



MEMO

TO: Melissa Halloran

FROM: Tom van Drempt, Michael Middlebrook

SUBJECT: **Feasibility of Rezoning of Wool Combing Pond Site and 466 Byrnes Road Site from Rural Activity to Regional Enterprise**

OUR REF: PS114535-TAP-MEM-013-WoolCombingSite.docx

DATE: 19 February 2021

1. BACKGROUND

WSP completed the Transport Plan and the Infrastructure Servicing Plan for Wagga Wagga Special Activation Precinct in July 2020.

Following submissions received on the Wagga Wagga SAP draft master plan, the Department of Planning Industry and Environment (DPIE) are investigating the following changes:

- Potential inclusion of the northern portion of 466 Byrnes Road, Bomen (Site A) within the Regional Enterprise Zone (REZ). This land is identified in the draft master plan for re-zoning to Rural Activity (currently it is zoned IN1). The portion of this lot proposed to be included is the area up to/in line with the southern extent of the REZ in the adjoining lot to the east.
- Permitting some additional uses including general and light industrial on the former Wool Combing Ponds site (Site B) which is proposed to be re-zoned to Rural Activity. The purpose of permitting additional uses will be to incentivise its rehabilitation.

DPIE are looking to understand whether the above changes would be feasible / appropriate from a traffic and infrastructure perspective. WSP has been commissioned to revise the analysis undertaken for the Wagga Wagga SAP to determine whether the inclusion of these sites would modify any of the recommendations. Details of both sites are described further in Section 2.

2. ADDITIONAL SITE DETAILS

2.1 SITE A: 466 BYRNES ROAD BOMEN

Site A details

- Lot:22
- DP:1265468
- Area: 21.99ha (only approximately 8ha to be rezoned)
- Address: 466 Byrnes Road BOMEN
- Owner: Wagga Wagga City Council
- Currently Zoned: IN1 (General Industrial)
- Current Masterplan: Rural Activity
- Proposed zoning: Regional Enterprise Zone

Level 27, 680 George Street
Sydney NSW 2000
GPO Box 5394
Sydney NSW 2001

Tel: +61 2 9272 5100
Fax: +61 2 9272 5101
www.wsp.com

The locality and zoning of Site A is depicted in Source: DPIE

Figure 2.1.

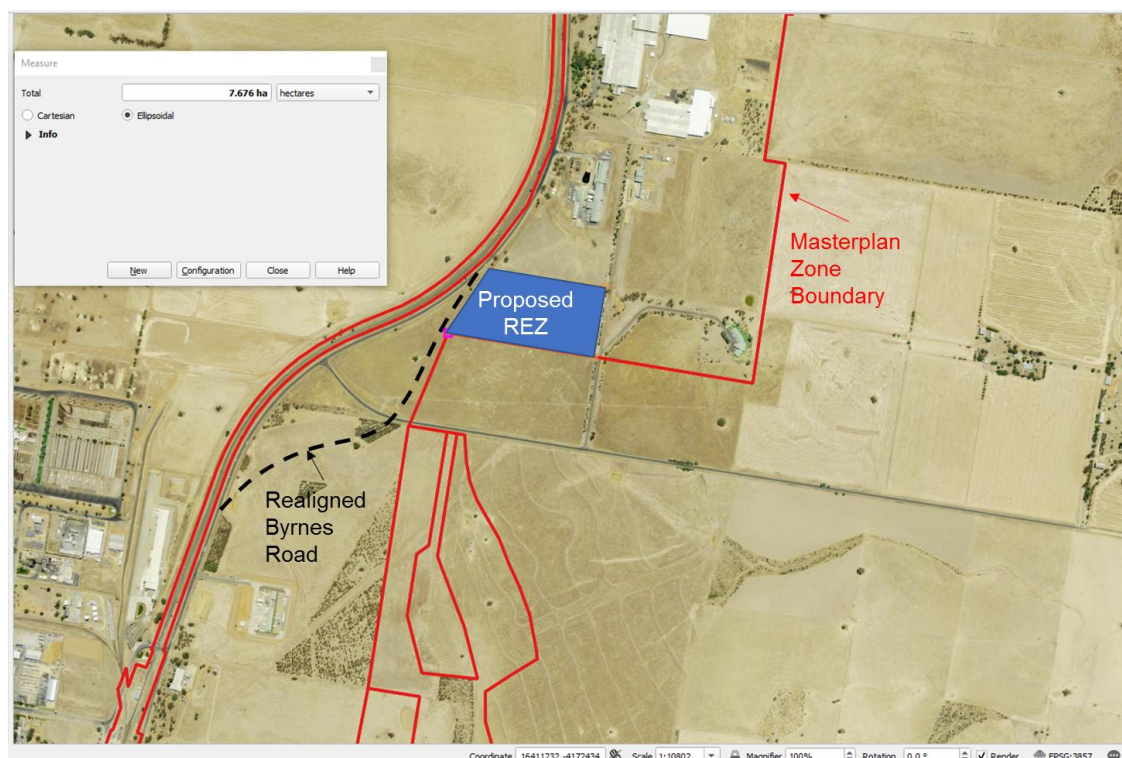


Source: DPIE

Figure 2.1 466 Byrnes Road (Site A) – location and zoning

Only a portion of the site (shown in blue in Source: DPIE shapefile

Figure 2.2) is proposed for the REZ zoning. This area is estimated to be approximately 8 hectares, subject to future refinements in its planning. The site abuts the realigned Byrnes Road alignment in the west.



Source: DPIE shapefile

Figure 2.2 Site A proposed rezoning area – approximately 8ha

2.2 SITE B: WOOL COMBING PONDS

Site B details

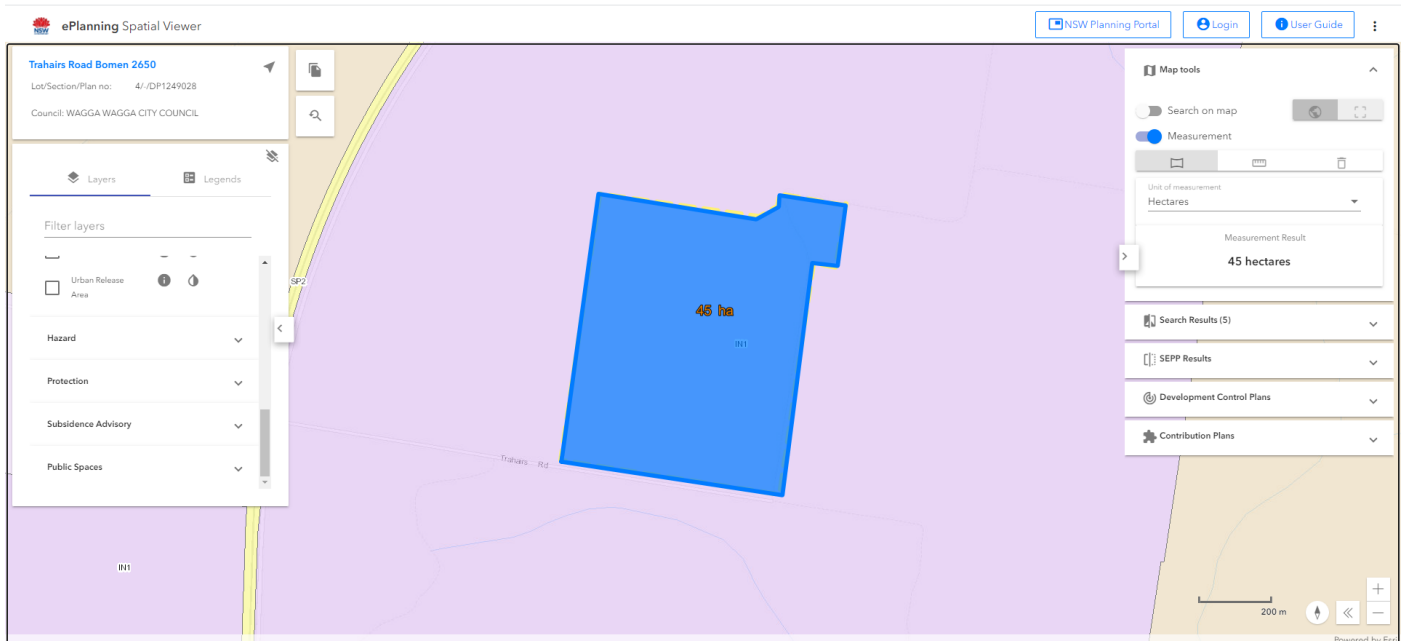
- Lot 4
- DP1249028
- Area: Approximately 45ha
- Address: Trahairs Road,
- Riverina Warehousing Solutions Pty Ltd
- Currently Zoned: IN1
- Current Masterplan: Rural Activity
- Proposed zoning: Regional Enterprise Zone

The locality and zoning of Site B is depicted in Figure 2.3



Source: Insert-source-details

Figure 2.3 Trahairs Road (Site B) – location and zoning



Source: DPIE ePlanning

Figure 2.4 Site B proposed rezoning area – approximately 45ha

3. TRANSPORT ASSESSMENT

3.1 METHOD

The sites are currently zoned industrial. However, they are both undeveloped or used for rural activities. The proposed change of zoning under the SAP Master Plan would allow them to be redeveloped with more intensive land uses that could have a greater impact on the transport network.

The methodology to assess this change in zoning includes:

1. **Trip generation assessment** – assess the additional trips proposed to be generated by the additional land parcels based on their proposed land uses. Estimates of traffic generation have been estimated using previously rates for Regional Enterprise zones for the SAP Master Plan assessment.
2. **Trip distribution** has been assumed to be consistent with previous SAP Master Plan assessment and aligned with Transport for NSW's strategic (EMME) traffic model.
3. **Trip assignment** of the extra trips on the road network for each site. From this the traffic volume forecasts were revised. This allowed the capacity of road network to be re-assessed.
4. **Access assessment** – provide a qualitative assessment of access to the additional land parcels including for heavy vehicles and rail freight, public transport and active transport.
5. Review the **impact to the recommended road infrastructure upgrade** and provide advice on the impact of the additional land parcels on the road infrastructure and their delivery staging.

3.2 ASSUMPTIONS

Assumptions made for this assessment include:

- 20% of each site is assumed to be required for roads, and another 20% of the remaining area is assumed to have ‘capacity constraints’. This means a net developable area of 5.0ha for Site A and 28.2ha for Site B
- The number of jobs created has been estimated on the rate of 11.7 jobs per ha of developable land, consistent with the assumption for the rest of the SAP. This equates to approximately 60 jobs for Site A and 330 jobs for Site B.
- Both sites would be amalgamated into Stage 1E of the Wagga Wagga Sap staging. Stage 1E covers the area east of Byrnes Road, north of East Bomen Road.
- As documented in *Wagga Wagga Special Activation Precinct Assessment of Refined Land Use - Transport and Traffic Plan* (WSP, 20 July 2020), this Stage is assumed to be developed to 35% of its capacity by 2030, 87% of its capacity by 2040 and 95% of its capacity by 2060.
- **Trip generation rates** are assumed to be the same as other REZ areas assessed for the SAP and documented in the *Wagga Wagga Special Activation Precinct Assessment of Refined Land Use - Transport and Traffic Plan* (WSP, 20 July 2020), namely:
 - 0.57 peak hour vehicle trips per employee/11.1 peak hour vehicle trips per hectare
 - 44.6 daily vehicle trips per hectare.
- **Trip distribution** was assumed to be the same as documented in the *Wagga Wagga Special Activation Precinct Assessment of Refined Land Use - Transport and Traffic Plan* (WSP, 20 July 2020)
 - 96 per cent of employees live within Wagga, 2 per cent live in Junee and 2 per cent live in Coolamon
 - For those living in Wagga Wagga, 50 per cent used Byrnes Road to get to Bomen, 6 per cent used Hampden Avenue, 15 per cent use the Olympic Highway from the south, 24 per cent use Coolamon Road and the remainder arrive via Byrnes Road, and the Olympic Highway from the north following the development of the Northern Growth Area.
 - 40% of trips are to/from within the SAP to reflect the circular economy
 - The direction of trucks trips was based on the 2056 Transport for NSW Freight Forecast from the Strategic Freight Model, September 2018:
 - North on Olympic Highway – 3 per cent of imports and 3 per cent exports
 - West on Olympic Highway then Sturt Highway – 4 per cent of imports and 11 per cent of exports
 - South on Olympic Highway – 17 per cent of imports, 10 per cent of exports
 - East on Byrnes Road, Eunony Bridge Road and Sturt Highway – 27 per cent of imports and 15 per cent of exports
 - North East on Byrnes Road – 3 per cent of imports and 1 per cent of exports
 - Internal within Wagga – 46 per cent of imports and 60 per cent of exports. These were further distributed on the 2015 car directions from the Wagga Wagga EMME traffic model.

3.3 RESULTS

3.3.1 TRIP GENERATION

The expected trip generation for the SAP area (including existing and currently planned growth) is outlined in Table 3.1. Compared to the assessment for the SAP Master Plan, the additions of Site A and B would increase:

- Stage 1E trips by approximately 173%
- Stage 1 trips by 12%
- The total trips by 7%.

Table 3.1 Proposed vehicle trip generation by stage

Trips in Time Period	Stage 1						Stage 2	Stage 3	Total
	Stage 1A	Stage 1B	Stage 1C	Stage 1D	Stage 1E	Sub-Total			
Net Developable Regional Enterprise (hectares)	41.0	42.2	99.8	50.6	80.6	280.3	71.7	131.2	483.2
Peak hour trips Total Vehicles	456	471	1,112	563	898	3,123	798	1,462	5,383
Peak hour trips Light Vehicles	365	376	776	451	719	2,498	639	1,169	4,306
Peak hour trips Heavy Vehicles	91	94	336	113	180	625	160	292	1,077
Daily trips Total Vehicles	1,825	1,882	4,449	2,253	3,593	12,491	3,194	5,846	21,531
Daily trips Light Vehicles	1,460	1,506	3,103	1,802	2,875	9,993	2,555	4,677	17,225
Daily trips Heavy Vehicles	365	376	1,346	451	719	2,498	639	1,169	4,306

3.3.2 TRAFFIC VOLUMES

The trips calculated from the trip generation and direction assumptions were assigned to the road network on top of the baseline traffic projections. The baseline traffic projections were obtained from the Wagga Wagga EMME model supplied by WWCC and Transport for NSW (TfNSW). The Wagga Wagga Strategic Traffic Model includes currently known development information provided by Wagga Wagga City Council and an estimate of background traffic growth on the Roads and Maritime highway network.

The SAP increase in trips was assigned to the road network using the most direct route that used highways or arterial/sub-arterial roads where possible. The SAP traffic was then added on top of the baseline traffic volumes to obtain a final estimate of traffic volumes on the road network with the SAP. The future years of 2030, 2040 and 2060 were estimated. The forecast traffic volumes and road capacity assessment are provided in Appendix A.

Forecast traffic volumes for the roads most affected by trips to/from Sites A and B are summarised in Table 3.2 overleaf. They indicate that the additional trips for Sites A and B would increase traffic volumes on average by:

- Byrnes Road, north of Oura Road: +4%
- Byrnes Road, north of Merino Road: +24%
- Byrnes Road, north of Trahairs Road: +1%
- Eunony Bridge Road at Eunony Bridge: +3%
- Merino Road, west of Byrnes Road: +7%

Table 3.2 Comparison of forecast traffic volumes at selected sites – SAP Masterplan versus scenario with Sites A and B

Road	Location	Direction	Wagga Wagga SAP Master Plan						With Extra Sites						Difference					
			2030		2040		2060		2030		2040		2060		2030		2040		2060	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Byrnes Road	north of Oura Road	northbound	447	345	920	617	1,337	951	470	353	982	640	1,401	974	23	8	62	23	63	24
		southbound	365	730	553	1,338	720	2,027	373	753	576	1,400	744	2,091	8	23	23	62	23	63
	north of Merino Road	northbound	249	224	500	402	646	528	311	263	673	509	827	642	63	39	173	107	181	114
		southbound	238	324	433	575	603	733	273	388	528	752	705	916	35	64	96	176	102	182
	north of Trahairs Road	northbound	142	160	220	237	369	370	142	161	221	240	370	373	0	1	1	3	1	3
		southbound	174	220	271	304	441	460	175	221	274	305	444	461	1	0	3	1	3	1
Eunony Bridge Road	at Eunony Bridge	northbound	672	505	1,313	900	2,067	1,480	695	514	1,375	924	2,130	1,503	23	8	62	23	63	24
		southbound	526	933	1,169	1,659	2,244	2,587	535	955	1,192	1,721	2,267	2,650	8	23	23	62	23	63
Merino Road	west of Byrnes Road	eastbound	257	570	575	1,264	836	2,093	278	590	634	1,317	904	2,156	21	20	59	54	68	63
		westbound	359	232	791	531	1,119	787	375	254	836	592	1,173	855	16	22	45	61	54	68

The largest impact is expected to be created by Site B on the section of Byrnes Road between Merino Road and Trahairs Road. The impact on other roads is likely to be smaller in volume and percentage.

3.3.3 ROAD INFRASTRUCTURE

The road network planned for the SAP would be able to accommodate the additional trips generated by Sites A and B in general, without the need for additional road upgrades. The exception is the section of Byrnes Road between Merino Road and Trahairs Road (a distance of approximately 2.1km). The indicative timing of this upgrade is 2057 – just within the assessment horizon of 2060.

It is noted that the trigger for upgrading this section of road is only just met (916veh/hr compared to the threshold of 896 veh/hr). It is understood that the development of 28.2ha of Site B may be an upper limit of development, given its location and the remediation works required to create developable land where the wool combing ponds are located. If development was kept under the following, the need to upgrade this section of Byrnes Road by the 2060 horizon would be avoided:

- Limit for development to avoid need to upgrade Byrnes Road between Merino Road and Trahairs Road by 2060 = **23.8ha or 275 jobs** i.e. approximately 15% less than the upper limit assumed.

The additional trips on the network from Sites A and B would also accelerate the anticipated timing of some road upgrades already recommended for the SAP. The affected items (including their code from Table 8.1 of the *Wagga Wagga Special Activation Precinct Assessment of Refined Land Use - Transport and Traffic Plan* (WSP, 20 July 2020) are listed below.

1. Re.12 - Byrnes Road widening between Merino Road and Oura Road – brought forward by approximately 6 months from late 2033 to early 2033
2. Re.13 - Upgrade intersection of Oura Road, Byrnes Road and Eunony Bridge Road – brought forward by approximately 6 months from late 2033 to early 2033
3. Re.8 - Eunony Bridge Road (including Eunony Bridge widening) – brought forward by approximately 6 months from early 2034 to late 2033
4. Ri.1 - Merino Road widening between Olympic Highway and Byrnes Road – brought forward by approximately 6 months from early 2035 to late 2034
5. Ri.4 - Dorset Drive widening between Merino Road and Bomen Road – brought forward by approximately 1 year from 2055 to 2054
6. Ri.13 - RIFL Road widening between Merino Road and first intersection – brought forward by approximately 1 year from 2049 to 2048.

3.4 SITE ACCESS

3.4.1 BY CAR

Site A has good access via the roundabout at the intersection of Byrnes Road and Merino Road. However, given its position at the north of the site, a new access direct from Byrnes Road may be sought, similar to the adjoining properties. With the increasing volumes on Byrnes Road, turning right into and out of properties will become more difficult. A channelised right-turn and left-turn entry bay may be required to improve safety and reduce disruption to vehicles travelling north-south.

Site B has access to Byrnes Road via Trahairs Road. This intersection has a right-turn bay and left-turn bay, minimising the impact on north-south traffic. With the focus of trips being south towards Wagga Wagga, this intersection is likely to have sufficient capacity in the future.

ACCESS DRIVEWAY

For Site A, the preferred location of an access driveway appears feasible in the northernmost boundary of the lot. This location is considered most appropriate, as it would:

- minimise operation conflicts with Byrnes Road/East Bomen Road intersection – locating the access driveway further from the roundabout would reduce the impact of queueing formed from the roundabout to the access driveway, or visa-versa.

- reduce the amount of earthworks to provide a suitable gradient and sight distance needed for a driveway – as shown in Figure 3.1 below, the road embankment gradually decreases further north of the roundabout, making it more suitable for a site access to be provided at the northernmost location of the site.
- maximise sight distance to traffic on Byrnes Road – the location of an access driveway in the northernmost location of the site would minimise potential sight distance limitations due to existing embankments and potential queueing from roundabout

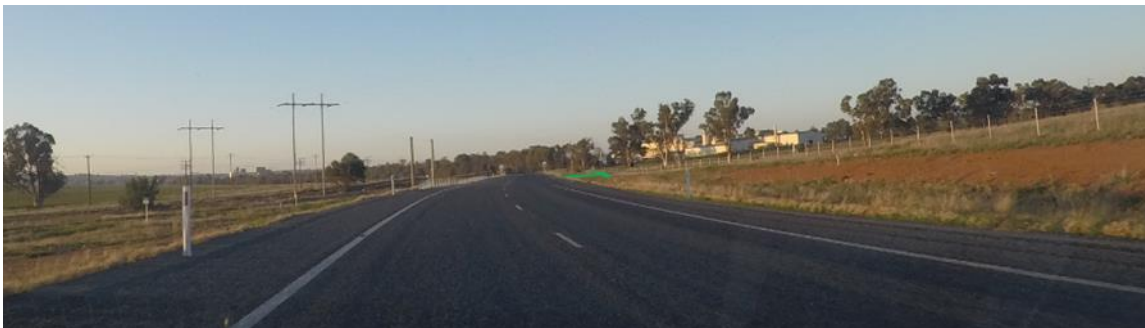


Figure 3.1 Site A – potential access driveway location

For Site B, the site would be accessible from Trahairs Road. Trahairs Road is a non-continuing road terminates further east of the site. Trahairs Road intersects at Byrnes Road with a channelised right turn (CHR) and an auxiliary left turn (AUL) treatment into and out of Trahairs Road. Currently, the neighbouring property at 177 Trahairs Road is accessible from Trahairs Road as well.

The specific location of the access driveway for this site would be subject to future planning and investigation of the site, however an access point currently exists as depicted in Figure 3.2.



Figure 3.2 Site B – potential access driveway location

3.4.2 BY TRUCK

Byrnes Road is identified as a priority truck route in the *Wagga Wagga Special Activation Precinct Assessment of Refined Land Use - Transport and Traffic Plan* (WSP, 20 July 2020). The SAP Master Plan identifies the upgrading of the Byrnes Road and Eunony Bridge Road route to the Sturt Highway to be suitable for use by Performance Based Standards Class 2B vehicles. Both sites also have good access to Merino Road which in turn provides access to the Olympic Highway.

3.4.3 BY RAIL

The proposed Riverina Intermodal Freight and Logistics Hub (RIFL) is located close to both sites.

Site A is located very close, with road access via Merino Drive and RIFL road. Depending on the freight needs of the business occupying the site, a direct connection (e.g. conveyor belt over Byrnes Road) to the RIFL Hub would minimise the number of freight trips on the road network.

Site B is located approximately 800m from the northern end of the RIFL site. Road access to RIFL is possible via Byrnes Road, Merino Road and RIFL road. Alternatively, Site B is within a 14km drive of the Qube facility at Harefield.

3.4.4 BY PUBLIC TRANSPORT

The fixed-route bus routes in the *Transport and Traffic Plan* do not travel east of the rail line, which means that both sites are not located close to public transport. However, the other proposed services, including flexible/on-demand bus, taxis and ride share services.

3.4.5 BY WALKING AND CYCLING

Both sites are located away from the proposed walking and cycling paths proposed in the *Transport and Traffic Plan*. Facilities were concentrated in the areas of greatest need/highest likelihood of attracting walking and cycling trips. Because of the dispersed nature of trips and distances involved for properties east of the rail line, these facilities did not extend to this portion of the SAP area.

3.5 SUMMARY

The rezoning of the sites from Rural Activity to Regional Enterprise Zone in the SAP Master Plan is feasible with a minor impact non the required road infrastructure.

The development of Site B to the levels assumed would trigger the need to widen Byrnes Road between Merino Road and Trahairs Road to four lanes by 2057. However, if the magnitude of the development was limited to **23.8ha** (excluding roads and capacity constrained land) or **275 jobs**, the threshold to upgrade would not be reached by the assessment timeframe of 2060.

The development of Sites A and B would contribute to the need to bring forward the construction of some upgrades planned in the Wagga Wagga SAP *Transport and Traffic Plan*. These include:

1. Byrnes Road widening between Merino Road and Oura Road – brought forward by approximately 6 months
2. Upgrade intersection of Oura Road, Byrnes Road and Eunony Bridge Road – brought forward by approximately 6 months
3. Eunony Bridge Road (including Eunony Bridge widening) – brought forward by approximately 6 months
4. Merino Road widening between Olympic Highway and Byrnes Road – brought forward by approximately 6 months
5. Dorset Drive widening between Merino Road and Bomen Road – brought forward by approximately 1 year
6. Ri.13 - RIFL Road widening between Merino Road and first intersection – brought forward by approximately 1 year.

The sites have good access by car and truck and to the planned RIFL hub. Site A may require a new direct access to Byrnes Road, depending on the configuration of the site. This access would need to be designed for safety and avoid disruption to the anticipated traffic volumes on Byrnes Road.

Both sites are located away from the proposed infrastructure and fixed services for public transport, walking and cycling. However, they could be accessed by the flexible services proposed for the SAP.

4. EXISTING INFRASTRUCTURE ASSESSMENT

4.1 WATER

WATER SUPPLY

Site A and B are located within the North Wagga Wagga supply system where water is sourced from three groundwater bores and supplemented from the Murrumbidgee River as shown in Figure 4.1. The water sources, treatment and pumping systems are at or approaching capacity. For further details of existing water supply of the SAP investigation area refer to section 2.1 of Final Masterplan Report - Infrastructure and Services Plan.

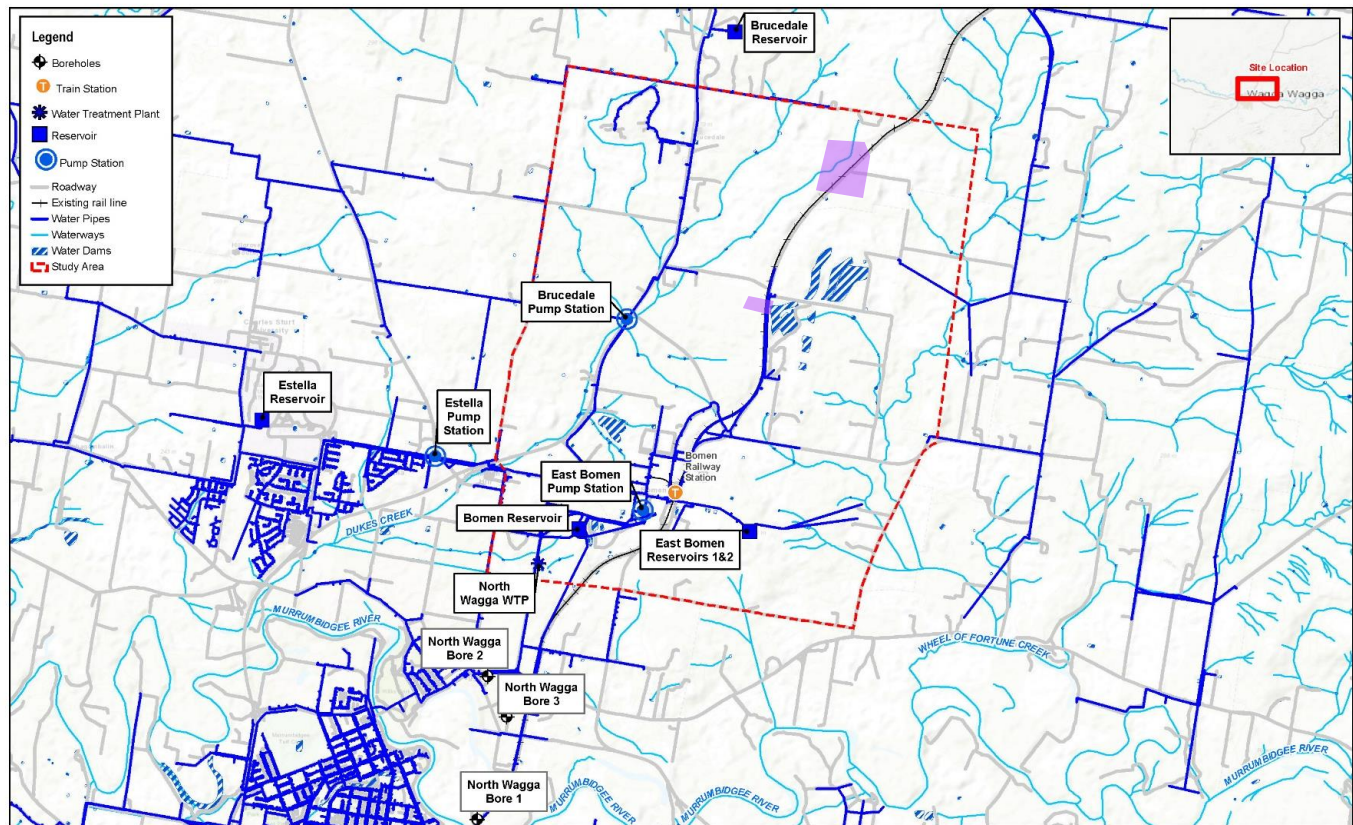
There are three existing pressure zones within the North Wagga Wagga supply system known as Estella, Brucedale and East Bomen Sub-systems. Both Site A and B are within the East Bomen Sub-system zones.

Due to Site A's high elevation (up to 248 m AHD) it is approaching the upper limit of what can be supplied from the East Bomen Reservoir and associated pressure zone. An existing water main is located adjacent to these sites in Byrnes Rd.

An existing water main from Riverina Water's rural system is also located to the East of Site B. This system is likely to be unsuitable to supply any development which has significant water requirements.

WATER CAPACITY

The East Bomen system does not have capacity to service the proposed SAP development generally and major upgrades (including to the reservoir, pump station and mains) are proposed in the Final Masterplan Report - Infrastructure and Services Plan..



Source: WSP and Riverina Water County Council

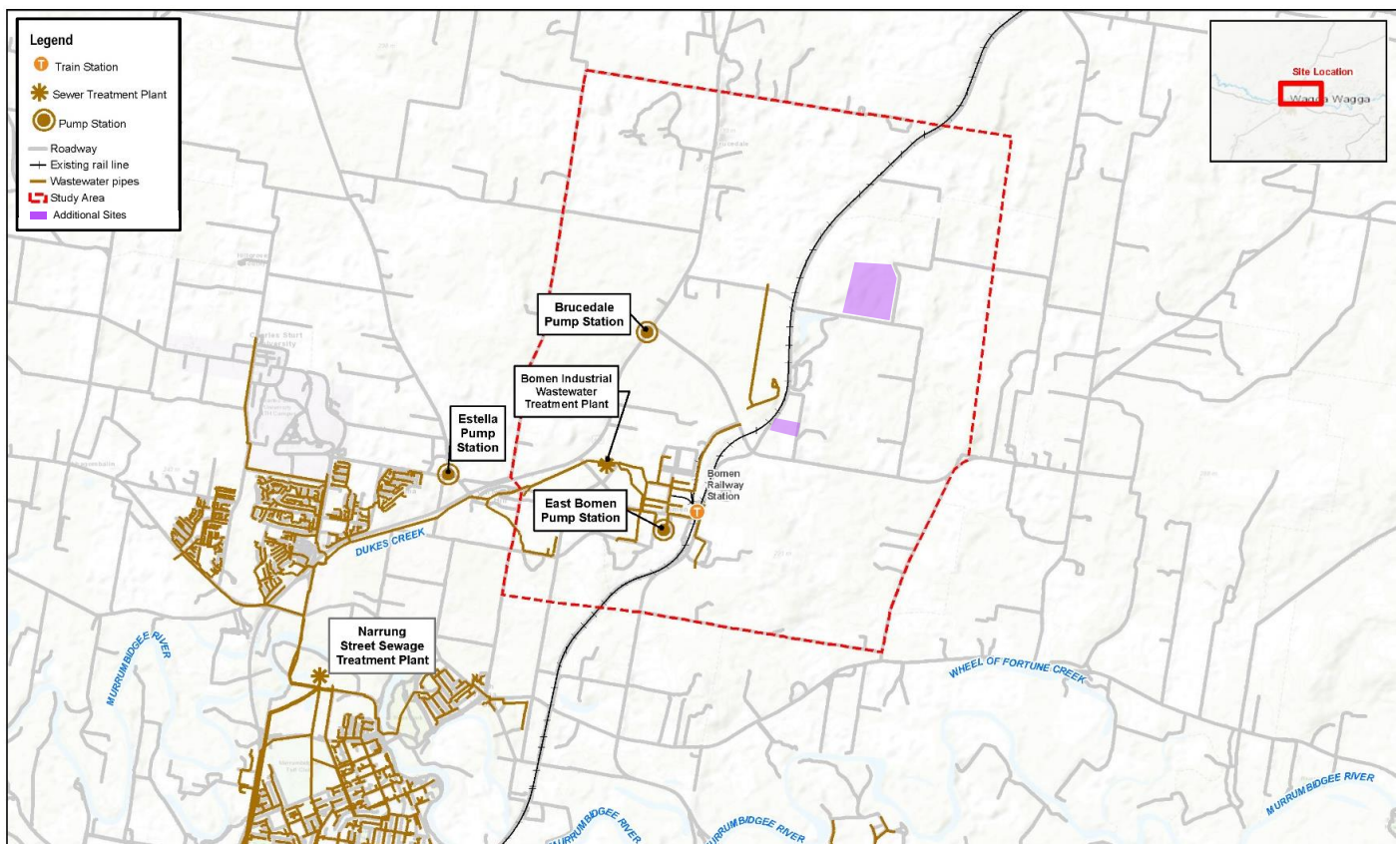
Figure 4.1 Existing water infrastructure

4.2 SEWER

The existing Bomen industrial pre-treatment plant receives all wastewater from the local serviced area in Bomen. From here, partially treated sewage is pumped south-east into the town catchment and is conveyed to the Narrung St Waste Water Treatment Plant (WWTP). Treated effluent from the Narrung St WWTP is discharged to the Murrumbidgee River, a small part of this is further treated and re-used for open space irrigation at Council sites. Figure 4.2 illustrates the current configuration of the existing wastewater infrastructure.

Wastewater servicing within the SAP is governed by topography, which varies significantly between 180 m to 300 m AHD as conceptually shown in Figure 2.4 of Final Masterplan Report - Infrastructure and Services Plan.

The SAP masterplan proposes the development of a new sewerage pump station (SPS) catchment to service all development on the eastern side of the railway. This would discharge into an extension of the gravity catchment (proposed to be a significant new gravity trunk sewer) draining to the Bomen industrial pre-treatment plant. The existing network and treatment infrastructure does not have available capacity to service the SAP development and major upgrades are proposed in the SAP masterplan.



Source: WSP and Wagga Wagga City Council

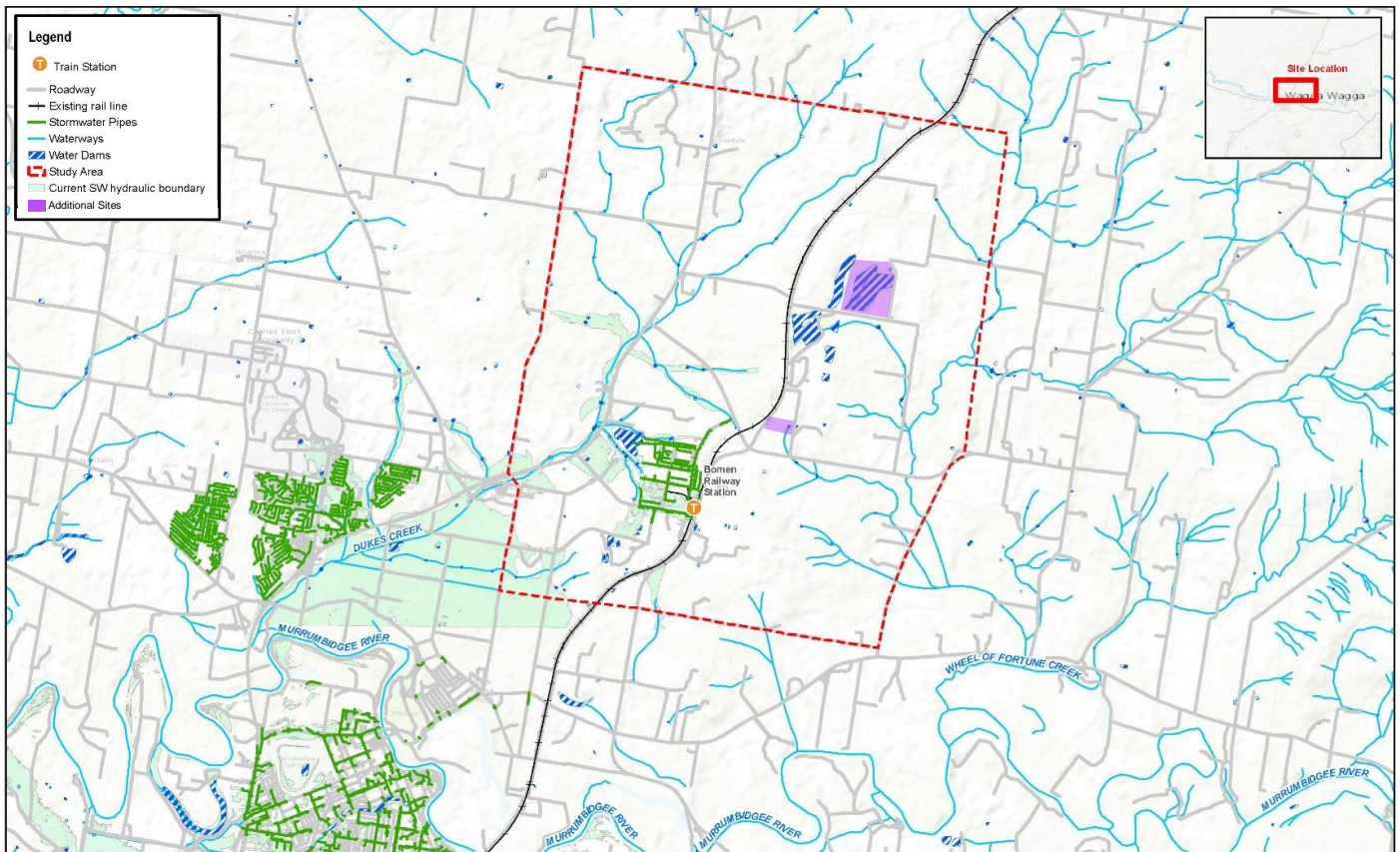
Figure 4.2 Existing wastewater infrastructure

4.3 STORMWATER

Stormwater within the SAP investigation area predominantly falls within the Murrumbidgee catchment boundary through natural flow paths.

Site A – there is a water body located with investigation area that discharges naturally downstream into Wheel of Fortune Creek.

Site B – there are existing ponds located on site that naturally downstream into Wheel of Fortune Creek.



Source: WSP, DPE and WMA Water

Figure 4.3 Existing stormwater infrastructure including the extent of the stormwater hydraulic boundary

4.4 ELECTRICAL TRANSMISSION AND DISTRIBUTION

The transmission network which passes through the Wagga Wagga SAP investigation area is operated by TransGrid and Essential Energy while the distribution network is operated by Essential Energy.

Due to the proximity of the Wagga North 132/66 kV substation, the generation for future development within the SAP investigation area would be drawn via this substation. The proposed development size and types will need to be confirmed to assess if the existing distribution feeders, and substation requires upgrade.

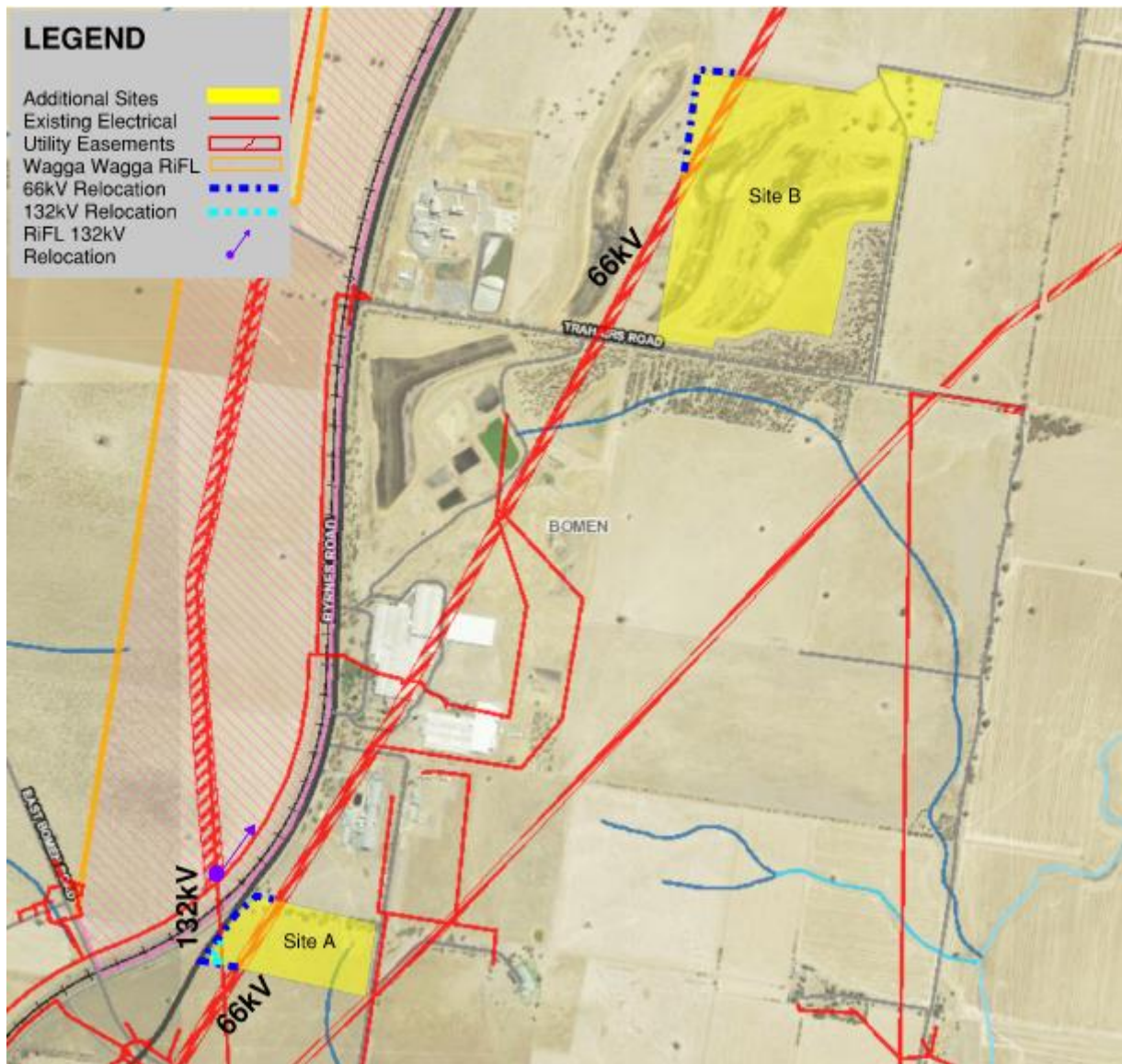
There are two existing overhead power lines located with Site A.

Essential Energy has a 132kV transmission line that transverse over the south west corner of Site A. The Riverina Intermodal Freight and Logistics Hub (RIFL) concept design obtained from Inland Power Solution (on the 17/2/21) identifies that this asset is to be relocated to the West of the rail line. The relocation is terminated at a new pole on the West side of the rail alignment, before the asset enters Site A.

Options include maintaining the existing Essential Energy 132Kv overhead or relocating the asset to avoid Site A. Maintaining the overhead will reduce the developable area by 0.3 ha.

Essential Energy has a 66kV overhead transmission and an approximately 30m wide easement running north and south dividing Site A. To enable development, it would be expected that this overhead will require relocation. Figure 4.4 below shows location of these assets. Maintaining overhead will reduce the developable area by 2 ha (easement 0.75ha).

Essential Energy's 66kV overhead transmission mentioned above also continues North to cross to cross Site B. To enable development, it would be expected that this overhead will require relocation as well. Maintaining the overhead will reduce the developable area by 2.5 ha.



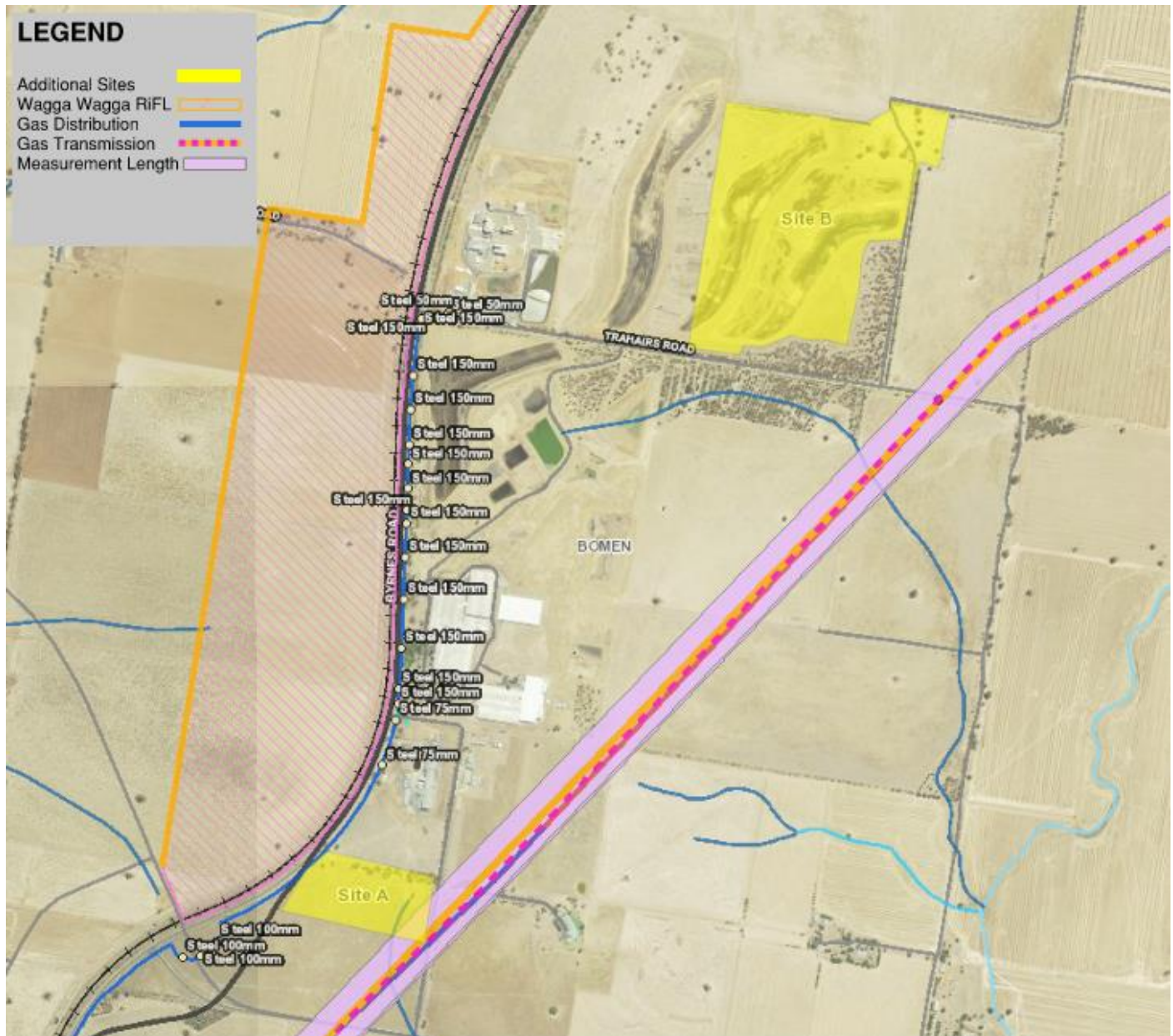
Source: WSP, DBYD, Essential Energy and TransGrid

Figure 4.4 Existing local electrical transmission and distribution network

4.5 GAS

Two existing APA transmission lines are near Site A and Site B. They include the Young – Wagga Wagga Pipeline and Young – Wagga Wagga Looping line which run along the east boundary of the sites. The South-East corner of site A is located within the APA measurement length (ML) zone. Refer to Figure 4.5. APA currently classes site A within this zone as Rural Residential and Heavy Industrial. APA will need to review the proposed development with the ML zone and advise on safety requirements for development in this zone.

APA gas networks also maintain existing distribution mains servicing the Bomen industrial areas. These distribution services include an existing 100mm pipeline along Byrnes Road.



Source: WSP and APA Transmission

Figure 4.5 Existing gas transmission and distribution infrastructure with measurement length

4.6 TELECOMMUNICATION AND DIGITAL CONNECTIVITY

This preliminary analysis draws from publicly available information (DBYDs), information from utility providers as well as team knowledge of the assets within the area.

TELECOMMUNICATIONS INFRASTRUCTURE

Telstra

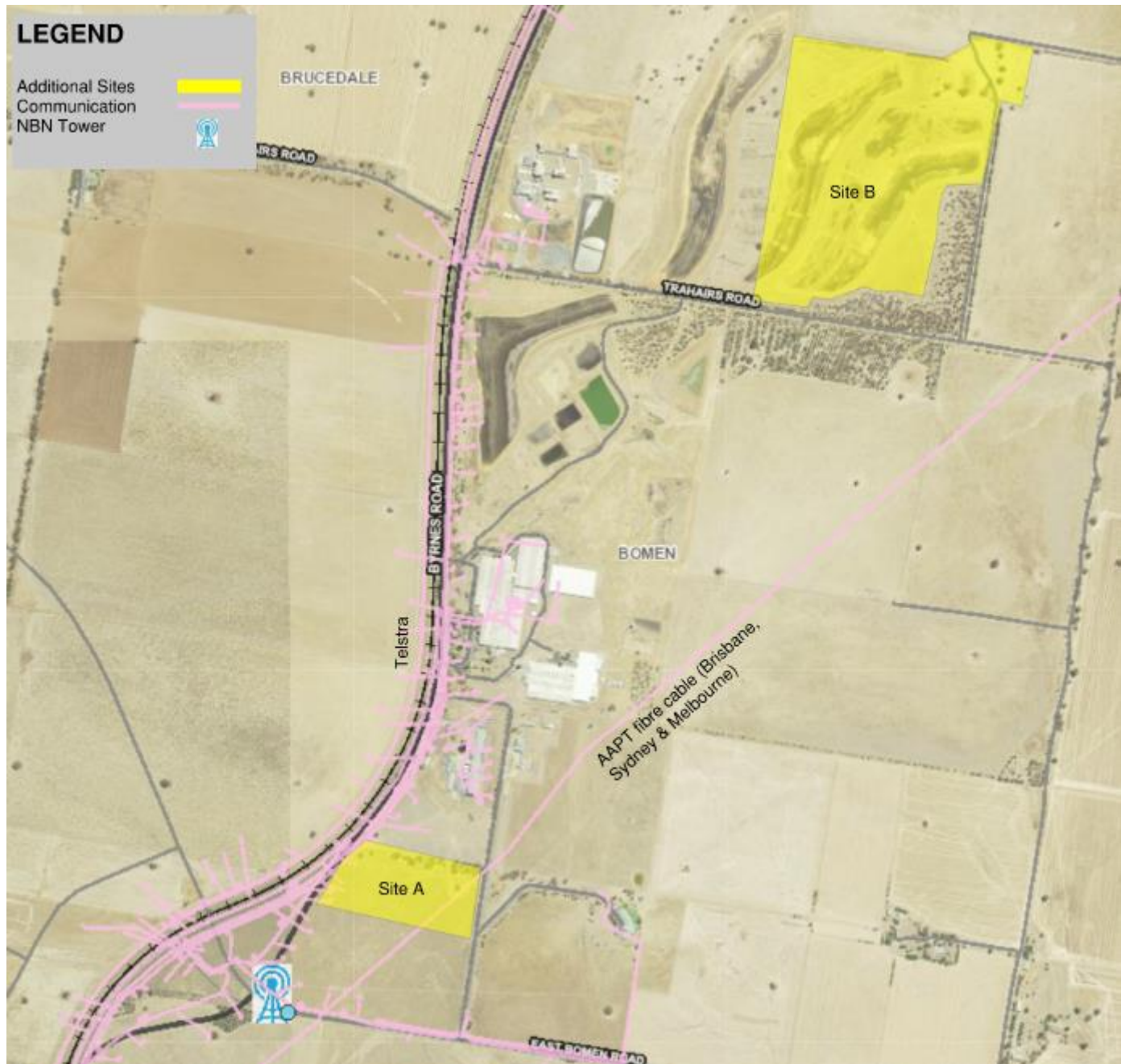
Telstra has a fibre network located near both Site A and B that runs parallel with Byrnes Road (See Figure 4.6).

AAPT

AAPT has advised that they have a known asset, being a fibre cable between Brisbane, Sydney and Melbourne. This asset runs through the western side of Site A. It is not able to be used to service any of the additional areas. There is an approximate. 2+ year program to relocate major fibre option connections dependant on route complexity, priority and node to node length.

NBN

Site A and B are serviced by the NBN Fixed Wireless broadband service. Both Site are rated as high broadband availability and moderate to low quality. Figure 2.13 and Figure 2.15, of Final Masterplan Report - Infrastructure and Services Plan, illustrate the broadband availability and quality around the SAP investigation area. A NBN tower is located to the south of Site A, on East Bomen Road.



Source: WSP, AAPT, OPTUS and Telstra

Figure 4.6 Existing telecommunication assets

5. INFRASTRUCTURE SERVICING STRATEGIES

The following section reviews how the strategies for future infrastructure requirements, as detailed in the final infrastructure report, can be leveraged to service Sites A and B. No demands analysis has been completed to confirm capacity or additional upgrades to the existing networks, and all proposals are subject to review and approval by the asset owners

5.1 WATER

Site A is at elevation ranges between 240-248m. This is around the upper limit of what can be supplied from the East Bomen Reservoirs (Top Water Level 285 m AHD). Generally, this site can be serviced via the existing main in Byrens Rd, however the pressure performance and requirements will need to be carefully reviewed with Riverina Water, including hydraulic modelling assessment based on the specific development layout and requirements (this is particularly important if development occurs in the highest elevation part of this site).

Site B falls within the elevation range suitable to be serviced by the East Bomen Reservoirs and can be serviced by extending the water main network, proposed in stage 1 of the Final Masterplan, as shown in Figure 5.1 below.

Additional (likely to be minor/incremental) capacity would be required as part of the upstream network infrastructure proposed in the masterplan to service these additional sites. Hydraulic modelling is required to confirm specific additional requirements (upsizing of proposed mains).

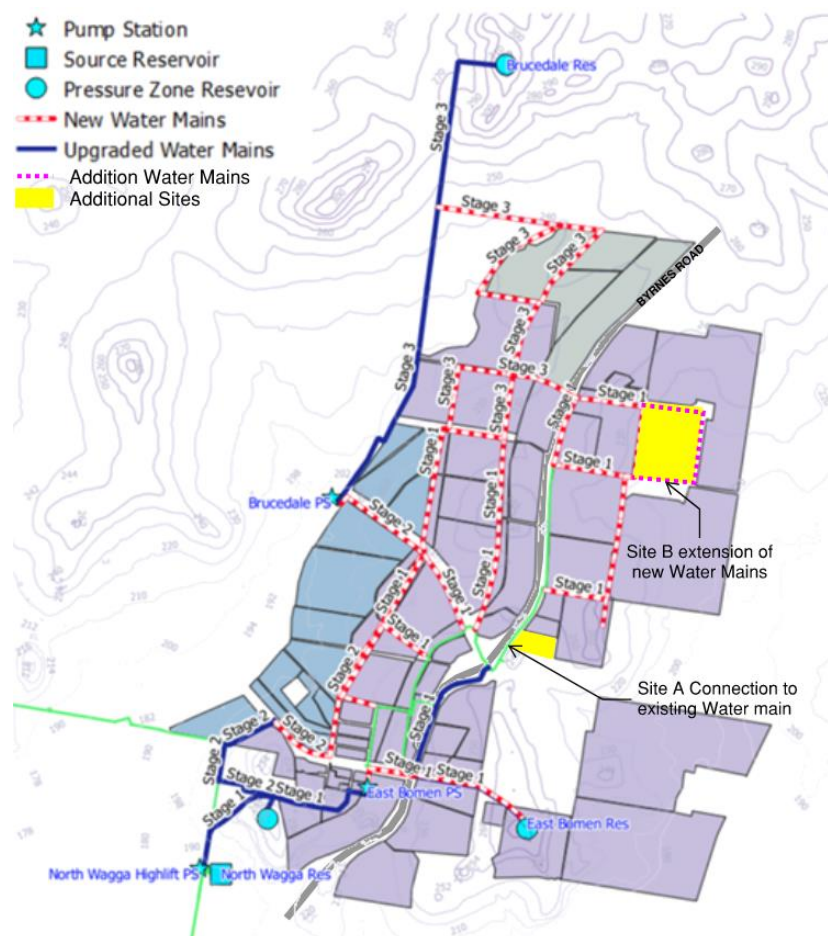


Figure 5.1 Proposed water infrastructure servicing additional sites

5.2 SEWER

Due to the high elevation of Site A, it can be partially serviced via gravity to the proposed Stage 1 gravity trunk sewer prior to crossing the railway. However, the area in the south east part of the site naturally falls away from the connection point and would require a pumping system to service. The south east corner (Elevation 238m) of the site approximately 6m lower than western boundary (Elevation 244m) where sewer connection will be made. This proposal is subject to further in-depth investigations of the proposed development. To maximise the flexibility of the network to service this additional area, the Stage 1 gravity sewer under the railway, and connection point, could be constructed deeper, which would be at some additional cost.

To service Site B the Sewer Pump Station (SPS) B will need to be located at the lowest point of Catchment B. As a result, this will increase both gravity main and rising main lengths by 500m.

The additional load from these two sites would incrementally increase capacity requirements for all downstream network and treatment infrastructure. This infrastructure will either be new or requiring upgrade in any case to service the SAP development.

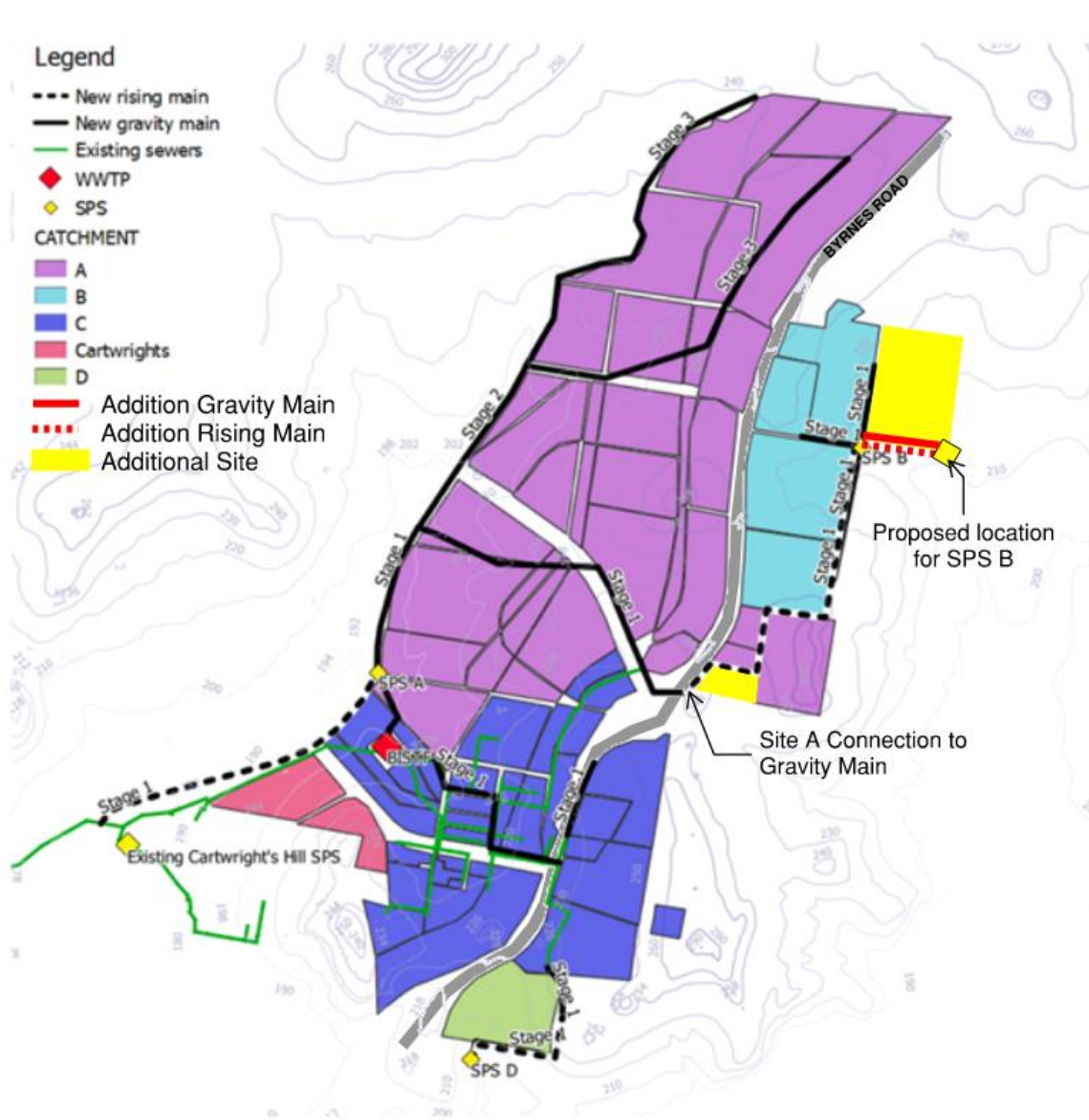


Figure 5.2 Proposed Wastewater Servicing Additional Sites

5.3 ELECTRICAL TRANSMISSION AND DISTRIBUTION

The summary of proposed power infrastructure to support the Wagga SAP refined structure plan are shown in Figure 5.3 and detailed below:

- Site A connects into the proposed 11kV network extension detailed in stage 1e of Electrical refined structural plan.
- Site B would require a 1km extension of the proposed 11kV network extension detailed in stage 1e of Electrical refined structural plan

Additional loads from site A & B may require upgrades to the distribution substation and existing Wagga North 132kV/66kV substation in addition to what was proposed in the Final Masterplan Report - Infrastructure and Services Plan.

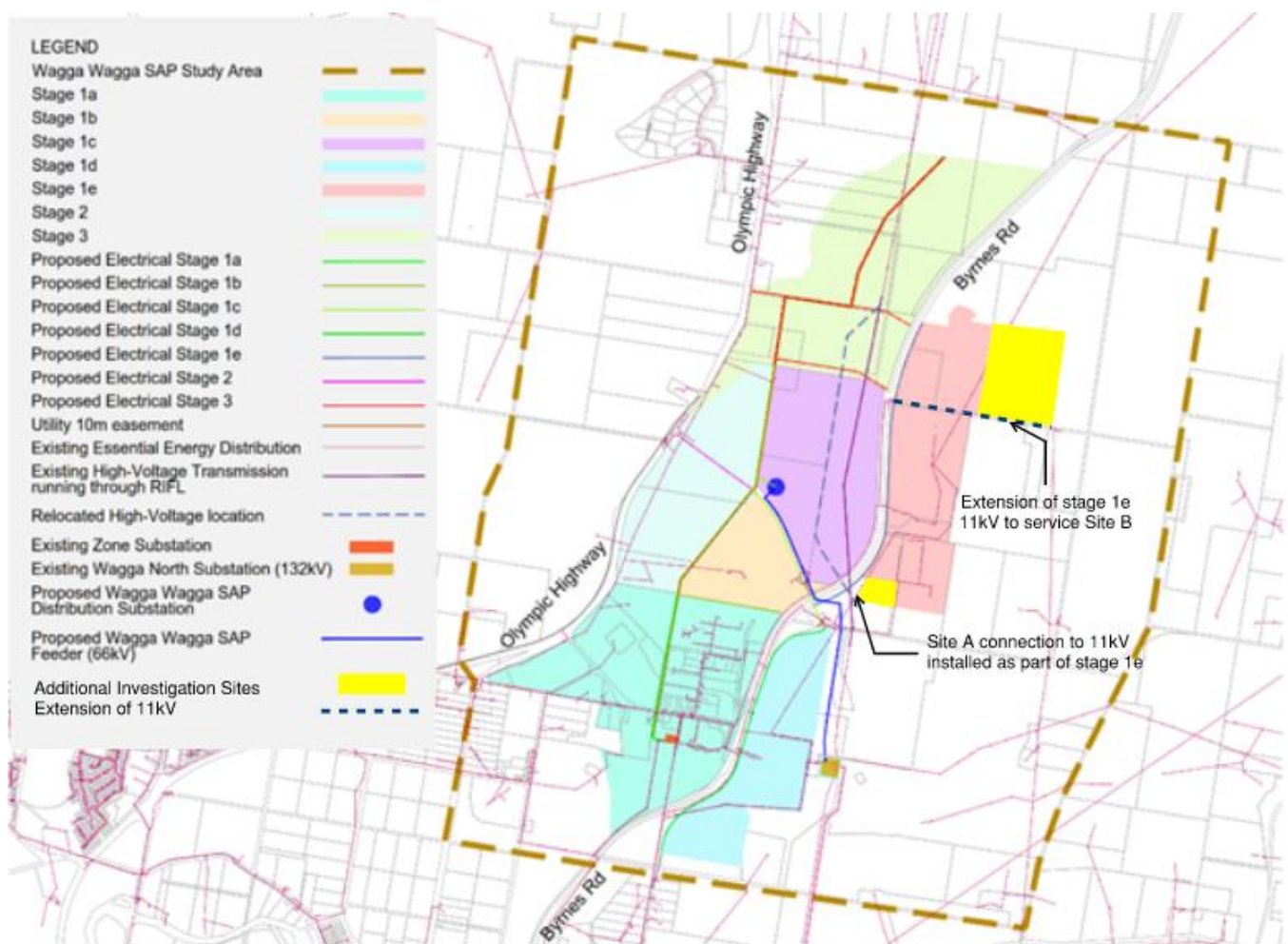


Figure 5.3 Proposed Electrical Servicing Additional Sites

5.4 GAS

Gas connections for both Site A & B can be included as part of the proposed stage 1 works. Future gas infrastructure for stage 1 will connect to existing APA 100 mm gas line along Bomen Road. A 1km extension is required service Site B.

5.5 TELECOMMUNICATION AND DIGITAL CONNECTIVITY

The existing Telstra fibre along Byrnes Road could be used to service Site A.

An additional extension of 1km of the Telstra network could be used to service Site B.

The existing cable capacity will need to be reviewed by Telstra. Telstra will advise of any additional upgrades to their network to service both sites.

6. INFRASTRUCTURE RECOMMENDATION

Table 6.1 Infrastructure requirements for Site A

UTILITY	CONNECTION AND ADJUSTMENTS	DISTANCE
WATER	Connection to existing 375mm dia main along Byrnes Road.	N/A
SEWER	Connection to stage 1 gravity main on Byrnes Road Pumping station and rising main required to service the Western Boundary of the site	Connection is to be made at the boundary of Site A
ELECTRICAL	Connect into stage 1e extension (11kV). An additional 11kv/LV step down transformer required to service the site Increase capacity proposed for the distribution substation and Wagga North 132kV/66kV substation is likely required. 132kV & 66kV overheads would be required to be relocated to maximise developable land	Connection is to be made at the boundary of Site A 132kV-300m 66kV – 500m
GAS	Connection into existing APA 100mm Gas main along Byrnes road Additional Gas line protect may be requested as site within the measurement length	Connection is to be made at the boundary of Site A
COMMS	Connection to Telstra along Byrnes Road AAPT fibre optic Sydney - Melbourne cable to be located and possibly relocated if it clash with the proposed development design	Connection is to be made at the boundary of Site A

Table 6.2 Infrastructure requirements for Site B

UTILITY	CONNECTION AND ADJUSTMENTS	DISTANCE
WATER	Extension of the stage 1 150mm dia network	1.75km – 150mm Dia
SEWER	Extension of stage 1 Rising main Extension of stage 1 Gravity main Revise concept location of Sewer Pumping Station to SE south East corner of the site	0.5km0.5km
ELECTRICAL	Extension of stage 1e proposed electrical (11kV). An additional 11kv/LV step down transformer required to service the site Increase capacity proposed for the distribution substation and Wagga North 132kV/66kV substation Relocation of 66kV	1km extension 550m
GAS	Connection into existing APA 100mm Gas main along Byrnes road	Extension of 1km to site location
COMMS	Connection to Telstra along Byrnes Road	Extension of 1km to site location

APPENDIX A FUTURE TRAFFIC ASSESSMENT

The pages overleaf show the forecast baseline and with SAP traffic volumes as well as the assessment of the road link capacity and need for an upgrade for the model years of: 2030, 2040 and 2060.

A.1.1.1 ROAD CAPACITIES

To assess how well a road section will perform for a particular forecast traffic volume, a nominal theoretical lane traffic capacity has been assigned based on Austroads and Roads and Maritime Services guidance depending on the type of road. Table A.1 shows the assumed traffic volumes (measured in passenger car units per hour (pcuph)) and the Level of Service from A to F (equated to a volume to a volume to capacity ratio (V/C Ratio)).

For these calculations, trucks are converted to passenger car units using a factor based on their length. Roads were classified as either a rural highway, urban highways with clearways, urban highways with interruptions or an industrial street.

Table A.1 Assumed road lane traffic capacities by road type and associated LoS (as determined by V/C ratio)

Level of Service	Rural Highway Undivided		Urban Divided/ Undivided Highways or Roads, With Clearways		Urban Divided/ Undivided Highways or Roads With Interruptions		Industrial Streets	
	V/C Ratio	MSF (pcuph)	V/C Ratio	MSF (pcuph)	V/C Ratio	MSF (pcuph)	V/C Ratio	MSF (pcuph)
A	0.15	210	0.35	560	0.35	420	0.35	315
B	0.27	380	0.5	800	0.5	600	0.5	450
C	0.43	600	0.75	1,200	0.75	900	0.75	675
D	0.64	900	0.9	1,440	0.9	1,080	0.9	810
E	1	1,400	1	1,600	1	1,200	1	900
F	10	> 1,400	10	> 1,600	10	> 1,200	10	> 900

- (1) Notes:
- (2) V/C: ratio of traffic demand to nominal capacity on a road network
- (3) LoS: Level of Service
- (4) MSF: Maximum Service Flow, measured in passenger car units per hour (pcuph)

For this assessment, to obtain effective use of current road assets, the threshold for upgrading a road has been assumed as the transition **between LoS D and LoS E**, i.e. 900 pcuph for a rural highway, 1,440 pcuph for urban highways with clearways, 1,080 pcuph for urban highways with interruptions and 810 pcuph for industrial streets.

The transition from LoS D to E is used as the threshold for upgrade as daily fluctuations in traffic volumes and conditions may mean above-capacity operation on some days. It also plans for upgrades before LoS E operation which has unstable flow where minor disruptions can cause delays. The transition from LoS E to F is assumed to be the theoretical capacity of the lane. LoS F represents above-capacity operation, with extensive delays.

The recent WWCC traffic counts on Merino Road were used to calculate truck to passenger car units (pcu) equivalent factor, which was found to be 2.12. This means that in terms traffic volume demand, a truck is equivalent to 2.12 passenger car unit (pcu).