

Infrastructure Delivery Plan

South Ingleside Precinct

80221013



Prepared for

Department of Planning, Industry and
Environment c/o Cox Architecture

29 March 2021

Contact Information

Cardno (NSW/ACT) Pty Ltd

ABN 95 001 145 035

Level 9 - The Forum
203 Pacific Highway
St Leonards 2065
Australia

www.cardno.com

Phone +61 2 9496 7700

Fax +61 2 9496 7748

Document Information

Prepared for Department of Planning,
Industry and Environment c/o
Cox Architecture

Project Name South Ingleside Precinct

File Reference 80221013 Ingleside IDP v6

Job Reference 80221013

Date 29 March 2021

Version Number 6

Author(s):

Kunal Rudra

Effective Date 29/03/2021

Approved By:

Garry Neville

Date Approved 29/03/2021

Document History

| Version | Effective Date | Description of Revision | Prepared by | Reviewed by |
|---------|----------------|-------------------------|-------------|-------------|
| 1 | 13/11/20 | Draft for review | KR/JD | AG |
| 2 | 19/11/20 | Draft for review | KR/JD | AG |
| 3 | 26/11/20 | Draft for review | KR | AG |
| 4 | 01/12/20 | Draft for review | KR | AG |
| 5 | 02/03/21 | Draft for review | KR | MZ |
| 6 | 29/03/21 | Final | AP | GN |

© Cardno. Copyright in the whole and every part of this document belongs to Cardno and may not be used, sold, transferred, copied or reproduced in whole or in part in any manner or form or in or on any media to any person other than by agreement with Cardno.

This document is produced by Cardno solely for the benefit and use by the client in accordance with the terms of the engagement. Cardno does not and shall not assume any responsibility or liability whatsoever to any third party arising out of any use or reliance by any third party on the content of this document.

Table of Contents

| | |
|-------------------------------------|------------|
| Table of Contents | iii |
| 1 Executive Summary | iv |
| 2 Introduction | 1 |
| 2.2 South Ingleside | 2 |
| 3 Infrastructure review | 2 |
| 3.2 Potable Water | 2 |
| 3.2.1 Existing Network | 2 |
| 3.2.2 Proposed Major Infrastructure | 4 |
| 3.2.3 Conclusion | 7 |
| 3.3 Waste Water | 7 |
| 3.3.1 Existing Network | 7 |
| 3.3.2 Proposed Major Infrastructure | 8 |
| 3.3.3 Conclusion | 10 |
| 3.4 Electrical | 10 |
| 3.4.1 Existing Network | 10 |
| 3.4.2 Proposed Development Demand | 14 |
| 3.4.3 Ausgrid Network planning | 14 |
| 3.4.4 Conclusion | 15 |
| 3.5 Telecommunications | 16 |
| 3.5.1 Existing Network | 16 |
| 3.5.2 Proposed Development Demand | 18 |
| 3.5.3 Conclusion | 18 |
| 3.6 Gas | 18 |
| 3.6.1 Existing Network | 18 |
| 3.6.2 Proposed Development Demand | 19 |
| 3.6.3 Jemena Consultation | 19 |
| 3.6.4 Conclusion | 19 |
| 4 Opinion of Probable Cost | 20 |

1 Executive Summary

Cardno has been engaged by the Department of Planning and Environment c/o Cox Architecture to provide engineering services to assist in the preparation of an Infrastructure Delivery Plan to inform a rezoning process and subsequent urban development for the Ingleside Precinct.

The Ingleside Precinct is located in the Northern Beaches Local Government Area and covers approximately 700 hectares. Cardno previously completed an Infrastructure Delivery Plan (IDP) for the entire Ingleside Release Area in May 2016, at which time the development was proposed to yield approximately 3500 dwellings.

It is understood that bushfire evacuation constraints now limit the development yield of the Ingleside Precinct to approximately 980 new dwellings and 130 existing dwellings, which are to be located within the South Ingleside Sub-Precinct.

This Infrastructure Delivery Plan is reliant upon traditional suppliers of utility infrastructure. This is the preferred approach of the Department of Planning and Environment, owing to the fragmented land ownership within the Ingleside Precinct and the potential for the full development of the Precinct to be protracted over a period of time. Notwithstanding, developers and land owners have the capacity to seek alternative servicing arrangements within the Ingleside Precinct as part of the Development Application process.

The South Ingleside Sub-Precinct can be adequately serviced with potable water. The South Ingleside Sub-Precinct can be serviced via new trunk mains from the Elanora Heights Reservoir combined with a booster to service the high elevation areas. Sydney Water has also advised that additional lead-in water mains would be required to meet the forecast demands of the development.

With respect to analysing the feasibility of sewer serviceability to the South Ingleside Sub-Precincts, the key consideration is the portion of the Sub-Precinct(s) which can be drained via gravity. Pressure infrastructure is reliant on sewer pumping stations (SPS). The planning and commissioning of these assets has a significant impact on development programs and requires upfront investment on the part of Sydney Water. The South Ingleside Sub-Precinct can be serviced via gravity sewer.

In consideration of electrical servicing, the current Mona Vale Zone Substation has adequate capacity to service the proposed development. It is however expected that more than lead-in 11kV feeders will be required to be constructed from Mona Vale Zone Substation to the Precinct. It is expected that 2 feeders will be required to supply the development.

In regards to telecommunications, the areas of the development proposed are predominately serviced by NBN and Telstra. While there is no new telecommunications infrastructure planned for this area, it is anticipated that NBN will cooperate with the developers of the Precinct to improve and extend the NBN network as required if the development is deemed to be commercially viable.

Natural Gas is available in the vicinity of the Precinct however the existing infrastructure is insufficient to supply the proposed 980 new dwellings and 130 existing. A High-Pressure network is located on Mona Vale Road, which would be utilised for a new District Regulator station used to supply the 980 new and 130 existing dwellings. From this Regulator Station, a feeder would be required to be extended throughout the designated area. In due course, Jemena will cooperate with the developers to improve the network as required, as long as the development is commercially viable. Should the development not be deemed viable for Jemena, the developer may be required to provide contribution fees to ensure the provision of gas services.

2 Introduction

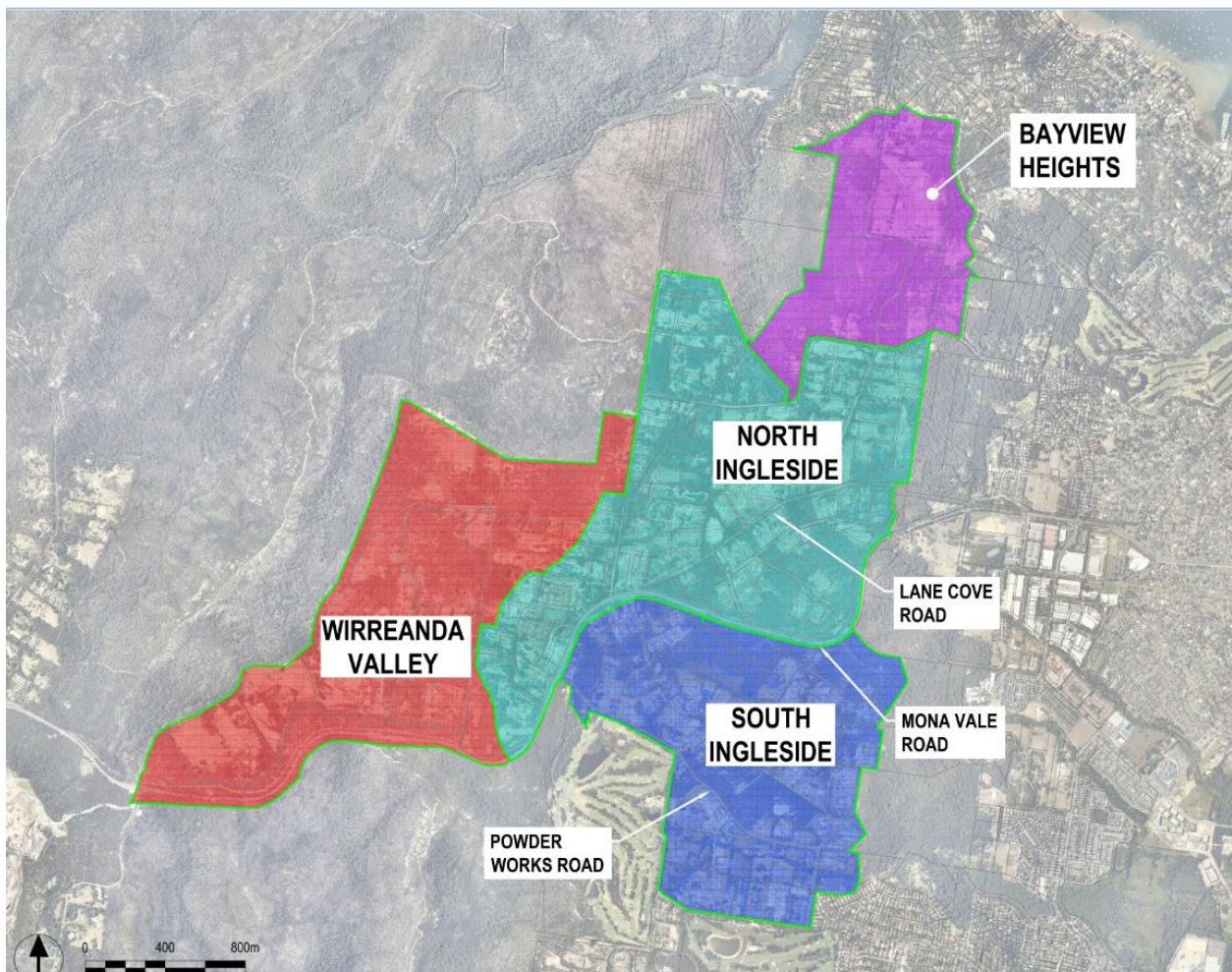
Cardno has been engaged by the Department of Planning and Environment c/o Cox Architecture to provide engineering services to assist in the preparation of an Infrastructure Delivery Plan to inform a rezoning process for the Ingleside Precinct.

Cardno had previously completed an Infrastructure Delivery Plan (IDP) for the broader Ingleside Area in May, 2016 at which time the development was proposed to yield approximately 3500 dwellings across the Sub-Precincts known as:

- North Ingleside
- South Ingleside
- Wirreanda Valley
- Bayview Heights

These Sub-Precincts are shown in Figure 2-1 below:

Figure 2-1 Sub-Precincts



Constraints informed by technical studies now limit the yield of the Ingleside Precinct to a total of 980 new dwellings across the South Ingleside Sub-Precinct.

2.2 South Ingleside

The South Ingleside Sub-Precinct covers an area of approximately 181 hectares and is bounded by Mona Vale Road to the north and west, the escarpment known as the Ingleside Chase Reserve to the east, and Monash and Elanora Country Clubs to the south.

Areas of low and medium density development within this Sub-Precinct are estimated to yield between 5 and 30 dwellings per hectare. Additionally, the South Ingleside Sub-Precinct also contains a potential school site, neighbourhood centre and community area.

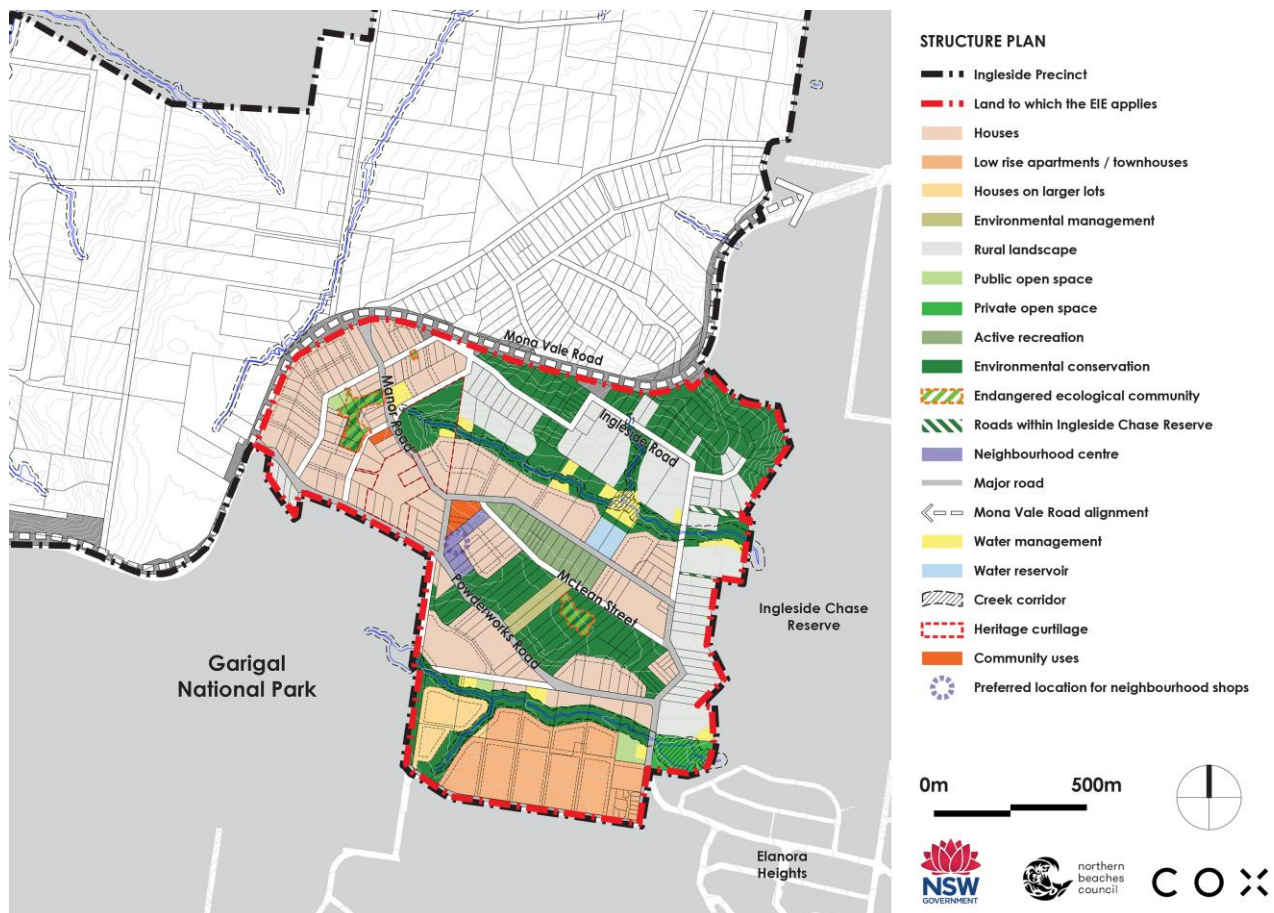
Large environmental conservation areas and open spaces have also been set aside within this Sub-Precinct.

3 Infrastructure review

The purpose of this investigation is to review the previous ILP in relation to utility authority advice and to advise on the necessary changes to the servicing strategies proposed therein.

Figure 3-1 identifies the current Masterplan associated with the Ingleside Precinct, which is the masterplan option to which our servicing assumptions have been based upon.

Figure 3-1 Preferred South Ingleside Structure Plan Option



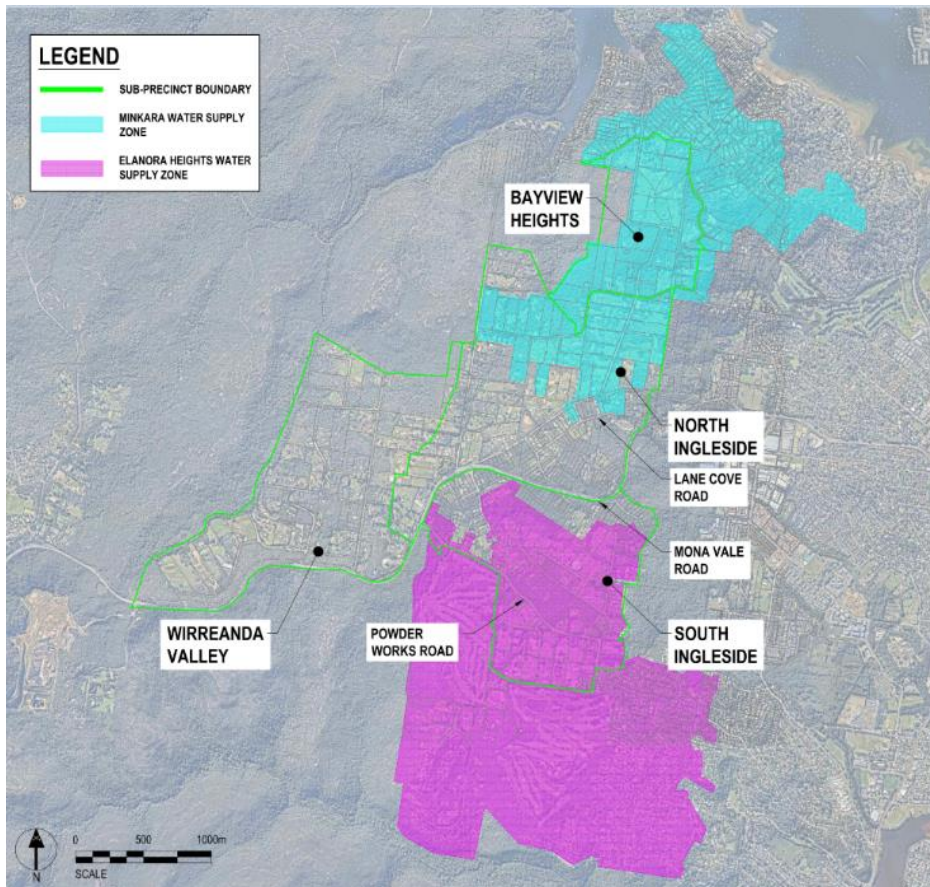
We understand the latest ILP allows for a total of 980 new dwellings and 130 existing dwellings.

3.2 Potable Water

3.2.1 Existing Network

The Elenora Heights water supply zone covers the majority of the Ingleside South Sub-Precinct as shown in **Figure 3-2**. It is understood that the properties that do not contain Sydney Water potable water infrastructure rely upon on-site rainwater harvesting and rainwater tank storage.

Figure 3-2 Water Supply zones



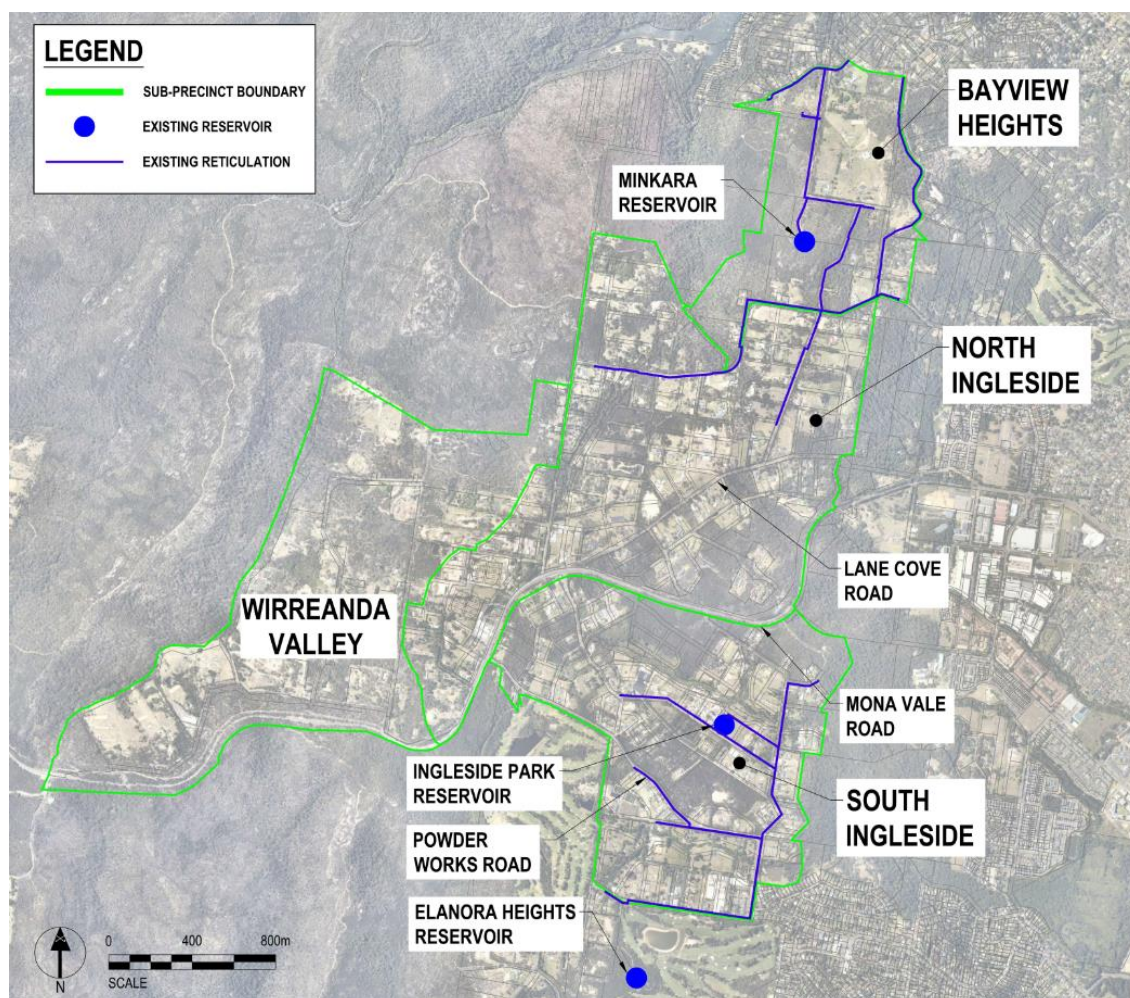
There is an existing potable water reservoir (the “Ingleside Park Reservoir”) located within the South Ingleside Sub-Precinct. The Ingleside Park Reservoir services existing properties outside of the Precinct boundary. This reservoir is located on Wattle Road.

There is an existing potable water reservoir (referred to as the “Minkara Reservoir”) located within the North Ingleside Sub-Precinct which provides potable water to a selection of properties within the Precinct. The Minkara Reservoir is located off Walter Road.

There is also an existing potable water reservoir (“Elanora Heights Reservoir”) located approximately 400 meters to the south of the South Precinct. The Elanora Heights Reservoir is located off Mirbelia Parade.

The locations of these reservoirs are as shown below in **Figure 3-3**.

Figure 3-3 Existing Potable Water Network

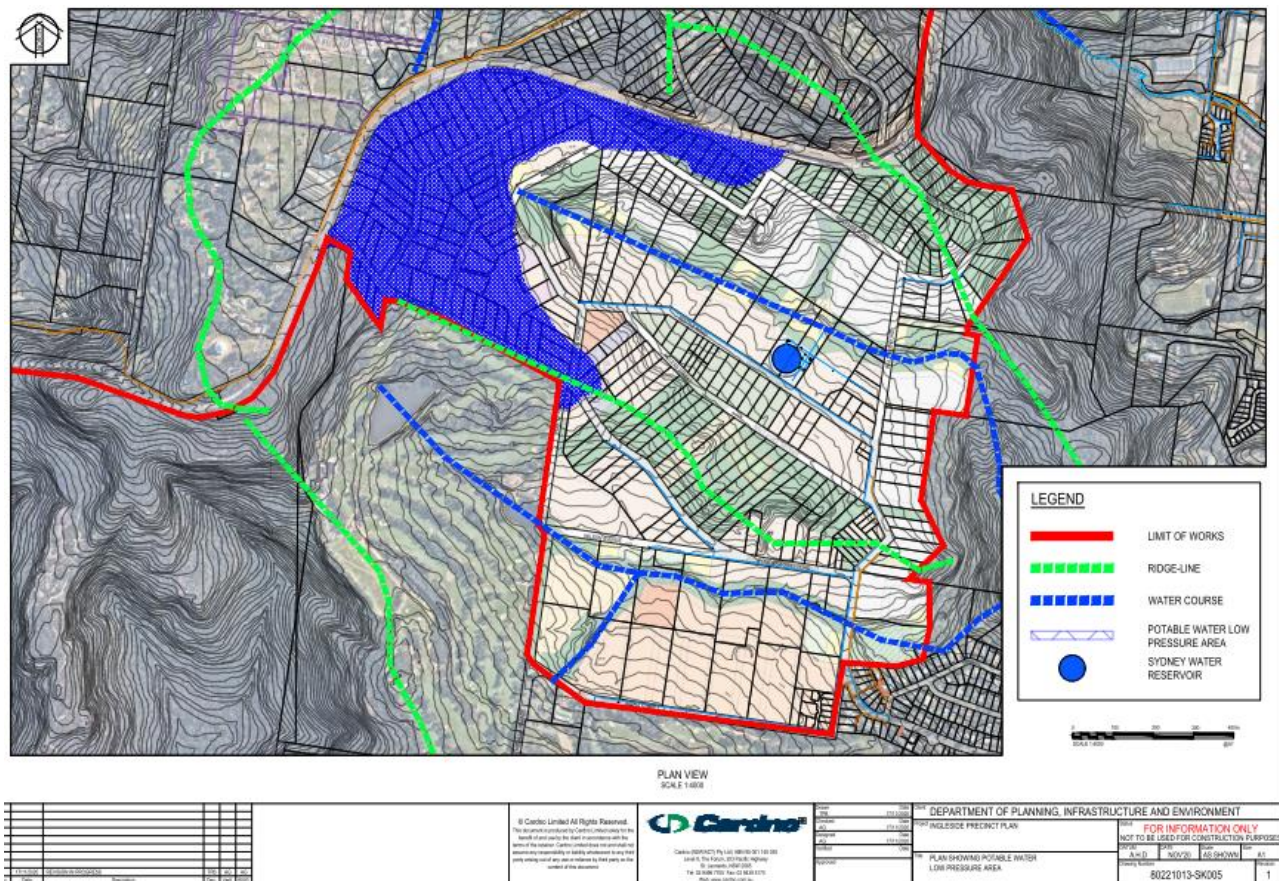


3.2.2 Proposed Major Infrastructure

Our opinions relating to the servicing of the precinct have been informed by a Sydney Water Feasibility Letter issued under Case 186931 on the 28 October 2020 together with previous advice which informed the previous IDP in May 2016. The recent Sydney Water Feasibility Letter contained information which was excerpted from a report titled the 'Ingleside Drinking Water and Wastewater Servicing Options' dated March, 2018. Sydney Water have advised that the water and sewer servicing strategy presented in this report is currently under review. Specific modelling is being undertaken to confirm the currency of this 2018 strategy in light of the diminished development yield of the Ingleside Precinct.

A key difference between the advice received in May 2016 and the advice contained within the Feasibility letter dated 28 October 2020 is whether a second reservoir will be required. The Feasibility letter states that the South can be serviced via new trunk mains from the Elanora Heights Reservoir combined with a booster to service the high elevation areas. A second reservoir was not part of this strategy. This is different from the advice received in May 2016 in which both a booster together with a reservoir were required. The high elevation areas of the South Sub-Precinct boundaries are shown below in **Figure 3-4**.

Figure 3-4 High Elevation Areas

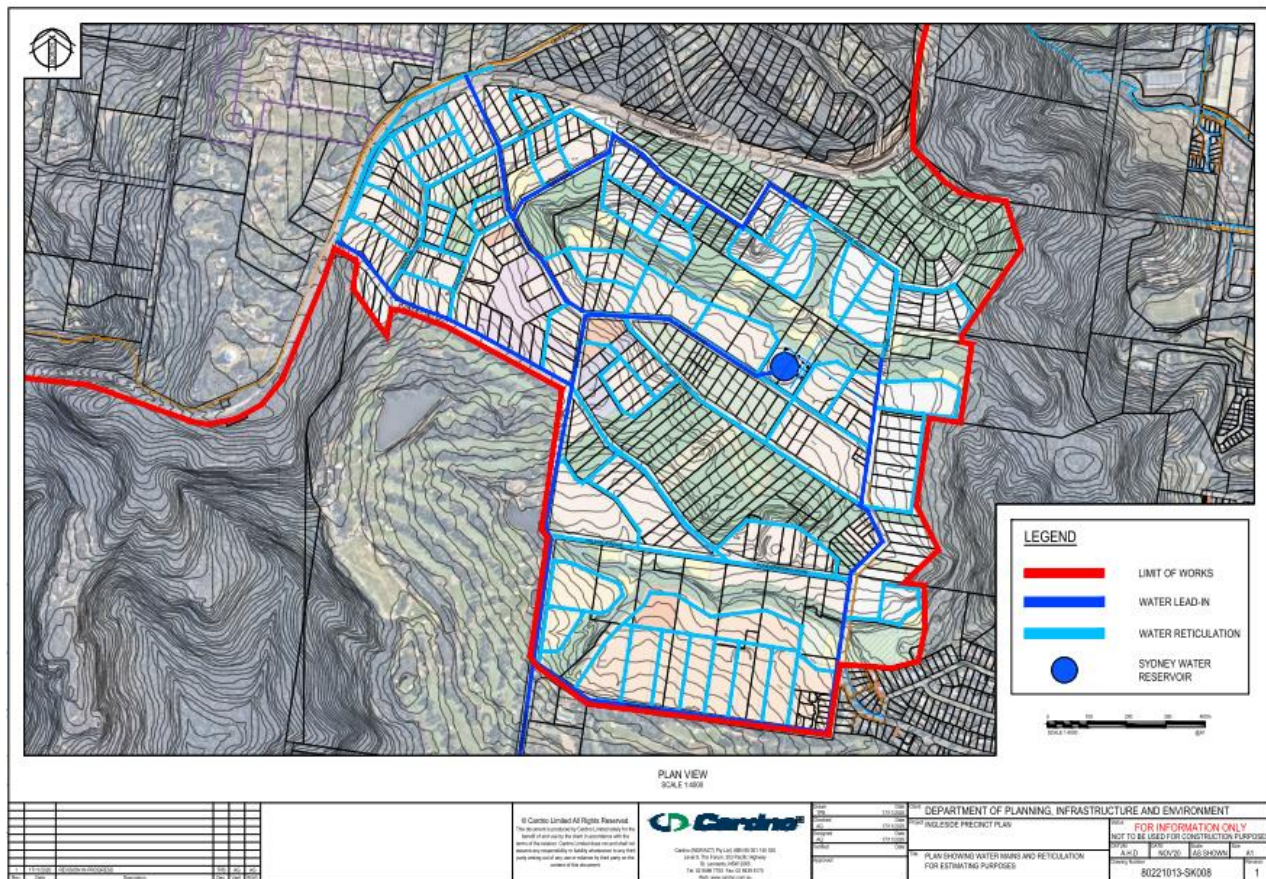


Cardno have prepared a plan to show the proposed lead-in infrastructure and reticulation network that would be required to service the proposed development, which is shown within Figure 3-5. We have assumed that the second reservoir will not be required but note that this is to be confirmed as part of Sydney Water's review of the strategy for this area.

Sydney Water has advised that the following lead-in water mains would be required to meet the forecast demands of the likely development:

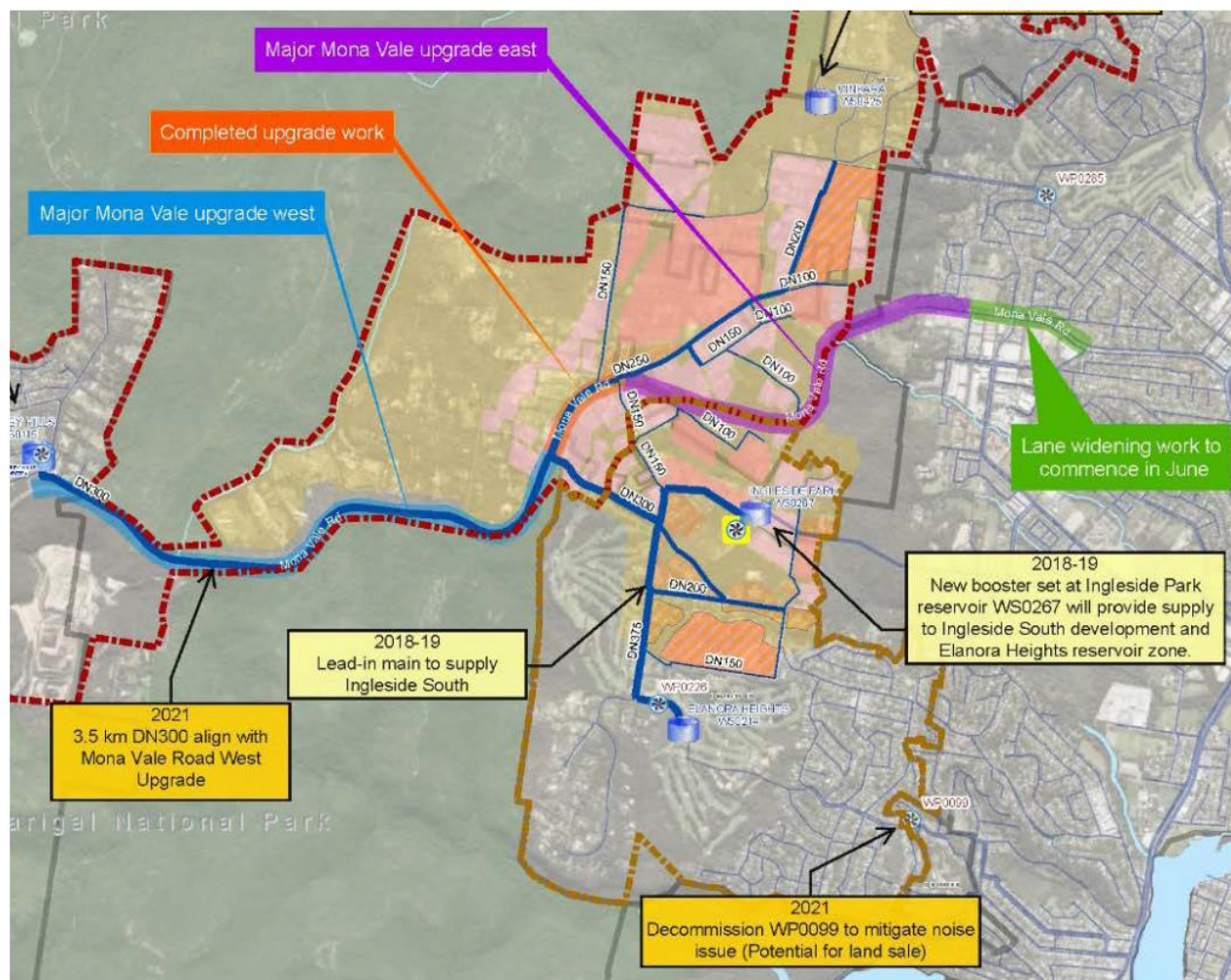
- 2.6 km of water main on Mirbelia Parade, Wilga Street, Powder Works Road and Ingleside Road; and;
- 1.0 km of water main on Powder Works Road and Ingleside Road.

Figure 3-5 Proposed Potable Water Leadin and Reticulation network



The above Figure is based on an extract from the Sydney Water Feasibility letter which shows the potential major water infrastructure upgrades to the area. This is shown in **Figure 3-6** below. Trunk infrastructure is proposed to connect to the Elanora Heights Reservoir and the Ingleside Park Reservoir and the watermains being delivered adjacent to Mona Vale Road as part of the road upgrade. Reticulation mains will feed off these trunk mains to service the South Ingleside precincts. A new booster arrangement is proposed at the Ingleside Park Reservoir which will provide adequate pressure to the elevated areas of the South Ingleside Sub-Precinct.

Figure 3-6 Feasibility Letter Extract – Potable Water Servicing Strategy



The Elanora Heights Reservoir is expected to supply the booster pump however Sydney Water will confirm this assumption as part of their current modelling analysis.

3.2.3 Conclusion

The infrastructure works discussed above are based predominantly on the Sydney Water Feasibility Letter issued under Case 186931 on the 28 October, 2020. It has not been defined within the Sydney Water servicing strategy as to the dates and responsibilities of who is delivering the trunk infrastructure. Under Sydney Water's *Funding Infrastructure to Service Growth* policy, the infrastructure can be delivered by the developer, with Sydney Water reimbursing the developer for the infrastructure in cases where the infrastructure will also benefit other developers. Developers of land would be required to connect to trunk infrastructure by constructing the necessary lead-in works and reticulated network to meet the demands of the proposed development. Alternatively, developers may have the opportunity to accelerate the delivery of trunk infrastructure by negotiating a commercial agreement with Sydney Water. Through a Precinct Acceleration Plan (PAP), a commercial agreement can be arranged with Sydney Water in which a funding reimbursement is granted, subject to a pre-set percentage of lots being released for housing.

3.3 Waste Water

3.3.1 Existing Network

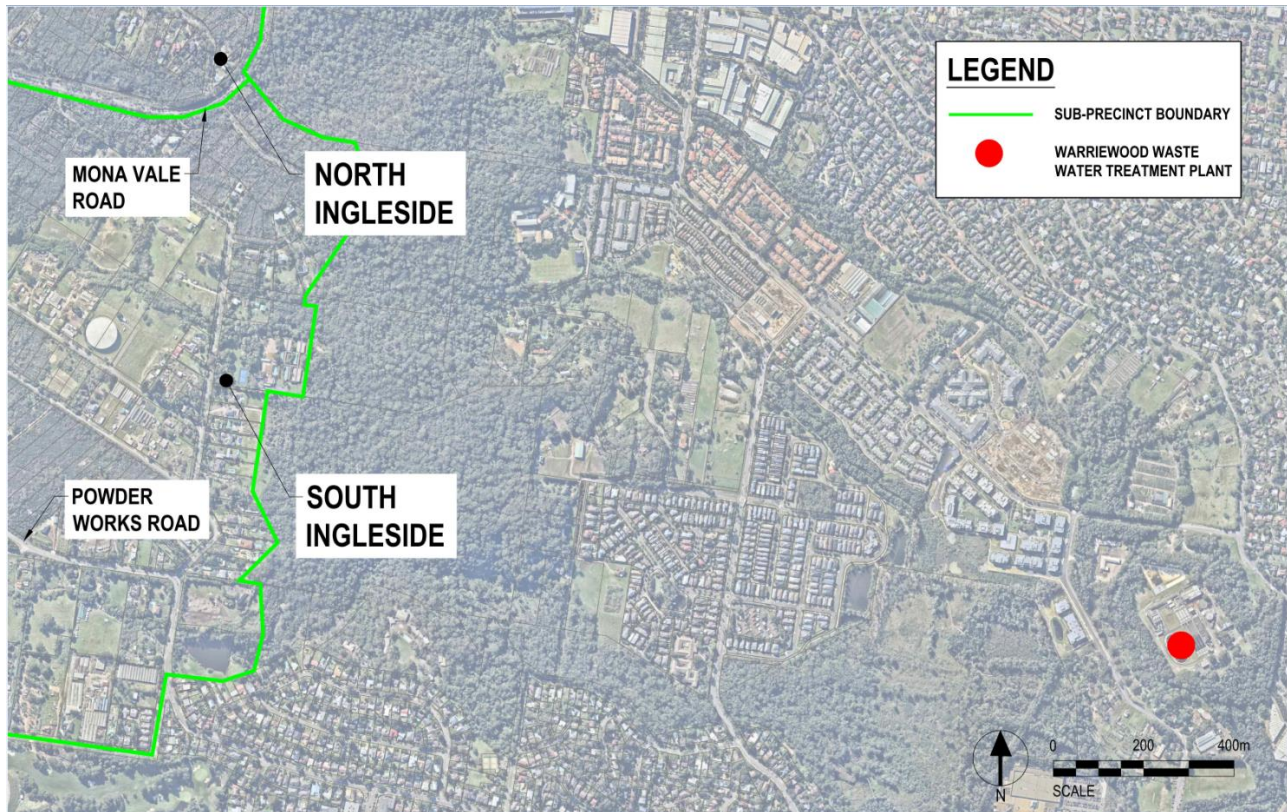
A significant majority of the Precinct is currently not connected to the Sydney Water wastewater network and those existing land uses rely on privately owned and operated on-site disposal systems.

The closest Sydney Water Wastewater Treatment Plan (WWTP) is the Warriewood WWTP which is located approximately 2.0 kilometres east of the eastern Precinct boundary. There is sewer infrastructure located adjacent to the south and east boundary points of the South Ingleside Sub-Precinct which could be utilised

as part of a future connection. The location of the Warriewood WWTP in relation to the Precinct is illustrated in **Figure 3-7** below.

Treatment capacity is available at the Warriewood WWTP to service the Precinct. The existing trunk infrastructure has sufficient capacity to service the South Ingleside Sub-Precinct via a gravity led sewer.

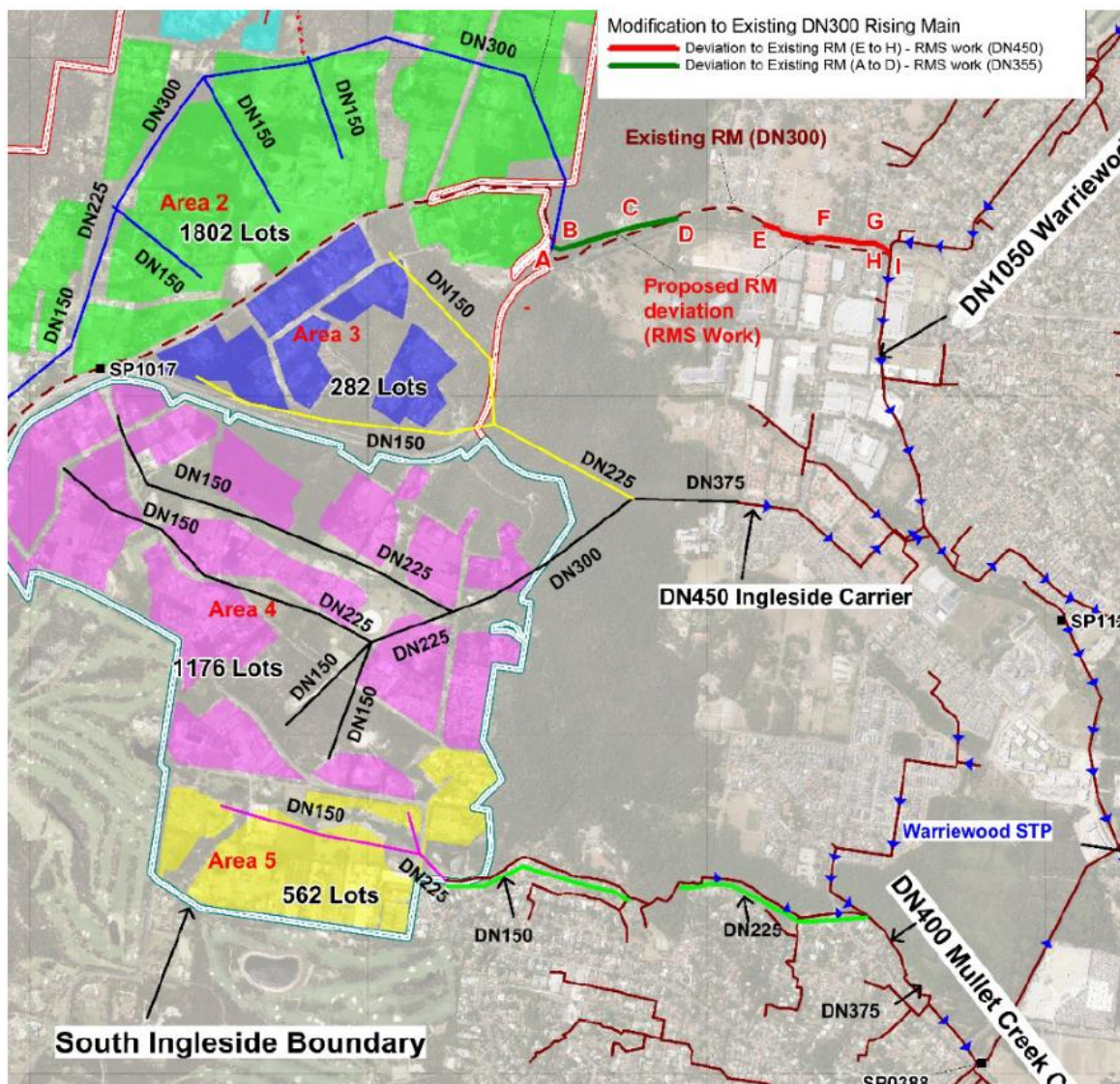
Figure 3-7 Warriewood STP Location



3.3.2 Proposed Major Infrastructure

The Warriewood Wastewater Treatment Plant and ocean outfall has sufficient capacity to accommodate the loads associated with the proposed development of the Precinct. There are currently three catchment lines along the eastern boundary of the South Ingleside Sub-Precincts as defined in **Figure 3-8**, extracted from the Sydney Water Feasibility letter dated 28 October 2020. The South Ingleside Sub-Precinct is within Areas 4 and 5 below.

Figure 3-8 Feasibility Letter Extract – Wastewater Servicing Strategy



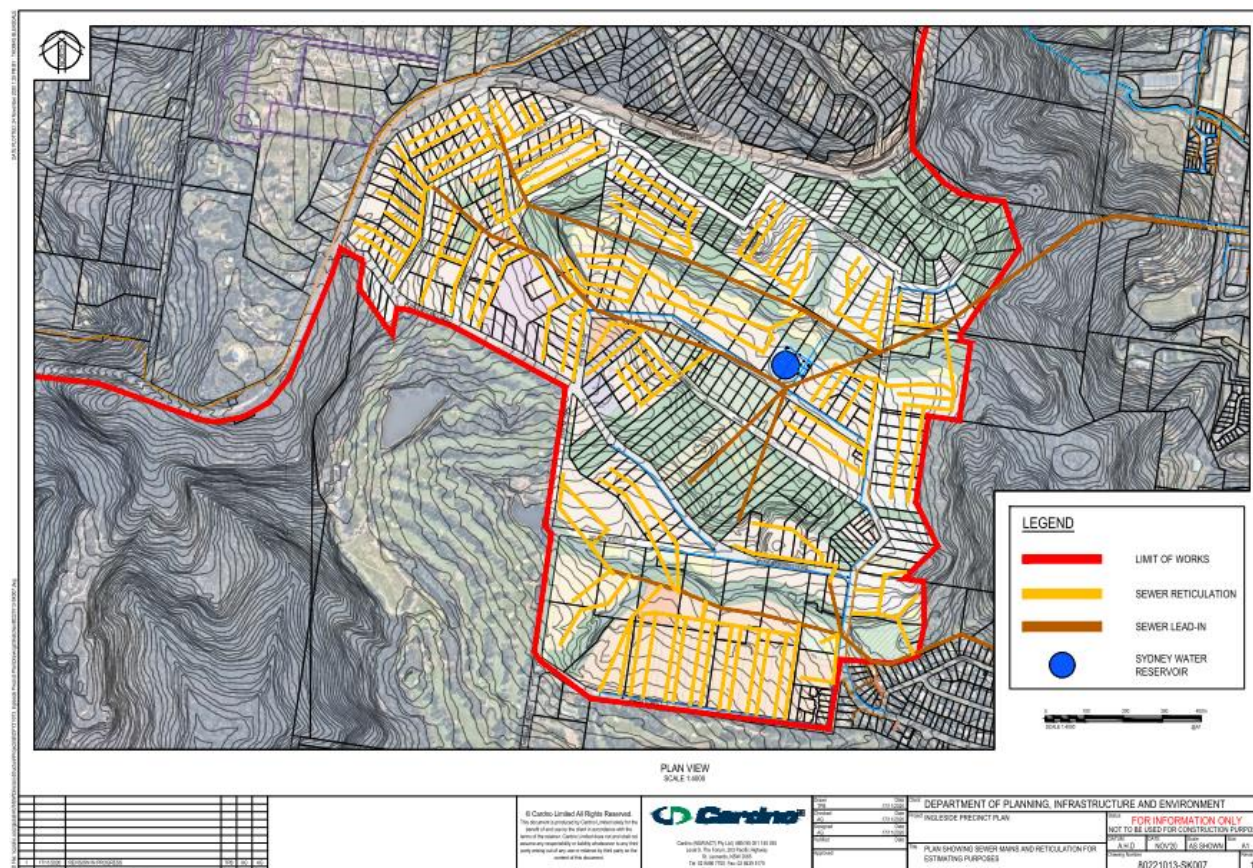
There are three waste water lead-ins identified in the figure above. These have the following connection points:

- Southern connection point, being the existing DN225 sewer which drains into the DN400 Mullet Creek Carrier. This discharges into SP0388 prior to being pumped north to the Warriewood Wastewater Treatment Plant.
- Central connection point, being the DN450 sewer main labelled as the Ingleside Carrier. This transfers the sewer to SPS112 which pumps the sewer the Warriewood Wastewater Treatment Plant via SPS0388.
- Northern connection point, being a DN300 pressure rising main off Mona Vale Road. This pressure line pumps the sewer to the Warriewood Wastewater Treatment Plant via the DN1050 Warriewood Carrier. It is not clear how this connection will be utilised as part of the servicing strategy and requires further investigation.

Each of the three connection points depicted in **Figure 3-8** will require additional lead-in infrastructure. As per the water infrastructure strategy, Sydney Water are yet to confirm dates and responsibilities for these works.

Cardno has prepared a plan to show the proposed wastewater lead-in infrastructure and possible reticulation network that would be required to service the proposed development, which is shown within **Figure 3-9**.

Figure 3-9 Proposed Sewer Leadin and Reticulation Network



3.3.3 Conclusion

When analysing the sewer serviceability and associated risk of the South Ingleside Sub-Precinct, the key consideration is the portion of the Sub-Precinct which can be drained via gravity. Pressure Infrastructure is reliant on Pumping Stations and the planning and commissioning of these assets has a significant impact on development programs, due to the requirement for upfront investment on the part of Sydney Water.

The South Ingleside Sub-Precinct naturally drains west to east across the site. This supports the Sydney Water strategy to service the South Ingleside Sub-Precinct by gravity sewer lead-in mains which will flow to the east. Referring to Figure 3-8, Area 5 (in yellow) will require DN225 and DN150 extensions of the wastewater connection 1, whilst Area 4 (in pink) will also utilise DN225 and DN150 reticulation off a DN375 extension to the DN450 Ingleside Carrier at wastewater connection 2. Therefore, it is concluded that the entire catchment area can be drained via gravity.

The Feasibility Letter currently proposes that the area to the north of Mona Vale Road will drain by a gravity sewer into a DN300 rising main at wastewater connection 3. Cardno are of the view that this is not likely to be a feasible arrangement given that a gravity sewer cannot typically be connected directly into a pressure line. For this to be a viable option, it is our view that a pumping station would be required at the connection point to transition the gravity sewer into the pressure line. The pressure line is required due to the sewer having to drain against the grade to get to SPS1017 to the east.

3.4 Electrical

3.4.1 Existing Network

The proposed development is within the Ausgrid distribution network and Ausgrid will be the supplier for the Precinct. The subject area is predominantly supplied by an 11kV feeder which is connected to the Terry Hills Zone Substation. The remainder of the development area is serviced by a feeder supplied by the Narrabeen Zone Substation. These feeders are shown in the figures below.

Feeder “PA 10”, shown pink in Figure 3-10 below, is fed from the Terrey Hills Zone Substation. Feeder “PA 2”, shown black in Figure 3-11, is fed by the Narrabeen Zone Substation. Feeder “PA 14”, shown blue in Figure 3-12, is fed by the Mona Vale Zone Substation.

Figure 3-10 Ausgrid 11kV Network Feeder PA 10 TERRY HILLS in Pink (Ausgrid WEBGIS, 2020)

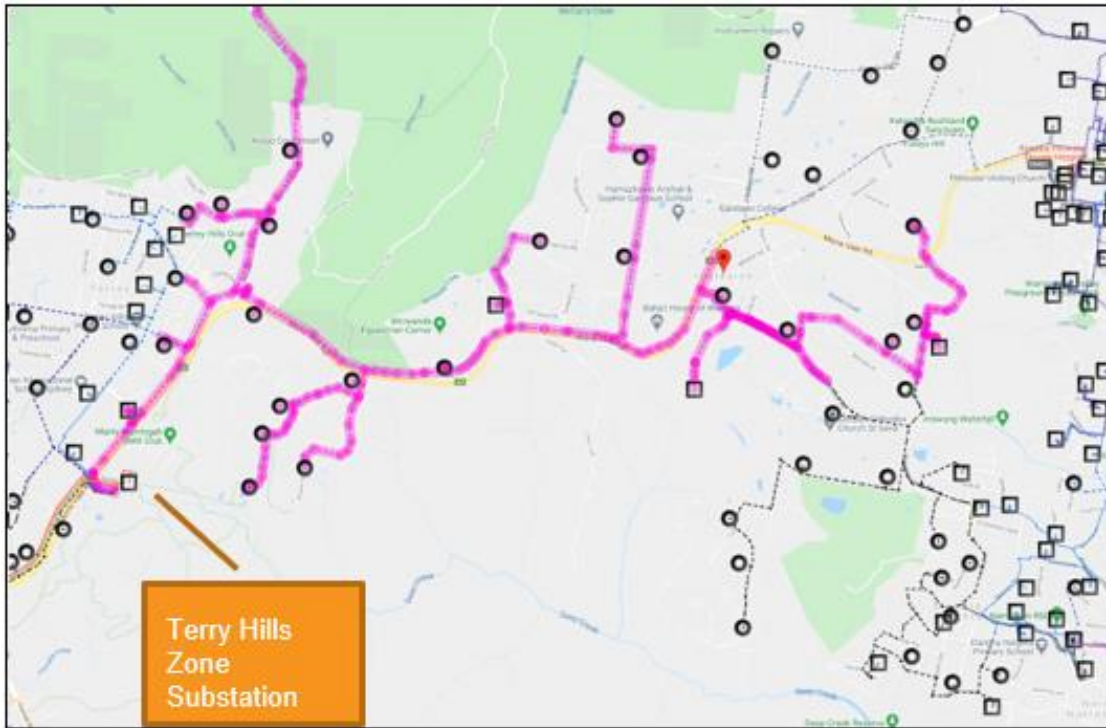


Figure 3-11 Ausgrid 11kV Network Feeder PA 2 NARRABEEN in Black (Ausgrid WEBGIS, 2020)

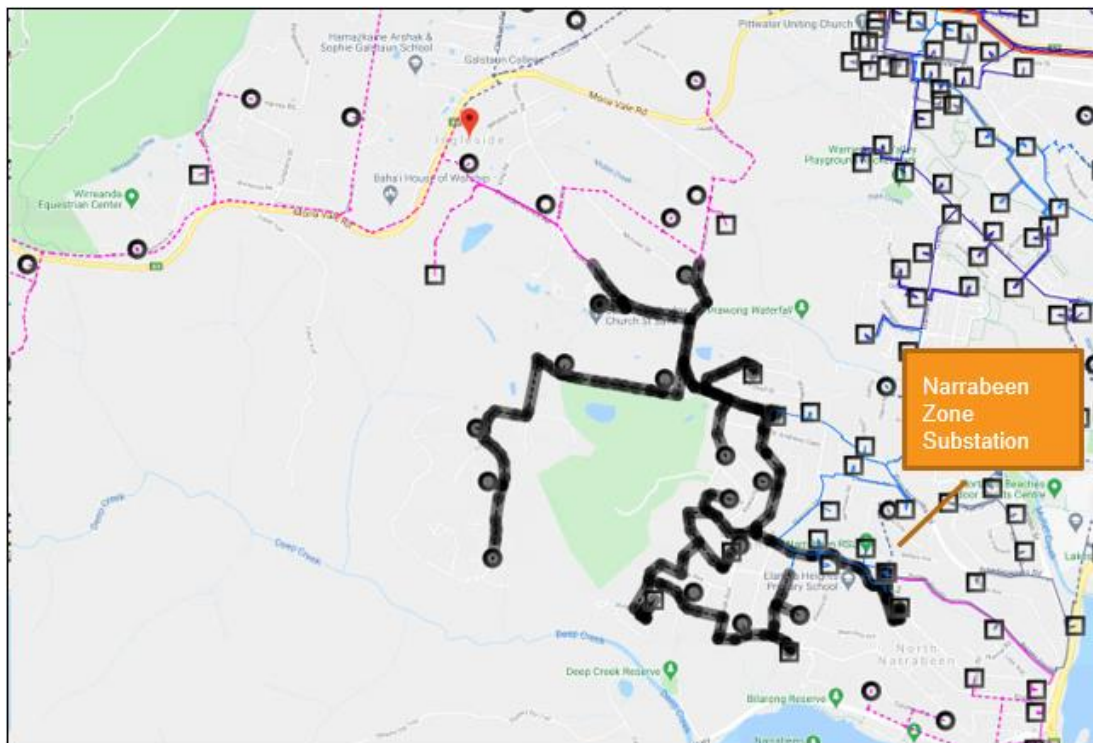
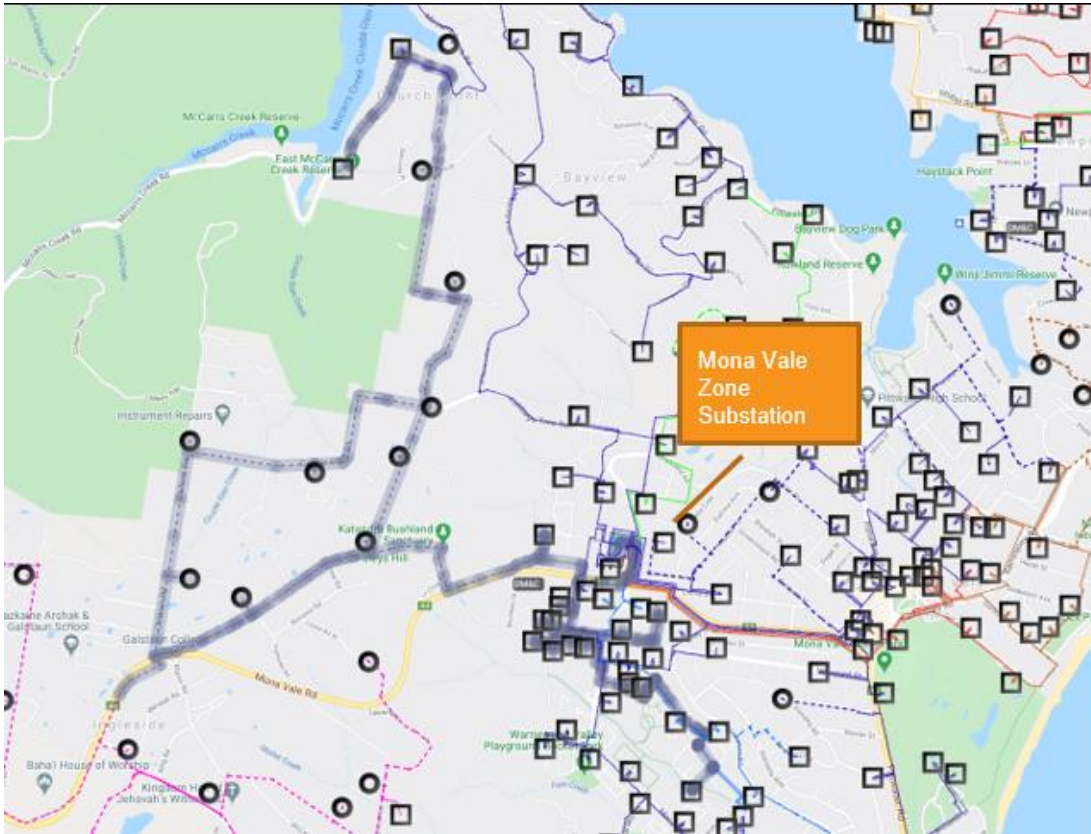


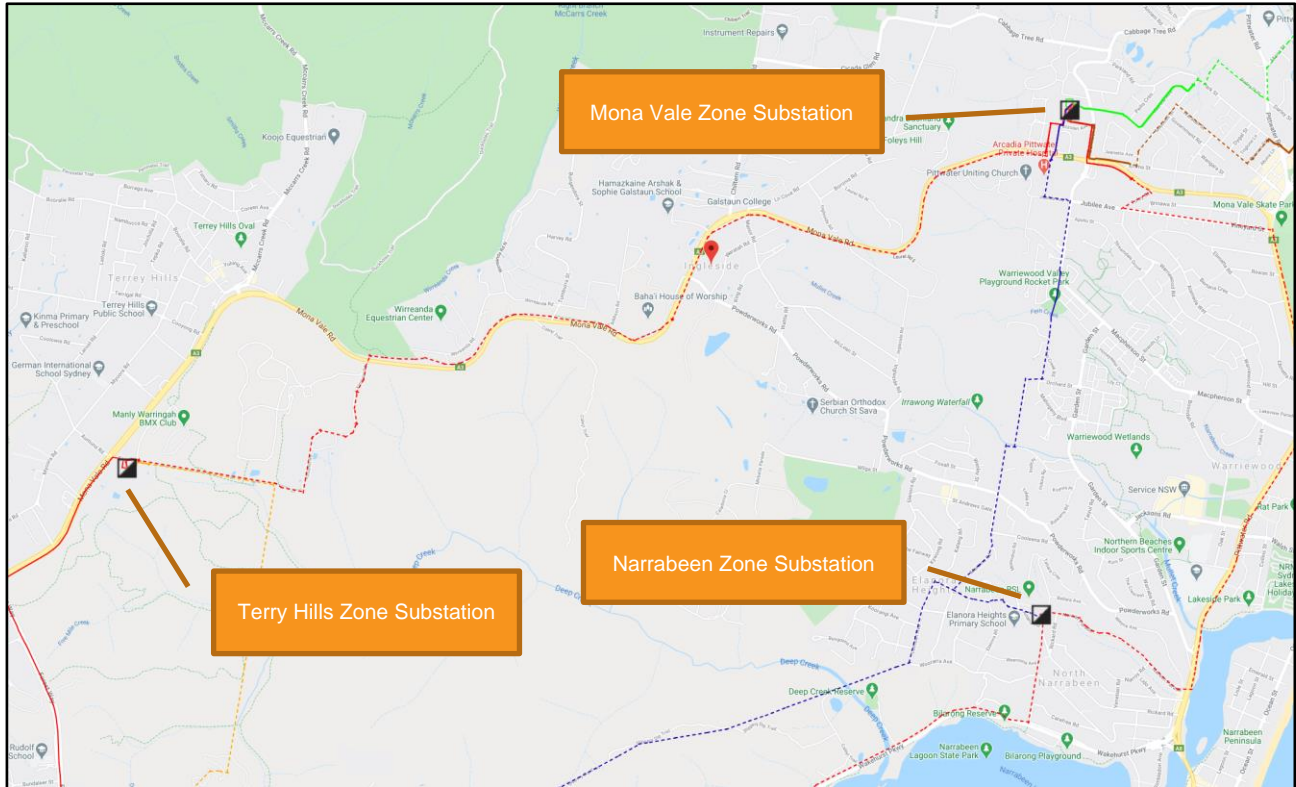
Figure 3-12 Ausgrid 11kV Network Feeder PA 14 MONA VALE in Grey (Ausgrid WEBGIS, 2020)



The Ausgrid Distribution and Transmission Annual Planning Report 2019 (DTAPR) was used as the basis through which to determine the existing supply arrangements to the subject area.

The nearest zone substation (ZS) to the area is the Narrabeen Zone Substation (ZN15002 NARRABEEN). The Mona Vale Zone Substation (ZN15014 MONA VALE) is the next closest, followed by the Terry Hills Zone Substation (ZN15013 TERRY HILLS.) All Zone Substations are supplied at 33kV. These zone substations are shown within Figure 3-13

Figure 3-13 Ausgrid Zone Substation and Transmission Network



The Terry Hills Zone Substation has a Firm Summer Capacity of 30.5 MVA and a Firm Winter Capacity of 30.5 MVA.

Table 3-1 Terry Hills Zone Substation Data (DTAPR, 2019)

| | Summer Load (MVA) | Winter Load (MVA) |
|-----------------------|-------------------|-------------------|
| Total Capacity | 60.7 | 60.7 |
| Firm Capacity | 30.5 | 30.5 |
| Actual Load (2016/17) | 17.9 | 12.6 |
| Actual Load (2017/18) | 16.3 | 13.5 |
| Actual Load (2018/19) | 15.8 | 13.3 |
| Forecast (2019/20) | 16.5 | 13.2 |
| Forecast (2020/21) | 16.2 | 13.2 |
| Forecast (2021/22) | 15.9 | 13.1 |
| Forecast (2022/23) | 15.8 | 13 |

The Mona Vale Zone Substation has a Firm Summer Capacity of 57.4 MVA and a Firm Winter Capacity of 59.6MVA.

Table 3-2 Mona Vale Zone Substation Data (DTAPR, 2019)

| | Summer Load (MVA) | Winter Load (MVA) |
|-----------------------|-------------------|-------------------|
| Total Capacity | 104.6 | 105.4 |
| Firm Capacity | 57.4 | 59.6 |
| Actual Load (2016/17) | 36.6 | 31.6 |
| Actual Load (2017/18) | 34.1 | 32.1 |
| Actual Load (2018/19) | 34.7 | 31.7 |
| Forecast (2019/20) | 34.3 | 32.6 |
| Forecast (2020/21) | 35.4 | 32.1 |
| Forecast (2021/22) | 35.3 | 31.7 |
| Forecast (2022/23) | 35.1 | 31.4 |

The Narrabeen Zone Substation has a Firm Summer Capacity of 19.6 MVA and a Firm Winter Capacity of 20.3 MVA.

Table 3-3 Narrabeen Zone Substation Data (DTAPR, 2019)

| | Summer Load (MVA) | Winter Load (MVA) |
|-----------------------|-------------------|-------------------|
| Total Capacity | 20.3 | 20.3 |
| Firm Capacity | 19.6 | 20.3 |
| Actual Load (2016/17) | 13.1 | 12.1 |
| Actual Load (2017/18) | 12.3 | 12.3 |
| Actual Load (2018/19) | 11 | 12.6 |
| Forecast (2019/20) | 10.4 | 12.8 |
| Forecast (2020/21) | 10.6 | 12.6 |
| Forecast (2021/22) | 10.3 | 12.5 |
| Forecast (2022/23) | 10.1 | 12.4 |

3.4.2 Proposed Development Demand

The Maximum Demand of the proposed development was based on the Indicative Layout Plan detailed in Figure 3-1. It is assumed that there will a maximum of 980 new and 130 existing dwellings to be supplied across the Southern Precinct. The calculated load is based on AS3000 and assumes load requirement of 5-7kVA per dwelling resulting in an overall demand of approximately 5-7MVA. A detailed maximum demand would need to be conducted on each of the proposed sites to determine the final loads required once the lot layouts and distributions are known.

3.4.3 Ausgrid Network planning

Ausgrid's Distribution and Transmission Annual Planning Report details Ausgrid's planned distribution network upgrades. The latest version of this report is dated for 2019, where the Ingleside precinct forms part of the Pittwater and Terrey Hills load area (Section 5.16 of the aforementioned report). Ausgrid has not identified any system limitations within this issue of the report, therefore Ausgrid does not appear to have plans for future expansions in this area for the foreseeable future.

A preliminary enquiry application has been submitted to Ausgrid based on the draft ILP provided by Cox Architecture (Figure 3-1). Ausgrid has not provided a formal response to this application at the time of writing this report.

3.4.4 Conclusion

The existing firm capacity of the Mona Vale Zone Substation is 57.4 MVA.

34.7MVA is currently being used, resulting in 22.7 MVA of spare capacity. The DAPTR states that it is forecast that the future load will increase to a maximum of 35.1 MVA in the next 4 years, which results in 22.3 MVA of spare capacity.

The maximum demand for the proposed development is 5-7 MVA. This is based on a development yield of 980 new and 130 existing dwellings with a load requirement of 5-7kVA. A detailed maximum demand analysis would need to be conducted once the Lot Layout for the Precinct has been finalised. The demand for the proposed school and neighbourhood centre in the South Sub-Precinct would also need to be determined. It is considered that the spare capacity within the Mona Vale Substation can adequately cater for the demand of these land uses.

Therefore, it is confirmed that there is sufficient capacity within the Mona Vale Zone Substation to service the assumed 7 MVA of demand for the proposed development.

To supply the future development, it is expected that 2 lead-in 11kV feeders will be required to be constructed from the Mona Vale Zone Substation to the subject site. Further HV reticulation together with substations will need to be installed within the site as part of the standard reticulation.

There are opportunities to reduce the associated costs through efficient staging. If the lots are released from east to west, the required lead-in works will be minimised. Alternatively, the supply to the development can be split into two, with the southern portion of the South Ingleside Sub-Precinct being supplied from the Narrabeen Zone substation. The northern portion of the South Ingleside Sub-Precinct would be supplied from Mona Vale Zone substation per the commentary above.

Figure 3-14 Concept Route for 11kV Extension



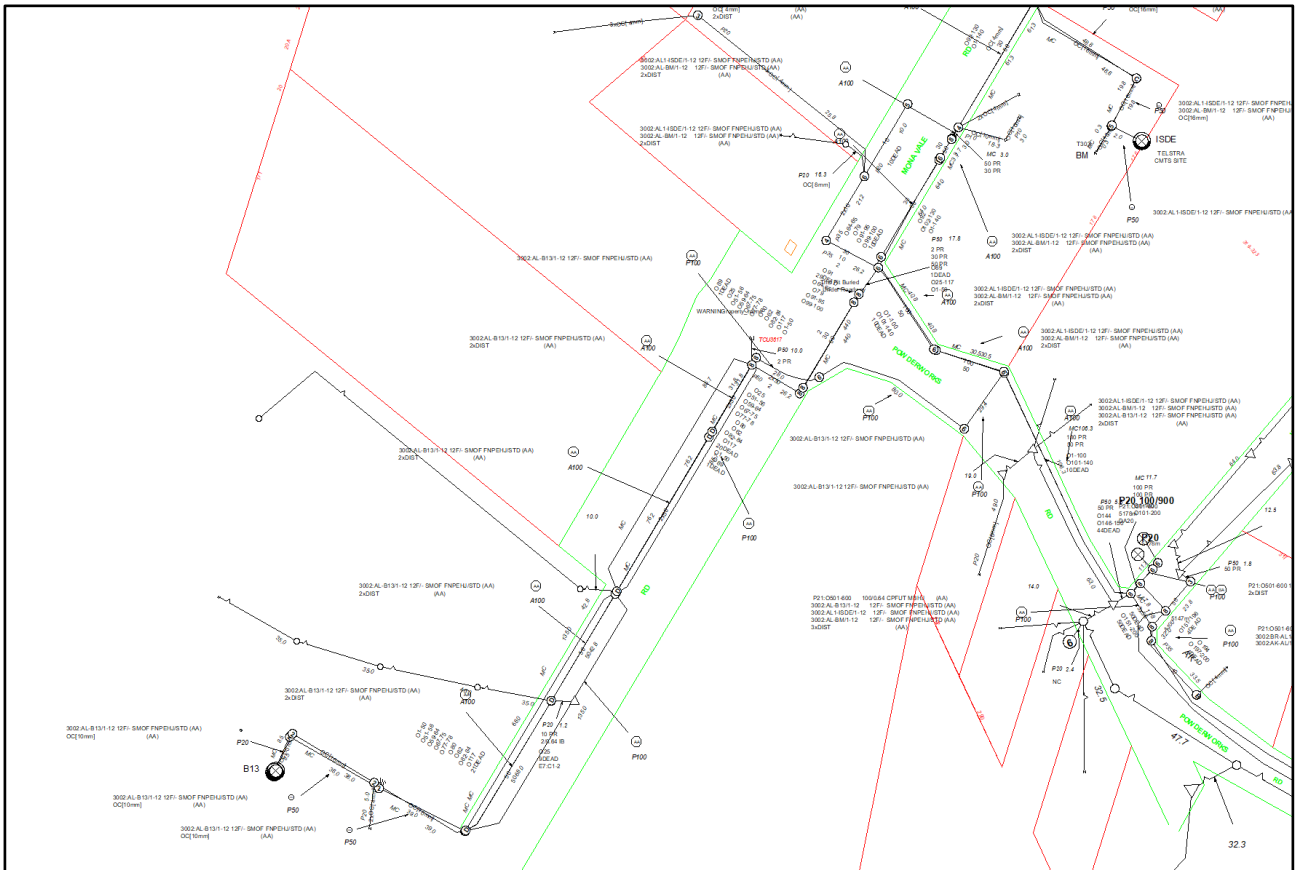
3.5 Telecommunications

3.5.1 Existing Network

The area of the proposed development will be predominately serviced by NBN and Telstra. There are additional Optus and TPG assets within the vicinity of the proposed development.

There are Telstra assets which run along Powder Works Road and Mona Vale road within the footpath verge. The costs associated with any required adjustment to these assets resulting from the development of the Precinct will need to be borne by the Developer.

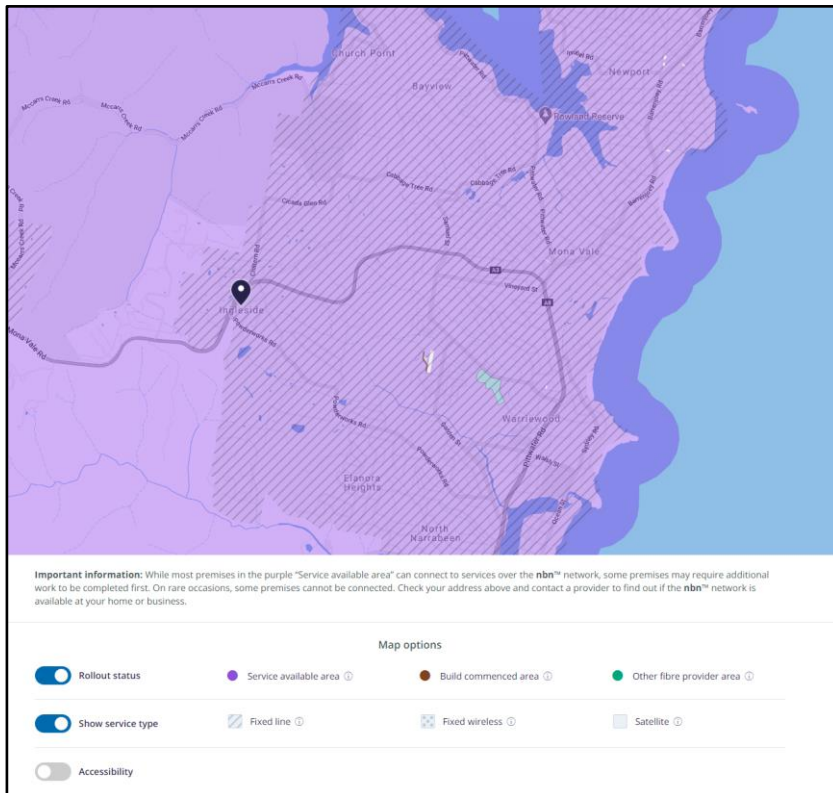
Figure 3-15 Telstra infrastructure



NBN is available in the area. The current technology in the area is Fixed Line as shown in **Figure 3-16** below. All future supply of this development will be from NBN.

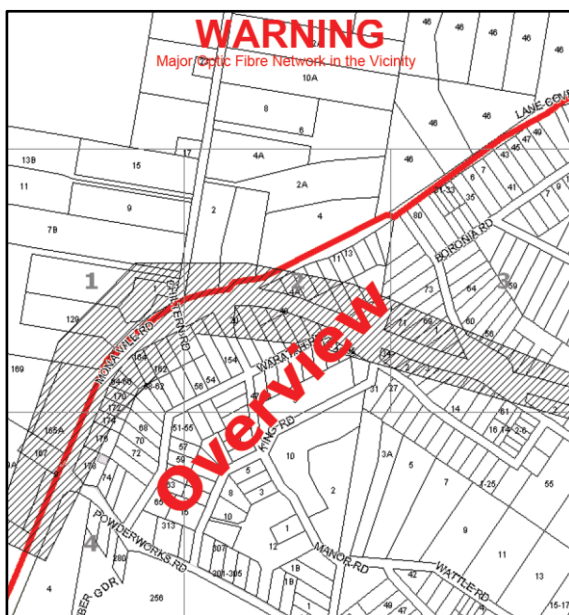
Cardno consider that NBN will most likely deem this development as being commercially viable and will supply fibre to the development. The Developer(s) will be responsible for the construction of the pit and pipe network which the fibre will run through.

Figure 3-16 Extents of NBN Coverage



In addition to Telstra and NBN Infrastructure, there is also Optus Infrastructure in the area, as shown in **Figure 3-17** below. There is a national fibre cable that is running along Monash Vale Road and Lane Cove Road. It is advised that the costs associated with needing to adjust this infrastructure as part of the development of the Precinct will be borne by the Developer(s).

Figure 3-17 Optus Major Optic Fibre



It is recommended that impacts to this existing cable are avoided at all costs.

3.5.2 Proposed Development Demand

The future development will require NBN connections to each of the proposed dwellings. It is assumed that lead in works will be required to facilitate these connections.

3.5.3 Conclusion

At the time of writing, there is no infrastructure planned for this area.

The investigation determined that NBN is currently available to the area.

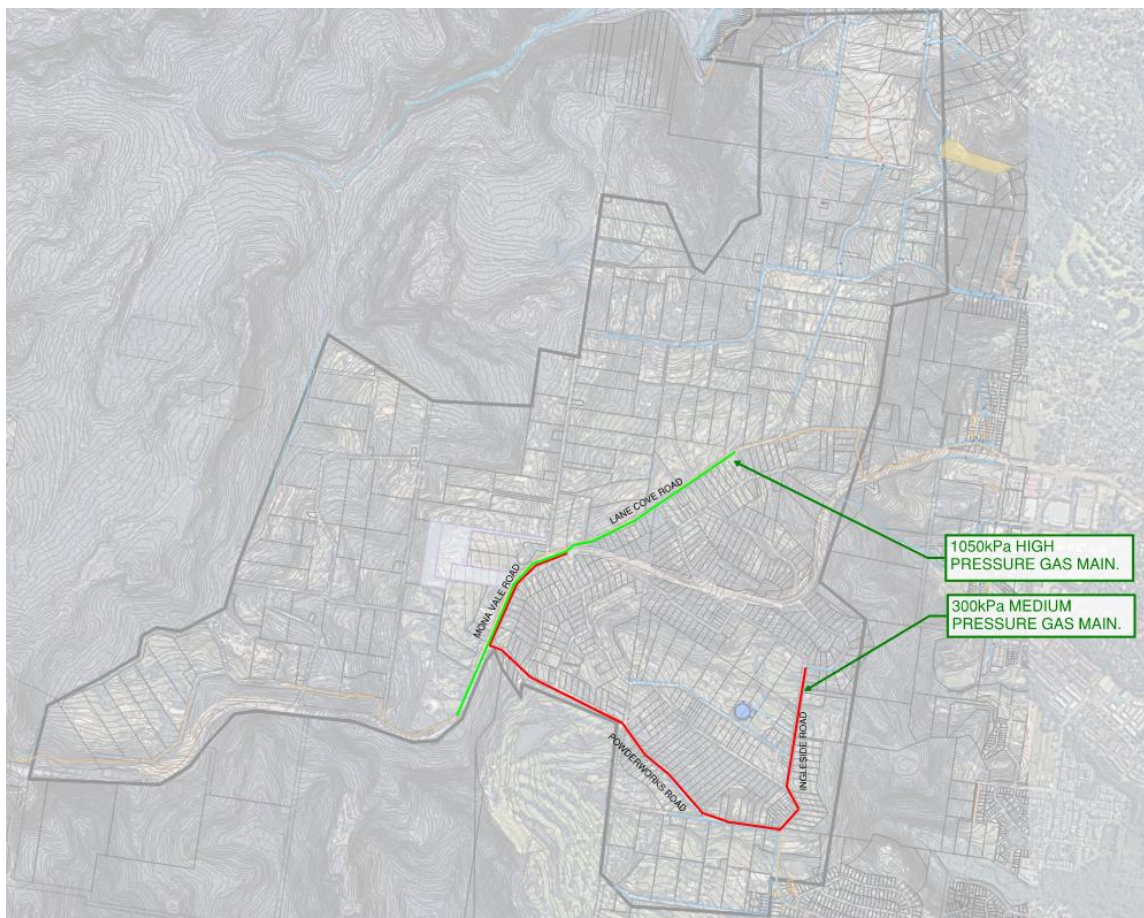
Prior to construction, NBN will typically cooperate with the developers to improve and extend the network as required if the development is deemed to be commercially viable.

3.6 Gas

3.6.1 Existing Network

There are existing gas pipelines running within the investigation area. According to the gas network information from Jemena, a 300kPa Medium Pressure gas main exists on Powder Works Road and extends along Mona Vale Road and Ingleside Road. A 1050kPa High Pressure Gas Main also exists within the Mona Vale Road reserve and extends onto Lane Cove Road (**Figure 3-18**).

Figure 3-18 Existing Gas Network



3.6.2 Proposed Development Demand

Table 3-4 below details the estimated gas usage demand.

Table 3-4 Appliances gas consumption assumption

| Appliance | Gas consumption (MJ/h) |
|---------------------------------------|------------------------|
| Gas heater per dwelling | 40 |
| Gas cooktop per dwelling | 30 |
| Gas flued heater | 30 |
| Bayonet outside (Barbecue on balcony) | 25 |

This information will be used to give a total gas consumption amount in MJ/h for the proposed development.

The South Ingleside Sub-Precinct has a proposed development yield of 980 new dwellings. Therefore, the peak gas demand for the proposed development is estimated at approximately 122,500MJ/h.

The daily peak development demand has been calculated based on the rates in Table 3-4 above and the daily consumption routine assumed below:

- Peak cooking will occur between 11:00 to 13:00 and 18:00 to 20:00 for lunch and dinner respectively;
- Peak water heating will occur between 20:00 to 22:00 for showers; and
- Heating will occur between 18:00 to 8:00 during the winter months.

3.6.3 Jemena Consultation

Cardno has consulted with Jemena regarding the gas network and development procedures in order to establish whether an extension to the network is feasible. The following points were raised by Jemena:

- Natural Gas is available in the vicinity of the study area however this is insufficient to supply the proposed 980 new and 130 existing dwellings.
- A High Pressure 1050kPa gas main is located on Mona Vale Road. A new District Regulator Station could be constructed along this line and used to supply the 980 new dwellings. From this Regulator Station, a 160mm 300kPa feeder would be required to extend throughout the Precinct.
- The Jemena policy is to extend gas mains to all developments wherever possible, depending upon economic viability;
- In consideration of Jemena's shareholders' interests and under NSW regulation, Jemena Gas Networks (NSW) Ltd is required to ensure that any extension of the natural gas distribution system is commercially viable and therefore must assess each request for supply on an individual basis;
- Upon the provision of the final approved layout and gas load configurations for the development a full economic evaluation can be undertaken to determine the availability of natural gas to the area;
- Should the development not prove to be viable for Jemena, a contribution fee may be required to be paid by the developer to assist in economic viability of the proposal;
- To assist in the planning of supply to this area, Jemena will require an accurate breakdown of the dwellings and any commercial loads proposed for the area once all approvals and zonings are in place;
- In order to enhance the viability of gas supply to the region, developers should allow for the provision of all trenching required throughout their sites at no cost to Jemena;

3.6.4 Conclusion

The investigation determined that Jemena currently has a gas network in the vicinity of the investigation area.

Jemena will cooperate with the developers to improve the network as required, as long as the development is commercially viable.

Should the development not be deemed viable for Jemena, the developer may be required to provide contribution fees to ensure the provision of gas services.

Jemena would determine these contribution fees on a case-by-case basis and was not in a position to provide further advice at this time.

4 Opinion of Probable Cost

Opinion of Probable Costs have been prepared for the provision of utility infrastructure required for the South Ingleside Sub-precinct. The estimates are preliminary only and are based on the advice provided by utility providers and Cardno's past experience on similar sized developments. Infrastructure cost estimates should be reviewed as design evolves. Complete cost estimates for the South Ingleside Sub-Precinct are included in Appendix C.

Cardno have also prepared an Opinion of Probable Costs for the upgrade of selected existing roads within the South Ingleside Precinct. Cardno have provided a lineal metre rate for the road upgrades based on a desktop review and limited information, the rate provided is preliminary only and based on the assumptions and exclusions noted within. This cost estimate may be found in Appendix D.

APPENDIX

A

WATER SERVICES COORDINATION -
SYDNEY WATER

Case Number: 186931

28 October 2020

COX ARCHITECTURE
c/- CARDNO (NSW/ACT) PTY LTD

FEASIBILITY LETTER

Developer: COX ARCHITECTURE
Your reference: 80221013
Development: Lot 15 DP12115 MONA VALE RD, Ingleside
Development Description: Feasibility for a residential development Ingleside South. Sydney Water to confirm the servicing requirements for the development
Your application date: 21 September 2020

Note: Level 1 water restrictions are now in place, which limits how and when water can be used outdoors. This can impact you and your contractors in the activities they need to undertake for this proposal.

Using water to suppress dust is not restricted, but this does mean that you/your contractors will need to apply for an exemption permit to use water for most outdoor uses including:

- Cleaning equipment and the exterior of new buildings
- Drilling and boring, and
- Batching concrete on-site

Fines for deliberate breaches of restriction rules apply from 1 September 2019.

For more information on the restrictions and for applying for an exemption, visit our web site at <http://www.sydneywater.com.au/SW/water-the-environment/what-we-re-doing/water-restrictions/index.htm>

The more water everyone saves, the longer we can stave off the progression to stricter restrictions or emergency measures.

Please provide this information to your contractors and delivery partners to inform them of their obligations.

Dear Applicant

This Feasibility Letter (Letter) is a guide only. It provides general information about what Sydney Water's requirements could be if you applied to us for a Section 73 Certificate (Certificate) for your proposed development. **The information is accurate at today's date only.**

If you obtain development consent for that development from your consent authority (this is usually your local Council) they will require you to apply to us for a Section 73 Certificate. You will need to submit a new application (and pay another application fee) to us for that Certificate by using your current or another Water Servicing Coordinator (Coordinator).

Sydney Water will then send you either a:

- Notice of Requirements (Notice) and Developer Works Deed (Deed) or
- Certificate.

These documents will be the definitive statement of Sydney Water's requirements.

There may be changes in Sydney Water's requirements between the issue dates of this Letter and the Notice or Certificate. The changes may be:

- if you change your proposed development eg the development description or the plan/site layout, after today, the requirements in this Letter could change when you submit your new application; and
- if you decide to do your development in stages then you must submit a new application (and pay another application fee) for each stage.

You have made an application for specific information. Sydney Water's possible requirements are:

(OR, if completing a specific response, only complete this section. Type a heading for each service and list the relevant information below. Insert the following paragraph at the end and delete pages 3 to 10.)

No warranties or assurances can be given about the suitability of this document or any of its provisions for any specific transaction. It does not constitute an approval from Sydney Water and to the extent that it is able, Sydney Water limits its liability to the reissue of this Letter or the return of your application fee. You should rely on your own independent professional advice.

What You Must Do To Get A Section 73 Certificate In The Future.

To get a Section 73 Certificate you must do the following things. You can also find out about this process by visiting www.sydneywater.com.au > Plumbing, building & developing > Developing > Land development.

1. **Obtain Development Consent from the consent authority for your development proposal.**
2. **Engage a Water Servicing Coordinator (Coordinator).**

You must engage your current or another authorised Coordinator to manage the design and construction of works that you must provide, at your cost, to service your development. If you wish to engage another Coordinator (at any point in this process) you must write and tell Sydney Water.

For a list of authorised Coordinators, either visit www.sydneywater.com.au > Plumbing, building & developing > Developing > Providers > Lists or call **13 20 92**.

The Coordinator will be your point of contact with Sydney Water. They can answer most questions that you might have about the process and developer charges and can give you a quote or information about costs for services/works (including Sydney Water costs).

3. **Developer Works Deed**

After the Coordinator has submitted your new application, they will receive the Sydney Water Notice and Developer Works Deed. You and your accredited Developer Infrastructure Providers (Providers) will need to sign and lodge both copies of the Deed with your nominated Coordinator. After Sydney Water has signed the documents, one copy will be returned to the Coordinator.

The Deed sets out for this project:

- your responsibilities;
- Sydney Water's responsibilities; and
- the Provider's responsibilities.

You must do all the things that we ask you to do in that Deed. This is because your development does not have water and sewer services and you must construct and pay for the following works extensions under this Deed to provide these services.

Note: The Coordinator must be fully authorised by us for the whole time of the agreement.

4. **Water and Sewer Works**

- 4.1 **Water**

Your development must have a frontage to a water main that is the right size and can be used for connection.

- If deviation of a water main required part of the development, separate application to submitted to Sydney water and to be approved by Engineering services.
- Design to meet Sydney water Easement Guidelines.

The proposed development site is outside any Sydney Water's water supply zone. The closest water supply zone to service this future development is Elanora Heights Water Supply Zone.

Sydney Water had completed a study (Ingleside Drinking Water and Wastewater Servicing Options – March 2018) to service future Ingleside Development. The figure (extracted from the report) below shows the proposed water works to service the future Ingleside development. The figure show a number assets that will be required to service the Ingleside South development.

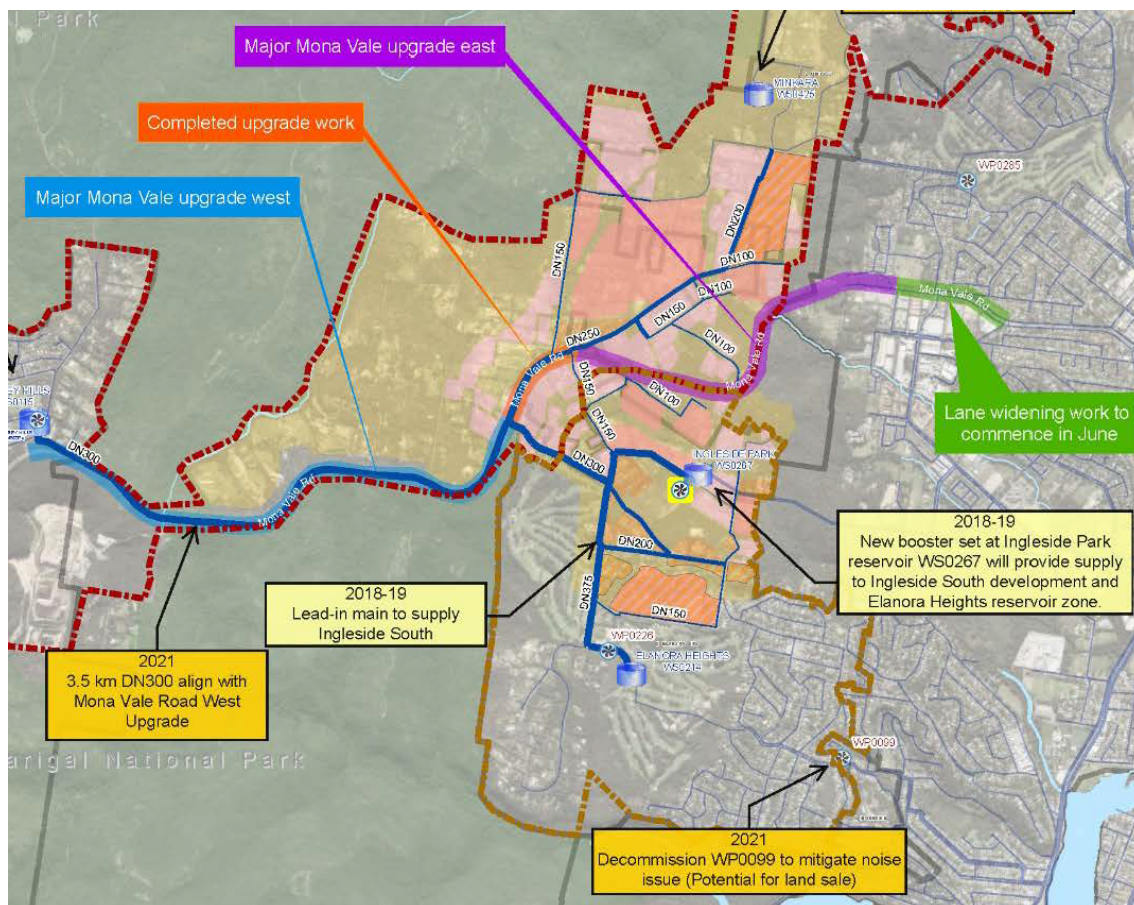


Figure A Preferred water servicing plan (source Ingleside Drinking Water and Wastewater Servicing Options – March 2018)

4.2 Sewer

Your development must have a sewer main that is the right size and can be used for connection. That sewer must also have a connection point within your development's boundaries.

Detail design to be submitted. Sydney Water Planning team and Network Area Team Representatives are included during preparation of servicing strategy. Following standard requirements are to be considered during design stage.

- Sewer to be deviated may require upsizing and protection. Sydney Water Planning to determine whether grade and capacity is adequate in intended receiving sewer
- Common BOS and/or BAS standards and procedures to be communicated to the applicant and carried out.
- Refer to Section 6.4 of the sewer code for requirements on location of MH's. An area of clearance at least 1m from the outside rim of the MH to a building is to be maintained with available access of at least 1m wide from a roadway to the MH.
- A detailed method statement for construction of deviation to be submitted
- Reference should be made to Sydney Water's Edition of the Water and Sewerage Code of Australia.

The proposed development site is outside any Sydney Water's Sewerage System. The closest sewage treatment system to service this future development is Warriewood Sewerage System.

Sydney Water had completed a study (Ingleside Drinking Water and Wastewater Servicing Options – March 2018) to service future Ingleside Development. The figure (extracted from the report) below shows the proposed sewer works to service the future Ingleside development. The figure shows a number of assets that will be required to service the Ingleside South development.

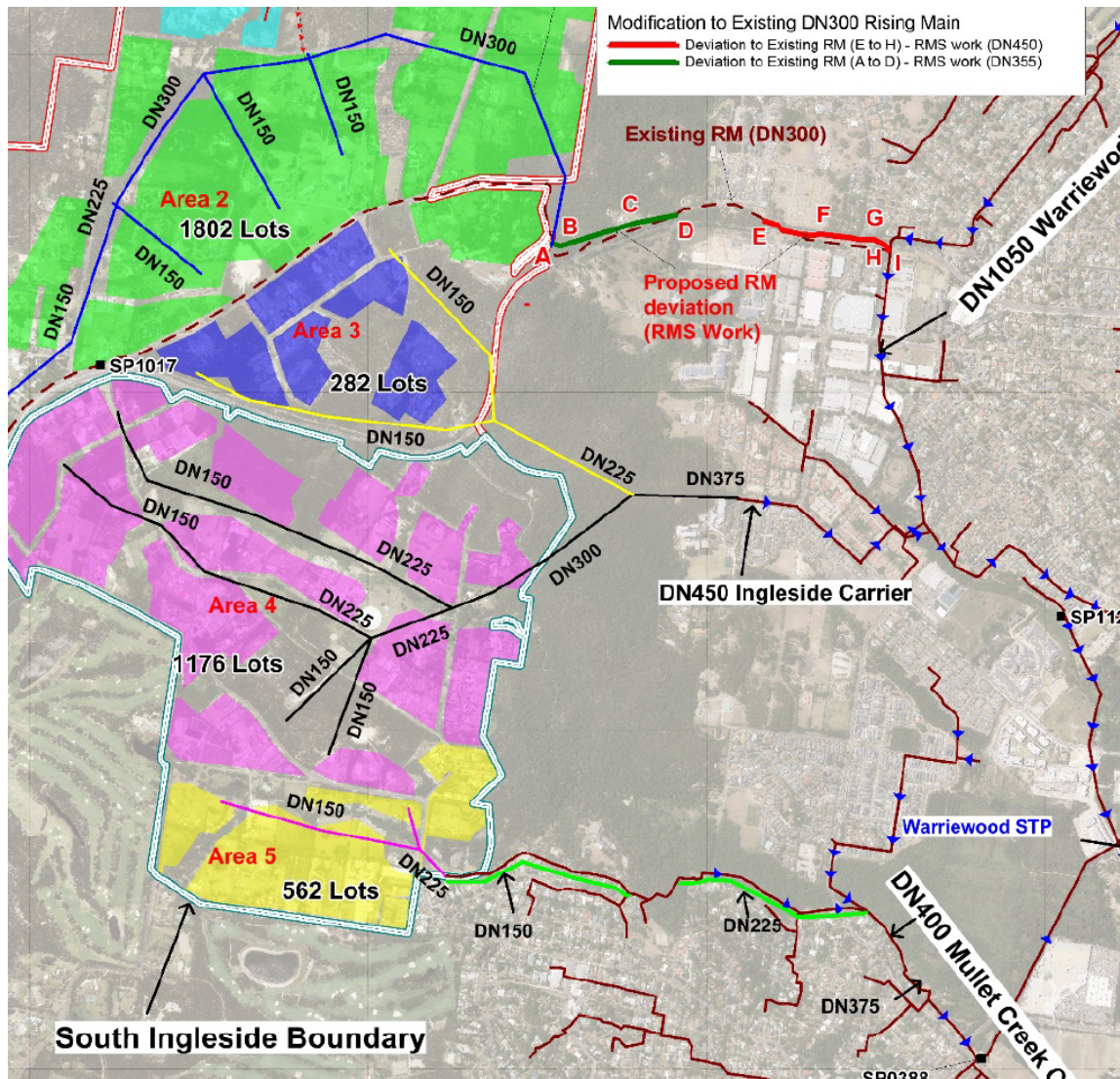


Figure B Preferred wastewater servicing plan (source Ingleside Drinking Water and Wastewater Servicing Options – March 2018)

Funding of works

Under Sydney Water's 'Funding of infrastructure to service growth' policy we may agree to contribute towards a portion of the cost of the works you are required to build. This is done either by Sydney Waters Schedule of Rates or via the Procurement process. Your Water Service Coordinator can advise you in relation to this policy, the likelihood of Sydney Water sharing a portion of the cost and the process you need to satisfy Sydney Water's probity requirements.

If you do choose to request a quote through the Schedule of Rates for Sydney Water's contribution you will avoid going through the full procurement process. Your WSC can advise you of this option.

The funding assessment will be made at the detailed design stage, prior to any construction works commencing. A firm commitment would not be made by Sydney Water until we:

- Have reviewed the detailed design and;
- Have reviewed the detailed construction quotations needed to meet our probity requirements and;
- Come to an agreement on the amount.

5. Ancillary Matters

5.1 Asset adjustments

After Sydney Water issues this Notice (and more detailed designs are available), Sydney Water may require that the water main/sewer main/stormwater located in the footway/your property needs to be adjusted/deviated. If this happens, you will need to do this work as well as the extension we have detailed above at your cost. The work must meet the conditions of this Notice and you will need to complete it **before we can issue the Certificate**. Sydney Water will need to see the completed designs for the work and we will require you to lodge a security. The security will be refunded once the work is completed.

5.2 Entry onto neighbouring property

If you need to enter a neighbouring property, you must have the written permission of the relevant property owners and tenants. You must use Sydney Water's **Permission to Enter** form(s) for this. You can get copies of these forms from your Coordinator or the Sydney Water website. Your Coordinator can also negotiate on your behalf. Please make sure that you address all the items on the form(s) including payment of compensation and whether there are other ways of designing and constructing that could avoid or reduce their impacts. You will be responsible for all costs of mediation involved in resolving any disputes. Please allow enough time for entry issues to be resolved.

5.3 Costs

Construction of these **future** works will require you to pay project management, survey, design and construction costs **directly to your suppliers**. Additional costs payable to Sydney Water may include:

- water main shutdown and disinfection;
- connection of new water mains to Sydney Water system(s);
- design and construction audit fees;
- contract administration, Operations Area Charge & Customer Redress prior to project finalisation;
- creation or alteration of easements etc; and

- water usage charges where water has been supplied for building activity purposes prior to disinfection of a newly constructed water main.

Note: Payment for any Goods and Services (including Customer Redress) provided by Sydney Water will be required prior to the issue of the Section 73 Certificate or release of the Bank Guarantee or Cash Bond.

Your Coordinator can tell you about these costs.

6. Approval of your Building Plans

You must have your building plans approved **before the Certificate can be issued. Building construction work MUST NOT commence until Sydney Water has granted approval.** Approval is needed because construction/building works may affect Sydney Water's assets (e.g. water and sewer mains).

Your Coordinator can tell you about the approval process including:

- Your provision, if required, of a "Services Protection Report" (also known as a "pegout"). This is needed to check whether the building and engineering plans show accurately where Sydney Water's assets are located in relation to your proposed building work. Your Coordinator will then either approve the plans or make requirements to protect those assets before approving the plans;
- Possible requirements;
- Costs; and
- Timeframes.

You can also find information about this process (including technical specifications) if you either:

- visit www.sydneywater.com.au > Plumbing, building & developing > Building > Building over or next to assets. Here you can find Sydney Water's *Technical guidelines - Building over and adjacent to pipe assets*; or
- call 13 20 92.

Notes:

- **The Certificate will not be issued until the plans have been approved and, if required, Sydney Water's assets are altered or deviated;**
- **You can only remove, deviate or replace any of Sydney Water's pipes using temporary pipework if you have written approval from Sydney Water's Urban Growth Business. You must engage your Coordinator to arrange this approval; and**
- **You must obtain our written approval before you do any work on Sydney Water's systems. Sydney Water will take action to have work stopped on the site if you do not have that approval. We will apply Section 44 of the *Sydney Water Act 1994*.**

7. Special Requirements

Multi-level individual metering requirements

Your development must either allow for or provide individual metering. This means that you must:

1. comply at all times and in all respects with the requirements of Sydney Water's "*Multi-level Individual Metering Guide*" (version 6 dated 1 July 2015);
2. provide and install plumbing and space for individual metering in accordance with Sydney Water's "*Multi-level Individual Metering Guide*";
3. if and when you implement a strata/ stratum plan (or strata/ stratum subdivide) you must:
 - a. engage an Accredited Metering Supplier ("**AMS**") to provide individual metering in accordance with the "*Multi-level Individual Metering Guide*" and meet the cost of the meters and metering system;
 - b. transfer the meters and metering system to Sydney Water once the Testing Certificate has been issued by Sydney Water to the AMS and the AMS has confirmed that payment for the meters and metering system has been paid in full.

Before the Section 73 Certificate can be issued, you will be required to sign an undertaking to show that you understand and accept these metering requirements and associated costs.

Visit www.sydneywater.com.au > Plumbing, Building & Developing > Plumbing > Meters & metered standpipes to see the *Multi-level individual metering guide* and find out more.

OTHER THINGS YOU MAY NEED TO DO

Shown below are other things you need to do that are NOT a requirement for the Certificate. They may well be a requirement of Sydney Water in the future because of the impact of your development on our assets. You must read them before you go any further.

Backflow Prevention Water supply connections

A backflow prevention containment device appropriate to the property's hazard rating must be installed at the property boundary. The device is to be installed on all water supplies entering the property, regardless of the supply type or metering arrangements. It is needed to reduce the risk of contamination by backflow from these supplies.

A licensed plumber with backflow accreditation can advise you of the correct requirements for your property. To view a copy of Sydney Water's Backflow Prevention Policy and a list of backflow accredited plumbers visit www.sydneywater.com.au > Plumbing, building & developing > Plumbing > Backflow prevention.

The water service for your development

Sydney Water does not consider whether the existing water main(s) talked about above is adequate for fire fighting purposes for your development. We cannot guarantee that this water supply will meet your Council's fire fighting requirements. The Council and your hydraulic consultant can help.

You must make sure that each dwelling/lot has its own 20mm meter.

When access to the water supply is required, the property owner or agent must apply to Sydney Water online. Sydney Water must install a water meter before any water is used. It is illegal for anyone other than a Sydney Water employee to remove the locking mechanism on the water meter.

The online application can be found by visiting our website www.sydneywater.com.au > Plumbing, building & developing > Plumbing > Connections & disconnections. The applicant will need to have the:

1. Account (Property) Number which can be obtained from the Coordinator; and
2. Serial Number which can be found on the metal tag on your property service.

You can find more information by using the "Ask Sydney Water" section of our website.

Fire Fighting

Definition of fire fighting systems is the responsibility of the developer and is not part of the Section 73 process. It is recommended that a consultant should advise the developer regarding the fire fighting flow of the development and the ability of Sydney Water's system to provide that flow in an emergency. Sydney Water's Operating Licence directs that Sydney Water's mains are only required to provide domestic supply at a minimum pressure of 15 m head.

Disused Water Service Sealing

You must pay to disconnect all disused private water services and seal them at the point of connection to a Sydney Water water main. This work must meet Sydney Water's standards in the Plumbing Code of Australia (the Code) and be done by a licensed plumber. The licensed plumber must arrange for an inspection of the work by a NSW Fair Trading Plumbing Inspection Assurance Services (PIAS) officer. After that officer has looked at the work, the drainer can issue the Certificate of Compliance. The Code requires this.

Disused Sewerage Service Sealing

Please do not forget that you must pay to disconnect all disused private sewerage services and seal them at the point of connection to a Sydney Water sewer main. This work must meet Sydney Water's standards in the Plumbing Code of Australia (the Code) and be done by a licensed drainer. The licensed drainer must arrange for an inspection of the work by a NSW Fair Trading Plumbing Inspection Assurance Services (PIAS) officer. After that officer has looked at the work, the drainer can issue the Certificate of Compliance. The Code requires this.

Soffit Requirements

Please be aware that floor levels must be able to meet Sydney Water's soffit requirements for property connection and drainage.

Other fees and requirements

The requirements in this Notice relate to your Certificate application only. Sydney Water may be involved with other aspects of your development and there may be other fees or requirements. These include:

- plumbing and drainage inspection costs;
- the installation of backflow prevention devices; and
- council fire fighting requirements. (It will help you to know what the fire fighting requirements are for your development as soon as possible. Your hydraulic consultant can help you here.)

No warranties or assurances can be given about the suitability of this document or any of its provisions for any specific transaction. It does not constitute an approval from Sydney Water and to the extent that it is able, Sydney Water limits its liability to the reissue of this Letter or the return of your application fee. You should rely on your own independent professional advice.

END

South Ingleside Precinct

APPENDIX

B

GAS – JEMENA CORRESPONDENCE

From: Neale Hilton <Neale.Hilton@jemena.com.au>
Sent: Wednesday, 30 September 2020 1:15 PM
To: Ashwin Prakash <ashwin.prakash@cardno.com.au>
Subject: Ingleside - Natural Gas supply

Ashwin

Jemena has conducted a high level assessment of the current network infrastructure and potential capacity for the proposed 1200 housing Lots.

Currently there is a 300kpa 32mm network in this area which cannot supply these proposed Lots. A High Pressure 1050kpa network is located on Mona Vale Rd which would be utilised for a new District Regulator station used to supply the 1200 Lots. From this Regulator Station a 160mm 300kPa feeder is required to extend throughout the designated area. Costs are unknown and Jemena will provide formal offer to individual Developer prior to construction taking place.

Please note that Jemena does not reserve capacity for any individual project. Regards

Neale Hilton
 Network Development Specialist –
 Residential Medium Density/High Rise
Jemena
 Level 14, 99 Walker Street, North Sydney, NSW 2060
 M 0402 060 151
neale.hilton@jemena.com.au | www.jemena.com.au





**Our new Gas Network
Access Arrangement
commenced on
1 July 2020**



Click here for more
information about our
5 year plan, including
reduced network tariffs

This is a confidential message intended for the named recipient(s) only. The contents herein are privileged to the sender and the use thereof is restricted to the intended purpose. If you have received this e-mail in error, please do not use, disclose, distribute, copy, print or relay on this email. If receipt is in error, please advise the sender by reply email. Thank you.

APPENDIX

C

OPINION OF PROBABLE COSTS – UTILITIES

INGLESIDE PRECINCT
ELECTRICAL, TELECOMMUNICATIONS, GAS, POTABLE WATER & WASTEWATER INFRASTRUCTURE



Cardno Opinion of Probable Costs
 2-Mar-21

| ITEM | DESCRIPTION OF WORK | QTY | UNIT | RATE | AMOUNT | NOTES |
|----------|--|--------|------|--------------|----------------------|--|
| 1 | POTABLE WATER | | | | | |
| 1.11 | Lead-in / Trunk 100 mm main | 990 | m | \$ 280 | \$ 277,200 | Quantities taken off preliminary potable water layout in plan SK-007. Lead-in/Trunks per Sydney Water Feasibility Letter dated 28 Oct 2020 |
| 1.12 | Lead-in / Trunk 150 mm main | 2,490 | m | \$ 300 | \$ 747,000 | Quantities taken off preliminary potable water layout in plan SK-007. Lead-in/Trunks per Sydney Water Feasibility Letter dated 28 Oct 2020 |
| 1.13 | Lead-in / Trunk 300 mm main | 710 | m | \$ 380 | \$ 269,800 | Quantities taken off preliminary potable water layout in plan SK-007. Lead-in/Trunks per Sydney Water Feasibility Letter dated 28 Oct 2020 |
| 1.14 | Lead-in / Trunk 375 mm main | 2,060 | m | \$ 450 | \$ 927,000 | Quantities taken off preliminary potable water layout in plan SK-007. Lead-in/Trunks per Sydney Water Feasibility Letter dated 28 Oct 2020 |
| 1.15 | Reticulation (150 mm main) | 18,400 | m | \$ 300 | \$ 5,520,000 | Quantities taken off preliminary potable water layout in plan SK-007. |
| 1.16 | Water booster | 1 | Item | \$ 1,500,000 | \$ 1,500,000 | Per advice from Sydney Water Feasibility Letter dated 28 Oct 2020. Required for elevated areas of South and whole of North Sub-Precinct. |
| 1.17 | Water Reservoir (Provisional) | | Item | | \$ - | Assumed that this item is not required. |
| | Potable Water Sub-Total | | | | \$ 9,241,000 | |
| 2 | WASTEWATER | | | | | |
| 2.11 | Lead in / Trunk 150 mm main | 2,550 | m | \$ 560 | \$ 1,428,000 | Quantities taken off preliminary sewer water layout in plan SK-008. Lead-in/Trunks per Sydney Water Feasibility Letter dated 28 Oct 2020 |
| 2.12 | Lead in / Trunk 225 mm main | 2,790 | m | \$ 560 | \$ 1,562,400 | Quantities taken off preliminary sewer water layout in plan SK-008. Lead-in/Trunks per Sydney Water Feasibility Letter dated 28 Oct 2020 |
| 2.13 | Lead in / Trunk 300 mm main | 630 | m | \$ 600 | \$ 378,000 | Quantities taken off preliminary sewer water layout in plan SK-008. Lead-in/Trunks per Sydney Water Feasibility Letter dated 28 Oct 2020 |
| 2.14 | Lead in / Trunk 375 mm main | 320 | m | \$ 700 | \$ 224,000 | Quantities taken off preliminary sewer water layout in plan SK-008. Lead-in/Trunks per Sydney Water Feasibility Letter dated 28 Oct 2020 |
| 2.15 | Wastewater reticulation (150 mm main) | 20,490 | m | \$ 560 | \$ 11,474,400 | Quantities taken off preliminary sewer water layout in plan SK-008. |
| | Wastewater Sub-Total | | | | \$ 15,066,800 | |
| 3 | Electrical | | | | | |
| 3.11 | Lead-in feeder (Mona Vale Zone Substation) | 3,650 | m | \$ 1,350 | \$ 4,927,500 | Assumes that there is adequate capacity in the Monavale Zone Substation |
| 3.12 | Electrical reticulation | 1,008 | lots | \$ 8,000 | \$ 8,064,000 | Allowance for LV reticulation, 11 kV kiosk substations and street lighting |
| | Electrical Sub-Total | | | | \$ 12,991,500 | |
| 4 | Gas | | | | | |
| 3.11 | Gas Main Extension | 4,000 | m | \$ 300.00 | \$ 1,200,000 | Based on linear metre cost from past project-(inc. 20% contingency)- it is to be confirmed whether the Developer or Jemena will fund these works |
| | Gas Sub-Total | | | | \$ 1,200,000 | |
| 5 | Communications | | | | | |
| 3.11 | NBN Reticulation (Pit and Pipe) | 1,008 | lot | \$ 1,000.00 | \$ 1,008,000 | Assume existing NBN Co. network has adequate capacity and thus no leadin is required. To be funded by Developer(s) |
| | Communications Sub-Total | | | | \$ 1,008,000 | |

We understand there are 980 new dwellings and 130 existing dwellings proposed for the precinct, this will not have a substantial cost difference to the 1008 new lots that the above estimate is based upon.

APPENDIX

D

OPINION OF PROBABLE COSTS – ROAD UPGRADE

Our Ref: 80221013 Ingleside Road Upgrade Costing: MZ
Contact: Matthew Zollinger

02 March 2021

Cox Architecture
Level 6, 155 Clarence Street
Sydney NSW 2000

Attention: Ian Connolly

Cardno (NSW/ACT) Pty Ltd
ABN 95 001 145 035

Suite 3.01, Level 3
3 Horwood Place
Parramatta NSW 2150
Australia

Phone +61 2 9496 7700
Fax +61 2 9439 5170

Dear Ian,

INGLESIDE - ROADS UPGRADE – OPINION OF PROBABLE COSTS

As discussed Cardno have put together an Opinion of Probable Costs for the upgrade of a section of existing road network within the Ingleside Precinct. This cost estimate has been prepared on the basis of past projects undertaken by Cardno and advice that has been provided by Cox Architecture on the new road profiles proposed and the selection of roads that are to be upgraded. The road profile and road network for the upgrades are shown below:

Figure 1-1 Proposed road network upgrades

Typical Urban Street - 20m Existing reserve

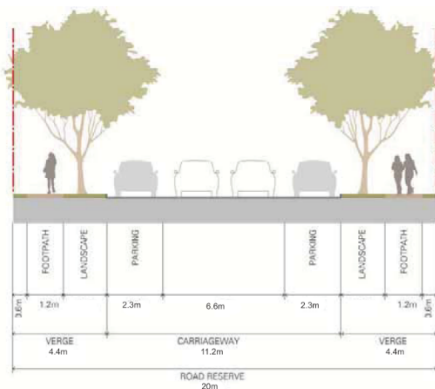
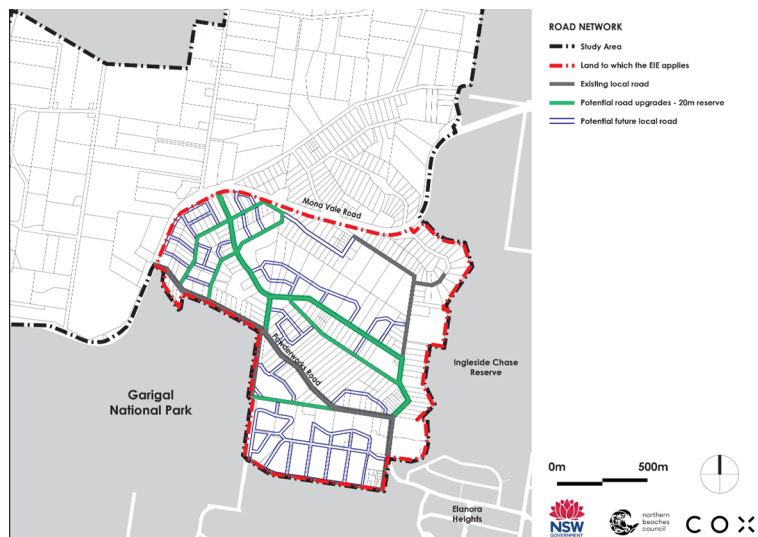


Figure 1-2 Proposed Road Profile



Opinion of Probable Costs

Cardno has developed a linear metre rate for the proposed road upgrades, which is inclusive of:

- Demolition and disposal of existing pavement;
- Earthworks;
- Retaining Walls and batters;
- New pavement construction;
- Footpaths;
- Landscaping;
- Stormwater Drainage;
- Electrical Reticulation including street lights;
- Communications infrastructure; and
- Potable Water and Recycled reticulation network.

A breakdown of the linear metre rate is as below:

| Road Type 1 - Local (20m Road) Road | Qty | Unit | Rate | Amount | Notes |
|--|------------------|----------------|------------------|--------------------|--|
| Road Name | Local (20m Road) | | | | |
| Width - Road reserve | 20 | | | | |
| Width - Pavement | 11.2 | | | | |
| Footpath width | 2.4 | | | | |
| Cycleway width | | | | | |
| Turf width | 6.4 | | | | |
| Total Check (should equal zero) | 0 | | | | |
| Depth - Pavement (mm) | 450 | | | | |
| Light Poles | One Side | of road | | | |
| Street Tree Size | Large | | | | |
| Cut and dispose existing pavement. | 2.6 | m ³ | \$ 25.00 | \$ 65.00 | Assume that existing pavement cannot be re-used. |
| Earthworks cut & fill for road formation | 15 | m ³ | \$ 4.50 | \$ 67.50 | Assume current carriageway and verge is 6m wide. Road to be extended 7m either side. Depth estimated to be 2m in cut and fill. Therefore 15sqm per 1m for cut and fill |
| Road batters | 8 | m ³ | \$ 4.50 | \$ 36.00 | Assume roads will have a 1V:4H batter except where there is a wall. |
| Retaining walls | 0.5 | m | \$ 1,000.00 | \$ 500.00 | Assume 50% of roads will have a retaining wall on one side at 1m high |
| Kerb and gutter | 2 | m | \$ 70.00 | \$ 140.00 | |
| Dish Drain | 0 | m | \$ 140.00 | \$ - | |
| AC 10 (25mm) Second Layer | 10.3 | m ² | \$ 11.54 | \$ 118.86 | |
| AC 10 (25mm) First Layer | 10.3 | m ² | \$ 11.54 | \$ 118.86 | |
| Primer Seal | 10.3 | m ² | \$ 8.78 | \$ 90.43 | |
| DGB20 Basecourse (150mm deep) | 10.3 | m ² | \$ 14.00 | \$ 144.20 | |
| DGS40 Subbase (300mm deep) | 12.1 | m ² | \$ 29.00 | \$ 350.90 | |
| Subgrade Improvement/Replacement | 2.24 | m ² | \$ 12.00 | \$ 26.88 | Assume 20% of total road area requires subgrade replacement/improvement |
| Subgrade trim and prepare | 12.1 | m ² | \$ 2.57 | \$ 31.10 | |
| Lime stabilisation (150mm, 3%) | 12.1 | m ² | \$ 11.00 | \$ 133.10 | |
| Pavement Testing | 0.27 | Item | \$ 130.00 | \$ 34.67 | |
| Subsoil drainage pipe with filter sock | 1.5 | m | \$ 42.00 | \$ 63.00 | |
| Subsoil drainage concrete surround flushing point | 0.05 | Item | \$ 70.00 | \$ 3.50 | |
| Drainage Pipe (<dia 600) | 1 | m | \$ 450.00 | \$ 450.00 | |
| Drainage Pit | 0.033333333 | Item | \$ 2,650.00 | \$ 88.33 | |
| Drainage Pipe CCTV | 1 | m | \$ 16.88 | \$ 16.88 | |
| Verge/Median turf | 5.2 | m ² | \$ 7.50 | \$ 39.00 | |
| Street Trees | 0.133333333 | m | \$ 1,000.00 | \$ 133.33 | Including tree guard etc. |
| Footpath | 2.4 | m ² | \$ 100.00 | \$ 240.00 | |
| Cycleway/Shared Path | 0 | m ² | \$ 125.00 | \$ - | |
| Service Crossings | 0.033333333 | m ² | \$ 10,000.00 | \$ 333.33 | |
| P/W Reticulation (150mm main) | 1 | m | \$ 300.00 | \$ 300.00 | |
| R/W Reticulation (150mm main) | 1 | m | \$ 300.00 | \$ 300.00 | |
| Electrical (including street lights, LV and HV infras) | 1 | m | \$ 600.00 | \$ 600.00 | |
| NBN | 1 | m | \$ 60.00 | \$ 60.00 | |
| Gas | 1 | m | \$ 30.00 | \$ 30.00 | |
| | | | Sub Total | \$ 4,514.88 | |

Assumptions, Clarifications and Exclusions

This Opinion of Probable Costs for this cost estimate is based on a number of assumptions, clarifications and exclusions including:

- The cost estimate has been based on desktop information only. There is no geotechnical information and survey information available interpret existing ground profile and conditions to inform estimation of earthworks and pavement construction works required;
- It is assumed that the CBR for existing and new pavement area is generally 3%;
- It is assumed that 20% of the subgrade will need improvement;
- It is assumed that the existing pavement will not be able to be re-used and will therefor be disposed of. This cost is included in the linear metre road rate;
- The current nearmap and street view desktop imagery indicates that the existing carriageway and verge is about 6m wide in places, as such that extensions 7m wide in either direction would be required in order to construct a 20m wide road reserve;
- The cut and fill quantities for the per linear metre road rate assumes a depth of cut and fill of 2m at the edges of the road reserve;
- Batters 1V:4H in grade have been costed for the interface of the new road with the existing properties;
- It is assumed that the existing carriageway will need to be disposed and cannot be re-used onsite;
- It is assumed that 50% of roads will have a retaining wall on one side at 1m high;
- Rock excavation for roads and trenching has not been included;
- No allowance has been made for land acquisition, removal of existing trees, removal of contaminated material and intersection upgrades;
- We have allowed for service reticulation; however no allowance has been made for major utility infrastructure relocations;
- Note that the linear m road rate includes installation of new utility reticulation; and
- The linear road rate includes large street trees every 15m on both sides of the road.

Yours sincerely,



Matthew Zollinger
Business Leader Urban Infrastructure
for Cardno
Direct Line: +61 2 9024 7041
Email: matthew.zollinger@cardno.com.au