, therefore, concentrates all driveway crossovers to that single primary street frontage. Impacts to existing canopy in the public and private domain and opportunities for retention and /or canopy replacement become significantly impacted.

How this can be managed will be subject to future DCP review that may include controls around the design, total width and placement of driveway cross-overs in tandem with the Codes SEPP provisions. This will assist in determining appropriate locations for garages/car spaces within a site, to better consider the public domain so that consolidated deep soil zones are maintained/accommodated within the public street reservation 'nature strip'.

Exploring opportunities for introducing blisters for street tree planting also should be considered as options for canopy replacement. This will need to balance a managed loss of existing on-street car parking and be well-aligned to existing street reservation widths. This will require further urban testing with further canopy mapping to identify areas where introducing blisters may be needed and/or appropriate and possible.

4.5 Canopy opportunities

Ku-ring-gai's existing DCP controls continue to evolve. Established over many years, these remain exemplars of positive policy outcomes. Evidence-based testing has demonstrated a minimum consolidated area of 6 metres x 6 metres of deep soil is required to support one (1) viable medium-sized tree over the long-term.

Ku-ring-gai's controls envisage more than one tree per development and dependant on land use zoning, lot size and development type.

Generally, a minimum area of 6 metres x 6 metres deep soil cannot be achieved under the minimum provisions of *SEPP (Exempt and Complying Development Codes) 200,* and EIE minimum lot sizes, which at best require 1 small tree / 200sqm or part thereof. One medium tree / 225 sqm or part thereof is required for parent lots of >600 sqm. In the Ku-ring-gai context, smaller lots range between 650–750sqm and would be expected to accommodate a minimum of 3 medium sized trees. This appears will be challenging with the setback and FSR provisions of the EIE. Noting a medium sized tree is generally accepted as having a canopy diameter of 8 metres providing approximately 200 sqm of cover.

As can be seen at Appendix 2 sheets 4.01 and 4.02, this study has overlaid a 6m x 6m minimum deep soil area for 1 medium sized tree on lots under the EIE minimum lot size provisions.

Therefore, on a 900sqm lot, the EIE landscape targets equates to 4 x medium sized trees. This can also be considered as 4 x separate areas of 6m x 6m deep soil or 144 sqm with a minimum dimension of 6 metres.

None of the testing has included extended paved areas or swimming pools, both of which are common in Ku-ring-gai, and which further erode available deep soil nor provisions of larger areas of consolidated deep soil for large canopy trees. Other LGAs such as Ryde have dual occupancy provisions for a consolidated 8 metres x 8 metres area of deep soil that can accommodate larger trees.

Ku-ring-gai's existing LEP and DCP provisions for dual occupancy require further review. Currently, they have been focused on corner lots rather than Ku-ring-gai's general subdivision patterns of single frontage lots or lot types to be permitted by the EIE. As previously identified, unlike many other LGAs, Ku-ring-gai has many lots that are excessively deep (60 metres) but not proportionally wide – generally ranging between 15 metres to approximately 19 metres.

As a housing type, an attached pair of dual occupancy dwellings will result in unusually deep and narrow lots (where subdivided as Torrens title). However, these outcomes are also likely to have the potential of retaining existing larger trees located in these extended backyards noting the lots sizes will be significantly larger than the EIE provisions in many instances due to the existing subdivision patterns.

5.0 Summary Findings

5.1 Lot size options to consider

There is a need for tiered minimum lot sizes that will be aligned with proximity to transport and services. This exists currently in the KLEP 2015 for lots within numbered 'Areas' for FSR and Height development standards.

<u>Option 1</u>

- Local Housing Areas = EIE minimum lot size 450 sqm applies
- Remaining R2 lot in the wider LGA = KLEP 2015 general application for minimum lot size of 955 sqm for dual occupancy - the median includes existing R2 lots within the 'Local Housing Areas'.

Advantages:

- As a single development standard, it simply expresses the median to deliver the DPHI number of lots.
- Development standards applied across a LGA with a consistent lots size can avoid any complexity for some property owners intending to carry out dual occupancy development who are unfamiliar with mechanisms within planning instruments.

Disadvantages:

- Applying the same lot size across the LGA does not facilitate Ku-ring-gai's LSPS where future rezoning of identified Neighbourhood Centres may be impacted by further Torrens Title subdivisions making lot amalgamations more difficult.
- Limits the ability of Council to mitigate canopy loss through DCP controls.

- Loss of tiered strategic planning that does not sufficiently enable some of the more established and well-structured Neighbourhood Centres from realising their full potential and relies on upzoning investigations being prioritised and completed in the short to mid-term. Timeframes for investigations, master planning, community consultation and exhibition timeframes need to be considered to deliver high quality holistic strategic planning.

<u>Option 2</u>
- 'Local Housing Areas' have mandated the *SEPP (Exempt and Complying Development Codes) 2008* minimum lot sizes of 450 sqm.
- Remainder of R2 within the LGA to minimum lot size of approximately 1015 sqm to capture the 5186 remaining lots required to achieve the EIE's 50% of R2 lots.

Advantages of Scenario 2
- Dual occupancy on smaller lots will be concentrated within the identified 'Local Housing Areas'.
- The larger minimum lot size to apply to the remainder of the LGA would exclude lots in some Neighbourhood Centres to allow Council to continue further investigations for upzoning and higher density than would be achieved under dual occupancy.

Disadvantages:
- Lesser impact to strategic planning than Option 1, however, there remains a loss of tiered strategic planning that does not sufficiently enable some of the more established and well-structured Neighbourhood Centres from realising their potential and relies on upzoning investigations being prioritised and completed in the short to mid-term. Timeframes for investigations, master planning, community consultation and exhibition timeframes need to be considered to deliver high quality holistic strategic planning.
- The smaller lot sizes will result in canopy loss that will need to be made up within the available public domain and subject to further Council strategic planning.

<u>Option 3</u>
- Local Housing Areas have mandated the *SEPP (Exempt and Complying Development Codes) 2008* minimum lot sizes of 450 sqm
- Neighbourhood Centres identified within the Ku-ring-gai LSPS to be identified as 'Areas' within Ku-ring-gai LEP 2015 with minimum lot sizes approximately 940 sqm. This may need further nuancing for a minimum lot size that may range between the 'Area' median down to 700 sqm in specific Neighbourhood Centres where those smaller lots are specific to their subdivision.
- Remainder of R2 within the LGA to minimum lot size of approximately 1075 sqm to capture the 3847 remaining lots required to achieve the EIE's 50% of R2 lots.
- The smaller lot sizes will result in canopy loss that will need to be made up within the available public domain and subject to further Council strategic planning.

Advantages:
- Option 3 focuses dual occupancy in a clear hierarchy based on the size of Local and Neighbourhood Centres and their available transport and facilities to align with the LSPS.
- Larger lot sizes can be facilitated with a sliding scale to better support canopy targets over time.

Disadvantages:
- Some of the Neighbourhood Centres that are a focus of potential future upzoning may be more difficult where dual occupancy is widely taken up and further smaller dual occupancy Torrens Title subdivisions occur.
- While potentially less impacts to strategic planning than Options 1 and 2, Ku-ring-gai's experience of development under State Environmental Planning Policies where local controls for deep soil landscape and tree canopy are overridden continues to result in poor outcomes and continuing erosion of urban canopy. There remains a loss of tiered strategic planning that remains unlikely to sufficiently enable some of the more established and well-structured Neighbourhood Centres from realising their potential and relies on upzoning investigations being prioritised and completed in the short to mid-term. Timeframes for investigations, master planning, community consultation and exhibition timeframes need to be considered to deliver high quality holistic strategic planning.
- The smaller lot sizes will result in canopy loss that will need to be made up within the available public domain and subject to further Council strategic planning.

The above options have used Ku-ring-gai's existing subdivision patterns to deliver the DPHI target of 50% of R2 lots.

Future dual occupancy in heritage conservation areas is best delivered via a development application pathway similar to the EIE approach to heritage items. High quality adaptive reuse, alterations and additions to contributory items to deliver dual occupancy is supported in principle. However, a CDC pathway is likely to erode the character of heritage conservation areas and their subdivision patterns without further amendments to its provisions. Ku-ring-gai's minimum lot widths in heritage conservations be set to ensure the values of those subdivisions are maintained.

5.2 Canopy options to consider

Significant canopy loss is likely with the EIE provisions. This has been the experience in Ku-ring-gai with existing SEPP development standards and non-refusal standards. This is increasing the challenges for local government to deliver their LSPS Planning Priorities and support strategic policies, to care for the environment so we have healthy places to live shared with thriving flora and fauna, to mitigate urban heat and providing sufficient shade to buildings to maximise their long-term performance, to provide the community with places of respite and thermal comfort afforded by trees, and to deliver the urban character for which Ku-ring-gai is founded.

Mitigating canopy loss
Further investigative work and canopy mapping will be required to coordinate with mitigation strategies and mechanisms for the impacts of multi-driveway cross-overs and increased site coverage associated with dual occupancies and to better understand the full implications to biodiversity corridors and identify opportunities within Ku-ring-gai's public space network for canopy replenishment.

Further work on public domain street design will be required to accommodate consolidated deep soil zones that cater to Ku-ring-gai's different street types, reservations, ratios of carriageway, nature strip and footpaths, and to prioritise areas for urban repair.

Public open spaces will need to do the heavy lifting. Opportunities for increasing canopy planting for all Council facilities will need to be prioritised.

Protection of wildlife corridors is to be prioritised so that east-west and north connectivity for wildlife is retained, and biodiversity remains healthy. Option 3 of the minimum lot sizes may be better suited to protection of the biodiversity bushland corridors by concentrating dual occupancies to Neighbourhood Centres where such corridors generally are absent or may affect a lesser number of lots.

Lot sizes and lot widths for trees within the private domain
The following is recommended subject to Council's internal further canopy testing and based on the EIE provisions:

	Min dimension for deep soil area (metres)	EIE Canopy target	Deep soil target	Tree-planting rate	EIE Minimum parent lot size sqm	Ku-ring-gai beyond 'Local Housing Areas'	Minimum Lot width metres
Small trees	3.5 x 3.5	20%	20%	For every 200 m2 of site area, or part thereof, at least one small tree	300-600		15m EIE 12m subject to Codes SEPP
Medium trees	6 x 6 (Ku-ring-gai requirements)	25%	25%	For every 225 m2 of site area, or part thereof, at least one medium tree	>600	>650 Ku-ring-gai minimum lot size	18 m
Larger trees	8 x 8 (Ku-ring-gai requirements)	To further testing	30% Ku-ring-gai minimum	Aligned with future DCP controls for dual occupancy with CDC	N/A	>1075 Ku-ring-gai minimum lot size	18-20m subject to Ku-ring-gai 'Areas'

Table 7: Deep soil, canopy and lot widths

5.3 Conclusion

The EIE intent to increase housing supply is acknowledged. Sound strategic planning policies need to be well-coordinated and have well-aligned mechanisms so that outcomes are positive rather than impactful.

The proposed EIE development standards for landscape provisions and lot size will be impactful to canopy and flow-on impacts, likely impactful to heritage conservation areas both of which need to be supported by local policies so that heritage can be sensitively considered, and deep soil and canopy landscape is not continually eroded.

The major success of the former SEPP 65, now Chapter 4 of *SEPP(Housing) 2021* has been the simple mechanism that prioritises local policy provisions for landscape, deep soil and heritage considerations above the SEPP.

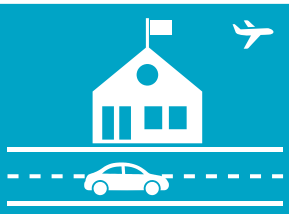
The Department is encouraged to continue to develop policies with GANSW that balance the need for facilitating housing supply with delivering high quality, liveable and desirable urban environments.

Appendix 1 – Summary of Ku-ring-gai LSPS Planning Priorities

Summary list of Ku-ring-gai Local Planning Priorities

North District Plan Direction

Ku-ring-gai Local Planning Priorities

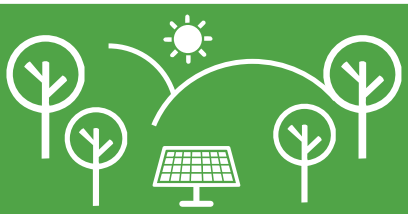


Infrastructure and Collaboration

Liveability

A city supported by infrastructure	A collaborative city	Housing the city	A city of great places	A city for people
LOCAL INFRASTRUCTURE K1. Providing well-planned and sustainable local infrastructure to support growth and change	COLLABORATION K2. Collaborating with State Government Agencies and the community to deliver infrastructure projects	HOUSING K3. Providing housing close to transport, services and facilities to meet the existing and future requirements of a growing and changing community K4. Providing a range of diverse housing to accommodate the changing structure of families and households and enable ageing in place K5. Providing affordable housing that retains and strengthens the local residential and business community	LOCAL AND NEIGHBOURHOOD CENTRES K6. Revitalising and growing a network of centres that offer unique character and lifestyle for local residents K7. Facilitating mixed-use developments within the centres that achieve urban design excellence K8. Promoting Gordon as the centre for business and civic functions and as the cultural heart of Ku-ring-gai K9. Promoting St Ives as an active green lifestyle and shopping destination K10. Promoting Turramurra as a family-focused urban village K11. Promoting Lindfield as a thriving and diverse centre LOCAL CHARACTER AND HERITAGE K12. Managing change and growth in a way that conserves and enhances Ku-ring-gai's unique visual and landscape character K13. Identifying and conserving Ku-ring-gai's environmental heritage ABORIGINAL COMMUNITIES AND CULTURAL HERITAGE K16. Protecting, conserving and managing Ku-ring-gai's Aboriginal heritage assets, items and significant places	COMMUNITY AND CULTURAL INFRASTRUCTURE K14. Providing a range of cultural, community and leisure facilities to foster a healthy, creative, culturally rich and socially connected Ku-ring-gai ABORIGINAL COMMUNITIES AND CULTURAL HERITAGE K15. Strengthening recognition and support for Aboriginal communities and cultural heritage OPEN SPACE, RECREATION AND SPORT K17. Providing a broad range of open spaces, sporting and leisure facilities to meet the community's diverse and changing needs K18. Ensuring recreational activities in natural areas are conducted within ecological limits and in harmony with no net impact on endangered ecological communities and endangered species or their habitats K19. Providing well maintained, connected, accessible and highly valued trail networks and recreational infrastructure where locals and visitors enjoy and connect with nature K20. Developing and managing a network of sporting assets that best meet the needs of a growing and changing community

Productivity



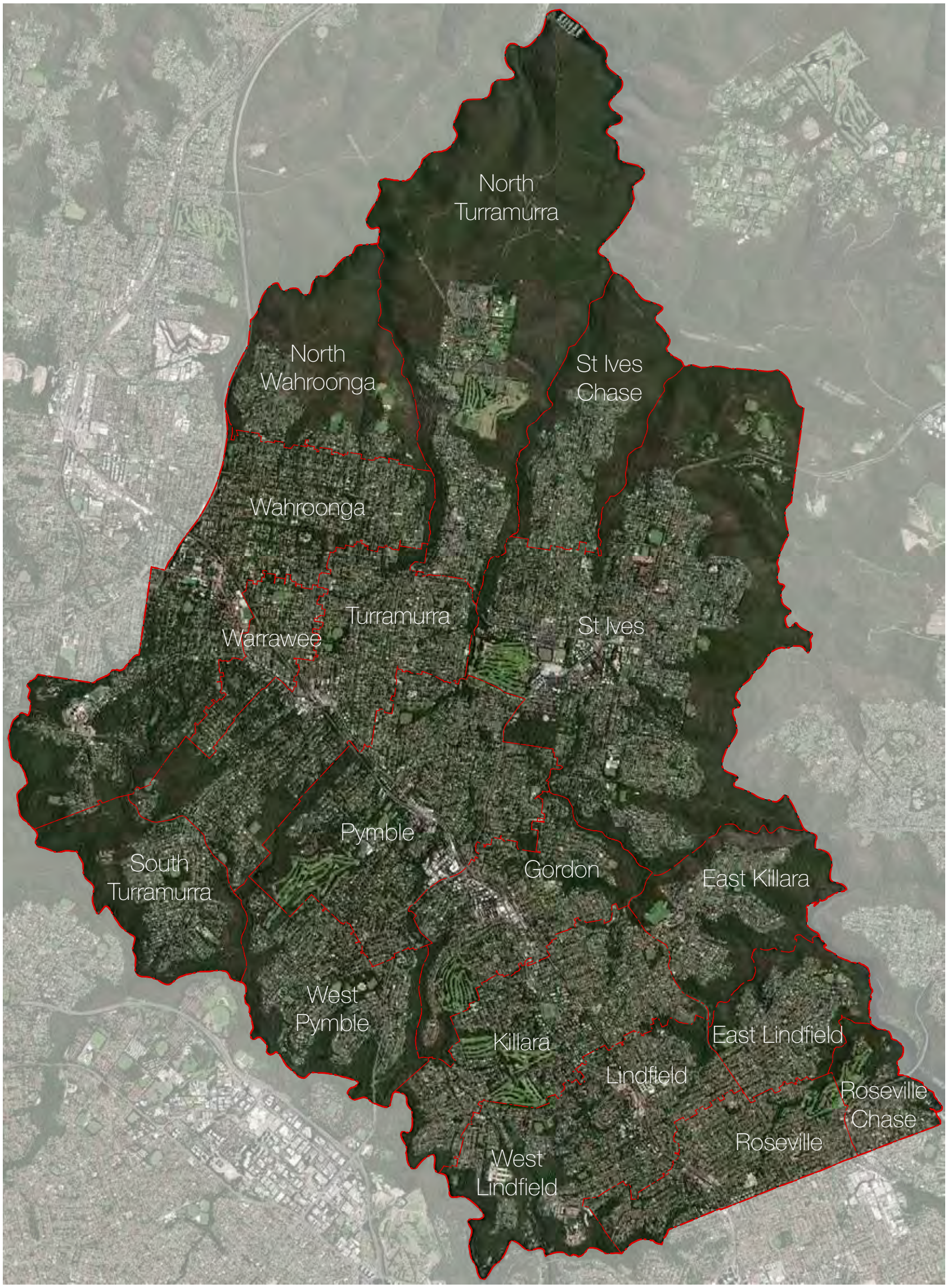
Sustainability

A well connected city	Jobs and skills for the city	A city in its landscape	An efficient city	A resilient city
30 MINUTE CITY K21. Prioritising new development and housing in locations that enable 30 minute access to key strategic centres K22. Providing improved and expanded district and regional connections through a range of integrated transport and infrastructure to enable effective movement to, from and within Ku-ring-gai ACTIVE TRANSPORT – WALKING AND CYCLING NETWORKS K23. Providing safe and convenient walking and cycling networks within Ku-ring-gai	LOCAL ECONOMY AND EMPLOYMENT K24. Diversifying Ku-ring-gai's local economy through the expansion of tourism and the local visitor economy K25. Providing for the retail and commercial needs of the local community within Ku-ring-gai's centres K26. Fostering a strong local economy that provides future employment opportunities for both residents and workers within key industries	OPEN SPACE NETWORK K27. Ensuring the provision of sufficient open space to meet the need of a growing and changing community BUSHLAND AND BIODIVERSITY K28. Improving the condition of Ku-ring-gai's bushland and protecting native terrestrial and aquatic flora and fauna and their habitats. K29. Enhancing the biodiversity values and ecosystem function services of Ku-ring-gai's natural assets URBAN FOREST K30. Improving the quality and diversity of Ku-ring-gai's urban forest K31. Increasing, managing and protecting Ku-ring-gai's urban tree canopy GREEN GRID K32. Protecting and improving Green Grid connections K33. Providing a network of walking and cycling links for leisure and recreation K34. Improving connections with natural areas including river and creek corridors, bushland reserves and National Parks WATER SENSITIVE CITY K35. Protecting and improving the health of waterways and riparian areas K36. Enhancing the liveability of Ku-ring-gai's urban environment through integrated water infrastructure and landscaping solutions K37. Enabling water resource recovery through the capture, storage and reuse of water, alternative water supplies and increased water efficiency	ENERGY AND GREENHOUSE GAS EMISSIONS K38. Reducing greenhouse gas emissions by Council and the Ku-ring-gai Community to achieve net zero emissions by 2045 or earlier WASTE K41. Reducing the generation of waste K42. Managing waste outcomes that are safe, efficient, cost effective, maximise recycling, and that contribute to the built form and liveability of the community	CLIMATE RESILIENCE AND ADAPTATION TO THE IMPACTS OF URBAN AND NATURAL HAZARDS K39. Reducing the vulnerability, and increasing resilience, to the impacts of climate change on Council, the community and the natural and built environment K40. Increasing urban tree canopy and water in the landscape to mitigate the urban heat island effect and create greener, cooler places K43. Mitigating the impacts of urban and natural hazards

Appendix 2 – Analysis Mapping for Dual Occupancy

1.01

Ku-ring-gai Local Government Area



date: 1/12/24

scale: 1:50000

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Nominated Architects:
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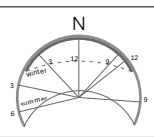


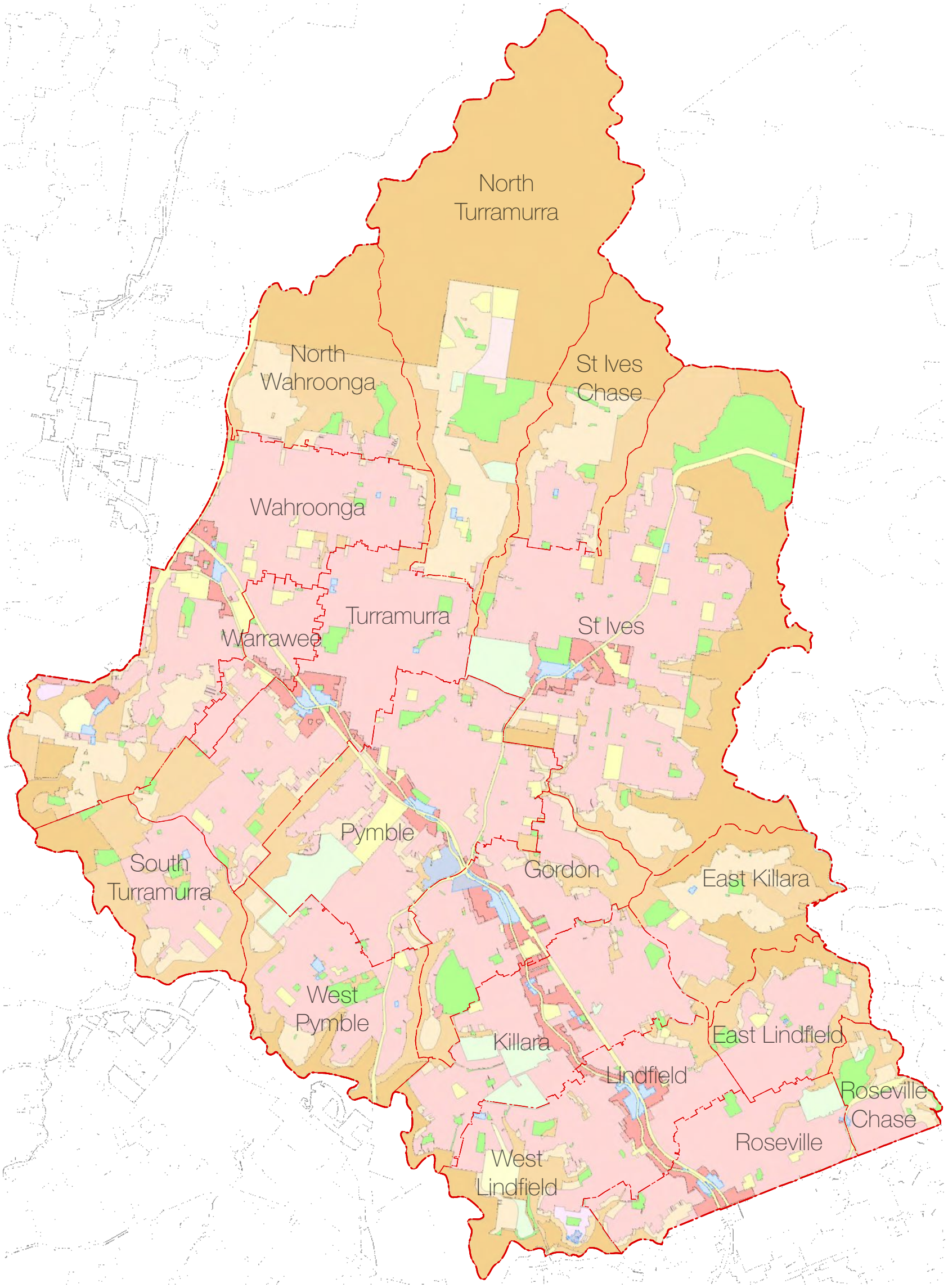
Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

1.02

Land Use Zoning

KLEP 2015



- C1 National Parks and Reserves
- C2 Environmental Conservation
- C3 Environmental Management
- C4 Environmental Living
- CA Area 1 or Area 2
- E1 Local Centre
- E3 Productivity Support
- MU1 Mixed Use
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R4 High Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- SP1 Special Activities
- SP2 Infrastructure
- W1 Natural Waterways

date: 1/12/24

scale: 1:50000

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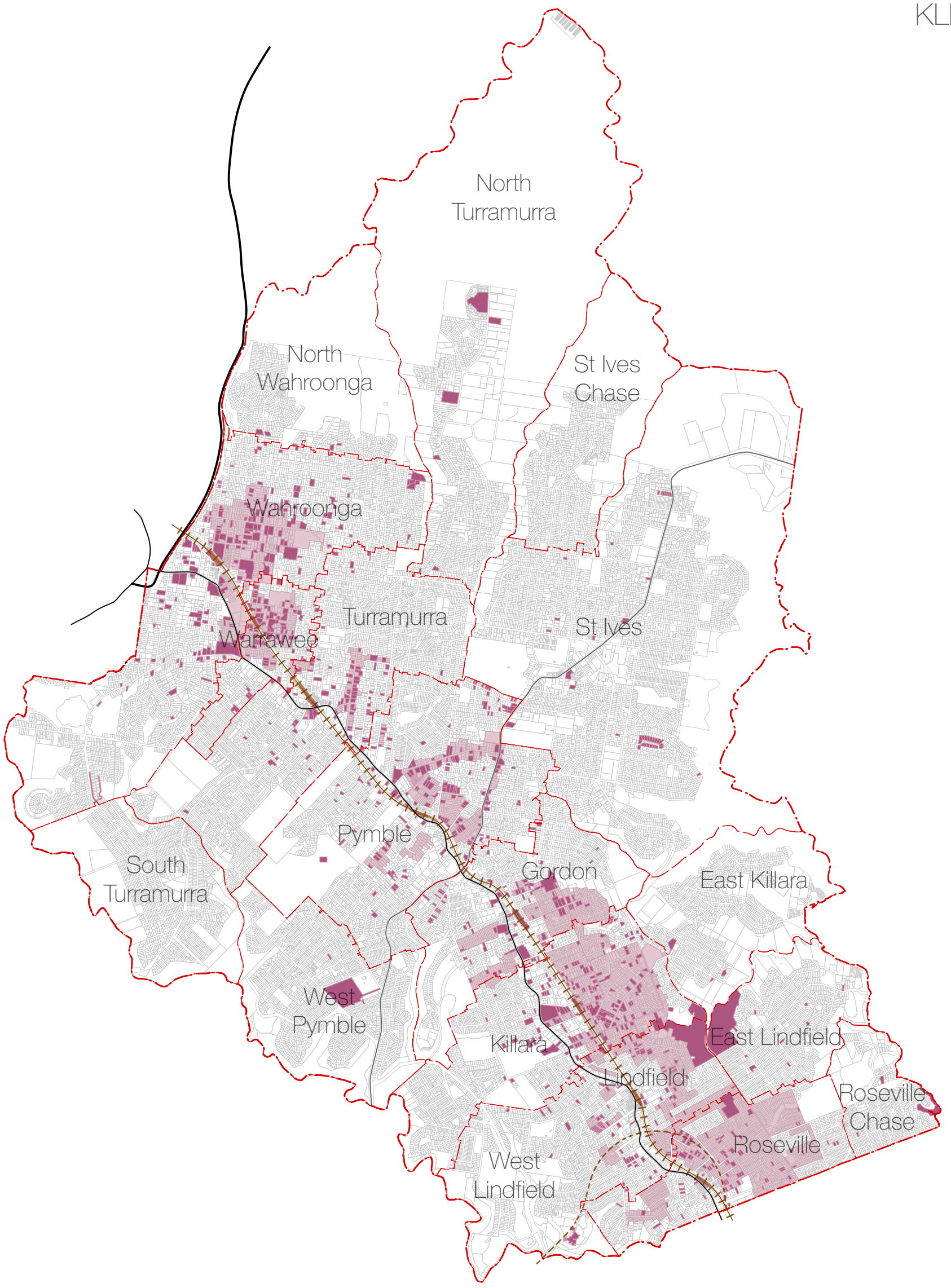
Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

1.03

Heritage

KLEP 2015



Ku-ring-gai base cadastre

Heritage Item

Heritage Conservation Area

North Shore Rail Line

M1

Pacific Highway

Mona Vale Road

date: 1/12/24

scale: 1:50000

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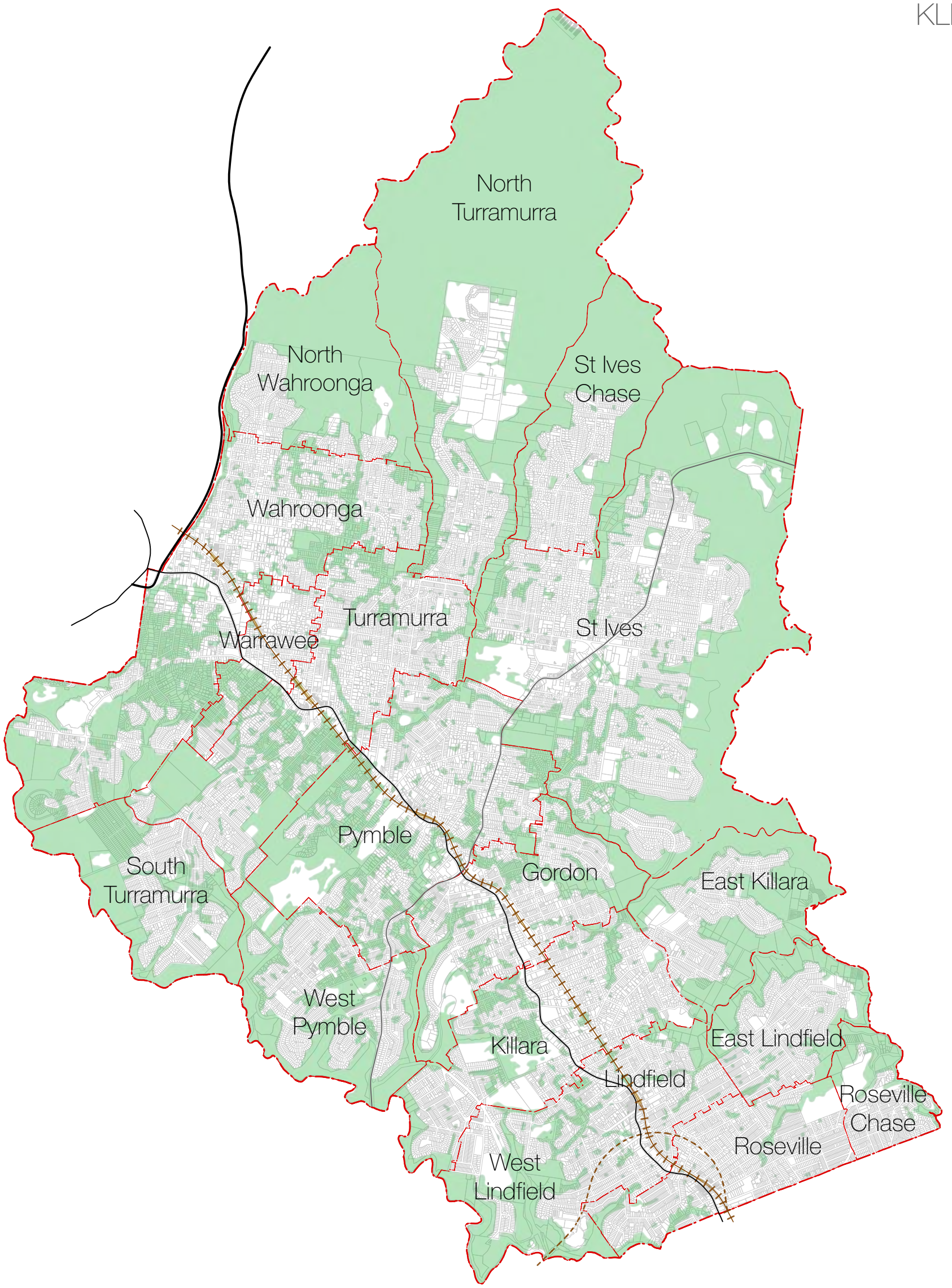
Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

1.04

Biodiversity

KLEP 2015



Ku-ring-gai base cadastre

Biodiversity Significant Land

North Shore Rail Line

M1

Pacific Highway

Mona Vale Road

date: 1/12/24

scale: 1:50000

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N

winter

summer

Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

1.05

Riparian

KLEP 2015

Ku-ring-gai base cadastre

Riparian corridor

North Shore Rail Line

M1

Pacific Highway

Mona Vale Road

date: 1/12/24

scale: 1:50000

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N

winter

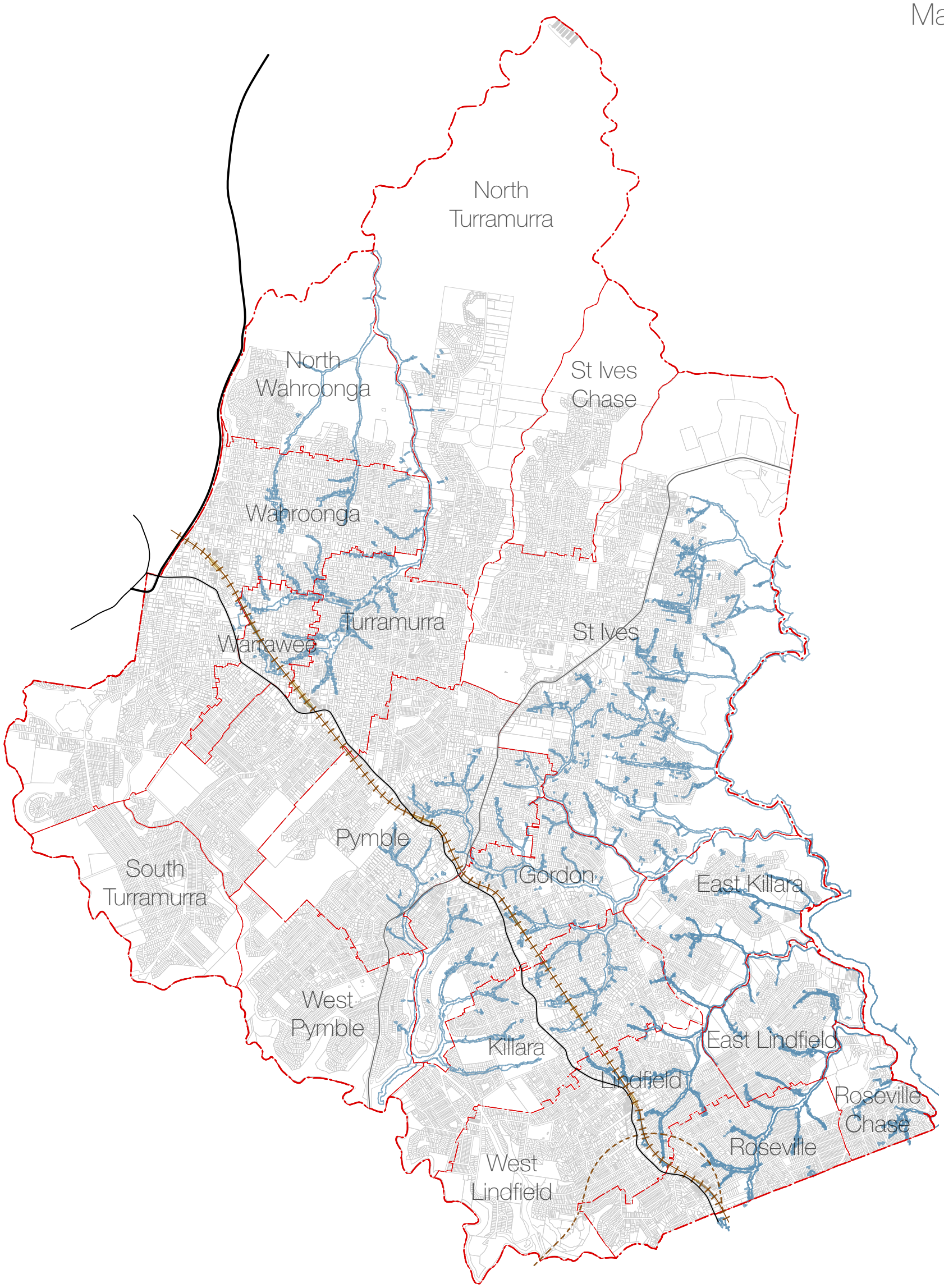
summer

Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

1.06

Probable Maximum Flood



Ku-ring-gai base cadastre

Probable Maximum Flood areas (note: Ku-ring-gai flood studies for the LGA are continuing)

North Shore Rail Line

M1

Pacific Highway

Mona Vale Road

date: 1/12/24

scale: 1:50000

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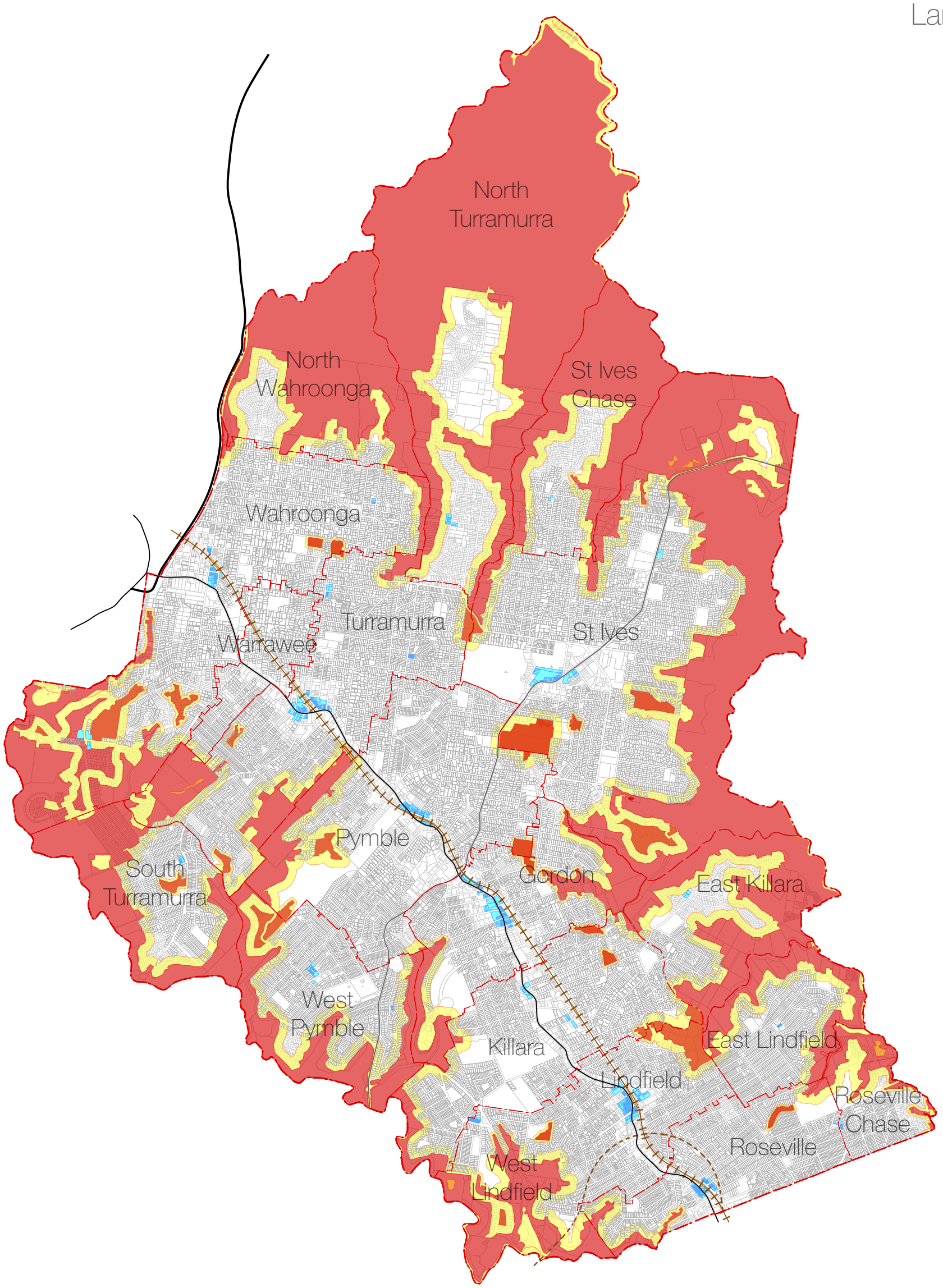
Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

1.07

Bushfire Prone Land



Ku-ring-gai base cadastre - showing excluded lots
Bushfire Prone Land - Vegetation Category 1 to 3
Bushfire Prone Land - Buffer Zone
E1 - Local and Neighbourhood Centres
North Shore Rail Line
M1
Pacific Highway
Mona Vale Road

date: 1/12/24

scale: 1:50000

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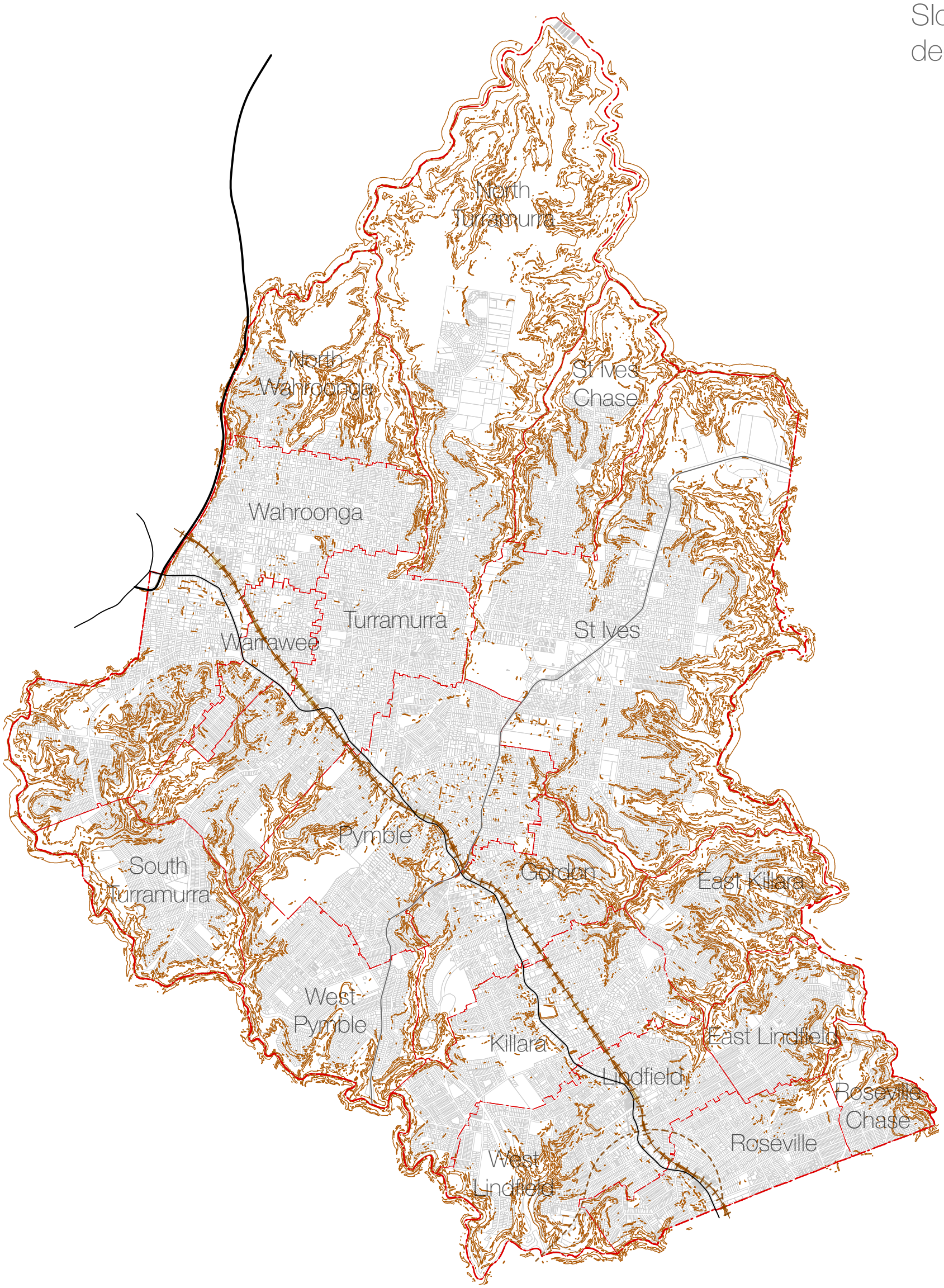
Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

1.08

Topography - Slope > than 18 degrees



Ku-ring-gai base cadastre
Contours
North Shore Rail Line
M1
Pacific Highway
Mona Vale Road

date: 1/12/24

scale: 1:50000

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N

winter
summer

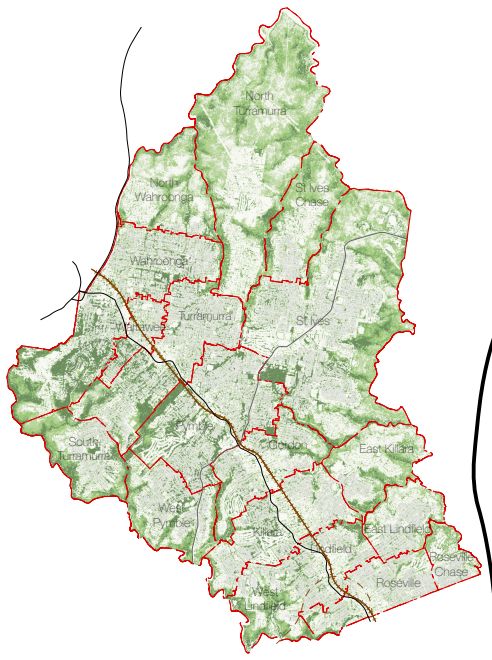
Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

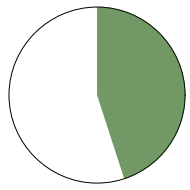
1.09

Canopy

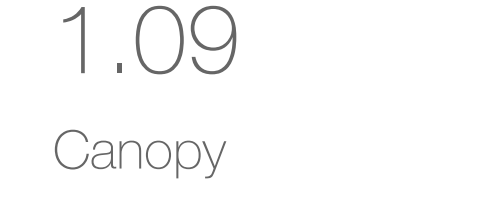
Source: Draft Ku-ring-gai Urban Forest Strategy 2022
Mapping conducted by ArborCarbon



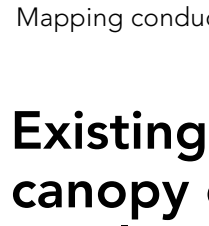
Existing urban canopy cover Total 45%



Distribution

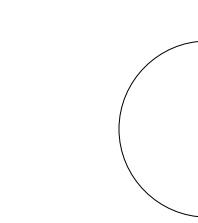


Highest canopy



South Turramurra

North Wahroonga



Wahroonga

Lowest canopy

Killara

Roseville

East Lindfield

The Draft Ku-ring-gai Urban Forest Strategy:

Excludes:

- Land zone C1 - National Parks
- Nature Reserves (Managed by NPWS).

Includes:

- similar bushland managed by Ku-ring-gai Council
- parks, ovals, streets, other public domain
- canopy on land in private ownership

NOTE: See supporting document Ku-ring-gai Dual Occupancy Study for neighbourhood centre urban canopy targets.

- Ku-ring-gai base cadastre
- Urban Canopy with excluded C1 - National Parks
- North Shore Rail Line
- M1
- Pacific Highway
- Mona Vale Road

date: 1/12/24

scale: 1:50000

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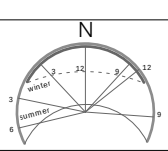
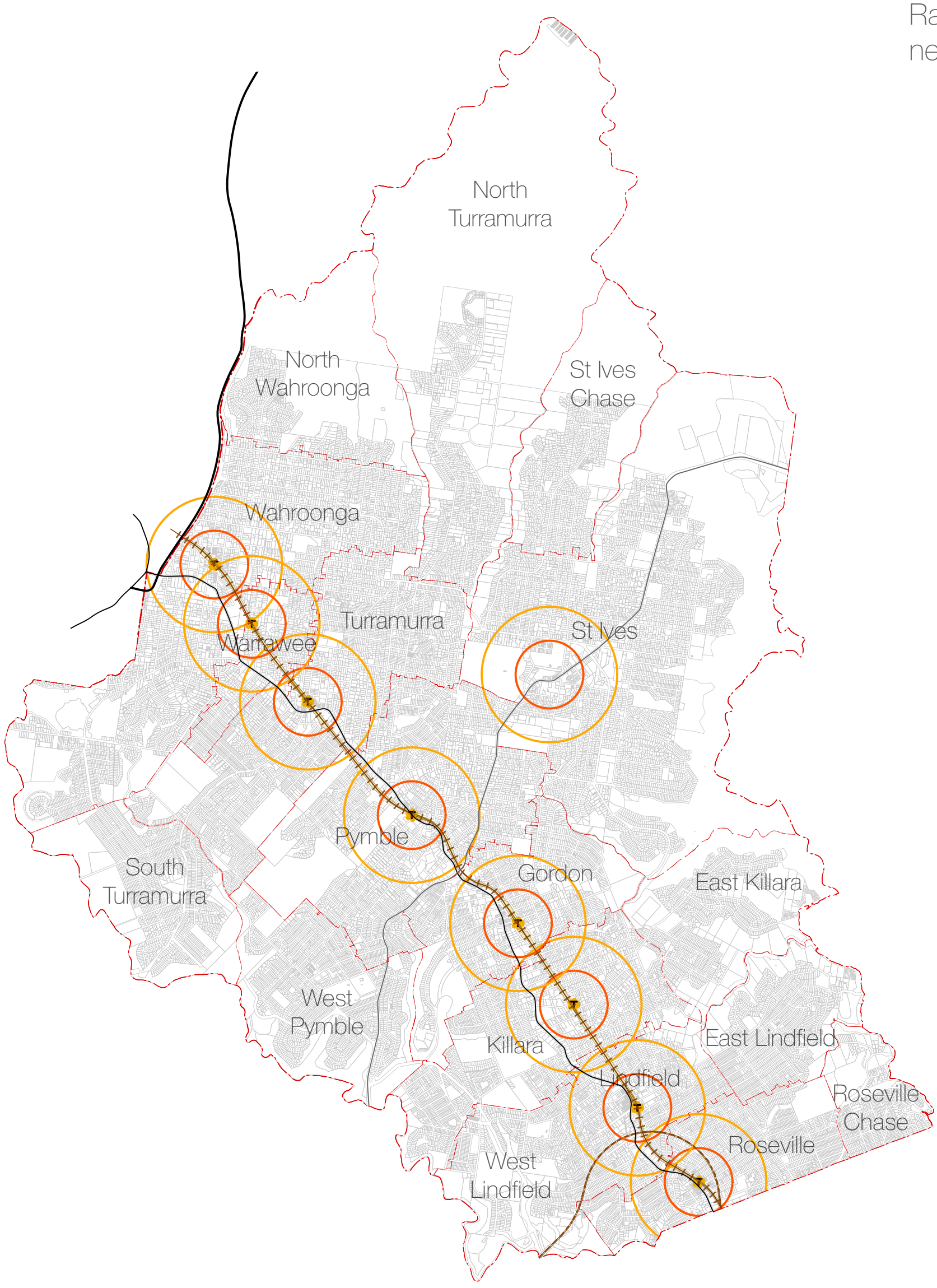


Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

1.10

Transport - Rail and Road network



Ku-ring-gai base cadastre
Walkability (400m)
Walkability (800m)
North Shore Rail Line
M1
Pacific Highway
Mona Vale Road

date: 1/12/24

scale: 1:50000

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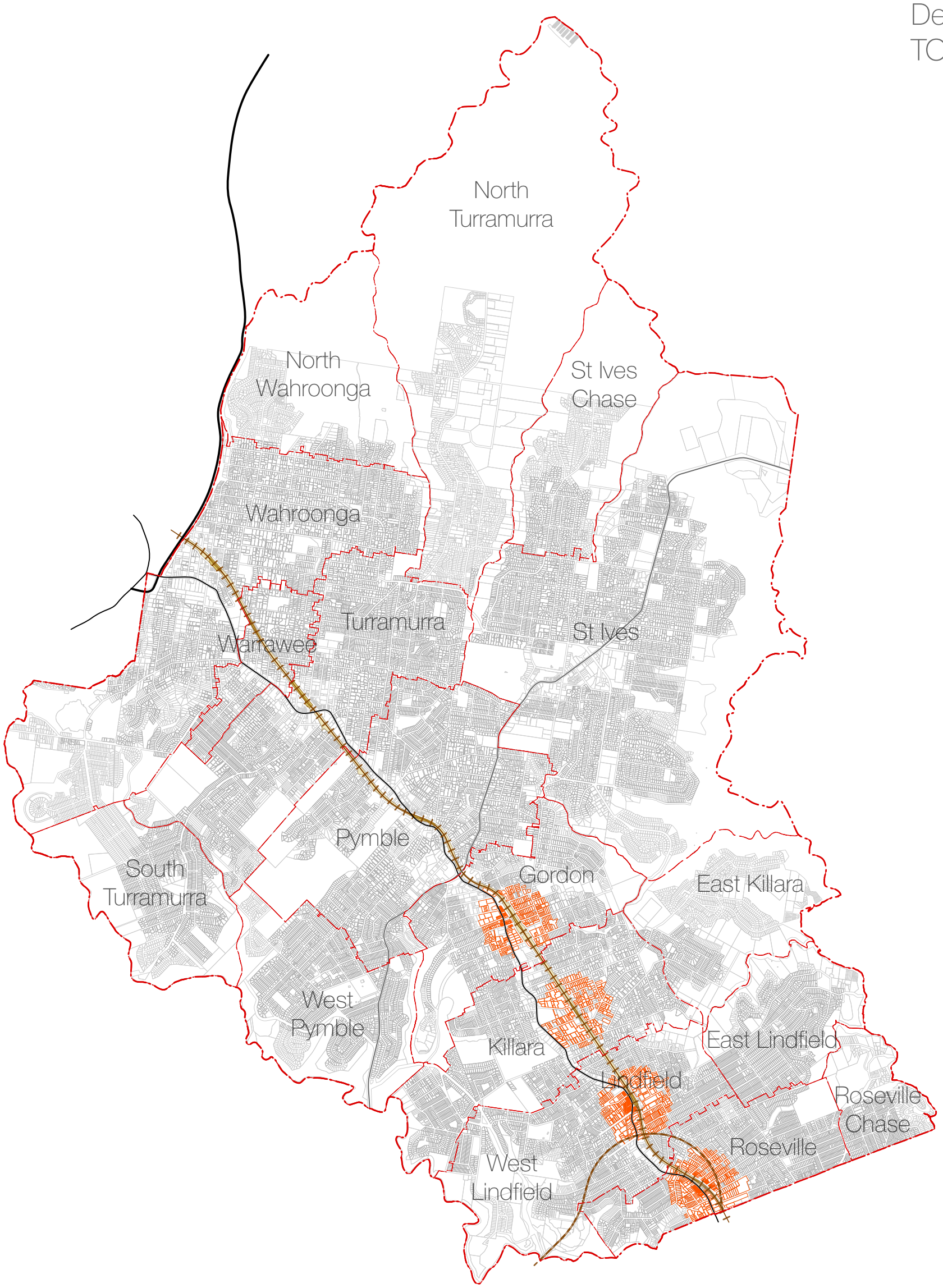
Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

1.11

Transport Oriented Development - TOD SEPP Areas



Ku-ring-gai base cadastre

Transport Oriented Development lots (residential R3, R4 and mixed-use within 400m of stations)

North Shore Rail Line

M1

Pacific Highway

Mona Vale Road

date: 1/12/24

scale: 1:50000

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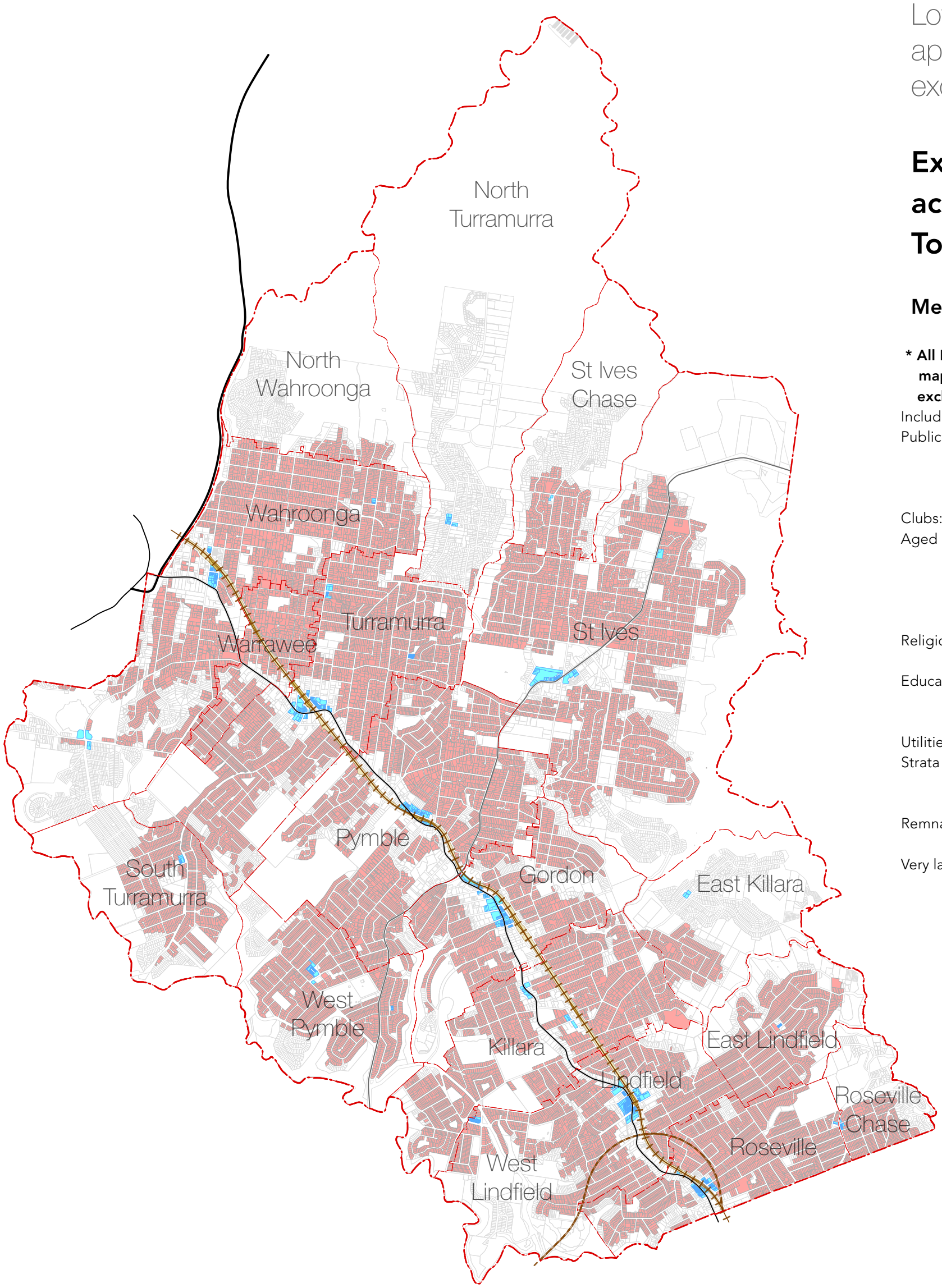
Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

2.01

R2 Lots - All R2 Lots before applying EIE exclusions



Existing R2 lots across Ku-ring-gai:
Total = 25,791

Median lot size* 951sqm

*** All R2 Zoned Lots from Council mapping before applying EIE exclusions**

Includes R2 lots with other uses such as:

Public domain:
- Urban parks
- Laneways
- Pathways

Clubs:
- Lawn Bowling

Aged Care:
- Retirement Villages
- Residential Aged Care Facilities
- Hospices

Religious:
- Churches
- Other church/religious uses

Education:
- Early Chilhdood Centres
- Primary schools
- High schools

Utilities:
- Substations

Strata subdivisions:
- existing Dual occupancy
- Aged care and Disability

Remnant very small lots >0 to <400m2
- approx 300 lots across LGA

Very large lots > 10,000m2
- approx 6 lots across LGA

Ku-ring-gai base cadastre
KLEP 2015 - E1 - Local Centre
KLEP 2015 - R2 - Low Density
North Shore Rail Line
M1
Pacific Highway
Mona Vale Road

date: 1/12/24

scale: 1:50000

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N

Ku-ring-gai Dual Occupancy Lot Size

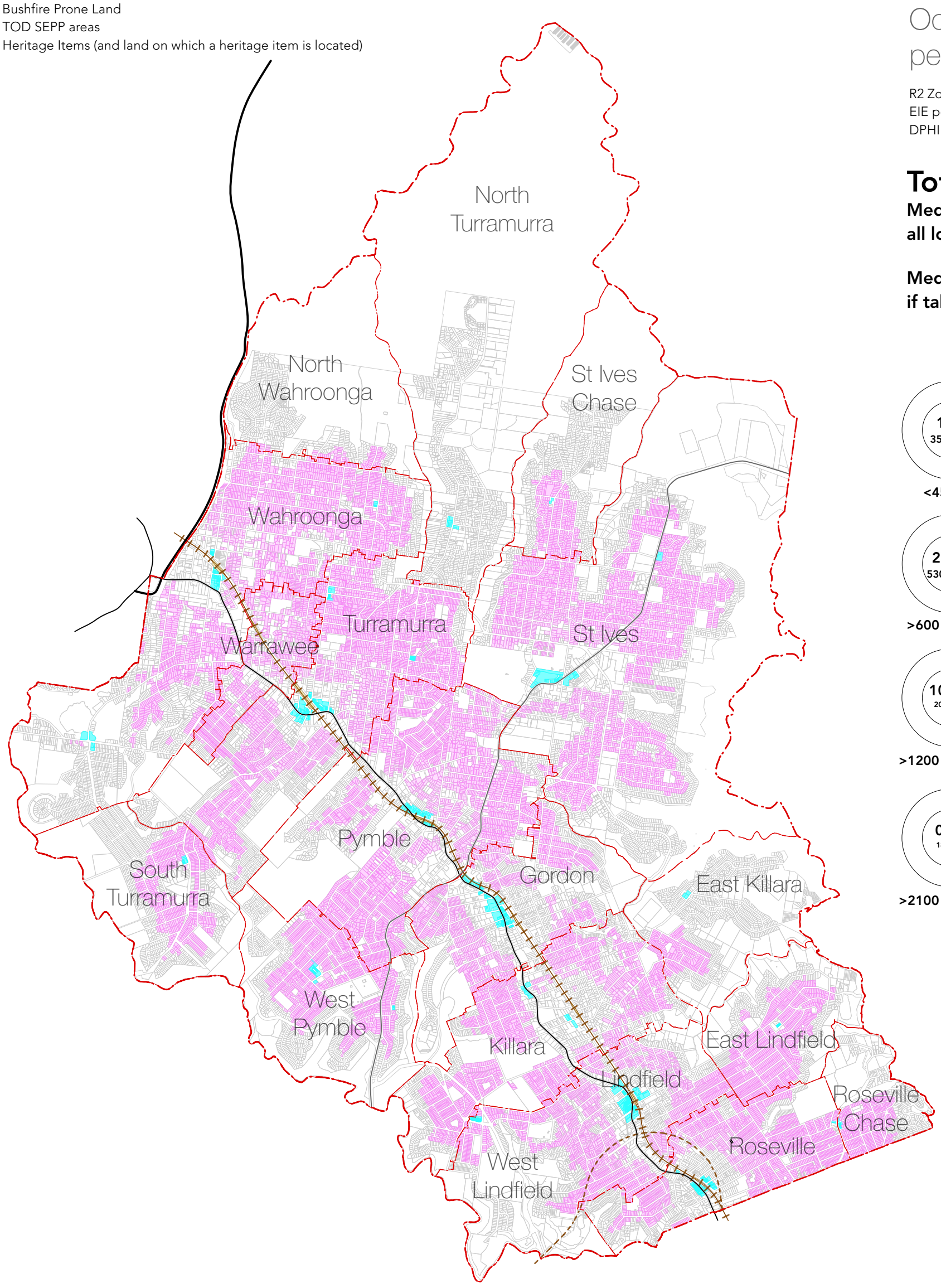
Ku-ring-gai Council

2.02

R2 Lots - EIE Dual Occupancy permitted

EIE exludes Dual Occupancy on R2 zoned lots that are:

- Bushfire Prone Land
- TOD SEPP areas
- Heritage Items (and land on which a heritage item is located)

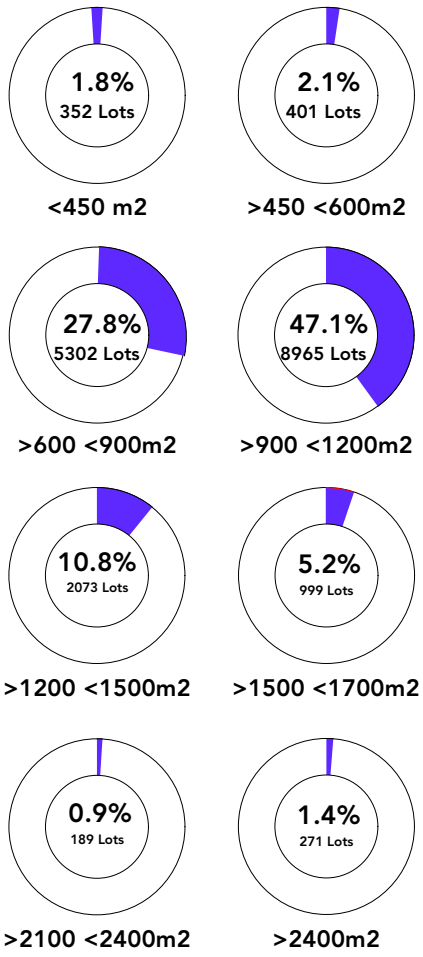


R2 Zoned Lots meeting Codes SEPP and EIE permissibility
DPHI requires 50% of total for target

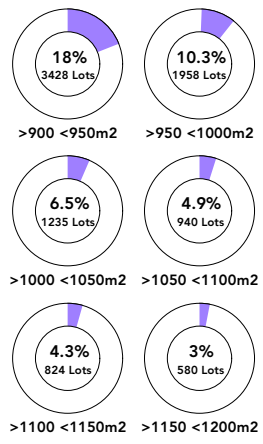
Total = 18725

Median Lot size = 954m2 all lots across LGA

Median Lot size = 1144m2 if taken from 9363 (50%) lots



Lot distribution in range 900<1200m2



- Ku-ring-gai base cadastre
- KLEP 2015 - E1 - Local Centre
- R2 - Low Density - Lots compliant for Dual Occupancy (maximum subject to individual lot conditions)
- DPHI - 'Local Housing Areas'
- North Shore Rail Line
- M1
- Pacific Highway
- Mona Vale Road

date: 1/12/24

scale: 1:50000

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N

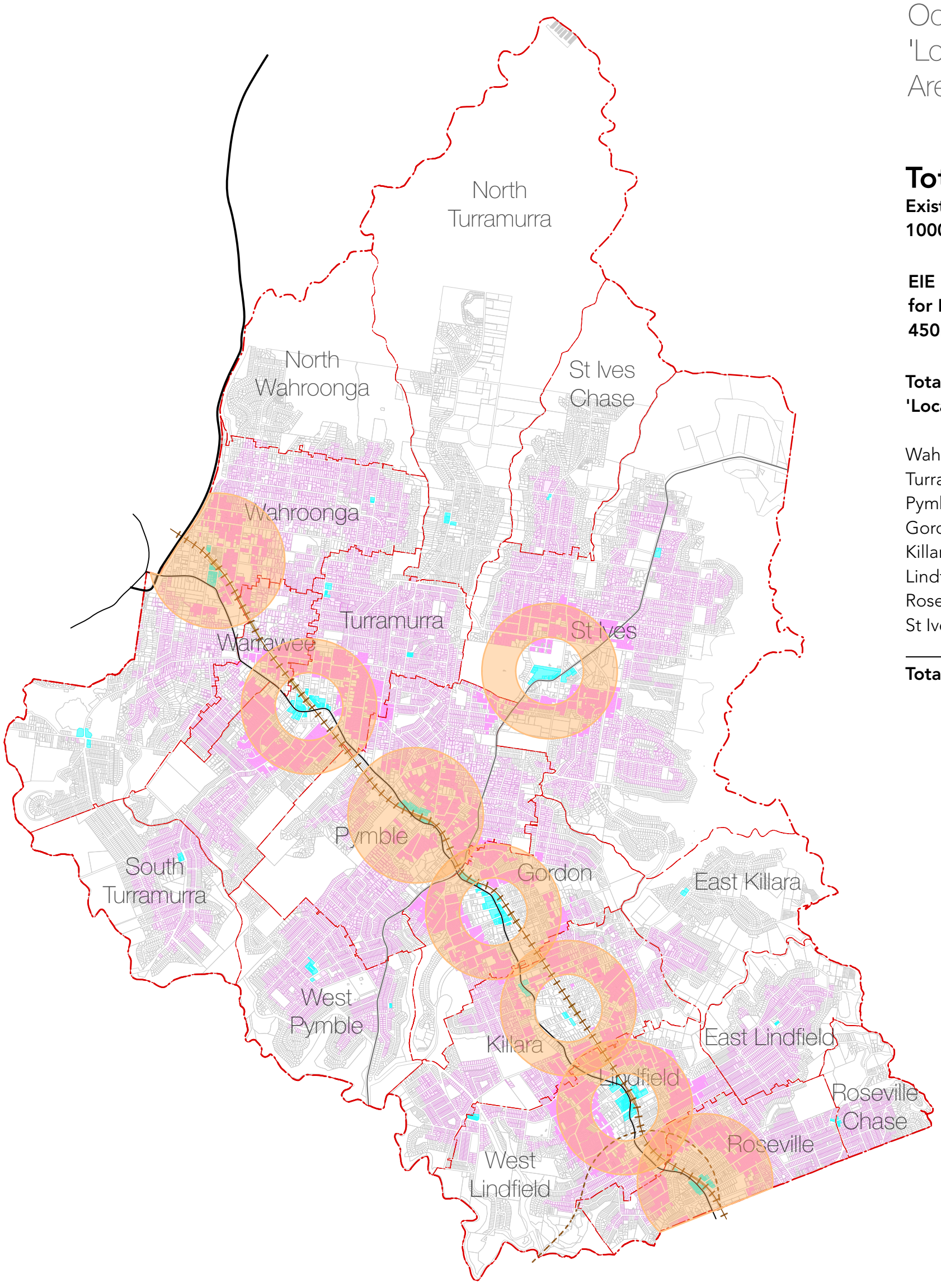
winter
summer

Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

2.03

R2 Lots_EIE Dual Occupancy_ 'Local Housing Areas'



Total = 4177

Existing Median Lot size = 1000m2

EIE minimum parent lot size for Local Housing Areas = 450m2

Total R2 lots in DPHI identified 'Local Housing Areas'

Wahroonga	241
Turramurra	849
Pymble	340
Gordon	577
Killara	331
Lindfield	859
Roseville	315
St Ives	665
Total	**4177**

Ku-ring-gai base cadastre

KLEP 2015 - E1 - Local Centre

R2 - Low Density - Lots compliant for Dual Occupancy (maximum subject to individual lot conditions)

R2 - Lots within 'Local Housing Areas' (excludes Warrawee Station which is generally captured within the Turramurra Station E1 catchment)

DPHI - 'Local Housing Areas'

North Shore Rail Line

M1

Pacific Highway

Mona Vale Road

NOTE: Slight discrepencies between base cadastre data sets (approx 32 lots) is assumed insignificant in LGA figures

date: 1/12/24

scale: 1:50000

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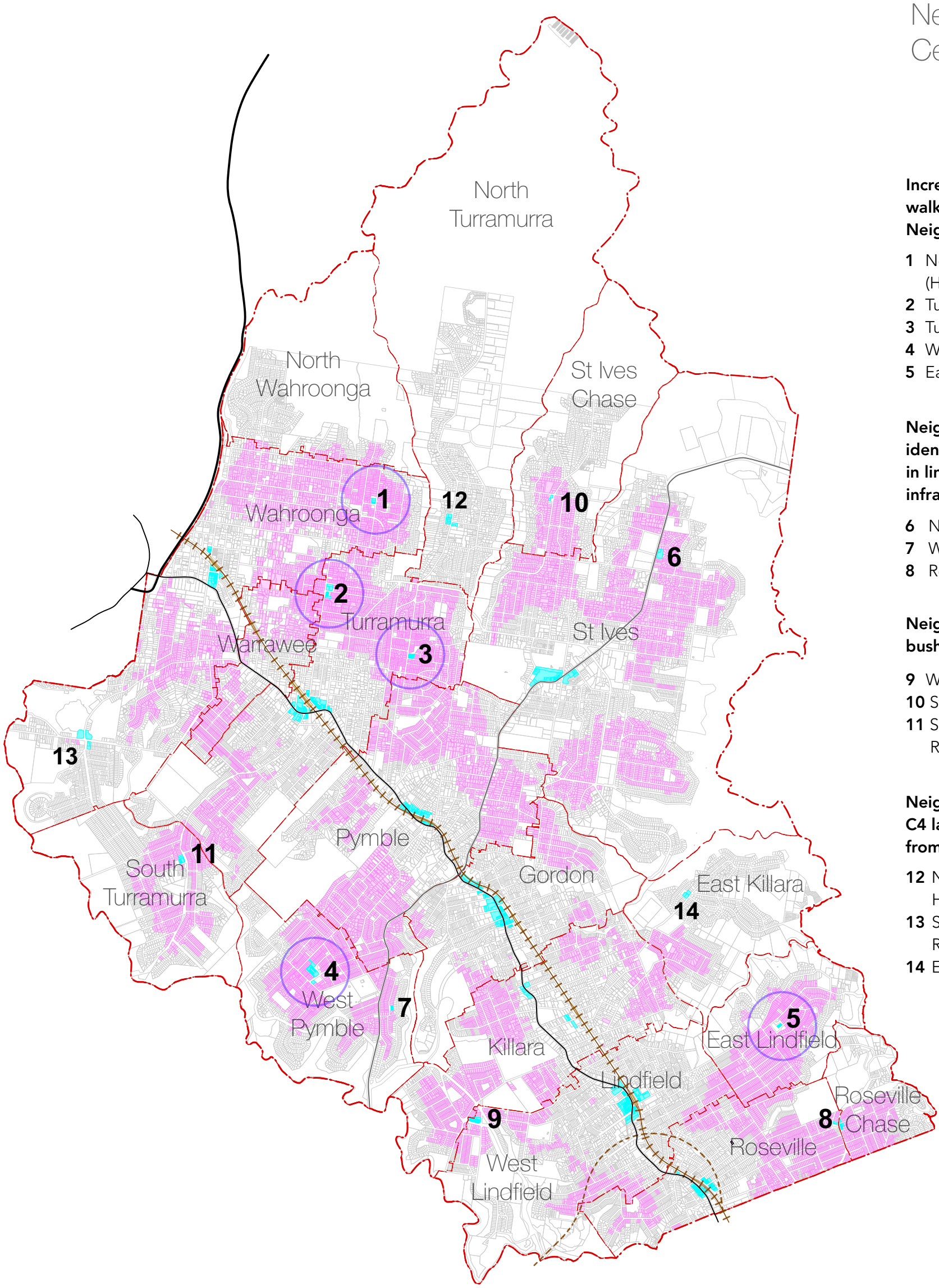
Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

2.04

R2 lots in Neighbourhood Centres LSPS



Increased housing within 400m walking distance of Neighbourhood Centres:

1 North Wahroonga (Hampden Avenue)
2 Turramurra (Eastern Road)
3 Turramurra (Princes Street)
4 West Pymble (Kendall Street)
5 East Lindfield (Wellington Road)

Neighbourhood Centres identified in LSPS for up-zoning in line with future transport infrastructure:

6 North St Ives (Mona Vale Road)
7 West Gordon (Duneba Avenue)
8 Roseville Chase (Babbage Road)

Neighbourhood Centres with bushfire evactuation risk:

9 West Lindfield (Moore Avenue)
10 St Ives Chase (Warrimoo Ave)
11 South Turramurra - Kissing Point Road)

Neighbourhood Centres with C4 land use zoning (excluded from EIE dual occupancy):

12 North Turramurra (Bobbin Head Road)
13 South Wahroonga (Fox Valley Road)
14 East Killara (Koola Avenue)

Ku-ring-gai base cadastre
E1 - Local / Neighbourhood Centre
R2 - Lots compliant for Dual Occupancy outside of EIE 'Local Housing Areas' (maximum subject to individual lot conditions)
Indicative 400m walking distance
North Shore Rail Line
M1
Pacific Highway
Mona Vale Road

date: 1/12/24
scale: 1:50000

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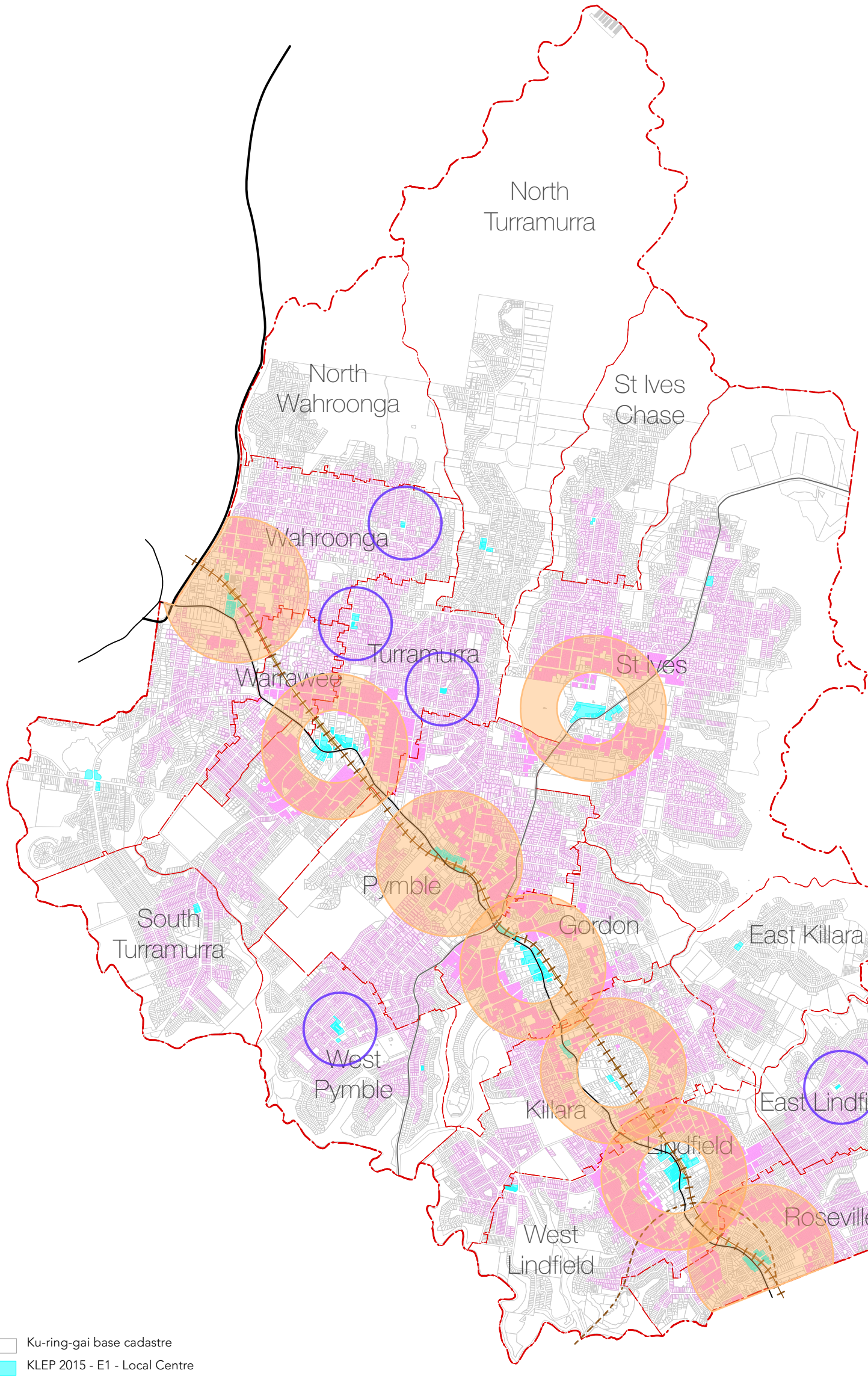
N

Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

2.05

Dual Occupancy
R2 Lots - Tiered
Lot Size strategy



Total = 9363
lots required across LGA

DPHI - 'Local Housing Areas'
Total lots 4177
Min lot size 450sqm (EIE)

LSPS - 5 x Neighbourhood Centres
Total lots 1339
Min lot size 940sqm
(Council to confirm lots within identifed 'Areas' requiring lot size between 725-940sqm)

R2 lots remaining to deliver 50% total across LGA
Total lots 3847
Min lot size 1075sqm
(Council to confirm lots within identifed 'Areas' requiring lot size between 725-940sqm)

Ku-ring-gai base cadastre
KLEP 2015 - E1 - Local Centre
R2 - Low Density - Lots compliant for Dual Occupancy (maximum subject to individual lot conditions)
R2 - Lots within 'Local Housing Areas' (excludes Warrawee Station which is generally captured within the Turramurra Station E1 catchment)
DPHI - 'Local Housing Areas'
LSPS - identified Neighbourhood Centres
North Shore Rail Line
M1
Pacific Highway
Mona Vale Road

NOTE: Slight discrepencies between base cadastre data sets (approx 32 lots) is assumed insignificant in LGA figures

date: 1/12/24
scale: 1:50000

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Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

3.01

R2 Lot Distribution Summary 1

Dual Occupancy - Lots identified within all R2 zoned land to EIE requirements:
excludes R2 lots that are:
- Bushfire Prone Land
- TOD SEPP
- Heritage Items (and land on which a heritage item is located)

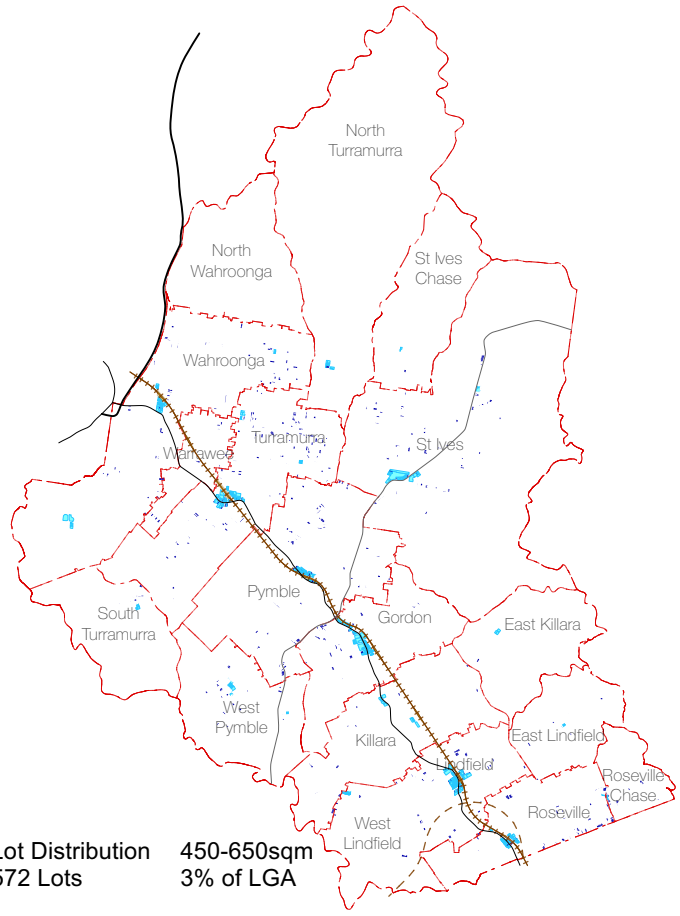
Generally, R2 lots are broadly distributed across the LGA with several ranges of concentrated lots within specific historical subdivisions.
- Smaller lots of 650-750sqm are predominantly in Roseville East and West Lindfield/Killara.
- Lots of 850-950sqm edge parts of the 'Green Fingers' character areas generally in the northern half of the LGA.
- Larger lots of 1500-3000sqm (see Sheet 2) are generally concentrated to the northern half of the LGA and generally around the stations within the areas identified as 'Local Housing Areas'.

Due to the spread of lot sizes throughout the LGA, identifying dual occupancy priority areas will assist with Ku-ring-gai's broader strategic planning to increase density supported by urban testing and additional infrastructure planning identified in the LSPS.

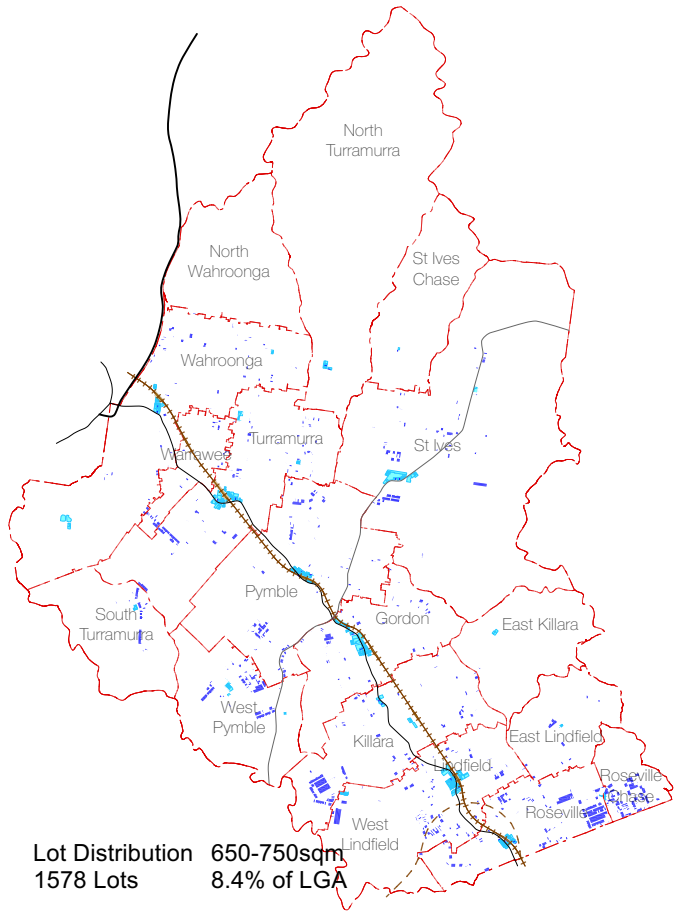
In a finer grain analysis, the lot distributions have implications for setting minimum lot sizes within the LSPS Neighbourhood Centres so that sufficient lots are captured for dual occupancies under the EIE consistent with the LSPS objectives including future urban testing.

R2 Lots within identified ranges

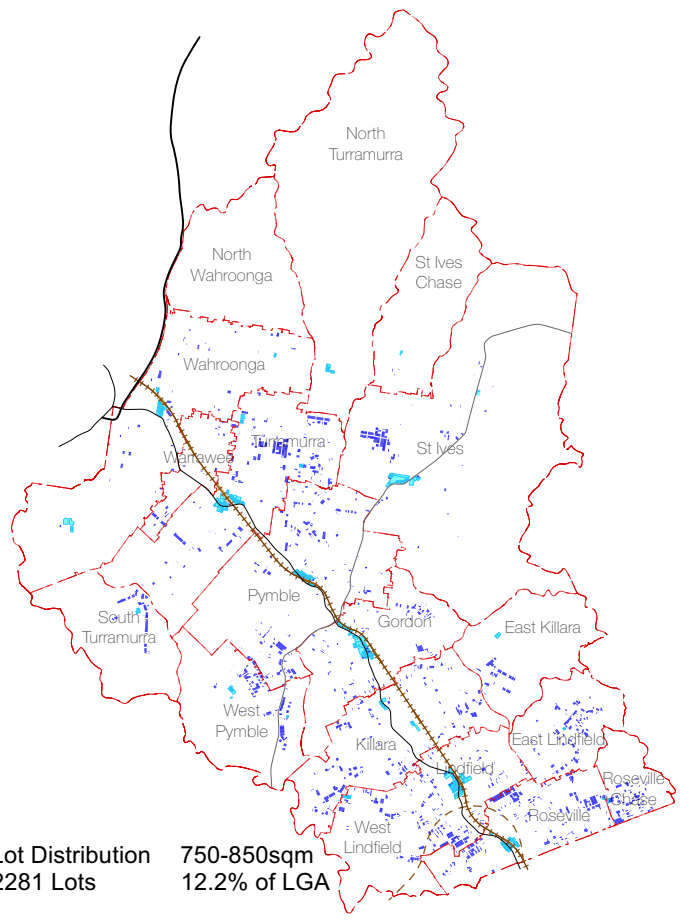
E1 Local Centres / Neighbourhood Centres



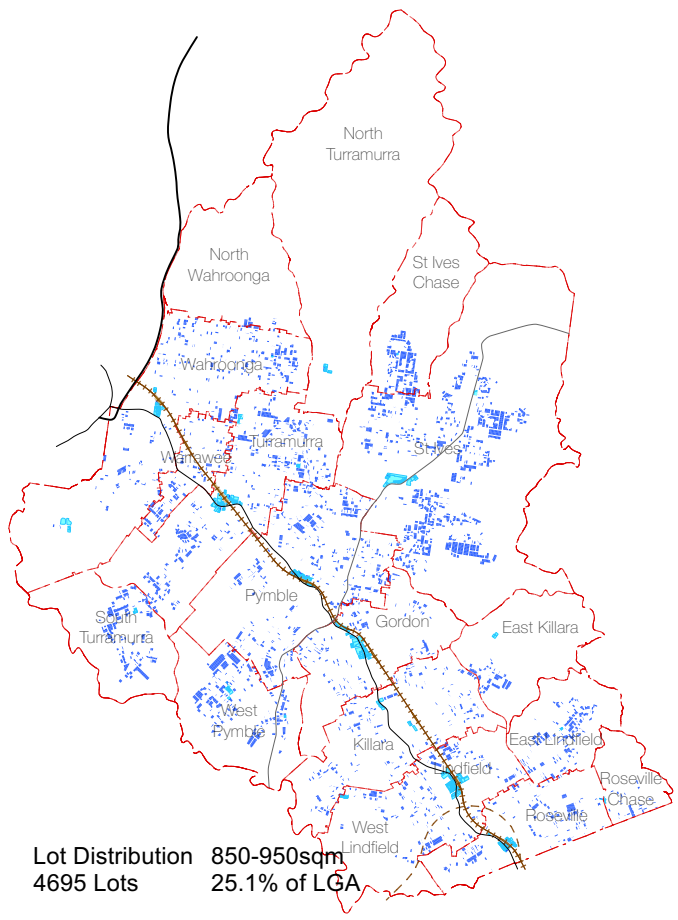
Lot Distribution 450-650sqm
572 Lots 3% of LGA



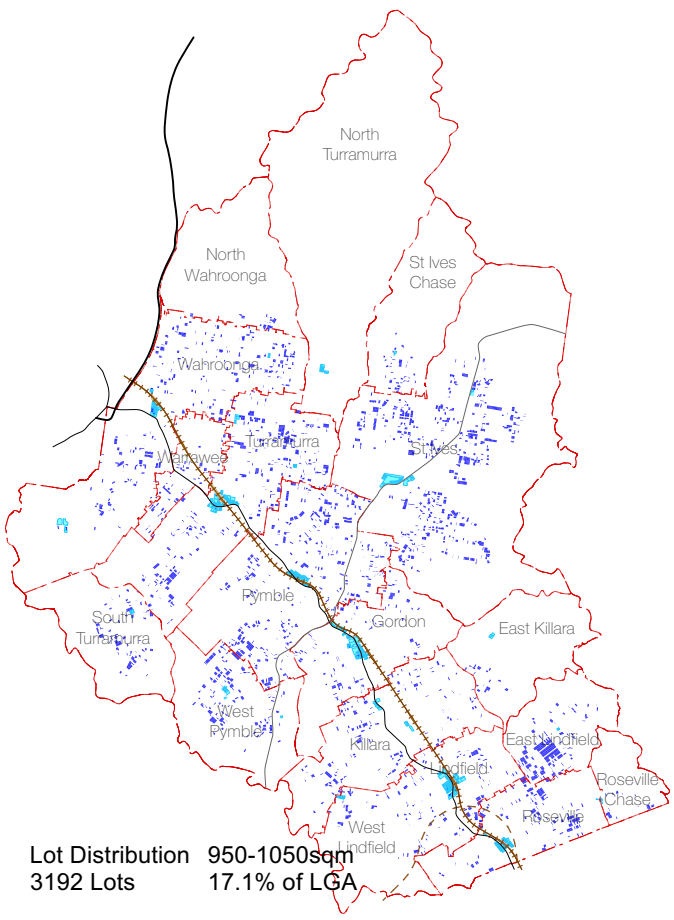
Lot Distribution 650-750sqm
1578 Lots 8.4% of LGA



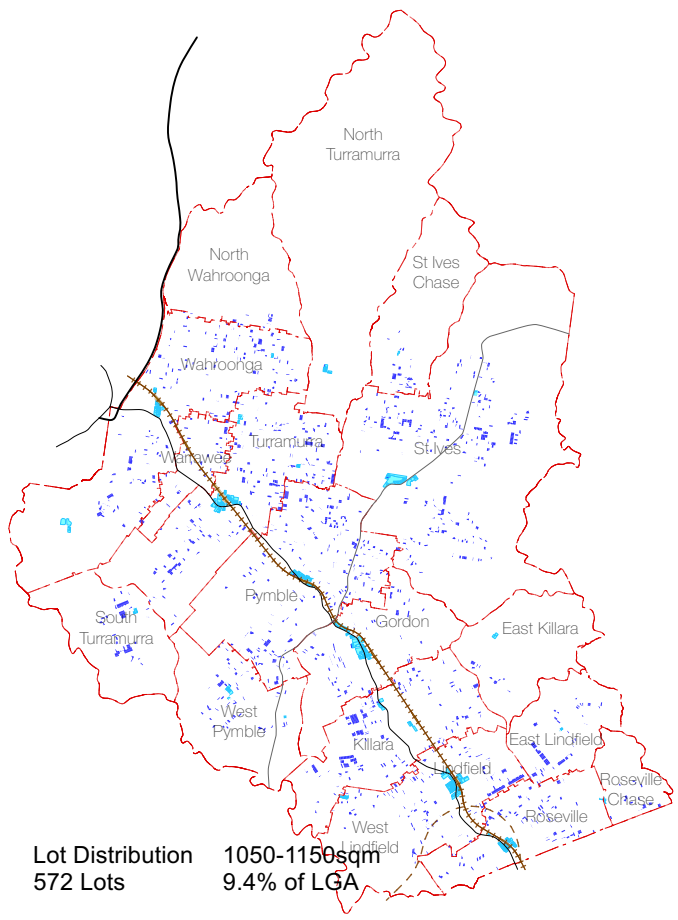
Lot Distribution 750-850sqm
2281 Lots 12.2% of LGA



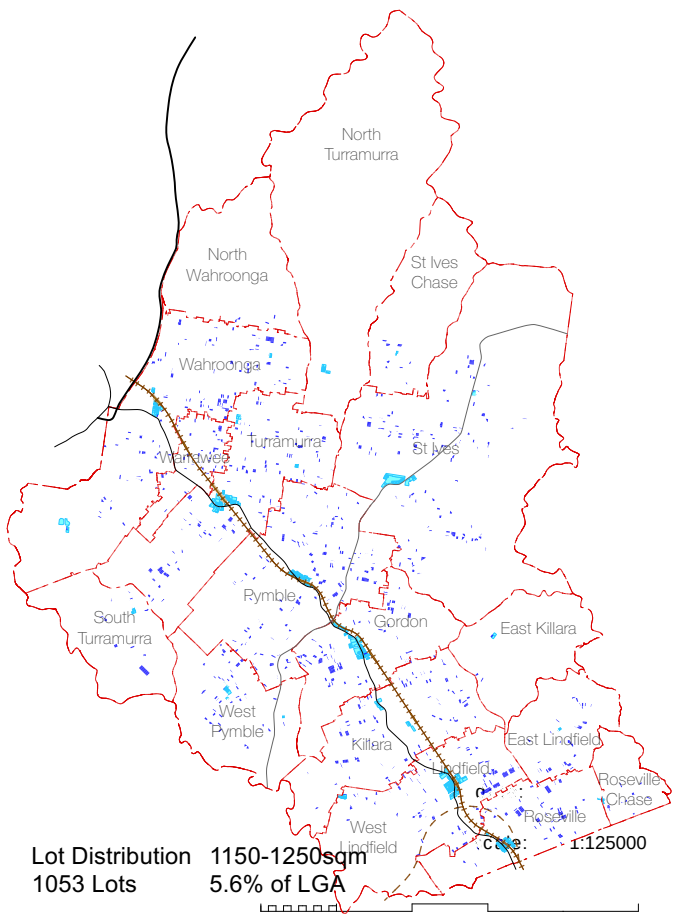
Lot Distribution 850-950sqm
4695 Lots 25.1% of LGA



Lot Distribution 950-1050sqm
3192 Lots 17.1% of LGA



Lot Distribution 1050-1150sqm
572 Lots 9.4% of LGA



Lot Distribution 1150-1250sqm
1053 Lots 5.6% of LGA

Scale: 1:125000

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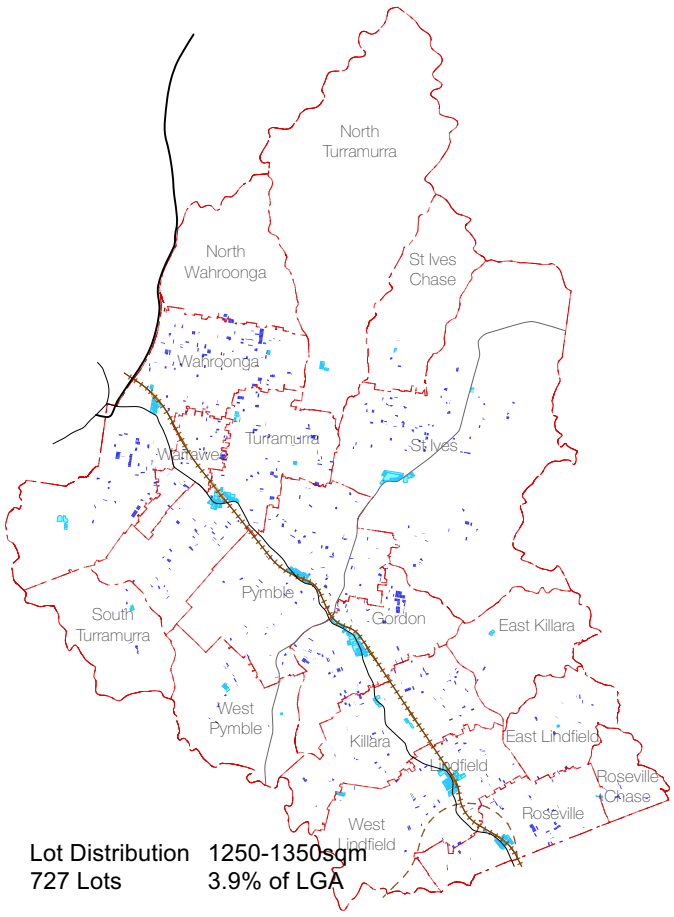
N

Ku-ring-gai Dual Occupancy Lot Size

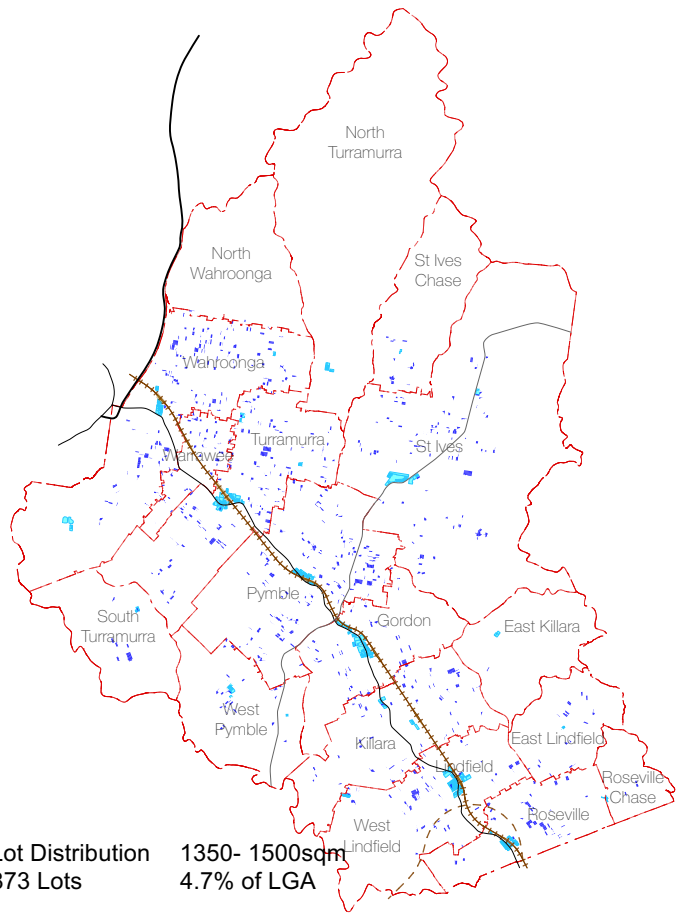
Ku-ring-gai Council

3.02

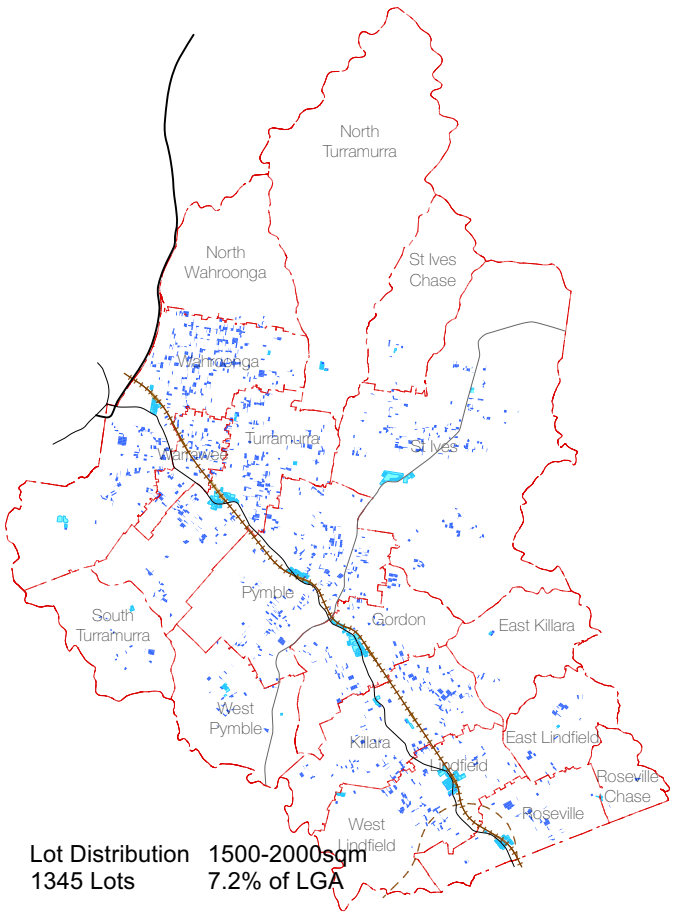
R2 Lot Distribution Summary 2



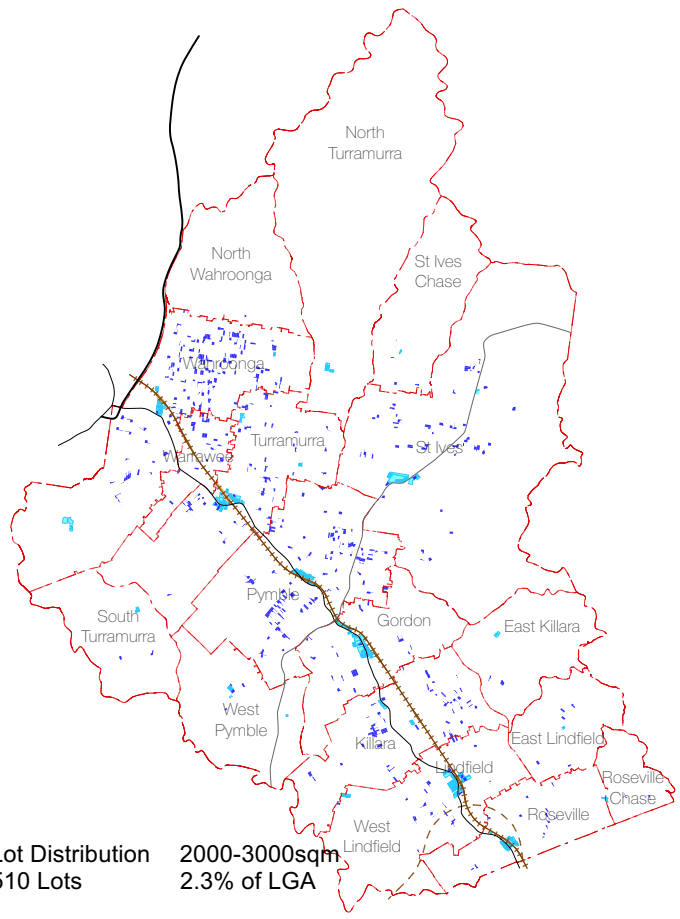
Lot Distribution 1250-1350sqm
727 Lots 3.9% of LGA



Lot Distribution 1350- 1500sqm
873 Lots 4.7% of LGA



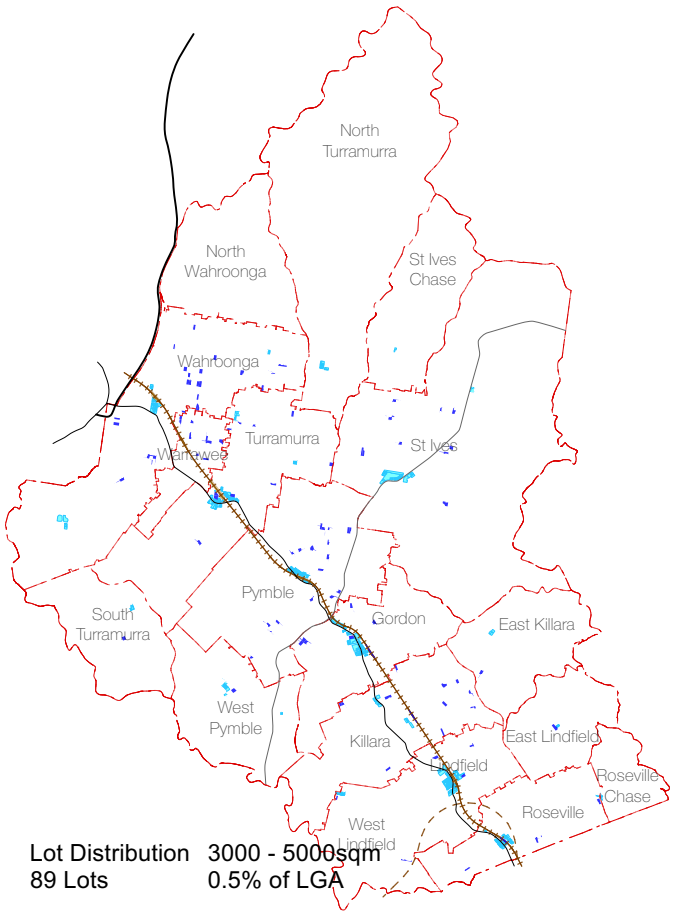
Lot Distribution 1500-2000sqm
1345 Lots 7.2% of LGA



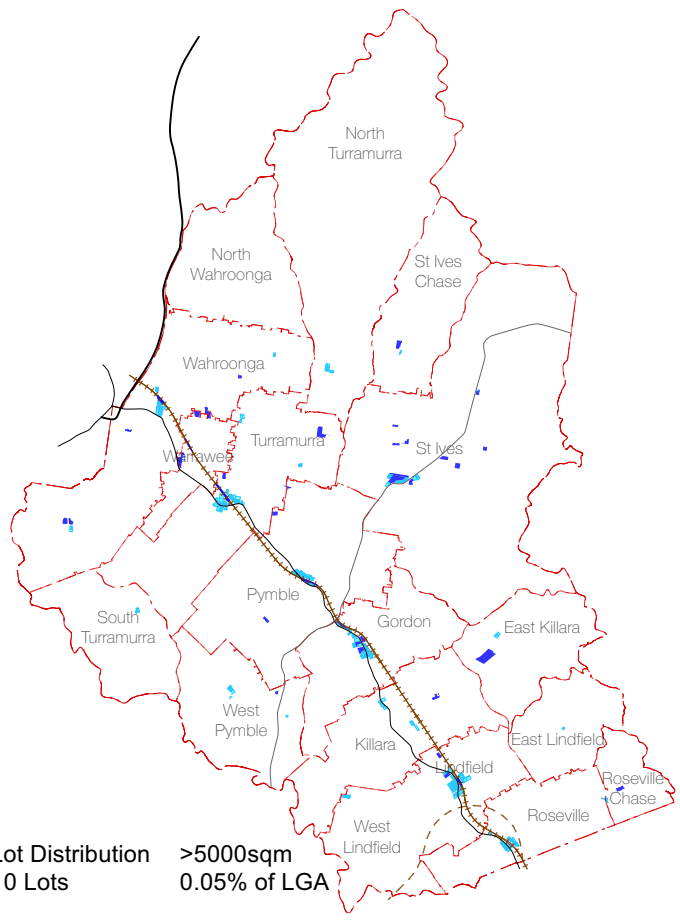
Lot Distribution 2000-3000sqm
510 Lots 2.3% of LGA

R2 Lots within identified ranges

E1 Local Centres / Neighbourhood Centres



Lot Distribution 3000 - 5000sqm
89 Lots 0.5% of LGA



Lot Distribution >5000sqm
10 Lots 0.05% of LGA

date: 1/12/24

scale: 1:125000

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N

Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

4.01

Exhibited EIE Dual Occupancy Standards

EIE non-refusal standards generally do not faciliate medium sized trees on minimum permitted 450sqm parent lots.

The examples have assumed the maximum FSR of 0.65;1 is achieved. This precludes a secondary structure in rear yards, which is noted would prevent a consolidated deep soil area large enough for a medium or small tree unless maximum site coverage controls are in place and prioritse landscape.

The EIE indicates battle-axe dual occupancy types are not permitted as a complying development type.

The interaction of the *Low Rise Housing Diversity Design Guide with* EIE provisions for dual occupancy. rquires further guidance from DPHI.

Testing indicates EIE small trees cannot be accommodated in front setbacks where lot width is 12metres. However, this is the only lot configuration that can accommodate a medium tree in the rear yard. with a min 6m x 6m consolidated deep soil area.

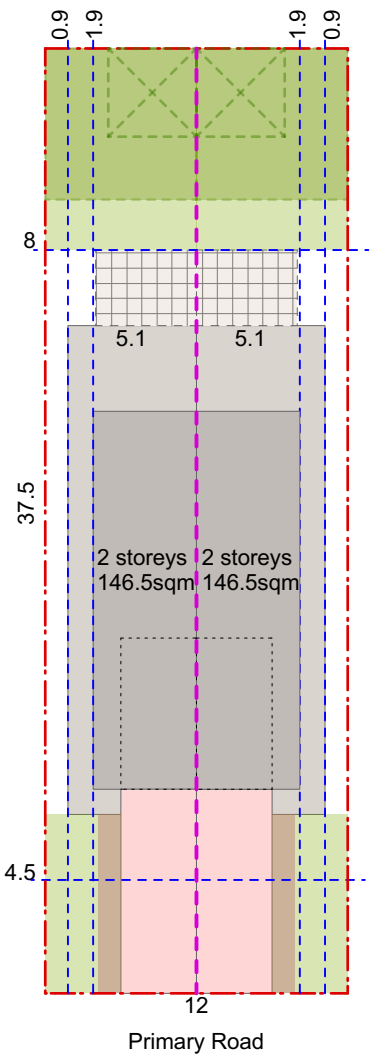
Dual Occupancy Non-refusal Standards

- Min parent Site Area: 450 sqm
- Max Building Height: 9.5m
- Max Floor Space Ratio: 0.65:1
- Min Lot Width: 12 m
- Min car parking: 1 space per dwelling

EIE Landscape provisions

Parent Lot size	Tree canopy	Deep soil	Tree-planting rate
<300m2	15%	15%	At least 1 small tree per dwelling
300-600m2	20%	20%	For every 200 m2 of site area, or part thereof, at least one small tree
>600m2	25%	25%	For every 225 m2 of site area, or part thereof, at least one medium tree

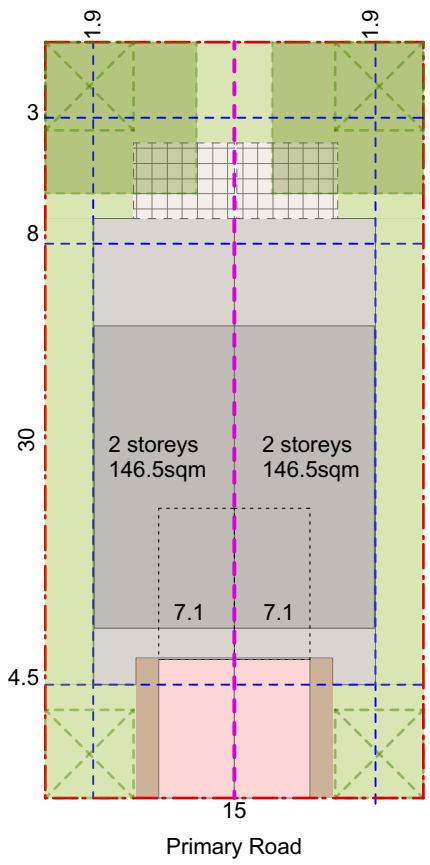
For further context also refer to ADG part 3E Deep Soil Zones and Ku-ring-gai DCP Parts 4, 6 and 7



Semi Detached House with EIE min frontage 12m

Site 1 Area: 225sqm
Built Area: 146.25sqm (0.65:1) (over 2 storeys)
Deep Soil: 645sqm (20%) required
Deep Soil achieved: 62.5sqm

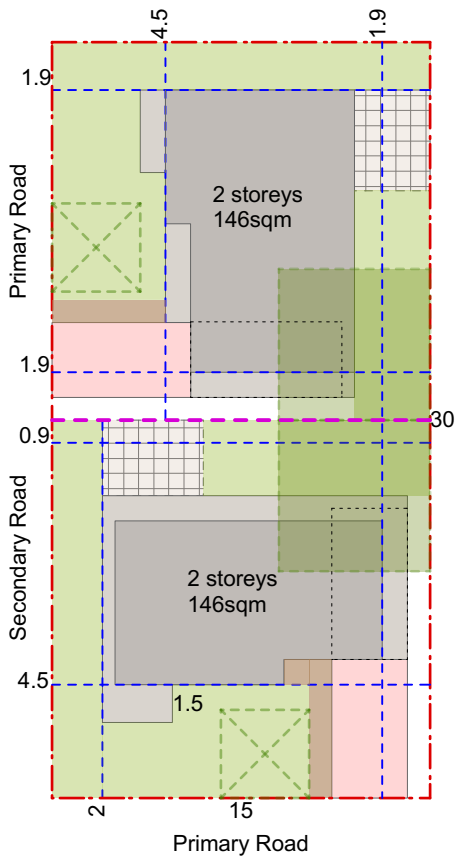
Site 2 Area: 225sqm
Built Area: 146.25sqm (0.65:1)
Deep Soil: 45sqm (20%) required
Deep Soil achieved: 62.5sqm



Semi Detached House with min frontage 15m:

Site 1 Area: 225sqm
Built Area: 146.25sqm (0.65:1) (over 2 storeys)
Deep Soil: 45sqm (20%) required
Deep Soil achieved: 92sqm

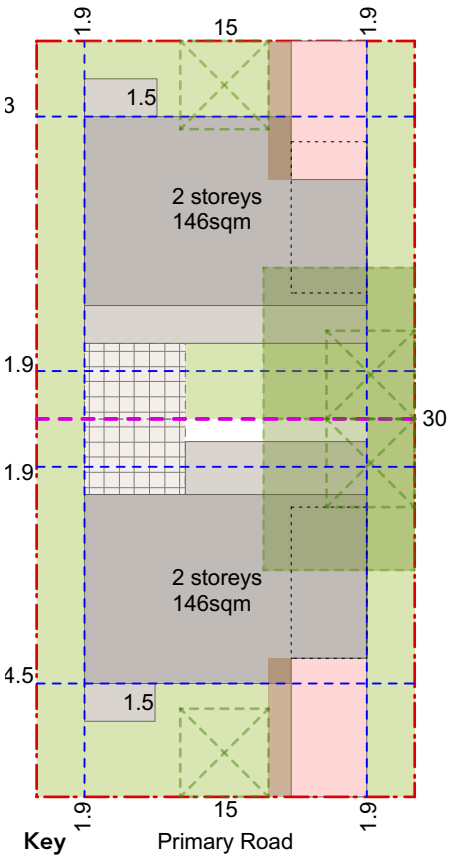
Site 2 Area: 225sqm
Built Area: 146.25sqm (0.65:1) (over 2 storeys)
Deep Soil: 45sqm (20%) required
Deep Soil achieved: 92sqm



Detached corner dwellings:

Site 1 Area: 225sqm
Built Area: 146.25sqm (0.65:1) (over 2 storeys)
Deep Soil : 45sqm (20%) required
Deep Soil achieved: 89sqm

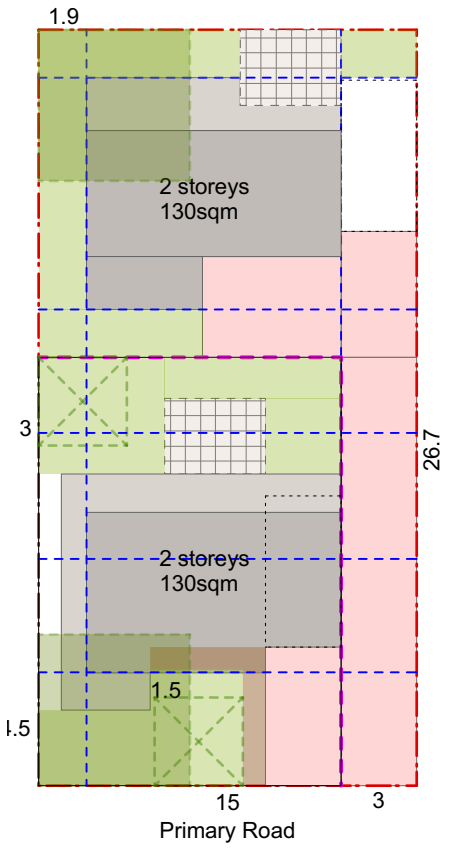
Site 2 Area: 225sqm
Built Area: 146.25sqm (0.65:1)
Deep Soil: 45sqm (20%) required
Deep Soil achieved: 89sqm



Detached Houses - Parallel Road:

Site 1 Area: 225sqm
Built Area: 146.25sqm (0.65:1) (over 2 storeys)
Deep Soil : 45sqm (20%) required
Deep Soil achieved: 96sqm

Site 2 Area: 225sqm
Built Area: 146.25sqm (0.65:1) (over 2 storeys)
Deep Soil achieved: 85sqm



Battle Axe (Interior Lot):

Street Lot
Site 1 Area: 200sqm
Built Area: 130sqm (0.65:1) (over 2 storeys)
Deep Soil : 45sqm (20%) required
Deep Soil achieved: 79sqm

Battle-axe Lot
Site 2 Area: 250sqm
Developable Area: 200sqm
Built Area: 130sqm (0.65:1) (over 2 storeys)
Deep Soil: 45sqm (20%) required
Deep Soil achieved: 50 sqm
Landscape complies if averaged over parent lot

This permutation accommodates no deep soil or other landscape for the extent of the driveway ajacent to the front dwelling or side boundary.

Permiisbility for dual occupancy: via Codes SEPP to be clarified.

Site boundary
New subdivision
Setback
Landscape
Pathway
Buildable Area Ground Floor
Buildable Area First Floor
Paving
Deep Soil per medium tree (min 6 x 6m)
Deep Soil per small tree (min 4 x 4m)
Driveway & Parking

date: 1/12/24
scale: 1:300

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Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

4.02

EIE Subdivision

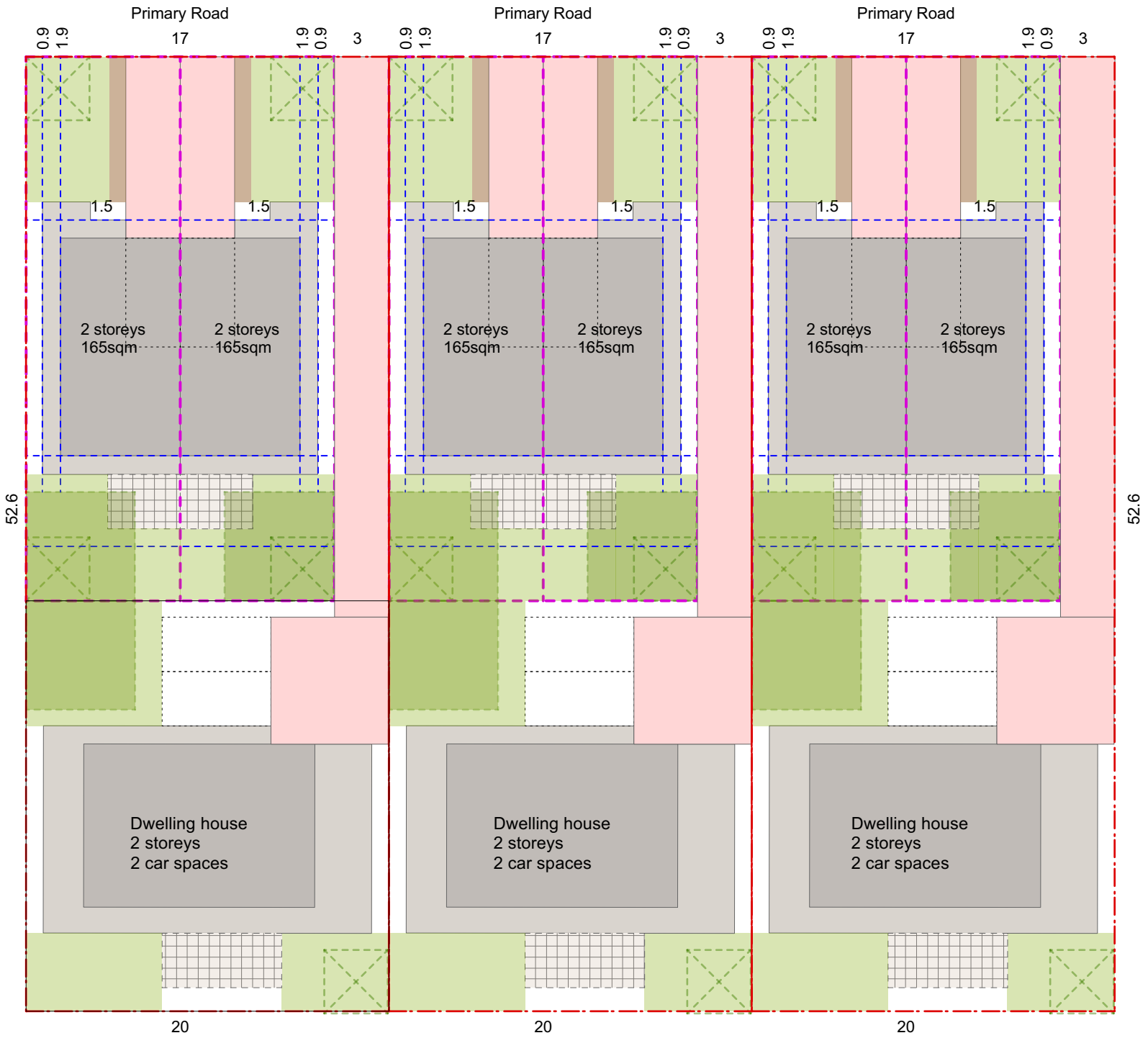
Dual Occupancy Standards

- Min parent Site Area: 450 sqm
- Max Building Height: 9.5m
- Max Floor Space Ratio: 0.65:1
- Min Lot Width: 12 m
- Min car parking: 1 space per dwelling

EIE Landscape provisions

Parent Lot size	Tree canopy	Deep soil	Tree-planting rate
<300m2	15%	15%	At least 1 small tree per dwelling
300-600m2	20%	20%	For every 200 m2 of site area, or part thereof, at least one small tree
>600m2	25%	25%	For every 225 m2 of site area, or part thereof, at least one medium tree

For further context also refer to ADG part 3E Deep Soil Zones and Ku-ring-gai DCP Parts 4, 6 and 7



Subdivision study

Parent lot Area: 1050sqm
Subdivision
Site 1 Dual occupancy: 510sqm
Site 2 Battle-axe: 450 sqm + battle-axe handle

Dual Occupancies:
Site 1 Area: 255sqm
Built Area: 165.75sqm (0.65:1) (over 2 storeys)
Deep Soil: 45sqm (20%) required
Deep Soil achieved: 84sqm

Site 2 Area: 225sqm
Built Area: 165.75sqm (0.65:1) (over 2 storeys)
Deep Soil: 45sqm (20%) required
Deep Soil achieved: 84sqm

EIE subdivision of larger lots. Ku-ring-gai typically has many lots with frontage between 18 to 20 metres.

EIE provision for dual occupancy to address a public street enable larger parent lot subdivision for a pair of dwellings addressing the street with a battle-axe lot behind.

This subdivision can be expected to impact canopy where vehicles and turning circles need to accommodated within the site.

The dual occupancy examples have assumed the maximum FSR of 0.65:1 is achieved. This precludes a secondary dwelling in rear yards. A larger front setback is tested assuming 9m for existing urban context.

Impacts of multiple driveway crossovers are exacerbated with association loss of on-street parking and risk to street tree canopy provision.

The dual occupancies within the streetscape do not provide adequate width for medium sized trees in front gardens.

This permutation accommodates no deep soil or other landscape for the extent of the driveways ajacent to the front lots or along the battle-axe side boundary.

Dual occupancy lots appear able to accommodate a small tree in their front and rear setback zones while there is some obstruction from rear terrace areas to allow for a medium tree.

Key

- Site boundary
- New subdivision
- Setback
- Landscape
- Pathway
- Buildable Area Ground Floor
- Buildable Area First Floor
- Paving
- Deep Soil per medium tree (min 6 x 6m)
- Deep Soil per small tree (min 4 x 4m)
- Driveway & Parking

date: 1/12/24

scale: 1:300

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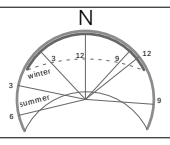


Ku-ring-gai Dual Occupancy Lot Size

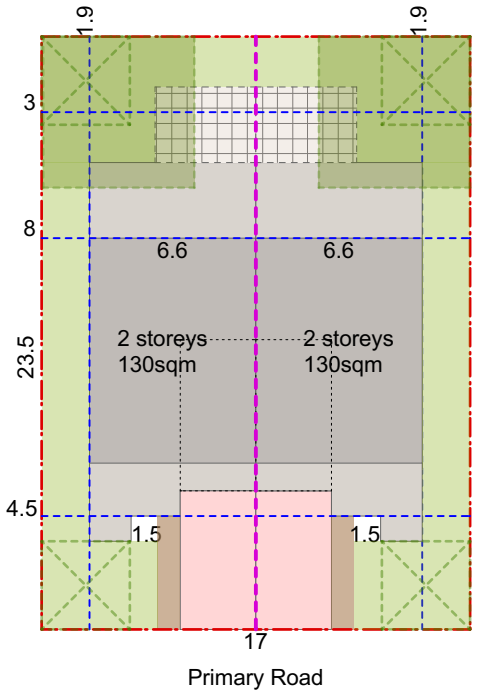
Ku-ring-gai Council

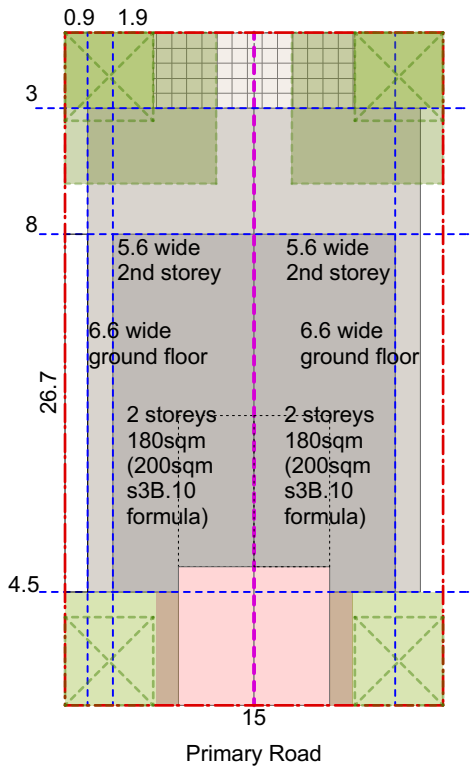
4.03

SEPP Exempt and Complying Development (Codes SEPP) Standards for 400sqm min lot

SEPP (Exempt and Complying Development Codes) 2008 -
Part 3B for Dual Occupancy Development Standards

- Parent Site Area: 400 sqm
- Building Height: 8.5m
- Floor Space Ratio: 400m2-2000m2 25% of lot area + 300m2
  >2000m2 800m2
- Lot Width: 15m or 12 m for vehicles lane/secondary road
- Car parking: 1 space per dwelling
- Landscaped Area: 50% of site area minus 100m2 *See Note 2*
  (min 25% forward of building line and min 50% behind)
- Private Open Space: 16m2 (min dimension 3m)





See Note 1

Attached pair of dwellings (on wider frontage):

Site 1 Area: 200sqm
Built Area: 130sqm (0.65:1)*
(over 2 storeys)
Landscaped Area: 30sqm (15%) min required
40 sqm (20%)
(s3.13 (1) of Codes SEPP)
Landscape area achieved: 75sqm

Site 2 Area: 200sqm
Built Area: 130sqm (0.65:1)*
Landscaped Area: 30sqm (15%) required
40 sqm (20%)
Landscape area achieved: 75sqm

Deep soil 6 x 6m: Not achieved
Ku-ring-gai minimum dimension needed to support
1 x canopy tree

Attached pair of dwellings (Codes SEPP min frontage):

Site 1 Area: 200sqm
FSR: 200sqm (1:1) (over 2 storeys)
s3B.10 formula
Landscaped Area: 30sqm (15%) min required
40 sqm (20%)
Landscape achieved: (16m2 NON COMPLIANT with max FSR)

Site 2 Area: 200sqm
FSR: 200sqm (1:1) (over 2 storeys)
s3B.10 formula
Landscaped Area: 30sqm (15%) min required
40 sqm (20%)
Landscape achieved: (16m2 NON COMPLIANT with max FSR)

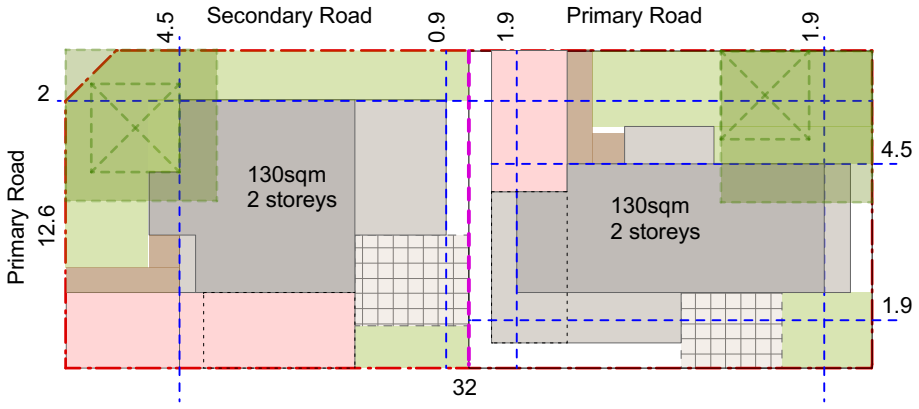
Deep soil 6 x 6m: Not achieved
Ku-ring-gai minimum dimension needed to support
1 x canopy tree

Detached dwellings corner lot:

Site 1 Area: 200sqm
Built Area: 130sqm (0.65:1)*
(over 2 storeys)
(Carport on boundary)
Landscaped Area: 30sqm (15%)
40 sqm (20%)
Landscape achieved: 63sqm

Site 2 Area: 200sqm
Built Area: 130sqm (0.65:1)*
Landscaped Area: 30sqm (15%)
40 sqm (20%)
Landscape achieved: 53sqm

Deep soil 6 x 6m: Not achieved
Ku-ring-gai min dimension needed to support
1 x canopy tree



Key

- Site boundary
- New subdivision
- Setback
- Landscape
- Pathway
- Buildable Area Ground Floor
- Buildable Area First Floor
- Paving
- Deep Soil per medium tree (min 6 x 6m)
- Deep Soil per small tree (min 4 x 4m)
- Driveway & Parking

NOTE 1:

Codes SEPP s3B.10

FSR for 400m2 lot does not achieve Landscape area using s3B.10 formula
25% lot + 300m2 = 100m2 + 300m2
= 200m2/per dwelling

(FSR 1:1 on a 400m2 parent lot compared to EIE of 0.65:1)

Non-compliance with Landscape area would require a Development Application (Low Rise Housing Diversity Design Guide)

SEPP (Exempt and Complying Development Codes) 2008 non-refusal standards generally do not faciliate medium sized trees on minimum permitted 400sqm parent lots.

NOTE 2:

Codes SEPP s3B.15

The standard refers to 'landscaped area' rather than a 'deep soil' provision.
The definition for *landscaped area* is assumed by the Standard Instrument LEP:

means a part of a site used for growing plants, grasses and trees, but does not include any building, structure or hard paved area.

The effect oif deep soil with the SEPP including minimum dimensions.

date: 1/12/24
scale: 1:300

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N

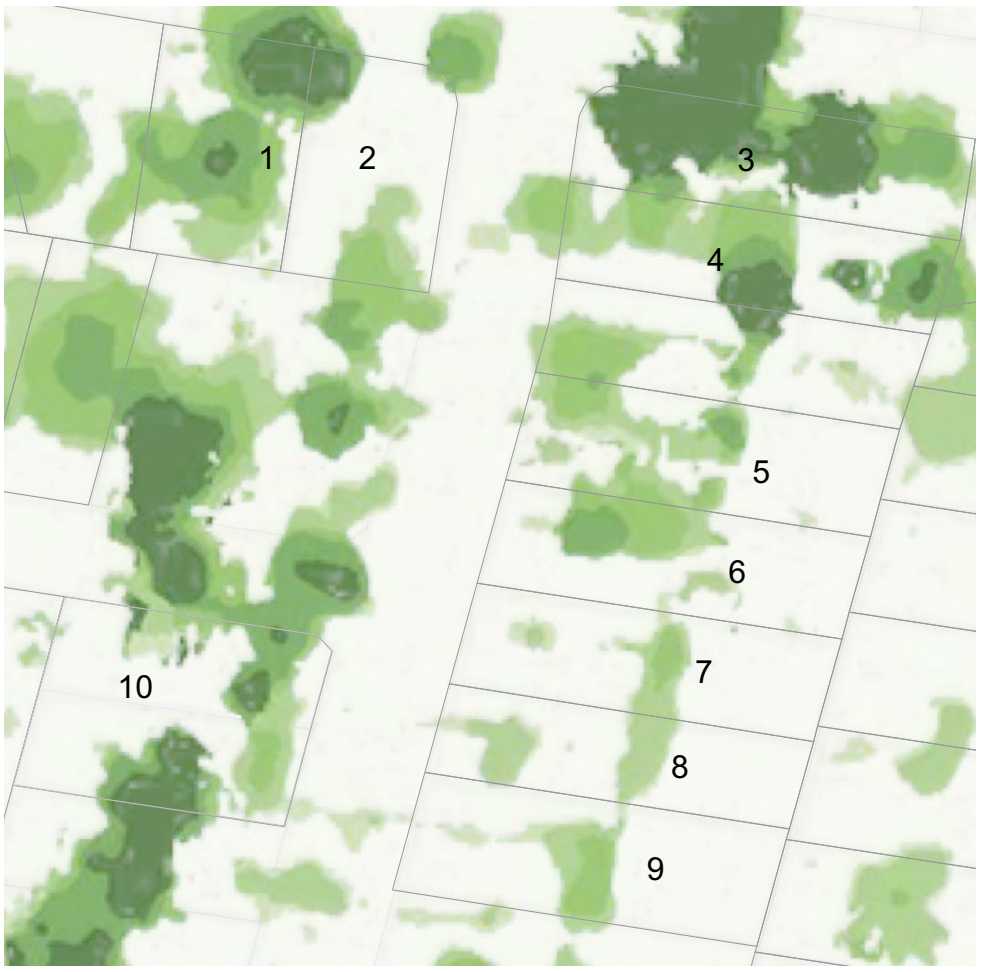
Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

4.04

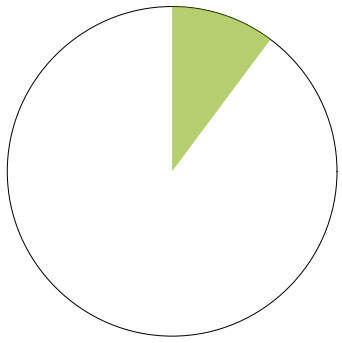
Study 1 - Canopy

Dual Occupancy Type: Side-by-side and corner - Both dwellings address a public street
Lot size range: 1034 sqm to 1450 sqm
Assumptions: EIE Subdivision possible with 18m min frontage enables dual occupancy at street with battle-axe detached dwelling subject to parent lot size. (Battle-axe dwelling or dual occupancy via Development Application)

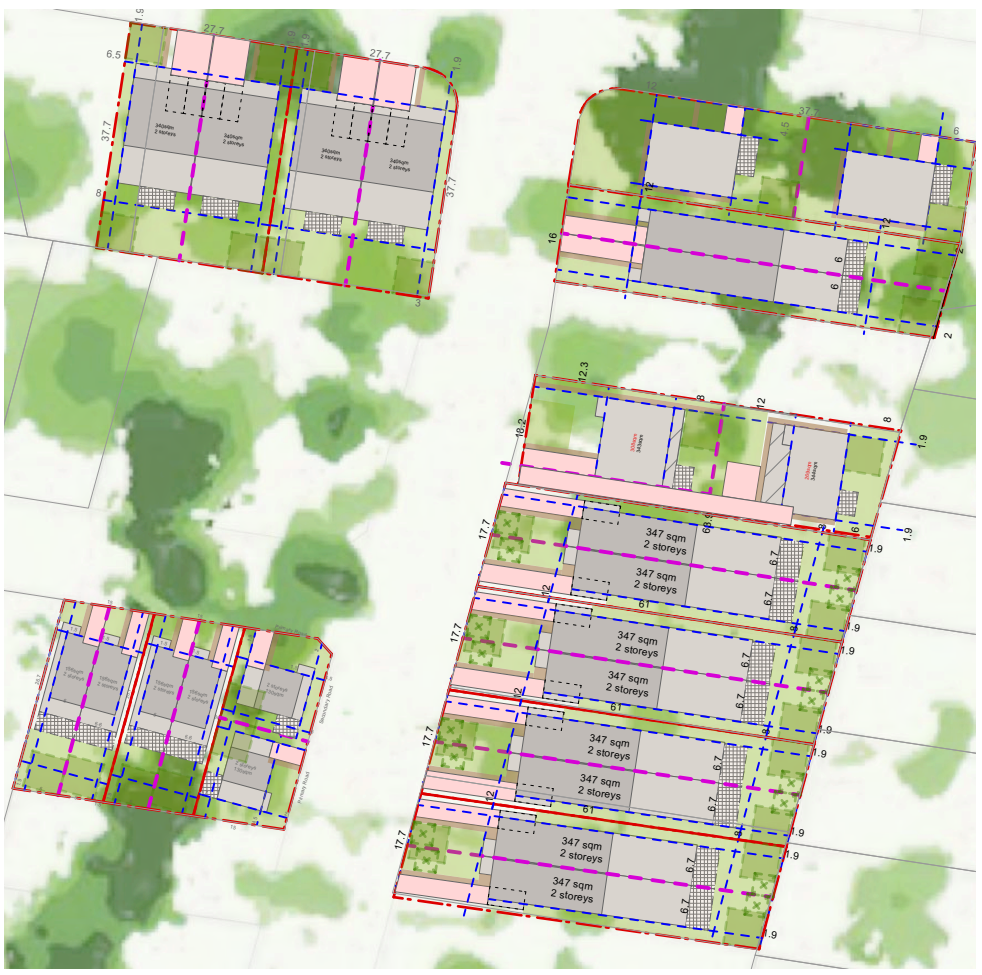


Study Area: 23200 m2
Lots in sudy area: 16 (includes heritage items)

Canopy cover: 8376 m2
36.7%

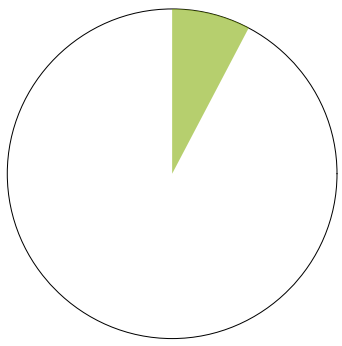


Lot	Width	Length	Area
1	27.8	37.7	1046
2	27.8	37.7	1034
3	17	65.3	1100
4	17.7	61	1070
5	19.3	61	1100
6	17.7	61	1070
7	17.7	61	1070
8	17.7	61	1070
9	17.7	61	1070
10	45.5	32.3	1450



Study Area: 23200 m2
Dual Occ Lots: 10 37.5% of study area developed

Canopy cover: 6390 m2
27.5%% min loss approx 13%



EIE FSR of 0.65:1 enables excessively large building footprints on larger lots.
KLEP maximum FSR is 0.4:1.
The above study demonstrates that canopy will be lost under the EIE.

Larger, deeper lot sizes are better able to retain canopy in the front setback and/or rear gardens.

Larger lots enable some replacement with medium sized trees. This will be needed to mitigate the loss of large canopy trees which can be anticipated where the EIE is widely taken up.

Key

- Site boundary
- New subdivision
- Setback
- Landscape
- Pathway
- Buildable Area Ground Floor
- Buildable Area First Floor
- Paving
- Deep Soil per medium tree (min 6 x 6m)
- Deep Soil per small tree (min 4 x 4m)
- Driveway & Parking

date: 1/12/24
scale: 1:1250

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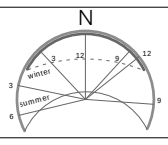


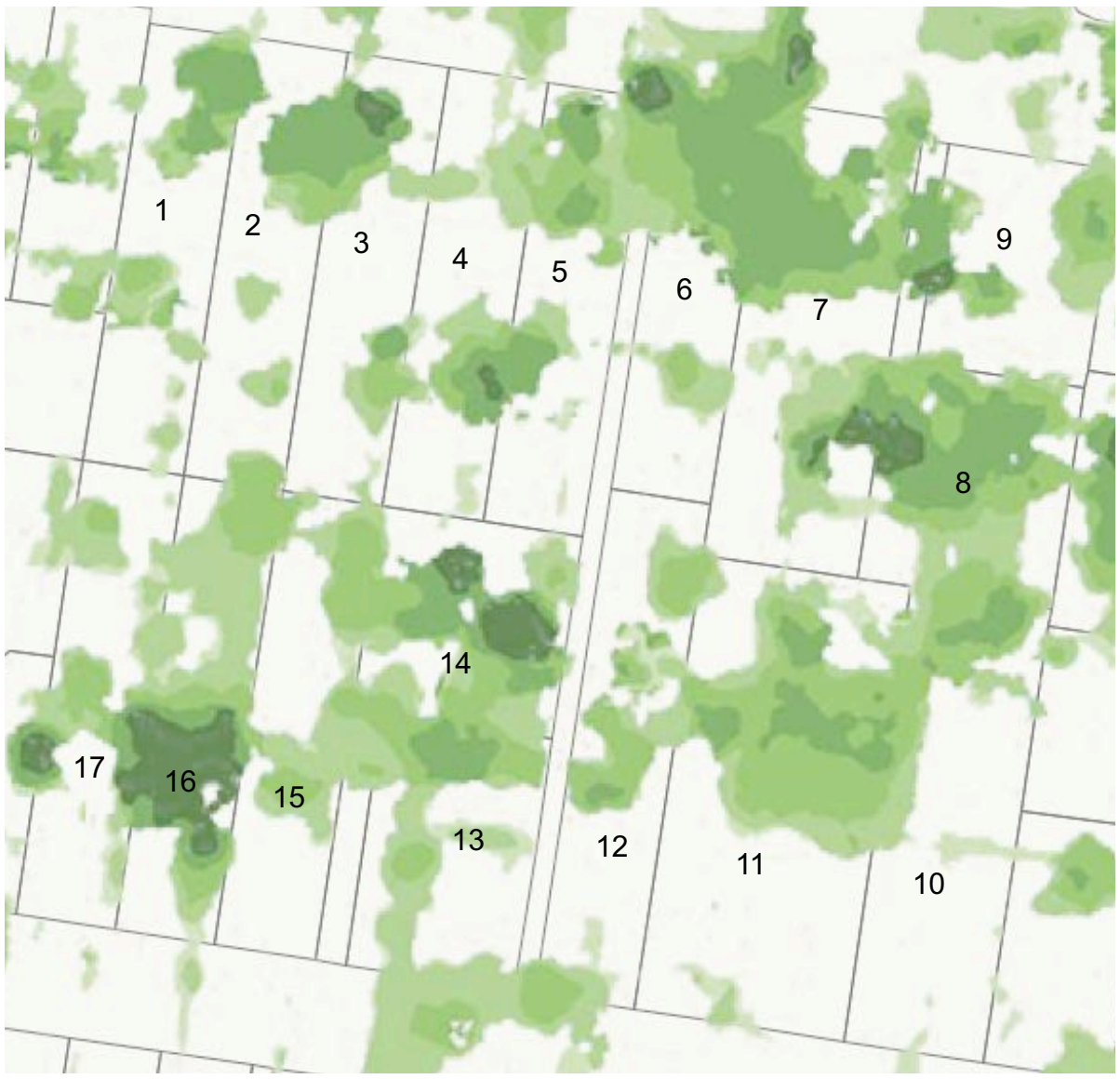
Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

4.05

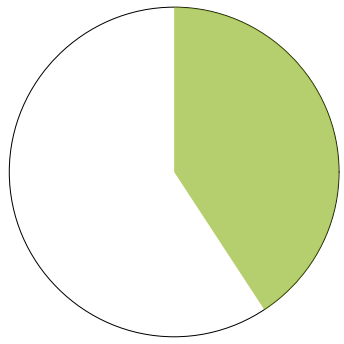
Study 2 - Canopy

Dual Occupancy Type: Side-by-side on large deep lots - Both dwellings address a public street
Secondary dwelling in rear yards
Lot size range: 1197 sqm to 3063.5 sqm
Assumptions: EIE Subdivision possible with 18m min frontage enables dual occupancy at street with battle-axe detached dwelling subject to parent lot size.



Study Area: 40400 m2
Lots in study area: 17 (includes heritage items)

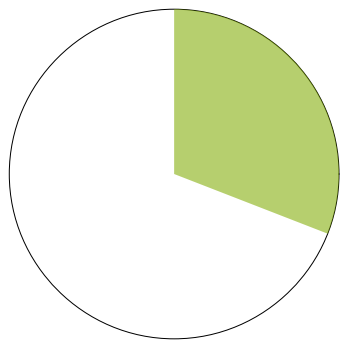
Canopy cover: 16496 m2
40.8%



Lot	Width	Length	Area	
1	29.5	80.7	1409.3	
2	29.5	80.8	1419.2	
3	29.5	80.8	1419.2	
4	29.5	80.8	1419.2	
5	29.5	80.8	1418.5	
6	28.1	71.7	1255.3	
7	39.5	85	2267.6	
8	40	83	1563.5	Battle-axe - effective lot length 40m
9	36	43.5	1197	
10	37.1	84.6	2059.2	
11	49.2	86.5	3063.5	
12	31.3	92.5	1634.7	
13	36.8	49.5	1384.4	
14	47.6	81.6	1553.1	Battle-axe - effective lot length 36.2m
15	29.8	83.5	1967.9	
16	29.8	83.5	1967.9	
17	29.8	83.5	1967.9	

Study Area: 40400 m2
Dual Occ Lots: 15 (+ 1 lot double subdivided)
88.2% of study area developed

Canopy cover: 12570 m2
30.9%% min loss approx 10%



Battle-axe lots via development application pathway not included.

EIE FSR of 0.65:1 enables excessively large building footprints on larger lots.
KLEP maximum FSR is 0.4:1.
The above study demonstrates that canopy will be lost under the EIE.
Larger, deeper lot sizes are better able to retain canopy in the front setback and/or rear gardens.
Larger lots enable some replacement with medium sized trees. This will be needed to mitigate the loss of large canopy trees which can be anticipated where the EIE is widely taken up.

Notes

Key

- Site boundary
- New subdivision
- Setback
- Landscape
- Pathway
- Buildable Area Ground Floor
- Buildable Area First Floor
- Buildable Area First Floor
- Deep Soil per medium tree (min 6 x 6m)
- Deep Soil per small tree (min 4 x 4m)
- Driveway & Parking
- Paving

date: 1/12/24

scale: 1:1250

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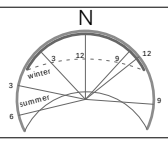


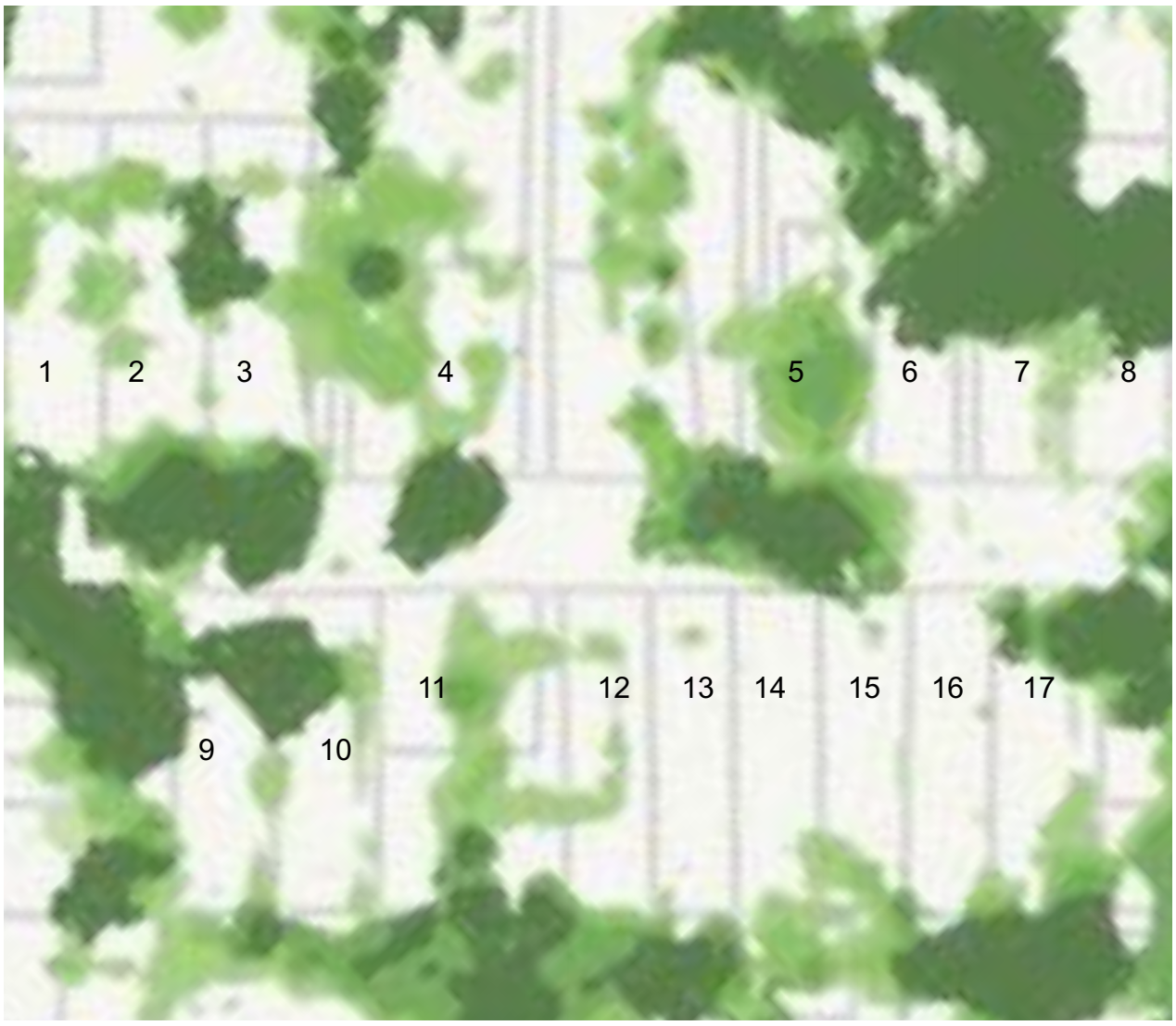
Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

4.06

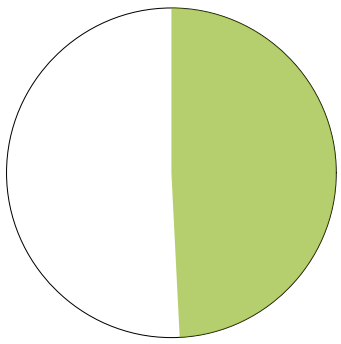
Study 3 - Canopy

Dual Occupancy Type: Side-by-side on smaller to median sized lots
Both dwellings address a public street
Lot size range: 697.6 sqm to 1176.7 sqm
Assumptions: EIE Subdivision possible where 18m min frontage enables dual occupancy at street with battle-axe detached dwelling behind subject to parent lot size.

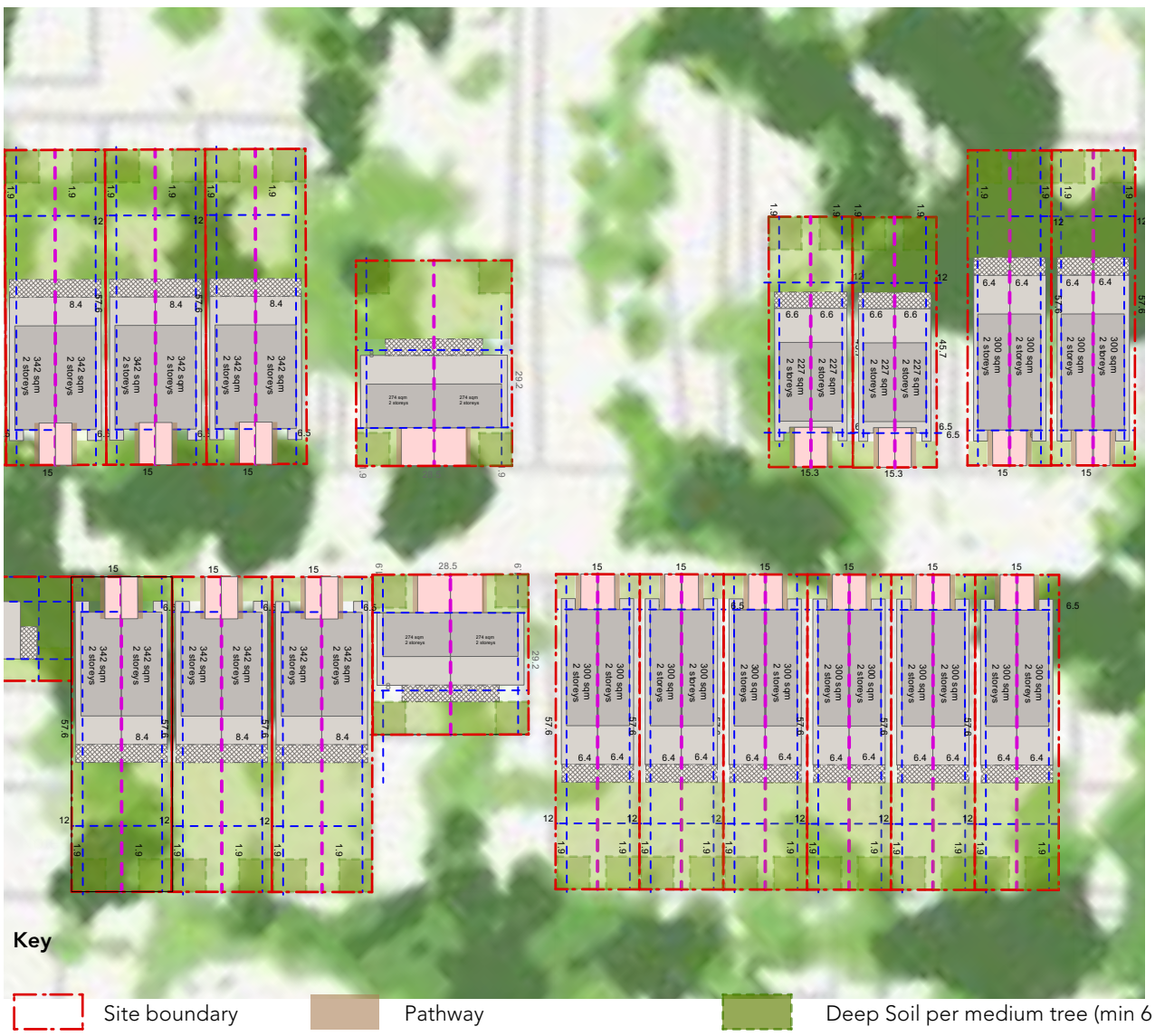


Study Area: 37715 m2
Lots in study area: 22

Canopy cover: 18566m2
49.2%

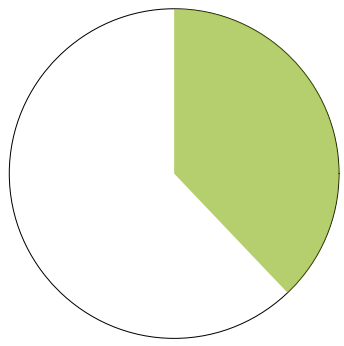


Lot	Width	Length	Area
1	18.3	64.3	1176.7
2	18.3	64.3	1176.7
3	18.3	64.3	1176.7
4	28.4	37.5	1065
5	15.3	45.6	697.6
6	15.3	45.6	697.6
7	18.3	64.3	1176.7
8	18.3	64.3	1176.7
9	18.5	57.5	1063.7
10	18.5	57.5	1063.7
11	18.5	57.5	1063.7
12	28.5	30	855
13	15.3	57.3	876.7
14	15.3	57.3	876.7
15	15.3	57.3	876.7
16	15.3	57.3	876.7
17	15.3	57.3	876.7



Study Area: 37715 m2
Dual Occ Lots: 17 88.2% of study area developed

Canopy cover: 14323 m2
37.9% min loss approx 11.1%



Battle-axe lots via development application pathway not included.

EIE FSR of 0.65:1 enables excessively large building footprints on larger lots.
KLEP maximum FSR is 0.4:1.
The above study demonstrates that canopy will be lost under the EIE.
Larger, deeper lot sizes are better able to retain canopy in the front setback and/or rear gardens.
Larger lots enable some replacement with medium sized trees.
This will be needed to mitigate the loss of large canopy trees which can be anticipated where the EIE is widely taken up.

date: 1/12/24
scale: 1:1250

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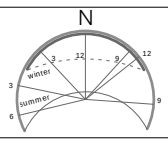


Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

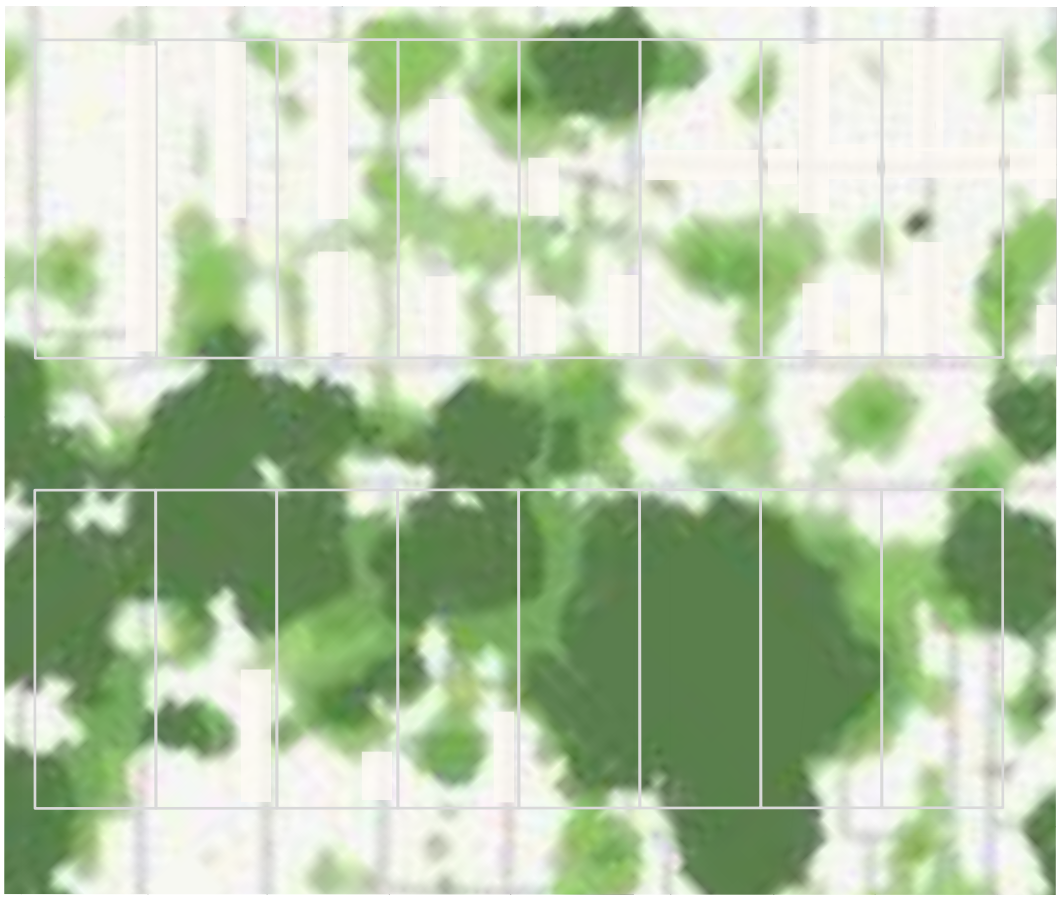
4.07

Study 4 - Canopy

Dual Occupancy Type: Side-by-side on larger median sized lots
Both dual occupancy dwellings address a public street plus battle-axe subdivsion

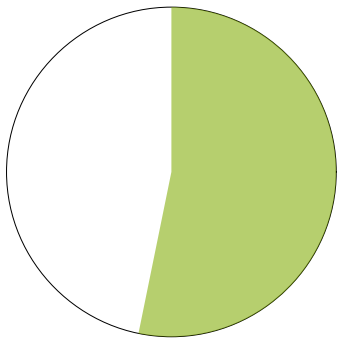
Lot size range: 1050 sqm

Assumptions: EIE Subdivision possible where18m to 20m min frontage enables dual occupancy at street with battle-axe detached dwelling behind subject to parent lot size.



Study Area: 25510 m2
Lots in study area: 18

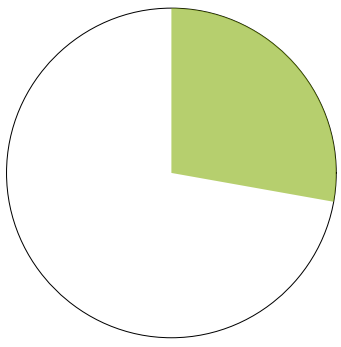
Canopy cover: 13355 m2
52.3%



Study Area: 25510 m2
Lots in study area: 18

Canopy cover: 7150 m2
28 %

Min loss approx 24%



Battle-axe lots via development application pathway for testing.

The above study demonstrates that canopy will be lost under the EIE increasingly where subdivsion for other lots occurs.

Larger lots are needed to mitigate this loss and provide opportunities for replacement.

Notes:

Key

- Site boundary
- New subdivision
- Setback
- Landscape
- Pathway
- Buildable Area Ground Floor
- Buildable Area First Floor
- Buildable Area First Floor
- Deep Soil per medium tree (min 6 x 6m)
- Deep Soil per small tree (min 4 x 4m)
- Driveway & Parking
- Paving

date: 1/12/24

scale: 1:1250

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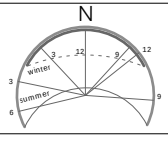

Ku-ring-gai Dual Occupancy Lot Size

Ku-ring-gai Council

5.01

R2 Median lot sizes - Analysis + Scenarios

BASE MAP
KMC - R2 Catalina - all R2 Lots before applying BE

Total lots from Vectorworks layer	Record Format: "R2_Median_Lot Area"	Median
37591	61%.36	95138
37660.91		
37660.75		
37660.00		
37660.44		
37660.71		
37660.79		
37660.42		
37660.62		
37660.44		
37660.48		
37660.34		
37660.44		
37660.42		
37660.44		
37660.57		
37660.63		
37660.63		
37660.44		
37660.73		
37660.65		
37660.44		
37660.71		
37660.73		
37660.71		
37660.71		
37660.71