



# **Riverwood Estate State Significant Precinct**

Infrastructure Services Report

March 2022

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# 1 Introduction

Mott MacDonald has been engaged by the NSW Land and Housing Corporation (LAHC) to assist with the preparation of a master plan to guide the revitalisation and renewal of the Riverwood Estate State Significant Project (SSP).

## 1.1 Scope of Works

LAHC is preparing a master plan to guide the revitalisation and renewal of the Riverwood Estate SSP. Mott MacDonald has been engaged to identify existing opportunities, constraints and risks associated with civil engineering and services infrastructure to support the delivery of the master plan.

To assist in the preparation of the master plan, Mott MacDonald has undertaken the following tasks:

- Undertake a comprehensive services search, Dial Before You Dig (DBYD), and identify the existing service infrastructure in the vicinity of the site;
- Liaise with the relevant service providers to determine the infrastructure requirements for the proposed master plan. A list of affected utility authorities is shown as below;
  - Sydney Water Corporation (SWC) – Water and Sewer;
  - Ausgrid – Electricity;
  - Jemena – Gas; and
  - National Broadband Network (NBN) – Telecommunications.
- Assess the existing capacity and any planned upgrades; and
- Map the existing services, identifying key infrastructure.

## 1.2 Purpose of Report

The purpose of this report is to identify existing servicing infrastructure and outline requirements for new infrastructure to service the Riverwood Renewal project. Requirements for new infrastructure will be in accordance to the Department of Planning, Industry and Environment (DPIE) study requirements against Section 10 (Utilities Servicing). Those requirements are:

- Identifies the existing situation, including constraints, opportunities, key issues and existing network capacity;
- Assesses the capacity of the relevant service infrastructure networks to service the Precinct, impacts on the networks resulting from the proposal and identify any augmentation and service options proposed to support the proposal;
- Assesses the implications of any proposed land use for local and regional infrastructure and service delivery; and
- Informs and supports the preparation of the proposed planning framework including any recommended planning controls of DCP / Design Guideline.

To accommodate these requirements this report will cover the following:

- Existing / proposed servicing strategies;
- Review of current supply;
- Available capacity;
- Key constraints and opportunities;
- Demand generated by the development;
- Adjustments/augmentations required to existing infrastructure to enable the development; and
- Staging recommendations.

### 1.3 Project Overview

Riverwood Estate is a 30 ha site, comprising of social housing dwellings, and private dwellings. The existing social housing is aged, needs to be improved and the current social housing mix is not reflective of the demand so the site has been identified for renewal.

The project team have worked with NSW Land and Housing Corporation to prepare a master plan for the redevelopment of the site that will replace the existing dwellings, provide for additional private dwellings, new streets, parks and community uses.

The proposed master plan provides for approximately 3,900 new dwellings, buildings ranging between three and 12 storeys and two local open spaces – Roosevelt Park and community Greenway. It will be a high-density community, with the amenity and community of a traditional Sydney suburb.



Figure 1.1: Riverwood Estate SSP Study Area



Source: Canterbury Local Environment Plan 2012

## 2 Existing Services Infrastructure

The existing utilities assessment is primarily based on information received as a result of a Dial Before You Dig (DBYD) search. This information was supplemented by a site inspection and subsequent liaison with key personnel at the respective service authorities. Further survey and asset identification should be undertaken at a later stage of design to confirm the assumptions made in this section and reduce the risk of asset striking.

The services information has been consolidated and displayed on a number of plans which can be found in Appendix A. The details shown on the plans should be considered as indicative only as the original DBYD information is not based on detailed survey data.

The following sections provide a commentary on the existing services within and adjacent to the site.

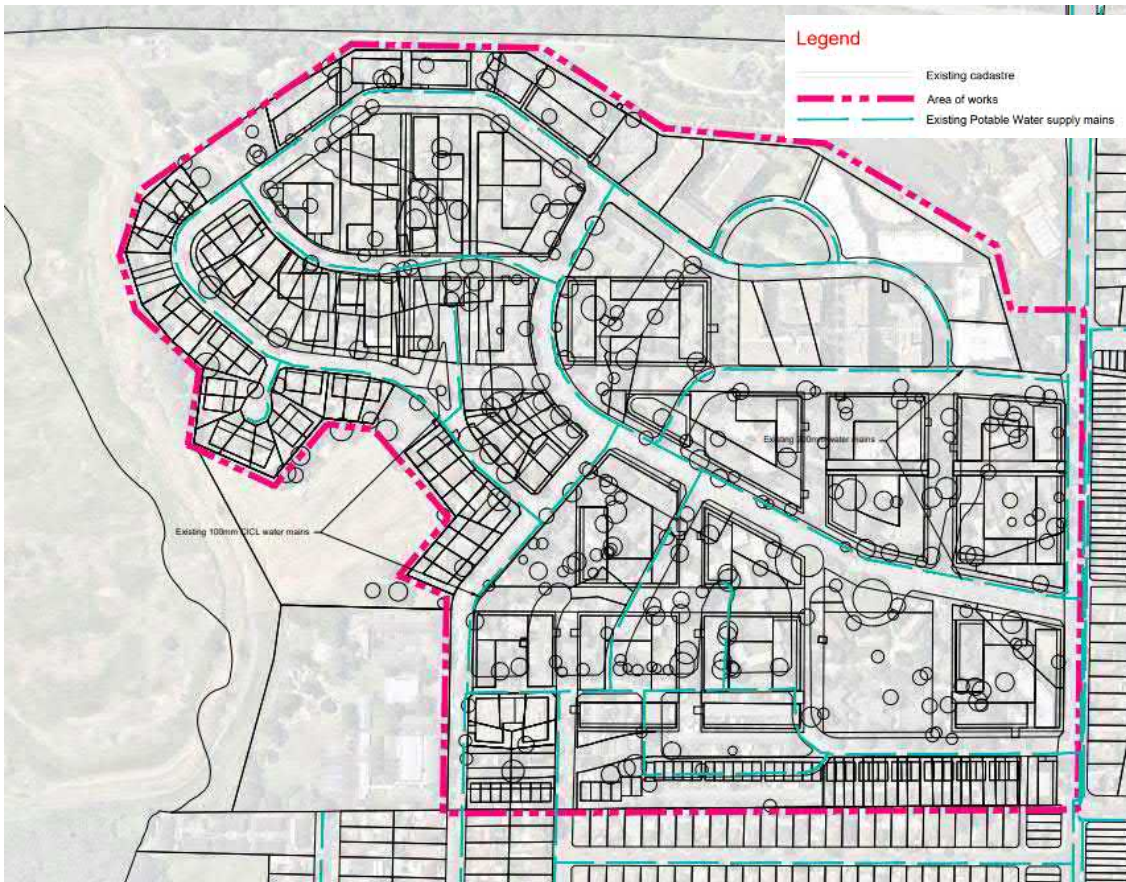
### 2.1 Water

The site likely receives water supply from the Wiley Park reservoirs, approximately 2.5 km north-east of the site. A 450 mm cast iron cement lined (CICL) water main located 350 m north of the M5 Motorway connects to a smaller 200 mm main to supply the site. The 200 mm main follows Belmore Road South where minor reticulation for the subject site connects into the water network. The Study Area contains a network of smaller existing reticulation lines, typically located within the standard trench allocation of the road reserve and 100-200 mm in size.

There are no trunk mains located within the vicinity of the site, and as such it is not anticipated any major relocation works will be required. Existing pipes can therefore be easily removed or relocated to suit the new layout without significant impact to neighbouring users.

Due to the absence of large water mains in the vicinity of the site, it is likely that there is limited capacity in the existing system and upgrade lead in works will be required to service any future development. Significant external lead-in upgrades are likely to be required to support the expected growth.

**Figure 2: Existing Water Infrastructure**



### 2.1.1 Key Constraints and Opportunities

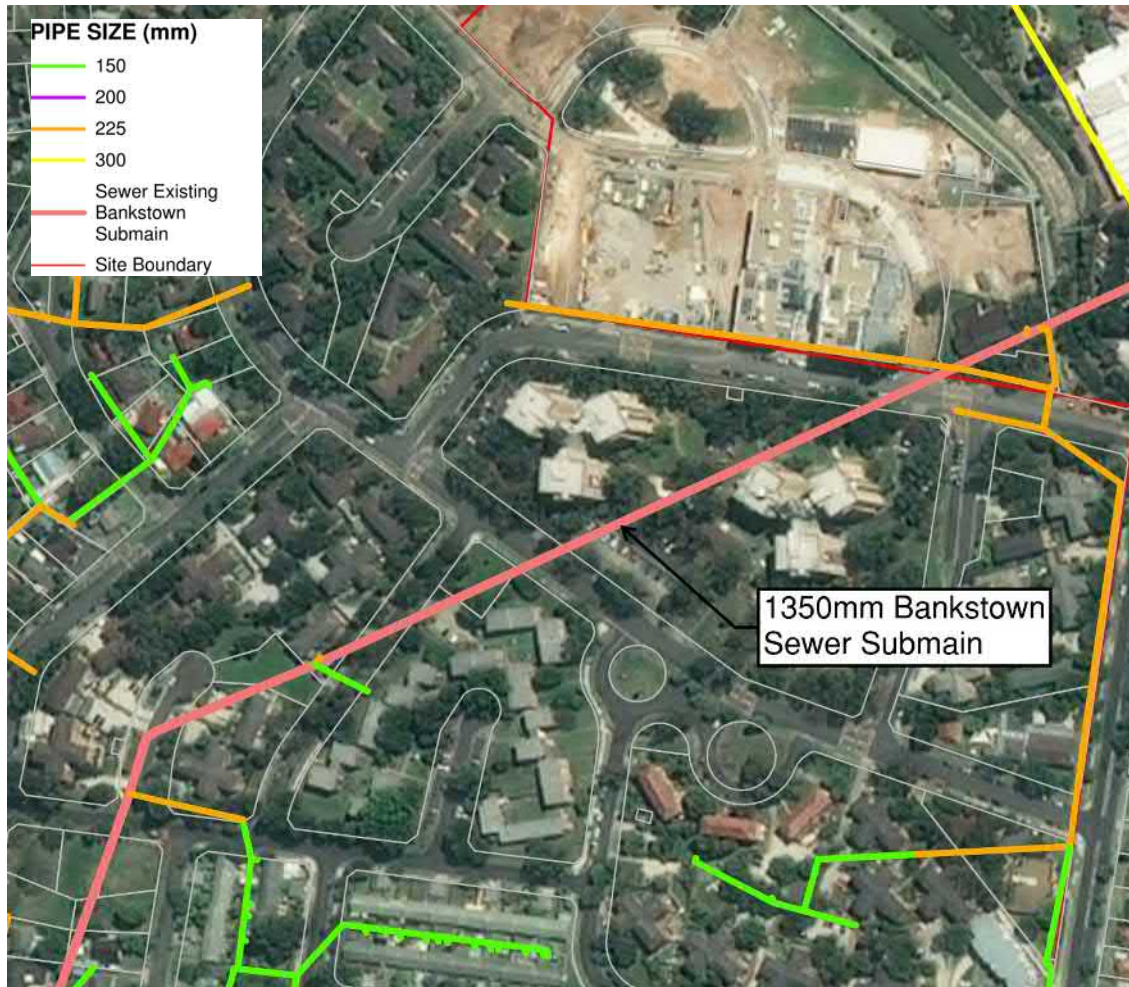
The key potable water constraints and opportunities for the site are as follows:

- Upgrade lead-in works will likely be required as there is likely to be limited capacity in the existing water mains. Upgrading the 200 mm water main underneath the M5 Motorway will incur in a significant cost;
- Existing minor reticulation within the site boundary will require removal/relocation to suit the proposed new master plan layout; and
- There are no trunk pipes within property boundaries requiring relocation.

## 2.2 Sewer

The site is serviced via a 1,350 x 1,200 mm reinforced concrete box culvert trunk sewer main which traverses through the middle of the site. The main enters the site from the north-east corner of the site and exits through the south. West of Minnesota Avenue, the main changes from a box culvert to a pipe. The location of this main is shown in Figure 3. All sewer mains within the site boundary and in the surrounding area connect to this trunk main, which drains to the Malabar Waste-Water Treatment Plant.

**Figure 3: Trunk Sewer Main Location**



The site generally slopes from east to west, with exception to the eastern portion of the site located over a ridge line, which grades slightly to the north.

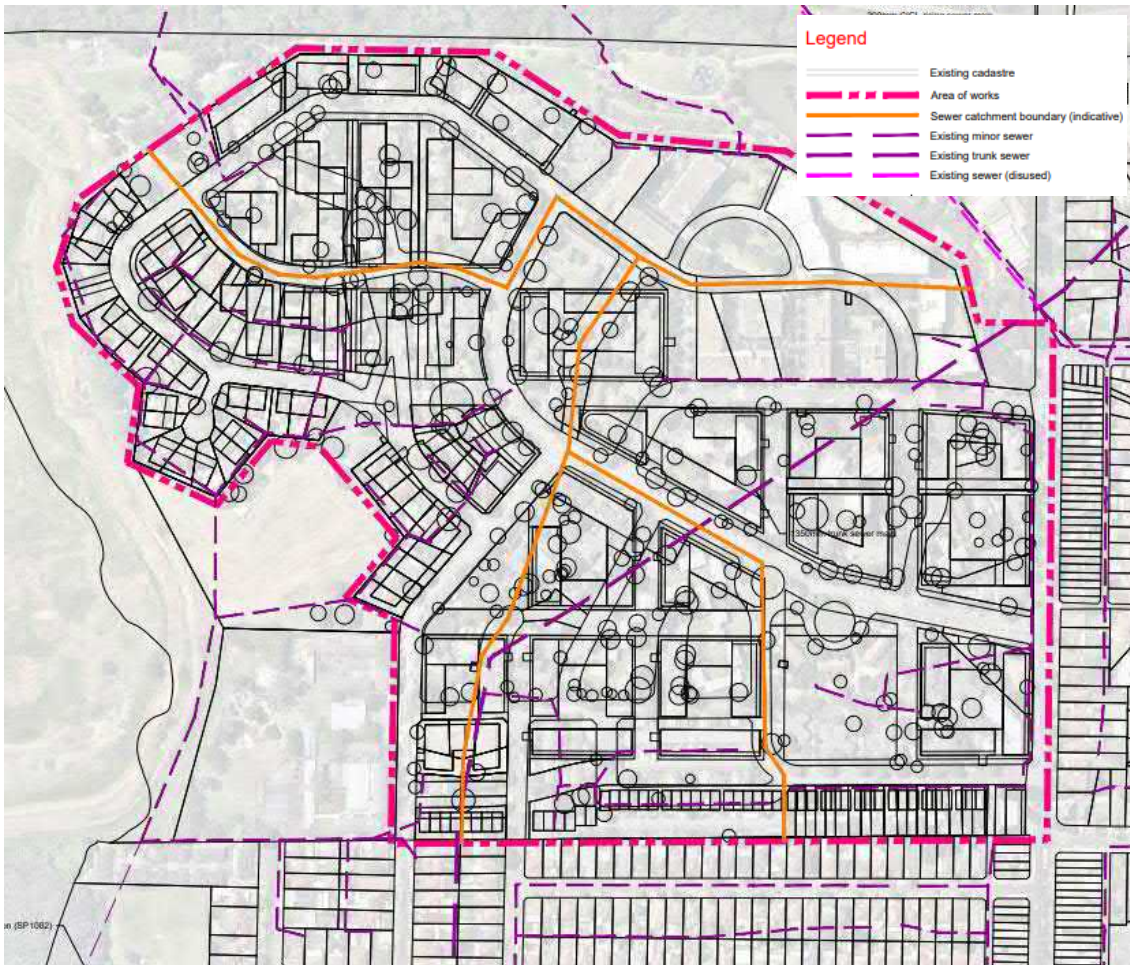
Figure 4: Sewer Catchments



Source: Google Maps 2017

The site drains to four smaller sub-catchments as shown in Figure 4. A small section at the north of the site (Catchment 1) drains to a pump station SPS0182 on the northern side of the M5 Motorway via two 225 mm PVC and vitrified clay lines. From the pump station, a 300 mm rising main connects back to the trunk sewer main and drains to the south. Should there be insufficient capacity in one of these mains to cater for the increased demand generated by the development, there is opportunity to utilise the other main to avoid any upgrade works. As the pipes travel under the M5 Motorway, increasing the pipe size would pose a large cost to the developer and should be avoided if possible.

**Figure 5: Existing Sewer Infrastructure**



Properties in the western side of the site (Catchment 2) drain to a pump station (SPS0211) located adjacent to Coleridge Street in the South-West corner of the Estate. A 200 mm CICL rising main connects the pump station to the trunk sewer main.

Catchments 3 and 4 drain via a series of smaller (150-225 mm) sewer mains directly to the trunk main. There are three main connection points into the trunk main, which will likely be utilised for any future connections required.

The Bankstown submain main drains via gravity at depths between 1.15-1.35 m below ground. Due to its size and grade, Sydney Water's preference will be to maintain the pipe in its current location given the difficulties and costs associated with relocation. Easements are required for sewer mains greater than 600 mm in size, with a minimum setback width of 3 m. The exact easement size will be confirmed by Sydney Water at a later stage. The location of this trunk main and the associated easement should be considered when developing the layout and staging plans.

An easement will also be required for the rising main from the SPS0211 pump station. Sydney Water's standard easements require a 3 m setback for all rising sewer mains. Only a small portion

of this main is located within the site boundary and as it is within the road reserve of Coleridge Street the impacts on development are expected to be minimal.

Due to the size of the trunk main within the site boundary, it can be assumed that the existing network will have sufficient capacity to supply the proposed development and therefore only minor upgrade works will be required.

### 2.2.1 Key Constraints and Opportunities

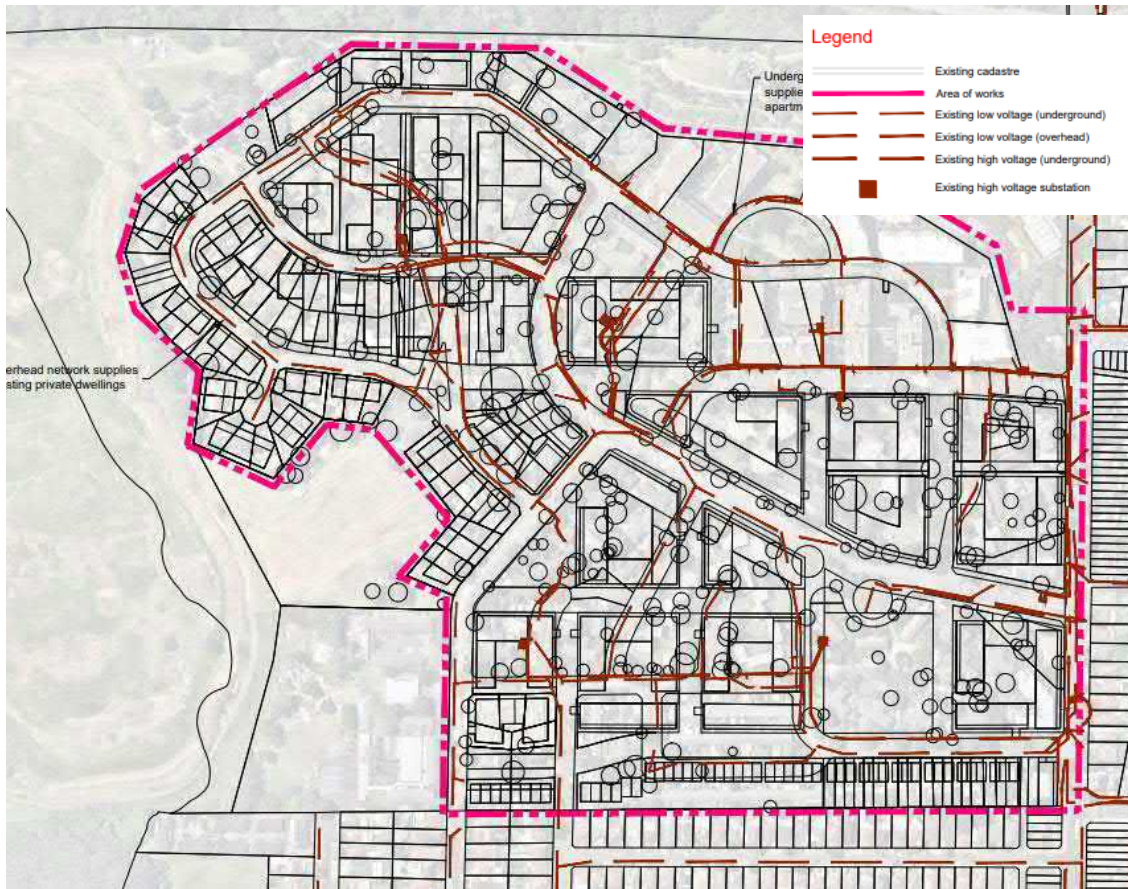
The key wastewater constraints and opportunities for the site are as follows:

- The 1,350 mm trunk sewer main is present through a significant area of the site and will require an easement of 3m where traversing private property. All new development must be located outside this easement. In order for the master plan layout to be delivered, options to relocate this pipe needs to be considered;
- Should there be no spare capacity in the two sewer mains draining under the M5 Motorway, upgrading these pipes may generate significant cost in under-boring;
- Existing spare capacities to be confirmed for the two pump stations. Upgrades may be required; and
- Existing minor sewer reticulation within the property boundaries will require removal/relocation to suit the proposed new layout. With the exception of the 1,350 mm trunk main, this is not expected to be onerous.





**Figure 7: Existing Electrical Infrastructure**



### 2.3.1 Key Constraints and Opportunities

The key electrical constraints and opportunities for the site are as follows:

- Existing overhead electrical cables will likely require undergrounding to facilitate the development. Care should be taken to ensure electrical connection to existing private dwellings is maintained throughout construction. Overhead electrical cables could be undergrounded to improve street amenity, this is generally achieved in a piecemeal fashion by providing spare conduits along property frontages as lots are developed. Once the majority of conduits are provided, Ausgrid will then underground the cables; and
- Relocation of the existing HV may be required to suit the new road layout.

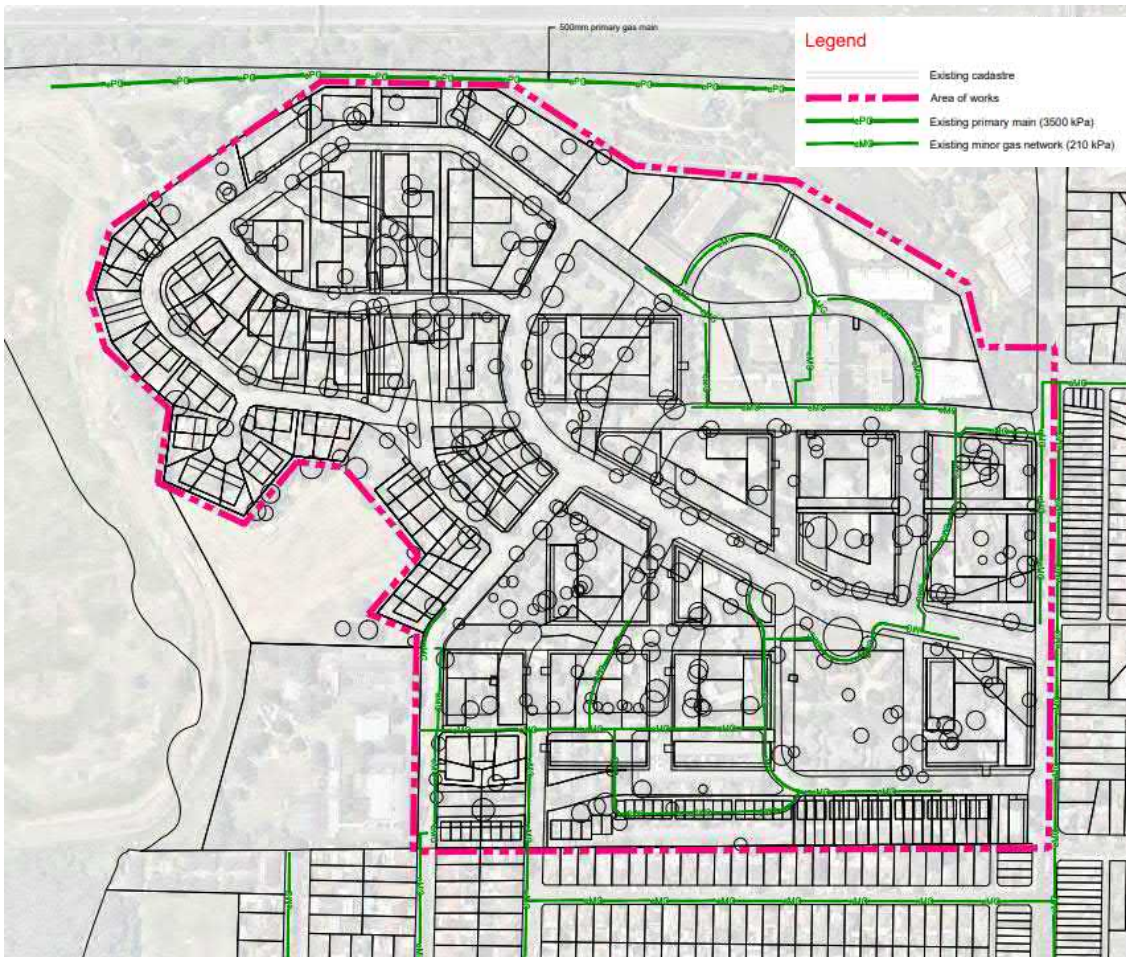
## 2.4 Gas

Gas is supplied to the site and surrounding area by Jemena. A series of 32 mm and 50 mm network mains services the existing dwellings in the Study Area. Gas is currently supplied to the private dwellings in the southern portion of the site, and to the Washington Park development on Washington Avenue. At present, there are no gas mains along Roosevelt Avenue or Kentucky Road to service the western area of the site.

As gas is a non-essential service, extending mains to these areas of the site will be dependent on demand and will be the responsibility of individual developers. Consideration should be given to existing gas mains within the site when new road layouts are decided.

A 500 mm primary gas main traverses the southern side of the M5 Motorway adjacent to the site boundary. The exact location and associated easements will be confirmed by Jemena during the feasibility analysis. It is not anticipated this main will impact the development at Riverwood as it is located outside the site boundary.

**Figure 8: Existing Gas Infrastructure**



### 2.4.1 Key Constraints and Opportunities

The key gas constraints and opportunities for the site are as follows:

- Relocation of existing gas main may be required to suit the new road layout;
- Consideration should be given to extending the existing gas mains to service the western portion of the site (this would be assessed by Jemena on an as needs basis); and
- Caution should be exercised during construction of the northern portion of the site due to proximity to the primary gas main.

## 2.5 Telecommunications

Telstra provide telecommunications services throughout the site. Underground cables traverse the majority of streets within the Study Area. A small portion of Kentucky Road adjacent to the reserve utilises aerial cabling from the electricity poles, however the remainder of the site receive service via the underground network.

A Telstra mobile tower is located atop one of the right apartment blocks on Washington Avenue, as shown in Figure 9. Optus and Vodaphone also have a mobile base station on this rooftop. It should be noted that before any development can occur on this site, consultation with these telecommunications providers will need to occur to determine a suitable new location for the tower and base station and measures for minimising disruption to the existing service will need to be implemented.

**Figure 9: Telstra Mobile Tower Location**



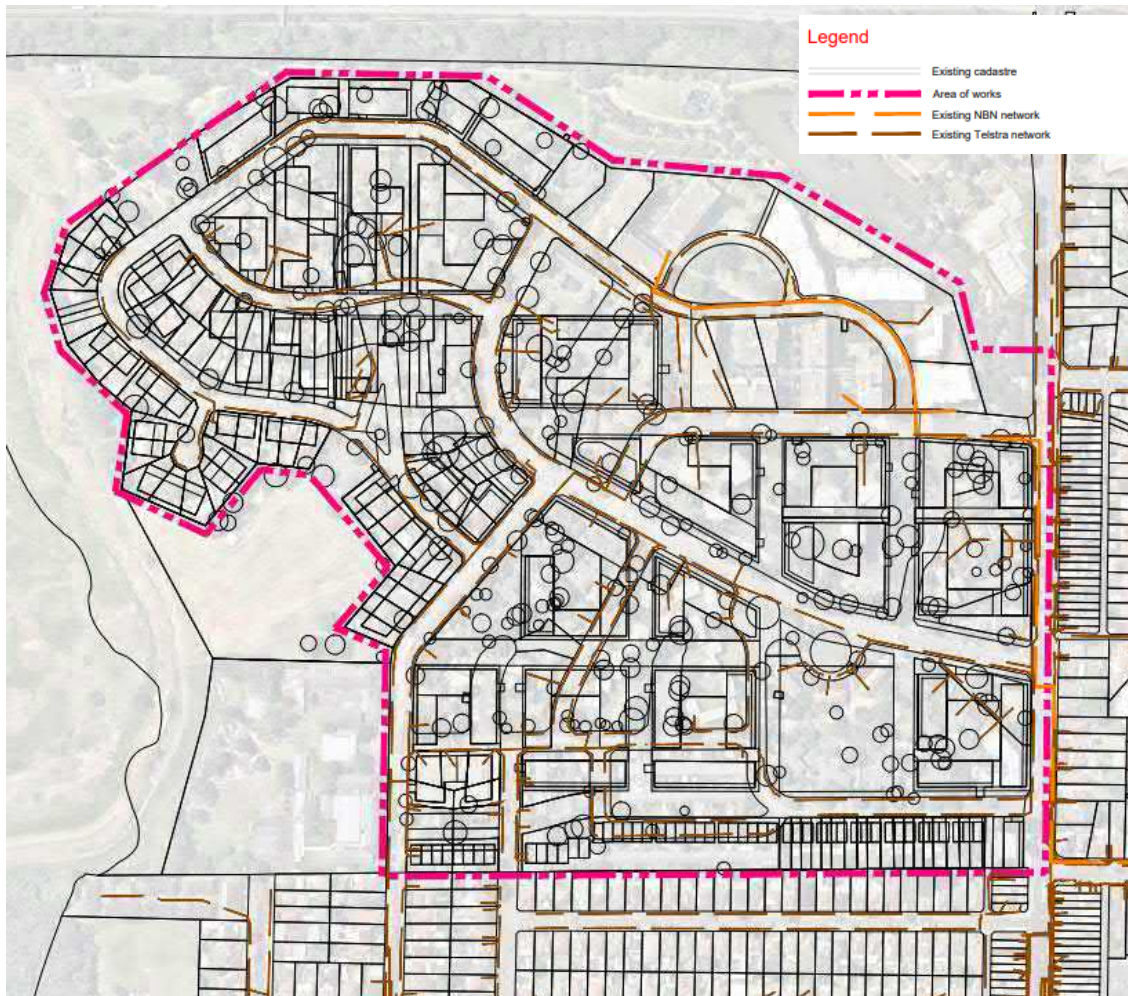
Source: Google Earth 2017

A significant amount of the underground Telstra network contains fibre optic cabling. Plans received from Telstra show the site area south of Roosevelt Avenue is serviced via these cables. Consideration should be given to these cables when new road layouts are designed as they can be difficult to relocate and should be avoided where possible.

The site is also partially serviced by the NBN network. Underground NBN cables traverse Belmore Road and service the Washington Park development via Washington Avenue and Kentucky Road. The remainder of the site does not receive NBN service. A feasibility application has been lodged with NBN Co. to determine the servicing options for the balance of the site.

The Washington Park development is also connected to the Optus network. Underground Optus cables traverse the extents of Washington Avenue and the eastern portion of Kentucky Road. Optus also provide internet service to Riverwood Public School, located in the southwest corner of the site. Care should be taken to ensure this service is not disrupted by the proposed development.

**Figure 10: Existing Telstra, Optus and NBN Infrastructure**



### 2.5.1 Key Constraints and Opportunities

The key telecommunication constraints and opportunities for the site are as follows:

- A Telstra mobile tower is located atop one of the residential apartment buildings on the site. Consultation with Telstra will be required to determine a new location for the tower, preferably atop a new building;
- The southern portion of the site is serviced by underground fibre optic cabling. Removal/relocation of these cables should be avoided where possible; and
- Existing reticulation will need to be removed/relocated to suit the new road layout.

### 3 Preferred Master Plan

The master plan will yield approximately 3,900 new dwellings within the Study Area. To facilitate this increase, upgrades to both internal and external services are required. The vast majority of existing infrastructure in the area is designed to generally accommodate low density housing with the occasional medium density development around centres and nodes. As such it is anticipated that lead-in/out works will be required to support the growth. Lead-in works are likely to be provided incrementally over the life of the project as demand grows as such the Riverwood development will be staged in such a way to initially leverage off existing spare service capacity and then to make efficient use of lead-in works as they are required.

**Figure 11: Preferred Master Plan**



Source: Architectus

As LAHC are the majority landowner in the area, this provides a unique opportunity to improve existing road networks and service configurations. With regard to minor internal reticulation, where internal roads are maintained there will also be an opportunity to maintain the existing servicing and conversely where new roads are provided, new services will be provided in a standard trench arrangement at a size commensurate to the increased density. This practice is common to residential subdivisions. The staged works will need to ensure that connection is maintained to existing and private properties throughout the development.

**Figure 12: Indicative Staging Plan**



## 4 Proposed Services Infrastructure

The following section of this report outlines the strategic servicing requirements to support the increase in development density associated with the project. Where possible details of advice and correspondence from the service authorities are provided. The assessment provides details of the ultimate servicing strategy and then commentary on the recommended staging of the lead-in works to match the staged development growth/uptake. Further to this, where trunk infrastructure is affected by the proposed development layout, opportunities will be explored to realign/replace trunk utilities to better suit the proposed development footprint. The realignments will only be considered where economically viable. It should be noted that this report focuses on traditional servicing methods.

It is acknowledged that the servicing and development industry is undergoing a transition as the industry aims to be more sustainable and less dependent on traditional utility networks. In order to capture these trends and ensure that the development is exploring sustainable best practice, separate Ecologically Sustainable Design (ESD), Climate Change Adaptation (CCA) and Water Cycle Management (WCM) reports have been prepared that identify and recommend measures for integration of sustainable/renewable servicing measures to the Riverwood site. The ESD, CCA and WCM reports are provided in parallel to this study as such the following assessment of servicing requirements only explores current standard industry practice. This then forms a benchmark or absolute minimum requirement for the project that is independent of industry aspirations.

### 4.1 Water

**A feasibility assessment application was lodged with Sydney Water [CN189528] to determine the servicing requirements for the site. Details of the investigation are contained within the Appendices (if any).**

Sydney Water have initially advised that the trunk system has limited capacity due to significant growth in the supply zone and adjoining systems. Subsequently, trunk upgrades from the reservoir will be required to service the Riverwood site. Sydney Water were unable to provide details of spare/available capacities within the network and reservoir however, suggested that detailed modelling be undertaken to assess the available spare capacity in the network, the upgrades required to service the ultimate development, any reservoir upgrades and how the upgrades will integrate with the overall Riverwood master plan. A formal response is expected, and this document will be updated according to the contents of that assessment.

To determine the overall water supply requirements for the site, a high-level assessment was undertaken using the Water Supply Code of Australia (WSA). This involved calculating the peak hourly demand for the site to determine the appropriate trunk reticulation size.

The maximum water demand rates were extracted from Table 2.1 of the WSA. For high density residential areas, this rate is 0.8 kL/dwelling/day. The demand rate was then multiplied by the number of proposed dwellings to determine the average daily demand. The average demand was then multiplied by the peak day factor of 1.5 to determine the peak daily demand.

The peak hourly demand was calculated using the average hour demand for the peak day and a peak hour factor of 2. Assuming a design velocity of 1.2 m/s for the pipe, the minimum pipe size



required to meet the demand is between a 300 mm and 375 mm pipe, however, a 375 mm pipe has been adopted to provide a conservative estimate and account for losses experienced over the length of the pipe. The results of this assessment are shown in Table 1 below.

**Table 1: Water Main Calculations**

	Result
Average Daily Demand (L/s)	19.6
Peak Daily Demand (L/s)	55.8
Peak Hourly Demand (L/s)	111.6
Velocity (m/s)	1.01
Minimum Required Pipe Size (mm)	375
Pipe Size Adopted (mm)	375

#### 4.1.1 External Upgrade Works/Alignment

A 900 mm steel cement lined trunk main distributes water from the Wiley Park reservoir to a 650 mm main located on King Georges Road. Two trunk reticulation routes exist from this main. One 500 mm main traverses Shorter Avenue to the north of the M5 motorway, and the second, initially a 650 mm main converting down to a 300 mm pipe, passes under the M5 motorway and extends west along Broad Arrow Road. The two routes are shown in Figure 13 below.

**Figure 13: Existing Trunk Water Mains**



Ultimately, a 375 mm main or equivalent in capacity will be required from the reservoir to the site to service the entire development. Two scenarios were explored in relation to the required trunk upgrades:

1. Assume there is currently 25 percent available capacity in the regional trunk main network. Whilst this is not confirmed through modelling, it is also observed that development in the greater Riverwood region has been fairly static in recent years; further to this, waterwise technologies have advanced fairly dramatically in the past decade due to periods of drought and water restrictions however, there is no current water restrictions in force but the general public still generally adopt water wise practices and also use alternative sources of water such as rainwater tanks. These two items combined have generally resulted in lower potable water usage over the past decade. This option therefore presents an optimistic approach to spare capacity in the network. Initial upgrades will therefore only be required from the end of the trunk water mains to the site (denoted Routes A and B on Figure 14 below). At a later date, the existing trunk mains will then be upgraded (or duplicated) back to the reservoir; and
2. Assume no spare capacity in the existing network and pipe upgrades will be required from the 900 mm trunk main to the site, this option is similar to Scenario 1 however, this impacts the staging of when the 375 mm main needs to be provided.

Both options explored assume the existing 900 mm pipe from the reservoir will have capacity to service the development. Sydney Water have indicated that the Wiley Park Reservoir may not have capacity to support the growth however, this is to be explored with detailed modelling and capital works managed by Sydney Water.

**Figure 14: Proposed Trunk Water Main Extensions**



#### 4.1.1.1 Option 1 – Staged Upgrade

The first option explored assumed there is 25 percent available capacity in both Route A and Route B that could be utilised to initiate development. One or both mains could be extended to the site boundary to service the first development stage at Riverwood. Lead in works would therefore be staged as shown in Table 2. Currently the existing supply services approximately 200 yields, Phase 1 will allow service to approximately 1700 dwellings, 1A an additional 750 and finally Phase 2 servicing all approximately proposed dwellings. Phases consist of strategies for which each main is explored in further detail below.

**Table 2: Staging of Upgrades**

Phase	Description of Works	Length Required	Approx. Dwelling Yield
Existing Supply	Leverage off existing supply. This has been estimated only and will require modelling to confirm.	0 m	200
Phase 1	Construct new 375 mm main from Bonds Rd to the site boundary	1.3 km	1,700
Phase 1A	Construct new 300 mm main from Broad Arrow Rd and connect to proposed 450 mm main on Hannans Road. This is an interim alternative option to provide some extra supply however may not prove economically viable. Refer below.	1.1 km	750
Phase 2	Construct duplicate 375 mm	2.4 km	3,900

#### Route A (Phases 1 & 2)

Route A (Phase 1) would be utilised to initiate development of the site. Assuming there is some spare capacity initially, extension of this main could be achieved in two phases. Phase 1 would involve the construction of a new main connecting to the existing 450 mm main on Bonds Road. A 375 mm main would then extend down Bonds Road, passing underneath the M5 Motorway before moving west to the site boundary along Hannans Road. The total additional pipe length is approximately 1.3 km. Assuming there is currently 25 percent available capacity in this main, approximately 1,700 dwellings could be serviced via this route initially. This first phase would connect into the existing 500 mm pipe, whilst the 375 mm pipe size is not required for the first few stages it is cost effective to trench once and have the pipe commensurate to the final design.

The balance of the site would be serviced in Phase 2. A 375 mm main (Phase 2) would be created parallel to the existing 500 mm pipe connect from Bonds Road back to the 900 mm trunk main on Canarys Road. This would involve construction of an additional 2.4 km of pipe. The pipe constructed in Phase 1 would then be disconnected from the existing trunk 500 mm trunk main and connected to the newly 375 mm pipe constructed pipe. This would service the ultimate development.

#### Route B (Phase 1A)

An alternative connection point for the site was also explored. Approximately 750 dwellings could be serviced by extending Route B to the site. This would involve connecting to the existing 300 mm main on Broad Arrow Road. A 300 mm main would extend the length of Hannans Road to reach the site boundary (Phase 1A in the table above). The total additional pipe length for this route is approximately 1.8 km. If Phase 1 were also constructed, the 300 mm main would connect

to the new 375 mm main at Hannans Road. The length of pipe required would therefore be reduced to 1.1 km.

This option is not preferred as the head losses experienced in the pipe fall outside the allowable range specified in the WSA. Pipes must be designed to limit head losses to less than 3 m/km for sizes greater than 200 mm in diameter.

**Table 3: Water Main Head Loss**

	Head Loss (m)
Acceptable Range	5.38
Calculated Loss	7.39

Source: Water Supply Code Australia 2009

Implementation of this option is subject to further assessment to ensure all WSA design requirements can be met.

#### 4.1.1.2 Option 2 – Full Upgrade

If no capacity is available in the existing network, construction of a new main from the 900 mm main on Canarys Road to the site boundary will be required to initiate development. Route A provides the shortest length of pipe with a total of 3.7 km required and would therefore be the preferred route over Route B with a total overall length of approximately 4.3 km. With no capacity in the existing trunk main, a new pipe would be constructed parallel to the existing mains on Shorter and Skinner Avenues, then extend down Bonds and Hannans Roads to the site as discussed above. This pipe would have capacity to service the entire Precinct.

#### 4.1.1.3 Qualifications

To provide a worst-case estimate of upgrade works required, the above assessment does not account for any existing spare capacity in the network adjacent to the site. It is likely that a small number of lots could be serviced from the existing 200 mm main on Belmore Road due to existing apartments being disconnected from the network. Further capacity in this main has not been included in this assessment and could be explored in the next phase of the project. This would be in the form of detailed modelling.

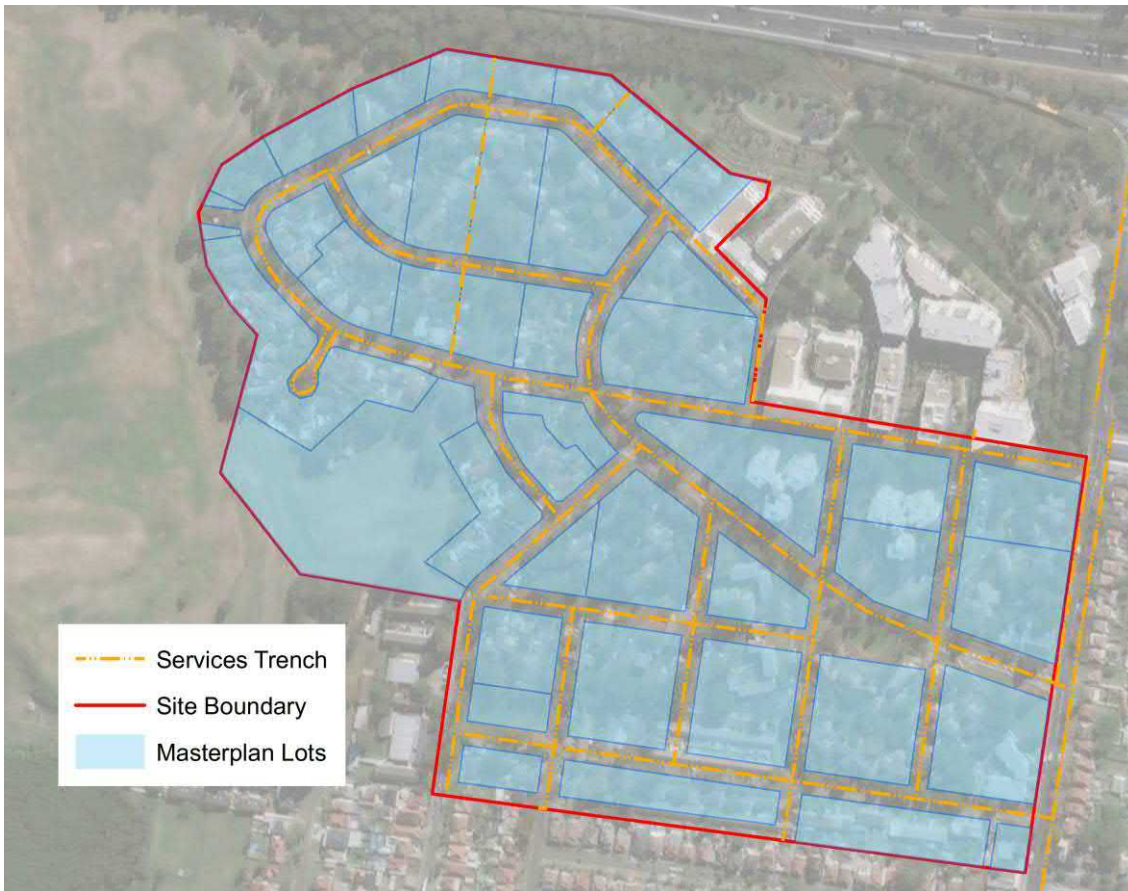
It has been assumed that any upgrade works required will be staged and supplied by Sydney Water.

As the Riverwood development will be delivered in stages over a 10 to 15-year period, it is understood that there is sufficient lead in time for Sydney Water to plan any broader network upgrades required.

#### 4.1.2 Minor Internal Reticulation

Potable water will be supplied to the site from the Wiley Park Reservoir. All minor water reticulation servicing the existing dwellings at Riverwood will be decommissioned and removed with the existing roads. New minor reticulation will be installed along the proposed road alignments within the standard shared trench allocation of the road reserve. The proposed indicative water reticulation layout is shown in Figure 15 below.

**Figure 15: Proposed Water Servicing Strategy**



## 4.2 Sewer

### 4.2.1 Introduction

**A feasibility application has been lodged with Sydney Water [CN189528] to confirm network arrangements. Details of the investigation are contained within the Appendices (if any). Deviation of the Bankstown submain and network augmentations due to increases in load are considered in the feasibility application.**

The existing sewer network servicing Riverwood can be simplified into three main components as shown in Figure 16:

1. A pump station north of the M5 Motorway which services the northern catchment of the site and the Washington Park development (shown in blue). The pump station connects to the Bankstown Submain via a rising main;
2. A pump station to the west of Riverwood Public School which services the western catchment of the site as well as approximately 50 private dwellings to the south-west of the study area (shown in yellow). The pump station connects to the Bankstown Submain via a rising main; and
3. The Bankstown Submain which ultimately drains all sewer away from the site. The southern and eastern catchments drain directly via gravity to this submain (shown in red and green respectively).

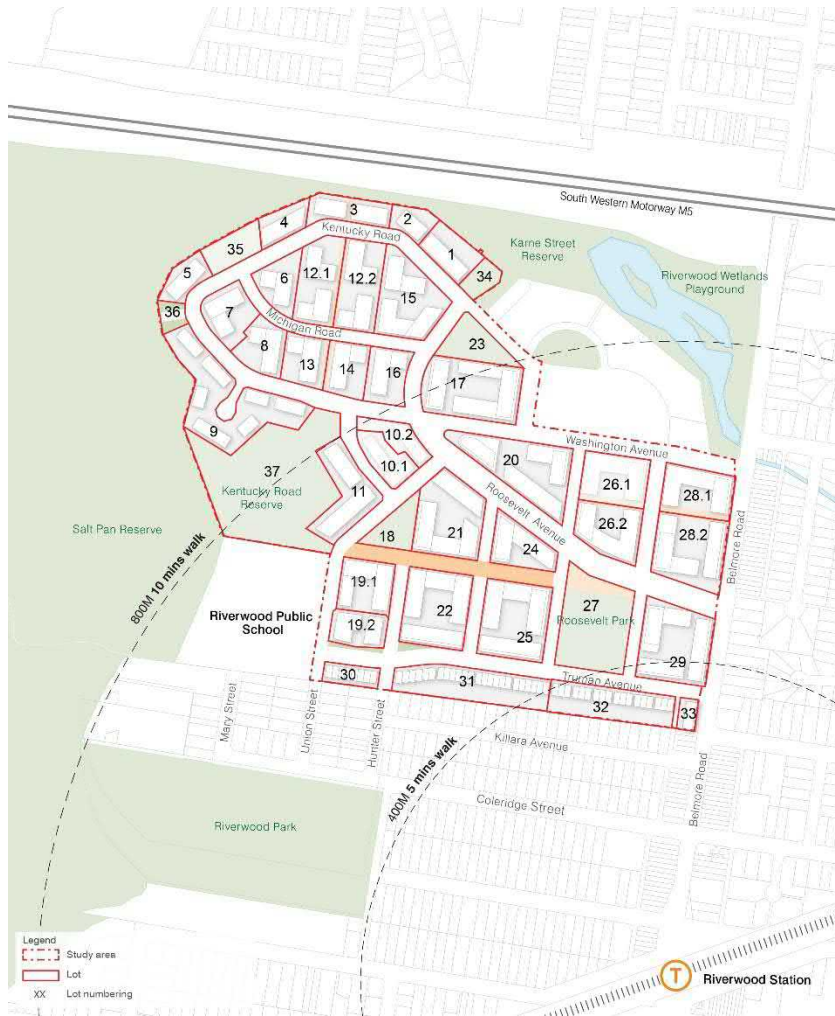
**Figure 16: Riverwood Development Sewer Context**



#### 4.2.2 Sewer Demand Increases

The Riverwood development will yield approximately 3,900 dwellings and consequently there will be a significant increase in demand on the existing sewer network. The blocks nominated by Architectus in Figure 17 were used to determine the outlet points into the reticulation sewer network with the Equivalent Population (EP) for each block determined as per *WSA 02-2002-2.2 Table A1*.

**Figure 17: Preferred Master Plan Block Numbers**



Source: Architectus 2021

A summary of the total overall EP for the Riverwood Study Area is summarised in Table 4 Sewer network for the new development is required to service an additional 7,125 EP.

**Table 4: Equivalent People**

Development	Assumed Dwellings	WSA 02-2002-2.2 Classification	EP / Dwelling	Total EP
Proposed Riverwood Development	3,900	Single Occupancy High Density Dwelling Units	2.5	9,750
Existing Riverwood Study Area	1050	Single Occupancy High Density Dwelling Units	2.5	2,625
<b>Total Additional Demand</b>				<b>7,125</b>

Source: Sydney Water WSA 02-2002-2.2 / A2.1.3



### 4.2.3 Bankstown Submain Sewer Re-Alignment

The major constraint to development at the Riverwood site is the existing location of the Bankstown Submain (a 1,372 mm x 1,219 mm box culvert). The existing alignment is shown in Figure 18 and poses the following challenges to developing the site:

1. It is not located in the road corridor and requires an easement of approximately 3 m, in which space development cannot occur; and
2. The pipe layout is not conducive to potential road layouts and therefore the pipe setback will need to be incorporated within new property boundaries. This prevents large areas of the site from being divided into blocks that could be used for higher density development.

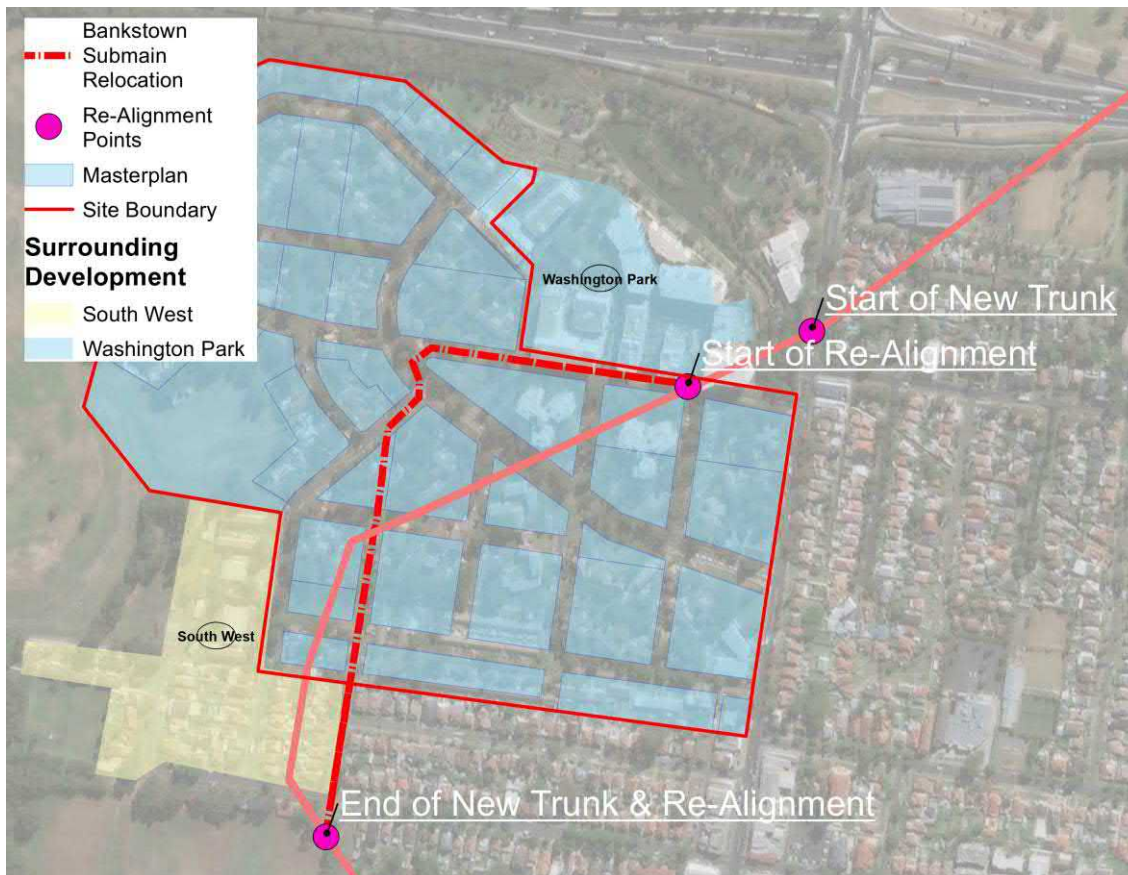
Several options were considered to determine the most practical solution, including:

- Potential re-alignment;
- Building over the main; and
- Creating an easement.

The problems identified earlier in Section 4.2.3 exert large constraints on the master plan layout and limit development yields. Through consultation, Mott MacDonald considered the most appropriate option was to re-align the Bankstown Submain into the new road corridor as shown in Figure 18. This would have the following benefits:

1. The 3m easement would be located within the road corridor, which does not constrain development;
2. The master plan layout can be formed to provide typically more regularised development blocks, increasing yields, and assisting with staging of development;
3. By relocating the Bankstown Submain, it can be upsized to accommodate the increased loads generated by the Riverwood development; and
4. Any future requirement for Sydney Water to up-size the Submain will be more easily facilitated given its location within the road corridor.

**Figure 18: Proposed Bankstown Submain Re-Alignment**



#### 4.2.4 Bankstown Submain Sewer Upgrades

##### 4.2.4.1 Design Exclusions

In providing a conceptual size for the re-aligned Bankstown Submain, Mott MacDonald has not considered demand growth in the upstream region as this is assumed to be assessed by Sydney Water via detailed network modelling at a later date. Instead, Mott MacDonald has considered potential implications on the size of the proposed Bankstown Submain assuming a status quo upstream condition.

Mott MacDonald notes that design of the re-aligned submain considers conceptual hydraulic implications of sewer from upstream and the proposed re-alignment. Whilst upstream growth has not been considered, the realignment has been located such that further upgrades could be accommodated within the road reserve.

##### 4.2.4.2 Methodology

Standard Sydney Water sizing of the re-aligned Submain cannot be undertaken due to the grade (1 in 2,000). This is too small for Sydney Water's standard sewer design calculations to apply. This would indicate that the existing Submain only has capacity for 14,950 EP (approximately 6,000 dwellings). The Submain is expected to currently be subject to a much larger demand than this based on current development in the surrounding area.

In lieu of standard Sydney Water Estimates, Mott MacDonald has undertaken the following conceptual design process:

1. Determine the approximate flow rate for the existing Bankstown Submain assuming it is 50 percent full at a slope of 0.05 percent;
2. Use the flow rate derived in Step 1 to back calculate the Bankstown Submain's capacity in terms of EP;
3. Repeat Step 1 and 2 for standard box culvert and pipe sizes to determine their capacity in terms of EP; and
4. Estimate the required pipe size to accommodate the growth.

Table 5 shows the increase in capacity that can be achieved by upgrading the Submain. These sizes have been benchmarked against the increased EP of 12,298 generated by the Riverwood development.

**Table 5: Major Sewer Trunk Capacity Comparisons**

Dimensions	Assumed Flow rate if 50% full (L/s)	Equivalent Pipe Diameter (mm)	Capacity (EP)	Capacity Increase from Existing (EP)	Sufficient Capacity
1,372 mm * 1,219 mm box culvert	450	1,459	53,500	-	
1,500 mm * 1,200 mm box culvert	480	1,514	57,200	3,700	No
1,524 mm pipe	566	1524	67,700	14,200	Yes
1,500 mm * 1,500 mm box culvert	665	1,693	79,800	26,300	Yes

The submain will need to be upgraded to either a 1,524 mm pipe or a 1,500 mm x 1,500 mm box culvert to provide sufficient capacity to service the increased load generated by the development. The preference of either a culvert or pipe will be considered during detailed design based on hydraulic constraints and constructability.

As the spare capacity of the existing Bankstown submain is identified during detailed modelling, there may be an opportunity to maintain current sizes or adopt an intermediate size. The assessment in this report is therefore seen as a worst-case scenario for the LAHC development. The proposed upgraded pipe would ultimately connect into the existing 1,524 mm pipe downstream of the site.

Mott MacDonald has not considered self-cleansing and slime control of the Bankstown Submain given the very low grade. This would need to be ascertained via detailed modelling.

#### 4.2.5 Minor Trunk Sewer Design

Three options were explored to service the increased sewer demand generated by the development. This assessment was based on the three major sewer system components outlined in Section 4.2.1 above. In addition to the load generated by the development, the demands from the Washington Park development and approximately 50 privately owned dwellings located to the southwest of the Study Area have also been included to provide a holistic assessment of the sewer network. The demands generated by each of these areas was calculated using Sydney Water's Sewerage Code of Australia. A summary of the loads is provided in Table 6.

**Table 6: Equivalent Persons for Each Area Contributing to Trunk Sewer Re-Aligned Section**

Development	Approx. No. Dwellings	WSA 02-2002-2.2 Classification	EP/dwelling	Factor of Uncertainty	Total Design EP
Riverwood Development	3,900	Single Occupancy High Density Dwelling Units	2.5	1	9,750
Washington Park	750	Single Occupancy High Density Dwelling Units	2.5	1	1,875
Southwest	50	Single Occupancy Medium Density Dwelling Units	3	1.5	225

Source: Sydney Water WSA 02-2002-2.2

The change in demand for each catchment was then assessed to determine the extent of upgrades to the sewer network that would be required. The Washington Park development drains to the Northern catchment while the private dwellings to the southwest drain to the Western Catchment.

**Table 7: Change in EP per Catchment**

Catchment	Existing EP	Proposed EP
Northern	2,280	1,933
Western	1,230	2,278
Eastern/Southern	1,080	5,602
<b>Total</b>	<b>4,590</b>	<b>9,813</b>

Each lot within the Study Area was associated with an outlet point shown in Figure 19 below. Outlets 1, 2, 10-12 drain to a sewer pump station while Outlets 3-9 drain directly to the Bankstown Submain.

From the demand provided in the table above, Mott MacDonald have investigated several options to service the Study Area, which are discussed in the sections below. It should be noted that the strategies for the Western and Eastern/Southern catchments are the same for all options. The upgrade works required for these catchments are discussed in Section 4.2.5.3.

#### 4.2.5.1 Option 1: Retain Existing Minor Trunk Alignment

The first option explored involved retaining the existing sewer alignments. Due to the increased load generated by the development upgrades would be required to several pipes and the existing pump station adjacent Riverwood Public School (SPS0211). Figure 19 shows the existing pipe locations, with mains to be retained in their current size shown in green and mains to be upsized shown in orange. The associated demand on each of the sewer pump stations in this option are tabulated below. These loads include the external demands from the Washington Park development and the private dwellings to the southwest of the study area.

Figure 19: Sewer Upgrades – Option 1



Table 8: Option 1 Sewer Pump Station Demands

Location	Contributing Internal Outlets	Contributing External Developments	Total EP
North (SPS0182)	10, 11	Washington Park	3,808
South (SPS0211)	1, 2, 12	Southwest	4,040

The existing 300 mm vitrified clay main located underneath the M5 Motorway would require upsizing in this case and therefore this solution is not considered favourable.

#### 4.2.5.2 Option 2: Re-Divert Additional Load to the Western Main under the M5

The second option investigated the potential to change the sewer reticulation such that Blocks 12.1, 12.2 and 15 would drain to the western main (location 1) and ultimately to SPS0211 instead of location 11 under the M5 Motorway. The resulting increase in load on the western main would exceed the capacity of this pipe and it would therefore need to be upgraded. As well as a further increase to SPS0211. This option is therefore considered to be less favourable than Option 1.

#### 4.2.5.3 Option 3: New Pump Station for Northern Catchment and Washington Park

##### **Northern Catchment**

To avoid upgrading the mains under the M5 Motorway, Option 3 seeks to utilise as much spare capacity as is available in the existing mains under the M5 and any additional load would be compensated with the construction of a new localised sewer pump station to the north of Washington Park. In this case, the flow from Washington Park will be adjusted to drain to the new pump station and flows from Outlet 10 will drain to the existing pump station north of the motorway. The new pump station will pump back to the Bankstown Submain via a new rising main.

The capacity of the existing mains under the M5 Motorway is the limiting factor in this scenario, and it is anticipated that the demand on Outlet 10 will exceed the existing capacity of this main. It is therefore proposed that Blocks 3, 12.1 and 12.2 be diverted to Outlet 11 to avoid the need to upgrade the mains under the M5 Motorway. This will divert approximately 615 EP from Outlet 10 to Outlet 11 to share the load.

##### **Western Catchment**

Sydney Water were unable to provide information regarding the size and utilisation of the existing pump stations. To provide a worst-case scenario it has therefore been assumed that there is no spare capacity in the existing pump station adjacent Riverwood Public School (SPS 0211). This pump station will therefore need to be upgraded to cater for the growth in the western catchment. Assuming there is no spare capacity this pump station would need to accommodate an additional 1,050 EP. The upgrade requirements will need to be confirmed through detailed modelling.

##### **Southern/Eastern Catchments**

The southern and eastern catchments drain directly to the Bankstown Submain and therefore it is not anticipated any further upgrades will be required to service these catchments other than the overall upgrade of the Bankstown Submain.

Figure 20: Sewer Upgrades – Option 3



Table 9: Equivalent Persons for Option 3 Pump Stations

Location	Contributing Internal Outlets	Contributing External Developments	EP
North (SPS0182)	11 (plus 615 EP from 10)	-	715
South (SPS0211)	1, 2, 12	Southwest	4,040
North Washington Park (New)	-	Washington Park	1,875

**This is considered the preferred option and forms the basis of the master plan documentation.**

## 4.2.6 Reticulation Design

### 4.2.6.1 Methodology

Each lot has been delegated a single point of discharge to connect in with the surrounding trunk network. This is generally taken to be the point in the lot with the lowest elevation. It is assumed that any internal reticulation within the property boundary will be provided by the developer.

### 4.2.7 Consultation

Mott MacDonald notes that a number of properties to the southwest, and outside of, the Study Area will be affected by the re-alignment of the Bankstown Submain.

The re-alignment of the Bankstown Submain would move the existing easement from within the private property boundaries to the road corridor. It is likely that the move would be considered favourable from the perspective of the private property owners. We therefore consider the likelihood of these property owners opposing the change to be low. This is likely still to require an effective consultation process in detailed design phase explaining to property owners of the benefits to their property of the re-aligned Bankstown Submain.

### 4.2.8 Summary

Mott MacDonald notes that the conceptual sizes of new sewer mains are based on a set of limiting assumptions. Detailed network modelling would need to be undertaken to accurately ascertain the capacity of the Bankstown Submain and the true amount of sewer demand in it from the development and further upstream.

It is anticipated that further negotiations with Sydney Water and LAHC would need to be undertaken with results from detailed network modelling to explore further efficiencies and upgrades that may be required as a result of neighbouring developments.

#### 4.2.8.1 Summary of Trunk Upgrade Works

Based on the options analysis above, the following trunk upgrade works are proposed to service the Riverwood Renewal project:

- Construct a new sewer pump station at Location 10 in Figure 20 and associated rising main to connect to the existing Bankstown Submain to cater for an EP of 1,875. These works will be undertaken as part of Stage 3;
- Upgrade Sewer Pump Station 0211 west of the Riverwood Public School to cater for an EP of 4,040. These works will be undertaken as part of Stage 4; and
- Realign the Bankstown Submain to suit the proposed new development footprint. The submain will also need to be upgraded to either a 1,500 mm x 1,500 mm box culvert or 1,524 mm pipe (to be confirmed through detailed modelling) to accommodate the growth. It is expected that this realignment would be undertaken as part of Stage 2 works.
- New sewer mains to suit the proposed layout and EP of the Riverwood Renewal project.



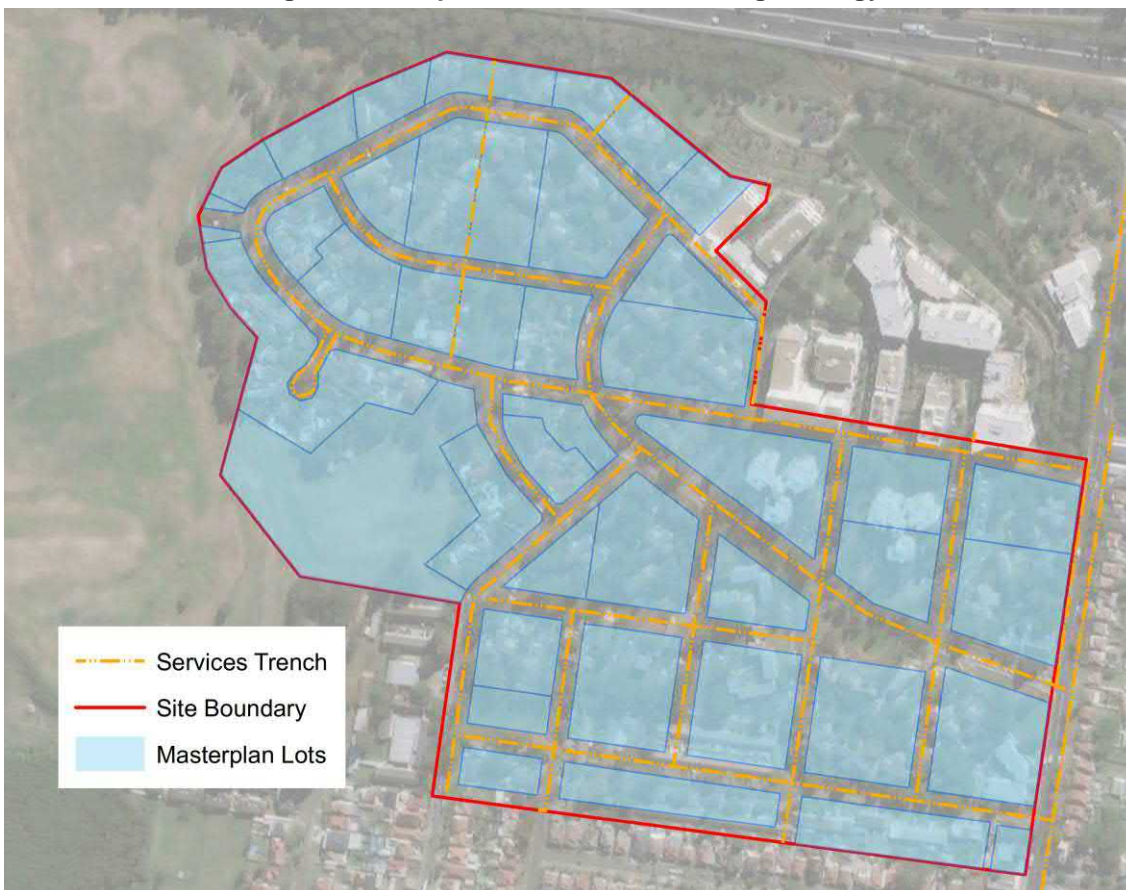
### 4.3 Electricity

**A feasibility application has been lodged with Ausgrid to determine the available network capacity and required upgrade works to support growth. Still awaiting desktop feasibility from Ausgrid on the details of the investigation.**

Existing electrical reticulation including padmount substations will be decommissioned and removed or relocated to suit the master plan layout. Overhead cabling could be undergrounded to improve street amenity however care should be taken to ensure electrical connection to existing private dwellings is maintained.

Proposed apartment blocks will likely be supplied via high voltage cabling to padmount or chamber substations located within property boundaries. A chamber substation can service up to 150 dwellings. The proposed electrical servicing strategy is shown in below.

**Figure 21: Proposed Electrical Servicing Strategy**



In addition to the above works, the street lighting network will require augmentation to suit the proposed road layout.

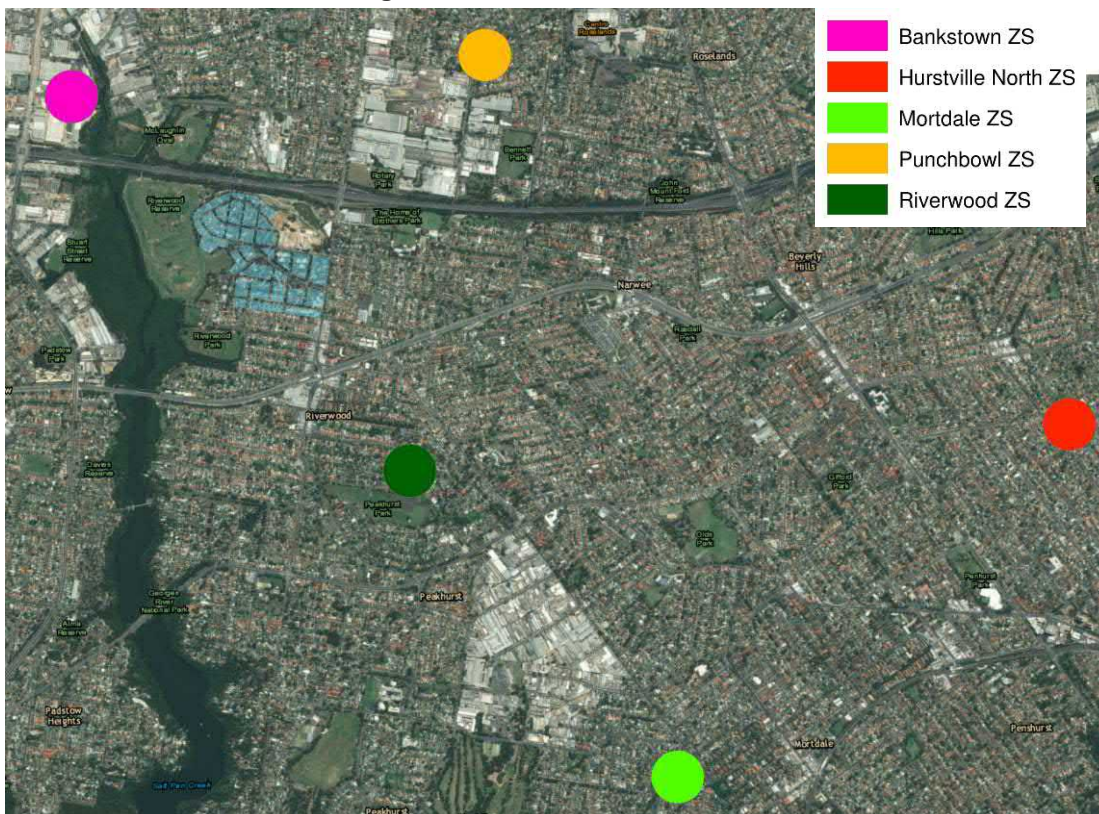
#### 4.3.1 External Upgrade Works

Consultation is currently being undertaken with Ausgrid to determine the servicing options for the site and to identify any growth servicing strategies for the Canterbury-Bankstown area. Provision of a new localised zone substation (ZS) and supply through new 11 kV feeders were considered.

Of these options, it was determined that supplying the site via new feeders would prove the most cost effective.

Due to the scale of the development, three feeders will be required to service the site in its entirety. Three servicing options were developed by Ausgrid and are detailed in Table 11. At present, there is no existing capacity in both the Riverwood ZS and Punchbowl ZS to provide a feeder to the site. Bankstown, Mortdale and Hurstville North ZSs all have capacity to supply part of the development, however they are located a considerable distance from the site. The location of these substations in relation to the site are shown in Figure 22 below.

**Figure 22: Substation Locations**



Source: Google Earth 2017

It is understood that Ausgrid have no plans to upgrade the capacity of these substations in the near future. In addition, their advice does not account for any potential future developments in the region.

#### 4.3.2 Summary of Ultimate Load Calculations

The ultimate Riverwood Renewal project load was estimated by Mott MacDonald at 10.1 MVA. This estimate is based on current industry standard calculations for units. It is noted that if the developers build small, energy efficient units with gas cook tops, hot water, no air conditioning and include energy efficient lighting and appliances, the load calculations could be less than those predicted. As a conservative estimate for the purpose of master planning the 10.1 MVA load has been used. This can be refined as the development progresses. A breakdown of the estimated loads is provided in the table below.

**Table 10: Electrical Demands**

Land Use	Yield	Unit	VA per dwelling/sqm	Total Load (MVA)	Diversified
Medium / High Density Residential	3,858	units	3,000	11.6	9.3
Residential Terraces	67	dwelling	10,000	0.7	0.5
Retail / Commercial	3,985	sqm	100	0.4	0.3
<b>Total</b>				<b>12.6</b>	<b>10.1</b>

Ausgrid / Endeavour Energy have previously indicated a single 11 kV feeder supplies approximately 4.5 MVA. The equivalent of 2.2 new 11 kV feeders will be required to supply the proposed loads. As such an allowance of three 11 kV feeders has been made. A high-level assessment of the surrounding zone substation capacities has been provided by Ausgrid:

- Punchbowl ZS has minimal capacity based on Zone TX loads to supply the development;
- Bankstown ZS has capacity (approximately two new 11 kV feeders) to supply part of the development, however it is approx. 3-4 kms from the site;
- Hurstville North ZS has capacity (approximately two new 11 kV feeders) to supply part of the development, however it is approximately 5-6 kms from the site;
- Riverwood ZS has minimal capacity to provide a new 11 kV feeder to supply part of the development; and
- Mortdale ZS has capacity (approximately one new 11 kV feeder) to supply part of the development, however it is approximately 4-5 kms from the site.

The most recent Ausgrid Canterbury Bankstown and St George area plans do not address the Riverwood area and the potential future growth in the region and as such there is an element of flexibility to the rollout of feeders. All options below have been made assuming there are no upgrades to the capacity of the zone substations.

Each strategy is revised on a three year horizon as development become known to Ausgrid future planning can be accommodated/explored.

Assuming that there are no zone substation growth options, the following feeder alignments are proposed with Option 1 being the preferred route.

**Table 11: Electrical Supply Options**

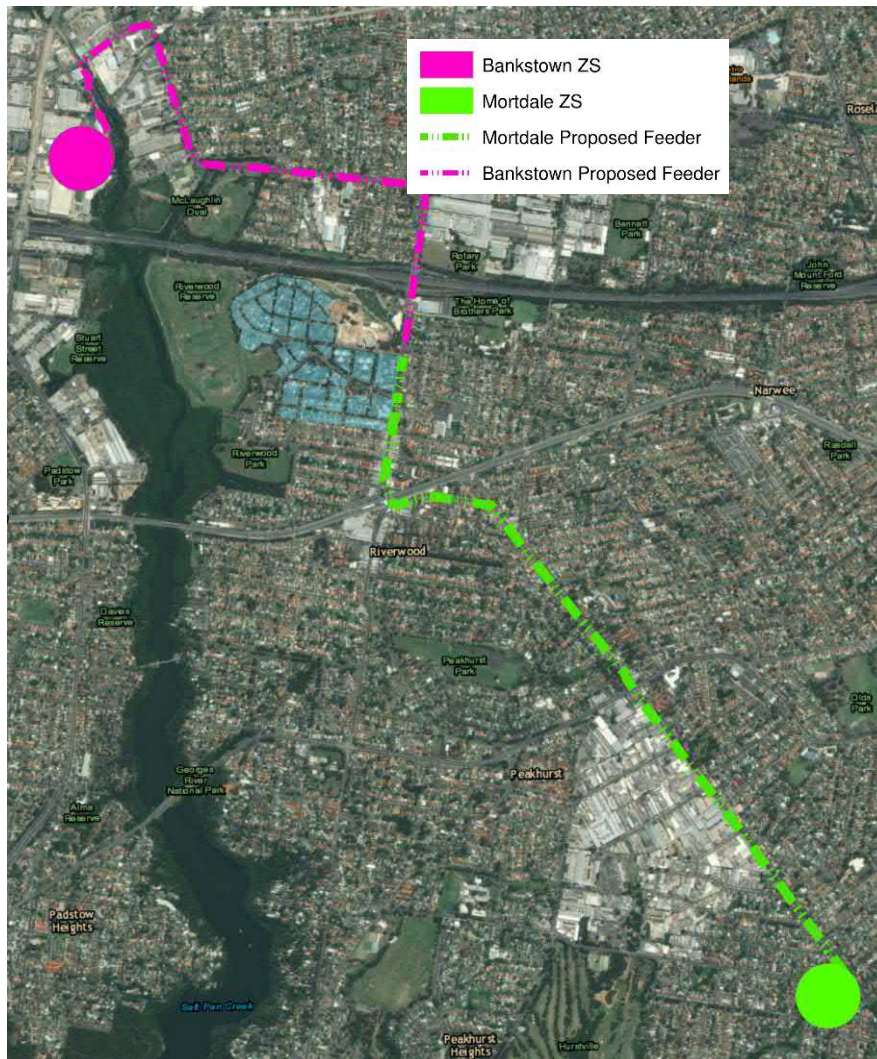
Option	Route	Total Trenching Length
1	Two feeders from Bankstown ZS One feeder from Mortdale ZS	Approximately 9 km
2	Two feeders from Bankstown ZS One feeder from Hurstville North ZS	Approximately 10 km
3	Two feeders from Bankstown ZS One feeder from Punchbowl ZS Augmentation works to transfer load from Punchbowl to Hurstville North	Approximately 12 km

Option 1 provides the most cost-effective solution as it requires the least amount of cabling. Potential indicative feeder alignments from the Bankstown and Mortdale substations are shown in Figure 23 below. Please note that these alignments are dependent on the availability of free ducts and are subject to change.

Feeders would be brought to the site in the following order:

1. Trench and lay two new 11 kV ducts from Bankstown ZS and pull through one feeder cable. Supply approximately 1,300-1,600 units;
2. Pull through second feeder cable as required from Bankstown ZS. Supply approximately 1,300-1,600 units; and
3. Trench and lay one new 11 kV ducts from Mortdale ZS and pull through one feeder cable. Supplying the remainder of the precinct load.

**Figure 23: Indicative Feeder Routes – Option 1**



### 4.3.3 Future Considerations

The above analysis assumes that there will be no expansion to zone substations in the region and therefore represents the worst-case scenario. Through discussions with Ausgrid it is expected that as development occurs, they will be able to adjust their strategy to match the growth over time. This is expected to result in expansion of the existing zone substations. It is therefore plausible to assume that the requirement to bring the final feeder from Mortdale ZS is excessive

however, the closest zone substations are Riverwood or Bankstown such that a feed would still be required from one of these substations if they were upgraded.

An option was explored with Ausgrid to evaluate the potential for a new zone substation to be provided between the railway line and M5 Motorway. Under such a scenario the LAHC site is likely to utilise two thirds to one half of a new zone substation capacity. Whilst the capital costs are significant (\$35-40 M including acquisition) there are advantages in offsetting lengthy trenching.

Ausgrid have identified that they do not believe this option would be a feasible alternative however, their assessment does not take into account the future growth in Riverwood.

## 4.4 Gas

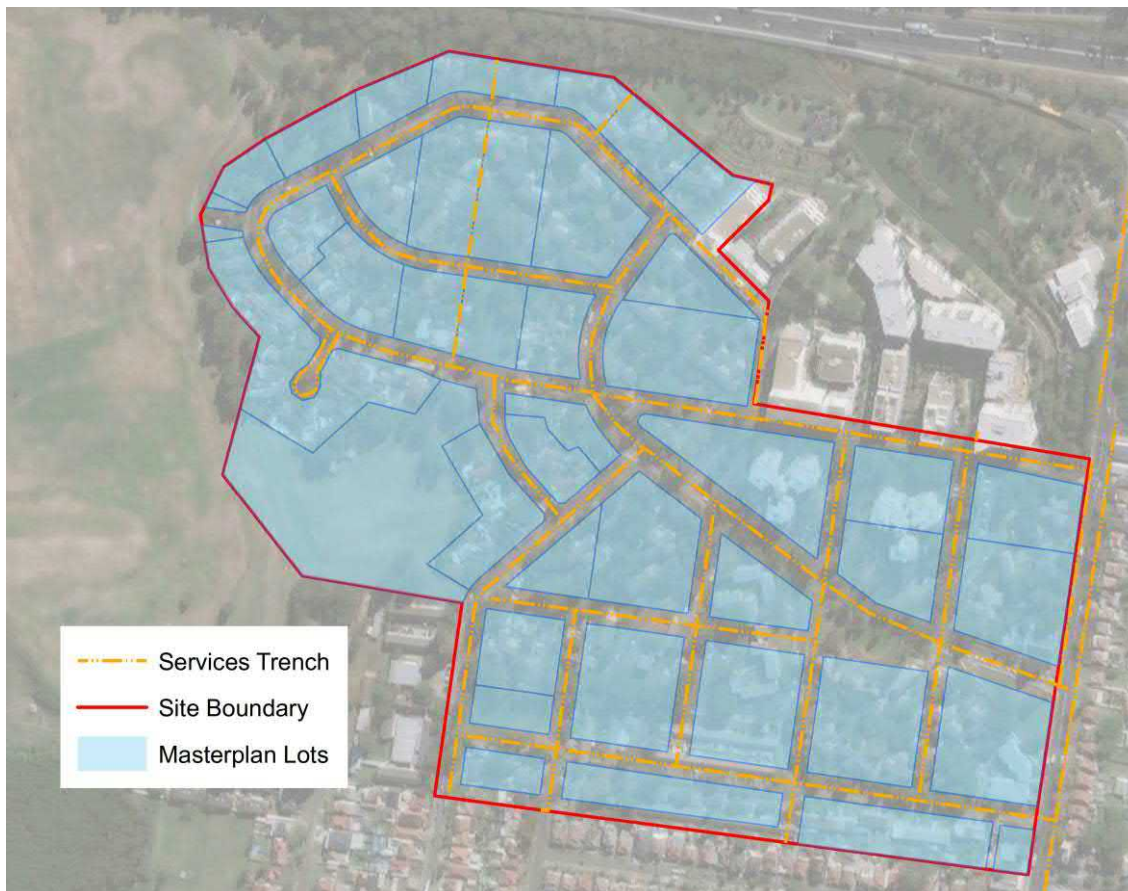
**A feasibility application has been lodged with Jemena to determine the available network capacity. Jemena will assess the servicing options for the site once the final building configuration are prepared and a connection application is submitted. Details of the investigation are contained within the Appendices.**

Existing gas mains on Washington Avenue will need to be retained to service the Washington Park development. All other existing mains will be decommissioned and removed along with the existing roads.

A feasibility enquiry was lodged with Jemena to determine the gas servicing options for the development. Jemena have advised that the existing gas network could be extended to supply the proposed development depending on commercial viability. As gas is a non-essential service, Jemena must assess each request for supply on an individual basis and once the final building configurations are prepared and a connection application is made, they will advise whether gas servicing will be provided.

Proposed indicative gas mains are shown in Figure 24 below. All gas mains will be constructed within the shared trench allocation of the road reserve. This layout is indicative only and subject to the uptake of gas throughout the precinct. During detailed design, Jemena will provide an indication of any augmentation works required to retain connection to Washington Park.

**Figure 24: Proposed Gas Servicing Strategy**



#### 4.4.1 APA Ethane Pipeline

APA own and operate an ethane pipeline which traverses the existing rail corridor, approximately 260 m from the southeast corner of the site boundary. The pipeline is subject to a 'notification zone' which covers a radius of 500 m either side of the pipe. While the pipeline itself does not cross the site, this notification zone intersects with the southern portion of the site as shown on the figure below.

Within the notification zone, sensitive land uses may require a safety management study to be undertaken. These land uses include:

- Schools & childcare centres;
- Function centres;
- Hospitals & medical centres;
- Places of worship;
- Retail premises;
- Seniors housing;
- Service stations; and
- Hotel or motel accommodation.

**Figure 25: APA Ethane Pipeline**



Source: APA (2017)

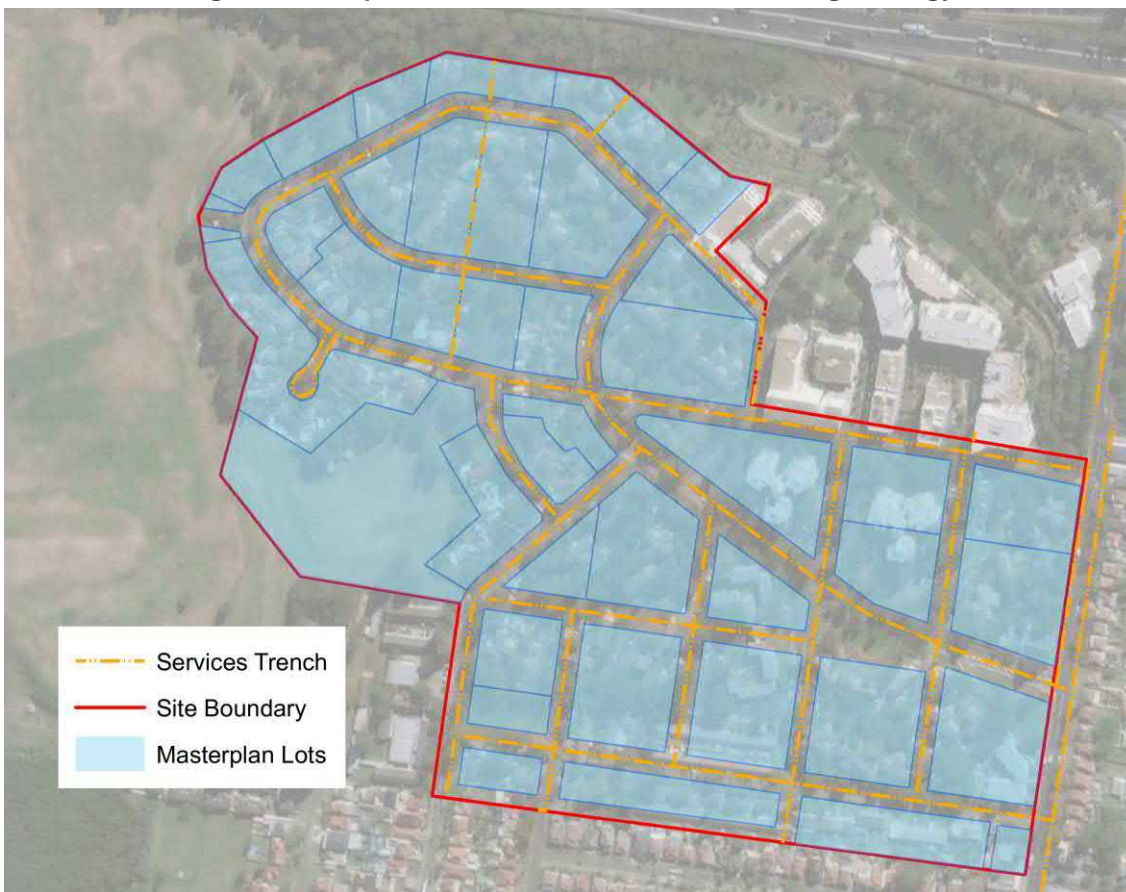
## 4.5 Telecommunications

**A feasibility application has been lodged with Telstra to confirm network arrangements. Details of the investigation are contained within the Appendices.**

Existing telecommunications infrastructure within the site boundary will be decommissioned and removed. Care should be taken to ensure that the existing NBN infrastructure servicing the Washington Park development and fibre optic cabling to Riverwood Public School are retained.

A feasibility application was lodged with NBN Co. to determine the servicing requirements for the site. They have advised that NBN will be available for the development, and the cost associated for a fibre connection is \$400 per unit. NBN cabling will be located within the standard trench allocation in the road reserve. The proposed telecommunications servicing strategy for the site is shown in Figure 26 below. This infrastructure will then enable public Wi-Fi, FTP or possible data centres.

**Figure 26: Proposed Telecommunications Servicing Strategy**





#### 4.5.1 Mobile Tower

As discussed in Section 2.4.1, Telstra has a mobile tower located on the rooftop of one of the LAHC apartment blocks on Washington Avenue. Telstra have a lease on the site till 27<sup>th</sup> March 2021, with an option to extend the lease a further five years. Optus and Vodaphone also have mobile base stations on this rooftop, however their lease agreements are unknown.

To ensure continuous mobile coverage is maintained, an alternative rooftop location will need to be available prior to the decommissioning of the existing site. Due to the existing lease agreement, relocation of the mobile tower will be funded by the developer.

Telstra have advised that they will aid with relocating the tower to ensure the existing coverage is maintained and to manage the increased demand generated by the development.

#### 4.5.2 External Upgrade Works

NBN Co. have advised some backhaul works will be required to service the subject site. Due to confidentiality reasons the location of the backhaul route cannot be provided by NBN.

## 5 Trunk Infrastructure Staging Matrix

A summary of the trunk infrastructure items of work and the stage in which they will be delivered is provided below. The staging is based on threshold yields and would need refinement as the project progresses and more details become available regarding existing capacities and detailed modelling. The staging is illustrated below.

**Figure 27: Indicative Staging Plan**



As spare capacities cannot be reserved, it is noted that there may be limited availability at the time of application which may result in acceleration of the required trunk upgrades to meet demand.

Conversely, development in the region there may also be the opportunity to reduce the scope of works should utility authorities provide regional upgrades as part of their future capital works programs.

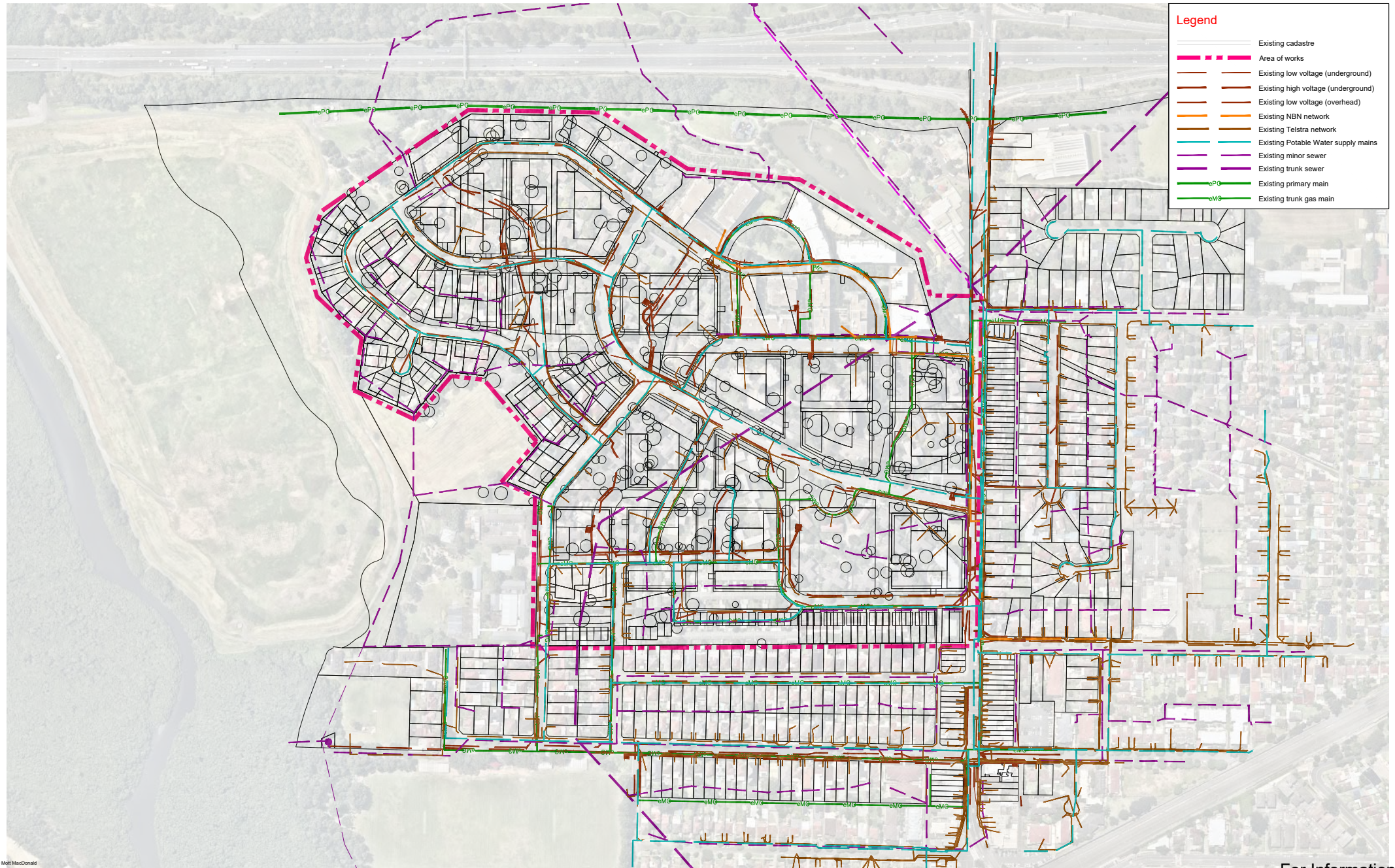
**Table 12: Trunk Infrastructure Matrix**

Service	Item	Stage
Electricity	Install new dual conduit from Bankstown Zone Substation	1
	Run new 11 kV feeder from Bankstown Zone Substation (First)	1
	Run new 11 kV feeder from Bankstown Zone Substation (Second)	2
	Install new dual conduit from Mortdale Zone Substation	4
	Run new 11 kV Feeder from Mortdale Zone Substation	4
Water	Construct new 375 mm main to Bonds Road (Phase 1)	1
	Construct duplicate 375 mm from Bonds Rd to Canarys Rd (Phase 2)	3
Sewer	Bankstown Submain realignment	2 & 4
	Upgrade SPS0211	4
	Construct new SPS north of Washington Park	3
Telecommunications	Relocate mobile tower	2
NBN	Lead in works	1

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## A. Existing Services Plans



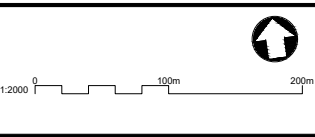
**Legend**

- Existing cadastre
- Area of works
- Existing low voltage (underground)
- Existing high voltage (underground)
- Existing low voltage (overhead)
- Existing NBN network
- Existing Telstra network
- Existing Potable Water supply mains
- Existing minor sewer
- Existing trunk sewer
- Existing primary main
- Existing trunk gas main

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Rev	Date	Drawn	Description	Chk'd	App'd



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Client

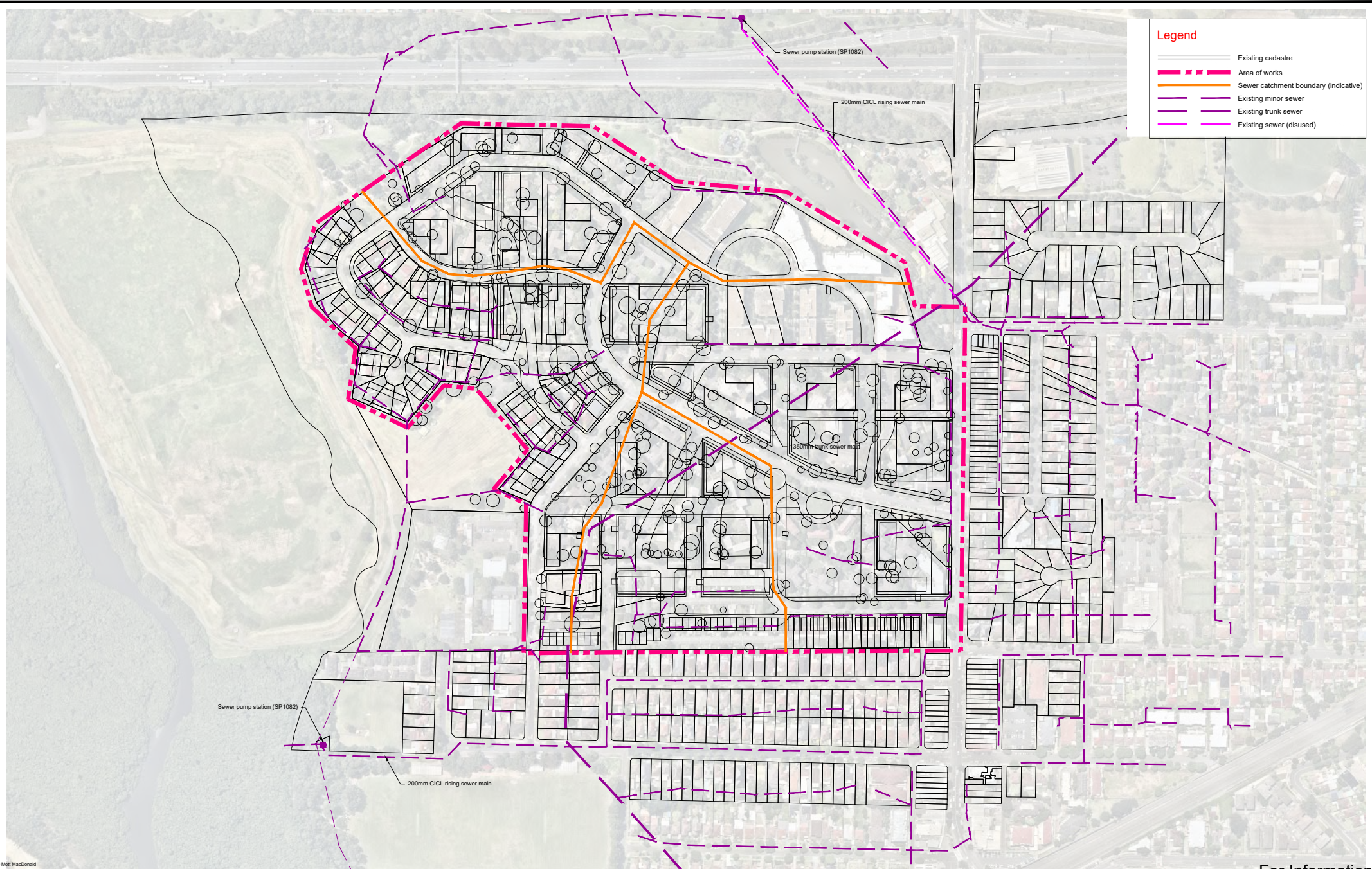
\\mott\projects\riverwood\Project\375987\Riverwood\_Estate\CD\0401\Riverwood\_Estate\_Land\_and\_Utilities\_Masterplan.dwg

Title

**Riverwood Estate, Urban Renewal  
 Utilities Masterplan  
 Combined Existing Utilities Plan**

Designed	D.Chapman	Eng check	R.Higginson
Drawn	D.Chapman	Coordination	R.Higginson
Dwg check	A.Singh	Approved	G.Lee
Scale at A1	Status	Rev	Security
1:200	PRE	P1	STD
Drawing Number			
MMD-375987-C-DR-IN-01-1010			





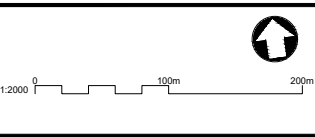
**Legend**

- Existing cadastre
- Area of works
- Sewer catchment boundary (indicative)
- Existing minor sewer
- Existing trunk sewer
- Existing sewer (disused)

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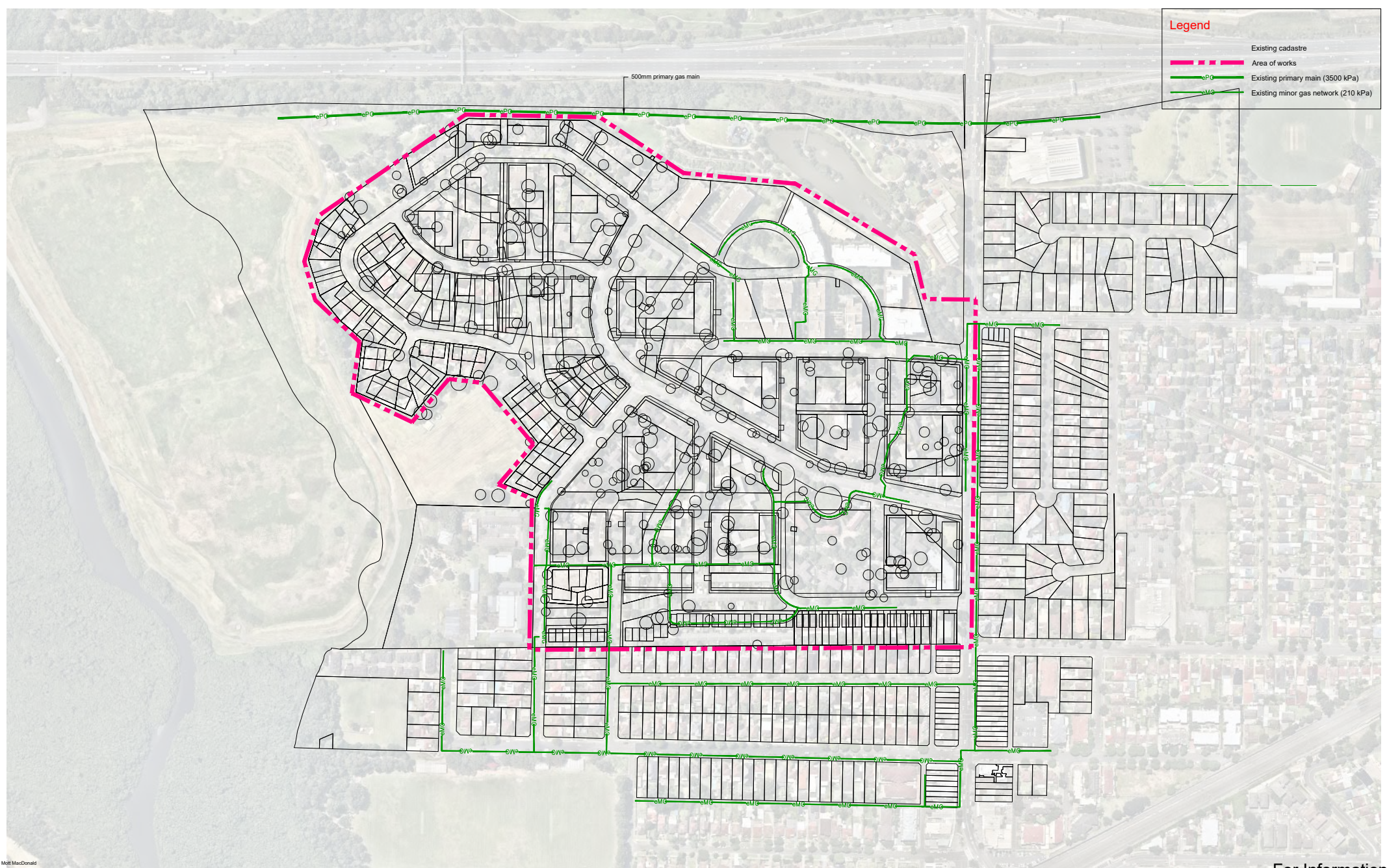
Client  
 Title  
 Riverwood Estate, Urban Renewal  
 Utilities Masterplan  
 Sewer Utilities Plan

Designed: D.Chapman  
 Drawn: D.Chapman  
 Dwg check: A.Singh  
 Scale at A1: 1:100  
 Status: PRE  
 Rev: P1  
 Security: STD

Designed	D.Chapman	Eng check	R.Higginson
Drawn	D.Chapman	Coordination	R.Higginson
Dwg check	A.Singh	Approved	G.Lee
Scale at A1	1:100	Status	PRE
Rev	P1	Security	STD
Drawing Number	MMD-375987-C-DR-IN-01-1050		







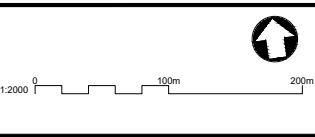
**Legend**

- Existing cadastre
- Area of works
- Existing primary main (3500 kPa)
- Existing minor gas network (210 kPa)

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Client

Title





Riverwood Estate, Urban Renewal  
 Utilities Masterplan  
 Gas Utilities Plan

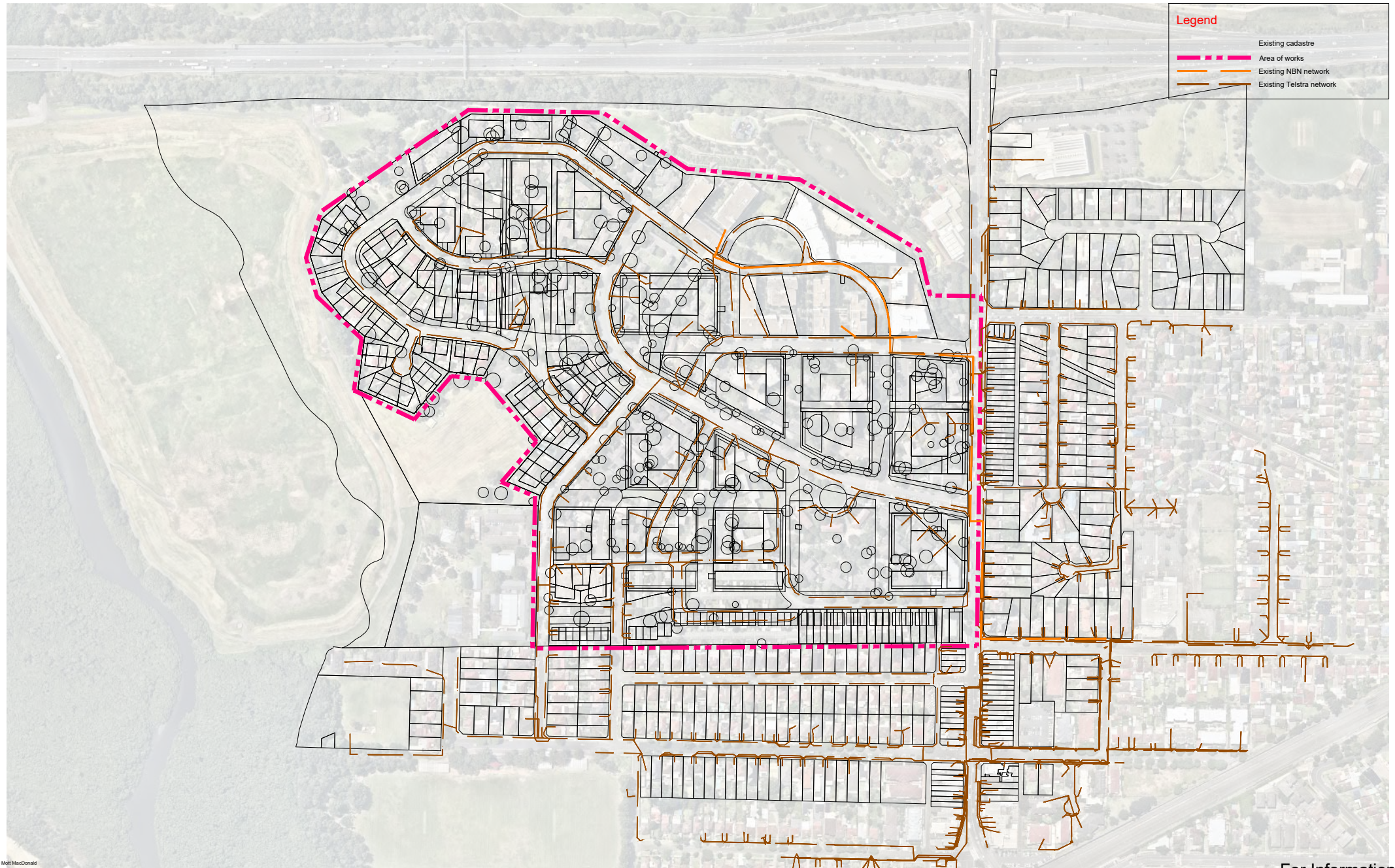
Scale at A1	Status	Rev	Security
1:50	PRE	P1	STD

Drawing Number  
**MMD-375987-C-DR-IN-01-1060**

Designed	Eng check
D.Chapman	R.Higginson
Drawn	Coordination
D.Chapman	R.Higginson
Dwg check	Approved
A.Singh	G.Lee

**Legend**

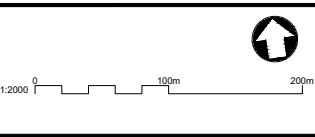
-  Existing cadastre
-  Area of works
-  Existing NBN network
-  Existing Telstra network



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 NSW 1230, Australia  
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Client



Title

**Riverwood Estate, Urban Renewal  
 Utilities Masterplan  
 Telecommunications Utilities Plan**

Designed	D.Chapman	Eng check	R.Higginson
Drawn	D.Chapman	Coordination	R.Higginson
Dwg check	A.Singh	Approved	G.Lee
Scale at A1	1:50	Status	PRE
Rev	P1	Security	STD
Drawing Number <b>MMD-375987-C-DR-IN-01-1030</b>			

## **B. Proposed Services Plans**

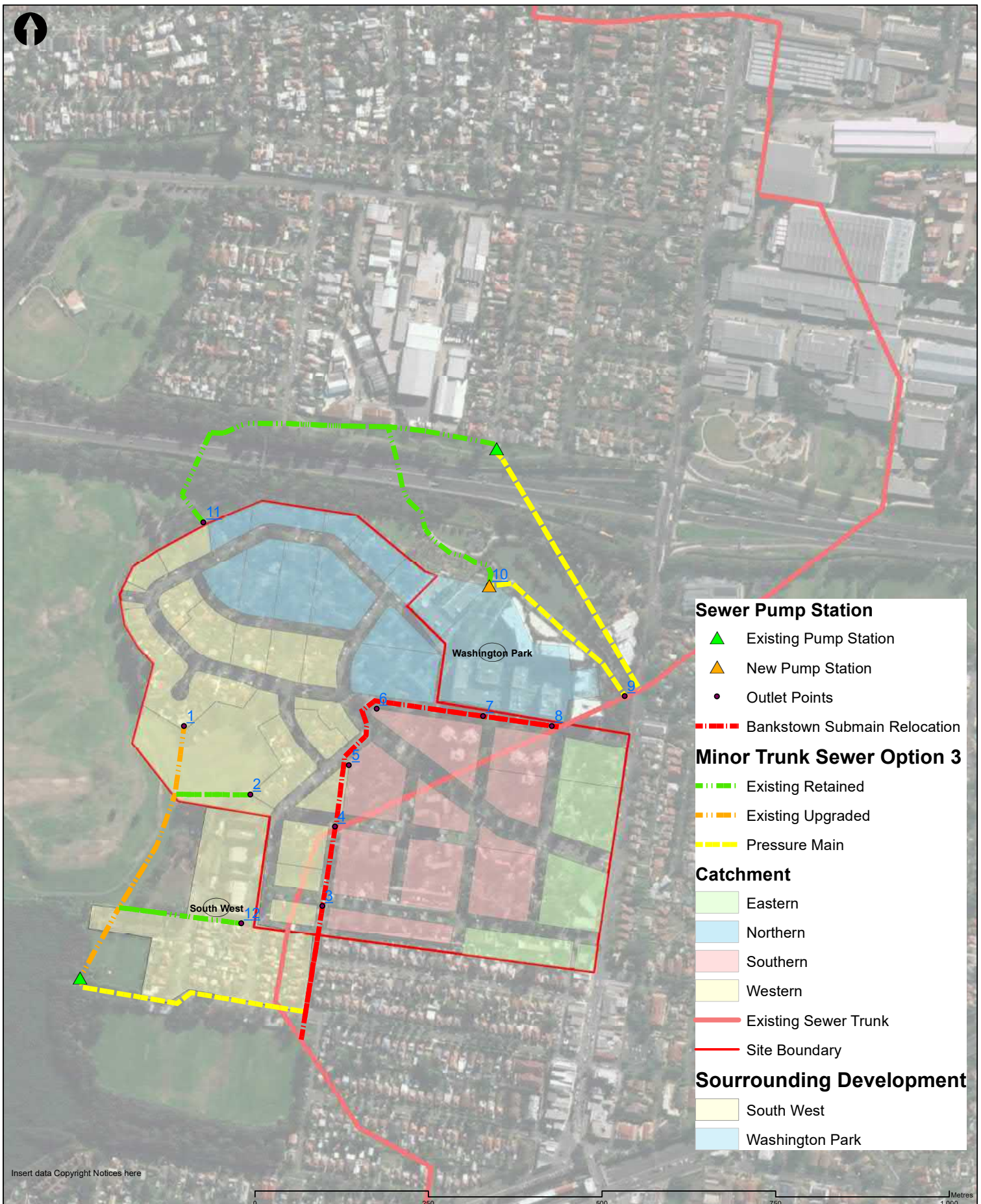


- Services Trench
- Site Boundary
- Masterplan Lots



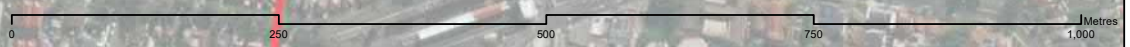
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									Checked	J WUKOWIC
									Approved	J WUKOWIC
									Scale at A3 1:4,000	
		Rev	Date	Drawn	Description	Ch'k'd	App'd	Drawing Number		
		00	05/03/21	TL	FOR INFORMATION	JW	JW	MMD-422942-C-SK-IN-01-2083		
								Security	Status	Rev
								STD	PRE	P1



- Sewer Pump Station**
- ▲ Existing Pump Station
  - ▲ New Pump Station
  - Outlet Points
- Bankstown Submain Relocation**
- Bankstown Submain Relocation
- Minor Trunk Sewer Option 3**
- Existing Retained
  - Existing Upgraded
  - Pressure Main
- Catchment**
- Eastern
  - Northern
  - Southern
  - Western
- Existing Sewer Trunk**
- Existing Sewer Trunk
- Site Boundary**
- Site Boundary
- Sourrounding Development**
- South West
  - Washington Park

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	LAND & HOUSING CORPORATION					RIVERWOOD RENEWAL INDICATIVE SEWER UPGRADES			Checked	J WUKOWIC											
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Rev	Date	Drawn	Description	Ch'k'd	App'd																
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					MMD-422942-C-SK-IN-01-2052			Scale at A3 1:5,000													
								Security	Status	Rev											
								STD	PRE	P1											

- Existing 250mm main
- Existing 300mm main
- Existing 375mm main
- Existing 450mm main
- Existing 500mm main
- Existing 600mm main
- Existing 650mm main
- Existing 675mm main
- Existing 750mm main
- Existing 900mm main
- Existing 1200mm main
- - - Proposed 300mm main
- - - Proposed 375mm main
- Wiley Park Reservoir
- Site Boundary



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										<p>Checked J WUKOWIC</p>										
										<p>Approved J WUKOWIC</p>										
								<p>Scale at A3 1:15,000</p>												
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Rev	Date	Drawn	Description	Ch'k'd	App'd															
00	05/03/21	TL	FOR INFORMATION	JW	JW															



- Riverwood\_Masterplan
- Bankstown ZS
- Mortdale ZS
- Mortdale Proposed Feeder
- Bankstown Proposed Feeder

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					Approved J WUKOWIC													
					Scale at A3 1:15,000													
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Rev	Date	Drawn	Description	Ch'k'd	App'd													
00	05/03/21	TL	FOR INFORMATION	JW	JW													





— Site Boundary

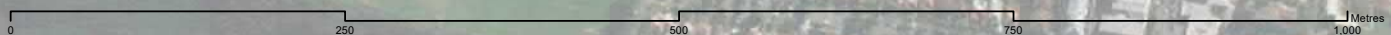
**Reticulation**  
PIPE SIZE (mm)  
— 250

**Trunk upgrades**  
PIPE SIZE (mm)  
▬ 300  
▬ 450

▭ Masterplan Lots



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									Checked	J WUKOWIC									
									Approved	J WUKOWIC									
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<table border="1"> <thead> <tr> <th>Rev</th> <th>Date</th> <th>Drawn</th> <th>Description</th> <th>Ch'k'd</th> <th>App'd</th> </tr> </thead> <tbody> <tr> <td>00</td> <td>05/03/21</td> <td>TL</td> <td>FOR INFORMATION</td> <td>JW</td> <td>JW</td> </tr> </tbody> </table>		Rev	Date	Drawn	Description	Ch'k'd	App'd	00	05/03/21	TL	FOR INFORMATION	JW	JW	<p>Drawing Number</p> <p><b>MMD-422942-C-SK-IN-01-2082</b></p>			Security	Status	Rev
Rev	Date	Drawn	Description	Ch'k'd	App'd														
00	05/03/21	TL	FOR INFORMATION	JW	JW														
					STD	PRE	P1												

## C. Proposed Sewer Calculations

**Table 13: Equivalent Population per Block**

Block	Indicative Dwellings	EP
Block 1	45	113
Block 2	27	68
Block 3	58	145
Block 4	40	100
Block 5	30	75
Block 6	53	133
Block 7	47	118
Block 8	58	145
Block 9	142	355
Block 10.1	68	170
Block 10.2	43	108
Block 11	99	248
Block 12.1	94	235
Block 12.2	94	235
Block 13	62	155
Block 14	62	155
Block 15	138	345
Block 16	62	155
Block 17	277	693
Block 18 (Park)		11
Block 19.1	111	278
Block 19.2	63	158
Block 20	270	675
Block 21	215	538
Block 22	229	9
Block 23 (Park)		573
Block 24	152	14
Block 25	246	380
Block 26.1	165	615
Block 26.2	198	413
Block 27 (Park)		495
Block 28.1	165	40
Block 28.2	255	413
Block 29	290	638
Block 30	11	725
Block 31	31	21
Block 32.1	4	28
Block 32.2	15	78
Block 33	6	10

Block 34 (Park)		38
Block 35 (Park)		15
Block 36 (Park)		10
Block 37 (Park)		11
<b>Total</b>	<b>3,900</b>	<b>9,813</b>

Source: Architectus

## **D. Authority Correspondence**

June 22, 2021

NSW LAND & HOUSING CORPORATION  
c/- MOTT MACDONALD AUSTRALIA

**FEASIBILITY LETTER**

**Developer:** NSW LAND & HOUSING CORPORATION  
**Your reference:** 422942  
**Development:** Belmore Road, Riverwood  
**Development Description:** The proposed redevelopment of this site aims to provide high density housing similar to the Riverwood North development (shown in Figure 1 above). The aim is to provide a total of 3,925 dwellings with a mix of 70% private and 30% public ownership. It is envisaged that the development will be staged in 800-1,000 apartment packages up to 8 storey buildings.  
**Your application date:** February 4, 2021

Dear Applicant

This Feasibility Letter (Letter) is a guide only. It provides general information about what our 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 (WSC).

We'll then send you either a:

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

These documents will be the definitive statement of our requirements.

There may be changes in our 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
- if you decide to do your development in stages then you must submit a new application (and pay another application fee) for each stage.

**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 us and to the extent that it is able, we limit 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 [Plumbing, building & developing](#) page on our website.

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

**You must engage your current or another authorised WSC** 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 WSC (at any point in this process) you must write and tell us.

You'll find a list of WSC's at [Listed providers](#) on our website.

The WSC will be your point of contact with us. 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 our costs).

### 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.

We've assessed your application and found that:

- You must conduct an options study before Sydney Water can determine specific servicing requirements including a scheme plan to advise sizing of extensions for drinking water. The options study must also consider whether there's an opportunity for a better outcome with local reuse (stormwater or wastewater recycling) given the specific constraints in the system.
- The required options study should include hydraulic analysis to provide an updated view of system capacity and any upgrades required to accommodate this.

- Sydney Water can provide a scope of work to assist you in engaging an appropriate consultant to do this work (note that additional reviews and quality assurance by Sydney Water need to be embedded in the process and Sydney Water would need to endorse the resources being used, as this is a specialist investigation).
- Alternatively, Sydney Water can be engaged to perform this option study pending resource availability. Consult Sydney Water if you would like to request a quote and approximate time frame to complete these works.

## 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.

We've assessed your application and found that:

- You must conduct an options study before Sydney Water can determine specific servicing requirements including a scheme plan to advise sizing of extensions for Wastewater. The options study must also consider whether there's an opportunity for a better outcome with local reuse (stormwater or wastewater recycling) given the specific constraints in the system.
- The required options study should include hydraulic analysis to provide an updated view of system capacity and any upgrades required to accommodate this.
- Sydney Water can provide a scope of work to assist you in engaging an appropriate consultant to do this work (note that additional reviews and quality assurance by Sydney Water need to be embedded in the process and Sydney Water would need to endorse the resources being used, as this is a specialist investigation).
- Alternatively, Sydney Water can be engaged to perform this option study pending resource availability. Consult Sydney Water if you would like to request a quote and approximate time frame to complete these works.



## 5. Ancillary Matters

### 5.1 Asset adjustments

After we issue this Notice (and more detailed designs are available), we may require that the water main/sewer main/stormwater located in the footway/your property needs to be adjusted/deviated. If this happens, you'll 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**. We'll need to see the completed designs for the work, and we'll 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 our **Permission to Enter** form(s) for this. You can get copies of these forms from your WSC or on our website. Your WSC 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.

## **6. 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 our "*Multi-level Individual Metering Guide*". You can find this in the [Meters & metered standpipes](#) page on our website.
2. provide and install plumbing and space for individual metering in accordance with our "*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 us once the Testing Certificate has been issued by us 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 [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 from us in the future because of the impact of your development on our assets. You must read them before you go any further.

### **Approval of your building plans**

Please note that your building plans must be approved. This can be done on our Tap in™ system [Sydney Water Tap in™](#) or call 13 20 92.

This is not a requirement of the Certificate, but the approval is needed because construction/building works may impact on our existing assets (e.g. water and sewer mains). In any case, these works MUST NOT commence until we have granted approval.

Your WSC can tell you about the approval process including:

- Possible requirements
- Their costs
- Timeframes.

We recommend that you apply for Building Plan Approval early as in some instances your WSC may need to refer your building plans to us for detailed review. You'll be required to pay us for the costs associated with the detailed review.

**Note: You must obtain our written approval before you do any work on our systems. We'll 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*.**

### **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 our Backflow Prevention Policy and a list of backflow accredited plumbers [Plumbing, building & developing](#).

### **Large Water Service Connection**

A water main is available to provide your development with a domestic supply. The size of your development means that you will need a connection larger than the standard domestic 20 mm size.

To get approval for your connection, you will need to lodge an application at Sydney Water Tap in™. You, or your hydraulic consultant, may need to supply the following:

- A plan of the hydraulic layout;
- A list of all the fixtures/fittings within the property;
- A copy of the fireflow pressure inquiry issued by Sydney Water;
- A pump application form (if a pump is required);
- All pump details (if a pump is required).

You will have to pay an application fee.

Sydney Water does not consider whether a water main 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.

## **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 our systems to provide that flow in an emergency. Sydney Water's Operating Licence directs that our 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 our water main. This work must meet our 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 don't forget that you must pay to disconnect all disused private sewerage services and seal them at the point of connection to our sewer main. This work must meet our 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 our soffit requirements for property connection and drainage.

## **Other fees and requirements**

The requirements in this Notice relate to your Certificate application only. We 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 us and to the extent that it is able, we limit 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**



Address all relevant correspondence to:

Ausgrid Contestability Section  
Building 1a, 33-45 Judd Street  
Oatley NSW 2223

E: Contestability@ausgrid.com.au

4<sup>th</sup> May 2017

Mott MacDonald  
Attention: Rachel Higgerson  
383 Kent Street  
Sydney NSW 2000

Email: rachel.higgisson@mottmac.com

Project Number: 700003602

Rachel,

**Re: Proposed Development - Riverwood Estate, RIVERWOOD NSW 2210**

Please find below Ausgrid response to Preliminary Enquiry 700003602 dated 2<sup>nd</sup> March 2017, concerning a request for a feasibility study to help understand what will be required to supply electricity to this proposed development, the Riverwood Estate.

This response is based on the information supplied by Mott MacDonald. All options below have been made assuming there are no upgrades to the capacity of the zone substations.

The ultimate Riverwood Estate load was estimated by Mott MacDonald at 16500A @ LV and 650A @ 11kV over a 10 year period.

It is estimated the equivalent of 3 new 11kV feeders will be required to supply the proposed loads. A high level assessment of the surrounding Zone Substations, based on the current network arrangement, shows the following capacity of the surrounding existing zone substations:

- Punchbowl ZS has minimal capacity based on Zone TX loads to supply the development.
- Bankstown ZS has capacity (approx 2 x new 11kV feeders) to supply part of the development, however it is approx 3-4kms from the site.
- Hurstville North ZS has capacity (approx 2 x new 11kV feeders) to supply part of the development, however it is approx 5-6kms from the site.
- Riverwood ZS has minimal capacity to provide a new 11kV feeder to supply part of the development.
- Mortdale ZS has capacity (approx 1 x new 11kV feeder) to supply part of the development, however it is approx 4-5kms from the site.

Based on the proposed power requirements and the physical location of this project, the Developer will be required to fund significant new works to supply this development. New 11kV feeders, lengthy trenching and Network Augmentations will be required. A number of options have been proposed (below) with the most cost effective being Option 1.

Option 1 :

2 x new 11kV feeders from Bankstown ZS  
1 x new 11kV feeder from Mortdale ZS  
Approx 9kms of trenching for 3 cables

Option 2:

2 x new 11kV feeders from Bankstown ZS  
1 x new 11kV feeder from Hurstville North ZS  
Approx 10kms of trenching

Option 3:

2 x new 11kV feeders from Bankstown ZS  
1 x new 11kV feeder from Punchbowl  
Augmentation works to transfer load from Punchbowl ZS to Hurstville North ZS  
Approx 12kms minimum of trenching

#### **Additional planning notes and comments:**

A single HV feeder supplies approximately 270A.  
1 x 11kV feeder is assumed to supply a nominal 270A at 11kV.

Residual capacity at Punchbowl ZS.  
270A residual capacity at Punchbowl ZS is subject to a review of N-1, customer connections, DNP's, and any other network alterations.

No residual capacity is available at Riverwood ZS  
Riverwood is unable to supply an 11kV feeder; an estimate of residual capacity would be less than 270A at 11kV.

Draft strategies for upgrading zone substations in the Canterbury Bankstown area are available. The most recent Canterbury Bankstown and St George area plans are available on the Ausgrid website. Whilst there are some relevant draft strategies, Ausgrid plans all major projects using an area planning methodology, which considers all investment drivers that apply within a particular geographic area to enable optimised solutions to be developed. Each plan is revised on a three year cycle to ensure it remains robust to changes in drivers and knowledge. Each plan covers a twenty year planning horizon to ensure plans are efficient and maximise value over the long term. These projects are included in the investment portfolio with timing reviewed annually based on changes in forecast electricity demand, asset condition and other key inputs.

Potential for a new small ZS:

It's not believed that a new zone substation to supply this development would be feasible. Considering the distance from Bankstown ZS and the likelihood of being able to use spare ducts, we would suggest the option of a new ZS for this load would not be feasible. This would be a decision based on many factors, but ultimately if it is required then there would need to be further consultation with appropriate departments within Ausgrid.

Substations locations:

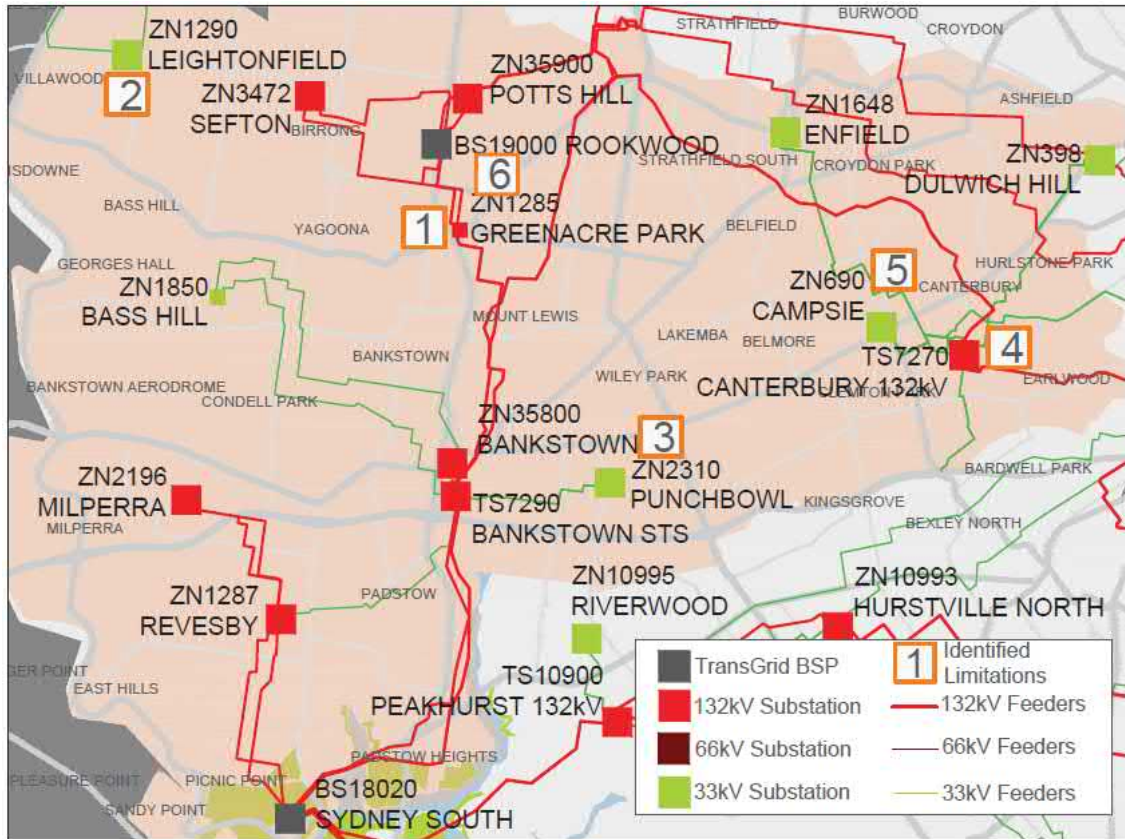
Punchbowl ZS – 76 Bonds Rd, Roselands

Riverwood ZS – 25 Keith St, Peakhurst

Bankstown ZS – 2 Gow St, Padstow

Hurstville Nth ZS – 196 Patrick St, Hurstville

Mortdale ZS – 6 Gungah Bay Rd, Mortdale



When detailed information and plans become available regarding this development, Ausgrid should be contacted to confirm the supply arrangements.

Should you require any further information please contact me on the phone number or email address detailed below.

Yours sincerely,

Doug Chalker  
Contestability Project Coordinator  
Ausgrid

Direct Telephone Number: 02 9585 5677

Email: [dchalker@ausgrid.com.au](mailto:dchalker@ausgrid.com.au)



19/04/2017

Mott MacDonald  
383 Kent Street  
Sydney NSW 2000

Attn: Rachel Higginson

Jemena Limited  
ABN 95 052 167 405

Level 9-15  
99 Walker St  
North Sydney NSW 2060  
PO Box 1220  
North Sydney NSW 2060  
T +61 2 9867 7000  
F +61 2 9867 7010  
[www.jemena.com.au](http://www.jemena.com.au)

Dear Rachel,

**Re: Riverwood Estate**

Thank you for your advice with regard to this proposal, I can confirm that Natural Gas is available in the vicinity and may be able to supply this proposal.

Our policy is to supply all developments wherever possible, depending upon economic viability.

In consideration of our shareholders' interests and under NSW regulation, Jemena Gas Networks (NSW) Ltd is required to ensure that any connection to 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 layout and load configurations for the development a full economic evaluation can be undertaken to determine the viability of supplying natural gas to the site, as a contribution may be required to assist in the economic viability of the proposal.

There will costs associated with disconnections and any relocation works that are required.

Thank you for your enquiry. If further information or assistance is required, please do not hesitate to contact me



Aaron Greaves  
Network Development Manager  
0419 230 600

## Higginson, Rachel

---

**From:** Joice, Bob J <Bob.J.Joice@team.telstra.com>  
**Sent:** Monday, March 6, 2017 2:32 PM  
**To:** Nietoski, Les P; Higginson, Rachel; Bonser, Damian F  
**Cc:** Lee, Greg A  
**Subject:** RE: [375987] Feasibility Enquiry - Riverwood

Rachel,

Telstra has a mobile base station on the rooftop of the apartment building at 2 Washington Ave, Riverwood. Optus and VHA also have mobile base station on this rooftop.

Telstra current tenure expires on 27 March 2021 with an option for a further 5 years, expiring on 27 March 2026. I am not aware of the lease terms for the other carriers.

To ensure continuous mobile coverage from all three carriers, an alternative rooftop location will need to be available prior to the decommissioning of the current facilities. As Telstra has tenure until 2026, any relocation of its facility prior to 2026 will need to be funded by the developer. Once your master plan is further developed, Telstra can assist in identifying which new apartment building is the best location to provide current coverage requirements and the increased capacity demanded by the redevelopment.

Details of the carrier facilities can be found at <http://www.rfnsa.com.au/nsa/index.cgi> Typing site no. **2210005** into the search window

Regards,

**Bob Joice**  
**GM, Wireless Strategic Solutions**  
**Wireless Network Engineering, Telstra Operations**  
**Email:** [bob.j.joice@team.telstra.com](mailto:bob.j.joice@team.telstra.com)

---

**From:** Nietoski, Les P  
**Sent:** Monday, 6 March 2017 1:29 PM  
**To:** Higginson, Rachel <Rachel.Higginson@mottmac.com>; Bonser, Damian F <Damien.Bonser@team.telstra.com>  
**Cc:** Lee, Greg A <Greg.Lee@mottmac.com>; Joice, Bob J <Bob.J.Joice@team.telstra.com>  
**Subject:** RE: [375987] Feasibility Enquiry - Riverwood

Hi Rachel,

Thank you for your letter.

As far as provision of services to this development it will be most likely be nbnTM. They are already looking at some sites under construction. You should be consulting with nbnTM for the provision of services to this development.

Telstra's involvement would most be in the protection of our assets, which Damian is the right person to deal with.

As far as the mobile site is concerned, you can contact Bob Joice from our Mobiles area to discuss the future of this site.

Let me know if you require any further details.

## Higgisson, Rachel

---

**From:** Greg Clifford <gregclifford@nbnco.com.au>  
**Sent:** Monday, March 27, 2017 11:24 AM  
**To:** Higgisson, Rachel  
**Cc:** Lee, Greg A; Kristine Lam  
**Subject:** RE: AYCA-49EVCA

Hi Rachel,

Thanks for your time on the phone today. There is a small backhaul charge which relates to **NBN** providing fibre to service a development of this size and we have our standard \$400 per unit charge. If you require any further information please either email me or call on the below numbers. Thanks Greg

Backhaul charge - \$12,350.00  
In Estate charge - \$400 per unit

### Greg Clifford

Account Manager

nbn Build Partnerships | Deployment, Planning & Support

**P** +61 2 8918 8193 | **M** +61 419 492 745 | **E** [gregclifford@nbnco.com.au](mailto:gregclifford@nbnco.com.au)

6 Roberts Road, Eastern Creek, NSW 2766



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**From:** Higgisson, Rachel [<mailto:Rachel.Higgisson@mottmac.com>]  
**Sent:** Monday, 27 March 2017 10:34 AM  
**To:** Kristine Lam  
**Cc:** Lee, Greg A; Greg Clifford  
**Subject:** RE: AYCA-49EVCA

Hi Kristine,

Just wondering if you've had a chance to review the below? Telstra have advised that provision of services for the site will be from NBN, and their involvement will be limited to the protection of their assets.

We are hoping to wrap this up this week for Land and Housing. Are you able to provide me any update with how the advice is progressing?

Kind regards,

**Rachel Higgisson**

Graduate Engineer

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M +61 430 342 100

F +61 (0)2 9098 6810

[rachel.higgisson@mottmac.com](mailto:rachel.higgisson@mottmac.com)



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**From:** Kristine Lam [<mailto:KristineLam@nbnco.com.au>]

**Sent:** Thursday, March 9, 2017 4:26 PM

**To:** Higgisson, Rachel <[Rachel.Higgisson@mottmac.com](mailto:Rachel.Higgisson@mottmac.com)>

**Cc:** Lee, Greg A <[Greg.Lee@mottmac.com](mailto:Greg.Lee@mottmac.com)>; Greg Clifford <[gregclifford@nbnco.com.au](mailto:gregclifford@nbnco.com.au)>

**Subject:** RE: [375987] Feasibility Study - Riverwood [nbn-Confidential:Commercial]

## nbn-Confidential: Commercial

Hi Rachel,

Thank you for your email.

A Feasibility Assessment Request has been created in our system for this redevelopment – application reference is **AYCA-49EVCA**.

Once our planning team has completed the feasibility assessment, we will contact you to discuss the outcome.

Regards

**Kristine Lam**

Account Associate NSW/ACT | Build Partnerships

P +61 2 8918 8547 | M +61 409 208 875 | E [kristinelam@nbnco.com.au](mailto:kristinelam@nbnco.com.au)

Level 11, 100 Arthur Street, North Sydney NSW 2060



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