



PUBLIC DOMAIN AND OPEN SPACE STRATEGY

Glenmore Park Stage 3 at Mulgoa

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Prepared for

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Executive Summary

This Public Domain and Open Space Strategy (PDOSS) has been prepared to satisfy Gateway Determination conditions issued for Glenmore Park Stage 3 (GP3) at Mulgoa. The purpose of the PDOSS is to address the provision of open space, tree canopy targets and other landscape outcomes for not only the future population that will reside in GP3 but also the wider Penrith community.

The specific requirement and content in this PDOSS was prepared for endorsement of the Department of Planning and Environment (DPE) to demonstrate how the proposed delivery of GP3 can address the NSW Government's Draft Greener Places Design Guide including the 40% tree canopy target, the incorporation of existing large trees and riparian corridors into the open space network and suitability of the south east open space.

The Department has been given an earlier version of this Strategy and have confirmed it addresses its requirements. However, since then the Department has directed that land forming part of the exhibited draft Cumberland Plain Conservation Plan should be recognised in the LEP mapping resulting in the urban land being bio-certified. In discussions with the Department, it is noted that essential infrastructure to support the release can occur within the draft CPCP mapped land, subject to the normal environmental assessments. This would include road crossings, stormwater management infrastructure, active transport links and even areas of open space. The land on which this infrastructure is located would ultimately be transferred to Council as is the normal practice.

The CPCP mapping increases the land set aside for open space and conservation outcomes by 6.16ha improving the amenity of the release and tree canopy outcomes. The CPCP land has also reduced the ultimate yield for the development from 7,648 persons to 6,996 persons.

The assessment of the proposed open space and landscape outcomes for this development has also had regard to Council's Penrith Sport and Recreation Strategy and detailed consultation with Council on specific open space outcomes.

As the ultimate section 7.11 Contributions Plan (CP) that will deliver the open space and landscape outcomes identified in the PDOSS will exceed the current contribution cap of \$30,000 per dwelling, the CP is likely to be referred to IPART for review and endorsement. Whilst the role and benchmarking of standards and costs is currently under review, IPART has consistently reviewed the provision of open space and costs for embellishment against the *Priority Growth Areas Development Code* and benchmarks standards applied to other release areas across Sydney. This is expected to continue to be the case for GP3.

This PDOSS confirms that the quantum, location and nature of open spaces to be delivered generally meets the principles and relevant standards within the Sport and Recreation Strategy and the Draft Greener Places Design Guide. The quantum of local and district open spaces of 3.28ha/1,000 people (excluding the environmental corridors and CPCP land) slightly exceeds the 2.83/1,000 people benchmark that IPART will apply to the total new but reduced population of 6,996 persons estimated in the release

The purpose of the PDOSS is not to provide detailed designs for each open space proposed. However, it is important that the PDOSS includes sufficient information at the Planning Proposal phase to outline that each open space can accommodate areas for landscaping and can be suitably embellished to create active and passive recreation areas that will cater for the needs of the wider community.



Sufficient budgets for landscaping and embellishments included in this Strategy have been prepared to inform the CP enabling Council to determine the equipment and embellishments required during the development application stage (post rezoning) whilst providing the flexibility to swap or substitute items and areas if required based on a more fine-grained assessment of the community's needs at the time. To confirm each open space can be delivered as outlined in this PDOSS, concept landscape plans for the open space outcomes for each area in GP3 have been developed by Sturt Noble Associates, Landscape Architects, with costings prepared to inform the CP. Input into the landscape concept plans has also been provided by Council as well as landscape architects from Scott Carver.

An assessment has also been undertaken to identify tree planting opportunities within GP3 to meet the NSW Government's 40% tree canopy target, but more importantly how trees can play a major role in combatting the heat island effect associated with urban development. This is particularly challenging in greenfield areas where the desire to provide diverse and affordable housing can constrain opportunities for landscaping. As an example, smaller lots in medium density zones will have reduced building setbacks so the private areas available to plant a good-sized tree within the property can be limited. Whilst examples like the Wilton Growth Area are touted as meeting the standards, the tree canopy assumptions do not easily translate to GP3. Nonetheless, the additional 6.12ha of CPCP land will increase the tree canopy outcomes across the site to 37.8%.

The PDOSS calculates the total percentage of tree canopy based on tree retention and regeneration in open space areas and riparian corridors as well as new plantings within private residential lots and the local road network i.e. street trees.

Even though GP3 is benefitted by some 25.7ha of environmental corridors that traverse through the release and which are ideal for tree retention and regeneration, achieving the 40% tree canopy target still requires new or different approaches to challenge existing engineering standards and street tree planting requirements to create opportunities to enable GP3 to get close to achieving the target with 37.8%.

The Western Sydney City Deal included a project titled the *Western Sydney Street Design Guidelines* which sought to review engineering and landscaping standards to enable Western Sydney Councils to create greater opportunities for tree planting and adopt road standards that are intended to reduce the quantum of pavement areas in future developments. The combination of more trees and less pavement areas would significantly reduce the heat island effect. Penrith Council was represented on the project however it is understood that Council is yet to confirm whether it will adopt the Western Sydney Street Design Guidelines for GP3 and as such the PDOSS has been largely based on the existing road standards as included in the draft Development Control Plan. The PDOSS examines areas of best practice that, if implemented, will provide new and improved opportunities for increasing tree canopy in GP3.

Despite the generous open space and environmental corridors within GP3, the tree canopy target is not able to be practically achieved, highlighting the difficulties of meeting this standard in new greenfield release areas.

Open space provision in the south eastern corner of the development and on other land held in private ownership has been reviewed to ensure that there is equitable access and quantum of open space for the future population. The open space outcomes proposed for this area of GP3 is required to meet the locational criteria and attributes incorporated in the Penrith Sport and Recreation Strategy and Draft Greener Places Design Guide. The owners of the land on which the south-east open space is proposed to be located will not be disadvantaged given that the subject part of their



properties will be included in the CP as land to be acquired by Council at market value based on urban potential and in consideration of any environmental constraints.



1 Introduction

This Public Domain and Open Space Strategy (PDOSS) outlines the delivery of open spaces and tree canopy outcomes for Glenmore Park Stage 3 (GP3) at Mulgoa. It has been prepared to address condition 3 of the Gateway Determination for the Planning Proposal (Department Reference: PP_2020_PENRI_002_00):

The applicant must prepare a public domain and open space strategy, for endorsement by the Department prior to exhibition, that addresses:

- a. The principles and performance indicators in the NSW Government's Draft Greener Places Design Guide 2020;*
- b. How the precinct will achieve the 40% tree open(sic) (canopy) target for Greater Sydney;*
- c. How existing large trees can be incorporated into the public domain wherever possible;*
- d. How riparian corridors will be incorporated into the open space network; and*
- e. The suitability of the south-east open space on land with fragmented ownership.*

The area known as GP3 comprises of multiple holdings with a combined total of 206ha. The area identified for urban redevelopment is shown in **Figure 1**.



Source: Mirvac

Figure 1 Glenmore Park Stage 3 at Mulgoa Master Plan (outlined in dotted red line)

The Gateway condition requires various matters to be addressed in the Public Domain and Open Space Strategy. To do this and provide context to the responses, this PDOSS is structured as follows:



Chapter 2	Provides a background to the Planning Proposal including the nature of the proposed development and the approach to and discussion of the strategic documents that are relevant to the planning and delivery of open space within the site.
Chapter 3	Outlines the broad key principles and performance indicators in the Draft Greener Places Design Guide.
Chapter 4	Compares the specific principles, performance indicators and standards in the NSW Government's Draft Greener Places Design Guide and Council's Penrith Sport and Recreation Strategy relevant to the delivery of different open space areas within the release. Concept landscape plans for each park (local and district) and environmental corridors together with costings to outline the embellishment of the open space areas have been prepared by Sturt Noble Associates, Landscape Architects, to ultimately inform the CP.
Chapter 5	Identifies existing and proposed tree planting opportunities, recommended approaches and assessment against the 40% tree canopy target advised by the NSW Government's Draft Greener Places Design Guide.
Chapter 6	Outlines the approach to preserve existing large trees into the public domain.
Chapter 7	Provides a discussion outlining how riparian corridors will be incorporated into the open space network.
Chapter 8	Provides a discussion of the suitability of the south-east open space on land with fragmented ownership.
Chapter 9	Conclusions.

This PDOSS has been informed by discussions with Penrith City Council's Planning and Parks and Recreation officers. The PDOSS also references, where appropriate, the planning standards applied to other greenfield release areas given IPART's likely role in reviewing and endorsing the final CP for the provision and embellishment of open space within GP3.



2 Background

Penrith City Council has supported a Planning Proposal which will facilitate the urban redevelopment of the area known as Glenmore Park Stage 3 at Mulgoa including:

- 517 medium density dwellings comprising a diverse mix of townhouses, dwellings above garages and smaller adaptable housing on lots averaging around 230m².
- 1,702 low density residential dwellings on lots averaging 440m².
- 81 large Environmental Living lots with minimum areas of 1,000m², 2,000m², 4,000m² and 12,500m².
- A local centre for retail activities including the provision for 100 shop top dwellings (subject to maximum building height controls and future development applications).
- A future school site co-located adjacent to district open space and the local centre.
- Open spaces comprising of environmental corridors, local parks and district parks including sports fields and areas for passive recreation.

The Master Planning prepared to support the Planning Proposal focusses on the attributes of the land to implement the best and most equitable open space provision for the new community, based on the following principles:

- Land adjacent to key riparian areas can easily be identified for future linear parks and land with high amenity such as areas containing existing water bodies, good stands of native vegetation or provide desirable views and present good opportunities for passive recreation spaces.
- Parks for organised sports are large areas that need to be located on flatter parts of the landscape otherwise dominated by rolling to moderate topography. The main sports fields are all located on the few large relatively flat and substantially cleared parts of the site. The locations of these district parks are well connected by the linear park that will traverse the site connecting the edges of GP3 to other open spaces as well as the school and shopping attractors.
- Separate local open space areas have been provided in the centre of neighbourhoods within GP3 to be delivered at an appropriate scale and landform corresponding with the surrounding subdivisions. Where they exist, open space designs enable stands of trees to be retained wherever practical to enhance the space.

The open spaces identified in the Master Plan include land proposed to be zoned RE1 Public Recreation, the majority of which is located on land controlled by the proponent. The south-eastern open space, also proposed for RE1 zoning, is located across 4 private landholdings. This park is required to ensure all residential land with GP3 is located within 400m of local open space and to allow the existing vegetation on the land to be retained. There is also a District Park within land held in private ownership and is proposed to be zoned C2 Environmental Conservation. The District Park and Local Park within privately owned land will be included in the CP so the owners will be compensated at fair market value based on the opportunities and constraints of the land. These private holdings are identified on the map at **Appendix A**.



A Social Impact and Infrastructure Assessment (SIIA) by Elton Consulting was first prepared in 2018 for the initial concept release of 3,200 lots. However, the SIIA was updated in 2020 and an addendum letter prepared in 2022 for an amended Master Plan to reassess the impact of a reduced residential yield being the current 2,400 (inclusive of 30 'Fonzie Flat' dwellings, C4 lots plus provision of shop top housing). The loss of development yield resulted from Council's direction to:

- Incorporate larger lots at all non-residential interfaces of GP3,
- Incorporate additional open space areas primarily to transition to the Mulgoa Nature Reserve, and
- Remove the western most property along Chain-O-Ponds Road from the planning proposal as this lot formed part of the Mulgoa Valley.
- The DPE's direction to incorporate the draft CPCP mapped lands as relevant to the site.

The 2020 SIIA included an open space assessment (Chapter 6) addressing access to open space for both active and passive recreation pursuits based on the Penrith Sport and Recreation Strategy (draft from 2019) and the then Draft Greener Places Design Guide which had previously been on exhibition in 2017. The SIIA found that the Planning Proposal provided more than enough open space of various types to meet the needs of the future community. Council's Penrith Sport and Recreation Strategy, which had incorporated, as relevant, the provisions in the Draft Greener Places Design Guide, has been subsequently adopted by Council.

Although generally consistent, there are some minor differences between the Penrith Sport and Recreation Strategy and Draft Greener Places Design Guide in the descriptions of different types of open space and locational requirements. Further, the Penrith Sport and Recreation Strategy includes additional provisions aimed at ensuring the quantum of open space is proportional and responds to the ultimate population.

The Draft Greener Places Design Guide was re-exhibited between 25 June to 28 August 2020. Aside from providing detail on the provision of different types of open space, the document seeks initiatives to achieve a 40% tree canopy target for the site, an aim also reflected in Council's Penrith Sport and Recreation Strategy. At the time of writing, the document remains in draft form.

The documents above must also be considered through an additional lens - being the IPART assessment of the CP given the value to deliver open space and other components of the release will exceed the contribution cap of \$30,000 per lot. IPART will apply some standards for the provision and embellishment of open space areas, benchmarked against other urban releases across Sydney.

At the heart of the PDOSS and Master Plan is a commitment to produce a great landscape outcome for the community as part of the broader package of initiatives that will raise the bar on sustainability and quality development.



3 Draft Greener Places Design Guide Principles

The Draft Greener Places Design Guide notes that the information in the Guide can be used in a wide range of plans and processes.

For local government, it notes the information will be useful for 'embedding green infrastructure in planning, including local strategic planning statements, local environmental plan (LEP) and development control plan (DCP) amendments as well as open space strategies'.

For industry, the Guide notes that the information will be useful to support delivery in projects, including master planning, implementation plans, urban design and spatial frameworks.

As a Guide being applied to the Planning Proposal (PP) stage, its application will be to confirm the master planning by the proponent as originally informed by the Social Impact and Infrastructure Assessment by Elton Consulting and to ensure an appropriate framework is applied in the LEP, DCP and CP, for the delivery of the land and embellishment of the open space areas.

In this respect, and as confirmed by the above, this PDOSS is not the tool to address the finer grain planning that occurs at the Development Application (DA) stage including the design of specific embellishments, the specifications for those works and other detailed aspects for the delivery of successful play, sporting and recreation activities. Rather this PDOSS confirms that the various open space offerings and embellishments are located and are of a size and function to best meet the needs of the community, including setting appropriate budgets to deliver a range of embellishments for their intended use.

To advance this latter component of the work, Sturt Noble Associates has prepared concept landscape plans for each park in GP3 showing the spatial location of key elements/activities and costings to deliver the range of spaces, activities and landscaping within each open space. Council has reviewed these previously and required confirmation of areas and requested changes to activities/embellishments in some spaces. The plans and budgets have been updated to reflect these changes.

The budgets identify the package of play equipment, activations, landscaping and other costs for the delivery of each park and provide more than sufficient detail to inform budgets for the CP, and these are included in that document. Council has the opportunity to transfer or substitute budgets for items to better meet the future needs of the community to be determined as the finer grained design process evolves with participation from Council at the DA stage.

The Draft Greener Places Design Guide sets six core criteria to guide performance outcomes which underpin the planning of open space areas. These are the criteria or principles relevant to the consideration of open space at this Planning Proposal stage and should be applied subject to local precinct considerations. The criteria and performance indicators are set out in **Table 1**.

Table 1 Core Criteria in draft Greener Places Design Guide

Criteria	Performance Indicators	Comment
Accessibility and connectivity	Local access - Medium- to low-density areas - < 60 dwellings/ha 5 minutes walk / 400m walking	At the master planning level, local access is provided to local parks located generally at the centre of neighbourhoods and within 400m walking distance.



Criteria	Performance Indicators	Comment
Ease of access is critical for the community to be able to enjoy and use public open space and recreation facilities.	<p>distance to a local park (barrier free)</p> <p>District access - 25 minutes walk / 2 km proximity to a district park. District parks also provide local access</p> <p>Regional access - Up to 30 minutes travel time on public transport or by vehicle to regional open space. Regional parks also provide local access and district access</p>	<p>District Parks including sports fields and passive parks are located adjacent to linear parks which provide continuous linkages from the existing suburb of Glenmore Park in the north, The Northern Road in the east, Mulgoa Nature Reserve in the west and Chain-O-Ponds in the south. An additional link (LIN2) adjacent to Mulgoa Nature Reserve links the passive District Park (D1) to the main environmental corridor in GP3 (LIN1).</p> <p>The active transport links within these linear parks are all located off road with proposed crossings near the Local Centre comprising of local shops, school and sports fields. The expansive network of linear parks provides a high level of accessibility and connectivity to different recreation space without barriers.</p> <p>Bus services including a future designated bus lane along The Northern Road provides access to regional and district parks within Penrith LGA.</p> <p>The open space and linkages are embedded in the LEP zoning map, with the DCP providing further controls to ensure provision of infrastructure and accessibility for all users.</p>
<p>Distribution</p> <p>The ability of residents to gain access to public open space within an easy walk from home, workplaces, and schools is an important factor for quality of life. The geographic distribution of open space is a key access and equity issue for the community.</p>	<p>Local distribution - (0.3–2 ha public open space) 400 m from most houses</p> <p>District distribution - (2–5 ha public open space) 2 km from most houses</p> <p>Regional/metropolitan distribution (> 5 ha public open space) 5–10 km from most houses</p>	<p>Distribution is consistent with the criteria and performance indicators as outlined in later sections of the PDOSS</p>
<p>Size and shape</p> <p>Size and shape of open space has a direct bearing on the capacity of that open space to meet and accommodate recreation activities and needs.</p>	<p>Medium to low density areas – the minimum size of a local park is 5000–7000m².</p> <p>Road frontage and visibility are key considerations, especially in high-density areas so open space is accessible for all. Sporting facilities have specific size and shape requirements that need to be met to provide</p>	<p>All local parks are 5,000m² or greater.</p> <p>All open spaces have road frontages that can accommodate additional parking. The proposed embellishments fit within the open space areas. The 5 sporting fields have been sized and oriented correctly to suit the proposed sport for which they are intended to be used.</p>



Criteria	Performance Indicators	Comment
	functional space for their use.	
Quantity In low and high-density areas, good provision of public open space is essential to compensate for the lack of private open space to support active living and contribute to a more liveable neighbourhood.	Quantity should be considered in the number of opportunities available. Larger public open space areas mean more opportunities can be provided in one location. Quantity of land available, along with size and shape, are critical in adequately meeting sporting needs. There are minimum areas needed for different sports, and different sporting spaces can only accommodate so many users.	<p>The master plan includes both low and medium density areas. All dwellings have access to a range of open spaces for different activities. The open spaces have been identified in locations where slope is most manageable. Local open space exceeds Council's requirements. The total number of sports fields exceed IPART's benchmark requirements.</p> <p>The different spaces are capable of accommodating a range of sports and activities giving flexibility for different sporting codes and users.</p>
Quality The quality of design and ongoing maintenance and management is critical to attracting use and activating the open space network	<p>Open space needs to be strategically planned and designed to create a quality open space network; the sum is greater than its parts. Key characteristics of open space that influence quality include:</p> <ul style="list-style-type: none"> - visual and physical access - landscape setting - demographic, cultural, and community demand - condition of facilities and equipment - maintenance - number of activations within the space - size, shape, and topography - adjacent land uses - amount of vegetation and shade - biodiversity outcomes - safety 	<p>It is important that open spaces provide a quality recreation experience for the users.</p> <p>The location of open space areas has considered both accessibility and opportunities to retain trees. Where appropriate these areas have been expanded further to ensure the size, shape and area are suitable to support key infrastructure such as playing fields or play equipment.</p> <p>The open space outcomes envisaged for GP3 are typical of other greenfield releases, with the exception that the areas for trees have been maximised to help combat the heat island effect and minimise maintenance.</p>



Criteria	Performance Indicators	Comment
	- sustainability	
Diversity The range of open space setting types within an urban area will determine the diversity of recreation opportunity for communities.	Performance indicators are outlined for a range of recreation types below. These are not the only types of open space but represent a range of opportunities. They should be combined, as multi-use facilities: <ul style="list-style-type: none"> - local play for the very young (LPY) - local children's play (LPC) - older children's activity space (OCA) - youth recreation space (YRS) —local recreation space (LRS) —active recreation space (ARS) - large community outdoor recreation area (LCOR) - fitness and exercise space (FES) - trail and path-based recreation (TPR) - organised sport and recreation (OSR) - off-leash dog exercise area (DEA) 	The concept plans and budgets prepared by Sturt Noble Associates provide for a diverse package of play equipment and recreation pursuits. These budgets are sufficient to substitute equipment and design spaces for different age groups where specific activities can be resolved at the DA stage.



4 Strategies for the provision of the open space

Access to a range of spaces for different passive, leisure and recreation activities for a healthy and sustainable community are hallmarks of good planning. In greenfield environments, these spaces include local parks as well as district parks, sporting spaces for organised sport, and even linear parks that connect open spaces and other attractors in a release area. It is accepted that City Wide Parks are not typically incorporated in greenfield release areas but should be reasonably accessible.

Both the Penrith Sport and Recreation Strategy and Draft Greener Places Design Guide identify that a new community will require access to local parks, and a variety of district open spaces which, wherever possible, can be connected by linear parks incorporating pedestrian and cycle linkages. It is common in both documents that convenient access to a district park will be as valuable as having that same access to a local park if it incorporates a similar range of activities. The Greener Places Design Guide reinforces this as follows:

In some cases, equitable distribution may mean that some residents have a linear open space with recreation opportunities within 400m and others have a local park (p 17).

Local parks will provide most of the local opportunities. Higher order parks will generally also fulfil lower order opportunities for the immediate neighbourhood (i.e. a district-level park also provides local-level opportunities) (p24).

Both IPART and Penrith City Council, through the Sport and Recreation Strategy, apply standards for provision of open space types based on the number of persons/ha. For this assessment the relevant, occupancy rates for the release adopts 3.1 persons per dwelling for the low density residential areas, medium density dwellings (including shop top dwellings) at 2.4 persons per dwelling, and studios at 2 persons per dwelling. The increase in population is estimated at 6,996 persons.

Overall, the proposed development provides a total of 48.5ha of various types of open space , including CPCP land. Excluding the environmental corridors forming the linear parks and CPCP land, the subdivision delivers just over 3.28haha/1,000 people which slightly exceeds IPART's benchmark standard of 2.83ha/1,000 people. The increase above IPART's standard is a result of the reduction of yield caused by the CPCP land, without substantive change to the key open space offerings.

The linear parks generally align with the riparian corridors and comprise approximately 25ha of land.

As the PDOSS also addresses the public domain, the document identifies landscape buffers, walkways and street trees, including median plantings on Entry Boulevards, as part of the landscape strategy for GP3. The open space areas within the Master Plan Area have been given a reference identifier that denotes their primarily role as local (L), district (D) or linear (LIN) open space, and public domain items such as the landscape buffers (LB) and entry boulevards (EB). These areas are shown in **Figure 2** below.



Source: Sturt Noble Associates

Figure 2 Open Space Master Plan Local parks

Local parks provide local recreation opportunities within the centre of, or sometimes at edges of a neighbourhood. In Glenmore Park Stage 3 at Mulgoa, the provision of local parks has been planned at the centre of neighbourhoods as well as incorporated within larger district spaces to ensure convenient access to all residents.

The Penrith Sport and Recreation Strategy and the draft Greener Places Design Guide have similar descriptions for local open space as shown by the extracts from each document in **Table 2** below.

Table 2 Descriptions of Local Open Space

Penrith Sport and Recreation Strategy	Draft Greener Places Design Guide
Local open space – provides convenient access to passive and some active recreation for nearby residents of all ages within walking distance. Typical uses, functions and facilities include passive un-irrigated area, low key planting, shade, seating (natural or bench), play equipment catering for predominantly 0-6 years, paths only as required to access park and seats/play, play spaces, some isolated sports facilities, some picnic/low key BBQ facilities and shade/tables, informal active areas, passive areas for family recreation including small kick-about areas.	Local open space - caters to a local neighbourhood area in urban areas where users predominantly walk or cycle to use the facility because it is reasonably close to residences. A multi-use local open space may serve a regional small town or village. These parks provide local play and recreation opportunities.

The delivery and embellishment of the local open space is described in the following sections.



Local Open Space Delivery

The descriptions above both confirm that local open space should be convenient, within walking distance of the local neighbourhood and can provide a range of local play and recreation opportunities. The Penrith Sport and Recreation Strategy and the Draft Greener Places Design Guide provide slightly different performance indicators for local space delivery as shown in **Table 3** below.

Table 3 Comparison of Local Park Performance Indicators

OPEN SPACE TYPE	MINIMUM RATE	ACCESS FROM HOMES	LAND SIZE
LOCAL PARK			
Penrith Sport and Recreation Strategy	0.2ha/1,000 pop	80% within 400m and 100% within 500m	Min 0.5ha
Draft Greener Places Design Guide	Nil	5 minutes walk / 400m walking distance to a local park (barrier free)	Min 0.5ha with road frontage

For the purposes of this assessment, the minimum rate per person of 0.2ha/1000 population in Council's Sport and Recreation Strategy, and the maximum distance from a dwelling of 400m from the Draft Greener Places Design Guide have been applied as the most stringent performance indicators to the provision of local open space in GP3.

The Master Plan includes local parks in the centre of 3 residential neighbourhoods (L1, L2 and L3) and local play facilities within district parks to ensure local play opportunities for all residents in the release.

All of the local parks in the centre of each neighbourhood have areas which meet the minimum area requirement of 5,000m². As noted earlier, local parks can be supplemented by activities in more convenient District Parks if required.

The north eastern parts of the release are also within 400m of Pinnacle Park (L5) with future residents in the north west of GP3 being able to access Linear Park (L6) at Bimbadeen Way (under construction) (both within GP2). These two parks have not been included in the calculations for open space provision in GP3, except to acknowledge that they are in proximity whereby residents in either GP2 or GP3 may be as close to one or another and have the choice to visit parks in either release based on the different recreation experiences provided in each. The location of local parks within and adjacent to the Master Plan area are shown in **Figure 3** below.



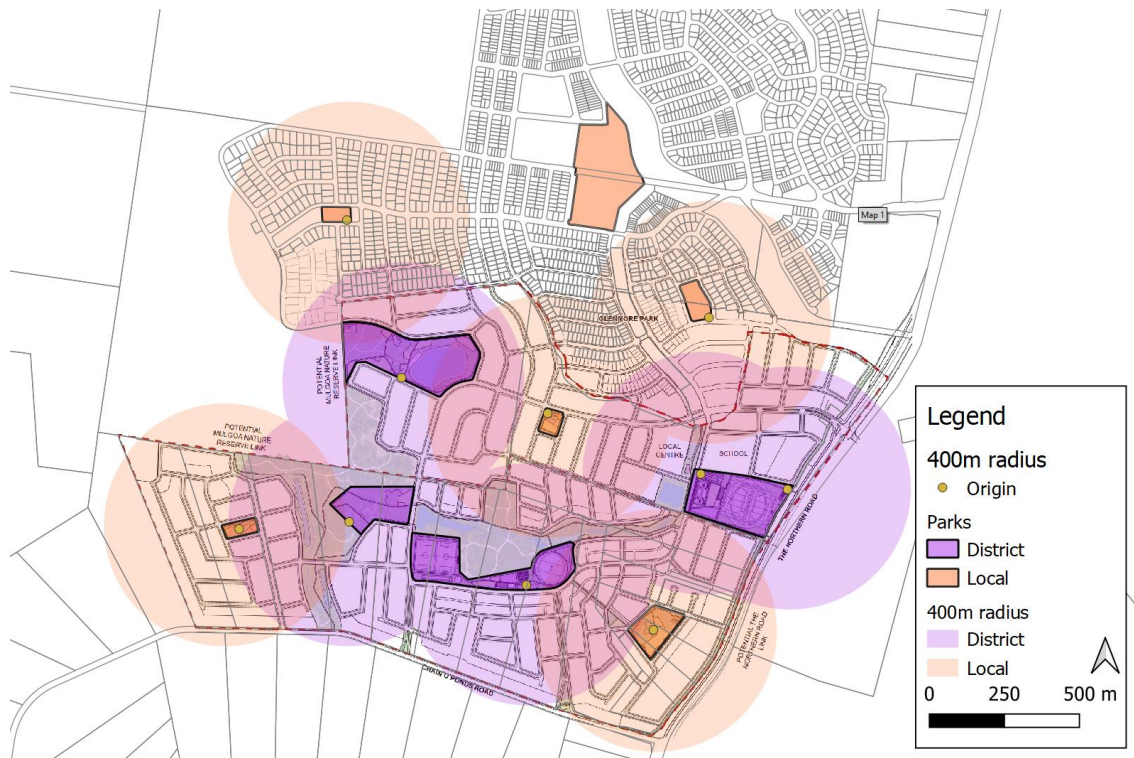
Source: Open Space Master Plan as amended by GLN

Figure 3 Local Parks in and adjacent to the Master Plan Area

Based on the population of the release, the Master Plan requires the provision of 1.339ha of local open space. The three local parks in the centre of the residential precincts (L1, L2 and L3) total 2.8ha. This total area excludes the district open spaces within the Master Plan area. The Master Plan well exceeds the quantum of land for the additional population required by the Penrith Sport and Recreation Strategy.

Compliance with the performance indicator that seeks to ensure residents live in proximity to local open space can be determined by overlaying a 400m band from each of the local parks and, where relevant, the local play embellishment provided in district parks.

Figure 4 maps a 400m perimeter from the boundary of the local parks in orange. Where District Parks are intended to provide local recreation opportunities, a perimeter of 400m in purple from where the local play and recreation embellishments are anticipated.



Source: Open Space Master Plan as amended by GLN

Figure 4 Proximity of dwellings to local recreation experiences provided in local and district parks

Figure 4 confirms that there are only very minor gaps where a small number of dwellings are marginally outside the 400m catchment radii. These minor gaps are not considered an issue as all dwellings will satisfy Council's Sport and Recreation Strategy requirement of being within 500m of local open space or district space that incorporates local recreation opportunities.

Local Open Space Embellishment

There has been a welcome evolution in the embellishment of local parks to ensure designs encourage a range of activities and recreation experiences as well as landscape settings.

As noted previously, it is important that the PDOSS include sufficient work to outline that each park can accommodate areas for landscaping and the embellishments required for both active and passive recreation areas as well as set the appropriate budgets to deliver these. The budgets are sufficient to ensure that Council has the flexibility at the detailed development application stage, to swap out, substitute or adjust budgets, if required and based on a more fine-grained assessment of community needs.

Appendix B includes plans for the local open space areas in Glenmore Park 3 at Mulgoa. Local play activities have also been incorporated into District Park D1 and are shown in the concept plans referenced in the next section.



4.1 District Parks including sporting spaces and linear parks

The descriptions of district open space in the Penrith Sport and Recreation Strategy and the Draft Greener Places Design Guide recognise that these larger parks can incorporate a broader range of uses including passive recreation areas, sports fields as well as linear parks that provide linkages to destinations within or beyond the release area.

Table 4 extracts the descriptions of District Open Space in the Penrith Sport and Recreation Strategy and Draft Greener Places Design Guide.

Table 4 Descriptions of District Open Space

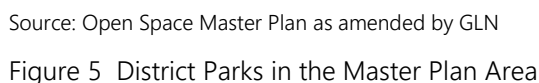
Penrith Sport and Recreation Strategy	Draft Greener Places Design Guide
<p>District open space – is larger and provides for a variety of active and passive recreation needs of the residents with a catchment across two or more suburbs. These spaces can accommodate large group activities, organised sports and offer opportunities for cultural expression and environmental education.</p> <p>Typical uses, functions and facilities include; play spaces for all ages; sports facilities that accommodate multiple sports and hard courts with supporting infrastructure such as car parking, floodlighting, seating, amenities buildings; cultural and civic spaces for events or ceremonies; specific areas of interest including natural areas, bushland and riverside settings; single and group picnic areas; park amenity buildings; other possible uses may include community gardens, community/public art and other interpretive items, youth and mixed recreation spaces, walking/cycling loops, dog off leash areas, on and off street parking, boat ramps, river jetties and access to the river for water sports.</p>	<p>District open spaces - Typically service catchments of less than one local government area (LGA), or several neighbourhoods, but can service a catchment spanning across two LGAs. The planning assumption is that users will be prepared to drive up to 30 minutes to access district open spaces in urban areas.</p> <p>Sporting facilities mostly operate at district level.</p>

The requirements for the provision of District Open Space within the Penrith Sport and Recreation Strategy and the Draft Greener Places Design Guide are summarised in **Table 5** below.

Table 5 Comparison of District Park Performance Indicators

OPEN SPACE TYPE	MINIMUM RATE	ACCESS FROM HOMES	LAND SIZE
DISTRICT PARK - PASSIVE			
Penrith Sport and Recreation Strategy	1ha/1,000 pop	80% within 800m 100% within 1.5km	Min 2ha, Average >5-10ha
Draft Greener Places Design Guide		25 minutes walk / 2 km proximity to a district park District parks also provide	Min 2 ha

The location of the separate district open spaces within the Master Plan area are shown in **Figure 5** below.



gln.



4.1.1 District Open Spaces - Passive

District passive open space provides opportunities for passive recreation – spaces to sit, picnic and enjoy. Ideally passive open spaces provide a variety of settings for different activities within cleared, treed and native bush landscapes.

Passive District Open Space Delivery

The broad descriptions of passive district open space in the Penrith Sport and Recreation Strategy and the Draft Greener Places Design Guide apply to two parks in the Master Plan (D1 and D2). These parks have high amenity and sufficient land area incorporating areas for picnicking, appreciating nature, informal recreation, and embellishments to supplement the local play destinations.

The requirements in the Penrith Sport and Recreation Strategy for walking distances and park areas are more stringent than the Draft Greener Places Design Guide, so these have been adopted for this part of the assessment.

Figure 6 shows the indicative location and features of the two District Parks for passive recreation.



Source: Near map as amended by GLN

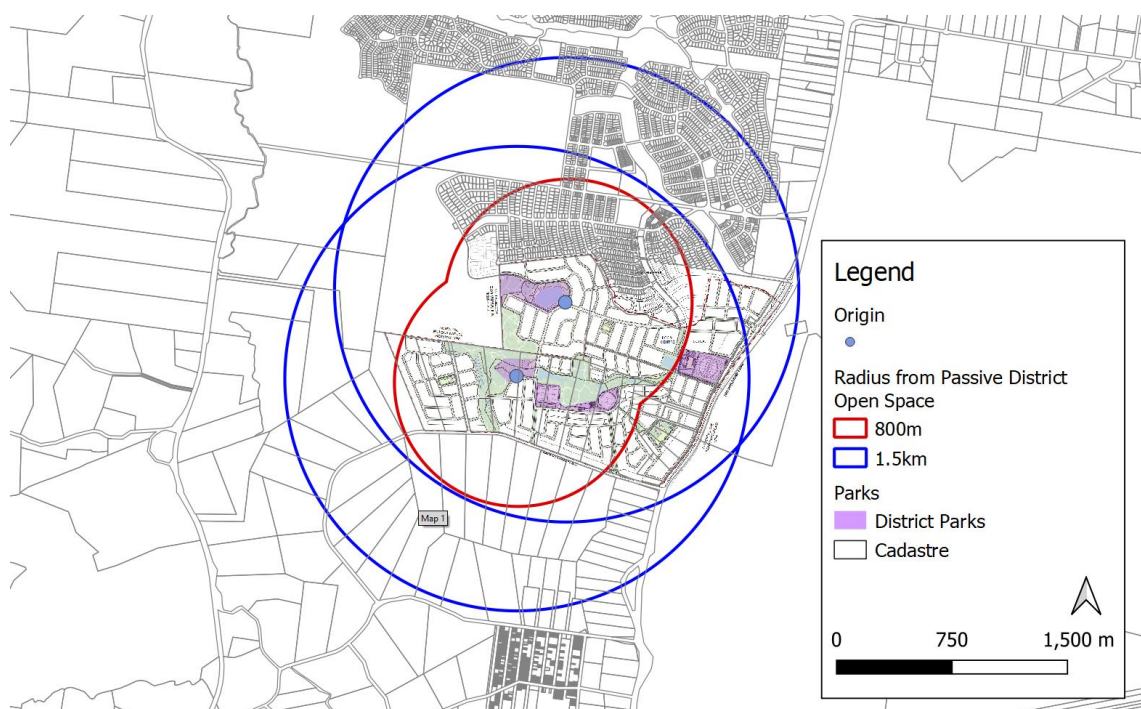
Figure 6 Location and features of Passive District Parks

District Park D1 located in the north west of GP3 has an area of 6.7ha and will incorporate a large dam to be reconstructed and retained as a water feature where it can safely function as a wetland and stormwater detention basin. This facility is not intended to be used for recreational activities however the wetland will greatly improve the overall amenity of the space and provide a better environment for the local fauna and flora to thrive.

D1 also accommodates stands of existing trees with some cleared areas and will include wild/nature play facilities. Wild/nature play are spaces which use natural elements such as water, vegetation, logs and rocks to encourage unstructured play and are ideally located within and adjacent to treed areas. Wild play spaces are intended to complement conventional manufactured play equipment. More importantly these spaces provide inclusive opportunities for all users and promote environmental awareness from a young age.

District Park D2 located at the meeting point of the linear parks adjacent to the south east corner of Mulgoa Nature Reserve has an area of 2.95ha and includes substantial stands of native vegetation. Nature trails are intended to be provided to access the hilltop in this location as well as the wild/nature play facility proposed.

Figure 7 shows the 800m and 1.5km distances from each of the district open space serving a passive recreation function.



Source: Open Space Master Plan as amended by GLN

Figure 7 800m and 1.5km radii from Passive District Open Spaces

All dwellings in GP3 are within 1.5km of a passive district park and 80% are within 800m, noting the large lots along The Northern Road and location of the school and other open space areas limit the number of dwellings that are located outside the 800m catchment.

Based on the population of the release, the Master Plan requires the provision of almost 9.7 ha of passive district open space. There is 10.2ha of passive district open space proposed within GP3 in parks D1 and D2 alone.

The location and areas for the Passive District Parks in the Master Plan fully complies with the performance indicators in the Penrith Sport and Recreation Strategy and Draft Greener Places Design Guide.



Passive District Open Space Embellishment

The embellishment of passive district parks will be focussed primarily for passive recreation including picnics, informal wild/nature play that can supplement local play activities (provided elsewhere in GP3), shelters and paths for nature walks.

Table 6 Embellishments within the Passive District Open Spaces in GP3

	D1	D2
Shared paths/cycleways	•	•
Walking paths and trails	•	•
Reflection Spaces	•	•
Fitness Trail Stations	•	
Picnic Areas	•	•
Recreational lawns	•	•
Viewing deck	•	
Wild Nature Play	•	•
BBQ facilities	•	•
Shelters	•	•

Appendix B includes plans and costings for the passive District Open Spaces in Glenmore Park 3 at Mulgoa.

4.1.2 District Open Space – Sporting Space

Areas for organised sport are perhaps the most difficult to locate on a landscape that is predominantly rolling to moderate terrain. This means the focus for the delivery of sports fields must be on the flatter and preferably cleared parts of the Master Plan area and in locations that are either central and/or capable of being connected to other parks, the school and local centre.

The proposed sporting spaces in Glenmore Park Stage 3 at Mulgoa are all located in areas that are relatively flat, generally cleared, and most importantly easily connected to each other by the linear park that traverses through the release.

Sporting District Open Space Delivery

The Penrith Sport and Recreation Strategy and the Draft Greener Places Design Guide have similar descriptions for District Open Space – Sporting Space as shown by the extracts from each document in **Table 7**.



Table 7 Descriptions of Sporting Space

Penrith Sport and Recreation Strategy	Draft Greener Places Design Guide
Sporting spaces – relates to areas where the primary role is for the purpose of supporting organised sport, including training and competition. Such a space could provide sportsgrounds, athletics tracks, courts and other sports surfaces, and may include buildings where there is a recreation function (for example sports halls, aquatic centres etc.)	District Sporting Precincts – 10+ha site with multiple fields and courts and built facilities supporting formal use such as clubhouses, change and amenities buildings, on-site parking, access networks, and buffer spaces to adjacent uses

The descriptions of sporting spaces are similar except the Draft Greener Places Design Guide sets a 10ha+ site to provide for a combined organised sports offering. The sports fields within the release area have been separated as follows:

- The eastern district park for sporting space, District Park D3, is located on 5.04ha of relatively flat land adjacent to The Northern Road and is co-located with the potential school site (to capitalise on separate sporting facilities in the school grounds). D3 is also located adjacent to the local shops and well connected to the rest of the development by a linear park.
- A central district park for sporting space, District Park D4, is located on a 5.38ha site adjacent to the main linear park in the southern part of the release.

The separation of the district open space allocated to sporting spaces is a planned outcome given:

- The relatively flat and substantively cleared areas within GP3 are at a premium, limiting the formal sporting spaces to only a few areas of the site.
- The traffic and parking requirements associated with having one large sporting park particularly if located close to the local centre will have a much greater impact on local traffic management and the residential amenity in surrounding streets.

Both areas nominated for sporting spaces are easily connected by the active transport link through the linear corridor and provide good sporting opportunities in different parts of the release. Both areas meet the different and most stringent key performance indicators in both documents with the sports fields being within 2km of each dwelling, and within 500m of a public transport stop that could take residents to the sporting space.

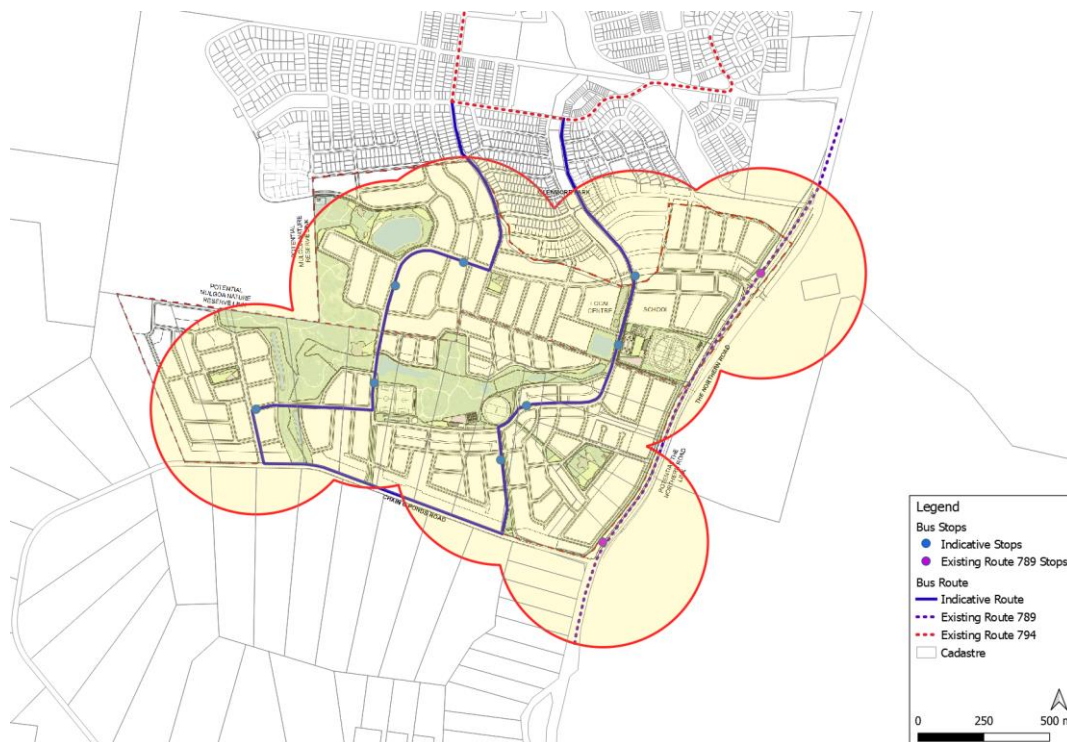
Figure 8 shows a 2km radii from the sporting spaces that captures all dwellings within the Master Plan area.



Source: Open Space Master Plan as amended by GLN

Figure 8 2km radii from the Sporting Spaces

Figure 9 shows the 500m radii from the bus stops on the proposed bus route on collector roads within the Master Plan areas required by the draft Greener Places Design Guide. The bus routes and anticipated stop locations provide easy walking distance to the sporting spaces.



Source: Open Space Master Plan as amended by GLN

Figure 9 500m radii from the proposed bus stops



The total area nominated for sporting spaces is marginally under the key performance indicator of 1.4 ha/1,000 persons (i.e. 9.79ha required compared to total 9.7ha provided) however consideration of the excess in local open space and passive district open space provisions in GP3 and the specific activities designed for the sporting spaces overcome this difference.

The Penrith Sport and Recreation Strategy does not contain a nominated ratio of sports fields per new resident. However, it does indicate (refer page 50) that 84 ha of active open space will be required for 48 sports fields which equates to a rate of provision of 1.75 hectares per sports field. Based on this rate and applying the 1.4ha/1,000 persons standard, GP3 would require 5.6 or 6 sports fields. This equates to a rate of 1 sports field per 1,250 persons for GP3 which is well above the benchmark applied by IPART for the Growth Centres of 1 sports field per 1,850 persons or just over 4 sports fields for GP3. The Master Plan proposes 5 sports fields at a rate of 1 sports field per 1,399 persons.

Sporting District Open Space Embellishment

The area for District Park D3 can comfortably fit double sports fields/oval, an amenities building (to Council's requirements), spectator facilities as well as other courts and other local recreation activities.

District Park D4 has been designed to accommodate 3 sport fields; two in the west and one in the east, as well as other courts and district level playground. A centrally located amenities building has been provided within D4 and sized to Council's requirements.

Consideration of the surfaces for the various sporting fields can be made as part of the finer grained planning at DA stage.

Table 8 Embellishments within the District Parks – Sporting Spaces

	D3	D4
Sports Fields	• 2 x Rugby (or Cricket/AFL oval)	• 2 x Soccer & 1 Cricket/Jnr. AFL oval
Amenities Building	•	•
Sports Courts	• 2 x Netball & 1 Basketball	• 2 x Basketball/Tennis (multi-purpose)
Cricket Practice Wickets	•	
Playground	• Mixed Recreational Space	•
Fitness Node		•
Shared Path / Cycleways	•	•
Footpaths	•	•
Picnic Area	•	•



	D3	D4
BBQ Facilities	•	•
Recreational Lawn	•	•
Shelters	•	•
Dog Park		•
Car Park	•	•

Appendix B includes concept plans and costings for the District Park Sporting Spaces in Glenmore Park 3 at Mulgoa.

4.1.3 Linear Spaces

Linear spaces are important to connect open spaces and a range of other land use attractors within the release. Typically, linear parks follow established riparian networks, but these may be expanded upon to connect to other open space offerings in different catchments and are otherwise not connected by the riparian network.

In the case of Glenmore Park Stage 3 at Mulgoa, the main linear parks LIN 1 and LIN3 traverse through the release connecting the existing linear park located between Gunyah Drive and Riverflat Drive in GP2 in the north, Mulgoa Reserve in the west and Chain-O-Ponds in the south. The linear park traverses through the community hub and also links the district sport spaces located in the east (D3) and in the centre of GP3 (D4). This core link has been extended by the additional CPCP lands located adjacent to Mulgoa Nature Reserve which allows connection with District Park D1 in the north west. This linear park provides a transition to the Mulgoa Nature Reserve and accommodates a further expansion of the off road active transport network.

Linear Open Space Delivery

Whilst the Penrith Sport and Recreation Strategy has a specific definition of linear open space, the Draft Greener Place Design Guide does not, but references this type of open space in various parts of the document as described in **Table 9**.



Table 9 Descriptions of Linear Spaces

Penrith Sport and Recreation Strategy.	Draft Greener Places Design Guide
<p>Linear open space – relates to areas where the primary role may not be public open space but where recreation can occur and is often associated with movement oriented recreation (walking and cycling) for example creek lines, storm water channels, linear trails, native vegetation corridors, river foreshores, rail corridors etc.</p> <p>Linear open space provides additional green links between existing parks and reserves and are particularly important in suburbs deficient in open space as well as new developments. They include the river, creek walks, trails, wildlife corridors with trails and a network linking local reserves.</p>	<p>The Draft Greener Places Design Guide does not contain a comparable definition but recognises these in the hierarchy of parkland provision as providing recreational and active transport pathways, linkages to formal parks, minor recreational features such as seats and active opportunities such as fitness equipment.</p>

Council's Penrith Sport and Recreation Strategy adopts a standard of 1ha/1,000 people for linear parks in greenfield areas. This would require 6.9ha of land set aside for linear parks. In total there is some 25ha of land, excluding other district and local parks but including CPCP land, specifically identified for linear parks in the proposed C2 Environmental Conservation throughout the release. All linear parks exceed 20m in width and are within 800m of all residents within GP3.

Linear Open Space Embellishment

The embellishment of linear parks typically incorporates an active transport link being a 2.5m wide path that is located along the edge of the link. Collectively, these form a comprehensive off-road shared path network that also includes paths within collector roads that together link all land use attractors within the community and will contain stormwater infrastructure to service the release..

Figure 10 shows the Active Transport Links that will be provided throughout GP3 and connections to shared paths/cycleways on The Northern Road and within Glenmore Park Stage 2.



Figure 10 Active Transport Link

Appendix B includes concept plans for the Linear Spaces in Glenmore Park 3 at Mulgoa.



5 Delivering on the Tree Canopy Target

Both the Penrith Sport and Recreation Strategy and the Draft Greener Places Design Guide seek to deliver on the 40% tree canopy target within new greenfield release areas by 2056.

The land proposed for rezoning has a total area of 206ha, including Chain-O-Ponds Road which is also subject to rezoning under the Planning Proposal. For Glenmore Park Stage 3 at Mulgoa to meet the 40% tree canopy requirement, the total area to be covered by tree canopy is 83.6ha.

Existing trees will be preserved wherever possible and new plants delivered within the street network, on private lots and within open space areas including the substantial environmental corridors and CPCP areas that traverse through the release. It is widely acknowledged that the health and survival of new trees greatly depends on species selection. To this end, only trees appropriate to Penrith's climate and soil conditions shall be introduced in the public domain and open space areas of GP3.

The Draft Greener Places Design Guide defines canopy as:

the extent of an individual tree crown (including branches and leaves) or the combined canopy area of a group of trees. A common method for determining the amount of urban tree canopy is to measure the area of canopy as a percentage of total land area. This allows government authorities to understand changes in tree canopy over time (p36).

To provide more certainty around the approaches taken to calculate the tree canopy opportunities in GP3, **Table 10** below outlines the assumptions used for tree planting in streets, parks, and riparian corridors as well as within residential lots, the local centre and proposed school to determine an overall canopy target that would result in a balanced outcome for the release. In terms of street trees, assumptions are based on the road profiles proposed in the draft DCP. Alternative assumptions and calculations are also provided in **Appendix C** to demonstrate how GP3 could meet the 40% canopy target if no restrictions were placed on planting street trees with 10m dia. spreads throughout the release.

Table 10 Tree Canopy Opportunities and Assumptions

Tree Canopy Opportunity	Total Area/unit available for tree planting	Assumptions	Adjusted tree canopy
Linear Parks including CPCP land	25.1ha	<p>LIN1 and LIN3 have been located to retain as many of the existing trees as possible and will be revegetated along the riparian corridors.</p> <p>All linear parks accommodate active transport links along the perimeter and water cycle management facilities i.e. detention basins and raingardens.</p> <p>LIN1 - 76% canopy cover</p>	185,691m ²



Tree Canopy Opportunity	Total Area/unit available for tree planting	Assumptions	Adjusted tree canopy
		<p>Total area excluding water quality facilities 192,143m²</p> <p>LIN2 - 74% canopy cover</p> <p>Total area excluding water quality facilities 37,742m²</p> <p>LIN3 - 43% canopy cover</p> <p>Total area excluding water quality facilities 17,129m²</p> <p>LIN4 - 87% canopy cover</p> <p>Total area excluding water quality facilities 4,094m²</p> <p>Additional CPCP land - 6.12 ha at 90% canopy cover</p>	
District Parks	20.16ha	<p>D1 - 46% canopy cover</p> <p>Total area excluding water quality facilities 67,837m²</p> <p>D2 - 75% canopy cover</p> <p>Total area excluding water quality facilities 29,520m²</p> <p>D3 - 24% canopy cover</p> <p>Total area 50,400m²</p> <p>D4 - 29% canopy cover</p> <p>Total area excluding water quality facilities 53,824m²</p>	80,859m ²
Local Parks	2.8ha	<p>L1 - 50% canopy cover</p> <p>Total area 5,099m²</p> <p>L2 - 58% canopy cover</p> <p>Total area 17,450m²</p> <p>L3 - 47% canopy cover</p> <p>Total area 5,470m²</p>	15,200m ²
Landscape Buffer – C4 zone	1.12ha	<p>The Northern Road Interface</p> <p>10m wide zone to be densely planted to create substantial landscape screen.</p> <p>LB1 - 100% canopy cover</p> <p>Total area 4,135m²</p> <p>LB2 - 100% canopy cover</p> <p>Total area 7,035m²</p>	11,170m ²



Tree Canopy Opportunity	Total Area/unit available for tree planting	Assumptions	Adjusted tree canopy
Street Tree Planting		<p>Refer to plan and schedule in Appendix C for Assumptions and Calculations.</p> <p>Chain-O-Ponds Road Total canopy cover 19,320m²</p> <p>EB1, EB2 & EB3 – Entry Boulevards including medians Total canopy cover 17,330m²</p> <p>Collector Roads Total canopy cover 17,800m²</p> <p>Minor Local Roads Total canopy cover 205,060m²</p> <p>Perimeter Roads 12,430m²</p> <p>Laneways Total canopy cover 740m²</p>	272,680m ²
Lot planting – C4 lots		<p>Minimum 4,000m² lots (The Northern Road Interface)</p> <p>2 large trees in front building setback (16m dia. spread)</p> <p>3 medium trees in rear building setback (8m dia. spread)</p> <p>Total 25 lots i.e. $25 \times ((201.1\text{m}^2 \times 2) + (50.3\text{m}^2 \times 3)) = 13,830\text{m}^2$</p> <p>Minimum 2,000m² lots (Chain-O-Ponds Road)</p> <p>2 medium trees in front building setback (8m dia. spread)</p> <p>3 small trees in rear & side building setbacks (5m dia. spread)</p> <p>Total 24 lots i.e. $24 \times ((50.3\text{m}^2 \times 2) + (19.6\text{m}^2 \times 3)) = 3,830\text{m}^2$</p>	22,880m ²



Tree Canopy Opportunity	Total Area/unit available for tree planting	Assumptions	Adjusted tree canopy
		<p>Minimum 2,000m² lots (Mulgoa Nature Reserve Interface)</p> <p>2 medium trees in front building setback (8m dia. spread)</p> <p>3 small trees in rear & side building setbacks (5m dia. spread)</p> <p>Total 9 lots</p> <p>i.e. $9 \times ((50.3\text{m}^2 \times 2) + (19.6\text{m}^2 \times 3)) = 1,430\text{m}^2$</p>	
		<p>Minimum 2,000m² lots (Western Boundary)</p> <p>2 medium trees in front building setback (8m dia. spread)</p> <p>3 small trees in rear & side building setbacks (5m dia. spread)</p> <p>Total 12 lots</p> <p>i.e. $12 \times ((50.3\text{m}^2 \times 2) + (19.6\text{m}^2 \times 3)) = 1,910\text{m}^2$</p>	
		<p>Minimum 1,000m² lots (Mulgoa Nature Reserve Interface)</p> <p>1 medium tree in front building setback (8m dia. spread)</p> <p>2 small trees in rear building setback (5m dia. spread)</p> <p>Total 21 lots</p> <p>i.e. $21 \times ((50.3\text{m}^2 \times 1) + (19.6\text{m}^2 \times 2)) = 1,880\text{m}^2$</p>	
Lot Planting – R2 lots		<p>1 small tree in front building setback (5m dia. spread)</p> <p>1 small tree in rear building setback (5m dia. spread)</p> <p>Total 1,702 dwellings</p>	66,718.4m ²



Tree Canopy Opportunity	Total Area/unit available for tree planting	Assumptions	Adjusted tree canopy
		i.e. 1,702 x (19.6m ² + 19.6m ²)	
Lot planting – R3 lots		1 small tree per dwelling in front or rear building setback (5m dia. spread) Total 517 dwellings i.e. 517 x 19.6m ²	10,133m ²
Lot planting – C2 zone		Dual zoned large residential lot adjacent to Mulgoa Nature Reserve 100% canopy coverage of E2 zoned part Total area 7,300m ²	7,300m ²
School Site – SP2 zone	2.03ha	40% canopy cover	8,120m ²
Local Centre – B2 zone	2.39ha	20% canopy cover	4,790m ²
Total			68.6ha
Percentage (Based on total GP3 rezoning area of 206 ha)			33.3%
Water Cycle Management Facilities		Wet bed basins over permanent water bodies D1 - Detention Basin with wetland 9,370m ² LIN1 & D2 - Detention Basin (over pond) 21,230m ² LIN3 - Detention Basin (over pond) 6,980m ²	37,580m ²
Total including Water Cycle Management Facilities			77.8ha
Percentage			37.7%

5.1 Street Trees

GLN Planning are aware of, or have been referred to projects at Wilton North and St Leonards Crows Nest that have achieved the tree canopy target of 40% or above. Invariably, these projects select street trees capable of achieving a 10m diameter spread (78.5m² canopy). The difference between a 10m diameter canopy tree and for example, a small 5m diameter canopy tree (19.6m²) is 59m². If all street trees in GP3 were nominated to be 5m in diameter and spaced apart to create a continuous canopy, GP3 would require in the order of 11,000 street trees which would create approximately 21.6ha of canopy cover. Assuming 10m diameter canopy for all street trees and increasing the spacing



accordingly to create a continuous canopy, will result in half the number of street trees required in GP3 however the canopy cover is doubled i.e. $5,500 \text{ trees} \times 78.5\text{m}^2 = 43.2\text{ha}$.

This overall difference is substantial and goes a long way to meeting the 40% canopy target in GP3 however it is impractical to plan for 10m diameter canopy trees everywhere in the road network given the limitations on verge space available once footpaths and cycleways are taken into account. More recent work published by DPIE in the *Street Tree Planting Design Manual – September 2021* suggests that (on page 42):

As a rule of thumb, street trees should be provided the following minimum unobstructed soil volumes:

- *Between 5 and 15 cubic metres for a small tree*
- *Between 20 and 40 cubic metres for a medium-sized tree*
- *Between 50 and 80 cubic metres for a large tree.*

To put this 'rule' in perspective, this would mean that on a standard street with a typical road profile a large tree having a 12m diameter canopy could only be planted every 41.5m in GP3. This spacing is based on the assumptions that the large tree is planted in a 1.2m wide verge (between a footpath and kerb) with a soil depth of 1.0m and only the minimum soil volume requirement of 50m^3 . A medium tree with an 8m diameter canopy, based on the same assumptions, would need to be spaced every 16.5m (See Figures on page 43 and 44 of the *Street Tree Planting Design Manual*.) Neither application creates the ideal scenario of a continuous canopy.

The above example would suggest that it is near impossible to get good tree canopy outcomes in streets that would provide a meaningful contribution to the 40% cover target. However, there are many examples in an urban environment where substantial canopy trees have been planted in streets, are thriving at much closer spacings and without the need for excessive soil volumes, including in other urban locations in Penrith.

The Draft Greener Places Design Guide recommends a package of strategies to assist in meeting the challenge to move toward the 40% tree canopy target. In this regard, it is broadly recognised that to increase tree canopy coverage in new release areas, there needs to be a change to the way street trees have been delivered in the past. To assist with this process, the Western Sydney City Deal funded a program called the *Western Sydney Street Design Guidelines* which examined best practices to reduce hardstand areas associated with roads i.e. carriageways and pedestrian/cycle paths and subsequently increase street tree planting opportunities. Whilst Penrith City Council was represented on the project taskforce that signed off on the final document, it is understood that to date Council has not incorporated the findings into its own DCP.

As roads comprise approximately 20% of the land take in a typical residential subdivision, the ability to optimise street planting opportunities can make a substantive difference. However, Council has raised several issues it believes limits the opportunities to increase tree canopy in greenfield releases including:

- a. The bulk earthworks and ground compaction at the civil works stage constrain the root zone and for street trees cause lifting of footpaths
- b. The limited planting zone in verges because of pedestrian/cycle paths
- c. Trees are removed by residents



There are of course many residential subdivisions in western Sydney which have grappled with these same issues and have managed to produce good canopy outcomes to improve the amenity of the streetscape and open space areas. For Council, some of the following approaches should be considered to facilitate a better canopy tree outcome for GP3:

- Minimise carriageway widths whilst maintaining the overall road reserve to create wider verges and therefore providing more soil volume to offer more opportunities for larger trees with bigger canopies to be planted within streets,
- Limit residential driveway crossover widths to maximum 3m wide,
- Limit location of pedestrian footpaths to one side of local roads only to allow for larger canopy trees on the opposite verge (note orientation of streets should be considered when nominating footpath side to optimise shade area of larger trees), and
- Allow street trees with 6m dia. spread or more to be planted within verges which accommodate pedestrian/cycle paths lessening the number of trees whilst improving individual canopy contribution.

Although simplified, the assumptions made to estimate the total canopy coverage provided by street trees in GP3 is appropriate for this PDOSS. The selection of the street tree sizes and their corresponding spreads for the various road types in GP3 have been directly informed by Council's Street & Park Tree Management Plan (refer extract below).

Tree size	Planting spacing distance
Small trees: 6-8m high x 5m spread	Small trees at 5 – 7 m centres
Medium trees: 10- 12m high x 8m spread	Medium trees at 7 – 10m centres
Larger trees: 16 – 20m high x 16m spread	Large trees at 10- 15m centres

Factors such as residential lot boundaries, driveway locations, street lighting and drainage infrastructure will need to be considered when determining the final placement of trees within the local road network however this level of assessment should be reserved for the DA stage when these finer grained details will be available.

One of the main purposes of the PDOSS is to identify all opportunities within GP3 to provide urban tree canopy throughout the release including within future private allotments. The scenarios proposed for street tree planting throughout GP3 prioritise the objective of creating continuous canopies within the future public roads. The only exception being where street trees are proposed in verges adjacent to a bushfire threat, trees are spaced apart, so their canopies are disconnected.

To determine the areas available for planting street trees in GP3, approximate verge lengths have been based on a concept subdivision masterplan (refer to Appendix C) and the road profiles in the draft DCP. Measurements of verge lengths for each road have been taken to calculate the number of street trees, at their nominated canopy sizes, that each verge can accommodate whilst taking into consideration sight distance requirements at intersections.

Figures 11, 12 and 13 below demonstrate how the street tree sizes/spreads and spacings assumed for the entry boulevards, a typical collector road and a typical local road can be arranged to achieve continuous canopies.

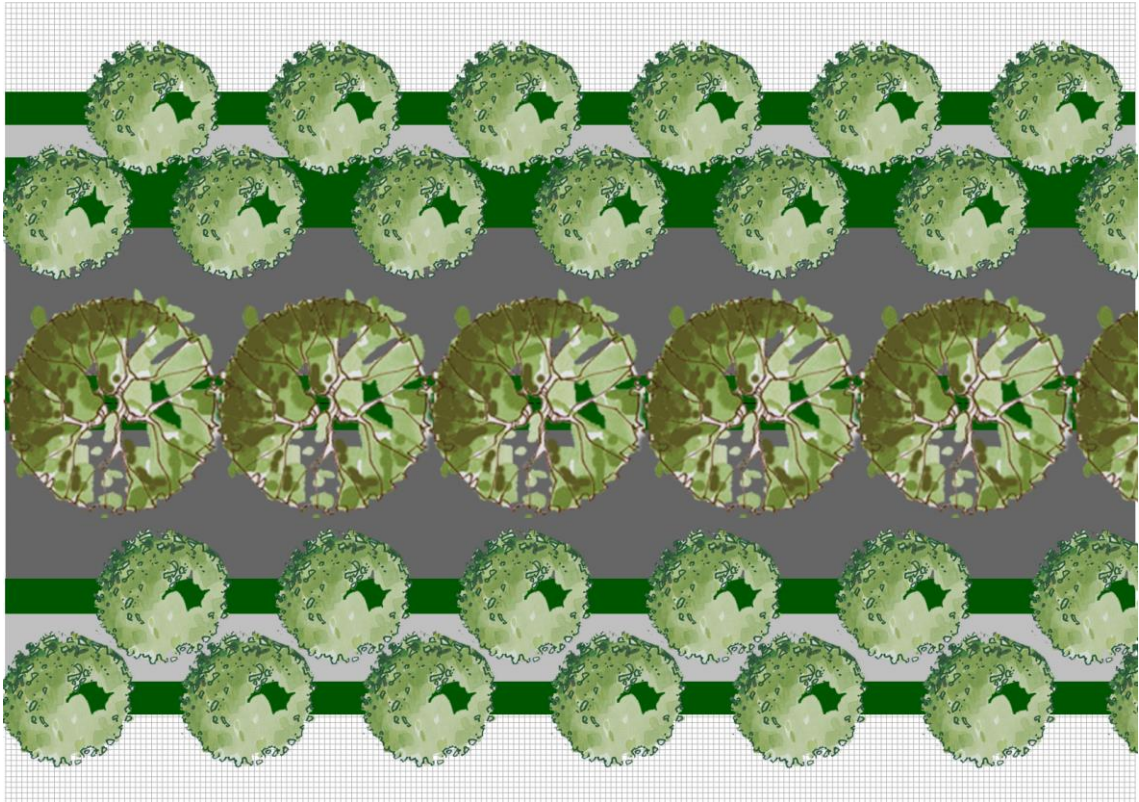


Figure 11 Continuous Street Tree Canopy - Entry Boulevard [5.0-5.5-2.0-5.5- 5.0]

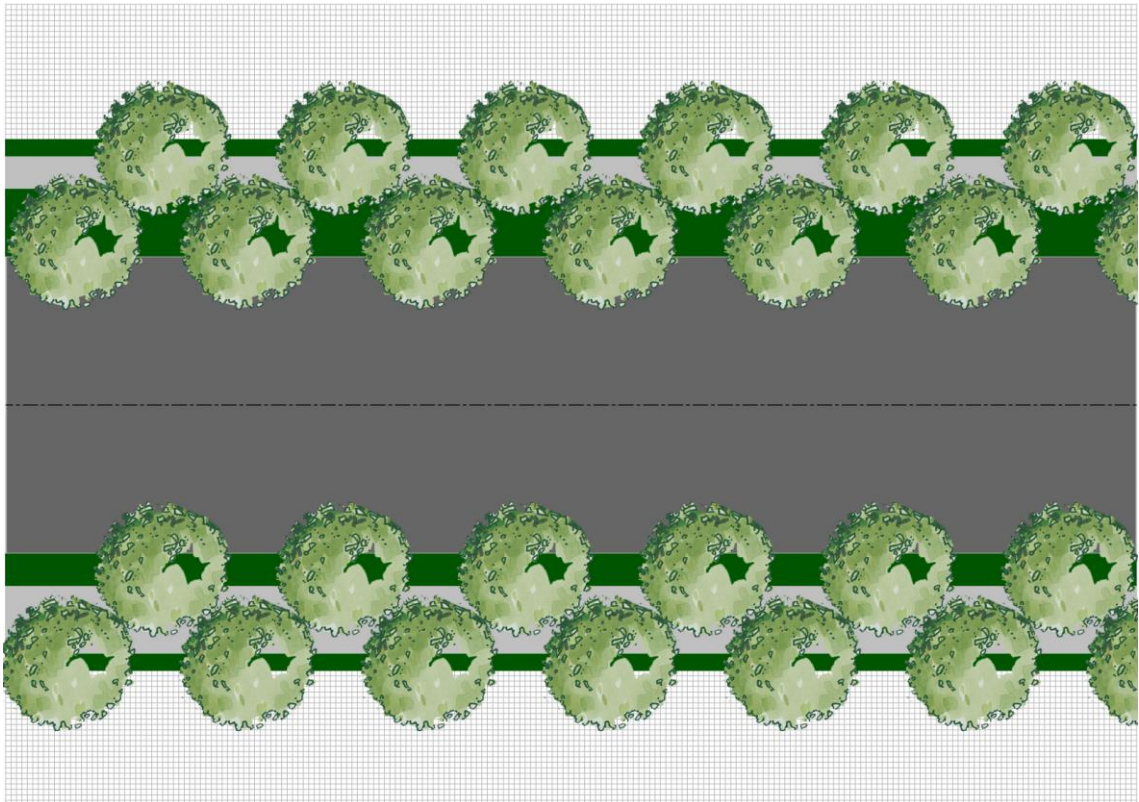


Figure 12 Continuous Street Tree Canopy - Collector Road [4.3-11.0-4.3]

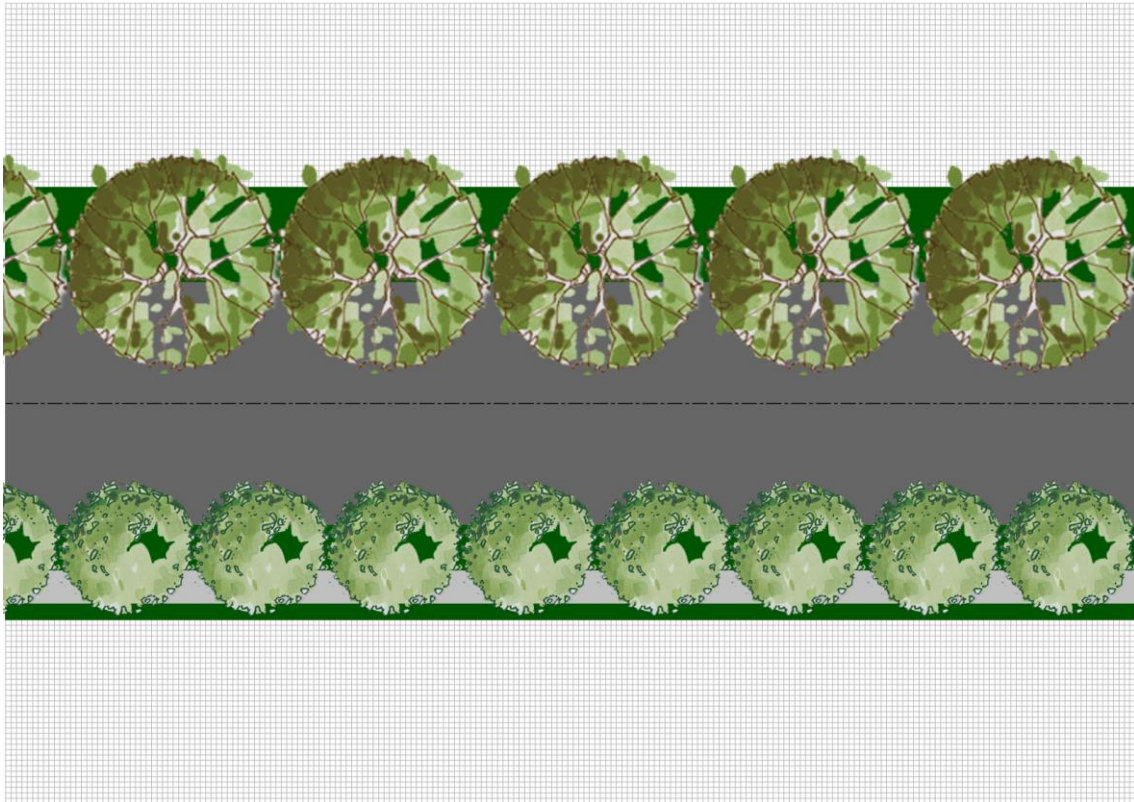


Figure 13 Continuous Street Tree Canopy – Local Road [3.5–9.0–3.5]

It is acknowledged that the street tree planting treatment proposed for GP3 is ambitious however in order to achieve the main objectives of the Draft Greener Places Design Guide and Council's own draft The Penrith Green Grid Strategy, a progressive approach is necessary with street trees taking precedence in the delivery of future local roads.

The challenges trees face in urban greenfield developments are extensive so again, the importance of selecting the right trees for their intended purposes and the prevalent conditions will be key to achieving a balanced and realistic canopy target for GP3. Reference to Council's Street & Park Tree Management Plan shall be made when species are eventually chosen for planting within the streets and open space areas.

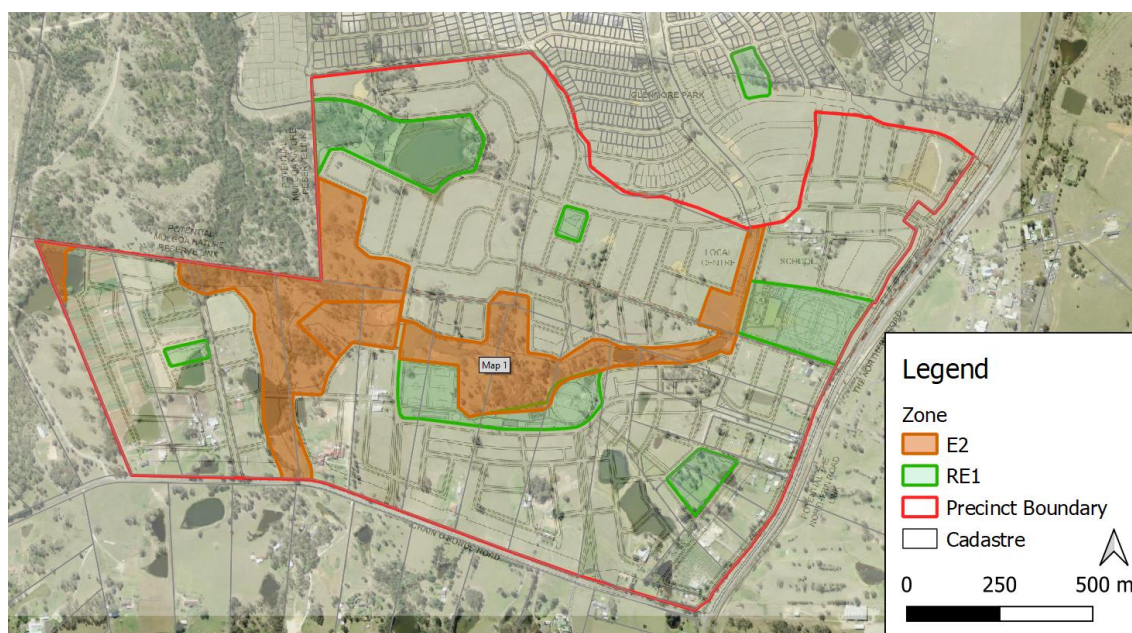
Further, future local roads and drainage infrastructure should prioritise the occupation of street trees, and their ongoing management including, where practical, the implementation of passive irrigation measures. All reasonable efforts shall be made to protect trees from establishment to maturity and beyond however the education of the community in GP3 on the benefits that tree-lined streets will have on their own personal environment will provide the best chance of growth and survival.

6 Approach to preserve existing large trees into the public domain

Most of the existing trees on site will be retained within the proposed C2 Environmental Conservation and RE1 Public Recreation zones including the District Parks identified for passive recreation. The trees to be retained are largely contained on land controlled by the proponent however some trees are in areas owned privately by other landowners in GP3.

The CPCP mapping will be applied to enable bio-certification of the remaining urban land so isolated remaining trees are likely to be removed as part of the subdivision process.

Figure 14 shows the proposed E2 and RE1 zonings in relation to the existing trees on the site.



Source: Master Plan as amended by GLN

Figure 14 Existing trees within future open space

The zoned open space land, linear parks and CPCP land with trees is intended to be transferred into public ownership through either land dedication through a local VPA, acquisition/dedication under a CP, and potentially through offsetting via a VPA with the State Government for CPCP land (depending on final arrangements).

There are also opportunities to incorporate existing trees within the larger lots located along the periphery of the release through the development application process noting that State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 will not apply to this land as a result of its proposed zoning i.e. C4 Environmental Living.

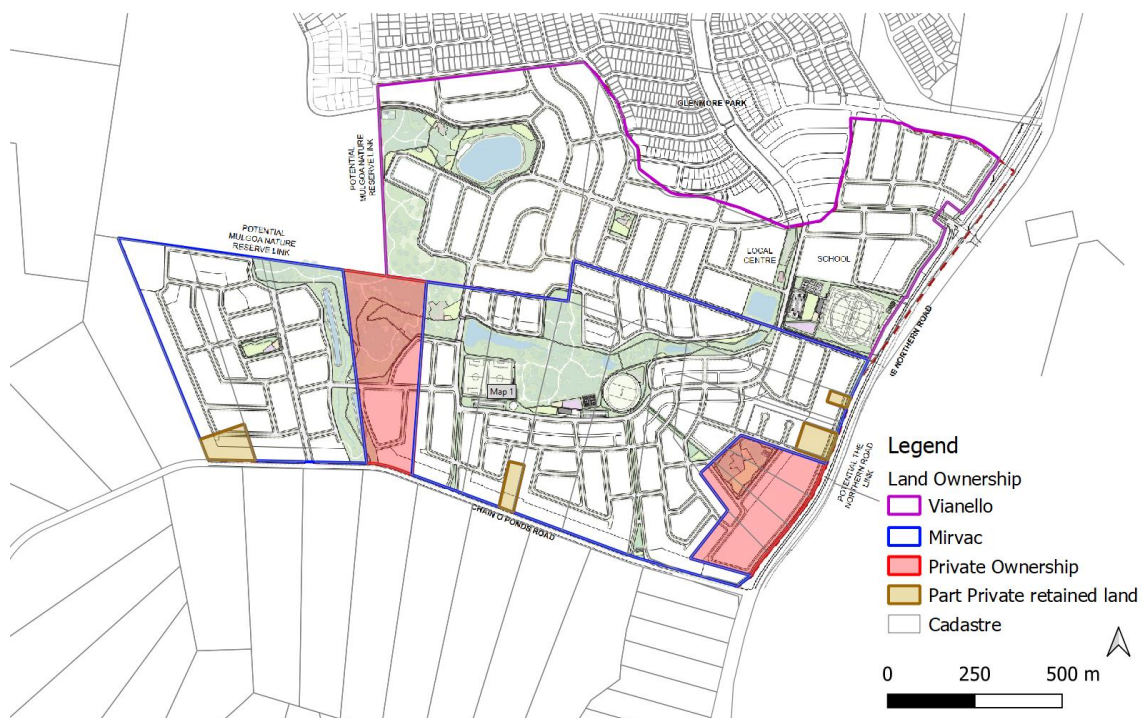
7 Delivery of riparian corridors and other open space commitments

As noted above, the majority of the RE1 Public Recreation and C2 Environmental Conservation Zones are on land which the proponent will control. Mirvac and Vianello intend to enter into Planning Agreements with the State Government for the CPCP land where there are no infrastructure items, or via Works in Kind Agreements with Council to dedicate and embellish open space in GP3, thereby offsetting Local Development Contributions for these items.

The location of existing watercourses, identified as riparian corridors, have largely informed the extent of open space within GP3 and their respective zonings. One of the important functions of a riparian corridor is to convey and control flood flows so in this respect certain parts of the open space network will be flood affected.

In terms of the active recreation areas, the 1% AEP flood extents based on pre-development conditions indicate that the proposed sports fields will be generally clear of this flood extent. Detailed modelling at DA stage will determine the levels that the active recreation areas need to be designed for to remain flood free under post development conditions.

Figure 15 shows the land under the control of Vianello and Mirvac and those held under private ownership.



Source: Open Space Master Plan as amended by GLN

Figure 15 Open space land in Mirvac, Vianello and private ownership

The section above outlines the delivery of the Mirvac, Vianello and private landowners land designated for open space or environmental corridor.



Table 11 below summarises the open space commitments for GP3 in relation to the area of each park, its proposed zoning and the requirement to satisfy the *Everyone Can Play* Guidelines.

Table 11 Open Space Summary

Open Space	Classification	Area (m ²)	Zoning	Details
L1	Local Park	5,099	RE1	For: <ul style="list-style-type: none"> • Recreational Infrastructure & Inclusions • Character • Functionality • Facilities • Constraints
L2	Local Park	17,450	RE1	
L3	Local Park	5,470	RE1	
D1	District Park	67,837	RE1	
D2	District Park	29,520	C2	refer to concept plans and cost schedules prepared by Sturt Noble Associates Appendix B.
D3	District Park	50,400	RE1	
D4	District Park	53,824	RE1	The NSW Government's <i>Everyone Can Play</i> Guideline shall inform the detailed planning for all future play spaces in GP3 to ensure each are designed to be inclusive of all in the community.
LIN1	Linear Park	192,143	C2	
LIN2	Linear Park	37,742	RE1	
LIN3	Linear Park	17,129	C2, RE1	
LIN4	Linear Park	4,094	R2, R3	
Total Area (m ²)		480,702		

The concept designs for the open space areas have been closely informed by the water cycle management strategy (WCMS) for GP3 and embrace the importance of creating good connections between passive and active recreation zones.

The 'wet' basins in Linear Park LIN1 and District Park D1 are proposed to function as such to create water bodies that will be key features for the project. Although not typically used for recreational purposes, the land surrounding the basins offer opportunities for reflection spaces, picnic areas and nature-based pursuits such as birdwatching. A well-thought-out network of paths and trails (formal and informal) throughout GP3 will ensure amenities provided within stormwater management areas are easily accessible and suitably integrated within the overall open space strategy.

The Draft Local Development Contributions Plan has been prepared and is separate to this PDOSS.



8 Delivery and suitability of the south east open space

The original Master Plan proposed land adjacent and parallel to The Northern Road in the south east corner of the release for smaller lots suitable for standard residential housing. The smaller lot housing was to face The Northern Road and the open space in this part of the site (Ref L2) was sized and located for the anticipated dwelling yield and corresponding population.

The planning approach adopted at this time was consistent with advice from the Roads and Maritime Services that it did not want an acoustic wall along this section of The Northern Road. In place of an acoustic wall, a substantive landscaped screen was proposed to provide a visual barrier and amenity to these dwellings. However, through the planning process Council requested changes to the Master Plan including larger lots along the western boundary of the Master Plan area to provide a rural transition interface to The Northern Road, thereby reducing the residential population in this part of the Master Plan area.

The local open space located in the south east corner of the release has remained unchanged from the first Master Plan area. The open space was proposed in this area as:

- Residents in this part of the release would be over 400m from other open space offerings and hence an area in this location of the release is required for the future residents as per the Penrith Sport and Recreation Strategy and the draft Greener Places Design Guide as discussed in Section 4.1 of the PDOSS.
- The land is one of the relatively flat parts of the site but was considered to not be central enough for the sporting spaces that are provided elsewhere in the release. The open space was required in this area given the distances from other local and district open spaces within the release.
- The location incorporates a large stand of existing trees worthy of preservation.

Figure 16 shows that the south east open space (L2) is required to provide access to the residents in this part of the Master Plan area. The area could be reduced in size given that the dwelling density has been reduced in this part of the release.



Source: Master Plan as amended by GLN

Figure 16 400m radii of other district and local spaces excluding the South East corner of GP3



9 Conclusion

This Public Domain and Open Space Strategy has confirmed that the provision of open spaces within Glenmore Park Stage 3 at Mulgoa substantially meets the requirements of the Penrith Sport and Recreation Strategy and Draft Greener Places Design Guide. Although GP3 does not strictly meet the recommendation of providing 10ha or more for a sporting space, the release proposes more sporting fields than IPART's benchmarked standard and significantly exceeds local open space area requirements with some parks specifically embellished to provide additional activations. All local and district open spaces within GP3 are well connected by the linear parks and the considerable shared path network that links the environmental corridors with the residential areas of GP3 and beyond.

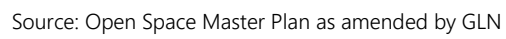
The open spaces are all capable of being embellished to achieve a range of passive and active recreation experiences. The documents provided herein outline the conceptual embellishment of open space within GP3. Notwithstanding, it is intended that most of the land will be dedicated to Penrith City Council or the State Government through the development process or in accordance with a Planning Agreement/s to be entered into by the proponent which will also include embellishment works.

The 40% tree canopy target is difficult to achieve in greenfield releases, even in developments such as Glenmore Park Stage 3 at Mulgoa which has a much higher proportion of open space through the extensive riparian corridors and large passive district open spaces. Whilst the target could theoretically be achieved, it is impractical to assume that most trees outside the bounds of the open space will reach a mature canopy of 10m diameter. A detailed assessment has found that a total canopy cover of 37.8% is a more realistic outcome for this release based on the practical sizing and quantities of trees within both private residential lots and road reserves.

The open space in the south east corner of the site is required to ensure all parts of the site have access to local open space within 400m of all dwellings.



APPENDIX A: OWNERSHIP WITHIN MASTER PLAN





APPENDIX B: CONCEPT LANDSCAPE PLANS

MASTERPLAN



- LEGEND**
- Stage boundary
 - Extent of works

- KEY**
- D1 District Park 1
 - D2 District Park 2
 - D3 District Park 3
 - D4 District Park 4
 - L1 Local Park 1
 - L2 Local Park 2
 - L3 Local Park 3
 - LIN1 Linear Park 1
 - LIN2 Linear Park 2
 - LIN3 Linear Park 3
 - LIN4 Linear Park 4
 - EB1 Entry Boulevard 1
 - EB2 Entry Boulevard 2
 - EB3 Entry Boulevard 3
 - LB1 Landscape Buffer 1
 - LB2 Landscape Buffer 2

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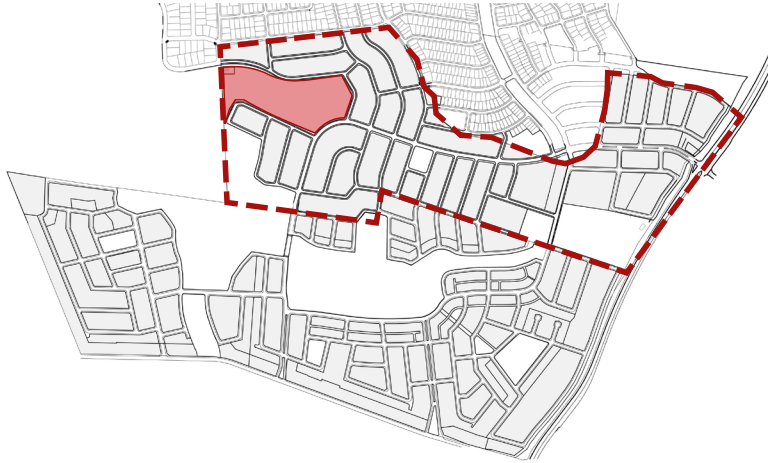
CLIENT
MIRVAC / VIANELLO

DRAWING
MASTERPLAN

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CP-2109-000	C	jw / jc	13.04.2022

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LEGEND

- Stage boundary
- Extent of works
- Extent of avoided land for Cumberland Plains Conservation
- Existing trees
- Proposed trees
- Street trees
- Water quality basin / wetland
- Paths / hardstand
- Informal paths
- Open lawn area
- Picnic area
- Wild play / nature play
- Landscape area
- Feature planting

NOTES

- 2.5m wide shared path
- On-street parking
- Bridge
- Informal stepping stone crossing
- Pumping station by others 40 x 25m
- Maintenance access track and spill way to basin
- Approximate location of existing watercourse

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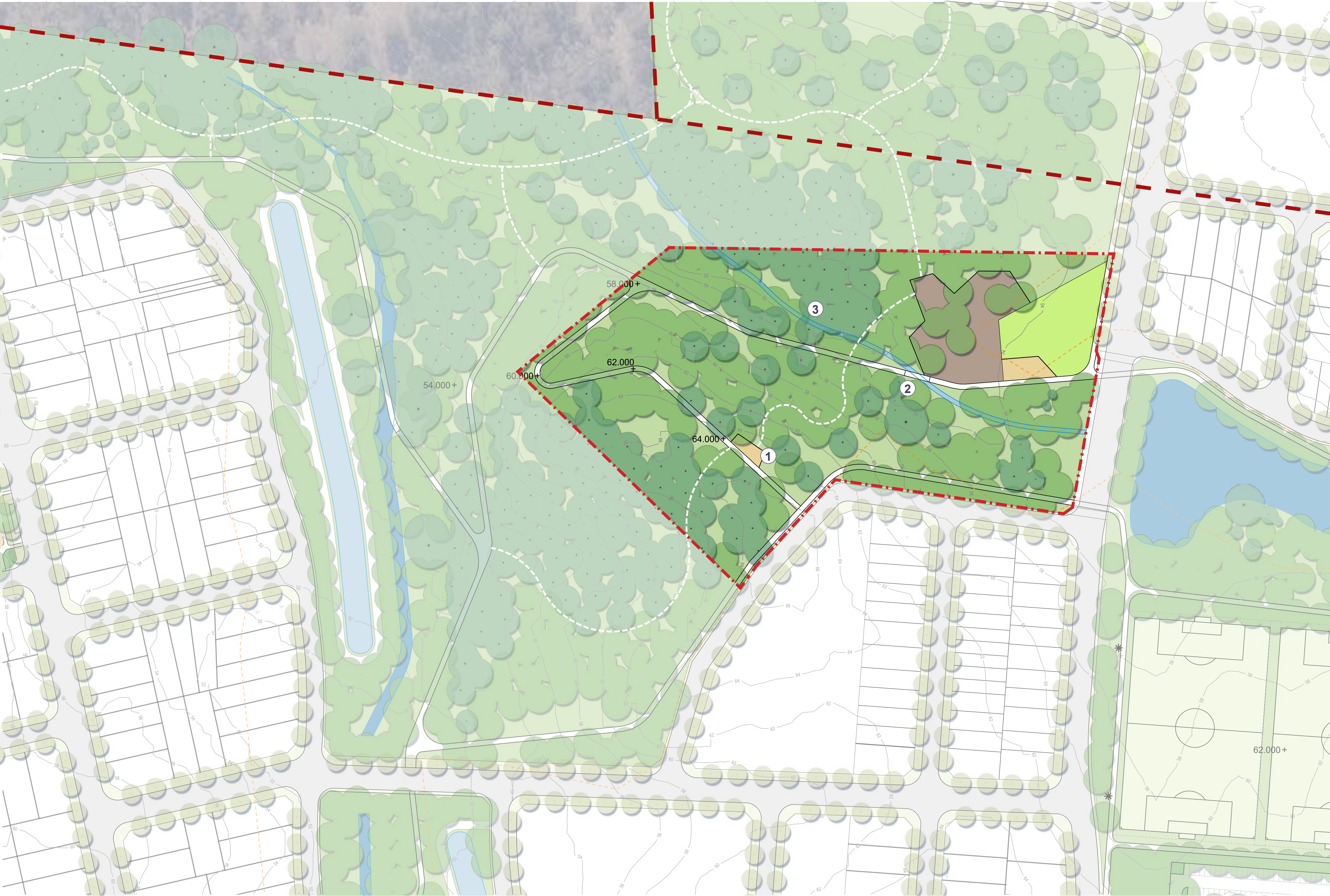
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DISTRICT PARK 2



KEY PLAN



LEGEND

- Stage boundary
- Extent of works
- Extent of avoided land for Cumberland Plains Conservation
- Existing trees
- Proposed trees
- Street trees
- Paths / hardstand
- Informal paths
- Open lawn area
- Wild play / nature play
- Picnic area
- Landscape area

NOTES

- Views to wetland and beyond
- Bridge
- Approximate location of existing watercourse



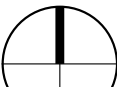
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CLIENT
MIRVAC

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DISTRICT PARK 2 (D2)

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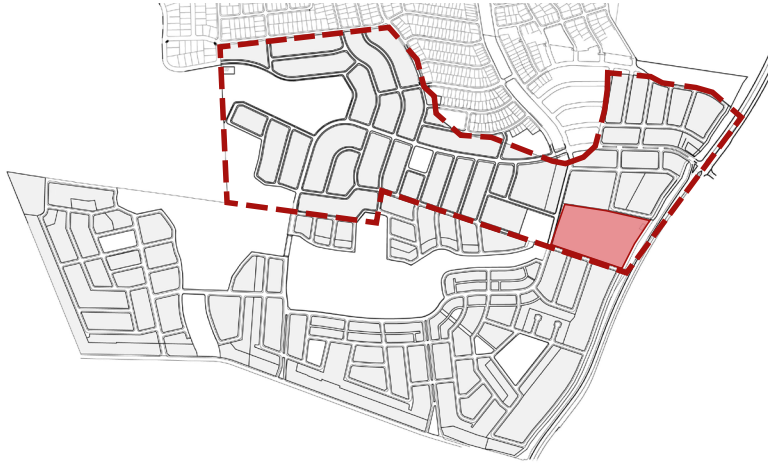
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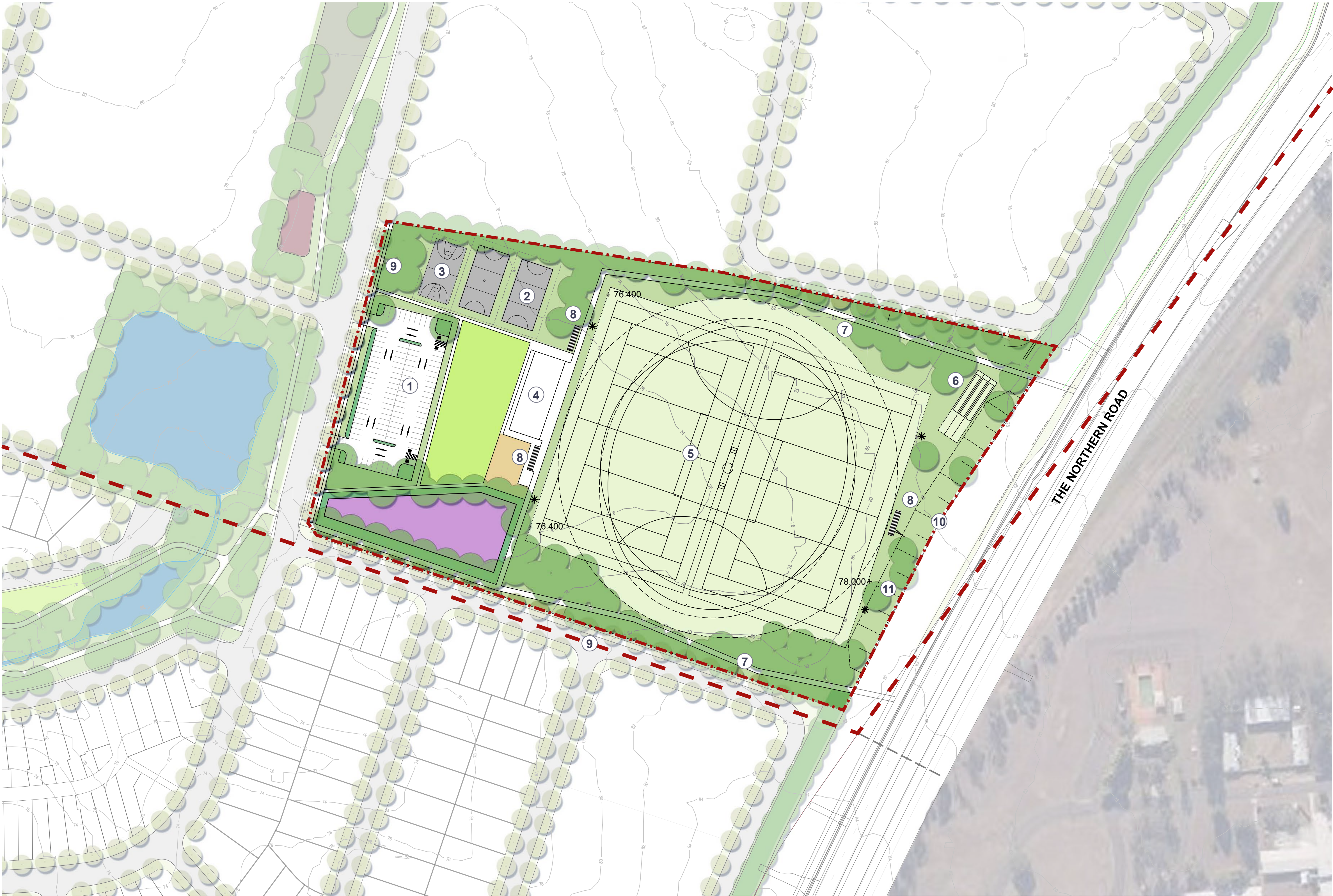
DISTRICT PARK 03

KEY PLAN



LEGEND

- Stage boundary
- Extent of works
- Existing trees
- Proposed trees
- Street trees
- Paths / hardstand
- Sports fields
- Open lawn area
- Picnic area
- Mixed recreation space
- Landscape area
- Feature planting
- Indicative flood light location



NOTES

1. Carpark with 98 spaces plus 4 accessible spaces

2. Netball courts

3. Basketball court

4. Amenities building (39 x 16m)

5. Community Cricket oval (120m dia with 20m runoff) / Small regional AFL field (135 x 100m with 4m run off) / 2 x rugby league fields (100 x 68m with 8m try lines and 5m runoff area)
6. Cricket practice nets

7. 2.5m wide shared path

8. Bleacher seating

9. On-street parking

10. Clear sightlines through to Riley's Mountain

11. Landscape bank

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PROJECT
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CLIENT
VIANELLO

DRAWING
DISTRICT PARK 3 (D3)

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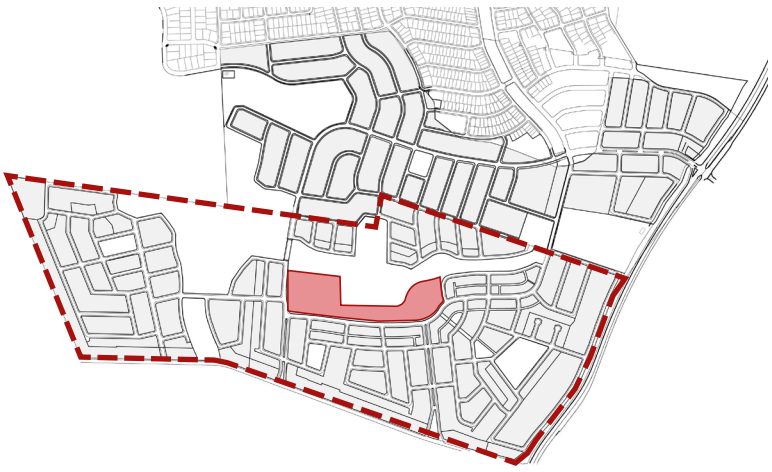
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DISTRICT PARK 4

KEY PLAN



LEGEND

- Extent of works
- Extent of avoided land for Cumberland Plains Conservation
- Existing trees
- Proposed trees
- Street trees
- Paths / hardstand
- Informal paths
- Sports fields
- Open lawn area
- Picnic area
- District playground
- Landscape area
- Indicative flood light location



NOTES

- 2 x Soccer fields (100 x 64m with 3m runoff area around and a 5m technical area)
- Multi use tennis / basketball courts
- Amenities building and community centre (59 x 15m)
- Outdoor fitness node with dynamic and static equipment
- Car park with 64 spaces and 4 accessible spaces
- Car park with 48 spaces and 4 accessible spaces
- Village green / Cricket oval (110m dia) and junior AFL field (100 x 80m with a 5m run off area)
- Bleacher seating
- 2.5m wide shared path
- Fenced dog park

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CLIENT
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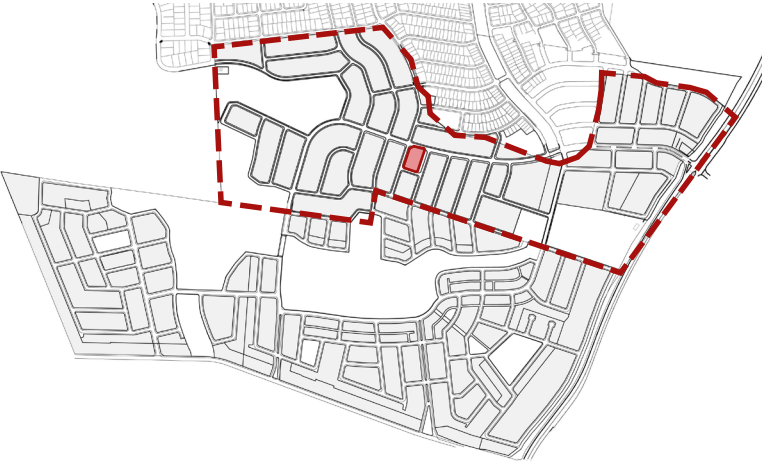
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LOCAL PARK 1



KEY PLAN



LEGEND

- Extent of works
- Existing trees
- Proposed trees
- Street trees
- Paths / hardstand
- Open lawn area
- Picnic area
- Playground
- Wild play / nature play
- Landscape area
- Feature planting

NOTES

- 1.5m wide path
- 2.5m wide shared path

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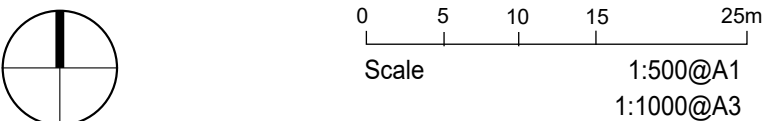
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CLIENT
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LOCAL PARK 1 (L1)

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LOCAL PARK 2

KEY PLAN



LEGEND

-  Extent of works
-  Existing trees
-  Proposed trees
-  Street trees
-  Paths / hardstand
-  Sports courts
-  Open lawn area
-  Picnic area
-  Wild play / nature play
-  Landscape area
-  Feature planting

NOTES

1. Half basketball court
2. On-street parking
3. 2.5m wide path

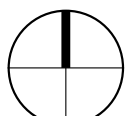


PROJECT GLENMORE PARK STAGE 3 SOUTH

CLIENT
MIRVAC

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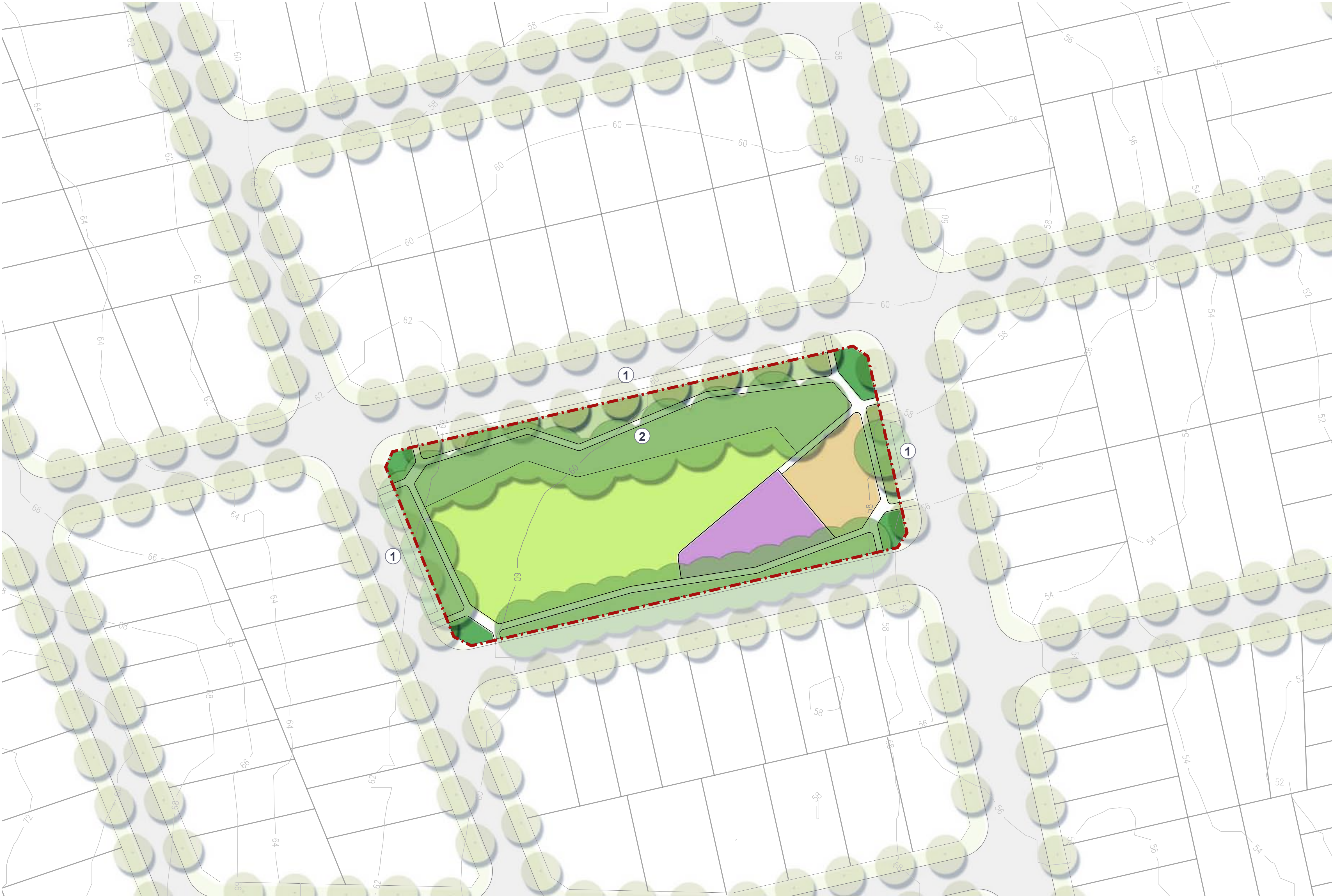
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LOCAL PARK 3



KEY PLAN



LEGEND

- Extent of works
- Existing trees
- Proposed trees
- Street trees
- Paths / hardstand
- Open lawn area
- Picnic area
- Playground
- Landscape area
- Feature planting

NOTES

- On-street parking
- 1.5m wide path

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PROJECT
GLENMORE PARK STAGE 3 SOUTH

CLIENT
MIRVAC

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LOCAL PARK 3 (L3)

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LINEAR PARK 1



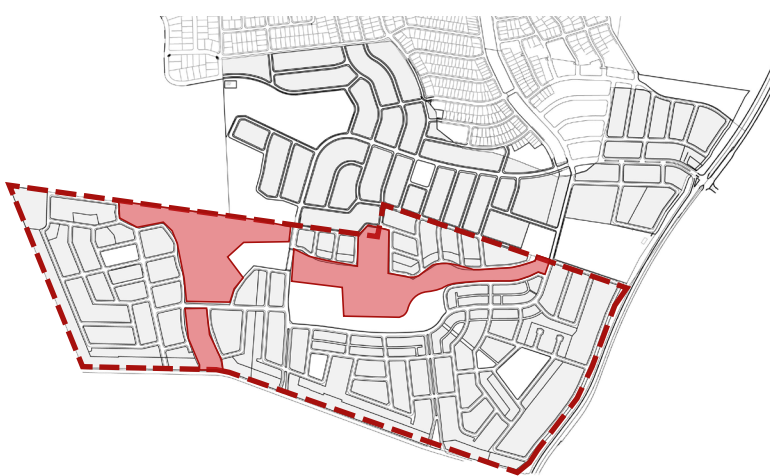
LEGEND

- Stage boundary
- Extent of works
- Extent of avoided land for Cumberland Plains Conservation
- Existing trees
- Proposed trees
- Street trees
- Water quality basin / wetland / channel
- Rain garden
- Paths / hardstand
- Informal paths
- Open lawn area
- Landscape area

NOTES

- 2.5m wide shared path
- Bridge
- Informal stepping stone crossing
- Approximate location of existing water course

KEY PLAN



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CLIENT
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LINEAR PARK 1 (LIN1)

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LINEAR PARK 2



KEY PLAN



LEGEND

- Stage boundary
- . - . - . Extent of works
- - - - - Extent of avoided land for Cumberland Plains Conservation
- Existing trees
- Proposed trees
- Street trees
- ▭ Paths / hardstand
- ▭ Informal paths
- ▭ Landscape area

NOTES

- 2.5m wide shared path



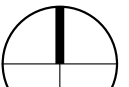
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PROJECT
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CLIENT
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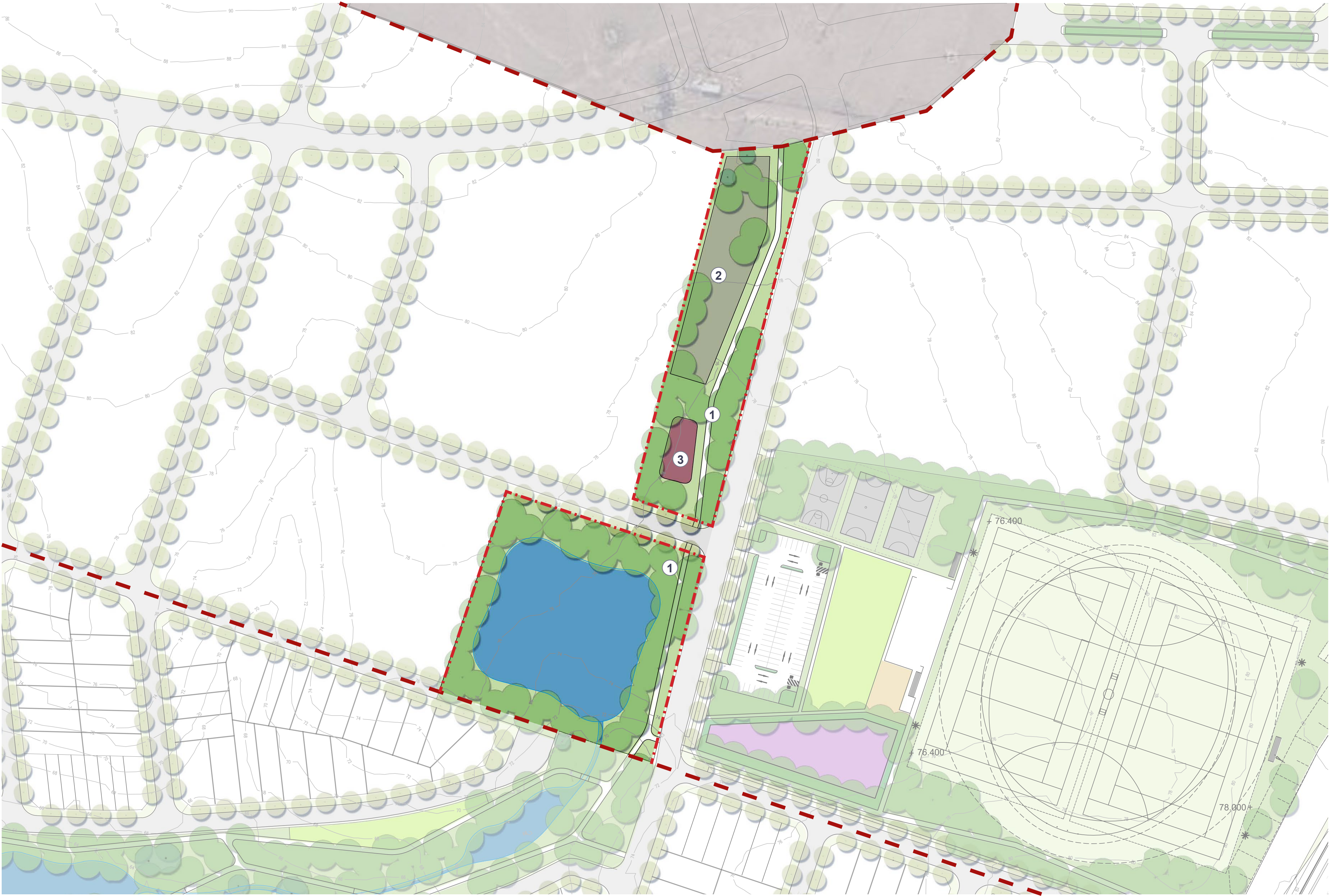
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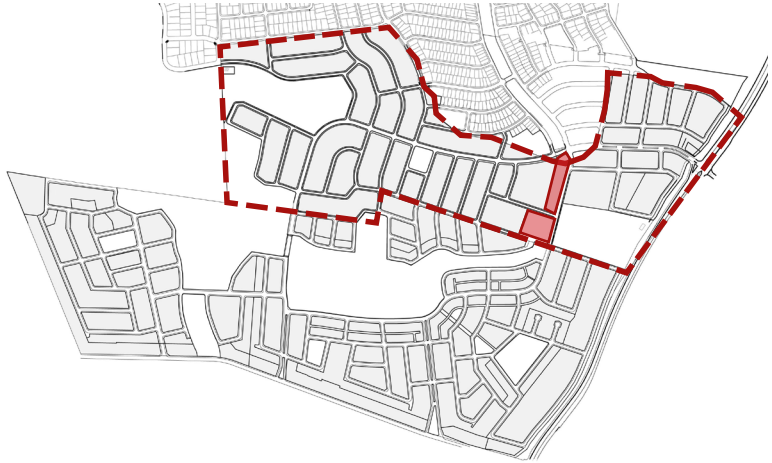
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LINEAR PARK 3



KEY PLAN



LEGEND

- Stage boundary
- Extent of works
- Extent of avoided land for Cumberland Plains Conservation
- Existing trees
- Proposed trees
- Street trees
- Water quality basin / wetland
- Paths / hardstand
- Landscape area

NOTES

- 2.5m wide shared path
- Fenced dog park
- Outdoor fitness node with dynamic and static equipment

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PROJECT
GLENMORE PARK STAGE 3 NORTH

CLIENT
VIANELLO

DRAWING
LINEAR PARK 3 (LIN3)

DRAWING No.	ISSUE	DRAWN	DATE
CP-2109-010	C	jw / jc	13.04.2022



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ENTRY BOULEVARD 2 AND LINEAR PARK 4

KEY PLAN



LEGEND

- Stage boundary
- Extent of works
- Existing trees
- Proposed trees
- Street trees
- Paths / hardstand
- Open lawn area
- Swale planting

NOTES

- Entry statement
- Swale with low planting and trees
- 2.5m wide shared path



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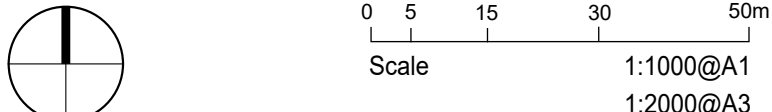
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PROJECT
GLENMORE PARK STAGE 3 SOUTH

CLIENT
MIRVAC

DRAWING
ENTRY BOULEVARD 2 (EB2) AND
LINEAR PARK 4 (LIN4)

DRAWING No.	ISSUE	DRAWN	DATE
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ENTRY BOULEVARD 1



KEY PLAN



LEGEND

- Stage boundary
- Extent of works
- Existing trees
- Proposed trees
- Street trees
- Swale planting

NOTES

- Swale with low planting and trees

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PROJECT
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MIRVAC

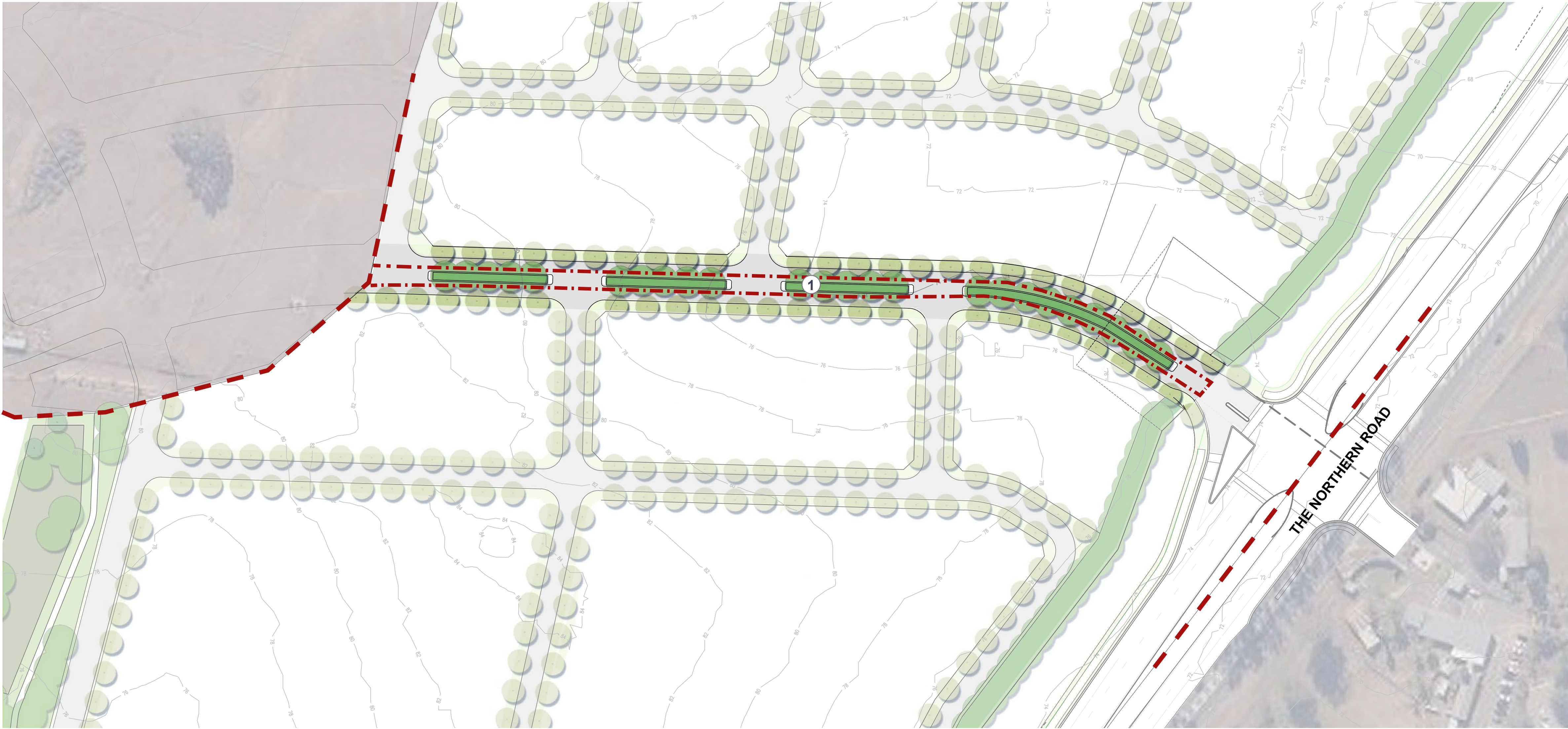
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ENTRY BOULEVARD 1 (EB1)

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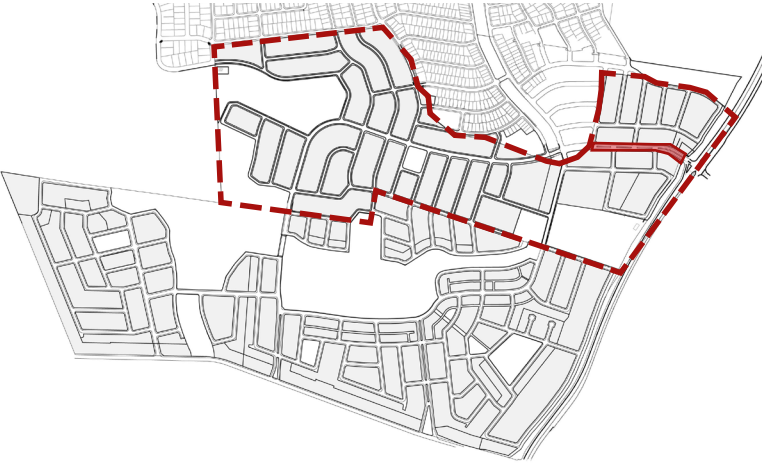
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ENTRY BOULEVARD 3



KEY PLAN



LEGEND

- Stage boundary
- Extent of works
- Proposed trees
- Street trees
- Swale planting

NOTES

- Swale with low planting and trees

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DRAWING
ENTRY BOULEVARD 3 (EB3)

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LANDSCAPE BUFFER 2



KEY PLAN



LEGEND

- Stage boundary
- Extent of works
- Existing trees
- Proposed trees
- Street trees
- Landscape area

NOTES

- Buffer planting of trees, shrubs and groundcovers
- RMS planting area
- The Northern Road shared path

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PROJECT
GLENMORE PARK STAGE 3 SOUTH

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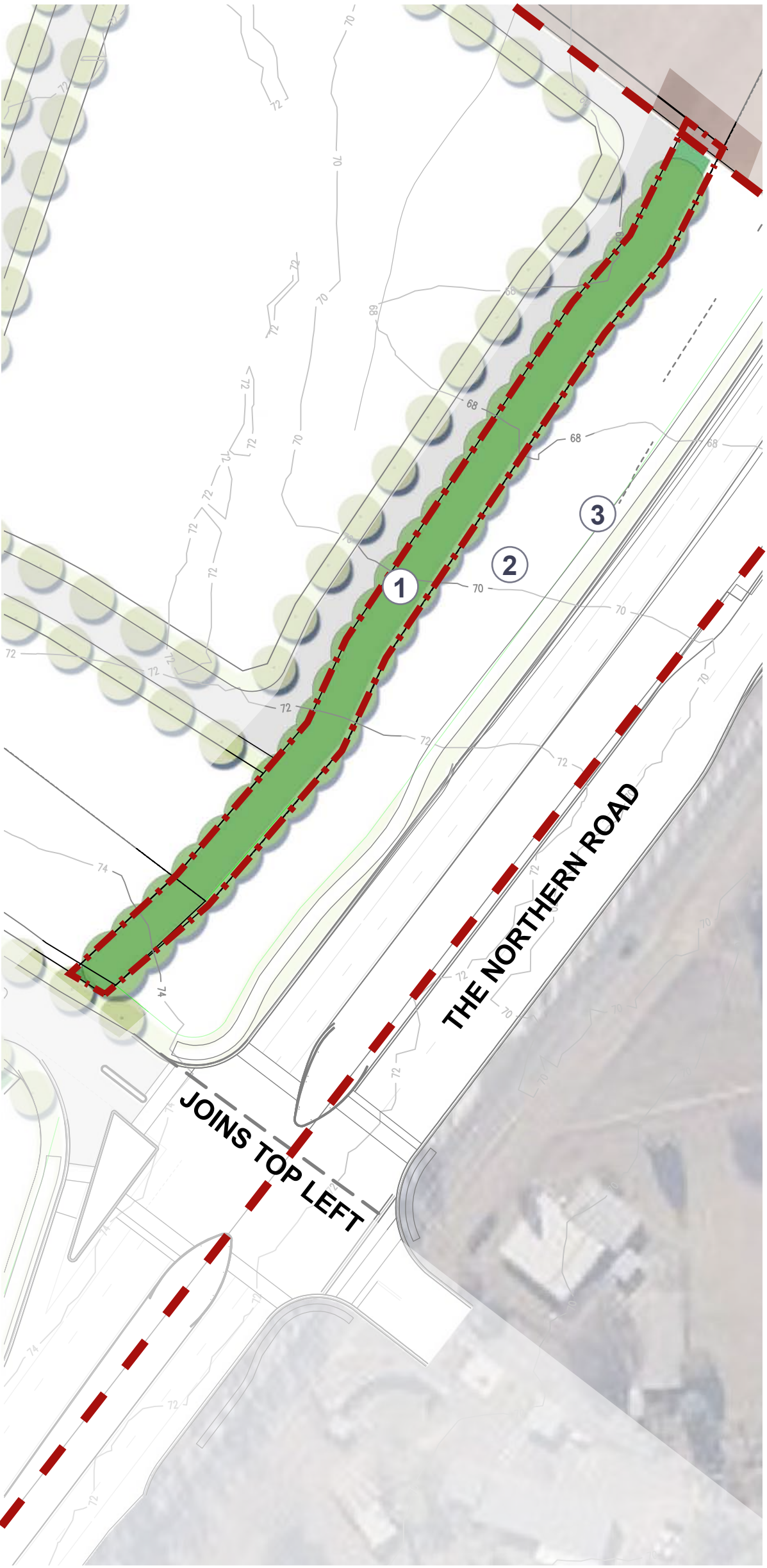
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LANDSCAPE BUFFER 2 (LB2)

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jw / jc 13.04.2022

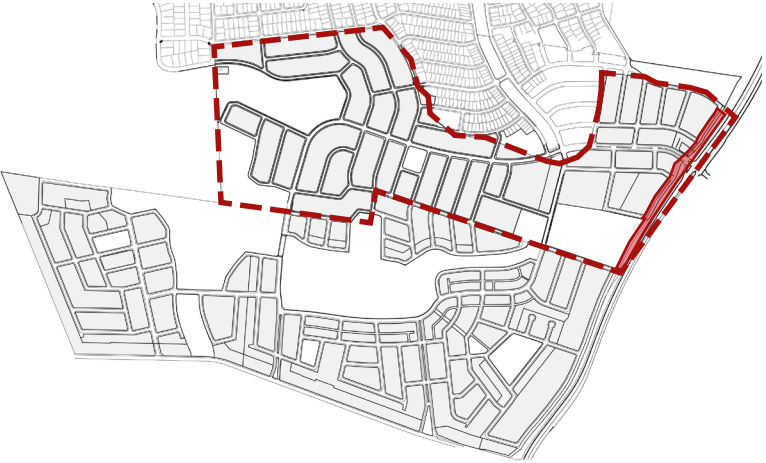
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LANDSCAPE BUFFER 1



KEY PLAN



LEGEND

- Stage boundary
- Extent of works
- Proposed trees
- Street trees
- Landscape area

NOTES

- Buffer planting of trees, shrubs and groundcovers
- RMS planting area
- The Northern Road shared path

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PROJECT
GLENMORE PARK STAGE 3 NORTH

CLIENT
VIANELLO

DRAWING
LANDSCAPE BUFFER 1 (LB1)

DRAWING No.	ISSUE	DRAWN	DATE
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APPENDIX C: STREET TREE PLAN AND SCHEDULES



New CPCP Boundaries Response

Mulgoa Chain-O-Ponds & The Northern Road Street Hierarchy Plan

architect:

**MIRVAC
DESIGN**
an architecture
urban design
interior design
graphic design

Level 28 200 George St
Sydney NSW 2000
T 02 9060 8000

Mirvac Design Pty Ltd
ABN 75 365 369 153

client:



date 07.04.20

job no.

scale @ A1 1:4000

drawing no.

MP06 rev E



APPENDIX D: ACTIVE TRANSPORT LINK

