ENVIRONMENT, PLANNING AND SUSTAINABLE DEVELOPMENT DIRECTORATE

Molonglo 3 East Planning and Infrastructure Study

Planning and Infrastructure Outcomes Report

MARCH 2021

NOTE: This report has not received formal endorsement from the Territory Government or its Agencies and is provided as background for further investigations. The outcomes and concept plan within the report will be subject to change as further studies progress.

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Molonglo 3 East Planning and Infrastructure Study
Planning and Infrastructure Outcomes Report

Environment, Planning and Sustainable Development Directorate

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EXECUTIVE SUMMARY

WSP was engaged by the ACT Government – Environment, Planning and Sustainable Development Directorate (EPSDD) to undertake the Molonglo 3 East Planning and Infrastructure Study, to investigate and develop planning, urban design and infrastructure to create an exemplar of urban development in Canberra.

The site has substantial topographical and environmental constraints, including steep slopes, a large proportion of south-facing land and the requirement to retain trees, that puts limitations on the minimum size of blocks permissible, the yield, equitable access and transport planning. Innovative solutions will be required in planning, engineering infrastructure and housing typology to maintain and utilise as much natural contouring as possible.

In particular, compliance with the Estate Development Code would act as a substantial constraint to developing a Concept Plan that meets the objectives of the development as an urban development exemplar.

Three design concept plan options were developed, informed by technical studies previously undertaken, the 2019 Proof of Concept by Roberts Day, a "big ideas" engagement session with stakeholders and a series of design principles covering

- Block compliance/yield impacts
- Key interfaces
- Acoustic principles
- Walkable neighbourhoods
- View corridors/key axis
- Land-use policies
- Designing for inclusion
- Slope responsive streets.

One option built on the 2019 Proof of Concept by Roberts Day, while two additional options considered alternative solutions for the collector roads and Public Transport Corridor on the site to create slow speed environments.

The following design concept options were presented to stakeholders for feedback:

1. Business as usual
2. Public transport creek crossing
3. Low-speed environment.

However, a preferred option was not agreed upon in the stakeholder workshop. Accordingly, WSP developed a fourth hybrid concept plan option based on stakeholder feedback and reviewed by relevant ACT Government Agencies; aiming to have access and movement at its core, supporting active travel, enabling the sharing of public spaces and community assets, building social cohesion, and enhancing the lives of its residents.

Key elements of this design concept plan, shown in Figure 6.1 include:

- The Bindubi Street Extension connects to the northern end of John Gorton Drive serving local traffic in the north
- The secondary Collector Road connects from the southern end of John Gorton Drive past the group centre to the proposed East-West Arterial serving the majority of neighbourhood units
- Collector Roads are in the centre of neighbourhoods to provide maximum access to public transport located along this road
- A slow speed collector road joins these Collector Roads past the schools and group centre - this road will only service local traffic within this central zone as all other neighbourhoods can exit Molonglo 3 via the main Collector Roads
- The Intertown Public Transport (IPT) corridor de-couples from the road reserve past the primary school and group centre with a stop terminating at a linear open space between the group centre and primary school
- In the short to medium term (prior to the IPT being constructed), buses are the likely mode of public transport to be included along the collector roads, though road cross sections and building frontage types should accommodate staged changes to transit corridors over the life of the precinct
- Density is in areas of high amenity and access to public transport.

Chapters 6–10 detail the:

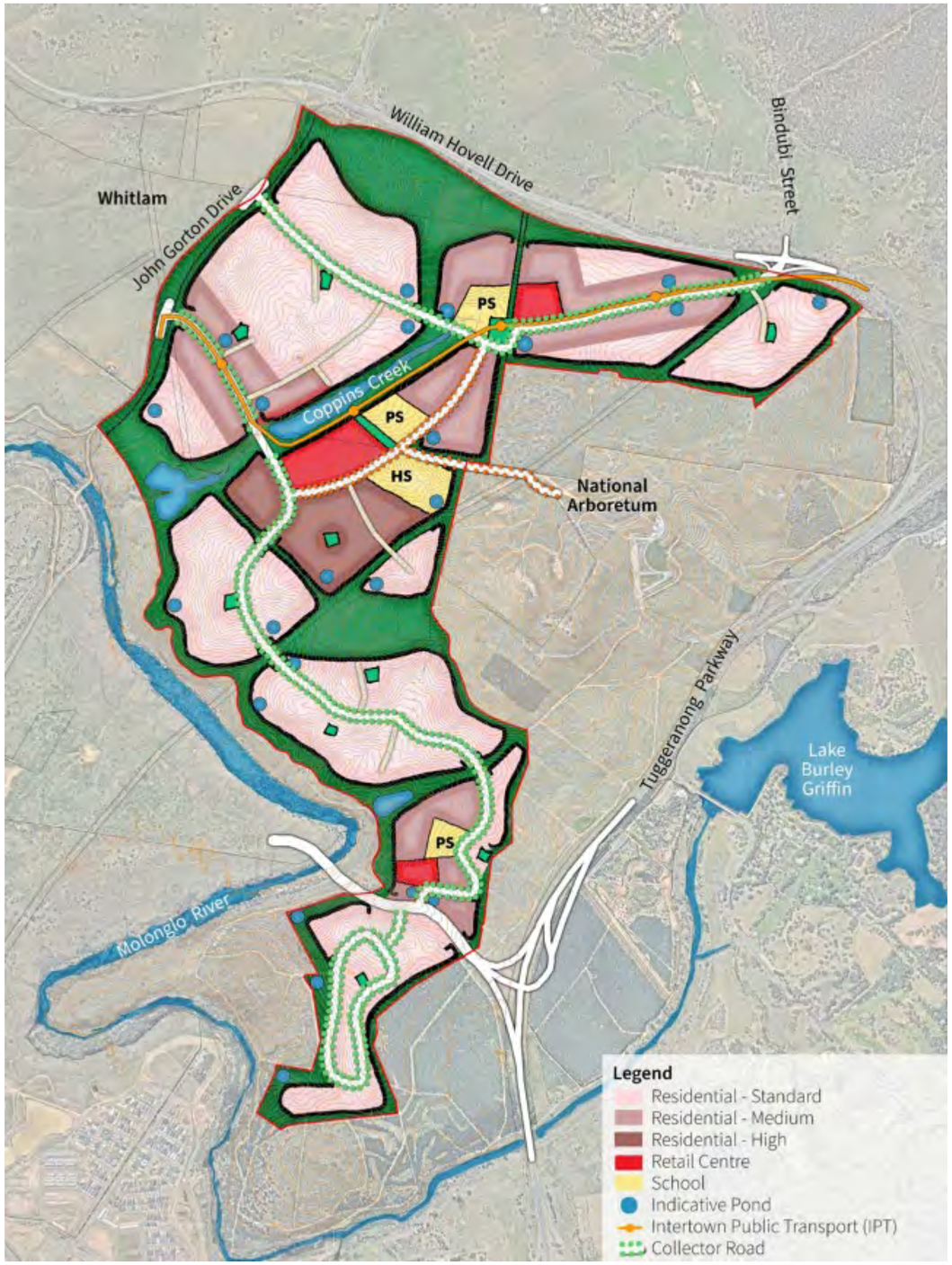
- Planning and Design Overview
- Urban interfaces
- Nature reserves
- Character areas and inspiration
- Yield analysis
- Group Centre options, including massing
- Housing typologies
- Community needs
- Transport network including the road network, application of the movement and place principles, street trees and intersection configurations, interfaces and public transport
- Active transport including the equestrian network
- Travel demand management
- Future mobility
- Infrastructure strategy
- Phasing opportunities and issues
- Planning considerations

for the hybrid design concept option.

Some highlights of the hybrid design concept option include:

- Urban interfaces with Coppins Creek, the Molonglo River and the National Arboretum.
- The plan responds to Canberra's Living Infrastructure Plan, particularly consideration of street trees and the approach to water sensitive urban design.
- The establishment of Character Areas based on existing and future features, characteristics, values and the grids.
- Group Centre options include a linear, private car free group centre opening to a beautiful foreshore to the south-west of the precinct, and an option that decouples the collector road from the IPT corridor, encouraging a slow speed environment around the group centre and school sites by directing traffic along major collector roads away from the central heart of Molonglo.
- 3D massing options are based on business as usual, additional height, a midway option and an ultimate scenario.

- Identification of housing typologies that provide choice and balance with respect to appropriate levels of density, affordability and amenity. A Lifestyle Package develops a strategy for how diversity and balance can be achieved, accommodating differing liveable values without compromising overall quality of life. A scoring system endeavours to protect residents from development and/or building solutions that might have otherwise used alternative solutions to deliver the lowest common denominator.
- Principles to include for consideration of the community, sports and recreation facilities that ensure the liveability/viability of the neighbourhoods as they develop.
- A Movement and Place based transport network that supports the preferred site option and consideration of active travel, public transport, car and freight movements, equestrian and future mobility journeys, along with considerations for travel demand management. Example street cross-sections are provided.
- Molonglo 3 has minimal existing infrastructure within the study area, and the limited infrastructure that can be found within the site is often large-scale trunk services that limit connection availability.
- In terms of stormwater infrastructure, the majority of the study area is between 5–7 per cent in grade with the steepest being up to 30 per cent. Provision of new municipal roads with piped stormwater infrastructure will be achievable at these grades, but will need significant engineering inputs, particularly at the detailed design stage.



Assessment

Planning

This report will inform a planning study for Molonglo 3 East, with the later development of a Concept Plan for incorporation into the Territory Plan via a Territory Plan Variation.

The planning principles for the preferred Concept Plan Option, influenced by its challenging topography, are not readily integrated into the current Territory Plan – for example the design concept plan does not allocate land uses consistent with current Territory Plan zone nomenclature, which will require resolution within the text of the eventual Concept Plan. A Concept Plan also provides an opportunity to apply novel development assessment requirements through the Territory Plan that can help deliver desired outcomes.

As well, the challenging topography of the site, and the resulting diversity of dwelling typologies in the Concept Plan Option presents challenges for compliance with the Estate Development Code and existing provisions of the Single and Multi-Unit Housing Development Codes. Application of the Code would likely reduce yield and constrain the desired development outcomes for Molonglo 3 East.

Existing Territory Plan controls (including those related to transport, parking, access and mobility; and household trip generation rates), rules and criteria are not consistent with a best-practice urban development of the type envisaged at Molonglo 3 East.

Molonglo 3 East can be a pilot for the required move from existing Territory Plan controls to the application of performance criteria and deemed-to-comply outcomes (which is consistent with proposed ACT Planning system reform) and this is likely essential to achieving the desired outcomes for the site.

Transport

Molonglo 3 East's transport elements aim to deliver significant modal shift with a lower reliance on cars as a primary mode of transport, partly through alignment with movement and place principles.

However, existing conventional traffic impact assessment tools and performance assumptions are not suitable for assessment of a development based on best practice sustainable transport and land use principles.

Traffic impact assessment, based on conservative transport and land use outcomes (societal trends and future mobility advancements not include, for consistency with the regional Canberra network) showed that sustainable transport outcomes, that encourage the use of active modes and public transport, as well as the discouragement of 'rat-running', will be critical to meeting the objectives of the development as an urban exemplar.

Traffic analysis did not include potential impacts from development of the Western Edge Investigation Area, west of Molonglo – this development may increase traffic on arterial roads surrounding the Molonglo 3 East area and have impacts on traffic within Molonglo 3 East; and will require further investigation.

Progressing the project

Several, if not most of the challenges identified through this report are systemic. While the existing Territory Plan framework of Concept Plans/Precinct Codes provides an opportunity to deliver novel outcomes for Molonglo 3 East that diverge from the rest of the Territory Plan, the constraints around rules and criteria, and the limited weight that can be placed on planning principles, is problematic when seeking to deliver an outcomes-based solution that incentivises innovation under significant site constraints.

The ACT Government has flagged that many of these issues will be resolved through forthcoming planning reform processes. The timeframes associated with this may, but equally may not, dovetail with planning processes necessary to achieve the indicative land release program for Molonglo 3 East. In addition, the proposed reform proposals are indicative at this stage, and cannot be relied on.

However, for the EDP processes to commence in a timeframe that does achieve the Indicative Land release program, it will be necessary to embed key principles – addressed above - into a Concept Plan. More detailed, rule based, controls can be developed as part of the EDP process and then uploaded via subsequent technical variations. It is possible that planning reform will have sufficiently progressed by that stage to allow more innovative framing of development controls. Irrespective, this will allow each EDP stage to be framed relative to the planning system as it exists at that time, and as will be in place throughout substantive development.

In the short term, WSP recommends that further work be undertaken to distil key principles into a rule and criteria format that is suitable for uplift into a Concept Plan/Precinct Code. Further work is also required to align land use allocations with existing Territory Plan nomenclature, taking into account the purpose and limitations of each zone and future flexibility. WSP can assist in this regard.

Scoping of Phase 2

Section 12 of the report identifies key scope items for further investigation, including:

- Early discussions with EPSDD's Planning Reform team to frame development controls for ease of applicability under both current and possible future regimes
- The investigation of land to the west of Canberra's metropolitan area – the western edge as identified in the ACT Planning Strategy
- Future proofing and development staging
- Revised and detailed heritage assessments
- Neighbourhood master planning based on the suggested neighbourhoods and phasing of the overall development, including detailed density bands to ensure yield is achieved in each neighbourhood
- Continued stakeholder consultation during future stages of the project, and development of a Planning Report and Concept Plan
- Continue the planning of the interfaces with patch GG, the Molonglo River Corridor and the National Arboretum
- Development of the local road network (including the secondary access road to the Arboretum) and staging of public transport services
- Continuation of planning for active transport in the precinct, in close consultation with numerous agencies
- Further infrastructure investigations including proof of concept for roads and earthworks informed by an earthworks model, a water sensitive design strategy and supplementary geotechnical investigations.

1 INTRODUCTION

1.1 PURPOSE

WSP was engaged by the ACT Government – Environment, Planning and Sustainable Development Directorate (EPSDD) to undertake the Molonglo 3 East Planning and Infrastructure Study (the Project).

The key objectives of the Project are to:

1 Explore options to achieve an integrated planning, urban design and infrastructure outcome for Molonglo 3 East and to recommend a preferred outcome.

2 Identify the elements of the preferred outcome and based on planning principles and policies that set the planning, urban design and engineering infrastructure directions, describe how these will deliver an integrated design outcome for the area.

3 Clearly describe and illustrate the integrated planning and engineering requirements in sufficient detail to incorporate into a Territory Plan Statutory Concept Plan.

The Project, and this report, comprises the identification and analysis of planning and infrastructure options for the Study Area. Integrating engineering infrastructure with planning and urban design objectives that will be incorporated into a statutory Concept Plan for the Study Area in the next phase of planning.

1.2 PROJECT VISION AND OBJECTIVES

Molonglo 3 East will become a destination and an exemplar of urban development in Canberra.

To deliver this, we are working through a place-led approach. A series of interventions will demonstrate the future of urban planning and community design, with people at its core.

Key vision elements which were developed in conjunction with stakeholders are:

1 Molonglo 3 East will provide character-based lifestyle housing with great diversity. This will help attract and retain a diverse community, catering for a range of stages of life, backgrounds, family characteristics and importantly, budgets.

2 Housing should be climate wise, and deliver zero or negative emissions, meeting the highest environmental outcomes. Each house too can play a role in the capture of clean energy through a Government-led micro-grid.

3 The design of our streets will align with movement and place framework to improve mobility as well as access, create environmental, health and social benefits through increased active travel, and reduce our environmental impact with lower reliance on vehicles for transport.

4 Through careful planning and strong dedication to our vision, we will see Molonglo 3 East pave the way for significant modal shift with a lower reliance on cars as a primary mode of transport. We will include designated car-free zones and potentially carparking as separate land-use, while providing excellent options for public and active transport. By reconsidering the way we use our cars, and value the public space they take-up, we are able to begin shifting the hearts and minds of Canberrans.

5 A 40 per cent or higher urban tree canopy, alongside the inclusion of urban forests across Molonglo 3 East will help provide cleaner air, more filtered stormwater and have the capacity to help lower temperatures. It will also provide opportunities for people to connect with nature, make our streets more beautiful and provide important habitat for animals.

6 To achieve water sensitive urban design, we will deliver 30 per cent or higher permeable surfaces, which can improve stormwater management through filtration of contaminants and pollutants.

1.3 STUDY AREA

The Project Study Area is illustrated in Figure 1.2, being the area located east of John Gorton Drive, west of the National Arboretum and Tuggeranong Parkway, north of the Molonglo River and south of William Hovell Drive. The site is approximately 6.5 kilometres from the Canberra city centre. The developable area of Molonglo 3 East is approximately 480 hectares. Preliminary land use and future development conceptual planning has been undertaken for the study area to achieve a target of up to 9,900 dwellings based on the contours, topographic features, and known infrastructure constraints.

Figure 1.1 Study location – Canberra context

Figure 1.2 Study location

1.4 REPORT STRUCTURE

Following this introduction, the remainder of the report sets out:

- **Background review:** focusing on the site constraints and opportunities.
- **Stakeholder approach and outcomes:** summarising the engagement process and the unique discoveries and big ideas investigated.
- **Design principles:** an overview of the resulting design principles for the study area.
- **Development of preferred option:** description of how the preferred site option was developed from three separate concepts.
- **Planning and urban design**: an overview of the key design for the preferred site option including urban interface, planning reform, character areas, yield analysis, Group Centre options, housing typologies and community needs.
- **Transport network:** an overview of the transport network to support the preferred site option including provision for active and public transport and private vehicles. It also includes the consideration of future mobility and the balance of movement and placemaking roles of the roads and streets.
- **Infrastructure strategy**: an overview of the water, sewer, stormwater and utilities options for the preferred concept plan including a water sensitive urban design strategy.
- **Staging opportunities:** key infrastructure, planning and transport considerations for implementation and development of the site.
- **Conclusions:** a summary of the key elements of the Molonglo 3 East Design Concept Plan and description of the Group Centre, transport and infrastructure findings.
- **Phase 2 Scoping**: This section will be completed after review of the draft report to ensure handover to the next stage of project development.

The findings and recommendations are supported by additional documentation in the appendices.

2 BACKGROUND REVIEW

A number of technical studies have already been undertaken covering all or parts of the study area. A background review for the Molonglo 3 East project was completed in June 2020. This review summarises all relevant policies and previous planning for the study area, as related to infrastructure, transport planning and transport modelling. A supplementary background review was also prepared by for the urban planning context by Hatch | RobertsDay. This report is appended to the Background Review in Appendix A.

2.1 CONSTRAINTS AND OPPORTUNITIES

The study area is a greenfield site, bounded by John Gorton Drive, William Hovell Drive, the Molonglo River and the National Arboretum Canberra. The site has considerable constraints to the planning, particularly relating to topographical and environmental constraints.

2.1.1 ENVIRONMENTAL

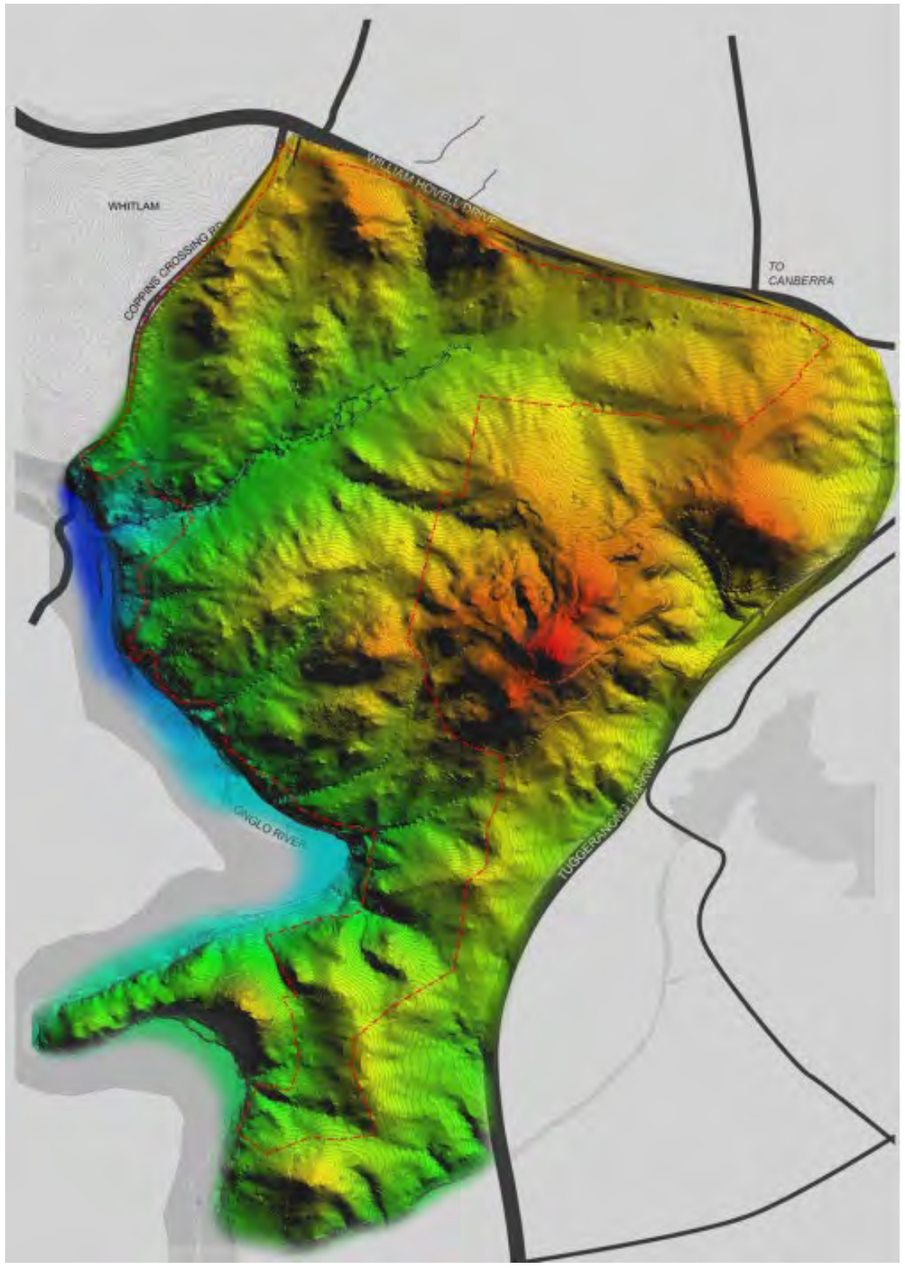
- The Urban Amenity Tree Assessment identifies a number of medium to high quality trees in the northern portion of the site with some clusters following Coppins Creek south. All these trees are to be retained, which may impact on earthworks strategies as they are on some of the steepest parts of the site.
- The southern two thirds of the site is heavily vegetated with non-native pine trees, these can be removed, however clusters could be retained to create established landscaped zones.

2.1.2 TOPOGRAPHICAL

- The site is characterised by significant topography, with an elevation difference of over 100 m between the lowest point in Coppins Creek to the highest hilltop on the eastern side of the site (outlined in Figure 2.1).
- The infrastructure strategy will aim to maintain and utilise as much natural contouring as possible to fit within the precinct development.
- There are distinct hilltops throughout the site that provide opportunities for broad views to the Molonglo River and the mountains. These hilltops present challenges in the large quantity of south facing slope, which cover around 40 per cent of developable area. Within the Estate Development Code, south facing slope puts a limitation on the minimum size of blocks permissible with the existing block compliance tables.
- Due to the significant quantity of south facing slope there will be an impact on the available yield allowable under the Estate Development Code.

2.1.3 SLOPE ANALYSIS

- Most of the site has falls greater than 8 per cent, with large central portions in excess of 15 per cent.
- The steepness of the land will require innovative solutions to the road layout and road types as currently the maximum gradient for a bus route is 8 per cent and maximum on a local street is 12.5 per cent.
- The significant slope will require innovative housing typologies to reduce cut and fill on block.



Source: Molonglo 3 Stage 2 Proof of Concept (Roberts Day 2019)

Figure 2.1 Topography of the study area

2.1.4 INFRASTRUCTURE

- **Water Supply** – Review the existing locations of water supply mains and indicate constraints or connection opportunities and incorporate the information into the overall design. The adjacent Whitlam development has made provisions for the proposed Molonglo 3 to tap into, reducing impact on the existing network.
- **Sewerage supply** –The adjacent Whitlam development has made provision for future connections along its eastern boundary for the Molonglo 3 Development. This assessment will build on the current Concept Design works undertaken to date which will form the basis considerations for the development of Molonglo 3.
- **Electricity** – Existing 132 kV overhead supply is due to be undergrounded and realigned along the eastern boundary of the Molonglo 3 development site, in an effort to reduce the existing easement corridors and as such enable additional area to be activated (as shown in Figure 2.2).
- **Stormwater** – Careful masterplanning and co-ordination of stormwater infrastructure with road corridors and precinct planning will need to be considered to ensure environmentally sensitive areas are preserved – ponds/water bodies will be strategically located to work with the above mentioned considerations of topography and existing onsite infrastructure and be located outside the identified "Molonglo River Corridor" boundary.

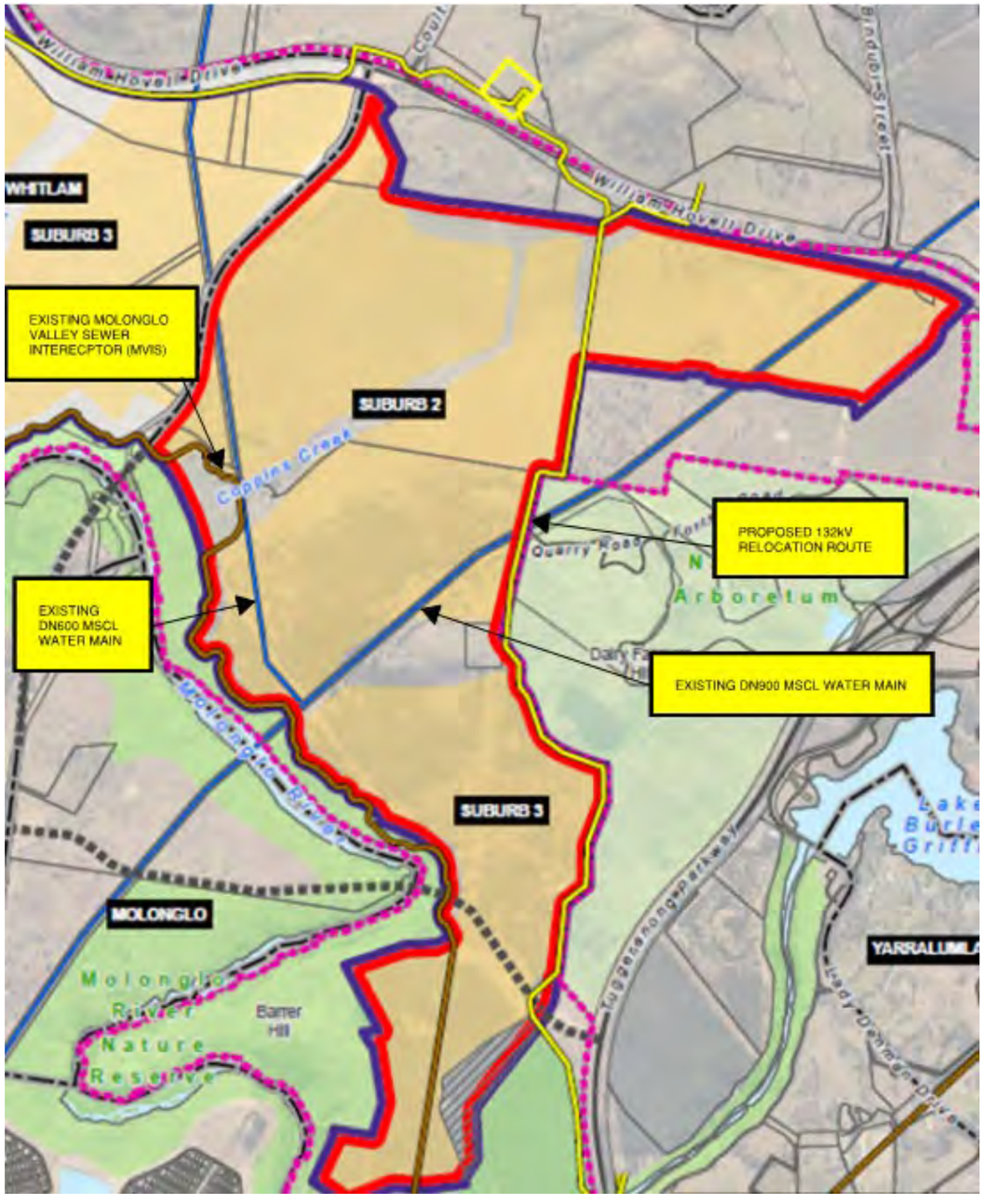


Figure 2.2 Existing Trunk Infrastructure

3 STAKEHOLDER APPROACH AND OUTCOMES

3.1 STAKEHOLDER ENGAGEMENT OPPORTUNITIES

To assist and inform the direction of the vision, design principles, options development, and subsequent concept plan for the study area, the project engaged with key stakeholders.

Stakeholders included representatives from:

- Environment, Planning and Sustainable Development Directorate (EPSDD)
- Transport Canberra and City Services (TCCS)
- Suburban Land Agency (SLA)
- Parks and Conservation Services (PCS)
- National Arboretum Canberra (NAC).

Opportunities for stakeholders to engage with this project are shown in Table 3.1.

Table 3.1 Opportunities for engagement

Activity	Attendees	Purpose	Date/s
Coordination Group	EPSDD Project team	Fortnightly progress meetings to discuss stakeholder concerns and share project information.	Various
Big Ideas Workshop	All stakeholders	A "Big Ideas" Visioning Workshop to explore all ideas that will ultimately inform the endorsed design principles, code reform and alternative approaches and innovation (presentation attached in Appendix G-1)	11 May 2020
Options Workshop	All stakeholders	The Options Workshop will be undertaken to discuss the three project options. The outcome of this workshop will to be define the preferred option to progress to the design concept plan stage (presentation attached in Appendix G-2).	27 July 2020
Response to Design Principles	All stakeholders	A separate Design Principles Report was issued to all stakeholders for comment (final report attached in Appendix B).	12 June 2020
Response to Options Report	All stakeholders	A separate Options Report was issued to all stakeholders as supplementary information to the Options Workshop (final report attached in Appendix C).	23 July 2020
Ad-Hoc meetings	NAC EPSDD	Options discussion: To provide further detail on the concept plan options presented in the Options Workshop and to seek additional feedback to guide the project team to a preferred concept plan option.	17 August 2020
	PCS EPSDD		18 August 2020
	TCCS EPSDD		25 August 2020
	TCCS EPSDD	The Transport Modelling team gave an overview of the CSTM model results to provide direction on choosing Option 1 or Option 2 as the preferred concept plan option (Transport Modelling Report attached in Appendix E).	16 November 2020 25 November 2020
	SLA EPSDD	An opportunity for information sharing between the Molonglo 3 East project team and the SLA.	3 November 2020

3.1.1 BIG IDEAS WORKSHOP

The Big Ideas engagement session provided a forum for stakeholders to share insights, ideas, visions and identify issues and opportunities of the site for consideration. The design concept options reflected the aspirations of the key stakeholder groups. Feedback from this session was subsequently used to develop preliminary options.

The Big Ideas presentation to stakeholders is included as Appendix G-1.

Below is a summary of the key aspirations for each stakeholder group:

ENVIRONMENT PLANNING SUSTAINABLE DESIGN DIRECTORATE

- Create an exciting, special, vibrant, and different precinct.
- Provide housing choices.
- Sustainability embedded in structure.
- Best practice transport oriented design.
- Focus on centres and schools.
- Nature experiences.
- Water and energy management.

SUBURBAN LAND AGENCY

- Great places where communities thrive.
- Views are maintained (both external and internal to site).
- Interesting architecture that is suited to the topography.
- Town Centre – Canberra's Best.
- Incorporating retail, commercial, meeting places.
- Responding to community needs.
- Natural assets to be promoted.
- River loop path along the Molonglo River walk to be incorporated/integrated into the structure.

TRANSPORT CANBERRA & CITY SERVICES

- Coherent urban structure.
- Good access to/from area into the wider transport network.
- Facilities to be well connected (Molonglo pool is a poor example – perimeter of suburb).
- Community services and centres to be connected to wider Molonglo Valley.
- Network of interconnected streets across neighbourhoods.
- Focus on movement of goods and people.
- Arterial roads should be safe for through travel plus local traffic.
- Interface to arterial roads important – John Gorton Drive is a barrier.
- Innovative land-use planning to de-centralise employment.
- Molonglo 3 as an employment hub.
- Smart grid opportunities.
- Demand responsive transport.
- Adaptable streets.

NATIONAL ARBORETUM

- Landscape amenity in buffer zone.
- Pedestrian/cycle access into the Arboretum.
- Use the arboretum as *"Backyard"* for Molonglo residents.
- Complimentary tree species along the interfaces.
- Active travel connections are important – to Stromlo Forest Park and key centres around Canberra.
- Vistas to be protected – Western views from Arboretum are important.
- Secondary vehicle access for large scale events to be included.

PARKS AND CONSERVATION

- Molonglo River Corridor Plan provides natural and cultural conservation, and recreation.
- Long interface to Molonglo River needs to be well considered.
- Manage access and behaviour into the river corridor.
- Molonglo River Corridor Concept Plan's recommendations to be considered.
- River Reserve Management Plan to be considered.
- The river corridor is to the *"Front Yard"* for residents.
- Provide a sense of ownership to ensure the corridor is protected.
- Native species in Molonglo for birds and animal habitats – link into winder native corridors.
- Stormwater management critical to protect the Molonglo River.

3.1.2 OPTIONS WORKSHOP

As part of this study, three design concept plan options were developed and presented to stakeholders for feedback. An intermediate Options Report was also developed for stakeholders to provide further details on the options for consideration. The Options Report is attached to this report as Appendix C and the presentation to stakeholders is included in Appendix G-2.

The goal of this Options Workshop was to progress to a preferred option. Whilst a preferred option was not agreed upon in this Workshop, stakeholder feedback was recorded and adopted into a hybrid concept plan option.

Below is a summary of feedback and considerations that emerged from the Optioneering process.

ENVIRONMENT PLANNING SUSTAINABLE DESIGN DIRECTORATE

- Importance of schools and centres within the precinct helping to define character areas and transport modes.
- Rat running should be discouraged with design elements introduced to minimise rat running.
- Importance of designing for the different modes, e.g. road widths for buses or incorporating the commuter cycling route.

TRANSPORT CANBERRA & CITY SERVICES

- The William Hovell Drive and Bindubi Street interchange will require careful integration with the precinct to recognise the corridors role as a vibrant street.
- Questions on how the proposed road network will impact existing (and proposed) surrounding intersections.
- Importance of considered school placement and its interaction with the surrounding area.
- Knowledge sharing of the proposed rapid transport corridor. Options for the corridor include heading north across William Hovell Drive to Belconnen, or east to the City centre.

NATIONAL ARBORETUM

- Concerns over an interface boundary of a collector road compared to a residential boundary (note all boundaries must have an access road for asset protection).
- Desire to contribute Arboretum tree species into the Molonglo 3 East urban space such as for urban buffer, road medians or schools.

PARKS AND CONSERVATION

- Concerns over an interface boundary of a collector road compared to a residential boundary.
- Consideration of noise, lighting and other implications on the Molonglo River Corridor.
- Important to have a controlled access to the Molonglo River Corridor. It is not seen as a destination and should be primarily used for local use only as it's a narrow, environmentally sensitive corridor.
- Questions the north access to the Arboretum which is aligned through PCS environment areas. Would prefer the access to be relocated to the south near the group centre.

3.1.3 ADDITIONAL STAKEHOLDER ENGAGEMENT

Before reaching a preferred concept plan for Molonglo 3 East, additional stakeholder engagement activities were undertaken:

- Further analysis of opportunities for "edge roads" along both the Arboretum and Molonglo River Corridor Boundary (Appendix G-3).
- Strategic transport modelling was undertaken for Option 1 and Option 2 to understand the implications of both options on the surrounding transport network (Appendix E).

3.2 UNIQUE DISCOVERIES AND BIG IDEAS

During stakeholder workshops a series of "big ideas" were presented that have influenced the overall concept plan. The six key big ideas are outlined below:

NOT BUSINESS AS USUAL

An analysis on the significant slope in relation to the ACT Governments Estate Development Code Block Compliance requirement identified that a fully compliant scheme would create a yield 20 to 45 percent lower than a form-based approach.

Moving away from the existing Estate Development Code is a critical innovation to achieve an appropriate outcome. The SLA identified Whitlam as an example of achieving a good quality architectural outcome due to the slope.

URBAN INTERFACE

The 21.5 km of interfaces require over 100 interesting items to stimulate people who are walking/cycling around the site. Hatch | Roberts Day identified Coppins Creek as a similar scale walk to the Lake Burley Griffin two bridges walk (4.7 km vs 5.0 km) The SLA suggested incorporating trails along the Molonglo River as a "river loop" walk.

INFRASTRUCTURE AND CONNECTIVITY

The indicative IPT route (inter-town public transit route) identified through Molonglo 3, connecting William Hovell Drive to John Gorton Drive with three indicative stops near local centres, schools, and the main group centre provides opportunities to create transport-oriented density.

The extensive easement corridors (including the underground power lines, and water main easements) throughout Molonglo provide active travel connectivity opportunities into the IPT.

TRANSIT ORIENTED DESIGN

The significant topographical challenges the site faces include providing access to the future IPT stops with active travel networks. Many of the existing informal path networks are on alignments of between 5–15 per cent slope which will pose challenges in providing equitable access to public transport.

MOVEMENT + PLACE

Movement and Place is a new strategy for understanding how our roads can integrate urban design and transport. The Moving Canberra transport strategy includes further guidance on applying Movement and Place in the transport context might be useful given the discussion of topographical challenge for access to public transport.

PLACE AND IDENTITY

Hatch | Roberts Day's analysis of the identities of surrounding suburbs provided a basis for a series of potential place identities for Molonglo. Given the scale of Molonglo there is the opportunity for an overarching identity and unique ones for sub-precincts.

Potential identities included:

- The Healthy New Town
  - Infrastructure should prioritise pedestrians, cyclists, and public transport.
- The Eco-New Town
  - Focus on bringing the river, creek, hills, and arboretum into the site
  - Promote awareness of the natural systems inside and around Molonglo.
- The Innovative New Town
  - Thinking next practice rather than best practice or business as usual
  - Adaptability.
- The Destination New Town
  - Create Amenity to establish a point of difference
  - A destination to live, work, play, and visit
  - Compliment surrounding regions.
- A New Town for Well Being
  - Maximise joy
  - Build resilience against economic or environmental shocks
  - Enable us to strengthen social bonds.

The preferred identities are discussed in section 6.3: Character Areas.

4 DESIGN PRINCIPLES

4.1 DESIGN OVERVIEW

The Design Principles for Molonglo 3 cover an extensive array of topics. These Design Principles have been developed by the project team from the previous Proof of Concept and stakeholder inputs from the Big Ideas Workshop. The topics covered include:

1. Block compliance/yield impacts
2. Key interfaces
3. Acoustic principles
4. Walkable neighbourhoods
5. View corridors/key axis
6. Land-use policies
7. Designing for inclusion
8. Slope responsive streets.

A summary of the principles is provided in sections 4.1.1 to 4.1.8, with the full document attached as Appendix B.

Feedback on these principles was provided by key stakeholders which has subsequently informed the final Design Concept Layout.

4.1.1 BLOCK COMPLIANCE/YIELD IMPACTS

The Molonglo 3 East Proof of Concept (2019) identified the Estate Development Code Block Compliance as a limitation to the yield due to the orientation of the block to the street and the slope of the land. The Site Analysis highlighted that 40 per cent of the land had south facing slope and 66 per cent of the blocks would have an orientation outside the ideals within the Block Compliance tables.

When combined, this accounts for 80 per cent of all developable land within Molonglo East.

The limitations set by the Block Compliance tables means that most blocks must be greater than 18 m wide at their narrowest point, which results in the minimum lot size of 18 m x 28 m (504 m²) across around 80 per cent of the developable area. This minimum size can be increased greatly due to “fan” shaped blocks on curved streets (roads which work with the contours) which requires 18 m at the narrowest point, therefore potentially having 20 m+ at the front or rear.

The Block Compliance tables do not allow for the variety in dwelling typologies required for the compact walkable neighbourhoods envisioned for Molonglo.

The alternative to the Estate Development Code Block Compliance tables is a Form Based Approach, which would include site specific controls, rather than relying on the planning controls of the Single Dwelling Housing Development Code and Multi-Unit Housing Development Code to deliver outcomes when blocks do not comply. A Form Based Approach removes ambiguity at the estate development planning stage and should encourage innovative approaches for delivering integrated housing development parcels. It can also incorporate performance-based planning, whereby EPSDD can agree upon acceptable development outcomes, but provide flexibility on how those outcomes are reached.

Slope responsive standard designs should be investigated to determine likely yield outcomes and block design, orientation, and size. For medium and high-density residential development, non-conventional styles should be investigated for steeper sites that minimise interventions to the natural grade e.g. split level townhouses with under croft garaging, interlocking apartments/townhouses (i.e. designed as one building, accessed independently from the low or high side of adjacent streets as separate dwellings). For low density dwellings, it may be necessary to increase building height controls/number of storeys to deliver smaller lots and achieve efficient land use and dwelling yields.

A Form Based Approach should also consider orientation, noting two thirds of the potential blocks are likely to have orientation outside the Block Compliance ideals. Opportunities for northern orientation and/or ground level principal private open space will likely be diminished as a result, and a Form Based Approach to land use planning could help identify acceptable alternatives for Molonglo 3 East. Solar access should be prioritised over ground floor access where the gradient prevents efficient use of the private open space.

4.1.2 KEY INTERFACE PRINCIPLES

Molonglo 3 is surrounded by key interfaces with natural areas, including the National Arboretum, the Molonglo River Corridor, Coppins Creek, and Arterial Roads; William Hovell Drive, John Gorton Drive, and the Bindubi Street Extension.

NATIONAL ARBORETUM

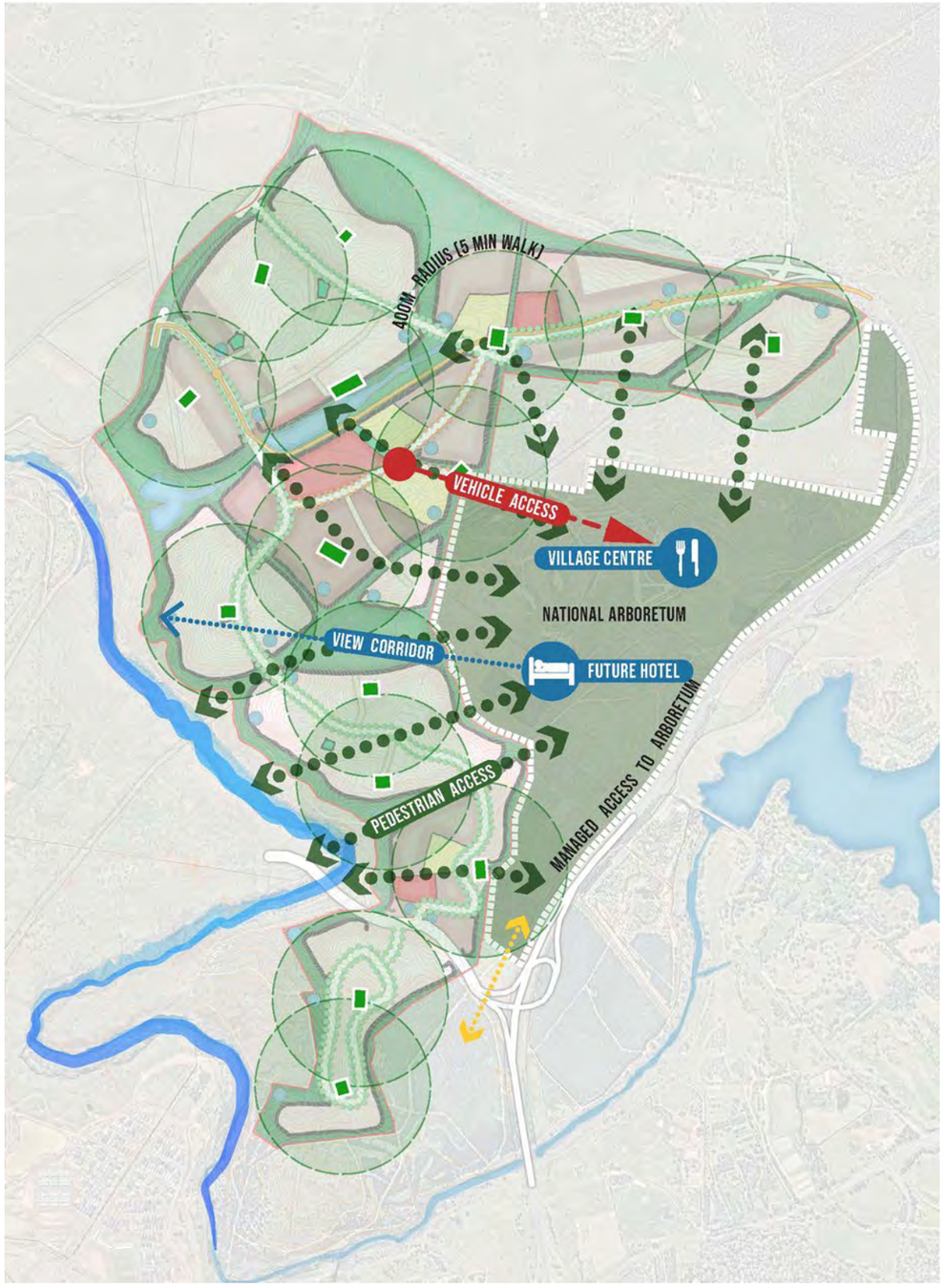


Figure 4.1 Arboretum Interface

Design Principles

The National Arboretum, shown in Figure 4.1 is a key feature and lifestyle opportunity for residents on the doorstep of Molonglo 3 East. It was identified within the Innovations Workshop (11 May 2020) as the "Back Yard" for the residents.

Permeability between the two areas is a key principle for pedestrians and cyclists, to enjoy the amenity provided by the Arboretum. A secondary vehicle access from the Arboretum into Molonglo 3 is required to increase the capacity of the events that are held there.

Key Principles include:

- Managed access
- Secondary entry road
- East-West Arterial interface
- Urban interface
- Bushfire resistance.

MANAGED ACCESS

- Arboretum is fully fenced and locked at night for vehicles.
- Access to network of paths within Arboretum should be around 400 m apart into Molonglo 3 East with controlled access if required.

SECOND ENTRY

- The 10,000-person amphitheatre currently takes up to 3.5 hours to clear.
- A Second Entry is required to travel north to William Hovel Drive at the Bindubi Street intersection.
- Potential for southern third entry in longer term for Hotel.
- Coordination between Molonglo 3 East project and Arboretum required for second entry as timing for Arboretum in imminent.

EAST-WEST ARTERIAL

- Current design impacts on the Boer War Forest.
- Provide under pass for horse trail/commuter cycle path.
- 3.5 m high clearance under arterial road for service vehicles.

URBAN INTERFACE

- No back or side fences to face the Arboretum.
- Use soft landscape as a transition to forests.
- Fence along edge of Arboretum will include lockable gates to provide daytime access to network of paths and trails.
- The access gates should be aligned to the following urban structuring elements to provide a legible regional amenity circuit (Arboretum, urban greenspace, waterfront and associated parks and corridors):
- Active travel links:
  - Connecting to internal neighbourhood centres, parks, civic facilities and/ or destinations and extending onward
  - Linking to River, Creek.
- A range of interface cross sections should be approved and applied depending on and relating to the Character Area. These cross sections are outlined here in draft form and consider a range of housing types/densities along the interface.
- Proposed hotel below Dairy Farmers Hill Lookout has views west through Molonglo that should be respected.

BUSHFIRE

- Inner Asset Protection Zone (IAPZ) of around 30 m within the Site Boundary with a 7.5 m wide edge road along development as per Emergency Services requirements. Soft landscaping should be provided to soften the interface between the arboretum and development.

MOLONGLO RIVER CORRIDOR

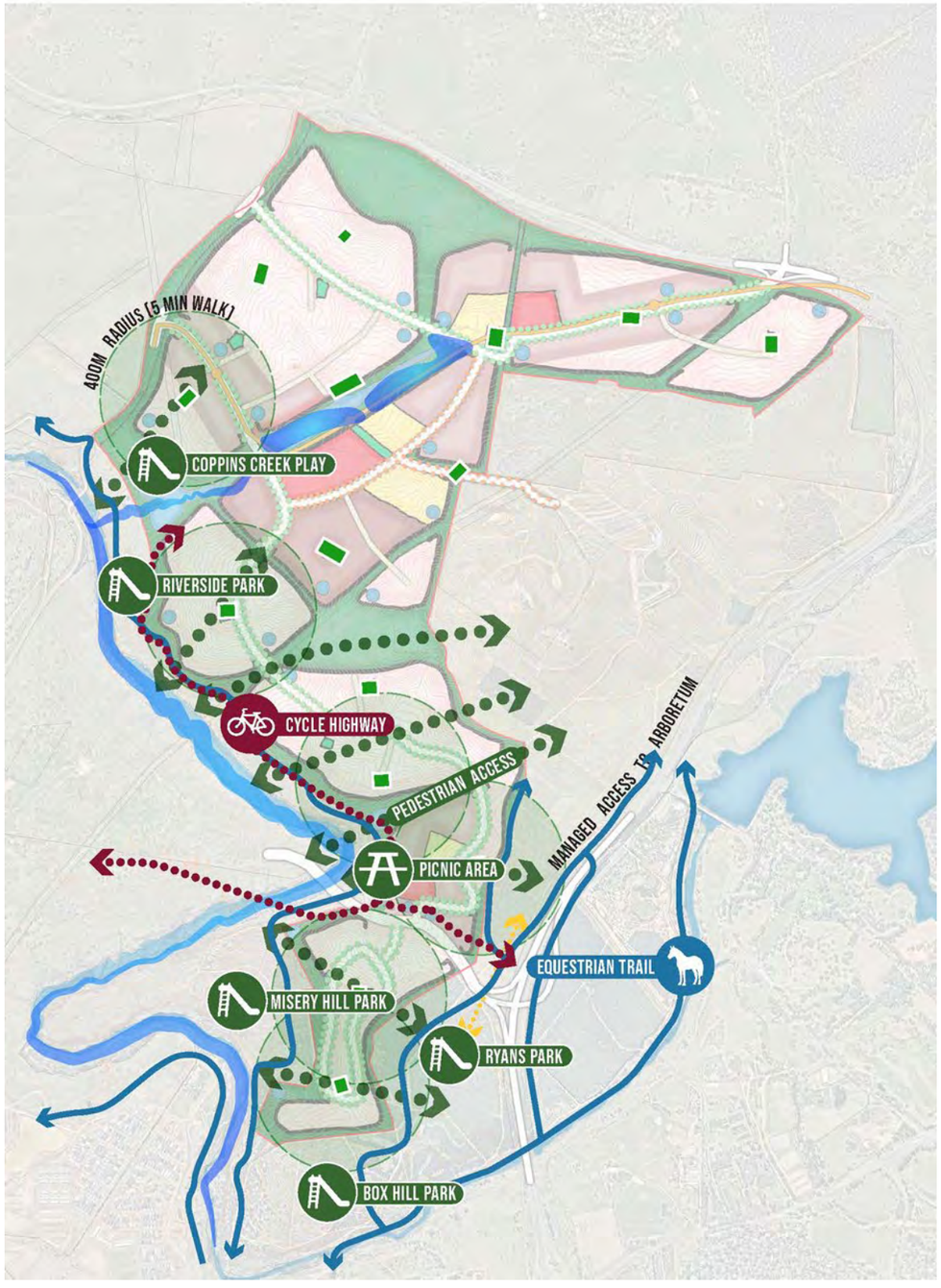


Figure 4.2 Molonglo River Corridor Interface

Design Principles

As identified within the Molonglo 3 East Innovation Workshop (11 May 2020) PACS saw the opportunity for the Molonglo River Corridor (shown in Figure 4.2) to be utilised as the "Front Yard" for the residents. This will encourage a sense of ownership and stewardship in the river corridor for residents who will in turn look after the area. Urban interface designs are to use same principles identified in the Kama Nature reserve Interface Strategy (Capital Ecology) and must be designed in consultation with PCS.

Key Principles include:

- Managed access
- Path network
- Storm water treatment
- Weed management
- Landscape buffer and objectives.

MANAGED ACCESS

- Fenced along length of River Reserve with pedestrian access points to facilitate low impact recreation.
- Gated vehicle access for service vehicles.

PATH NETWORK

- A bridge crossing of the Molonglo River at the Coombs peninsular.
- Connections to the two special purpose reserves (Barrer Hill and Misery Point).
- Connections into existing/proposed path network.
- Provide wayfinding and interpretive signage.
- Path access to Mount Painter under William Hovel Drive.

STORM WATER TREATMENT

- Included formal/informal WSUD.
- Naturalised wetland at the lower end of Coppins Creek with other smaller wetland/ponds at the other six or so minor watercourses that flow to the Molonglo River.
- Undertake more treatment higher up in the urban catchments.
- Multiple smaller ponds preferred by PCS for water treatment/detention including naturalised Coppins Creek Corridor.
- On-dwelling catchment to be increased to 30 per cent impervious surfaces to reduce size of ponds.

WEED MANAGEMENT

- Only authorised vehicles will be permitted to access the buffer or Molonglo River Reserve.
- A dedicated Weed Monitoring and Management Plan will be developed for the buffer.
- Wash down facilities to be located along the urban edge road for vehicles used within the buffer to prevent weeds impacting the River Reserve.

LANDSCAPE BUFFER

- To include Inner Asset Protection Zone (IAPZ) of around 60 m within Molonglo 3 East FUA.
- Fire Trail to be included closer to River Interface.
- Urban edge road to be included closer to development.

- Shared paths to be away from reserve to prevent impacts on native vegetation/animals.
- No parking to be included within buffer.
- The actual boundary between what is nature reserve and what is urban open space is not necessarily fixed and a new line of management responsibility (PCS vs TCCS) could be defined depending on the environmental values found and the management regime to be adopted for its 60 m wide zone. Managed access points to the reserve needed.
- Stormwater management to be included within the landscape buffer where necessary

LANDSCAPE OBJECTIVES

- Avoid light pollution from cars/bicycles.
- Minimise disturbance of ground (maintain existing ground cover where possible).
- Kama Nature Reserve Interface Strategy a good example of landscape objectives.
- Network of native species where possible throughout Molonglo 3 East.
- Interface treatments with Patches H, C, GG, N to be developed and discussed further with PCS.
- Identification of natural values inside the FUA should occur early and integrated/connected with those adjacent.

COPPINS CREEK INTERFACE

Design Principles

Engineering needs to be sympathetic to the natural state of the creek and ensure the natural features are maintained:

- Preservation of the river corridor is key to the success and sustainability of the future development of Molonglo 3. The preservation also lends itself to the activation of the river corridor and linking previous stages of development along the corridor to the public such as the Namarag Reserve (Molonglo Special Purpose Reserve).
- Activation and access for walking trails/horse trails/bike paths.
- Adequate crossing points for both walkers/riders and vehicles.
- Maintaining quality of water within the Creek and provide betterment (WSUD principles) where possible.
- Linkage to Whitlam development.
- Potential flooding from Coppins Creek to the proposed surrounding development areas to be considered.
- Encroachment within the Coppins Creek flood plain.
- Cannot impact existing development areas such as Whitlam development.

WSUD

Design Principles

- Appreciation of maintenance of both types as well as construction costs/urban design impacts and practicality.
- Staging of development is a key consideration which may lean toward multiple treatment measures.
- Topography will play an important role in the location and positioning of WSUD measures.
- Gravity systems where possible rather than pumping stations/pressurised mains.
- Overland flow and open swales to interface with the urban landscape.
- Ensuring adequate space allocation is provided in the streetscape layout and road cross sections.

4.1.3 ACOUSTIC INTERFACES

Design Principles

Provide a variety of mitigation strategies for dealing with acoustic issues caused by the surrounding arterial roads.

LAND PLANNING:

- Set back distances.
- Lot design so that outdoor areas and sensitive spaces do not directly face the road.
- Land use design so that less noise sensitive developments shield residential lots.

MITIGATION AT SOURCE

- Noise walls along the edge arterial road carriageways, within their road reserve and not the project boundary. By including the noise wall or earth mound next to the source its size and visual impact can be reduced:
  - This has been adopted in various parts of ACT however was ruled out to be feasible for other projects in Molonglo Valley due to project constraints (e.g. Whitlam).
  - This is unlikely to be suitable for Molonglo 3 as there is 4.66 kms worth of interface along William Hovell Drive and John Gorton Drive that would require a noise wall on the edge of the carriageway. This would have significant visual impact to the region.
- Selection of a low noise road surface for arterial roads. This however has been rejected by TCCS as not feasible from an ongoing maintenance perspective, however it may be suitable for project collector roads due to their lower speeds (less than 60 km/h)

MITIGATION ALONG TRANSFER PATH

- Noise walls at property boundaries. This however have been viewed as unfavourable in some projects in the past due to the size of the walls required (Whitlam required greater than 4 m high walls due to topography).

MITIGATION AT RECEIVER

- At property treatment such as improved glazing, mechanical fresh air ventilation etc. noting that best acoustic outcome is to reduce external noise level as much as possible and property mitigation is typically last resort. However, accepting higher external road noise levels and requiring an appropriate internal noise levels through building design have become more common outcome for some new residential subdivision in the ACT.

Note a preliminary road noise impact assessment for Molonglo 3 East has been undertaken and is included as Appendix F.

4.1.4 *WALKABLE NEIGHBOURHOODS*

INDICATIVE DEMONSTRATION OF PRINCIPLES (PROOF OF CONCEPT 2019)

The illustrative plan in Figure 4.3 shows one way that this neighbourhood within Molonglo 3 Stage 2 could be structured. The objective of the illustrative plan is to demonstrate the realisation of the overarching proposed design principles at a legible scale. These principles are repeatable and beneficial in terms of amenity, liveability, value and increased development and diversity capability. Whilst this level of detail will not be included in the Concept Plan, these principles are inherent in the structure.

Table 4.1 outlines code reforms associated with the realisation of the proposed principles compared to conventional and/or compliant practice.

Table 4.1 Code reforms

	Innovative/Reform	Conventional/Compliant
1	Bus avenues connecting neighbourhood centres (increased catchment and destination patronage contributing to modal shift)	Bus avenues on flat land and peripheral to neighbourhoods (reduced catchment)
2	Streets running perpendicular to topography	Street orientation driven by compliant block orientation requirements
3	Slope responsive cross sections more than 12%	Standard cross sections parallel to contours increase cut and fill
4	Streets connecting to high amenity areas (creek)	Streets running parallel to high amenity areas creating a privatised edge
5	Narrower rear lanes	Wide rear lanes
6	Removal of splays wherever possible	Default application of splays to all streets and lanes
7	Varied block depths suited to slope, orientation, and desired product	Standard 30 m deep blocks
8	Reduced land take for streets/lanes	Significant land take for streets/lanes and infrastructure
9	Density/dwelling types based around locational amenity, access and services	Density limited to flat land with optimum Code compliance orientation

Figure 4.3 Demonstration of Neighbourhood Principles (Proof of Concept 2019)

4.1.5 VIEW CORRIDORS

Design Principles

RESPONDING TO THE ESTABLISHED AXIS

Molonglo 3 East is on the edge of a series of established axes within Canberra, including:

- The alignment of the Arboretum Tree Grid
- The axis along Majura Avenue to Telstra Tower to the National Arboretum
- From Mt Ainslie through Ainslie Avenue to City Hill.

There is a view corridor from Telstra Tower along the future IPT Corridor towards the Central Group Centre. Providing key views to the major landmark, as shown in Figure 4.4.

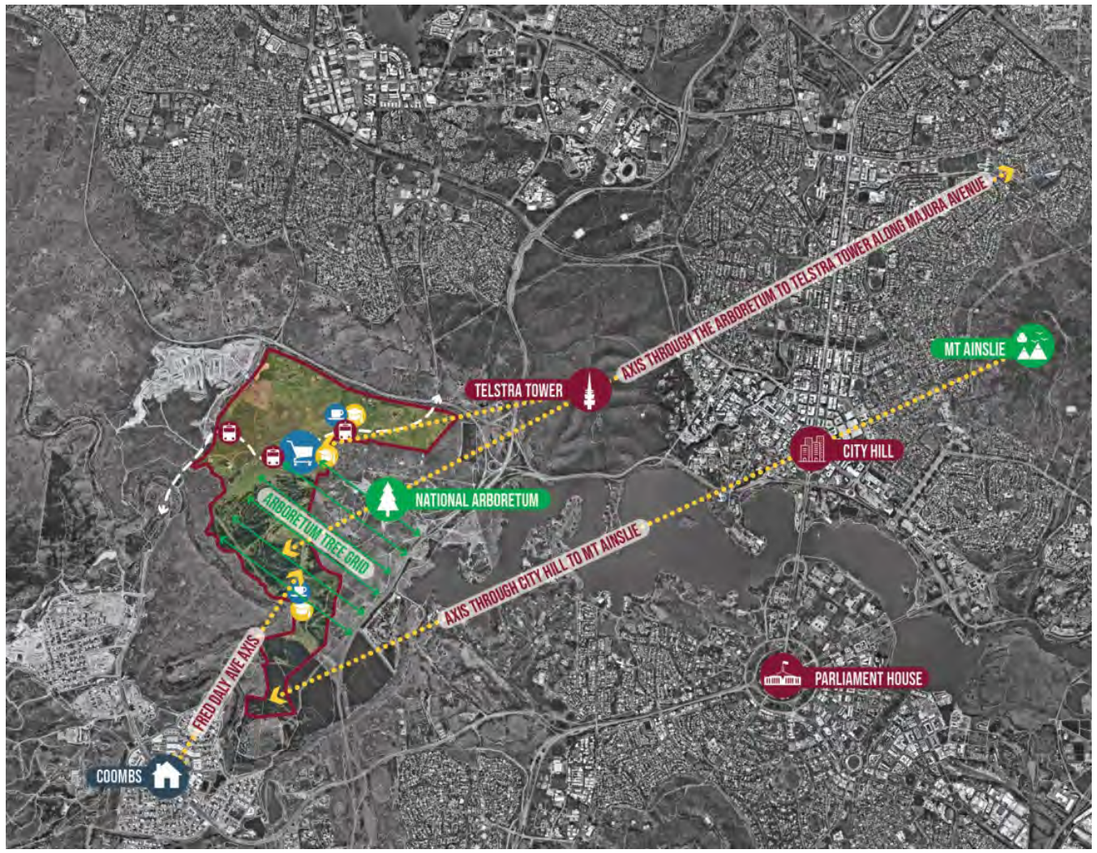


Figure 4.4 Key View Corridors

4.1.6 LAND USE POLICIES

Design Principles

- Generally, neighbourhoods should include large shady deciduous trees to reduce the urban "heat island" effect and promote a comfortable walkable neighbourhood.
- Residential neighbourhoods that interface with the Molonglo River Corridor should be defined by native landscape where appropriate (open space, buffer zones, etc.) whilst including exotic deciduous street trees:
  - Existing shared use paths within Molonglo district should connect into interfacing neighbourhoods.
- General neighbourhood design should promote health lifestyles and active transport by incorporating street alignment, gradients, connectivity, and wayfinding that assists with non-car-based movement.
- Community, recreation, and commercial facilities should be co-located and designed as activity nodes and "third spaces" for public interaction and wellbeing of surrounding neighbourhoods:
  - The "Third Space" is the social spaces that separate the First Space (Home) from the Second Space (Work). These could include public libraries, cafes, community halls, parks, etc.
- Communities, recreation, and commercial facilities should be centrally located within neighbourhoods and on public transport routes to encourage their role as activity nodes.
- Where located adjacent to green corridors or watercourses, built form should be oriented to natural elements and incorporate them into adjoining public space.
- Commercial, mixed use and higher density residential zoned land should be designed to encourage non car-based trips.
- Where possible, commercial and community zoned land is located on land with minimal gradient (less than 5 per cent). Where not possible the built form should relate to the topography and sleeve parking behind active facades.
- Site specific planning controls should be considered to enable slope responsive dwelling design to enable innovative and sustainable built form outcomes.
- Residential subdivision layout should be informed by slope responsive dwelling design of future dwellings and demonstrates ability to accommodate dwellings that achieve reasonable solar access, privacy and size of principal private open space.
- Dwelling design should prioritise area and orientation of principal private open space over ground floor access where slope of blocks exceeds 5 per cent grade.
- South facing blocks, and blocks with a north-east/south-west and south-east/north-west orientation, that are unlikely to achieve a northern orientation for principal private open space, should be located with proximity to public open space suitable for general amenity.
- Street verges should incorporate sufficient area to accommodate street trees to grow to maturity and contribute an urban canopy that is appropriate for the orientation of streets and solar access to associated blocks.
- Road design and verges including pedestrian paths should be of sufficient width and grade to promote active travel and accessible movement for people with reduced mobility.

4.1.7 DESIGNING FOR INCLUSION

Design Principles

To create welcoming environments that include:

- Adequate lighting
- A variety of people
- Passive surveillance (people overlooking areas)
- Avoid hiding/entrapment spots.

LIGHTING

- Public spaces including urban parks, River and Creek Corridor, Arboretum interface and active travel routes should provide up-lighting and human scale lighting (bollards or other).
- Lighting should not create glare or “blind” a pedestrian.

PASSIVE SURVEILLANCE

- Dwellings should not back onto public spaces, and include at least one habitable room facing the open space.
- Fencing and/or courtyard walls onto public spaces, including streets must not exceed a height of 1.5 m and should be semi-transparent (50 per cent transparency achieved through materials like picket fences, i.e. not solid fences).
- All dwellings with front, side, or rear address to public spaces, including roads, should have at least one habitable room/ window fronting the space.
- Urban open spaces should be supported by a mix of uses and relatively higher density to increase eyes on the space through the day/night.
- Where possible, dwellings fronting open space corridors and promenades should be raised above ground level (up to 0.6 m to enable privacy and passive surveillance (discourage closed blinds etc).
- Car free zones should demonstrate a mix of non- residential off/ on peak uses to maintain levels of safety through activation.

VISIBILITY

- Where possible, public connections should be provided at grade and in open, highly visible areas.
- Where at grade connections are not possible and an underpass is provided, they should be designed as:
  - A maximum length of 25 metres
  - A maximum length of 100 m with exits and openings into populated areas every 25 metres
  - Well-lit areas
  - Having no obstructions where people could hide
  - Having at grade entry/exits in populated, active areas.

Child Friendly Spaces

Design Principles

Spaces that are Child-Friendly require:

- Safety
- Security
- Availability/Access to spaces
- Beauty
- Adaptability
- Ability to play
- Access to education and development
- Ability to participate.

ENRICHMENT

- A park, linear green or open space should be provided within 200 m of every dwelling to promote healthy living opportunities for children, particularly in areas with a density greater than 22 dw/ha.
- Every space or circuit contains the opportunity for stimulation and education, awareness, and stewardship. Consider layering art, interpretation, and signage in all open spaces and street furniture such as transit stops).
- Stimulation and activation should be promoted by:
  - Establishing point of interest every 200 m along key public spaces
  - Medium to high density residential areas should have 10–15 doors per 100 m
  - Mixed use areas should have 15–20 doors per 100 m.
- Community uses (schools, childcare, hospitals) should have visual and physical access to greenery.

AVAILABILITY/ACCESS

- Pedestrian/cycle only zones must not exceed 200 m in length and should avoid entrapment opportunities.
- Shared zones must not exceed 400 m in length without full movement intersection breaks.
- Intersection design and kerb radius should be designed to allow pram ramps to be perpendicular to the kerb and aligned with zebra crossings and/ or the shortest crossing distance of a street.
- Wayfinding should be simple, graphical, colourful and no higher than 1.5 m above ground.
- Community uses (schools, childcare, hospitals) should not be located on arterial streets.
- Community and mixed-use streets should be designed with intentional friction, prioritising the pedestrian, and designed to withstand a certain level of traffic flow disruption.

DIVERSITY

- All dwellings should have access to a frequency and variety of open spaces including smaller pocket parks where young children and their parents feel comfortable.
- Children’s play should include nature play, adventure play and free play opportunities.
- All community facilities and open spaces should be multi-functional encouraging shared use, on- off peak uses and multi-generational interaction.
- Productive landscapes should be encouraged.

4.1.8 SLOPE RESPONSIVE STREETS

Design Principles

- Where greater than 12 per cent, streets are to run parallel to contours and have a narrow pavement width to reduce cut and fill.
- Narrow street carriageways should be a minimum of 5 m to reduce the cut/fill of the site. This will mean that there is minimal opportunity for on-street parking unless it is indented.
- Ensure the length of narrow streets is limited to lower the impact of limited on-street parking.

Figure 4.5 Split Level Road

Split level streets provide opportunities for houses on both the high and low side to have a relationship to the street level and avoid having houses below street level.

Figure 4.6 Example of Garage forward of the Building Line

Garages that are forward of the building line and against the footpath reduce the steepness of the driveway required.

Garage is to be wholly within the block and ensures there is sufficient sightlines to footpaths.

5 DEVELOPMENT OF PREFERRED OPTIONS

A series of concept options were investigated that included building on the 2019 Proof of Concept by Roberts Day. Two additional options pursued alternative solutions for the collector roads and Public Transport Corridor to create slow speed environments. All three options are presented in Figure 5.1.

The final Design Concept Master Plan (shown in Section 6) is a hybrid of all options, with the Public Transport Corridor de-coupled primarily past the high school and group centre. Two creek crossings will be provided, with Bindubi Street extension connecting to the northern end of John Gorton Drive, and a slow speed collector road adjacent the group centre.

OPTION 1 – BUSINESS AS USUAL

This option is based on the 2019 Proof of Concept. It is a traditional layout with Public Transport Corridor following Bindubi Street Collector Road through site.

Bindubi Street extension connects past the Group Centre to the southern end of John Gorton Drive.

OPTION 2 – PUBLIC TRANSPORT CREEK CROSSING

Limit Coppins Creek crossing in the south to Public Transport and Active Travel Only.

Bindubi Street extension connects south to the East-West arterial.

The Public Transport Corridor would be de-coupled from Bindubi Street extension to allow for more appropriate alignment with the topography.

OPTION 3 – SLOW SPEED ENVIRONMENT

Prohibit Collector Road past/through the Group Centre and provide Collector Roads to the edge of neighbourhoods to encourage a slow speed environment.

Bindubi Street extension connects to the northern end of John Gorton Drive. The secondary collector road connects from John Gorton Drive to the East-West Arterial.

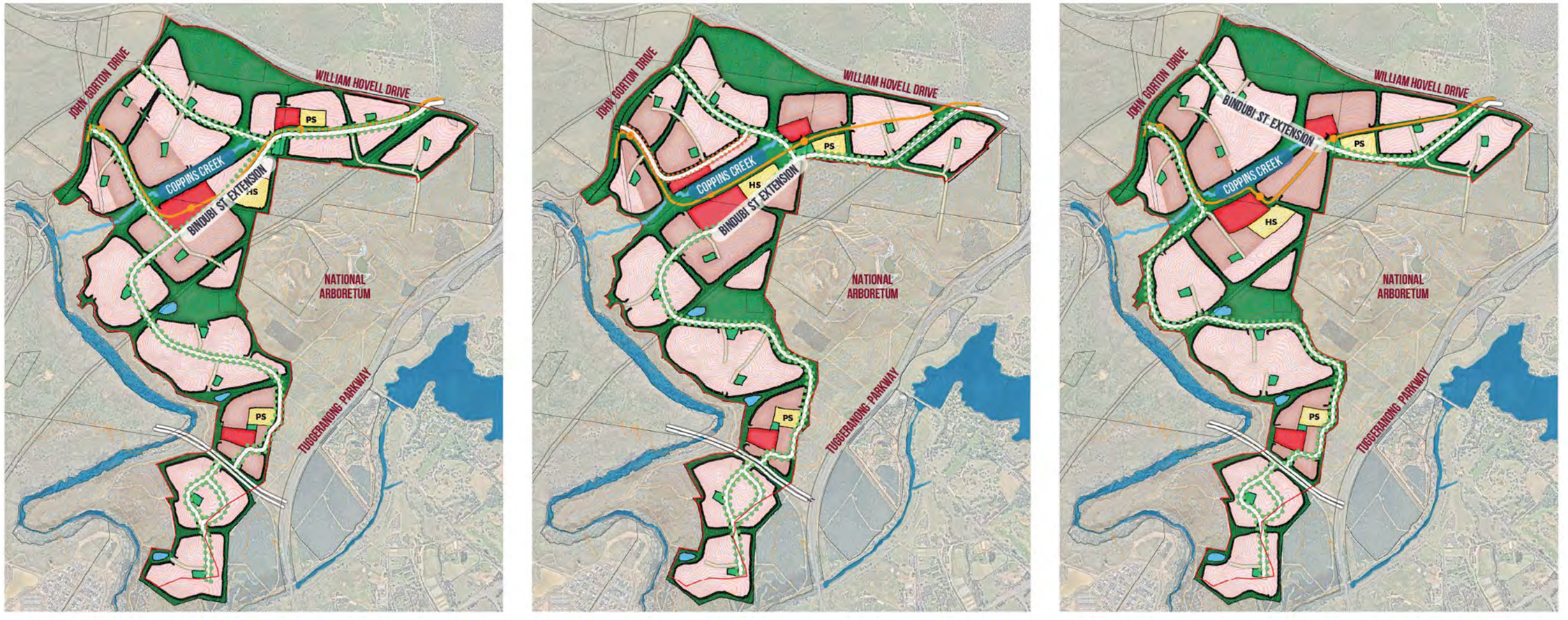


Figure 5.1 Concept plan options

5.1 CONCEPT PLAN OPTION COMPARISON

The options were presented to stakeholders in both an Options Report (Appendix C) and at an Optioneering Workshop (Appendix G-2). The road network was the driving factor for options selection:

- There was a desire to have two private vehicle crossings of Coppins Creek to ensure the Group Centre remains viable.
- Where possible, it was suggested that collector roads are located away from the interface with the Arboretum and Molonglo River Corridor.
- Due to uncertainty over the transport mode operating along the IPT, it was decided to be collocated with Bindubi Street Extension.
- Additional transport modelling was also undertaken to inform the options assessment. There was stakeholder concern over the traffic impacts these options would cause on the external intersections (included in Appendix E).

Figure 5.2 indicates some preliminary metrics that were used to compare options and assist stakeholders in developing a preferred option. Ultimately, factors such as transport connectivity and location of roads and centres guided the development of the hybrid concept plan outcome.

	OPTION 1	OPTION 2	OPTION 3
ENVIRONMENTAL		10% Increase in tree canopy	10% Increase in tree canopy
KEY ROAD LENGTH	11.2 km	10.5 km	10.8 km
TRANSPORT SERVICES	Baseline patronage	% Increase in Public Transport / Active Travel	% Increase in Public Transport / Active Travel
COMMUNITY CONNECTIONS	0.8km Bus Route Interface directly with Aboretum	2.7km Bus Route Interface directly with Aboretum / major open space	4.0km Bus Route Interface directly with Molonglo River Corridor / Aboretum
DENSITY	87.5 HA	102.3 HA	104.6 HA
ACTIVATION / INVESTMENT	1,085m Retail along IPT	701m Retail Along IPT	744m Retail Along IPT

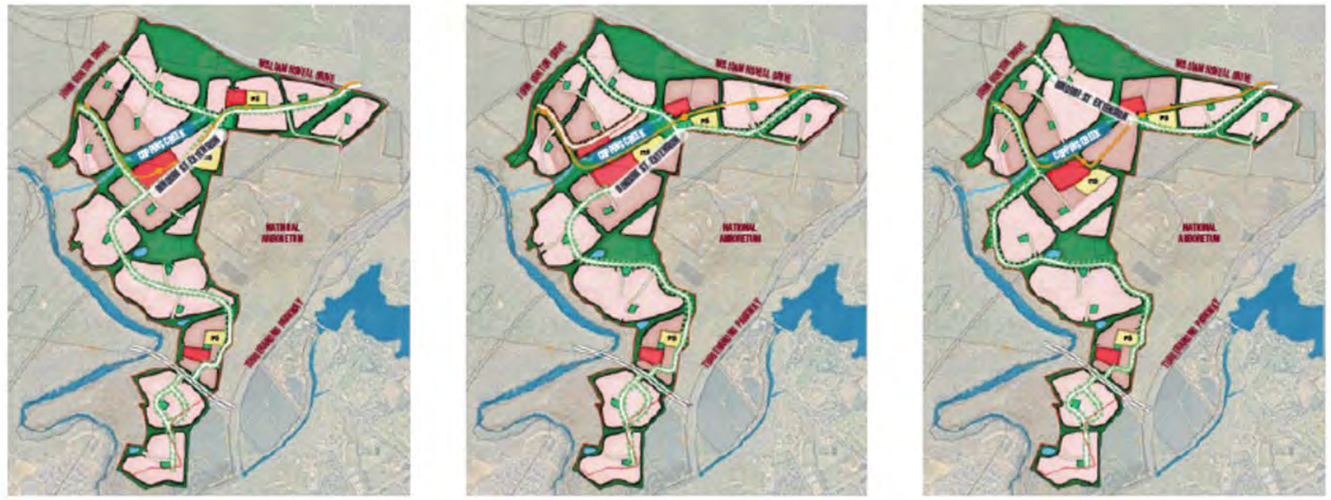


Figure 5.2 Concept Plan Option Comparison

6 PLANNING AND URBAN DESIGN

6.1 PLANNING AND DESIGN OVERVIEW

Molonglo 3 East will be an exciting, vibrant, and sustainable new precinct which could serve as a beacon for exceptional design and help create a community that thrives.

The three Design Concept Plan Options were reviewed by relevant ACT Government Agencies and workshopped to create a fourth "hybrid" option. From here, we looked for opportunities to make improvements based on the movement and place framework. This helped us design a concept plan that has access and movement at its core, supports active travel, enables the sharing of public spaces and community assets, builds social cohesion, and enhances the lives of its residents.

Key elements of this design concept plan, shown in Figure 6.1:

- Bindubi Street Extension connects to the northern end of John Gorton Drive serving local traffic in the north.
- The secondary Collector Road connects from the southern end of John Gorton Drive past the group centre to the proposed East-West Arterial serving the majority of neighbourhood units.
  - Collector Roads are in the centre of neighbourhoods to provide maximum access to public transport located along this road.
- A slow speed collector road joins these Collector Roads past the schools and group centre.
  - This road will only service local traffic within this central zone as all other neighbourhoods can exit Molonglo 3 via the main Collector Roads.
- The Intertown Public Transport corridor de-couples from the road reserve past the primary school and group centre with a stop terminating at a linear open space between the group centre and primary school.
  - In the short to medium term (prior to the IPT being constructed), buses are the likely mode of public transport to be included along the collector roads. Detailed cross sections/building frontage types to accommodate staged changes to transit corridors, should be considered in the early stages i.e. Transit corridor preservation where cars/buses in early stages become light rail or other at a later stage.
- Density is in areas of high amenity and access to public transport.

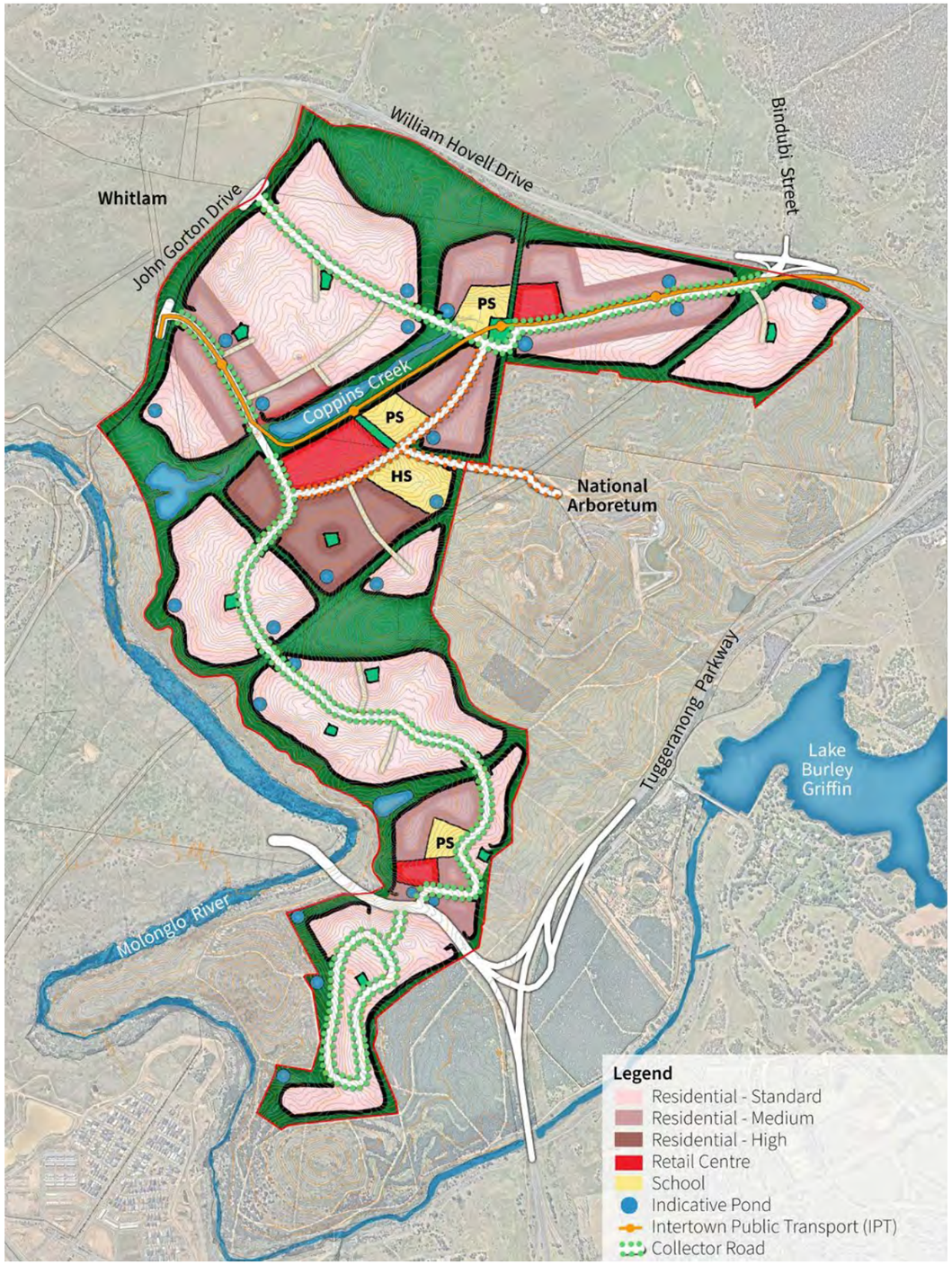


Figure 6.1 Design Concept Option

6.2 URBAN INTERFACE

SEAMS VS BARRIERS/DEVELOPMENT POTENTIAL

Molonglo 3 East includes over 21 kms of interfaces with multiple different characters which is displayed in Figure 6.2. These should be seams to tie into the surrounding region.

Active travel corridors require something interesting roughly every 200 m, therefore, there needs to be over 100 things to do along the boundaries to stimulate pedestrians/cyclists. The opportunity exists to create themed walks, with sculpture, exercise, lighting, events dotted along the path network.

There will also need to be multiple ways to connect into the site as a pedestrian/cyclist, with opportunities for creative and sculptural connection points. As identified by PCS, managed access will be required into the Molonglo River Corridor, and these locations could be celebrated.

There is almost 5 km of interface along Coppins Creek, with requirements to bridge across it to connect the development areas. Living bridges are a potential way to connect the region whilst introducing more biodiversity corridors to encourage nature throughout Molonglo. There also exists opportunities for educational facilities associated with the water to introduce people to ways to improve water quality.

ASSET PROTECTION ZONES

The interface with the Molonglo River Reserve Corridor (2C, 4A, 4B) will require a 60 m Asset Protection Zone, which can include the required edge road within the zone.

All other boundary interfaces will require a 30 m Asset Protection Zone and perimeter edge roads along development.

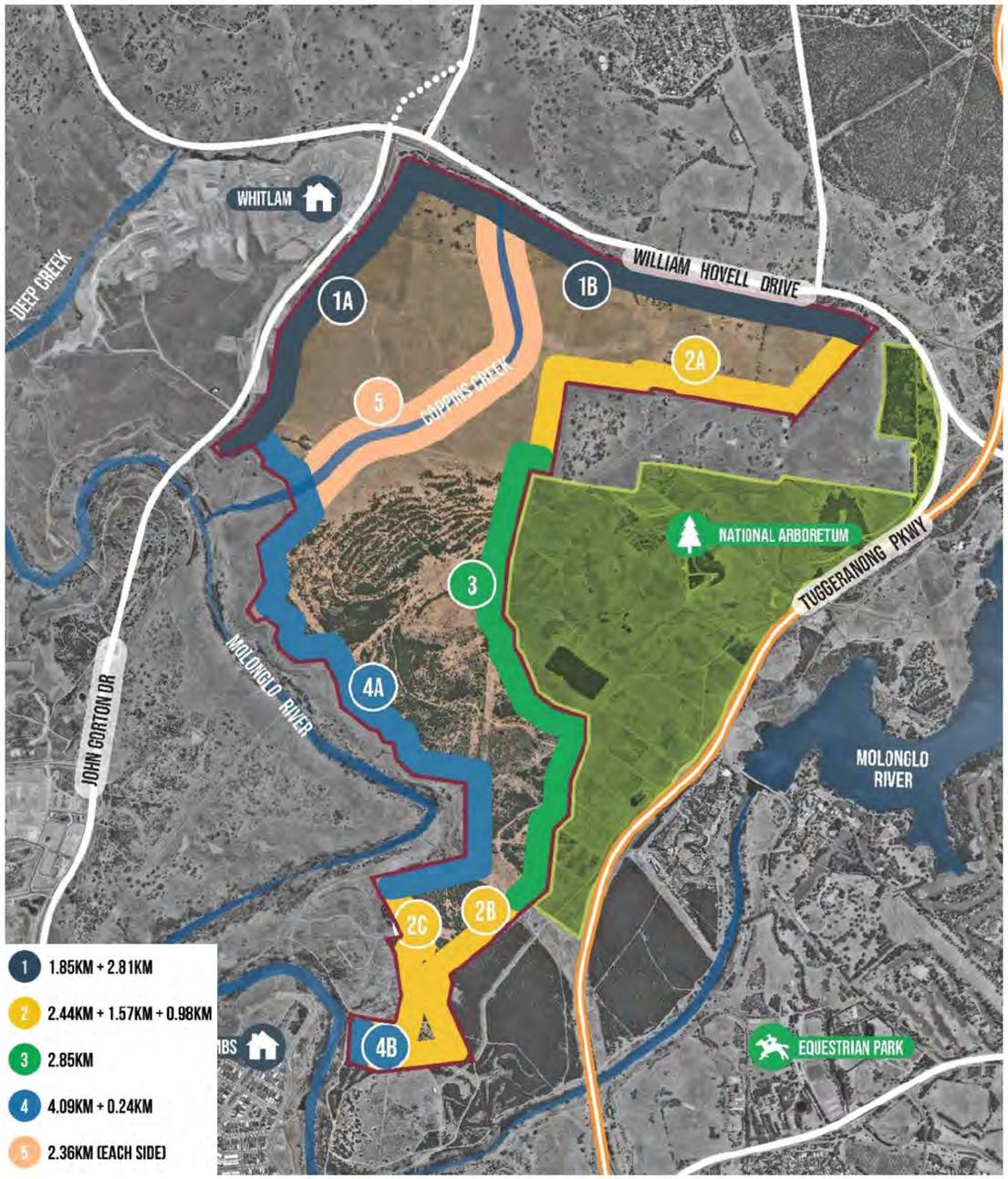


Figure 6.2 Urban Interfaces

6.3 ENVIRONMENT

This precinct is located adjacent to a number of important nature reserves as documented in the Molonglo Valley Plan for the Protection of Matters of National Environmental Significance (the NES Plan). The offset areas are shown in Figure 6.3 and include:

- Kama Nature Reserve (west of Whitlam)
- Molonglo River Park (south west boundary of the study area)
- Patch GG (located to the north east of the study area).

In addition to these areas, there are several areas of Box-Gum Woodland patches adjacent to the study area which the ACT Government will manage and/or enhance their ecological values.

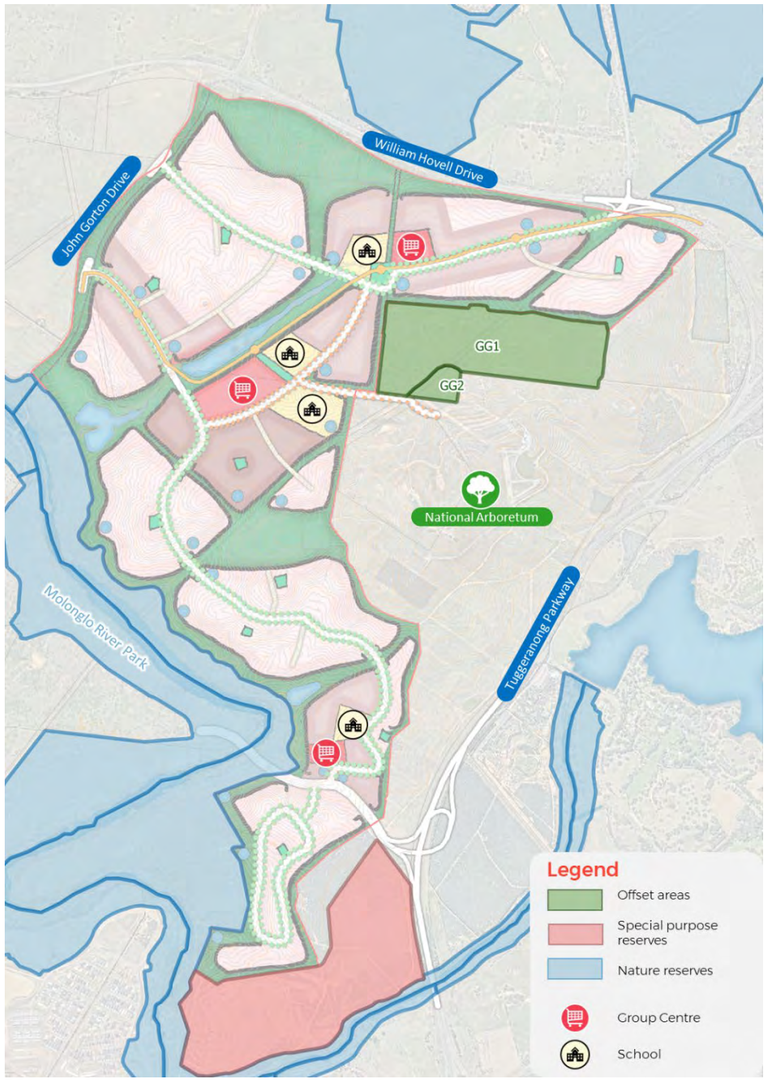


Figure 6.3 Offset areas

CANBERRA'S LIVING INFRASTRUCTURE PLAN

Canberra's Living Infrastructure Plan identifies challenges from climate change, urban growth and renewal, and the aging of the urban forest. The plan responds to these challenges and aims to enhance Canberra's urban environment. The plan details 15 actions, all of which are applicable for the development of the Molonglo 3 East development:

- Action 1: Expand existing asset management system
- Action 2: Living Infrastructure Targets (Achieve 30 per cent tree canopy cover (or equivalent) and 30 per cent permeable surfaces in Canberra's urban footprint by 2045.)
- Action 3: Microclimate Assessment Guide
- Action 4: Microclimate Assessment Program
- Action 5: Climate-wise Landscape Guide
- Action 6: Landscape Plans
- Action 7: Actsmart Programs
- Action 8: Tree Protection Act Review
- Action 9: Develop Urban Forest Strategy
- Action 10: City Cooling Program
- Action 11: "Oasis" Program
- Action 12: Shadeways Program
- Action 13: Demonstration Projects
- Action 14: Water Sensitive Urban Design
- Action 15: Public and private investment

Of particular importance for this Study, was consideration of street trees under Action 3 (section 7.3), and the approach to Water Sensitive Urban Design (section 8.3.4).

6.4 CHARACTER AREAS

The establishment of Character Areas is critical to driving holistic design outcomes and avoiding the dilution of intent through a series of small technical compromises.

The Character Areas are based on existing and future features, characteristics, values and synergies. The Character Areas work together to achieve diversity, sensitive responses to environment and a sliding scale of urbanity. The Character Areas are shown in Figure 6.4 with the inspiration and vision of these distinct areas shown in Figure 6.5.

CHARACTER AREAS VISION

The unique Principles and Guidelines may include:

- Context Sensitive Street Types (working within the Movement and Place Framework).
- Acceptable Building Typologies and siting that related to the Pattern Book (ideally, these typologies would become pre-approved/repeatable as integrated development solutions).
- Acceptable interface solutions- for instance, the River Corridor may have a suite of acceptable interface solutions that can be applied depending on the Character Area.
- Parks and landscape character.

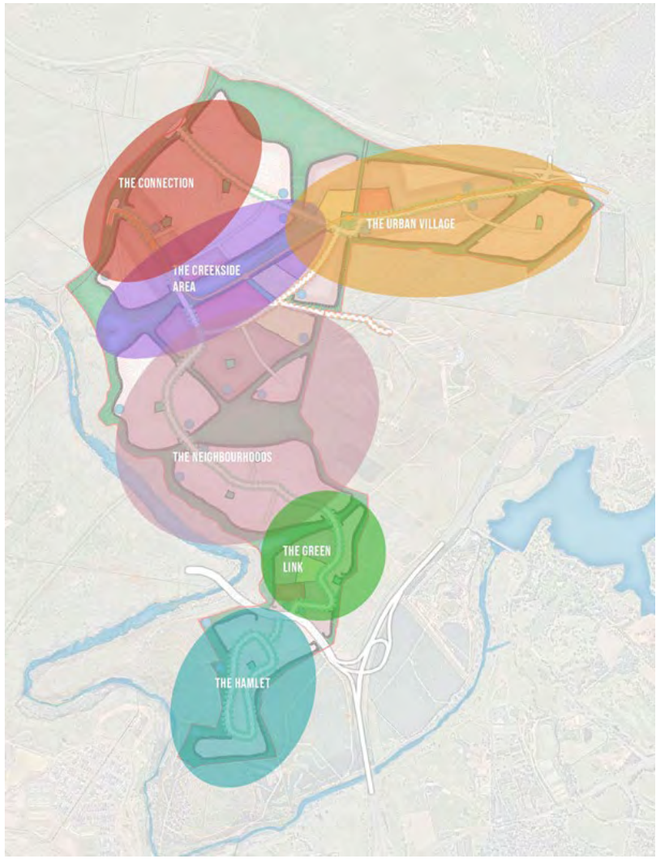


Figure 6.4 Character Areas

THE HAMLET

- The Hamlet provides an opportunity to connect on a closer, more intimate scale.
- It is a place to pause, reflect and enjoy the best that life has to offer.
- Ample planting and “old pine” forests will help give the community an established and secluded feel.
- The Hamlet is the gateway to the protected Molonglo River corridor, with focus given to the environmental qualities.
- This quiet community will enjoy large blocks, views in each direction of surrounding hills and River, as well as close access to the city and transport.

THE NEIGHBOURHOODS

- The Neighbourhoods is the spot for families who want cricket in the yard, and kids playing in the street.
- Sat between the National Arboretum and a large open park, families can ride their bikes, take a walk or picnic under a tree.
- It is a slower pace of life here, away from the hustle and bustle of the city and with lots of space to explore.
- It features traditional “garden city” open front yards, wide footpaths, shaded and active travel.

THE CONNECTION

- Adjoining key arterial roads, the Connection is the spot to be to access all of Canberra.
- With undulating views, and still close to the amenity of the Urban Village, the Connection will link residents to the broader Molonglo region.

THE GREENLINK

- The Green Link is the place to learn and play.
- Located on a small green perch between the Molonglo River corridor and a primary school, it gives opportunity to explore outdoors and understand the lessons provided by nature.
- The Green Link touches lightly, with smaller footprints that maintain a strong connection to the environment.
- It provides a place to get lost in the landscape, with priority given to the pedestrian over petrol.

THE URBAN VILLAGE

- The Urban Village is a place to live and play.
- It is a fringe-dweller, it’s offbeat, but don’t let that put you off.
- With direct links to the city, it will attract younger crowds. It throws away rigidity, and provides a place for free expression and creative endeavours.
- It comes alive at night, providing a bright, bubbling beacon within Molonglo.
- There is a volume of adaptable spaces, allowing the village to grow, change and develop over time and with shifting needs.

THE CREEKSIDE AREA

- The village is diverse, multicultural, and inviting— it’s the heart of Molonglo.
- It provides a place to meet, get together, connect, and share a meal.
- It’s active all day, and into the night with local businesses providing a place to shop, eat, drink, wind down, have fun and get to know your community.
- It’s protected from the elements, with urban connection to the foreshore.
- It’s a good neighbour – providing amenity for residents, while being sensitive to its surrounds.
- It’s the quieter, family- friendly sister to the urban village. It’s easy to get to, accessible, and you don’t need a car.

6.5 CHARACTER INSPIRATION

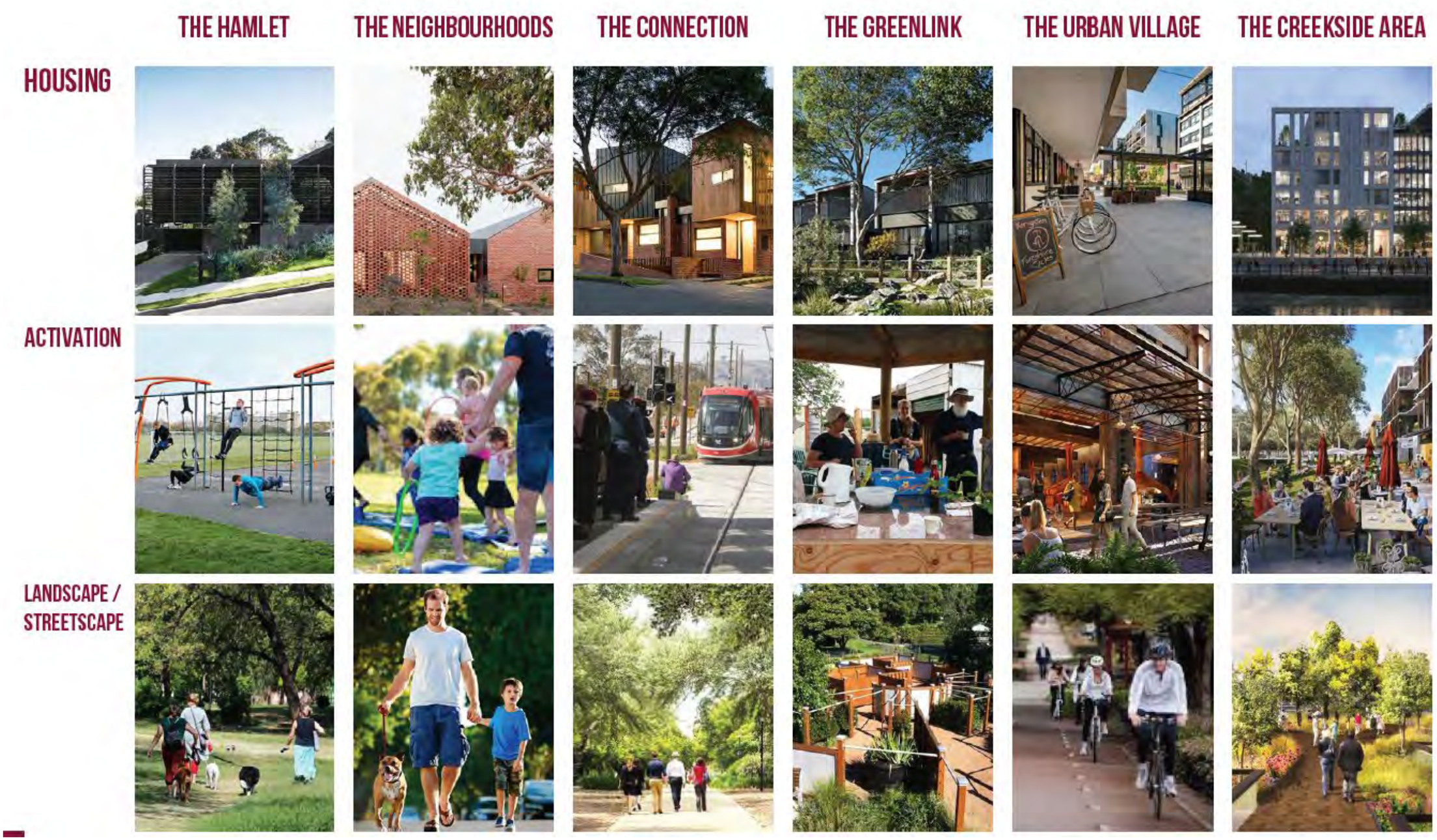


Figure 6.5 Character Inspiration

6.6 DESIGN CONCEPT PLAN

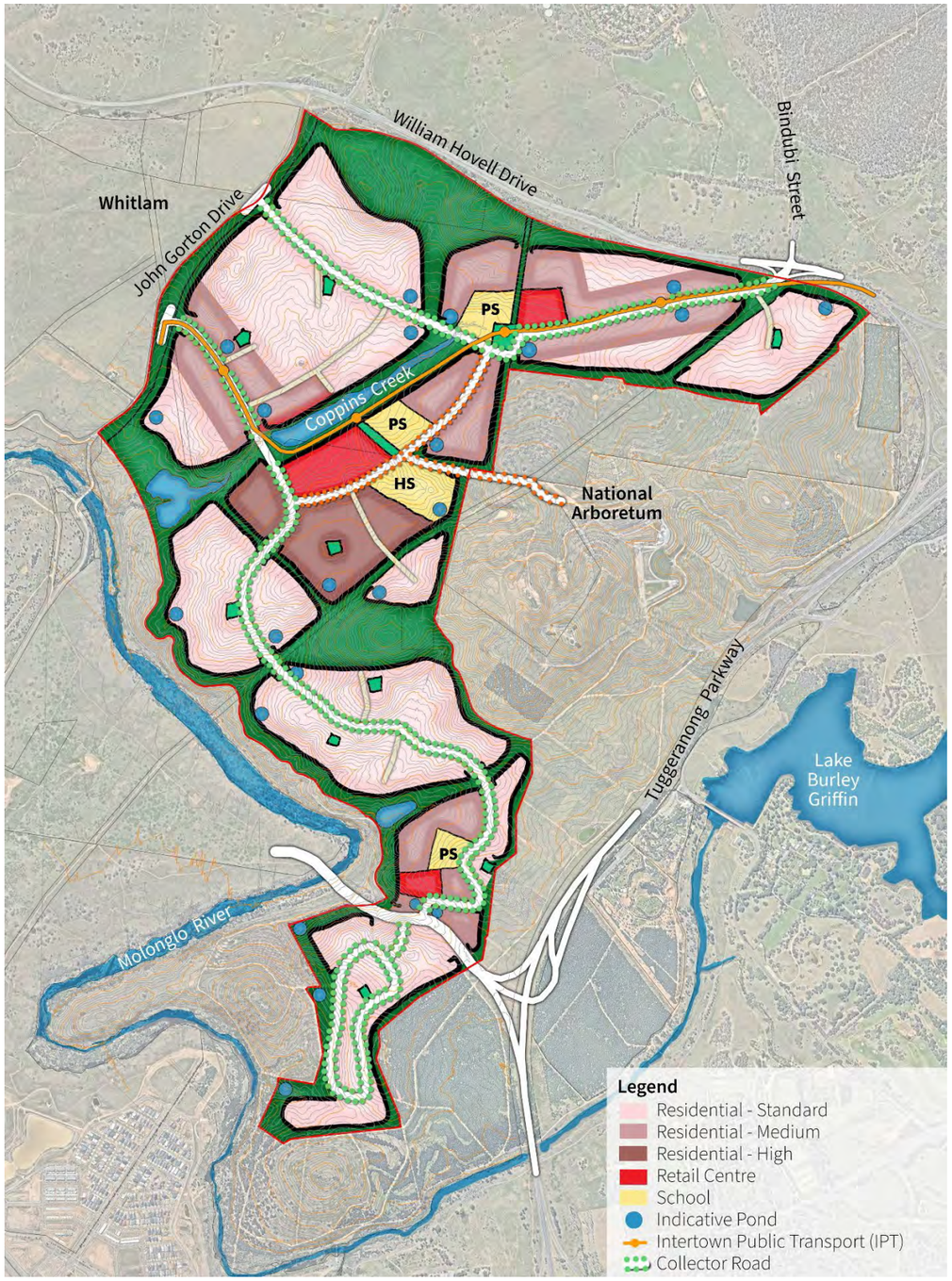


Figure 6.6 Design Concept Plan

The preferred Design Concept Plan (Figure 6.6) combines key principles from Option One and Two.

Key elements

INTERTOWN PUBLIC TRANSPORT (IPT) CORRIDOR

There are three main cross sections for the IPT corridor:

1 IPT combined with Collector Road – Centrally located public transit

2 IPT combined with Collector Road – Offset public transit (northern side of collector road)

3 De-coupled IPT Corridor (along Coppins Creek).

KEY COLLECTOR ROADS

There are three main collector roads servicing Molonglo 3.

1 Bindubi Street Extension

— Bindubi Street extension connects from William Hovell Drive to the northern end of John Gorton Drive to prevent significant traffic volumes from entering the central portion of the precinct around the Group Centre and schools.

2 Southern Collector Road

— This connects the southern end of John Gorton Drive south to the future East-West Arterial Road that links into the Tuggeranong Parkway. The road will be in the centre of neighbourhood units to provide maximum access to the bus route it will include.

3 Group Centre Slow Speed Collector

— This collector road connects between the other two and is designed to be a slow speed environment due to the Group Centre, High School, and non-Government Schools that directly front onto it. The layout of the concept plan is designed in such a way that through traffic should not need to use this road – only local traffic.

GROUP CENTRE/SCHOOLS

The centrally located Group Centre will be a mixed-use zone benefiting from its location fronting onto Coppins Creek. It will be a predominantly car-free area with parking regulating to the perimeter, to prioritise pedestrian and active travel movements. The inter-town public transport corridor will interface with the group centre, with a stop located at the end of a linear open space that separates the retail centre from the potential non-government school. By locating the stop here, both students and centre users are provided a safe and convenient access to their desired location.

A high school is located on the southern side of the slow speed collector road. The school is within a 3-minute walk of the IPT stop; however, bus stops will be located on the collector road to provide access to both schools and the group centre.

ACTIVE OPEN SPACE

Each neighbourhood unit includes a key active open space that is typically located on a local high point to provide equitable access to distant views from within the site.

6.7 YIELD ANALYSIS

The yield analysis is based on the 2019 Proof of Concept Density Allocation.

The area calculations exclude the key collector roads/IPT corridors and allows for a 60 m APZ along the Molonglo River Reserve Corridor, and 30 m APZ along all other boundaries.

STANDARD RESIDENTIAL

Most of Molonglo 3 East will consist of standard residential development that will include detached dwellings but may also include some multi-unit sites.

MEDIUM DENSITY RESIDENTIAL

Areas of higher amenity and access to the Intertown Public Transport (IPT) corridor will include the bulk of medium density land. This will include a mixture of terraces, townhouses, and residential flat buildings.

HIGHER DENSITY RESIDENTIAL

Taking advantage of the proximity to the Group Centre and Coppins Creek.

MIXED-USE RETAIL CENTRES

Within the retail centres there are opportunities to provide shop-top housing to create a hub of activity around the retail. These have been detailed in the Group Centre Options, with a general scenario provided in the overall yield table.

Note: Due to the high-level nature of the yield calculations, the actual final yields will vary depending on further detailed designs, market analysis, site conditions, etc.

6.7.1 YIELD SCENARIOS

Two yield scenarios are provided:

1. Mid Way Scenario is displayed in Figure 6.7 with further details in Table 6.1 and Table 6.2:
   - Based on the mid-range dwelling scenario from the 2019 Proof of Concept
   - Includes a low and high yield scenario
   - The Mid-way scenario is based on “easy wins” in the code reform, including reducing some reduced road reserves, and relaxing some block compliance.
2. Mix of Mid-Way and Ultimate Scenario is displayed in Figure 6.8 with further details in Table 6.3 and Table 6.4:
   - Combines Standard Residential from the Mid-Way Scenario with the Medium and High Density from the Ultimate Scenario
   - Provides certainty for agencies that most of the developable land is based on the “easy wins” code reform
   - Increased yield is in areas of greater amenity and access to public transport. This is suitable in combination with the Movement and Place transport model.

Table 6.1 Yield Option 1 – Mid-way Scenario

Table Land-use	Area (ha)	2% Water Catchment	Developable Area (ha)	Net DW/HA (low)	Yield (low)	Net DW/HA (high)	Yield (high)
Standard	260.60	5.21	255.39	13.5	3,451	16.9	4,314
Medium	90.17	1.80	88.37	26.7	2,363	36.8	3,249
High	29.57	0.59	28.98	52.9	1,533	74.1	2,147
Group Centre					900		1,000
Sub-Total	**380.34**	**7.61**	**372.73**		**8,247**		**10,709**
Retail Centres	16.90	0.34	16.56				
Schools	19.35	0.39	18.96				
TOTAL	**416.59**	**8.33**	**408.26**				

Table 6.2 Yield Option 1 – Mid-way Scenario: Typical block sizes

	Block Depth	Block Width	Average Block Size	Half Road Area	Total Area	Net Density DW/HA	Site Density DW/HA
Standard Residential							
Low	28 m	20 m	560 m²	180 m²	740 m²	13.5	17.9
High	28 m	16 m	448 m²	144 m²	592 m²	16.9	22.3
Medium Density Residential							
Low	25 m	11 m	275 m²	99 m²	374 m²	26.7	36.4
High	25 m	8 m	200 m²	72 m²	272 m²	36.8	50.0
High Density Residential							
Low	18 m	7 m	126 m²	63 m²	189 m²	52.9	79.4
High	18 m	5 m	90 m²	45 m²	135 m²	74.1	111.1

Notes:
Half Road Area is based on an 18 m wide Road Reserve
Net Residential Density: Represents the ratio of the number of dwellings to the area of land they occupy including internal public streets
Site Density: Represents the ratio of dwellings to the area of site they occupy
Group Centre yield is based on the 3D massing model options.

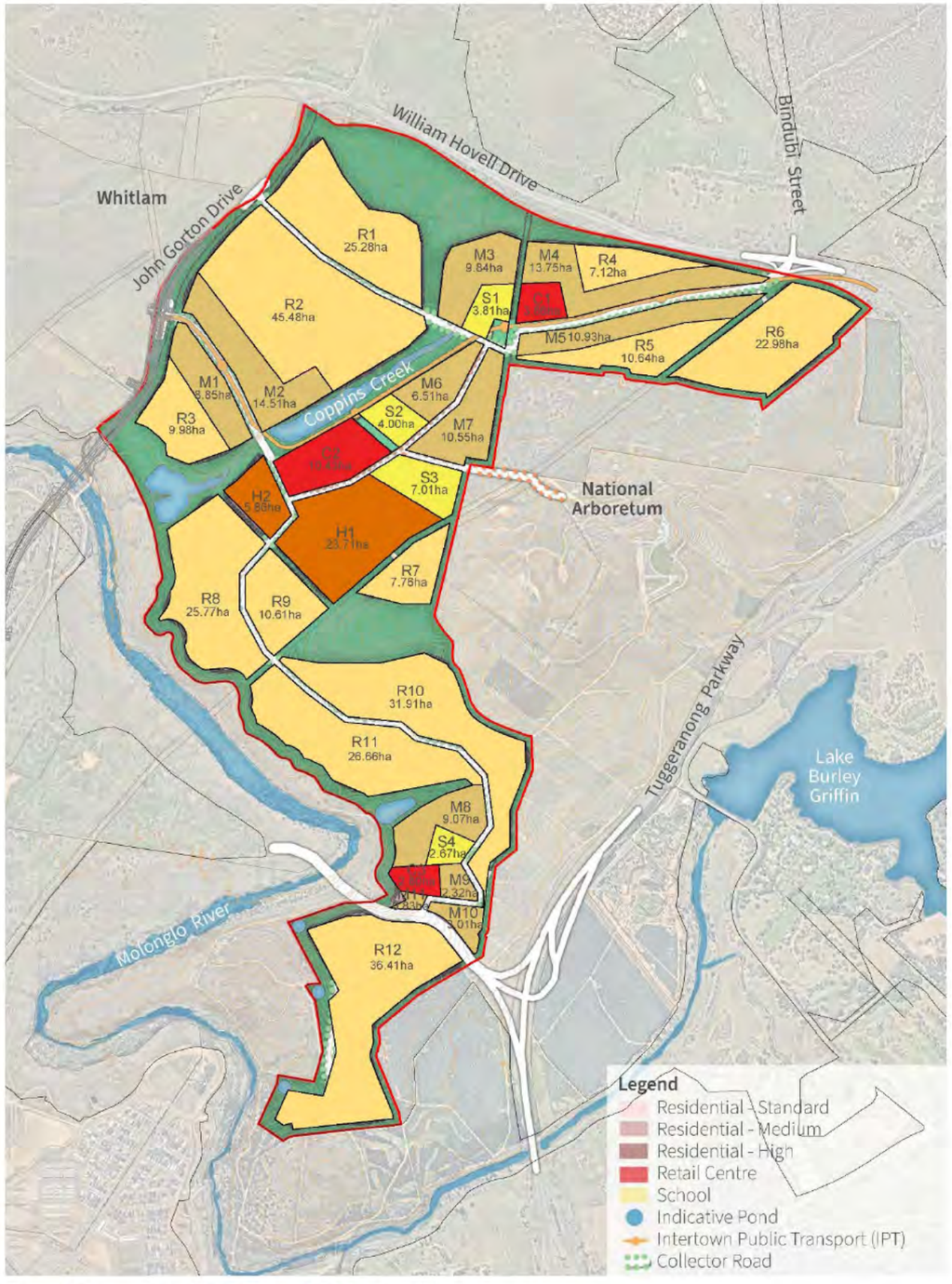


Figure 6.7 Area Calculation – Mid-Way Scenario

Table 6.3 Yield Option 2 – Mix of mid-way and ultimate scenario

Land-use	Area (ha)	2% Water Catchment	Developable Area (ha)	Net DW/HA (low)	Yield (low)	Net DW/HA (high)	Yield (high)
Standard	242.84	4.86	237.98	13.5	3,451	16.9	4,314
Medium	107.93	2.16	105.77	37.0	3,917	55.6	5,876
High	29.57	0.59	28.98	64.1	1,858	85.5	2,477
Group Centre					900		1,000
Sub-Total	**380.34**	**7.61**	**372.73**		**8,991**		**12,373**
Retail Centres	16.90	0.34	16.56				
Schools	19.35	0.39	18.96				
TOTAL	**416.59**	**8.33**	**408.26**				

Table 6.4 Yield Option 2 – Mix of mid-way and ultimate scenario: Typical block sizes

	Block Depth	Block Width	Average Block Size	Half Road Area	Total Area	Net Density DW/HA	Site Density DW/HA
Standard Residential							
Low	28 m	20 m	560 m²	180 m²	740 m²	13.5	17.9
High	28 m	16 m	448 m²	144 m²	592 m²	16.9	22.3
Medium Density Residential							
Low	22 m	9 m	198 m²	72 m²	270 m²	37.0	50.5
High	22 m	6 m	132 m²	48 m²	180 m²	55.6	75.8
High Density Residential							
Low	18 m	6 m	108 m²	48 m²	156 m²	64.1	92.6
High	18 m	4.5 m	81 m²	36 m²	117 m²	85.5	123.5

Notes:
Half Road Area (Standard Residential) is based on an 18 m wide Road Reserve
Half Road Area (Medium and High Density) is based on an 16 m wide Road Reserve
Net Residential Density: Represents the ratio of the number of dwellings to the area of land they occupy including internal public streets
Site Density: Represents the ratio of dwellings to the area of site they occupy
Group Centre yield is based on the 3D massing model options.

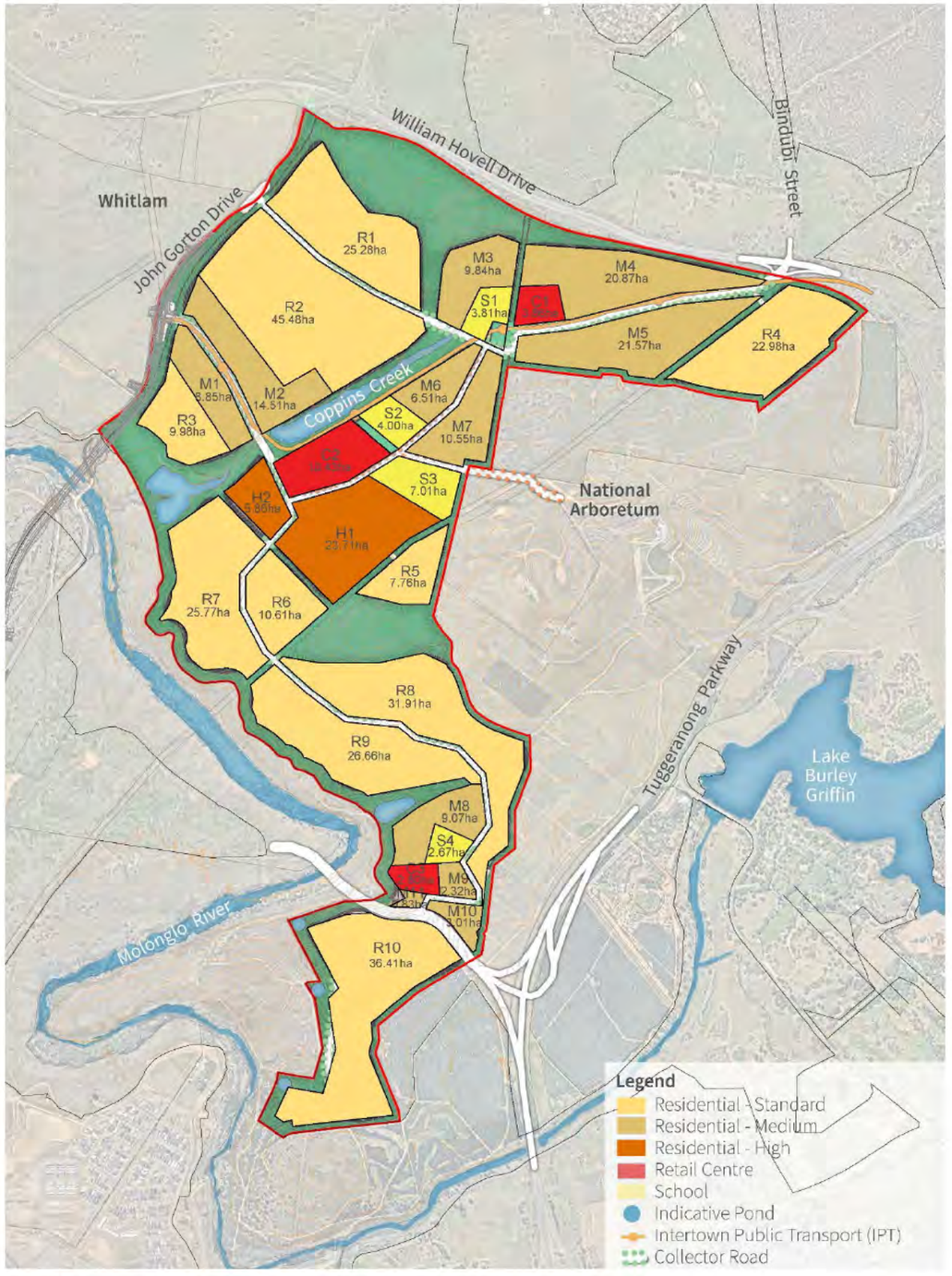


Figure 6.8 Area Calculation – Mix Mid-Way and Ultimate Scenario

6.8 GROUP CENTRE OPTIONS

INTRODUCTION

The Group Centre options undertaken are based on two of the Concept Plan Options presented during the Options Workshop. These two options are described in detail in sections 6.8.1 and 6.8.2.

The purpose of this report is to ensure there are considerations around place and Group Centre value as the overall transport network is considered.

Initial Group Centre options with design principles were undertaken to help inform the Design Concept Plan Option. Key principles include movement, parking, active frontage, and urban form. The Group Centre options outlined here are an evolution of the initial concepts outlined in Appendix G-4.

Multiple 3D detailed design options and development summary information is included in section 6.8.3 based on the preferred concept plan option.

VALUE	OPTION 1 BUSINESS AS USUAL	OPTION 2 PUBLIC TRANSPORT CREEK CROSSING
ACTIVATION Option one offers traditional main street activation, while option two offers a more diverse series of active frontages. Use of the group centre and foreshore is likely to increase during before and after school hours.		
DENSITY Both options offer similar level of density, although option two offers a higher residential density, as it provides for greater residential land near both the local and group centres which can accommodate a variety of dwelling types.		
COMMERCIAL VIABILITY While parking arrangements remain similar in both options, the likelihood of students visiting and using the group centre is significantly increased in option two, while parents may opt to meet their children here too.		
WALKABILITY Option two provides a safer and more enticing connection between the high school and group centre, and is less likely than option one to impact on the movement of vehicles (ie. Less intersections, less risk of jaywalking).		
QUALITY AND QUANTITY OF GREEN SPACE Option one offers a slightly larger green space between the school and group centre, while option two offers a more usable green space with more students likely to use it, and retail or hospitality fronting onto it.		
PLACE Both options will provide an excellent place, however option two may increase the immersive environment and experience for users.		

Will the group centre be successful?

VISION

We understand that studies undertaken to date have identified a need for two x local centres and one x group centre at Molonglo 3 East.

Our team used the Roberts Day Urbanity Index Benchmarking Tool to understand mixed use need (particularly acknowledging the proximity of the Molonglo Group Centre) In relation to the realistic population projections.

Our Urbanity Index provides a place- based overlay to conventional retail needs assessment, considering the following:

- Criteria for success and failure of comparable suburbs/centres Evolving requirements of mixed-use centres in areas benefiting from an integrated and people-focused movement system
- Housing diversity that supports mixed use centres
- Siting beyond that of movement economy principles with a focus on amenity, destination, identity, and entertainment principles.

WHAT SHOULD BE DISCOURAGED

- Vast expanse of tree-less, surface car park area.
- Internally focussed big box shopping centre that has its back to natural amenity.
- Isolated retail core that is mainly accessible with a car.
- Car-dominant and unpleasant public realm.
- Vehicular road creating a barrier between local centre and social infrastructure.
- Retail offering in competition with neighbouring centre.
- Mono-functional and insular zones.

WHAT SHOULD BE ENCOURAGED

- Main Street or Promenade configuration.
- Leveraging off natural amenity or a unique destination identity.
- Unique retail offering to neighbouring centre.
- Housing diversity including mixed use shop-top housing.
- Range of uses and activities.
- Co-located social infrastructure.
- Walkability and active transport accessibility, especially easy access to public transport stops.
- Car parking sleeved by active uses or slopes in topography.
- Internal shared street stitching together retail centre and social infrastructure.
- Comfortable micro-climate in public realm.

6.8.1 GROUP CENTRE OPTION 1

VISION

A lively group centre will open to a beautiful foreshore to the south-west of this precinct.

The group centre will be a predominantly private car free zone, with a combination of pedestrian only streets, shared streets, and delivery vehicle spaces.

The local centre and primary school will leverage the easement required by the 132 kV underground power by connecting via a linear green link. An open space transit plaza will connect into this link and provide safe and easy access for primary school students to get to school.

There is the opportunity of having a Yerrabi Pond (Gungahlin) type mixed-use site with local convenience retail on the ground addressing the western side of the creek. Pedestrian crossings over Coppins Creek could be provided to link into the IPT stop near the Group Centre.

PROS

- More area is allowed for the foreshore in this option, with a smaller group centre.
- A central open space that interfaces directly with the group centre provides opportunities for activities and events to spill out from the retail into the open space.
- Interface with the National Arboretum Canberra is predominantly school sites which will have their built form facing the collector road opposite the group centre. Playing spaces should be located closer to the arboretum to soften the interface.
- The school sites will likely include on-site parking towards the arboretum interface which can be used as out of hours overflow parking for arboretum events.

CONS

- Students and residents will be required to cross the collector road to access the group centre, local centre, or foreshore.

This option is based on the Option 1 Structure Plan (Proof of Concept Plan) which includes the IPT corridor within the collector road reserve. The IPT deviates from the road corridor between the group centre and Coppins Creek corridor.

IPT stops are located within open space to provide a transport-oriented plaza that is shared between the retail centre and neighbouring school. The primary school is connected to the open space providing a safe access to young students.

The high school and second primary school are opposite the collector road, which will likely require traffic lights with pedestrian crossings to provide safe crossings for students.

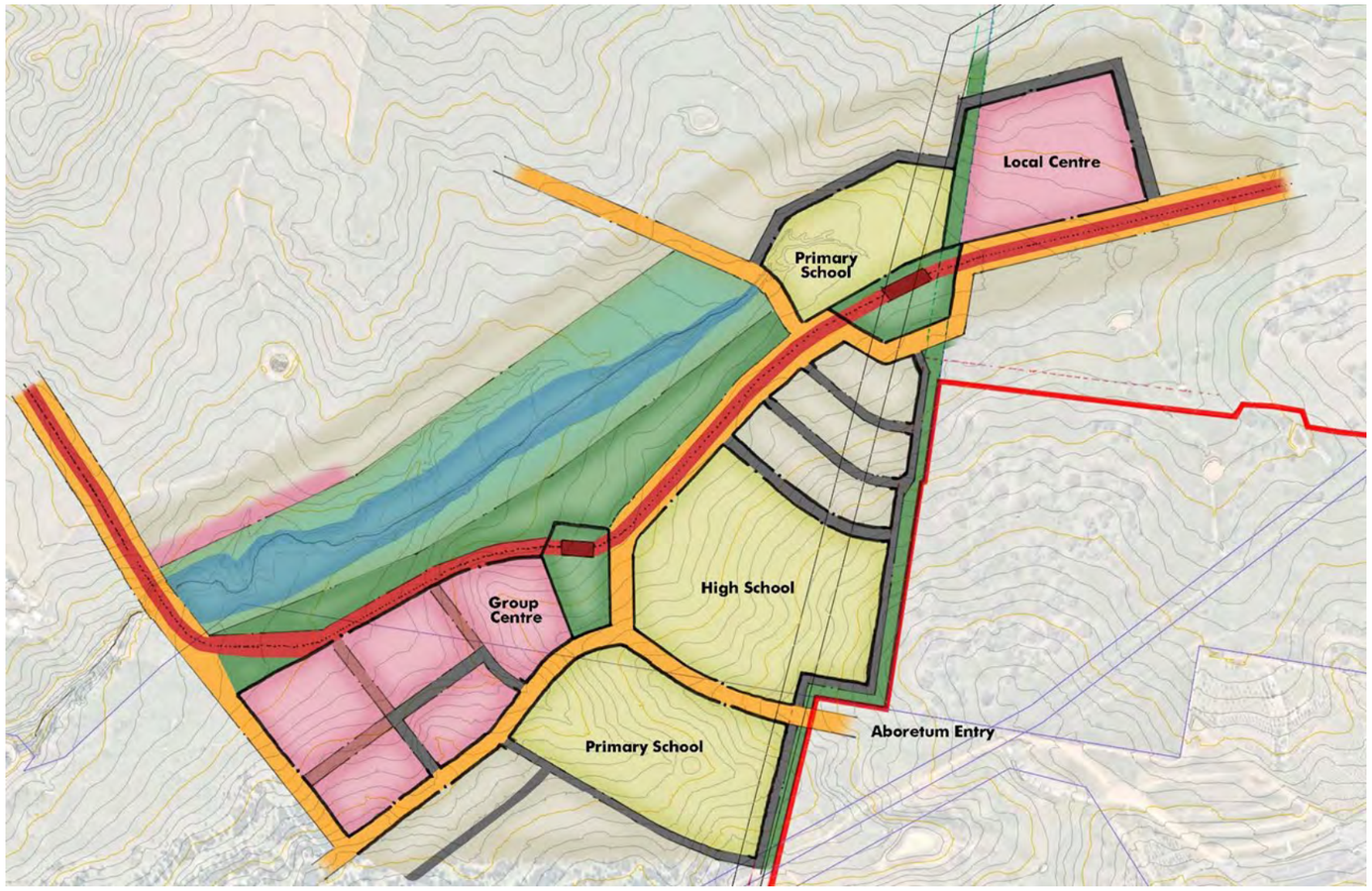


Figure 6.9 Group Centre Option 1

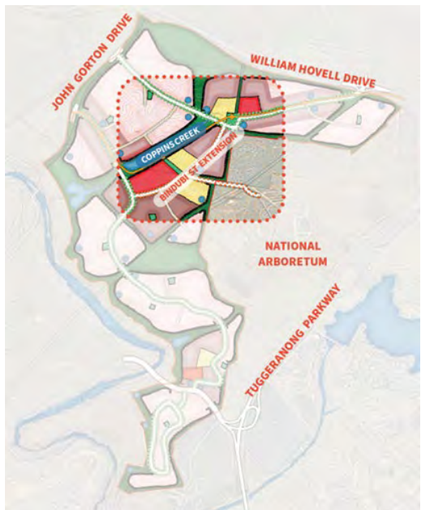


Figure 6.10 Location Plan

Figure 6.11 Central Open Space Precedent

6.8.2 GROUP CENTRE OPTION 2 (PREFERRED OPTION)

VISION

By decoupling the collector road from the IPT corridor, this option encourages a slow speed environment around the group centre and school sites by directing traffic along major collector roads away from the central heart of Molonglo.

In addition, this option creates a safer transition to the foreshore, without the need to cross the collector road.

There is a greater allowance in this option for residential, with many more residents to enjoy views and direct access to the adjacent arboretum.

There is the opportunity of having a Yerrabi Pond (Gungahlin) type mixed-use site with local convenience retail on the ground addressing the western side of the creek. Pedestrian crossings over Coppins Creek could be provided to link into the IPT stop near the Group Centre.

PROS

- Students will easily transition to IPT stops, with no need to compete with vehicles. They are also able to transition easily between the school and group centre with no crossing required.
- This option may allow the IPT corridor to operate with minimal crossings or interference from vehicles (particularly during school drop off times).
- The IPT corridor can be developed later with minimal interference.
- The high school site will have built form facing the collector road opposite the group centre and will have playing spaces closer to the National Arboretum interface.
- The high school will likely include on-site parking near the arboretum entry to be used as out of hours overflow parking during major arboretum events

CONS

- Private vehicles access to the wider Molonglo from John Gorton Drive is focused in the north-east and may cause traffic issues at this intersection.

This option decouples the IPT from the collector road reserve and provide a public transport/active travel only connection across Coppins Creek.

A linear open space is framed by the group centre and high school buildings and provides views from the National Arboretum entry road to the IPT stop and the creek corridor.

The local centre and group centre proximity will require different and complimentary tenants at the centres to avoid an oversupply of similar retail stores. There is the opportunity to swap the primary school and local centre to either side of the north-south green link to provide greater separation between the local centre and group centre.

The schools are large enough to provide a playing field on site, with access allowed for community benefits.

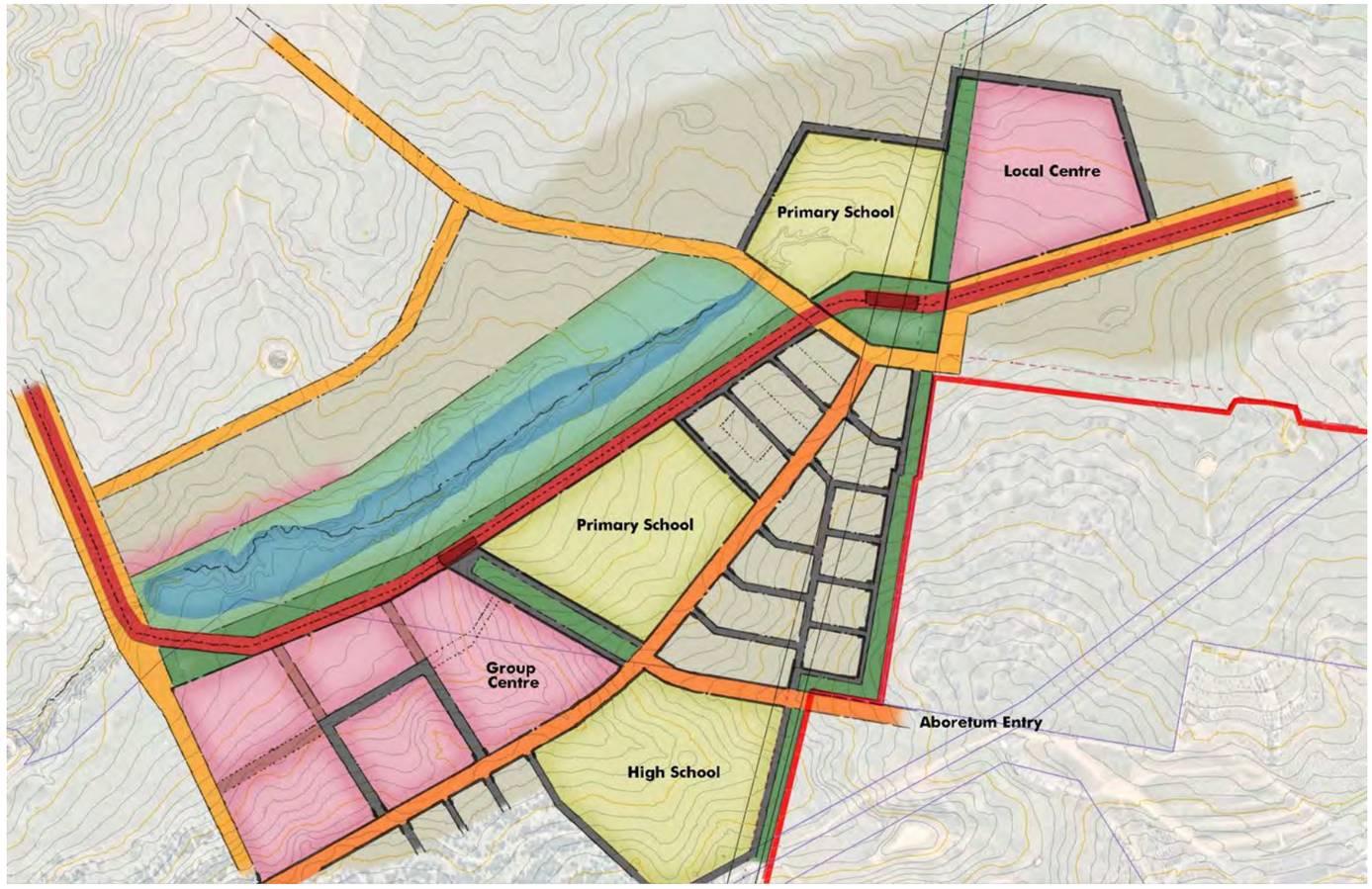


Figure 6.12 Group Centre Option 2

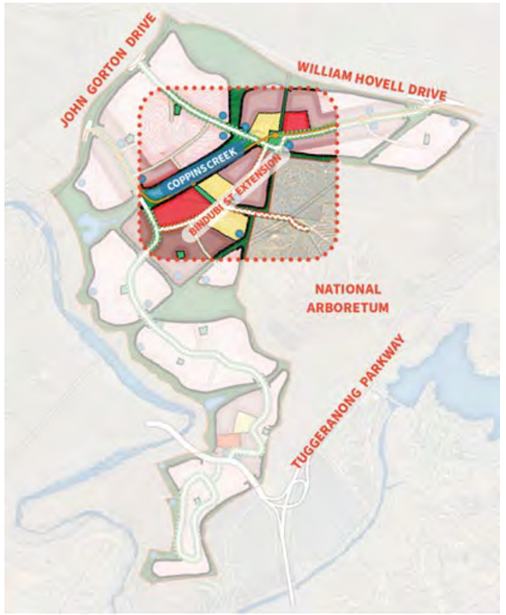


Figure 6.13 Location Plan

Figure 6.14 Linear Open Space Precedent

6.8.3 3D MASSING OPTION COMPARISON

Three yield scenarios have been investigated for the Group Centre based on Option 2 and are focused on the Group Centre site as a mixed-use precinct. The 3D massing and yield (residential and commercial/retail) focuses on the Group Centre precinct.

The three scenarios are described below:

Option 1 – Business as Usual

- This option includes surface car parking for retail / commercial which reduces developable land area.

Option 2 – Mid-Way

- By providing multiple levels of basement parking under the large format retail site additional developable area is provided.
- Cars are limited to a single loop street, with pedestrian links or timed shared zones elsewhere.

Option 3 – Ultimate Scenario

- The large blocks are broken down to provide greater pedestrian permeability.
- Greater flexibility of housing typologies is provided, including townhouses.

These three scenarios are detailed on the following pages. The assumptions used for the three scenarios are included in Table 6.5.

Table 6.5 Yield and parking assumptions

APARTMENT SIZE AND MIX

Apartment Type	Unit Mix (%)	Unit Size (m^2)	Balcony (m^2)
1 Bed	30%	60	8
2 Bed	60%	80	10
3 Bed	10%	100	12

PARKING RATIO

Residential	Residential Ratio	Visitor Ratio
1 Bed	1	0.15
2 Bed	1	0.15
3 Bed	1	.015
Nominal Size of Car Space*	30m^2	
Retail / Commercial		
Retail: 1 space / X m^2	20	
Commercial : 1 space / X m^2	40	
Nominal Size of Car Space*	25m^2	

* Includes an average portion of circulation space

OPTION COMPARISON

OPTION 1

Zone	GFA (m²)
Residential	58,248
Townhouse	0
Retail + Commercial	155,273
TOTAL GFA (m²)	**213,521**
Total Dwellings	**651**

Parking Quantity	Qty
Residential	749
Retail + Commercial	4718
Total Parking	**5,467**

OPTION 2

Zone	GFA (m²)
Residential	87,624
Townhouse	0
Retail + Commercial	197,396
TOTAL GFA (m²)	**285,020**
Total Dwellings	**980**

Parking Quantity	Qty
Residential	1,127
Retail + Commercial	6,070
Total Parking	**7,197**

OPTION 3

Zone	GFA (m²)
Residential	81,923
Townhouse	3,420
Retail + Commercial	224,536
TOTAL GFA (m²)	**309,879**
Total Dwellings	**935**

Parking Quantity	Qty
Residential	1,054
Retail + Commercial	6,913
Total Parking	**7,966**

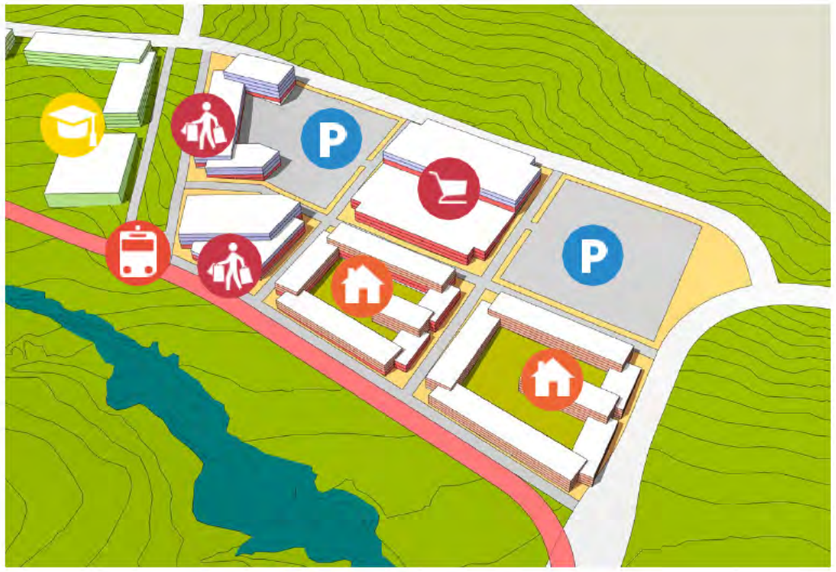
OPTION 1 – BUSINESS AS USUAL

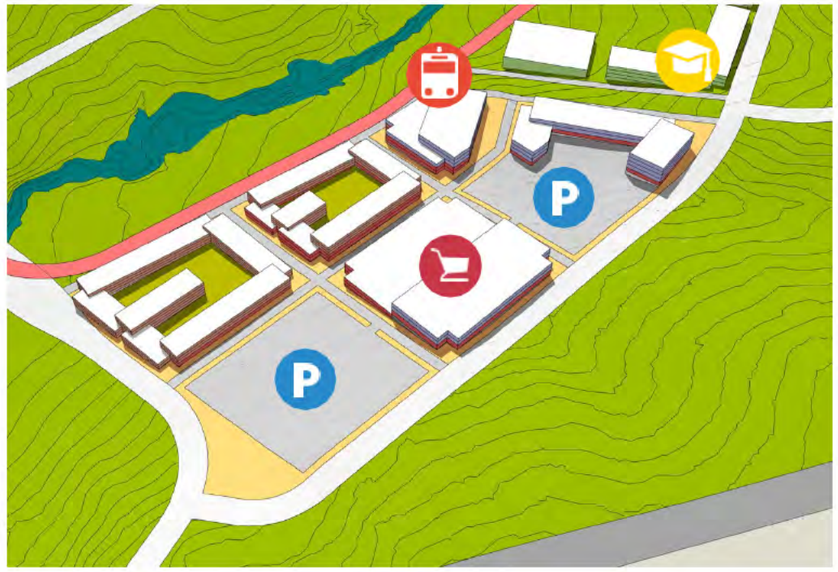
Option 1 seeks to understand the Group Centre in a traditional Canberra manner, with limited/no basement parking for the retail centre. This creates an extensive surface car park situation, which reduces developable area.

Retail and residential has been focused in areas of high amenity, including along Coppins Creek and the Linear Open Space that terminates at the Intertown Public Transport Corridor stop.

Large format retail (supermarket) has been located where it is easily accessible from the Collector Road.

Standard local streets are provided along all block interfaces.



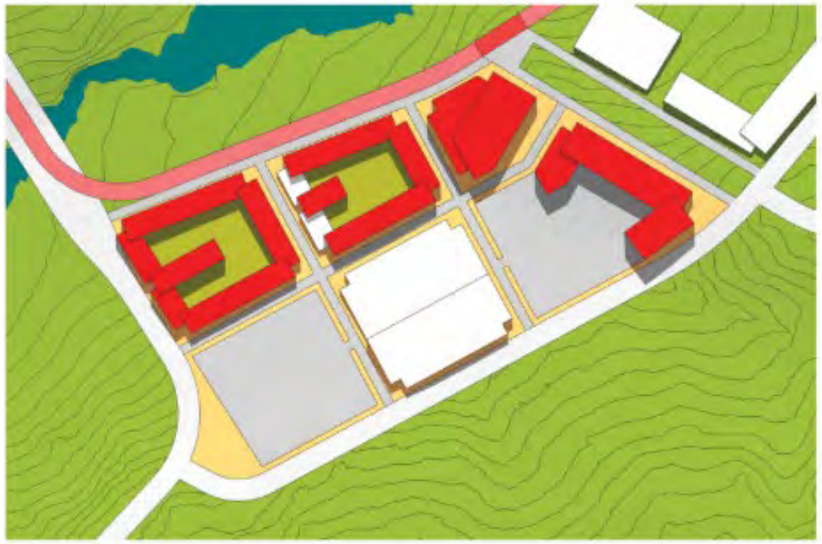


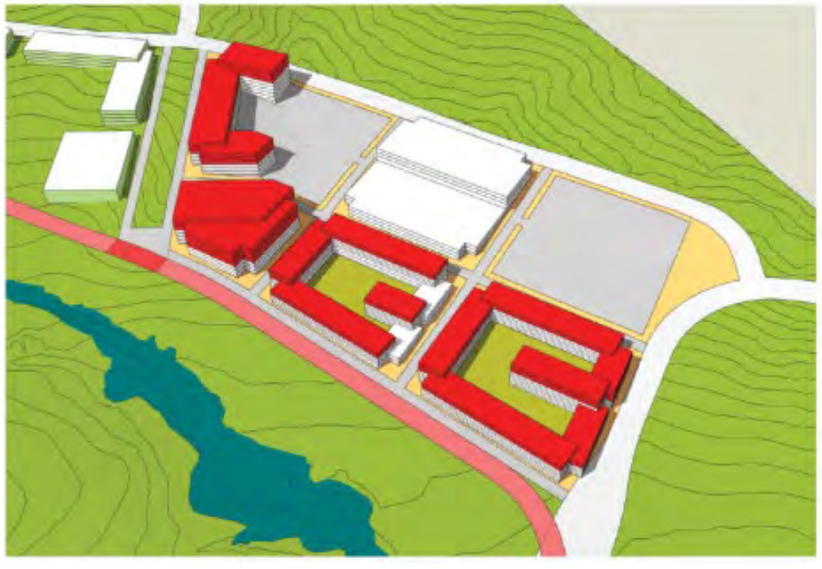
- Public Transport Corridor
- Parking (surface)
- Large Format Supermarket
- General Retail
- Residential
- School

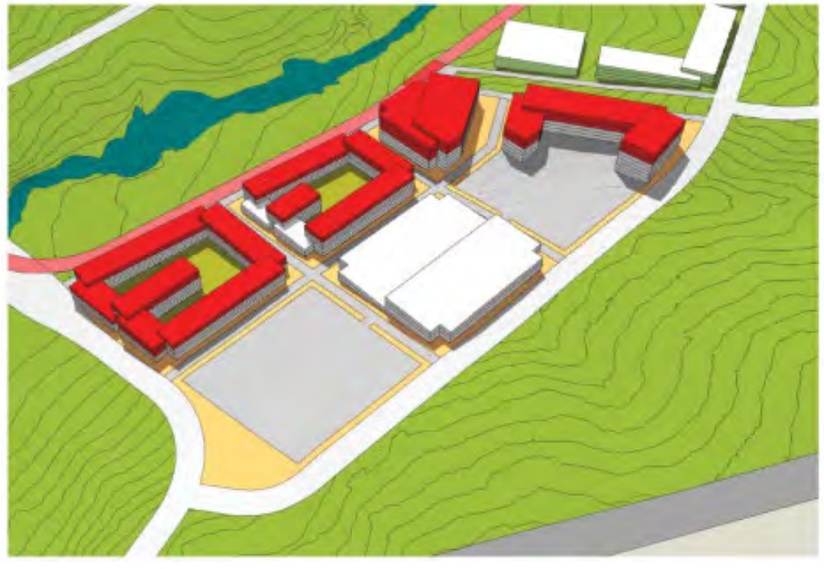
OPTION 1 – ADDITIONAL HEIGHT REQUIRED

To offset the loss of yield created by the surface car parking, additional height is required.

The red floorplates identify that between two to four additional floors are required to match the 24 m of the other options.



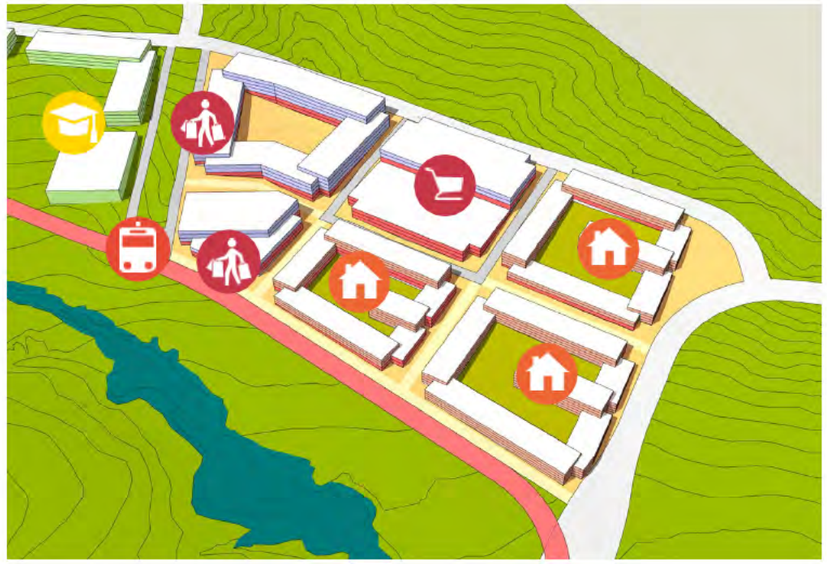


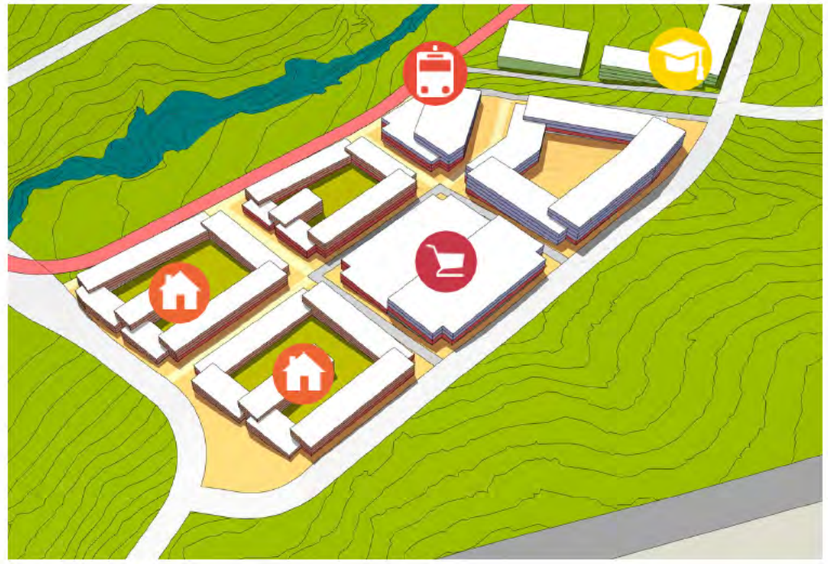


OPTION 2 – MID-WAY

Option two expands the developable area by provided retail parking as within basements under the large format retail block. The majority of non-residential parking will be located in this block, with limited on-street parking provided on the loop street surrounding it.

The majority of spaces between buildings are pedestrian only or potentially timed shared zones to allow for deliveries/waste collection. This provides a pedestrian priority precinct, with cars only permitted on the periphery of the site.





- Public Transport Corridor
- Large Format Supermarket
- General Retail
- Residential
- School

OPTION 3 – ULTIMATE

Option three seeks to break down the massing of the precinct to increase pedestrian permeability.

Laneways bisect the super blocks to create mews style dwelling areas and provide for maximum permeability through the site, and sight lines that terminate at Coppins Creek.

A variety of housing typologies can be provided for though this option, including townhouses which are indicatively located in the north-west corner.

- Public Transport Corridor
- Large Format Supermarket
- General Retail
- Residential
- School

6.9 HOUSING TYPOLOGIES

INTRODUCTION

21st century best practice design and planning of new communities promotes diversity and a range of lifestyle options. It is critical to provide equitable access to desirable community environments irrespective of an individual's dwelling priorities. Residents should not be forced to compromise on the liveability factors that they value based on conventional practice or volume build solutions. Choice and balance will facilitate appropriate levels of density, affordability and amenity across new towns and neighbourhoods in Canberra and accommodate the changing development landscape and lifestyle demand.

The below Lifestyle Package outlines a strategy for how diversity and balance can be achieved, accommodating differing liveable values without compromising overall quality of life. A scoring system also endeavours to protect residents from development and/or building solutions that might have otherwise used alternative solutions to deliver the lowest common denominator.

This process encourages and relies on relationships with, and the education of, local builders to tailor their standard product in a way that is commercially viable for them and meets the government's objectives.

THE LIFESTYLE PACKAGE

Both options are prepared based on the premise that our optimum lifestyle is a combination of the house and community in which we choose to live. Affordable housing should not exist without amenity and access to amenity should not be limited to those that choose a conventional household.

The first option demonstrates a "trade scheme" whereby a block/dwelling can select a tailored collection of values to be realised as compliant and the balance of the values can be provided in a less onerous manner.

The second option promotes diversity at the scale of the neighbourhood by requiring compliance as an average.

DIVERSITY AT THE SCALE OF THE NEIGHBOURHOOD

A neighbourhood unit, with a defined centre and edges and generally contained with a 400 m radius or 5-minute walk, must deliver a reasonable mix of housing. This mix should go beyond density bands and provide a variety of lifestyle choice beyond that of a conventional house and block. This means that only a certain percentage of dwellings/blocks will be code compliant in the conventional sense. However, it will also mean that a certain percentage of dwellings/blocks are guaranteed to deliver affordability and amenity.

The below table proposes a mix of dwellings/blocks based on specific block characteristics contributing to the delivery of genuine diversity.

A different mix is proposed for urban and suburban new communities based on the assumption of urban areas having greater access to public transport, services, daily convenience, and distribution of parks. The Design Excellence Criteria outlined in the Liveable Value Trade Scheme could be used to assess and categorise.

The table could be expanded to include additional community typologies such as renewal areas and slope-affected communities, both urban and suburban.

LIVEABLE VALUE TRADE SCHEME

In high amenity areas that fulfil the following design excellence criteria, i.e., go beyond basic code compliance, a block may be approved by achieving 3 of 5 "Liveable Value" AND an acceptable alternative for the 2 of 5 not achieved. These are shown in Table 6.6.

Design Excellence Criteria:

- Within 50 m of a public park/plaza that receives 3 hours of direct sunlight between 10–3 pm.
- Within 400 m of the IPT stops or 100 m of bus
- Within 200 m of a dedicated cycleway
- Within 400 m of retail
- Within 800 m of employment.

Table 6.6 Liveable value trade scheme

Liveable Values	Compliance	Acceptable Alternatives
Private Open Space	At Grade Private Open Space	Balcony, upper-level terrace, rood garden with a cumulative area equivalent to the Code requirements or shares a block boundary with a public park
Solar Amenity	3 Hours of direct sunlight between 10–3	Demonstrate 2 hours direct sunlight from sunrise to sunset or 5 hours of reflected light or 4 hours cumulative.
On-Site Parking	1 x on-site car space for 1 bed	Within 200 m of a shared carcourt and/or carshare space
	2 x on-site car space for 2+ bed	1 x on site car space plus 6 m long driveway inside block boundary or at grade POS with dual function of car space
Affordable	Demonstrates affordability threshold	Must comply with 4 of 5.
Views	3rd storey with reduced site coverage.	Floorspace redistribution allowance

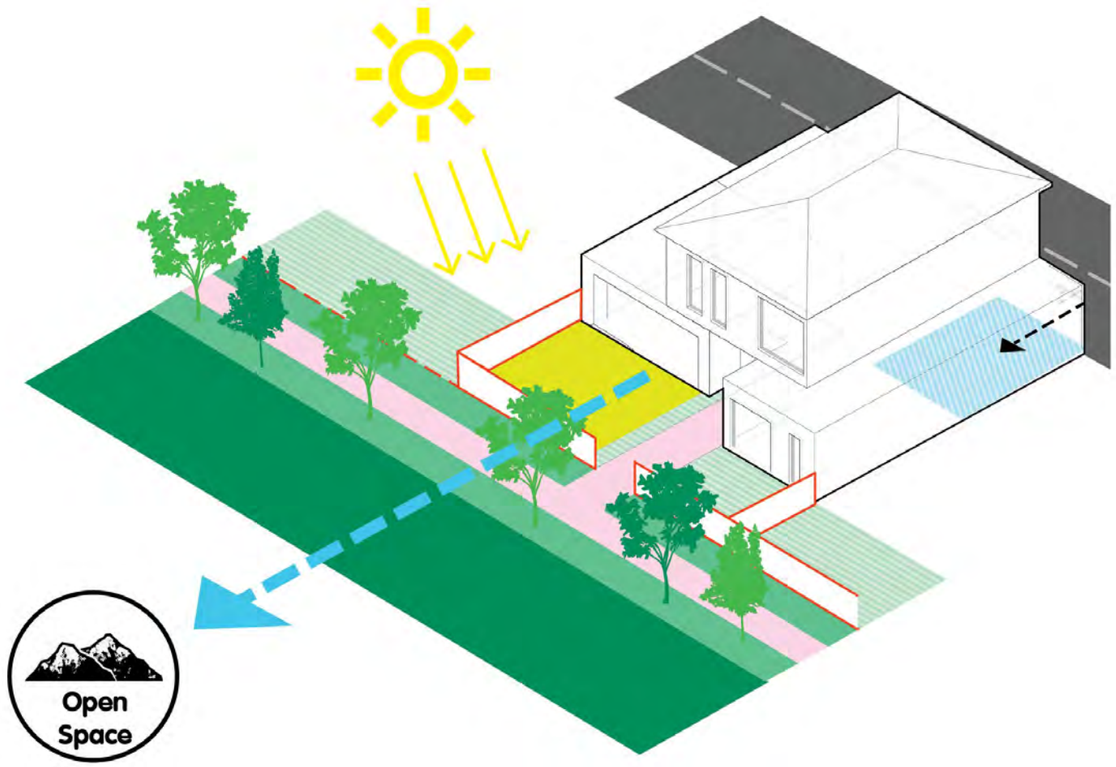


Figure 6.15 Park Frontage Dwellings (diagrammatic only)

INTERFACING WITH NATURE

To promote community ownership and stewardship of open space, houses can be provided directly fronting the open space.

Either rear or side loaded, these properties will have their primary habitable spaces face the park to provide passive surveillance. Additionally, they will include low courtyard walls (with 50 per cent transparency using timer/metal slats) to their front boundary to enclose their private open space, with mailboxes incorporated into these walls where appropriate. This will give an additional sense of activation to these areas as residents will frequently interact with the edges of the park.

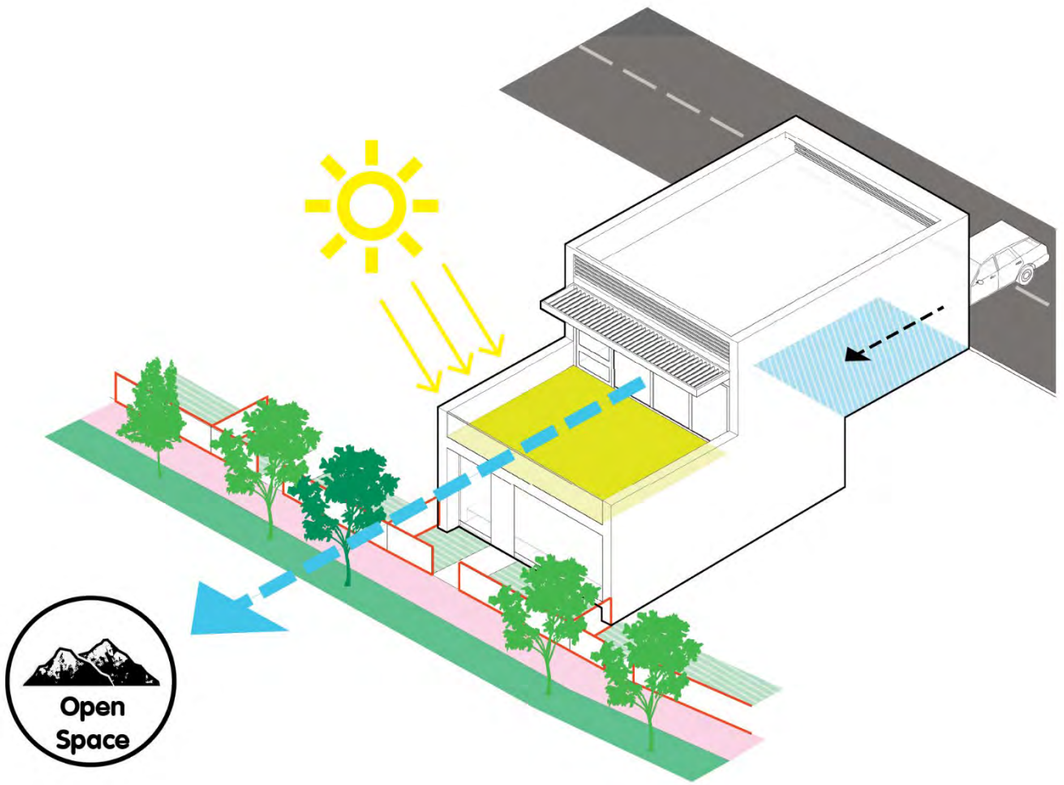


Figure 6.16 Over-Under Terraces (diagrammatic only)

ALTERNATIVE METHOD OF DELIVERING DWELLINGS ON STEEP TOPOGRAPHY

Challenging topography in the northern area of the site requires an alternative housing type. Typical frontages of 10 m and block sizes of around 300 m².

To allow for equitable access to views and solar access, built form that steps down the hillside is encouraged. The blocks have rear lane access which will require the garage on the upper level of the lower terraces.

Private open space is recommended to be at the upper levels facing north and taking advantage of the views to open space.

6.10 COMMUNITY NEEDS

GHD prepared the Molonglo Stage 3 Community, Sport and Recreation Facilities Needs Assessment in 2014 to inform the provision of community infrastructure for the study area. GHD's findings are based on population threshold and provide a generous allocation of infrastructure and facilities. The proposed facilities also represent formal/traditional community facilities that focus on internal spaces. In terms of facilities gaps, we suggest consideration of the following:

- Community meeting opportunities in "Third spaces" in the public domain generally and/or local parks.
  - The "Third Space" is the social spaces that separate the First Space (Home) from the Second Space (Work). These could include public libraries, cafes, community halls, parks, etc.
- Community markets opportunities (e.g. at school playgrounds, in town centres/ plazas). Consideration should be given to the permanency of any such market which will dictate requirements for infrastructure like power, so stallholders don't have to bring generators, running water, shade/shelter, and public amenities. The contemporary focus on food vans can be problematic for lower density and sloped areas, as they are heavy, require reinforced concrete footings/pads to be built, and generally work best when set up together in on the edge of public car parks.
- Outdoor performance space, which could be incorporated into landscaped areas as an amphitheatre, or space that could accommodate "pop up" stage, see infrastructure requirements as per community markets).
- "Turn up and play" casual sport opportunities, as opposed to having to pay to join club/attend training as part of a team. Examples include skateboarding elements in the landscape, half basketball courts, outdoor gym equipment. Water play areas are also increasingly population for younger children.
- "Natural" play opportunities which can be incorporated into essential infrastructure such as around detention basins or along the Molonglo River Reserve and include elements such as places for kids to float boats/ jump on logs etc.
- Outdoor library, which is essential a public wi-fi hotspot with a "book swap".
- Community gardening in verges or edible landscaping, which can incorporate links to the landscape e.g. Aboriginal bush tucker.

The Community, Sport and Recreation Facilities Needs Assessment (GHD, 2014) has been reviewed. As a general principle, the provision of new community facilities should only occur when there is a demonstrated capacity problem within existing facilities (e.g. demand for facilities exceeds provision rates/level of service). Before the decision is made to provide a new facility in a new location, the following considerations should be made:

- Is the existing facility really performing at maximum capacity or are there management interventions that can occur to free capacity (e.g. is there a common peak demand period for all uses, and can some of this demand be dispersed by changing to operating hours?)
- Does the existing facility have capacity to expand?

The sustainability of maintain several smaller facilities compares to fewer larger facilities should also be considered in terms of equity of access and distribution.

Given that CFZ land is minimised to just that for educational purposes, the allocation of land around the Group and Local centres for community purposes should be given utmost importance to ensure that the liveability/viability of the neighbourhoods as they develop.

Table 6.7 outlines principles to include for consideration of the community, sports and recreation facilities.

Table 6.7 Community principles

Principal	Rationale
Central to catchment and equitable access	Community facilities should be central and accessible to the population they are intending to serve. Access to space and services can be largely determined by the location and distribution of community facilities. Planning for urban growth areas provides an opportunity to integrate community facilities with key population areas (including major new release areas), urban structure (including designated activity centres) and transport routes (including existing and proposed bus and rail connections).
Location to promote accessibility and visibility	To be well used and serve identified social needs, community facilities should be highly accessible and visible. They should provide equitable access to all potential users, be accessible by public transport and have good pedestrian and cycling connections. Ideally, they should be on a main street with ground floor street frontage for optimum visibility and accessibility. Enabling an awareness of what happens inside also promotes usage. Adequate parking nearby also promotes good access to facilities.
Clustered	Clustering with other activity generating uses helps to promote convenient access and a focal point for community activity. The notion of a community hub expands beyond community facilities to include the range of activities and services that encourage human activity and gathering such as shops, transport nodes, schools, childcare, parks and playgrounds. Clustering can also contribute to overall sustainability by reducing the need for multiple trips and allowing residents to carry out several tasks in a single location through a single trip. Case study research demonstrates the preference of users of community facilities to combine trips with shopping and other activities. Integrating several community facilities can maximise their utilisation and activation. Co-location involves shared or joint use of facilities and often the integrated delivery of services.
Main street location for optimum visibility and accessibility	Community facilities are an important part of the civic fabric of our centres and suburbs. Accessibility and visibility through main street locations with a ground floor presence can be important to maximising utilisation and enhancing accessibility. Case studies like Vinegar Hill Library and Community Centre at Rouse Hill Town Centre in Western Sydney demonstrate how community facility space can be well integrated with town square type development without compromising the availability of valuable retail space.
Contribute to public domain and sense of place	Community facilities can contribute to urban vitality, local identity, and sense of place, and become important focal points and gathering places for the community. A strong connection between the facility and the broader community can be fostered through development of facilities on landmark sites and with distinctive architecture and quality design. Community facilities should be distinctive civic buildings and welcoming places and should present as a reflection of local culture. This helps ensure they develop a strong local profile and are well known in the community, thereby promoting high levels of usage. Incorporating public art into the building design is also important in creating distinctive and welcoming community centres. Public art is an important avenue to tell Maitland's stories and to create places that are recognised and valued in the community.
Near open space for events and activities	Locations adjacent to open space including local and group centres and parks increase the range of activities that can occur on community facilities land. As an example, community centres adjacent to parks and playgrounds are ideal locations for playgroups. Facilities located next to civic squares provide opportunities for markets, festivals, and similar events. Locating community facilities near open space areas is another approach to enhancing utilisation, flexibility of use and providing opportunities for a wider range of community

Principal	Rationale
	building activities. It is also another way to ensure that community facilities are integrated into their surrounding physical environment and seen as "part of the community".
Connected to public transport, pedestrian and cycling networks	Planning for community facilities requires a focus on enhancing efficiency and utilisation. Public transport enhances accessibility for all population groups. As a principle, community facilities should ideally be located within 400 metres walking distance of a regular public transport stop. Linking to pedestrian and cycling networks provides another avenue to promote the accessibility of facilities to all groups in the population and is a further means to encourage sustainable behaviour and a healthy and active lifestyle.
Flexibility and multiple use	Community facilities should be designed and built to maximise flexibility in use, so they can respond and adapt as needs change. Where possible, buildings should be capable of delivering a range of services, rather than designated for single uses or specific target groups that may quickly become outdated. Flexibility is enhanced by providing multi-purpose spaces capable of accommodating a diversity of uses, thereby enabling a range of activities and target groups to use the facility. Multi-use facilities are also more dynamic and capable of responding and adapting to the changing needs and preferences of the community. Facilities that are responsive and flexible will be used more intensively over their lifetime.
Sufficient size and design to enable expansion and adaptation	It is difficult to precisely predict the absolute requirements for community facilities of a future population. Assumptions about demand are based on current projections regarding future populations. These projections may change and therefore affect requirements for community facilities land. Experience has shown that it is important to provide some flexibility in the provision of community facility space.
Safety and security	Community facilities should be designed in accordance with Crime Prevention Through Environmental Design (CPTED) principles. They should provide a high degree of personal safety for people entering and leaving the building, especially at night. Safety and security can be enhanced by: — Involvement of the community in design and development of community spaces, leading to feelings of ownership of the space so it is more likely to be used. — Providing spaces that can be monitored by a range of people including passers-by and shop keepers. — Strategically positioning lighting, trees, and meeting places. — Using barriers to guide pedestrian and vehicle traffic.
Avoidance of conflict with neighbouring uses	Masterplanning processes can provide an opportunity to locate community facilities uses in areas where impacts on residential and other uses can be minimised. In greenfield areas siting facilities to incorporate some form of separation and/or buffering from residential areas is often an important consideration in reducing any potential future conflict. In infill areas the separation of community facilities and residential uses is often not possible, nor desirable, with mixed use building forms being a relatively common model that contributes to the vibrancy and activity of infill areas.

7 TRANSPORT NETWORK

7.1 TRANSPORT OVERVIEW

The transport network has been developed cognisant of the overarching vision and objectives for the network, namely:

- Through careful planning and strong dedication to our vision, we will see Molonglo 3 East pave the way for significant modal shift with a **lower reliance on cars** as a primary mode of transport. We will include designated car-free zones and potentially car parking as a separate land-use, while providing excellent options for public and active transport. By reconsidering the way we use our cars, and value the public space they take-up, we are able to begin shifting the hearts and minds of Canberrans.
- The design of our streets will align with movement and place principles so they are **great public spaces** and improve mobility for access, create environmental, health and social benefits through increased active travel, and reduce our environmental impact with lower reliance on vehicles for transport.

Based on the resulting big ideas and design principles, this section provides an overview of the transport network required to support the preferred site option. This includes provision for movement within, to/from and through the site with consideration of active travel, public transport, car and freight movements, equestrian and future mobility journeys. This has been achieved through consideration of the existing transport network commitments, determination of the Movement and Place roles, and determination of the road network classification – supported by illustration of sample street cross sections and traffic modelling.

7.2 DEVELOPMENT OF THE ROAD NETWORK

The site benefits from close connections to the strategic road network and is bordered by routes including William Hovell Drive to the north, John Gorton Drive to the west and the Tuggeranong Parkway to the east. All have proposed upgrades as part of upgrades to the ACT road network.

A new East-West Arterial (EWA) will bisect the site to the south. This will provide connection between the upgraded John Gorton Drive at Denman Prospect with a new grade separated intersection on Tuggeranong Parkway.

Four access points will be created with the wider road network:

- South from the William Hovell Drive and Bindubi Street intersection
- Two south-east from John Gorton Drive
- One north from the proposed East-West Link.

In addition, a connection to the southern section of the site is provided from the East-West Arterial.

The road network for the Molonglo 3 site will cater for a variety of users and uses. With four principle access point, the classifications of road corridors radiate from the central group centre and seeks to connect these with local resident. The network also seeks to be sympathetic to its natural surrounds and will be structured to minimise through traffic, which is already well served by the surrounding network, as shown in Figure 7.1. It is acknowledged that although the general principle is to minimise through traffic, it is useful to be able to accommodate alternative traffic routes during periods of road closures, especially during emergencies.

The development and operation of the road network can be further defined through consideration of:

- The Movement and Place Framework: balances the transport role and urban development placemaking interface of the network
- The Functional Road Classification: defines the movement needs of vehicles and access requirements to land uses adjacent to the road corridor.

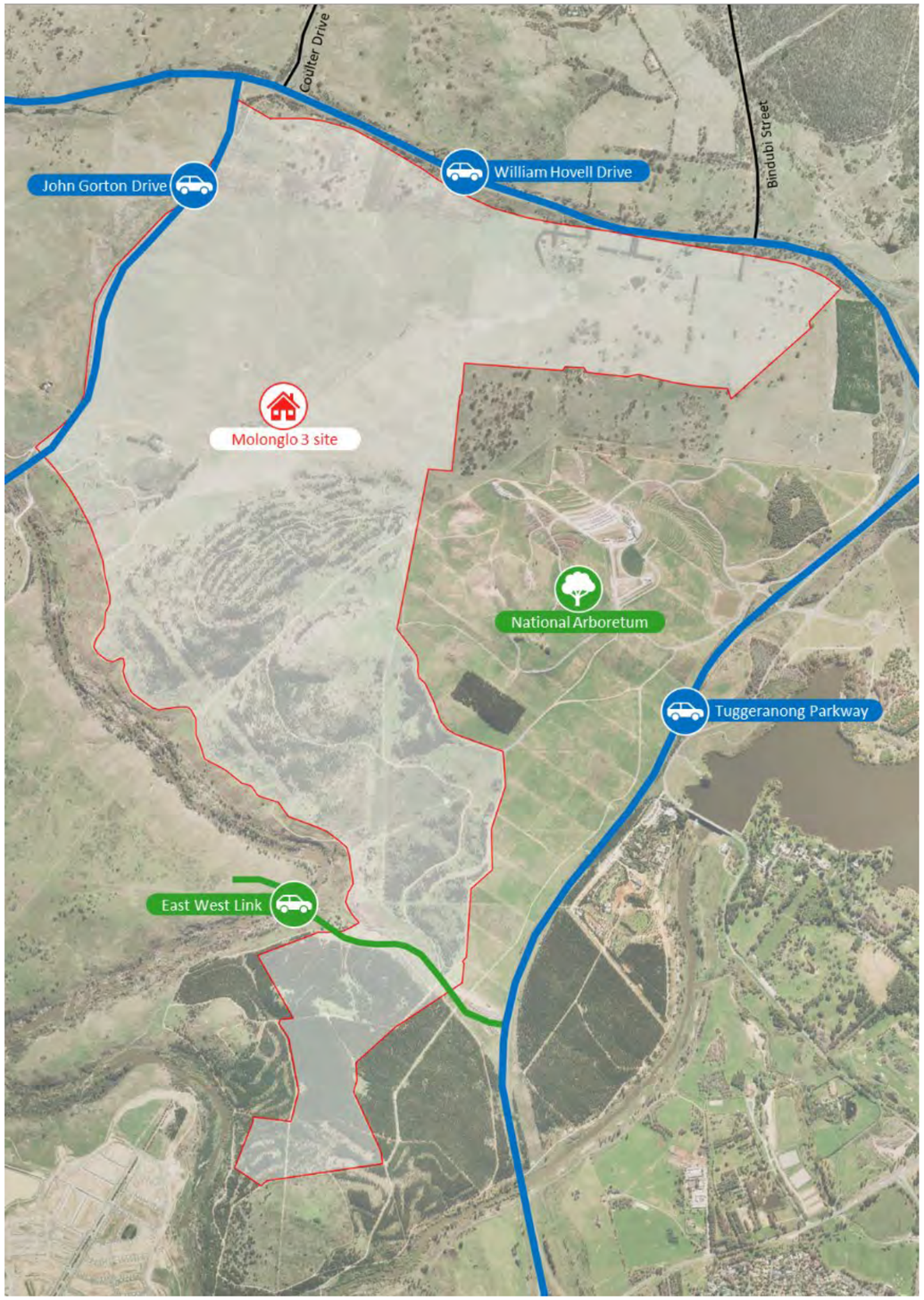


Figure 7.1 Neighbouring road network

7.2.1 APPLICATION OF THE MOVEMENT AND PLACE FRAMEWORK

Each street within the precinct should be designed with consideration for its movement role in road hierarchy and placemaking role as a public space with consideration to the ACT's Movement and Place framework. Road treatments and speed management should be introduced to emphasise the balance of placemaking/street activity and the prioritised journey mode, whether that be pedestrians, public transit or private vehicles.

A preliminary movement and place overlay on the design concept plan is shown in Figure 7.2, with the classifications explained in Table 7.1. The "movement and place" typology is designed to change along key corridors, reflecting the changing needs of the adjacent land uses, street activity and journeys.

Table 7.1 Classification of the precinct transport network

Classification	Function
Movement corridor	— Facilitates movement of all modes through the precinct. It will be the main access for private vehicles to travel to residential areas or the commercial and community centres. — Focussed along the main corridors shown in the design concept plan. There will be some sections that have a higher movement or place function whilst still being primarily a movement corridor. — The movement corridors are not limited to solely private vehicle movement. Along these corridors sufficient space and priority should be given to cyclist and public transport modes. They will accommodate a number of different modes including the IPT service and local bus and strategic walking and cycling networks. — Within the Molonglo site, movement corridors will primarily provide access from bordering strategic roads with the group centres, schools and other local facilities.
Vibrant streets	— Corridors that balance the need for movement through the precinct whilst activating the street frontage to create a vibrant community and commercial centre. — These corridors are shown around the local centres and schools. There will be a need for all movement modes around these nodes, however the value of these places for pedestrians and cyclists needs to be retained. e.g.; safety, high quality pedestrian environment.
Places for people	— Corridors that prioritise the safe and efficient movement of people with a sense of place. These corridors will be more pedestrian friendly and will prioritise the place function over movement needs. — Within Molonglo 3, the main street connecting the northern and southern collectors will encourage people to walk and dwell whilst minimising the impact of motor vehicles. — The main street, whilst being a place for people will also have higher movement needs. This street is given this Movement and Place category to encourage an environment which helps limit traffic through this area. A core principle of this network is to focus the traffic to the movement corridors and establish an environment which limits vehicle traffic past the group centre. — This can be achieved with slow speed environment, shared zones and other traffic calming measures. — This street may also be classified as a vibrant street, however the aim is to create a strong pedestrian environment and reduce the general traffic as much as possible.
Local streets	— Slow speed environments comprising of the majority of residential streets within Molonglo. — The main function of local streets is to form the basis of the neighbourhoods, facilitating local access and providing recreational opportunities. — Note that local streets have not been included in limited detail in this concept plan. Phase 2 of this project will investigate the local streets function and layout in more detail.

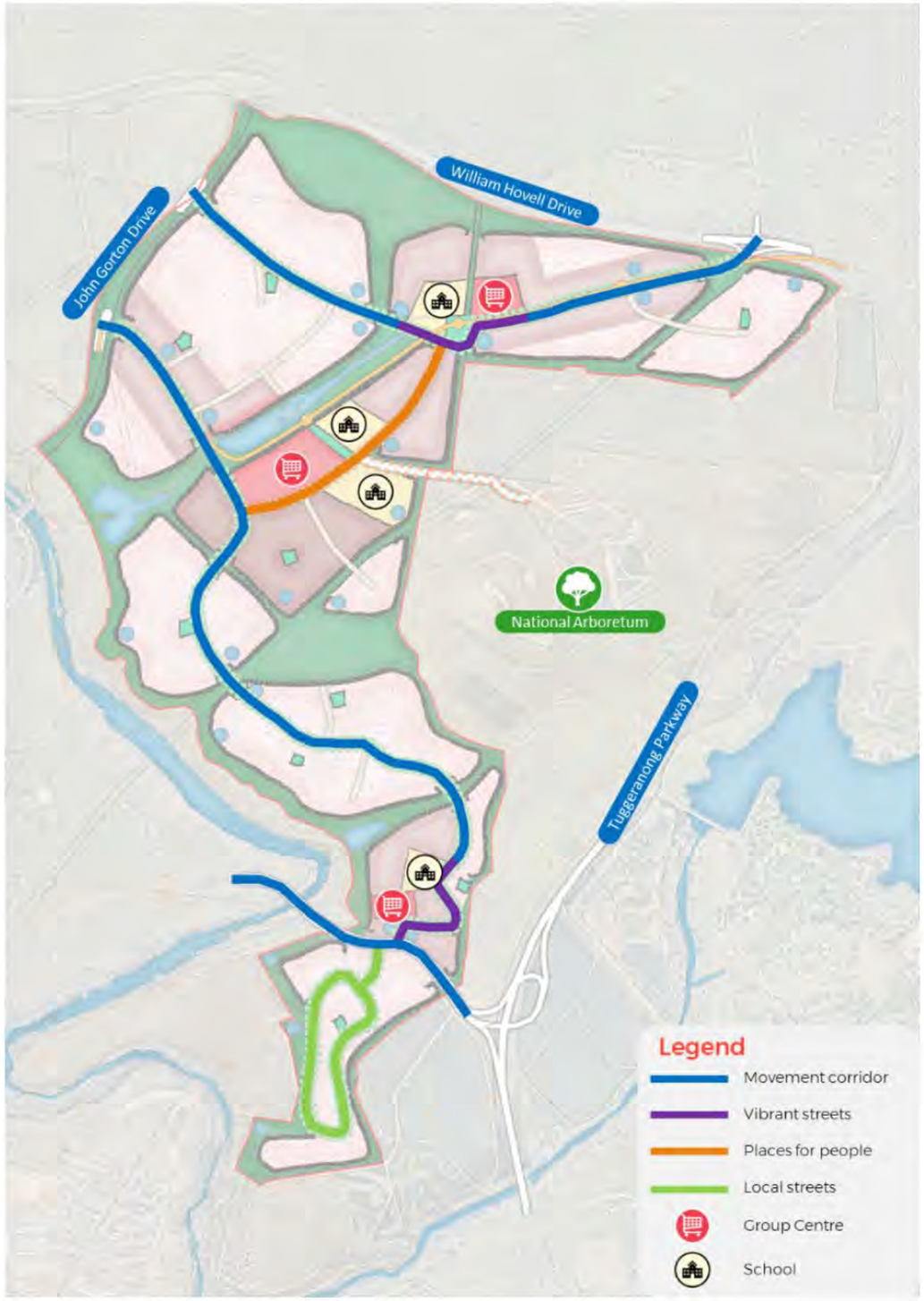


Figure 7.2 Movement and Place classification

7.2.2 FUNCTIONAL ROAD CLASSIFICATION OF THE NETWORK

Based on the geographical layout of the network, existing transport commitments, and consideration of the Movement and Place strategic roles, the proposed functional road classification of the network can be seen in Figure 7.3.

The Estate Development Code specifies maximum driving distances between dwellings and arterial and collector roads, 1200 meters and 700 metres respectively. As the local road network has not been established in this phase of the program, compliance is not able to be measured. However rough straight line distances indicate this should be achieved for the whole precinct to access Collector Roads. Meeting the specified distance to Arterial Roads may be challenging for the area south of the group centre. This will need to be investigated during the establishment of the local road network.

7.2.2.1 ARTERIAL ROADS

Arterial roads are the highest classified roads within the site and the arterial classification is limited to sections of the Northern Collector Road and the East West link. These two routes are likely to have the highest traffic flows. The Northern Collector will also support the IPT and cycling network. Both routes are prioritised for movement and are identified as Movement Corridors in the assessment.

7.2.2.2 COLLECTOR ROADS

Collector roads represent the spine of the development. They will connect the main arterial roads with the heart of the development. They will support the majority of the community functions and provide connectivity for local bus services and active transport. They will also provide access to local residential and access streets for all sub-divisions within the site. Collector roads will need to balance the needs of those seeking to exit the site with those moving within it.

7.2.2.3 LOCAL ROADS

Local roads represent the highest proportion of all roads within the site. They will provide direct access to residential properties. Local roads will be slow speed environments with various road treatments to promote safer transport and encourage active and public transport modes.

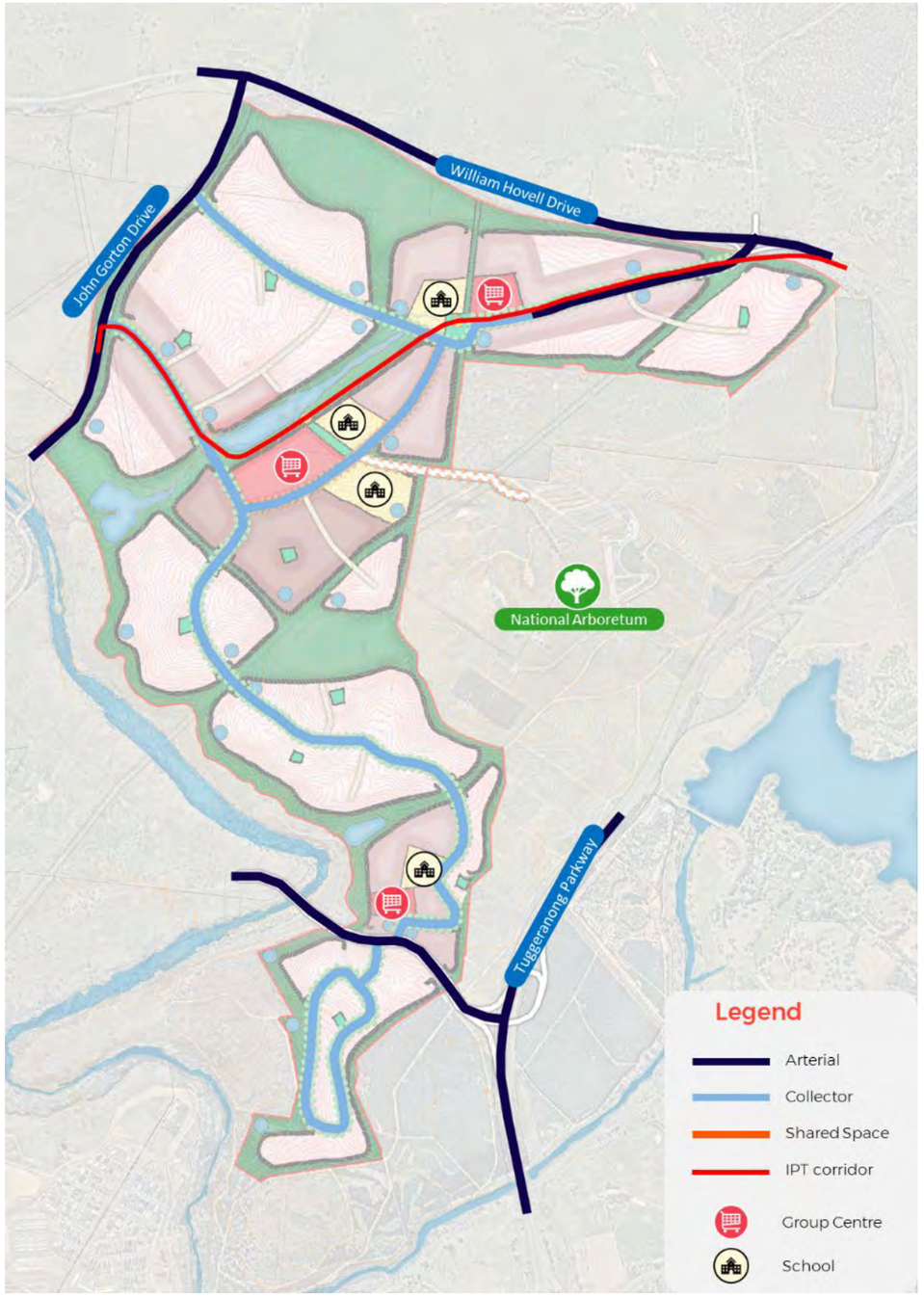


Figure 7.3 Proposed road hierarchy

Notes Local roads within subdivisions not shown

7.2.3 OTHER NETWORK OPTIONS ASSESSED

During the course of this project, several transport network elements were explored in collaboration with EPSDD that did not eventuate into the design concept plan:

- This project explored the opportunity for the collector roads to border the Arboretum and Molonglo River Corridor. A buffer zone for bushfire protection is required along these boundaries and road will be required along the boundary for access. The project team explored the opportunity to create an interface between the neighbourhoods and the River Corridor/Arboretum with the Collector Roads. A supplementary memo detailing proposed cross sections and precedents was circulated to stakeholders for their input (Appendix G-2). Stakeholder feedback indicated that the Collector Road interface with the Arboretum and Molonglo River Corridor should be kept to a small section only near the Southern Local Centre.
- Earlier concept plan options (shown in section 5), indicate the Arboretum access from the north, via a local road south of the William Hovell Drive and Bindubi Street intersection. This option, although favoured by the Arboretum, was removed due to environmental concerns. The proposed access point is now from the west, near the proposed group centre. The secondary access road to the Arboretum is still being refined in consultation between EPSDD, TCCS and the NAC.
- To meet TCCS requirements, a secondary southern neighbourhood access was proposed to the East-West Arterial feasibility team. Two different options were investigated by the SMEC EWA team, however both options were deemed not feasible:
  - A local road underpass was suggested under the East-West Arterial on the boundary with the Molonglo River Corridor. This option is marked in red in Figure 7.4. This option did not eventuate due to the environmental constraints of a local road within the Molonglo River Corridor. This underpass was not able to be shifted further east due to the proposed bridge over the Molonglo River.
  - A left in/left out was proposed to the west of the primary Molonglo 3 access point. This option was ruled out due to traffic constraints on the East West Arterial.
- As road design work is developed, consideration will need to be given to ensuring that gradients are appropriate to vehicle type. This will be of particular relevance to buses (both for vehicles traversing the site and assuring DDA appliance at stops) and minimising impact for pedestrian and cyclists as much as is reasonable.

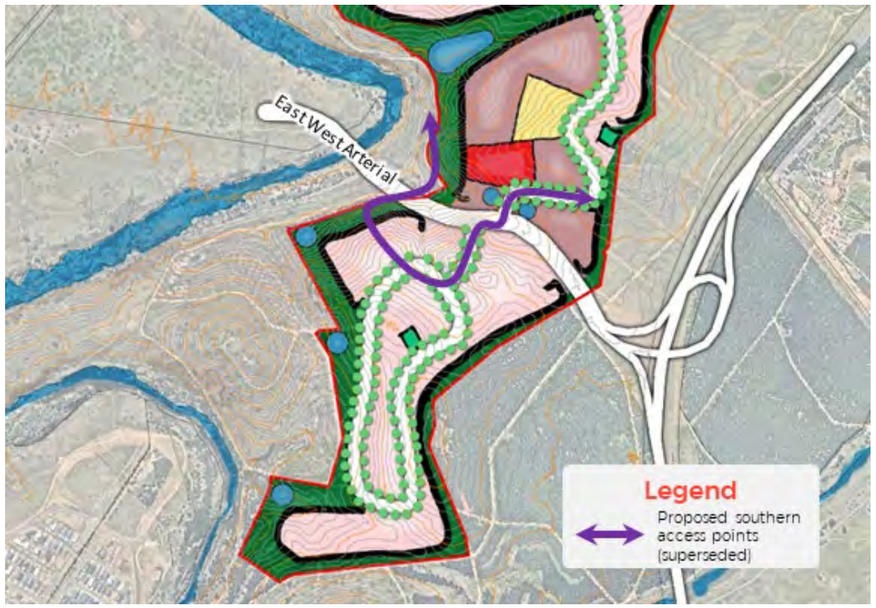


Figure 7.4 Secondary access to the southern precinct

7.2.4 EXAMPLE STREET CROSS SECTIONS

A series of example cross sections for key collector roads and the group centre is provided in this section. These are indicative of how the streetscape could be developed at its widest point to achieve the movement and place objectives. Variations in form and function may change based on prevailing space constraints, transport network requirement and neighbouring land uses.

Figure 7.5 indicates the location of the following road alignments contained in Figure 7.6 to Figure 7.10.

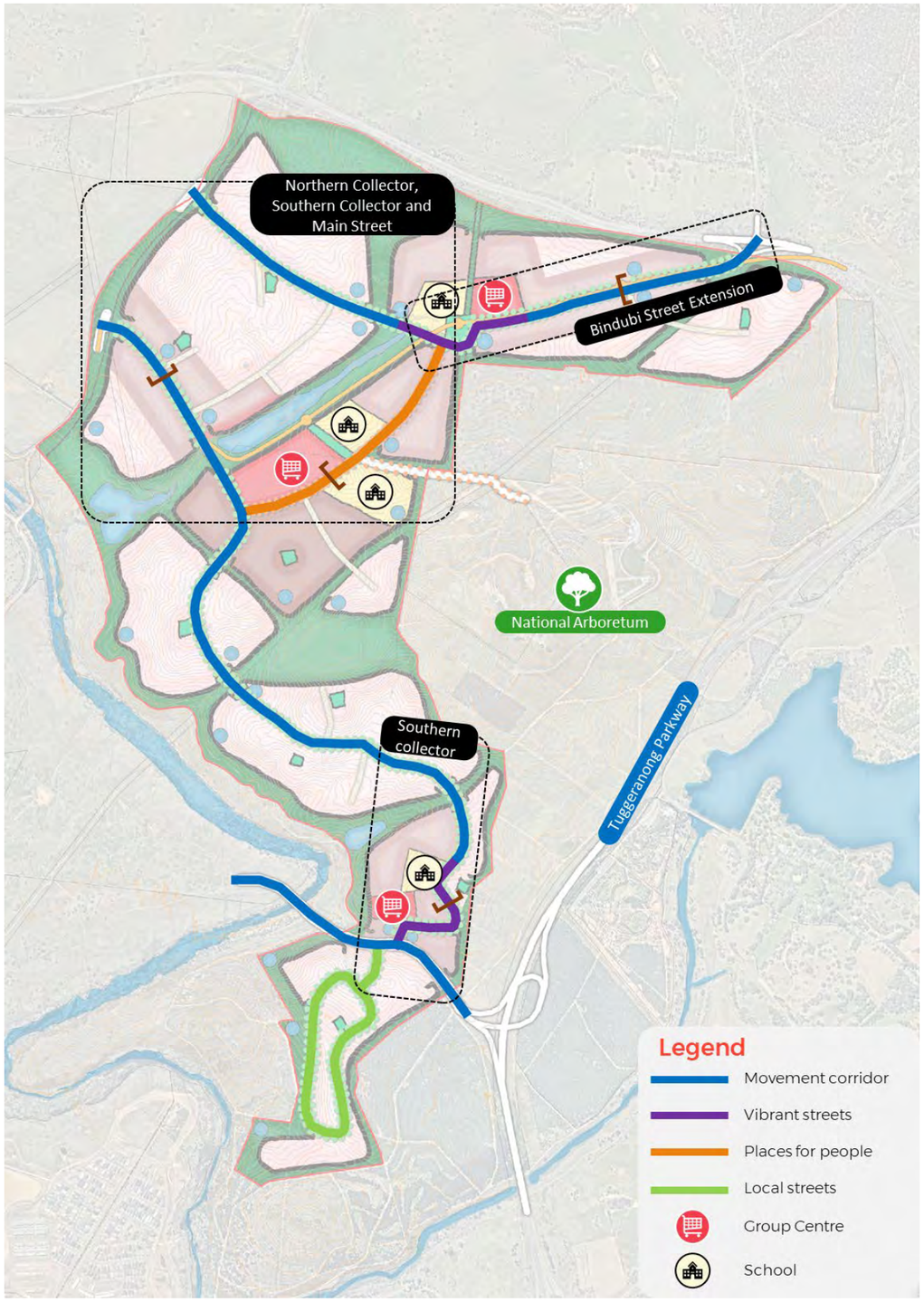
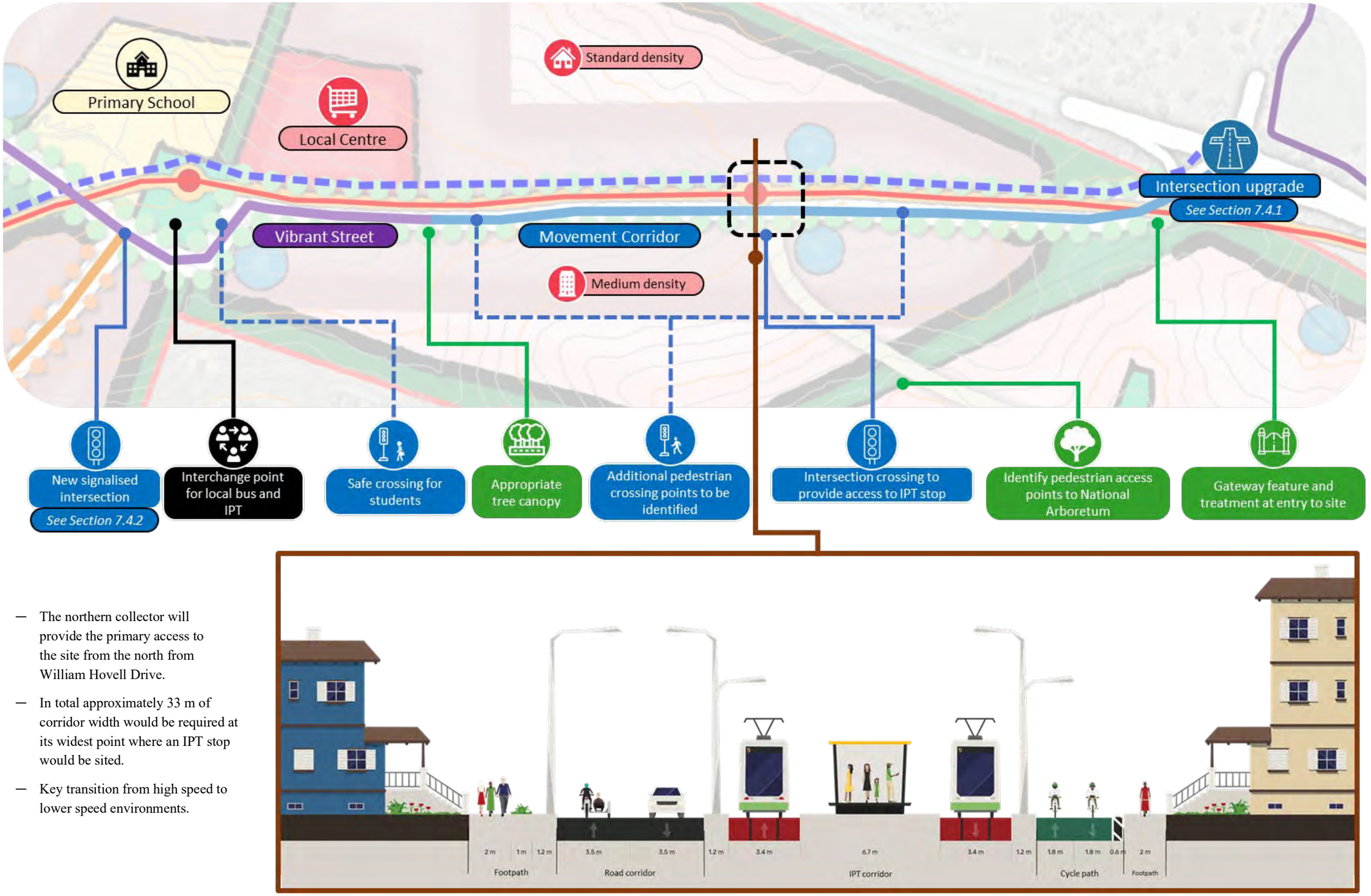


Figure 7.5 Cross-section locations and plans



- The northern collector will provide the primary access to the site from the north from William Hovell Drive.
- In total approximately 33 m of corridor width would be required at its widest point where an IPT stop would be sited.
- Key transition from high speed to lower speed environments.

Figure 7.6 Bindubi Street Extension alignment and cross section

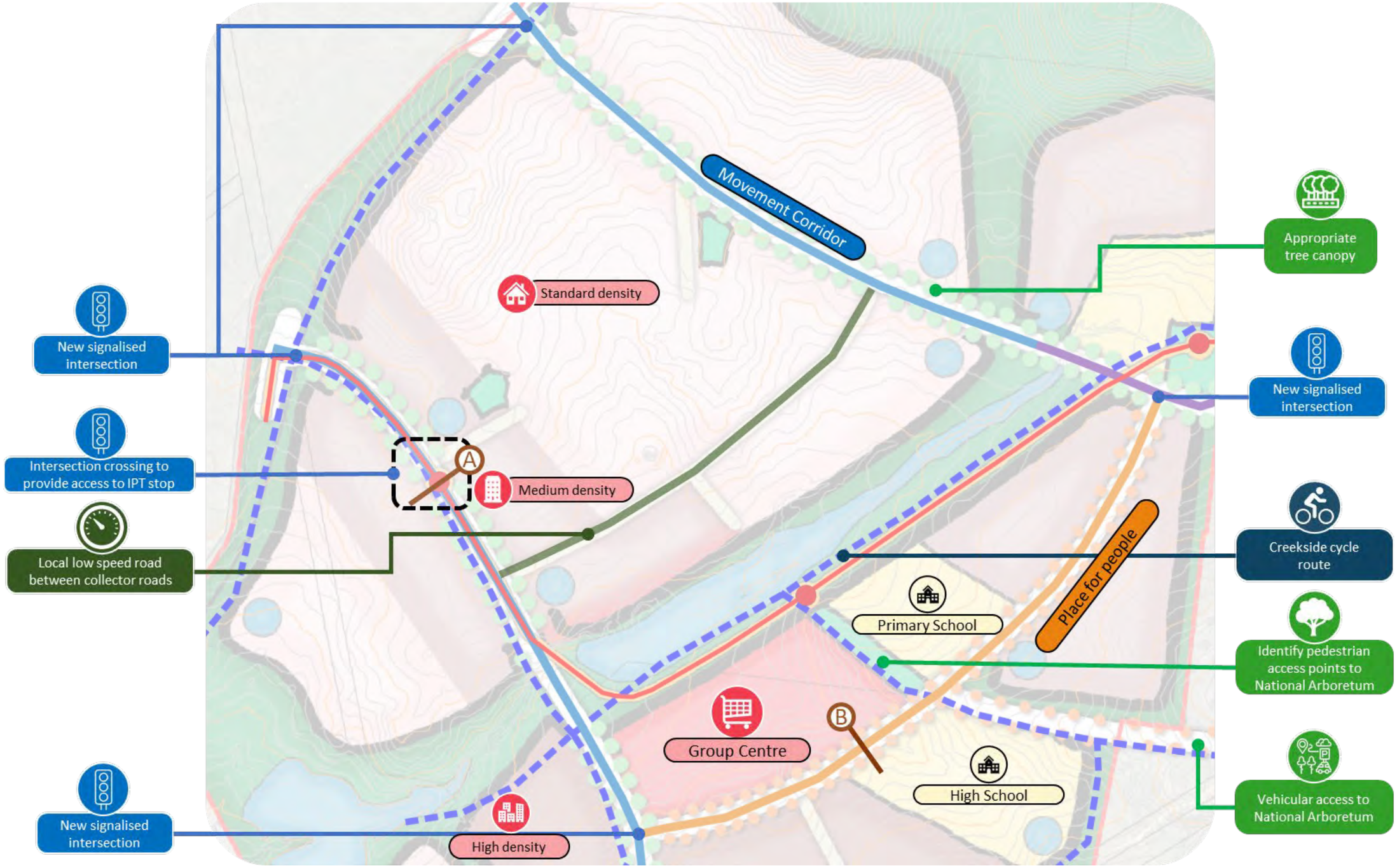


Figure 7.7 North-west Collector Roads and Main Street alignment

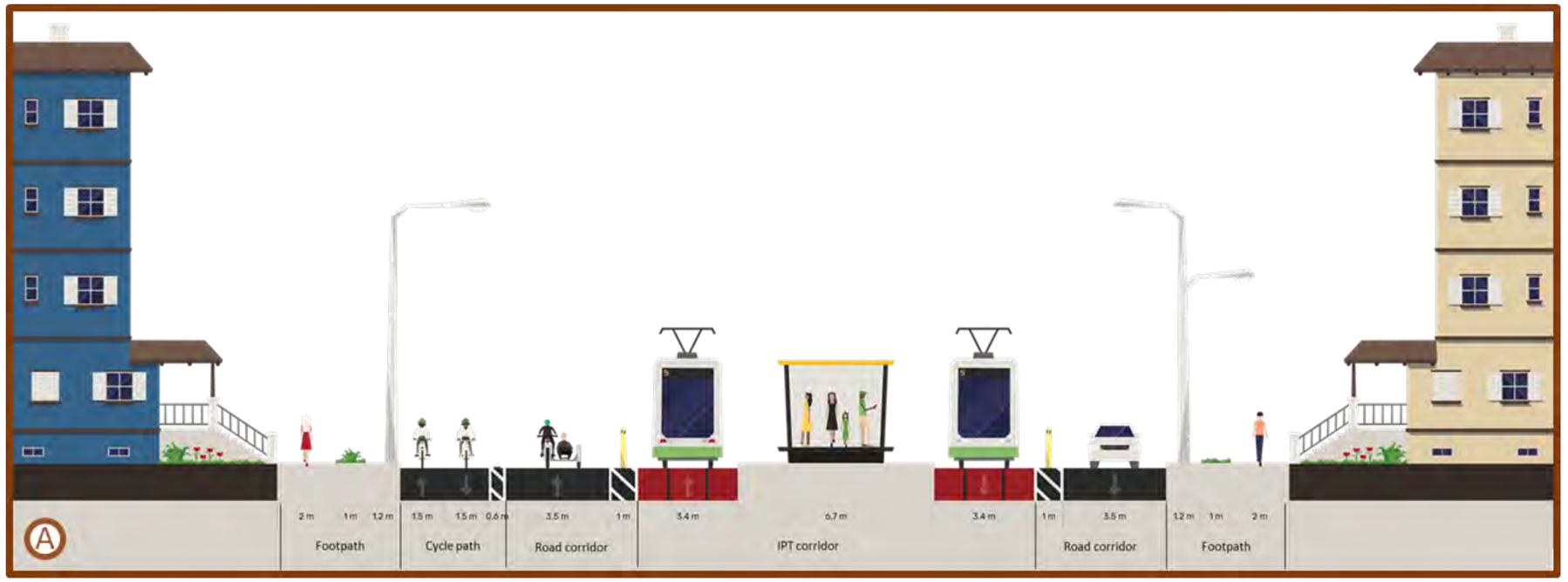


Figure 7.8 Southern Collector Road cross section

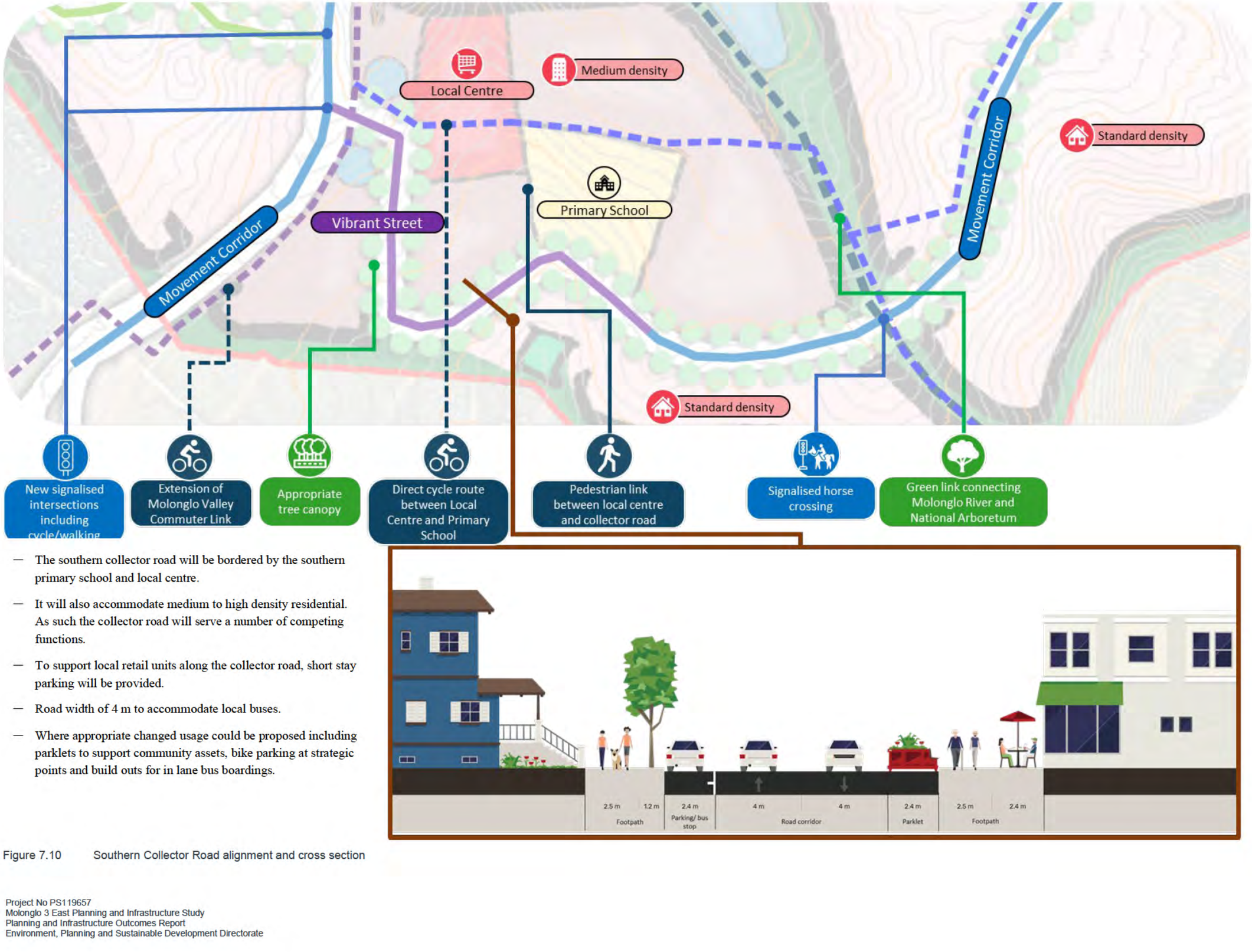
Note: Figure 7.8 is the recommended cross section at location A in Figure 7.7

- The north-western collector roads will connect the group centre with John Gorton Drive and Whitlam, crossing Coppins Creek. The cross-section shown is for the western of the two collector roads and connects to the existing built intersection on John Gorton Drive.
- The two collector roads will accommodate residential properties on either side of the road with increased density adjacent to the IPT corridor and associated stops.
- Construction of the intersection of this collector road with John Gorton Drive (Coppins Creek Road) has already been completed and includes provision for the IPT corridor along the centre of the road.

Figure 7.9 Main Street cross section

Note: Figure 7.9 is the recommended cross section at location B in Figure 7.7.

- Streets within the Group Centre will be designed as Places for People. Movement will be limited with the road corridor providing priority space for pedestrians and a low speed environment for vehicles (limited to less than 30 kph).
- This will be achieved through less intrusive measures including street furniture placement and paving.
- Footpaths fronting buildings will be wide with opportunity to provide outdoor seating, waiting areas and community facilities.
- The corridor is approximately 24 m at its widest point.



- The southern collector road will be bordered by the southern primary school and local centre.
- It will also accommodate medium to high density residential. As such the collector road will serve a number of competing functions.
- To support local retail units along the collector road, short stay parking will be provided.
- Road width of 4 m to accommodate local buses.
- Where appropriate changed usage could be proposed including parklets to support community assets, bike parking at strategic points and build outs for in lane bus boardings.

Figure 7.10 Southern Collector Road alignment and cross section

7.3 STREET TREES

Canberra's Living Infrastructure Plan outlines an action to achieve a 30 per cent tree canopy cover within Canberra's urban footprint. This will be recognised throughout the planned open space, including along the verges and medians, particularly along the collector roads.

TCCS guidelines and Austroads should be used when planning the implementation of these street trees. Stakeholder consultation with the Arboretum and PCS should also be included in this planning process. Both agencies have suggested a close coordination with the types of tree species used so they are complementary to neighbouring uses.

- The Arboretum has suggested unique trees be introduced at the gateways to the Arboretum to create a clear character and blur the interface with the Arboretum.
- PCS has asked that open space treatments and tree plantings should complement Conservation Area values.
- In general, plantings should integrate the conservation areas and development, with open space and collector roads being planted with native tree and shrub species to provide for wildlife connectivity through the suburb.

7.4 INTERSECTION CONFIGURATIONS

A number of key intersections have been reviewed as part of this report. The locations of the intersections are shown in Figure 7.11.

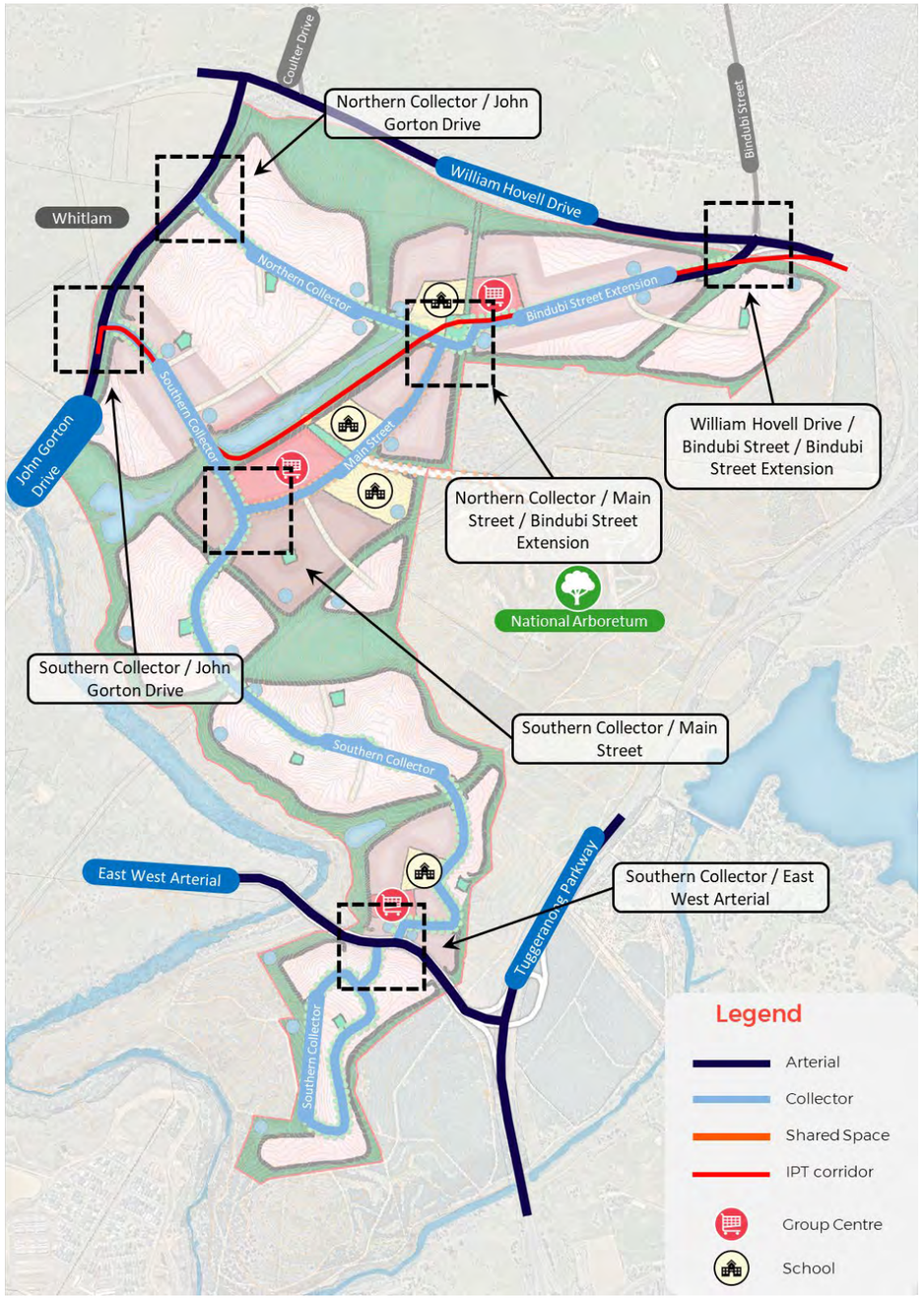
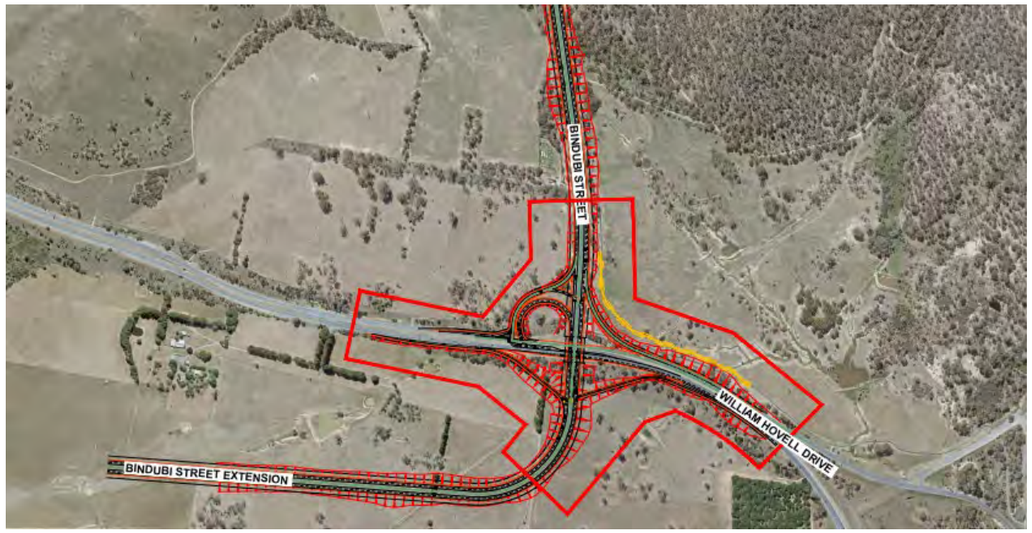


Figure 7.11 Road layout and intersection locations

7.4.1 WILLIAM HOVELL DRIVE/BINDUBI STREET/BINDUBI STREET EXTENSION



Source: Feasibility Study Report, Bindubi Street – William Hovell Drive grade Separated Interchange (Aecom, 2019)

Figure 7.12 William Hovell Drive/Bindubi Street/Bindubi Street Extension interchange lane configuration

This intersection (Figure 7.12) will provide the primary access from the site from the north. The proposed intersection remains consistent with previous work completed in the *Feasibility Study Report, Bindubi Street – William Hovell Drive Grade Separated* Interchange (Aecom, 2019). The intersection will be grade separated with free flowing slip roads allowing direct travel from:

- William Hovell Drive westbound towards Bindubi Road Extension south (towards Molonglo 3 site)
- Bindubi Street Extension towards William Hovell Drive east.

All other movements will require at least one traffic signal.

The proposed design accommodates IPT/light rail north towards Belconnen. Further investigations into the intersection arrangement will be required if the IPT/light rail route will travel east towards the City Centre. If this is to occur, it is suggested that the corridor remains south of William Hovell Drive and crosses William Hovell Drive (via an underpass) further east

7.4.2 NORTHERN COLLECTOR/MAIN STREET/BINDUBI STREET EXTENSION

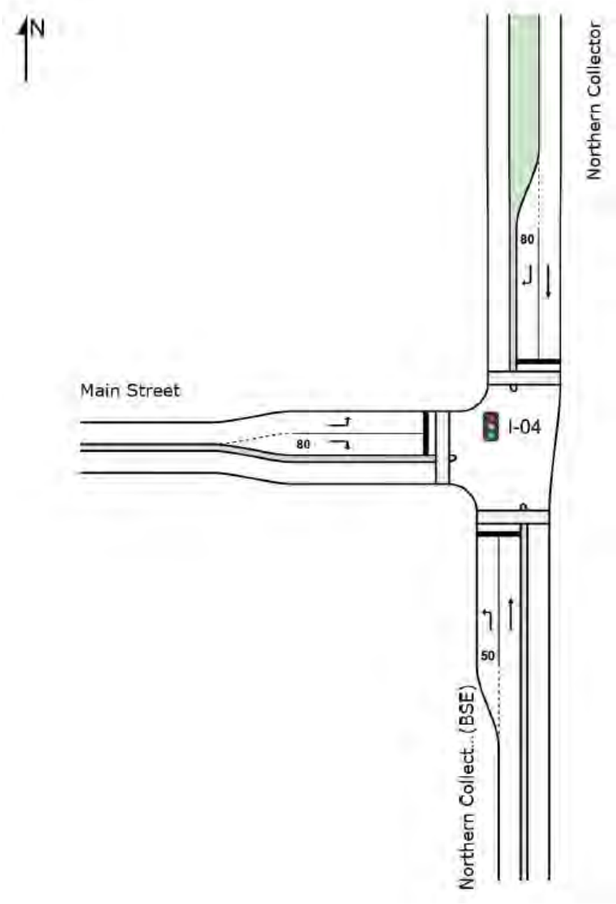


Figure 7.13 Northern Collector/Main Street lane configuration

This intersection (Figure 7.13) will serve as the main access point for Main Street, the group centre and Southern Collector. All approaches will have one lane which will fan at the interchange to provide turning lanes. The IPT corridor is decoupled at this point and additional signals are likely to be required for the IPT corridor west of this intersection.

7.4.3 NORTHERN COLLECTOR/JOHN GORTON DRIVE

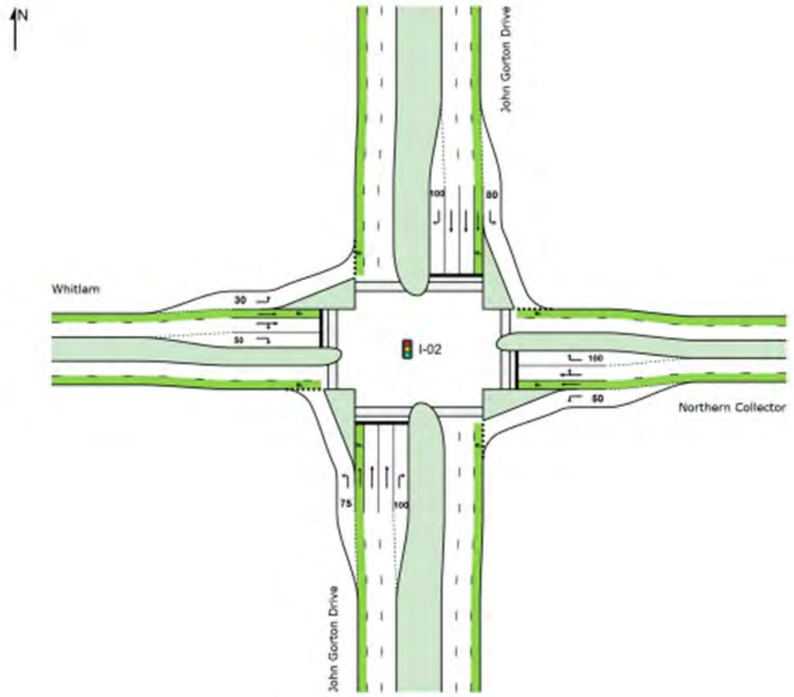


Figure 7.14 Northern Collector/John Gorton Drive lane configuration

This intersection (Figure 7.14) is one of two which exits the site to the north east on to John Gorton Drive. The intersection will be a four-way intersection and will also provide access to the new Whitlam development. On street cycle lanes are provided on all approaches. Local bus services connect Whitlam with the Molonglo Site 3 and IPT services will also traverse this intersection.

As part of upgrade works on John Gorton Drive, this intersection was completed in 2019. An aerial photo is shown in Figure 7.15.

Source: MetroMap, 2021

Figure 7.15 Constructed Northern Collector/ John Gorton Drive intersection

7.4.4 SOUTHERN COLLECTOR/JOHN GORTON DRIVE

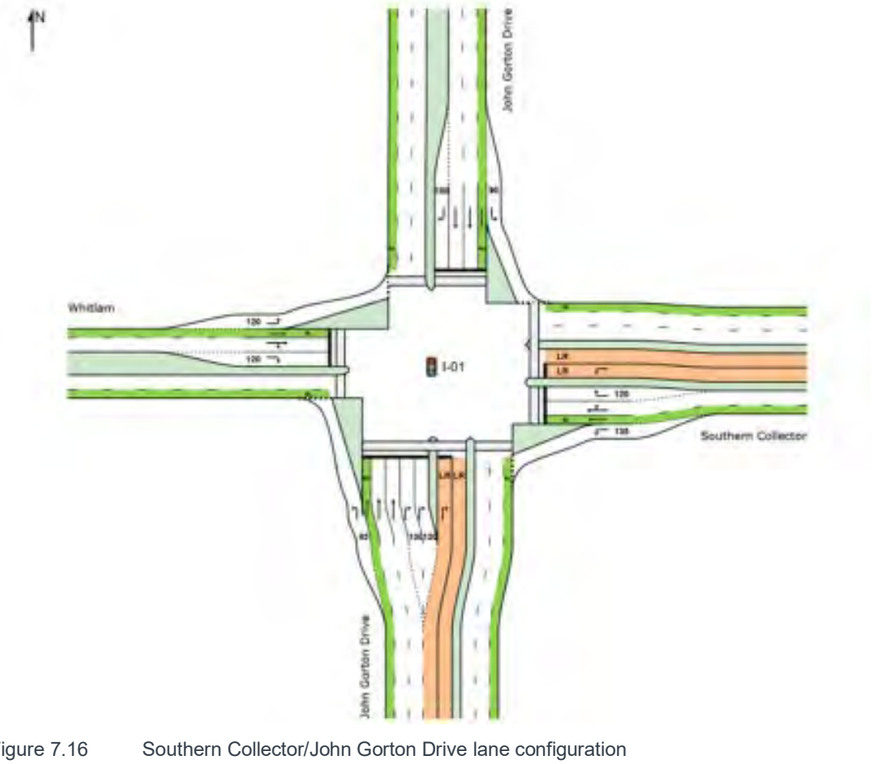


Figure 7.16 Southern Collector/John Gorton Drive lane configuration

This intersection (Figure 7.16) provides secondary access to the site from the north west via John Gorton Drive. This also provides additional access to Whitlam via a four-way intersection. The IPT corridor enters the intersection centre running and will operate from the Southern Collector south along John Gorton Drive towards the new Molonglo Commercial Centre.

As with the Northern Collector intersection, this intersection was completed as part of the John Gorton Drive upgrades later in 2020. An aerial photo of the completed intersection is shown in Figure 7.17.

Source: MetroMap, 2021

Figure 7.17 Constructed Southern Collector/ John Gorton Drive intersection

7.4.5 SOUTHERN COLLECTOR/MAIN STREET

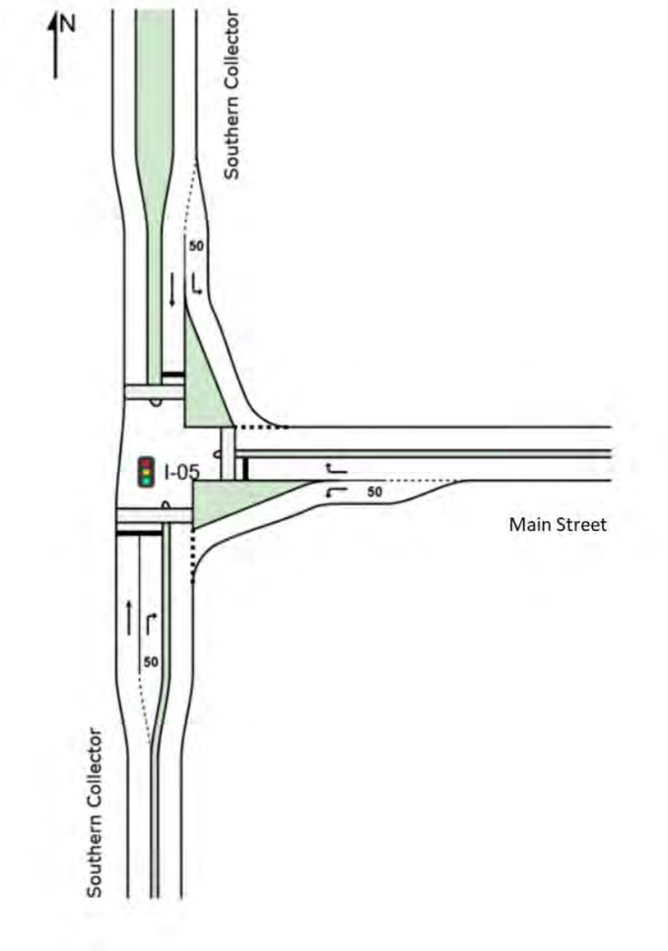
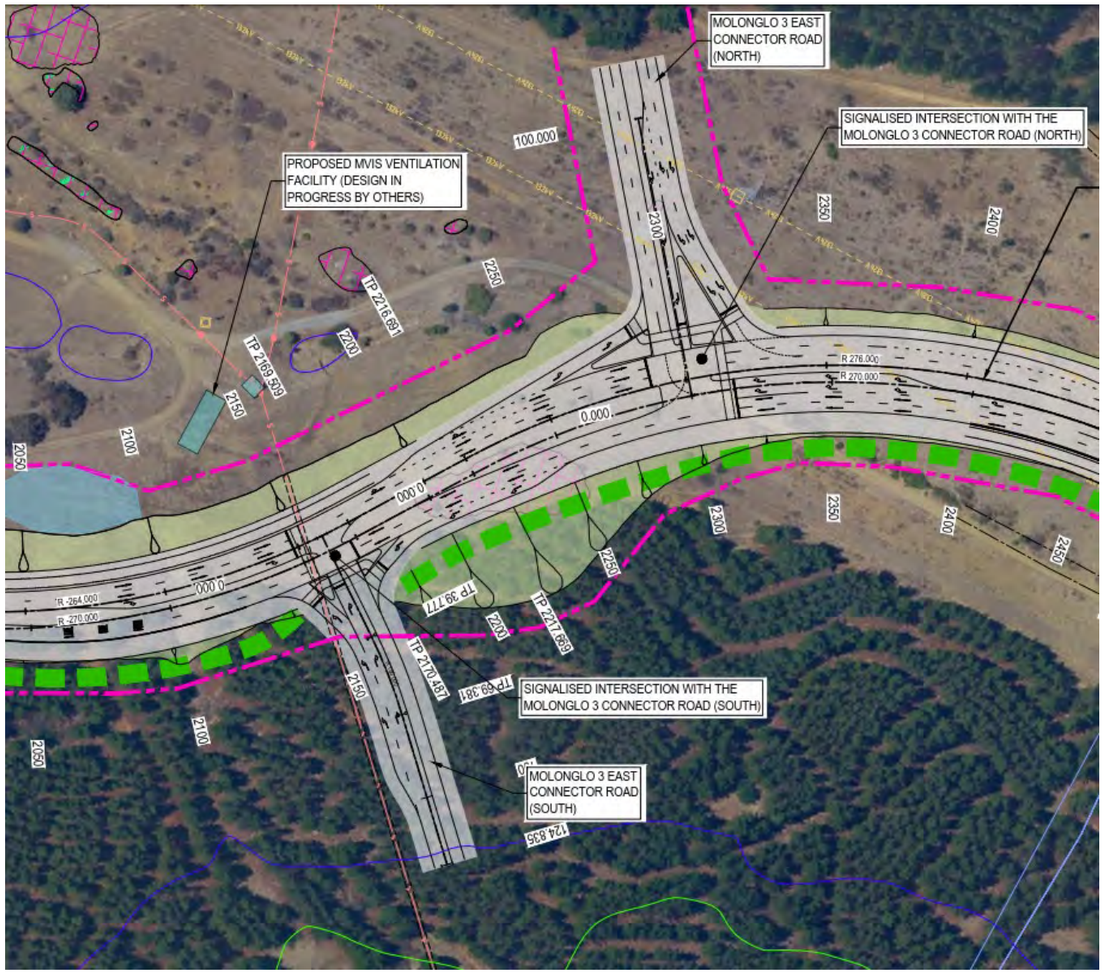


Figure 7.18 Southern Collector/Main Street lane configuration

This intersection (Figure 7.18) will link to the southern end of Main Street, providing access to the group centre and Northern Collector. All approaches will have one lane which will fan at the interchange to provide turning lanes. Both left turns will be "permitted at any time with care" reducing unnecessary delay on the intersection.

7.4.6 SOUTHERN COLLECTOR/EAST WEST ARTERIAL



Source: Molonglo East-West Arterial Road Feasibility Study and Molonglo Strategic Traffic Study (SMEC, 2020)

Figure 7.19 Southern Collector/East West Arterial lane configuration

This intersection (Figure 7.19) has been designed as part of the parallel East-West Arterial study. Several intersection arrangements have been investigated before landing on this preferred arrangement. The staggered T arrangement will be used to travel between the northern and southern portions of the site. Both intersections will provide opportunities for pedestrian crossing, as well as a pedestrian underpass to the east and west of this intersection.

7.5 INTERFACES

EDGE ROADS AND ASSET PROTECTION

Edge roads will provide bushfire abatement protection and provide evacuations routes as required. Whilst no collector or arterial roads are planned to run on the edge of the sites, local roads will form part of this network.

Local roads adjacent to the National Arboretum will require close consultation to ensure that they are complementary. In addition, consideration should be given to any plans for edge roads by the National Arboretum to avoid unnecessary duplication.

Local roads adjacent to the Molonglo River Corridor should also be developed in close consultation with PCS to ensure they are integrated within this environment.

NATIONAL ARBORETUM CANBERRA

The National Arboretum is a bordering neighbour of the Molonglo 3 East site. This presents both challenges and opportunities. Providing good and consistent access (particularly by horse, cycle or walking) will allow new residents to fully appreciate and connect with the arboretum site. For the Arboretum, the site provides the opportunity to provide additional access points for visitors as well as dovetailing on the improvements in active, equestrian and public transport networks afforded across the site.

This project supports the opportunity to provide additional accesses to the site for general access and during emergencies. This will also be of particular importance during events at the Arboretum. The adjacent site (and particularly the Group Centre) will be able to provide amenities for guests as well as good connections with mass rapid transport via the IPT corridor. Should events take place outside of peak times, additional parking can be made available through existing Group Centre car parks with patrons provided with shuttle buses to access the site.

7.6 EXISTING ACTIVE/PUBLIC TRANSPORT NETWORK COMMITMENTS

A robust multi-modal transport network that ensures both successful journeys and public activity and placemaking will be key to the ongoing success of the Molonglo 3 East site. This section reviews the current transport provision and how this will be developed for Molonglo 3 east site.

7.6.1 ACTIVE TRANSPORT AND EQUESTRIAN LINKS

Currently active transport and equestrian provision is primarily limited to the eastern side of Tuggeranong Parkway. The ACT Government has identified shared walking, cycling and equestrian routes alongside the Molonglo river as well as extension of the East-West Commuter route adjacent to the new East-West Arterial road link.

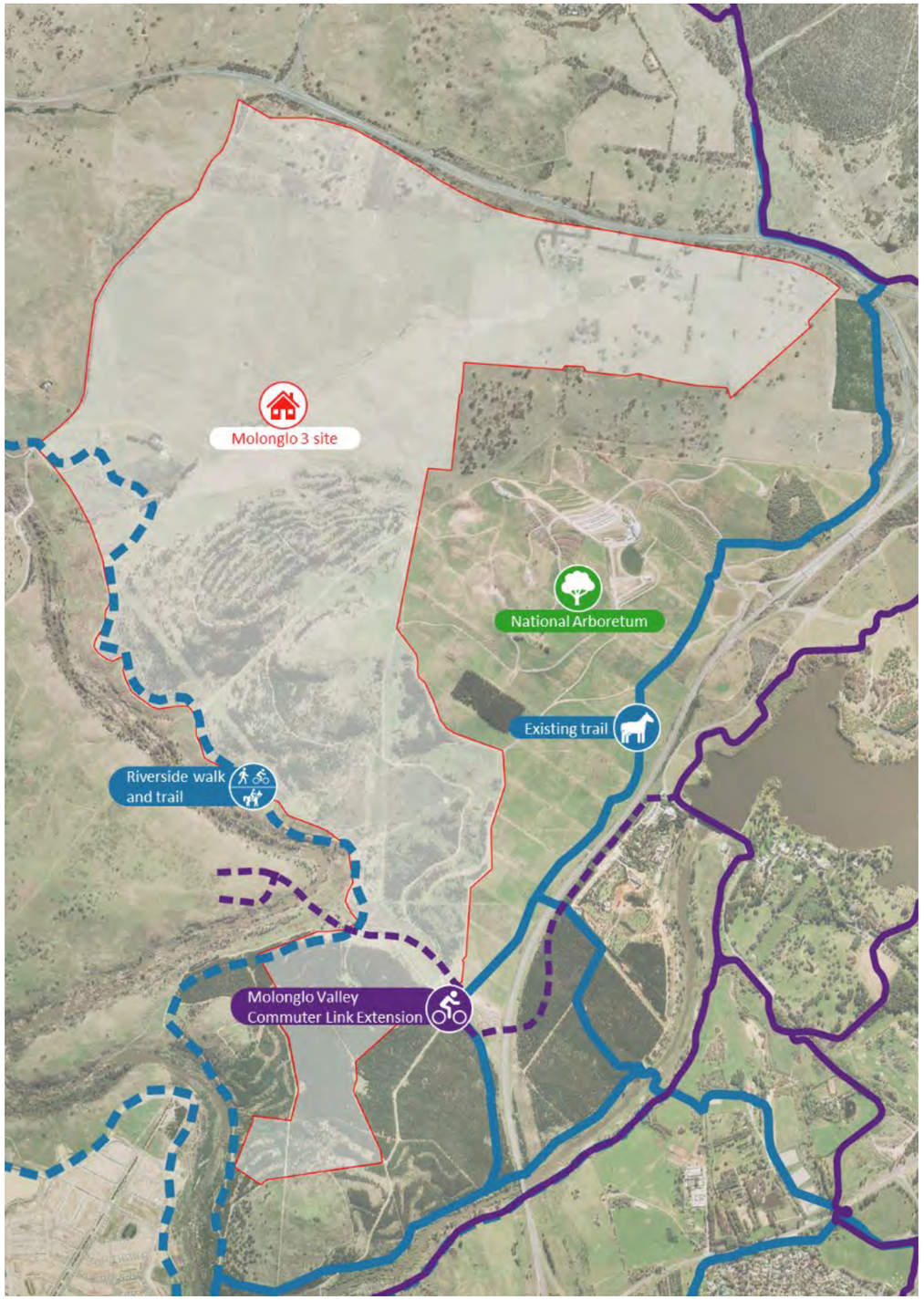


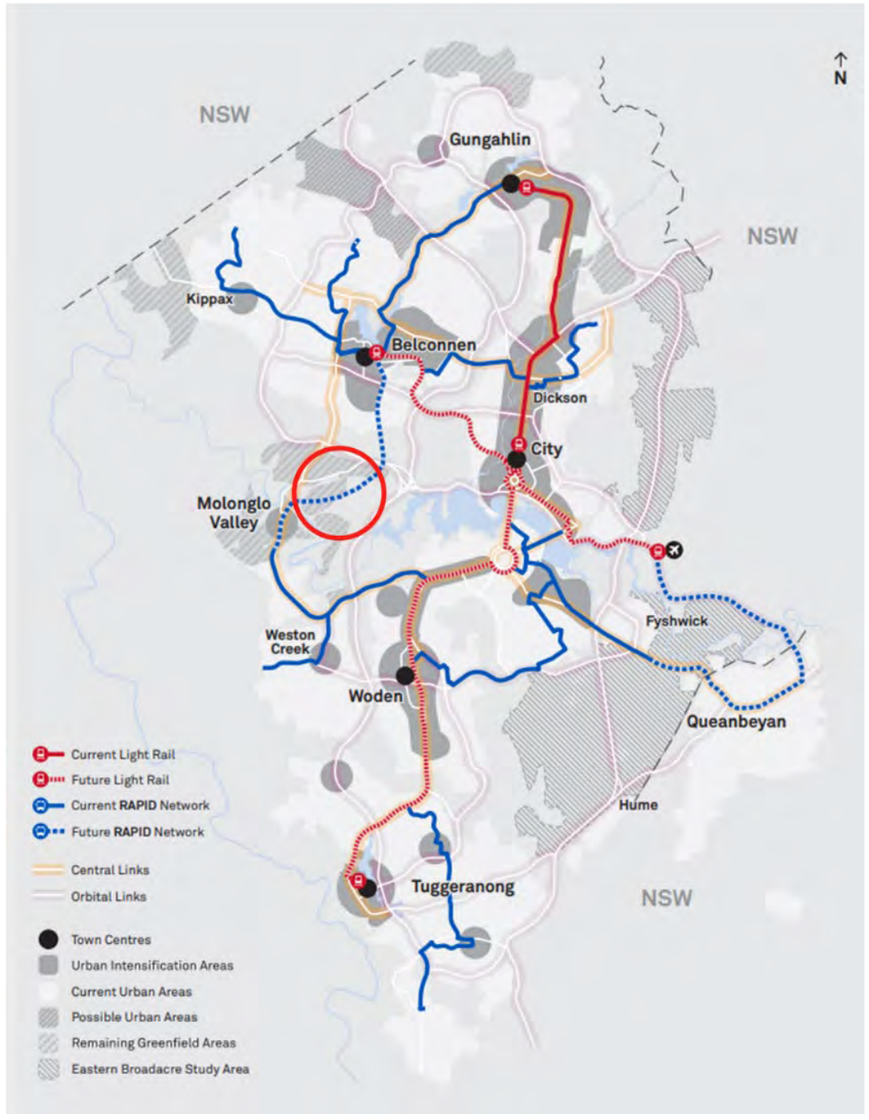
Figure 7.20 Current and identified active transport and equestrian network

Notes Location of Molonglo 3 site shown by red outline

7.6.2 PUBLIC TRANSPORT

Currently the site has no specific public transport provision in keeping with limited development of the current site. The closest provision are R10 rapid bus services which currently operate from Denman Precinct to the City Centre via John Gorton Drive.

The ACT Transport Strategy 2020 released in August 2020 identifies the rapid and light rail network across the territory. The Molonglo 3 site is projected to have a rapid network which will operate between Belconnen and the site via Bindubi Street. Whilst the form of this infrastructure is unknown at this time, the provision allows us to consider Intercity Public Transport (IPT) corridors within the site, particularly along the northern collector routes and as part of the wider intersection provision of Bindubi Street and Willian Hovell Drive.



Source: ACT Transport Strategy 2020, ACT Government 2020

Figure 7.21 Future Light Rail and Rapid network

7.7 ACTIVE TRAVEL NETWORK

7.7.1 ACTIVE TRAVEL PRINCIPLES

Active travel provides the most sustainable and healthy mode of transport for local trips within the precinct, longer distance commuter routes and as a recreational activity.

The active transport principles for the Molonglo 3 East precinct include:

- Provide Disability Discrimination Act (DDA) compliant footpaths on both sides of all collector roads and local roads where appropriate.
- Provide a mix of separated pedestrian and cyclists paths, as well as providing shared paths and shared zones to create an environment that accommodates and prioritises active transport, are that are designed to cater for the demand and minimise conflicts.
- Establish a network of bike paths, running tracks and potentially integrating an exercise courses across the precinct.
- Leverage the unique position of the development to tie in active transport with existing paths in the National Arboretum Canberra.
- Connect equestrians with the existing and proposed trains through the National Arboretum and Molonglo River Corridor.
- Provide enclosed walking connections between key buildings in the group centre, where practical.
- Accommodate a bike/scooter share program within the precinct, with pick up/drop off zones at key locations such as the group centre, local centres, schools and public transit stops.
- Avoid or limit impact of steep gradients within the Molonglo 3 site.
- Further discussion of the pedestrian, cycling and equestrian networks through the precinct are included in section 7.7.2 to 7.7.5.

7.7.2 PEDESTRIAN CONSIDERATIONS

The pedestrian network within Molonglo 3 will be a mixture of footpaths which runs parallel to roads, dedicated paths linking key centres with residential areas, green links and riverside walks linking the Molonglo River with the National Arboretum.

The type and dimensions of footpaths will be determined by its Movement and Place classification, whether it will be multi-modal (accommodating either cycles or equine) and will be responsive to neighbouring land uses. Special consideration should be given to crossing of Collector and Arterial routes and around sensitive land uses such as schools and aged care housing. This will be of particular importance when crossing wide IPT and road corridors where mid island crossing refuges may be required. Guidance for footpaths are drawn from the ACT Government's Estate Development Code. All footpaths on collector roads should aim for a minimum width of 2 m, with greater width proposed in areas of high footfall.

Where private motorised vehicles are not permitted or the corridor prioritises high quality pedestrian environments, permeable streetscapes should be favoured. These should be integrated closely with public transport modes and complementary land uses.

Links to public transport stops should be considered as part of a "whole of journey approach". This is of particular importance for rapid transit stops which can service catchments of up to 800 m. Furthermore, consideration should be given to ensuring that routes are secure, providing surveillance and lighting.

Crossing points should be provided at suitable intervals along collector routes. Priority should be given to siting these outside of heavy demand and/or where vulnerable users may be present such as in front of schools or group centres. A dedicated pedestrian crossing should also be provided over Coppins Creek, linking the western residential areas with the Group Centre.

7.7.3 CYCLING CONSIDERATIONS

Cycling provision within the Molonglo 3 East precinct should seek to accommodate local, commuter and recreational cyclists. The Molonglo 3 site is strategically placed adjacent to the existing Belconnen – Tuggeranong Cycle Route and proposed Molonglo Valley Commuter Link. Improving connection to this link and extending it to other development sites within the Molonglo Valley will provide future residents with excellent cycling connectivity to the City Centre.

Locally, the network should seek to connect residents with group centres, school and IPT stops for interchange as well as connecting residents to the Molonglo Valley Commuter Link for onwards travel.

7.7.4 PROPOSED ACTIVE TRANSPORT NETWORK

The proposed active transport network seeks to balance local needs with those of visitors and is shown in Figure 7.22.

The network will consist of on road footpath, off road trails, shared paths and dedicated cycling facilities. Whilst the majority will be adjacent to roads, specific links will be created between key destinations and the minimise changes in height as much as possible:

- The Molonglo 3 site will benefit from some of the most picturesque vistas within the territory. Linking the National Arboretum site with the Molonglo River through Green Links will help to merge them through the urban site. Recreational paths will be created on both the green links and around Coppins Creek, to encourage active transport and link residential sites with these natural features.
- Extension of the Molonglo Valley Commuter Link is provided across the Tuggeranong Parkway and will run north of the proposed East-West link road.
- To the north of the proposed East-West link, a new shared cycle and pedestrian route will be created. This will border both the southern Primary School and Group Centre. The route will provide direct access between the southern part of the site, the Molonglo Valley Commuter Link and key amenities.

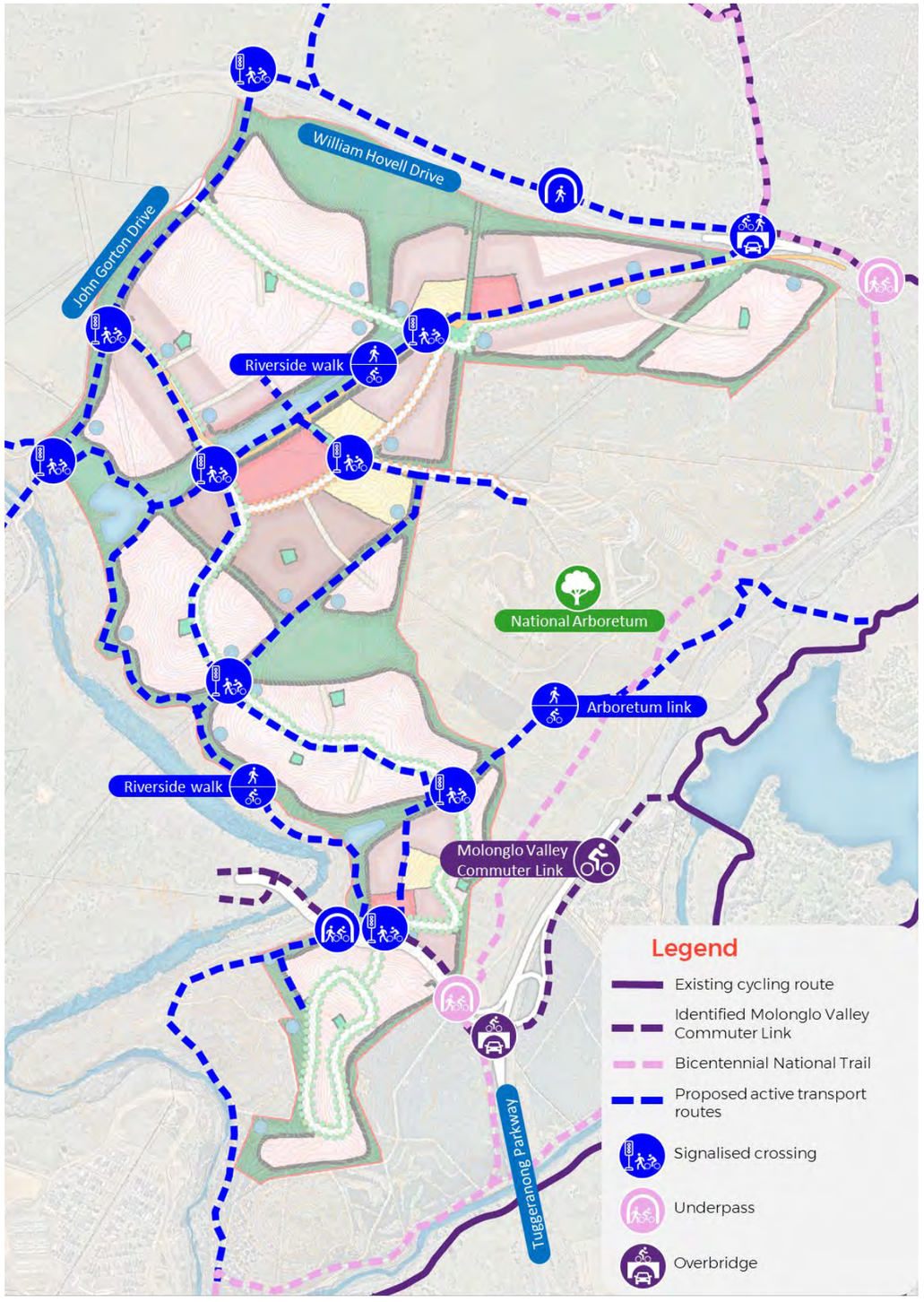


Figure 7.22 Proposed active transport network

7.7.5 EQUESTRIAN CONSIDERATIONS

Equestrian trails play a key recreational role both to and through the proposed Molonglo 3 East site. There are a number of stables and the ACT Equestrian Association (ACTEA) Equestrian Park within short riding distance from the Molonglo site.

Existing equestrian trails currently run to the south and east of the site providing access through the National Arboretum. As part of the Planning Design Framework, additional trails have been identified along the Molonglo River which primarily form the western boundary of the site.

7.7.6 PROPOSED EQUESTRIAN NETWORK

To complement these trails, and to provide connection through the site, a "Green link" is proposed. This link will connect the proposed western equestrian trail via the "Green Link" which is identified for north of the southern local centre and primary school. Via the National Arboretum, the proposed trail will connect with the existing equestrian trails to the east of the site. This network is shown in Figure 7.23. Note, a number of these routes are also shared by a variety of users.

A number of underpasses and signalised equestrian crossing are proposed as shown. These should consider and refer to the ACT Government's Active Travel Design Guides particularly in relation to clearance heights for horse and rider (both on existing and proposed) and in the provision of signalised horse crossing with higher push buttons. Canberra's first signalised horse crossing was installed on Streeton Drive in 2015.

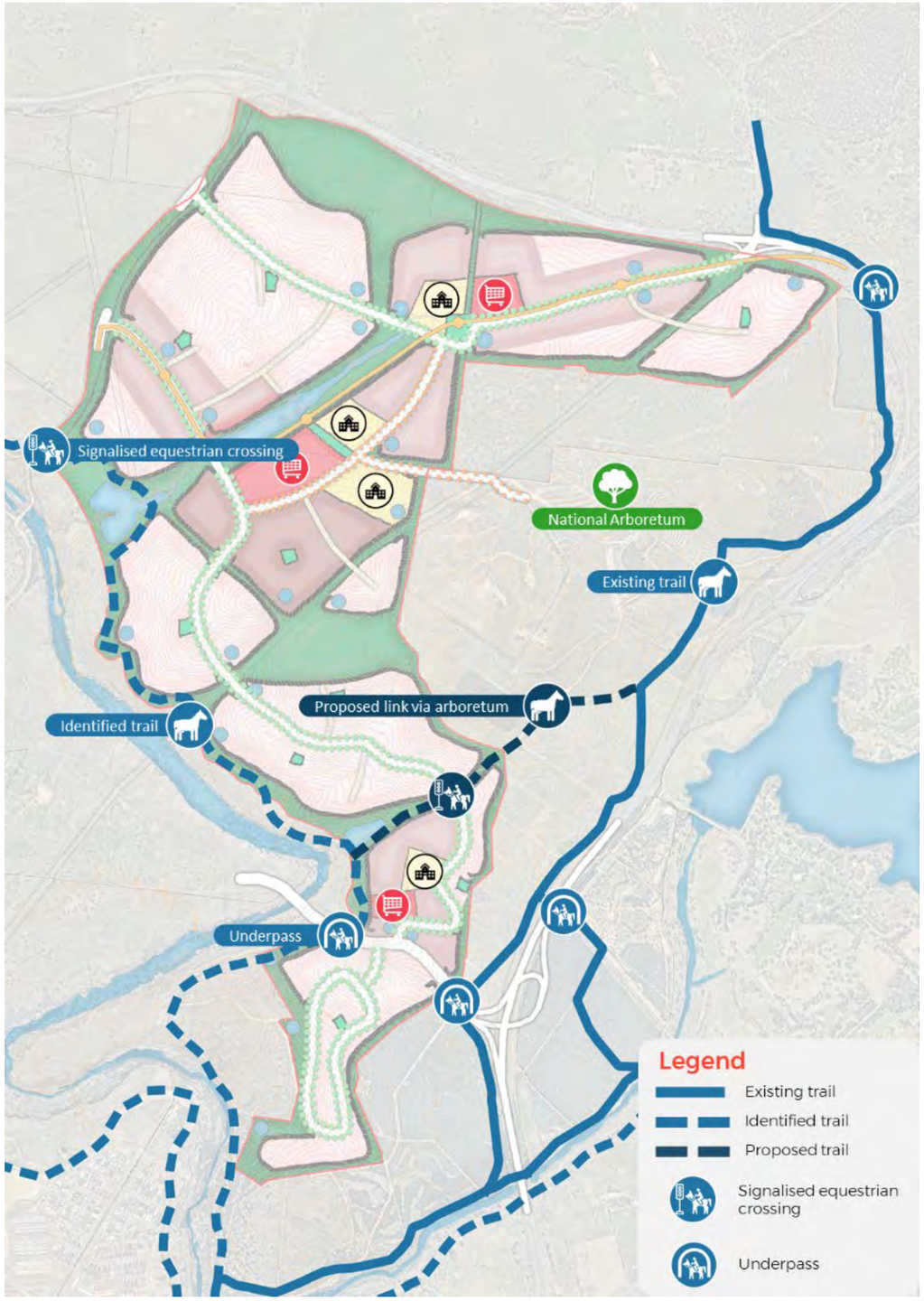


Figure 7.23 Proposed equestrian trail network

7.8 PUBLIC TRANSPORT NETWORK

7.8.1 PUBLIC TRANSPORT PRINCIPLES

The proposed public transport network within the site will look to connect local bus services with the IPT network for destinations outside of the precinct.

The public transport principles for the Molonglo 3 East precinct include:

- Design the public transit network to encourage residents to use these services for journeys for employment, education, shopping or recreation.
- Accommodate flexibility in public transport options and not preclude future transit services such as light rail.
- Strengthen the pedestrian and cyclist connections from residential streets to key public transit stops.

The public transport network is indicatively shown in Figure 7.25.

7.8.2 IPT CORRIDOR OPTIONS

The IPT corridor will accommodate rapid transit services between the Molonglo 3 site and key centres including the City Centre and Belconnen.

Whilst no formal commitment is in place, the principles of the corridor has been based on that of light rail services, considered to be the highest viable option in the public transport hierarchy. In total, a width of 13.5 m is recommended for a light rail stop with an island platform (*Guidelines for Light Rail Planning: 01 Corridor Preservation, TCCS 2019).* For this assessment a minimum of lane width of 3.4 m has been used with an island platform of 6.7 m. Should a bus rapid transit or standard bus-based solution be progressed then the minimum lane width would increase to 4 m and should be considered in terms of corridor width provision.

Figure 7.24 shows the planned IPT corridor. A principal of preferring side running has been used for this study as this provides improved access to stops for passengers and better facilitates vehicular movement along Bindubi Street Extension. Further design work would be required as scheme progresses on precise alignment.

Features of the IPT corridor include:

- Crosses under William Hovell Drive and Bindubi Street Extension via two underpasses.
- Is located side running, to the north of Bindubi Street Extension.
- Crosses the Northern Collector to the west of the intersection with Main Street/Bindubi Street Extension.
- Is located in its own corridor past the group centre, along Coppins Creek.
- Crosses to centre running along the Southern Collector to accommodate the reservation at the John Gorton Drive/ Southern Collector intersection.

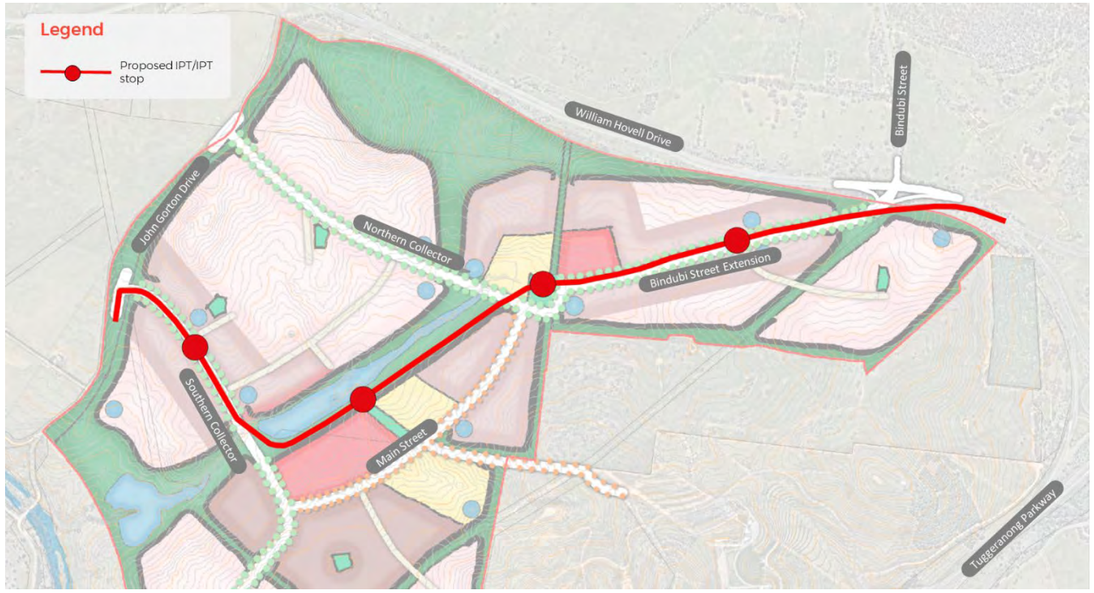


Figure 7.24 Proposed IPT corridor

BUS RAPID TRANSPORT (BRT)

It is likely that a rapid bus system similar to those as part of the Transport Canberra Rapid Network would be used initially with other modes developed over time as development is realised. This would follow the same corridor from Canberra City to the Molonglo Commercial Centre. There are opportunities for this service to run with general traffic prior to the IPT being established. Once established, the service can run in a dedicated busway which will assist in improving travel times for the service. This IPT can then be converted to a light rail or other emerging technology in the future.

LIGHT RAIL

As discussed above, the IPT corridor has been based on a future light rail service. The *Transport Canberra Guidelines for Light Rail Planning* have been reviewed, these can be found in Appendix A. It is likely that a bus service will service the initial stages of the precinct, however the corridor planning should still meet the requirements for light rail to allow for future transport solutions.

Other solutions including guided bus, electric vehicles or other emerging technology could be considered with consideration for suitable infrastructure and reservation planning put in place.

7.8.2.1 IPT TRANSIT STOPS

Transport stops should be designed to a high standard and include shelter, seats and real time information. Accommodation of high capacity and quick boarding and exiting from vehicles should be considered.

Interchange with other modes, through signposting, close location of local bus services stops, and secure bike parking facilities should be considered. Stops which are located away from collector roads should have good access and be well lit.

7.8.3 LOCAL BUS ROUTES

One local bus route is proposed connecting the southern section of the development site with Whitlam via the Southern Collector and Main Street. Indicative stop locations are shown in Figure 7.25. This service (combined with the IPT) provides catchment for nearly 95 per cent of the proposed development site.

The local bus route seeks to connect residents with local centres, schools and the group centre and for interchange with the IPT corridor for onwards travel. The main intersection point will be within the group centre which will also promote use of local retail during interchange times.

Depending on demand, future consideration should be given to providing on-demand bus services for the precinct.

7.8.3.1 LOCAL BUS STOPS

Bus stops will provide a minimum of a flag and timetable information with high demand stops also having seating and shelter provision. The bus stops should also be paired to allow for people to board and alight the bus at the same location.

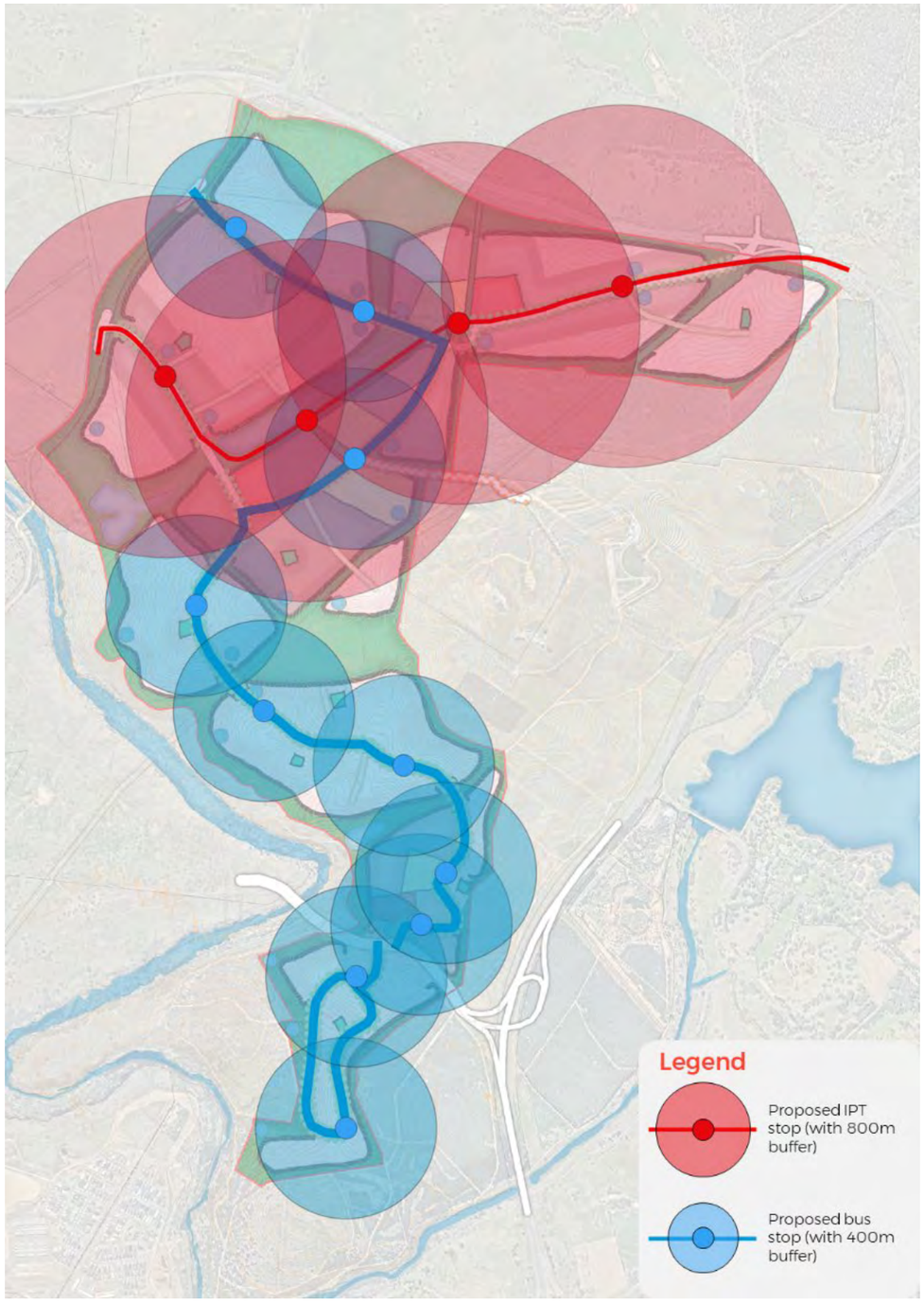


Figure 7.25 Proposed public transport network with catchment

7.9 TRAVEL DEMAND MANAGEMENT

For the Molonglo 3 East precinct to be sustainable and successful, travel demand management (TDM) should be applied to reduce reliance on private vehicles (particularly single-occupancy). Strategies are needed to encourage demand to other non-private vehicle modes. These strategies benefit the customer/resident, improving travel choices and adding flexibility to the journey options.

TDM strategies which have been considered for the development have been included in Table 7.2.

Table 7.2 Travel demand management measures

Strategy	Travel Demand Action
Provide a mixed-use community	The location of the proposed higher density development takes advantage of walkable access to transit stops, local centres, schools and open space.
Promote sustainable transport options	The streets are pedestrian and cycle friendly with improved amenity, infrastructure and connectivity.
	Cycling will be a convenient and safe option with wide roads and a slow speed environment.
	The cycling network ties into two commuter cycling routes to the north and south of the precinct.
	A convenient and rapid public transport option operates through the precinct.
Encourage changes in travel behaviour	Provide comfortable bus stop facilities to reduce the weather impact of using public transport.
	Provide ample supply and quality of bicycle parking or end-of-trip facilities.
	Support innovative bicycle/scooter share programs throughout the precinct.
Reduce the amount of travel	Increase community facilities within the precinct so residents do not have to travel outside the precinct for shopping, appointments, recreation, etc.
Increase joint planning with adjacent developments and users	Integrate transport demand and alternative transport options with nearby land-uses including the Molonglo Commercial Centre.
Limit parking provision	Introduce smart parking initiatives around the commercial and community centres to encourage efficient parking, i.e. limited to short stay parking.
	Parking provisions kept to a minimum.
	Majority of parking located at the periphery of the group centre/local centres with only accessible spaces located close to the hubs.

7.10 FUTURE MOBILITY

Future Mobility refers to the transport, technology, and mobility changes that will become the foundation of future transport systems. The five emergent themes identified for future transport systems are illustrated in Figure 7.26.

Relevant opportunities for further consideration within the Molonglo 3 East development area include:

1 Automated:

- Self-parking capabilities that reduce required manoeuvring space (and therefore footprint) of parking areas around the group centres and local centres. Opportunities to reclaim car parking space for public open space or other public uses.
- An increase in drop-off and pick-up movements, and need for higher capacity zones to accommodate this. This includes short-term pick-up bays adjacent to shops, and kerbside space allocated for ride share uses.
- Increased automation of vehicles used for internal distribution/movement of goods and refuse onsite.

2 Connected vehicles, transport systems, and networks:

- Near real-time information on car parking, traffic or disruptions reported via apps to inform trip-making through the precinct. This becomes more relevant with event parking to access the National Arboretum Canberra.

3 Electric vehicles (estimated to make up 50 per cent of vehicles on Australia's roads by 2040 (ACT Government, 2019):

- Provide and prioritise electric vehicle parking bays over standard parking bays.
- Ensure bus infrastructure meets requirements for zero-emission buses, acknowledging ACT's commitment to transition Transport Canberra buses to zero emissions by 2040.

4 Shared use, including Mobility as a Service (MaaS):

- Reduced demand for vehicle parking, but increased demand for drop-off and pick-up zones.
- Operation of shared use schemes through the precinct, concentrated in areas of higher population density.
- The potential for any new car parks to be fully or partially adapted for different users in the future should be considered during the associated car park design development.

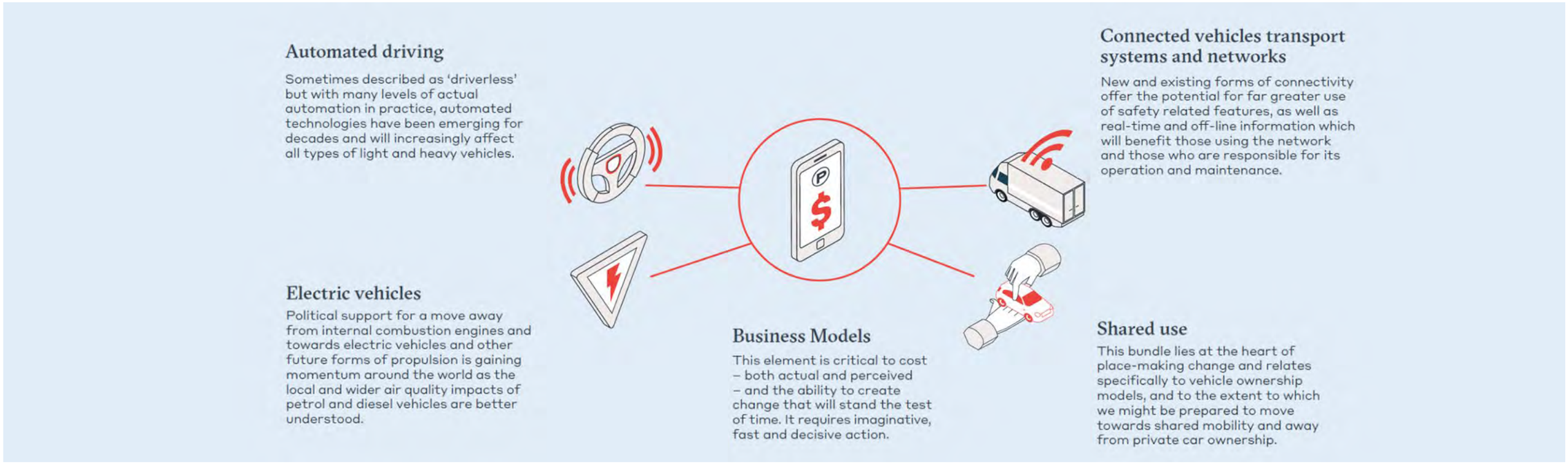


Figure 7.26 The five emergent themes of New Mobility

7.11 TRANSPORT MODELLING RESULTS

Whilst we appreciate the mega societal trends and future mobility advancements are likely to impact journeys within, to/from and through the site; to be conservative and consistent with the regional Canberra network we have undertaken traffic modelling using the current strategic models and the land use and transport scenario assumptions contained within. The mode share and land use assumptions used within the modelling are consistent with Transport Canberra's Canberra Strategic Transport Model (CSTM).

Two project options involving different road network configurations and light rail alignments have been considered using the CSTM in the 2041 future year. The Transport Modelling Report is included in Appendix E. This section provides some commentary on how the model results should be interpreted in the context of the preferred transport network.

A brief description of each project option modelled using CSTM is given below:

- In Project Option 1, the IPT/light rail runs along Bindubi Street Extension and two collectors connect northern neighbourhoods to John Gorton Drive and the Southern Collector runs north-south through the precinct.
- In Project Option 2, the IPT/light rail follows Coppins Creek and runs parallel to Bindubi Street Extension. The Northern Collector and a local road connect northern neighbourhoods to John Gorton Drive and the Southern Collector runs north-south through the precinct.

Project Option 1 which represents the preferred concept plan, was investigated further with five intersections modelled using SIDRA analysis. This analysis helped to understand the performance on the adjoining arterial roads and confirm the geometry at key locations within the development. The five key intersections investigated were:

- William Hovell Drive/Bindubi Street Extension
- John Gorton Drive/Northern Collector Road
- John Gorton Drive/Bindubi Street Extension
- Northern Collector Road/Bindubi Street Extension
- Southern Collector Road/Bindubi Street Extension.

The CSTM analysis shown in Table 7.3 (AM) and Table 7.4 (PM) indicates the future road network performance in 2041.

Table 7.3 CSTM Performance metrics along key corridors (inbound | outbound direction) – AM peak hour

Corridor Features			Congested Speed(kph)		V/C	
Name	Lanes	Speed	Project Opt 1	Project Opt 2	Project Opt 1	Project Opt 2
Bindubi Street Extension	2	60/40	59 | 7	59 | 6	0.40 | 1.21	0.41 | 1.27
Northern Collector	2	50	49 | 49	24 | 47	0.46 | 0.45	0.99 | 0.65
Southern Collector	2	50	46 | 49	19 | 49	0.74 | 0.40	1.02 | 0.29
Collector/Local Road	2	various	59 | 7	49 | 34	0.31 | 1.23	0.34 | 0.94
John Gorton Drive	4	70	66 | 63	68 | 68	0.66 | 0.78	0.49 | 0.51

Table 7.4 CSTM Performance metrics along key corridors (inbound | outbound direction) – PM peak hour

Corridor Features			Congested Speed(kph)		V/C	
Name	Lanes	Speed	Project Opt 1	Project Opt 2	Project Opt 1	Project Opt 2
Bindubi Street Extension	2	60/40	9 | 57	6 | 57	1.15 | 0.59	1.24 | 0.61
Northern Collector	2	50	48 | 48	46 | 13	0.48 | 0.55	0.71 | 1.07
Southern Collector	2	50	48 | 44	49 | 18	0.55 | 0.79	0.43 | 1.03
Collector/Local Road	2	various	10 | 59	38 | 49	1.13 | 0.39	0.90 | 0.33
John Gorton Drive	4	70	63 | 63	67 | 67	0.77 | 0.76	0.56 | 0.60

Observations from the CSTM analysis and its implications for the proposed transport network include:

- The volume/capacity ratio is greater than one along Bindubi Street Extension, indicating that the proposed one lane in each direction will not meet the modelled demand in the AM and PM peak in 2041. In this CSTM model, Bindubi Street Extension has been modelled with one traffic and one public transport lane in each direction.
- It is not proposed to increase the capacity of Bindubi Street Extension with an additional traffic lane. The Transport Modelling Report suggests that there is some degree of "rat-running" through the site, along the Bindubi Street Extension corridor. The proposed transport network aims to mitigate this through a slow speed environment and traffic calming measures around the group centre.
- The public transport and active transport network has also been designed to promote these modes and reduce the reliance on private vehicles.

The SIDRA analysis followed the CSTM analysis, using the projected volumes to investigate the key intersections in the proposed transport network. The analysis also identified risks and opportunities for the intersections in the surrounding arterial network.

The AM peak modelling results are shown in Table 7.5 with all results included in Appendix E.

Table 7.5 AM peak SIDRA results

No	Intersection	Flow	Degree of saturation	Ave Delay (s)	Cycle time (S)	95th percentile queue (m)				LoS
						South	East	Nth	West	
1	John Gorton Drive/ Southern Collector	3,654	0.90	49	120	87	142	268	113	D
2	John Gorton Drive/ Northern Collector	3,722	1.03	54	100	242	88	211	254	D
3a	Bindubi Street/ William Hovell Drive/ Bindubi Street Extension	4,998	1.29	258	150		571	182	1067	F
3c	Bindubi Street/ William Hovell Drive/ Bindubi Street Extension	4,391	0.81	21	150	151		10	184	B
3d	Bindubi Street/ William Hovell Drive/ Bindubi Street Extension	1,669	0.45	6	150	52	3	15		A
4	Northern Collector/ Bindubi Street Extension	1,151	0.86	27	70	133		41	25	B
5	Southern Collector/ Bindubi Street Extension	1,220	0.71	16	50	46	56	13		B

The intersections within the development (intersection 4 and 5) operate below capacity assuming single lane approaches with turning lanes. The intersections along John Gorton Drive (intersection 1 and 2) have been modelled as currently constructed. The SIDRA analysis results indicate that these intersections are operating near to capacity. The William Hovell Drive and Bindubi Street intersection was modelled as shown in the *Bindubi Street – William Hovell Drive Grade Separated Interchange feasibility Study Report* (AECOM, 2019). The results indicate that the westbound right turn from William Hovell Drive into Bindubi Street and the eastbound William Hovell Drive through movements experiencing long delays and queues.

Further traffic modelling and intersection refinements would be required to the William Hovell Drive and Bindubi Street intersection to ensure it meets the needs of the future precinct.

7.11.1 ROAD CLASSIFICATION

As discussed in section 7.2.2, the precinct will have a variety of road types; local and collector roads. The ACT Estate Development Code (2013) outlines considerations for allocating the road type. One of these metrics is traffic volumes, see Table 7.6 for more information.

Table 7.6 Street hierarchy for estates in residential zones and CZ5

	Rear lane	Access street A	Access street B	Minor collector	Major collector
Design speed (km/h)	30	30	60	60	70
Traffic volume (vpd)	0–160	0–300	301–1000	1001–3000	3001–6000

The CSTM modelling results output the traffic flows in a peak one hour volume only, whilst the guidelines are for a number of vehicles per day. Therefore, they cannot be directly compared. However, the AM and PM results indicate that these planned Collector Roads will likely be categorised as a Major Collector purely on traffic volumes. These collector roads are planned for a posted 50 or 60 km/h speed limit (60 km/h on Bindubi Street Extension only). It is likely that these Collector Roads will form their own "slow speed collector" category

7.11.2 TRANSPORT MODELLING CONSIDERATIONS

The current traffic analyses do not include the development of areas to the west of Molonglo in the Western Edge Investigation Area (WEIA). If urban development were to proceed in the WEIA then the traffic flows on the arterial roads surrounding the Molonglo 3 East area would likely change significantly in the longer term (15 plus years) and could also conceivably impact on the traffic and use of the local urban areas also. These impacts will be investigated in future studies.

8 INFRASTRUCTURE STRATEGY

8.1 OVERVIEW

Molonglo 3 East has minimal existing infrastructure within the study area, and the limited infrastructure that can be found within the site is often large-scale trunk services that limit connection availability. The adjacent residential development of Whitlam is the first stage of development in the area, and the infrastructure planning that has been incorporated into Whitlam includes some consideration to the Molonglo 3 East development. Water supply and wastewater for the Molonglo 3 development has been previously designed to the concept level and connections have therefore been allowed for as part of previous planning and design works. Stormwater management and Water Sensitive Urban Design (WSUD) strategies have been considered, with a focus on protection of the Molonglo River in terms of environmental and ecological considerations.

The proposed site is approximately 590 ha, with around 480 ha of developable area. The existing topography of the land slopes from approximately RL 630 m to RL 530 m, with a grade averaging between 5–7 per cent. The highest point of the site is amongst the hills located along the eastern boundary. The south-western corner of the site, adjacent Molonglo River is the lowest part of the site. Considerations to the undulating topography has been a key challenge to the infrastructure strategy. An elevation heat map model depicting the contours of the site can be found in Drawing PS119657_CIV_LP003 from the Civil Drawing Package in Appendix D.

8.2 KEY DESIGN CONSIDERATIONS

The following items have been critical in developing the following infrastructure strategy:

- **Existing Weetangera Reservoirs** – These reservoirs are the proposed potable water supply to the Molonglo 3 development. Existing water main infrastructure is available for connection to the north-west of the development area along John Gordon Drive, adjacent the recently constructed Whitlam suburb. Previously conducted concept studies of the water supply to the development area and communication with ACT Government stakeholders have confirmed the viability of this water source.
- **Existing Molonglo Valley Interceptor Sewer (MVIS)** – The MVIS is an existing 1950 mm diameter sewer main adjacent the south-west site boundary, that is proposed to drain the wastewater from the proposed Molonglo 3 development site. The internal sewer main infrastructure proposed as part of the infrastructure strategy is all to be connected to the MVIS, and subsequently carried to the Lower Molonglo Sewer Treatment Plant.
- **Protection of the Molonglo River** – A key outcome of workshops and communication with the ACT Government stakeholders has been the importance of maintaining the environmental and ecological protections of the Molonglo River. Therefore, the Water Sensitive Urban Design (WSUD) strategy has been a key focus of this assessment. The communication with the ACT Government also included the suggestions that WSUD devices that over treat areas to compensate for other areas that are undertreated are not preferred, despite meeting ACT general codes. The infrastructure approach for the development has taken this preference on board within the greater WSUD strategy.
- **1% AEP Storm Immunity** – To prevent flooding concerns for the new residential areas, the site boundary has been limited to outside the Probable Maximum Flood (PMF) level of the Molonglo River. Furthermore, all proposed development areas are to be protected from the 1% Annual Exceedance Probability (AEP) storm event in accordance with Element 2 of the ACT Waterways: Water Sensitive Urban Design General Code.
- **Development Topography** – The general steepness across the development area is a key design focus that impacts multiple infrastructure items. The water supply is proposed to utilise ridgelines to maximise mains coverage and pressures where possible. The sewer infrastructure must be considerate of the undulating terrain to maintain gravity capabilities and reduce the number of pump stations. The stormwater catchments are greatly impacted by the topography of the study area as well, the strategy utilises drainage reserves and natural gullies to direct overland flow to appropriate areas for stormwater management devices.

8.3 INFRASTRUCTURE STRATEGY

8.3.1 WATER SUPPLY

The proposed trunk water supply will come from the Weetangera Reservoirs north-west of the proposed Molonglo 3 development, with water supply infrastructure heading south, crossing William Hovell Drive, and into the recently constructed development of Whitlam. The primary connection for the Molonglo 3 development area will stem from these mains in Whitlam from the north-west corner of the study area, adjacent John Gorton Drive. The proposed water supply mains will then head north-east into the proposed development area. A ringmain is to be created by taking a proposed main south to maximise head efficiencies, before crossing back across John Gorton Drive to connect to existing water infrastructure within Whitlam.

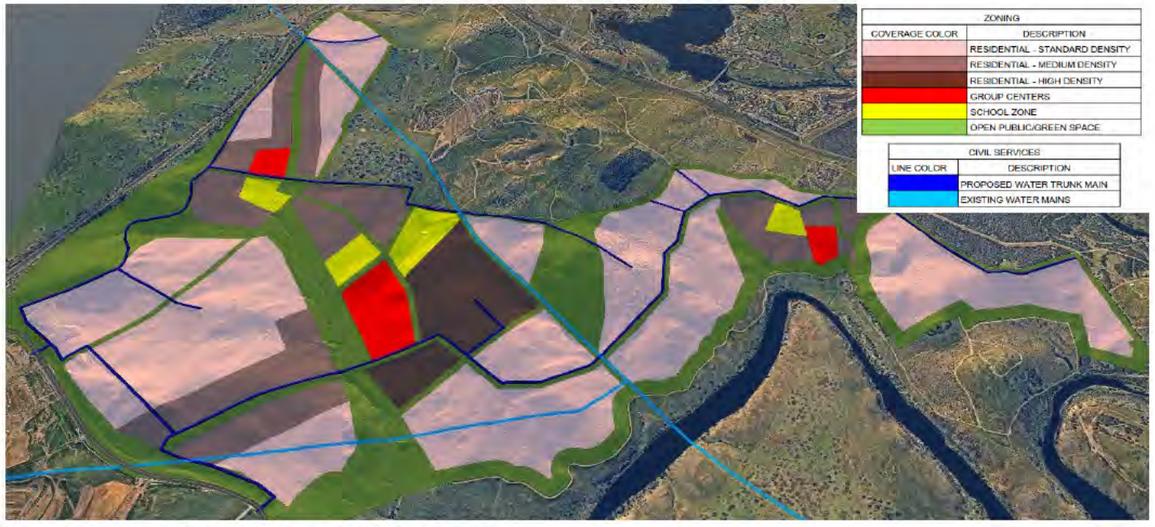


Figure 8.1 Proposed Water Trunk Main Alignment

Previously, discussions have been undertaken regarding the position of the existing 600 mm diameter water supply main (Refer to Figure 8.1, the existing service in the eastern area of the proposed development). Due to the service intersecting developable area, the question was posed as to whether it would be suitable for relocation. A brief study of a localised area of the water main easement was undertaken by Roberts Day to review maintaining the easement or removing it. This study resulted in less than a 4 per cent reduction in development lots while retaining the service in its current position, while also providing open space, nature reserves and passive recreation areas. Relocation of the service would also incur significant costs, and a new appropriate alignment is not immediately apparent and would need further study. It is clear, by the Roberts Day planning studies, that solutions can be achieved while working around the easement. The existing 900 mm dia. water supply main, running north to south in Figure 8.1, is also proposed to be left as is with easements through the proposed development area allowing for the existing alignment to be retained. Connections to these two Bulk Supply Mains (BSMs) are limited, and it is proposed to only utilise one connection to the 900 mm dia. main (as noted in Drawing PS119657_CIV_W_001 from the Civil Drawing Package in Appendix D) via a proposed pressure reducing valve (PRV). This connection will provide a 50 per cent backup supply, as per the provided water modelling results from the Molonglo 3 Water Supply Strategy Concept Design Report, dated February 2016.

A water main is proposed to be installed across the northern boundary of the development area, extending into the north-east corner before terminating to the south of Bindubi Street–William Hovell Drive intersection. Both connection points provided in the proposed water main alignments are fixed, as they have been constructed as part of the adjacent development works. A main is proposed to head south from this extension along the eastern boundary of the site. Another main is proposed to be taken form the initial ring between the existing Whitlam infrastructure, south-east to the remainder of the development area, primarily following the proposed road network and terminating to the south of the proposed East-West Arterial at the south-east corner of the site. Short branches off the mains have been proposed to service parts of the development area that are not

effectively covered by the proposed mains alignments. A layout of the preliminary water supply strategy can be found in Drawing PS119657_CIV_W_001 and PS119657_CIV_W_002 from the Civil Drawing Package in Appendix D.

The above strategy has been based upon the existing surface topography and proposed development layouts of Molonglo 3, with inputs from the concept design documentation undertaken by GHD in 2016. The alignments proposed by the GHD concept plans were required to be revised to incorporate the new zoning and road layouts developed by Hatch | Roberts Day and the WSP Team.

As per the review of the 2015 Icon Water masterplanning conducted as part of the Molonglo 3 Water Supply Concept Design Report, dated February 2016, the Weetangera Bulk Supply Main is expected to provide an adequate supply to the proposed development and will require no augmentations to the BSM systems for over 20 years. These comments were made with regards to population growth estimates and climate change factors considered as part of the Icon Water masterplan, dated June 2015, which informed the demand trends of the previously conducted water modelling that is reported in the 2016 Concept Design Report. However, it should be noted that the growth estimates are now over four years old, and peak demand rates should be confirmed and updated as necessary for future concept design and modelling projects to conform with the proposed urban layouts and Icon Water requirements.

The localised water reticulation fed from the proposed trunk mains will need to be considered at a detailed level, where internal development layouts can be considered and the water authority, Icon Water, can give detailed inputs. Pressure zoning is to be further considered as an output of the future water supply modelling at the next level of design, to incorporate more details such as PRVs. The integration of localised development layouts will also assist in improving design concepts and ensure alignments are serviceable by Icon Water for their maintenance procedures.

8.3.1.1 FIRE FLOW

Icon Water has previously requested concept designs for the development area to be based on an F4 fire risk. The fire risk types are a classification system (developed by ACT Fire and Rescue) used to define the minimum firefighting water flow requirement for different types of developments within the ACT. It is a supplement to the WSA 03 water supply standards, administrated by Icon Water. An F4 fire risk type has been requested as Icon Water has identified the Molonglo 3 development as a higher risk residential area; resulting in a fire flow requirement of 60 L/s, with 60 metre hydrant spacing on mains (with three adjacent hydrants available in cul-de-sacs). However, F5 fire risk may be considered for the small group centres, likely due to a lower risk to these high-density areas, requiring a fire flow capacity of 45L/s. Further confirmation of acceptable Fire Risk Ratings across the site will need to be agreed with Icon Water for the next design stage to enable sizing of mains throughout the development and relevant delivery stages.

8.3.2 SEWER

The basis of the proposed sewer alignments and treatment options are from the supplied document "Molonglo 3 Trunk Sewerage Concept Design Report" dated February 2016. The proposed concept plan layout will alter the proposed sewer alignments from this previously conducted study, but the proposed population densities within the study area are not dissimilar. The realignments of the proposed sewer infrastructure can be found in have been detailed as part of the Infrastructure Drawing package in Appendix D.

A high-level sewer assessment for the proposed layout was undertaken, as a sanity check on the previously completed sewer concept designs contained in the "Molonglo 3 Trunk Sewerage Concept Design Report". The demand assessment refers to Water Services Association of Australia (WSAA) – Sewerage Code of Australia (WSA02) with Icon Water supplements.

Note: The assessment assumed the open space would not require any sewer infrastructure.

Figure 8.2 Proposed Sewer Trunk Main Alignment

The proposed development consists of five land use types, these are outlined in Table 8.1 below. It should be noted that in discussion with EPSDD, the proposed pump station and MVIS at Connection M is unlikely to be viable due to the depth of the MVIS at this location. The previously conducted sewer concepts that were reviewed as part of this study did not detail this constraint, and it will likely cause a reduction in developable land in the southern region, unless the use of a pump station is deemed acceptable. An alternative to the proposed is the connection of Line L to Line K via a pressure main, to eliminate a required connection direct to the MVIS at Connection M. However, the current advice states that small pumped catchments are unlikely to be supported by utilities or environmental agencies, this will need further investigation as the development progresses.

Table 8.1 Land Use areas

Land Use	Area (ha)
Residential Standard	242.84
Residential Medium	107.93
Residential High	29.57
Group Centres	17.09
School Zones	17.49
TOTAL	414.92

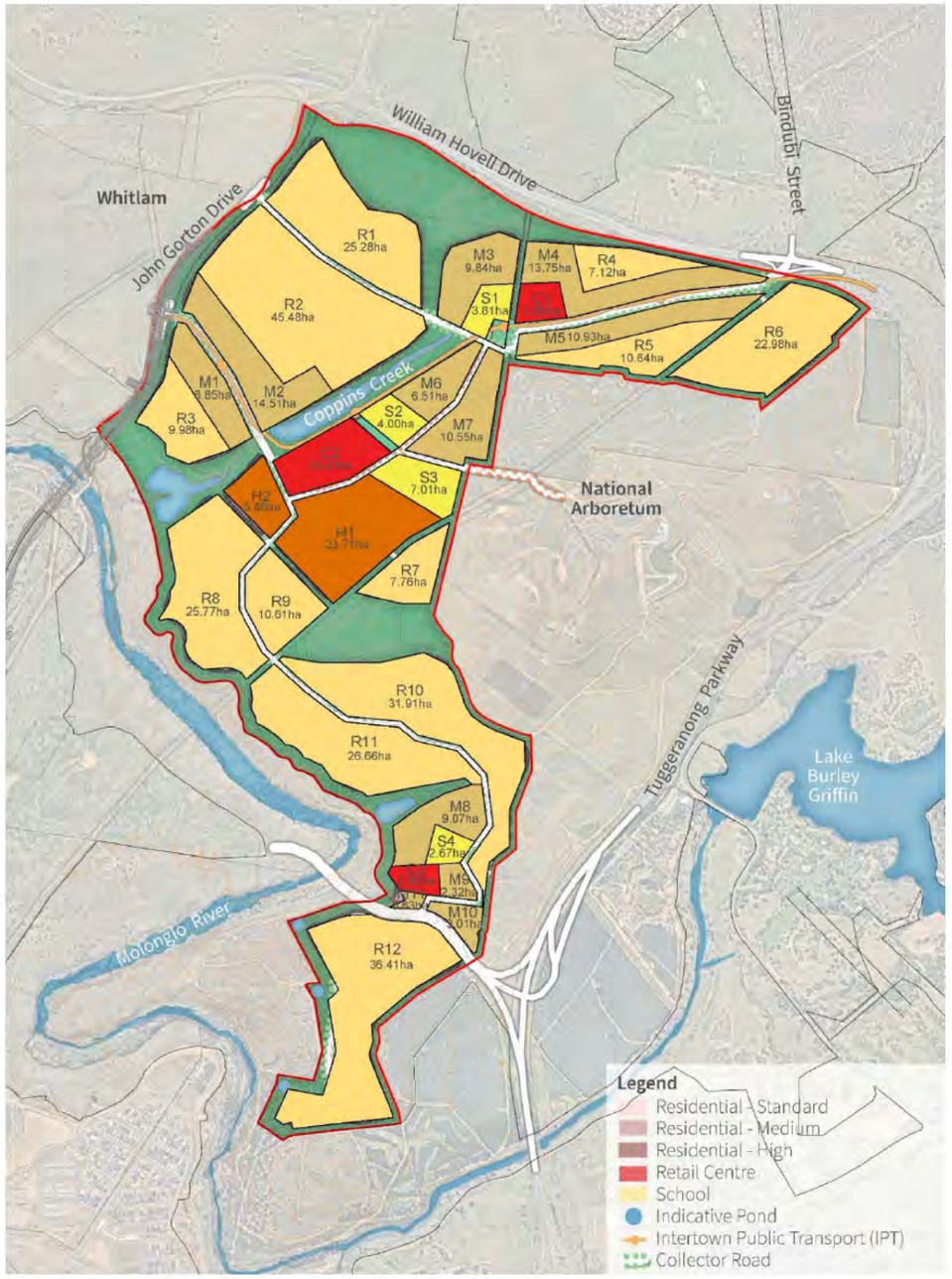


Figure 8.3 Area Calculation – Mid-Way Scenario

Note: Yield scenarios are discussed in more detail in section 6.7.

The land uses each had a specific demand requirement as set by Appendix B of the WSA 02 guide. Table 8.2 below summarises the estimated Equivalent Population (EP) for each land use as outlined in Figure 8.3. Based on the estimated EP in Table 8.2 below, a design flow was estimated to determine suitable sewer main sizes. Table 8.3 below is an overview of the design flows.

Table 8.2 Estimated EP

Section Number	Gross Area (ha)	Land use	Nett Area	Lower Limit Lot Density (Dw/ha)	Higher Lot Limit Density (Dw/ha)	Lower EP	Upper EP
R1	25.28	Residential Standard	18.96	13.50	16.90	896.00	1,123.50
R2	45.48	Residential Standard	34.11	13.50	16.90	1,613.50	2,019.50
R3	9.98	Residential Standard	7.49	13.50	16.90	357.00	444.50
R4	22.98	Residential Standard	17.24	13.50	16.90	815.50	1,022.00
R5	7.76	Residential Standard	5.82	13.50	16.90	276.50	346.50
R6	10.61	Residential Standard	7.96	13.50	16.90	378.00	472.50
R7	25.77	Residential Standard	19.33	13.50	16.90	913.50	1,144.50
R8	31.91	Residential Standard	23.93	13.50	16.90	1,134.00	1,417.50
R9	26.66	Residential Standard	20.00	13.50	16.90	945.00	1,183.00
R10	36.41	Residential Standard	27.31	13.50	16.90	1,291.50	1,617.00
M1	8.85	Residential Medium	6.64	37.00	55.60	861.00	1,295.00
M2	14.51	Residential Medium	10.88	37.00	55.60	1,410.50	2,121.00
M3	9.84	Residential Medium	7.38	37.00	55.60	959.00	1,438.50
M4	20.87	Residential Medium	15.65	37.00	55.60	2,030.00	3,048.50
M5	21.57	Residential Medium	16.18	37.00	55.60	2,096.50	3,150.00
M6	6.51	Residential Medium	4.88	37.00	55.60	633.50	952.00
M7	10.55	Residential Medium	7.91	37.00	55.60	1,025.50	1,540.00
M8	9.07	Residential Medium	6.80	37.00	55.60	882.00	1,326.50
M9	2.32	Residential Medium	1.74	37.00	55.60	227.50	339.50
M10	3.01	Residential Medium	2.26	37.00	55.60	294.00	441.00
M11	0.83	Residential Medium	0.62	37.00	55.60	84.00	122.50
H1	23.71	Residential High	17.78	64.10	85.50	3,990.00	5,323.50
H2	5.86	Residential High	4.40	64.10	85.50	987.00	1,316.00
C1	3.86	Group Centre	2.90	N/A	N/A	217.13	260.55
C2	10.43	Group Centre	7.82	N/A	N/A	586.69	704.03
C3	2.80	Group Centre	2.10	N/A	N/A	157.50	189.00
S1	3.81	School	2.86	N/A	N/A	100	120.00
S2	4.00	School	3.00	N/A	N/A	100	120.00
S3	7.01	School	5.26	N/A	N/A	150	180.00
S4	2.67	School	2.00	N/A	N/A	70	84.00

Table 8.3 Estimated EP

Section Number	Average Dry Weather Flow (l/s) – Lower Limit	Average Dry Weather Flow (l/s) – Upper Limit	Peak Dry Weather Flow (l/s) – Lower	Peak Dry Weather Flow (l/s) – Upper	Groundwater Infiltration (l/s)	RDI (l/s)	Design Flow (l/s) – Lower Limit	Design Flow (l/s) – Upper Limit
R1	1.88	2.36	6.21	7.79	0.38	7.63	14.22	15.80
R2	3.39	4.24	9.83	12.31	0.68	12.79	23.30	25.77
R3	0.75	0.93	3.10	3.86	0.15	3.37	6.61	7.37
R4	1.71	2.15	5.78	7.24	0.34	7.01	13.14	14.60
R5	0.58	0.73	2.56	3.20	0.12	2.70	5.37	6.02
R6	0.79	0.99	3.23	4.04	0.16	3.55	6.94	7.75
R7	1.92	2.40	6.31	7.90	0.39	7.76	14.45	16.04
R8	2.38	2.98	7.46	9.33	0.48	9.36	17.30	19.17
R9	1.98	2.48	6.47	8.10	0.40	7.99	14.86	16.50
R10	2.71	3.40	8.25	10.33	0.55	10.51	19.31	21.39
M1	1.31	1.80	5.57	7.67	0.13	4.38	10.08	12.18
M2	2.14	2.95	8.06	11.10	0.22	6.76	15.03	18.08
M3	1.46	2.00	6.03	8.29	0.15	4.80	10.99	13.24
M4	3.07	4.24	10.61	14.64	0.31	9.31	20.23	24.26
M5	3.18	4.38	10.88	15.01	0.32	9.58	20.79	24.92
M6	0.96	1.32	4.44	6.10	0.10	3.34	7.87	9.53
M7	1.56	2.15	6.35	8.75	0.16	5.11	11.62	14.01
M8	1.34	1.84	5.66	7.81	0.14	4.47	10.27	12.42
M9	0.35	0.48	2.09	2.89	0.03	1.35	3.47	4.27
M10	0.45	0.62	2.53	3.48	0.05	1.69	4.27	5.22
M11	0.12	0.17	0.99	1.35	0.01	0.55	1.55	1.90
H1	6.92	9.69	23.18	32.47	0.36	14.73	38.27	47.55
H2	1.71	2.40	8.11	11.34	0.09	4.31	12.50	15.74
C1	0.46	0.55	2.41	2.89	0.06	1.16	3.63	4.11
C2	1.23	1.48	5.03	6.04	0.16	2.79	7.98	8.99
C3	0.33	0.40	1.90	2.28	0.04	0.88	2.82	3.20
S1	0.21	0.25	1.11	1.34	0.06	1.06	2.23	2.46
S2	0.21	0.25	1.10	1.32	0.06	1.08	2.24	2.46
S3	0.32	0.38	1.42	1.71	0.11	1.64	3.17	3.45
S4	0.15	0.18	0.86	1.03	0.04	0.78	1.67	1.84

The calculations outlined in the tables above resulted in similar pipe sizing to the GHD concepts (GHD Concept Design Report, 2016) throughout the development, suggesting the expected EP volumes are accurate.

Drawing PS119657_CIV_S_001 to PS119657_CIV_S_005 of the Infrastructure Drawing package in Appendix D shows the proposed sewer main alignments and the estimated pipe sizes.

8.3.3 STORMWATER

The majority of the study area is between 5–7 per cent in grade with the steepest being up to 30 per cent. Provision of new municipal roads with piped stormwater infrastructure will be achievable at these grades, but will need significant engineering inputs, particularly at the detailed design stage. Engineered waterways and swales supporting the piped network through natural drainage areas have been included where possible.

Piped stormwater system design targets for major road sites over 2000 m^2 are defined in Section 2.3 – R4 of the Territory Plan 2008 document "Waterways: Water Sensitive Urban Design General Code":

The codes require development of major roads involving sites greater than 2000 m^2 comply with the following:

- The capacity of existing pipe (minor) stormwater connection to the site is not exceeded in the 1 in 10 year storm event
- The capacity of the existing overland (major) stormwater system to the site is not exceeded in the 1 in 100 year storm event.

For the future design stages, compliance with these rules are required to be demonstrated through a report from a suitably qualified person consistent with the methods specified in the ACT Practice Guidelines for Water Sensitive Urban Design.

A series of existing overland flow paths traverse the study area and ultimately discharge to the Molonglo River to the south west boundary of the site. Above ground naturally vegetated engineered channels will operate in conjunction to the natural overland flow paths, to assist in conveying the high-volume stormwater runoff from surrounding catchments effectively through the development layout. The study area is not typically subject to river flooding. However, there are localized areas along the Molonglo River which will be affected by the Probable Maximum Flood (PMF), and has been zoned appropriately to reflect this, with drainage reserve creating an environmental buffer from the residential zones.

There has been allowance of significant open greenspace and environmental buffers included throughout the site, with regards to the natural topography of the study area, which further allows for incorporation of site wide stormwater drainage conveyance.

It is proposed that existing overland flow paths be formalised and dedicated as drainage reserves where appropriate, which will be handed over to TCCS as an asset to maintain. This has been coordinated with proposed ecological buffers and park designation where possible. However, a major existing drainage channel flows through the proposed high school location. Redirection of the channel will involve extensive earthworks, and the channel is suggested to be incorporated into the area as a feature. Comparable stormwater channels have recently been utilised in other schools in a similar manner. As the project develops into the next design stage, water depths and flow velocities will need to be studied to ensure the drainage channel is suitable to remain.

The greater external stormwater catchment extends into the hilly area to the east of the proposed development, adding an additional 117 ha of stormwater runoff, with several major gullies conveying the additional stormwater. These external catchments represent approximately 16 per cent of the total runoff flowing thorough the study area, and must be considered when designing infrastructure. The site is further split into 26 existing sub-catchments that eventually discharge to the Molonglo River.

The proposed Molonglo 3 infrastructure strategy plan considers the following items that will impact the behaviour of existing stormwater runoff across the study area:

- Impervious road network
- Impervious carparking
- Proposed new buildings
- Proposed swales
- Pit and pipe infrastructure network
- Open spaces for overland flow conveyance.

The proposed development will create new impervious areas within what was a greenfield space. With the addition of this new impervious area, less water is absorbed by vegetation and ground infiltration, which increases the stormwater runoff during rainfall events and can cause stormwater flooding issues if left unchecked. Typical increases in impervious area, such as buildings, car parks and roads are usually mitigated by capture in localised stormwater pit and pipe infrastructure. However, due to the extensive nature of the proposed Molonglo 3 development area, larger scale treatments need to be considered, and utilisation of the natural topography to convey large water volumes becomes a critical design item.

Grassed swales will therefore be utilised as naturally vegetated engineered controls to the stormwater runoff. These swales will guide the stormwater runoff through the development area while minimising impacts to the proposed developable land. Stormwater structures, such as culverts will be required to navigate the proposed road network. Grassed swales can also provide some water quality treatment contributions to the stormwater runoff. This is due to the nature of these naturally vegetated swales and the characteristics that allow for infiltration, evaporation and vegetation absorption of stormwater.

Grassed swales are primarily proposed in areas where large volumes of stormwater runoff will be directed, where utilisation of pit and pipe infrastructure can be prohibitively expensive, difficult to maintain or even just unnecessary.

The proposed swales will be designed to safely convey major storm events, up to the 1 per cent AEP storm event as per Territory Plan Section 4.1 – C8 of Waterways: Water Sensitive Urban Design General Code, while maintaining the required freeboard directed by the ACT Design Standard for Urban Infrastructure (DSUI). The DSUI further states a maximum depth of 900 mm, with a maximum flow velocity of 2 m/s to prevent scour. The detailed sizing of individual swales will need to be individually determined for each sub-catchments. The varying steepness of the site may also require velocity controls such as rock checks and drop structures to ensure a safe environment and reduce the effects of scour. These features could be moulded in the overall landscape design to soften the engineering requirements.

Refer to Drawing PS119657_CIV_SS_006 of the Infrastructure Drawing package in Appendix D showing stormwater management strategies.

8.3.3.1 ON-SITE DETENTION

On-Site Detention (OSD) is a stormwater attenuation control device, used to prevent additional runoff produced by an increase in impervious area, causing actionable nuisance to other areas of the new development and adjacent ecosystems. The proposed OSD devices limit the stormwater runoff rate from the newly developed areas to pre-development flow rates. This assists in maintaining the existing stormwater runoff rates within the surrounding environment and preventing damage to waterways and surrounding property.

The OSD devices proposed for the Molonglo 3 development are primarily detention basins. The basins will capture a defined amount of water from the site and slowly release it over an extended period, this ensures that at no point the stormwater runoff coming from the new developments exceeds the flow rates of the pre-developed site. Due to the existing site being a 100 per cent pervious greenfield area, any increases in impervious area will contribute to additional stormwater runoff that will eventually end up in the Molonglo River. However, the catchments that fall directly to the Molonglo Rive, those that will not flow through another development area, have been determined to be subject to a reduced detention criteria, as indicated by EPSDD. Due to the Molonglo River receiving a much larger rainfall catchment than the localised volumes from the Molonglo 3 development, the Time of Concentration of the stormwater runoff from the greater catchment will be over 24 hours after the storm event. At which point the localised Molonglo 3 development and the associated runoff will have already discharged to the river, due to a significantly shorter Time of Concertation, and will therefore have no impact on the critical flows during larger storm events. EPSDD has suggested the criteria for stormwater detention in these downstream catchments be limited to the 5 per cent AEP and smaller storm events only. However, the catchments that do not discharge directly to the Molonglo River will need to be aptly detained up to the 1 per cent storm event, to ensure there is no worsening to the runoff volumes in downstream properties.

Table 8.4 below lists the catchment area, estimated retention area and the estimated retention volume for each contributing catchment. Refer to Drawing PS119657_CIV_SS_001 to PS119657_CIV_SS_005 of the Infrastructure Drawing package in Appendix D showing catchment boundaries.

Table 8.4 Stormwater Catchment Characteristics

Catchment id	Catchment area (ha)	Estimated retention size (ha)	Estimated retention volume (m^3) – lower limit	Estimated retention volume (m^3) – upper limit	Additional information
1	12.14	0.24	1,820.25	3,640.50	
2	14.42	0.29	2,163.44	4,326.87	
3	23.77	0.48	3,565.08	7,130.16	
4	35.46	0.71	5,318.31	10,636.62	
5	63.46	N/A	N/A	N/A	SWALE
6	18.15	0.36	2,721.78	5,443.56	
7	26.19	0.52	3,928.14	7,856.28	
8	55.16	1.10	8,274.44	16,548.87	
9	39.82	0.80	5,972.52	11,945.04	
10	23.62	0.47	3,542.27	7,084.53	
11	50.31	N/A	N/A	N/A	BIO SWALE
12	26.80	0.54	4,019.25	8,038.50	
13	12.13	0.24	1,818.90	3,637.80	
14	22.43	0.45	3,364.70	6,729.39	
15	9.66	0.19	1,449.65	2,899.29	
16	5.03	0.10	754.10	1,508.19	
17	1.52	0.03	228.02	456.03	
18	41.09	0.82	6,163.25	12,326.49	
19	5.61	0.11	842.06	1,684.11	
20	46.46	N/A	N/A	N/A	BIO SWALE
21	14.28	0.29	2,142.74	4,285.47	
22	20.92	0.42	3,138.62	6,277.23	
23	18.24	0.36	2,735.75	5,471.49	
24	11.99	0.24	1,798.95	3,597.90	
25	3.62	0.07	543.23	1,086.45	
26	19.93	0.40	2,988.95	5,977.89	

It is proposed that Water Sensitive Urban Design (WSUD) devices are to be utilised as dual purpose basins that are to manage stormwater runoff volumes as well as stormwater quality, and will detain additional runoff where required. These devices have been positioned to utilise greenspace buffers and drainage reserve where possible, to limit impacts on developable land. Access to the proposed basins will need to be provided for on-going maintenance serviceability.

Even with these proposed stormwater management strategies in place, legislation should also condition the proposed developments within the Molonglo 3 area to ensure non-worsening of stormwater runoff to safeguard upstream or downstream catchments and properties.

8.3.4 *WATER SENSITIVE URBAN DESIGN STRATEGY (WSUD)*

The ACT Design Standard for Urban Infrastructure (DSUI) – Section 1 is the primary document for regulating stormwater design in Canberra. In accordance with the DSUI, the additional stormwater runoff generated by the proposed development will need to be attenuated to prevent any actionable downstream nuisance. Furthermore, the proposed road network requires stormwater overland flow controls to minimise runoff flowing across roads and reducing potential dangers to vehicles and pedestrians. The DSUI states that continuous overland flow paths must be provided from the top of the existing catchment through the development site. The overland flow paths, where impacted by the road network or other components of the proposed development, will be appropriately redirected and controlled by swales, pit and pipe infrastructure, on-site detention/retention basins and engineered wetlands.

Stormwater quality requirements have been developed to help protect the health of downstream receiving environments. The ACT WSUD General Code (2017) provides a series of catchment-wide targets and development targets. Catchment-wide pollutant reduction targets are adjusted for percentage catchment urbanisation and percentage imperviousness. The possible ranges on pollutant removal are between:

- 23 per cent and 85 per cent of the mean annual suspended solids load (TSS);
- 15 per cent and 70 per cent of the mean annual total phosphorus load (TP);
- 15 per cent and 60 per cent of the mean annual total nitrogen load (TN).

The baseline for stormwater quality targets that can be found in the various Territory Plan Precinct Codes has been set to an urban catchment of the same area with no water quality management controls. These targets are less applicable to the Molonglo 3 development, as it is a rural greenfield development discharging directly to a waterway. Therefore, the proposed water quality pollutant reduction targets are to be determined by the Urbanisation and Urban Imperviousness adjustments found at Appendix A of the ACT Practice Guidelines for Water Sensitive Urban Design (Module 2). The urbanisation value was determined by dividing the expected urban development area by the total catchment area, resulting in a value of 66.7 per cent. The imperviousness has not been explicitly determined, and rather a range of values selected. The table below details the adjustments and the expected targets have been highlighted.

Table 8.5 Stormwater Catchment TSS/TP/TN Reduction Targets (%) Adjustments for Urbanisation and Imperviousness

	Urban Imperviousness							
Urbanisation	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	90%
0%–10%	23/15/15	27/18/18	31/21/21	35/23/23	38/26/26	41/28/27	43/30/29	45/31/30
11%–20%	39/26/26	44/31/30	48/34/33	52/37/35	55/40/37	57/42/39	59/44/40	61/45/42
21%–30%	50/36/34	55/40/38	59/43/40	62/46/42	64/49/44	66/50/46	68/52/47	69/53/48
31%–40%	59/43/40	63/47/43	66/50/46	68/52/47	70/54/49	72/56/50	73/57/51	74/58/51
41%–50%	65/49/45	69/53/48	71/55/49	73/57/51	75/59/52	76/60/53	76/61/53	77/61/54
51%–60%	71/55/49	73/57/51	75/59/52	77/61/53	78/62/54	78/63/55	79/63/55	79/64/56
61%–70%	75/59/52	77/61/54	78/63/55	79/64/55	80/64/56	80/65/56	81/65/57	81/66/57
71%–80%	79/63/55	80/64/56	81/65/57	81/66/57	82/66/57	82/67/58	82/67/58	83/67/58
81%–90%	82/66/57	82/67/58	83/68/58	83/68/58	83/68/59	83/68/59	84/68/59	84/68/59
91%–100%	85/70/60	85/70/60	85/70/60	85/70/60	85/70/60	85/70/60	85/70/60	85/70/60

The expected adjusted catchment-wide reduction target range, pending detailed imperviousness values are as follows:

- 78 per cent to 80 per cent of the mean annual suspended solids load (TSS)
- 63 per cent to 64 per cent of the mean annual total phosphorus load (TP)
- 55 per cent and 56 per cent of the mean annual total nitrogen load (TN).

The water sensitive urban design strategy has been undertaken with input from ACT Government stakeholders, and with consideration of cost effective maintenance requirements for the department that will be charged with the maintenance responsibilities, being TCCS. In an effort to minimise these costs, WSP has attempted to limit the number of WSUD devices, reducing on-going maintenance costs where possible.

Expected WSUD device sizing has been based upon the sub-catchment areas utilising the rule of thumb that suggests a bio-basin sizing of 2 per cent of catchment area. This rule of thumb has been utilised due to limited information on the imperviousness of the proposed catchment areas. MUSIC modelling is to be undertaken at the next design stage to further refine device sizing.

The wetland and bio-retention treatment systems can work together or separately, by receiving flows from drainage pipes throughout the development. As flow enters the treatment systems it follows the sequence outlined below:

- Inlet pond – flows from pipes enter an inlet pond or forebay where coarse sediment will settle out and low flows will slowly pass into the wetland or bio-retention areas.
- Wetland – Flows enter the treatment areas of the wetland. The wetlands will treat base flows and small storm events, discharging to the Coppins Creek clean water bypass. Wetlands typically have a maximum depth of 350 mm, with a detention time of 2–3 days.
- Bio-Retention – During rainfall events outside of wetland areas or where wetlands are filled to design capacity, water flows into bio-retention basins for treatment. As the storm ends, water then flows through the filter media and discharges from the basin. The treated flows will be discharged to the Coppins Creek clean water bypass. Having multiple cell bio retention systems can improve stormwater management flexibility, and can improve construction and maintenance constraints.
- Overflow Swales – The majority of the runoff will pass through wetland or bio retention systems, achieving the required water quality targets. However, large storm events will require overflow routes. These vegetated swales will promote filtration of sediment and a reduction of phosphorus pollutions, while protecting the more delicate bio retention systems.

8.3.4.1 COPPINS CREEK

The proposed Coppins Creek wetland area is to be utilised as a significant landscape feature, running from north to south alongside the proposed IPT corridor, and adjacent the proposed main group centre in Molonglo 3. The wetland precinct provides a number of functions including but not limited to the following:

- Parkland
- Pedestrian activation
- Visual amenity
- Stormwater runoff conveyance
- Stormwater treatment capabilities
- Urban ecology.

In conjunction to the proposed central wetland area, a network of sediment and bio-retention basins are proposed to assist in preventing over dependence on Coppins Creek system. Smaller storm events will be controlled and treated by the surrounding basins, while Coppins Creek will be able to convey and treat the larger storm events which may exceed the capacity of the smaller treatment devices. Any permanent water systems for visual amenity purposes can only accept treated stormwater and will not form part of the treatment system.

8.3.4.2 BIO SWALES, RAINGARDENS AND BIOPODS

Bio-swales have been proposed as an additional treatment measure in areas that have limited space or inappropriate topography/land use for open bio-retention basins. These devices work in a similar manner to the bio-basins, treating the water by utilising natural vegetation and filter medias.

Figure 8.4 Typical Raingarden Cross Section

For the group centres, particularly the northernmost area, the higher density may cause constraints of the availability of land for bio basins. However, water quality improvement devices are still required to treat the stormwater catchments, and in some cases parts of the upstream catchments. A localised multi-cell bio-retention system, potentially incorporating tanks with filter media cartridges located under impervious surfaces could be utilised in this area to maximise the developable land. A bypass of the upstream water to a basin further downstream could be considered, to reduce the maintenance requirements and sizing of the multi-cell system. Incorporation of streetscape bio retention, such as biopods or rain garden devices, throughout all group centres will provide additional water quality treatment on top of any multi-cell systems required, while also improving aesthetic and streetscape amenity. Discussions with ACT Government stakeholders have suggested implementation of rain garden infrastructure will need to be limited due to maintenance costs constraints. However, with these constraints in mind, inclusion of biopods or rain gardens in the higher density zones may offset some costs of maintaining cartridge filter systems that may be required in these regions due to land constraints making basin devices unsuitable. Typical details for the WSUD strategy items can be found in Drawing PS119657_CIV_TD_001 to PS119657_CIV_TD_003 of the Infrastructure Drawing package in Appendix D.

Figure 8.5 Example of Biopod

8.3.5 EARTHWORKS

As part of this study, the Molonglo 3 Earthworks Management Strategy, dated August 2015 was reviewed. The conclusions and recommendations detailed in this report will still be applicable to the new urban layout. The proposed road construction is likely to provide an excess of material, however the volumes predicted by the Earthworks Management Strategy will need to be reviewed with the newly proposed alignments in mind. There is also a significant chance of unsuitable material in the form of both rock outcrops, as well as water logged gully areas.

The resolutions to these issues also remain the same. Incorporating permanent ground water control measures early in the construction process, to assist in protecting future works, with construction ideally taking place in the warmer months. The geotechnical investigation included in the report noted that the rock outcrops will require use of hydraulic hammers and possibly blasting. The excess material predicted as part of the road works was noted to potentially be accommodated by the proposed Arboretum fill site, however, this report is now several years old and discussions with the Arboretum may need to be renewed.

8.3.6 POWER AND GAS

The existing 132 kV infrastructure is an overhead supply that would have significant impact on the amenity of the proposed development site. The existing 132 kV overhead lines are due to be undergrounded and realigned along the northern and eastern boundary of the Molonglo 3 development site, in an effort to reduce the existing easement corridors and as such enable additional area to be activated. The proposed realignment of the 132 kV power infrastructure is to be placed along William Hovell Drive and then bisect the north-east corner of the development area and proceeds to run down the eastern boundary of the site. Connections to this main supply will be used to distribute 11 kV and 33 kV trunk infrastructure throughout the development site, primarily adjacent the road networks, utilising transformers where required. The primary substation location has already been incorporated in the preliminary realignment designs. It is to be located on the northern side of William Hovell Drive slightly to the east of Coulter Drive, external to the Molonglo 3 development area.

A key concern for the power supply to the development area is consideration to the ACT Governments policy of reducing greenhouse gas emissions to zero by 2045. This policy has removed the requirement for new suburbs to have a natural gas connection, paving the way for 100 per cent electric suburbs powered by renewable sources. A detailed analysis of the power consumptions expected within the Molonglo 3 area needs to be undertaken to determine if the development can be supported by electricity alone. Canberra suburbs often utilise their gas connection for heating purposes, and the available electricity network must be reviewed to ensure it can take on the burden.

9 PHASING OPPORTUNITIES

It is understood that EPSDD plan to release the Molonglo 3 East development area in stages, starting with the north-west corner of the site. This chapter outlines interdependencies and considerations for the staging plan in relation to infrastructure, transport and urban planning.

The five proposed phases are shown in Figure 9.1. It is understood that these phases will likely be managed in smaller sub-phases to accommodate smaller land release sizes and/or market demands.

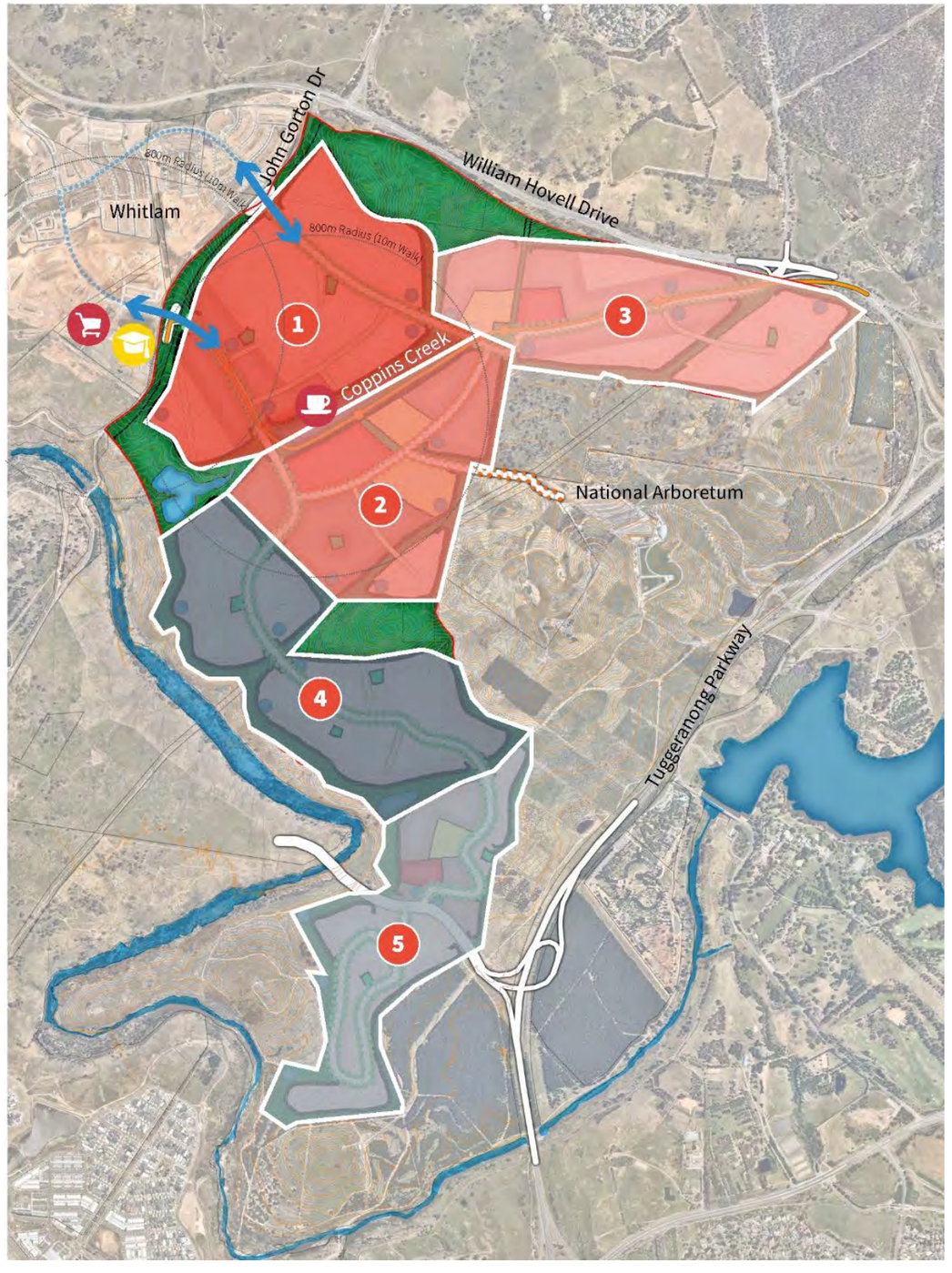


Figure 9.1 Phasing of development

9.1 DEVELOPMENT PHASING

9.1.1 INITIAL PHASING

Stage One should be located along John Gorton Drive to take advantage of the establishment of Whitlam and create a cluster of new residential development. The key collector roads through Molonglo 3 East align with the new intersections along John Gorton Drive into Whitlam.

Stage One will take advantage of the proposed Primary School and Local Centre within Whitlam as part of this stage is located within a 10-minute walk of these amenities.

There is an opportunity for small convenience retail and/or cafes along Coppins Creek to establish a community hub within Molonglo that will eventually continue along the eastern side of the creek with the future Group Centre.

Housing diversity should be considered in Stage One to set a precedence for the remaining stages within Molonglo. Given the extent of steep topography throughout the region, a demonstration precinct that includes slope responsive built form should be established.

Any works on the Coppins Creek corridor, including ponds, the road corridor and proposed IPT should be excluded as part of the initial phase of works. It is suggested that these are included as part of Phase Two.

9.1.2 OTHER STAGES

Limiting major infrastructure upgrades such as the new Bindubi Street intersection and the East-West arterial will dictate the subsequent stages. The second stage should be on the eastern side of Coppins Creek using the collector roads from stage one for access. This will establish the heart of Molonglo with the Group Centre and schools and create a permanent water body between the first two phases using the new embankment as the road crossing between stages.

The quantity of dwellings within these stages will likely trigger the requirement for the Bindubi Street intersection to provide an alternative access/egress into the precinct, which will establish the third stage. The fourth and fifth stages will be developed towards the south in anticipation of the East-West arterial being completed.

There are opportunities to create sub-stages within each broader stage depending on market need and future Indicative Land Release Programs.

9.2 KEY INFRASTRUCTURE CONSIDERATIONS

9.2.1 WATER

The water infrastructure alignment has considered the proposed strategy staging for the development area, with the north-west region of the Molonglo 3 area expected to be the first area to be developed. There are two connection points proposed for the first stage, to create a ring main with existing services in the adjacent Whitlam. This fundamental strategy will assist in stabilising pressures across the proposed development. The water infrastructure in the first stage has also targeted a minimal approach to the required water mains, with the area being serviceable by relatively small branches that can then be built upon as part of later stages. This will assist in alleviating front end infrastructure delivery costs.

The proposed Stage 2 trunk water mains will incorporate simple extensions to the Stage 1 infrastructure, while also promoting the development of Stage 3 by providing the future stages primary connection along the north of the site. The remaining stages are natural extensions to the infrastructure that will be completed as part of the earlier stages.

9.2.2 SEWER

The sewer strategy for the site splits comfortably into the proposed staging plans, with minimal sewer required to be built out of the proposed staging order. Trunk sewer infrastructure for Stage 1 of the Molonglo development is proposed to be connected at one location into the MVIS, minimising works on the 1950 mm diameter sewer main. There are two main trunk alignments to service the first stage. The eastern branch will take the bulk of the wastewater, but will also need to have available capacity to service the Stage 3 development area.

The proposed Stage 2 sewer main requires a portion of pipeline within Stage 4 to be completed to connect into the MVIS, but this constraint is unavoidable with a gravity main due to the gully created by Coppins Creek restricting connection to the eastern side. This sewer, also with consideration to the water services in this area, allows for flexibility in the staging in terms of infrastructure. The proposed alignment allows for Stage 4 to be easily serviced, in the event Stage 3 cannot proceed due to unforeseen transport or planning constraints around the Bindubi Street-William Hovell Drive intersection.

The final staging is a natural extension to the proposed earlier sewer works, with relatively narrow catchments with sufficient fall. A small pump station is proposed in the southern most development area that will likely be the last stage of the development.

9.2.3 STORMWATER

Detention and retention for the stormwater runoff across the site is heavily restricted by the topography of the staging areas. With a strategy focusing on more end of line detention and water quality treatment, temporary basins may need to be considered based on localised construction packages. Sediment and erosion controls will be critical to protect Coppins Creek and the Molonglo River as part of these works. Temporary basins may need to be incorporated in areas that are developed far from the proposed end of line treatment, where new housing developments may produce additional runoff and pollutants prior to the final basin being constructed. These temporary basins have the potential to be repurposed into parkland or similar as the final treatment devices are constructed.

The proposed strategy for the first two stages will incorporate some intricate WSUD and stormwater management design, as it is proposed in include the Coppins Creek wetland area, and the surrounding detention and retention basins. These stages will include the most extensive construction sections of the stormwater works, as the will also incorporate the both Coppins Creek road crossings. Stage 3, being at the top of the catchments will need to be extremely careful of producing sediment pollution into the Coppins Creek wetland area, and erosion and sediment control measures will be critical for this stage. An option to mitigate the risks in polluting the Coppins Creek wetland is to hold off on planting out the wetland area until Stage 3 has been stabilised in terms of sediment, and then proceeding with the vegetation and landscaping installations in the wetland area.

The remaining stages have localised stormwater basins proposed, that will ensure the water quality and quantity targets are met and have minimal impact on surrounding stages.

9.2.4 WATER SENSITIVE URBAN DESIGN

The first expected stage of construction for the Molonglo 3 development area is planned for the north-west corner, adjacent the Whitlam development. Depending on the exact boundaries of the staging, there are two options to incorporate bio-retention basins to ensure water quality targets are being met. If the higher density area is included as part of the earlier staging, a larger basin will be required. However, a smaller basin can be utilised to the north in the event the higher density area is not developed early in the construction staging process. The proposed layout provides flexibility in the early staging process. Despite this strategy to allow for alternate staging possibilities, the proposed WSUD devices in these areas are still quite large and may need to be constructed in stages with more treatment elements or cells introduced appropriately as the development progresses.

9.2.5 POWER

The early stages of the development, in the north-west corner of the Molonglo 3 area, may be able to locally utilise the power supply and reticulation from the recently constructed Whitlam suburb. This strategy may reduce upfront development costs and requirements for major power infrastructure to be constructed as part of the early stages. The eastern and southern portions of the development will utilise the main 132 kV supply to develop the rest of the power reticulation.

9.3 TRANSPORT CONSIDERATIONS

9.3.1 NATIONAL ARBORETUM CANBERRA ACCESS

The Arboretum requires a secondary access road; their current access is limited to the entry/exit point off the Tuggeranong Parkway. This secondary access is important in managing the transport demand at major events, as well as managing emergency situations. The concept plan shows the current preferred alignment of this proposed secondary access. However, this secondary access road is still being refined in consultation between EPSDD, TCCS and the NAC.

It is understood that this additional access point is needed prior to the Molonglo 3 East concept plan being established. An interim solution for the arboretum access is for a temporary road to be constructed using the existing left in/left out on William Hovell Drive. This access will likely need to be managed during major events.

9.3.2 EAST-WEST ARTERIAL

The feasibility study for the East-West Arterial Road was released in December 2020 *(Molonglo East-West Arterial Road Feasibility Study and Molonglo traffic Study [SMEC, 2020])*. It acknowledges that the East-West Arterial may not be required for another 10–15 years. The land release of the southern section of Molonglo 3 East should be aligned with the implementation of this project.

9.3.3 BINDUBI STREET AND WILLIAM HOVELL DRIVE INTERSECTION

As discussed in 7.3, this intersection is proposed to be upgraded to a grade separated intersection (*Bindubi Street – William Hovell Drive Grade Separated Interchange feasibility Study Report* [AECOM, 2019]). It is recognised that this upgrade is due to a number of factors, not simply the additional demands of the development. However, this intersection should be delivered in parallel with the release of the north-eastern portion of the development. There may be a need for this intersection to be introduced earlier in Phase 2 to support traffic in and out of the site.

9.3.4 PUBLIC TRANSPORT

Public transport service provision should be in place as residents move into the development. Without this, residents will revert back to private vehicles which will be difficult to change in the future. Public transport should be delivered in a staged approach whilst maintain high levels of service for the initial residents of Molonglo 3 East.

It is recommended that the IPT is introduced in full in Phase 2 of the development. This should assist in relieving some traffic pressures from the John Gorton Drive intersections. Whilst the eastern portion of the corridor is being developed, the eastern stop in Phase 3 would remain closed.

9.3.5 JOHN GORTON DRIVE UPGRADES

As part of upgrades to John Gorton Drive completed in 2020, four-way intersections with the Molonglo 3 site and Whitlam have been completed. Completing the first phase of the development adjacent to this would allow for these intersections to be used and negate any delay in delivery resulting from longer term improvements at other intersections (such as Bindubi Street Extension).

10 PLANNING CONSIDERATIONS

The Planning and Development Act 2008 sets out a framework of Territory Plan codes, each with a different purpose and status within the established hierarchy. The outcomes of planning studies such as this, and planning policy more generally, must be integrated into Territory Plan codes to have influence over development delivery.

This report and the outcomes of other due diligence/environmental studies already undertaken by EPSDD will ultimately inform a Planning Study for Molonglo 3 East. The Planning Study will provide the EPSDD Territory Plan Team with the information necessary to prepare a Concept Plan for incorporation into the Territory Plan via a Territory Plan Variation. Once the Variation has taken effect, the Concept Plan will have the status as a Precinct Code, which in turn ensures that its provisions override those of Development General Codes where there is an inconsistency. Consequently, the formulation of a Concept Plan provides an opportunity to give effect to novel development assessment requirements through the Territory Plan, and in turn deliver desired outcomes. It should also be noted that development provisions approved through an Estate Development Plan (EDP) process can also be uplifted into a Precinct Code via a technical variation process.

This section presents a high level assessment of key issues that will need to be addressed during the formulation and in the Concept Plan. At present, planning legislation requires Codes to be structured around rules and criteria. While Codes may integrate other information (including for example a statement of the purpose of the Code, Desired Planning Outcomes, or Statements of Desired Character), these hold no weight in their own right, unless specifically cross referenced in a rule or criteria.[1]

It is also important to note that the existing Code assessment track for development applications is only open to those proposals that satisfy all relevant *rules*. That is, if a development (for example a single dwelling house) that would otherwise be code compliant is also subject to a criteria that does not have a corresponding rule, it must be assessed in the Merit track. This has particular implications for framing of the Concept Plan/Precinct Codes when looking ahead to future development and obligations on builders/householders.

In December 2020 the ACT Government released a series of papers identifying potential reforms to the ACT planning system, to be rolled out from 2021 onwards. These reforms may potentially overlap with Molonglo 3 planning and land release timetables. Consequently the reform process will need to be carefully monitored to ensure that new opportunities are identified and utilised, and conversely, that adherence to current practice does not create any longer term constraints as the system changes. For information, key relevant reforms identified in the papers include:

- The removal of the current rule and criteria format within Codes, and its replacement with performance criteria and deemed to comply provisions.
- A review of land use zones to ensure they are fit for purpose.
- The introduction or additional overlays.
- The replacement of existing DA tracks with a two track (simple and complex proposal) system. We note that the papers do not comment on the future of existing EDP processes, and is generally positive towards existing greenfield development practices.
- The creation and implementation of district level strategic plans.

[1] It is also possible that these may be excluded wholesale pursuant to S126(2) of the Legislation Act, which excludes "reader guides".

10.1 PLANNING PRINCIPLES

This report has identified a range of planning principles to be integrated into future controls. Current Territory Plan arrangements do not easily facilitate the integration of planning principles; rather it requires these be translated into rules and criteria to have effect.

It is appropriate for the Concept Plan to integrate a clear statement of planning principles, if only to provide line of sight between early planning and later statutory documents, but these limitations must be recognised.

10.2 LAND USES AND ZONING

The Territory Plan is formatted around a common suite of land use zones. The design concept plan does not allocate land uses using current Territory Plan zone nomenclature. This will require resolution within the text of the Concept Plan.

In addition the design concept plan also identifies a relatively limited range of land use types (residential, retail centre and school), although the proposed land use policies design principle does refer to recreational uses. This infers that future land uses will be derived solely from the existing suite of Residential (RZ1-5), Commercial (CZ1 to 5) and Community Facility Zones (CFZ). Despite the reservation of considerable green space, the likelihood of public realm areas within the retail centre, and the identification of an Intertown Public Transport route, no reference has been made to the Parks and Recreation Zones (PRZ), Non Urban Zones (NUZ) or Transport and Service Zones (TSZ). This will require resolution within the Concept Plan.

Care will need to be taken to ensure nomenclature does not unnecessarily constrain future opportunities. For example it would be preferable for "school" sites to be referred to as "community facility" sites, to provide for a diversity of appropriate, co-located uses, and flexibility as community needs emerge. The treatment of "car park" as a separate land use across existing zones should also be considered.

The nomenclature "retail centre" does not have a parallel in the Territory Plan, which identifies commercial land use zones, and differentiates between City, Town, Group and Local centres. However this approach is not fundamentally different from that for the Molonglo commercial centre. A full review of the Territory Plan Commercial Zone Development Code will be required to ensure that the retail centre proposals are achievable, and where not, appropriate controls integrated into the Concept Plan.

10.3 TOPOGRAPHY

This report and the Proof of Concept Code Reform Work prepared by Roberts Day in 2019 has discussed the interface between existing Estate Development Code provisions and the topographical conditions of Molonglo 3 extensively. That discussion will not be duplicated here, other than to reiterate that reliance on the existing block compliance tables of the Estate Development Code will significantly impact yield, and will preclude the development outcomes proposed.

This report contemplates a form based approach integrating performance based planning. This is appropriate, but does not sit easily with the rule and criteria format of Codes (with particular regard to the implications of having criteria only controls). An option would be to develop a Concept Plan integrating broad slope responsive criterium, applicable only to FUA areas, against which the EDP's will be assessed, but use the EDP to upload site specific form based parameters through a later technical amendment.

The proposed replacement of rules and criteria with performance criteria and deemed to comply standards is consistent with proposed ACT Planning system reform, and there is a possibility of Molonglo 3 acting as a pilot in this regard. Irrespective, any rules and criteria should be formulated with a view to their future translation into performance criteria and deemed to comply standards.

10.4 KEY TRANSPORT AREAS AND MODAL SHIFT

The plan proposes designing to achieve a significant modal shift with lower reliance on private vehicles as a primary mode of transport, including designated car free zones. Existing Territory Plan controls (in particular those of the Vehicular Parking and Access, Bicycle Parking, Access and Mobility General Codes) will require review and appropriate alternative controls framed for inclusion in the Concept Plan. Most pertinently, this will include a review of vehicle movements per dwelling per day standards.

This report has identified the topographical challenges of equitable access to future rapid transport stops and the active transport networks. Rules/criteria for approval will need to be integrated into the Concept Plan to avoid these issues being dealt with on a location by location basis.

10.5 HOUSING TYPOLOGIES AND BUILT FORM

The plan proposes character based lifestyle housing of significant diversity, to support the place identified for each of the sub-precincts. The existing provisions of the Single and Multi-Unit Housing Development Codes provide little opportunity for variation away from standard typologies or built forms. This has been recognised in this study through proposals for liveable value trade schemes, and/or the adoption of performance standards and deemed to comply outcomes. As discussed earlier, the current format of the Territory Plan does not facilitate this approach, but this is as per the amendments envisaged in forthcoming ACT planning system reform.

It will be essential to build character areas and opportunities for housing diversity into the Concept Plan. This will also need to contemplate building height controls/number of storeys to delivery smaller lots and achieve efficient land use and dwelling yields.

10.6 MEANS TO PROGRESS

Several, if not most of the issues identified here are systemic. While the existing Territory Plan framework of Concept Plans/Precinct Codes provide an opportunity to deliver novel outcomes that diverge from the rest of the Territory Plan, the constraints around rules and criteria, and the limited weight that can be placed on planning principles, is problematic when seeking to deliver an outcomes based solution that incentivizes innovation under significant site constraints.

The ACT Government has flagged that many of these issues will be resolved through forthcoming reform processes. The timeframes associated with this may, but equally may not dovetail with planning processes necessary to achieve the indicative land release program. In addition, the proposed reform proposals are indicative at this stage, and cannot be relied on.

However, for the EDP processes to commence in a timeframe that does achieve the Indicative Land release program, it will be necessary to embed key principles – addressed above - into a Concept Plan. More detailed, rule based, controls can be developed as part of the EDP process and then uploaded via subsequent technical variations. It is possible that planning reform will have sufficiently progressed by that stage to allow more innovative framing of development controls. Irrespective, this will allow each EDP stage to be framed relative to the planning system as it exists at that time, and as will be in place throughout substantive development.

In the short term, WSP recommend that further work be undertaken to distil key principles into a rule and criteria format that is suitable for uplift into a Concept Plan/Precinct Code. Further work is also required to align land use allocations with existing Territory Plan nomenclature, taking into account the purpose and limitations of each zone and future flexibility. WSP could assist in this regard.