3.12 Summary

Figure 25 sets out a combined existing conditions map for the Study Area. The existing conditions affecting redevelopment of the Study Area are set out below:

- The Study Area has a south facing aspect with a slope between 0 to 10 degrees with some portions ranging up to 20-25 degrees. Whilst the later is considered steep, such topography does not preclude the construction of residential flat development. All roads within the Study Area are generally within the accepted maximum gradients.
- There is no evidence of any significant geotechnical constraints within the Study Area that would preclude residential flat development.
- The Study Area comprises a mix of dwelling houses and strata titled apartments, both of varying age, quality and style. The Study Area also currently includes two small retail shops and two small public open space areas.
- The existing road conditions would not preclude residential flat development with the Study Area.
- The Study Area is accessible to a range of bus services that provide access to surrounding centres and employment areas.
- There are no known European or Aboriginal heritage items or sites.
- The likely capacity of the utility services, in their current form, will be limited and is insufficient for high density development. It is expected that subject to the required investigations and augmentation by the relevant service providers, there is unlikely to be constraints to redeveloping the precinct for higher density residential development.
- Aside from potential blocking of pits and pipes there are no constraints to development with respect to stormwater management and flooding. It is recommended that stormwater outlets into Batten Reserve be upgraded to control stormwater discharging into the reserve, and gross pollutant traps be provided.
- The Stringybark Creek riparian constraints only affect a very small part of the Study Area and would most likely limit the development potential of only one lot.
- Based on flora and fauna mapping/surveys undertaken by NPWS and on behalf of Council, and the JRPP's findings in relation to the DA for 76-82 Gordon Crescent, there is unlikely to be substantial flora and fauna constraints within the Study Area or Batten Reserve that would preclude the general redevelopment of the Study Area for higher density residential development.
- Bush fire risk is the most significant condition that imposes constraints of the redevelopment potential of the Study Area. A number of lots within the southern extent of the Study Area are not considered developable for the purposes of residential flat development due to the impact of APZ requirement under Planning for Bush Fire Protection 2006.

Overall, there are no major site conditions or constraints that would preclude higher density housing within the majority of the Study Area.

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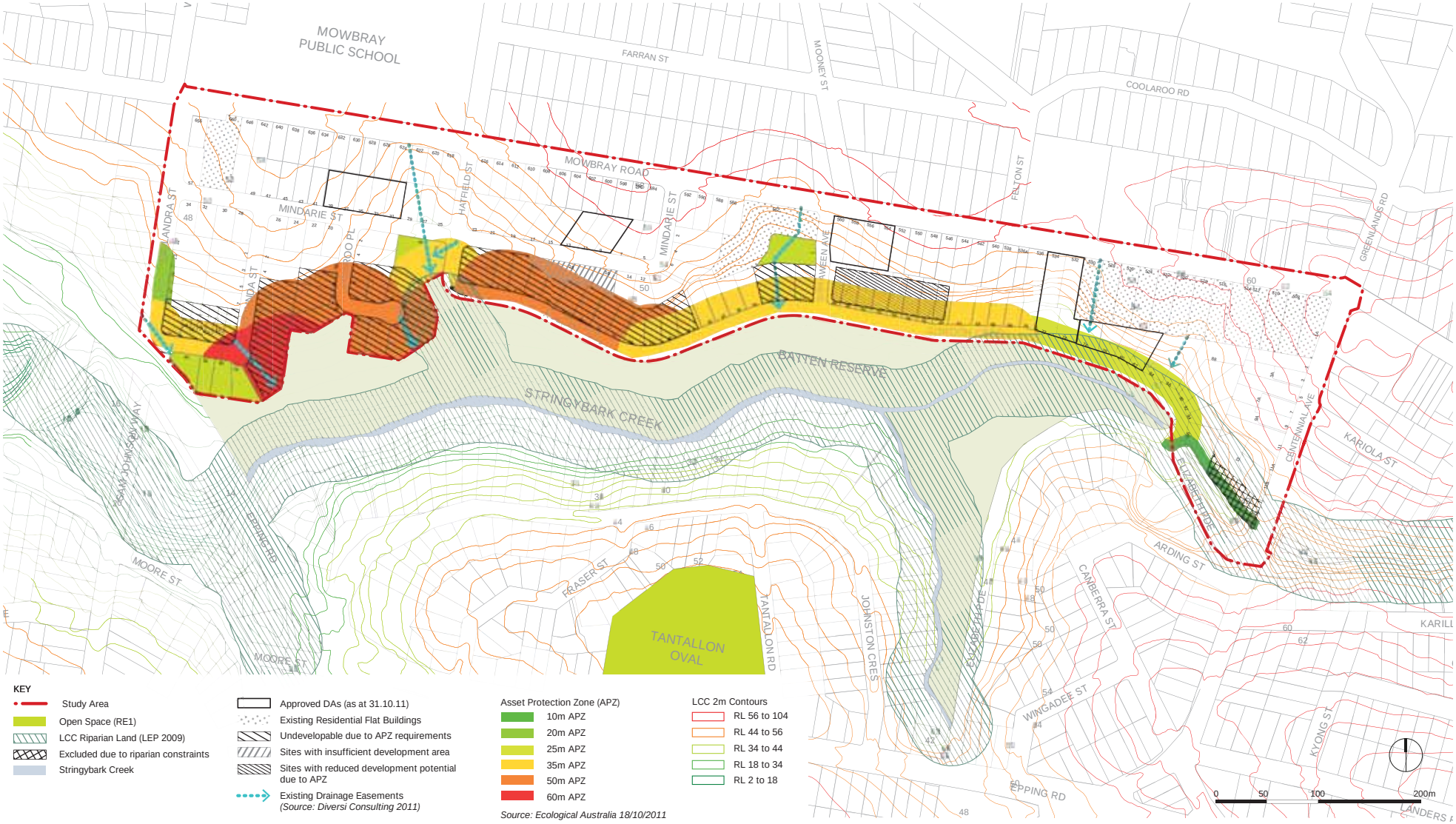

Figure 25 – Combined Existing Conditions Constraints Map

4.0 Residential Yield Estimates

The following section sets out the residential yield of the Study Area under both the LEP 2009 and the Planning Proposal 2011. It also includes the assumptions that have been used to generate the residential yield estimates under either of these scenarios. The assumptions below were developed and refined through consultation within the Project Control Group (PCG) - comprising both officers from DoPI and Council.

4.1 Yield Assumptions

Table 8 summaries the assumptions used in the yield scenarios. Where required, further explanation is included below.

Table 8 – Assumptions used in the Residential Yield Estimates

Element	Assumption
Study Area	▪ All land as shown at Figure 1
Existing Residential Yield	▪ 387 (being the existing number for dwellings constructed within the Study Area as at September 2011)
Gross Developable Area (GDA)	▪ All land zoned R2, R3 or R4, excluding roads and laneways ▪ All land zoned and / or proposed to be zoned RE1, E2 and E4 are non-developable with respect to increased dwelling yield (beyond a single dwelling house)
Net Developable Area (NDA) for LEP 2009	▪ Equals Gross Developable Area less: - Approved RFB DA sites (see below) - Non viable sites (see below) - Land affected by the APZ bush fire requirements (see Section 3.9) - Sites with insufficient development area due to APZs (see Section 3.9) - Riparian constrained sites (see Section 3.7) ▪ LEP 2009 NDA (77,939m^2) = - 136,500m^2 (GDA) less - 58,651m^2 (above constraints)
Net Developable Area (NDA) for Planning Proposal 1/2011	▪ Equals Gross Developable Area less: - Approved and Proposed RFB DA sites (see below) - Non viable sites (see below) - Land affected by the APZ bush fire requirements (see Section 3.9) - Sites with insufficient development area due to APZs (see Section 3.9) - Riparian constrained sites (see Section 3.7) ▪ Planning Proposal 1/2011 NDA (55,856m^2) = - 136,500m^2 (GDA) less - 80,644m^2 (above constraints)
Average Gross Dwelling Size	▪ Apartments: 90m^2 (see below) ▪ Townhouse / villas: 130m^2 ▪ 87.5% efficiency (GFA to net floor area for apartments)
Dwelling Yield	Equals Net Developable Area x FSR / Average Gross Dwelling Size
Max Floor Space Ratio (FSR)	▪ As defined by Lane Cove LEP 2009 ▪ LEP 2009: R4: 175:1 (see discussion below) ▪ Planning Proposal 1/2011: - R4: 0.8:1 - R3: 0.7:1 - R2: 0.5:1 (0.4:1 for villas)
Max Gross Floor Area (GFA)	▪ Definition as per Lane Cove LEP 2009
Max Building Height	▪ Definition as per Lane Cove LEP 2009 ▪ LEP 2009: - R4:12m ▪ Planning Proposal 1/2011: - R4: 12m - R3: 9.5 - R2: 9.5m (multi dwelling housing is 5m) ▪ 3m residential floor to floor height
Dwelling Yield Take up Rate	▪ 80% of the Net Developable Area (see below)
Occupancy Rates	▪ Dwelling houses: 2.9 persons per dwelling (ppd) ▪ Townhouses / villas: 2.1 ppd ▪ Apartments: 1.7 ppd
Car Parking	▪ Apartments (Lane Cove DCP 2010 rates): - Studio – 0.5 space - 1 Bed – 1 space - 2 Bed – 1.5 spaces - 3+ Bed – 2 spaces - Visitors – 1 space per 4 dwellings ▪ Average 1.4 spaces per apartment (based on 8 x RFB DAs submitted to date) ▪ Townhouses/ villas (Lane Cove DCP 2010 rates): - 2 or 3 bed - 1 car space - 4 + bed - 2 car spaces - Visitors - 1 car space per 4 dwellings - Minimum number of car parking spaces (with any number of 0.5 or above rounded to the nearest whole number)

Approved DA Dwelling Yield

The dwelling yield from the approved DAs is taken to be yield as it has been approved (ie 244 apartments (224 net) from the 5 x residential flat building DAs approved as at 31 October 2011).

At the request of the PCG, under the Planning Proposal 1/2011 scenario, the yield from the 8 x (approved and proposed) residential flat building DAs (ie 375 apartments, 345 net) has been included as if all of the DAs were approved as submitted.

Non Viable Sites

The existing residential flats at 508-530 Mowbray Road West and 1A Centennial Ave are not economically viable to redevelop in the medium term in that the sites are strata titled and the development potential provided (under both the LEP 2009 and Planning Proposal 1/2011) is insufficient to warrant redevelopment.

Under Planning Proposal 1/2011, 548-562 Mowbray Road West and 648-650 Mowbray Road West are not economically viable in that the proposed development potential is less than what currently exists on the land.

Average Gross Dwelling Size

The Lane Cove DCP 2010 does not include any minimal dwelling sizes, except for studios (40m^2). The scenarios assume an average gross dwelling size (for apartments) of 90m^2 with a net area of around 79m^2 (12.5% of GFA utilised for circulation etc). Often an average gross apartment size of 100m^2 is utilised when undertaking yield models. The 90m^2 has been derived from an assessment of the 8 x residential flat building DAs submitted to date within the Study Area. This is a more accurate reflection of what the market is likely to deliver and is consistent with the recommended rules of thumb for apartment sizes under the NSW Residential Flat Design Code.

Floor Space Ratio in the R4 High Density Residential Zone

It is assumed that all sites will be developed to their highest yielding residential form under the applicable LEP provisions. The maximum Floor Space Ratio (FSR) in the R4 High Density Residential Zone is 2.1:1. A review of the 8 x residential flat building DAs submitted to date indicates that the average FSR is 1.7:1. The average FSR of the 4 x approved DAs is 1.72:1.

The developments are not achieving the maximum FSR due to the constraints of other development standards and controls such as building height and setbacks. As such, for the purposes of determining yield under the LEP 2009 scenario, an 'achievable' FSR of, say 1.75:1 is likely to generate a more accurate yield scenario (than the maximum 2.1:1), everything else being equal.

Future Development of the Housing NSW Land

As noted Housing NSW own a large number of sites within the western half of the Study Area. For consistency, the same development assumptions that apply to the remainder of the Study Area (ie apartment size, car parking rates etc) have been applied to this land.

Clause 13 of the Affordable Rental Housing SEPP provides a 0.5:1 FSR bonus for residential flat development within the R4 High Density Residential Zone. It is highly unlikely that the 0.5:1 bonus could be accommodated over the base FSR of 2.1:1 and still meet other controls (DCP 2010 and RFDC). Therefore, under the LEP 2009 scenario, no allowance for bonus FSR has been factored into the yield model. Should the base FSR be reduced under an alternative scenario, this bonus may need to be factored into the yield.

It is also noted that the savings provisions relevant to Housing NSW development under Part 2 Div 1 of the ARHSEPP 2009 (ie 2 storey RFBs in R2 and R3 Zones) will lapse in May 2013 and will therefore provide minimal additional development yield potential over and above the proposed Planning Proposal 1/2011 controls.

Dwelling Yield Take Up Rate and Time Frame

Not all sites within the Net Developable Area will get developed in the short, medium and long terms for a number of reasons, such as, owners not wishing to sell or sites becoming isolated due to adjacent development. Evidence of the later includes No. 15 Mindarie Street and 552 Mowbray Road West whereby DAs, if constructed will leave these single lost isolated. Therefore a 'take up rate' of 80% is applied under both scenarios. The 80% is a reasonable assumption with 60% being a low range take up and 100% being a high range take up.

Davis and Langdon P/L advise that anecdotal evidence suggests a strong market demand for new residential flat development within the Lane Cove area and the majority of the projects currently being considered within the Study Area should be sold within 6-12 months of completion.

4.2 Residential Yields under LEP 2009 and Planning Proposal 1/2011

Table 9 summarises the estimated residential yields under both LEP 2009 and Planning Proposal 1/2011. The estimates are based on the set of assumptions outlined above. Given the expected development timeframe or minor variations to the assumptions, it is not unreasonable to assume the estimated yields could vary 10% in either direction. **Figures 26** and **27** illustrate the inclusions and exclusions for both the LEP 2009 and Planning Proposal 1/2011 scenarios respectively.

Table 9 – The estimated residential yields under both LEP 2009 and Planning Proposal 1/2011

	LEP 2009	Planning Proposal 1/2011
Potential increased yield	1,039	90
Approved DAs*	224	224
Proposed DAs**	0	121
Net Increase	*1,263*	*435*
Existing Dwellings	387	387
TOTAL DWELLINGS	1,650	820
Total Population	2,800	1,600

* *Net approved RFB DAs as at 31 October 2011*
** *Net proposed RFB DAs as at 31 October 2011*

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Figure 26 – Residential Yield Inclusions and Exclusions (LEP 2009)

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Figure 27 – Residential Yield Inclusions and Exclusions (Planning Proposal 1/2011)

5.0 Study Recommendations

The following section sets out the recommendations of this Study. It is noted that the capacity of the road network from a traffic generation and management perspective is discussed in the SMEC Report (under separate cover).

5.1 Bush Fire Risk and Evacuation

The Ecological Australia Report (**Appendix C**) identifies bush fire planning constraints, controls and necessary infrastructure works required to achieve an adequate level of bush fire protection for high density development.

The assessment concludes that the Study Area is capable of accommodating future high density residential development and associated land use subject to appropriate bush fire protection measures. Appropriate measures required to be implemented include:

- providing asset protection zones (APZ) along the southern side of the Study Area (see Section 3.1);
- the application of building construction standards for bush fire protection;
- providing passing bays of at least 20m in length by restricting parking on one side of the road (eg with sign-posting and line marking) every 200m (this is not required for Kullah Parade and Gordon Crescent); and
- pruning branches to 4m above kerb height on the bushland interface side of Kullah Parade and Gordon Crescent.

Evacuation Assessment

The Ecological Australia Report also includes an assessment of bushfire evacuation points within the Study Area. In understanding the adequacy of the bushfire evacuation options in the Study Area the following matters were considered:

- *The bushfire risk to development adjoining Batten Reserve, including the likelihood and consequence of a bush fire attack:* It was concluded that the bush fire risk was 'low' along Kullah Parade and Gordon Crescent, and 'medium' in Merinda Street and Pinaroo Place. These lower risk ratings do not require the application of specific resources, but it is recommended that each building have an appropriate on-site refuge/bush fire response plan;
- *The level and type of evacuation that is likely to be required:* On-site refuge is considered appropriate in this instance given the low-medium bush fire risk and providing buildings are appropriately maintained;
- *The capacity of the access network to cope with the level of evacuation likely to occur:* If residents adopt and comply with an on-site refuge/bush fire response plan, the number of residents who choose to evacuate will be small. The access network is therefore acceptable; and
- *The level of risk to fire fighters and residents associated with the evacuation points:* It is unlikely that the Study Area will be subject to a widespread fire requiring large-scale evacuation. Therefore, the level of risk is low

The Report makes the following additional comments in relation to evacuation:

- Options for fire control are considered good;
- If mandatory evacuation were to occur, this would only occur from perimeter buildings as the others will not be exposed to bushfire attack; nevertheless, evacuation is not considered the preferred option;
- The risk of an inappropriate evacuation response (eg mass self-evacuation or panic) can be minimised with an evacuation and emergency response plan for each multiple occupancy building; and
- The above evacuation risk will be improved by potential redevelopment as the new buildings will provide a much higher level of on-site refuge capability than the existing housing stock.

The Bushfire Risk Assessment provides the following concluding comments on evacuation:

> *"Planning for Bushfire Protection 2006 (PBP)] states that the suite of bush fire protection measures are applicable to and sufficient for multi-occupancy residential development, however it is doubtful whether high density residential development, particularly at the bushland interface, was specifically considered in the intent of the document. To complicate things further, in this instance an assessment of high density development is required within an existing area with existing and constrained infrastructure.*
>
> *Notwithstanding these matters on-site refuge is considered the most probable evacuation response in the event of a bush fire in Batten Reserve. In the authors opinion this will provide an appropriate level of safety for residents and a level consistent with that required by PBP. It is anticipated that some individual evacuation will occur however this will be at a level that should not compromise firefighter response.*
>
> *If a high intensity bushfire were to occur, the new buildings of the precinct will be designed and constructed to withstand the bush fire attack and shelter its occupants. This is important as mass evacuation would not be viable in the time available".*

5.2 Impacts on Batten Reserve

SEPP 19 – Bushland in Urban Areas and Councils planning instruments requires the consideration of impacts on new development on the adjacent bushland (Batten Reserve). With respect to works that may potentially impact upon Batten Reserve, this Study recommends:

- That stormwater outlets into Batten Reserve be upgraded to control stormwater discharging into the reserve, and gross pollutant traps be provided; and
- The pruning of branches, to 4m above the kerb height, on the bushland interface side of Kullah Parade and Gordon Crescent.

The works outlined in the above recommendations can be undertaken in a sensitive manner that does not adversely impact upon the ecological significance of Batten Reserve.

5.3 Recommended Planning Principles

Figure 28 illustrates the recommended planning principles for the Study Area. The key aspects are summarised below:

- Retain the R4 zoning across the majority of the Study Area:
- Rezone to retain single dwelling housing (R2 Low Density Residential) on land that is substantially affected at APZ requirements;
- Retain the 4 storey height limit across the majority of the Study Area and permit a partial 5th storey on land at the western end of the Study Area (see Section 5.4 below);
- Reduce the maximum floor space ratio permitted within the R4 from 2.1:1 to 1.6 and 1.8:1 (see Section 5.4 below);
- Consolidate the open space within the Study Area into a more useable park at the between Pinaroo Place and Kullah Parade (see 5.6 below);
- Reinforce the corner of Mowbray West Road and Willandra Street as a local neighbourhood centre that can provide an increased range of local retail uses;
- Improve the pedestrian linkage between Merinda Street and the pedestrian overbridge at Epping Road;
- Upgrade the pedestrian connection between Mindarie Street and Kullah Parade. This may include realignment as part of any future redevelopment of adjacent sites; and
- Investigate the potential for a new pedestrian connection / steps between Mowbray Road West and Gordon Crescent generally located in the vicinity as shown at **Figure 29**.

The recommended LEP land zoning amendments to implement the structure plan is shown at **Figure 29**.

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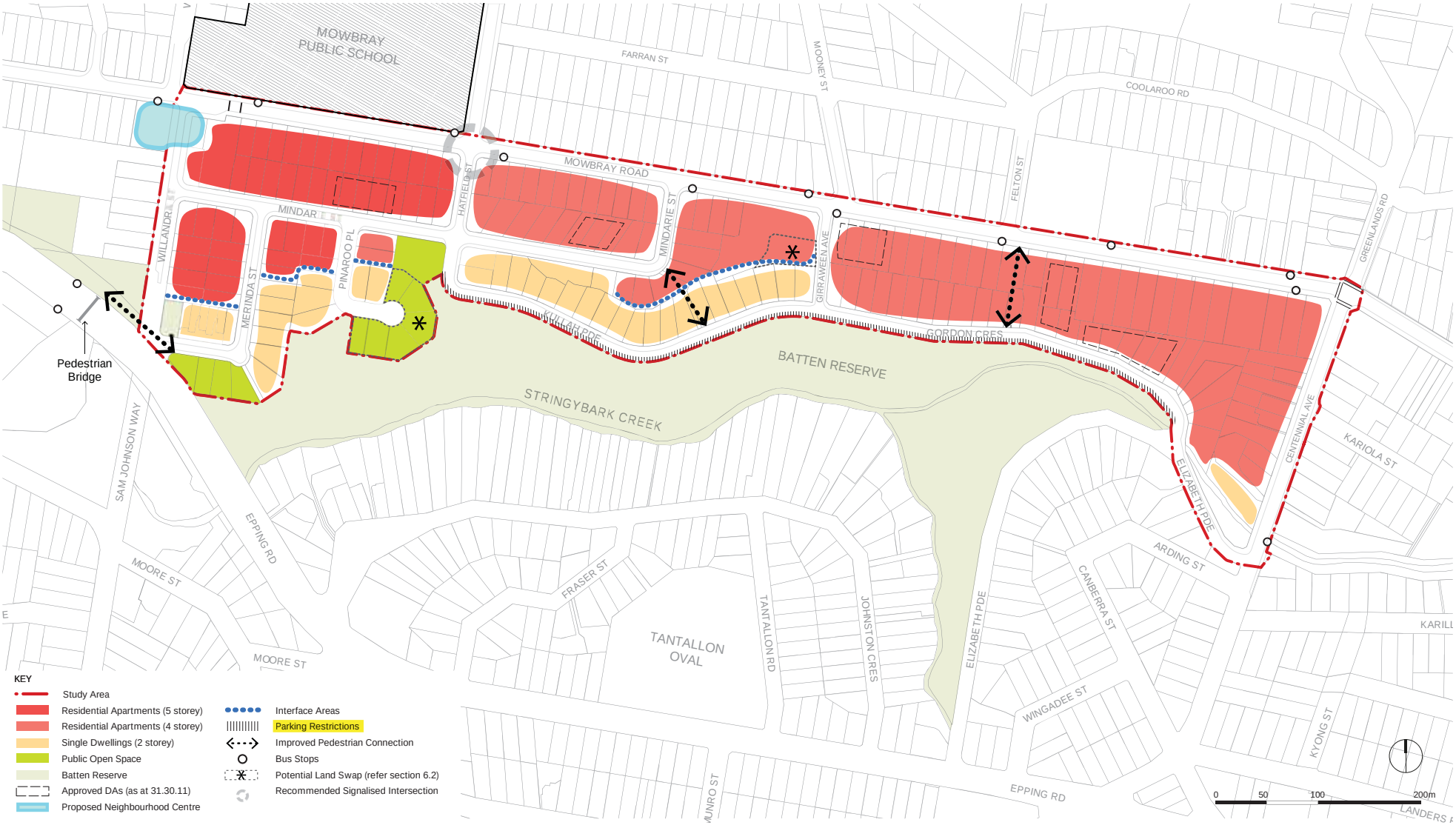

Figure 28 – Recommended Planning Principles for the Study Area

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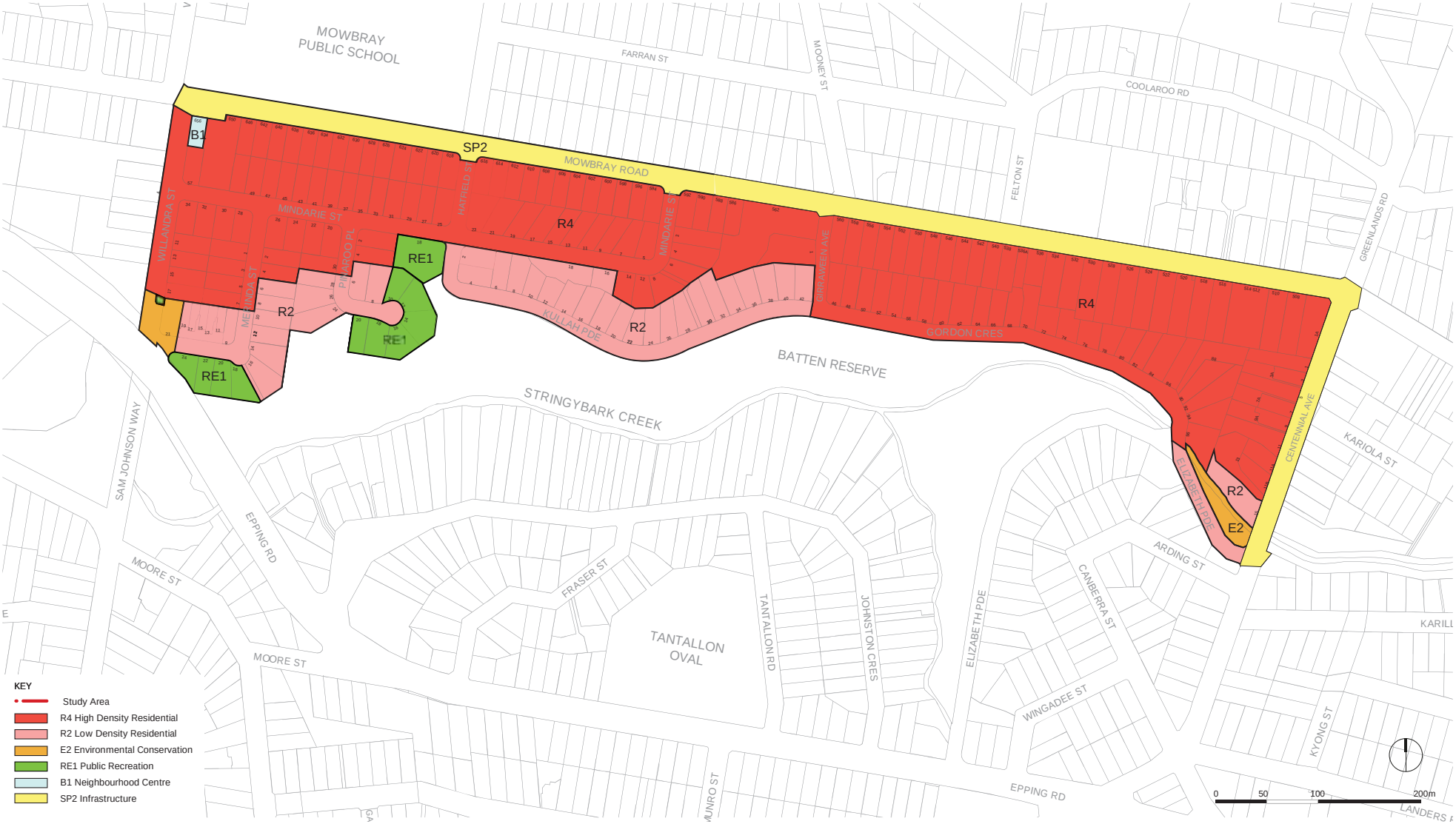

Figure 29 – Recommended LEP Land Zoning Map

5.4 Built Form and Residential Design

Building Heights

LEP 2009 currently provides a 12m building height. This is lower than what typically would be provided for 4 storey residential flat development.

In order to achieve the four residential storeys within this height limit, the residential buildings being proposed within the Study Area are being sited low into the ground often with the lower level apartments below natural ground level and large amounts of excavation. Secondly, in order to avoid non-compliance with the height controls, the tops of the buildings lack articulation or roof features to the detriment of the design quality and streetscape appeal of the buildings (see **Figure 30**).

In order to provide greater design flexibility, a maximum building height of 14.5m is recommended for that part of the Study Area nominated as 4 storeys. The 14.5m allows for 4 residential floors (12m) plus an allowance for basement extrusions and roof features / plant. To ensure a 5th storey is not accommodated, it is recommended that Part C of DCP 2010 be amended to be explicit as to the maximum number of storeys that may be accommodated within the 14.5m height limit.

As noted above, the height limit at the north western end of the Study Area is recommended to be increased to permit a partial 5th storey (17.5m). This portion of the Study Area is the more accessible to a range of amenities such as public transport, local shops and Mowbray School and it is has a more gentle slope than other parts of the Study Area. In this regard, it is well suited for higher density housing.

In is recommended that Part C of DCP 2010 be amended to ensure than the 5th storey is recessed (ie max 50% of the area of the floor below and setback generally 3m from the facade (see **Figure 31**). In this way, potential visual and shadow impacts resulting from the 5th storey can be minimised.

The recommended LEP building heights for the Study Area is shown at **Figure 32**.

Figure 30 – Extracts from various proposed developments within the Study Area

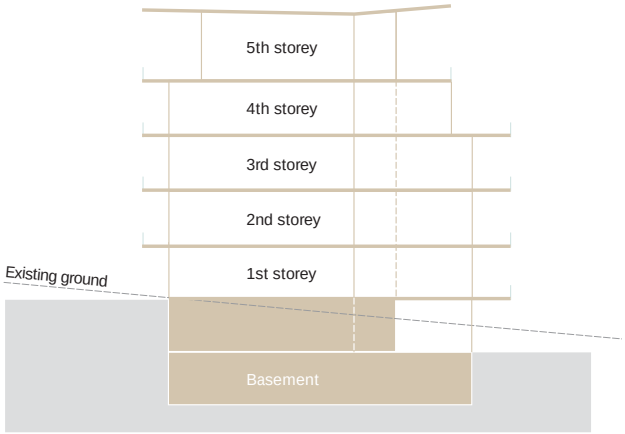

Figure 31 – Typical cross section and examples of the recessed upper storey

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Figure 32 – Recommended LEP Building Height Map

Floor Space Ratio

LEP 2009 provides an FSR of 2.1:1 in the R4 zone. There is a disconnect with this FSR and the maximum permitted building height of 12m (4 storeys). This is evident in the assessment of the existing DAs that have been submitted within the Study Area which are achieving an average of only 1.7:1.

To provide an FSR that is more consistent with the permitted maximum building heights and the other recommendations of this Study, the following maximum FSRs are recommended, as illustrated at **Figure 33**:

- 1.6:1 for the 4 storey apartment areas;
- 1.8:1 for the 5 storey apartment areas; and
- 0.5:1 for the single dwelling areas.

Davis and Langdon P/L confirm that the 1.6:1 FSR remains economically feasible.

Site Coverage and Deep Soil Planting

For residential flat development, Council's current DCP requires a minimum of 25% of a site to be landscaped area (ie 'soft landscaping') and a further 15% of a site to include landscaping on structures (ie over basement car parking, on podiums or internal courtyards). The minimum of 25% landscaped area limits the ability for tree retention and the ability for new large tree planting.

It is recommended that Council amend Section 3.17 of DCP 2010 to require a minimum 40% of a site area for deep soil planting (ie unexcavated).

Tree Retention and Replacement

It is recommended that DCP is amended to provide greater emphasis on the tree retention of existing trees (for both amenity and ecological reasons) and the planting of new trees within development sites. The Ku-ring-gai Development Control Plan (Town Centres) 2010 provides a useful resource in this regard. In addition, Council may wish to consider varying setbacks (front and rear) where an alternative design will result in the retention of significant tree(s).

Interface between Residential Flats and Dwelling Houses

It is recommended that DCP 2010 be amended to include a provision to require the consideration of the interface between residential flat buildings and dwelling houses. The provision is to require design solutions such as the stepping down of buildings, inclusion of upper level setbacks, greater boundary setbacks etc.

Building Materials and Finishes

It is recommended that Part C of DCP 2010 be amended to provide more design guidance as to the external materials and finishes of buildings. The DCP should promote a palette of materials and finishes that are in harmony with the natural landscape and complementary with the bushland setting of the Study Area. This extends to encouraging roof form articulation such as large overhanging roofs and 'pop up' elements.

5.5 Estimated Residential Yield

Table 10 summarises the estimated residential yield under the recommended scenario. The estimate is based on the set of assumptions outlined in Section 4.1 above. Given the expected development timeframe or minor variations to the assumptions, it is not unreasonable to assume the estimated yield could vary 10% in either direction. **Figure 34** illustrates the inclusions and exclusions for the scenario.

Table 10 – The estimated residential yields (as recommended)

	Recommended scenario
Potential increased yield	973
Approved DAs	224
Net Increase	1,200
Existing Dwellings	381
TOTAL DWELLINGS	1,580
Total Population	2,900

Example of stepping down interface between 5 storey residential flat building and 2 storey dwelling

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Figure 33 – Recommended LEP Floor Space Ratio Map

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Figure 34 – Residential Yield Inclusions and Exclusions (as recommended)

5.6 Open Space Land Swap

It is recommended that Council and Housing NSW consider a land swap with respect to Council's existing open space at No. 1 Girraween Avenue (1,332m^2) and Housing NSW's residential land at No 10-20 Pinaroo Place (2,588m^2). The benefits of this land swap are that would:

- Provide a larger, more useable open space recreation area for the Study Area at No. 10-20 Pinaroo Place that is integrated with the existing open space at 18 Mindarie Street and Batten Reserve (see **Figure 35**). The open space would be embellished with new facilities such as children's play equipment, sun shading, seating and community BBQs; and
- Allow No. 1 Girraween Avenue to be developed for residential purposes (R4) and for it to be developed as part of any redevelopment of the existing Housing NSW property at No. 562 Mowbray Road West. This would provide a more regular development parcel and greater incentive to redevelop this aging building.

Figure 35 – Location of potential new open space resulting from land swap

5.7 Local Infrastructure Upgrades

The following local infrastructure upgrades (to be funded through Section 94 Contributions) are recommended within the Study Area:

- Upgraded intersection of Mowbray Road West and Hatfield Street to a signalised intersection. Subject to detailed design, this may include some land acquisition;
- Upgraded existing pedestrian connection between Merinda Street and Epping Road, including lighting, signage and improved footpaths;
- Upgraded and realigned pedestrian connection between Mindarie Street and Kullah Parade;
- Potential new pedestrian connection between Mowbray Road West and Gordon Crescent;
- Upgraded stormwater outlets to Batten Reserve to control stormwater discharging into the reserve, and gross pollutant traps be provided;
- New street tree planting (where required) throughout the Precinct;
- Embellishments to the existing and proposed open space located at the corner of Mindarie Street and Kullah Parade;
- Sign posting and line marking for passing bays in accordance with the recommendations of Ecological Australia (Appendix C).