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STATEMENT OF ENVIRONMENTAL EFFECTS

Staged Residential Subdivision
10 Col Drewe Drive, Bowenfels, NSW, 2790 (Lot 1 DP 1268778)

Prepared for

Treadstone on behalf of Lithgow City Council

By

Integrated Design Group Pty Ltd

Document History and Status

Version	Issue to	Date	Prepared by	Reviewed by
A	Lithgow City Council	08/12/2022	Integarted Design Group	Andrew Elia

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EXECUTIVE SUMMARY

This Statement of Environmental Effects has been prepared to accompany a Development Application lodged on behalf of Lithgow City Council. The development application seeks approval for a staged residential subdivision to create 46 Torrens Title residential lots and 1 residue lot (to form public open space). The development application includes bulk earthworks, associated civil works including the construction of new roads, stormwater drainage, temporary detention basins and installation of services.

The objective of the development includes provision of alotments to encourage a diversity of housing type on specifically zoned land adjacent to important social infrastructure.

The proposed development is located west of Great Western Highway at Lot 1 in DP 1268778, 10 Col Drewe Drive, Bowenfels, NSW 2790 and is a DA for a two-stage subdivision that will facilitate a diverse community of 80 dwellings to suit a range of household types and incomes. There will be subsequent DA's lodged for the development of housing and strata subdivision of several lots with in the subdivision to deliver the final yield of 80 dwellings.

This development application seeks approval for subdivision and works pursuant to Part 4 of the Environmental Planning and Assessment Act 1979. The land is zoned R1 General Residential and C3 Environmental Management, and the proposed development is permissible with consent pursuant to Lithgow Local Environment Plan 2014. The proposal complies with the relevant plans and policies that apply to the land and the development.

The proposed development is categorised as 'Integrated development' pursuant to section 4.46 of the Environmental Planning and Assessment Act 1979 given the land is mapped as bushfire prone and requires a Bush Fire Safety Authority from the New South Wales Rural Fire Service for the subdivision of bushfire prone land pursuant to section 100B of the Rural Fires Act 1997.

The DA is not considered 'Designated development' or 'State significant development' pursuant to the Environmental Planning and Assessment Act 1979 or Environmental Planning and Assessment Regulation 2021.

This Statement of Environmental Effects has considered the proposal pursuant to the requirements of section 4.15 of the Environmental Planning and Assessment Act 1979, Schedule 1 of the Environmental Planning and Assessment Regulation 2021, Lithgow Local Environment Plan 2014 and potential development impacts under the Lithgow Development Control Plan 2021. This Statement of Environmental Effects describes the development, its likely impacts, and measures to be implemented to mitigate any impacts. All anticipated environmental impacts can be satisfactorily managed and mitigated.

The proposed development is an acceptable form of development as it promotes the delivery of diverse land and housing opportunities in the Lithgow Council local government area. It is recommended that development consent be granted subject to appropriate conditions of consent.

1 INTRODUCTION

1.1 BACKGROUND

INTEGRATED DESIGN GROUP Pty Ltd (IDG) has been commissioned by the Applicant to prepare this Statement of Environmental Effects (SEE). It accompanies a Development Application (DA) seeking approval for staged residential subdivision of one existing allotment to create 46 Torrens Title residential lots and 1 residue lot allowing for residential development compliant with the current Lithgow Local Environmetn Plan 2014 and Lithgow Development Control Plan 2021,

The proposal is for the delivery of a masterplan to achieve an increased diversity of housing in an area zoned for such purpose and adjacent to key community assets. The masterplan provides for detached residential dwellings to semi-detached dwellings, various forms of row housing and secondary dwellings. Subsequent applications will specifiy various housing typologies to be delivered within 'superlots', subject to market conditions and demographic need. The current application provides for allowable and known built form on familiar allotment sizes, and for future flexibility within the controls of the DCP.

The DA includes bulk earthworks and associated civil works including the construction of new roads, laneway, stormwater drainage and installation of services.

The site is legally identified as Lot 1 in Deposited Plan 1268778, 10 Col Drewe Drive, Bowenfels NSW 2790 (the Site). It is located adjacent to Lithgow Hospital, Three Tree Lodge (Residential Aged Care), Notre Dame University campus, adjoining R2 subdivision and future development parcels and the Locally Significant Heritage Listed Sweet Briar 'rural' property. The nearby precinct also includes Child Care facilities, Motel, small business premises and a Seniors Living village. The proposal has the potential to provide key worker housing within this locality and to serve the needs of these important community assets. The subject site and adjoining land includes zoning and planning for public recreation spaces of various kinds.

This DA is proposed to ensure the orderly development and efficient use of lands. Due to the changing nature of this locality, Table 1 outlines the relevant development consents, that were identified using Council's online ePlanning Portal, that are considered to influence the proposed development.

Table 1. Relevant DAs to the development of the site.

TABLE 1: RELEVANT DEVELOPMENT APPLICATIONS TO THE DEVELOPMENT OF THE SITE			
DA	**Description**	**Address**	**Status**
DA142/18	Residential subdivision and civil works	994 Great Western Highway, Bowenfels 2790	Approved

1.2 PRE-LODGEMENT MEETING

A Pre-Lodgement meeting was held with Council on the 8 November 2022. for the subdivision and to enable delivery of Master Planned construction of attached, detached and semi-detached dwellings, across a 2 staged process.

Following the discussion and advice from Council, the application was further develpoed based on feedback given and to address the following matters raised by council: stormwater drainage design based on different scenarios addressing staging of the approved DA142/18 north of the proposed development,;servicing design; temporary turning circles; proximity to Local Heritage Item; Council Engineering Standards and turning swept paths allowances.

1.3 PURPOSE OF REPORT

The SEE has been prepared in accordance with the Environmental Planning and Assessment Regulation 2021 (**EP&A Regulation**) Reference Clause 24(1)(b)(i) for the purpose of:

- Demonstrating that the environmental impacts of the development have been considered, and
- Outlining steps to be undertaken to protect the environment or to lessen any expected harm to the environment.

This SEE details the necessary information for the proposal to be assessed by the consent authority, including a description of the site and its surrounds and an assessment of the proposal against the relevant planning controls.

This SEE concludes that the proposed development is acceptable in that it is consistent with the relevant planning controls and will have minimal environmental impacts that can be satisfactorily managed. Moreover, the development meets key objectives in the diversification of housing and to address a general lack of supply in what is now recognised as a 'regional housing crisis', especially in respect of key worker and affordable housing.

1.4 TYPE OF DEVELOPMENT APPLICATION

This DA seeks approval for staged residential subdivision of one existing allotment to create 46 Torrens Title residential lots and 1 residue lot allowing for residential development compliant with the current Lithgow Local Environmetn plan 2014 and Lithgow Development Control Plan 2021, pursuant with section 1.5 of the Environmental Planning and Assessment Act 1979 (**EP&A Act**), compliant with the current Lithgow Local Environment Plan 2014 and Lithgow Development Control Plan 2021. This housing diversity provides opportunity for residential development ranging from detached residential dwellings to semi-detached dwellings, row housing and secondary dwellings.

The capital investment of the development is above $5 million (refer to **Appendix A**) and the DA therefore will be referred to the Western Region Planning Panel for determination.

The Applicant has elected to lodge this DA as 'Integrated development' pursuant to section 4.46 of the EP&A Act given the land the subject of this DA is mapped as bushfire prone land. The following is therefore required:

- The land is mapped as bushfire prone and requires a Bush Fire Safety Authority from the New South Wales Rural Fire Service for the subdivision of bushfire prone land pursuant to section 100B of the Rural Fires Act 1997.

The development will be determined by the Western Regional Planning Panel but will be assessed by Council and as such under Policy 7.6 that assessment will be reported to full Council to refer to Panel for Determination the application being on Council owned land will will be determined by the Council.

1.5 REFERRALS AND CONSULTATION

As discussed above in **Section 1.4** of this SEE, the proposed development is categorised as 'Integrated development' pursuant to section 4.46 of the EP&A Act and is to be referred to the RFS to obtain General Terms of Approval.

The proposed development is likely to require the relocation of an aboveground electricity pole. As prescribed in section 45 of the State Environmental Planning Policy (Infrastructure) 2007 (**Infrastructure SEPP**), the DA will need to be referred to the relevant energy authority for a period of 21 days.

The site is located in the Sydney Drinking Water catchment & is subject to the requirements of Part 6.5 of SEPP (Biodiversity and Conservation) 2021. The proposal will be referred to Water NSW for concurrence. The proposal needs to demonstrate that it achieves a neutral or beneficial effect (NorBE) on the water quality being discharged from the site. The proposal will be supported by a water quality assessment including MUSIC modelling that demonstrates NorBE can be achieved.

2 THE SITE AND LOCALITY

This section of the SEE describes the Site and its location. It defines the project area for the purpose of this SEE and provides a summary of the key features of the environment of the area, and the broader locality which may be impacted by physical works, and therefore provides the key factors considered as part for the proposed development.

2.1 SITE LOCATION

The Site is situated in the suburb of Bowenfels, with close proximity to Lithgow Hospital, Notre Dame University and Three Tree Lodge residential aged care. The precinct also includes Child Care facilities, small commercial offices, a Seniors' Living village and zoned recreational land. The site is located approximately 3.5km south-west of Lithgow city centre. The site benefits from close proximity to major roads, including Great Western Highway and future open space allocated to the northern subdivision (DA142/18) and existing open space to the west at Three Tree Hill.

FIGURE 1. GENERAL SITE LOCATION WITHIN THE CITY OF LITHGOW LGA

2.2 SITE DESCRIPTION

The Site is located to the west of Great Western Highway, legally described as Lot 1 in DP 1268778, 10 Col Drewe Drive, Bowenfels.

The Site is irregular in shape and has a total area of 70,445m^2. The property is predominantly grassed with no trees within the development area and 1 dam located toarwds the south eastern corner. The site does not contain any existing built structures. The western portion of the site falls to the east down 'Three Tree Hill', the north-eastern portion of the site falls to the north with a 941 -

955 Australian Height Datum (**AHD**) to the northen boundary and 941 - 948 AHD to the eastern boundary (refer to the Survey Plan at **Appendix B**).

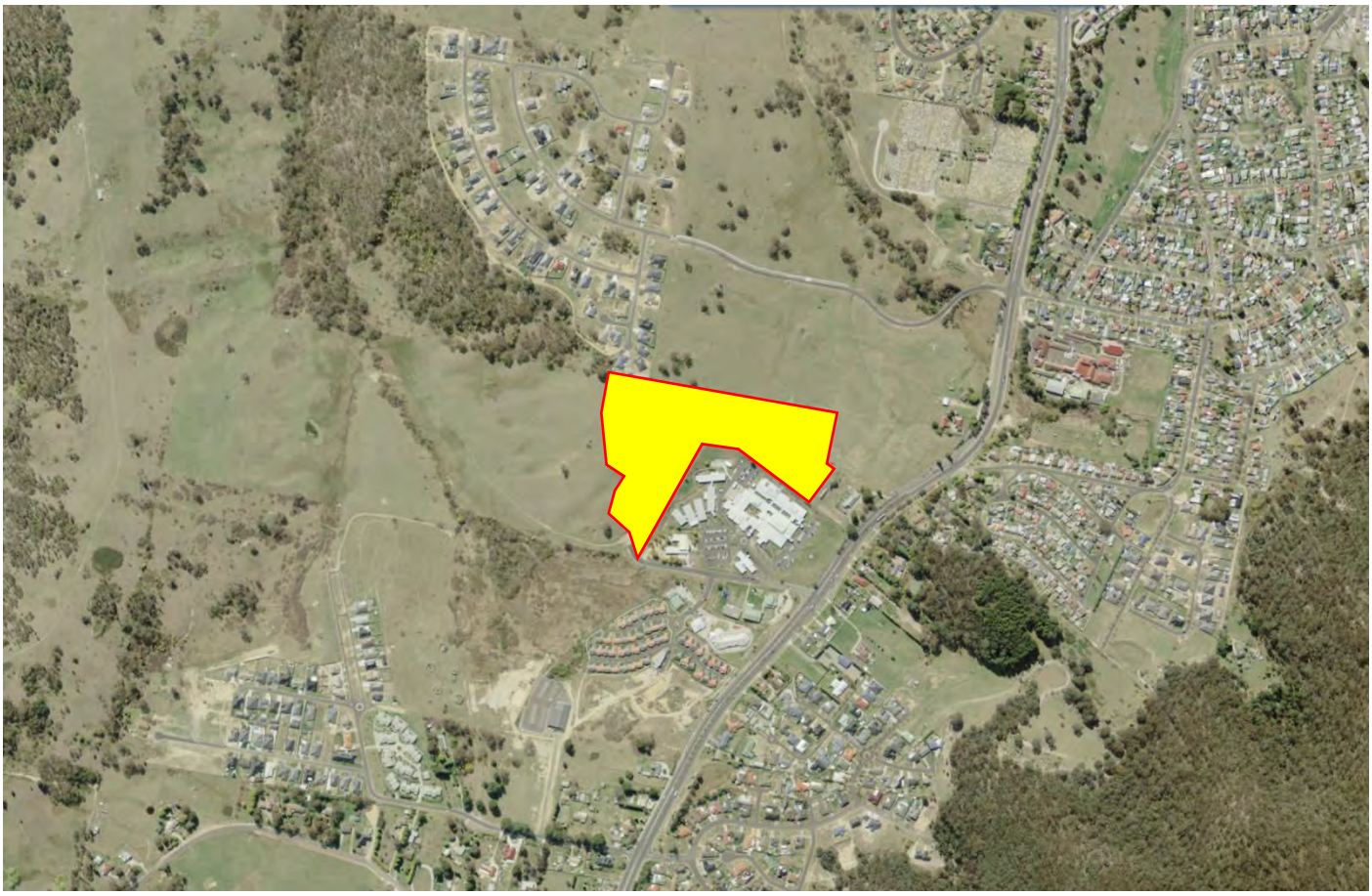

FIGURE 2. AERIAL PHOTOGRAPHY OF THE SITE AND SURROUNDING LOCALITY

2.3 SURROUNDING LOCALITY

The Site is located in an area traditionally characterised as rural, however, with a number of recent nearby residential subdivisions being approved and developed, the locality is considered to be land in transition, in accordance with relevant current zoning. Most subdivision to date would be regarded as “typical” low density residential development, though higher density is evident in seniors’ living estates and health infrastructure.

The development of important community health and other infrastructure in this locality through the past decade(s) has been a catalyst for zoning of the subject site to accommodate a higher diversity of housing stock. This includes the Lithgow Hospital, Residentail Aged Care, Motel, Offices, Senior’s Living, Child Care and the like.

Simultaneously, the area is well served with public open space, associated with Three Tree Hill and open space provision in neighbouring residential estate development to the north.

Three Tree Hill is so called due to the significant location of 3 trees on an otherwise grassed hilltop. These 3 trees (2 remaining in reasonable condition) are an identified place marker in the locality, viewed from various directions and locations in the vicinity. The proposal specifically accounts for view lines toward the trees and height limits relative to the topography and tree locations.

The Site is located approximately 4.8km south-west of Lithgow Train Station, withint 400m of local bus services and 4km south-west of the nearest major shopping centre.

2.4 SERVICES

The proposed development will require service connections to the utility service mains. A summary of the proposed utility infrastructure that is available or to be augmented by the applicant is outlined below and detailed in the Infrastructure Report provided at **Appendix C**.

Sewer
The site falls into two catchments for sewer services. Lots 1-17 are located within the western catchment. These lots will be serviced by a reticulated sewer system that drains to the south to the existing sewer pumping station located within the University of Notre Dame land.
Lots 18 – 46 are located within the eastern/northern catchment. These lots will be serviced by a reticulated sewer system that drains to a sewer lead-out that extends from the proposed sewer pumping station to the north and through the adjoining property 994 Great Western Highway.

Water

The site will be connected into the existing potable water main within Col Drewe Drive and a water main system extended along the proposed road network. The site will be serviced from the reservoir located off Hill Range Crescent. That reservoir has a ground level of approximately RL 972m AHD, more than 10m higher than the highest proposed allotment.

Electricity

The site will be serviced by the extension of an 11kv feeder from the Great Western Highway, along Col Drewe Drive to the site. This will be connected to a substation within the subdivision and electrical services distributed throughout the road network to service the proposed lots.

Gas

Gas services are available in the locality. The proposed subdivision will be serviced by the extension of the existing gas mains within Col Drewe Drive to the site and throughout the proposed road network.

Telecommunications

Telecommunications services are available in the locality. The proposed subdivision will be serviced by the extension of the existing NBN network within Col Drewe Drive to the site and throughout the proposed road network

3 PROPOSED DEVELOPMENT

The DA seeks approval for staged residential subdivision of one existing allotment to create 46 Torrens title allotments and 1 residue lot. The DA provides a masterplanned vision for a diverse housing estate and includes bulk earthworks and associated civil works including the construction of a new road network, stormwater drainage and installation of services.

Each component is described in more detail in the sections below.

3.1 DEVELOPMENT STAGING

The development is a two stage DA Subdivision based on the delivery timeframes of the approved subdivision to the north of the subject site (DA142/18). This staging will facilitate a diverse community of 80 dwellings to suit a range of household types and incomes. There will be subsequent DA's lodged for the development of housing and strata subdivision of several lots with in the subdivision to deliver the final yield of 80 dwellings.

Stage 1 will deliver the Collector Rd (Road A) and all lots West of it (Lots 1 -17) and a proportion of Lots to the East (Lots 18-31) including Road B & Road C. These lots will provide generally more familiar housing types but will also include a portion for 'demonstration' of alternative housing, including some medium density development of 2 superlots, and dual occupancy variants on lots that comply with the DCP provision for same. Development of the housing within Stage 1 will be the subject of Complying Development Certificates (where applicable) and/or subsequent Development Applications. **Stage 2** will complete the current proposal with the eastern part of Roads B, Road D and Circuit A and Lots 32-46. Again, superlots 32 & 36 will provide opportunity for further diversity in housing type, subject to future Development Consent. In total, the proposal is expected to yield approximately 80 homes across the 46 Lots identified in this application.

Investigation of services and road network capacity together with other environmental matters has confirmed capacity for the intended total development.

3.2 SEDIMENT AND EROSION CONTROL

During construction, and ongoing use of the Site, appropriate sediment and erosion control measures will be implemented and maintained by the applicant's contractors. The measures shown in the Engineering Plans (**Appendix D**) are intended to be a minimum treatment only as the contractor will be required to modify and stage the erosion and sediment control measures to suit the construction program, sequencing and techniques. These measures will include, but are not limited to:

- A temporary site security/safety fence is to be constructed around the site,
- Sediment fencing provided downstream of disturbed areas, including any topsoil stockpiles,
- Dust control measures including stockpiles, installing fence hessian and watering exposed areas,
- Placement of hay bales or mesh and gravel inlet filters around and along proposed catch drains and around stormwater inlet pits, and
- Stabilised site access at the construction vehicle entry/exits.

During the earthworks, the temporary detention basin will be used as a temporary sediment basin. Once the permanent solution is constructed, the basin will be cleared, and outlet pits will be constructed.

Any stockpiled material, including topsoil, shall be located as far away as possible from any associated watercourses or temporary overland flow paths. Sediment fences shall be installed to the downstream side of stockpiles and any embankment formation. All stockpiles and embankment formations shall be stabilised by hydroseeding or hydro mulching on formation.

3.3 DEMOLITION

The Site does not contain any structure but just existing fencing to be replaced. All demolition works and material disposal will be carried out in accordance with the AS2601-1991 – Demolition of Structures and Waste Management Plan.

3.4 TREE REMOVAL

The majority of the Site of the proposed works is clear of vegetation (other than pasture) with remnant trees (3) located on the site above the effected development area and within a non-residetial zoning. The proposed road pattern, disposition of development density and extent of cut required to grade the Site, does not effect these trees and none are required to be removed or impacted by development.

3.5 REMEDIATION OF LAND

The site is not known to have been subject to any past contaminating land uses and a contamination report is not required.

3.6 BULK EARTH WORKS

The proposed earthworks are required to establish the lot levels for the intended dwelling footprints. These levels have been designed to optimise the utilisation of cut and fill across the site, maintain fall to the street and to maintain boundary levels. All efforts have been made to balance cut and fill and limit the use of engineered structures to deliver the proposed design levels.

The proposed subdivision includes bulk earthworks across the site, including cut of approximately 21,200m^3, and fill of approximately 9,200m^3. The excess material is proposed to be stockpiled on the Stage 2 super lot 36 pending final detail earthworks for dwelling construction.

Stage 1 works include bulk earthworks across the whole site, with surplus material to be stockpiled in the area of the Stage 2 Lot 36. That material will be utilised in the detailed earthworks for future dwelling construction. Any remaining surplus material will be disposed of offsite as required.

FIGURE 3. CUT & FILL PLAN (JWP)

3.7 ROADS AND CIVIL WORKS

The proposed development includes the construction and delivery of a series of new local roads with associated road drainage, services and stormwater drainage facilities. All local roads are to be dedicated to Council as part of the subdivision and will be supplemented by a series of temporary turning areas until adjoining land is developed. Neighbours Consent for termporary works located in **Appendix I**. Further details on each aspect of the civil works are proposed in the following sections and detailed in the Engineering Plans at **Appendix C**.

3.7.1 ROADS

The proposed street network and hierarchy provide a permeable and legible street network, which will facilitate the safe movement of vehicles, pedestrian, and cyclists within the residential subdivision. The primary point of road access will be provided from Col Drewe Drive.

Table 2. Summary of Proposed Road Configuration

Proposed Road	Road Construction	Proposed Road Reserve Width
Road A	Collector Road	18m
Road B	Local Road	15m
Road C	Local Road	15m
Road D	Local Road	15m
Circuit A	Local Road (Car court)	32m
Road E	Laneway	10m

Local streets within the proposed subdivision have been designed to promote low-speed traffic environment whilst achieving the function and safety objectives for local residential traffic. In addition, the proposed local streets will make an important contribution to residential amenity through the provision of canopy cover through street tree planting, whilst also supporting appropriate levels of on-street parking.

Temporary turning facility is proposed at the termination of Road A, Road B and C, in order to allow vehicles to turn around at the end of the dead-end road. The temporary turning facility is proposed to utilise the on-street parking which will be restricted to allow Council garbage truck (10.7m) to turn around. ‘NO PARKING’ signage in the vicinity of the temporary turning facility will be installed and will be provided with ‘NO THROUGH ROAD’ signage at the entry. Neighbours Consent for termporary works located in **Appendix I**.

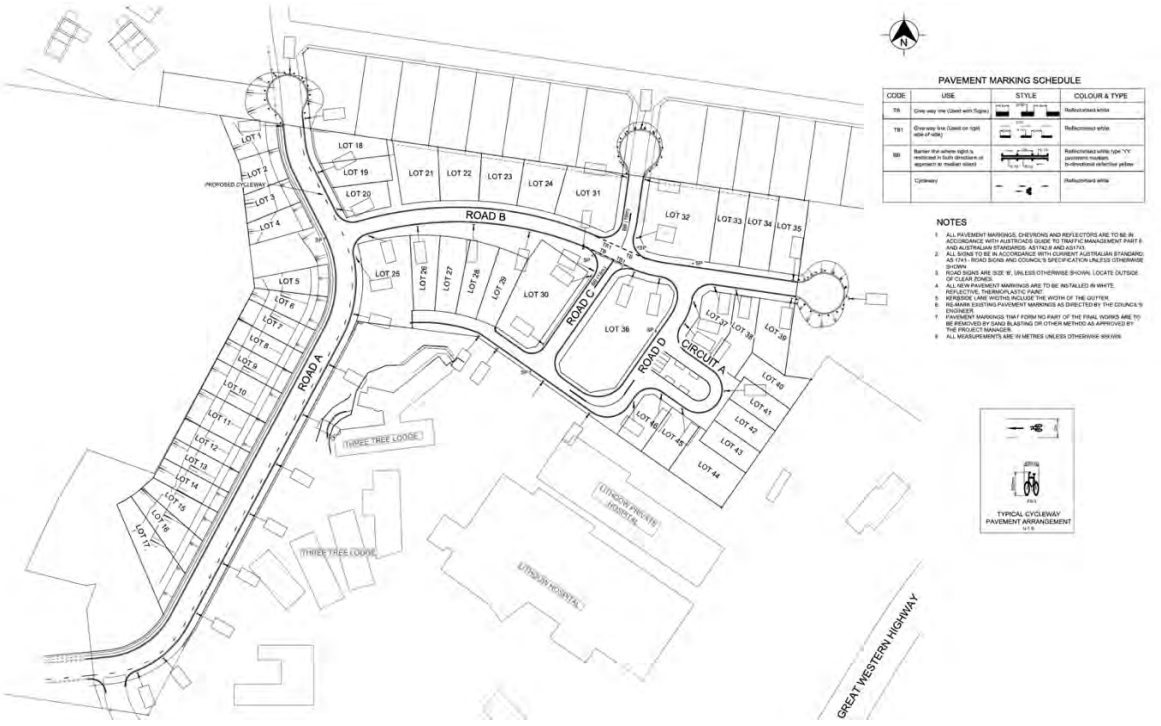

FIGURE 4. PROPSOED LOCAL ROAD (JWP)

3.7.2 LOCAL ROADS

The proposed development includes 4 roads that are identified as Local Roads (Road B, C, D and Circuit A) under the adopted planning controls and will have a total reserve width of 15m, with road pavement of 8m and 3.5m verge on each side as per the DCP and illustrated in **Figure 4**. These roads will provide a 1.5m wide footpath within each of the road verges. Each Road is aligned wholly within the site.

3.7.3 COLLECTOR ROADS

The proposed development includes 1 road that is identified as an Access Road (Road A) under the adopted planning controls and will have a total reserve width of 18m, with road pavement of 11m and 3.5m verge on both sides as per the DCP and illustrated in **Figure 4**. These roads will provide a 1.5m wide footpath on one side of the road and a cycle lane on the other side (eastern) of the road with planting on either side of the road verge. Each Road is aligned wholly within the site.

The alignment of this road varies from the DCP to better respond to topography at the northern end of the site, and to align adjacent the eastern boundary adjoinging Three Tree Lodge to the east. This provides for better open view from the residential aged care facility, better view lines to Three Tree Hill, improved drainage management and better boundary interface. Working more closely with the topography also allows for better use of the natural fall, better drainage and servicing, better surveillance, and provides a buffer between residential properties and adjacent developments.

3.7.4 LANEWAY

The proposed development includes a Laneway (Road E). The laneway will have a total reserve width of 10m, with road pavement of 6m and a varying verge with a minimum dimension of 2m on one side as illustrated in **Figure 4**. The laneway provides for part of the diversity of housing type appropriate to its location nearest the hospital and also provides passive surveillance along the hospital boundary and overlooking the staff parking area of the hospital. The laneway verge provides for a landscape buffer to the hospital site and an improved boundary interface in preference to rear fencing of multiple residential lots. The laneways specifically enable improved pedestrian movements along key desire lines connecting the development across “live, work and play” assets. Refer to Masteplan Document **Appendix G.**

Specific streetscapes are envisaged in Council’s planning objectives and are enabled through a careful and strategic limited use of laneways. The entirety of the ’traditional’ town plan of Lithgow is laneway based, and when compared with many newer parts appears to serve the townscape much better. These laneways also avoid dead-ends or convoluted turning heads that might otherwise result from the efficient development of the irregular site. This provides forward movement of service and emergency vehicles throughout the street network. These laneways allow for deliberate buffer landscaping between the development and the Three Tree Lodge.

3.7.5 INSTALLATON OF SERVICES

The proposal includes the provision of services to all proposed lots as well as any necessary service main lead-ins.

3.7.6 RETAINING WALLS

The proposal includes the provision of a retaining wall along the eastern side of the collector road, from Col Drewe Drive to proposed Lot 25, and returning along the south boundary of Lot 25 for approximately 10m. The wall is a maximum height of 1m.

3.7.7 STORMWATER MANAGEMENT AND WATER QUALITY

The proposal will include a piped road drainage system and detention to restrict the post development discharge rates to the pre-development for the 1% AEP event. The western catchment will drain to an above ground detention system on the southern side of Col Drewe Drive.

The eastern/northern catchment will drain to a detention tank below Road C to be constructed as part of the Stage 1 works. It will be sized to accommodate both Stages 1 and 2 run-off within that catchment. Discharge will be directed to the proposed drainage system within the development immediately to the north.

3.7.8 INTERALLOTMENT DRAINAGE

Interallotment drainage will be provided for all lots unable to drain stormwater directly to a public road. If the approved development to the north is not completed by the time works commence on site there will be temporary treatment on the subject site with tail out and a temporary easement on the neighbouring property. Please refer to letter of consent from the neighbouring owners.

3.8 SUBDIVISION

This DA seeks approval for subdivision of one existing allotment to create 46 Torrens Title lots and 1 residue lot and new local roads to be dedicated to Council as per the proposed Plan of Subdivision (refer to Engineering Plans **Appendix C**) and has been designed to align with future adjoining subdivision, generally in accordance with the DCP.

The subdivision provides superlots for future subdivision of a range of diverse housing types to suit the demographic and market preferences at the time. The supoerlots have been conceived to provide a degree of flexibility for subdivision into lot sizes compliant with various options within the DCP. In this the proposed development will deliver a range of different lot types that will provide for different housing and different market entry points.

In spite of the irregular shape of the existing lot, proposed lots have been developed to remain as rectilinear as possible. The proposed residential allotments range in area between approx 400m^2 (proposed Lot 43) to 2,118m^2 (proposed Superlot 36) (refer to **Figure 5**). The future subdivision of superlots will further diversify this lot size.

The allotment orientations have been designed in accordance with the DCP and provide an orderly streetscape to facilitate different housing products to achieve a variety of dwelling designs within the ‘Suburban’ and ‘Urban’ streetscape character anticipated by the DCP. Solar access ought be afforded within the detailed design of higher density housing types.

FIGURE 5. PROPOSED SUBDIVISION LAYOUT (JWP)

3.9 LANDSCAPING

Landscaping will be achievable within the front setback, side and rear yards of each of the dwellings as shown indicatively in the Masterplan Document provided at **Appendix G**. The intention is to provide a level transition between private indoor and outdoor spaces as much as possible on the steeply sloping site to create an extension of the main living spaces and incorporate both soft and hard elements to provide for a high level of residential amenity with opportunities for outdoor recreation and relaxation.

Landscaping is proposed in public open spaces, especially street verges to enhance streetscapes and reduce negative environmental impacts of road pavement, etc.

For each of the lots where integrated housing is proposed, future DA's will identify appropriate landscape and fencing treatments to compliment the streetscape and ensure defensible open space for residents.

Lots adjacent to the heritage item at LOT 252 DP1045308 will have a rear fence detail that is sympathetic to the heritage item. This fence will be constructed of timber and mesh, with screen planting within the rear boundary. (refer to **Figure 6**)

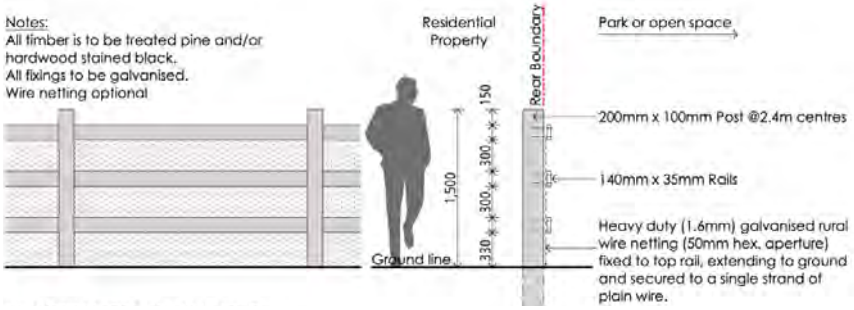

FIGURE 6. HERITAGE FENCE DETAIL

4 ENVIRONMENTAL ASSESSMENT

This section of the SEE assesses the proposed development against the planning framework and planning controls applicable to the site and the development, including:

- Threatened Species and Biodiversity Impacts (section 1.7 of the EP&A Act), and
- Bushfire prone land (section 4.14 of the EP&A Act); and
- Integrated development matters (section 4.46 of the EP&A Act), and
- Matters for consideration relating to DAs (section 4.15 of the EP&A Act).

4.1 THREATENED SPECIES & BIODIVERSITY IMPACTS

The EP&A Act contains provisions designed to ensure threatened species legislation as well as any approvals required under other legislation (known as 'Integrated development') are considered as part of a single development assessment process. The provisions as they apply to the proposed development are discussed below.

Section 1.7 of the EP&A Act requires consideration as to whether a proposed development will have a significant effect on threatened species, populations or ecological communities relating to terrestrial and/or aquatic environments as required under Part 7 of the Biodiversity Conservation Act 2016 (**BC Act**) and Part 7A of the Fisheries Management Act 1994 (**FM Act**).

Biodiversity Conservation Act 2016: In accordance with the BC Act, consideration as to whether the proposal is likely to significantly affect threatened species or ecological communities, or their habitats is required in accordance with the test outlined in section 7.3 of Part 7 of the BC Act. The subject site is not listed with council as containing any threatened species of ecological communities.

Fisheries Management Act 1994: The proposed development and associated civil works are not located in proximity to any watercourses or proposes any works that would cause harm to any threatened species, populations, or ecological communities under the FM Act.

4.2 BUSHFIRE PRONE LAND

Section 4.14 of the EP&A Act provides for the general consideration of bushfire hazard on land mapped as bushfire prone. The Environmental Planning and Assessment Amendment (Planning for Bush Fire Protection) Regulation 2020 amended clause 272 of the EP&A Regulation and prescribed PBP 2019 for the purposes of section 4.14(1)(a) of the EP&A Act.

Pursuant to section 4.14 of the EP&A Act, development consent cannot be granted for the carrying out of certain types of development on bush fire prone land, unless the consent authority:

a. Is satisfied that the development conforms to the specifications and requirements of the version (as prescribed by the regulations) of the document entitled Planning for Bush Fire Protection prepared by the NSW Rural Fire Service in co-operation with the Department (or, if another document is prescribed by the regulations for the purposes of this paragraph, that document) that are relevant to the development (the relevant specifications and requirements), or
b. Has been provided with a certificate by a person who is recognised by the NSW Rural Fire Service as a qualified consultant in bush fire risk assessment stating that the development conforms to the relevant specifications and requirements.

The Site considered 'bushfire prone'. Accordingly, the proposed development is categorised by the RFS as being a residential subdivision and this requires the RFS to issue a Bush Fire Safety Authority under the RF Act. The Bushfire Hazard Assessment provided at **Appendix F** demonstrates that the site can implement appropriate Bushfire Protection Measures in accordance with PBP 2019 including:

- Temporary APZs are indicated along the northern and eastern boundaries of 12m in depth as a temporary easement on neighbouring properties (see Appendix I) together with an APZ along the western boundary of 10m.
- Roads providing appropriate access and temporary turning heads (where required) in hammerhead arrangement
- Bushfire Attack Level construction standards for dwellings as required
- Access to appropriate services.

4.3 INTEGRATED DEVELOPMENT

Section 4.46 and 4.47 of the EP&A Act requires a review of whether the proposed development on the land would trigger an approval under other environmental or related legislation. Such development is categorised as 'Integrated development'. The following provides brief commentary on whether any aspects of the development trigger a need for the consent authority to obtain General Terms of Approval from the relevant approval bodies.

Coal Mine Subsidence Act 2017

The Coal Mine Subsidence Compensation Act 2017 establishes the provision for the payment of compensation for damaged caused by subsidence arising from coal mining. The site is not located within a mine subsidence district. Therefore, no integrated approval is required to address this legislation.

Fisheries Management Act 1994

The FM Act contains several provisions for the protection of fish habitat and threatened species. The proposed development will not impact on any waterway mapped as 'Key Fish Habitat' or a waterway that contains a threatened species record. The proposed development will not harm marine vegetation, nor will it require dredging of the bed and land reclamation of a Key Fish Habitat Creek. Therefore, no integrated approval is required to address this legislation.

Heritage Act 1977

The Heritage Act 1977 seeks to protect and conserve items of Local and State Heritage Significance through the operation and establishment of the Heritage Council of NSW and its associated functions. No works are proposed that are referred to under section 57 of the Heritage Act 1977. Therefore, no integrated approval is required to address this legislation.

We do note that the site is adjacent to a heritage item (LOT 252 DP1045308) and measures have been taken to mitigate impact on this item including materials, construction methods, fence details and landscape buffer to those lots adjacent to the heritage item. Refer to Heritage Statement in **APPENDIX J**.

Mining Act 1992

The Mining Act 1992 aims to encourage and facilitate the discovery and development of mineral resources in NSW, having regard to the need to encourage ecologically sustainable development. No mining lease is being sought as part of this application, noting this application is for residential subdivision with component integrated housing.

National Parks and Wildlife Act 1974

The purpose of the NP&W Act is to conserve NSW's natural and cultural heritage, as well as foster public appreciation, understanding and enjoyment of NSW's natural and cultural heritage, and managing any lands reserved for the purposes of conserving and fostering public appreciation and enjoyment of NSW's natural and/or cultural heritage. It is also the principal legislative instrument for the protection and management of Aboriginal cultural heritage places and objects in NSW.

The Applicant will progress these investigation during the assessment period and appropriate conditions of consent can be imposed in the consent to ensure this procedure is followed.

Petroleum (Onshore) Act 1991

The Petroleum (Onshore) Act 1991 encourages and facilitates the discovery and development of petroleum resources in NSW. No production lease is being sought as a part of this DA, noting this application is for residential subdivision with component integrated housing.

Protection of the Environment Operations Act 1997

The Protection of the Environment Operations Act 1997 aims to protect and enhance the environment in NSW while promoting public access to information and involvement in environmental protection. The implementation of appropriate environmental protection works will ensure that no licence will be required.

Roads Act 1993

The Roads Act 1993 makes provision for road boundaries and road levels, opening and closing of public roads, classification of public roads, road works, protection of public roads and traffic and other road management practices including procedural matters

for the establishment of tollways and financial assistance for road authorities. Section 138 of the Roads Act 1993 requires approval from the road's authority (either Council or Transport for NSW) for certain works to be carried out on, or over a public road, or connect to a classified road.

Col Drewe Drive is not a classified road and so the proposal is not Integrated Development pursuant to s138 of the Roads Act – see attached map of classified roads. SEPP (Transport and Infrastructure) 2021 is also not applicable. The subdivision proposal creates less than 50 lots and is more than 90m away from the Great Western Highway.

Rural Fires Act 1997

The Rural Fires Act 1997 (**RF Act**) establishes the NSW Rural Fire Service (**RFS**), defines its functions and makes provisions for the prevention, mitigation and suppression of rural fires. Section 100B of the RF Act requires a Bushfire Safety Authority to be issued by the Commissioner for:

(a) a subdivision of bush fire prone land that could lawfully be used for residential or rural residential purposes, or
(b) development of bush fire prone land for a special fire protection purpose.

A Bushfire Safety Authority authorises development for a purpose referred to in subsection (1) to the extent that it complies with standards regarding setback, provision of water supply and other matters considered by the Commissioner to be necessary to protect persons, property or the environment from danger that may arise from a bushfire.

The site is identified as 'bushfire prone land' on the Lithgow City Council Map 2014. Section 4.46 of the EP&A Act requires a bushfire assessment of residential subdivision proposals on bushfire prone land following the process and methodology set out within section 100B of the RF Act, clause 44 of the Rural Fires Regulation 2013 and the RFS document Planning for Bush Fire Protection 2019 (**PBP 2019**).

Peterson Bushfire were commissioned by the applicant to prepare a Bushfire Assessment and Recommendations for bushfire safety and design compliance and assess the proposed development against the requirements and principles of PBP 2019 (refer to **Appendix F**). As such, the proposed development is categorised by the RFS as being a residential subdivision and this required the RFS to issue a Bush Fire Safety Authority in accordance section 100B of the RF Act.

Water Management Act 2000

The Water Management Act 2000 (**WM Act**) provides for the protection, conservation and ecologically sustainable development of the water sources of the State. A Controlled Activity Approval is required to be obtained for any activity situated within 'waterfront land' (identified as being within 40 metres from the top of a river, lake or estuary) in accordance with section 91(2) of the WM Act. A review of the Department of Planning, Industry and Environment's (**DPIE**) Hydroline Map indicates that the site is not within 40m of a mapped watercourse. Therefore, the proposed development does not need to be referred to the Natural Resource Access Regulator.

4.4 ENVIRONMENTAL PLANNING INSTRUMENTS

State Environmental Planning Policy (Biodiversity and Conservation) 2021

The site is located within the Water Catchment Area and is subject to the provisions of SEPP (Biodiversity and Conservation) 2021.

The application is supported by a Stormwater Management Strategy that demonstrates the post development discharges from the site will achieve a NorBE (neutral or beneficial effect) on the quality of water leaving the site.

The western catchment will be treated in a raingarden on the southern side of Col Drewe Drive. The eastern/northern catchment will be treated in an amplified raingarden to be constructed on the subdivision of the site to the north of the subject site.

State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

This Development Application does not include the construction of dwellings. Future applications for house construction will address the various environmental controls at such time.

State Environmental Planning Policy (Resillience and Hazards) 2021

The Infrastructure SEPP aims to facilitate the effective delivery of infrastructure across NSW and allows for a range of development to be permitted with and without consent. It contains planning provisions for development of government infrastructure and utilities including requirements for proposal adjacent to sites containing or nominated as containing planned infrastructure.

State Environmental Planning Policy (Transport and Infrastructure) 2021

The Infrastructure SEPP aims to facilitate the effective delivery of infrastructure across NSW and allows for a range of development to be permitted with and without consent. It contains planning provisions for development of government infrastructure and utilities including requirements for proposal adjacent to sites containing or nominated as containing planned infrastructure.

4.5 LITHGOW CITY LOCAL ENVIRONMENTAL PLAN 2014

The Lithgow City Local Environment Plan 2014 described the planning, design and environmental objectives and controls to ensure orderly, efficient and sensitive development occurs. An assessment of the proposal against the relevant provisions of the LEP is provided in **Detailed Compliance Table in APPENDIX H**.

4.6 LITHGOW CITY DEVELOPMENT CONTROL PLAN 2021

The Lithgow City Development Control Plan 2021 described the planning, design and environmental objectives and controls to ensure orderly, efficient and sensitive development occurs. An assessment of the proposal against the relevant provisions of the DCP is provided in **Detailed Compliance Table in APPENDIX H**.

4.7 PLANNING AGREEMENT

Negotiations with Council are being undertaken in relation to a Voluntary Planning Agreement for the development with a view to have a finalised draft to be available for notification with DA

4.8 ENVIRONMENTAL PLANNING AND ASSESSMENT REGULATION 2000

There are no additional matters that previously considered in this SEE under the EP&A Regulation which would impact upon the consideration of this application. In accordance with the EP&A Regulation, all demolition works are to be carried out in accordance with AS 2601.

4.9 LIKELY IMPACTS OF DEVELOPMENT

The likely environmental impacts of the proposed development have been discussed in the previous sections of this SEE. As previously discussed, the proposed development is not considered likely to result in any adverse impacts provided the mitigation measure described in this report and supporting appendices are implemented.

4.10 SUITABILITY OF SITE

The site is in a key location between Lithgow's Health Precinct and adjoining subdivisions, this parcel of land bridges the two. It is suitable development of the subject site consistent with the zone objectives.

4.11 SUBMISSIONS

The application will be notified in accordance with Council's notification policy. The applicant requests the opportunity to review and comment on any submission received.

4.12 PUBLIC INTEREST

This DA seeks approval for residential subdivision and associated site works. It is considered in the public's interest for the following reasons:

- The proposed development provides for residential accommodation that is consistent with the objectives and controls contained in the Lithgow Development Control Plan.
- The proposed lots to be created under this DA meet a key purpose to address housing supply to accommodate the growth of housing demand within the Lithgow region, and specifically in proximity to key social infrastructure.
- The proposed subdivision provides for a mix of lots that can contribute to the supply and diversity of housing within the Lithgow Precinct.
- The development provides a suitable density within an area that will, when fully developed have sufficient and reasonable access to public recreation facilities, schools and the town centre.
- The proposed lots are capable of supporting a range of housing product which will facilitate variety within the streetscape and support different housing types.
- The orderly development of this site will enable the Applicant to address the conflugrance of a range of servicing technicallities that arise from other developments in the locality and subject catchments.

5 CONCLUSION

This DA seeks approval for residential subdivision of one existing allotment to create 46 Torrens Title residential lots and 1 residue lot. The DA includes bulk earthworks and associated civil works including the construction of roads, stormwater drainage and installation of services. The DA encompasses a strategy of a two-stage subdivision that will facilitate a diverse community of 80 dwellings to suit a range of household types and incomes. There will be subsequent DA's lodged for the development of housing and strata subdivision of several lots with in the subdivision to deliver the final yield of 80 dwellings. (See Figure 7)

The proposed development has been assessed against the relevant provisions of the EP&A Act and DCP and have been found to be an acceptable form of development consistent with the future anticipated growth of the Precinct for urban development. Further, it will provide for a diverse range of housing options within close proximity to key social infrastructure and with reasonable access to the Lithgow Town Centre and train station in a manner that is sensitive to the emerging character of the Lithgow area.

Future applications will indicate the realisation of the Masterplan represented in this application for subdivision. Individual and multi-residential housing applications will be informed and facilitated by this application but be subject to future determination.

Based on the information contained in this Statement of Environmental Effects we put forward the proposal should be granted consent, subject to appropriate conditions of consent.

FIGURE 7. MASTERPLAN DOCUMENT (IDG)

INTEGRATED
DESIGN
GROUP
ARCHITECTURE|MASTERPLANNING|INTERIORS

APPENDIX A – COST ESTIMATE REPORT

OPINION OF PROBABLE DEVELOPMENT COSTS (DETAILED)

PROJECT: 3 Tree Hill
CLIENT: Treadstone
DATE OF ESTIMATE: Nov-22
DRAWING REF: IDG DA-0104 Rev A

SUBDIVISION WORKS

Precinct	Yield	Construction Cost	Professional Fees	Authority Fees	Voluntary Planning Agreement contributions	South Bowenfels DSP Charges	Contingencies	Total Subdivision Cost
1	80	$ 5,761,381	$ 640,000	$ 352,965	$ -	$ -	$ -	**$ 6,754,345**
	80	**$ 5,761,381**	**$ 640,000**	**$ 352,965**	**$ -**	**$ -**	**$ -**	**$ 6,754,345**
	per lot	***$ 72,017***	***$ 8,000***	***$ 4,412***	***$ -***	***$ -***	***$ -***	***$ 84,429***

ESTATE MAJOR WORKS

		Construction Cost	Professional Fees	Authority Fees	Contingencies	Total EMW Cost	Recoveries	Net Cost
Electrical Lead In		$ -	$ -	$ -	-	**$ -**	$ -	**$ -**
Water & Sewer Lead In		$ -	$ -	$ -	-	**$ -**	$ -	**$ -**
	0	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
	per lot	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***	***$ -***

TOTAL DEVELOPMENT COSTS

Subdivision Works	$ 6,754,345	*$84,429 per lot*	
Estate Major Works	$ -	*$0 per lot*	
Subtotal	**$ 6,754,345**	*$84,429 per lot*	**All costs ex GST**
Recoveries	$ -	*$0 per lot*	
Subtotal	**$ -**	*$0 per lot*	
TOTAL	**$ 6,754,345**	*$84,429 per lot*	

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OPINION OF PROBABLE DEVELOPMENT COSTS (DETAILED)

PROJECT: 3 Tree Hill - Precinct 1

DATE OF ESTIMATE: Nov-22

DRAWING REF: IDG DA-0104 RevA

CLIENT: Treadstone

lumber of Residential Lots: 80

Public Reserve Lots:

Number of MD Lots: 0

Residue Lots: 1

Total lots: 80

Residue equivalent lots:

Cost per lot: $ 84,429 ex GST

	DESCRIPTION		QTY	UNIT	RATE	AMOUNT
	CIVIL WORKS AND SERVICING					
1.0	***Preliminaries***					
1.01	Includes site establishment, fencing, traffic control, clear rubbish/vegetation and soil/water management.		80	lots	$ 750	$ 60,000
1.02	Demolition of Existing dwellings		-	Dwellings	$ 70,000	$ -
1.03	Protection of existing dwellings to be retained		-	Dwellings	$ 20,000	$ -
1.04	Provisional allowance for Remediation		45,920	m^2	$ 3	$ 137,760
2.0	***Civil Works - Roads and Drainage***					
2.01	Road Type 1 - Collector Road 18m Wide		371	m	$ 2,700	$ 1,001,700
2.02	Road Type 2 - Local Street 15m wide		463	m	$ 2,600	$ 1,203,800
2.03	Road Type 4 - Laneway 10m wide		191	m	$ 2,300	$ 439,300
2.04	Retaining Wall along eastern side of collector		200	m^2	$ 680	$ 136,000
2.05	Bulk Earthworks (cut to fill) Assume 0.44m average across the site		20,205	m^3	$ 5	$ 107,085
2.06	E.O for excavation in weathered rock (assumed % -->)	15%	3,031	m^3	$ 15	$ 45,461
2.07	E.O for excavation in hard rock (assumed % -->)	5%	1,010	m^3	$ 35	$ 35,358
2.08	GPTs		3	each	$ 200,000	$ 600,000
2.09	Northern under road OSD tank		360	m^3	$ 1,100	$ 396,000
2.10	Northern WQ device		605	m^2	$ 550	$ 332,750
2.11	Southern OSD basin		749	m^3	$ 150	$ 112,350
2.12	Southern WQ device		145	m^2	$ 550	$ 79,750
2.13	Inter-allotment Drainage -150mm Pipe		100	m	$ 40	$ 4,000
2.14	Inter-allotment Drainage - 225mm Pipe		108	m	$ 60	$ 6,480
2.15	Inter-allotment Drainage - 300mm Pipe		-	m	$ 80	$ -
2.16	Inter-allotment Drainage - GSIP		10	Each	$ 3,500	$ 35,000
2.17	Retaining Walls within lots		-	m^2	$ 680	$ -
2.18	Benching of lots (assumed % -->)	0%	-	Lots	$ 1,000	$ -
2.19	Hydroseeding	70%	32,144	m2	$ 1.50	$ 48,216
2.20	Culvert Crossings		-	Each	########	$ -
2.21	Lot classifications		80	lots	$ 120	$ 9,600
2.22	Roundabouts		-	item	$ 150,000	$ -
2.23	Staging Costs (Temporary turning head, etc.)		1	Stage	$ 50,000	$ 50,000
	Sub Total					**$ 4,840,611**
3.0	***Potable Water Reticulation***					
3.01	Main to Meter (Short)		43	each	$ 200	$ 8,600
3.02	Main to Meter (long)		35	each	$ 300	$ 10,500
3.03	100mm dia		654	m	$ 90	$ 58,860
3.04	150mm dia		391	m	$ 110	$ 43,010
3.05	225mm dia		-	m	$ 300	$ -
3.06	Hydrants		21	each	$ 800	$ 16,800
3.07	Stop Valves		10	each	$ 1,200	$ 12,000
	Sub Total					**$ 149,770**

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	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
4.0	***Sewer Reticulation***				
4.01	Manholes	6	each	$ 8,000	$ 48,000
4.02	Maintenance Shafts	25	each	$ 2,000	$ 50,000
4.03	150mm dia	1,200	m	$ 120	$ 144,000
4.04	225mm dia	-	m	$ 200	$ -
4.05	300mm dia	-	m	$ 300	$ -
4.06	Concrete Encasement	95	m	$ 150	$ 14,250
	Sub Total				**$ 256,250**
5.0	***Electrical Reticulation***				
5.01	LV Cable Length (m)	1,955	m	$ 70	$ 136,850
5.02	HV Cable Length (m)	835	m	$ 100	$ 83,500
5.03	Street light Columns	22	each	$ 7,000	$ 154,000
5.04	Pillars	20	each	$ 1,200	$ 24,000
5.05	Padmount Substations	1	each	$ 60,000	$ 60,000
	Sub Total				**$ 458,350**
6.0	***Telecommunications***				
6.01	NBN Standard Pits	39	each	$ 620	**$ 24,180**
6.02	Install NBN Conduits	2,148	m	$ 15	**$ 32,220**
	Sub Total				**$ 56,400**
7.0	***Landscaping***				
	Sub Total				$ -
	SUBTOTAL for CIVIL WORKS AND SERVICING				**$ 5,761,381**
8.0	**PROFESSIONAL FEES**	80	lots	$ 8,000	$ 640,000
	SUBTOTAL for PROFESSIONAL FEES				**$ 640,000**
9.0	**AUTHORITY FEES**				
9.01	Council Fees (Development Application)	80	lots	$ 500	$ 40,000
9.02	Council Fees (CC)	80	lots	$ 450	$ 36,000
9.03	Council Fees (PCA)	80	lots	$ 600	$ 48,000
9.04	Long Service Levy	$ 5,761,381	%	0.35%	$ 20,165
9.05	Council Water & Sewer fees	80	lots	$ 400	$ 32,000
9.06	Electricity Fees	80	lots	$ 230	$ 18,400
9.07	Jemena - connection fees	80	lots	$ 250	$ 20,000
9.08	Council Fees (SC)	80	lots	$ 230	$ 18,400
9.09	LRS pre-lodgement	80	lots	$ 350	$ 28,000
9.10	LRS lodgement	80	lots	$ 350	$ 28,000
9.11	LRS Lot Fees	80	lots	$ 200	$ 16,000
9.12	NBN	80	lots	$ 600	$ 48,000
	SUBTOTAL for AUTHORITY FEES				**$ 352,965**
###	***Contributions***				
10.01	Voluntary Planning Agreement contributions				$ -
10.02	South Bowenfels sewer DSP Charges				$ -
10.03	Lithgow water supply DSP Charges				$ -
	SUBTOTAL for CONTRIBUTIONS				**$ -**
###	**CONTINGENCIES**				
11.01	As per Treadstone instructions, no allowance for contingency has been applied. Treadstone to allow for their own contingency.				**$ -**
	SUBTOTAL for CONTINGENCIES				**$ -**
	GRAND TOTAL FOR STAGE COSTS ex GST				**$ 6,754,345**

J Wyndham Prince has prepared the opinion/estimate of development costs in the following

1 This Opinion of Probable cost is based on J. Wyndham Prince's experience and judgment as a firm of practicing professional civil engineers familiar with the construction industry. The cost estimate cannot be guaranteed as we have no control over Contractor's prices, market forces, material supply costs, competitive bids from tenderers and specific site conditions that may be encountered but
2 The rates used for each element of work are derived from recent civil works contracts of similar nature to the work proposed under this estimate in the Greater Sydney Region.

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DESCRIPTION	QTY	UNIT	RATE	AMOUNT

3 The rates in the schedule appear to be precise, however, they are the output of the statistical analysis performed and fed into the Estimate schedule from the background data, for Greater Sydney Region.

4 As more information becomes available through the development process, and as more design detail becomes available the accuracy of the Estimate normally increases subject to latent conditions which may become evident on the site.

5 The rates are as accurate as the latest market information from which the rates are derived. The actual contract awarded for the work will be based on the market conditions at the time of the contract and therefore all rates will be subject at that time to rise and fall.

6 The only time at which the true cost of the project will be known is at the completion of each stage of the project.

OPINION OF PROBABLE DEVELOPMENT COSTS

PROJECT: 3 Tree Hill - Electrical Lead In

DATE OF ESTIMATE: Nov-22

DRAWING REF: IDG DA-0104 Rev A

CLIENT: Treadstone

ENDEAVOUR ENERGY LEAD IN WORKS

	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
1.0	***Electrical Lead In Works***				
1.01	Feeder within Col Drewe Drive		m	$ 500	$ -
1.02	Feeder within the site		m	$ 50	$ -
1.03					
	Works Subtotal				**$ -**
1.02	Professional fees	$0	%	12%	$ -
1.03	Authority fees	$0	%	2%	$ -
1.04	Contingencies	$0	%	20%	$ -
	Sub Total				**$ -**

GRAND TOTAL FOR ELECTRICAL COSTS ex GST				**$ -**

OPINION OF PROBABLE DEVELOPMENT COSTS

PROJECT: 3 Tree Hill - Water and Sewer Trunk Infrastructure

DATE OF ESTIMATE: Nov-22

CLIENT: Treadstone

DRAWING REF: IDG DA-0104 Rev A

WATER & SEWER LEAD IN WORKS

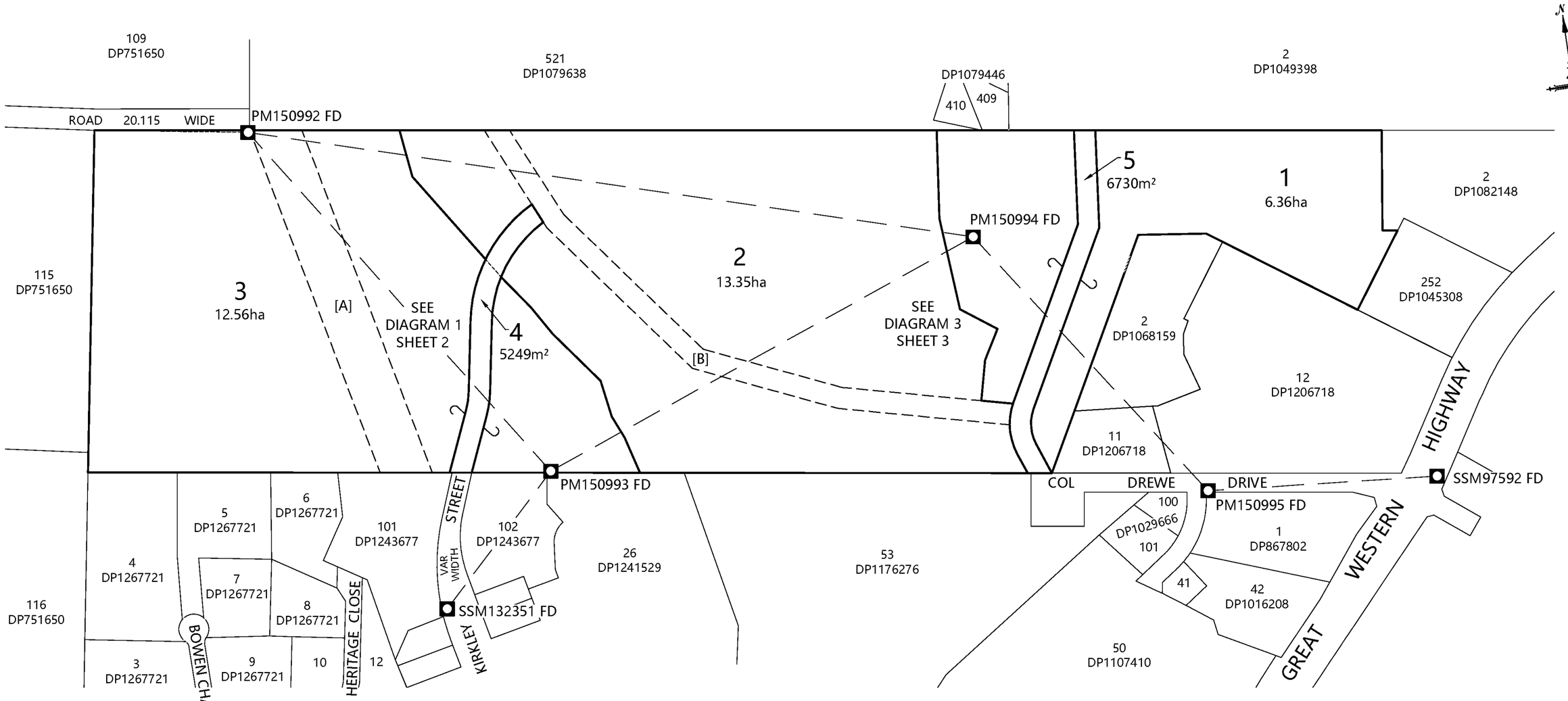
	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
1.0	***Sewer Trunk Mains***				
1.01	Northern gravity lead-in DN225 - funded by Council	800	m	$ -	$ -
1.02					
1.03					
1.04					
1.05					
	Works Subtotal				**$ -**
1.06	Professional fees	$0	%	12%	$ -
1.07	Authority fees	$0	%	2%	$ -
1.08	Contingencies	$0	%	20%	$ -
	Sub Total ex GST				**$ -**
	Sewer Recoveries				
1.09	Assume 95% recovery	$0	%	95%	$ -

	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
2.0	***Potable Water Trunk Main***				
2.01	Upsize Col Drewe Drive DN100 to DN150 - funded by development		m	$ 300	$ -
	Works Subtotal				**$ -**
2.02	Professional fees	$0	%	12%	$ -
2.03	Authority fees	$0	%	2%	$ -
2.04	Contingencies	$0	%	20%	$ -
	Sub Total ex GST				**$ -**
	Potable Water Recoveries				
2.05	Assume 0% recovery	$0	%	0%	$ -

					$ -

INTEGRATED
DESIGN
GROUP
ARCHITECTURE|MASTERPLANNING|INTERIORS

APPENDIX B – SURVEY PLAN



[A] EASEMENT FOR TRANSMISSION LINE 45.72 WIDE DP443677 J453271
[B] RIGHT OF ACCESS 20 WIDE

CONNECTIONS:

PM150992 TO PM150994	106° 25' 24" ~ 687.164 SCIMS ~ 687.163 OBS
PM150994 TO PM150995	145° 26' 49" ~ 324.524 SCIMS 145° 26' 52" ~ 324.530 OBS
PM150995 TO SSM97592	94° 34' 29" ~ 215.271 SCIMS 94° 34' 23" ~ 215.272 OBS
PM150992 TO PM150993	146° 26' 14" ~ 426.185 SCIMS 146° 26' 09" ~ 426.185 OBS
PM150993 TO SSM132351	225° 11' 00" ~ 161.622 SCIMS 225° 11' 19" ~ 161.636 TRAV

COORDINATE SCHEDULE						
MARK	MGA COORDINATES		CLASS	PU	METHOD	STATE
	EASTING	NORTHING				
PM150992	232235.375	6290071.261	B	0.02	SCIMS	FOUND
PM150993	232471.068	6289716.013	B	0.02	SCIMS	FOUND
PM150994	232894.717	6289876.915	B	0.02	SCIMS	FOUND
PM150995	233078.837	6289609.549	B	N/A	SCIMS	FOUND
SSM97592	233293.492	6289592.374	B	0.02	SCIMS	FOUND
SSM132351	232356.381	6289602.058	C	N/A	SCIMS	FOUND
DATE OF SCIMS COORDINATES: 7-AUG-2020 MGA ZONE: 56 MGA DATUM: GDA2020 COMBINED SCALE FACTOR: 1.000326						

SURVEYOR Name: PETRAS GORDON SILINIS Date: 26-08-2020 Reference: 4-4596	PLAN OF SUBDIVISION OF LOT 1 DP1082148.	L.G.A.: LITHGOW CITY Locality: BOWENFELS Reduction Ratio: 1:2750 Lengths are in metres	REGISTERED 11.11.2020	DP1268778

98° OLD ROAD 20.115 WIDE — PM150992 FD — (1.5) 6B — 13' — 521 DP1079638 FCE — 53"

PM TO COR 278° 56' 25" ~ 143.875

GIN IN ORP
RMGIP FD
313°36'~3.29
DP1082148

286.085

129°00'30" 40.64

RMGIP FD
AT TOWER CENTRE
DP1086154

167° 23' 15" ~ 512.805 GIP TO GIP

(79.55) (23.77) 503.815

352° 36' 50" 45.085

335° 82.315 93.47 31'

RMGIP
115°08'~0.655

326° 103.53 44'

48°10'20"~67.45
ARC 68.12 RAD 140

20.04 6.29 40" 322°

RMGIP
146°58'~0.54

40" 21.97

45°52'40"~64.8
ARC 65.61 RAD 120

[B] 182.275 189.71 13' 35"

21°54'50"~59.74
ARC 60.2 RAD 140

143° 46' 20" 40.225

148°39'40" 31.855

RMGIP
88°30'~0.415

19°54'20"~42.945
ARC 43.18 RAD 120

142° 48' 62.795

65.09 9° 35' 45" 65.09

RMGIP
74°48'~0.52

16°18'~18.68
ARC 18.725 RAD 80

16°18'~23.355
ARC 23.41 RAD 100

60.375 23° 00' 25" 55.11

170° 32' 35.09

157° 10' 23.31

164° 39' 35" 35.9

134.67 293° 36' 20" 131.45

141.51 283° 41' 161.84

115
DP751650

19' 320.825

10"

9°

PEG &
RMGIP FD
196°44'~8.495
DP1082148

278° 234.1

PEG &
RMGIP FD
189°~0.525
DP1086154

(0.1) 105.1

SEE DIAGRAM 2

PM150993 FD

70.545 87.28 15' 363.605 53"

RMPM150993 FD
255°22'~3.88
DP1241529

(1.4) (1)

44.035 20° 39' 30"

RMGIP FD
266°44'~1.075
DP1241529

KIRKLEY STREET

53
DP1176276

116
DP751650

5
DP1267721

6
DP1267721

4
DP1267721

101
DP1243677

102
DP1243677

26
DP1241529

7
DP1267721

8
DP1267721

SSM132351 FD

61

60
DP1103064

49
DP1103064

48
DP1103064

3
DP1267721

BOWEN CHASE

9
DP1267721

10
DP1267721

HERITAGE CLOSE

12
DP1267721

RMGIP FD
AT TOWER CENTRE
DP1086154

2

3

4

[A]

CONTINUES ON SHEET 3

DIAGRAM 1
SCALE 1:1250

DIAGRAM 2
NOT TO SCALE

3 4 60.375 23° 00' 25" 55.11

RMGIP FD
242°11'~0.51
DP1241529

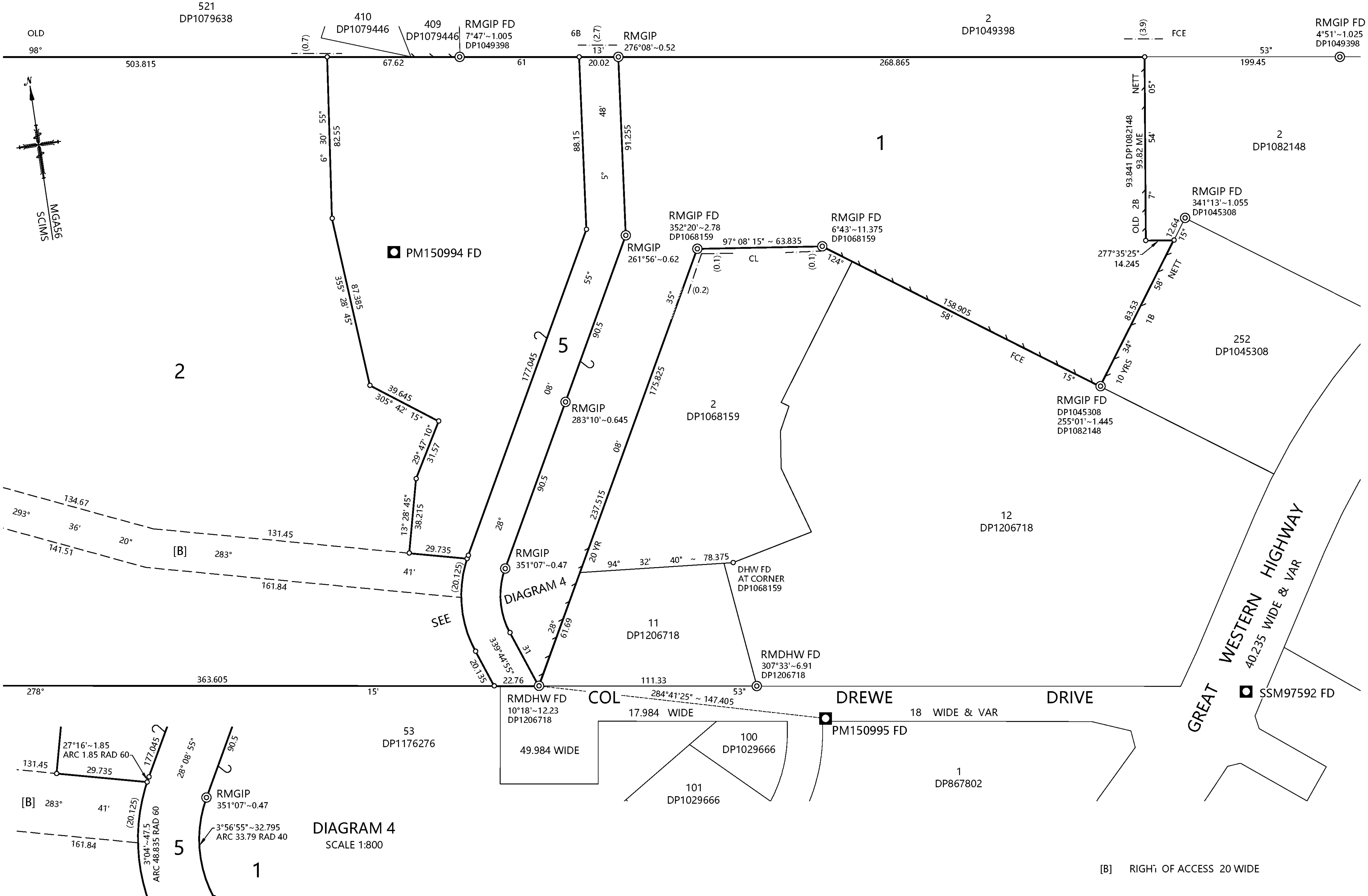
105.1 278° 2.25 18.43 15' 70.545 53"

101 DP1243677 KIRKLEY STREET 102 DP1243677

MGA56
SCIMS

[A] EASEMENT FOR TRANSMISSION LINE 45.72 WIDE DP443677 J453271
[B] RIGHT OF ACCESS 20 WIDE

SURVEYOR Name: PETRAS GORDON SILINIS Date: 26-08-2020 Reference: 4-4596	PLAN OF SUBDIVISION OF LOT 1 DP1082148.	L.G.A.: LITHGOW CITY Locality: BOWENFELS Reduction Ratio: 1:1500 Lengths are in metres	REGISTERED 11.11.2020	DP1268778


521
DP1079638
410
DP1079446
409
DP1079446
RMGIP FD
7°47'~1.005
DP1049398
RMGIP
276°08'~0.52
2
DP1049398
RMGIP FD
4°51'~1.025
DP1049398
OLD
98°
503.815
67.62
61
20.02
268.865
53"
199.45
FCE
1
2
DP1082148
93.841 DP1082148
93.82 ME
OLD 2B
NETT
RMGIP FD
341°13'~1.055
DP1045308
277°35'25"
14.245
RMGIP FD
352°20'~2.78
DP1068159
97° 08' 15" ~ 63.835
RMGIP FD
6°43'~11.375
DP1068159
CL
PM150994 FD
RMGIP
261°56'~0.62
5
2
DP1068159
158.905
FCE
83.53
10 YRS
252
DP1045308
RMGIP FD
DP1045308
255°01'~1.445
DP1082148
MGA56
SCIMS
2
RMGIP
283°10'~0.645
CONTINUED FROM SHEET 2
134.67
293°
131.45
141.51
[B]
283°
161.84
29.735
RMGIP
351°07'~0.47
DIAGRAM 4
SEE
94° 32' 40" ~ 78.375
DHW FD
AT CORNER
DP1068159
12
DP1206718
11
DP1206718
RMDHW FD
307°33'~6.91
DP1206718
GREAT WESTERN HIGHWAY
40.235 WIDE & VAR
363.605
278°
15'
20.135
22.76
111.33
RMDHW FD
10°18'~12.23
DP1206718
COL
DREWE
DRIVE
284°41'25" ~ 147.405
17.984 WIDE
18 WIDE & VAR
PM150995 FD
SSM97592 FD
53
DP1176276
49.984 WIDE
100
DP1029666
101
DP1029666
1
DP867802
27°16'~1.85
ARC 1.85 RAD 60
131.45
29.735
177.045
[B] 283°
41'
(20.125)
RMGIP
351°07'~0.47
3°56'55"~32.795
ARC 33.79 RAD 40
161.84
3°04'~47.5
ARC 48.835 RAD 60
5
1
2
20.135
339°44'55"
31
DIAGRAM 4
SCALE 1:800
[B] RIGHT OF ACCESS 20 WIDE
DP1268778

SURVEYOR	PLAN OF	L.G.A. / Locality	REGISTERED	
Name: PETRAS GORDON SILINIS Date: 26-08-2020 Reference: 4-4596	SUBDIVISION OF LOT 1 DP1082148.	L.G.A.: LITHGOW CITY Locality: BOWENFELS Reduction Ratio: 1:1250 Lengths are in metres	11.11.2020	DP1268778

ePlan

PLAN FORM 6 (2017)	**DEPOSITED PLAN ADMINISTRATION SHEET**	Sheet 1 of 2 sheet(s)

Office Use Only

Registered: 11.11.2020

Title System: TORRENS

Office Use Only

DP1268778

PLAN OF SUBDIVISION OF LOT 1 DP1082148

LGA: LITHGOW CITY

Locality: BOWENFELS

Parish: LETT

County: COOK

Survey Certificate

I, **Petras Gordon Silinis** of **CEH Survey**, a surveyor registered under the *Surveying and Spatial Information Act 2002*, certify that:

*(a) The land shown in the plan was surveyed in accordance with the *Surveying and Spatial Information Regulation 2017*, is accurate and the survey was completed on 26-08-2020, or

~~*(b) The part of the land shown in the plan (*being/*excluding **.....) was surveyed in accordance with the *Surveying and Spatial Information Regulation 2017*, the part surveyed is accurate and the survey was completed on,..... the part not surveyed was compiled in accordance with that Regulation, or~~

~~*(c) The land shown in this plan was compiled in accordance with the *Surveying and Spatial Information Regulation 2017*.~~

Datum Line: PM150992 – PM150994

Type: *Urban/~~*Rural~~

The terrain is *~~Level-Undulating~~ / *Steep-Mountainous.

Signature: ..... Dated: 31/8/20

Surveyor Identification No: SU008557
Surveyor registered under the *Surveying and Spatial Information Act 2002*

*Strike out inappropriate words.

**Specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey.

Crown Lands NSW/Western Lands Office Approval

I, ... (Authorised Officer) in approving this plan certify that all necessary approvals in regard to the allocation of the land shown herein have been given.

Signature: .....

Date: .....

File Number: .....

Office: .....

Subdivision Certificate

I, PAUL CASHEL

Authorised Person/~~General Manager~~/*~~Accredited Certifier~~, certify that the provisions of s.6.15 of the *Environmental Planning and Assessment Act 1979* have been satisfied in relation to the proposed subdivision, new road or reserve set out herein.

Signature: Paul Cashel

Accreditation number: –

Consent Authority: LITHGOW CITY COUNCIL

Date of endorsement: 28.9.20

Subdivision Certificate number: 011/20

File number: 335/050A - Stage A

*Strike through if inapplicable.

Plans used in the preparation of survey/~~compilation~~.

DP1045308
DP1049398
DP1068159
DP1082148
DP1086154
DP1206718
DP1241529

Statements of intention to dedicate public roads, create public reserves and drainage reserves, acquire/resume land.

IT IS INTENDED TO DEDICATE LOT 4 (SHANNY CLOSE 20 WIDE) AND LOT 5 (THREE TREE DRIVE 20 WIDE) TO THE PUBLIC AS PUBLIC ROAD.

Surveyor's Reference: 4-4596

Signatures, Seals and Section 88B Statements should appear on PLAN FORM 6A

ePlan

PLAN FORM 6A (2017) **DEPOSITED PLAN ADMINISTRATION SHEET** Sheet 2 of 2 sheet(s)

Office Use Only

Registered: 11.11.2020

Office Use Only

DP1268778

PLAN OF SUBDIVISION OF LOT 1 DP1082148

Subdivision Certificate number: 011/20

Date of Endorsement: 28.9.20

This sheet is for the provision of the following information as required:

- A schedule of lots and addresses - See 60(c) *SSI Regulation 2017*
- Statements of intention to create and release affecting interests in accordance with section 88B *Conveyancing Act 1919*
- Signatures and seals- see 195D *Conveyancing Act 1919*
- Any information which cannot fit in the appropriate panel of sheet 1 of the administration sheets.

SCHEDULE OF STREET ADDRESSES

LOT	ADDRESS NUMBER	ROAD NAME	ROAD TYPE	LOCALITY
1	10	COL DREWE	DRIVE	BOWENFELS
2	12	COL DREWE	DRIVE	BOWENFELS
3	50	KIRKLEY	STREET	BOWENFELS
4		NO ADDRESS AVAILABLE		
5		NO ADDRESS AVAILABLE		

PURSUANT TO SECTION 88B OF THE CONVEYANCING ACT 1919, AS AMENDED, IT IS INTENDED TO CREATE:

1) RIGHT OF ACCESS 20 WIDE

PURSUANT TO SECTION 88B OF THE CONVEYANCING ACT 1919, AS AMENDED, IT IS INTENDED TO RELEASE:

1) EASEMENT A340789

PTY LIMITED

Executed on behalf of Trinity Heights ACN 003 912 276, by the authorised persons whose signatures appear below pursuant to the section 127 of the Corporations Act 2001.

Signature of authorised person:

JOHN HOWARD IRELAND

Name of authorised person:

DIRECTOR

Office held:

Signature of authorised person:

PETER ROGERS

Name of authorised person:

DIRECTOR

Office held:

If space is insufficient use additional annexure sheet

Surveyor's Reference: 4-4596

INTEGRATED
DESIGN
GROUP
ARCHITECTURE|MASTERPLANNING|INTERIORS

APPENDIX C – ENGINEERING PLANS

SOUTH BOWENFELS

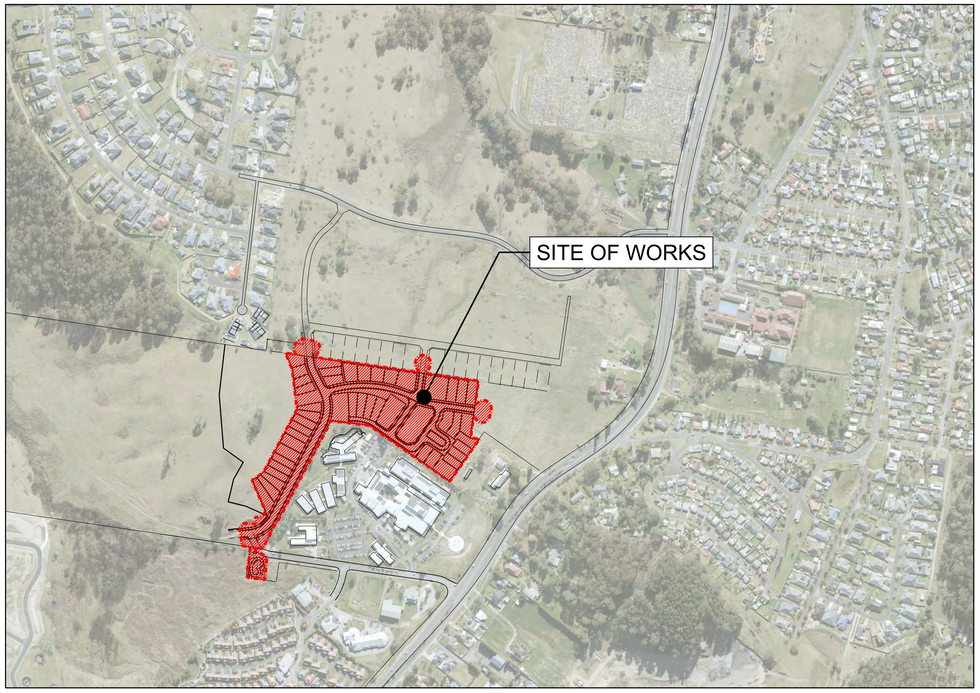
DEVELOPMENT APPLICATION

PROPOSED LOT, ROAD AND DRAINAGE WORKS

LEGEND			
DESCRIPTION	PROPOSED	EXISTING	FUTURE
EXTENT OF WORKS			
ELSHOLZ KERB	EK		
ROLL KERB	RK		
KERB ONLY	KO		
DISH DRAIN	DD		
EDGE STRIP	ES		
CONTOURS			
BOUNDARIES			
DRAINAGE LINE & PIT			
HEADWALL			
CATCHDRAIN			
RETAINING WALLS			
ZONE BOUNDARY			
PARKING BAY			

Survey By:
CEH SURVEY
CUNSULTING LAND, ENGINEERING AND MINING SURVEYORS
"ASTROLABE" 1 RUTHERFORD LANE, LITHGOW, 2790
Ph. (02) 6351 2281
Subdivision Survey:
Surveyed On: 04/06/2021 Plan Number: 4882_DETAIL_0621

Survey By:
CEH SURVEY
CUNSULTING LAND, ENGINEERING AND MINING SURVEYORS
"ASTROLABE" 1 RUTHERFORD LANE, LITHGOW, 2790
Ph. (02) 6351 2281
Subdivision Survey:
Surveyed On: 21/04/2016
Plan Number: TTL MASTER PLAN, JOB:TTL MASTER-TTL001



CIVIL PLAN INDEX		
PLAN NO.	PLAN NAME	REV
110698-03-CC001	COVER SHEET, NOTES, LEGEND & INDEX	B
110698-03-CC002	LAYOUT PLAN	B
110698-03-CC003	LOT ARRANGEMENT PLAN	B
110698-03-CC004	TYPICAL SECTIONS	B
110698-03-CC005	SERVICES PLAN	B
110698-03-CC006	STAGING PLAN	A
110698-03-CC010	CUT & FILL PLAN	B
110698-03-CC011	SITE SECTIONS SHEET 1	B
110698-03-CC012	SITE SECTIONS SHEET 2	A
110698-03-CC050	ENGINEERING PLAN SHEET 1	B
110698-03-CC051	ENGINEERING PLAN SHEET 2	B
110698-03-CC100	ROAD LONGITUDINAL SECTIONS SHEET 1	B
110698-03-CC101	ROAD LONGITUDINAL SECTIONS SHEET 2	B
110698-03-CC102	ROAD LONGITUDINAL SECTIONS	B
110698-03-CC200	SOIL & WATER MANAGEMENT PLAN	B
110698-03-CD250	OSD AND RAINGARDEN PLAN	A
110698-03-CD300	SIGNAGE & LINEMARKING PLAN SHEET 1	A
110698-03-CD301	SIGNAGE & LINEMARKING PLAN SHEET 2	B
110698-03-CD400	TURNING PATHS SHEET 1	B
110698-03-CD401	TURNING PATHS SHEET 2	B

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DIMENSIONS & AREAS SHOWN ARE APPROXIMATE ONLY & ARE SUBJECT TO SURVEY.

THE POSITION OF FEATURES SHOWN MAY BE DIAGRAMATIC ONLY & ARE SUBJECT TO SURVEY.

THIS PLAN IS FOR DEVELOPMENT APPLICATION PURPOSES ONLY.

EASEMENTS FOR SERVICES TO BE CREATED WHERE NECESSARY.

BEFORE YOU DIG www.byda.com.au

UTILITIES SHOWN ARE DIAGRAMMATIC ONLY, CONTRCTORS ARE RESPONSIBLE TO LOCATE AND AVOID DAMAGE TO THEM AS SPECIFIED BY EACH UTILITIES EXCUVATION GUIDE LINES & STANDARDS.

NOTE: UTILITIES SHOWN MAY NOT INCLUDE ALL SERVICES WITHIN THE LIMIT OF WORKS

B	ISSUE FOR DA APPROVAL	CC	JM	KE	MS	08/12/22
A	ISSUE FOR CLIENT REVIEW	CC	JM			
	AMENDMENT	DES	DRN	CKD	APR	DATE

J. WYNDHAM PRINCE
CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS
PO Box 4366 PENRITH WESTFIELD NSW 2750
P 02 4720 3300 W www.jwprince.com.au E jwp@jwprince.com.au

CLIENT: Lithgow City Council

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SOUTH BOWENFELS
STAGE 1 & 2
COVER SHEET, NOTES, LEGEND & INDEX

PROJECT No: 110698-03
SHEET No: CD001

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD001 | B

Plotted: 8 December, 2022 1:30:41 PM File Name: C:\SynergyWS\data\AS.JWP\41110698 - 03 - Development Application_13584\Design\CD\110698-03-CD001.dwg

FUTURE SUBDIVISION

LOT 2 DP 1049398

ROAD B

LOT 1 DP 1268778

ROAD C

ROAD D

CIRCUIT A

LOT 2 DP 1082148

LOT 1 DP 1268778

LOT 2 DP 1268778

ROAD A

LOT 2 DP 1068159

LOT 252 DP 1045308

LOT 12 DP 1206718

LOT 11 DP 1068159

COL DREWE DRIVE

GREAT WESTERN HIGHWAY

LOT 52 DP 1176276

N

LEGEND

STAGE 6 BOUNDARY

EXTENT OF STAGE 6 WORKS

1:1000 (AT A1)

20 10 0 10 20 30 40 50 60 70 80 90 100

METRES

B	ISSUE FOR DA APPROVAL	CC	JM	KE	MS	08/12/22
A	ISSUE FOR CLIENT REVIEW	CC	JM			
	AMENDMENT	DES	DRN	CKD	APR	DATE

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SOUTH BOWENFELS
STAGE 1 & 2
LAYOUT PLAN

PROJECT No: 110698-03

SHEET No: CD002

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD002 | B

Plotted: 8 December 2022 1:28:48 PM File Name: C:\SynergyWS\data\AS\JWP\41110698 - 03 - Development Application_13584\Design\CD\110698-03-CD002.dwg

B	ISSUE FOR DA APPROVAL	CC	JM	KE	MS	08/12/22
A	ISSUE FOR CLIENT REVIEW	CC	JM			
	AMENDMENT	DES	DRN	CKD	APR	DATE

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SOUTH BOWENFELS
STAGE 1 & 2
LOT ARRANGEMENT PLAN

PROJECT No: 110698-03
SHEET No: CD003

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD003 | B

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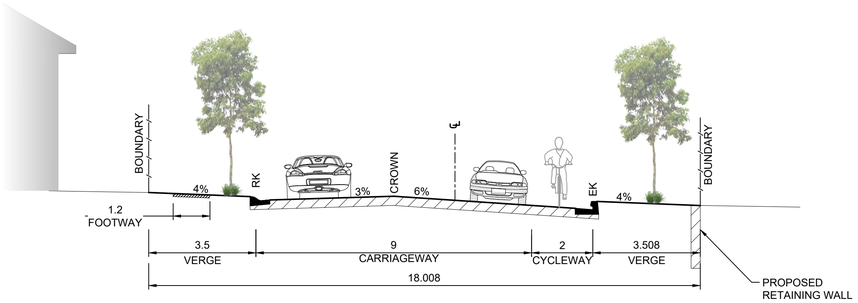
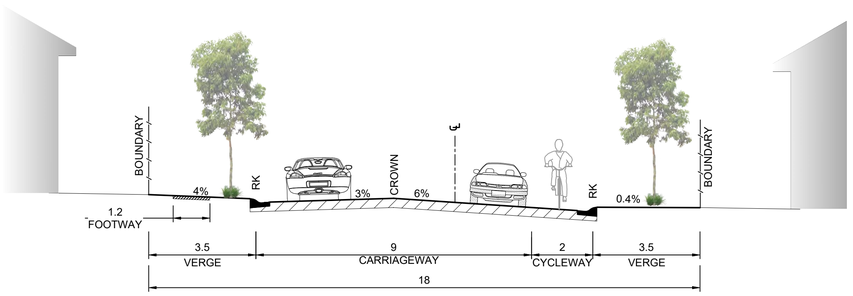


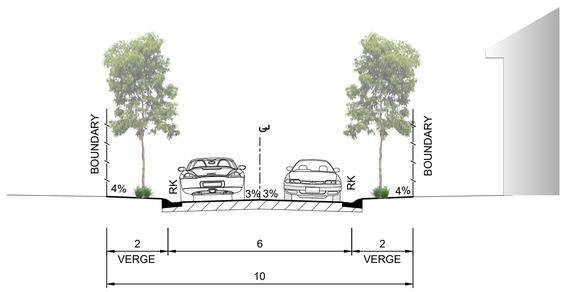
ROAD A TYPICAL SECTION - CH 23.041 - CH 270

SCALE: 1:100



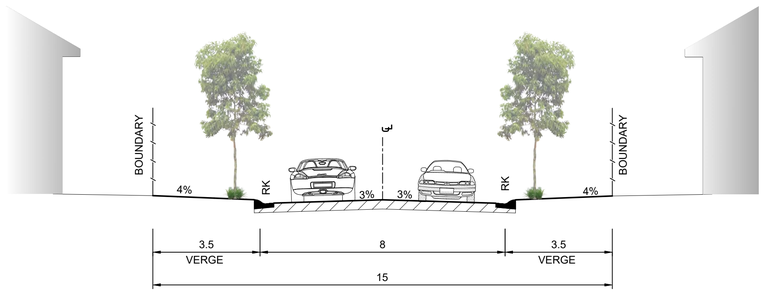
ROAD A CH 270.000 TO CH 371.110

SCALE: 1:100



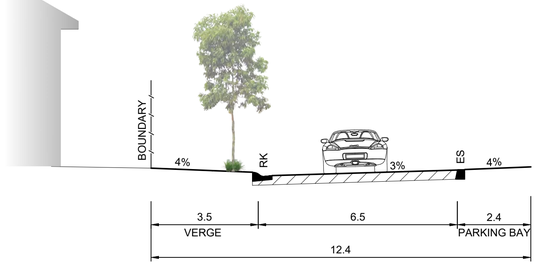
ROAD D CH 102.698 TO CH 204.615

SCALE: 1:100



ROAD B, C & D CH 0.000 TO CH 69.668

SCALE: 1:100



CIRCUIT A

SCALE: 1:100

1:100 (AT A1)

2 1 0 1 2 3 4 5 6 7 8 9 10

METRES

B	ISSUE FOR DA APPROVAL	CC	JM	KE	MS	08/12/22
A	ISSUE FOR CLIENT REVIEW	CC	JM			
	AMENDMENT	DES	DRN	CKD	APR	DATE

J. WYNDHAM PRINCE
CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS
PO Box 4366 PENRITH WESTFIELD NSW 2750
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SOUTH BOWENFELS
STAGE 1 & 2
TYPICAL SECTIONS

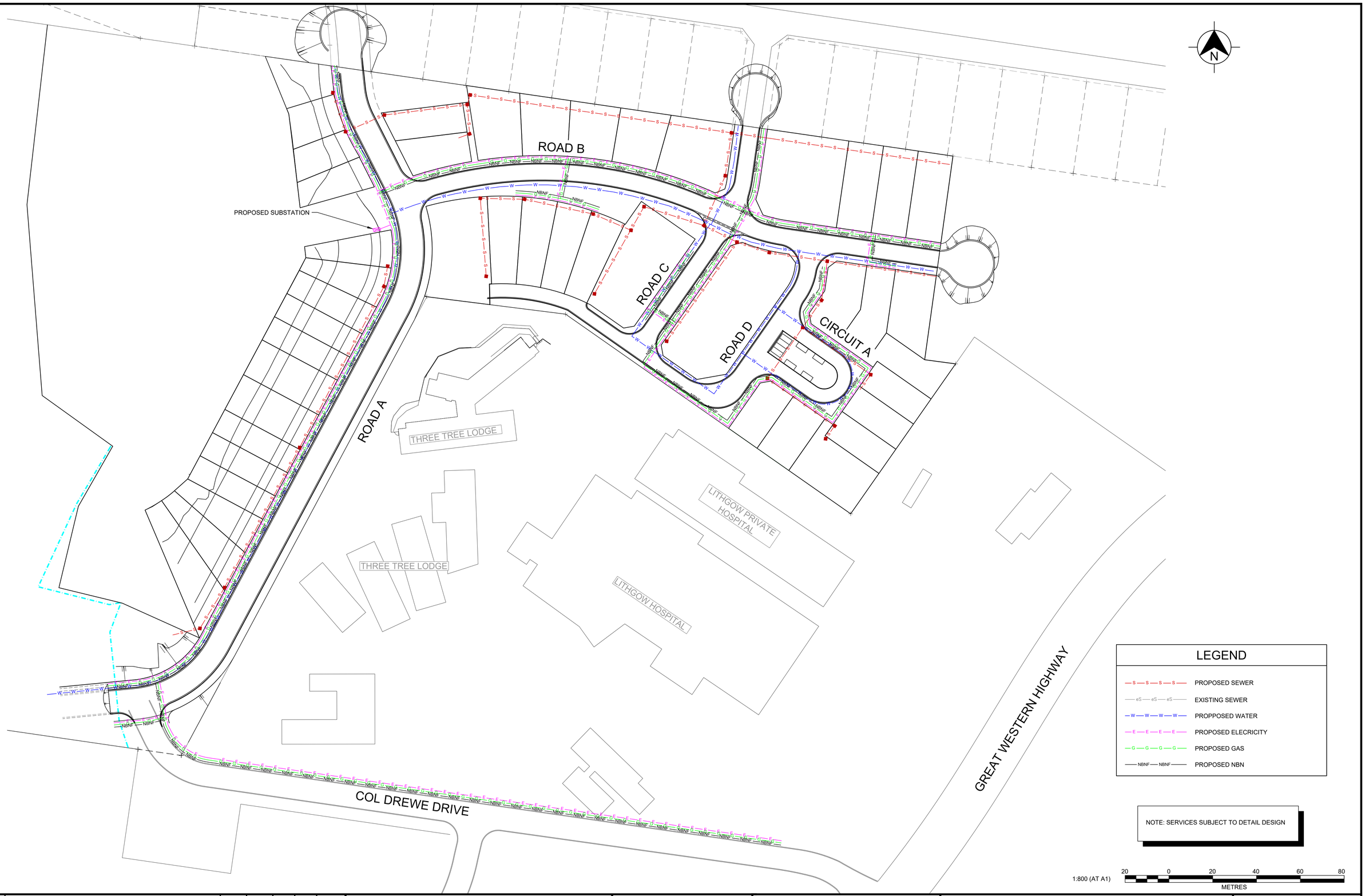
PROJECT No: 110698-03

SHEET No: CD004

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD004 | B

Plotted: 8 December, 2022 1:28:49 PM File Name: C:\Synergy\WS\data\AS.JWP\04\110698 - 03 - Development Application_13584\Design\CD\110698-03-CD004.dwg

Document Set ID: 2079568
Version: 1, Version Date: 09/12/2022



	AMENDMENT	DES	DRN	CKD	APR	DATE
B	ISSUE FOR DA APPROVAL	CC	JM	KE	MS	08/12/22
A	ISSUE FOR CLIENT REVIEW	CC	JM			

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SOUTH BOWENFELS STAGE 1 & 2
PROPOSED SERVICES PLAN

PROJECT No: 110698-03

SHEET No: CD005

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD005 | B

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LEGEND

- STAGE 1
- STAGE 2
- STAGE BOUNDARY

N

ROAD A
ROAD B
ROAD C
ROAD D
CIRCUIT A
COL DREWE DRIVE
GREAT WESTERN HIGHWAY

LOT 1 DP 1268778
LOT 2 DP 1268778
LOT 1 DP 1268778
LOT 2 DP 1082148
LOT 2 DP 1068159
LOT 252 DP 1045308
LOT 12 DP 1206718
LOT 11 DP 1068159
LOT 52 DP 1176276

A	ISSUE FOR DA APPROVAL	CC	JM	KE	MS	
	AMENDMENT	DES	DRN	CKD	APR	DATE

J. WYNDHAM PRINCE
CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS
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STATUS: ISSUE FOR DA APPROVAL

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SOUTH BOWENFELS
STAGE 1 & 2
STAGING PLAN

PROJECT No: 110698-03

SHEET No: CD006

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD006 | A

Plotted: 8 December, 2022 1:28:52 PM File Name: C:\SynergyWS\data\AS\JWP04\110698 - 03 - Development Application_13584\Design\CD\110698-03-CD006.dwg

ROAD A

ROAD B

ROAD C

ROAD D

CIRCUIT A

COL DREWE DRIVE

GREAT WESTERN HIGHWAY

A CD011

B CD011

N

LEGEND

Lower_value		Upper_value		Colour
-3.5	to	-3	m	
-3	to	-2.5	m	
-2.5	to	-2	m	
-2	to	-1.5	m	
-1.5	to	-1	m	
-1	to	-0.5	m	
-0.5	to	0	m	
0	to	0.5	m	
0.5	to	1	m	
1.	to	1.5	m	
1.5	to	2	m	
2	to	2.5	m	

1:800 (AT A1)

20 0 20 40 60 80

METRES

B	ISSUE FOR DA APPROVAL	CC	JM	KE	MS	08/12/22
A	ISSUE FOR CLIENT REVIEW	CC	JM			
	AMENDMENT	DES	DRN	CKD	APR	DATE

J. WYNDHAM PRINCE
CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS
PO Box 4366 PENRITH WESTFIELD NSW 2750
P 02 4720 3300 W www.jwprince.com.au E jwp@jwprince.com.au

CLIENT: Lithgow CITY COUNCIL

STATUS: ISSUE FOR DA APPROVAL

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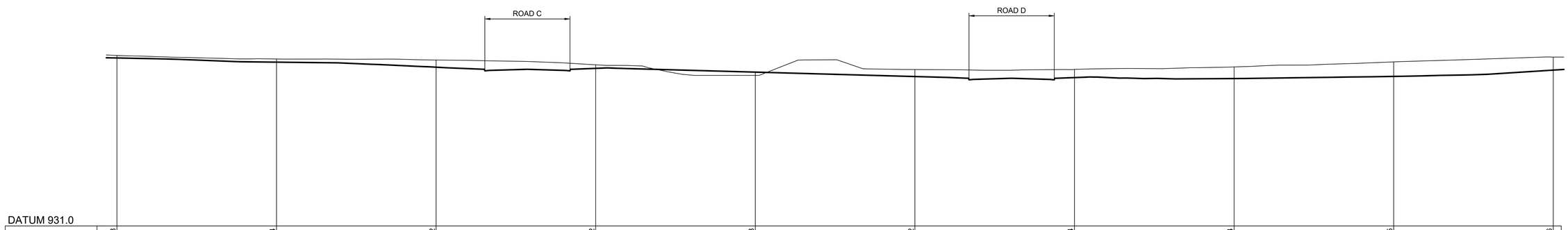
SOUTH BOWENFELS
STAGE 1 & 2
CUT & FILL PLAN

PROJECT No: 110698-03

SHEET No: CD010

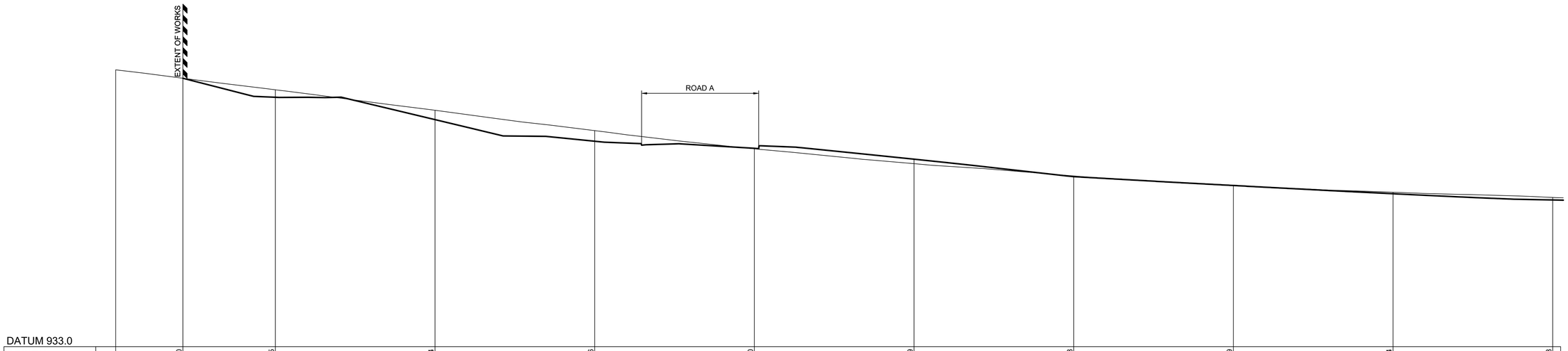
AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD010 | B

Plotted: 8 December , 2022 1:28:53 PM File Name: C:\Synergy\WS\data\ASJWP\04110698 - 03 - Development Application_13584\Design\CD\110698-03-CD010.dwg



DATUM 931.0											
DESIGN SURFACE	946.778	946.384	945.912	945.802	945.448	945.032	944.934	944.844	945.045	945.636	
EXISTING SURFACE	947.014	946.680	946.588	946.135	945.140	945.691	945.698	945.938	946.410	946.861	
CHAINAGE	135.000	150.000	165.000	180.000	195.000	210.000	225.000	240.000	255.000	270.000	

SECTION A
SCALE H 1:200
V 1:200
CD010



DATUM 933.0											
DESIGN SURFACE		958.210	956.425	954.324	952.296	951.630	950.609	948.968	948.139	947.364	946.778
EXISTING SURFACE	959.000	958.210	957.126	955.203	953.291	951.579	950.189	949.036	948.131	947.504	947.014
CHAINAGE	0.000	6.310	15.000	30.000	45.000	60.000	75.000	90.000	105.000	120.000	135.000

SECTION A
SCALE H 1:200
V 1:200
CD010

1:200 (AT A1)

4 2 0 4 8 12 16 20
METRES

B	ISSUE FOR DA APPROVAL	CC	JM	KE	MS	08/12/22	
A	ISSUE FOR CLIENT REVIEW	CC	JM				
	AMENDMENT	DES	DRN	CKD	APR	DATE	

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CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS
PO Box 4366 PENRITH WESTFIELD NSW 2750
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CLIENT: Lithgow City Council

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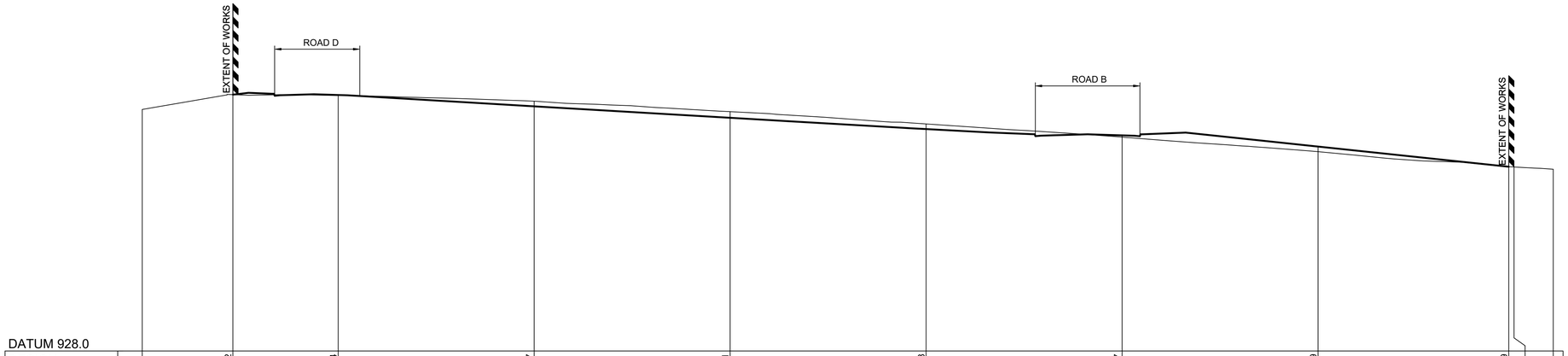
SOUTH BOWENFELS
STAGE 1 & 2
SITE SECTIONS
SHEET 1

PROJECT No: 110698-03
SHEET No: CD011

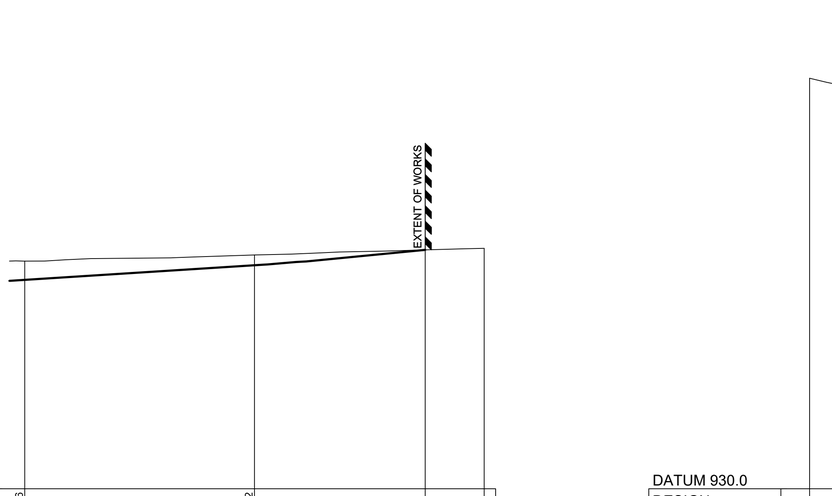
AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD011 | B

Plotted: 8 December , 2022 1:28:54 PM File Name: C:\Synergy\WS\data\ASJWP\4110698 - 03 - Development Application_13584\Design\CD\110698-03-CD010.dwg



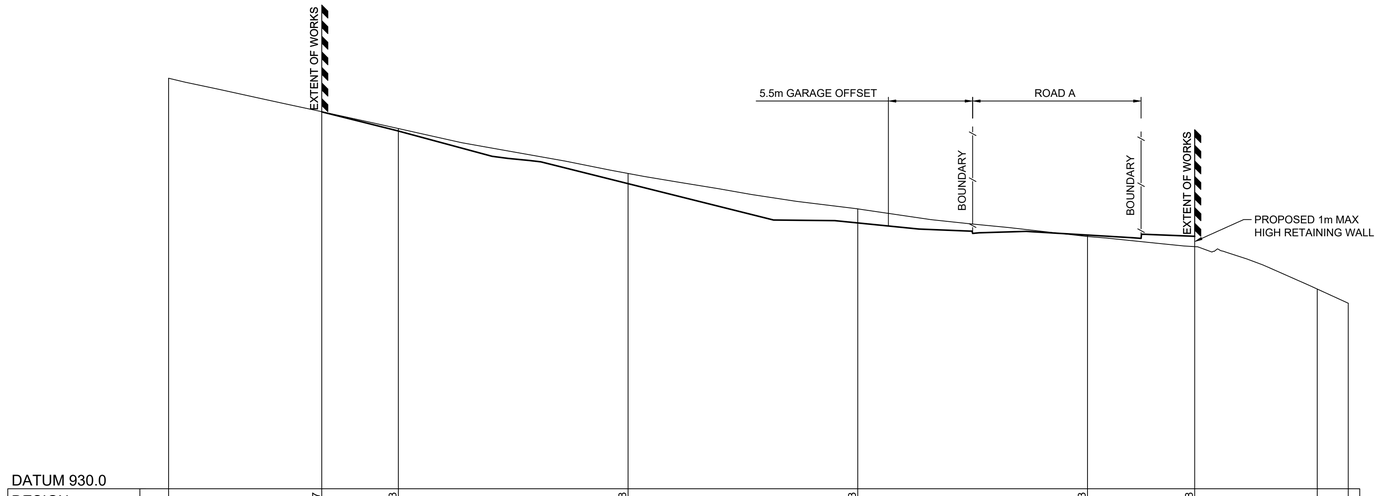
DATUM 928.0											
DESIGN SURFACE		947.602	947.574	946.707	945.831	944.968	944.487	943.629	942.089		
EXISTING SURFACE	946.467	947.602	947.540	947.099	946.301	945.360	944.353	943.241	942.089	942.067	941.896
CHAINAGE	0.000	6.940	15.000	30.000	45.000	60.000	75.000	90.000	104.596	105.000	108.000

SECTION B
SCALE H 1:200
V 1:200
CD010



DATUM 932.0					
DESIGN SURFACE	945.636	946.592			
EXISTING SURFACE	946.861	947.263	947.594	947.697	
CHAINAGE	270.000	285.000	296.150	300.000	

SECTION A
SCALE H 1:200
V 1:200
CD010



DATUM 930.0										
DESIGN SURFACE		954.617	953.353	949.918	947.353	946.563	946.468			
EXISTING SURFACE	956.799	954.617	953.516	950.583	948.273	946.469	945.807	943.039	942.113	
CHAINAGE	0.000	10.000	15.000	30.000	45.000	60.000	67.000	75.000	77.027	

SECTION C
SCALE H 1:200
V 1:200
CD010

1:200 (AT A1)

4 2 0 4 8 12 16 20
METRES

A	ISSUE FOR DA APPROVAL	CC	JM	KE	MS		
	AMENDMENT	DES	DRN	CKD	APR	DATE	

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SOUTH BOWENFELS
STAGE 1 & 2
SITE SECTIONS
SHEET 2

PROJECT No: 110698-03
SHEET No: CD012

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD012 | A

Plotted: 8 December, 2022 1:28:55 PM File Name: C:\SynergyWS\data\AS_JWP04\110698 - 03 - Development Application_13584\Design\CD\110698-03-CD010.dwg

PROPOSED TEMPORARY CUL-DE-SAC WITH BOLLARDS
1:4 BATTER
CAP PIPE FOR FUTURE CONNECTION
PROPOSED GPT
PROPOSED UNDERGROUND OSD TANK COMBINED VOLUME 550m²
PROPOSED TANK BALANCING PIPE
PROPOSED UNDERGROUND OSD TANK COMBINED VOLUME 550m²
EXISTING DAM TO BE DE-WATERED, DESILTED AND FILLED
PROPOSED 1m HIGH MAX RETAINING WALL
LOT 2 DP 1049398
LOT 2 DP 1082148
LOT 2 DP 1068159
LOT 252 DP 1045308
THREE TREE LODGE
LITHGOW PRIVATE HOSPITAL
ROAD A
ROAD B
ROAD C
ROAD D
CIRCUIT A

REFER DRAWING CD051 FOR CONTINUATION

(A) PROPOSED EASEMENT 2m WIDE TO DRAIN WATER

1:500 (AT A1)

METRES

REFER DRAWING CD051 FOR CONTINUATION

Plotted: 8 December 2022 1:28:56 PM File Name: C:\Synergy\WS\data\ASJWP04\110698 - 03 - Development Application_13584\Design\CD\110698-03-CD050.dwg

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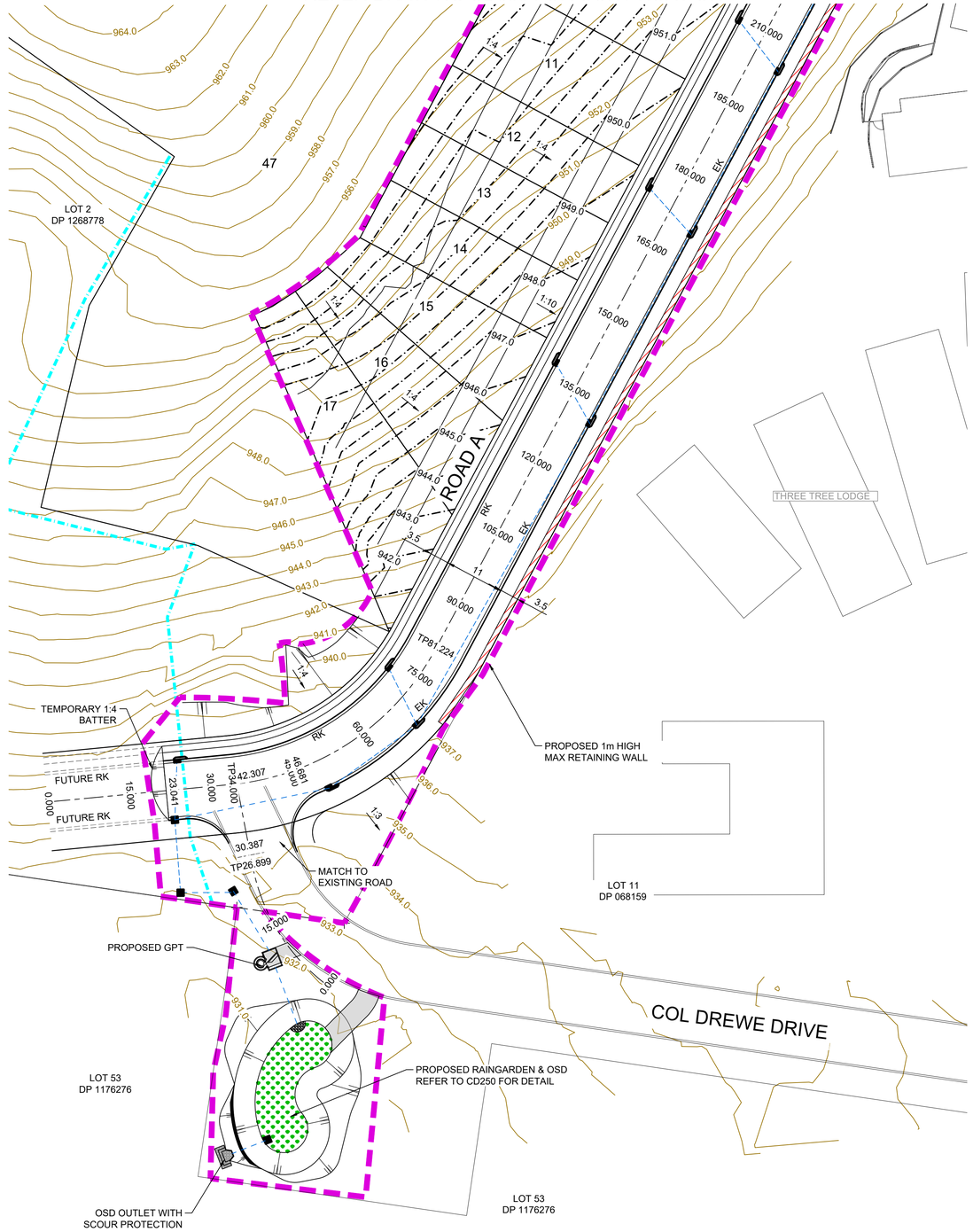
SOUTH BOWENFELS STAGE 1 & 2
ENGINEERING PLAN
SHEET 1

PROJECT No: 110698-03

SHEET No: CD050

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD050 | B

REFER DRAWING CD050 FOR CONTINUATION



1:500 (AT A1)

10 0 10 20 30 40 50

METRES

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A	ISSUE FOR CLIENT REVIEW	CC	JM				
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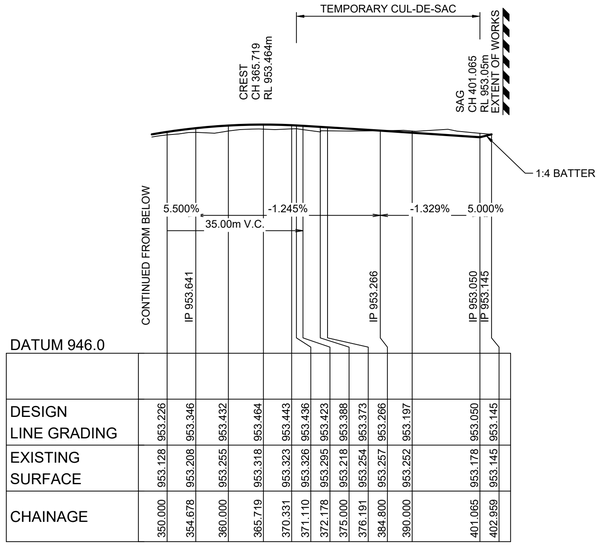
SOUTH BOWENFELS
STAGE 1 & 2
ENGINEERING PLAN
SHEET 2

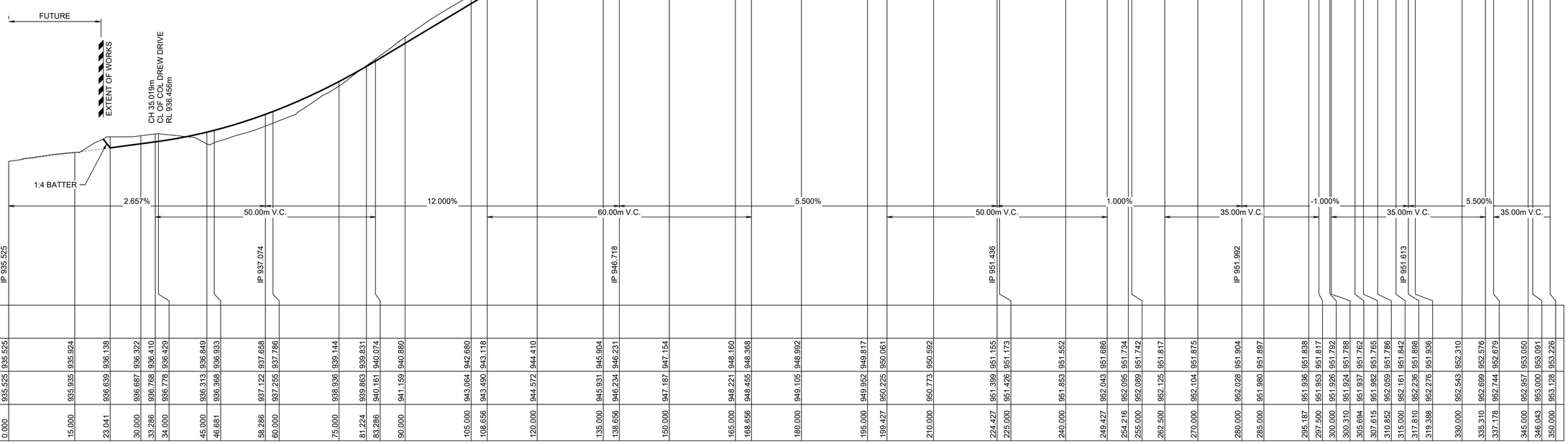
PROJECT No: 110698-03

SHEET No: CD051

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD051 | B

Plotted: 8 December , 2022 1:28:56 PM File Name: C:\SynergyWS\data\ASJWP\04110698 - 03 - Development Application_13584\Design\CD\110698-03-CD050.dwg





DATUM 946.0

DESIGN LINE GRADING	953.226	953.346	953.432	953.464	953.443	953.436	953.423	953.388	953.373	953.266	953.197	953.050	953.145
EXISTING SURFACE	953.128	953.208	953.255	953.318	953.323	953.326	953.295	953.218	953.254	953.257	953.252	953.178	953.145
CHAINAGE	350.000	354.678	360.000	365.719	370.331	371.110	372.178	375.000	376.191	384.800	390.000	401.065	402.959

LONGITUDINAL SECTION ROAD A

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100

DATUM 929.0

DESIGN LINE GRADING	935.525	935.924	936.138	936.322	936.410	936.429	936.849	936.933	937.658	937.786	939.144	939.831	940.074
EXISTING SURFACE	935.525	935.935	936.639	936.687	936.768	936.778	936.313	936.368	937.122	937.255	938.936	939.863	940.161
CHAINAGE	0.000	15.000	23.041	30.000	33.286	34.000	45.000	46.681	58.286	60.000	75.000	81.224	83.286

DESIGN LINE GRADING	940.880	942.680	943.118	944.410	945.904	946.231	947.154	948.160	948.368	948.992	949.817	950.061	950.592
EXISTING SURFACE	941.159	943.064	943.490	944.572	945.931	946.234	947.187	948.221	948.455	949.105	949.952	950.225	950.773
CHAINAGE	90.000	105.000	108.656	120.000	135.000	138.656	150.000	165.000	168.656	180.000	195.000	199.427	210.000

DESIGN LINE GRADING	951.155	951.173	951.552	951.686	951.734	951.742	951.817	951.875	951.904	951.897	951.838	951.817	951.792
EXISTING SURFACE	951.399	951.426	951.853	952.043	952.095	952.089	952.125	952.104	952.028	951.980	951.936	951.953	951.926
CHAINAGE	224.427	225.000	240.000	249.427	254.216	255.000	262.500	270.000	280.000	285.000	295.187	297.500	300.000

DESIGN LINE GRADING	951.788	951.762	951.765	951.786	951.842	951.898	951.936	952.310	952.576	952.679	953.050	953.091	953.226
EXISTING SURFACE	951.924	951.937	951.982	952.059	952.161	952.236	952.276	952.543	952.699	952.744	952.957	953.000	953.128
CHAINAGE	300.310	305.694	307.615	310.852	315.000	317.810	319.388	330.000	335.310	337.178	345.000	346.043	350.000

LONGITUDINAL SECTION ROAD A

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100

	AMENDMENT	DES	DRN	CKD	APR	DATE
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A	ISSUE FOR CLIENT REVIEW	CC	JM			

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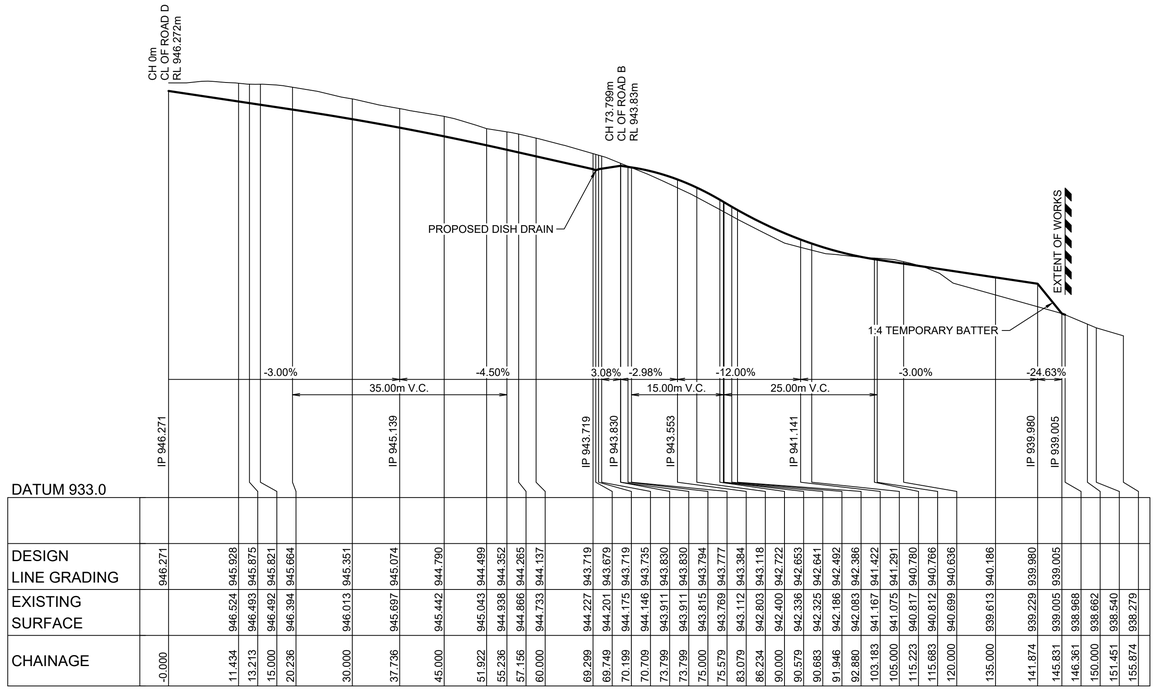
SOUTH BOWENFELS
STAGE 1 & 2
ROAD LONGITUDINAL SECTIONS
SHEET 1

PROJECT No: 110698-03
SHEET No: CD100

AZIMUTH: M.G.A.2020
DATUM: A.H.D.
ORIGIN:
PLAN No: 110698-03-CD100
B

Plotted: 8 December , 2022 1:28:59 PM File Name: C:\SynergyWS\data\ASJWP04\110698 - 03 - Development Application_13584\Design\CD\110698-03-CD100.dwg



DATUM 933.0

DESIGN LINE GRADING	946.271	945.928	945.875	945.821	945.664	945.351	945.074	944.790	944.499	944.352
EXISTING SURFACE		946.524	946.493	946.492	946.394	946.013	945.697	945.442	945.043	944.938
CHAINAGE	-0.000	11.434	13.213	15.000	20.236	30.000	37.736	45.000	51.922	55.236

DESIGN LINE GRADING	944.265	944.137	943.719	943.679	943.719	943.735	943.830	943.830	943.794	943.777
EXISTING SURFACE	944.866	944.733	944.227	944.201	944.175	944.146	943.911	943.911	943.815	943.769
CHAINAGE	57.156	60.000	69.299	69.749	70.199	70.709	73.799	73.799	75.000	75.579

DESIGN LINE GRADING	943.384	943.118	942.722	942.653	942.641	942.492	942.386	941.422	941.291	940.780
EXISTING SURFACE	943.112	942.803	942.400	942.336	942.325	942.186	942.083	941.167	941.075	940.817
CHAINAGE	83.079	86.234	90.000	90.579	90.683	91.946	92.880	103.183	105.000	115.223

DESIGN LINE GRADING	940.766	940.636	940.186	939.980	939.005				
EXISTING SURFACE	940.812	940.699	939.613	939.229	939.005	938.968	938.662	938.540	938.279
CHAINAGE	115.683	120.000	135.000	141.874	145.831	146.361	150.000	151.451	155.874

LONGITUDINAL SECTION ROAD C

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100

DATUM 937.0

DESIGN LINE GRADING	951.765	951.513	950.925	950.807	950.728	950.113	949.632	948.313	948.233	947.215
EXISTING SURFACE	951.983	951.375	950.047	949.811	949.660	948.765	948.179	947.075	947.022	946.442
CHAINAGE	0.000	4.193	13.312	15.000	16.104	24.193	30.000	44.193	45.000	55.177

DESIGN LINE GRADING	946.751	945.547	945.215	944.703	944.219	944.215	944.029	943.930	943.779	943.777
EXISTING SURFACE	946.136	945.131	944.875	944.500	944.077	944.074	943.839	943.675	943.564	943.575
CHAINAGE	60.000	75.000	80.177	90.000	105.000	105.177	114.467	120.000	134.467	135.000

DESIGN LINE GRADING	943.768	943.763	943.763	943.792	943.829	943.830	943.830	943.935	943.938	943.989
EXISTING SURFACE	943.629	943.777	943.798	943.869	943.910	943.911	943.911	943.948	943.954	943.943
CHAINAGE	137.322	140.185	141.133	150.000	154.467	154.547	154.558	165.000	165.393	170.475

DESIGN LINE GRADING	944.085	944.098	944.223	944.235	944.366	944.385	944.535	944.685	944.799	944.835	944.985	945.060	944.812
EXISTING SURFACE	943.711	943.690	943.587	943.591	943.744	943.783	944.141	944.486	944.779	944.834	944.862	944.855	944.812
CHAINAGE	180.000	181.306	193.882	195.000	208.133	210.000	225.000	240.000	251.435	255.000	270.000	277.522	280.000

LONGITUDINAL SECTION ROAD B

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100

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	AMENDMENT	DES	DRN	CKD	APR	DATE

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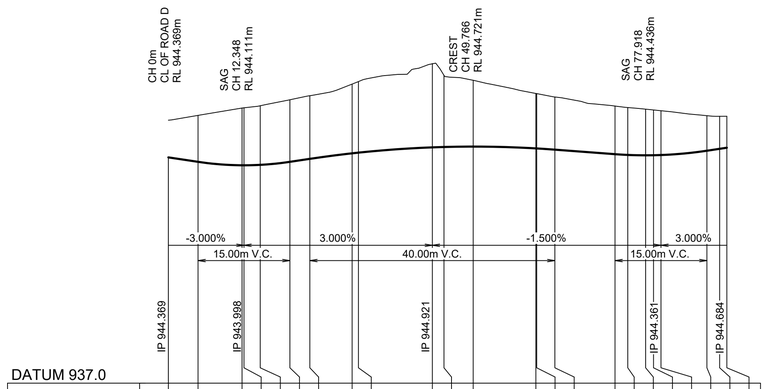
SOUTH BOWENFELS
STAGE 1 & 2
ROAD LONGITUDINAL SECTIONS
SHEET 2

PROJECT No: 110698-03
SHEET No: CD101

AZIMUTH: M.G.A.2020
DATUM: A.H.D.
ORIGIN:
PLAN No: 110698-03-CD101
B

Plotted: 8 December , 2022 1:28:59 PM File Name: C:\SynergyWS\data\ASJWP04\110698 - 03 - Development Application_13584\Design\CD\110698-03-CD100.dwg



DATUM 937.0

DESIGN LINE GRADING	944.369	944.223	944.111	944.111	944.125	944.223	944.321	944.501	944.524	944.696	944.708	944.721
EXISTING SURFACE		945.740	945.979	945.987	946.054	946.249	946.382	946.762	946.843	947.432	947.046	946.886
CHAINAGE	-0.000	4.848	12.030	12.348	15.000	19.848	23.100	30.000	31.034	43.100	45.000	49.766

DESIGN LINE GRADING	944.662	944.660	944.621	944.474	944.449	944.436	944.439	944.446	944.586	944.649	944.684
EXISTING SURFACE	946.455	946.450	946.340	946.044	945.996	945.943	945.917	945.892	945.730	945.709	945.711
CHAINAGE	60.000	60.137	63.100	72.918	75.000	77.918	79.204	80.418	87.918	90.000	91.172

LONGITUDINAL SECTION CIRCUIT A

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100

DATUM 937.0

DESIGN LINE GRADING	944.223	944.109	943.972	943.965	943.965	943.965	943.968	943.969	944.011	944.130	944.176
EXISTING SURFACE		943.940	944.493	944.614	944.622	944.647	944.730	944.737	945.026	945.205	945.316
CHAINAGE	0.000	3.812	11.312	13.274	13.394	13.812	14.930	15.000	18.812	25.814	28.556

DESIGN LINE GRADING	944.201	944.369	944.456	944.685	944.711	944.875	944.878	944.917	944.955	944.967	945.006
EXISTING SURFACE	945.368	945.583	945.678	945.711	945.717	945.621	945.623	945.597	945.428	945.409	945.349
CHAINAGE	30.000	39.881	45.000	58.482	60.000	69.668	69.856	72.108	74.331	75.000	77.150

DESIGN LINE GRADING	945.263	945.337	945.423	945.558	945.617	945.858	946.029	946.092	946.272	946.478	946.634
EXISTING SURFACE	945.194	945.254	945.369	945.558	945.640	945.991	946.225	946.305	946.535	946.793	946.901
CHAINAGE	90.000	93.356	97.108	102.698	105.000	114.039	120.000	122.108	128.108	135.000	140.198

DESIGN LINE GRADING	946.928	947.143	947.311	947.394	947.496	947.843	947.959	948.637	948.743	949.086
EXISTING SURFACE	947.139	947.259	947.342	947.390	947.445	947.700	947.809	948.498	948.646	949.086
CHAINAGE	150.000	157.146	162.524	165.000	167.951	177.146	180.000	195.000	197.146	204.015

LONGITUDINAL SECTION ROAD D

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100

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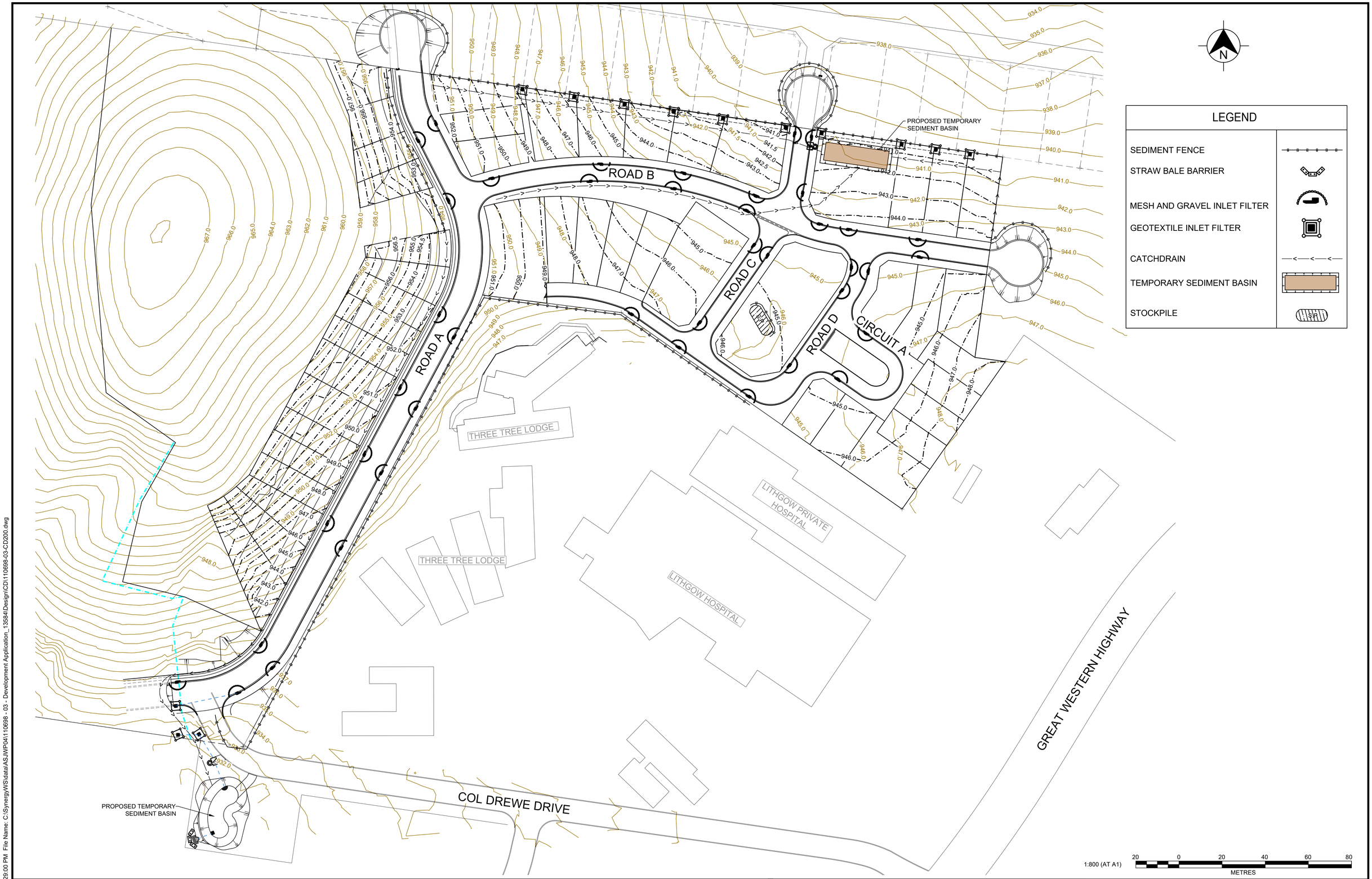
SOUTH BOWENFELS
STAGE 1 & 2
ROAD LONGITUDINAL SECTIONS

PROJECT No: 110698-03
SHEET No: CD102

AZIMUTH: M.G.A.2020
DATUM: A.H.D.
ORIGIN:
PLAN No: 110698-03-CD102
B



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CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS
PO Box 4366 PENRITH WESTFIELD NSW 2750
P 02 4720 3300 W www.jwprince.com.au E jwp@jwprince.com.au

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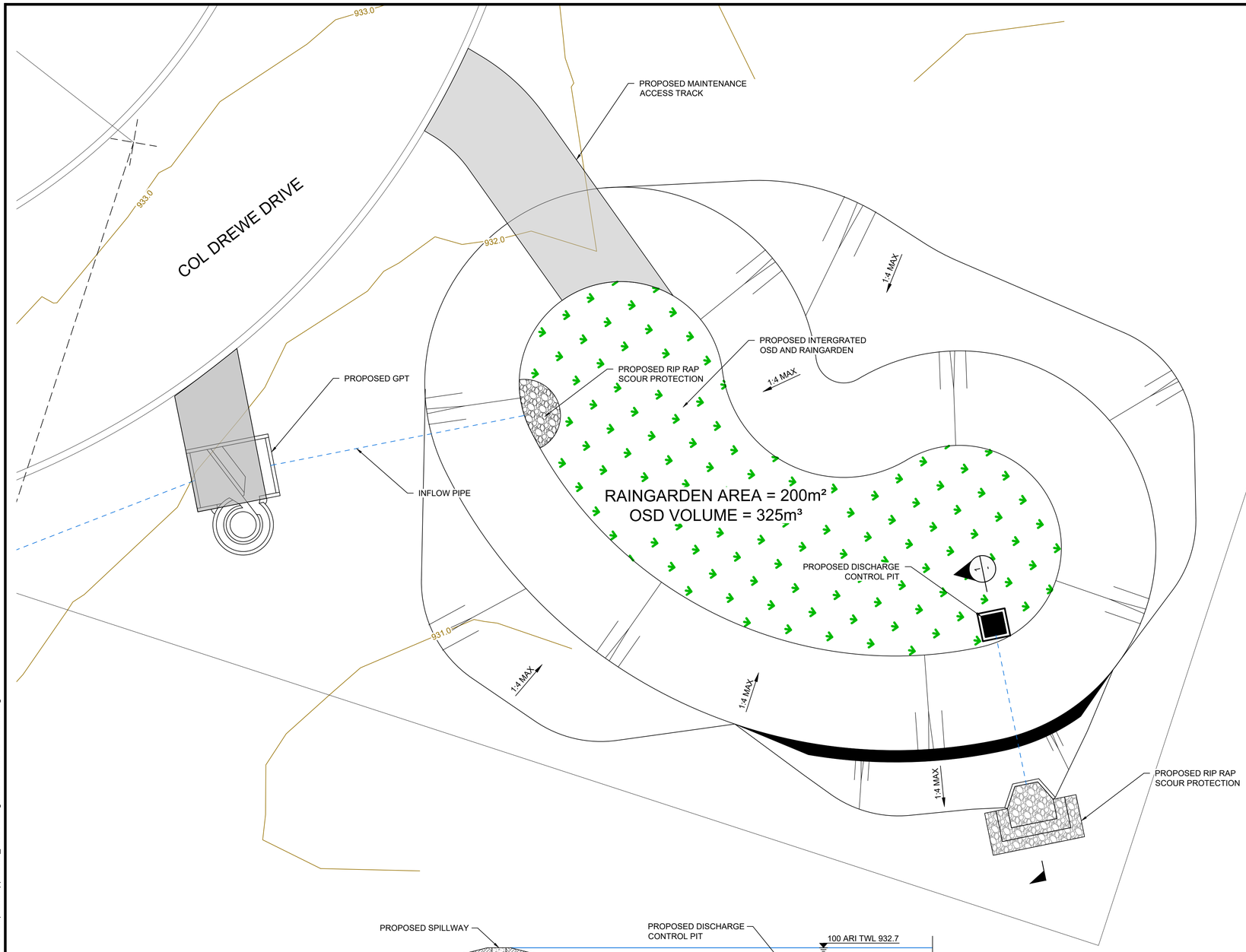
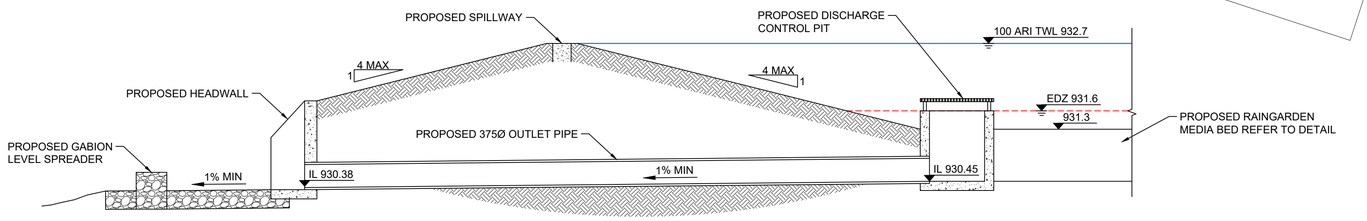
SOUTH BOWENFELS
STAGE 1 & 2
SOIL & WATER MANAGEMENT PLAN

PROJECT No: 110698-03
SHEET No: CD200

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD200 | B





SECTION 1
SCALE 1:50

NOTE:

LEVELS SUBJECT TO DETAIL SURVEY AT DETAIL DESIGN STAGE.

1:50 (AT A1) 1 0 1 2 3 4 5 METRES

1:100 (AT A1) 2 1 0 1 2 3 4 5 6 7 8 9 10 METRES

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SOUTH BOWENFELS
STAGE 1 & 2
OSD AND RAINGARDEN PLAN

PROJECT No: 110698-03

SHEET No: CD250

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD250 | A

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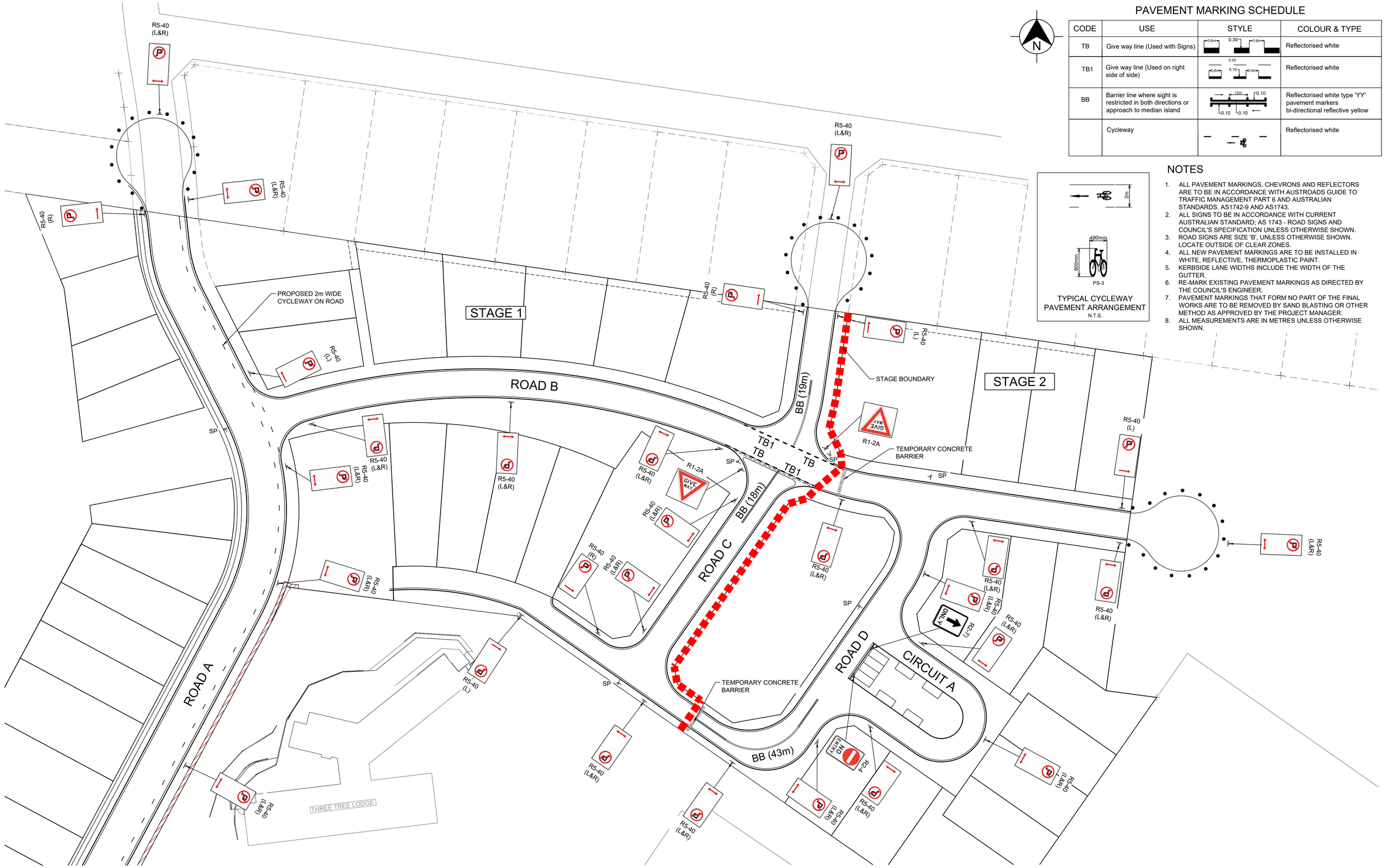
PAVEMENT MARKING SCHEDULE

CODE	USE	STYLE	COLOUR & TYPE
TB	Give way line (Used with Signs)	0.6m, 0.30, 0.6m	Reflectorised white
TB1	Give way line (Used on right side of side)	0.20, 0.6m, 0.15, 0.6m	Reflectorised white
BB	Barrier line where sight is restricted in both directions or approach to median island	12m, 0.10, 0.10, 0.10	Reflectorised white type 'YY' pavement markers bi-directional reflective yellow
	Cycleway		Reflectorised white

TYPICAL CYCLEWAY PAVEMENT ARRANGEMENT
N.T.S.

NOTES

1. ALL PAVEMENT MARKINGS, CHEVRONS AND REFLECTORS ARE TO BE IN ACCORDANCE WITH AUSTROADS GUIDE TO TRAFFIC MANAGEMENT PART 6 AND AUSTRALIAN STANDARDS. AS1742-9 AND AS1743.
2. ALL SIGNS TO BE IN ACCORDANCE WITH CURRENT AUSTRALIAN STANDARD; AS 1743 - ROAD SIGNS AND COUNCIL'S SPECIFICATION UNLESS OTHERWISE SHOWN.
3. ROAD SIGNS ARE SIZE 'B', UNLESS OTHERWISE SHOWN. LOCATE OUTSIDE OF CLEAR ZONES.
4. ALL NEW PAVEMENT MARKINGS ARE TO BE INSTALLED IN WHITE, REFLECTIVE, THERMOPLASTIC PAINT.
5. KERBSIDE LANE WIDTHS INCLUDE THE WIDTH OF THE GUTTER.
6. RE-MARK EXISTING PAVEMENT MARKINGS AS DIRECTED BY THE COUNCIL'S ENGINEER.
7. PAVEMENT MARKINGS THAT FORM NO PART OF THE FINAL WORKS ARE TO BE REMOVED BY SAND BLASTING OR OTHER METHOD AS APPROVED BY THE PROJECT MANAGER.
8. ALL MEASUREMENTS ARE IN METRES UNLESS OTHERWISE SHOWN.



REFER DRAWING CD301 FOR CONTINUATION

1:500 (AT A1)

10 0 10 20 30 40 50

METRES

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PO Box 4366 PENRITH WESTFIELD NSW 2750
P 02 4720 3300 W www.jwprince.com.au E jwp@jwprince.com.au

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SOUTH BOWENFELS
STAGE 1 & 2
SIGNAGE & LINEMARKING PLAN
SHEET 1

PROJECT No: 110698-03

SHEET No: CD300

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD300 | A

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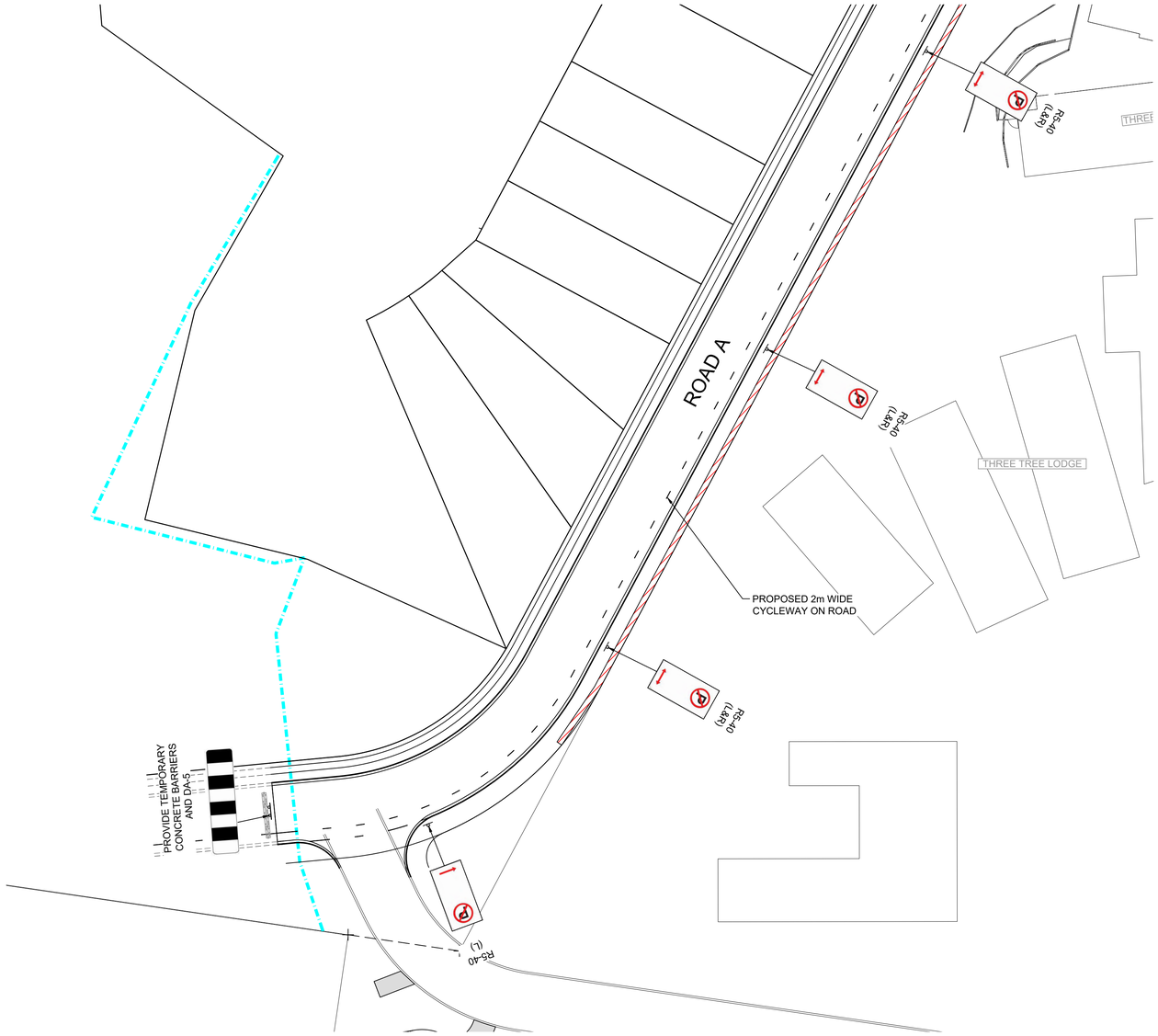

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10 0 10 20 30 40 50

METRES

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	AMENDMENT	DES	DRN	CKD	APR	DATE

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P 02 4720 3300 W www.jwprince.com.au E jwp@jwprince.com.au

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SOUTH BOWENFELS
STAGE 1 & 2
SIGNAGE & LINEMARKING PLAN
SHEET 2

PROJECT No: 110698-03

SHEET No: CD301

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD301 | B

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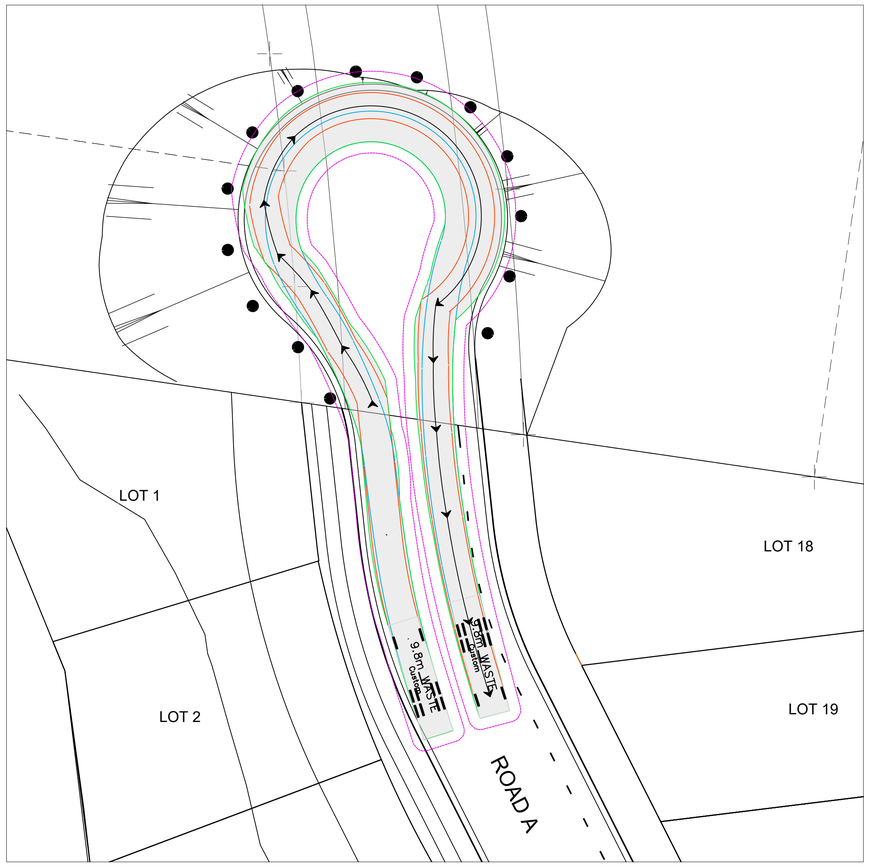

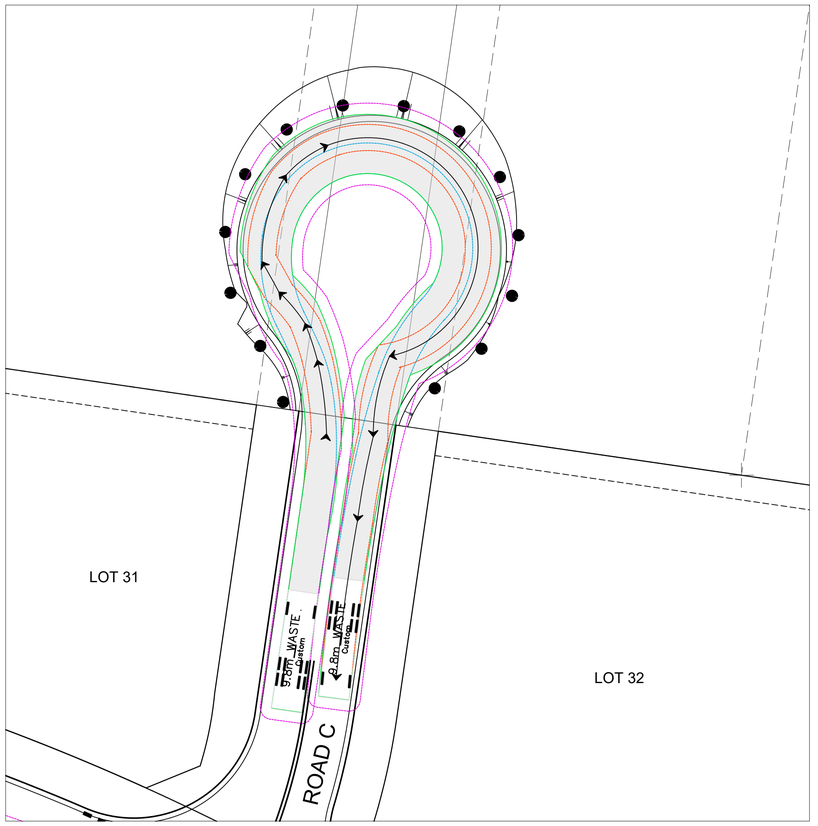

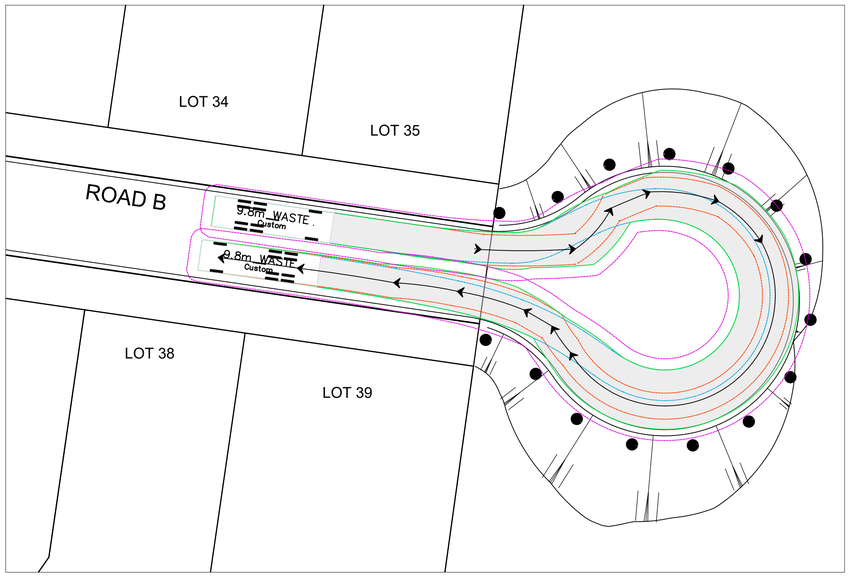

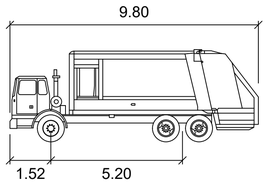

9.8m WASTE

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 35.3

1:250 (AT A1)

5 0 5 10 15 20 25

METRES

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P 02 4720 3300 W www.jwprince.com.au E jwp@jwprince.com.au

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SOUTH BOWENFELS
STAGE 1 & 2
TURNING PATHS
SHEET 1

PROJECT No: 110698-03

SHEET No: CD400

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD400 | B

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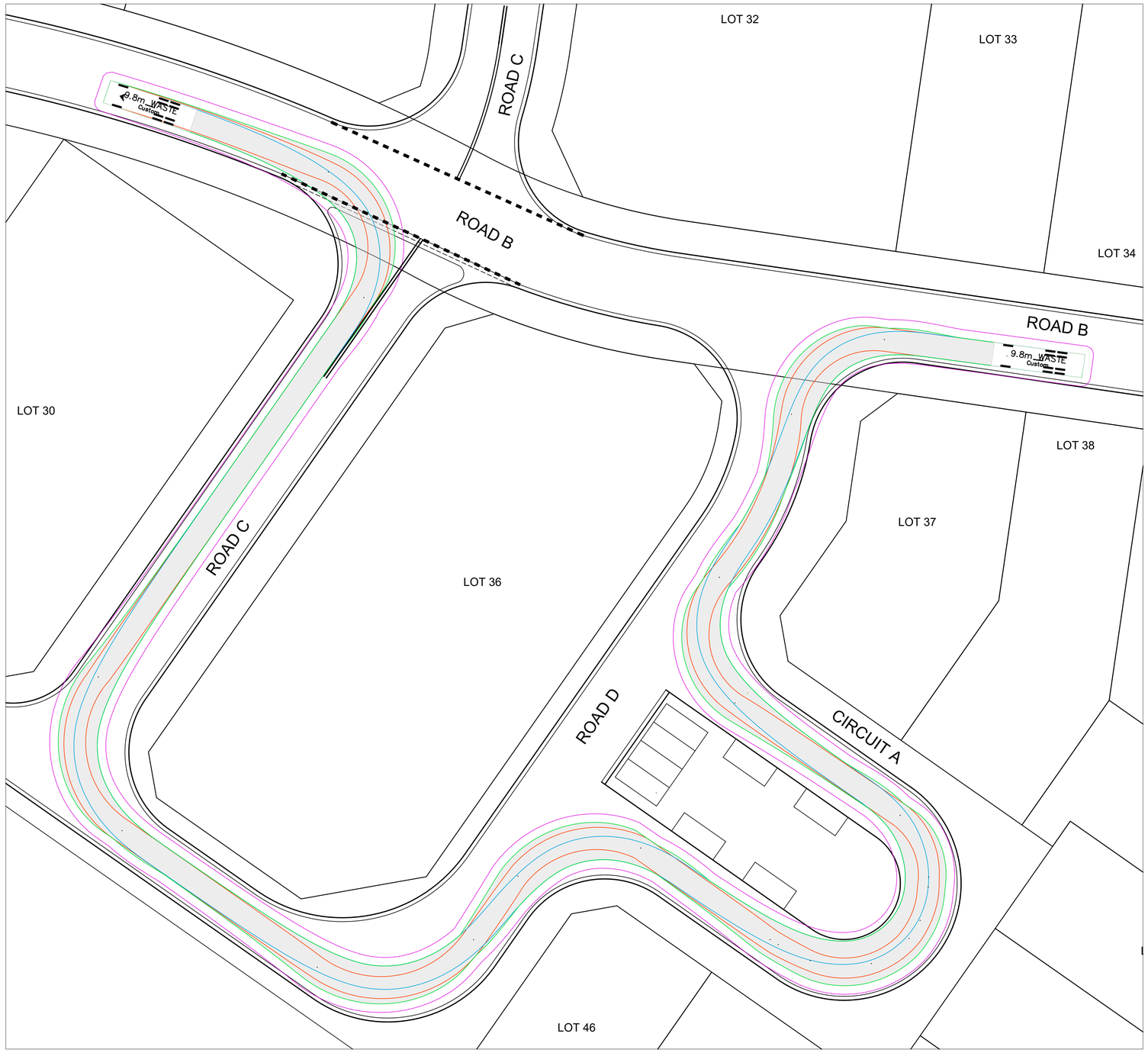
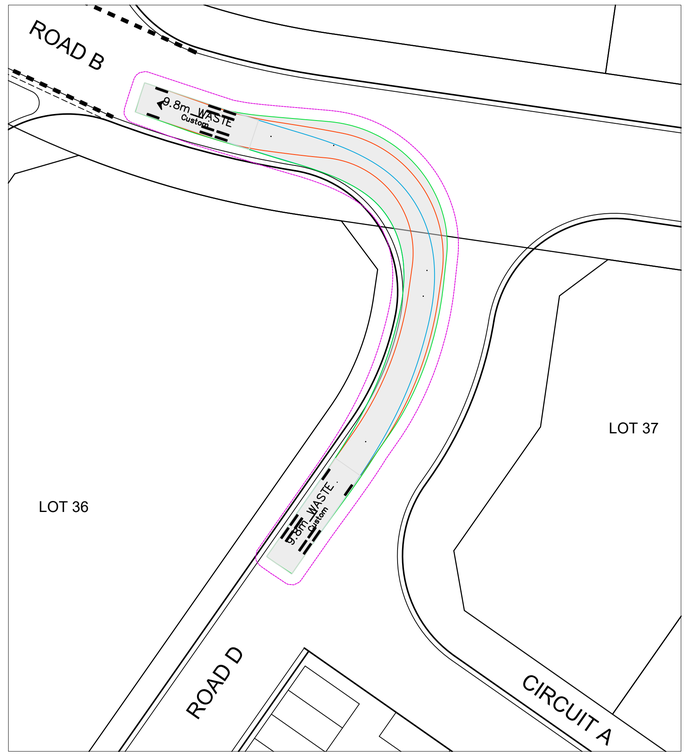
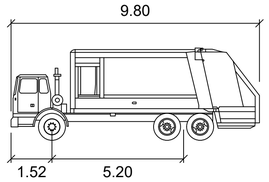


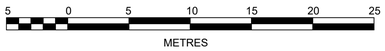




9.8m WASTE

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 35.3

1:250 (AT A1)



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CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS
PO Box 4366 PENRITH WESTFIELD NSW 2750
P 02 4720 3300 W www.jwprince.com.au E jwp@jwprince.com.au

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SOUTH BOWENFELS
STAGE 1 & 3
TURNING PATHS
SHEET 2

PROJECT No: 110698-03
SHEET No: CD401

AZIMUTH: M.G.A.2020 | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-03-CD401 | B

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REPORT

THE TREADSTONE COMPANY PTY LTD

Col Drewe Drive, South Bowenfels

Stormwater Management Strategy

December 2022

J. WYNDHAM PRINCE
CONSULTING CIVIL INFRASTRUCTURE ENGINEERS
& PROJECT MANAGERS

Prepared by

J. Wyndham Prince
Contact: Daniel Gardiner
Phone: 02 4720 3300
Email: jwp@jwprince.com.au
ABN: 67 002 318 621

Prepared for

The Treadstone Company Pty Ltd
Contact: Mike Scott
Phone: 0418 223 969
Email: mikescott@treadstone.net.au

Version control

Issue	Author	Reviewer	Approver	Date approved
A	DG	SL	SL	08/12/2022

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PLATES

TABLES

APPENDICES

1. EXECUTIVE SUMMARY

J. Wyndham Prince has been engaged by The Treadstone Company to undertake a *Stormwater Management Strategy Report* in support of a Development Application (DA) for the proposed subdivision at Col Drewe Drive, South Bowenfels (the site). This report details the results of the water quality and water quantity management investigations to support the DA approval from Lithgow City Council (Council).

The development application seeks to create forty six (46) lots, including five (5) superlots for future development. Ultimately, the development will yield eighty (80) separate dwellings.

The stormwater management assessment has been undertaken to ensure that both water quantity and water quality discharge from the site are managed prior to discharge to the downstream environment. These assessments have been completed in accordance with Lithgow City Council's guidelines and policy documents. The development is within a drinking water catchment and the water quality assessment has also been completed in accordance with the Water NSW guidelines.

The site is split into two distinct catchments – the northern catchment and the western catchment. The *Stormwater Management Strategy* proposed for the site consists of a water quality treatment train for each catchment. The treatment train comprises the following:

- A minimum 2.5 kL rainwater tank for each dwelling.
- A gross pollutant trap located upstream of the bioretention system.
- A bioretention system with a filter area of 295m^2 for the northern catchment and 200m^2 for the western catchment. The bioretention for the northern catchment will be located within the future development to the north and will be constructed by others. The filter area of this device needs to be sized to include the 295m^2 required for the South Bowenfels development.

The water quantity control strategy for the development will attenuate peak post development flows to pre-development levels for the 1% AEP storm event and consists of the following:

- An underground stormwater detention tank with minimum volume of 500m^3 for the northern catchment.
- An above ground stormwater detention basin with minimum volume of 325m^3 for the western catchment.

The assessment is considered fit for purpose and suitable to inform detailed design once the application is approved.

2. INTRODUCTION

J. Wyndham Prince has been engaged by The Treadstone Company to undertake a *Stormwater Management Strategy Report* in support of a Development Application (DA) for the proposed subdivision at Col Drewe Drive, South Bowenfels (the site). This report details the procedures used and presents the results of investigations undertaken by J. Wyndham Prince for water quality and water quantity management to support the DA approval from Lithgow City Council (Council).

2.1. Existing Site

The South Bowenfels development site is approximately 4.8 hectares in size and located approximately 2km south west of the Lithgow CBD. The site is bordered by vacant rural land to the north and east (for future development), Lithgow Hospital to the south and vacant rural land (Three Tree Hill) to the west. The site consists of grassland and has been cleared of all other vegetation.

The western portion of the site is steep with average grades of 8-9%, while the eastern portion of the site is flatter and generally has average grades of 2-4%. The site is split into two distinct catchments – the western and northern catchments. The western catchment drains to the south and the northern catchment drains to the north. An external catchment to the west also drains to the site. There are no watercourses within the site.

The existing site details are shown below in Plate 4-1.

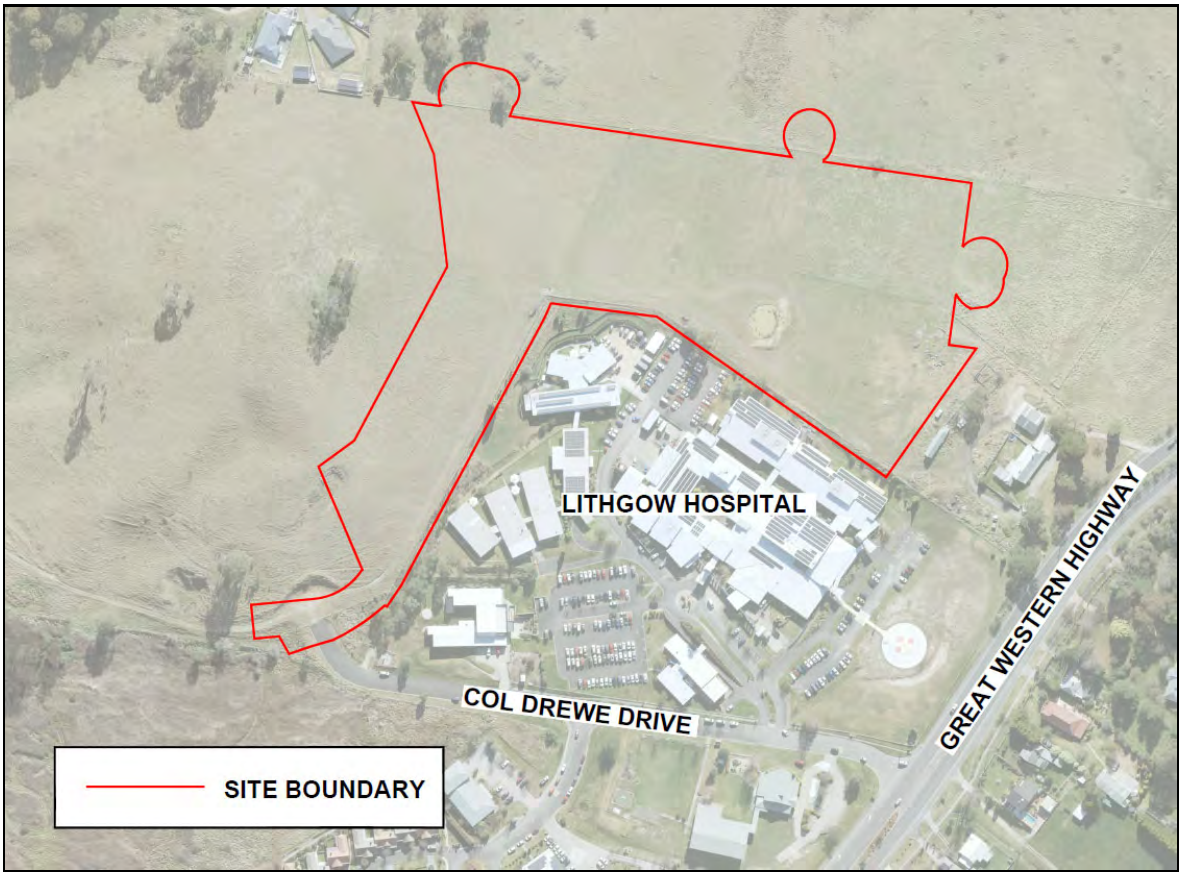


Plate 2-1 – South Bowenfels Site Location

2.2. Developed Site

The development application seeks to create forty six (46) lots, including five (5) superlots for future development. Ultimately, the development will yield eighty (80) separate dwellings along with the associated road and drainage infrastructure and utility services. The external catchment to the west will remain as existing and will continue to drain through the development site.

The proposed development layout, as prepared by Integrated Design Group, is shown below on Plate 4-2.

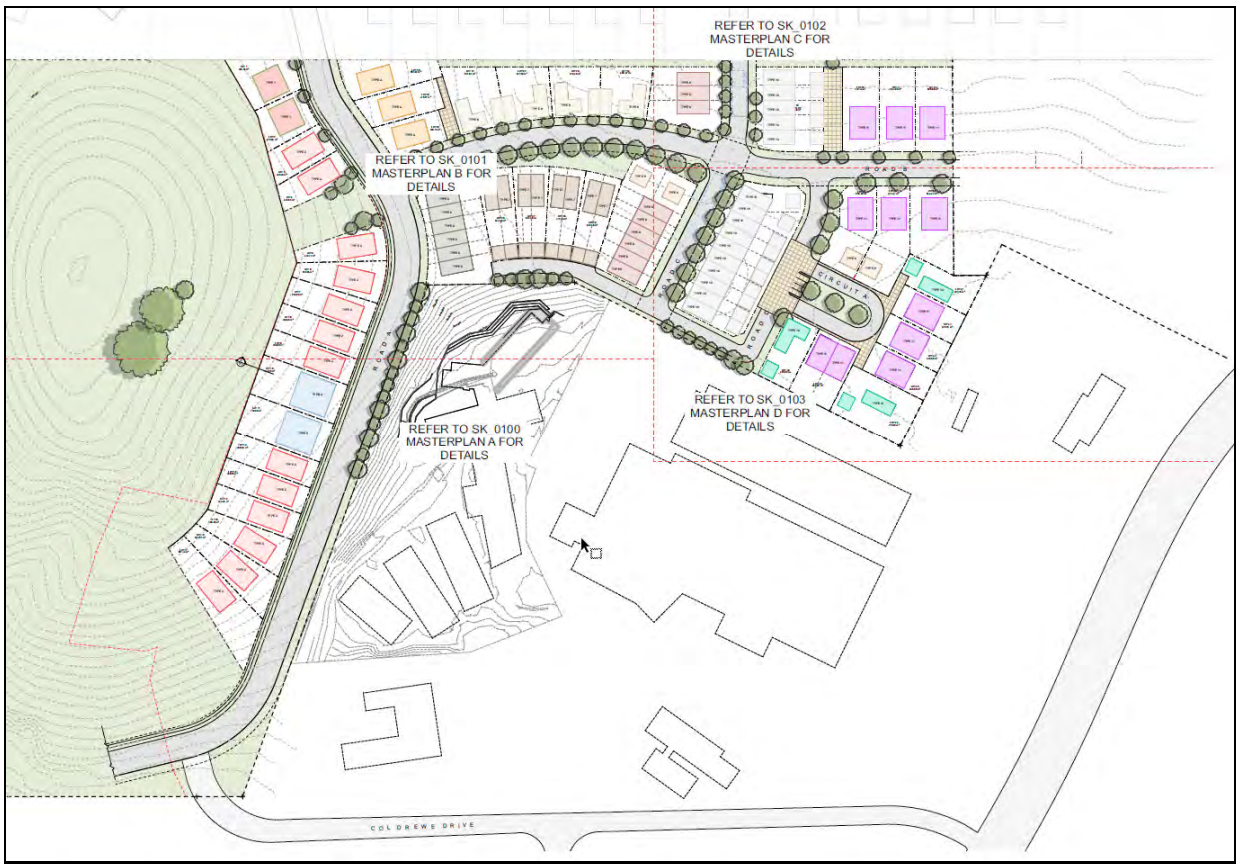


Plate 2-2 – South Bowenfels Proposed Development (Prepared by Integrated Design Group)

3. RELEVANT GUIDELINES

3.1. Guidelines for Civil Engineering Design and Construction for Development (Lithgow City Council, 2012)

This guideline outlines the required objectives and design criteria relevant for the stormwater quantity and quality assessments undertaken for this investigation, including:

- Convey stormwater to receiving waters with minimal damage, danger and nuisance.
- Stabilise landform and control erosion.
- Enhance the urban landscape, whilst maximising land available for urbanisation.
- Maintain the water quality of receiving waters.
- Land within Sydney's drinking water catchments must be developed in accordance with the Drinking Water Catchments State Environmental Planning Policy.
- The fraction impervious for normal residential including half road is 65%.
- Detention basin design shall be based on a critical storm event with an annual exceedance probability of 1%.

3.2. Neutral or Beneficial Effect on Water Quality Assessment Guideline (Water NSW, 2022)

This document provides guidance on the requirement under State Environmental Planning Policy (Biodiversity and Conservation) 2021 for all development in the Sydney drinking water catchment to have a neutral or beneficial effect on water quality. The guideline provides direction on what a neutral or beneficial effect means, how to achieve it and how to assess an application against the neutral or beneficial effect on water quality test using the 'Neutral or Beneficial Effect on Water Quality Assessment Tool'.

3.3. Using MUSIC in Sydney Drinking Water Catchment, Water NSW Standard (Water NSW, 2019)

This document provides detailed methodology for using the MUSIC water quality software to demonstrate a neutral or beneficial effect on water quality can be achieved for proposed urban and rural land use developments. The guideline provides specific parameters to be adopted in the pre and post development water quality modelling.

4. STORMWATER QUANTITY ANALYSIS

4.1. Hydrologic Modelling

The stormwater quantity analysis for the site has been undertaken using the rainfall – runoff flood routing model *XP-RAFTS* version 2018.1.3. The analysis was undertaken to determine the volume of stormwater detention required to attenuate peak post development 1% AEP event flows to pre-development levels. XP-RAFTS models have been created to represent both "Existing" and "Developed" site conditions.

4.2. Storm Events and Durations

This study has adopted ARR 2019 rainfall methodology. ARR 2019 rainfall includes ten temporal patterns for each storm burst duration. Typically, all ten temporal patterns were assessed for each storm burst duration, from 10 minutes to 720 minutes and the median peak result was determined at each location of interest for the 1% AEP storm event.

4.3. Catchments

The site consists of two distinct catchments – the northern catchment and western catchment. Pre-development sub-catchment areas contributing to the drainage system were established from the contour data provided for the site and surrounding area. The total area for the northern catchment is 3.46 hectares and 2.66 hectares for the western catchment. Refer to Plate 4-1 for the pre-development XP-RAFTS model layout and Figure 4-1 for the pre-development catchment plan.

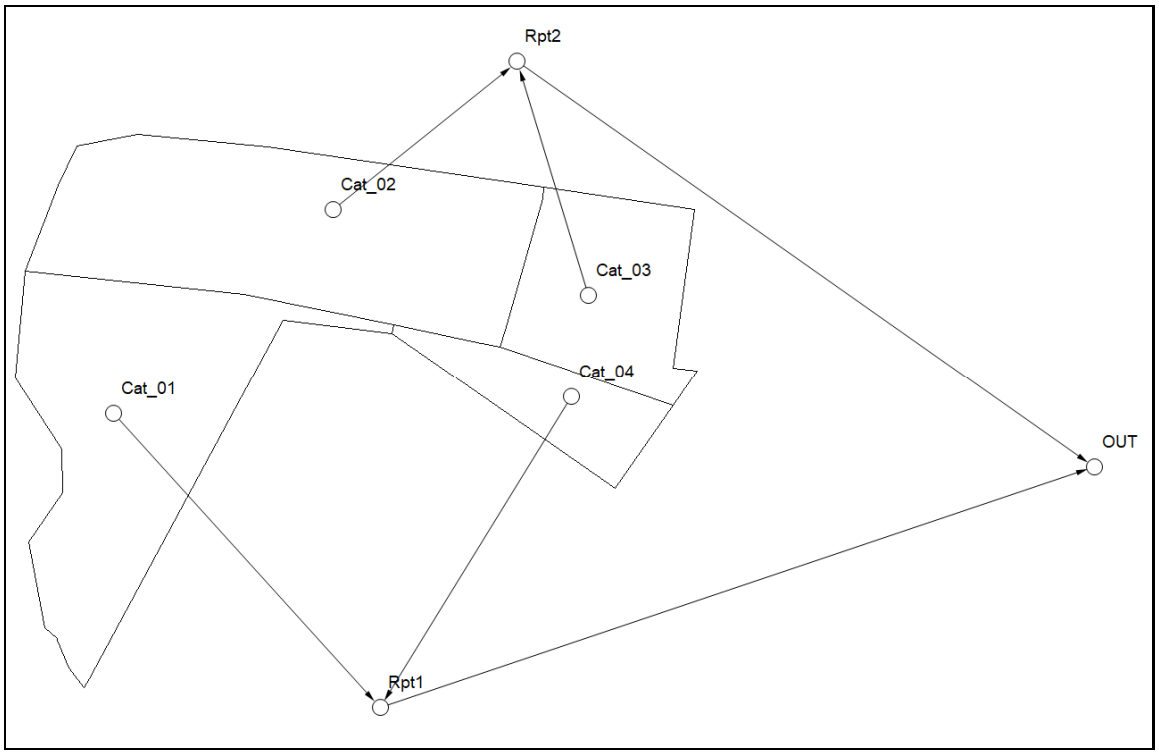


Plate 4-1 – XP-RAFTS Pre-Development Model Layout

The post development sub-catchment areas are generally the same as for the pre-development case, except the external catchments west of the site have been separated as they will remain as undeveloped. Stormwater detention nodes have also been incorporated in the developed case model to represent the two basins that will attenuate peak post development 1% AEP flows to pre-development levels.

In accordance with Lithgow City Council's engineering guidelines, a percentage impervious of 65% (normal residential lot including half road) was adopted for the proposed residential areas in the post development case.

Refer to Plate 4-2 for the developed case XP-RAFTS model layout and Figure 4-2 for the post development catchment plan.

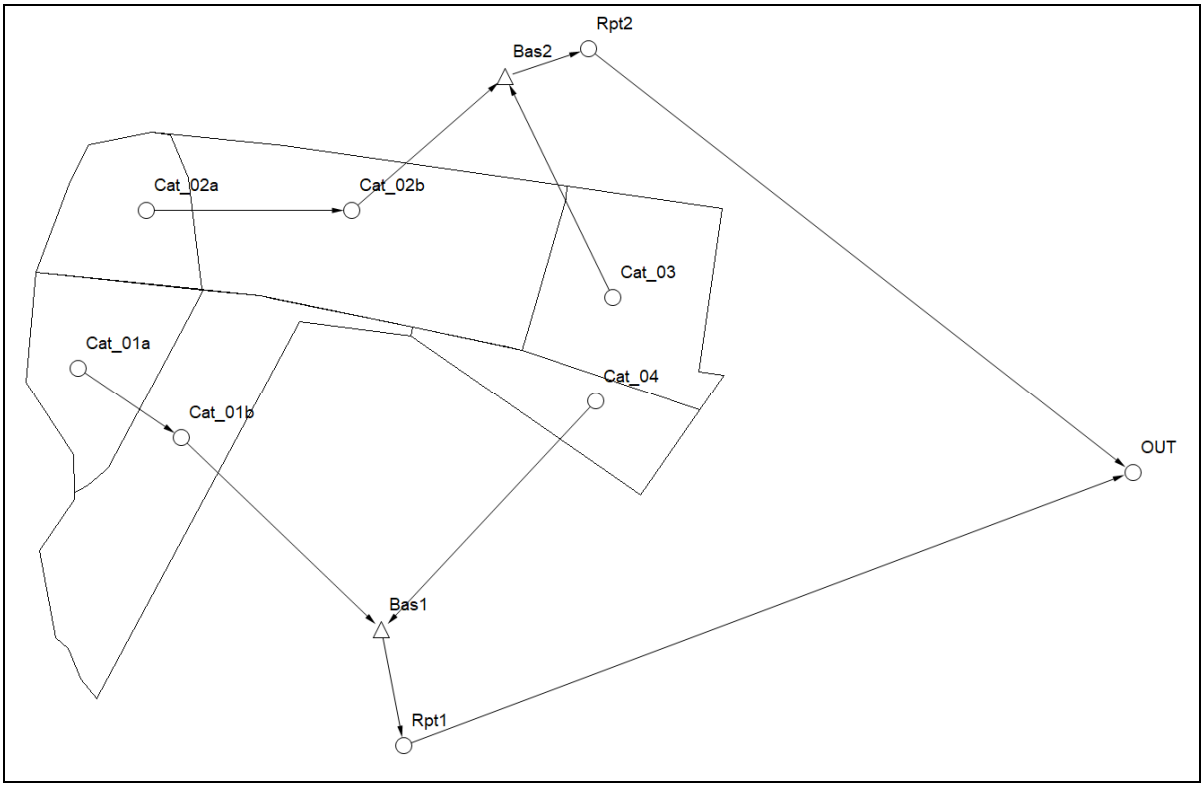


Plate 4-2 – XP-RAFTS Post Development Model Layout

4.4. Parameters and Assumptions

The rainfall loss and Mannings 'n' values adopted for the catchments in the XP-RAFTS modelling are shown in Tables 4-1 and 4-2 below.

Table 4-1 – Rainfall Loss Values

Rainfall Loss Values		
	Initial (mm)	**Continuing (mm/hour)**
Pervious Surfaces	34	2.56
Impervious Surface	1	0
Loss values sourced as 0.4 x ARR19 Datahub Value		

Table 4-2 – Mannings 'n' Values

Mannings 'n' Values		
	Pre-Development	**Post Development**
Pervious Surfaces	0.05	0.025
Impervious Surfaces	0.015	0.015

Due to the relatively small area of the site and overall catchment area, link lagging between sub-catchments has been conservatively adopted as zero.

4.5. Proposed Basin Volumes

The proposed stormwater detention basin volumes for the South Bowenfels development are shown in Table 4-3.

Table 4-3 – Summary of Detention Basin Volumes

Basin	Total Storage, m^3
Bas1	325
Bas2*	550

* Bas2 is an underground tank

4.6. Discharge Estimates

Discharge estimates were derived for the pre-development and post development catchments for the 1% AEP storm event. A range of storms from 10 minutes to 720 minutes were analysed to determine the critical storm duration for each sub-catchment.

XP-RAFTS modelling was undertaken to determine the peak discharges from the site for the following catchments conditions:

- Undeveloped site under existing rural conditions.
- Site developed with stormwater detention systems provided.

The 1% AEP peak flows from the catchment are presented in Table 4-4.

Table 4-4 – Summary of Peak 1% AEP Flows

Comparison Node	Location	Pre Development			Post Development			Post/Pre
		Peak Median Flow (m^3/sec)	Duration (min)	TP	Peak Median Flow (m^3/sec)	Duration (min)	TP	
Rpt1	Western Catchment	0.315	1hr	06	0.313	45m	06	0.99
Rpt2	Northern Catchment	0.386	1.5hr	08	0.377	45m	06	0.98

4.7. Basin Performance

The performance of the detention basins for the 1% AEP storm event are detailed in Table 4-5.

Table 4-5 – Detention Basin Performance - 1% AEP Flows

Basin	Location	Median Peak Inflow (m^3/s)	Duration (min)	TP	Median Peak Outflow (m^3/s)	Duration (min)	TP	Storage Used (m^3)
Bas1	Western Catchment	0.676	10min	06	0.313	45min	06	280
Bas2	Northern Catchment	0.976	10min	08	0.377	45min	06	430

The XP-RAFTS modelling has determined that the proposed stormwater detention basins are adequate to restrict post development peak discharges from the site to pre-development levels for the 1% AEP storm event. The results of the modelling, as summarised in Tables 4-4 and 4-5, demonstrate compliance with Lithgow City Council's engineering guidelines.

5. STORMWATER QUALITY ANALYSIS

The stormwater quality analysis for the site was undertaken using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC). This water quality modelling software was developed by the Cooperative Research Centre (CRC) for Catchment Hydrology, which is based at Monash University and was first released in July 2002. Version 6.3 has been adopted for this study.

The model provides a number of features relevant for the development:

- It is able to model the potential nutrient reduction benefits of gross pollutant traps, constructed wetlands, grass swales, bio-retention systems, sedimentation basins, infiltration systems, ponds and it incorporates mechanisms to model stormwater re-use as a treatment technique
- It provides mechanisms to evaluate the attainment of water quality objectives

MUSIC modelling was undertaken to demonstrate that the stormwater management system proposed for the proposed development will result in reductions in overall post development pollutant loads and concentrations in accordance with the designated target objectives. As the site falls within a Sydney drinking water catchment, the development is required to have a neutral or beneficial effect on water quality, both for pollutant loads and concentrations. Water NSW has detailed guidelines on how the water quality assessment is be undertaken and specific parameters to be used in the modelling. Recommended MUSIC modelling parameters for this development have been adopted from the *Using MUSIC in Sydney Drinking Water Catchment* (Water NSW, 2019) and the *Guidelines for Civil Engineering Design and Construction for Development* (Lithgow City Council, 2012).

5.1. MUSIC Modelling

5.1.1 Site and Development Summary

The site characteristics for this 80 lot residential development are summarised in Table 5-1. The post development site plan is shown on Plate 5-1.

Table 5-1 – Site Characteristics

Site Characteristics	**Detail**
Site location:	South Bowenfels
Drinking water catchment:	27 - Lithgow
Rainfall and PET zone:	Zone 4
Total site area:	4.79 ha
Total catchment area:	6.13 ha
Pre-development site gradient:	2 - 9%
Soil landscape:	Lithgow - sandy clay
Existing watercourses through the site?	No
Overland flow draining to the site?	Yes - small upstream catchments draining to the site (incuded in the modelling)
Soils suitable for infiltration?	No
Pre-development	**Description**
Existing development characteristics:	Rural cleared land with no trees
Existing land uses and areas:	Rural/agricultural
Post-development	**Description**
Proposed development characteristics:	Residential subdivision. 47 lots initially with 5 superlots for future development. Ultimately 80 separate dwellings

5.1.2 Catchment Details and Representation

In order to assess the neutral or beneficial effect on water quality, the modelling requires consideration of both the pre-development and post development catchments. The site is split into two distinct catchments – the northern and western catchments. The pre-development model consists of two nodes, a node to represent each sub-catchment. The pre-development modelling adopts an "agricultural" node for each sub-catchment with 100% pervious area.

In accordance with Lithgow City Council's engineering guidelines, an overall fraction impervious of 65% (normal residential lot including half road) was adopted for the post development model. The post development catchments are split into roofs, roads, other impervious, other pervious and remaining undeveloped, as appropriate to represent each post development sub-catchment within the South Bowenfels development. The post development catchment breakup and water quality layout is shown on Figure 5-1.

A summary of the pre-development and post development catchment areas are shown in Table 5-2.

Table 5-2 – Development Summary for the Site

Land use / surface type	Total area (ha)	Sub-catchment areas (ha)	
Pre-development		**Northern**	**Western**
Cleared rural land	6.13	3.46	2.66
Total	**6.13**	3.46	2.66
Post-development			
Residential roofs	1.324	0.820	0.504
Roads	1.484	0.803	0.681
Remaining undeveloped (upstream catchment)	1.335	0.612	0.723
Remaining impervious	0.408	0.229	0.179
Remaining pervious area	1.574	0.997	0.577
Total	**6.13**	3.46	2.66

Soils on the site were assumed to be sandy clay. The appropriate soil storage capacity, field capacity, rainfall-runoff parameters have been adopted as per the values in the Water NSW guidelines for this soil type. Base flow and storm flow pollutant concentration parameters adopted for all land use types are also in accordance with the values in the Water NSW guidelines (Water NSW, 2019). The proposed development is shown on Plate 4-2.

5.1.3 Proposed Treatment Measures for Post Development Case

A critical consideration for the Stormwater Management Strategy is the long term ecological sustainability of the downstream environment. To maintain stormwater quality at the required levels, a 'treatment train' approach is proposed where various types of pollutants are removed by a number of devices acting in series. The strategy focuses on mitigating the impacts of the development on the total water cycle and maximising the environmental, social and economic benefits achievable by utilising responsible and sustainable stormwater management practices.

A range of water sensitive urban design measures have been adopted as part of the proposed development for the management of stormwater runoff.

Rainwater Tanks

Rainwater tanks are sealed tanks designed to capture stormwater runoff from roofs and re-use for toilet flushing, laundry and garden watering. For the purpose of the investigation, it is assumed that a minimum rainwater tank of 2.5kL will be provided for each dwelling. Additionally, the following assumptions were made:

- 50% of the total roof area will drain to the rainwater tank, the remaining 50% will bypass.
- Roof areas, rainwater tanks and water demand were aggregated into single nodes for each sub-catchment for simplification of the modelling.

- All roofs are 100% impervious and the appropriate rainfall threshold for roofs were adopted from the Water NSW guidelines.

- 80% of the 2.5kL rainwater tank capacity is available to harvest and the other 20% of the capacity is configured for mains top-up.

Rainwater tanks can be either above ground or underground. Above ground tanks can be placed on stands to prevent the need of installing a pump to distribute the water. Pressure systems require a pump and can be either above or below ground tanks.

Gross Pollutant Traps (GPTs)

GPT devices are typically provided at the outlet of stormwater drainage lines. These systems operate as a primary treatment to remove litter, vegetative matter, free oils and grease and coarse sediments prior to discharge to downstream (Secondary and Tertiary) treatment devices. They can take the form of trash screens or litter control pits, pit filter inserts and wet sump gross pollutant traps.

The treatment parameters for the GPT are in accordance with the Water NSW guidelines.

Bioretention System

Bioretention systems consist of a filtration bed with sandy loam media and an extended detention zone typically between 100-300 mm deep designed to detain and treat first flush flows from the upstream catchment. An extended detention depth of 300mm was adopted in this assessment.

Bioretentions typically take the form of an irregular bed or a linear swale and are located within the verge area of a road reserve or extend within the bushland corridors or other open space areas. The surface of the bioretention system can be grassed or mass planted with water tolerant species. Filtration beds of bioretention systems are typically 0.4 to 0.6 metres deep. A filtration bed 0.5m deep has been adopted for this assessment.

The bioretention bed areas adopted in this assessment are 295m^2 for the northern catchment and 200m^2 for the southern catchment.

Orthophosphate content of filter media was modelled at 40 mg/kg while TN content of filter media was modelled at 800 mg/kg. Saturated hydraulic conductivity was modelled at 100 mm/hr to reflect the average hydraulic conductivity over the life of the bioretention systems.

5.1.4 MUSIC Modelling Results

The pre and post development MUSIC models are shown on Plate 5-1. The results for the annual pollutant loads are shown in Table 5-3 and the comparative cumulative frequency curves for total suspended solids and nutrient concentrations are shown on Plates 5-2, 5-3 and 5-4.

Table 5-3 – MUSIC Modelling Pollutant Load Results

Scenario / catchment	Annual pollutant loading (kg/yr)			
	TSS	TP	TN	GP
Pre-development (1)	1430	5.92	32.7	0
Post development (with measures) (2)	569	3.03	29	6.66
Difference (3) = (1) - (2)	861	2.89	3.7	-6.66
% Improvement = (3) / (1) * 100	60%	49%	11%	0%
Neutral or beneficial effect (Y/N)	Y	Y	Y	-

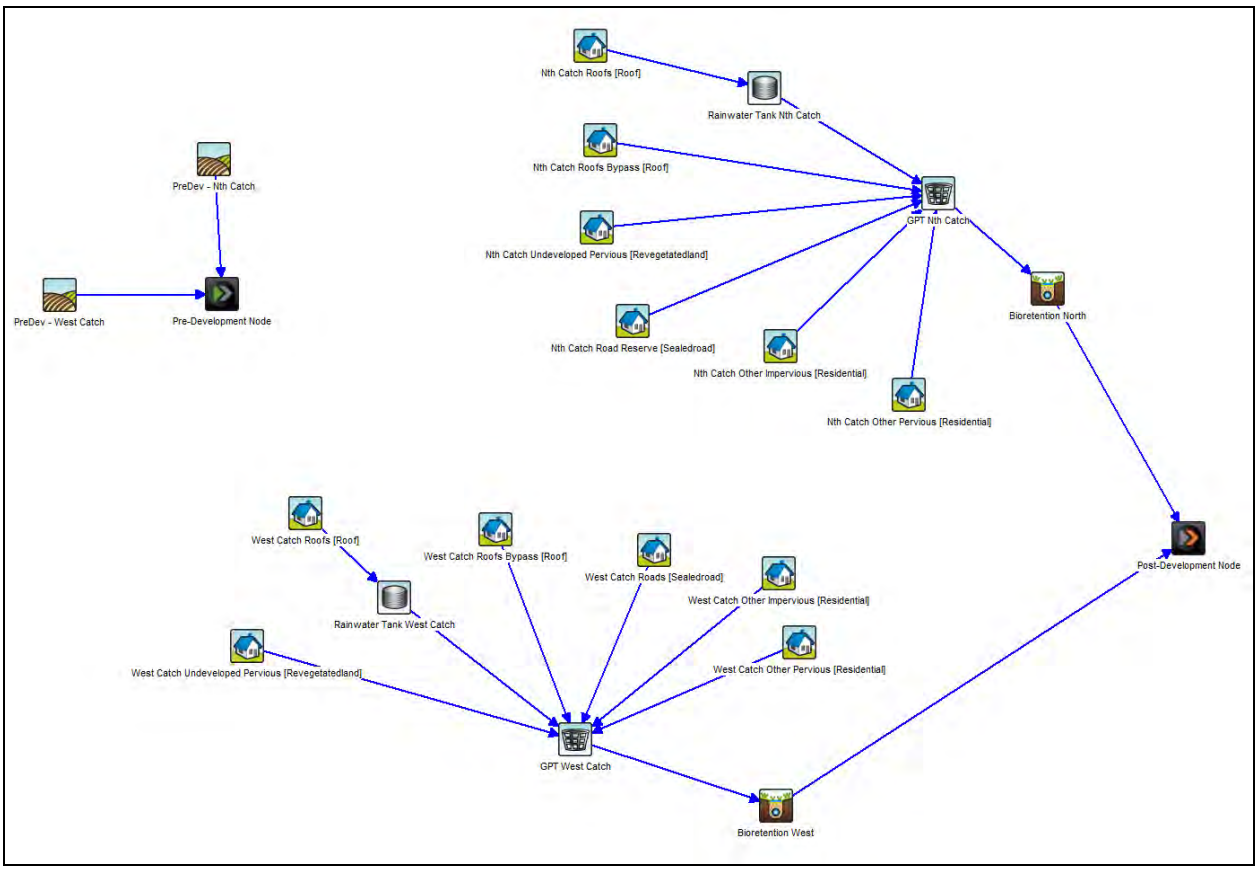


Plate 5-1 – Pre and Post Development MUSIC Model Layout (11069803-MU1.sqz)

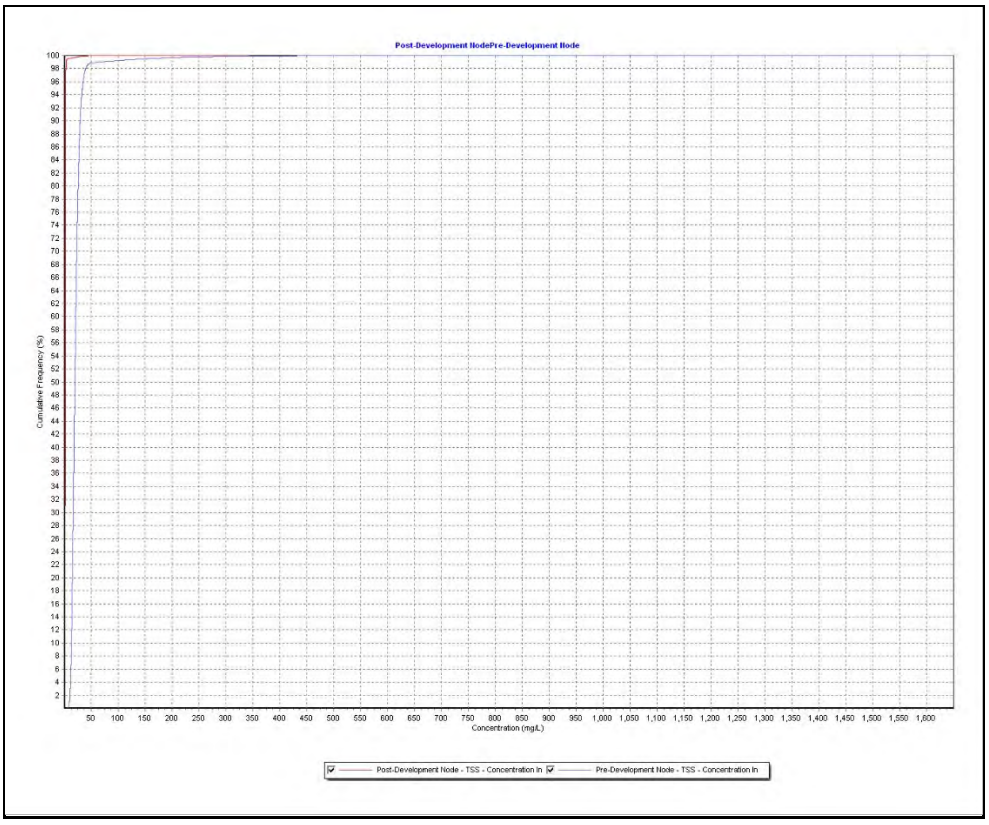


Plate 5-2 – Pre and Post Development Cumulative Frequency Graph for TSS

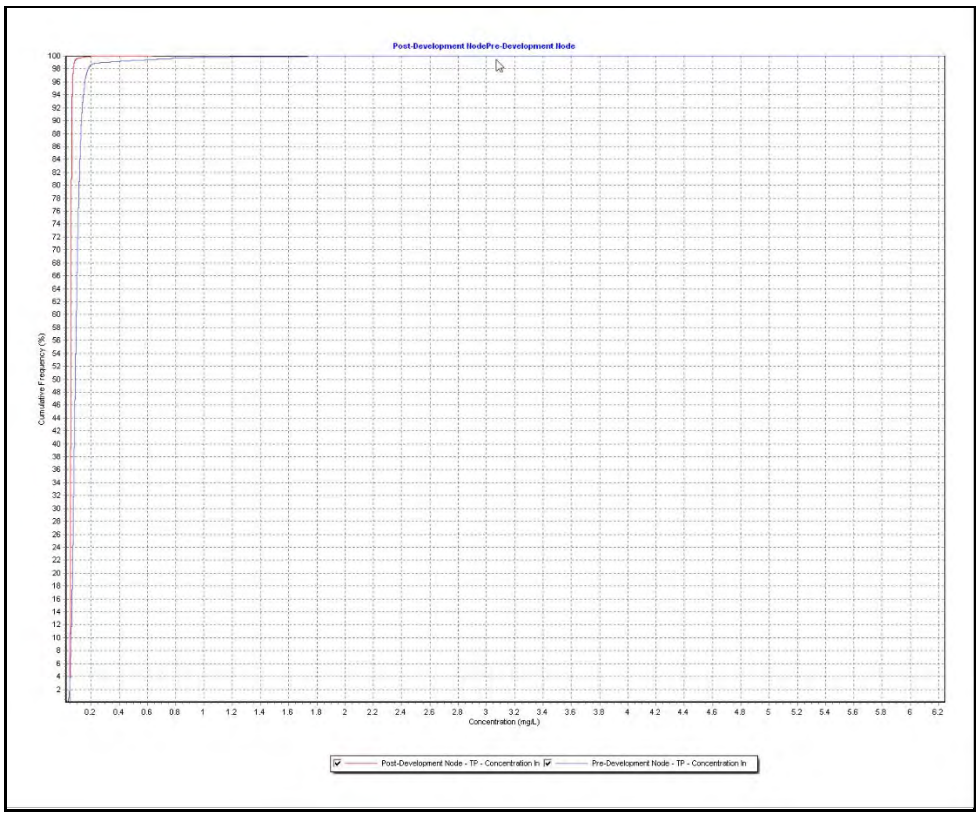


Plate 5-3 – Pre and Post Development Cumulative Frequency Graph for TP

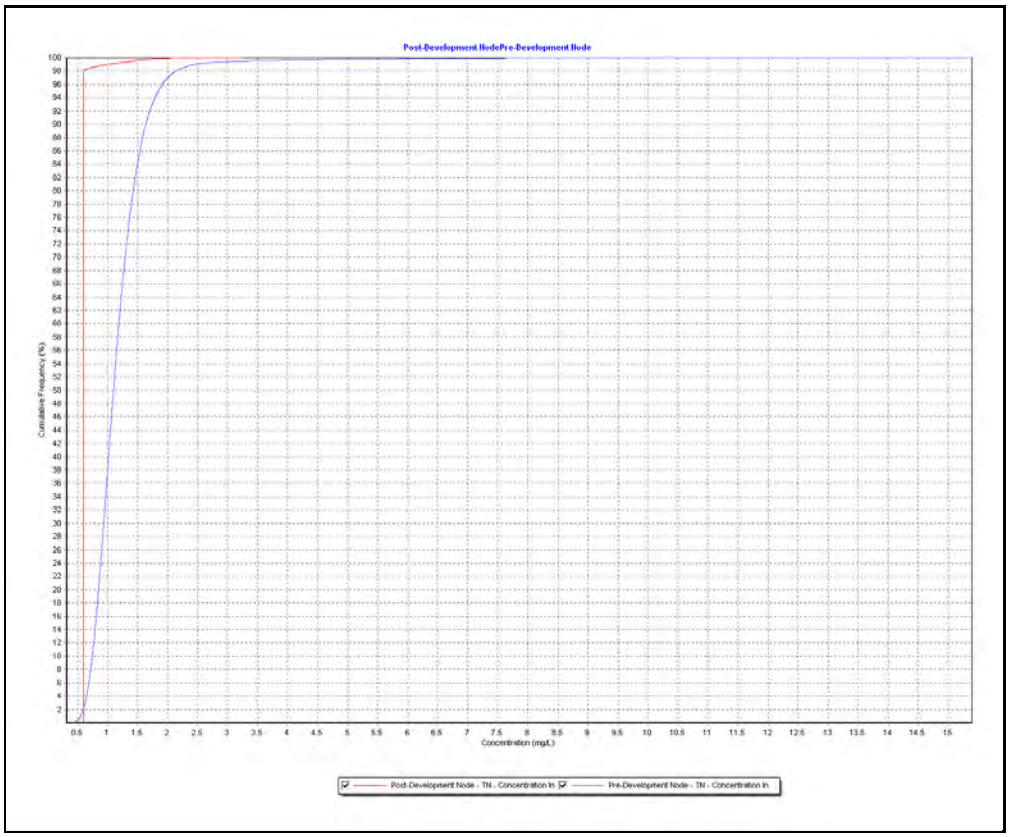


Plate 5-4 – Pre and Post Development Cumulative Frequency Graph for TN

5.1.5 Modelling Results Conclusions

- The modelled post development total suspended solids, total phosphorus and total nitrogen loads with the proposed stormwater management measures in place are all more than 10% lower than the pre-development conditions.

- The total suspended solids, total phosphorus and total nitrogen concentrations in runoff for the post development scenario are lower than or equal to the pre-development conditions between the 50th and 98th percentiles.

- The MUSIC model results conceptually show that NorBE would be achieved for the proposed South Bowenfels residential development using the proposed stormwater management measures, except as noted above.

6. CONCLUSION

The Stormwater Management Strategy for the South Bowenfels development has been prepared to support the DA submission to Lithgow City Council. The strategy has been prepared to conform with the statutory requirements and industry best practice for stormwater management at the site.

- The Stormwater Management Strategy consists of a treatment train of on lot treatment and subdivision / development treatment measures. The structural elements for the proposed development consist of:
- Rainwater tanks with a minimum capacity of 2.5kL for each dwelling.
- Two gross pollutant traps (one for the each subcatchment).
- Two bioretention systems of area 295m^2 (northern catchment) and 200m^2 (western catchment).
- One detention tank with volume 550m^3 (northern catchment) and one detention basin with volume 325m^3 (western catchment).

Existing and post development case hydrology models have been prepared for the South Bowenfels site, which incorporate the upstream catchments draining to the site. The hydrology modelling undertaken shows the inclusion of the proposed detention basins will attenuate the peak post development 1% AEP flows to less than existing levels.

Provision of the proposed water quality treatment devices within the development will ensure that there is a neutral or beneficial impact on the existing case water quality, in accordance with the Water NSW guidelines for Sydney drinking water catchments.

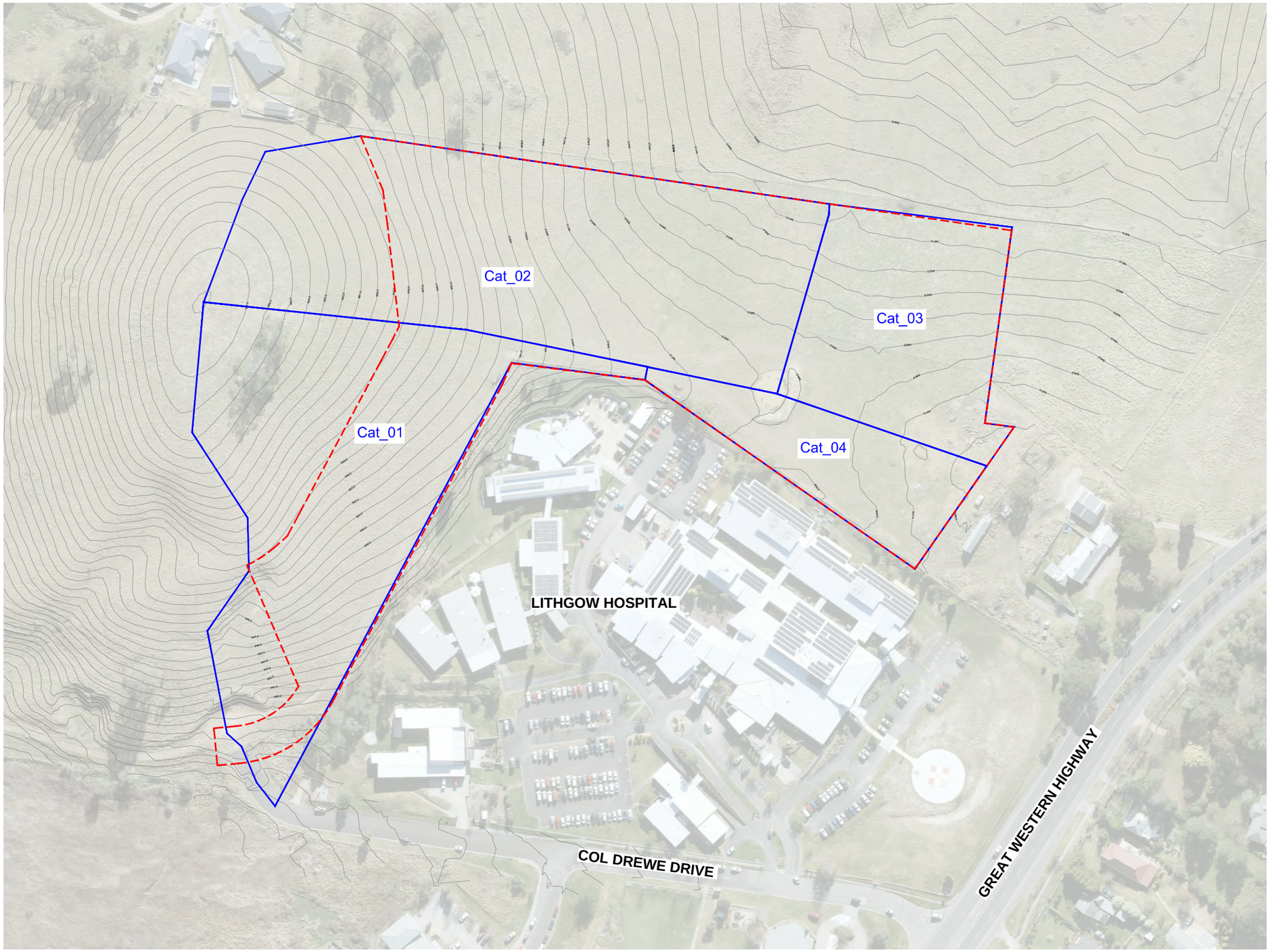
Yours faithfully

J. WYNDHAM PRINCE

DANIEL GARDINER

Senior Design Engineer

APPENDIX A – FIGURES



N

LEGEND

- SITE BOUNDARY
- PRE-DEVELOPMENT CATCHMENT BOUNDARY
- Cat_01 — XP-RAFTS CATCHMENT LABEL

FIGURE 4-1

1:1000 (AT A1)
1:2000 (AT A3)

20 10 0 10 20 30 40 50 60 70 80 90 100
METRES

DRAFT ISSUE ONLY
PRELIMINARY DESIGNS SUBJECT TO CHANGE

1	ISSUED FOR DA APPROVAL	DG	DG			6/12/22
	AMENDMENT	DES	DRN	CKD	APR	DATE

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CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS
PO Box 4366 PENRITH WESTFIELD NSW 2750
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COL DREWE DRIVE
SOUTH BOWENFELS

PRE-DEVELOPMENT CATCHMENT PLAN

PROJECT No: 110698-03
SHEET No: FIGURE 4-1

AZIMUTH: M.G.A. | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-FIG4-1 | 1

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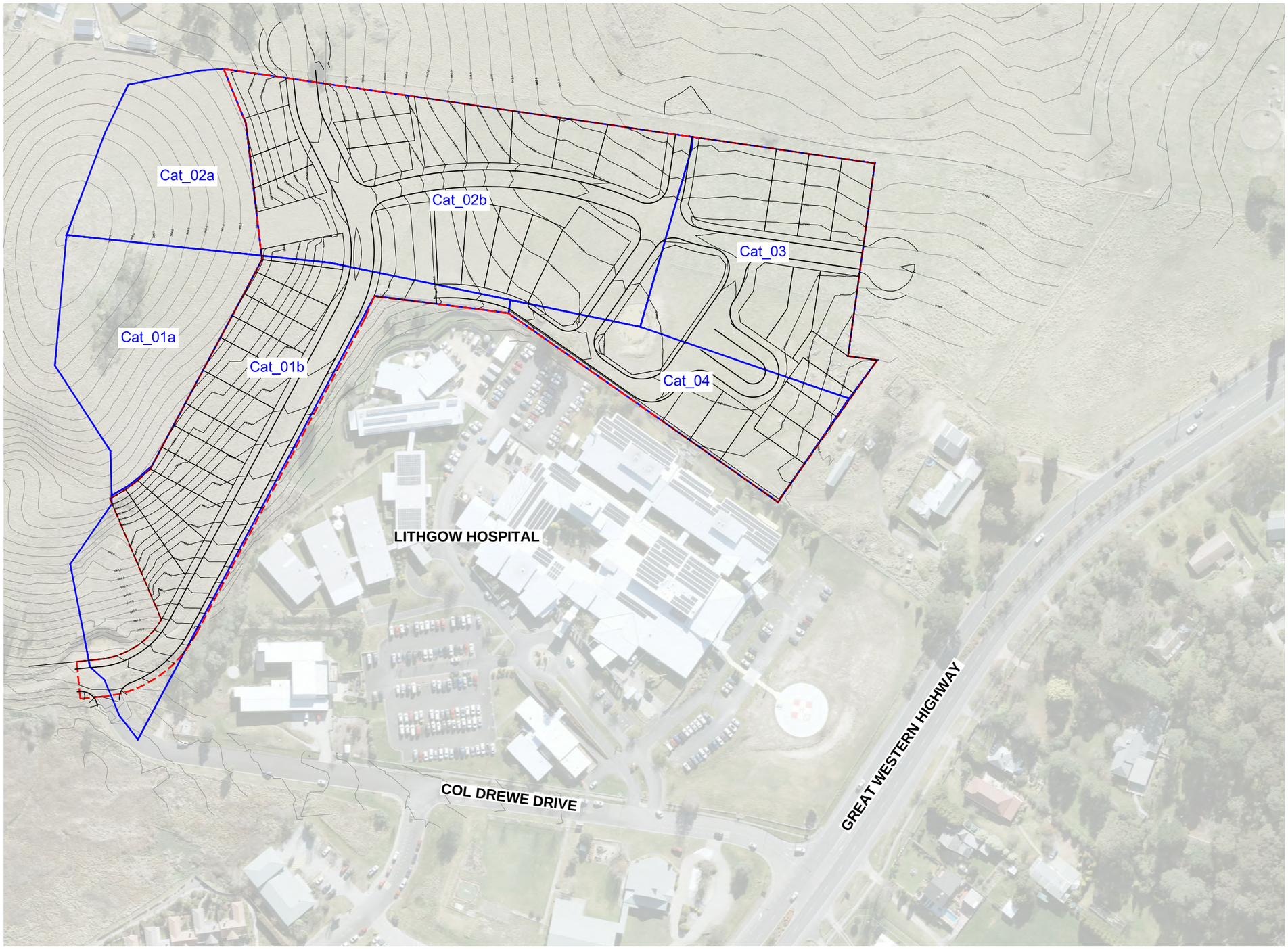

N

LEGEND

- SITE BOUNDARY
- POST DEVELOPMENT CATCHMENT BOUNDARY
- Cat_01b — XP-RAFTS CATCHMENT LABEL

FIGURE 4-2

DRAFT ISSUE ONLY
PRELIMINARY DESIGNS SUBJECT TO CHANGE

1:1000 (AT A1)
1:2000 (AT A3)

20 10 0 10 20 30 40 50 60 70 80 90 100
METRES

1	ISSUED FOR DA APPROVAL	DG	DG			6/12/22
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POST DEVELOPMENT CATCHMENT PLAN

PROJECT No: 110698-03
SHEET No: FIGURE 4-2

AZIMUTH: M.G.A. | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-FIG4-2 | 1

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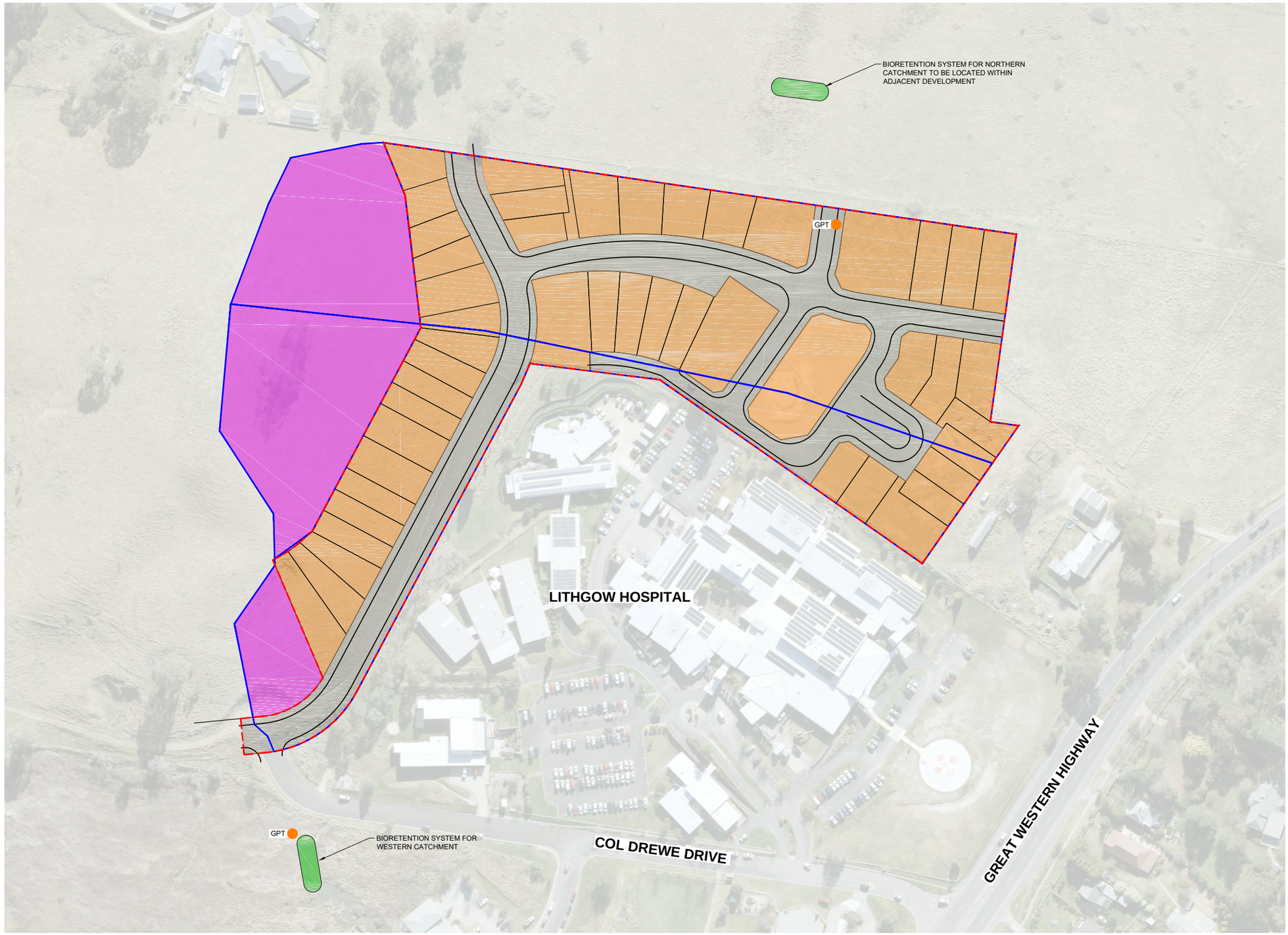

N

LEGEND

- SITE BOUNDARY
- MUSIC - CATCHMENT BOUNDARY
- MUSIC - LOT
- MUSIC - ROAD
- MUSIC - REMAINING UNDEVELOPED
- PROPOSED BIORETENTION
- GPT — PROPOSED GROSS POLLUTANT TRAP

FIGURE 5-1

DRAFT ISSUE ONLY
PRELIMINARY DESIGNS SUBJECT TO CHANGE

1:1000 (AT A1)
1:2000 (AT A3)

20 10 0 10 20 30 40 50 60 70 80 90 100
METRES

	AMENDMENT	DES	DRN	CKD	APR	DATE
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COL DREWE DRIVE
SOUTH BOWENFELS
MUSIC CATCHMENT PLAN
AND WATER QUALITY LAYOUT

PROJECT No: 110698-03
SHEET No: FIGURE 5-1

AZIMUTH: M.G.A. | DATUM: A.H.D. | ORIGIN: | PLAN No: 110698-FIG5-1 | 1

Plotted: 7 December, 2022 12:13:27 PM File Name: J:\110698 - Three Tree Hill\02 -XXX Package\SWE\SW Reports\110698-FIG5-1.dwg

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APPENDIX D – POTABLE WATER & WASTE WATER CONCEPT REVIEW

POTABLE WATER AND WASTEWATER CONCEPT REVIEW FOR THE COL DREWE DRIVE BOWENFELS SUBDIVISION – THREE TREE HILL PROJECT

16th November 2022

For J.Wydham Prince.

QALCHEK REFERENCE: PM 31355

T 02 4722 8181 E admin@qalchek.com.au PO Box 465 Emu Plains, 2750
F 02 4722 3155 www.qalchek.com.au Unit 2, Level 1, 15-17 David Road EMU PLAINS, 2750 ABN 14 062 942 509

CONTENTS

T 02 4722 8181 E admin@qalchek.com.au PO Box 465 Emu Plains, 2750
F 02 4722 3155 www.qalchek.com.au Unit 2, Level 1, 15-17 David Road EMU PLAINS, 2750 ABN 14 062 942 509

INTRODUCTION

Qalchek has been engaged by J.Wyndham Prince to undertake a Waster Water / Potable Water strategy for the proposed Lithgow residential subdivision.

The proposed residential development is identified as Lot 1 DP 1268778, further Identified as No. 10 Col Drewe Drive Bowenfels NSW 2790.

Please refer to the map below for the sites' approximate location.

T 02 4722 8181 E admin@qalchek.com.au PO Box 465 Emu Plains, 2750
F 02 4722 3155 www.qalchek.com.au Unit 2, Level 1, 15-17 David Road EMU PLAINS, 2750 ABN 14 062 942 509

REPORT OBJECTIVES

This report aims to determine the following:

- Estimate the possible development flows.

- Review possible Potable Water and Waste Water service options.

- Locate the nearest service which could assist the development.

DEVELOPMENT YIELDS

Based on the proposed development plans we have identified the following development yields.

Type	No: of	Total Lot Area (m2)	EP per a unit	Total EP
Residential	42	23,002	3.5	147
Superlot (Future Small Lot)	5	7,225	146ep/ha	105
	Total Area:	30,227		252

If the above assumption is incorrect then the calculations below will need to be adjusted.

ESTIMATED DEMANDS

Based on the above development potable water and wastewater demands are tabulated below.

1. **Sewer**

Development Time	Residential
E.P. loading	252
PDWF L/S	5.41
Design flow L/S	14.29

Based on Sydney Water Flow Schedule & WSA Codes

2. **Water**

	Normal operation
E.P. loading	4164
Water Demand 178L/Day/EP	44,856 Litres/Day

Based on Sydney Water Average Daily Use& WSA Codes

T 02 4722 8181 E admin@qalchek.com.au PO Box 465 Emu Plains, 2750
F 02 4722 3155 www.qalchek.com.au Unit 2, Level 1, 15-17 David Road EMU PLAINS, 2750 ABN 14 062 942 509

The proposed subdivision falls within two catchment areas. These catchment areas and proposed lots affected are identified as: (refer to Appendix A – Water & WasteWater Concept Plan)

1. **Eastern Catchment – Lot 18 to Lot 46**

This catchment area is bound by Lot 2 DP 1082148 to the East, Sweet Briar, Lithgow Hospital, Three Tree Lodge to the South, and Three Tree Drive (Proposed Road A) to the West.

This area naturally discharges to the North to a proposed subdivision of Lot 2 DP 1049398 further identified as No. 994 Great Western Highway, Bowenfels.

These sites will ultimately discharge to the North to a proposed new sewer pumping station.

Service Strategy

Lots 18 to 46 are dependent on:

- Provision of a sewer Lead-Out by the development of Lot 2 DP 1049398
- Completion of construction of the new sewer pumping station. Anticipated commission by the end of 2023

2. **Western Catchment – Lot 1 to Lot 17**

This area is bound by Three Tree Drive (Proposed Road A) to the East and Col Drewe Drive to the South and Lot 2 DP 1268778 Further Identified as No. 12 Col Drewe Drive to the West. This area naturally discharges to the South.

Service Strategy

Lot 1 to Lot 17 will discharge to an existing sewer collecting manhole within the Sewerage Pumping Station Site at the intersection of Col Drewe Drive / Three Tree Drive within land identified as Lot 11 DP 1206718 (University of Notre Dame).

T 02 4722 8181 E admin@qalchek.com.au PO Box 465 Emu Plains, 2750
F 02 4722 3155 www.qalchek.com.au Unit 2, Level 1, 15-17 David Road EMU PLAINS, 2750 ABN 14 062 942 509

POTABLE WATER SERVICING

General Review

- There is an existing Potable Water Main in Col. Drewe Drive. It is uncertain whether this main is a DN 100 or DN 150.
- Lithgow Hospital has its' own independent water supply.
- The existing ground levels range from RL 940 AHD at the intersection of Col Drewe Drive / Three Tree Drive to a maximum of RL 960m to the North of the site.

From aerial imagery it would appear that the site is serviced from the water reservoir located off Hill Range Crescent that stands at a ground level of approximately RL 972m AHD.

Service Strategy

Lot 18 to Lot 46

- A DN100 watermain will be required to service these lots.
- An extension of a DN100 watermain North along Proposed Road C up to the boundary of Lot 2 DP 1049398 (Refer to Appendix A)

Lot 1 to Lot 17

- A DN150 Watermain will be required to be extended off the existing watermain in the Col Drewe Drive
- An allowance should be made for possible upsizing of the existing main in the Col Drewe Drive

PREPARED / REVIEWED BY

Prepared by David Loizou

Reviewed by Mike Pletkan

Version A.

T 02 4722 8181 E admin@qalchek.com.au PO Box 465 Emu Plains, 2750
F 02 4722 3155 www.qalchek.com.au Unit 2, Level 1, 15-17 David Road EMU PLAINS, 2750 ABN 14 062 942 509

APPENDIX A

T 02 4722 8181 E admin@qalchek.com.au PO Box 465 Emu Plains, 2750
F 02 4722 3155 www.qalchek.com.au Unit 2, Level 1, 15-17 David Road EMU PLAINS, 2750 ABN 14 062 942 509

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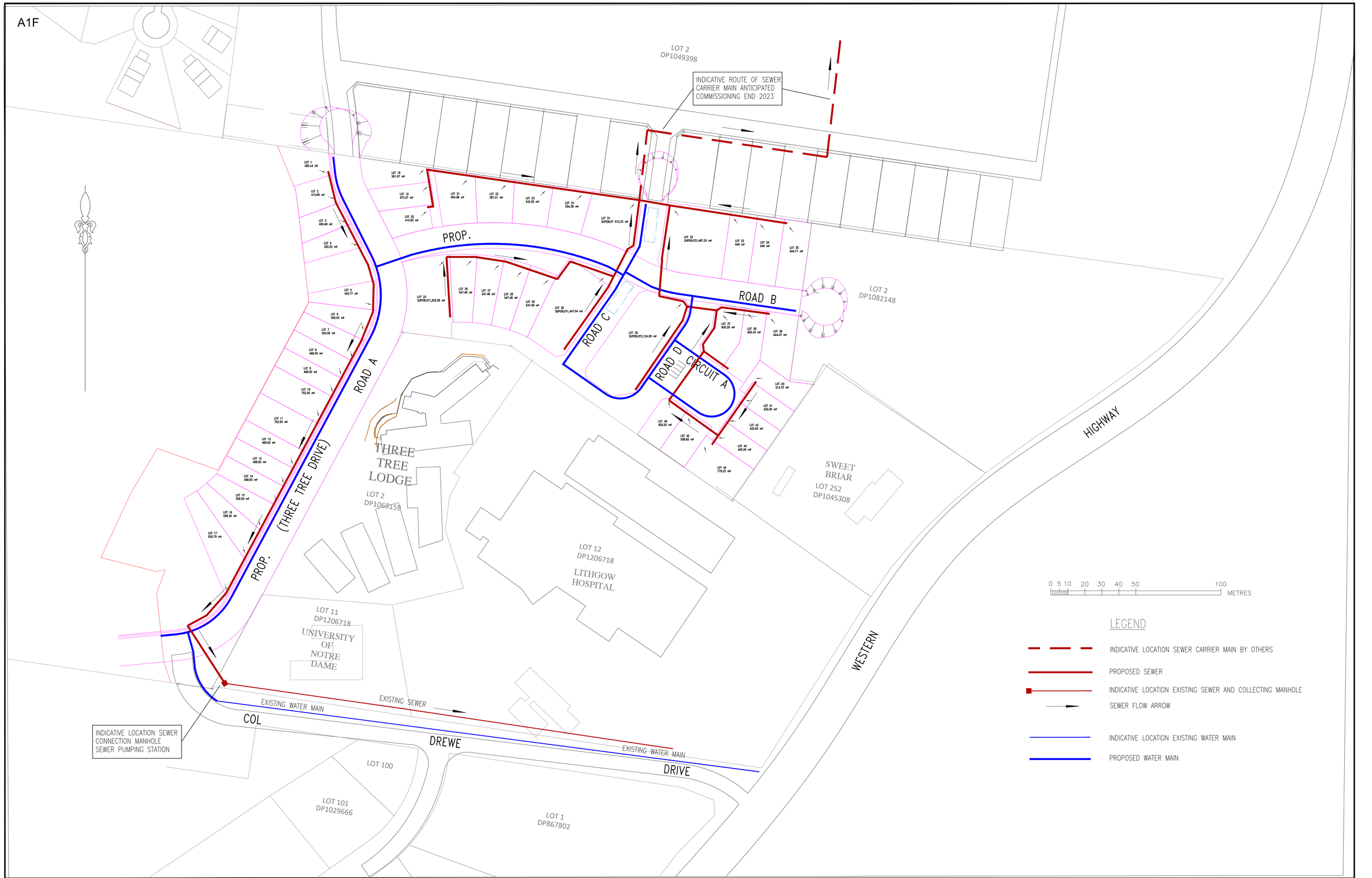

PLAN TO BE READ IN CONJUNCTION WITH CURRENT COUNCIL STANDARDS

PRIOR TO COMMENCEMENT OF EXCAVATION FOR PROPOSED AND EXISTING SERVICES CONTACT :-

DIAL BEFORE YOU DIG . . . Ph. 1100
COUNCIL . . . Ph.
ELECTRICITY . . . Ph.
GAS . . . Ph.
TELECOMMUNICATIONS . . . Ph.

GIVING AT LEAST 48 HOURS NOTICE.

LEVELS PROVIDED IN AHD AUSTRALIAN HEIGHT DATUM

SCALES

PLAN 1:1000 SECTION { HOR. – VERT. –

CROSS SECTIONS . . . NATURAL

LENGTHS, DEPTHS & LEVELS ARE IN METRES.

WORK AS CONSTRUCTED CERTIFICATION

DEVELOPER . . .
SUPERINTENDENT . . .
CONSTRUCTOR . . .
COMPLETED . . . W.A.C. PREPARED

DESIGNER . . .

I CERTIFY THAT THE WORKS HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THE WORK AS CONSTRUCTED DRAWINGS.

PIPE SCHEDULE

SIZE	TYPE	CLASS	LENGTH	NOTES

DESIGN HEAD m

NO BOUNDARY TRAPS REQUIRED.

CLIENT
TREADSTONE

PROJECT
THREE TREE HILL
LOT 1 DP 1082148
CONCEPT WATER AND SEWER SERVICE STRATEGY
BOWENFELS

L.G.A. - LITHGOW COUNCIL

SHEET 1 OF 5 L.G.A. Ref. . . .

PREPARED BY:
QALCHEK PTY. LTD.
UNIT 2, LEVEL 1, 15-17 DAVID ROAD, EMU PLAINS 2750
PH: (02) 4722 8181
FAX: (02) 4722 3155

VER	AMENDMENTS	BY	DATE
A	ISSUED FOR REVIEW	M.P	15.11.22

FILE LOCATION: PM31355 – B DESIGNED: M.P DRAFTED: M.P VERIFIED: M.P REVIEWED: D.L APPROVED: D.L ISSUED: 15-11-2022

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APPENDIX E – ELECTRICAL SERVICES REPORT

powerlinedesign

Accredited Level 3 Service Provider NSW – 2486

ELECTRICAL SERVICES REPORT
SOUTH BOWENFELS HOUSING
10 COL DREWE DRIVE BOWENFELS

Report Prepared For:	Company: J Wyndhan Prince Pty Ltd Contact: Mr Paul Koen Mob: 0412 934 094
Location:	Lot 1 /DP1268778
Supply Authority:	Endeavour Energy
Report Prepared By:	Laurence Mckinnon
Date:	1 November 2022
Reviewed By:	Laurence McKinnon
Reference No:	PLD4318
Version:	1.0

Table of Contents

1 Introduction

This report is to provide preliminary feedback on the existing electrical services supplying the South Bowenfels Housing development, potential maximum electrical demand for the development of the site, potential network upgrades to supply the proposed development.
This assessment will look at the 11kV network only, as this is the basic framework for a development of this size with Padmount Substations being utilised throughout the development to offer localised supplies to each individual lot.

3 Location

The site is located off the Great Western Highway at Bowenfels behind the Lithgow Hospital, approximately 3.2km from Endeavour Energy's Lithgow Zone Substation off Barton Street Lithgow.

Access to the site is from the Great Western Highway via Col Drew Drive.

Endeavour Energy have two 11kv Feeders within easy access to the site.

1. Feeder Number L591 – Supplying the Hospital.
2. Feeder No. 50231508 located on the Eastern Side of the Great Western Highway.

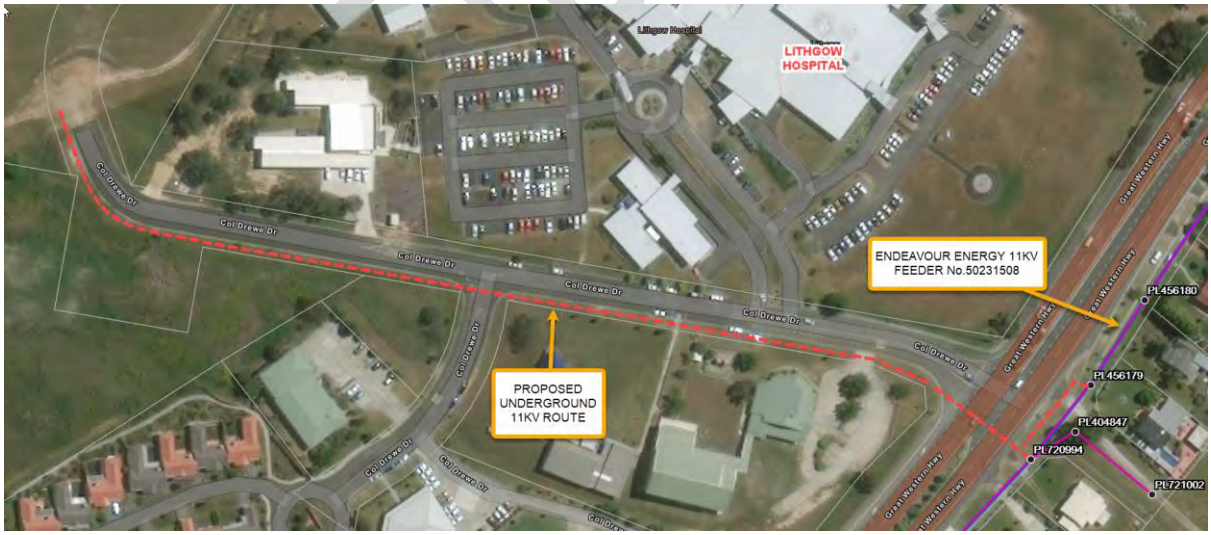
DIAGRAM 1 – THE SITE

4 Electrical Services

At present the nearest access to Endeavour Energy's 11kv network is at the Great Western Highway to overhead Feeder No.50231508 and Underground Feeder No. L591. Either of these feeders will need to be extended underground along Col Drew Drive into the site to supply strategically placed Pad Mount Substations to supply underground Low Voltage cabling to each of the new lots and street lighting in accordance with Endeavour Energy's standard MDI0028.

Endeavour Energy will require the 11kv Network to be 'Ring Fed' in and out of the proposed development, this will require the installation of 2 cables along Col Drew Drive, reticulation throughout the development and back to the Great Western Highway.

Endeavour Energy's overhead 132kv tranmission Line No.50461520 traverses the western end of the site in a North South Direction, any development of the site needs to acknowledge Endeavour Energy's access and easement requirements around this line.



5 Proposed Maximum Demand

The proposed maximum demand for the development (See TB 0188A) for the site based on 102 new dwellings at an ADMD of 6.5kva will be 663Kva or 0.663Mva;

Maximum Demand	**Load Kva**
Residential options (TB 0188A) 102 dwellings @ 6.5kva	663
Total	**663**

From information available on Endeavour Energy's Connectional portal, Lithgow Zone Substation has spare capacity to supply 10Mva to 15Mva at the site.

5.1 Conclusion

A formal Technical Review Request has not been submitted to Endeavour Energy for this site. This report is based on available data and our many years of experience in the electrical distribution Industry.

Endeavour Energy's 11kv feeders L591 and 50231508 have ample capacity to supply this proposed development of 102 Lots.

Endeavour Energy's overhead 132kv tranmission Line No.50461520 traverses the Western end of the site in a North South Direction, any development of the site needs to be planned not to interfere with Endeavour Energy's access and easement requirements around this line.

Endeavour Energy will issue a Supply Offer for this development on receipt of the completed form FPJ6010.

This report is subject to the conditions at the time of the report, as a result this report is only valid for a period of up to 31 days after which the report findings should be reviewed.

5.2 Disclaimer

Please note that this report is based on experience and current Endeavour Energy standards. There may be alterations based on Endeavour Energy's network requirements at the time of the design and construction.

There may be alterations depending on any adjacent developments superseding the proposed development, developer planning and design alterations, or changes to relevant standards once the electrical reticulation design is submitted for certification or during the construction phase.

This report has been prepared with every effort made to ensure its accuracy, neither Power Line Design Pty Ltd nor any of its employees shall be liable on any ground whatsoever to any party in respect of decisions or actions taken as a result of this report.

FPJ6010

Endeavour Energy

Application for Provision of an Electricity Network in a Subdivision / Boundary Adjustment / Consolidation (Excluding Strata Subdivision)

Application Type: ☐ Subdivision ☐ Boundary Adjustment ☐ Consolidation

Please return completed form along with all attachments to: Endeavour Energy, PO Box 811 Seven Hills NSW 1730
Email: cwadmin@endeavourenergy.com.au | **Fax:** 02 9853 7925 | For connection enquiries, please contact 133 718

Note: All information requested should be provided. Where not applicable please insert N/A. Application submitted with inadequate information will not be accepted.

Site Details

Date supply of electricity is required ___/___/___

Type of subdivision
☐ Urban Residential ☐ Non-Urban Residential (Rural)
☐ Dual Occupancy Torrens ☐ Community Title
☐ Industrial ☐ Torrens
☐ Integrated Housing ☐ Commercial

Lot & DP No. ___/_____ Street No._____ Street Name _____

Cross Street _____ Suburb / Town _____ Post Code_____

Local Council / Shire _____ UBD Map & Reference No. _____/_____

Development Details

Council land zoning _____

Lot numbers of new single dwellings _____ Total _____

Lot numbers of existing dwellings to be retained _____ Total _____

Lot numbers of multiple dwelling areas _____ No. of units _____

Lot numbers of dual occupancy lots _____ Total _____

Lot numbers of residue lots _____

Lot numbers of special use areas (include details if any) _____

Lot numbers of public reserves, road reserves, etc _____

Lots affected by existing overhead power _____
line easements (also show on plan) _____

Community Title *(where applicable)* - maximum living floor area permitted by Council _____

Developer / Developer's Representative Details

Developer's Name _____

Developer's Representative (if applicable) _____

Developer / Developer's Representative Reference Number for correspondence _____

Address for correspondence _____
_____ Post Code _____

Mobile: _____ Telephone: _____ Fax: _____

Email _____

Developer / Developer's Representative Acknowledgement and Agreement

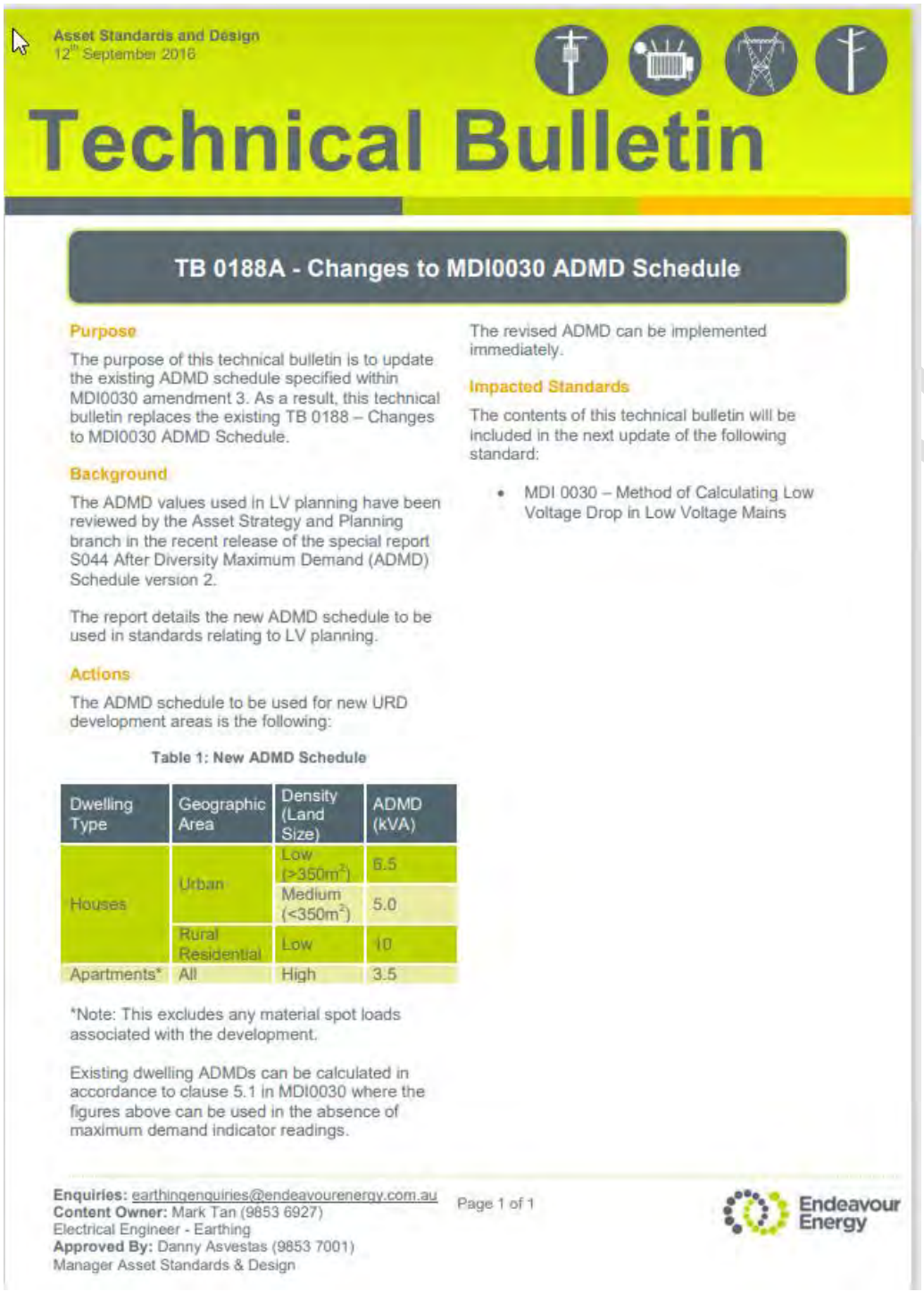
I acknowledge and agree that:

1. in signing and submitting this application I am requesting an expedited connection;
2. I have read and understood the terms of Endeavour Energy's Model Standing Offer for a Standard Connection Service (Subdivision and Asset Relocation), as published on its website at **www.endeavourenergy.com.au**, and a connection offer by Endeavour Energy for a Standard Connection Service (Subdivision and Asset Relocation) on the terms of that Model Standing Offer is acceptable to me; and
3. if Endeavour Energy is satisfied that the service requested by me falls within the terms of Endeavour Energy's Model Standing Offer for a Standard Connection Service (Subdivision and Asset Relocation), then I will be taken to have accepted a connection offer by Endeavour Energy on the terms of that Model Standing Offer on the date that Endeavour Energy receives this application.

Developer / Developer's Representative Signature:

_____ Date: ____/____/____

* **Do you consent to the release of your contact details to other customers with similar works in progress nearby to facilitate co-operation in design and construction activities.** ☐ **Yes** ☐ **No**



Asset Standards and Design
12th September 2016

Technical Bulletin

TB 0188A - Changes to MDI0030 ADMD Schedule

Purpose

The purpose of this technical bulletin is to update the existing ADMD schedule specified within MDI0030 amendment 3. As a result, this technical bulletin replaces the existing TB 0188 – Changes to MDI0030 ADMD Schedule.

Background

The ADMD values used in LV planning have been reviewed by the Asset Strategy and Planning branch in the recent release of the special report S044 After Diversity Maximum Demand (ADMD) Schedule version 2.

The report details the new ADMD schedule to be used in standards relating to LV planning.

Actions

The ADMD schedule to be used for new URD development areas is the following:

Table 1: New ADMD Schedule

Dwelling Type	Geographic Area	Density (Land Size)	ADMD (kVA)
Houses	Urban	Low (>350m^2)	6.5
		Medium (<350m^2)	5.0
	Rural Residential	Low	10
Apartments*	All	High	3.5

*Note: This excludes any material spot loads associated with the development.

Existing dwelling ADMDs can be calculated in accordance to clause 5.1 in MDI0030 where the figures above can be used in the absence of maximum demand indicator readings.

The revised ADMD can be implemented immediately.

Impacted Standards

The contents of this technical bulletin will be included in the next update of the following standard:

- MDI 0030 – Method of Calculating Low Voltage Drop in Low Voltage Mains

Enquiries: earthingenquiries@endeavourenergy.com.au
Content Owner: Mark Tan (9853 6927)
Electrical Engineer - Earthing
Approved By: Danny Asvestas (9853 7001)
Manager Asset Standards & Design

Page 1 of 1

Endeavour Energy

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APPENDIX F – BUSHFIRE ASSESSMENT

peterson bushfire.
expert consulting services

Bushfire Assessment

Residential Subdivision

10 Col Drewe Drive, Bowenfels

J. Wyndham Prince Pty Ltd

29 November 2022

(Ref: 22108)

report by
david peterson

0455 024 480
david@petersonbushfire.com.au
po box 391 terrigal nsw 2260
petersonbushfire.com.au

FPA AUSTRALIA (NO.BPAD18882)
BPAD LEVEL 3 ACCREDITED PRACTITIONER
ABN 28 607 444 833

Contents

peterson bushfire
expert consulting services

david peterson
0455 024 480 • david@petersonbushfire.com.au
po box 391 terrigal nsw 2260 • petersonbushfire.com.au
FPA AUSTRALIA (NO.BPAD18882) BPAD LEVEL 3 ACCREDITED PRACTITIONER • ABN 28 607 444 833

1 Introduction

Street or property name:	10 Col Drew Drive		
Suburb, town or locality:	Bowenfels	**Postcode:**	2790
Lot/DP no:	Lot 1 DP 1268778		
Local Government Area:	Lithgow City Council		
Type of development:	Residential subdivision		

1.1 Background

J. Wyndham Prince Pty Ltd commissioned Peterson Bushfire to prepare a Bushfire Assessment Report for a proposed residential subdivision located on bushfire prone land in Bowenfels, south-west of Lithgow. This report presents the assessment and recommendations to ensure compliance with the relevant bushfire protection legislation and policy.

This bushfire assessment has been prepared by a consultant accredited by the Fire Protection Association of Australia's BPAD scheme (Accreditation No. BPD-L3-18882).

1.2 Location of subject land and description of proposal

The subject land is located approximately 3.5 km south-west of Lithgow adjacent the Lithgow Hospital as shown on Figure 1. Consisting of a single lot with an area of just over 6 hectares in size, subject land is a cleared and vacant. The lower portion of the subject land that adjoins the northern and western boundaries of the Lithgow Hospital site is zoned R2 Low Density Residential and is the subject of the subdivision proposal. The higher portion in the western part of the subject land is zoned C3 Environmental Management.

The bushfire hazards consist of undeveloped paddocks adjoining the R2 zoned land located to the east, north and west. A description of the bushfire hazard is provided in Section 2.

The proposal consists of the subdivision of the subject land into residential allotments, including superlots subject to integrated housing, and the creation of public roads. The plan of subdivision is included as Figure 2.

1.3 Assessment requirements

The subject land is identified as 'bushfire prone land' on the Lithgow Bushfire Prone Land Map (refer to Figure 3). Section 4.46 *Environmental Planning and Assessment Act 1979* requires a bushfire assessment of residential subdivision proposals on bushfire prone land following the process and methodology set out within Section 100B of the *Rural Fires Act 1997*, Clause 44 of the *Rural Fires Regulation 2022* and the NSW Rural Fire Service (RFS) document *Planning for Bush Fire Protection 2019* (referred to as 'PBP' throughout this report).

Legend

- Watercourse
- Subject Land

N

DKGIS

Date: 23/11/2022

0 125 250 500

Metres

Figure 1: Location of the Subject Land

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

peterson bushfire. expert consulting services

david peterson

0455 024 480 • david@petersonbushfire.com.au

po box 391 terrigal nsw 2260 • petersonbushfire.com.au

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Legend

- Watercourse
- Subject Land
- Cadastre

N

DKGIS

Date: 15/11/2022

0 20 40 80

Metres

Figure 2: The Proposal

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

peterson bushfire. expert consulting services

david peterson

0455 024 480 • david@petersonbushfire.com.au

po box 391 terrigal nsw 2260 • petersonbushfire.com.au

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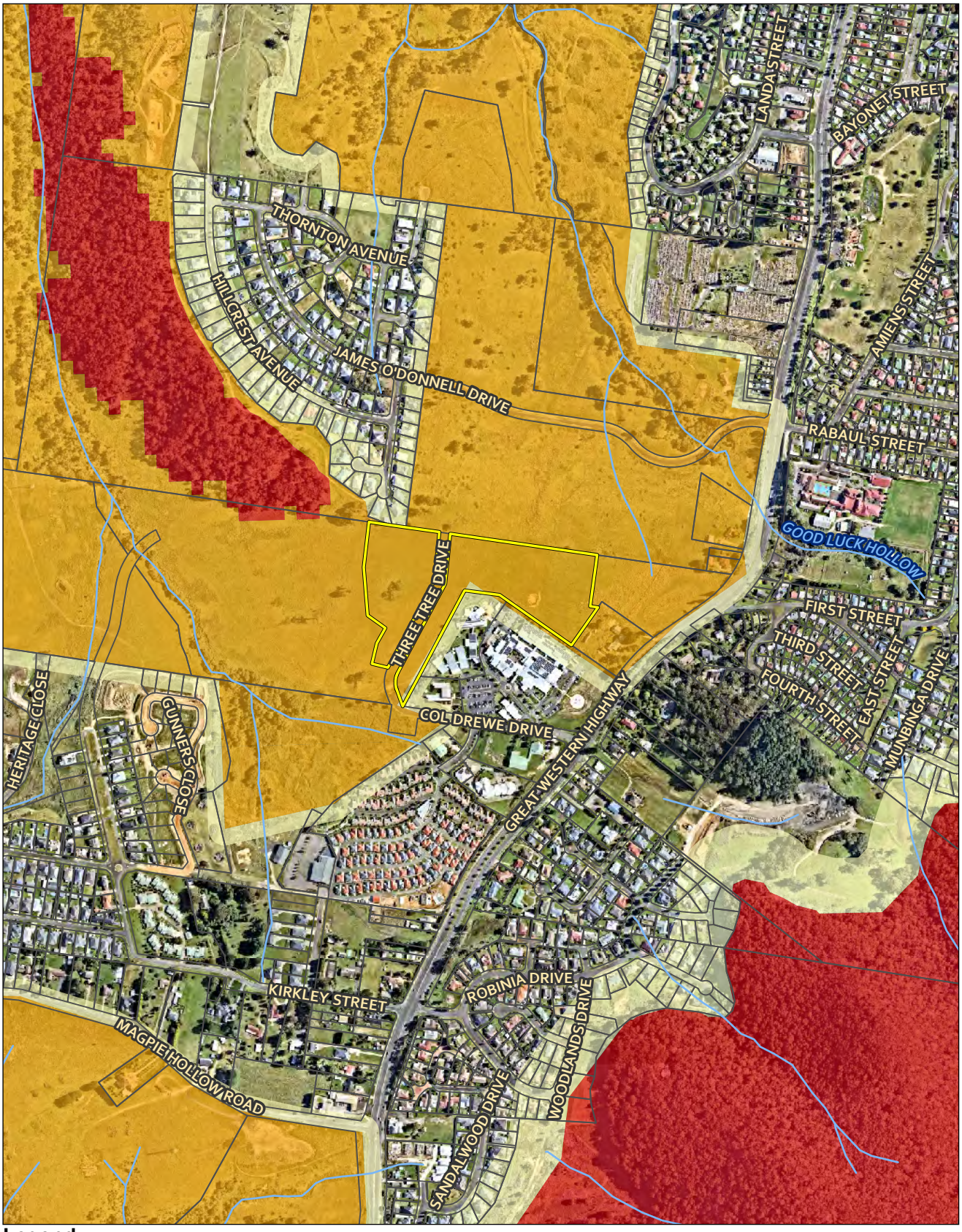

Legend

Watercourse
Subject Land
Cadastre

Bushfire Prone Land

Vegetation Category 1
Vegetation Category 3
Vegetation Buffer

N

DKGIS

Date: 15/11/2022

0 50 100 200
Metres

Figure 3: Bushfire Prone Land

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

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david peterson
0455 024 480 • david@petersonbushfire.com.au
po box 391 terrigal nsw 2260 • petersonbushfire.com.au
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2 Bushfire hazard

An assessment of the bushfire hazard is necessary to determine the application of bushfire protection measures such as Asset Protection Zone (APZ) location and dimension. The following sub-sections provide a detailed account of the vegetation communities (bushfire fuels) and the topography (effective slope) that combine to create the bushfire hazard that may affect bushfire behaviour at the site.

2.1 Predominant vegetation

The vegetation within 140 m of the subject land has been assessed in accordance with the methodology specified within PBP. Figure 4 maps the current distribution of the identified hazards.

The bushfire hazard consists of potential grassland hazard within cleared and vacant paddocks adjoining to the east and north, and within the C3 zoned land to the west. The grass within these lands could act as a potential grassfire hazard depending on growth and curing rates as well as grazing regimes.

The adjoining property to the north is subject to an approved subdivision therefore the grassland hazard in that direction is temporary only. Similarly, the adjoining property to the east is likely to be developed in the near future.

2.2 Effective slope

The ‘effective slope’ influencing fire behaviour has been assessed in accordance with the methodology specified within PBP. This is conducted by measuring the slope that would most significantly influence fire behaviour where the hazard occurs. The slope was determined using a 2 m contour layer as shown on Figure 4.

The slope underneath the identified grassland hazards is within the PBP slope class of ‘downslope 0-5 degrees’ to the east and north, ‘upslope’ within the C3 zoned land to the west, and ‘downslope 5-10 degrees’ to the south-west.

Legend

- Contour - 2m
- Watercourse
- Subject Land
- Cadastre
- Vegetation Assessment Area

Vegetation Formation

- Grassland

Asset Protection Zone

- Asset Protection Zone - 10m
- Asset Protection Zone - 12m
- Asset Protection Zone - 13m

N

DKGIS

Date: 16/11/2022

0 25 50 100

Metres

Figure 4: Bushfire Hazard Analysis and Asset Protection Zone (APZ)

Coordinate System: GDA 1994 MGA Zone 56

Imagery: © Nearmap

peterson bushfire. expert consulting services

david peterson

0455 024 480 • david@petersonbushfire.com.au

po box 391 terrigal nsw 2260 • petersonbushfire.com.au

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3 Bushfire protection measures

PBP requires the assessment of a suite of bushfire protection measures that in total provide an adequate level of protection for residential subdivision. The measures required to be assessed are listed in Table 1 below and are discussed in detail in the remainder of this section.

Table 1: PBP bushfire protection measures

Measures	Considerations
Asset Protection Zones (APZ)	Location and dimension of APZ building setbacks from vegetation including prescriptions of vegetation management within the APZ.
Access	Assessment to include access and egress, perimeter access and design standards of public roads.
Water supply and other utilities	List requirements for reticulated water supply and hydrant provisions, and any static water supplies for fire-fighting.

3.1 Asset Protection Zones (APZ)

Using the vegetation and slope information presented in Section 2 and mapped on Figure 4, an Asset Protection Zone (APZ) suitable for residential subdivision has been calculated. The APZ determination is listed in Table 2 below and the APZ is mapped on Figure 4.

Table 2: APZ determination

Location[1]	Vegetation[2]	Slope[3]	APZ[4]	How will the APZ be accommodated
East	Grassland	Downslope 0-5˚	12 m	Within adjoining property (Lot 2 DP 1082148) by a temporary s88B easement until hazard is removed by adjoining development
North	Grassland	Downslope 0-5˚	12 m	Within adjoining property (Lot 2 DP 10499398) by a temporary s88B easement until hazard is removed by adjoining development
West	Grassland	Upslope	10 m	Within subject land by a temporary s88B easement until hazard is removed by the next stage of development
South-west	Grassland	Downslope 5-10˚	12 m	Within subject land by a temporary s88B easement until hazard is removed by the next stage of development

[1] Direction of assessment from subject land. Refer to Figure 4.

[2] Predominant vegetation classification over 140 m from subject land.

[3] Effective slope assessed where the bushfire hazard occurs.

[4] APZ required by Table A1.12.2 of Planning for Bush Fire Protection 2019.

The APZs to the north and east will be temporarily placed within the adjoining properties by way of a s88B easement until the hazards are removed during the process of development of the adjoining land.

The APZs to the west and south-west are contained within the subject land and are also temporary measures to be placed within a s88B easement until development progresses generally in the west direction removing the need for the APZs

3.2 Vegetation management

Earthworks and construction of the proposal will ensure the subdivision complies with the standard of an Inner Protection Area (IPA) as described by Section A4.1.1 of PBP.

Maintenance of the APZs and landscaping proposed across the subdivision, such as street trees, are to achieve the principles listed in Section A4.1.1 of PBP.

The IPA requirements stated within PBP are repeated below:

A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defendable space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

- ***Trees***
  - *tree canopy cover should be less than 15% at maturity;*
  - *trees at maturity should not touch or overhang the building;*
  - *lower limbs should be removed up to a height of 2m above the ground;*
  - *tree canopies should be separated by 2 to 5m; and*
  - *preference should be given to smooth barked and evergreen trees.*
- ***Shrubs***
  - *create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;*
  - *shrubs should not be located under trees;*
  - *shrubs should not form more than 10% ground cover; and*
  - *clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.*

- ***Grass***
  - *grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and*
  - *leaves and vegetation debris should be removed.*

3.3 Access

3.3.1 Alternate access and egress

PBP requires an access design that enables safe evacuation whilst facilitating adequate emergency and operational response. All bushfire prone areas should have an alternate access or egress option depending on the bushfire risk, the density of the development, and the chances of the road being cut by fire for a prolonged period.

The access to the subdivision will initially be from a single access point from Col Drewe Drive to the south. A second access point road will be provided through the approved subdivision to the north will which ensure alternate access. Any temporary period of a single access point to the south, should development of the subject land be completed prior to the land to the north, is acceptable in this instance due to the low risk nature of the bushfire threat consisting of cleared paddocks only. It is highly unlikely for Col Drewe Drive to be severed by the impacts of bushfire impact.

3.3.2 Perimeter access

Perimeter access roads are not required for temporary and low risk grassland hazards.

3.3.3 Design and construction standards

The road design is to comply with the PBP Acceptable Solutions (Table 5.3b of PBP) for the design and construction of non-perimeter roads in bushfire prone areas as listed below.

The extension of Col Drewe Drive will be 11 m wide kerb-to-kerb and will therefore comply with the 5.5 m carriageway width requirement of a non-perimeter road, allowing parking either side. The remainder of the roads will be 8 m wide kerb-to-kerb and will temporarily have 'No Parking' restrictions on one side of the road to ensure a 5.5 m wide carriageway until such time that the adjoining properties to the north and east have had the grassland hazards removed as part of an approved development. Removal of the adjoining grassland hazards will ensure that the lots accessed by the remaining roads are not within bushfire prone land, therefore removing the requirement for the provision of parking outside of the 5.5 m carriageway width.

<u>PBP design standards for roads servicing residential subdivision:</u>

- *Property access roads are two-wheel drive, all weather roads.*
- *Perimeter roads are provided for residential subdivisions of three or more allotments.*
- *Subdivisions of three or more allotments have more than one access in an out of the development.*

- *Traffic management devices are constructed to not prohibit access by emergency service vehicles.*
- *Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient.*
- *All roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end.*
- *Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road.*
- *Where access/egress can only be achieved through forest, woodland or heath vegetation, secondary access shall be provided to an alternate point on the existing public road system.*
- *The capacity of perimeter and non-perimeter road surfaces and any bridges and causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); Bridges/causeways to clearly indicate load rating.*
- *Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression.*
- *Hydrants are provided in accordance with AS 2419.1:2005.*
- *There is suitable access for a Category 1 fire appliance to within 4 m of the static water supply where no reticulated supply is available.*
- *Non-perimeter roads are:*
    - *Minimum 5.5 m width kerb to kerb;*
    - *parking is provided outside of the carriageway width;*
    - *hydrants are located clear or parking reserves;*
    - *there are through roads, and these are linked to the internal road system at an internal of no greater than 500 m;*
    - *curves of roads have a minimum inner radius of 6 m;*
    - *the road crossfall does not exceed 3º;*
    - *a minimum vertical clearance of 4 m to any overhanging obstruction, including tree branches, is provided.*

3.4 Water supply and utilities

3.4.1 Water supply

Fire hydrants are to be installed along road reserves to comply with *AS 2419.1 – 2005 Fire Hydrant Installations - System Design, Installation and Commissioning* (AS 2419) so that all sides of a building envelope are within 70 m of a hydrant by lay of the hose (or 90 m with a tanker parked in-line maximum 20 m from the hydrant).

3.4.2 Electricity supply

Electricity will be provided below ground, therefore complying with PBP.

3.4.3 Gas supply

Any gas services are to be installed and maintained in accordance with *AS/NZS 1596-2014 The storage and handling of LP gas*.

david peterson
0455 024 480 • david@petersonbushfire.com.au
po box 391 terrigal nsw 2260 • petersonbushfire.com.au
FPA AUSTRALIA (NO.BPAD18882) BPAD LEVEL 3 ACCREDITED PRACTITIONER • ABN 28 607 444 833

4 Conclusion and recommendations

4.1 Summary

The proposal consists of a residential subdivision south-west of Lithgow adjoining the Lithgow Hospital site. The bushfire hazard consists of cleared paddocks adjoining to the east, north and west. It is proposed to temporarily place APZs within adjoining properties to the east and north within s88B easements to ensure maintenance of an APZ until development of the adjoining lands occur. Similarly, the APZs to the west that fall within the subject land will be placed within a s88B easement until the adjoining grassland is removed as part of the next stage of development.

The single road access point to the south will be complemented by a second access to the north with the development of the adjoining land. The proposed roads are to comply with the PBP Acceptable Solutions until the removal of the grassland hazards on the adjoining lands to the north and east which will see the lots and roads removed from bushfire prone land and the ability to allow parking within the carriageway width.

4.2 Conclusion

This report presents an assessment of a residential subdivision at 10 Col Drewe Drive, Bowenfels. The assessment demonstrates that the proposal, together with the recommendations (see below), complies with *Planning for Bush Fire Protection 2019*.

4.3 Recommendations

The recommendations made within this assessment are repeated below:

1. A 12 m APZ is to be maintained within the adjoining lot to the east (Lot 1 DP 1082148) and north (Lot 2 DP 1082148) as shown on Figure 4 by way of a s88B easement until the hazards are removed during the process of development of the adjoining lands.
2. A 10 m and 13 m APZ is to be maintained within the subject land to the west of the proposed lots as shown on Figure 4 by way of a s88B easement until the hazards are removed during the process of development of the adjoining lands.
3. APZs are to be maintained to achieve the standard of an Inner Protection Area (IPA) as listed in Section A4.1.1 of *Planning for Bush Fire Protection 2019*.
4. Landscaping across the subdivision is to achieve the standard of an Inner Protection Area (IPA) as listed in Section A4.1.1 of *Planning for Bush Fire Protection 2019*.
5. The proposed roads are to comply with the PBP Acceptable Solutions (Table 5.3b of PBP) for the design and construction of non-perimeter roads. With the exception of the extension of Col Drewe Drive, the roads are to temporarily have ‘No Parking’ restrictions on one side until such time that the adjoining properties to the north and east have had the grassland hazards removed as part of an approved development.

6. Fire hydrants are to be installed along road reserves to achieve compliance with AS 2419.1 – *2005 Fire Hydrant Installations - System Design, Installation and Commissioning* (AS 2419).

7. Any gas services are to be installed and maintained in accordance with *AS/NZS 1596-2014 The storage and handling of LP gas*.

David Peterson

peterson bushfire
expert consulting services

david peterson
0455 024 480 • david@petersonbushfire.com.au
po box 391 terrigal nsw 2260 • petersonbushfire.com.au
FPA AUSTRALIA (NO.BPAD18882) BPAD LEVEL 3 ACCREDITED PRACTITIONER • ABN 28 607 444 833

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peterson bushfire.
expert consulting services

david peterson
0455 024 480 • david@petersonbushfire.com.au
po box 391 terrigal nsw 2260 • petersonbushfire.com.au

FPA AUSTRALIA (NO.BPAD18882) BPAD LEVEL 3 ACCREDITED PRACTITIONER • ABN 28 607 444 833

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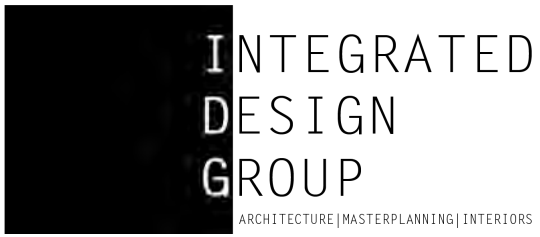
APPENDIX G – MASTERPLAN DOCUMENT

LITHGOW CITY COUNCIL
SWEET BRIAR CONCEPT MASTERPLAN
SOUTH BOWENFELS

SWEET BRIAR, SOUTH BOWENFELS
8 DECEMBER 2022

INTEGRATED DESIGN GROUP
ARCHITECTURE | MASTERPLANNING | INTERIORS

INTEGRATED DESIGN GROUP PTY LTD
ABN 84 115 006 329
NOMINATED ARCHITECT SIMON THORNE NSW ARB #7093
INFO@IDGARCHITECTS.COM.AU



PREPARED BY:

INTEGRATED DESIGN GROUP PTY LTD | ABN 84 115 006 329
NOMINATED ARCHITECT SIMON THORNE NSW ARB #7093
INFO@IDGARCHITECTS.COM.AU | WWW.IDGARCHITECTS.COM.AU

CONTENTS

INTRODUCTION

SUBJECT SITE

The subject site is located on the western edges to the Lithgow City Centre. The site contains Three Tree Hill which is a way finding marker to the surround area, and a significant natural feature.

The site benefits from a semi rural context yet still in close proximity to the Great Western Highway and easy access to Lithgow City Centre.

The site is surrounded by smaller pockets of development ranging from low rise residential, educational facilities, medical facilities and retail.

As a reflection of the site's unique position, the zoning allows particular site allow for 400m^2 sites which provides more opportunity for diversity of housing to include medium density than the surrounding suburbs.

INTRODUCTION

PROJECT OBJECTIVES

The broad objectives and outcomes of the project are to:

1)
Plan and design a new and innovative residential estate that meets the needs of the community and reflects current industry best practice and principles in urban design, sustainability, and social outcomes.

2)
Prepare and lodge a development application with Lithgow City Council for the subdivision of the land via the NSW Planning Portal.

3)
Prepare a business case to test opportunities/risks for the development to provide broader sustainability, environmental and social outcomes against achieving a reasonable return on investment.

4)
Explores and if possible, incorporates opportunities for the future provision of more diverse and affordable housing to meet the needs of the community and opportunities to assist with upcoming major project construction workforces.

5)
Fulfil Council's obligations under a Regional Housing Fund Participation Agreement with NSW Department of Planning and Environment

ANALYSIS

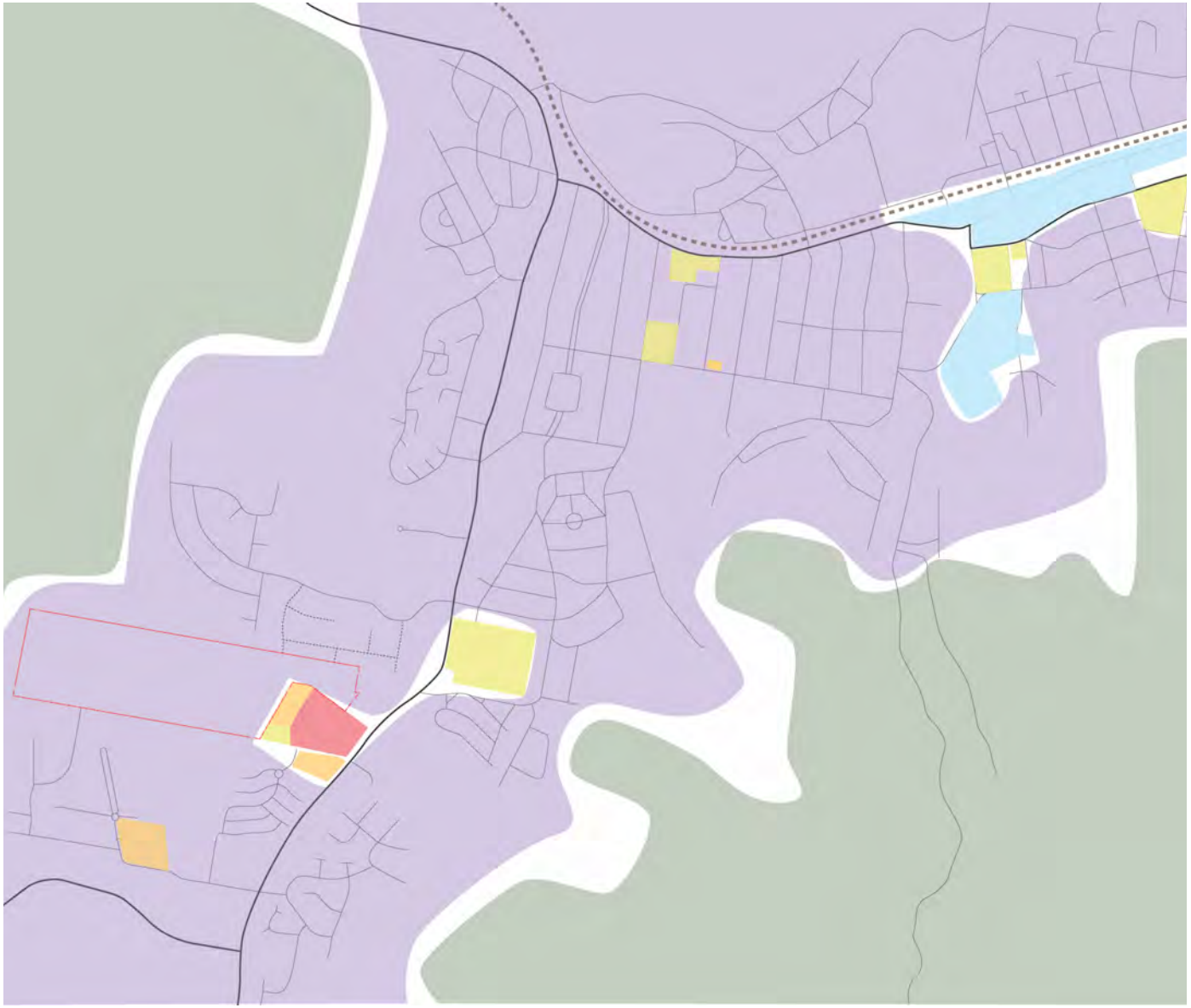
LAND USE

The site is located within an existing residential zone and on western edge of town, however it adjoins the Lithgow Hospital, Seniors living, and aged-care services to the east. To the North and further South of the site are DA approved residential subdivisions.

The Australian Bureau of Statistics recent Census Data indicated that the highest industry employment in Lithgow is aged-care services and this site is in close proximity to some of the key services in the city centre.

Opportunities:

- Provide housing on this site for key workers in a health and education employment zone
- Provide housing diversity through increase density models for key workers due to close proximity to work and less requirement for vehicular transport



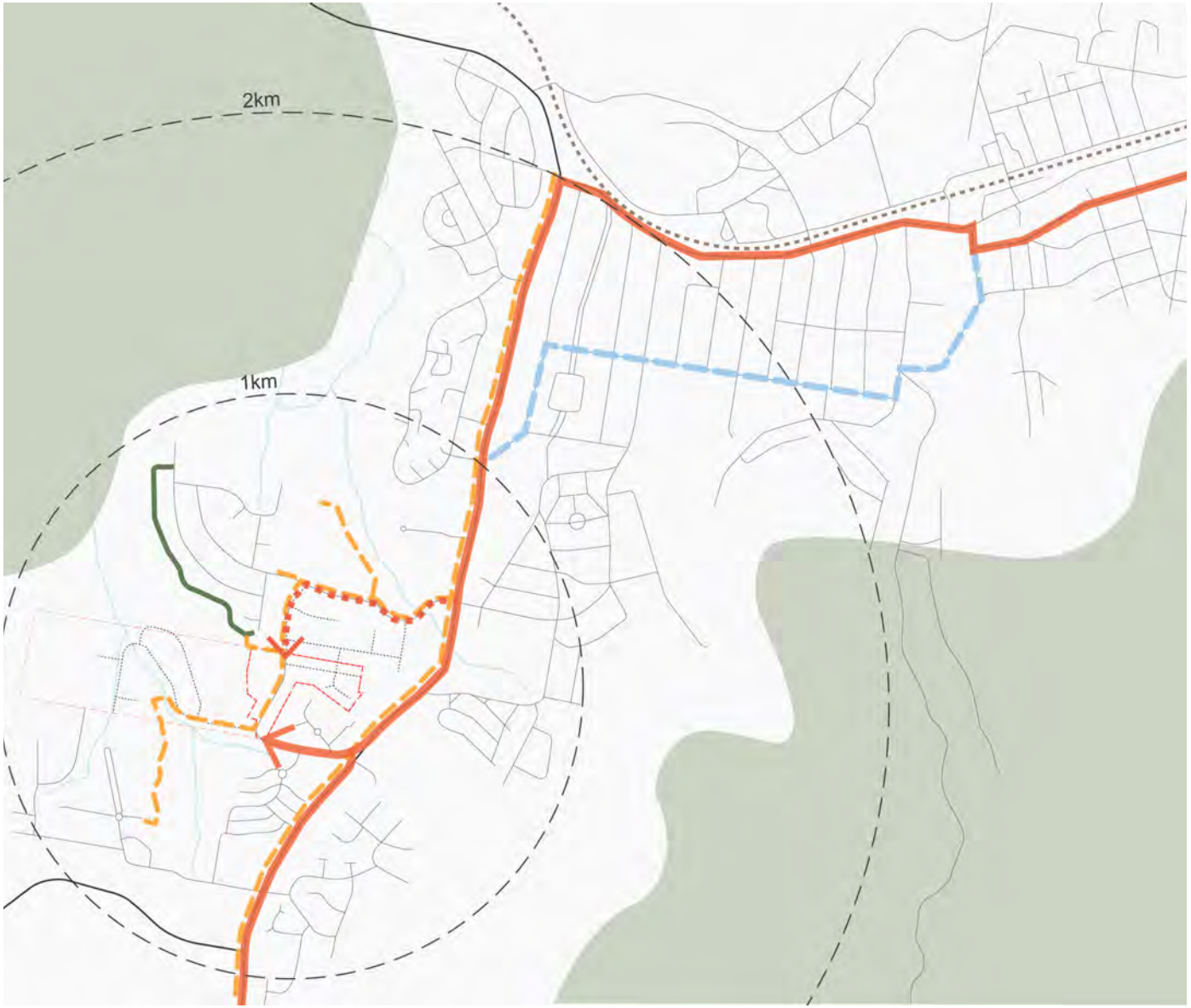
ANALYSIS

ACCESS

The main access route from Sweet Briar to Lithgow Town Centre runs along the Great Western Highway and onto Main Street. With the proposition of creating a shared walkway along this vehicular route, to increase connectivity to the new subdivision at Sweet Briar. The main arrival point to the site connects in with the existing hospital and aged acre services with a grand view to the Three Trees atop the landscaped hill.

Opportunities:

- Provide housing development that promotes a walkable character and easy access to public transport to promote health and reduce vehicular traffic.
- Connect housing development in with local environmental assets such as bush and park areas



MAIN ACCESS ROUTE

PROPOSED SHARED ZONE

RECREATIONAL PATH

LOCAL ROUTE

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INFO@IDGARCHITECTS.COM.AU

ANALYSIS

TRANSPORT

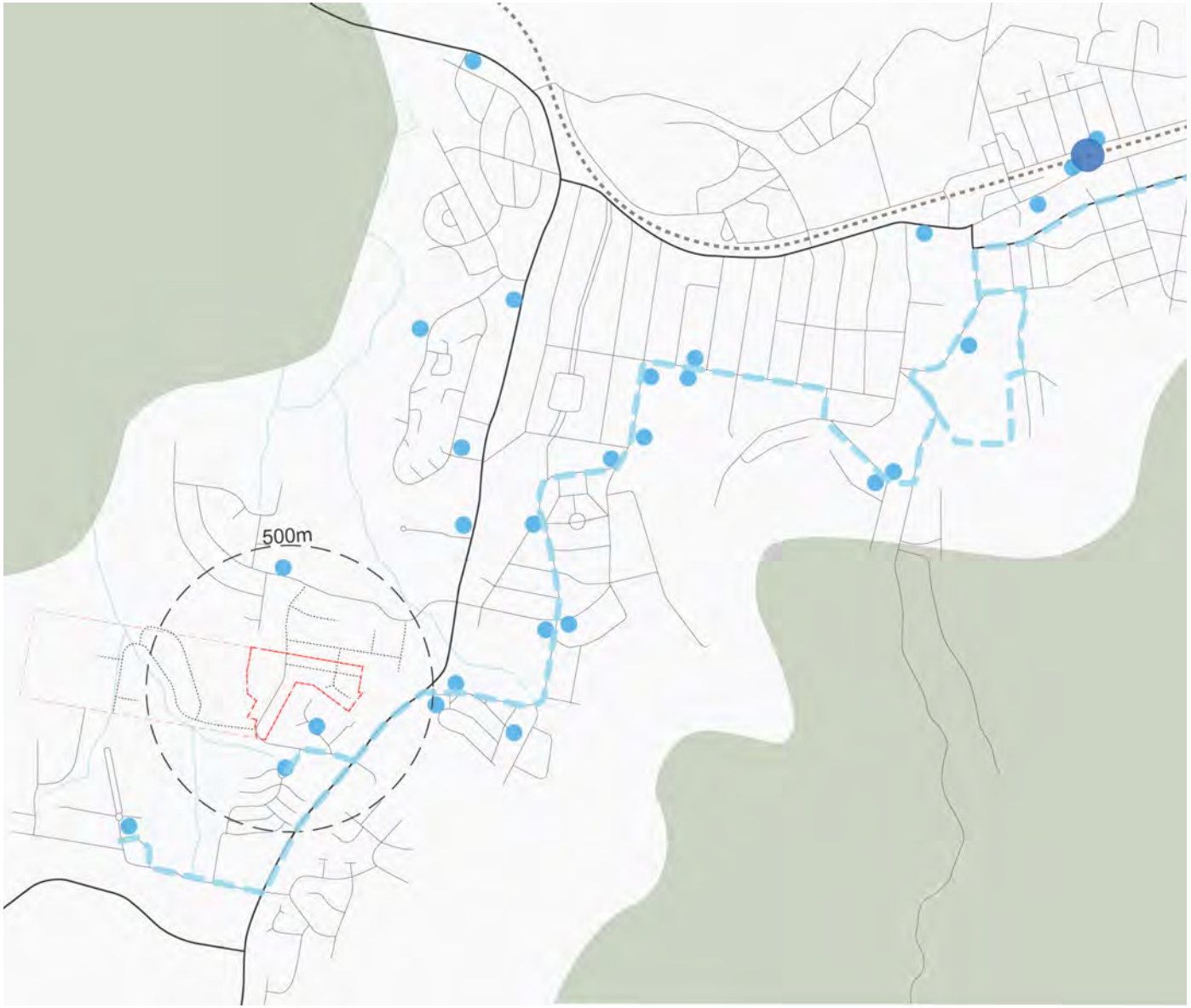
Bus routes connect the neighbouring hospital and aged care services to the train station and town centre on the hour hour.

The two closest bus stops are within 500m from the site both to the north and to the south.

The provides potential to develop a landscaped pedestrian connection running from north to south and with potential connection through the hospital to access bus stops and promote pedestrian movement throughout the new residential subdivisions.

Opportunities:

- Opportunity to connect local bus route through the new subdivision and connect existing bus lines
- Connect housing development in with local environmental assets such as bush and park areas



ANALYSIS

GREEN SPACE

Lithgow has a large number of outdoor sporting fields for public use with smaller pockets of recreational outdoor space available.

The proposed subdivision to the north has dedicated open green space at the centre of the subdivision and there is an opportunity to incorporate and expand the open green space within the Sweet Briar proposal, connecting to this network of open spaces through bicycle and pedestrian paths networks and provide access to the significant community asset of Three Tree Hill as the centre point to any residential subdivision.

Opportunities:

- Opportunity to connect green spaces through residential development and bicycle paths
- Provide view lines and direct visual connections through residential road network to the sites key feature Three Tree Hill

ANALYSIS

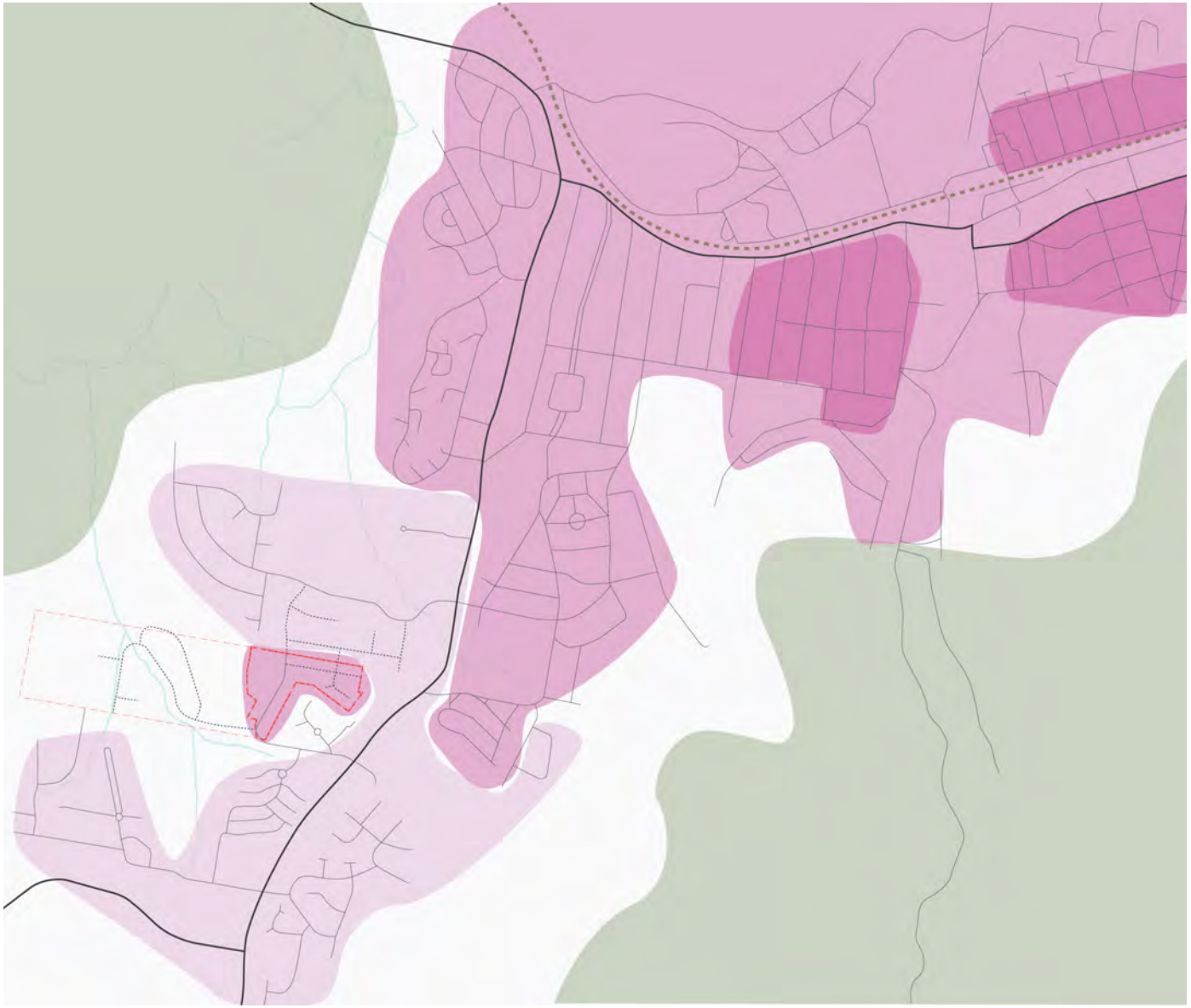
RESIDENTIAL DENSITY

Density in Lithgow ranges from high density to low density housing, with high density areas primarily located within close proximity the older centre of Lithgow close to transport, retail, commercial and community centres.

This higher density provides a useful precedent for diversity of housing in the Lithgow City and how this can be achieved to activate suburbs and communities through a diverse demographic.

Opportunities:

- Opportunity to provide localised area of higher density closer to key transport and employment areas
- Opportunity to explore low density housing options on smaller lots due to sites unique minimum lot size (400m^2)



ANALYSIS

TOPOGRAPHY

Topography is what defines the site with the Three Tree Hill and prominent location and views across should be maintained.

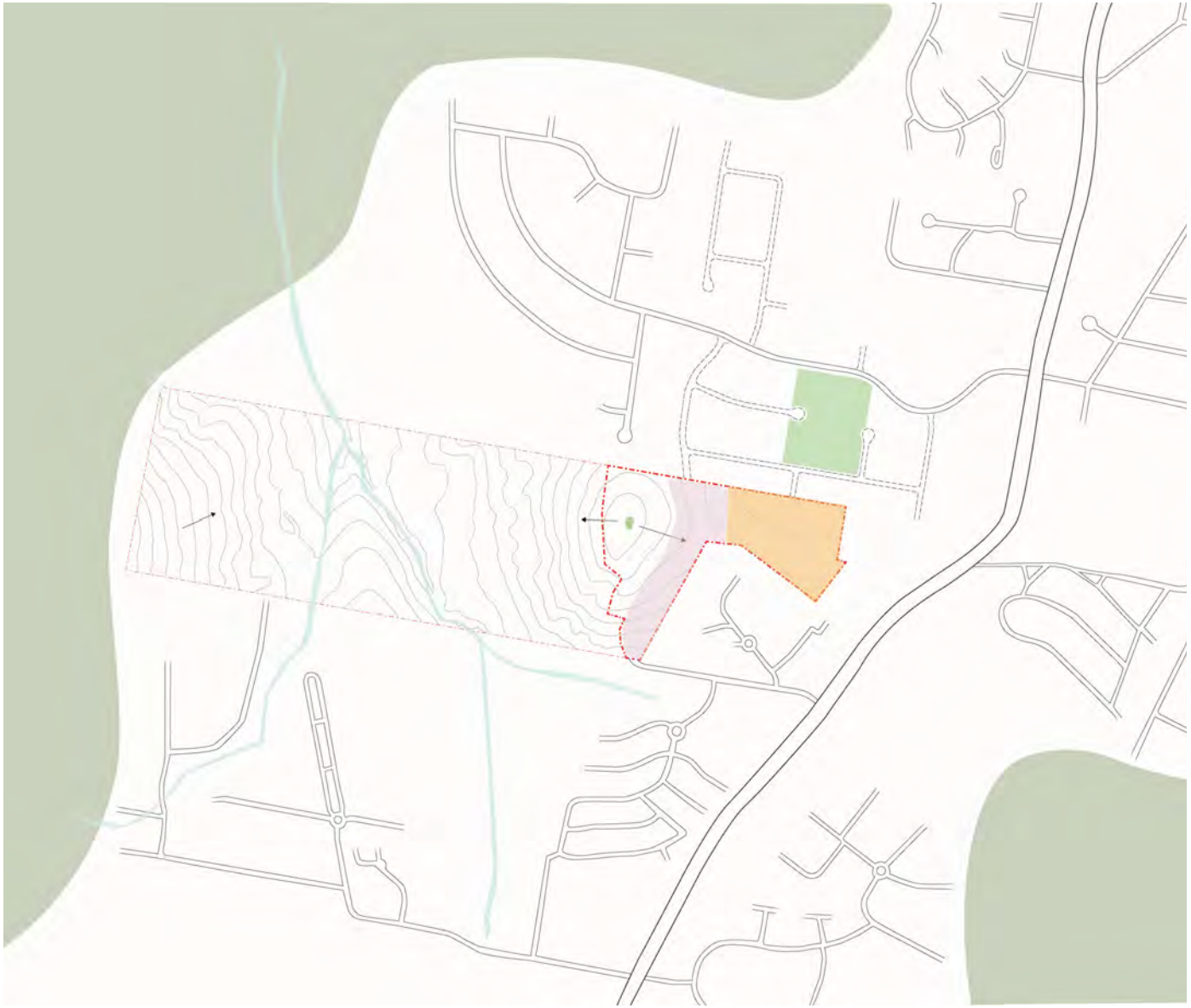
From this analysis we also understand the developable areas of the site, highlighting the opportunities for different types of development, driving the proposing locations of the residential and open space areas.

Areas on greater topography can be developed through tradition single detached dwellings which are stepped appropriate to deal with slop, while flatter areas of the site present opportunity for higher density residential developments.

Identified on the adjacent diagram is the primary developable area for a residential area which allows for a greater density of development

Opportunities:

- Develop higher density typology on the level area of the site by incorporating terraces, studios and townhouse typologies
- Redirect collector road to better respond to the topography and allow for more housing yield on sloping land
- Provide alternative low density housing type that specifically addresses areas of significant slope and allows for minimal excavation and ground works.



ANALYSIS

ENVIRONMENT

Climate conditions local to Lithgow range from cold winters with high westerly winds and occasional snow to hot dry summer days with large expansive views to the western horizon, whilst nestled into the mountains to the east.

In the semi-rural context the site is also located in bushfire zone which is impacted by surrounding vegetation, and the topography and exposure to large areas of grassland and vegetation to the west.

Opportunities:

- Develop road network to provides houses with best opportunity to access north light
- Planting and landscape management takes into account bushfire risk. Provide access to part to allow for regular maintenance and monitoring of conditions.
- Road network provides for access for fire trucks and fire fighting strategies

VEGETATION BUFFER

VEGETATION CATEGORY 3

VEGETATION CATEGORY 1

ANALYSIS

VIEWS

With the topography of the site, the Three Trees Hill is a significant landmark in the local area. Views of the top of the hill become the focal point from almost any point along the highway.

As such the views to the site a significant and any residential development should look to ensure that these views are maintain and enhances from the site surrounding.

There are local views to the north across the valley, to the east to mountains, and a large expansive view at the western edge of the site towards the sunset.

There is also an adjacent heritage item and while views to this item are not significant from the subject site, views from this item across to the Three Tree Hill are important to maintain to reinforce.

Opportunities:

- Develop road network which directs you towards Three Tree Hill that marks the site as a destination and promote the character of the hillside village
- Provide views to Three Tree Hill and for pedestrian movement and wayfinding through new subdivision
- Provide buffer landscaping and fence treatment along boundary with local heritage item

ANALYSIS

SITE ACCESS

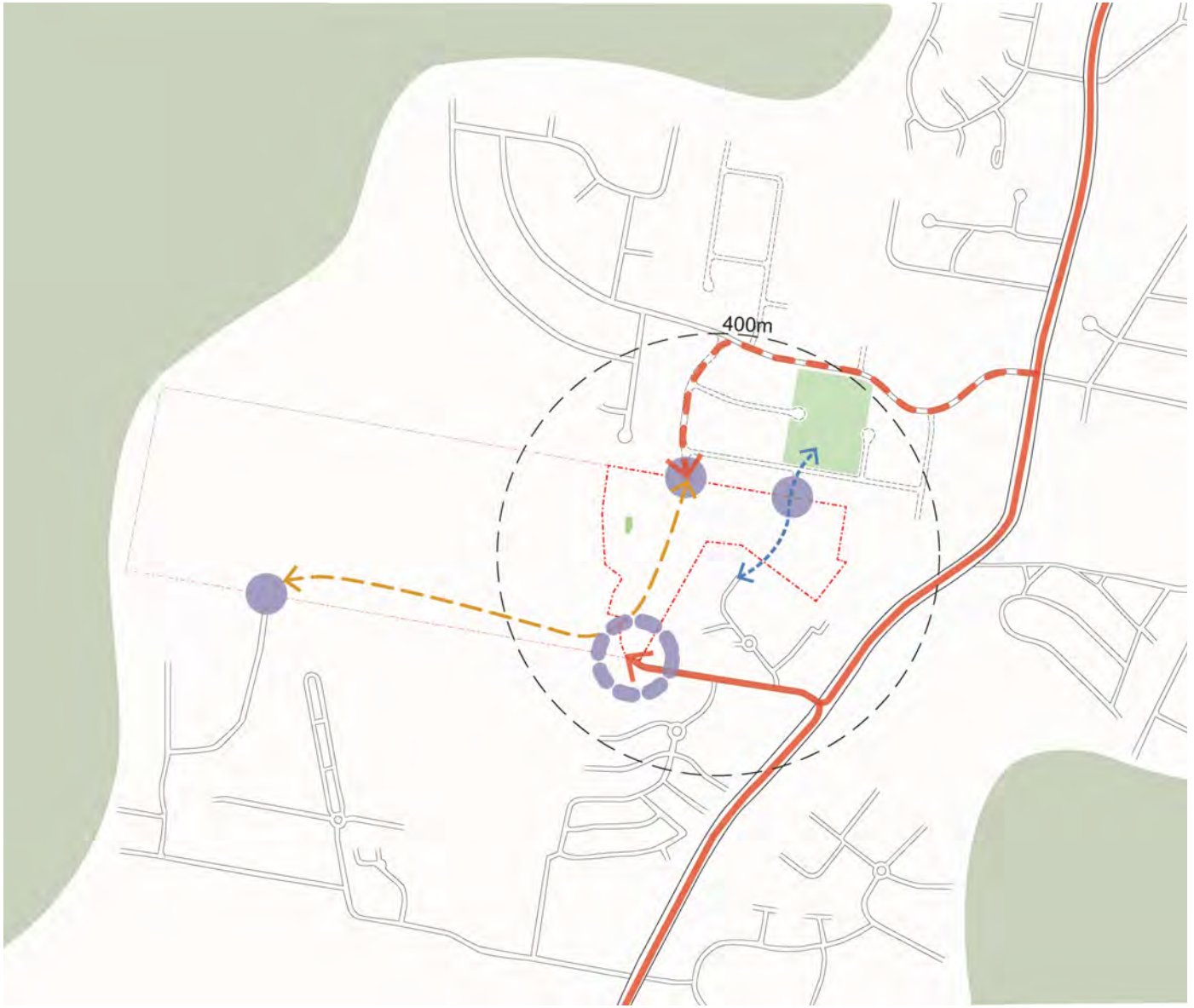
The site is primarily accessed on Col Drewe Drive off the Great Western Highway and this p[art of the site presents an opportunity for an entry point to the subdivision that is visible and easy wayfinding.

With the proposed DA subdivision to the North, there is another primary access point is to James O'Donnell Drive and through to Lithgow Town Centre.

These access points creates a potential connection through the site towards the west to increase permeability in the site, and provide more pedestrian links through the surrounding suburbs.

Opportunities:

- Utilise existing and approved connection points from neighbouring properties and existing roads
- Provide connection to existing residential developments to the west through internal collector roads
- Potential for north-south connection through site to connect surround residential developments to employment and education areas.



ANALYSIS

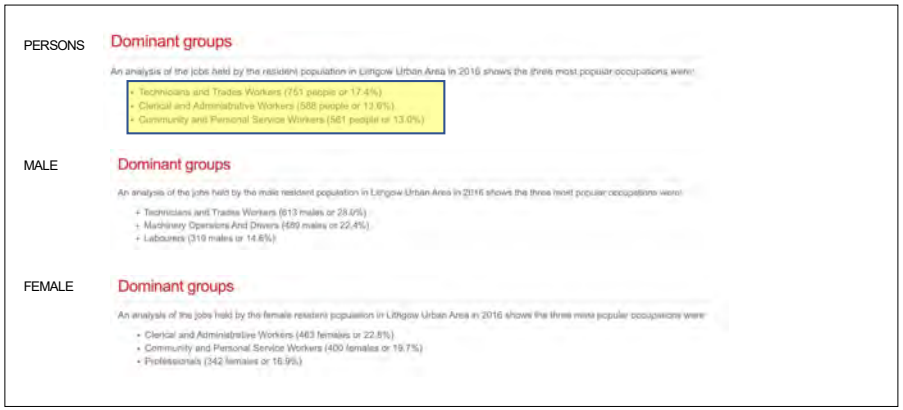
CENSUS DATA | AUSTRALIAN BUREAU OF STATISTICS

Recent census data indicates that the demographics of Lithgow City heavily focus towards those working in trade and technical industry, clerical and admin and community and personal service workers.

Data indicates that Aged Care Residential Services is the second larges employment industry in Lithgow, and with the Lithgow Hospital, and Three Tree Lodge Aged Care facility, it is reasonable to assume that workers in this industry would be looking for housing close to work.

Opportunities:

- Provide key worker housing for rental
- Provide smaller lot housing for key workers that promotes walkable communities higher density residential living



Industry of employment, top responses *Employed people aged 15 years and over*	Lithgow (C)	%	New South Wales	%	Australia	%
Coal Mining	618	8.1	19,153	0.6	46,491	0.4
Aged Care Residential Services	253	3.3	67,209	2.0	211,621	2.0
Supermarket and Grocery Stores	216	2.8	74,487	2.2	254,275	2.4
Accommodation	215	2.8	34,450	1.0	113,373	1.1
Local Government Administration	202	2.6	43,378	1.3	142,724	1.3

Of the employed people in Lithgow (C), the most common responses for industry of employment included Coal Mining 8.1%, Aged Care Residential Services 3.3%, Supermarket and Grocery Stores 2.8%, Accommodation 2.8% and Local Government Administration 2.6%.
View the data quality statement for Industry of employment (INGP)

People	**21,090**
Male	50.7%
Female	49.3%
Median age	45
Families	**5,215**
Average children per family	
for families with children	1.8
for all households (a)	0.6
All private dwellings	**9,684**
Average people per household	2.3
Median weekly household income	$984
Median monthly mortgage repayments	$1,387
Median weekly rent	$230
Average motor vehicles per dwelling	1.8

MEDIAN AGE : 46

MARITAL STATUS:

married: 43.8%

not married: 45%

de facto: 11.2%

CULTURAL DIVERSITY:

English: 41.5%

Australia: 41.4%

Irish: 11.9%

Scottish: 11.3%

Australian Aboriginal: 6.3%

COUNTRY OF BIRTH:

Australia: 82.1%

England: 2.4%

New Zealand: 1.0%

MEDIAN PERSONAL INCOME PERSONAL: $632

FAMILY COMPOSITION:

Couple family without children: 44.1%

Couple with children: 35%

One parent family 19.2%cv

SINGLE PARENTS

Female 79.3%

Male 20.6%

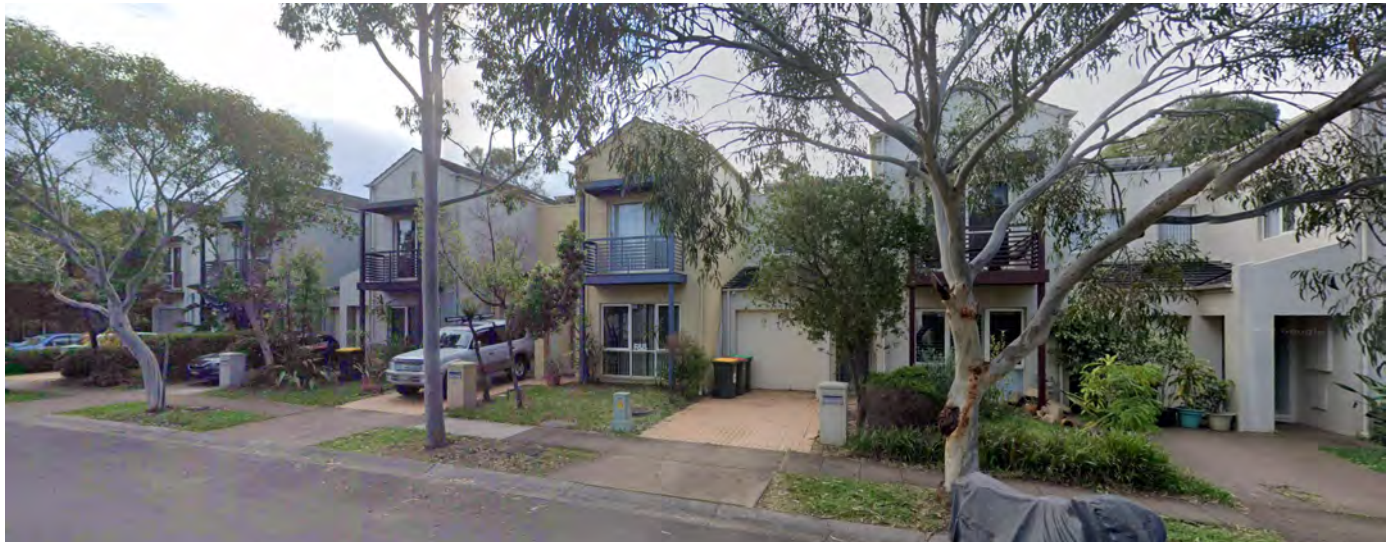
EXAMPLES

NEWINGTON

Originally the Sydney Olympic Village, the suburb of Newington in Sydney's Inner West demonstrates how density can be achieved in a suburban context around key facilities and within commuting distances of shops and services.

Housing typology has a variety of areas ranging from 200-500m^2 with a townhouse typology and a unique Australian contemporary character.

The Newington example demonstrates how smaller lot housing can provide a significant range of housing diversity from 2 bedroom apartments to 5 bedroom dwellings.



EXAMPLES

THORNTON

Initially conceptualised by Landcom, Thornton in North Penrith utilizes a range of housing densities from terraces and townhouse typologies near the community facilities and train station, transitioning into lower density suburban housing as the distance increases from the central community area.

Wirth a central park area the road network is a simple arrangement of link roads from surrounding areas, and circular roads around the precinct allowing for easy wayfinding and direct connections to neighbouring areas.

The Thornton example demonstrates hour diversity of housing works in a single subdivision, and how building up density from the edges to to the centre provides a clear public open space and central focus to a residential suburb.

EXAMPLES

LAURENCE STREET, LITHGOW

Laurence Street in Lithgow displays the current medium density typologies in regional New South Wales, with lots starting at 300m² in size.

The entirety of the 'traditional' town plan of Lithgow is laneway based, and when compared with many newer parts appears to serve the townscape much better.

The Laurence Street example shows how single storey small lot housing with small front setbacks and rear laneways provides an active streetscape with well defined private open space through the incorporation of positive fencing options.

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ABN 84 115 006 329
NOMINATED ARCHITECT SIMON THORNE NSW ARB #7093
INFO@IDGARCHITECTS.COM.AU

EXAMPLES

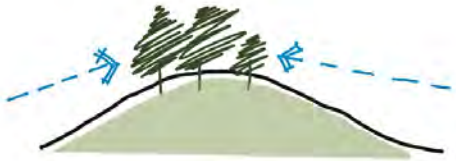
CHIFLEY ROAD, LITHGOW

Housing along Chifley Road in Lithgow responds to the slope of the land by creating a consistent front fence along the streetscape with minor variations in building height as the building mass steps down with the topography.

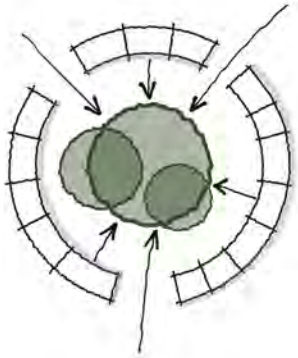
As noted previously the entirety of the 'traditional' town plan of Lithgow is laneway based, and when compared with many newer parts appears to serve the townscape much better.

Chiefly road provides an example of how laneway development promotes active pedestrian-based streetscapes, and how row housing typologies present a fine grain texture to a streetscape and ample opportunities for engagement with between the pubic and private realm despite topography challenges.

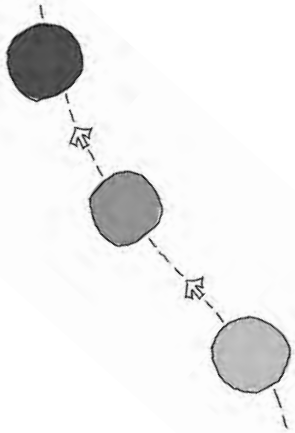
DESIGN PRINCIPLES



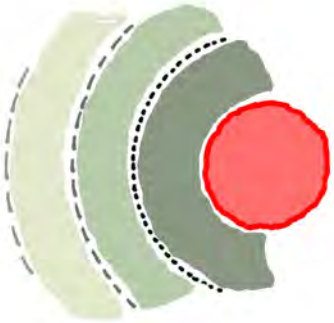
VIEWS TO LANDMARKS



CONNECTION TO PUBLIC GREEN SPACE



LIVE, WORK, PLAY



LAYERS OF DENSITY AND DIVERSITY

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DESIGN PRINCIPLES

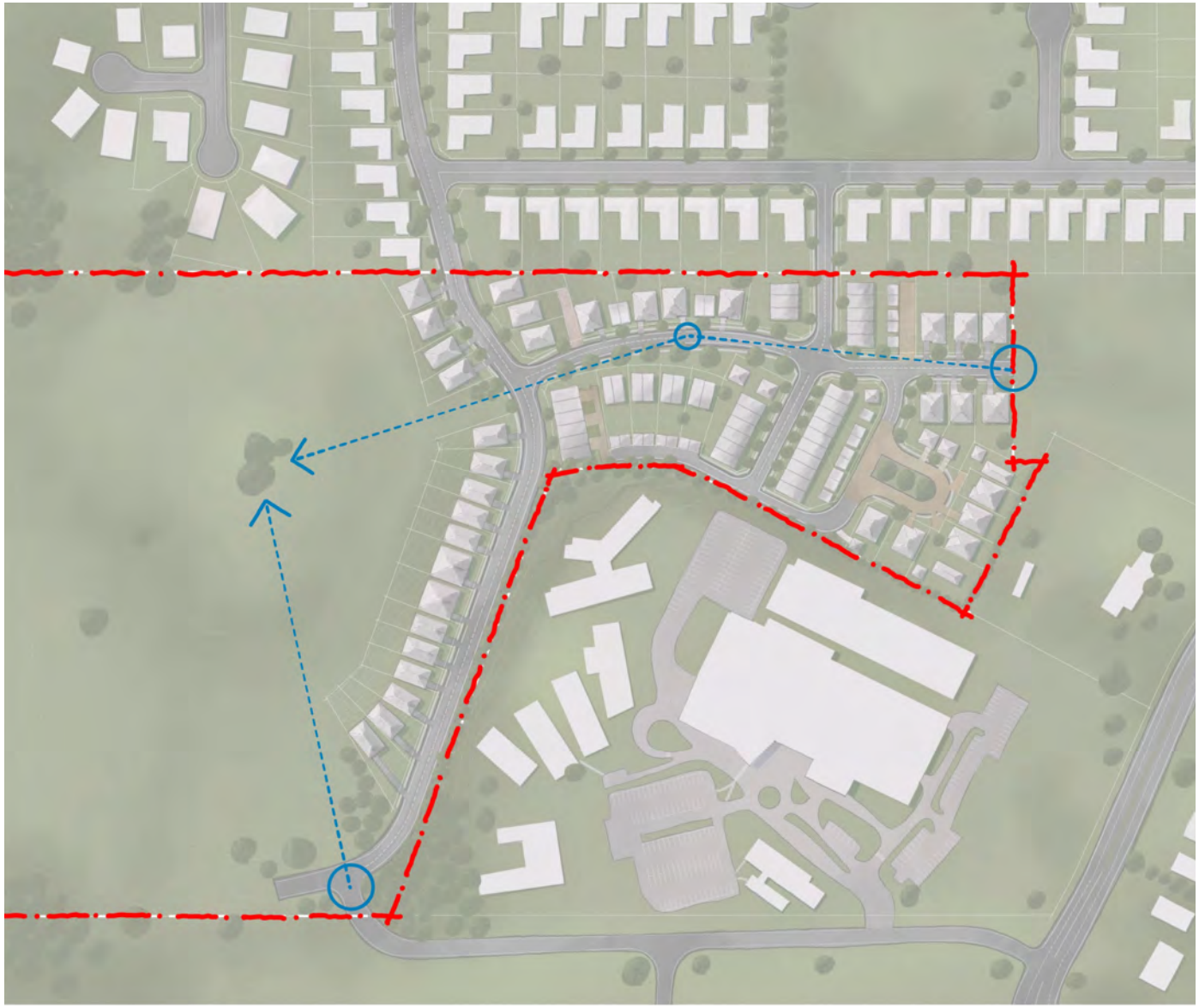
VIEWS TO LANDMARKS

The proposed development includes the construction and delivery of a series of new local roads with associated road drainage, services and stormwater drainage facilities. All local roads are to be dedicated to Council as part of the subdivision.

The key feature of this road network is the orientation of these roads towards the natural landmark on the site, Three Tree Hill.

By curving around the contours the collector road running north to south responds more appropriately to the topography and accentuates the base of the hill allowing for development to the perimeter.

The new local road running from east to west leads directly towards This encourages pedestrian movement around the site as there is clear wayfinding to local landmarks and it sets up the character of the streetscape.



DESIGN PRINCIPLES

CONNECTION TO PUBLIC GREEN SPACE

The masterplan develops a clear connection of residential dwellings to a number of public green space assets within or adjacent to the site.

Providing all houses in the subdivision with simple and clear access to public open spaces it promotes a healthy walkable community. It also provides activated streetscapes.

Wider verges or islands along the local roads also provides for a softer landscape experience as you traverse the site.

The subdivision deliberately leaves an open area along the western side of the north south collector road which provides a direct visual and walkable connection to this landmark space.

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ABN 84 115 006 329
NOMINATED ARCHITECT SIMON THORNE NSW ARB #7093
INFO@IDGARCHITECTS.COM.AU

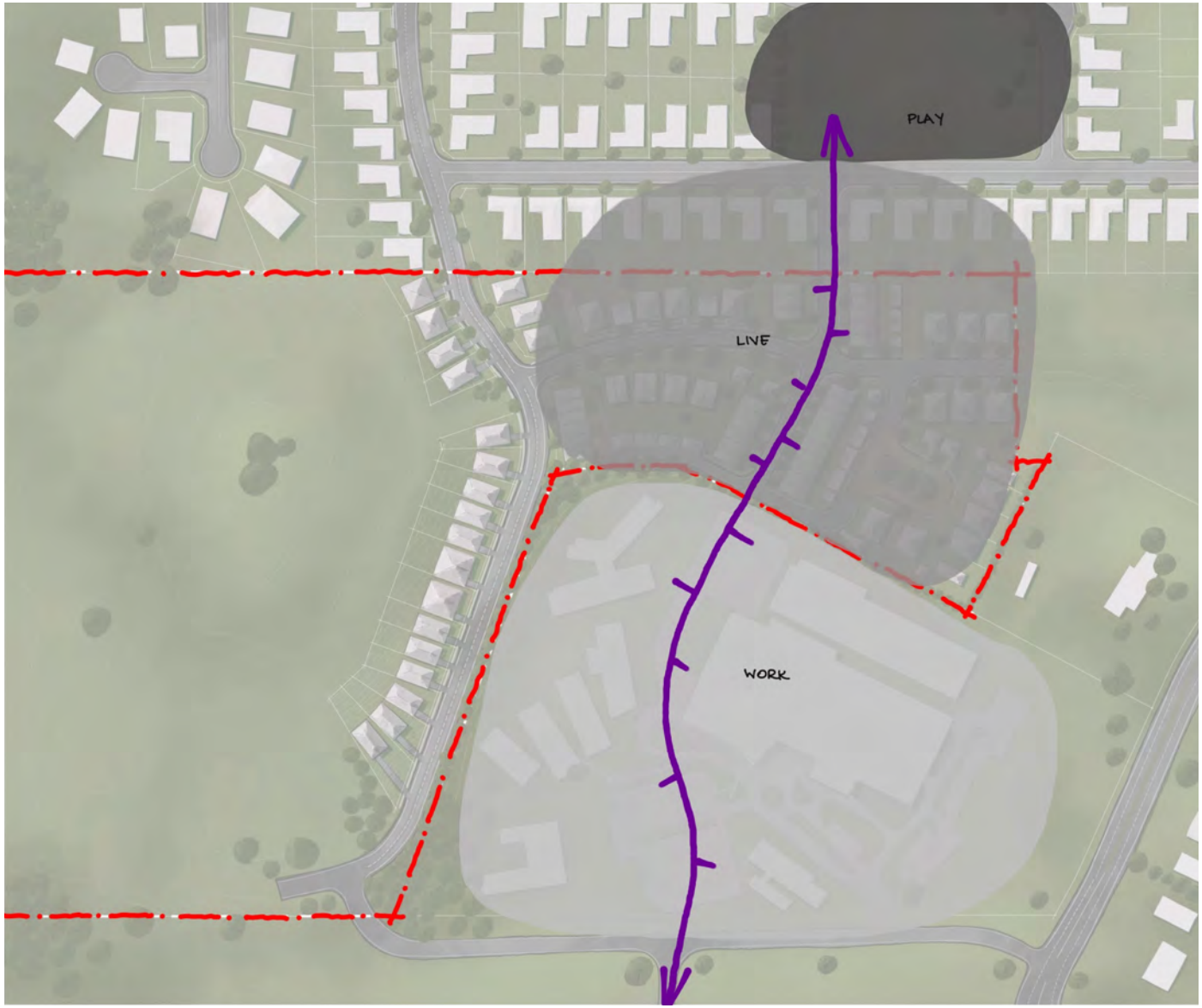
DESIGN PRINCIPLES

LIVE | WORK | PLAY

The masterplan has been designed around the connection between the residential area, employment and recreation areas and the principle of ‘LIVE, WORK, PLAY’.

The subdivision layout and road network are designed around a “live, work, play” axis promoting the idea that through a pedestrian network residents in the local area can live, work and play within walking distance of their dwellings.

There is potential that the employment generating facilities such as the hospital, university and aged care facility can access housing for key workers who often work shift hours that aren’t conducive to regular daily commuting, specifically meeting their staff needs.



DESIGN PRINCIPLES

LAYERS OF DENSITY AND DIVERSITY

In response to the site analysis of environmental conditions, topography, and zoning the masterplan looks to provide housing diversity through a mix of house types that respond to each of these factors.

The site presents a limited opportunity to Lithgow to demonstrate housing diversity and address affordability

The zoning permits minimum 400m² lot sizes for single detached dwellings and while smaller than surrounding areas, this allows for a variety of dwelling types to the perimeter of the subdivision which provide a consistent blend into the neighbouring developments. It provides for the larger 4 bedroom dwelling currently in good supply in Lithgow.

The next layer of density is a series of attached dual occupancies which under the current LEP allow for 2 dwellings on 600m². This housing type presents the opportunity for larger extended families through the incorporation of granny flats.

On the more level area of the site, close to employment zones and central to the site, the masterplan provides the opportunity to provide medium density housing a series of 1, 2 and 3 bedroom townhouses, terraces.

CONCEPT MASTERPLAN

CONCEPT MASTERPLAN

1. HILLSIDE HOME UPHILL - single dwellings (Min. 400m²)
2. HILLSIDE HOME NARROW - single dwellings (Min. 400m²)
3. HILLSIDE HOME WIDE - single dwellings (Min. 400m²)
4. HILLSIDE HOME LOWSIDE - single dwellings (Min. 400m²)
5. ATTACHED SPLIT LEVEL HOME LOWSIDE - Terraces or Town Houses (Multi Units)
6. TWO STOREY 4B DWELLING AND GRANNY FLAT - Dwelling + Granny Flat (450m²)
7. SINGLE STOREY 3B DWELLING ATTACHED - Attached Dual Occupancy (Duplex)
8. SINGLE STOREY 2B DWELLING - Attached Dual Occupancy (Duplex)
9. ATTACHED TWO STOREY DWELLING - Terraces or Town Houses (Multi Units)
10. TERRACE DWELLING Terraces or Town Houses (Multi Units)
11. TYPICAL 4B DWELLING - single dwellings (Min. 400m²)
12. TYPICAL 4B WITH DETACHED GARAGE - single dwellings (Min. 400m²)

HOUSING TYPES	TOTAL DWELLINGS	STAGE 1 DWELLINGS	STAGE 2 DWELLINGS	LOT PRICES $	HOUSE SIZE	HOUSE & LAND PRICES $ 000s
Lots - single dwellings (Min. 400m²)	27	20	7	$ 240,000 +	4 bedroom 2 garage	$700 - $800
Dwelling + Granny Flat (450m²)	7	4	3	$ 260,000 +	3 + 1/2 bed GF	$800 - $1,000
Attached Dual Occupancy (Duplex)	10	8	2		3 bedroom	$600 - $700
Detached Dual Occupancy (Detached)	4	0	4		3 bedroom (+std.?)	$650 - $750
Terraces or Town Houses (Multi Units)	32	17	15		2 or 3 bedroom	$500 - $600
Total	**80**	**49**	**31**		**Range**	**$500 - $1,000**

CONCEPT MASTERPLAN

CONCEPT MASTERPLAN - STAGING

1. HILLSIDE HOME UPHILL - single dwellings (Min. 400m²)
2. HILLSIDE HOME NARROW - single dwellings (Min. 400m²)
3. HILLSIDE HOME WIDE - single dwellings (Min. 400m²)
4. HILLSIDE HOME LOWSIDE - single dwellings (Min. 400m²)
5. ATTACHED SPLIT LEVEL HOME LOWSIDE - Terraces or Town Houses (Multi Units)
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10. TERRACE DWELLING Terraces or Town Houses (Multi Units)
11. TYPICAL 4B DWELLING - single dwellings (Min. 400m²)
12. TYPICAL 4B WITH DETACHED GARAGE - single dwellings (Min. 400m²)

STAGE 1

STAGE 2

HOUSING TYPES	TOTAL DWELLINGS	STAGE 1 DWELLINGS	STAGE 2 DWELLINGS	LOT PRICES $	HOUSE SIZE	HOUSE & LAND PRICES $ 000s
Lots - single dwellings (Min. 400m²)	27	20	7	$ 240,000 +	4 bedroom 2 garage	$700 - $800
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Detached Dual Occupancy (Detached)	4	0	4		3 bedroom (+std.?)	$650 - $750
Terraces or Town Houses (Multi Units)	32	17	5		2 or 3 bedroom	$500 - $600
Total	**80**	**49**	**31**		**Range**	**$500 - $1,000**

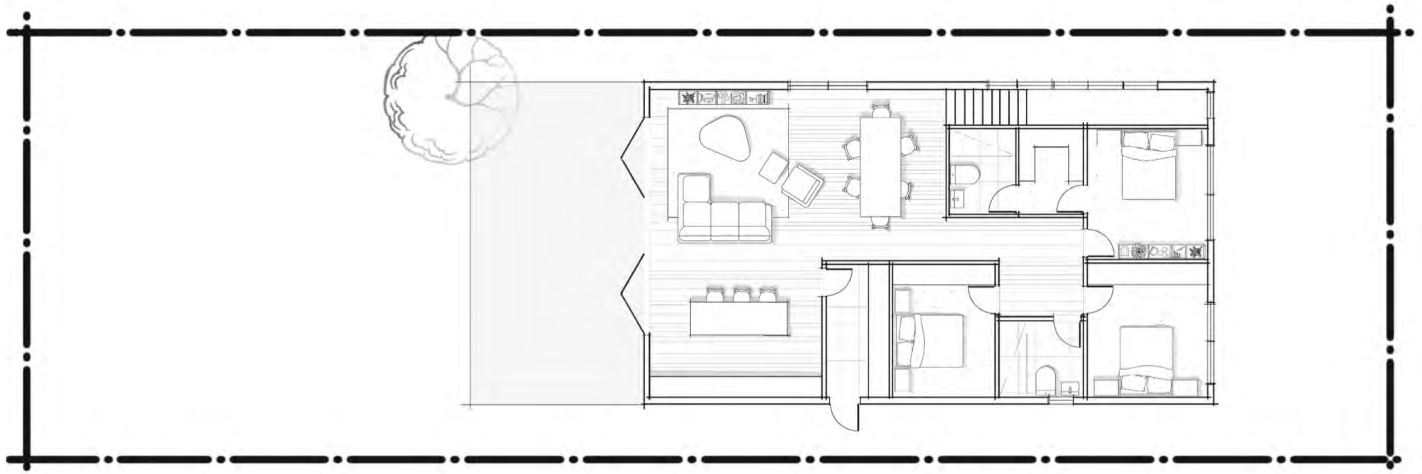
CONCEPT MASTERPLAN

PERSPECTIVE IMAGE

EXAMPLE HOUSE TYPES

2 | HILLSIDE HOME NARROW

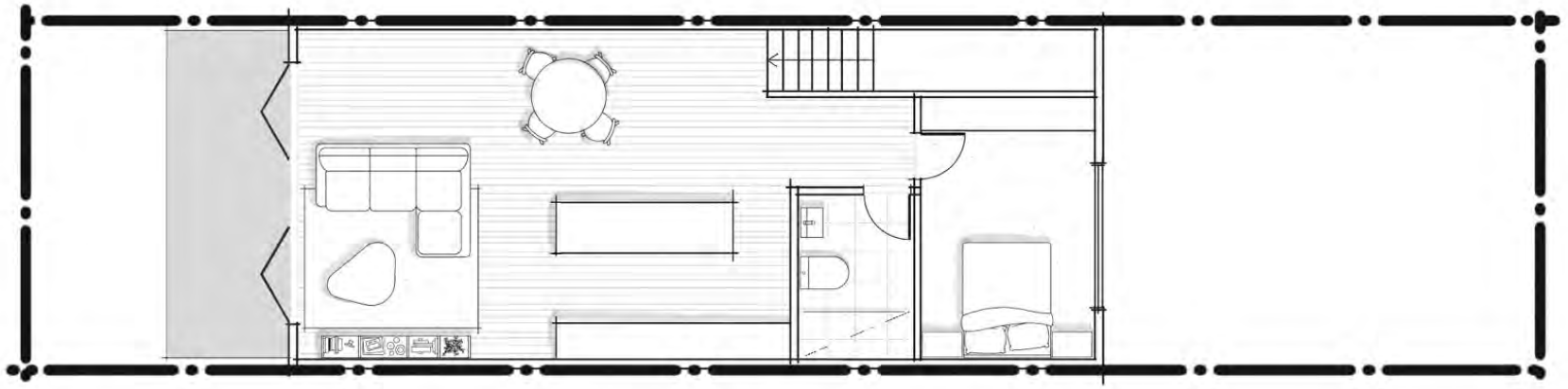
FIRST FLOOR



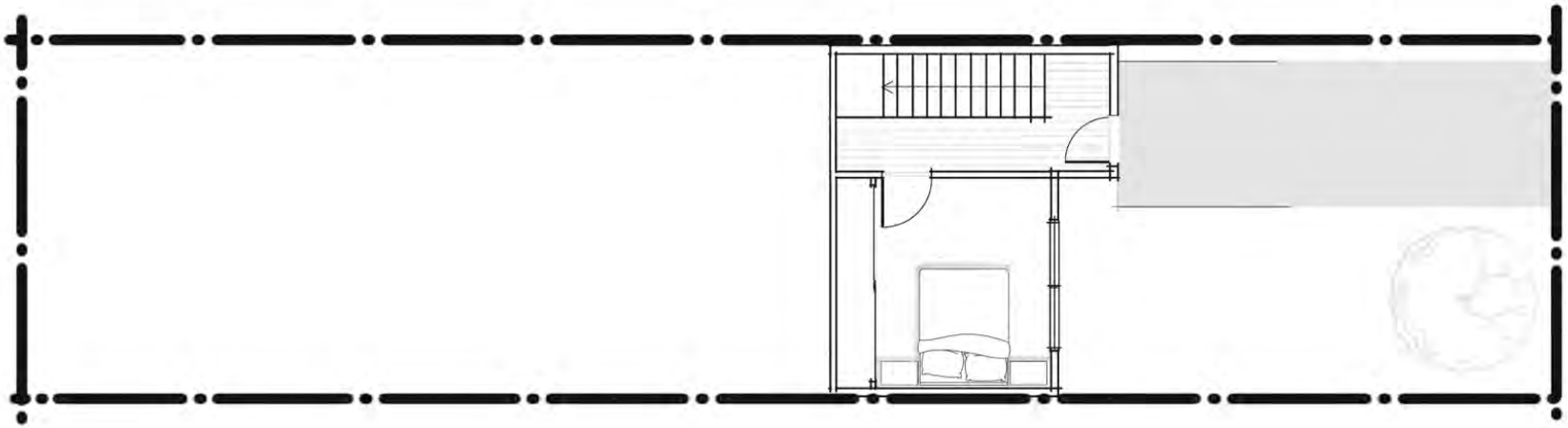
GROUND FLOOR

EXAMPLE HOUSE TYPES

5 | ATTACHED SPLIT LEVEL HOME LOWSIDE



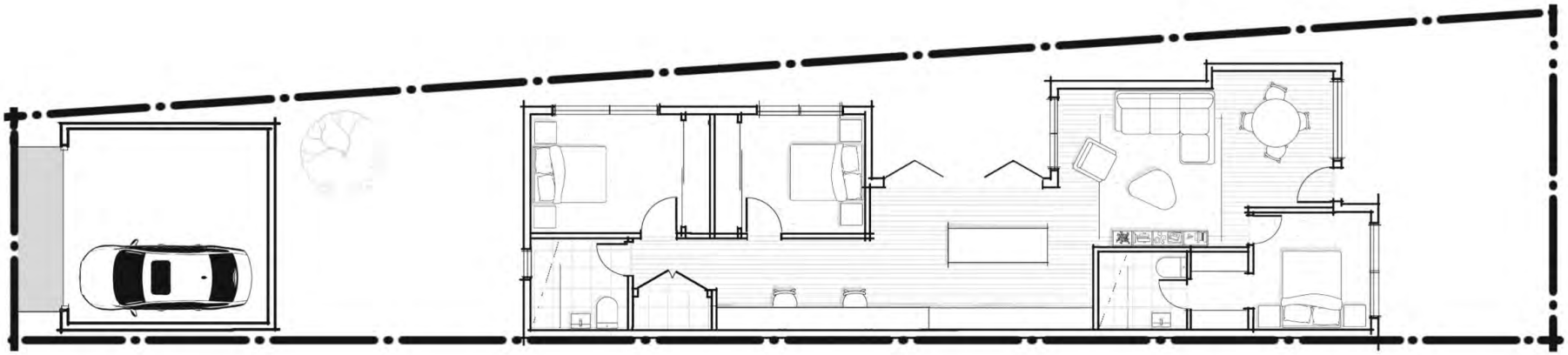
FIRST FLOOR



GROUND FLOOR

EXAMPLE HOUSE TYPES

7 | SINGLE STOREY 3B DWELLING ATTACHED



GROUND FLOOR

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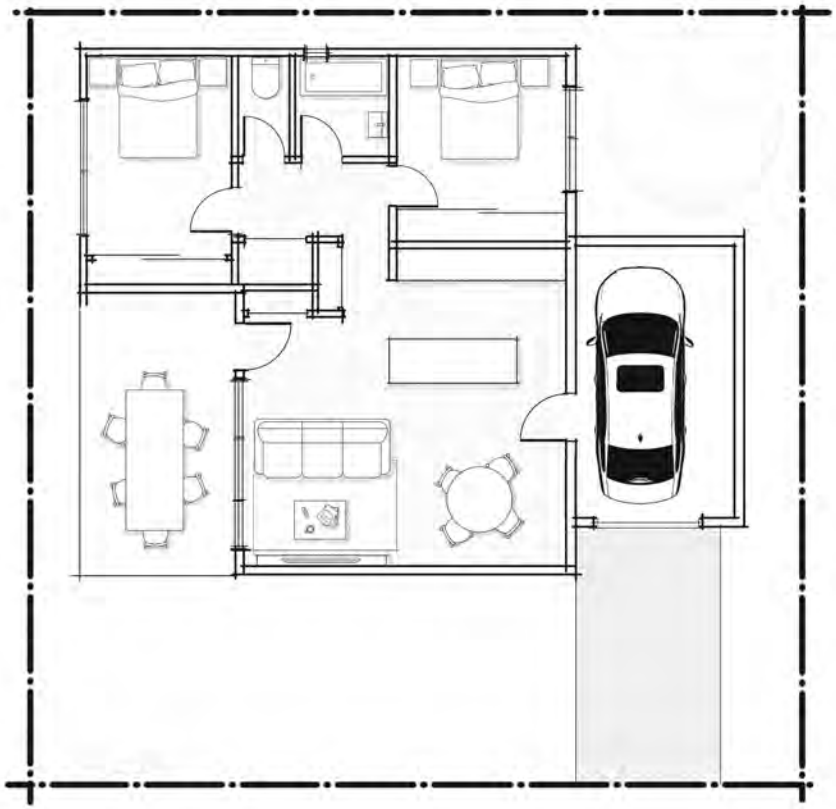
EXAMPLE HOUSE TYPES

8 | SINGLE STOREY 2B DWELLING



GROUND FLOOR

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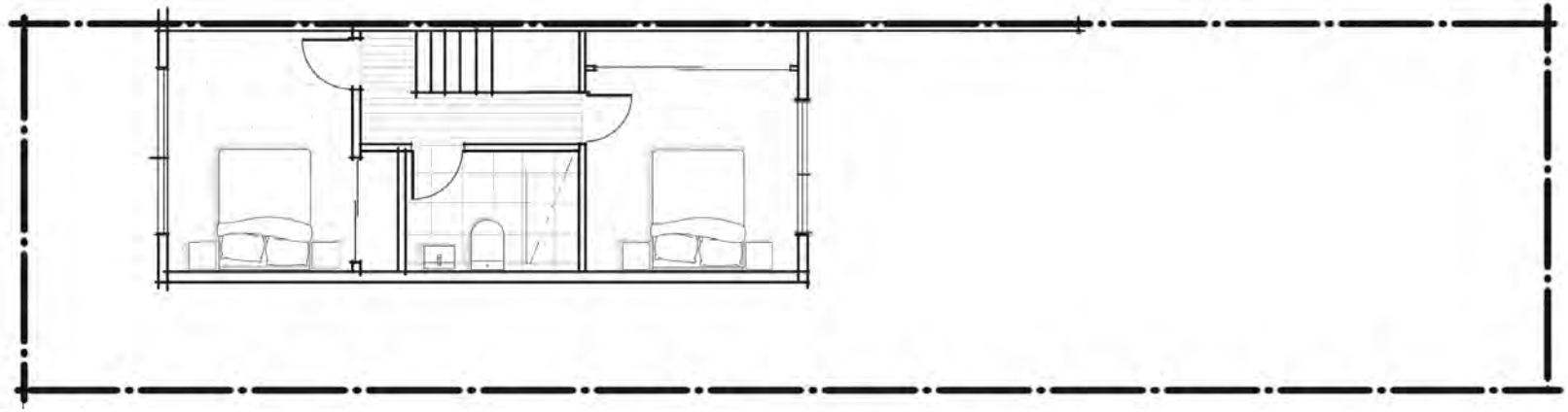
EXAMPLE HOUSE TYPES

9 | ATTACHED TWO STOREY DWELLING

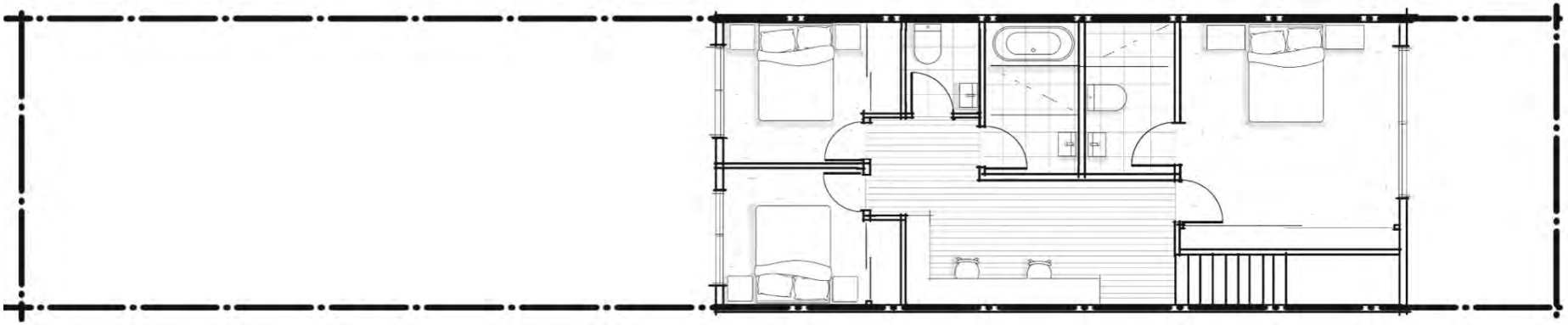


FIRST FLOOR

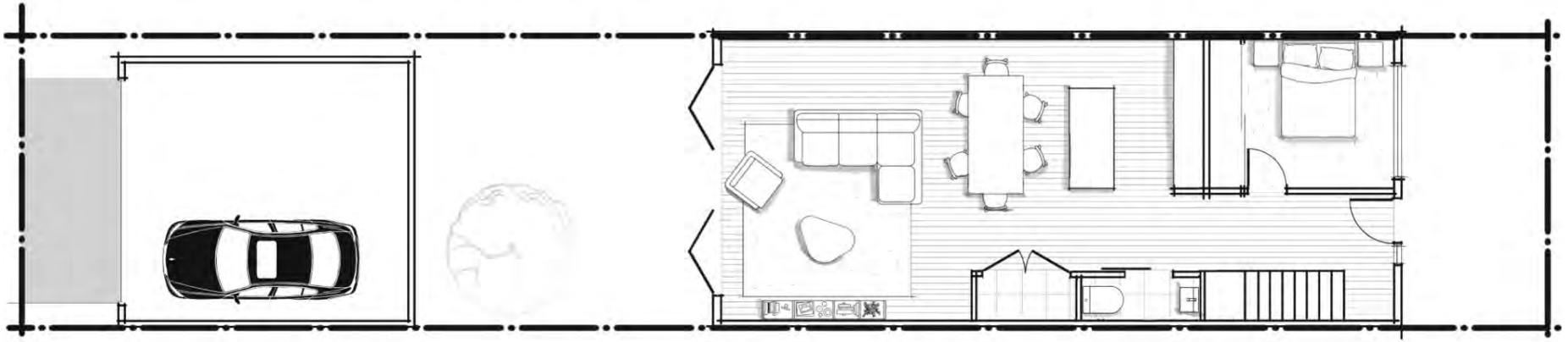
GROUND FLOOR

EXAMPLE HOUSE TYPES

10 | TERRACE DWELLING



FIRST FLOOR



GROUND FLOOR

INTEGRATED
DESIGN
GROUP
ARCHITECTURE|MASTERPLANNING|INTERIORS

APPENDIX H – DETAILED COMPLIANCE TABLE

LITHGOW DCP 2021 - DETAILED COMPLIANCE TABLE		
CLAUSE	OBJECTIVES	COMMENT
PART 5.2 SITE SELECTION, ANALYSIS & DESIGN RESPONSE		
5.2.1 SITE ANALYSIS & POTENTIAL LAND USE CONFLICT	a. That a detailed Site Analysis has been conducted/documented in accordance with the opportunities/constraints of the Site informed (where relevant) by this DCP	The various aspects of the site analysis have been carried out and documented in the Masterplan Document, this analysis was used to develop the proposed subdivision scheme.
	b. That the proposed development has provided an appropriate response to the Site Analysis for the proposed subdivision and the future intended use(s) whilst minimising potential land use conflicts and environmental impacts.	
5.2.2 WATER, NATURAL ENVIRONMENT & HAZARDS	O1. Stormwater Management: a) That stormwater systems are designed to maximise the resulting water quality leaving the site and manage water quantity to prevent environmental impacts and flooding. b) The need for inter-allotment drainage easements has been considered/addressed. c) For larger developments, detention basins and/or water sensitive urban design / water treatment mechanisms may be required.	Complies: Refer to Stormwater management Strategy and Stormwater Engineering Plans prepared by JWP.
	O2. Watercourses: That suitable setbacks for lot boundaries (and where necessary - building envelopes) are provided to: a) Address the risk of flooding; b) Protect and enhance watercourses (including water quality and quantity); and c) Provide riparian corridor buffers for protection of vegetation and water quality.	Complies: Refer to Stormwater Management Strategy and Stormwater Engineering Plans prepared by JWP.
	O3. Significant Vegetation: That it maximises the retention and protection of existing significant vegetation/trees from both the Subdivision and future development (including infrastructure). Council may require: a) A Survey Plan or other suitably accurate plan showing existing trees/species/approximate size and indicating which trees are to be retained or removed; b) An Arborist Report or other suitably qualified report that provides: i) justification for removal of any significant trees; and ii) demonstration that the subdivision and future development will provide sufficient protection for those trees to be retained.	Complies: Proposed subdivision does not involved the removal of any existing trees and maintains all significant vegetation on the site.
	O4. Hazards: That the site has limited hazards or that the hazards can be avoided or minimised/mitigated to an acceptable level for both the development area and associated access.	Complies: The proposed subdivision and road network avoids hazards and provides unlimited access to the site.
	O5. Slope: Subdivision on land with a slope of 20% or greater (being ~1:5 or 11o) is significantly constrained and needs to be supported by a Survey Plan and Geotechnical Report prepared by a suitably qualified person verifying the suitability of the proposed lot size considering any future (likely) building(s), hydrology and drainage, and site stability during site works, construction and operation of the development.	Complies: Survey plan has been provided and example house types indicate how houses can be developed on sloping arreas of the site through simple stepping in stories.
5.2.3 LOT SIZES, DIMENSIONS & SUITABILITY	O1. To provide lot sizes and dimensions that respond to the site constraints and opportunities and avoid or minimise / mitigate against existing and/or future land use conflicts.	Complies: Lot sizes and dimensions are compliant with relevant LEP minimum lot sizes and lot frontage requirements.

	O2. To increase lot sizes and dimensions (above the minimum) where sites have significant slope, site constraints, or natural hazards that would impact on the useability/amenity of the site layout and future development or environmental requirements in this DCP.	Complies: Lots that have an increased slope gradient have been fairly sized above the minimum requirements to ensure useability and amenity is adequate for future development.
	O3. To integrate infill subdivision(s) into existing urban and historic areas with similar pattern(s) and street frontage(s) to create consistent street character and improve navigation.	Complies: Infill subdivision has been considered for future developmnet and to respond to contextual character throughout Lithgow.
	O3 To ensure applications demonstrate that any proposed lot(s) in a subdivision, consolidation or boundary adjustment have an appropriate area and dimensions for the siting and construction of all proposed and/or likely development/buildings as well as ancillary or associated development.	Complies: Subdivision lot sizes have been designed to respond to a variety of housing typologies and are sized based on this analysis.
	O4. To achieve good urban design and (where relevant) residential amenity outcomes.	Complies: Residential amenity and urban design have been considered and are apparent in the masterplan with the inclusion of passive green spaces, walkable and rideable pathways and verges to accommodate future streetscape landscaping.
CONTROLS	1) Minimum Lot Size: Any lot(s) created must comply with the minimum lot size(s) in LLEP2014. However, this is a minimum size only and larger lot sizes may be required to respond to site constraints including, but not limited to the following: a) Site constraints and opportunities raised in DCP Sections 5.2.1 & 5.2.2 above; b) Requirements for on-site effluent disposal areas (if relevant); c) The objectives for lot size in LLEP2014; d) Provision of a range of lot sizes to enhance the character of an area and minimise development that is too repetitive in lot layout and design.	Complies: The subdivision includes various lot sizes to accommodate a variety of housing types. Minimum lot sizes have been achieved and are compliant with LLEP 2014. Refer to LEP compliance table for further information.
	2) Urban Areas: Subdivisions in or adjacent to an urban zone and/or area are to satisfy the following design standards: d) If a new public road is created, address the controls in DCP Section 5.7 – New or Upgraded Public Roads below; e) Ensure lot sizes and shapes address and relate to the prevailing dimensions (including street frontages), pattern or rhythm of subdivision in the surrounding locality, particularly in historic areas, where this is a significant part of the street or local character; f) Maximise the number of regular shaped lots (i.e., lots that are roughly rectangular in shape) so there are less constraints for future development and/or subdivision, particularly in existing/historic urban areas; g) Provide suitable road frontage lot widths to promote ease-of-access to and servicing/utilities for each lot without dominating the street and ensure buildings address the street (where relevant); h) Provide depth to width ratios that accommodate vehicle access, manoeuvring, and a range of standard building types/layouts with relevant setbacks.	Complies: Subdivision lot sizes have been designed to respond to a variety of housing typologies and are sized based on this analysis.
5.2.4 ACCES & ENTRANCES	O1. To provide all lots with safe, legal and practical vehicle access and manoeuvring area(s).	Complies: The proposal provides safe, legal and practical vehicle access and manouvering.
	O2. To provide safe and suitable access and manoeuvring for emergency vehicles and larger vehicles for servicing (as required).	Complies: The proposal provides suitable access for servicing and emergency vehicles.
	O3. To provide safe & suitable pedestrian/cycle access and facilities to encourage walking and/or cycling.	Complies: The proposal provides safe and suitable pedestriand and cycle ways.
	O4. To promote safe and efficient road and footpath environments for all road users, cyclists and pedestrians.	Complies: The proposal provides safe and efficient road and footpath environments for users.

	O5. To minimise the number of lots created that do not have a substantial frontage/ direct access to a public road.	Complies: The propsal subdivision addresses and minimises lots that have no street frontage. All lots have access of a pubiic road.
	O6. To ensure any access ways are of sufficient width and driveway construction to minimise impacts on neighbouring lots and provide suitable vehicle access.	Complies: Refer to Engineering Documentation
CONTROLS	1) Public Road: Each lot in a subdivision (including lots with adjusted boundaries) has safe, legal and practical access to a public road (maintained to Council's standards) either through: a) A direct frontage to that public road (this is the most desirable outcome for all new lots); b) A right-of-way arrangement through another lot; or c) By consolidation with an existing allotment that has access.	Complies: Refer to Engineering Plans
	2) Reference: Address the requirements of DCP Section 2.5 – Vehicle Access & Parking and Section 2.6 – Pedestrian Access, Mobility & Safety (where relevant).	Complies: Refer to Engineering Plans
	3) Right-of-Way: Council will only permit subdivision that creates lot(s) that rely for access on an easement or right-of-way (or other restriction on title) in a rural and/or environmental zone/area where all of the following are satisfied: a) No public road access is adjacent to, or could reasonably be provided to, the proposed lot(s); b) A maximum of: i) Three (3) lots will utilise any easement or right-of-way (including the primary lot providing the access and two (2) additional lots); ii) Two (2) allotments are behind any allotment which has direct frontage to a public road; c) There is a minimum carriageway width for a right-of-way of 10m with a 4m formation with appropriate drainage; d) Where the slope of a driveway exceeds 10%, the access is to have a two-coat bitumen seal; e) There is written approval from the affected lot owner (easement only).	Not Applicable
5.2.5 UTILITIES/EASEMENTS	O1. To provide all essential utilities to the boundary of any new allotment suitable for the proposed use in accordance with LLEP2014 Clause 7.10 Essential services.	Complies: Refer to Engineering Plans
	O2. To address any connection requirements of the relevant utility authority.	Complies: Refer to Engineering Plans
	O3. To protect the operation of utilities and ensure appropriate access.	Complies: Refer to Engineering Plans
	O4. To ensure that on-site effluent management (if required) can be accommodated on any proposed lot without significantly affecting adjacent properties or the natural environment.	Complies: Refer to Engineering Plans
CONTROLS	1) Reference: All subdivision(s) comply with and address DCP Section 2.8 – Utilities, Easements & Infrastructure (where relevant).	Complies: Refer to Engineering Plans
	2) Servicing Plan: A Concept Servicing Plan is to be submitted in support of all subdivision proposals detailing the location of all existing and proposed services to each lot including all existing and proposed easements.	Complies: Refer to Engineering Plans
	3) Easements: If any easements are reliant on or cross over land adjoining the proposed subdivision then owners' consent from that adjoining land is required to be provided with the application.	Not Applicable
5.2.6 SITING & VISIBILITY OF UTILITIES	O1. To minimise the visual impact of any new or upgraded utilities by undergrounding connections and integrating infrastructure into the subdivision design (where possible).	Will be addressed

CONTROLS	For larger subdivisions that will require significant new or upgraded utilities: 1) Impacts: Utilities are sited where: a) Utilities installation (and maintenance) will have the least impact on existing site stability and disturbance, significant native vegetation, watercourses or riparian/ecological corridors, or other environmentally sensitive areas; and b) Existing or proposed vegetation (considering mature height of trees etc.), natural hazards (bushfire or flooding), or the environment will have the least impacts on utilities.	Complies: Refer to Engineering Plans
	2) Efficiency: Utilities are sited to cater for all existing or future lots in an efficient and cost- effective manner that allows for future augmentation to allow for growth.	Complies: Refer to Engineering Plans
	3) Underground: New or relocated utilities are sited: a) Underground (particularly in heritage conservation areas, new urban release areas, or main streets); or b) Utilise existing poles (where possible), to the satisfaction of the relevant utility authority, unless other constraints make this unsuitable.	Complies: Refer to Engineering Plans
	4) Common Trenching: Compatible public utility services are sited in common trenching (where possible) in a service corridor (see Engineering Guidelines) in order to: a) Minimise the land area required and future constraints on development of that land; b) Reduce costs; and c) Minimise any environmental impact.	Will Comply
	5) Screening: Utility boxes and cabinets (e.g., electricity substations, meter boxes etc.) on private land above-ground must be integrated into the development and screened from public view whilst providing appropriate access (where appropriate).	Will Comply
5.2.7 STAGING	O1. Larger subdivisions must consider staged subdivision release and ensure each stage is capable of being developed independently of later stages and has appropriate access and utilities.	Complies: The proposal has beensplit into 2 stages, however the entire subdivision is being designed to ensure a holistic approach to lot sizes, layout and access to utilities.
CONTROLS	1) Plan(s): Where the subdivision of land will be (or is likely to be) carried out in stages or would result in a remnant parcel of vacant land capable of further subdivision, a Subdivision Plan (for the entire subdivision) is to clearly indicate: a) The entire land area to be subdivided (including land likely to be subdivided in the future) AND the boundaries of each stage of the subdivision; b) The proposed access, road structure, and other vehicle and pedestrian/bicycle connections for the development AND any likely future adjoining subdivision/development; c) Any staging of essential roads, infrastructure and/or other essential utilities/services or communal spaces and buildings.	Complies: Refer to Engineering Plans

	2) Connectivity: Each individual stage of a staged subdivision is to be designed to ensure it: a) Does not compromise suitable access to any other stage(s) of subdivision; b) Has access to essential infrastructure / utilities, roads and pedestrian connections, and landscaping in accordance with the controls in this DCP and is capable of operating independently of the infrastructure of later stage(s); c) Provides suitable capacity in infrastructure to allow for future development (that is likely to utilise or extend that infrastructure) to occur without significant capacity constraints/ upgrades; d) Provides a fully formed cul-de-sac or turning head (see Council's Engineering Guidelines) for any temporary terminating roads (that will later become through roads) so that the maximum sized design vehicle can enter and exit the cul-de-sac with a maximum three-point turn.	Complies: Refer to Engineering Plans
	3) Future Growth: The staged subdivision of land is designed so that it promotes ease of future road access and infrastructure connection for adjacent land (not part of the subdivision application) where there is a reasonable likelihood it could be developed in the future (even if not currently identified in Council's relevant land use strategies).	Complies: Refer to Engineering Plans
PART 5.3 URBAN RESIDENTIAL SUBDIVISION		
5.3.1 LOT SIZE & ARRANGEMENT - GENERAL	O1. To provide a range of lot sizes to suit a variety of residential type(s) and densities.	Complies: Lot sizes and dimensions are compliant with relevant LEP minimum lot sizes and lot frontage requirements. A variuety of lot sizes have been included to allow for a range of housing diversity.
	O2. To ensure new subdivisions in or adjacent to existing urban areas complement the existing subdivision pattern and character of the existing urban area.	Complies: The proposal takes into consideration the adjacent proposed and existing subdivision patterns and character.
	O3. To promote lot sizes, shapes and orientation that will maximise the number of lots with potential solar access to the future living spaces and private open spaces of new dwellings.	Complies: The proposal provides varied lots, with a focus on allowing the maximum amount of lots to have adequate solar access.
	O4. To require sufficient road frontage for all new lots for appropriate driveway access whilst encouraging dwellings to have a frontage/address to the street.	Complies: The proposal provides lots that have adeqaute frontage to roads, in some cases the lots are rear loaded to allow for a pedestrian focused street frontage.
	O5. To ensure that lots in villages without reticulated sewer have sufficient size to accommodate on- site effluent management as well as proposed or future development.	Not Applicable
CONTROLS	1) Sewerage: All new lots are to comply with DCP Section 2.8.1 – Connection to Utilities. Where a village does not have reticulated sewer then lots sizes must address the requirements of DCP Section 2.8.3 – On-Site Sewage Management.	Complies: Refer to Engineering Plans
	2) Dwelling Diversity: The design of a subdivision creating 10 or more lots is to: a) Provide a range of lot sizes that can encourage diversity in residential type(s)/densities suited to the land use zone and desired character of the area; b) Highlight where different residential type(s)/densities could locate and any additional future subdivision potential; and c) Consider how corner lots could support future dual occupancies and/or subdivision.	Complies: The proposal provides a variety of lot sizes to support a range of housing diversity appropriate to various demographics.

	3) Lot Width: All lots (excluding battle-axe lots and medium density housing) are designed to have a minimum width of: a) 10m at the building line (see front setbacks in DCP Chapter 6 – Residential Development) for a rectangular lot; b) 8m at the street frontage for a 'fan' or 'radial' shaped lot and 14m at a point setback 6m from any road frontage.	Complies: The proposal complies with the DCPs lots width requirements.
	4) Layout/Orientation: The subdivision design is to consider lot layout and orientation that will: a) Maximise the opportunity for dwellings to have sufficient presentation and openings to the primary (street) frontage and contribute positively to the streetscape; b) Promote dwelling separation, privacy, landscape and open space(s) and residential amenity; c) Demonstrate adequate solar access for all proposed future and existing neighbouring dwellings and maximise good solar orientation (see diagram below) subject to site constraints; and d) Minimise overshadowing between future dwellings, for example, by providing suitable lot widths that allow for up to a two-storey building and respond to topography/slope.	Complies: The proposal provides varied lots, with a focus on allowing the maximum amount of lots to have adequate solar access.
5.3.2 ACCESS TO LOTS WITH LIMITED OR NO ROAD FRONTAGE	O1. To promote safe and efficient access to urban residential lots.	Complies: The proposal provides safe and efficient acces to residential lots with reduced street frontage.
	O2. To provide sufficient driveway widths & design for battle-axe lots to minimise impacts on adjacent residential lots and accommodate traffic requirements.	Complies: The proposal provides sufficent access widths to residential lots with reduced street frontage.
CONTROLS	A subdivision proposal that will create a battle-axe lot(s) (or lot(s) accessed by an easement/right- of-way) addresses the following design standards: 1) Amount: Battle-axe lots in an existing urban residential zone: a) If a lot is a battle-axe lot or other lot with an access handle, the area of the access handle is not to be included in calculating the lot size for the purposes of Clause 4.1 of the Lithgow LEP 2014. b) Are only used where it is not feasible to extend a road to the frontage of the lot and a battle- axe lot is needed to efficiently use the land; and c) Do not unreasonably impact on the amenity of adjacent residential lots.	Not Applicable
	2) Access: Each battle-axe lot has a minimum access handle/easement width of: a) 4.5m for access to a single lot; or b) 6.0m for combined access to two lots (with reciprocal easements for access and services); and Access handle lengths do not exceed 60m.	Not Applicable
	3) Access Seal: A sealed or concrete pavement is constructed for the full length of the access handle in accordance with Council's Engineering Guidelines prior to release of the Subdivision Certificate; and	Complies: Refer to Engineering Plans
	4) Higher Densities: If the proposed battle-axe lot is intended to be used for more than a single dwelling and/or dual occupancy (i.e., it is for the purposes of medium density housing) then it may require: a) A wider access handle/driveway seal for two-way vehicle traffic; and b) Consider additional width to include setbacks and/or landscaping to minimise impacts on adjacent lots/dwellings.	Complies: Refer to Engineering Plans
PART 5.5 LARGE LOT RESIDENTIAL & RURAL SUBDIVISION		

5.5.1 ACCESS & ROAD DESIGN	O1. To provide safe and efficient access points to/from proposed lots to rural roads.	Not Applicable
CONTROLS	New driveways to public roads are grouped at existing or limited access points (if feasible) to: 1) Minimise the traffic impact and risk of additional access points to the public road system; and	Not Applicable
	2) Ensure sight lines in accordance with DCP Section 2.5.3 - Vehicle Access & Driveways and Council's Engineering Guidelines.	Not Applicable
5.5.2 ACCESS TO LOTS WITH LIMITED OR NO ROAD FRONTAGE	O1. To ensure lots have sufficient access widths to cater for the intended traffic and minimise impacts on adjacent lots.	Not Applicable
CONTROLS	The design of a subdivision that includes battle-axe lots or access to a lot via an easement/right-of- way has regard for the following design standards: 1) Each lot has a minimum access handle width of: a) 6.0m for access to a single lot; b) 8.0m for combined access for up to three (3) lots (with reciprocal easements for access and services); and	Not Applicable
	2) A minimum 3.5m wide road is constructed for the full length of the access handle in accordance with Council's Engineering Guidelines.	Not Applicable
PART 5.7 NEW OR UPGRADED PUBLIC ROADS		
5.7.1 GUIDELINES	O1. To ensure any road design comply with relevant road and access guidelines adopted by Council.	Complies: The proposal complies with the DCPs road and access guidelines.
	New road design(s) for residential subdivisions comply with Council's Engineering Guidelines and other relevant development standards including, but not limited to (as amended): 1) Roads & Traffic Authority (RTA – now Transport for NSW) (2002) Guide to Traffic Generating Development; 2) Roads & Traffic Authority (RTA – now Transport for NSW) (1995) Road Design Guide; 3) Relevant Australian Standards; 4) AUSTROADS (1988) Guide to Traffic Engineering Practice; 5) AUSTROADS Guide to Road Design; and 6) Council Policy 10.5 – Footpath Reservations – Works Requirements.	Complies: Refer to Engineering Plans
5.7.2 SURROUNDING ROAD PATTERNS & ACCESS	Any subdivision design that includes new public road(s) must: O1. Integrate with the surrounding road network and other pedestrian/bicycle and open space connections and be sympathetic to settlements with strong grid pattern road systems.	Complies: Refer to Engineering Plans
	O2. Provide a subdivision pattern and road layout that enables adjacent lands to be developed as urban growth occurs.	Complies: Refer to Engineering Plans
CONTROLS	1) Navigation: Any new road pattern integrates with the adjacent road network and promotes ease of navigation and way-finding for someone not familiar with the neighbourhood.	Complies: Refer to Engineering Plans
	2) Pattern: Where a grid road pattern is dominant in a locality, that pattern (modified to suit the site and solar orientation) is maintained except where steeper topography dictates a curvilinear road pattern to significantly reduce cut and fill.	Complies: Refer to Engineering Plans
	3) Connection(s): New roads and pedestrian/bicycle paths are designed to connect to existing surrounding roads and road heads and shared pathways networks where they exist adjacent (or in reasonable proximity) to the proposed subdivision (particularly in urban zone and/or area where connectivity would benefit the broader community).	Complies: The proposal responds to existing site context, including roads, pedestrian paths and cycleways. Also taking into consideration the future intention for new cycle ways into Lithgow City Centre.

	4) Future Connection(s): A subdivision of land adjacent to land that has additional development potential (or is likely to in the future) makes provision for future road access to the adjacent (developable) land.	Complies: The proposal has taken into considertaion the future potential of subdivision on neighbiouring properties for allowing road conections through to the nieghbouring properties.
	5) Open Space: Where there is a drainage corridor or public open space proposed as part of the subdivision, where possible roads front these spaces rather than the backs of lot(s) to encourage access, maintenance, safety and improved recreational use and environmental outcomes. See DCP Section 5.4.3.5 – Public Open Space & Facilities.	Complies: Refer to Engineering Plans
5.7.3 ROAD HIERARCHY & DESIGN	O1. To provide a logical road pattern / clear hierarchy of roads.	Complies: The proposal provides a logical road pattern and hierarchy, which responds to future neighbouring subdivision opportunities.
	O2. To provide suitable vehicle, pedestrian and cycle connections and navigation to key services and attractions (suited to the size and density of the subdivision and surrounding network/connections).	Complies: The proposal provides suitable vehicle, pedestrian and cycle connections to key services.
CONTROLS	A development proposal considers relevant traffic impacts and, where warranted, provides a Local or Area-Wide Traffic & Parking Assessment (or similar, see Council's DA Guide) in support of a development application that addresses: 1) How the road hierarchy will promote ease-of-navigation and connectivity for vehicles, pedestrians, and bicycles (where relevant);	Complies: Refer to Engineering Plans
	2) The impact of any traffic generation from the proposed subdivision on the proposed and existing road network and pedestrian / cycle routes;	Complies: Refer to Engineering Plans
	3) The maximum vehicle sizes likely to utilise the road network during construction and future use and provision of appropriate turning paths for the largest vehicle sizes; and	Complies: Refer to Engineering Plans
	4) The location, design and safety of any intersections or crossings.	Complies: Refer to Engineering Plans
5.7.4 TERMINATING ROADS (CUL-DE-SACS)	O1. To minimise the use of cul-de-sacs, their length, and number of lots serviced by any cul-de-sac, and ensure they cater for waste collection and other services.	Complies: The proposal has mitigated the use of traditional cul-de-sacs by designing circuit roads around common green space. The circuit roads allow for access by service vehicles and garbage trucks.
	A subdivision design in an urban zone and/or area includes cul-de-sacs only where: 1) There are no other suitable alternatives; and	Complies: The circuit road responds to the irregular lot shape towards the south east of the current lot.
	2) Each cul-de-sac does not service more than 25 lots; and	Complies
	3) Each cul-de-sac is no longer than 150m from the nearest intersection;	Complies
	4) Each cul-de-sac has a turning facility to cater for a 12.5m truck or standard waste collection truck;	Complies
	5) Large vehicles (greater than 12.5m in length) will not need to rely on the cul-de-sac to turn around (i.e. cul-de-sacs will only be considered in commercial and industrial zones where there is on site turning capacity for every lot); and	Complies
	6) The design complies with Council's Engineering Guidelines relating to cul-de-sacs.	Complies: Refer to Engineering Plans
5.7.6 SAFETY & SURVEILLANCE	O1. To ensure new roads are designed in accordance with crime prevention principles and to maximise safety and amenity for users.	Complies: The proposal has taken into consideration the impacts of safety and surveillance, arranging lots in a way to allow for passive surveillance to areas that may be of concern.

CONTROLS	The design of a subdivision that creates a new public road or extends an existing road by more than 50 metres addresses DCP Section 2.7 Designing for Crime Prevention including, but not limited to: 1) Appropriate locations and orientations of lots and building envelopes to maximise casual surveillance of the street;	Complies: Refer to Engineering Plans & Masterplan Document
	2) Provision of appropriate lighting of roads, public spaces and walkways;	Will Comply
	3) Clear boundaries between public open space / streets, communal open space (if applicable) and private open spaces;	Complies: Refer to Engineering Plans & Masterplan Document
	4) Appropriate landscaping and fence design.	Will Comply
5.7.7 PUBLIC DOMAIN LANDSCAPING & STREET TREES	O1 New urban subdivisions must have street tree planting provided to soften the proposed future buildings and streetscape whilst accommodating required vehicle and pedestrian access and movement.	Complies: The proposal adopts a wider verge along key roads to encourage larger street trees to be planted along key pedestrian links throughout the subdivision.
CONTROLS	A development application for the subdivision of land in urban zones and/or areas that includes a new road is supported by a Public Domain Landscaping Design that includes/addresses the following: 1) Avenue planting along all new public roads including at a minimum: a) One (1) street tree per lot frontage (up to a 40m frontage); or b) One tree every 25m (for all lots with road frontages greater than 40m).	Will Comply. Refer to Masterplan Document for initial site analysis.
	2) Species are to be selected in discussion / agreement with Council's Parks & Recreation Supervisor (or another authorised officer).	Will Comply

LITHGOW LEP 2014 - DETAILED COMPLIANCE REVIEW		
CLAUSE	REQUIREMENT	COMMENT
PART 4. PRINCIPLE DEVELOPMENT STANDARDS		
4.1 MINIMUM SUBDIVISION LOT SIZE	R1 - 400m2 R2 - 800m2 R5 - 4000m2	Complies: The proposed development is consistent with the relevant requirements and aims of Part 4.1 of the Litghow LEP 2014
4.1A MINIMUM LOT SIZES FOR DUAL OCCUPANCINES, MULTI DWELLING HOUSING AND RESIDENTIAL FLAT BUILDINGS	ZONE R1 - DUAL OCCUPANCY (ATTACHED) - 500m2 DUAL OCCUPANCY (DETACHED) - 600m2 MULTI DWELLING HOUSING - 800m2	Complies: The proposed development is consistent with the relevant requirements and aims of Part 4.1A of the Litghow LEP 2014
4.3 HEIGHT OF BUILDINGS	Not Applicable	Not Applicable
4.4 FLOOR SPACE RATIO	Not Applicable	Not Applicable

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APPENDIX I – NEIGHBOURS CONSENT LETTERS

General Manager
Lithgow City Council
180 Mort Street,
LITHGOW NSW 2790

Owners Letter of Consent

We are the owners of Lot 2 in DP 1049398.

We hereby provide our owners consent to the lodgement of a DA by Lithgow City Council and agree to the following items being undertaken on our land as part of the development of the project known as the Three Trees Project on Lot 1 DP 1082148 which is adjacent to our land.

1) Construction of sewer main across the property.
2) Construction of two temporary turning heads that will be fenced and located on temporary easements to be extinguished when we develop.
3) Construction of tail-out drain on an easement to disperse the water runoff that is currently natural overland flow to be removed when we develop, and the stormwater is connected.
4) Establish a temporary 12m wide APZ in an easement along the boundary which will extinguish when we develop.
5) Agree to allow Council to upsize to downstream water quality device when you construct it.

Your faithfully

…….

Owners.

General Manager
Lithgow City Council
180 Mort Street,
LITHGOW NSW 2790

Owners Letter of Consent

We are the owners of Lot 252 in DP 1045308 known as Sweetbriar House and Lot 2 DP 1082148.

We hereby provide our owners consent to the lodgement of a DA by Lithgow City Council and agree to the following items being undertaken on our land as part of the development of the project known as the Three Trees Project on Lot 1 DP 1082148 which is adjacent to our land.

1. Build a temporary turning head at the end of the road (as shown on the JWP-3TH) layout on a temporary easement on our land adjoining the proposed development. This temporary easement to be extinguished when we develop our land
2. For a temporary easement for an 12m wide APZ (asset protection zone) which will be maintained by council and extinguished when we develop or otherwise deal with our land.

John Baxter & Heather Baxter (Signatures)

Owners.

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APPENDIX J – HERITAGE STATEMENT

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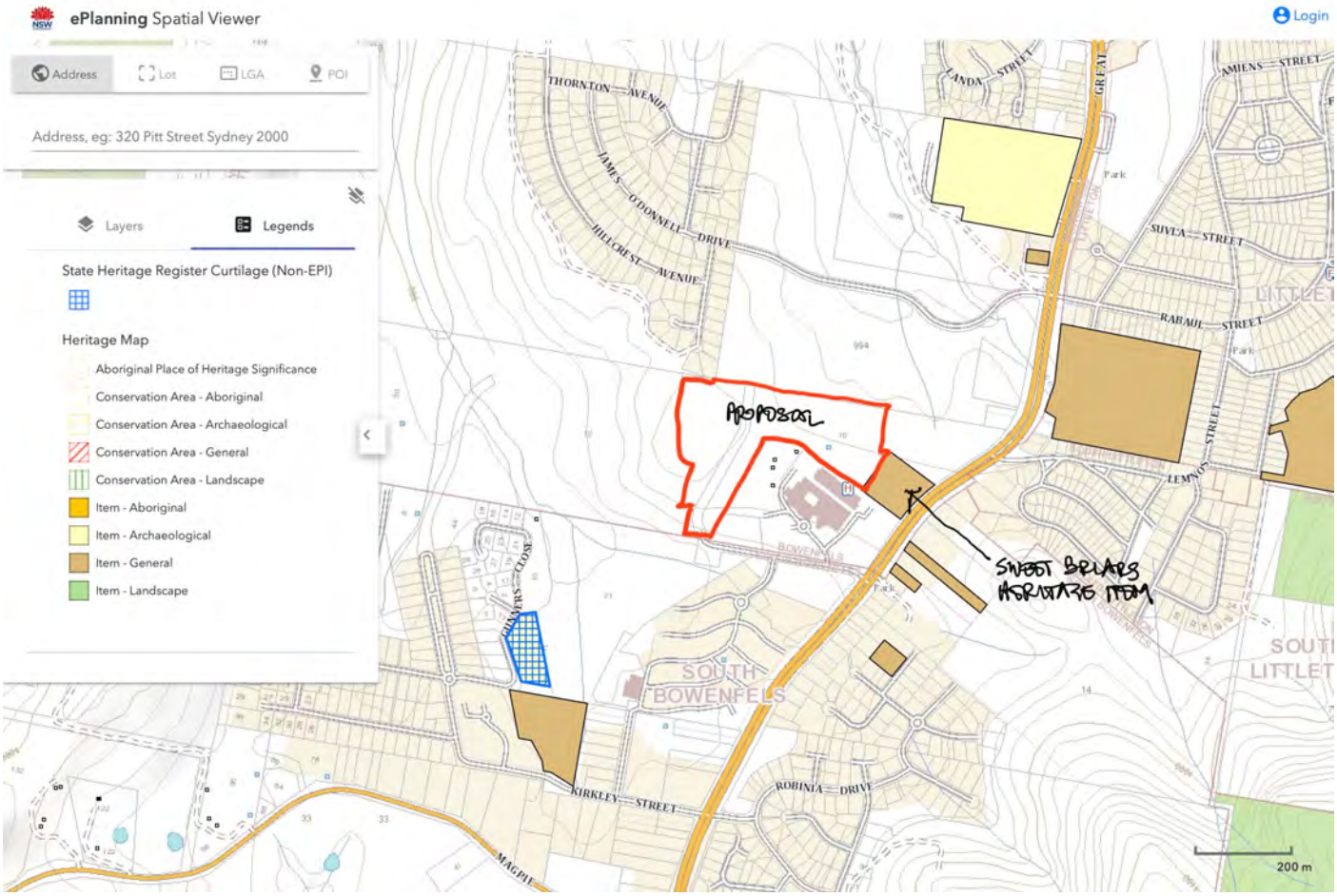
HERITAGE IMPACT STATEMENT

8 December 2022

10 Col Drewe Drive
SOUTH BOWENFELLS NSW 2790

RE: “Sweet Briars” - Great Western Highway, South Bowenfels, NSW 2790

The Heritage Item “Sweet Briars” adjoins the proposed subdivision of 10 Col Drewe Drive, Bowenfels, NSW, 2790 (Lot 1 DP 1268778). Within the scope of Lithgow Local Environment Plan 2014, Cl 5.10, The Item SHR/LEP/S170 “has historic significance and is assessed as rare on a state basis”. The Item Details within the LEP schedule identifies a cottage, office, shop, etc and a range of outbuildings and agricultural activity and associated archeological sites. The Heritage Map identifies the extent of the item adjoining but not within the proposed development site.



The proposed development is located generally topographically ‘below’ and ‘to the rear’ of the heritage item, beyond outbuildings, fencing and limited vegetation that define a natural curtilage of the identified item. Aspects of the development, especially toward the west on Three Tree Hill will form a midrange to distant backdrop to the item, though key views of the heritage item from public spaces are not readily available (due to foreground landscaping), nor likely to be greatly impacted by the proposal.

The residential forms likely to result in close proximity to the heritage item will be of a smaller bulk than extant component parts of the heritage context. Notwithstanding, the heritage item itself is constituted of a disparate combination of existing and previous rural outbuildings, forming a productive precinct. In this regard the proposal is somewhat compatible with the nature of an arrangement of buildings to create a ‘place’. In particular, ‘the Circuit’ precinct of the proposal, which is the closest part of the development adjoining the heritage item, is itself, such a compilation of individual buildings arranged around a central space.

It is possible, if appropriate, that 'the circuit' could contain heritage interpretive information within the public domain to describe the uses and history of the area and the adjoining item.

It is proposed that the interface between heritage item and development be defined with a rural type fence (ref Landscape section of the SEE), together with appropriate setback of built structures and selection of landscape treatment so as to maintain the rural character of the curtilage boundary. Similarly, materials selections for (eg roofing) new buildings could be considered with reference to elements of the heritage item to create a sympathetic (but not copyist) relationship and transition between new and old.

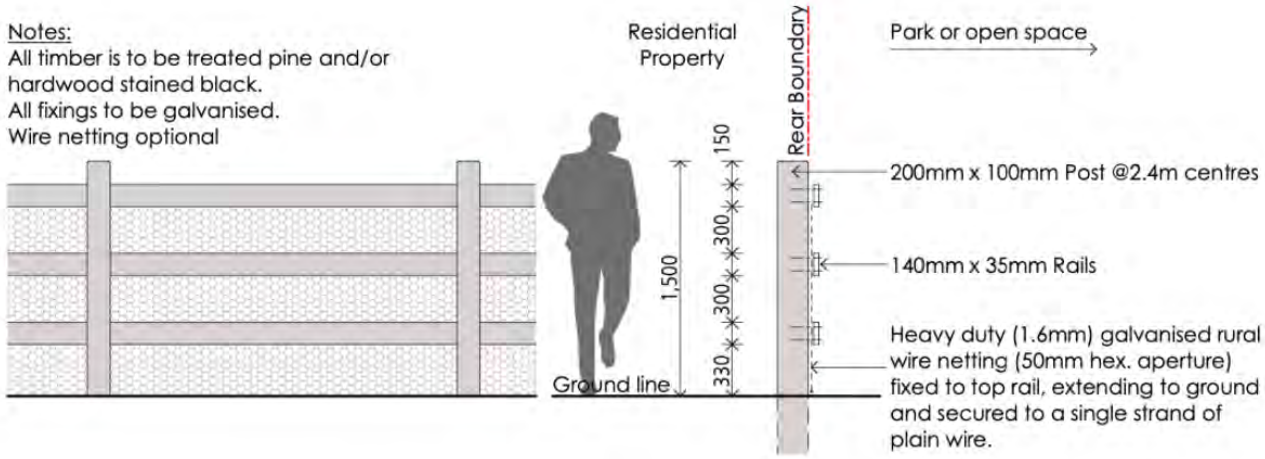


FIGURE 6. HERITAGE FENCE DETAIL

It is possible, though unexpected, that heritage 'finds' are encountered in the Works proposed for the development. In such an event the requirements of The Act should be met in respect of discovery, protection and interpretation.

There is no expected detrimental impact of the proposal, beyond what would have already been envisaged in the zoning of the subject site for residential purposes. Existing, approved and expected development of the area means the rural setting of the heritage item has already transitioned and the proposal continues this trajectory in an expected manner. Nonetheless, the proposal does demand sensitivity at the interface between development and heritage item but positively also creates interpretive opportunity of the heritage item within proposed public domain in close proximity.

SUMMARY

The heritage item includes a range of surviving buildings and archaeological evidence as a ‘rural cluster’ of “rare” and “state significance”. The item represents a range of European historical agricultural and commercial endeavours. The components of these are described in the LEP item description.

The known extent of the heritage item is defined within the Mapping in the LEP. It is not expected that the subject site includes additional items of significance but, if discovered during development, will be treated in accordance with The Act.

The interface between development and item will be treated sympathetically with a rural type fence according to the attached detail and material os adjoining buildings can be considered sympathetically.

There is no negative impact on the heritage item expected, beyond what is envisaged in the zoning of the subject site and already evidenced in the transition of the precinct. There is potential for positive interpretation of the heritage item within public domain of the development if this is deemed appropriate, either in the course of development or at some future time.