

Crows Nest Precinct

Utilities Report

July 2024



Acknowledgment of Country

On behalf of Mott MacDonald, we would like to begin by acknowledging the Traditional Custodians of the land on which we meet today, and pay our respects to their Elders past and present.

We recognise and respect their cultural heritage, beliefs, continued connection to the land and water and commit to building a brighter future together.

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Crows Nest Precinct

Utilities Report

July 2024

Issue and Revision Record

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Executive summary

The St Leonards and Crows Nest 2036 Plan facilitates the urban renewal and growth projection of the residential community in the suburbs of St Leonards, Greenwich, Naremburn, Wollstonecraft, Crows Nest and Artarmon. Mott MacDonald has been engaged by the Department of Planning, Housing and Infrastructure (DPHI) to take a utility service to assist in planning for growth projection of the St Leonards and Crows Nest Station Precinct. This assessment will support the delivery of this site as it will identify opportunities, constraints, and risks related to civil engineering and services infrastructures. The scope of this report summarises existing utility infrastructure.

The Crows Nest Precinct is located five kilometres north-west of the Sydney CBD and is identified as strategic centre for the Greater Sydney Region Plan and the North District Plan. The precinct is situated within the Lane Cove local government Area (LGA) and borders the Willoughby and North Sydney LGAs.

Utility Services

The site is currently serviced through the following means:

- **Potable Water:** Potable water is provided by Sydney Water through a number of existing mains on and adjacent to the site;
- **Sewer:** Wastewater facilities are provided by Sydney Water through a number of existing mains on and adjacent to the site;
- **Stormwater:** Stormwater assets are owned by North Sydney Council and Willoughby City Council;
- **Electrical:** Electrical supply is provided by Ausgrid;
- **Gas:** Gas servicing is provided by Jemena Gas; and
- **Telecommunications:** Multiple telecommunications providers service the site including NBN, Nextgen, Optus/Uecomm, Telstra, TPG, AARnet, Superloop, Verison, FibreconX, Aussie broadband and Vocus.

Servicing Constraints

The main servicing constraints are:

- **Potable Water:** There are numerous water mains within the proposed site, but local reticulation services may require amplification as a result of development uplift, The age, type, and conditions of these pipes vary significantly. The depths and positions of the existing key reticulation mains are also unknown;
- **Sewer:** The site is well serviced from trunk assets present in the precinct, but local reticulation services may require amplification as a result of the proposed development uplift, additionally the reticulation network predominately runs under low density residential lots and may need to be relocated to the street network as a part of any change in building form. The exact depths and positions of the existing reticulation mains are unknown;
- **Stormwater:** The exact depths and positions of the existing reticulation mains are unknown;
- **Electrical:** It is likely that new feeder cables from the substation will be required when existing LV distribution is at capacity. Additionally existing overhead power may need to be under grounded. The exact depths and positions of the existing mains are unknown;

- **Gas:** While there are existing gas services to a large proportion of the site, consideration should be given to a "zero-gas" precinct to reduce use of non-renewable resources;
- **Telecommunications:** No servicing constraints.

The outcomes of this assessment are subject to the results of feasibility applications with each utility authority.

Additional Constraints

There are also other utility assets within proximity to the site that may affect the development of this site. These assets are listed below:

- **Transport for NSW:** TfNSW assets are present in the Crows Nest Precinct.
- **Sydney Trains:** St Leonards Station is present in the site boundary which is affected by the work area. The train station is well connected with a HV cable throughout the precinct.

1 Introduction

1.1 Scope of Works

The key priority of NSW Government is to elevate Crows Nest Precinct into a green village that delivers to the shortage of diverse and affordable homes in well-located areas. The NSW government has committed to building 377,000 new homes as part of the National Housing Accord which is close to where people live and work and is close to transport and other amenities. Mott MacDonald has been engaged to provide professional service to support St Leonards and Crows Nest 2036 Plan associated with civil engineering and services infrastructure to support the delivery of rezoning package for the Crows Nest Precinct. To assist in the preparation of the rezoning package, Mott MacDonald have undertaken the following tasks:

- Undertaken background investigation, consultation, and mapping utilities capacity report for the precinct;
- Undertaken BYDA (Before You Dig Australia) searches and utilised existing access to utility GIS systems to map key utilities and assist with utility capacity planning;
- Undertaken a demand assessment of existing utilities including power, water, gas, NBN and sewage to identify potential impacts of infrastructure servicing;
- Identify constraints and limitations within the utilities present that may impact the future development or infrastructure;
- Identify any infrastructure upgrades required on-site and off-site to facilitate the development and any arrangements to ensure to upgrades will be implemented on time and be maintained;
- Develop recommendation and strategies to provide long term sustainability and resilience of the utility networks present in the Crows Nest Precinct; and
- Address the requirements for the precinct with other utilities authorities.

1.2 Purpose of Report

The purpose of this report is to identify the existing servicing infrastructure, requirements to service and identify any key upgrades for the Crows Nest Precinct. These requirements include:

- Identify the existing situation, including the constraints, opportunities, and key issues of existing services (including portable water, wastewater, stormwater, electrical, gas and telecommunication);
- Assess the capacity of the relevant service infrastructure networks to service the site;
- Assess the implications of any proposed land use for local infrastructure and service delivery;
- Guiding future utility infrastructure planning to support sustainable development and growth in the precinct;
- Identifying key opportunities which can be of critical importance for the development;
- Adjustments/augmentations required to existing infrastructure to enable development; and
- Inform and support 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 servicing strategies;
- Key constraints and opportunities; and
- Staging recommendations.

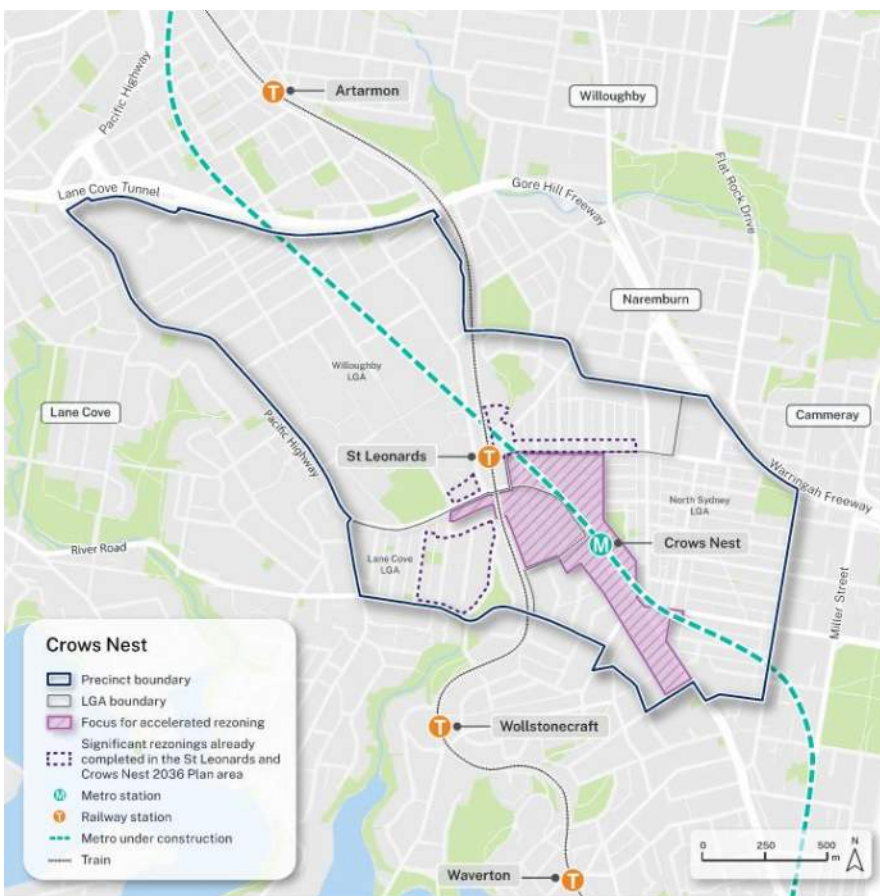
1.3 Site Context

The Crows Nest Precinct is located five kilometres north-west of the Sydney CBD and intersects with the three Local Government Areas (LGAs) of North Sydney, Lane Cove, and Willoughby. The Crows Nest Metro Station is within the precinct boundary and located within the North Sydney local government area. The Crows Nest Metro Station is situated west of the Crows Nest village, between the Pacific Highway and Clarke Lane (eastern side of the Pacific Highway) and Oxley Street.

- **North:** Gore Hill Freeway, Warringah Freeway & Dalleys Rd;
- **East:** West St;
- **South:** River Rd & Myrtle St; and
- **West:** Pacific Highway & Greenwich Rd.

The extents of the site are shown in the figure below:

Figure 1 Site Extents



1.4 Gathering Existing Utility Information

The existing utilities assessment is primarily based on information received as a result of a Before You Dig Australia (BYDA) search. The BYDA request identified multiple services as outlined in the table below. The services information has been consolidated and displayed on numerous plans which can be found throughout the report.

The details shown on the plans should be considered as indicative only as the original BYDA information is not based on a detailed survey.

Table 1 Summary of Existing Services

Authority name	Phone	Utility Type
Sydney Water	13 20 92	Potable Water
Sydney Water	13 20 92	Sewer
Ausgrid	(02) 4951 0899	Electricity
Jemena Gas North	1300 880 906	Gas
AARNet Pty Ltd NSW	1300 275 662	Telecommunication
NBN Co NswAct	1800 626 329	Telecommunication
Nextgen	1800 262 663	Telecommunication
Optus	1800 505 777	Telecommunication
TPG	1800 786 306	Telecommunication
Telstra NSW	1800 653 935	Telecommunication
Sydney Trains Metro North		Government Agency
TfNSW		State Government Agency

The plans provided from these BYDA reports were assessed as a component of our capacity review.

2 Assessment Methodology

The utilities and infrastructure servicing assessment methodology for each utility is summarized in the flow chart below:

Figure 2 Assessment Methodology



2.1 Desktop Investigation

- Desktop assessment helps to determine the utilities which may be affected by the proposed development, which is determined from Before you Dig Australia (BYDA);
- Review of different utilities which are obtained from the BYDA;
- Review the utility which is obtained from the site surveys;
- Using Geographic Information System (GIS) tools to analyse spatial data for the utility network;
- Creating maps and layers for the utility asset mapping; and
- Gap analysis and advice on further investigations required.

2.2 Utility Assessment

The process of utility assessment for the site is as follows:

- Mapping the existing utilities within and adjacent to the site boundary;
- Undertake demand modelling to determine utility demand rates based on the intended use and using authority demand rates;
- Identification of optimal locations for utility connections through assessing existing utility capacities; and
- Preliminary evaluation of potential constraints for the project.

2.3 Sustainability Initiative

There are a range of potential sustainability initiatives that are being considered for the proposed development works that may impact the demand calculations and the utility servicing during the development of the precinct:

- All utility works are to be coordinated with any precinct wide utility sustainability measures;
- Suggestion for the implementation of passive and active design measures to minimise consumption of energy; and
- Use of sustainable initiatives for different utilities to maximize the sustainable measures taken during development.

2.4 Utility Authority Consultation

Utility authorities are to be consulted to ensure:

- Development and submission of feasibility applications are provided to each utility authority with projected demands;
- Incorporation of utility agency advice on servicing options, routes, timings, costs, and timings for delivery; and
- Continual coordination around any changes to demand assessments and detailing of any further assessments or studies required to confirm supply methods (e.g., water or wastewater modelling).

2.5 Identifying Next Steps

The following steps are to be undertaken in the next design stage:

- Plans of potential utility relocations, supply points, and potential constraints;
- Detailing of further investigations or additional works required during subsequent design stages;
- Incorporation of proposed sustainability measures; and
- Confirmation of the feasibility of obtaining utility servicing for the development.

3 Desktop Investigation

As a part of this investigation, utility information was obtained from several sources. Table below shows a summary of the identified utility services within and adjacent to the site:

Table 2 Summary of Identified Utility Services

Utility	Authority Name	Potential Impacts
Potable Water	Sydney Water	TBC
Sewer	Sydney Water	TBC
Stormwater	Lane Cove Council	TBC
Stormwater	North Sydney Council	TBC
Stormwater	Willoughby City Council	TBC
Electrical	Ausgrid	TBC
Communications	NBN Co NswAct	TBC
Communications	Nextgen NCC - NSW	TBC
Communications	Optus and or Uecomm Nsw	TBC
Communications	Telstra NSW Central	TBC
Communications	TPG Telecom (NSW)	TBC
Communications	Vocus Communications 2	TBC
Communications	Superloop	TBC
Communications	Verizon	TBC
Communications	FibreconX	TBC
Communications	Aussie Broadband	TBC
Communications	AARNet (within Telstra Duct)	TBC
Gas	Jemena Gas North	TBC
Transport	Sydney Metro	TBC
Transport	Sydney Trains	TBC
Transport	Transport for NSW	TBC
Transport	Transurban Lane Cove Tunnel	TBC

3.1 Infrastructure Required On-Site Off-Site

Table 3 Summary of Required Infrastructure

Utility	Required (Y/N)	On-Site (Y/N)	Upgrade Required (Y/N)
Potable Water	Y	Y	TBC
Sewer	Y	Y	TBC
Stormwater	Y	Y	TBC
Electrical	Y	Y	TBC

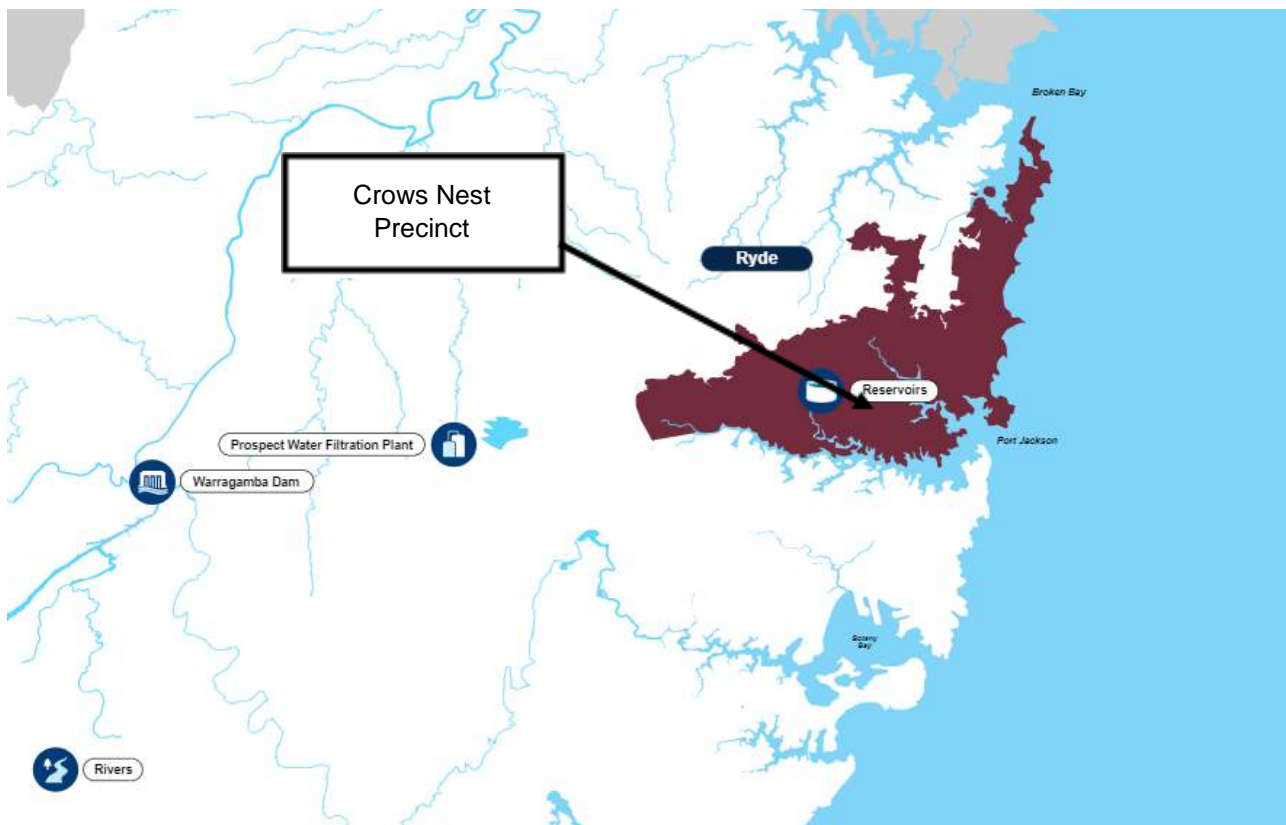
Communications	Y	Y	TBC
Gas	N	Y	TBC

4 Potable Water

4.1 Existing Assets

Potable water at the Crows Nest Precinct is currently supplied by Sydney Water through the Ryde water delivery system which is regularly supplemented by the Prospect North Delivery System.

Figure 3 Potable Water Supply



Source: Sydney Water

4.1.1 Reservoirs

The Precinct receives potable water supply from the Chatswood Reservoirs (WS0024, WS0025 and WS0239), approximately 1km north-west of the Precinct boundary as illustrated in Figure 5 Existing Water Infrastructure. The northern two Reservoirs (WS0024 and WS0025) were built in 1888 and have an interconnecting walkway at roof level. They each have 7ML capacity and depths of 9.5m. They are State Heritage Register (SHR) listed and are unlikely to be augmented should additional capacity be required.

The southern reservoir (WS0239) is a 54ML welded steel reservoir which was constructed in 1972. Also located on the Chatswood Reservoir site is a decommissioned brick pumping station which was built in 1895 and closed in 1918. It serviced the northern two reservoirs and is an item of local heritage significance.

Figure 4 Chatswood Reservoir



Source: ArcGIS Basemaps

4.1.2 Trunk Water Mains

Four water mains supply the Precinct from the Chatswood Reservoir which are also illustrated in Figure 5 Existing Water Infrastructure and described below:

- A 750mm cast iron cement lined (CICL) pipe runs southward along River Road, west of the Precinct. It reduces in size to 600mm and then 500mm diameter CICIL pipe - it services Character Area 5 (Residential - Naremburn) and part of Character Area 6 (Crows Nest Village);
- A 500mm CICL pipe runs southeast along the Pacific Highway and then east into the southern portion of Character Area 1 (Artarmon Employment Area). It then disperses into several 500mm and 250mm trunk pipes to the southeast of the Precinct. It is likely to service Character Areas 1, 2, 3, 7, 8, 9, 10 and 4;
- A 500mm CICL pipe which runs southeast along Reserve Road then east out of the southern portion of Character Area 2 (Health & Education Precinct) and then southeast along the Pacific Highway. It is likely to service Character Areas 1, 2, 3, 4, 5, 6, 7 and possibly 8; and

- A 600mm CICL pipe which runs south and east along Francis Street and Dalleys Road on the Precinct's eastern boundary. It then enters the Precinct Boundary near the border of Character Areas 9 and 10 before feeding into several 500mm trunks that service the southeast portion of the Precinct. It is likely to service Character Areas 1, 7, 8, 9, 10, 4 and 6.

Each of the four major trunk pipes listed above connect to minor existing reticulation lines, typically located within the standard trench allocation of the road reserve and 100-200mm in size.

Figure 5 Existing Water Infrastructure



4.1.3 Potable water infrastructure

The existing potable water infrastructure on site has been identified based on Before You Dig Australia (BYDA) records. These records indicate that there are numerous water mains within and adjacent to the site boundary. The key existing water mains on site include:

- DN750 SCL IBL water main along the Donnelly Rd;
- DN600 CIVL water main along the River Rd, Dalleys Rd and Intersection of the Greenwich Rd;
- DN600 CIVL water main along Donnelly Rd, Wheatleigh St and Chandos St;
- DN500 SCL water main at intersection of Chandos St and Herbert St;
- DN500 CICL and DN150CICL water main along the Pacific Hwy;

- DN500 CICL water main along Westbourne St from the intersection at the Pacific Hwy;
- DN500 CICL and DN500 DICL water main along the reserve road;
- DN500 SCL water main at the intersection of Herbert St and Westbourne St;
- DN500 SCL IBL water main along Westbourne St connected from the intersection of the reserve road;
- DN500 CIVL water main passing from the Royal North Shore Hospital along the reserve road;
- DN500 SCL water main connected on the intersection of the Pacific Hwy and Herbert St;
- DN500 SCL IBL water main along Alexander St and Holtermann St;
- DN500 CICL water main along Nicholson St and Shirley St;
- DN500 CICL water main along Clarke St;
- Dn500 CICL water main along Atchison St;
- DN500 PE and DN450 SCL water main along Oxley St opposite to 56 Hume St;
- DN500 SCL IBL water main along Albany St between Oxley and Alexander St;
- DN450 CICL water main along Willoughby Lane, Holtermann St, and Sophia St;
- DN450 CICL and DN500 CICL water main along Newland St and Morton St;
- DN375 CICL water main along Falcon St;
- DN300 CICL water main along Matthew St and Devonshire St;

The completed rezoning area (with development currently under construction) is bounded by Marshall Ave in North, Canberra Ave in East, River Rd in South, and Park Rd in West. The potable water mains which are identified for the Crows Nest Precinct State-Led Rezoning project are:

- DN100 CICL water main along the Park Rd;
- DN600 CICL, DN500CICL and DN150 CICL water main along River Rd and Russel St;
- DN100 CICL water main along Berry Rd and Canberra Rd;
- DN150 CICL water main along Canberra Rd extending North from Duntroon Ave;
- DN100 CICL water main extending from the intersection of River Rd and Berry Rd towards the Eastview St;
- DN100 CICL water main from Phwy Wilona Ave extending onto west of the River Rd.
- DN150 CICL water main along Pacific Hwy, Marshall Lane, and Canberra Rd;
- DN100 CICL water main along Park Rd and Berry Rd is connected to DN150 CICL water main along Pacific Hwy;

4.2 Demand Assessment

An assessment of the estimated net increase in potable water demand generated from the proposed development has been conducted to determine the required infrastructure upgrades in the precinct.

Demand forecasting and profiles were developed for the study area, which was based on the number of proposed dwellings. The number of proposed dwellings to be developed in the Rezoning area is 6683 dwellings.

Demand estimates for potable water have been calculated using the Design Criteria Guidelines Supplement for Single Reticulation System (Sydney Water, 2014) and is based on the

maximum daily demand. A BASIX reduction of 40% has been included within these calculations and applied to the residential portion of this development.

Table 4 Potable Water Demand Unit Rates

Development Type	Assumed Land Use	Design Criteria	Units	Demand/Unit
Residential	Multi-unit (>140 units / net / ha)	Max day demand	kL/unit/day	0.8

It is assumed that the area of each dwelling is 90m² GFA / dwellings.

An estimate of the future potable water demand for development has been calculated based on the projected development yields.

The maximum daily demand (MDD) of the development has been calculated as 3207.84 kL/Day.

Table 5 Estimated Potable Water Demand

	Estimated Demand
Total (kL/Day: Max Day Demand)	5346.40
Total (kL/Day: Max Day Demand, incl. BASIX)	3207.84
Total (kL/Day: Max Day Demand, incl. BASIX, +15%)	3689.02
Total (kL/Day: Max Day Demand, incl. BASIX, -15%)	2726.66

4.3 Coordination with other services

Coordination of the proposed potable water infrastructure with other service in the proposed precinct is based on the Streets Opening Conference standards. In addition, Section 5.12.5.2 of the Water Services Association of Australia codes (WSA 03-2011-3.1, Sydney Water Edition – 2012) states that the clearance requirements for water mains from other service utility assets shall not be less than the minimum vertical and horizontal clearances as summarized in the Figure below.

Figure 6 Sydney Water clearances between water mains and Underground services (WSA 03-2011-3.1, Sydney Water Edition-2012)

Utility (Existing or proposed service)	Minimum horizontal clearance mm		Minimum vertical clearance ¹ mm
	New main size		
	≤DN 200	>DN 200	
Water mains ² >DN 375	600	600	300
Water mains ≤DN 375	300 ³	600	150
Gas mains	300 ³	600	150
Telecommunication conduits and cables	300 ³	600	150
Electricity conduits and cables	500	1000	225 ⁷
Stormwater drains	300 ³	600	150 ⁴
Sewers – gravity	1000 ⁵ /600	1000 ⁵ /600	500 ⁴
Sewers – pressure and vacuum	600	600	300
Kerbs	150	600 ⁶	150 (where possible)

NOTES – see over

NOTES:

- 1 Vertical clearances apply where water mains cross one another and other utility services, except in the case of sewers where a vertical separation shall always be maintained, even when the main and sewer are parallel. *The main should always be located above the sewer to minimise the possibility of backflow contamination in the event of a main break.*
- 2 *Water mains includes mains supplying drinking water and non-drinking water.*
- 3 *Clearances can be further reduced to 150 mm for distances up to 2 m where mains are to be laid past installations such as concrete bases for poles, pits and small structures, providing the structure will not be destabilised in the process. The clearance from timber poles should be at least 200 mm and preferably 300 mm..*
- 4 *Water mains should always cross over sewers and stormwater drains. For cases where there is no alternative and the main must cross under the sewer, the design shall nominate an appropriate trenchless construction technique in accordance with Clause 5.5 or other water main construction and protection treatment, effectively joint-free in the vicinity of the sewer. Refer to Standard Drawings WAT-1211-V and WAT-1255-S.*
- 5 *Where a parallel sewer is at the minimum vertical clearance lower than the water main (500 mm), maintain a minimum horizontal clearance of 1000 mm. This minimum horizontal clearance can be progressively reduced to 600 mm as the vertical clearance is increased to 750 mm.*
- 6 *Clearance from kerbs shall be measured from the nearest point of the kerb. For water mains ≤DN 375 clearances from kerbs can be progressively reduced until the minimum of 150 mm is reached for mains ≤DN 200.*
- 7 *An additional clearance from high voltage electrical installations should be maintained above the conduits or cables to allow for a protective barrier and marking to be provided.*

4.4 Sustainability Initiative

Integrating water sustainable initiatives and encouraging the supply of non-potable to the area can mitigate increases in potable water. Sustainable initiatives for potable water in NSW are crucial for ensuring long-term access to clean water while minimizing environmental impact. The following initiatives are recommended to reduce potable water demand:

- Rainwater harvesting systems which helps in onsite rainwater (non-potable water) reuse;
- Leak detection and repair programs which provides with high capacity of the water fixtures;
- Green infrastructure which invests in natural solutions like green roofs, permeable pavement, and rain gardens;
- Water efficient landscaping for the rezoning area;
- Stormwater harvesting and water recycling.

It should be noted that the above-mentioned initiatives are preliminary and suggestive which requires further investigation for future design stages.

Sydney Water, alongside the NSW Government, are committed to a Growth Servicing Plan between 2024-2029, this includes the identification of the Crows Nest precinct are to be a “Future Opportunity” for Integrated Water Management. The plan considers the water cycle in all stages between supply to treatment, consumption, and disposal.

It is to be noted that the St Leonards region is in the ‘Concept Planning’ phase for both potable and wastewater infrastructure, with wastewater being noted to have limited existing trunk capacity.

4.5 Service Authority Consultation

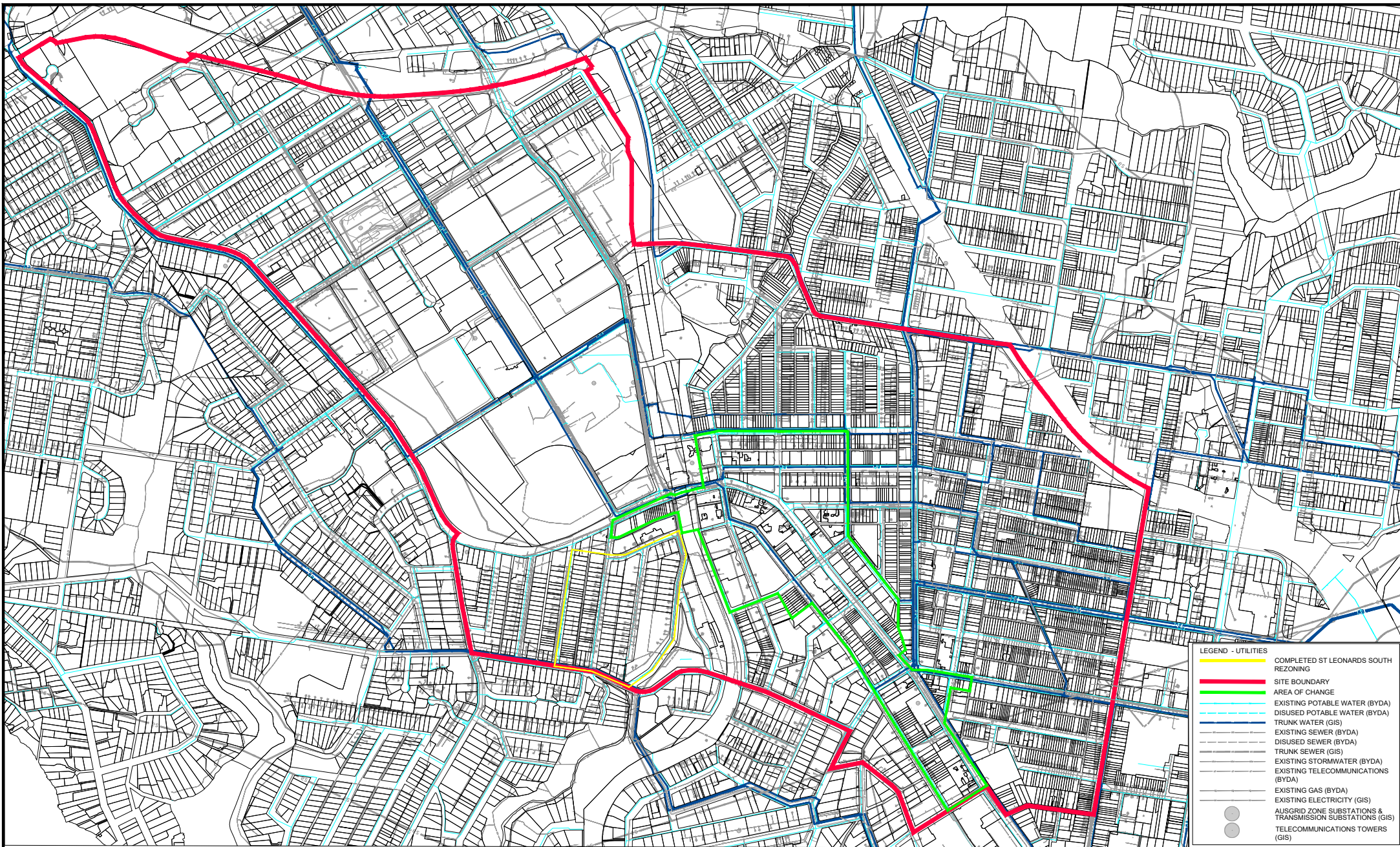
Feasibility applications have been submitted to Sydney Water and we are awaiting their response, which will be included in the final Crows Nest Utilities Report.

4.6 Next Steps

The potable water strategy is to be confirmed through hydraulic modelling, with separate reports outlining the modelling outcomes to be submitted to Sydney Water. Further discussion is also to be undertaken with Sydney Water to confirm lead-in infrastructure requirements and pressures of existing potable water services. The key next steps in progressing the delivery of potable water infrastructure through detailed design, including the formal approval process for Sydney Water infrastructure consists of the following:

- Undertake hydraulic modelling to confirm the extent of any lead-in infrastructure upgrades required
- Undertake site investigations to confirm the layout and extent of existing on-site infrastructure (including non- Sydney Water infrastructure)
- Develop an overall water master plan for the Crows Nest precinct including staging considerations and agree this with Sydney Water – As a part of Development Applications
- Develop diversion strategy (including any interim works to suit staging) and protection/build-over requirements for infrastructure that cannot be diverted - As a part of Development Applications
- Establish a Head Deed to be signed by required parties (Sydney Water, Designer, WSC, Developer, Constructor) – As a part of detailed design.
- Submit application/s for individual detailed design packages to Sydney Water with drawing of proposed works in stages, Section 73– As a part of detailed design.

- WSC to issue of Notice of Requirements (NOR) with their requirements for water main layout, sizing and funding matters confirmed– As a part of detailed design.
- Detailed design to be progressed based on the NOR and submitted to Sydney Water for approval – As a part of detailed design.



LEGEND - UTILITIES	
	COMPLETED ST LEONARDS SOUTH REZONING
	SITE BOUNDARY
	AREA OF CHANGE
	EXISTING POTABLE WATER (BYDA)
	DISUSED POTABLE WATER (BYDA)
	TRUNK WATER (GIS)
	EXISTING SEWER (BYDA)
	DISUSED SEWER (BYDA)
	TRUNK SEWER (GIS)
	EXISTING STORMWATER (BYDA)
	EXISTING TELECOMMUNICATIONS (BYDA)
	EXISTING GAS (BYDA)
	EXISTING ELECTRICITY (GIS)
	AUSGRID ZONE SUBSTATIONS & TRANSMISSION SUBSTATIONS (GIS)
	TELECOMMUNICATIONS TOWERS (GIS)

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Preliminary - Not for Construction

Rev	Date	Drawn	Description	Chk'd	App'd
P2	24.05.24	SS	UPDATED ISSUE	JL	DF
P1	23.03.24	AB	ISSUED FOR APPROVAL	JL	DF



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Project
 Crows Nest State Led Rezoning Utilities - Proposal Project Existing Potable Water

Designed	Drawn	Dwg check	Scale at A1	Status	Rev	Eng check	Coordination	Approved	Security
JL	SS		1:4500	APR	P2	JL	JL	DF	STD
Drawing Number MMD-102930-C-DR-SK-XX-1004									

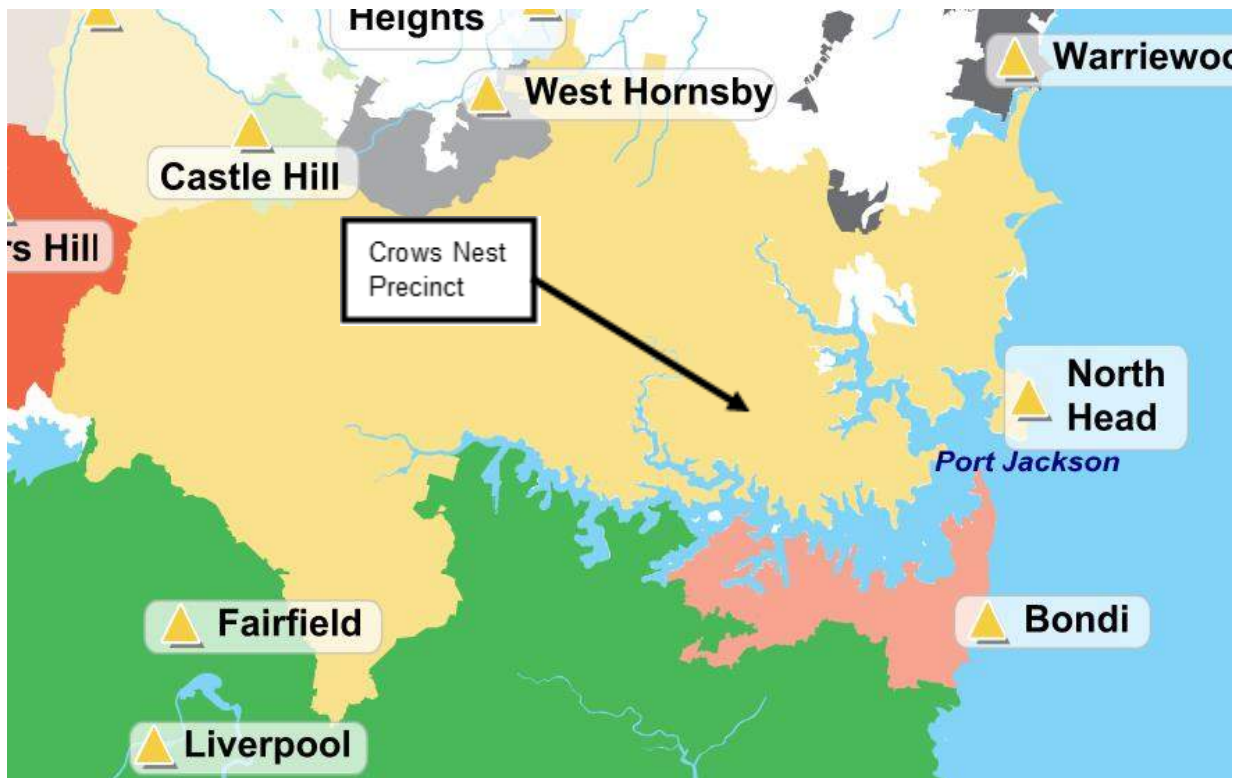
Figure 7 Water Plan

5 Wastewater

5.1 Existing Assets

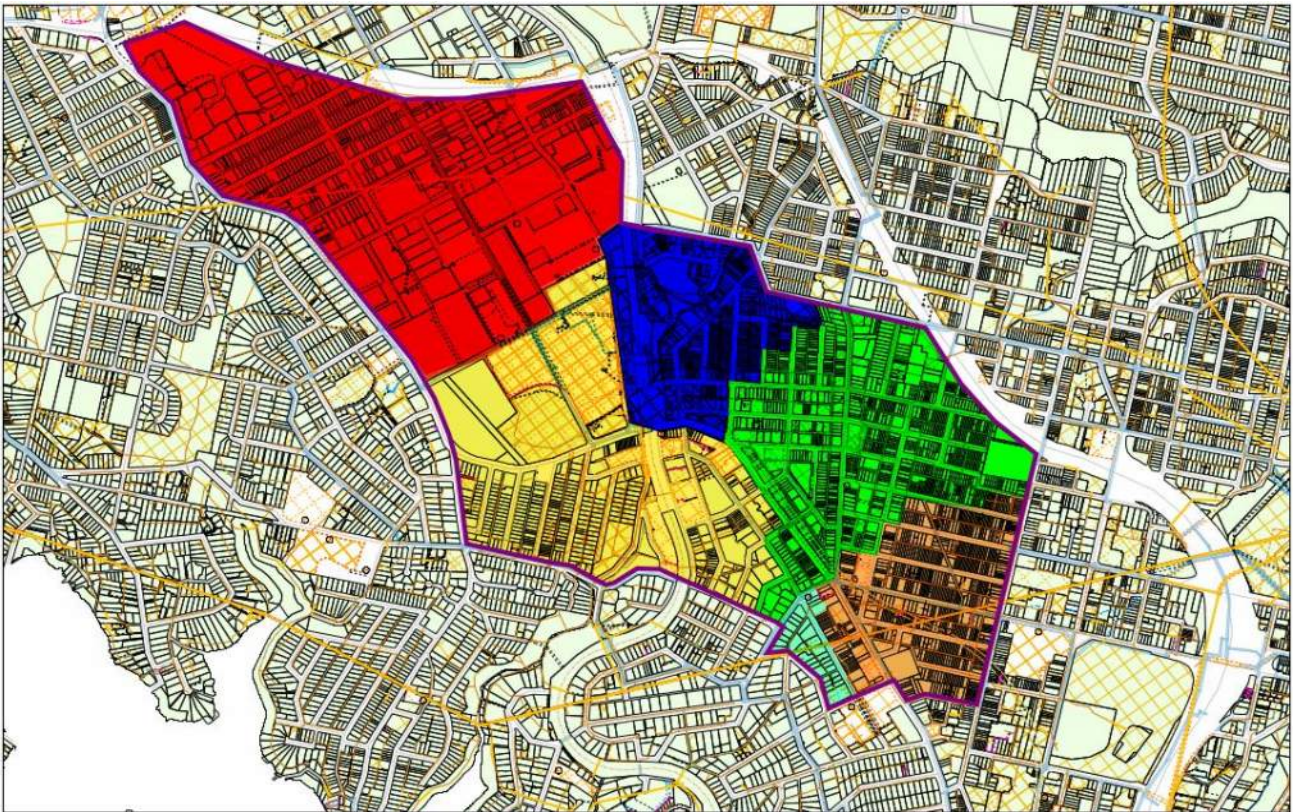
Wastewater servicing is provided by Sydney Water. Wastewater connected through the Crows Nest precinct connects to the North Head Water Resource Recovery Facility, which is located at Blue Road, Manly.

Figure 8 Wastewater Treatment Facility



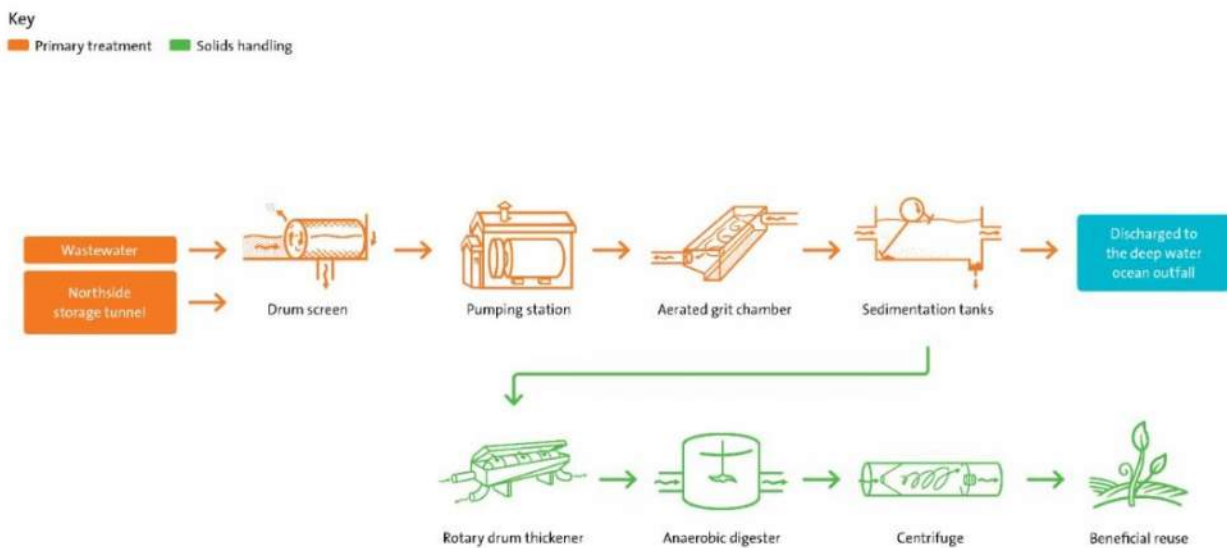
The Crows Nest precinct has 6 main sewer drainage channels, as referred to in Figure 9 Wastewater Mains Map. The 6 sewer facilities drain towards the Northern Beaches Ocean Outfall which ultimately arrives at North Head Wastewater Treatment Plant.

Figure 9 Wastewater Mains Map



The North Head Water Resource Recovery Facility serves a population of 1 million people, spread over 452 square kilometres. Wastewater within the precinct undertakes primary treatment, as shown in Figure 10 Preliminary Wastewater Treatment. Most of the treated wastewater is discharged to a deepwater ocean outfall at North Head.

Figure 10 Preliminary Wastewater Treatment



Source: Sydney Water

The existing wastewater infrastructure on site has been identified based on Before You Dig Australia (BYDA) records. These records indicate that there are numerous wastewater mains within and adjacent to the site boundary. The key existing wastewater mains on site include:

- DN225 SGW sewer rehabilitation main, from 50 Park Rd, continuing north, and ending at 36 Park Rd;
- DN225 SGW sewer main, from 36 Park Rd, continuing north, and ending at 10 Park Rd;
- DN225 SGW sewer main, from 8 Park Rd moving north-west towards and 110 Pacific Hwy and DN225 SGW disused Sewer main when it enters the boundaries of 110 Pacific Hwy;
- DN225 VC sewer main, adjacent to 82/86 Pacific Hwy and 2 Park Rd extending towards Berry Lane;
- DN225 SGW sewer main, from 52 River Rd, extending north and ending at 66/80 Berry Lane;
- DN225 SGW sewer main, extending east on the River Rd from 58 River Rd and ending at intersection of the Canberra St;
- DN225 SGW sewer main starting at the intersection of 44 River Rd and 46 River Rd, continuing North and ending at 14 Marshall Ave;
- DN225 SGW sewer main adjacent 11 Berry Rd, moving east and connecting to DN225 SGW at 14 Marshall Ave;
- DN225 VC sewer main adjacent to 29 Holdsworth Ave, extending north and ending at 3 Holdsworth Ave;
- DN150 SGW sewer main, connected to DN225 VC sewer main and extending towards the boundary line of 1 Holdsworth Ave;
- DN225 VC sewer main, from 8 Marshall Ave extending east, and ending at 2 Marshall Ave;
- DN225 SGW sewer main from 8 Marshall Ave, moving south and ending at intersection of boundary line of 4 Holdsworth Ave and 2 Holdsworth Ave;
- DN225 VC sewer main from 4 Holdsworth Ave, moving south ending at the intersection of 30 Holdsworth Ave and 31 Canberra Ave;
- DN225 VC sewer main, from boundary line 31 Canberra Ave moving east, ending at Canberra Ave;
- DN225 VC sewer main at the corner of 2 Canberra Ave extending west till 19-25 Marshall Ave, extending south till 9 Canberra Ave and north-east towards Marshall Lane;
- DN375 PE Concrete encased sewer main extending south from Pacific Hwy till 3 Canberra Ave;
- DN375 VC sewer main, from 3 Canberra Ave extending south on the boundaries of the Newlands Park Playground;
- DN375 VC rehabilitation sewer main moving south on the west boundary of Newlands Park Playground;
- DN225 EW sewer main, from 9 Canberra Ave, extending south till the intersection of Canberra Ave and River Rd;
- DN225 EW sewer main starting from 59 River Rd till 47 River Rd;
- DN225 SGW sewer main starting from 38 Park Rd, extending north till 30 Park Rd.

The depths and positions of these mains are unknown. Further investigation is required to determine the exact existing layout; this should be an investigation of the levels of the existing infrastructure from manhole surveys.

It should be noted that there are disused wastewater mains within the precinct – refer to Figure 12 Wastewater Plan.

It should also be noted that this only considers mains within the Sydney Water network. There is potential that private or infrastructure from other utility authorities exist on site. However, no records of such infrastructure have been made available for this study and have not been identified from BYDA enquiries.

The existing wastewater network is shown in Figure 12 Wastewater Plan.

5.2 Demand Assessment

An assessment of the net increase in sewer loading resulting from the proposed development has been undertaken to assist in determining the required infrastructure upgrades. Servicing forecasting and profiles have been based on the gross floor area (GFA).

The design criteria used to forecast future sewer loading are taken from the Sydney Water Area Planning Design Criteria Guide: WSA 02-2002-3.0 (Sewer Code of Australia) and is expressed as an equivalent population (EP) for a particular land use.

The average dry weather flow (ADWF) per equivalent population (EP) has been taken as 150 L/day or 0.0017 L/s (ADWF(L/s)) = 0.0017 * EP.

A BASIX reduction of 40 % has been included in the sewer loading calculation and applied to the residential portion of this development. These are summarized below.

Table 6 Sewer Design Load Criteria

Development type	Block Tag	Assumed land use	Design Criteria	Units	Demand/unit
Residential	All blocks	Single occupancy high density dwelling	Average Dry Weather Flow	EP/dwellings	2.5

An estimate of the wastewater demand for development has been calculated based on the development yields. The estimated wastewater demand is 17.04L/s. The results are shown in the table below.

Table 7 Estimated Wastewater Demand

	Estimated Demand
Total (Equivalent Population)- Residential	16707.50
Total (L/s: Average Dry Weather Flow)	28.40
Total (L/s: Average Dry Weather Flow) – Including BASIX	17.04
Total (L/s: Average Dry Weather Flow) – including BASIX (+15%)	19.60
Total (L/s: Average Dry Weather Flow) – including BASIX (-15%)	14.49

5.3 Coordination with Other services

Coordination of sewer infrastructure with other services in the proposed precinct is based on the Street Opening Conference Standards. In addition, Section 4.4.5.2 of Water Services Association of Australia codes (WSA 02-2002-2.2, Sydney Water Edition – Version 3) states that clearance requirements for sewers in Table 4.2, as summarized in figure below.

Figure 11 Sydney Water Clearance between Sewers and Other Underground Services

Utility (Existing service)	Minimum horizontal clearance mm		Minimum vertical clearance ¹ mm
	New sewer size		
	≤DN 300	>DN 300	
Sewers ≤DN 300	300	600	150 ² /300
Sewers >DN 300	600	600	300
Gas mains	300 ³	600	150 ² /300
Telecommunication conduits and cables	300 ³	600	150 ² /300
Electricity conduits and cables	500	1000	225 ² /300
Drains ⁷	300 ³	600	150 ² and ⁴ /300 ⁴
Water mains	1000 ⁵ /600	1000 ⁵ /600	500 ⁴
Kerbs	150	600 ⁶	150 (where practicable)

NOTES:

- Vertical clearances apply when sewers cross one another, except in the case of water mains when a vertical separation shall always be maintained, even when the sewer and main are parallel. *The sewer should always be located below the main to minimise the possibility of backflow contamination in the event of a main break.*
- A minimum vertical clearance of 300 mm applies if the size of either the existing service or proposed sewer is >DN 300.
- Clearances can be further reduced to 150 mm for distances up to 2 m when passing installations such as poles, pits and small structures, providing the structure is not destabilised in the process.*
- Sewers should always cross under water mains and stormwater drains.* If this requirement cannot be met, consult Sydney Water in respect of alternatives such as adjusting the water main or stormwater drain. Where a sewer crosses a water main at or close to 90 degrees, the vertical clearance may be reduced to not less than 200 mm provided that the sewer is concrete encased and a 50 mm compressible material is placed over the encasement. The encasement shall not have any joints within 1000 mm either side of the water main and shall conform to Drawing SEW-1205-V.
- When the sewer is at the minimum vertical clearance below the water main (500 mm) maintain a minimum horizontal clearance of 1000 mm. *This minimum horizontal clearance can be progressively reduced to 600 mm as the vertical clearance increases to 750 mm.*
- Clearance from kerbs shall be measured from the nearest point of the kerb.
- A sewer to be constructed under an existing or proposed stormwater pipe or channel ≥DN 375 shall be concrete encased. The concrete encasement shall extend at least one metre each side of the stormwater pipe or channel. Clearances between the sewer and other services shall be measured from the outer surface of the concrete encasement.

5.4 Sustainability Initiatives

Sustainable initiatives help to reduce the impact of wastewater treatment on the environment by minimizing pollution and conserving natural resources.

The following wastewater sustainability initiatives are recommended:

- Energy efficient improvements to reduce energy consumption and operational costs;
- Onsite rainwater reuse;
- Wastewater reuse and recycling to recycle treated wastewater for non-potable uses; and
- Blackwater/greywater use including split system.

It should be noted that the above-mentioned initiatives are preliminary and suggestive which requires further investigation for future design stages.

5.5 Service Authority Consultation

Feasibility applications have been submitted to Sydney Water and we are awaiting their response, which will be included in the final Crows Nest Utilities Report.

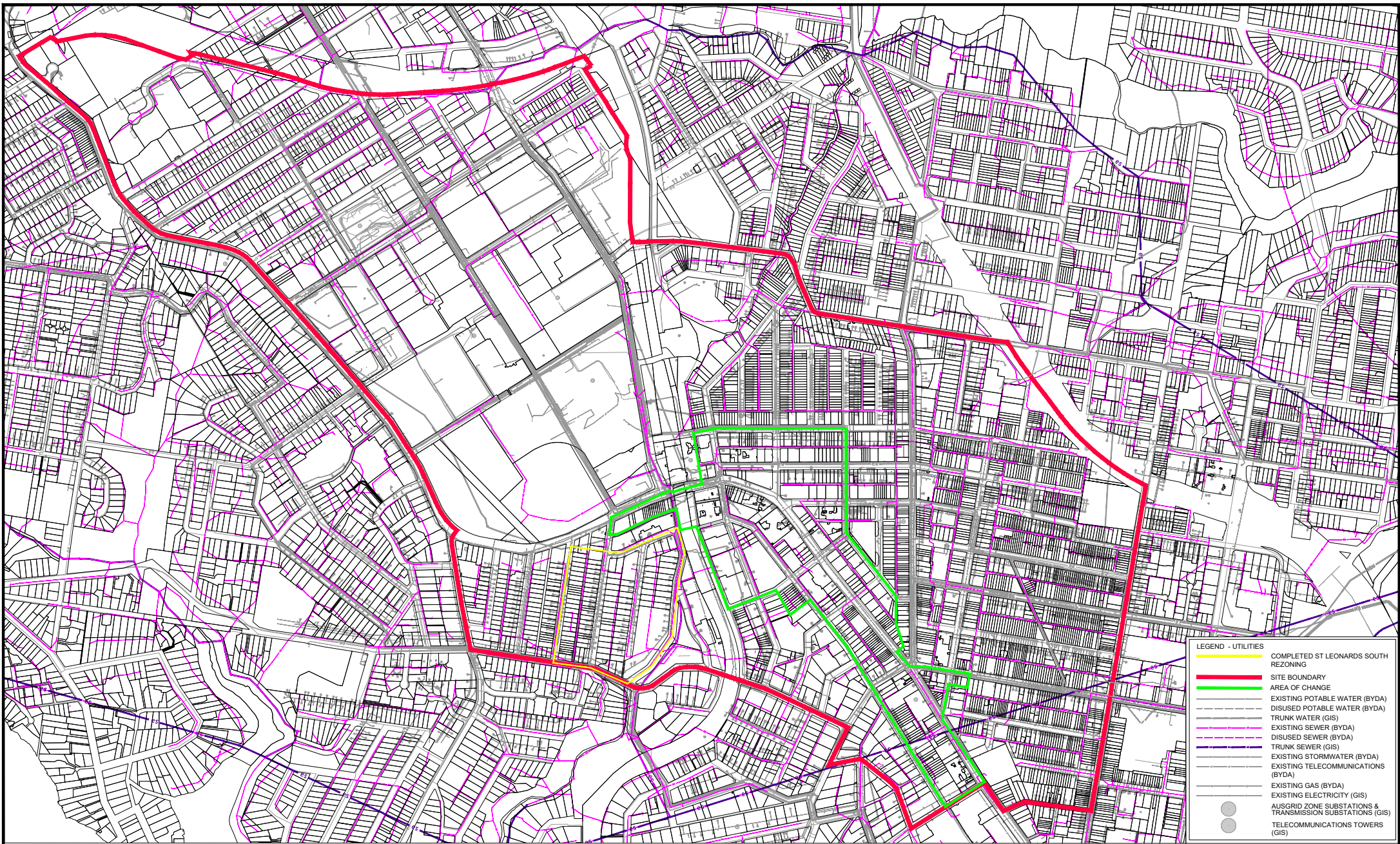
5.6 Next Steps

The sewer strategy is to be confirmed through hydraulic modelling, with separate reports outlining the modelling outcomes to be submitted to Sydney Water. Further discussion is also to be undertaken with Sydney Water to confirm lead-in infrastructure requirements and to check inverts of gravity pipes to ensure falls are achievable.

The key next steps in progressing the delivery of sewer infrastructure through design development, including the formal approval process for Sydney Water infrastructure, consists of the following:

- Undertake hydraulic modelling to confirm extent of any lead-in infrastructure upgrades required
- Undertake site investigations to confirm the layout and extent of existing on-site infrastructure (including non- Sydney Water infrastructure)
- Develop an overall wastewater master plan for the site including staging considerations and agree these with Sydney Water. Being a gravity service, this will need to include consideration of the depth of the existing sewer infrastructure to be maintained and/or connected to (based on manhole survey) and proposed grading of the site - As a part of Development Applications
- Develop a diversion strategy (including any interim works to suit staging) and protection/build-over requirements for infrastructure that cannot be diverted - As a part of Development Applications
- Establish a Head Deed to be signed by required parties (Sydney Water, Designer, WSC, Developer, Constructor) – As a part of detailed design.
- Submit application/s for individual detailed design packages to Sydney Water with drawing of proposed works in stages, Section 73 – As a part of detailed design.
- Sydney Water to issue of Notice of Requirements (NOR) with their requirements for water main layout, sizing and funding matters confirmed – As a part of detailed design;
- Detailed design to be progressed based on the NOR and submitted to Sydney Water for approval – As a part of detailed design.

It is noted that the above is for delivery of the wastewater network through the street network, depending on the strata arrangement individual buildings will still need to make separate applications for each connection.



LEGEND - UTILITIES

- COMPLETED ST LEONARDS SOUTH REZONING
- SITE BOUNDARY
- AREA OF CHANGE
- EXISTING POTABLE WATER (BYDA)
- DISUSED POTABLE WATER (BYDA)
- TRUNK WATER (GIS)
- EXISTING SEWER (BYDA)
- DISUSED SEWER (BYDA)
- TRUNK SEWER (GIS)
- EXISTING STORMWATER (BYDA)
- EXISTING TELECOMMUNICATIONS (BYDA)
- EXISTING GAS (BYDA)
- EXISTING ELECTRICITY (GIS)
- AUSGRID ZONE SUBSTATIONS & TRANSMISSION SUBSTATIONS (GIS)
- TELECOMMUNICATIONS TOWERS (GIS)

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 Utilities - Proposal Project
 Existing Sewer

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Drawn	SS	Coordination	JL
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Drawing Number MMD-102930-C-DR-SK-XX-1005			

Figure 12 Wastewater Plan

6 Stormwater

6.1 Existing Assets

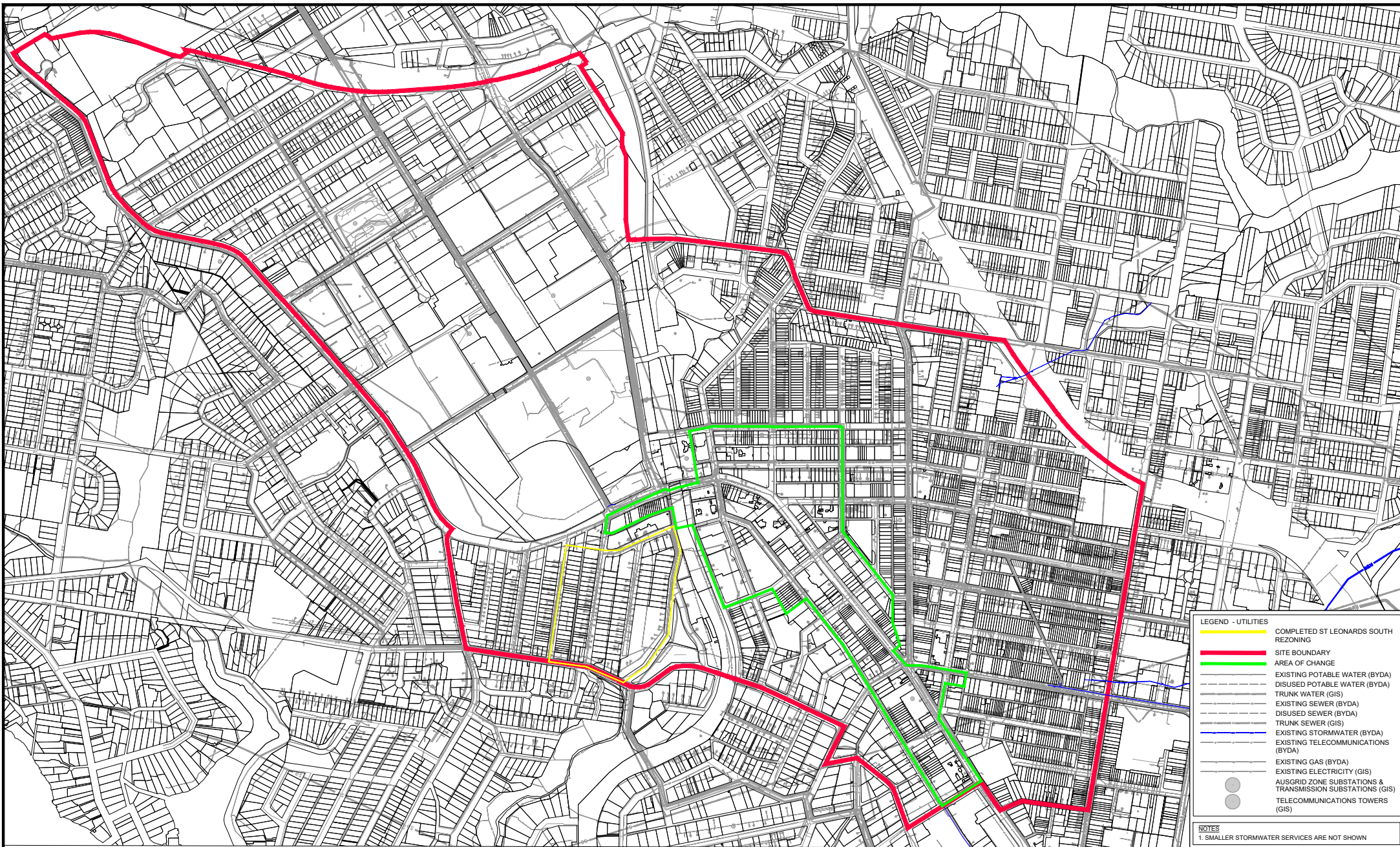
Stormwater assets in the Crows Nest Precinct are owned by three different LGAs which include the North Sydney council, Willoughby Council and Lane Cove Council. The existing stormwater infrastructure has been identified based on Before You Dig Australia (BYDA) records.

The depths, positions, and sizes of existing assets are unknown. Further investigation is required to determine the exact existing layout.

It should be noted that this only considers assets within North Sydney Council, Willoughby Council and Lane Cove Council. There are stormwater assets present in the precinct of Sydney water. There is potential that private or infrastructure from other authorities are present on site. However, no records of such infrastructure have been made available for this study and have not been identified from BYDA enquiries.

The existing stormwater network is shown in Figure 13 Stormwater Plan.

Further hydraulic assessment for this site is contained within the stormwater and flooding report accompanying this report.



LEGEND - UTILITIES

- COMPLETED ST LEONARDS SOUTH REZONING
- SITE BOUNDARY
- AREA OF CHANGE
- EXISTING POTABLE WATER (BYDA)
- - - DISUSED POTABLE WATER (BYDA)
- TRUNK WATER (GIS)
- EXISTING SEWER (BYDA)
- - - DISUSED SEWER (BYDA)
- TRUNK SEWER (GIS)
- EXISTING STORMWATER (BYDA)
- - - EXISTING TELECOMMUNICATIONS (BYDA)
- EXISTING GAS (BYDA)
- EXISTING ELECTRICITY (GIS)
- AUSGRID ZONE SUBSTATIONS & TRANSMISSION SUBSTATIONS (GIS)
- TELECOMMUNICATIONS TOWERS (GIS)

NOTES
 1. SMALLER STORMWATER SERVICES ARE NOT SHOWN

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 Title
 Existing Stormwater - Trunk Mains

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Figure 13 Stormwater Plan

7 Electricity

7.1 Existing Assets

Electrical servicing to the Crows Nest Precinct is provided by Ausgrid. Desktop investigation indicates the presence of several Ausgrid assets in the site area. As per the provided BYDA authority records, the existing electrical distribution network within the precinct mostly consists of underground assets that are inclusive of both high voltage (HV) and low voltage (LV) infrastructure, supplying multiple distribution substations located within the precinct.

7.1.1 Ausgrid

BYDA records indicate presence of numerous electrical mains within and adjacent to the site boundary. The key electrical mains on site include:

- 4 X 150 PVC conduits and 1 X 150 PVC conduits (HV) along River Rd at 7.3-7.9 from PL and 0.7-1.0 from cover
- 4 X 150 PVC and 1 X 50 PVC conduits (HV) Along the intersection of River Rd and Greenwich Rd at 6.5-7.3 from PL and 0.7-1.0 from cover
- 6 X 125 PVC and 1 X 50 PVC conduits (HV & LV) along Duntroon Ave from 1.0-1.1 from PL and 0.6-0.8 from Cover
- 2 X 150 PVC and 1 X 50 PVC conduits (HV & LV) along intersection of River Rd ad Russel St from GPS from PL and 0.6-0.9 from cover.
- 1 X 125 PVC conduit (LV) present along Russel St
- 3 X 125 PVC and 1 X 50 PVC conduits from 2.0 along Duntroon Ave from PL and 0.8 from cover
- 4 X 150 PVC and 1 X 50 PVC conduits (HV) from 1.7-7.6 along the intersection of Pacific Hwy and Greenwich Rd from PL and 0.6-1.2 from cover
- 2 X 150 FC and 1 X 150 FC conduits (HV & LV) along the Greenwich Rd from 0.4-0.6 from PL and 0.4-0.4 from Cover
- 1 X 125 PVC conduit (HV & LV) from 0.3 along the intersection of Pacific Hwy and Greenwich Rd from PL and 0.4 from cover
- 3 X 100 EW conduits along the west of Pacific Hwy from Greenwich Rd and is at 1.1-1.3 from the cover
- 4 X 150 FC conduits (HV & LV) moving west from the substation on the edge of 1/154 Pacific Hwy from 0.6 from cover
- 4 X 150 FC conduits (HV & LV) moving west from the substation on the corner of 2A Greenwich Rd and is at 1.1 from Cover
- 4 X 150 PVC and 1 X 50 PVC conduits (HV) along the intersection of Bellevue Ave and Greenwich Rd are at 0.8 from the cover
- 4 X 140 PVC conduits (HV & LV) moving east of subsystem present of the south of 120 Pacific Hwy and is at 0.5-0.6 from cover
- 2 X 150 FC conduits (HV) at the intersection of Pacific Hwy and Portview Rd which is at 1.0 from the cover
- 6 X 150 FC and 1 X 125 PVC conduits (HV & LV) along the intersection of Berry Rd and Pacific Hwy and is at 0.9-1.5 from the cover
- 5 X 100 PVC conduits (HV) on the Pacific Hwy at the intersection of Reserve Rd on Pacific and is at 1.4-2.7 from the Cover

- 9 X 125 PVC conduits (HV & LV) along North of Pacific Hwy located at east of Berry Rd and is at 0.7 from PL and 0.6 from the cover
- 4 X 125 PVC conduits (LV) on south of Pacific Hwy located east of Berry Rd
- Multiple HV and LV conduits present along the Berry Rd and are at 0.8 from PL and 0.6 from Cover
- 2 X 125 PVC conduits (LV) moving south from the substation present on Berry Rd
- 2 X 125 PVC conduits moving east on Marshall Ln from Berry Rd and are at 1.4 from the PL and 0.6 from the Cover
- Two Substations with HV and LV conduits connected present on either side of the Marshall Ln
- 6 X 125 PVC and 1 X 63 PVC from substation at corner of 17 Marshall Ln and moving east on the Marshall Ln and are at 3.3 from the PL and 0.6-1.0 from the cover
- Multiple HV and LV conduits present of the Railway infrastructure present between the Canberra Ave and Lithgow St
- 6 X 150 PVC conduits (HV and LV) moving east from the substation present on the railway infrastructure and is at 0.7 from the cover
- Multiple HV and LV conduits present on Marshall Ave moving west from the two substations present at 2 Marshall Ave
- 2 X 125 PVC and 1 X 50 PVC conduits (HV) along the Canberra Ave and is at 1.0-3.9 from PL and 0.5-0.8 from cover
- 6 X 125 PVC and 1 X 50 PVC conduits (HV & LV) along Duntroon Ave moving south from the Canberra Ave and is at 1.0-1.1 from the PL and 0.6-0.8 from the Cover.
- 2 X 125 PVC conduits (LV) moving south from the substation present of the Lithgow St and is at 19.5 from the PL
- 4 X 150 PVC and 1 X 50 PVC conduits (LV) moving north from the substation present on the Canberra Ave and is at 0.7 from the Cover
- 2 X 125 PVC and 1 X 50 PVC conduits (HV) present south of the substation present on the Canberra Ave and is at 1.0-3.9 from PL and 0.5-0.8 from the Cover
- 2 X 150 PVC conduits (LV) present south of the substation present on the Canberra Ave and is at 0.9 from PL and 0.6 from the Cover
- 9 X 125 PVC conduits (HV & LV) present on south of the Substation present on the Sergeants Ln
- Multiple HV and LV conduits present on the Sergeants Ln and are connected to the four substations present on the Corner of the Sergeants Ln
- 4 X 150 PVC conduits (LV) present on Christine St and is at 1.1 from the PL and 0.5 from the cover
- 6 X 125 PVC and 2 X 100 PVC conduits (HV and LV) present on Pacific Hwy which intersects at Christine St and is at 0.3-0.6 from the PL and 0.6 from the Cover
- 9 X 125 PVC conduits (HV & LV) present at the intersection of Herbert St and Pacific Hwy and is at 0.8 from the Cover
- 6 X 125 PVC conduits (HV) present at the intersection of Chandos St and Sergeants Ln and is at 1.2 from PL and 0.4-1.0 from the Cover
- 4 X 150 PVC and multiple HV and LV conduits present along Christine St
- 6 X 125 PVC conduits (HV & LV) moving west from the substation present of the Herbert St and is at 0.6-0.75 from the cover
- 5 X 150 FC and 2 X 125 PVC conduits (HV and LV) moving along Mitchell St and is south from Albany Ln and is at 0.5-0.6 from PL and 0.4-0.5 from cover

- 4 X 125 PVC (HV) and 4 X 125 PVC (LV) present on the south intersection of Mitchell St and Albany Ln
- 7 X 150 FC conduits (HV & LV) moving south from the substation present on the Albany St
- 8 X 150 FC conduits (HV & LV) present on Chandos St and is at 0.7-0.8 from the cover
- 4 X 150 FC conduits (LV) present on north of the subsystem present on the Christine St
- 4 X 150 PVC and 1 X 50 PVC (HV & LV) moving east from the subsystem present on Atchison Ln at 4.2 from PL and 0.8 from the cover
- 4 X 125 PVC and 2 X 150 PVC conduits (HV & LV) present on Albany Ln and is at 1.6-2.5 from PL and 0.7 from the cover
- 6 X 150 PVC conduits (LV) present at the intersection of Mitchell St and Atchison St and is at 0.6-0.8 from the Cover
- 2 X 50 PVC and 3 X 150 PVC conduits (LV) present on the Atchison St and is at 8.0 from the PL and 0.7 from the Cover

7.2 Demand Assessment

An assessment of the estimated net electrical demand for development has been undertaken to assist in determining the required infrastructure upgrades.

Table 8 Electricity Demand Rates

Development	Block Tag	Design Criteria	Unit	Demand/Unit
Residential	All blocks	AD Maximum Demand	MVA/ Dwelling	0.0035

Total number of dwellings to be considered for the precinct is 6683 dwellings.

The maximum demand for peak usage was calculated to be approximately 23.39 MVA.

Table 9 Estimated Electrical Demand

	Estimated Demand
Total (MVA)	23.39
Total (MVA, +15%)	26.90
Total (MVA, -15%)	19.88

7.3 Coordination with Other Services

Coordination of the proposed electrical infrastructure with other services in the proposed street network would generally be based on the Street Opening Conference Standards. Ausgrid does not provide specific information on clearances from other services. If the electrical services are installed within the standard allocation, the separations given by the other services provider should apply for all crossings. Where a reduced allocation is proposed, separations should be determined in consultation with Ausgrid. In addition to the above, all works should also comply with the Ausgrid standards.

7.4 Sustainability Initiatives

The following electricity sustainability initiatives are recommended:

- Solar PV;

- Building orientation;
- Natural ventilation of common areas;
- Electrical car charging;
- Centralised heat extraction system;
- Geothermal cooling;
- Smart metering; and
- Glazing options to improve thermal comfort and reduce heating and cooling loads.

It should be noted that the above initiatives are preliminary only and should be investigated in future design stages. It should also be noted that these initiatives would impact the final electrical peak demand and associated infrastructure upgrade requirements.

7.5 Service Authority Consultation

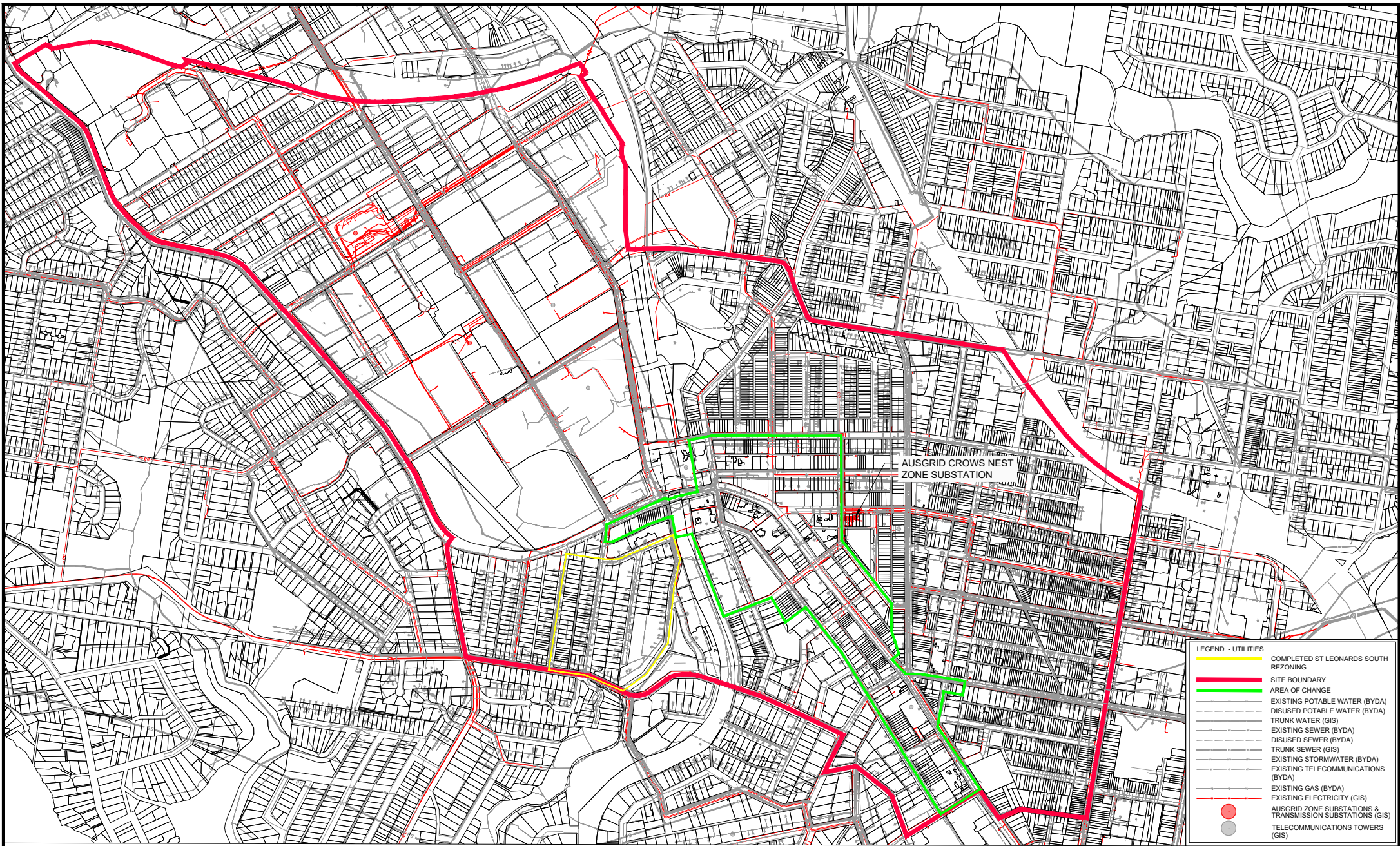
Feasibility applications have been submitted to Ausgrid and we are awaiting their response, which will be included in the final Crows Nest Utilities Report.

7.6 Next Steps

The key next steps in progressing the delivery of electrical infrastructure through detailed design including the formal Ausgrid approval process consists of the following (in conjunction with further Ausgrid coordination and consultation with all placeholders):

- Undertake site investigations to confirm the layout and extent of existing services (including non-Ausgrid assets)
- Confirm arrangements for supply and ownership of street lighting
- Confirm extent of existing infrastructure that can be abandoned and/or requires diversion – Post Rezoning/Development Application
- Develop duct masterplan and make submission to set up case with Ausgrid– As a part of Development Applications
- Develop staged designs for delivery of the new infrastructure – As a part of detailed design.
- Liaise with Ausgrid to confirm requirements for undergrounding of existing infrastructure – As a part of Development Applications
- Ausgrid to provide detailed requirements – As a part of Development Applications, As a part of detailed design
- Ausgrid to issue Design Information Pack (DIP), Design Contract & Deed of Agreement As a part of detailed design.
- Submit detailed design of individual packages for approval – As a part of detailed design.

It is noted that the above is for delivery of the duct network through the street network. It is expected that the buildings will need to make separate applications for connection, including installation of new feeders.



LEGEND - UTILITIES

	COMPLETED ST LEONARDS SOUTH REZONING
	SITE BOUNDARY
	AREA OF CHANGE
	EXISTING POTABLE WATER (BYDA)
	DISUSED POTABLE WATER (BYDA)
	TRUNK WATER (GIS)
	EXISTING SEWER (BYDA)
	DISUSED SEWER (BYDA)
	TRUNK SEWER (GIS)
	EXISTING STORMWATER (BYDA)
	EXISTING TELECOMMUNICATIONS (BYDA)
	EXISTING GAS (BYDA)
	EXISTING ELECTRICITY (GIS)
	AUSGRID ZONE SUBSTATIONS & TRANSMISSION SUBSTATIONS (GIS)
	TELECOMMUNICATIONS TOWERS (GIS)

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Figure 14 Electrical Plan

8 Gas

8.1 Existing Assets

Gas servicing to Crows Nest Precinct is provided by Jemena. The existing gas infrastructure has been identified based on Before You Dig Australia (BYDA) records.

A 1050kPa secondary gas main runs through the Precinct along Reserve Road, Berry Road, the Pacific Highway and Atchison Street which would service a large portion of the Precinct including the Royal North Shore Hospital. This is shown in Figure 15 Jemena Existing Secondary Gas Main Approximate Location

Figure 15 Jemena Existing Secondary Gas Main Approximate Location



These records indicate that the portion of the site located south of St Leonards Station, as there are 210kPa medium pressure gas mains and 1050kPa on for majority of the roads within this portion of the precinct. However, it should be noted that the high-pressure mains are in precinct on major roadways of the precinct. However, it should be noted that there are limited assets of gas mains of Park Lane and Berry Lane. Gas services within and surrounding the precinct area are noted below;

- 210kPa Medium Pressure gas main of 50 mm Nylon main inserted to 4-inch (Nominal Bore) Cast Iron Pipe along the Park Rd servicing the properties on both sides of Park Rd;

- 210kPa Medium Pressure gas main of 32 mm Nylon main inserted to 4-inch (Nominal Bore) Cast Iron Pipe along the Berry Rd servicing properties on both sides of the Berry Rd;
- 1050kPa High pressure gas main of 200mm steel pipe along Berry Rd connected to Pacific Hwy on the north and River Rd on the south;
- 210kPa Medium Pressure gas main of 32 mm Nylon main inserted to 4-inch (Nominal Bore) Cast Iron Pipe along the Holdworth Ave and Marshall Ave;
- 210kPa Medium Pressure gas main of 50 mm Nylon main inserted to 6-inch (Nominal Bore) Cast Iron Pipe along the Canberra Ave extending south from Marshall Ave till 39 Canberra Ave;
- 210kPa Medium Pressure gas main of 75mm Nylon main inserted to 110mm Nylon pipe along south of River Rd servicing 53 River Rd and extending till 1A Eastview St and continuing to the north of the River Rd till the intersection at Canberra Ave;
- 1050 kPa High Pressure gas main of 200mm steel pipe along River Rd, moving east on River Rd and then extending onto Russell St;

The depths and positions of existing mains are unknown. Further investigation is required to determine the exact existing layout.

There is potential that private or infrastructure from other utility authorities exist on site. However, no records of such infrastructure have been made available for this study and have not been identified from BYDA enquiries.

The existing gas network is shown in Figure 16 Gas Plan

8.2 Demand Assessment

An assessment for the net gas demand is not required because it is assumed that there will be no new gas connections within the precinct. However, it is noted that existing properties may retain their current gas connections.

8.3 Coordination with Other Services

Coordination of the proposed gas infrastructure with other services in the proposed precinct should be based on the Streets Opening Conference Standards.

Jemena to provide guidance on horizontal and vertical clearances, the minimum separation between electrical and natural gas mains are provided in the table of “Natural Gas Requirements for Developer Provided Trench” as summarised in table below.

Table 10 Jemena minimum separation between utilities

Utility	Minimum Separation	
	Gas Mains up to 75mm diameter	Gas Mains of 110mm diameter or larger
Telecommunication cables and/or conduits	150 mm	300 mm
Protected ² Low Voltage electricity cables	150 mm	300 mm
Protected ² High Voltage electricity cables	300 mm	300 mm

1. Separations relate to distances between conduits/cables peripheries
2. “Protected” refers to mechanical protection of the cables, which usually takes the form of either polymeric strips (at least 3 mm thick) or clay brick
3. The above table is considered to provide desirable minimum separations. Consideration should be given for the need to access for future maintenance of services when determining the required separations

8.4 Sustainability Initiatives

Although gas is currently less carbon intensive than grid electricity per unit of energy, it is still a fossil fuel and releases greenhouse gases during combustion. To reach a zero-carbon economy by 2050, such emissions must be reduced. Thus, replacing gas for a sustainable electrical supply for heating and cooking, should be considered for this development in future design stages.

8.5 Service Authority Consultation

A gas feasibility assessment has not been undertaken since gas servicing to this development is not anticipated.

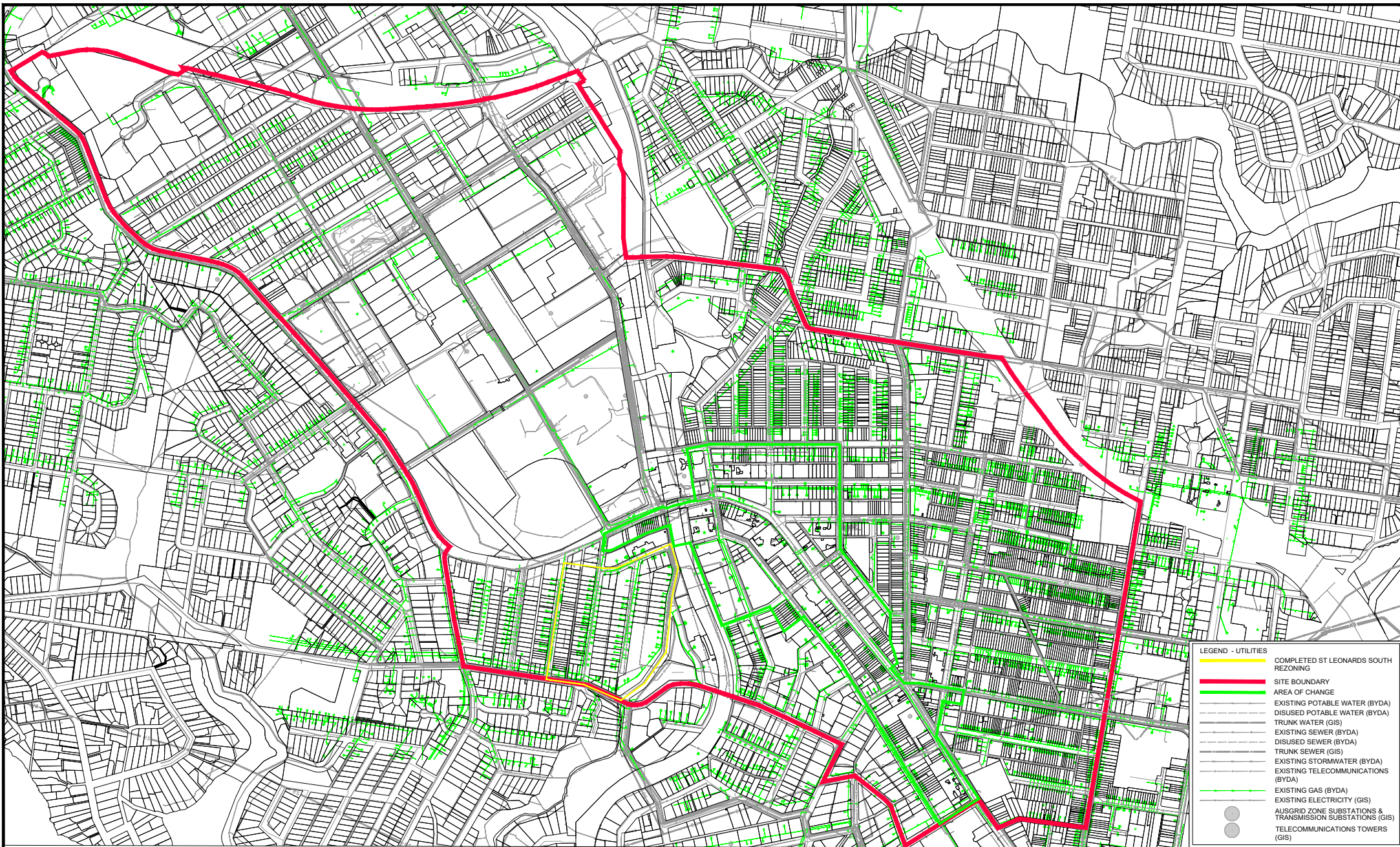
8.6 Next Steps

Jemena does not have a formal approval process, with supply arrangements being confirmed by Jemena as part of their quotation for construction to be provided following submission of applications for connection.

The formal approval process for provision of Jemena infrastructure to be progressed through detailed design processes consists of the following main steps:

- Undertake site investigations to confirm the layout and extent of existing services (including non-Jemena infrastructure)
- Submit masterplan including staging of delivery to Jemena for agreement – As a part of detailed design.
- Submit application for design to Jemena for individual detailed design packages (to include proposed alignment) – As a part of detailed design
- Jemena will provide a quote for construction works – As a part of detailed design.

It is noted that the above is for delivery of the gas network through the street network, depending on the strata arrangement individual buildings will still need to make separate applications for each connection.



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Project
 Crows Nest State Led Rezoning Utilities - Proposal Project Existing Gas

Drawn	SS	Eng check	JL
Dwg check		Approved	DF
Scale at A1	Status	Rev	Security
1:4500	APR	P2	STD
Drawing Number MMD-102930-C-DR-SK-XX-1002			

Figure 16 Gas Plan

9 Telecommunications

9.1 Existing assets

There are numerous telecommunications mains which are present within the precinct where majority of mains are in roads within and adjacent to the site. The types and locations of these mains are summarized in the following sections.

9.1.1 NBN

The proposed Crows Nest precinct is well serviced by NBN, as there are trenches containing Inservice/constructed (copper/RF/fibre) cables within a majority of the streets on site. However, it should be noted that there are limited NBN assets on Park Lane, Marshall Lane, and Berry Lane.

Additionally, there are trenches containing designed/planned (copper/RF/fibre/power) cables along the following streets:

- Park Rd;
- River Rd;
- Berry Rd;
- Holdsworth Ave;
- Canberra Ave;
- Eastview St;
- Russell St;
- Pacific Hwy;
- Marshall Ave; and
- Portview Rd.

9.1.2 Nextgen

The Crows Nest Precinct does not have Nextgen service in the rezoning area which includes River Rd, Berry Rd, Marshall Ave, Holdsworth Ave and Pard Rd; but there are key Nextgen assets along the boundaries the proposed precinct include:

- Cable and 3rd party duct along Pacific Hwy extending to Canberra Ave and then continuing towards Lithgow St on the east of the railway line.

9.1.3 Optus/Uecomm

The key Optus assets within the proposed precinct include:

- Optus underground IOF cables and Optus cables in Other Utility conduit along south side of Pacific Hwy;
- Optus cable in Other Utility conduit from north of Berry Rd, continuing east onto Marshall Ave till Lithgow St; and
- Optus cable in Other Utility from Pacific Hwy extending south on the Canberra St and moving south on Lithgow St.

The Uecomm assets within the precinct include:

- Uecomm underground assets along the Pacific Hwy on the north boundary of the precinct;

- Uecomm underground assets extending from the Pacific Hwy to the boundaries of 120 Pacific Hwy;
- Uecomm underground assets extending from the Pacific Hwy to the boundaries of 100 Pacific Hwy;
- Uecomm Underground asset moving along Herbert St and intersecting the Uecomm utilities on the Pacific Hwy; and
- Multiple Optus Manhole pit present along the Pacific Hwy.

9.1.4 Telstra

The Crows Nest precinct is well serviced by Telstra utilities. The location of assets present in the precinct are listed below;

- Greenwich Rd;
- Anglo Rd;
- Portview Rd;
- Park Rd;
- Berry Rd;
- Holdsworth Ave;
- River Rd;
- Canberra Ave;
- Marshall Ave;
- Pacific Hwy;
- Lithgow Ave;
- Wilona Ave;
- Chandos St;
- Atchison St;
- Willoughby Rd;
- Christine St; and
- Along railway infrastructure.

9.1.5 TPG

The key TPG assets within the proposed precinct include:

- AAPT/PowerTel Pit and duct along north side of the Pacific Hwy;
- PIPE network duct present on Canberra Ave near the intersection at Marshall Ave;
- DDA Pit and PIPE Networks pit and Duct along Chandos St;
- PIPE network Duct on the Pacific Hwy at the intersection of the Berry Ln;
- PIPE Networks Duct on the River Rd present at the intersection of the Greenwich Rd; and
- PIPE Networks Duct along the Atchison St which is extending from the PIPE Network Duct along the Christie St.

9.1.6 Vocus

The key Vocus assets within the proposed precinct include:

- Vocus Group Cable from Herbert St moving onto Canberra Ave;
- Vocus Group Cable along the Lithgow St which is extending from the Canberra Ave from the north;

- Vocus Digsite present along the River Rd; and
- Vocus Buffer present along the River Rd.

9.2 Demand Assessment

No demand has been calculated for telecommunications infrastructure as it cannot be estimated in the same way as other utilities.

9.3 Coordination with Other Services

Coordination of the proposed communications infrastructure with other services in the proposed street network would generally be based on the Streets Opening Conference standards. The clearances for NBN services from other utilities is given in Section 5.2.13 of “New Development: Deployment of the NBN Co Conduit and Pit Network – Guidelines for Developers,” these requirements are presented in Figure below.

Figure 17 NBN Clearances from other carriers and underground services

Service Item		Minimum Radial Clearances* ¹
Gas Pipe	Over 110 mm	300 mm
	110 mm or Less	150 mm
Power	High Voltage	300 mm
	Low Voltage	100 mm ²
Water Mains	High Pressure/Capacity	300 mm
	Local Reticulation	150 mm
Sewer	Main	300 mm
	Connection Pipe	150 mm
Other Telecommunications	100 mm ¹	

* 1 – Reduced separation is possible where all parties (including NBN Co) are consulted and agreement is reached.
* 2 – Only where protection barriers are used, for example, conduit, bedding, marker tape and cover batten.

9.4 Sustainability Initiatives

No current sustainability initiatives have been proposed for telecommunications infrastructure, however there may be the opportunity to bundle telecommunications supply into a combined precinct utility system.

9.5 Service Authority Consultation

A telecommunications feasibility assessment has not been undertaken since it has been confirmed that there are NBN connections available for the development.

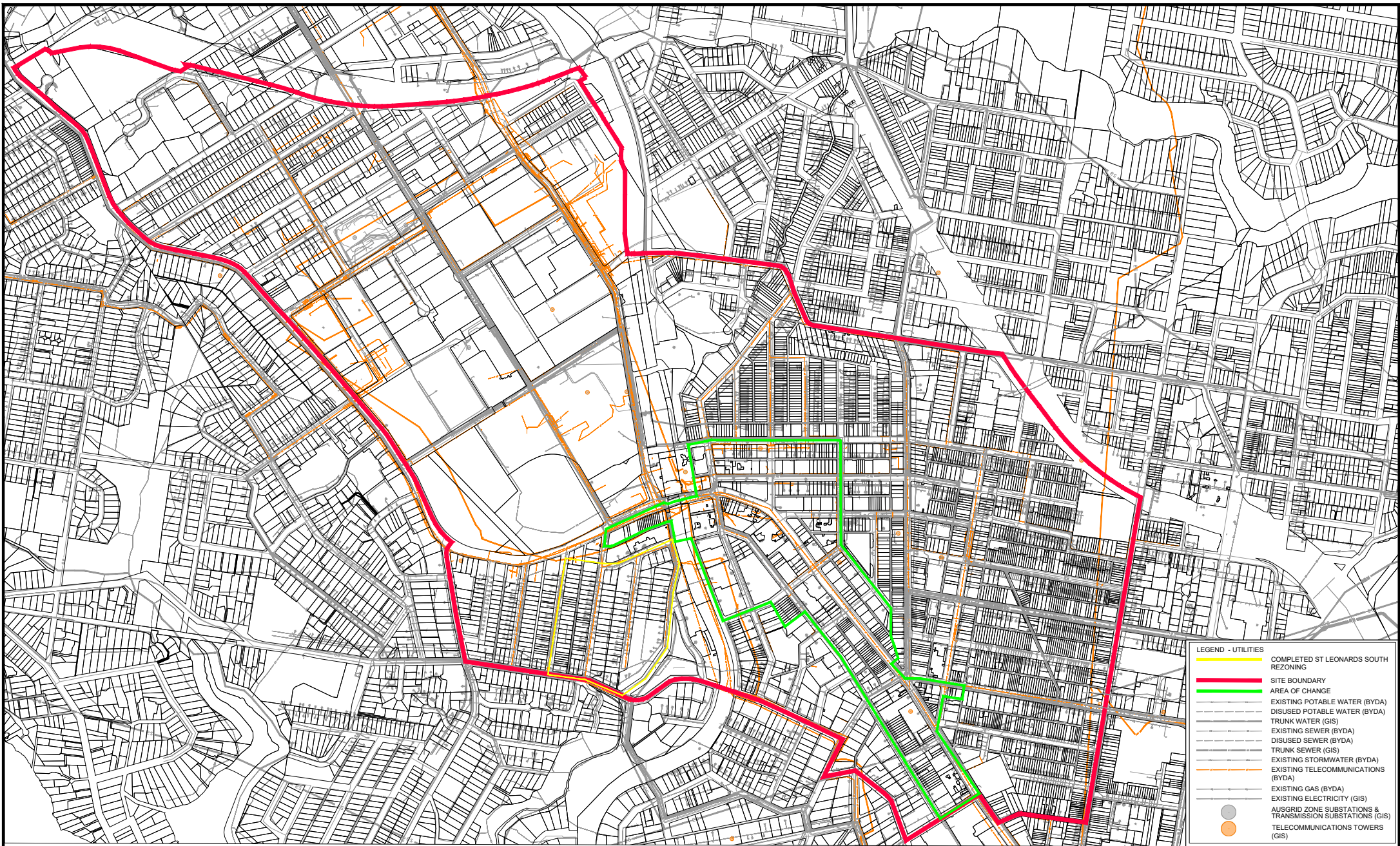
9.6 Next Steps

Confirmation is required from NBN Co that the site is eligible for supply from their network. Following this, an initial application is required, and a formal agreement entered between NBN Co. and the developer prior to construction works commencing (this does not prevent designs from being approved). The next steps generally consist of the following:

- Undertake site investigations to confirm the layout and extent of existing services (including private infrastructure associated with previous land-uses)

- Liaise with existing telecommunication providers to confirm the requirement for diversion and/or relocation of their existing infrastructure
- Confirm proposed infrastructure master plan (including staging) and in principle supply arrangements with NBN or other provider - As a part of Development Applications
- Initial application submitted to NBN Co. for supply of the site from their network - As a part of Development Applications
- NBN Co. to confirm supply can be provided and provide draft agreement – As a part of detailed design.
- Revisions of agreement where required – As a part of detailed design;
- The developer to sign NBN Co. agreement – As a part of detailed design;
- Liaise with existing telecommunication providers for quotes for diversions or abandonments including any interim works – As a part of detailed design; and
- Submit detailed design of individual packages for approval – As a part of detailed design.

It is noted that the above is for delivery of the NBN pit and pipe network through the new street network, it is expected that the buildings will need to make separate applications for connection.



LEGEND - UTILITIES

- COMPLETED ST LEONARDS SOUTH REZONING
- SITE BOUNDARY
- AREA OF CHANGE
- EXISTING POTABLE WATER (BYDA)
- DISUSED POTABLE WATER (BYDA)
- TRUNK WATER (GIS)
- EXISTING SEWER (BYDA)
- DISUSED SEWER (BYDA)
- TRUNK SEWER (GIS)
- EXISTING STORMWATER (BYDA)
- EXISTING TELECOMMUNICATIONS (BYDA)
- EXISTING GAS (BYDA)
- EXISTING ELECTRICITY (GIS)
- AUSGRID ZONE SUBSTATIONS & TRANSMISSION SUBSTATIONS (GIS)
- TELECOMMUNICATIONS TOWERS (GIS)

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P2	24.05.24	SS	UPDATED ISSUE	JL	DF
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Project
 Crows Nest State Led Rezoning Utilities - Proposal Project Existing Telecommunications

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Drawn	SS	Coordination	JL
Dwg check		Approved	DF
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Figure 18 Telecommunication Plan

10 Conclusion

10.1 Assessment Summary

This Utility Servicing Assessment has concluded that servicing is available to site with indicative connections for each service being:

- **Potable Water:** The site is well serviced from trunk assets present in the precinct, but local reticulation services may require amplification as a result of the proposed development uplift;
- **Sewer:** The site is well serviced from trunk assets present in the precinct, but local reticulation services may require amplification as a result of the proposed development uplift;
- **Electricity:** It is likely that new feeder cables from the Lane Cove Zone substation will be required when existing LV distribution is at capacity;
- **Gas:** While there are existing gas services across the site, consideration should be given to a "zero-gas" precinct to reduce use of non-renewable resources; and
- **Telecommunications:** No servicing constraints based on anticipated land uses however should this change and high use development then potential infrastructure upgrades may be required.

It should be noted that the above assessment is preliminary only and will be further developed upon consultation with utility providers. It should also be noted that the development should additionally consider impacts upon other utility assets owned by Transport for NSW and Sydney Trains Central as they are within and adjacent to the site. The details of these assets have been included in this report.

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