UTILITIES ASSESSMENT REPORT

Tolland Renewal

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Prepared for:

NSW Land and Housing Corporation (LAHC)

Prepared by:

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1.0 INTRODUCTION

Stantec has been engaged by NSW Land and Housing Corporation (LAHC) to develop a new masterplan for Tolland, an existing suburb in Wagga Wagga, NSW. The existing suburb, originally structured on the Radburn public housing model, is characterised by low internal connectivity, poor interface with public open space and pedestrian laneways and has limited access and egress opportunities to the surrounding suburbs. Stantec has supplemented the urban masterplan, civil masterplans, neighbourhood character assessment and landscape masterplan in order to generate improved social and urban outcomes for the Tolland Community.

1.1 PROJECT OVERVIEW

The subject site is an approximately 49-hectare parcel on the western edge of the suburb, boarded by Glenfield Road and Red Hill Road. The subject site for this assessment has been identified in **Figure 1-1** below. The Subject site is currently comprised of approximately 387 privately owned dwellings, 227 social housing dwellings, 20 social housing vacant blocks, a community centre, two schools, a church, and existing public open space.

Figure 1-1 Subject Site

The aim of the masterplan is to renew social, affordable, and private homes, and deliver enhanced open spaces and community infrastructure in the suburb of Tolland. To achieve this, a total of 200 new social and affordable dwellings will be constructed to replace the existing stock, as well as a net increase of 292 private dwellings.

1.2 PURPOSE

This report is intended to investigate the existing utility infrastructure, both trunk and reticulation, within Tolland in terms of their existing condition and capacity, and discuss what, if any, upgrades to the infrastructure is required to service the proposed future Tolland.

2.0 EXISTING SERVICES

2.1 POTABLE WATER

Tolland Estate is currently serviced by an existing potable water network owned and operated by Riverina Water. The Estate has multiple primary connection points from the surrounding Riverina Water supply. These being:

- The western side of Tolland contains one primary connection point within the north-eastern corner of the Glenfield Rd / Bruce St intersection. The supply is delivered from a 375mm asbestos cement (AC) rural distribution pipe which travels in a north / south alignment along the eastern side of Glenfield Rd where it joins to a 525mm distribution main along Red Hill Rd.
- The southern side of Tolland contains one primary connection within the eastern side of Ramus St, offset from the Red Hill Rd / Ramus St intersection. The supply is serviced by a 525mm asbestos cement (AC) rural distribution pipe which travels in an east / west alignment along the northern verge of the Red Hill Rd.
- The eastern side of Tolland is serviced by multiple connection points, these connection points tee off the 250mm asbestos cement (AC) urban distribution pipe which travels in a north / south alignment within the eastern verge of Bourke St. Tees from Bruce St and Maher St cross underneath Bourke St to service the Estate.

Reticulation mains varying in sizes from 100mm to 250mm largely follow the alignment of the road reserves with service connections through the front of each block. For further information regarding service authority correspondence and indicative DBYD service locations, refer to **Appendix A**.

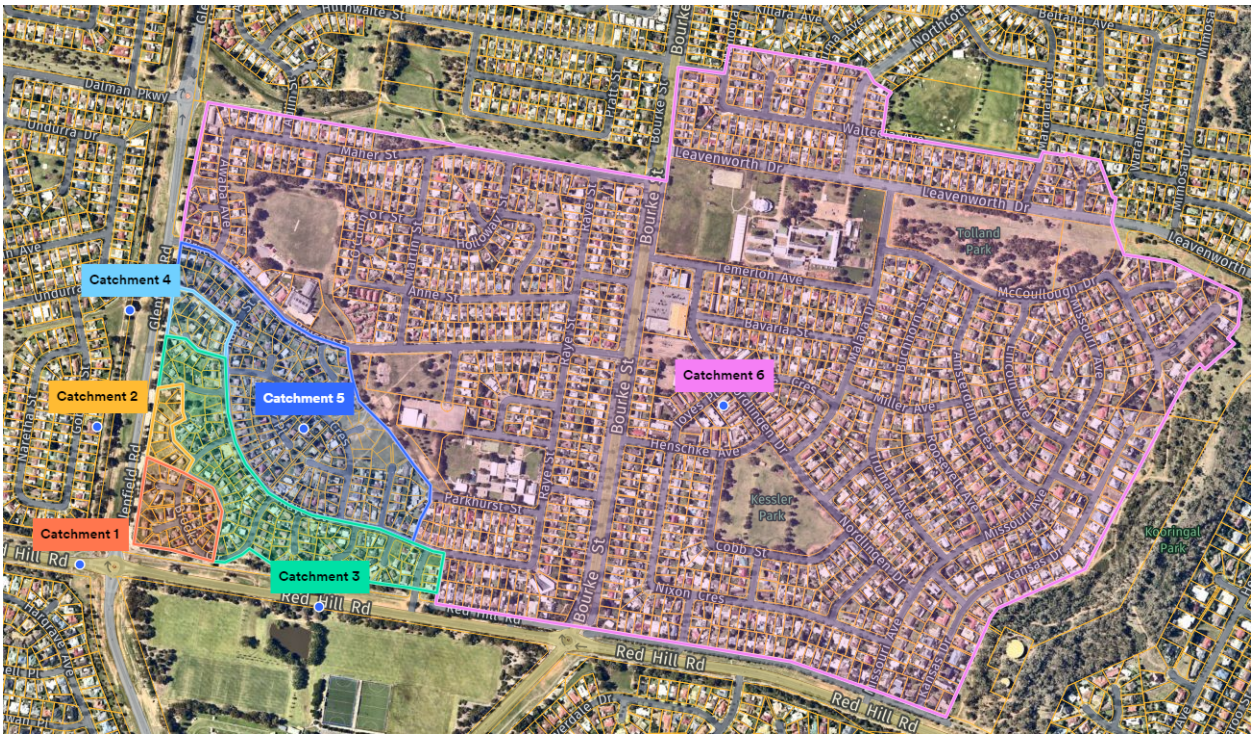
2.2 SEWERAGE

Wagga Wagga City Council is the service authority responsible for managing, maintaining, and providing upgrades to sewer reticulation networks located beyond block boundaries.

The Tolland Sewerage network is divided into six catchments, where trunk flows are directed to the north-western corner of the estate. An area breakdown is presented in **Figure 2-1**.

Gravity reticulation mains, typically DN150 – DN225, convey sewer from each of the catchments into the trunk main in the eastern road reserve of Holbrook Road. This trunk main is DN300 until Catchment 6 connects into it, north of Awaba St, where it increases to a DN375.

Figure 2-1 Sewer Catchment Area Breakdown



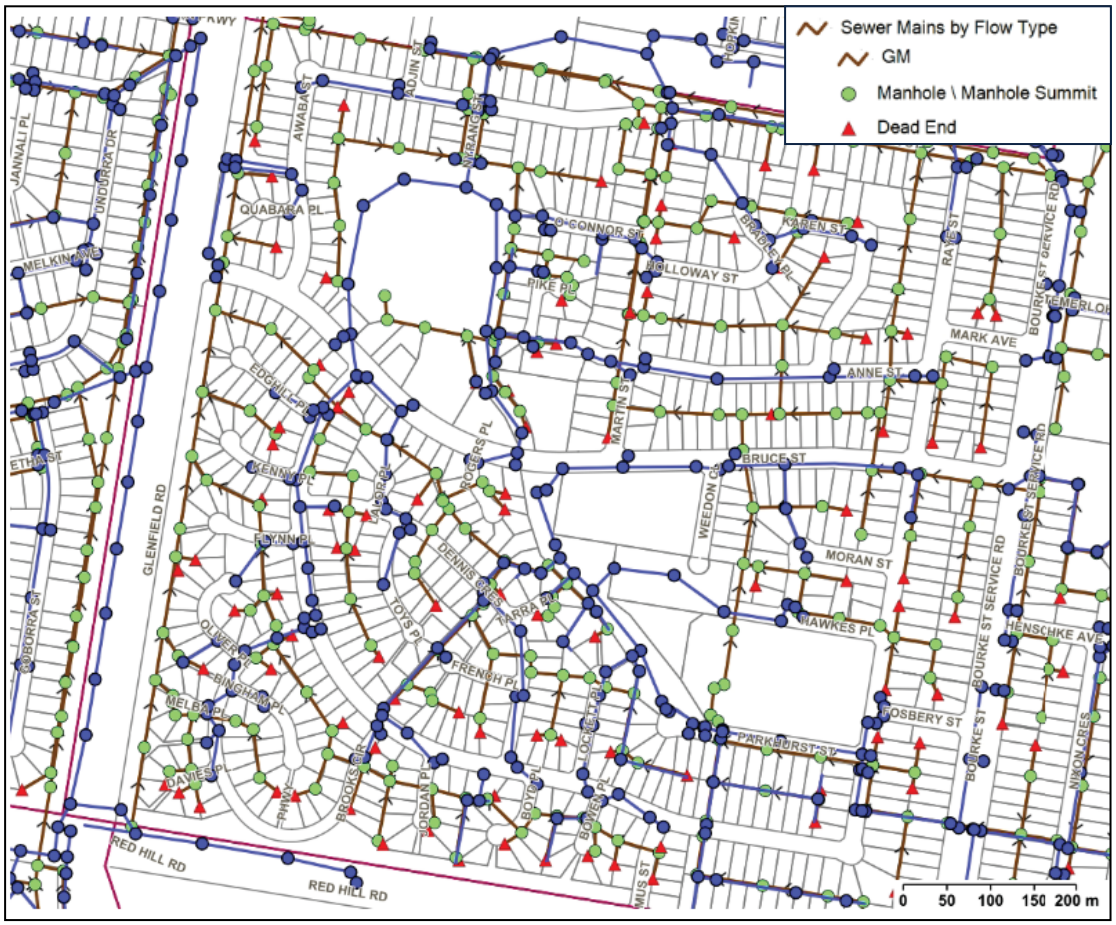
Based on aerial imagery of the existing land uses, the existing Equivalent Populations (EP) in each of the catchments was estimated and the resulting design flow calculated. Additional, information provided by Council was used to estimate the existing capacity in the reticulation mains that connect into the trunk main. This is summarised in **Table 2-1** below.

Table 2-1 Existing Sewer Catchment Details

Sub-Catchment	Area (Ha)	Equivalent Population (EP)	Design Flow (L/s)	Existing Pipe Size at Connection to Trunk Main	Existing Capacity at Connection to Trunk Main (L/s)
1	2.57	72.5	2.55	DN150	21.37
2	0.96	27.5	1.14	DN150	19.97
3	8.60	245	7.04	DN150	12.56
4	1.18	35	1.39	DN150	12.65
5	13.14	405	10.59	DN150	12.72
6	172.85	3332.5	18.94	DN375	434.73

Further details of the pipe arrangement is displayed in **Figure 2-2** below. The brown arrows denote the direction of sewerage flow.

Figure 2-2 Sewer Infrastructure Map



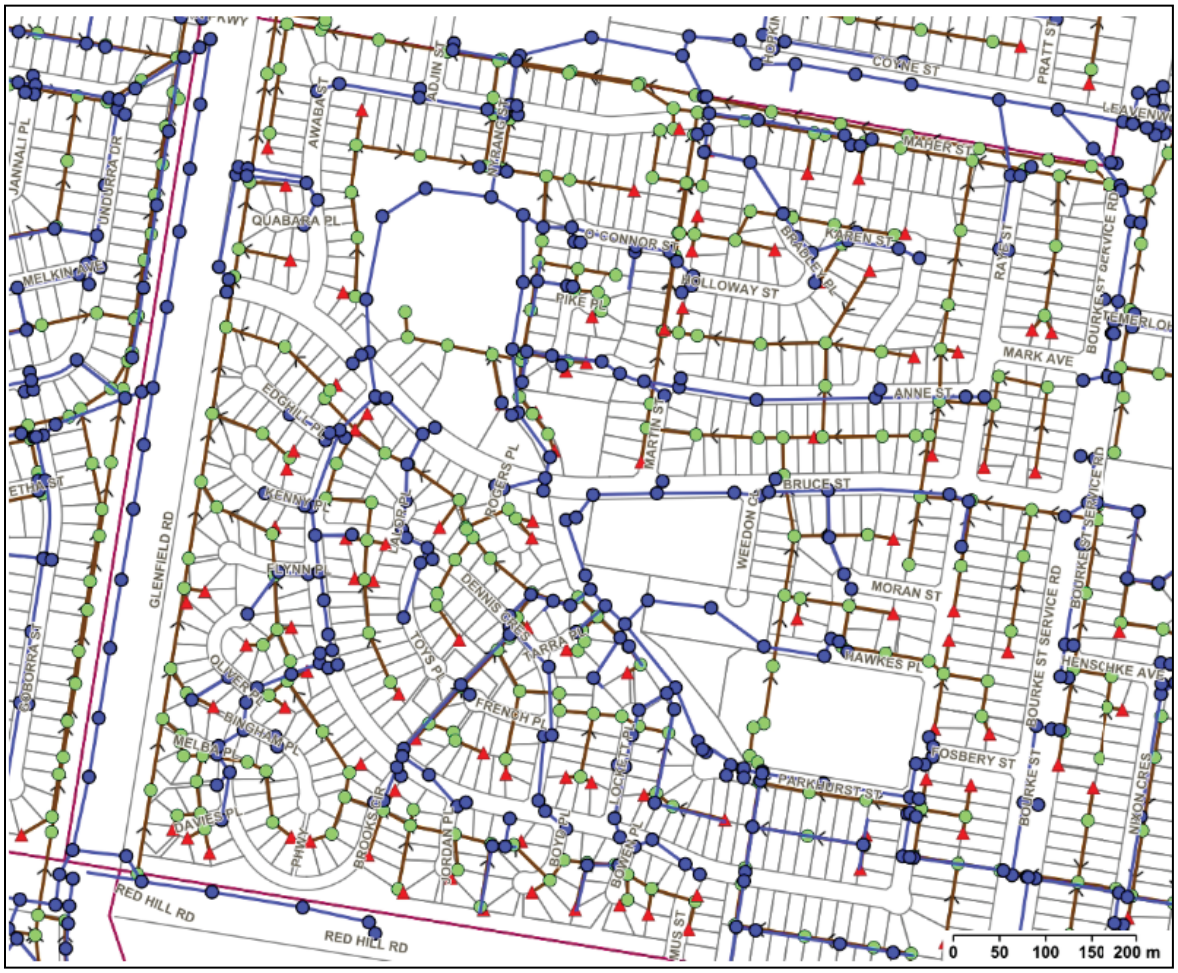
It is understood that the trunk main along Glenfield Road was initially designed to convey the sewage from Bourkelands (approx. 1000 dwellings) before it picked up the sewage from the Tolland catchments. However, through consultation with WWCC it is understood that the sewage from Bourkelands was redirected across Jubilee Park and now connects into the trunk main in the western road reserve of Glenfield Road. Therefore, the trunk main that services Tolland has no existing upstream loading. Considering the proposed Tolland works only results in a net increase of approximately 292 dwellings, the fact that the Glenfield Road trunk main was originally designed to have capacity for the approximately 1000 dwellings in Bourkelands, it is anticipated that the existing trunk main will have sufficient capacity for the proposed development without requiring upgrades.

For further information regarding service authority correspondence and indicative DBYD service locations, refer to **Appendix A**.

2.3 STORMWATER

From information provided by Wagga Wagga City Council. the stormwater within the Tolland estate is currently managed through a combination of a network of pits and pipes for low flows, and roads, swales, and a detention basin for overland flow and high flows. The blue lines and circles in **Figure 2-3** demonstrate the location of the piped stormwater infrastructure within the Tolland Estate.

Figure 2-3 Stormwater Infrastructure Map



Majority of Tolland's piped network conveys the stormwater to the trunk stormwater main located under the swale between Parkhurst St and the Chambers Park detention basin. This stormwater main is connected to several surcharge pits which allow the stormwater to overflow into the swale during large storm events. Notably, upstream of the culvert under Bruce St, the DN1350 trunk main gets reduced to a

DN375 meaning majority of the stormwater will surcharge at this point and continue to flow to Chambers Park by the swale.

Downstream of Chambers Park, the piped network continues north into a swale between Tolland and Mount Austin which transports the stormwater west into the Glenfield Road Drain. If the capacity of Chambers Park was to be exceeded, the overland flow would continue directly west, under Awaba St and Glenfield Road, into the Glenfield Road Drain.

Also within Tolland, there are four small catchments that do not convey stormwater to Chambers Park.

- There is a small catchment around Quabara Pl that pipes stormwater directly into the Glenfield Road Drain (Catchment B).
- There is a small catchment to the north of Chambers Park which connect directly into the outlet from Chambers Park (Catchment C).
- There are two small catchments in the north-eastern corner of this area of Tolland:
  - One of connects directly into the swale between Tolland and Mount Austin (Catchment D); and
  - The other connects into Mount Austin's piped stormwater network (Catchment E).

These catchments are illustrated in **Figure 2-4** below.

It should be noted that the piped network to Chambers Park (Catchment A), also services upstream flows from Bourkelands and much of the eastern half of Tolland, however, the exact extent of this is unknown.

Preliminary analysis of the existing DN1350 trunk main under the swale shows that it does not have capacity to fully service the Tolland and Bourkelands Catchment during a 10% ARI event. Therefore, it is expected that the swale is utilised during more frequent storm events.

Figure 2-4 Stormwater Catchment Map

A survey of Chambers Park shows that it has an existing capacity of approximately 15,400m^3. Preliminary analysis of the outlet from Chambers Park indicates that the existing DN1500 pipe does not have sufficient capacity for a 10% ARI event and is instead likely designed to only allow pre-developed flows from Tolland.

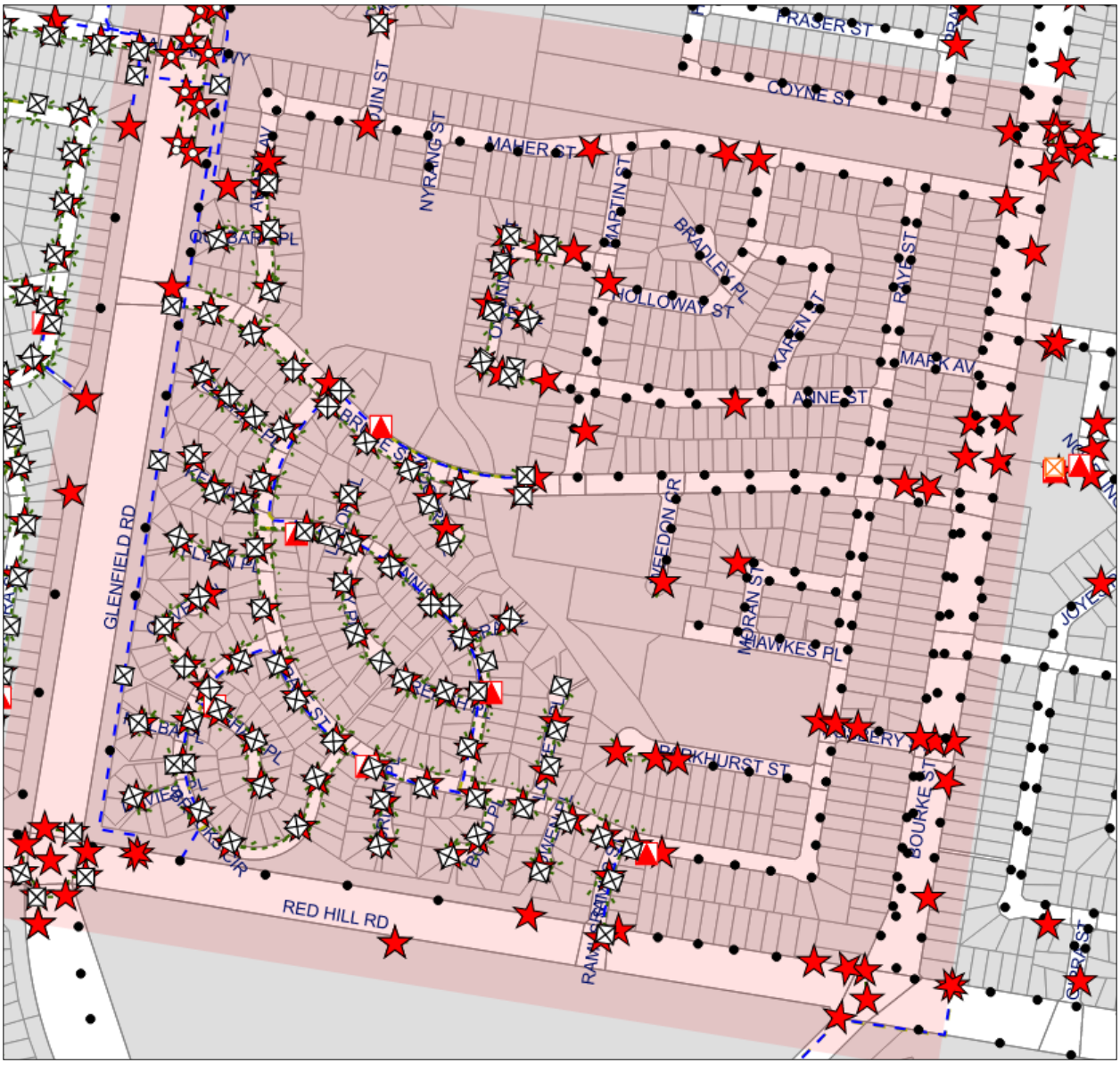
2.4 ELECTRICAL

The following electrical infrastructure information was compiled from DBYD information and initial advice from Essential Energy:

- Majority of the Estate is serviced by Low Voltage (LV) underground cables.
- The rest of the Estate is serviced by LV overhead wires. These areas include:
  - Raye St, east of Ramus St;

  - Bruce St, east of Martin St;
  - Martin St;
  - Weedon Cres; and
  - Maher St.
- Two High Voltage (HV) underground cables provide the primary connection points from the HV overhead line along the northern verge of Red Hill Rd.
  - These two connection points are located at Ramus St and south of Brooks Cir.
- The HV underground cable at Ramus St connects to a ground substation east of the Ramus St / Raye St intersection before terminating.
- The HV underground cable south of Brooks Cir services majority of the Estate through a series of ground substations located at:
  - Western end of Bingham Pl;
  - Raye St, between Brooks Cir and Jordan Pl;
  - Dennis Cres, near French Pl;
  - Western end of Dennis Cres; and
  - Bruce St, between Raye St and Roosters Pl.
- In total there are 6 pad mounted substations within the Estate.
- There is a HV underground cable running along the eastern road reserve of Glenfield Rd.
- There are also overhead power lines running along the eastern road reserve of Glenfield Rd. It is unknown whether this overhead line is low voltage or high voltage. Consultation with Essential Energy may be needed to determine this. These power lines appear to be approximately 4m from the existing property boundaries.
- For further information regarding service authority correspondence and indicative DBYD service locations, refer to **Figure 2-5** below and **Appendix A**.

Figure 2-5 Existing Electrical Infrastructure



2.5 TELECOMMUNICATION

The following telecommunication information has been compiled from DBYD investigations and consultation with the relevant service providers.

2.5.1 Telstra/NBN

All existing lots within the Tolland Estate are currently serviced by Telstra and NBN infrastructure. Within the Estate, there are 7 manholes to service these assets. These are located at:

- Bruce St, at the intersection with Glenfield Rd;
- Bruce St, at the intersection with Raye St on the western side of the Estate;
- Bruce St, near the intersection with Rogers Pl;
- Bruce St, at the intersection with Martin St;
- Bruce St, at the intersection with Weedon St;
- Bruce St, at the intersection with Raye St on the eastern side of the Estate; and
- Bruce St, at the Intersection with Bourke St.
- All conduits are PVC.

2.5.2 Optus

Optus have identified that they have an existing Optus fibre in the Telstra conduit along the eastern verge of Glenfield Rd. There was no Optus infrastructure identified within the Subject Site.

2.5.3 AARNet

AARNet have identified that they have an existing fibre optic asset along the western verge of Glenfield Rd. There was no AARNet infrastructure identified within the Subject Site.

2.6 GAS

All existing lots within the Tolland Estate are currently serviced by APA Gas infrastructure. From the DBYD data, the following was identified:

- The majority of the distribution pipes throughout the Estate are 40mm, 50mm, or 63mm Polyethylene.
- There are some distribution pipes throughout the Estate, mainly north or Bruce St, that are 50mm Galvanised Steel. Of particular note, Galvanised Steel pipes are located:
  - Along Oliver Pl, 2m inside the road reserve boundary; and
  - Along the northern part of O'Connor St, between 2.3m and 3.5m inside the road reserve boundary.
- The main distribution pipes that supply gas to the Estate are:
  - A 150mm Cast Iron pipe at the western entrance of the Estate runs down Bruce St, into Raye St and changes into a 90mm Polyethylene pipe near the intersection with Jordan Pl, before terminating at the intersection with Martin Cres;
  - A 110mm Polyethylene pipe along the northern verge of Red Hill Rd supplying 2 40mm Polyethylene pipes in Ramus St;
  - A 160mm Polyethylene pipe outside the northern boundary of the Estate that supplies a 50mm Galvanised Steel Pipe in Adjin Pl;

Existing Services

- A 150mm Cast Iron pipe runs from Bourke St, down Fosbery St, and turns into Parkhurst St before changing into a 63mm Polyethylene pipe at the turning circle of Parkhurst St. From this line there is a 50mm Galvanised Steel service line, servicing Red Hill School.
- A 100mm Cast Iron pipe along Bourke St that supplies a 50mm Galvanised Steel pipe along Mark Ave.

Advice from APA gas revealed that there are currently works undergoing to upgrade the gas main along Red Hill Road.

For further information regarding pipe sizing, material, and location, refer to **Appendix A**.

3.0 PROPOSED SERVICES

3.1 POTABLE WATER

3.1.1 Trunk Mains

As discussed in **Section 2.1**, the Subject Site is serviced by multiple trunk water supply mains ranging in size from DN225 to DN525. Due to their size, it is expected that the existing trunk infrastructure will have sufficient pressure and capacity to service the proposed 292 additional dwellings without requiring upgrades. However, consultation with Riverina water is will be required through design development.

3.1.2 Reticulation Mains

Using available information from Riverina Water and DBYD, preliminary assessments were undertaken to approximate the capacity of the existing DN200 reticulation mains within the Subject Site and the capacity required to service the proposed demand. The assessment was completed under the conservative assumption that the entire Subject Site is solely serviced by the trunk mains on Glenfield Road and Holbrook Road. As the pressure head in the existing mains is currently unknown, three different values were assumed. From the assessment, if as little as 20m of head (a conservative minimum) is available at the points where the DN200 mains branch off from then DN375 trunk or DN525 trunk, the existing flow capacity will be sufficient to service the proposed demand.

Whilst it is expected that the pressure and capacity within the existing reticulation infrastructure will be sufficient to service the proposed development, early and ongoing consultation with Riverina Water on a stage-by-stage basis is recommended to inform future design.

The results of the calculations are summarised in **Table 3-1**.

Table 3-1 Water Mains Capacity and Design Flow

Main Location	Assumed Head (m)	Capacity (l/s)	Required Design Flow (l/s)
Ø200 AC branches off from Ø375 at Glenfield Rd	60	124.97	35.3
	40	91.87	
	20	43.42	
Ø200 AC branches off from Ø525 at Red Hill Rd	60	122.71	35.0
	40	94.22	
	20	55.66	

Due to the proposed development resulting in the existing layout of Tolland being altered, some existing infrastructure will need to be decommissioned and new infrastructure will need to be installed. Drawing no. 50521067-C1025 provides an indication of the new infrastructure that may be required. As much of the existing water infrastructure is asbestos cement, challenges in connecting proposed PVC and DICL infrastructure to these existing AC assets are likely and a strategy for these works will need to be developed in consultation with Riverina Water. The water masterplans developed for the proposed layout identify that pipe-to-pipe connections ae likely to be unavoidable, and additional consultation with Riverina Water will be required to determine the adequacy of this proposal.

It is noted that multi-unit developments are likely to have different pressure head requirements to the single lot residential which currently makes up the suburb. As such, Riverina Water are likely to have building specific requirements for multi-unit developments within the masterplan area. Early and ongoing consultation is recommended.

3.2 SEWERAGE

3.2.1 Trunk Mains

As discussed previously, the Glenfield Road trunk main originally serviced the suburb of Bourkelands which has approximately 1000 dwellings, or 2500 EPs. The proposed development results in a net increase of 292 dwellings, or 730 EPs, which is 29% of Bourkelands. Therefore, considering the trunk main was designed to service Bourkelands, it is not expected that the Tolland Redevelopment would result in the capacity of this trunk main being exceeded. Additionally, from the information available to Stantec regarding the trunk main, at a minimum, there is over 40L/s of spare capacity available in the sections of the trunk main adjacent to Tolland. Considering the proposed development only results in a maximum increase of 7.03L/s, the capacity of the main is not anticipated to be an issue.

From separate consultation with Wagga Wagga City Council, Stantec are aware that there is a future Southern Growth Area for Wagga Wagga which is planned for residential development. This Southern Growth Area is expected to result in over 4000 new dwellings and the proposed sewer strategy is to service approximately 2100 of these dwelling via the trunk main in the eastern verge of Glenfield Road. This increased loading is expected to exceed the capacity of the Glenfield Road trunk main and upgrades to the main may be required at realisation of that development. Therefore, it is recommended that further consultation with Wagga Wagga City Council be undertaken to develop a plan for contributions towards these asset upgrades if required.

3.2.2 Reticulation Mains

As discussed in **Section 2.1**, the sewerage network for the existing Tolland suburb can be divided into six catchments. It is expected that these catchment boundaries will remain consistent for the proposed densification and layout for Tolland. Based on the proposed layout of Tolland, five of these catchments

will have an increase in Equivalent Population and one will have a slight decrease. The changes in EP and loading on the connections to the trunk main are summarised in the below table.

Table 3-2 Proposed Sewer Catchment Details

Sub-Catchment	Proposed Equivalent Population	Change in Equivalent Population	Proposed Design Flow (L/s)	Change in Design Flow (L/s)	Existing Pipe Size at Connection to Trunk Main	Existing Capacity at Connection to Trunk Main (L/s)
1	112.5	40	3.44	0.89	DN150	21.37
2	47.5	20	1.68	0.54	DN150	19.97
3	327.5	82.5	8.82	1.48	DN150	12.56
4	32.5	-2.5	1.32	-0.07	DN150	12.65
5	525	120	12.54	1.95	DN150	12.72
6	3747.5	470	21.18	2.24	DN375	434.73
	Total	**730**	**48.72**	**7.03**		

From the table, the introduction of 292 dwellings across the six catchments results in relatively minor increases in the design flow for the reticulation sewer network. For five of the catchments, the capacity of the pipe at the connection to the trunk main is significantly larger than the design flows produced by the catchments. Therefore, it is expected that all the reticulation sewer infrastructure in these catchments would be suitable for the proposed development. For Catchment 5, however, the capacity of the pipe that connects to the trunk main is only slightly larger than the proposed design flow. As such, further investigations should be undertaken as part of the detailed design of this catchment to determine if, and to what extent upgrades of the existing reticulation mains may be required.

As part of the proposed development, as much of the existing reticulation sewerage infrastructure as possible will be utilised, however, new sewerage infrastructure will need to be installed to service the new lot layout. Drawing 50521067-C1030 from the Masterplan indicates the proposed location of this new infrastructure. The condition of the existing sewerage infrastructure is currently unknown. Further analysis of the existing mains is proposed on a stage-by-stage basis during to ensure effective service life of the assets is maintained.

3.3 STORMWATER

The proposed works will result in the impervious area within the Subject Site increasing by up to four hectares, or 8% of the Subject Site. Due to this, there will be an increase in stormwater runoff for the site. Initial assessments predict this increase will be approximately 0.85m^3/s in the 10% ARI event and 1.3m^3/s in the 1% ARI.

3.3.1 Trunk Mains

As discussed previously, from the available data, the existing trunk infrastructure does not appear to have sufficient capacity to fully service the 10% ARI within the piped network for the current Tolland layout. Considering the piped network has been designed to surcharge into the overland flow system, consultation with WWCC should be undertaken to determine if the Tolland network should have the ability to contain the 10% ARI event wholly within the pipes system or if surcharging is acceptable. If the surcharging is not desired, it is recommended further investigations should be conducted to confirm the capacity of the pipe infrastructure compared to the expected loading, as well as additional consultation with WWCC undertaken to develop a plan for contributions towards the upgrades of this infrastructure if required.

Due to the increased impervious area within the catchment, the Chambers Park detention basin will also likely require upgrading to increase its capacity. Additionally, due to the proposed layout of Tolland, the detention basin will have to be relocated to the west slightly. Preliminary designs show that by moving the basin and increasing the height of the spillway slightly, the volume of the basin can be increased by nearly 50%. This is detailed further in **Table 3-3**. Considering the relatively low increase in runoff generation for the 1% ARI event, it is anticipated that this volume increase will be suitable to effectively detain the increased flows. A more detailed analysis as part of the detailed design phase is recommended to confirm this.

Table 3-3 Chambers Park Basin Volume Assessment

Configuration	Spillway Height (AHD)	Storage Volume (m^3)
Existing	201.80	15,450
Proposed	202.20	22,586

Additionally, it should be noted that WWCC have advised that they are in the process of undertaking an audit of all their detention basins within the Glenfield Road drain catchment, especially the upstream basins like Chambers Park. It is recommended that the findings of this audit be taken into consideration when undertaking the detailed design of this basin.

3.3.2 Reticulation Mains

The proposed stormwater for the development will utilise as much of the existing stormwater infrastructure network as practical. Minor alterations to the existing network as well construction of new infrastructure will be required to service the new layout of the development. Drawing no. 50521067-C1030 displays the proposed new stormwater infrastructure, for the new layout.

As discussed above, the proposed development results in an approximately 8% increase in impervious area, which subsequently results in a 0.85m^3/s or 14.5% increase in the flow generated by the site. Based on this, it is anticipated that only minor upgrades to the existing stormwater infrastructure will be required

to service the development. It is recommended that further survey and analysis of the existing stormwater infrastructure be undertaken during the detailed design of each stage of the development to confirm this.

The condition of the existing stormwater infrastructure is currently unknown. Further analysis of the existing mains is proposed on a stage-by-stage basis during to ensure effective service life of the assets is maintained.

3.4 ELECTRICAL

Preliminary advice suggests that the electrical network has sufficient capacity to service the proposed masterplan. Extension and augmentation of infrastructure is required throughout the new roads to ensure all new dwellings are serviced efficiently. Preliminary assessments suggest that additional substations are likely to be required to service the uplift in residential yield. It is expected that between three and five new pad mount substations are likely to be required to meet this demand.

It is recommended that an electrical capacity assessment be undertaken during the preliminary design phase for each stage of works to confirm the preliminary assessments and if any additional infrastructure upgrades are required beyond those stated.

3.5 TELECOMMUNICATION

3.5.1 Telstra/NBN

Tolland is currently serviced by Telstra and NBN copper and fibre optic networks. It is unlikely that infrastructure upgrades to the Telstra network will be required, however, extension and augmentation of the existing pit and pipe network to follow the proposed road layout will be required.

Further investigation with Telstra's Network Integrity group may be required for any future service or plant relocations.

It is recommended that consultation with both entities be undertaken during the early design phases to reduce the risk of lengthy delays in approvals for any required upgrade works.

3.5.2 Optus

This asset is unlikely to have an impact on, or be impacted by the proposed development.

3.5.3 AARNet

This asset is unlikely to have an impact on, or be impacted by the proposed development.

3.6 GAS

As mentioned in **Section 2.6**, Tolland is serviced by an existing gas network which extends throughout the entire estate. As part of the proposed development, the 200 new social and affordable dwellings that will be constructed will not be connected to the gas network. Therefore, the net increase in dwellings that will connect to the gas network is 92. Considering the size of the surrounding infrastructure, and the fact the Red Hill Rd is in the process of being upgraded, it is anticipated that the existing network has sufficient capacity for the proposed development. Extension and augmentation may be required throughout the new road network to enable servicing of individual lots.

It is recommended that the consultation be undertaken with APA Gas during the detailed design phases to confirm network capacity and service availability.

4.0 CONCLUSION

Based on the available information, with the exception of stormwater, it is not expected that any of the existing trunk infrastructure for the utilities will experience any capacity or service issues due to the proposed development. For the stormwater trunk infrastructure, preliminary assessments show that the pipes do not currently have capacity for the design storm. However, there is suitable capacity within the overland flow infrastructure. For the reticulation infrastructure, all utilities are expected to have sufficient capacity and alterations or new infrastructure should only be required to service the new layout of the Estate.

APPENDIX A

DBYD AND SERVICE AUTHORITY CORRESPONDENCE