Utilities Infrastructure

Analysis Report

Department of Regional NSW

08 November 2023

→ **The Power of Commitment**

Project name	DRNSW - Richmond Valley RJP
Document title	Utilities Infrastructure | Analysis Report
Project number	12621341
File name	12621341-REP_Utilities Infrastructure Analysis Report_.docx

			Reviewer		Approved for issue		
Status Code	**Revision**	**Author**	**Name**	**Signature**	**Name**	**Signature**	**Date**
S4	0	T Cook L Sharpe D Uncle	N Malcolm T Cook		N Malcolm		25/10/22
S4	1	T Cook L Sharpe D Uncle	N Malcolm T Cook		N Malcolm		29/11/22
S4	2	T Cook L Sharpe D Uncle	N Malcolm T Cook		N Malcolm		10/01/23
S4	3	T Cook L Sharpe S Douglas	T Cook		N Malcolm		15/09/23
S4	4	T Cook L Sharpe	T Cook		N Malcolm		29/09/23
S4	5	T Cook L Sharpe	T Cook		N Malcolm		08/11/23

GHD Pty Ltd | ABN 39 008 488 373

230 Harbour Drive,

Coffs Harbour, New South Wales 2450, Australia

T +61 2 6650 5600 | **F** +61 2 9475 0725 | **E** cfsmail@ghd.com | **ghd.com**

Contents

Table index

Figure index

Appendices

1. Introduction

GHD Pty Ltd (GHD) was engaged by Department of Regional NSW (DRNSW) to prepare the Utilities Infrastructure Analysis Report for three areas that form the Richmond Valley Regional Job Precincts (RJP's) as located in Casino, NSW as shown in Figure 1.1.

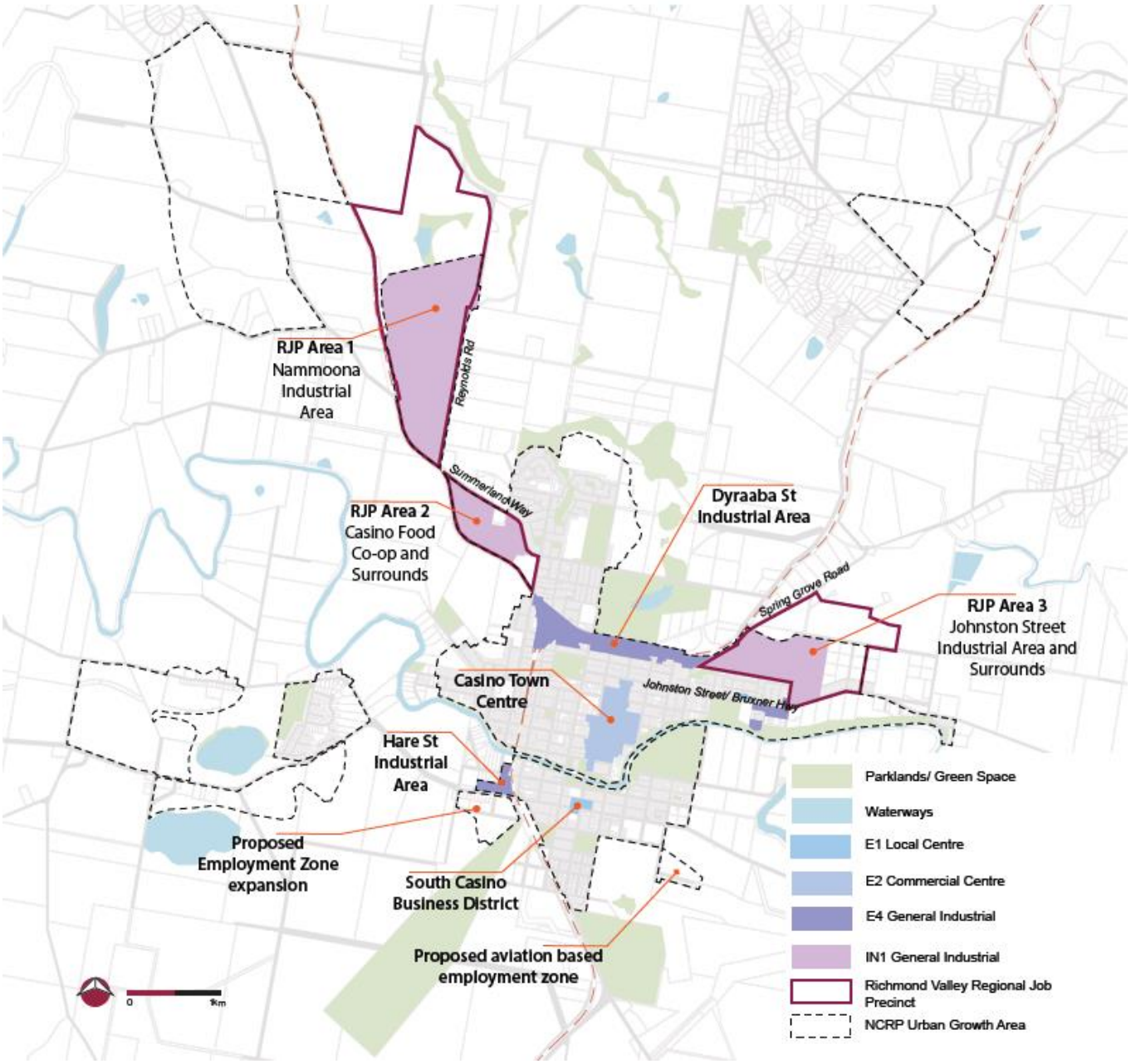

Figure 1.1 Richmond Valley Regional Job Precincts

Source: *Draft Richmond Valley Regional Jobs Precinct Structure Plan*

1.1 Purpose of this report

The purpose of the report is to highlight the key risks, issues, constraints, key insights, opportunities and assess three options associated with the provision of services for the proposed RJP developments. For the preferred option, recommendations for infrastructure concept designs are detailed along with updates to contribution plans. The outcomes of this report will lead into the development of the *Draft Richmond Valley RJP Structure Plan* for the three RJP's. The services analysed in this report included:

– Water supply
– Wastewater
– Trade waste
– Stormwater
– Waste management and recycling
– Electrical and gas
– Telecommunications and internet

1.2 Scope and limitations

This report: has been prepared by GHD for Department of Regional NSW and may only be used and relied on by Department of Regional NSW for the purpose agreed between GHD and Department of Regional NSW as set out in this report.

GHD otherwise disclaims responsibility to any person other than Department of Regional NSW arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section 1.3 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

This report has been prepared to inform the structure planning process for Richmond Valley RJP. The findings and recommendations have been developed where possible in collaboration with other disciplines. It is acknowledged that some of the recommendations in this report may not be included in the *Draft Richmond Valley RJP Structure Plan*, such as where they are out of scope for the RJP, conflict with other elements of the project or are proposed to be managed via an alternate mechanism.

1.3 Assumptions

This analysis has relied on data as referenced in the following sections. This data includes but is not limited to Council, State Government GIS data, information and studies which are publicly available. Where consultation has been appropriate this has also been used to support investigation and evaluation of needs within the regional job precincts.

Infrastructure staging information has been estimated and is dependent on the following:

– Forward funding of infrastructure by Council or developers
– Development timing
– RVC adoption of water demand scenario 2 (planning scenario)

This report is subject to, and must be read in conjunction with, the limitations set out and the assumptions and qualifications contained throughout the report.

2. Review of information

2.1 Data review

The following data was supplied by Richmond Valley Council, DRNSW, Gyde and various State Government agencies:

RJP planning

- Draft Casino Place Plan
- Draft Richmond Valley Regional Jobs Precinct Structure Plan
- Richmond Valley Regional Job Precincts Action Plan

Water supply

- Casino Water Security Assessment 2021
- Casino Water Supply Scoping Study 2022
- Casino Water Treatment Plant (WTP) process assessment and optimisation report
- Casino water model (in H2OMap Water) and additional Gays Hill data
- Casino water billing and WTP production data

Wastewater

- Casino sewer network servicing strategy
- Casino Sewage Treatment Plant (STP) long term strategy report 2019
- Wastewater network model (in InfoSWMM)
- Casino STP operations data 2014 – 2018
- RVC's trade waste policy
- 2007 Model Policy for Discharge of Liquid Trade Waste to the Sewerage System
- Stormwater
- Casino's existing stormwater conveyance system

Waste management and recycling

- Current waste management information and future plans
- Energy from waste infrastructure plan and project information
- Regional Waste Management Strategy
- Energy from Waste Infrastructure Plan (the Infrastructure Plan)
- NSW Waste and Sustainable Materials Strategy 2041 (the Waste Strategy)
- Electrical and gas
- Essential Energy GIS spatial database
- Essential Energy DAPR 2020

Telecommunications and internet

- NBNCo availability map

Flooding

- Casino flood study 1998
- Casino flood model 1999
- Casino Floodplain Risk Management Plan 2002
- Regional Jobs Precinct Flood Impact Assessment Stage 4 Final Report 2023
- Technical Note – Richmond Valley Regional Jobs Precinct: Additional Fill Scenario Testing 2023

GIS spatial data

– Council and State Government GIS data for the various services
– RVC aerial imagery overlayed road and flooding layers

2.2 Site inspection

A site inspection was undertaken by GHD personnel on 8 December 2021. Photographs were taken of the RJP Area 3 Johnston Street Industrial area and surrounds precinct.

3. Regional Job Precincts (RJPs)

3.1 Area 1 – Nammoona Industrial precinct

GHD has considered the proposed vision for the precinct, key site attributes, known limitations, key constraints as summarised in the *Draft Richmond Valley RJP Structure Plan* and *Draft Casino Place Plan*.

3.1.1 Site summary

The Nammoona Industrial precinct currently contains a mix of infrastructure, agribusiness and both council owned and private industrial uses. The *Draft Richmond Valley RJP Structure Plan* recommendations for the Nammoona industrial precinct are shown in Figure 3.1.

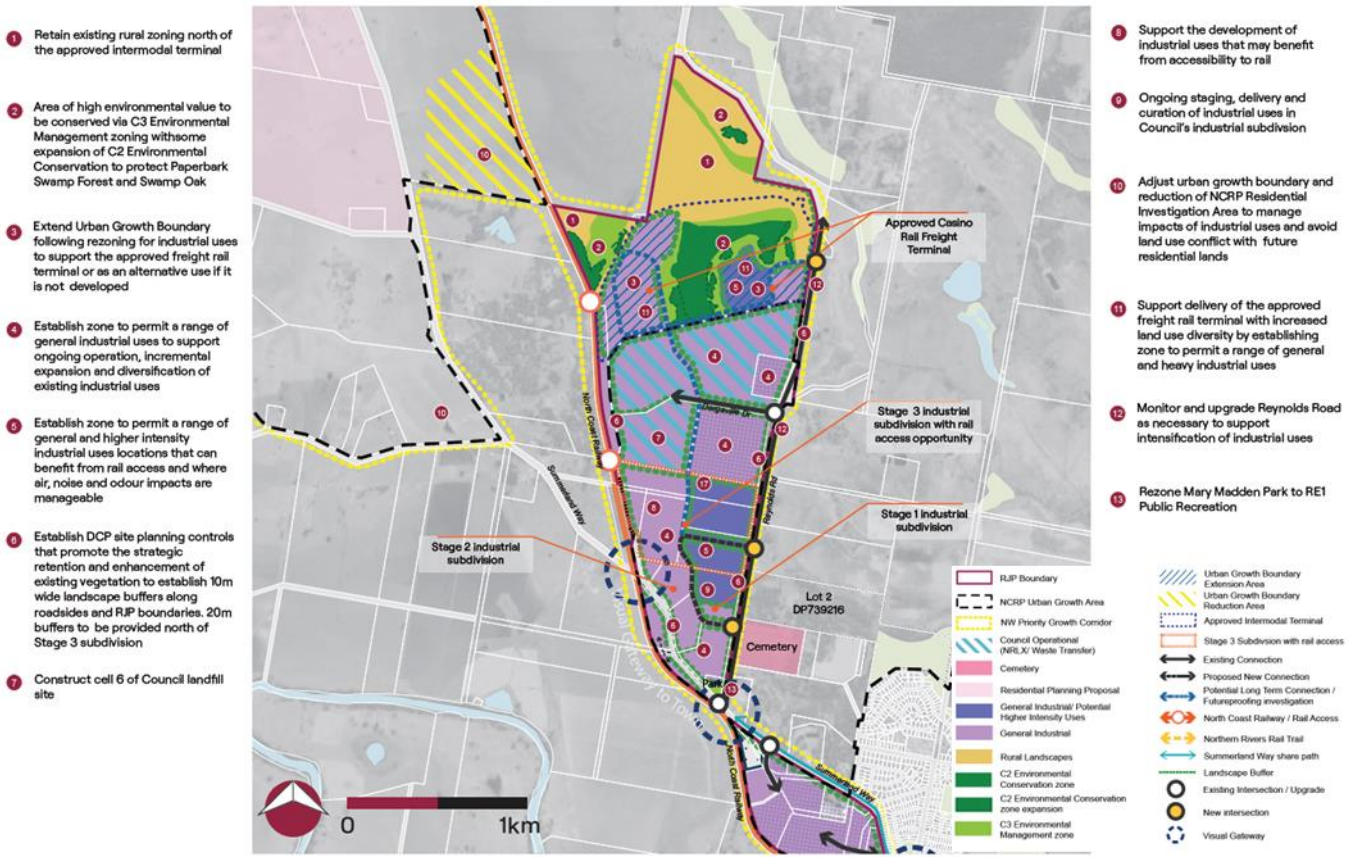

Figure 3.1 Regional Job Precinct 1 – Nammoona Industrial Precinct

Source: *Draft Richmond Valley Regional Jobs Precinct Structure Plan*

3.1.2 Existing zoning in and around site

Nammoona Industrial precinct is zoned IN1, RU1 Primary Production with additional use of a rail freight transport facility is permitted under Schedule 1 of the Richmond Valley Local Environmental Plan (RVLEP) for land at Reynolds Road, Casino, being Lot 2, DP 547143. Surrounding land includes zoning E2 Environmental Conservation.

3.1.3 Existing land use

Existing industrial activities are currently focused within the central portion of the area, including Council-owned assets (Northern Rivers Livestock Exchange and Richmond Valley Waste Management Centre) as well as several privately operated industries. This area also has direct heavy rail frontage to the North Coast Railway line but only provides limited access to this infrastructure (e.g., loading/unloading rail ballast). Within the southern portion, 13 ha of land is already under construction to provide 9 industrial lots.

3.2 Area 2 – Casino food co-op and surrounds precinct

GHD has considered the proposed vision for the precinct, key site attributes, known limitations, key constraints as summarised in the *Draft Richmond Valley RJP Structure Plan* and *Draft Casino Place Plan*.

3.2.1 Site summary

The Casino food co-op and surrounds precinct is the largest employment centre in Casino. This is currently a single-user area but does support a variety of activities. Several different activities are undertaken within the complex, with cattle yards supporting an abattoir and tannery. The area additionally includes the towns water supply infrastructure. The *Draft Richmond Valley RJP Structure Plan* recommendations for the Casino food co-op and surrounds precinct are shown in Figure 3.2.

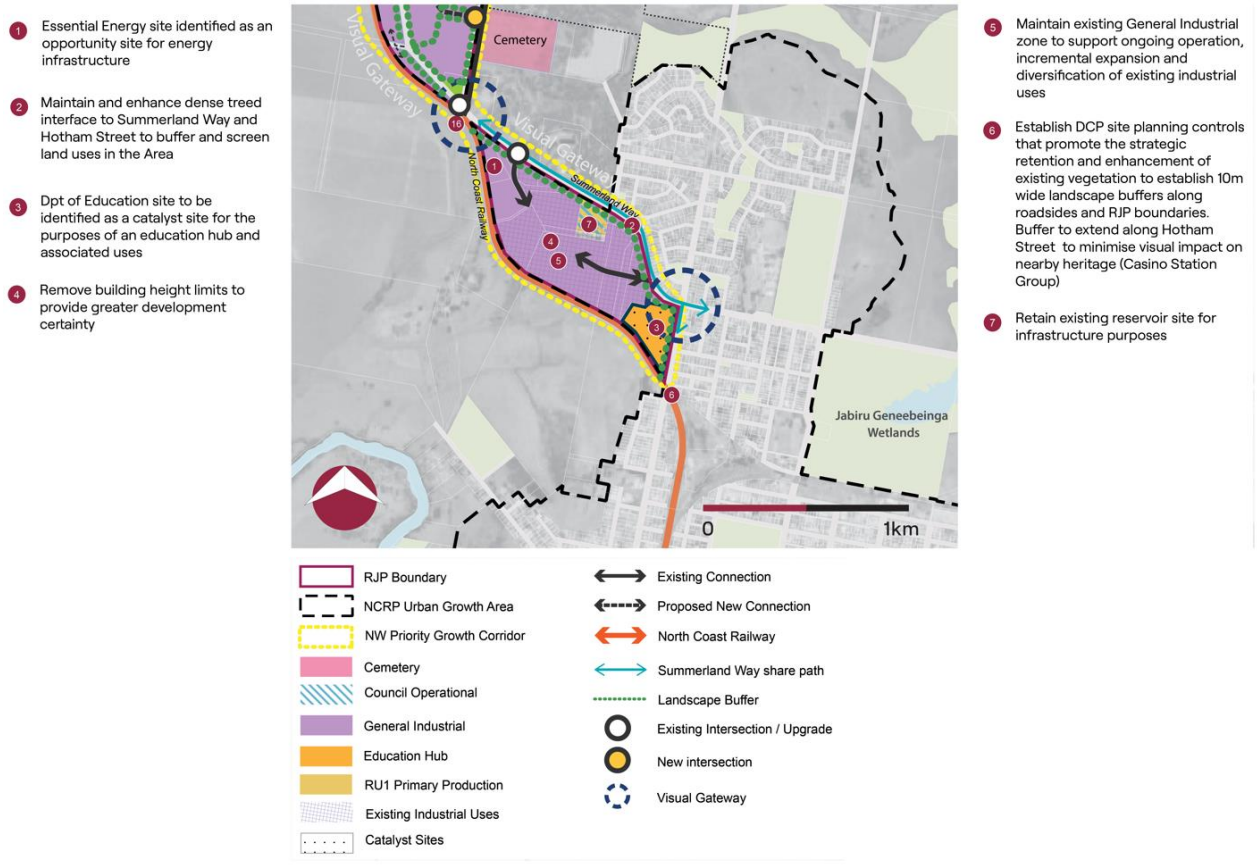

Figure 3.2 Regional Job Precinct 2 – Casino Food Co-op and surrounds Precinct

Source: *Draft Richmond Valley Regional Jobs Precinct Structure Plan*

3.2.2 Existing zoning in and around site

The three properties adjoining the complex are all owned by infrastructure providers, including Essential Energy, Richmond Valley Council, and NSW Education.

The land acquired by Essential Energy previously intended to accommodate a substation. This is currently zoned IN1 Light Industry, so would be immediately capable of supporting a variety of uses, with consent.

Richmond Valley Council-owned land is part of the town's water supply network. This land is zoned RU1 Primary Production, so may rely on a rezoning to facilitate further development (depending on the use).

Land owned by the Minister for Education is currently zoned R1 General Residential and hosts a variety of activities connected to the High School as well as other community uses.

3.2.3 Existing land use

The Casino Food Co-op (formerly the Northern Co-op Meat Company) Complex is already the largest employment centre in Casino. Several different activities are undertaken within the complex, with cattle yards supporting an abattoir and tannery.

3.3 Area 3 – Johnston Street Industrial area and surrounds precinct

GHD has considered the proposed vision for the precinct, key site attributes, known limitations, key constraints as summarised in the *Draft Richmond Valley RJP Structure Plan* and *Draft Casino Place Plan*.

3.3.1 Site summary

Johnston Street Industrial area and surrounds currently contains a mix of industrial, agribusiness uses as well as the Casino STP and Richmond Valley Events Centre (Primex). The *Draft Richmond Valley RJP Structure Plan* recommendations for the Johnston Street and STP industrial areas are shown in Figure 3.3.

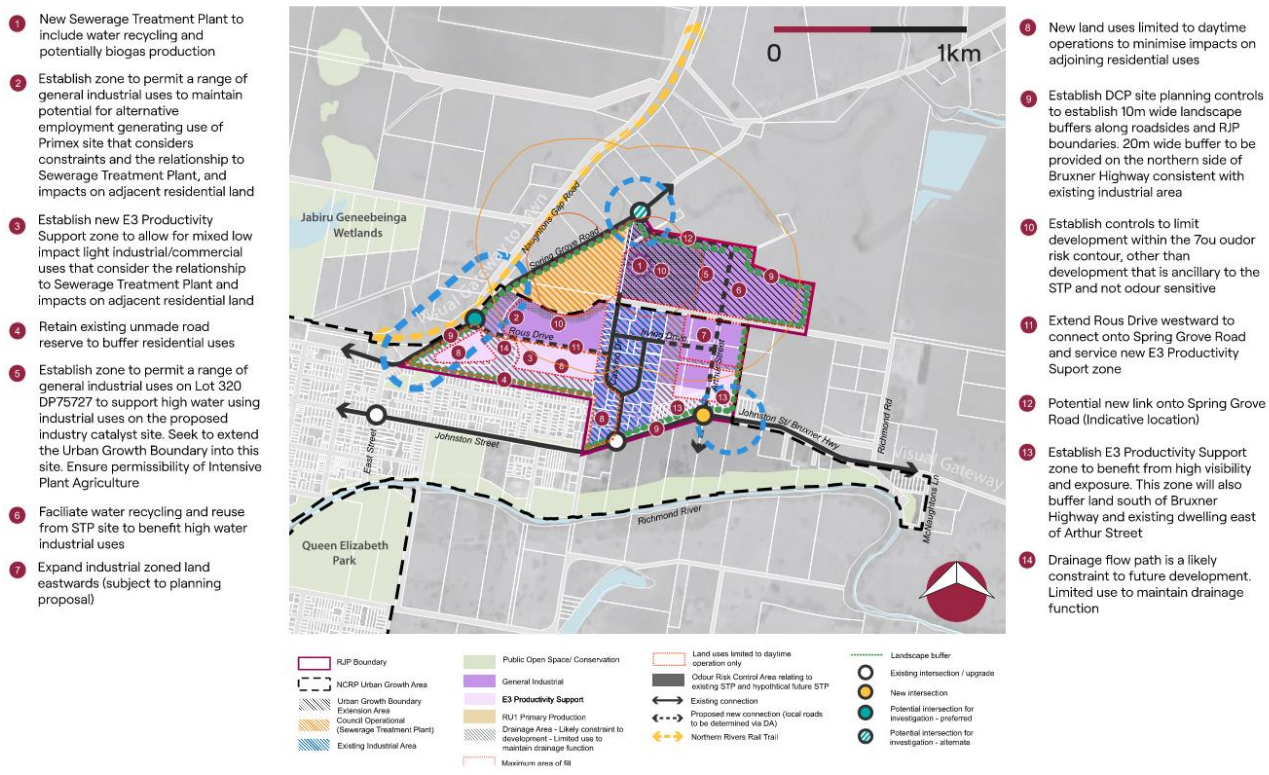

Figure 3.3 Regional Job Precinct 3 – Johnston Street Industrial area and surround

Source: Revised Area 3 Draft Richmond Valley RJP Structure Plan Concept

3.3.2 Existing zoning in and around site

The existing zoning for Area 3 consists of:

– IN1 General Industrial
– RU1 Primary Production
– E2 Environmental Conservation

3.3.3 Existing land use

Area 3 currently contains a mix of industrial, agribusiness uses as well as the Casino STP.

4. Existing services

4.1 Water supply

4.1.1 General

The town of Casino has its raw water sourced from the Richmond River, upstream of Jabour Weir with treatment at the Casino Water Treatment Plant (WTP) to the North-West of the township along Summerland Way. The WTP has a nominal treatment capacity in excess of 22 mega litres (ML) per day (d) but only a reliable capacity of 18 ML/d (noted by RVC in meeting on 30 November 2021). While recent water demands within Casino have not been increasing (noted by RVC in meeting on 30 November 2021) as predicted in the 2015 GHD Northern No.1 Reservoir Investigation where 0.5%, 1% and 1.5% growth rate to PDD was modelled. The *Casino Water Supply Scoping Study* states a 0.5% growth rate to be used as recommended by RVC.

Storage from the WTP is in the three primary Northern Reservoirs (located at the junction of Summerland Way and Rosewood Av), totalling 17.75 ML with top water level (TWL) 70.71 m which supplies the areas North of the Richmond River. A secondary Southern Reservoir (located at the junction of Hare Street and Walker Street and fed via gravity from the Northern Reservoirs) of 3.26 ML with TWL 70.67 m supplies to the remaining areas south of the Richmond River. A booster pump (currently not required) is maintained and operated with a re-chlorination station both located after the rail bridge river crossing on a diameter nominal (DN) 300 main. The main increases chlorine levels in the south Casino supply zone and directly supplies the southern reservoir. An additional DN300 main connection at the Centre St River crossing provides security to the southern supply zone though is currently valved off to distinguish the different supply zones.

The RVC has a desired standard of service (DSS) minimum pressure of 12 m with the peak day demand (PDD) services pressure throughout the town as shown in Figure 4.1 below. The general pressures ranged from 30 - 59.4 m, with the lowest of 0-12 m pressure directly surrounding the Northern reservoirs and WTP, and the largest of 40-59.4 m being predominantly throughout central to eastern Casino. The pressures from the reservoirs are generally related to the difference in elevation between the level in the reservoirs and the customer location (i.e. minimal headloss in the network modelled).

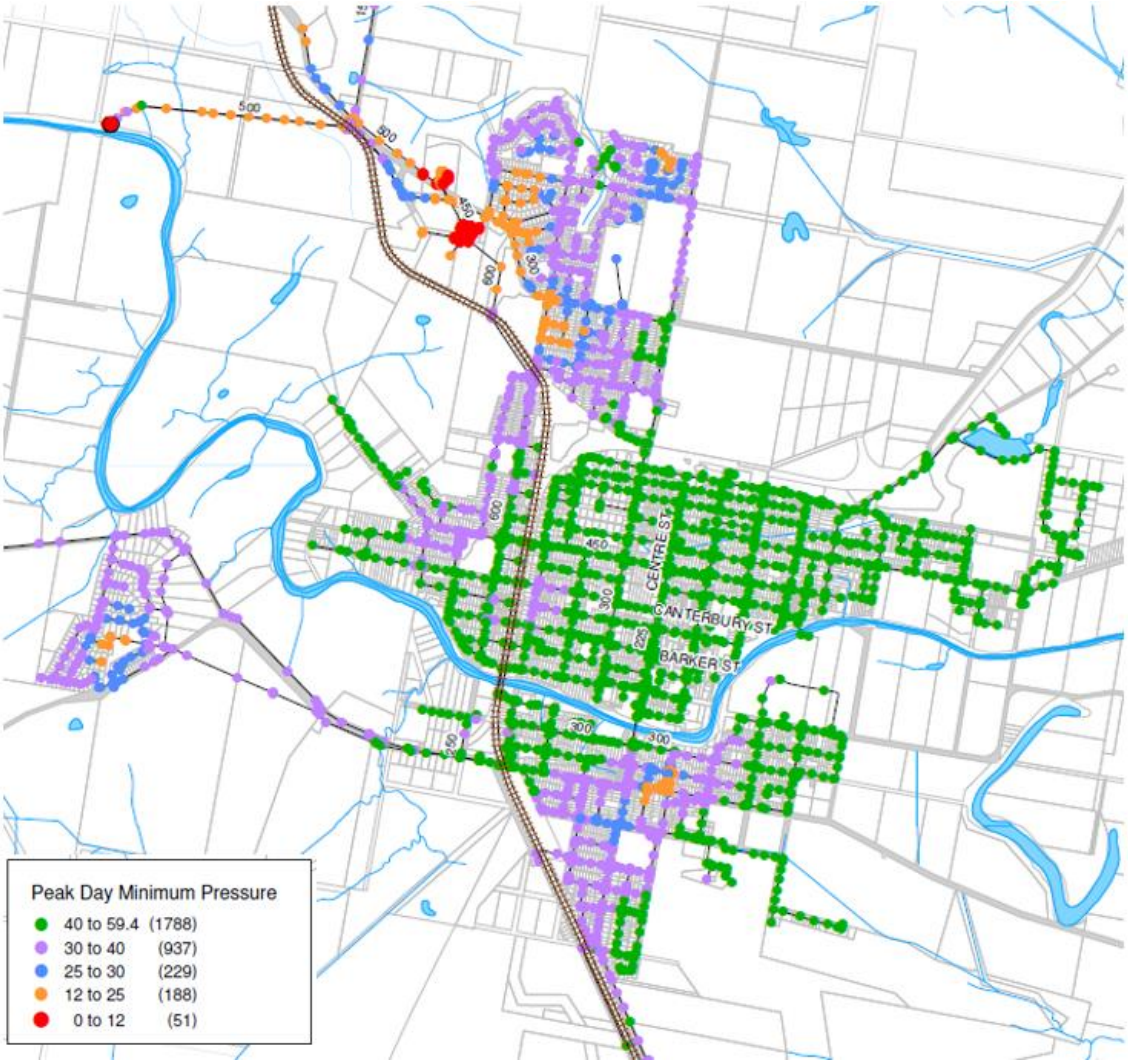

Figure 4.1 Peak day minimum pressures

Minimum service pressures required by Richmond Valley Council (RVC) under different demand scenarios including fire flow follow standards from the Hunter Water Corporation (HWC), Water Services Association of Australia (WSA) standard WSA03 as follows.

TABLE HW 2.7

SERVICE PRESSURE (SP) LIMITS

SP LIMIT	DEMAND	PRESSURE (m)
MAXIMUM	All applications	60
MINIMUM	Peak hour flow on a peak day of a peak week	20/25[1]
	Peak hour flow on an extreme day of an extreme week	12
	Peak hour flow on a 95th percentile peak day plus fire fighting flow (at location of fire flow)	15
	Peak hour flow on a 95th percentile peak day plus fire fighting flow (other than location of a fire flow)	3

1 Booster pump stations to be designed to deliver a minimum pressure of 25 m.

Figure 4.2 Minimum service pressures (HWC WSA03)

4.1.2 Water Treatment Plant

As stated in the *RVC Casino WTP Process Assessment and Optimisation report*, the WTP has a designed capacity of 280 L/s (22.2 ML/d over an operating time of 22 hours) with a current general operation of 8 hours at 230 Litres (L) per second (s) (10 ML/d). The general operation time is due to the manual chemical dosing required as no Supervisory Control and Data Acquisition (SCADA) feedback occurs (original design). See Figure 4.3 for the WTP process flow diagram.

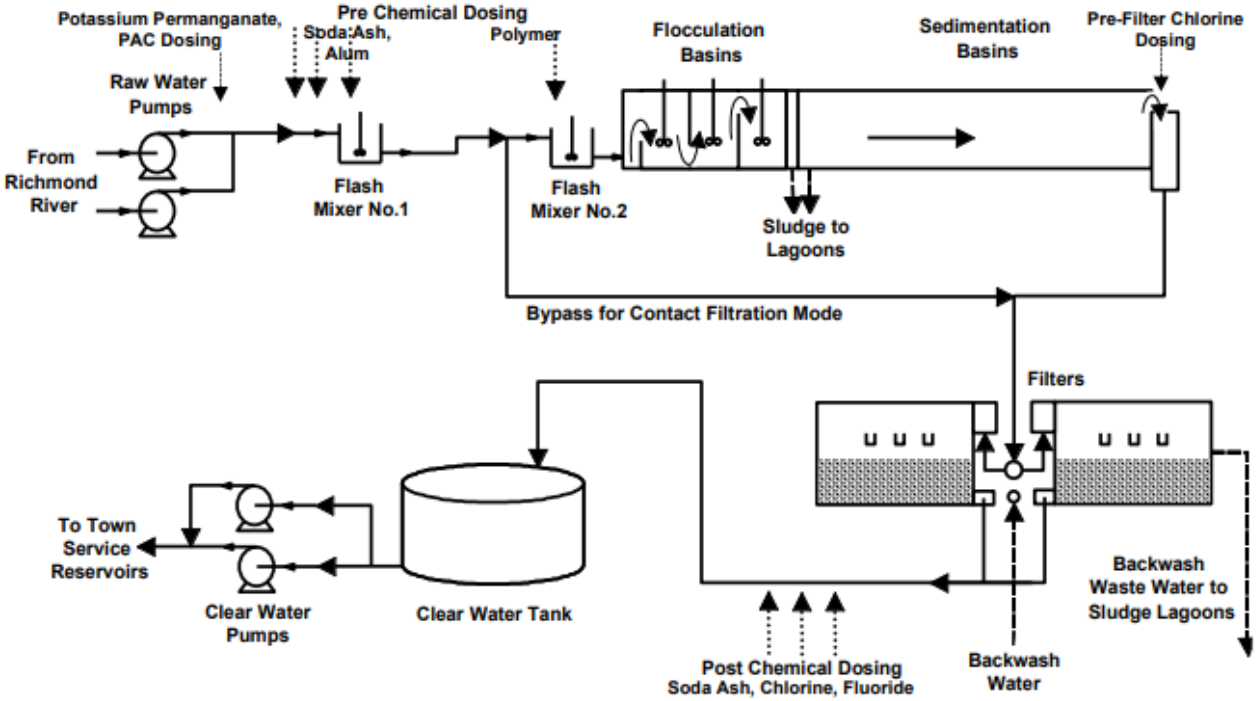

Figure 4.3 Casino WTP process flow diagram

As seen below from the *RVC Casino WTP Process Assessment and Optimisation report*, demand from the WTP has remained consistent with little seasonal effects being compensated by an increase in daily operational hours and no strong upward trend for increasing demand.

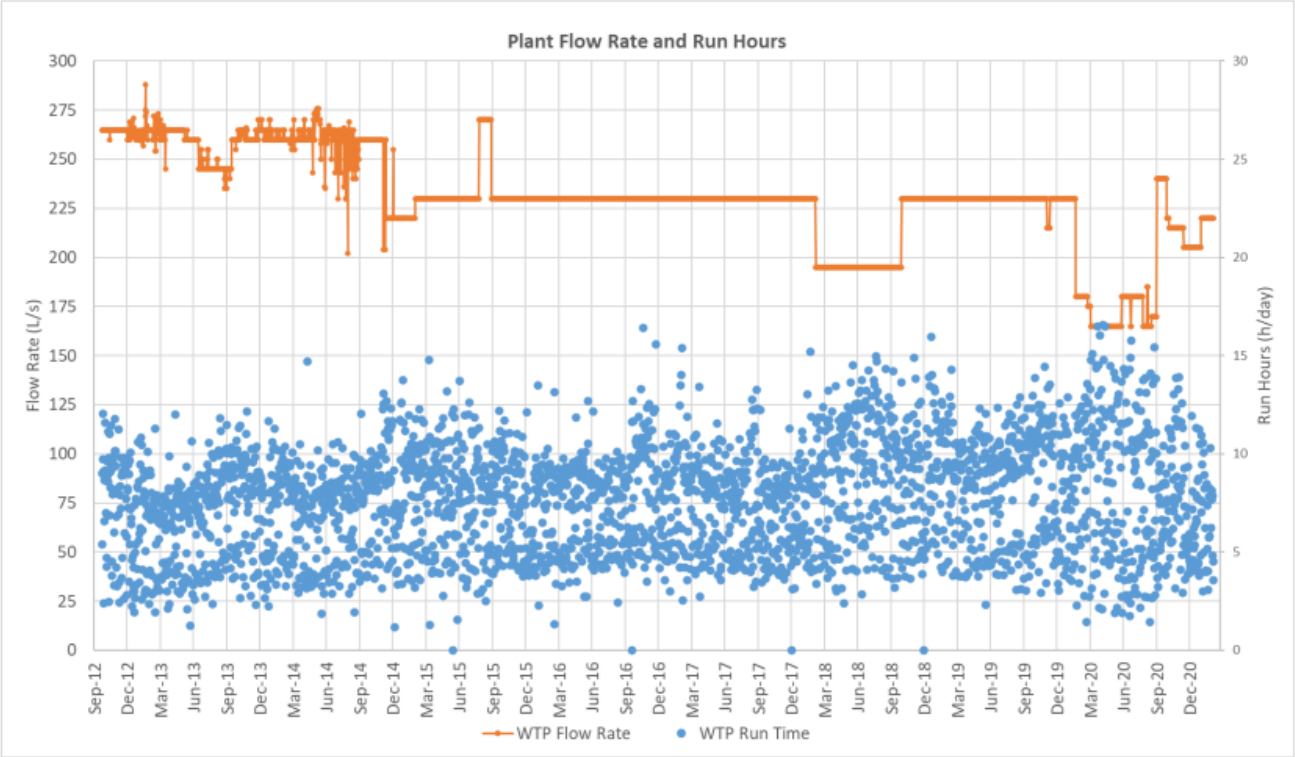

Figure 4.4 Casino WTP historic flow rates and run hours

RVC have indicated filter issues have recently reduced the reliable maximum production to 18 ML/d (appears to be issues from the end of 2014 based on graph above). During high turbidity periods in the river, operational staff have noted aluminium sulfate dosing is adjusted instead of WTP shutdown.

4.1.3 Area 1 – Nammoona Industrial area precinct

The Nammoona Industrial area precinct currently has a DN150 main extending along its eastern border (along Reynolds Road) and cuts inwards at Dargaville Drive to supply the existing users in this area. Similarly, an existing DN100 main follows Summerland Way, stopping before the railway crossing to supply a small number of residential properties.

It is advised by RVC the existing DN100 main following Summerland Way that feeds the Nammoona Industrial area precinct is planned to be decommissioned. In its place, a DN250 from Rosewood Av that will taper to DN200 at the Summerland Way/Reynolds Rd and reconnect to the DN150 at the new industrial subdivision. The existing DN150 will be decommissioned at the reservoir to the "new" connection point along Reynolds Road.

As shown in Figure 4.1, the northern section of the existing water network within this area is not displayed. From what is viewable, the minimum and maximum PDD pressures for this area are 12-25 m and 30-40 m respectively. This range is accurate due to the minimal elevation increases of the remaining (unviewable in report) Nammoona developments having insignificant effects of reducing pressure to a different range.

4.1.4 Area 2 - Casino food co-op and surrounds precinct

At the centre of this area on the highpoint is the three Northern Reservoirs. Within this area is the DN450 supply main from the WTP and to the town, a DN600 continues to the southern supply zone with a DN150 and DN200 to supply the existing industry within this area.

Due to the industries' proximity to the Northern Reservoirs located within the Casino Food Co-op Complex, the elevation change is insufficient to provide service pressures to parts of the area. The minimum and maximum pressure are 0-12 m and 25-30 m.

4.1.5 Area 3 - Johnston Street Industrial area and surrounds precinct

The STP and existing estate within this development area are connected by a combination of DN100 and DN150 reticulation mains. The nearest ‘trunk’ mains are considered to be DN200 located along Hickey Street.

This development area, due to western Casino’s comparatively low elevation, has the highest available pressure range of 40-59 m.

4.2 Wastewater

4.2.1 General

The township of Casino has its sewage treated by the Casino STP located to the north-east along Spring Grove Road. A total of 16 sewage pump stations (SPSs) form the wastewater network, with SPS601 being the primary SPS that supplies the STP directly with the flows received from the other SPSs except for SPS607 which supplies a small percentage of the total network to the STP. One new SPS to service the new industrial subdivision on Reynolds Road will be connected to the network in 2023. See Figure 4.5 for an overview of the network.

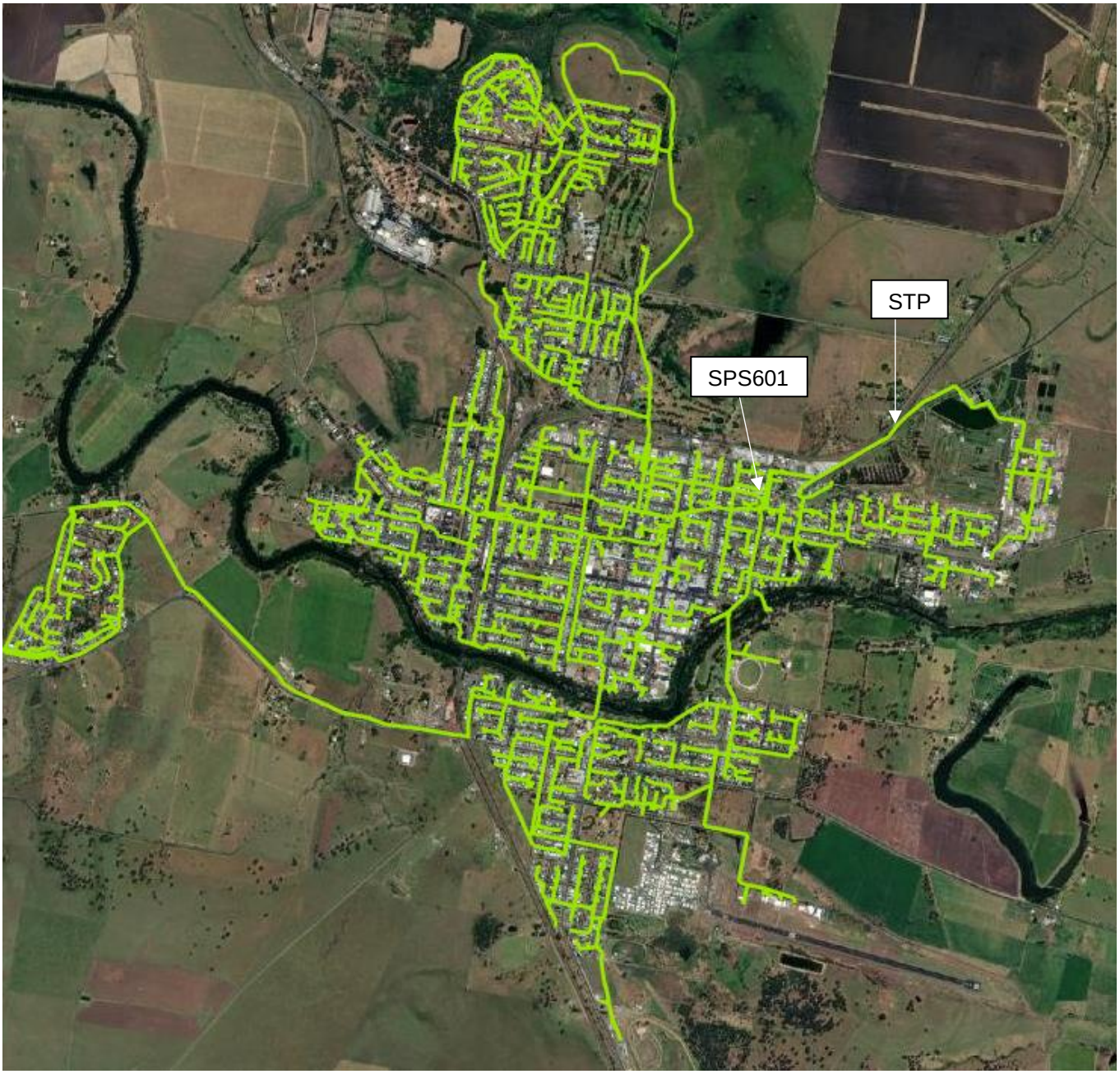

Figure 4.5 Casino wastewater network

From the 2019 GHD study, seven SPS's were found to not be requiring upgrade, three (SPS604, SPS611 and SPS614) were recommended to consider upgrading, with two (SPS608 and SPS615) requiring an upgrade as they were deemed under capacity. Since the delivery of the 2019 report, RVC have upgraded SPS604 and SPS608 to increase the pumping capacities. RVC has advised SPS615 observed flows are less than the noted theoretical flows and therefore does not require upgrading. It is assumed all other SPS maximum inflows are unchanged. See Figure 4.4 for relevant SPS of concern with the associated capacities, maximum theoretical PWWF flows and GHD recommendations.

Table 4.1 Relevant SPS capacities and loads

SPS	Pump Capacity (L/s)	Maximum Inflow (L/s)	GHD Recommendation
SPS601[1]	320	202.2	No Upgrade
SPS604	15.1 (single pumping) 18.5 (dual pumping)	8.5	No Upgrade
SPS607	17.3	2.3	No Upgrade
SPS608	20.9	20.9	Upgrade
SPS611	15.5	14.7	Consider Upgrade
SPS614	3.2	3	Consider Upgrade
SPS615	1.7	2.8	Upgrade[2]

[1] Actual observed inflows have been advised by RVC to be higher, unknown of actual inflows

[2] RVC have advised that upgrade is not required based on actual observed existing flows

Note that 2022 advice from RVC suggest that the actual inflow of SPS607 is much higher based on observed pump operation. GHD will discuss this further with RVC in the following project phase.

From the provided sewer data and model, there is no information regarding existing wastewater networks within the Nammoona Industrial precinct and Casino Food Co-op and surrounds precinct proposed developments. RVC have advised a Casino Food Complex connection for ablutions, canteen and laundry. Within the Nammoona Industrial precinct it is expected to be some private pump out systems are utilised to service some of the existing industries and small residential population.

4.2.2 Area 1 – Nammoona Industrial precinct

As previously mentioned, there is no current wastewater network in operation within the Nammoona Industrial precinct. The Reynolds Road SPS and 100 mm sewer rising main (SRM) is currently under construction and scheduled for commissioning in 2023. The SRM extends from the SPS at Reynolds Road along Summerland Way, Rosewood Ave and Sheppard St and connects to manhole (MH) 60369 into the DN450 trunk sewer.

4.2.3 Area 2 - Casino food co-op and surrounds precinct

Similarly, as previously mentioned no current wastewater network is in operation within the Casino Food Co-op and surrounds precinct though RVC have advised a DN150 connection for ablutions, canteen and laundry into MH60531 via an internal pump station.

4.2.4 Area 3 - Johnston Street Industrial area and surrounds precinct

Casino's Sewage Treatment Plant (STP) is located within this precinct, with a small amount of existing estate within the Johnston Street sub area which is serviced by a small branch of the wastewater network comprising of DN150 mains that contribute to SPS607.

The existing Casino STP (damaged by flooding in early 2022 and in need of significant refurbishment or rebuild) is a hybrid process consisting of two distinct process trains. Treatment is nominally provided through a combination of preliminary coarse treatment, an activated sludge bioreactor, primary clarifiers, and trickling filters. Some additional disinfection is provided through a maturation pond.

Raw influent is transported to the treatment plant through two rising mains which feed a balance tank at the head of the inlet works. Twin spiral sieve screens remove bulk solids from the incoming stream prior to flows being diverted through a flow distributor (FDS 1) which directs flows to various structures within the treatment process.

The majority of dry weather inflow is further distributed between the primary process trains which reduce carbon, nitrogen and phosphorus biologically. Three primary clarifiers (Eastern, Middle and Western) and associated trickling filters receive 25%, 25% and 30% of inflows respectively. The remaining 20% is directed to the intermittently decanting extended aeration bioreactor, which additionally reduces the concentration of suspended solids through a decanting mechanism. Similarly, flows through the trickling filters are further treated by two humus clarifiers which reduce concentrations of particulate matter prior to discharge. Secondary treated effluent is further disinfected in a downstream maturation pond prior to discharge to environment and reuse customers. Sludge generated by treatment trains is managed by a combination of anaerobic digesters and sludge lagoons, which receive sludge from the primary clarifiers and bioreactor respectively. The sludge is stabilised and then dried in on-site drying beds before off-site disposal.

A process flow diagram depicting the relatively complex process at Casino STP is shown in Figure 4.6 below.

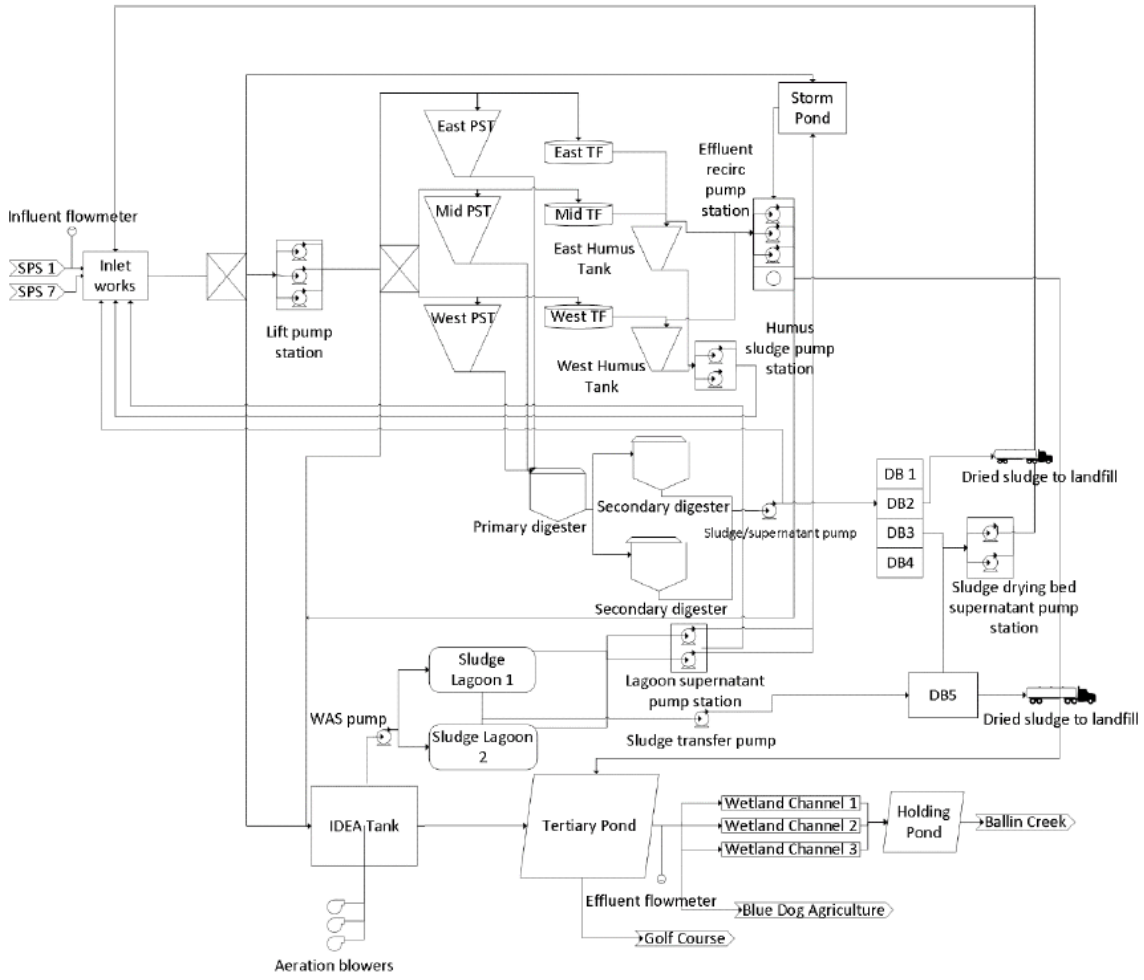

Figure 4.6 Casino STP Process Flow Diagram

A capacity assessment was undertaken which assessed the existing treatment plant against flows projected until 2050. The assessment nominally determined that the treatment plant can accept approximately 30 – 35 L/s of raw influent during normal dry weather conditions (with the notable exception of the anaerobic digesters which are currently operating beyond operating capacity). Flow projections anticipated that average flow was not likely to approach 35 L/s until beyond 2050. However, the previous study did not account for the recently proposed industrial developments and associated population growth covered by this scope of work, nor that the early 2022 flooding event would significantly damage the STP which RVC requires to now be replaced by a new STP. Projected flows received at the treatment plant are shown in the Hydrogeology, Quality and Demand Analysis Report (GHD, 2022) to determine required upgrades.

4.3 Trade waste

4.3.1 General

RVC recently established a new section within Council that will focus on Trade Waste including the application and managing of trade waste agreements.

The RVC trade waste policy is based on the Department of Water and Energy "2007 Model Policy for Discharge of Liquid Trade Waste to the Sewerage System" and outlines the following:

– Specifies circumstances in which people are exempt from the necessity to apply for approval to discharge liquid trade waste (LTW) into the sewage network.
– Specifies criteria which RVC will consider in the process of approval/refusal of LTW applications.
– Outline of other matters relating to LTW approvals including:
    - Application procedures
    - Discharge categories
    - Service agreements
    - Fees and charges
    - Prevention of contaminations to stormwater discharges from open areas

Tankering to the inlet works of the STP (if a development site is remote from sewer and extension of the network is cost prohibitive) may be a more cost-effective option for smaller developments in Area 1 in particular, RVC have also noted that works may be required to assess likely trade waste and any necessary on-site treatment or STP upgrades, plus any concerns with negative impacts on network conveying trade waste from the development site to the STP. This issue is discussed further in Section 6.3.

4.4 Stormwater

4.4.1 Local conveyance network

The local stormwater conveyance system is managed and operated by RVC. The existing stormwater conveyance system has been designed for existing road layouts, land uses and road alignments and will require upgrades to accommodate development of the precincts.

There are currently no stormwater quality improvement measures in the existing Council owned stormwater network. Several ponds that take overland flows are present within the precincts, particularly Nammoona Industrial precinct, but these have not been designed or constructed to provide stormwater treatment and would not be suitable, in current configuration, to treat stormwater from development within their catchments.

Recent stormwater quality assessment performed by BMT suggested three potential stormwater quality improvement methods for both the Nammoona Industrial precinct and Johnston Street Industrial area and surrounds precinct. Options 2 and 3 was noted to have minimal area requirements whilst option 2 had the lowest NPV. The three options

1. Wetlands
2. Bioretention basins
3. Streetscape bioretention

4.4.2 River flooding

Area specific flood modelling for the Nammoona Industrial precinct (Area 1) and the Johnston Street Industrial area and surrounds precinct (Area 3) industrial areas has been performed by BMT in the FIA. The results for the 1% AEP flood modelling mapping is illustrated in Figure 4.9 and Figure 4.10. Conclusions from the flood modelling suggest three potential flood mitigation methods, the third of which was determined to not be sufficient. The flood mitigation methods are as follows:

1. A flow channel which was originally blocked by the STP. This requires the removal of the tertiary treatment ponds and other associated infrastructure along with increasing the drainage capacity under Spring Grove Road.

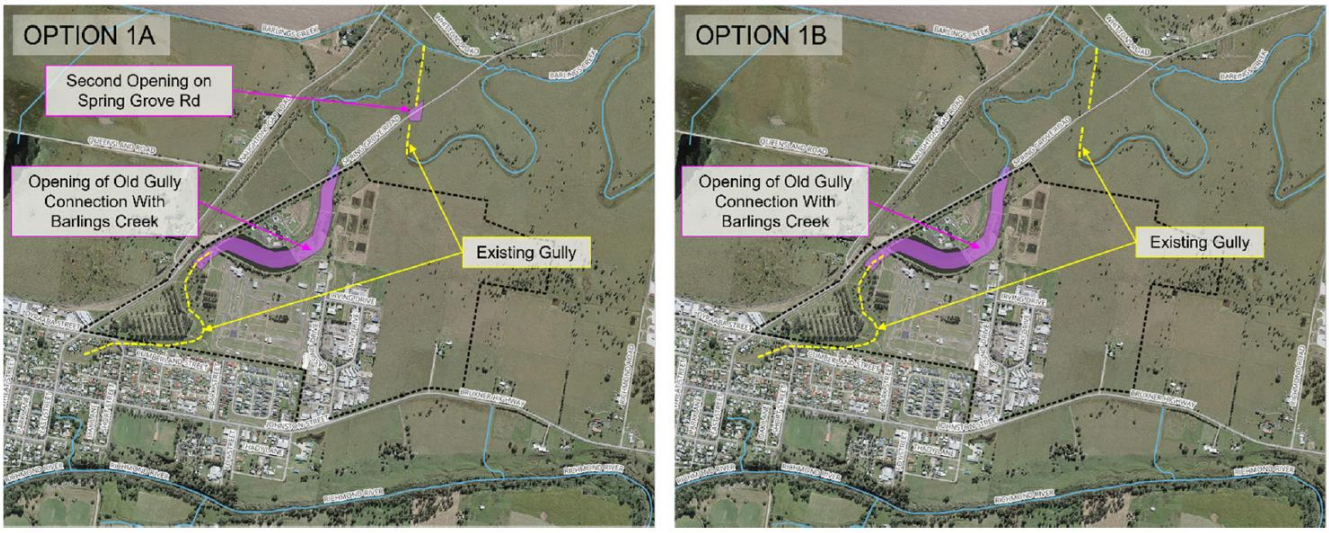

Figure 4.7 Flood mitigation option 1 with two variations

2. New broad channel within Crown Land adjacent to Naughtons Gap Road to provide a link between two natural gullies and which bypasses the existing STP.

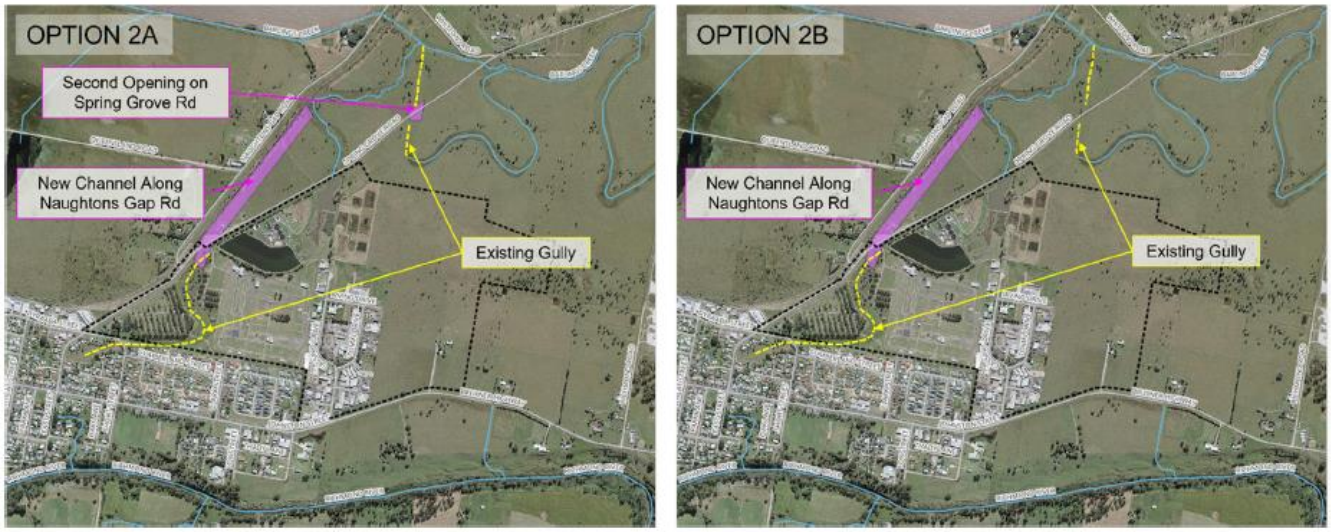

Figure 4.8 Flood mitigation option 2 with two variations

3. Widening and deepening of existing swale that along the southern boundary of Spring Grove Road.

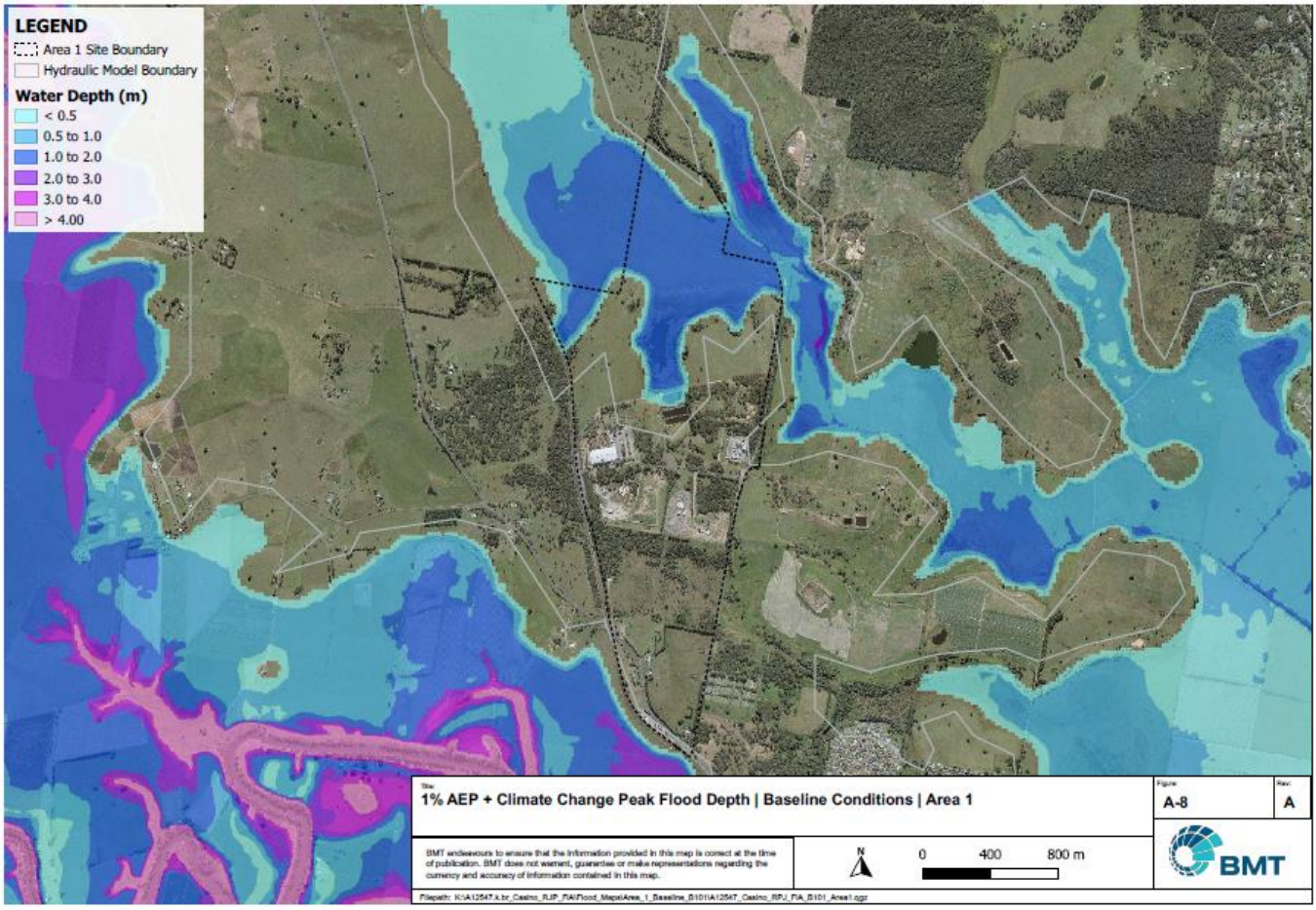

Figure 4.9 Nammoona Industrial precinct 1% AEP flood depth

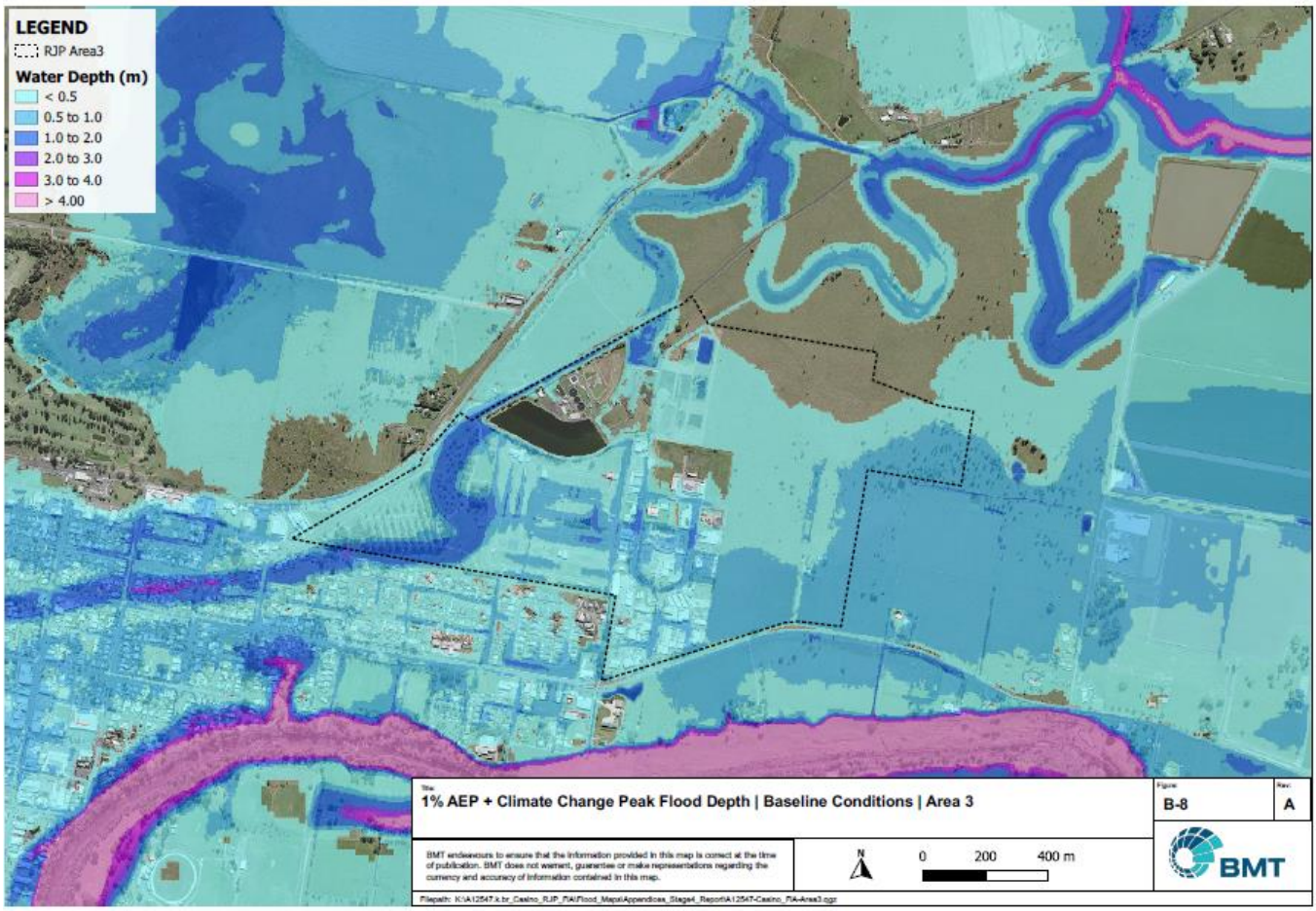

Figure 4.10 Johnston Street Industrial area and surrounds precinct 1% AEP flood depth

The flood hazard mapping indicates that the Nammoona Industrial precinct (Area 1) precinct is generally not flood affected, with the exception of the lower lying areas to the northern end where creek line cross east-west. The majority of Johnston Street and STP industrial areas (Area 3) categorised as low or rare flood hazard, with areas to the south being either high depth hazard or high floodway hazard.

4.5 Waste management and recycling

The main waste management facility operated by RVC is the Nammoona Waste and Resource Recovery Centre, located in Area 1. RVC also operates transfer stations at Evans Head, Bora Ridge (currently closed) and Rappville. RVC is an active member of North East Waste, a regional group of Councils working collaboratively towards cost-effective waste management solutions. A summary of primary destinations and secondary processing and end markets for waste generated by RVC is provided in Table 4.2.

Table 4.2 Richmond Valley Council waste destinations

Waste stream	Primary destination	Secondary reprocessing/ end market
Residual	Ti Tree Landfill (Qld)	-
Garden organics	Nammoona Waste Facility and Evans Head Transfer Station	Sold to the general public as pasteurised mulch
Food and garden organics	Ti Tree Landfill (Southeast Qld)	Sold to the general public as compost
Paper and cardboard	Lismore MRF	Re-processors and exported
Plastics	Lismore MRF	Re-processors and exported
Glass	Lismore MRF	Local market
Metal packaging	Lismore MRF	Re-processors and exported

Waste stream	Primary destination	Secondary reprocessing/ end market
Scrap metal and whitegoods	Lismore MRF	Assume exported
E-waste	Contractor	Unknown
Recovered C&D aggregates	Nammoona Waste Facility	Operational use at the landfill
Recovered soils	Nammoona Waste Facility	Operational use at the landfill
Timber	Evans Head Transfer Station	Mulch sold to the general public
Tyres	Contractor	Unknown

Source: Arcadis, 2020. North Coast Region Waste Investment Review Stocktake

The Nammoona Waste and Resource Recovery Facility currently has limited capacity (15,000 tonnes as of 2020). The majority of residual waste (waste that can't be recycled/reused) is transported to south-east Queensland to Veolia's Ti Tree Landfill. The Nammoona Waste and Resource Recovery Facility is used only for those wastes that can't be transported (primarily asbestos and animal carcasses). The approved annual waste input to the landfill is 28,000 tonnes.

This conserves landfill capacity until later next year when a new landfill cell is to be constructed at the site. The cell will be developed in 3 stages (A, B and C) over several years with only Stage A expected to be used in 2023. The entire cell is predicted to provide about 14 years of capacity based on current residual waste volumes. The landfill has 156,000 tonnes of unapproved capacity and is expected to close around 2037.

Along with the cell will be the construction of a new leachate pond and stormwater sedimentation pond as well as the first stage of capping of the existing landfill cells. Waste receival records were provided from financial year 2017 to 2021 and are summarised in Table 4.3.

Table 4.3 Waste tonnages

Waste stream	FY2018	FY2019	FY2020	FY2021
Commercial and industrial waste	3,050 t	2,540 t	2,980 t	2,560 t
Construction and demolition waste	2,080 t	1,590 t	1,440 t	1,220 t
Kerbside domestic waste	2,150 t	1,990 t	4,750 t	6,390 t
Other Council waste (animals, asbestos, mixed waste)	470 t	460 t	600 t	1,040 t
Other domestic waste (animals, asbestos, mixed waste)	1,630 t	1,890 t	2,080 t	2,110 t
Green waste	550 t	390 t	410 t	570 t
Total	9,930 t	8,860 t	12,260 t	13,890 t

In addition to the landfill facility, Council also operates a community recycling centre at the site. Another existing waste facility located within the Johnston Street Industrial Area includes the Teeling Recycling Centre. Kerbside recyclable waste is currently transferred to the Polytrade facility at Chinderah for processing.

According to the Richmond Valley Council website, North Coast councils have been exploring opportunities for an alternative waste treatment facility for the past five years, because local and regional landfills are approaching capacity. Around 40 percent of North Coast councils' waste is sent to landfill, despite having recycling and composting services in place for some time. A lot of this waste is transported to Queensland.

Richmond Valley Council worked with 12 North Coast councils and the Department of Regional NSW to prepare the North Coast Region Waste Investment Report 2020. The Waste Investment Report includes a stocktake of waste types and quantities in each council area. It highlights the need to develop alternative waste treatment infrastructure to divert residual waste from landfill. The Waste Investment Report provides the information base for councils to test the market for alternate waste treatment solutions. These solutions may include thermal treatment technologies.

In early 2022, a call for expressions of interest for alternative waste solutions (EOI) process was undertaken by Richmond Valley Council on behalf of nine North Coast councils. The EOI sought information from the market for alternate waste treatment solutions for landfill and recyclable waste streams and closed in June 2022. Submissions covered residual, recycled and food organic/green organic streams. The website says that these solutions will free Councils from the need to develop landfill capacity, with attendant development, resourcing and environmental management costs. On this basis, Richmond Valley Council may not currently be considering landfill solutions beyond 2035.

4.6 Electricity

The Casino area is supplied electricity from the Casino 132/66/33/11 kilovolt (kV) Zone Substation (ZSS) located to the south of Casino near the corner of Ellangowan Road and Summerland Way. The 25/26 demand forecast for the Casino Zone Substation is 34.2 mega volt-amp (MVA). This does not account for the developments considered by this report.

Casino Zone Substation is supplied from a Tee-off from Transgrid Feeder 96L fed from the Lismore Transgrid Substation. A 35/45/60MVA transformer steps down the voltage to 66kV. This suggests there is approximately 26MVA of capacity available, limited by the 132/66 transformer.

Two 66/11kV transformers step the voltage down to the distribution voltage used through the region. Both are 20/30MVA transformers, giving a firm rating of 30MVA. The 11kV demand forecast for 25/26 is 28.5MVA, suggesting there is limited firm capacity available at the Zone Substation in the medium term.

Transmission lines are all located to the south of Casino, meaning the establishment of a new ZSS to service very large customers would require a significant network extension.

4.6.1 Area 1 – Nammoona Industrial precinct

The Nammoona industrial precinct is located approximately 6.5 kilometres (km) from the ZSS and is currently serviced by an 11kV feeder CS03B2, which also services other areas. It is likely this feeder would need to be upgraded if there is significant additional load added in the development area.

4.6.2 Area 2 - Casino food co-op and surrounds precinct

The Casino Food Co-op and surrounds precinct is located approximately 6 km from the ZSS and is currently serviced by an 11kV feeder CS03B8, which also services other areas. It is likely this feeder would need to be upgraded if there is significant additional load added in the development area.

4.6.3 Area 3 - Johnston Street Industrial area and surrounds precinct

The Casino STP and Johnston Street area is located approximately 6 km from the ZSS and is currently serviced by an 11kV feeder CS03B6, and is in close proximity to CS03B7, both of which also service other areas. It is likely there can be some load sharing to enable some development in the area, though additional feeders will be required if significant load is added.

The existing industry serviced by Cassino Drive, Irving Drive and Tomki Drive is serviced by 4 distribution substations, with a total installed capacity of approximately 1.5MVA.

Refer to the existing electrical network map of Casino here at the Essential Energy website.

4.7 Telecommunications and internet

On review of the available Statutory Infrastructure Provider (SIP) via the Australian Communications and Media Authority (ACMA) website, it has been assessed that NBN Co are the SIP for the three areas under consideration about Casino. Upon review of available NBN Co dial before you dig information it is evident that existing in ground fibre services are available within the vicinity of each three proposed sites.

GHD reviewed the available communications infrastructure within the vicinity of each proposed RJP. As summary of these findings is below.

4.7.1 Area 1 – Nammoona Industrial precinct

Based on the available information, the major form of current telecommunications services is via wireless; either through provision of NBN Co fixed wireless or fourth generation (4G) global system for mobile communications (GSM) mobile internet available from all three major carriers. To the East of the proposed site, NBN Co has provided Fibre to the Curb (FTTC) and Fibre to the Node (FTTN) services, which provide the potential for higher bandwidth, more reliable internet and telecommunications connection.

4.7.2 Area 2 – Casino Food Co-op and surrounds precinct

Similarly, this area is currently supported by wireless communications; either via NBN Co fixed wireless or 4G GSM mobile internet.

4.7.3 Area 3 - Johnston Street Industrial area and surrounds precinct

Like the other two areas, the proposed area of development is only supported by NBN Co fixed wireless or mobile internet connectivity currently. Although the NBN Co availability map states that South-west of the site, plots are connected to the NBN via FTTN services, however there is no evidence of this on available dial before you dig information.

5. RJP options

A total of four workshops were conducted over a four month period involving technical experts, and local and state government stakeholders. The workshops ensured that the options created were tested with the final two workshops focusing on option development scenario testing and refinement of the preferred option. The option development process is described below.

5.1 Option assessment

Refer to the *Draft Richmond Valley RJP Master Structure Plan* for details on the development and comparison of the three options for each of the RJP's and identification of the preferred RJP options.

Key aspects of the preferred Area 3 – Johnston Street Industrial area and surrounds precinct includes:

– Option 2B: A new broad channel within Crown Land adjacent to Naughtons Gap Road to provide a link between the two natural gullies which bypasses the existing STP, along with additional drainage under Spring Grove Road as shown in Figure 5.3.

– Relocation of the Casino sewage Treatment Plant (STP) and establishment of controls to limit development within the 7ou contour, other than development that is ancillary to the STP and not odour sensitive.

Figure 5.1 Staged filling of Area 3 (1% AEP + Climate Change Flood Event)

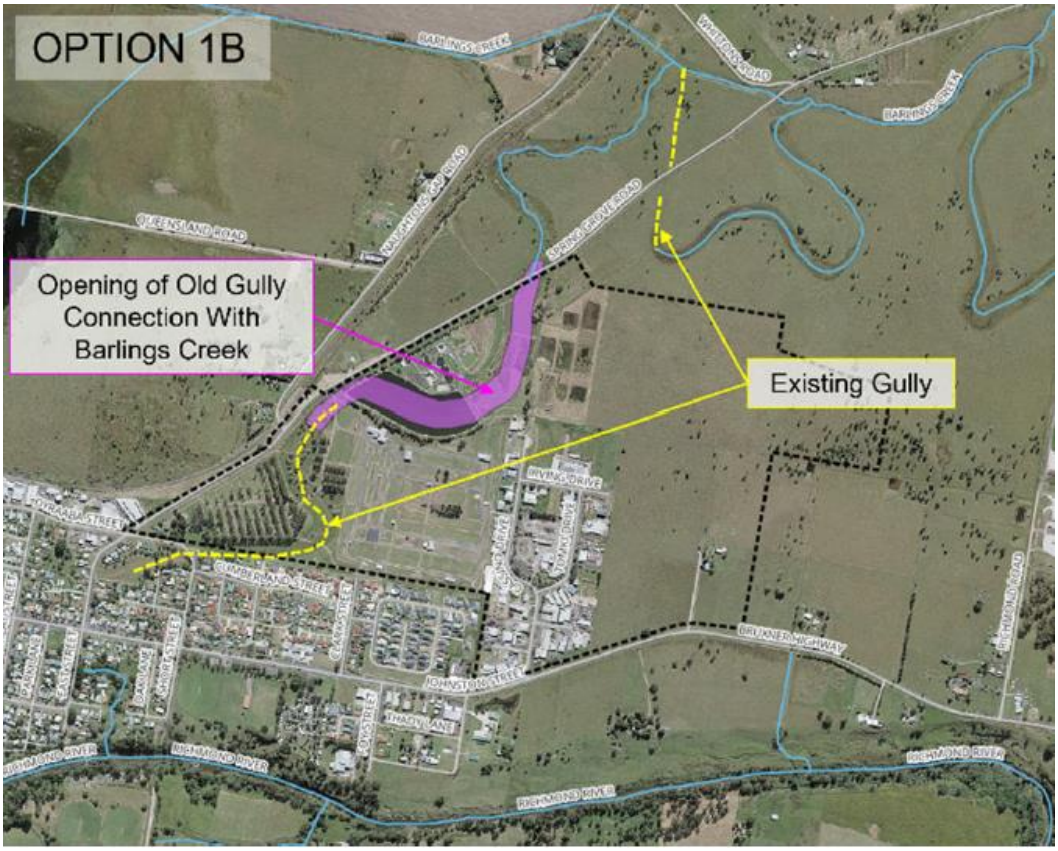

Figure 5.2 Major drainage option 1B

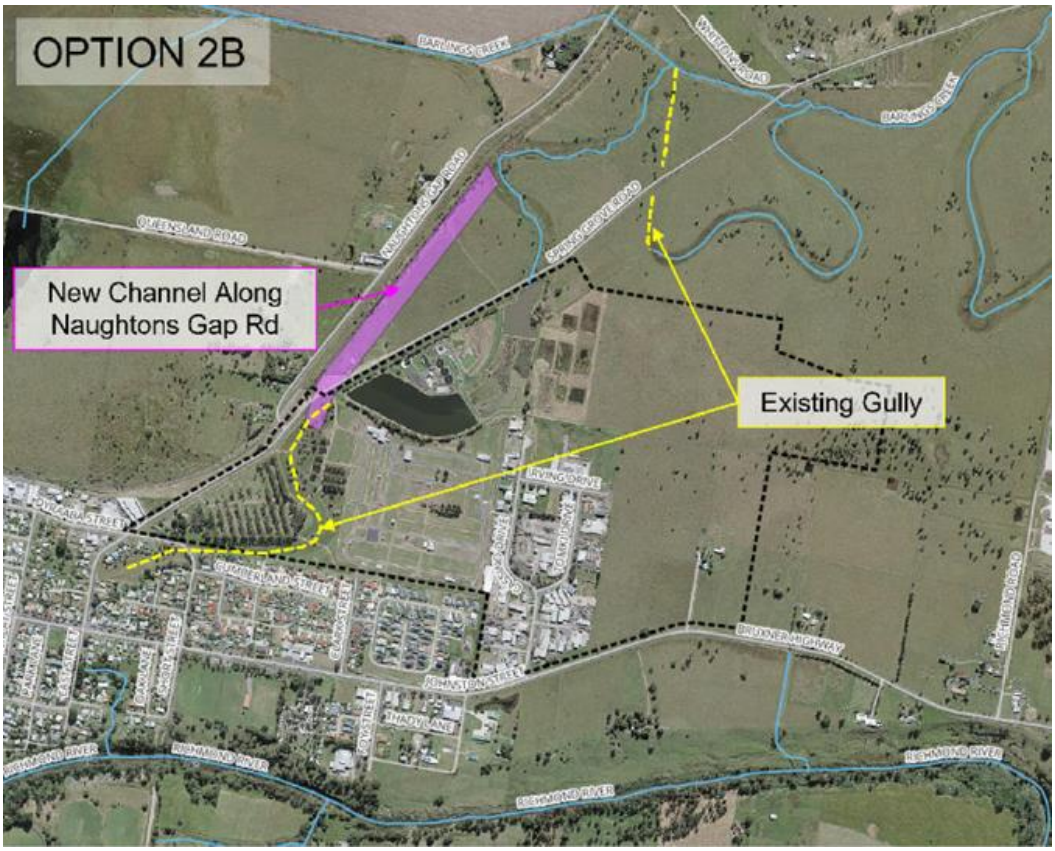

Figure 5.3 Major drainage option 2B

6. Key insights and opportunities

6.1 Water supply

6.1.1 Casino current water demand

The 2015 GHD investigation (for the Casino Northern No.1 Reservoir) estimated the future peak day demand (PDD) under 0.5%, 1% and 1.5% growth scenarios as an extrapolation of historical values. As noted by RVC (in the meeting on 30 November 2021) water demands within Casino have not been increasing as predicted. As seen below from the 2015 investigation, the predictions compared to the 2015-2021 demands have shown a highly variable but overall, a small trend downwards in PDD (noting variability between drier and wetter years) and a flat average day demand (ADD) trend around 6.8 ML/d.

GHD concurs with RVC in regards little change in underlying demand.

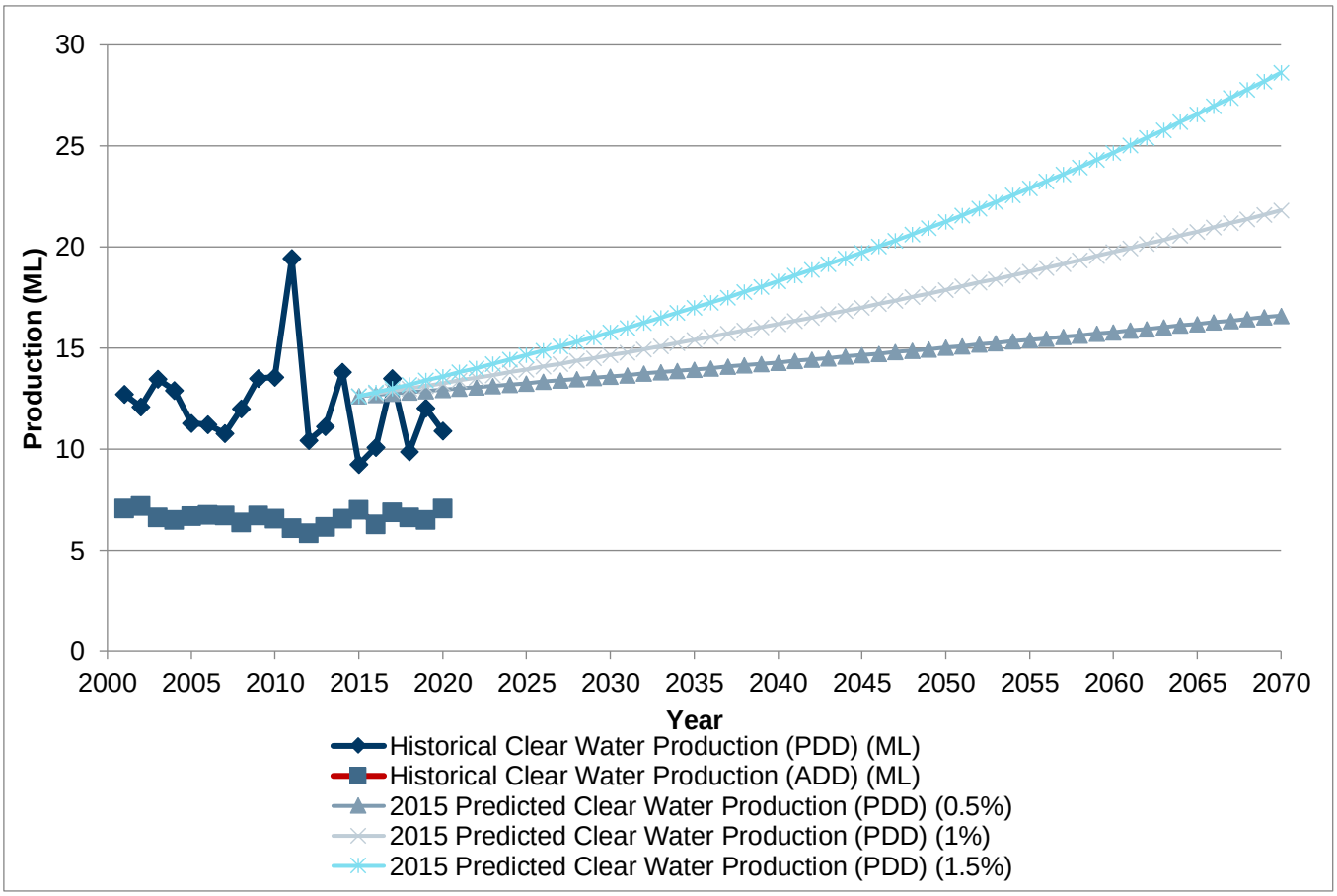

Figure 6.1 Estimated vs real clear water demand growth

RVC has advised that the adopted 0.5% growth rate (as per the 2022 PWA Casino Water Supply Scoping Study) had adopted some element of RJP development growth. A reduction of the 'underlying' growth rate (i.e. growth not within the RJP or Fairy Hill development areas) to 0.15% was deemed to be appropriate. Applying the 0.15% per annum population growth rate to recent data results in the forecasted PDD water demand values below, additionally the combined RJP PDDs (for scenario two) and PDD for Fairy Hill have been included outline the future demand on the Casino water network.

Table 6.1 Casino PDD water production future forecast

	2020	2025	2030	2035	2040	2045	2050
PDD (ML)	12.86	12.96	13.05	13.15	13.25	13.35	13.45

6.1.2 Development demand estimation

Using the procedure outlined in the demand analysis section of our *Hydrogeology, Quality and Demand Analysis Report,* a total of three increasingly water intensive scenarios have been determined.

Of the determined scenarios, based on discussions with RVC and the future industry information provided by Gyde, GHD recommends scenario 2 (light-medium) as a proposed design scenario to be used to guide future planning. The ADD and PDD estimations for the three increasingly water intensive scenarios are listed below.

Table 6.2 Water demand calculation results (RJP areas only)

	Scenario 1		Scenario 2		Scenario 3	
	PDD (ML/d)	ADD (ML/y)	PDD (ML/d)	ADD (ML/y)	PDD (ML/d)	ADD (ML/y)
Nammoona Industrial precinct	0.4	136.8	0.7	220.5	1.0	304.1
Casino Food Co-op and surrounds precinct	0.1	37.3	0.2	61.6	0.3	85.9
STP and surrounds	0.1	25.2	0.1	41.6	0.2	58.0
Johnston St	0.1	45.6	0.2	75.3	0.3	105.0
Total	0.8	244.8	1.3	398.9	1.8	553.0
***With 15% water efficiency**	0.7	208.1	1.1	339.1	1.5	470.0

Table 6.3 Fairy Hill water demand

PDD (ML/d)	ADD (ML/y)
4.4	667.5

From the 2050 Casino PDD of 13.45 ML/d, the maximum RJP development demand of 2.0 ML/d (PDD scenario 3 with no water reduction) and Fairy Hill PDD of 4.4 ML/d, the maximum PDD would be 19.85 ML/d.

The Casino water network is split along the Richmond River into a northern and southern network supplied by respective reservoirs. As all the new developments are located north of the Richmond River, it can be assumed the water supply would be sourced from the three northern reservoirs with a total capacity of 17.75 ML. Therefore, without consideration for pressure requirements, the northern reservoirs do have capacity to supply the new developments (using the standard guide of 1 day of PDD volume to be in storage reservoirs).

6.1.3 Security of supply

Bulk water supply is not currently an issue for RVC, but as climate patterns change, bringing longer periods of drought, inland communities such as Casino will experience greater water security challenges in the future. Council has been preparing for the impacts of climate change and increased development by investigating options to upgrade its bulk supply over the short-medium term. These options, to be implemented over the next 2-10 years will help to ensure there is sufficient water to meet the projected growth in the Casino township due to the Regional Job Precincts and Casino's access to flood-safe residential land.

6.1.3.1 Surface water

Refer to the Hydrogeology, Quality and Demand Analysis Report (GHD 2022) for details regarding the demand analysis including climate change and drought resilience in the existing Casino bulk water supply system.

6.1.3.2 Groundwater

Groundwater sources from bore holes that have been identified around the Casino township are not suitable to provide a potable water source of the quality and quantity required to future proof water supply security.

The following is a summary of the ground water characteristics of Casino.

– Based on the existing data and depending on location, there are both shallow and deep aquifers that have potential to meet or supplement water demand. The shallow alluvial aquifers upgradient of Casino is considered best potential with the expected groundwater yields from bores screened in the alluvials from 5 – 8 L/s. Yields in the fractured igneous rocks are low unless fracture density is high where yields can reach up to 10 L/s. Drilling in fractured rock terrain for high yields is higher risk in finding high yield water supply relative to associated costs. Shallow alluvial aquifers are more consistent in identifying a potential groundwater source and less associated costs.
– Groundwater from the shallow alluvial aquifers is likely to be connected to the river and have a similar water quality due to the high connectivity. Whilst the groundwater quality would need to be confirmed that is adjacent to the river offtake pump station that feeds into the existing WTP, there is potential for "shandying" the river water with groundwater of similar chemical composition for key water treatment parameters like hardness, pH, EC, metals and turbidity.
– Given the geology and quantum of additional water needed in relation to a secure yield. Groundwater is unlikely to be the primary long-term water supply source and should be considered as an emergency supply option. Other sources such as surface water should be investigated to secure sufficient yield and security.

6.1.4 Water Treatment Plant

From the Richmond Valley Casino WTP Process reports, the 230 L/s (18.0 ML/d over a 22 hour operational period) typical flow rate is an appropriate maximum, as the design maximum of 280 L/s (22.1 ML/d over a 22 hour operational period) imposes excessive loading on sedimentation tanks and filters. Increasing capacity of the treatment to 280 L/s will have treatment process constraints from the sediment tanks and filter, likely increasing demand on sludge lagoons. Further detailed investigation into the treatment constraint will be required.

Due to the lack of automation, RVC prefers to operate the WTP during normal working hours. Whilst this is sufficient to meet demands, opportunity to increase WTP capacity is through improvement of automation capabilities to allow for operation outside working hours (to refill the proposed Fairy Hill reservoir overnight), treating a maximum of 18 ML/d over 22-hour operation.

As the water security will be most susceptible during peak days, which commonly occur in the summer periods, to examine the WTP's capacity to accommodate the additional developments, the combined current PDD and estimated development demands in future years are compared to the WTP's maximum reliable capacity and design capacity. Additionally, the comparison has been done with demands from the proposed Fairy Hill development, with an additional 1,700 residential lots. The demands contributing to the PDD can be seen in the table below.

For ease of comparison, a traffic light system as follows has been used to highlight the more advantageous options for multiple design aspects:

– GREEN – Sufficient yield
– YELLOW – Marginally sufficient secure yield
– RED – Insufficient secure yield

Table 6.4 PDD WTP capacity comparison

		Reliable capacity			Design capacity		
WTP capacity (ML/d)		18.0			22.1		
Demand scenario		**1**	**2**	**3**	**1**	**2**	**3**
PDD (ML/d)	2026	13.7	13.8	13.8	13.7	13.8	13.8
	2031	14.8	15.0	15.2	14.8	15.0	15.2
	2036	16.1	16.4	16.8	16.1	16.4	16.8
	2041	17.0	17.5	17.9	17.0	17.5	17.9
	2045	17.7	18.2	18.6	17.7	18.2	18.6
	2050	18.5	19.0	19.4	18.5	19.0	19.4

Other river-intake treatment plants GHD have assessed, like Muswellbrook WTP, are considering greater storage and different types of filters at the WTP, along with network reservoir storage, to accommodate periods where the turbidity in the river (like occurs occasionally in the Richmond River) is very high at ADD. This is likely to be required for water demand scenarios 2 (appears to be sufficient land at the WTP site for these assets), with approximate capital costs (excluding costs to upgrade plant to full capacity) in the order of $3M.

Potential alterations to the Jabour Weir catchment, the WTP would require additional treatment (such as Ultraviolet (UV)) and improved monitoring and control to manage chlorine resistant pathogens resulting in additional costs.

6.1.5 Area 1 – Nammoona Industrial precinct

Following national standards and utilising the provided Casino H2OMAP water network model to check feasibility of differing potential pipe sizes and layouts, GHD recommends the following infrastructure developments to accommodate the demand scenario 2 as outlined in the Hydrogeology, Quality and Demand Analysis Report. For the Nammoona Industrial area, due to the greater general elevation of the Nammoona area compared to the township's existing reservoirs, supply of sufficient pressures is the critical consideration for the area. In previous project reports, a parallel pressurised main from a new booster pump supplied from the existing northern reservoirs (located in the co-op development) was discussed. From further investigation of the Nammoona area (and revised development areas provided by Gyde to include biodiversity study outcomes), GHD no longer recommends a pressurised main as the allowance for an elevated reservoirs will supply sufficient pressures with all new development areas identified as being below RL 45m AHD. For all calculated demand scenarios, a DN150 main branching off from the northern reservoir and continuing the existing DN150 along Reynolds Road is sufficient to support all water demands in this area.

Currently, no exact site has yet been identified for the AWTS. Due to the required consistent supply per day to the facility, if Nammoona Industrial area is identified to be the location for the site it is recommended the AWTS site be constructed on an elevation no greater than RL 45m AHD. This is to allow the existing northern reservoirs to supply water needs (without the need of a booster pump) to the AWTS if the filter backwash water from the WTP is not available, which will happen from time to time.

6.1.6 Area 2 - Casino Food Co-op and surrounds precinct

The immediate area surrounding the current northern reservoirs (in the allocated Casino Food Complex development) above an elevation of 45 m Australian Height Datum (AHD) will require connection to an elevated reservoir and small booster pump station to provide sufficient pressure (refer to Figure 6.3). Areas below this elevation will have sufficient pressures given a connection to the existing network within the development area to an existing DN600 trunk main (possibly via hot-tapped connection given the exercise required to shut down this main is quite involved), via a DN200 main for demand scenario being considered.

The required elevated reservoir (on 20 m high platform to provide adequate pressure) is incorporated for demand scenario 2, the capacity of which will be half the peak day flow value.

6.1.7 Area 3 - Johnston Street Industrial area and surrounds

Extension of this area's reticulation main network will provide sufficient pressure due to the low elevations (in respect to the elevation of the town's service reservoirs).

Specifically for scenario 2, DN150 mains connected to the predominately DN150 mains surrounding the STP development area at Clark Street, Irving Drive and Bruxner Highway are sufficient to supply water demands (see Figure 6.4). Due to water demand scenario 3's increased demands, approx. 1 km of DN200 lead in main from the closest DN200 trunk main along Hickey Street will service water demands. Refer to Figure 6.4. The industry catalyst site, to be located in the northeast area of subdivision 3c, potentially requires large water demands (in order of 715 kL/d) which have been noted by RVC to be supplied by treated water from the STP (as per previous discussions with the previous developer). For water demand scenario 2, a direct connection of DN150 between the water supply network near the STP and the industry catalyst site will allow sufficient supply for drinking water requirements only.

6.1.8 Servicing new urban release areas

Refer to the following reports for water servicing information for the new urban release areas of Fairy Hill, West Casino and North Casino.

– *Fairy Hill Sewer and Water Advice Report*
– *West Casino Sewer and Water Advice Report*
– *North Casino Sewer and Water Advice Report*

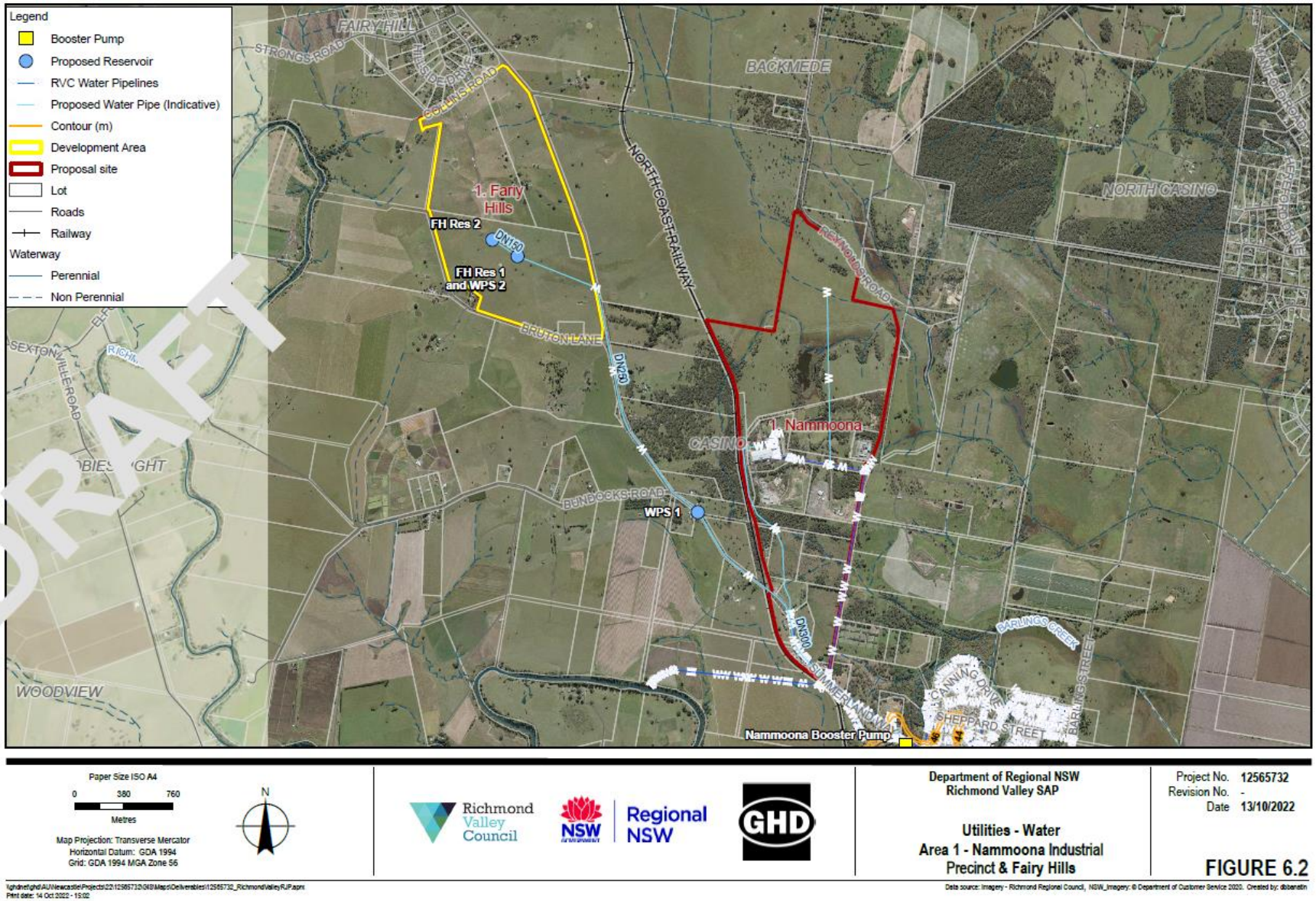

Figure 6.2 Utilities – Water – Area 1 Nammoona Industrial precinct

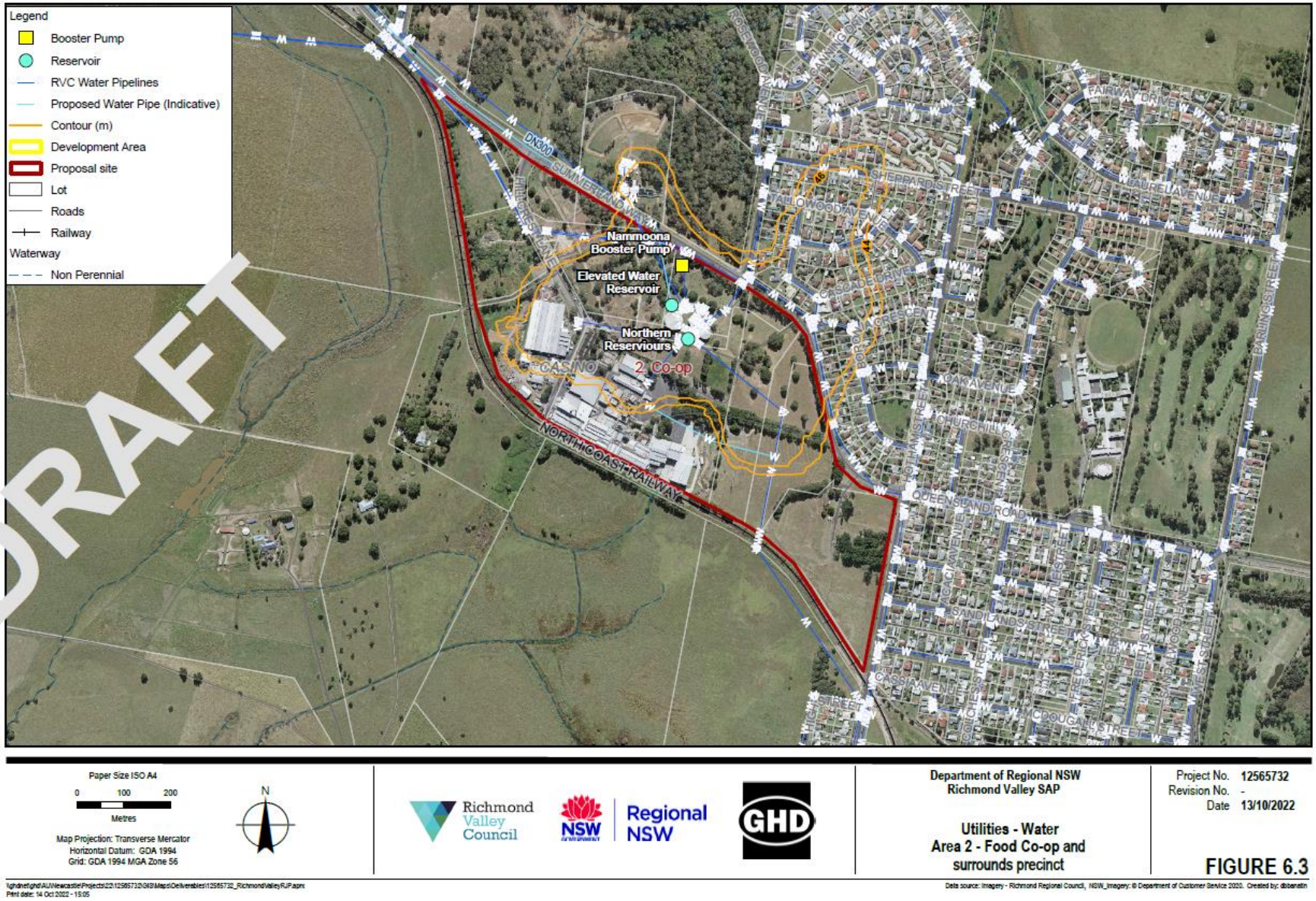

Figure 6.3 Utilities – Water – Area 2 Casino Food Co-op and surrounds precinct

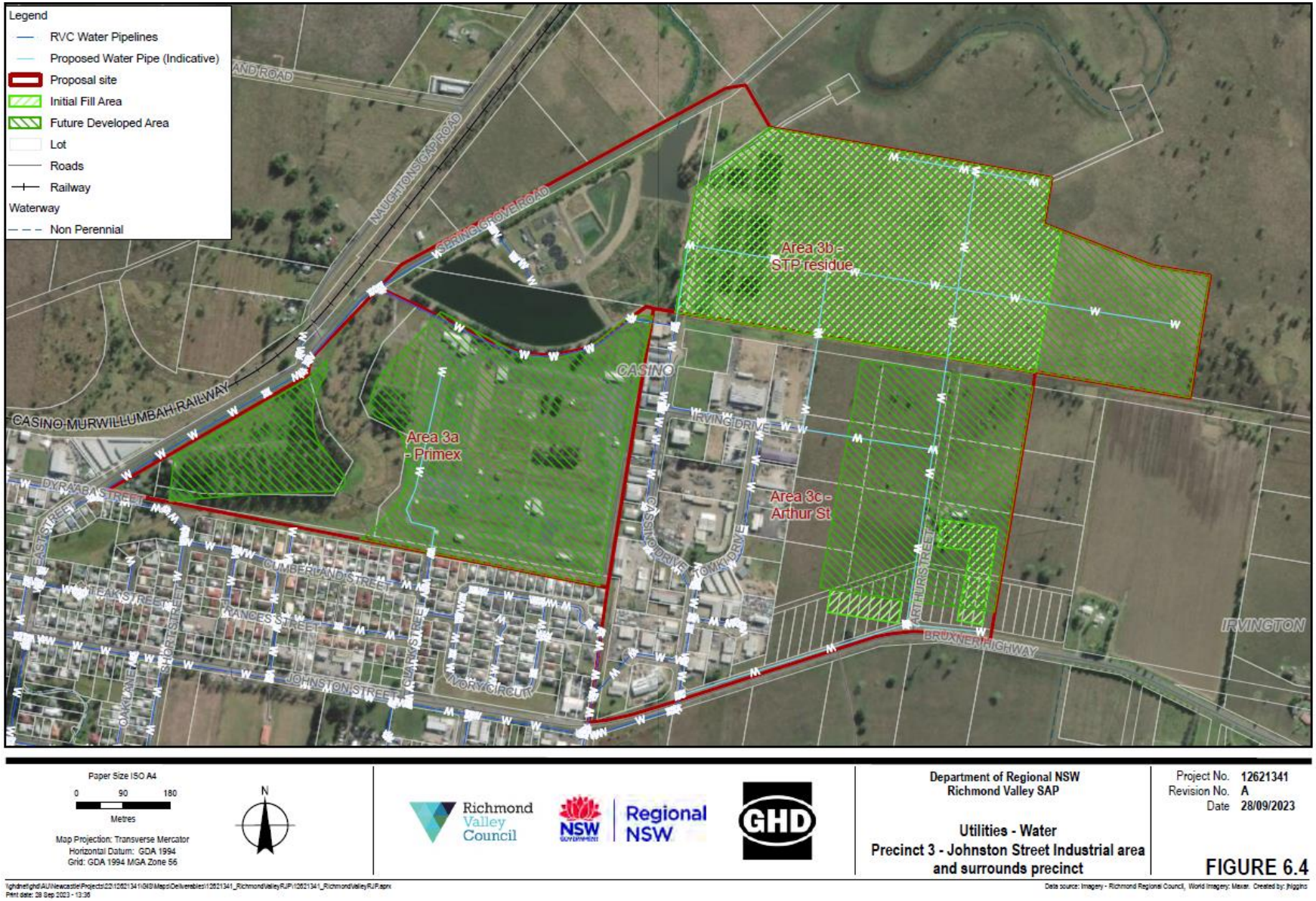

Figure 6.4 Utilities – Water – Area 3 Johnston Street Industrial area and surrounds precinct

6.2 Wastewater

6.2.1 General

Due to the lack of existing wastewater network in the proposed development areas, insights and opportunities are made on the basis for those areas requiring completely new wastewater infrastructure under peak wet weather flows (PWWF).

The near entirety of the Casino township's wastewater network contributes to the flows into SPS601. From the 2018 GHD study, SPS601 was determined to have considerable capacity (maximum capacity of 320 L/s with 2018 maximum inflow being around 202 L/s for PWWF although RVC are concerned this may be instead PDWF based on recent observations of high inflow/infiltration). Due to this consideration, GHD proposes a new pump station at Queensland Road and Barling Street junction and rising main to deliver loads directly to the STP as to avoid potential increases to overloading SPS601. A rising main following Queensland Road to Naughtons Gap Road will directly supply the STP with the loads from the new Nammoona Industrial precinct for a total of 1.0-5.5 L/s as determined in Hydrogeology, Quality and Demand Analysis Report. Additionally, the wastewater catchment area north of Queensland Road (total of approx.16.5% of Casino's current wastewater) will be diverted to this new pump station and rising main via connection to the DN450 gravity main at the Queensland Road and Barling Street junction. Therefore, the total capacity of the proposed SPS will be minimum of 34-39 L/s. It is noted no additional augmentations are proposed to take load from the SPS601 catchment. Constraints identified for the proposed new SPS and rising main include:

– Land acquirement for SPS location is recommended along Queensland Road and close to Barling Street or West Street as to allow ease of electrical and DN450 gravity main connection.
– Pipeline if to follow adjacent along Queensland Road, Naughtons Gap Road and Spring Grove Road will require a near 180 degree bend to follow Spring Grove Road. An alternative is lay pipeline between Naughtons Gap Road and Spring Grove Road as to reduce rising main length and headlosses due to bends.

As seen in Table 4.1, it is noted that two SPS are identified as under capacity and will likely require upgrades, more so for SPS608 which will most likely take additional loadings from the southern area of the 'STP and Johnston Street area' development. Upgrades to pump capacities will need to be determined through detailed loading analysis once exact loadings from each specific lot are known.

6.2.2 Area 1 – Nammoona Industrial precinct

Due to the naturally occurring valley to the Northern part of this area, a small SPS (approx. 2-3 L/s) will be required to service this northern sub-catchment of the Nammoona Industrial precinct. A rising main to the highpoint of Reynolds Road will allow the new gravity main to flow into the new SPS (currently under construction adjacent to Reynolds Road) as advised by RVC with capacity of 20 L/s will have the capacity to service the combined Nammoona catchment. Refer to Figure 6.5.

The small SPS to service the northern sub catchment of the Nammoona Industrial precinct will likely experience high infiltration due to proximity to the wetlands. The infrastructure required to house the SPS will be minimal due to the size of the expected inflow.

The small number of residential lots that are located along Summerland Way to the south of the Nammoona industrial precinct have water service, though no current wastewater infrastructure. To service this area for sewer, due to the few number of properties, a small dedicated low pressure pump station and rising main discharging to the reticulation system in the Nammoona industrial precinct is recommended to service the area.

As discussed above due to SPS601 potentially reaching capacity, the Nammoona wastewater loads will be delivered to the directly to the STP via a new pump station located at the junction of Queensland Road and Barling Street (identified as SPS601a) and rising main along Queensland and Naughtons Gap Roads. SPS601a will additionally be utilised to transport sewer loads from the Fairy Hill residential development located 8 km northwest of Casino.

Council have advised the Casino STP has an estimated 1300 ET available capacity to accommodate Stage 1 sewage loads from Area 1 and Area 3.

6.2.3 Area 2 - Casino Food Co-op and surrounds precinct

Whilst current sewer models display wastewater network within the Casino Food Co-op and surrounds precinct, RVC have advised the existing industry discharges to manhole 60531 via an internal pump station and DN150 main, which is near capacity. Opportunity exists to upgrade the DN150 main to DN200 for demand 2 with new developments gravity fed to the internal pump station. Alternatively, an additional DN150 branch network east of Hotham Street branching off (from either manholes 60531 or 60535), from the SPS601 catchment, can service the undeveloped areas via gravity, thereby no requirement the upgrading of the Casino Food Complex internal pump station. Refer to Figure 6.6 for a visual representation of infrastructure opportunity.

6.2.4 Area 3 - Johnston Street Industrial area and surrounds precinct

This area of development is near flat. Gravity mains can be utilised with conscious consideration of minimum depths as new network will only allow for 120-290 m of pipework at 1% grade before minimum depth of 600mm is met (from depth noted on existing manholes that appear suitable for connection). Refer to Figure 6.7.

Connection to the existing system, either via the existing Johnston St estate sewer branch or the Food Processing Industry branches, may require upgrades to the main sizes and pump stations depending on load and model analysis. Alternatively with development of a new STP works and potential new location, opportunity could allow for the new pump stations to instead discharge directly to the STP. Note that SPS607 (adjacent to Tomki Dr) pumps directly to the STP and SPS608 (corner of Johnston and Clark St) pumps into the SPS601 catchment.

Opportunity to use SPS607 to cater for the majority of the loading from this area is likely to be optimal, as the pump capacity is 17.3 L/s and, from the 2018 GHD study, the maximum inflow being 2.3 L/s (as compared to SPS608 with a capacity of 11.3 L/s with a measured maximum inflow of 20.9 L/s in 2018).

The existing wastewater network and the proposed additions and upgrades will unlikely have capacity to accommodate the industry catalyst site (located in the northeast of sub development 3c) if wastewater discharge flows resemble water demands. As designing to this potential wastewater load is costly, it is recommended that any discharges from the industry catalyst site are done slowly and flow limited (i.e. over time at low flow rate as to not overwhelm the network).

The proposed new STP location is at the western end Area 3, as shown on the in Figure 6.4. The design and location of the proposed new facility is subject to ongoing planning by Council.

Council have advised the Casino STP has an estimated 1300 ET available capacity to accommodate Stage 1 sewage loads from Area 1 and Area 3.

6.2.5 Servicing new urban release areas

Refer to the following reports for wastewater servicing information for the new urban release areas of Fairy Hill, West Casino and North Casino.

– *Fairy Hill Sewer and Water Advice Report*
– *West Casino Sewer and Water Advice Report*
– *North Casino Sewer and Water Advice Report*

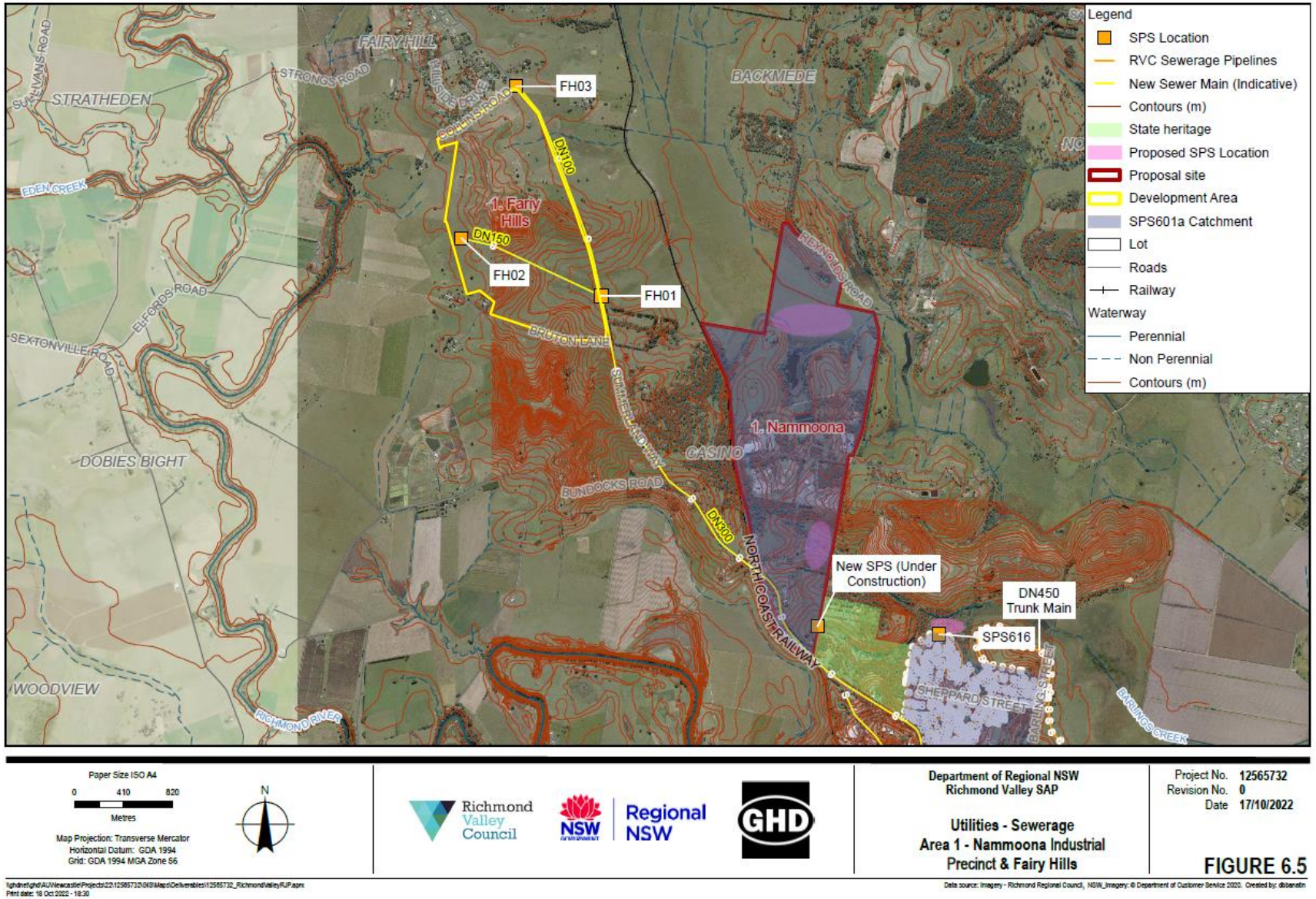

Figure 6.5 Utilities – Sewerage – Area 1 Nammoona Industrial precinct and Fairy Hill

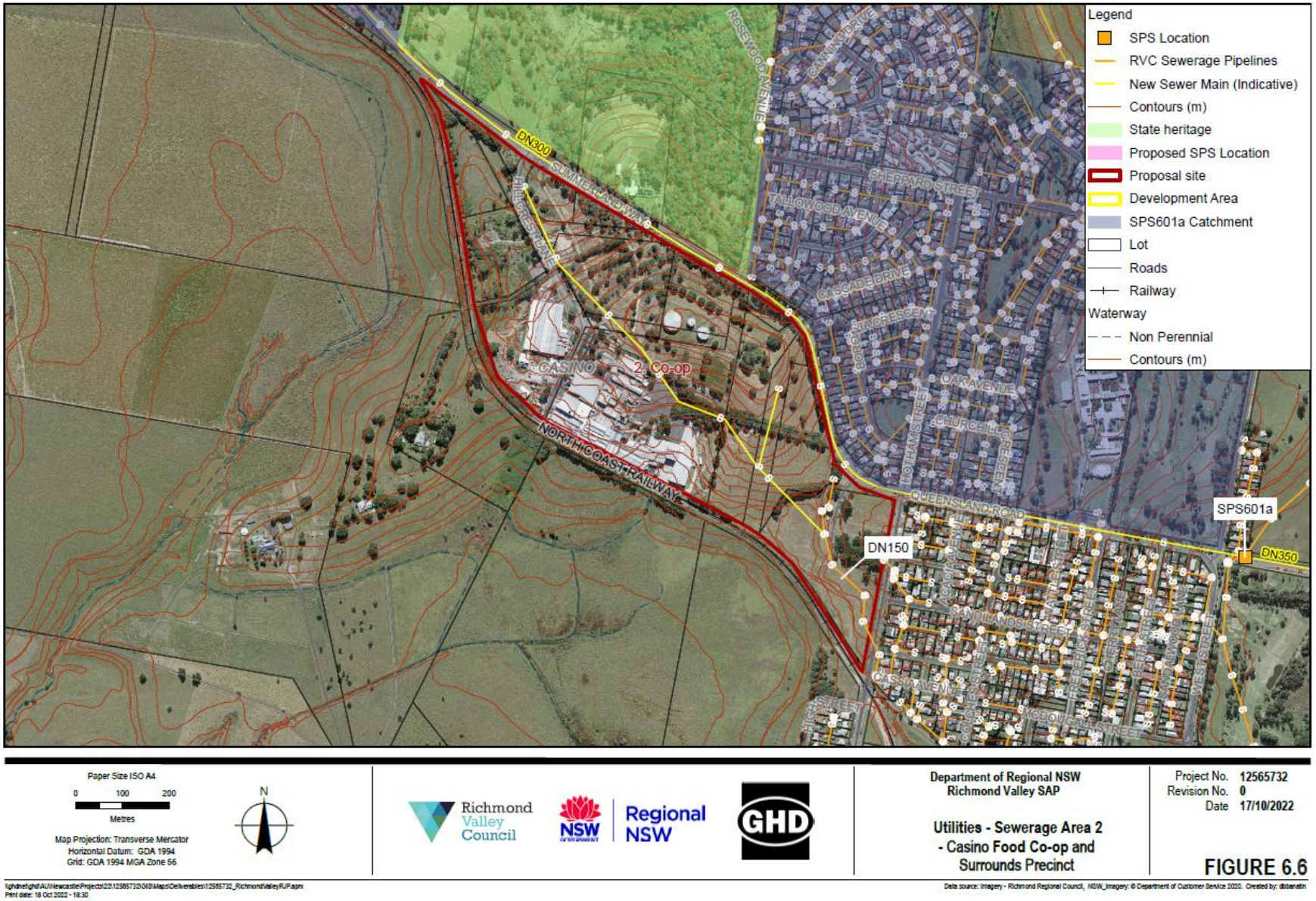

Figure 6.6 Utilities – Sewerage – Area 2 Casino Food Co-op and surrounds precinct

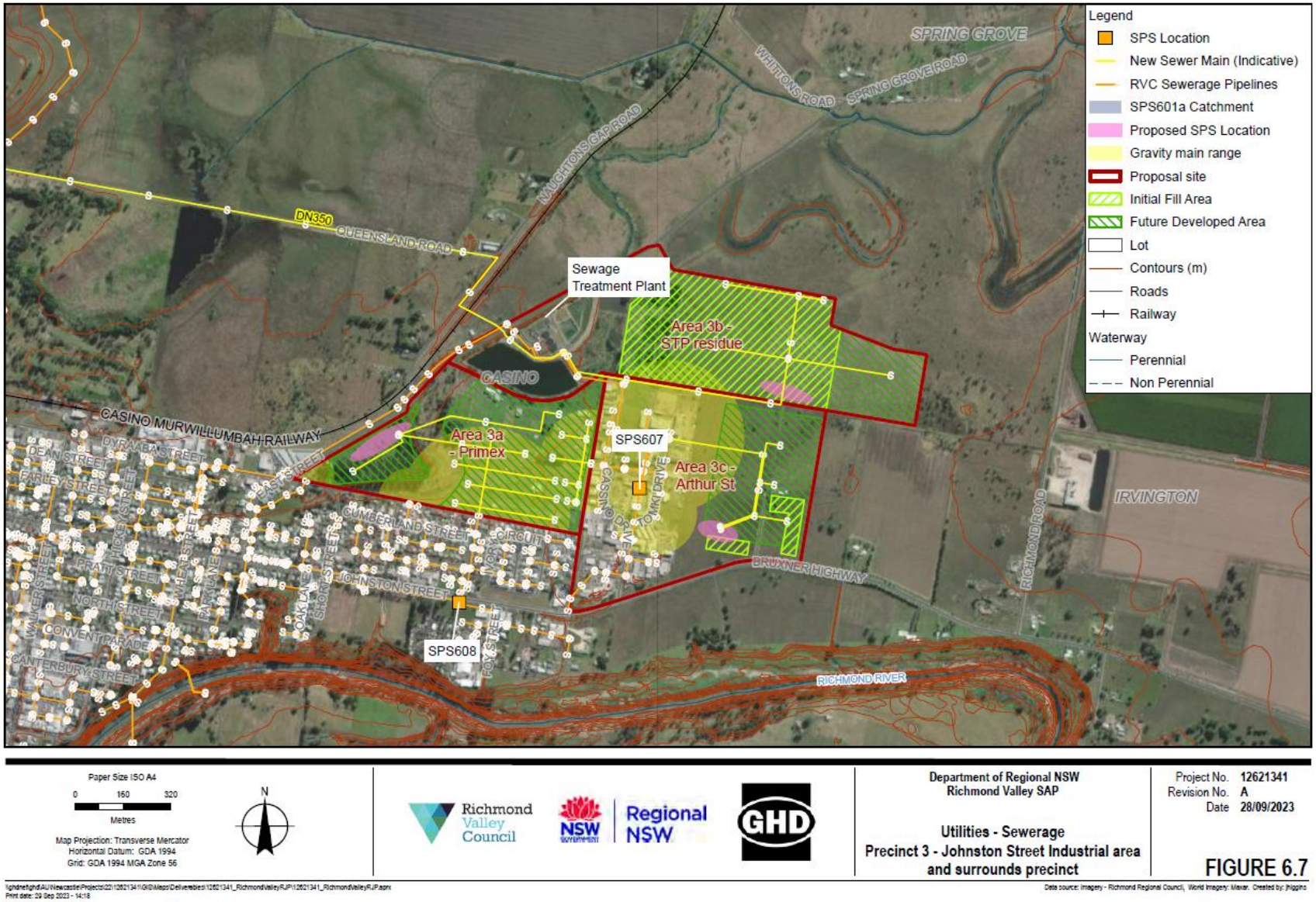

Figure 6.7 Utilities – Sewerage with existing STP location – Area 3 Johnston Street Industrial area and surrounds precinct

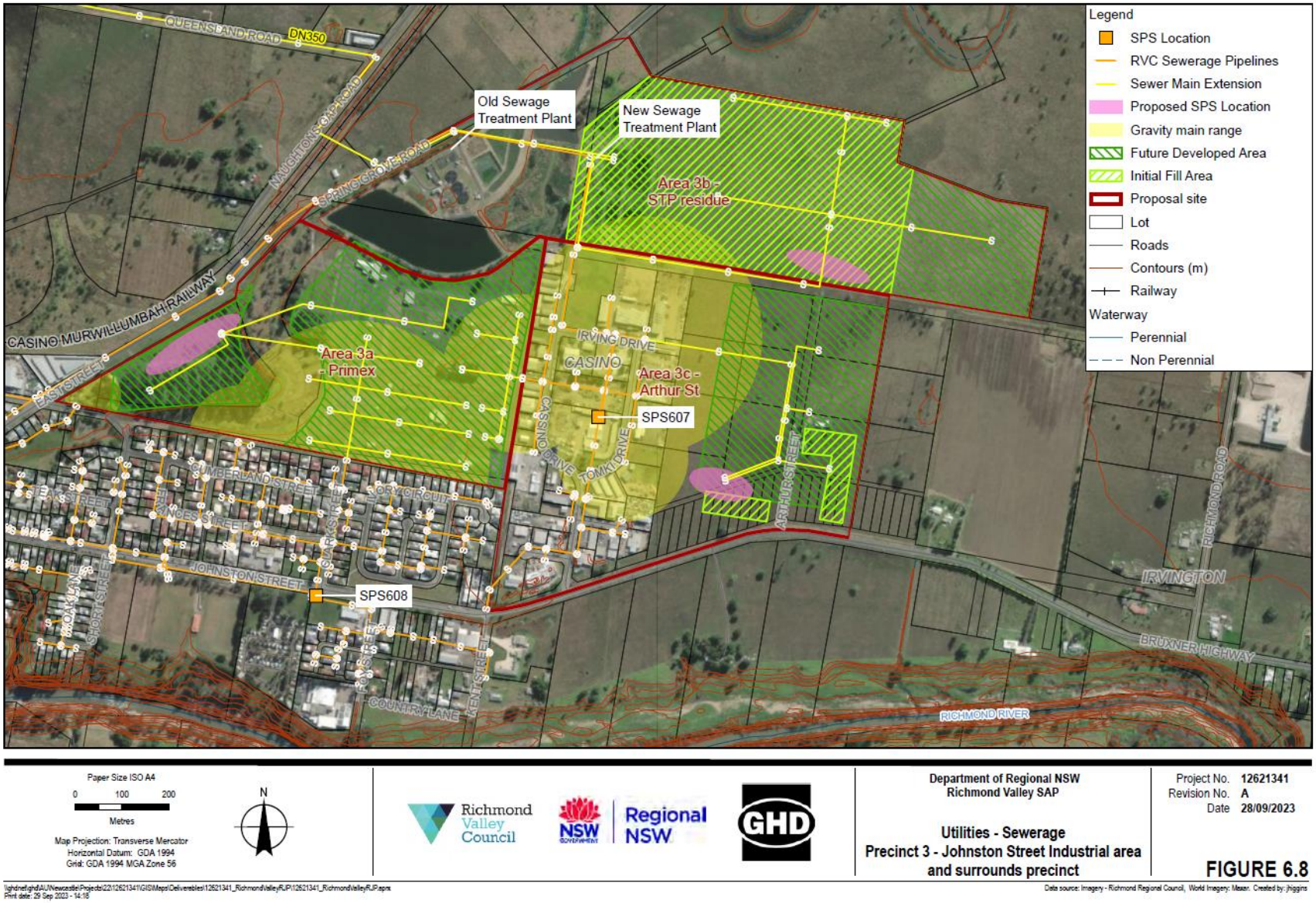

Figure 6.8 Utilities – Sewerage with proposed new STP – Area 3 Johnston Street Industrial area and surrounds precinct

6.2.6 STP

The following considerations should be made regarding the development of the STP:

- Council have advised Casino STP has an estimated 1300 ET available capacity to accommodate Stage 1 sewage loads from Area 1 and Area 3.
- Casino STP was significantly damaged by flooding in March 2022 and RVC has assessed the STP assets as having reached end-of-life. RVC is seeking funding through the Safe and Secure Water Program for a new Casino STP, which is expected to be replaced in the coming 5 to 10 years. The new STP is expected to include the treatment processes necessary to produce recycled water suitable for agricultural and municipal reuse with restricted access (e.g. golf course irrigation). This has been taken into account for the sewer loading scenarios, future plant arrangement and treated effluent requirements. The proposed new STP location is at the western end of the proposed catalyst development site within Area 3, as shown on the revised concept in Figure 3.3. The design and location of the proposed new facility is subject to ongoing planning by Council.
- Todoroski Air Sciences (TAS) has undertaken generic odour modelling as a basis for strategic planning. Outcomes of the modelling include:
  - The odour contours are indicative and do not reflect actual modelling for the proposed new facility.
  - The area that may be adversely affected by emissions will depend on site and process-specific factors, such as the scale of the operation, plant processes and emission controls, storage of raw material and waste, local wind patterns and topography.
  - The establishment of controls is necessary to limit development within the 7ou contour, other than development that is ancillary to the STP and not odour sensitive. Residential development will not be permitted within the 2ou contour.
  - Other uses that themselves generate odour or noise should preferably be located closer to the STP as the cumulative effect of more odour/noise generating uses is reduced by co-locating near the STP but this may still expand the odour contours outwards.
  - Facilities with no tangible odour or noise effects should preferably be located furthest from the STP.
  - The Master Plan needs to identify suitable buffers at the strategic planning stage as a basis for land use planning controls.
  - The introduction of a buffer considerations clause in the LEP may be warranted.
  - The possibility of future expansion will also be relevant in the consideration of an appropriate separation distance.
- Previous works have been based upon the assumption that influent entering the STP is predominantly domestic or domestic-like. The introduction of additional, large industrial discharges may substantially alter the ratios of key contaminants or introduce new contaminants if specific considerations are not made. Once large dischargers are identified, there may be opportunities to develop specific on-site treatment controls to eliminate specific contaminants at the source, prior to impacting the STP. It is assumed that all liquid trade waste will be pre-treated by each liquid trade waste generator to quality no less favourable to STP performance than the recommended acceptance limits contained within *Liquid Trade Waste Management Guidelines*, and that the general composition and characteristics of the total sewage stream will remain similar to domestic sewage.
- There may be opportunity to offset both potable water usage and wastewater discharge at large facilities if active water recycling practices are implemented and facilitated. For example, it may be possible for trade waste customers to partially recycle water used on site for cleaning or irrigation purposes, rather than discharging additional water to sewer.

– There is potential to supply approximately 715 kL/d of recycled water to the industry catalyst site (or other sites near the STP). Based on the previous developer's plans, it appears that the majority of the water required for the site was for drip irrigation in a glasshouse type facility (with limited flows for processing and drinking water). Based on this assumption, rather than a hydroponic set-up, the recycled water assumed for the new STP is likely to be adequate to manage human health risks but commercial suppliers of water recycling equipment have indicated that the users often require more intensively treated water, for example including reverse osmosis. Water pH requirements for hydroponics can vary depending on the crop grown. A typical pH range for effluent of the upgraded STP is in the range of 6.5 – 8.5. Modifications to the STP to chemically adjust pH could be implemented or pH adjustment could remain the responsibility of the recycled water user. Additional holding storage requirements would also be placed on the developer given the substantial additional cost. It is noted that these costs are not included in this report's cost estimates.
– Preliminary plans indicate that additional developments may be constructed in the vicinity of the treatment plant. The existing treatment plant includes two odour control units as advised by RVC. Increased loading upon the STP in combination with closer receivers may result in increased odour control considerations becoming required.

Based on the expected water demand, typical relationship between water consumption and sewage generation and adopting per capita flows of 180 L/EP/d, the corresponding equivalent population (EP) for each water demand scenario is as follows:

– 1,455 EP
– 4,209 EP
– 8,417 EP

As mentioned above, previous assessments by RVC were based upon minimal growth population estimates. The proposed industrial expansion will potentially introduce additional industrial source discharges. However, the industrial expansion may additionally result in significant growth in the baseline municipal load upon the STP as people move into the catchment to accept the newly available employment opportunities (i.e. Fairy Hill development area). Revised baseline population estimates have now been undertaken (provided by Gyde) in tandem with these industrial discharge estimates to fully determine the required capability of the upgraded STP and the estimated STP equivalent population is shown in Table 6.5, Table 6.6 and Table 6.7.

Table 6.5 Casino STP equivalent population, Scenario 1 (EP)

Source	2026	2031	2036	2041
Existing STP catchment inc. infill	11476	11614	11746	11840
New residential developments	783	2054	3115	3866
RJPs	256	697	1142	1455
Total	12514	14365	16003	17161

Table 6.6 Casino STP equivalent population, Scenario 2 (EP)

Source	2026	2031	2036	2041
Existing STP catchment inc. infill	11476	11614	11746	11840
New residential developments	783	2054	3115	3866
RJPs	734	2051	3313	4209
Total	12993	15719	18175	19915

Table 6.7 Casino STP equivalent population, Scenario 3 (EP)

Source	2026	2031	2036	2041
Existing STP catchment inc. infill	11476	11614	11746	11840
New residential developments	783	2054	3115	3866
RJPs	1469	4101	6626	8417
Total	13727	17768	21488	24123

Construction of the new Casino STP may be staged to reduce initial capital costs, to manage uncertainty in the sewage generation rates of RJP activities and to reduce performance risks associated with excessive underloading during early years of operation. For practical reasons, subsequent major capacity upgrades are sized for minimum 10 year intervals. The initial stage may be sized for the greatest of 2041 Scenario 1, 2036 Scenario 2 and 2031 Scenario 3. The 2036 Scenario 2 load of 18318 EP is a suitable design load for the first stage. Some treatment processes, such as the inlet works, are difficult or expensive to upgrade and may be provided with greater initial capacity. Potential staging of the main treatment process may be:

– Stage 1 – have installed or upgrade to two 9,200 EP process trains total capacity in 2026
– Stage 2 (Scenario 1) – No additional upgrade before 2041
– Stage 2 (Scenario 2) – Additional ~3,500 EP process train in 2036 to provide capacity to c.2046
– Stage 2 (Scenario 3) – Additional ~8,500 EP process train in 2032 to provide capacity to c.2042

There is sufficient land at the existing STP site for the upgrade for any of the three water demand scenarios while keeping the existing STP in operation during construction, with a footprint of 140 m x 95 m maximum required.

Infrastructure construction costs have been subject to substantial inflation over the past 1 to 2 years, with increases of ~40% above previous costs observed for several recent water or wastewater treatment projects. The cost for total replacement of the existing STP (capacity ~12,000 EP) with no additional capacity for the RJPs or new residential developments is estimated to be approximately $42 million (M). The estimated cost of the Stage 1 STP described above is $54M. Costs for the staged upgrades to provide capacity to at least 2041 for each RJP water demand scenario are shown in Table 6.8.

Table 6.8 Casino STP staged cost estimates ($M)

	Scenario 1	Scenario 2	Scenario 3
Stage 1	54	54	54
Stage 2	0	20	34
Total	54	74	88

The estimated costs are for comparison purposes only and concept design is required to provide cost estimates suitable for use in budget setting.

6.3 Trade waste

RVC's *Discharge of Liquid Trade Waste to the Sewerage System* policy (the "trade waste policy") addresses many of the issues likely to arise from the discharge to sewer of liquid trade wastes from the proposed commercial and industrial developments. This section is intended to support the implementation of the trade waste policy.

NSW Department of Planning, Industry and Environment has recently revised the *Liquid Trade Waste Management Guidelines* (2021, the "guidelines") and the *Model Policy for Discharge of Liquid Trade Waste to the Sewerage System* (the "model policy"), on which RVC's trade waste policy is based, was also updated. RVC should review the trade waste policy and consider updating it in line with the current model policy.

In general, trade waste should be treated by the generator to reduce contaminant concentrations, so they are broadly similar to municipal sewage. Adequate pre-treatment of the trade waste by the generators should allow normal routine operation of the STP without any special measures.

Sometimes trade waste generators near one another may produce trade waste streams that facilitate treatment of each other. For example, high biological oxygen demand (BOD) trade waste streams can support the treatment of high nutrient streams, or high pH and low pH streams can be mixed for self-neutralisation. A shared dedicated trade waste pre-treatment system would most likely be required and for practical reasons it would likely be owned and managed by RVC. No strong candidates for shared trade waste pre-treatment were identified.

Trade waste streams that have high BOD and low nitrogen and phosphorus content (e.g. beverage manufacturing wastewater) may be used to support biological nitrogen removal at the STP and there can be mutual benefit in relaxing the usual BOD concentration limits and load fees. Some treatment by the generator would generally be required (e.g. pH, TSS) and often storage and co-ordination would be required so that the volume and timing of the trade waste discharge coincides with demand for additional BOD at the STP. High BOD tends to promote odour and corrosion in the sewerage network and so only sites with short sewer residence time or direct delivery to the STP via pipe or tanker are likely to be appropriate. No strong candidates for using high BOD trade waste to support STP treatment processes were identified.

The nature of the trade waste associated with the proposed developments varies depending on the activities undertaken. The general nature of the trade waste streams and related key quality issues are summarised below.

– Energy from waste or other AWTS facilities may produce trade waste contaminated by leachate, run-off or process liquors from feedstock delivery, storage and processing areas; blow-down water and condensates from boilers or cooling systems, and oil, grease and hydrocarbons from equipment, vehicles and maintenance activities. Key quality issues include:
    - BOD
    - Total suspended solids (TSS)
    - Total dissolve solids (TDS)
    - pH
    - Temperature
    - Total oil and grease (TOG)
    - Total petroleum hydrocarbons (TPH)
– The industry catalyst site may produce trade waste contaminated by agricultural products, nutrient solutions, chemicals and solvents from production processes, concentrates from water treatment process and oil and grease from equipment and vehicles. Key quality issues include:
    - BOD
    - TSS
    - TDS
    - pH
    - Ammonia-N
    - Total Kjeldahl nitrogen (TKN)
    - Total nitrogen (TN)
    - Total phosphorus (TP)
    - TOG
    - TPH
– Logistics services suppliers (inc. cold chain) generally produce small volumes of trade waste, which may include water contaminated by cooling system condensate and blow-down water, spilled products, cleaning agents, and oil and grease from vehicles or equipment. Key quality issues include:
    - TSS
    - TDS
    - pH
    - TOG

- Engineering services businesses are likely to produce trade waste similar to other metal fabrication and light manufacturing businesses in the region. Trade waste may be contaminated by metals, process chemicals, paint or other coatings materials, and oil and grease. Key quality issues include:
  - TSS
  - TDS
  - pH
  - Cyanide
  - Hexavalent chrome
  - Other metals (e.g. aluminium, copper, nickel, zinc)
- Packaging manufacturers are likely to produce small volumes of trade waste. Trade waste may be contaminated with cleaning products; particulate matter; inks, pigments and other coating materials; solvents; and oil and grease. Key quality issues include:
  - BOD
  - TSS
  - TDS
  - pH
  - TOG
  - Total petroleum hydrocarbons (TPH)
- Food processing businesses can produce relatively large volumes of trade waste, which may be contaminated by food products, cleaning agents, and oil and grease. The decay of organic material in sewers may promote the development of anaerobic conditions and odour and corrosion issues in the sewers. Key quality issues include:
  - BOD
  - TSS
  - TDS
  - pH
  - Ammonia-N
  - TKN
  - TN
  - TP
  - TOG
- Medical grade agricultural product processors (e.g. tea tree and honey) may produce trade waste contaminated by agricultural products, chemicals and solvents from production processes, and oil and grease from products, equipment and vehicles. Key quality issues include:
  - BOD
  - TSS
  - TDS
  - pH
  - Ammonia-N
  - TKN
  - TN
  - TP
  - TOG
  - TPH

Trade waste is also produced by businesses that provide septic tank desludging and similar liquid waste services. The trade waste from these activities can be high strength and highly variable and may contain debris such as rags that are drawn along with the liquid waste. A tanker receival facility at the STP would facilitate tracking of tankered waste generation, removal of screenings and grit and the potential for the diversion of solids-rich tankered waste to the sludge handling stream to reduce impact on the main treatment stream.

6.4 Stormwater

6.4.1 Local conveyance network

Typical conveyance, detention and filter/treatment systems are able to be adopted for the developments to connect to the existing conveyance network adjacent to each development area. A typical allowance of 5% of each development area is a conservative estimate at this strategy stage for land required for detention and water quality improvement. This cost would be borne by the developer of each area.

The *Regional Jobs Precinct Flood Impact Assessment* (FIA) includes MUSIC modelling and stormwater management strategies for Area 1 and Area 3. Outcomes from the stormwater management strategy includes:

– Bioretention systems are recommended as achieving stormwater quality performance targets whilst minimising land use. Indicative areas and locations of bioretention systems have been proposed .
– Buffers for waterfront land have been defined for the northern portion of Area 1.
– Removal of some hydrolines in the southern portion of Area 1 are recommended due to absence of bed and banks.

A review of the peak flowrates and a hydrological model of the proposed development is still required to be undertaken.

6.5 Waste management and recycling

6.5.1 Alternate waste treatment solutions

The NSW Environment Protection Authority (EPA) released the *Energy from Waste Infrastructure Plan* (the Infrastructure Plan) in September 2021 to support the NSW *Waste and Sustainable Materials Strategy 2041* (the Waste Strategy). The Waste Strategy sets out the key objectives and actions underpinning the State's transition to a circular economy and identifies the need for a limited number of Energy from Waste facilities to manage residual waste in NSW.

One large-scale Energy from Waste facility would be required by 2030 to service the Greater Sydney region and an additional three large scale facilities required by 2040. Further, an additional landfill or medium scale Energy from Waste facility would be required to manage waste from the Hunter and Northern Rivers.

The Infrastructure Plan identifies the following Energy from Waste priority infrastructure areas:

– West Lithgow Precinct.
– Parkes Special Activation Precinct.
– Richmond Valley Regional Job Precincts.
– Southern Goulburn Mulwaree Precinct.
– At facilities that use waste or waste-derived feedstock to replace less environmentally sound fuels thermally treated at the site and the energy produced from the waste is used to power onsite site processes rather than exporting energy to the grid. It is noted the Food Co-op is proposing a biogas facility in area 2 as part of their ongoing operations. The proposal is to use existing on-site organic wastes/effluent, supplemented with off-site waste products, to produce biogas. This is subject to detailed assessment, approvals and EPA licencing

It is anticipated that an AWTS facility located in the Richmond Valley Regional Job Precincts could service waste management needs for northern NSW. The NSW North Coast Waste Investment Review prepared in September 2020 assessed the introduction of a large or small scale AWTS facility in Casino with through put capacity of 180,000 tonnes per year and 90,000 tonnes per year respectively.

The feedstock availability assessment indicated that there would be sufficient supply of residual waste from the region with optional contributions from south-east Queensland or commercial and industrial sources. Cost modelling indicated that while AWTS facilities did not represent the most cost-effective options for waste disposal, AWTS facilities would support higher resource recovery rates, job creation and provide long-term landfill security.

6.5.2 Landfill gas

Based on the waste streams identified in Table 4.3, the Nammoona Waste and Resource Recovery Facility is expected to generate landfill gas over many years, including after closure. The existing landfill cells are partially lined which may present a potential pathway for subsurface landfill gas migration. The proposed landfill Cell 6 will include an engineered base liner, which would reduce the risk of subsurface migration of landfill gas.

However, based on the low tonnages being landfilled and feedback from Council regarding landfill gas boundary monitoring, it is expected that risk of landfill gas migration off site is low. Annual subsurface landfill gas monitoring indicates no detection of landfill gas migrating from the site. The existing landfill cells are not capped which allows for venting through the surface.

Once the cells are capped in the future, this may increase the risk of lateral subsurface migration of landfill gas from unlined and partially lined historical filling areas. However, it is expected that landfill gas bores would be installed on the boundary of the site to enable potential lateral gas migration to adjacent sites to be detected. In addition, gas flaring or venting on site could be implemented if needed to dispose of gas safely.

Further investigation of the landfill cell geometry and surrounding geology could be undertaken in future to better characterise the risk of landfill gas migration for adjacent developments.

6.6 Electricity

6.6.1 Projected demand

Preliminary demand estimates were prepared based on expected gross floor areas (GFA) prepared and provided by the Department. These are summarised in Table 6.9 below.

Table 6.9 RJP electrical preliminary demand estimates

Area	Use description	GFA	Additional Demand (VA/m^2)	Additional Demand (MVA)
1	**Area 1 - Nammoona Industrial precinct**			
1_A	Existing Industries - General (heavy / high impact)	47,549	0	0
1_B	Intermodal - Logistics (Intermodal facility operations)	9,743	100	1.0
1_C	Intermodal - Logistics (Warehousing)	23,552	20	0.5
1_D	Intermodal - General industrial (low to moderate impact)	28,662	100	2.9
1_E	Heavy Industry - Food Processing – soybeans (heavy/ high impact) - Non Constrained Area	19,597	100	2.0
1_F	General industrial Stage 1 (low to moderate impact)	14,420	40	0.6
1_G	General industrial Stage 2 (low to moderate impact)	13,228	40	0.5
1_H	General industrial Stage 3 (low to moderate impact)	35,268	40	1.4
1_J	Existing Industries - General (heavy / high impact)	47,549	0	0
1_K	Intermodal - Logistics (Intermodal facility operations)	9,743	100	1.0
1_L	Intermodal - Logistics (Warehousing)	23,552	20	0.5
			Area 1 Total	**10.4MVA**

Area	Use description	GFA	Additional Demand (VA/m²)	Additional Demand (MVA)
2	**Area 2 – Casino Food Co-op and surrounds precinct**			
2_A	Existing Industries - General (heavy / high impact) including future bioenergy facility on Co-op Land	66,677	0	0
2_B	Catalyst Industries - Light/ General Industrial (Low impact). Uses unspecified at this stage	0	-	-
			Area 2 Total	**0MVA**
3A	**Area 3A Primex**			
3A_C	Light industrial/ commercial (Low impact industries)	27,342	40	1.1
3A_D	General Industrial (Low to medium impact industries)	32,673	40	1.3
			Area 3A Total	**2.4MVA**
3B	**Area 3b - Johnston Street Industrial Area**			
3B_A	Existing Industries - General (low to moderate impact)	36,753	0	0
3B_B	General industrial (low to moderate impact) - Extension north of Johnston Street	23,171	40	0.9
3B_C	General industrial - South of Johnston Street (low to moderate impact)	**0**	-	-
			Area 3B Total	**0.9**MVA
3C	**Area 3c Sewerage Treatment Plant and Surrounds**			
3C_A	Sewerage Treatment Plant	-		
3C_B	Industry catalyst site	57,099	80	4.6
			Area 3C Total	**4.6MVA**

Note: The Alternative Waste Treatment Solution generator is excluded from the demand calculations noting it may reduce total demand in the area, though should be assumed to not exist for planning purposes (given that supply from AWTS is not as reliable as grid power supply).

The above demands are preliminary in nature, noting the actual demand will be highly dependent on the actual industry that develops within the areas, the actual GFA they utilise and the actual energy usage profile within them. For example, un-airconditioned warehousing requires little power as compared to say additional abattoirs or meat packing facilities.

6.6.2 Servicing demand

6.6.2.1 General

Based on the GFA's and descriptions of potential industries, the additional load across the three areas totals 18.1MVA, which is approximately 70% the total demand of Casino (~26MVA), suggesting the figures may be excessive. Notwithstanding this, the development of the area to the extent suggested would significantly exceed the available capacity of the existing infrastructure at Casino Zone substation. This would need to be upgraded or supplemented in order to service the developments as described.

6.6.2.2 Nammoona Industrial precinct

It is anticipated the Nammoona Industrial precinct may generate demand in the order of 9MVA. At this level, the existing Zone Substation will not be able to service the load without upgrade. Assuming the future demand estimates are reasonable, noting there is very high uncertainty in them, it is anticipated a second zone substation may be required to service the load and other developments within Casino and surrounds. A new zone substation in Area 1, in addition to distribution network upgrades, could be used to service other developments, such as the Fairy Hill residential area, as well as offload demand from the existing ZSS, to free up that capacity for loads in other areas.

6.6.2.3 Casino food co-op and surrounds precinct

Given the apparent stagnation of growth in this area is anticipated, no new infrastructure would be required.

It is understood Essential Energy currently own land in Area 2 as shown in Figure 3.2. Further investigations and studies are required to determine if the size and location of the land is suitable for a new zone substation.

6.6.2.4 Johnston Street Industrial area and surrounds precinct

The demand in the STP and Johnston Street area is driven primarily by a single customer, being the pharmaceutical industry site. Given this is a single customer load, the servicing of that load is likely a matter for the customer. It is unclear of the servicing strategy for the customer but is expected to be either a new 66kV supply directly to the customer with a private power transformer, or a supply to a small new zone substation with supply taken at 11kV into the customer facility. The residual demand is in the order of 3.5MVA, which could potentially be serviced by a single additional 11kV feeder from the nearest Zone Substation.

If the supply to the facility is from a small Essential Energy owned ZSS, there would likely be opportunity to take other 11kV feeders from it to service the surrounds.

If the supply to the facility is a private one, and thus 11kV feeders cannot be taken for other customers, then it is expected the residual demand would be serviced by 11kV feeders from either the existing Casino Zone Substation, or the potential Nammoona Zone substation outlined above.

6.6.3 Alternate waste treatment solutions

It is estimated that capacity of an AWTS facility would be 5-10MVA based on the feedstock available in the region. A system of this capacity is expected to need a direct connection to the nearest zone substation or sub-transmission line. It may be possible for the generator to share an 11kV feeder with other customers however this would depend on the technical specifics of the feeder and the generator.

This would be subject to appropriate technical studies including an assessment of the capacity of the line to connect the generator.

6.7 Telecommunications and Internet

As part of redevelopment of the RJP's, the developer is obligated under Commonwealth Law to provide pit and pipe infrastructure to support the connection of new lots to nearby NBN Co infrastructure, unless the site is in a rural, bushland or remote area. Upon review of available NBN Co dial before you dig information, it is evident that existing in ground fibre services are available within the vicinity of each the proposed RJP's. Therefore, an exemption in this instance is considered unlikely, and extension of the existing NBN Co in ground infrastructure will need to be considered. This will entail provisioning of pit and pipe infrastructure compliant with NBN Co requirements to service new lots, which will be required to be paid for by the developer of the respective development. Note, the fibre infrastructure, terminations costs are not borne by the developer, with NBN installing in ground communications cabling, terminations etc, with cost recouped through subscriber connection fees via their chosen ISP.

NBNCo have confirmed that they would consider development of each area as a large development. In discussions with NBNCo, GHD were informed that given each nominated area appears to be currently serviced by fixed wireless and that any new lot within a redevelopment would be provided with Fibre to the Premises (FTTP) connectivity, providing the highest possible levels of speed and reliability to each lot.

– In each area a new pit and pipe would provide connectivity from the new development area back to existing NBNCo infrastructure and is required to be designed and installed to NBNCo guidelines. On completion, a NBNCo nominated contractor would install the backbone fibre provisions to each lot, connected back into the existing NBNCo network.
– As there is no evidence in any of the areas under consideration of existing FTTC or FTTN services, it is highly likely that upon development application to NBNCo, it will be considered that 100% of the backhaul costs associated with connection of the new development to existing NBNCo infrastructure will be borne by the developer.

6.7.1 Communications infrastructure assessment

As the planned land use for the development is not entirely known, full understanding of the telecommunications needs in comparison to existing available infrastructure cannot be fully determined at this stage. The bandwidth requirements (and hence requirements to upgrade infrastructure) will vary greatly between end user requirements; for example, a freight hub, with administration offices, tracking services etc, or a land survey company utilising remote access to high definition GIS information will require far more consistent and higher bandwidth requirements than a warehouse, workshop or depot. In considering the three proposed area development types, none appear to be particularly high data usage (i.e. data centre).

That said, an assessment of the likely order of magnitude increases in customers on the local NBN Co network to better understand the likely impact to bandwidth within the region was undertaken.

Based upon the *Indicative Land Use Yields and Delivery Projections - 23/09/2022*, the following estimated lot / customer count for each proposed area is summarised below:

– Nammoona Industrial precinct: 115 lots
– Casino Food Co-Op and surrounds precinct: 44 lots
– Johnston Street Industrial and surrounds precinct: 108 lots

Assuming each site is a light or heavy industrial facility, only requiring a minimum 25 megabits (Mb) per second (s) link as guaranteed by NBN Co under legislation and given the order of magnitude of lots likely to be developed, the impact on existing NBN Co infrastructure within the areas nominated is considered minimal. Given the numbers of lots under consideration, NBN Co will still consider each of these as large developments.

6.7.2 Area 1 – Nammoona Industrial precinct

It is recommended, through the provision of pit and pipe within the new development areas, expansion of the existing in ground fibre network along Summerland Way into the precinct be considered.

6.7.3 Area 2 – Casino Food co-op and surrounds precinct

Given the proximity of Area 2 to the edge of the Casino residential areas to the north-east and East, which is supported by underground fibre to the neighbourhood (FTTN) and fibre to the curb (FTTC) services, expansion across Summerland Way of FTTN services is possible, providing high speed, reliable telecommunications into the precinct. As per Nammoona Industrial precinct, all of the proposed area is supported by 4G mobile communications from all three major carriers.

6.7.4 Area 3 –Johnston Street Industrial area and surrounds precinct

The NBN Co availability map states that south-west of the site, plots are connected to the NBN via FTTN services, however there is no evidence of this on available dial before you dig information. Assuming that the dial before you dig information is accurate, to provide terrestrial communications to the new precinct, an extension of the NBN Co underground fibre network would have to be undertaken from the Eastern edge of the Casino city centre, East along Bruxner Highway to the precinct.

7. Recommended concept design

A summary of the recommended utilities and infrastructure to service the RJP's is provided below (noting water supply demand scenario 2 is recommended for adoption). With respect to the proposed recommendations, the indicative timeframes are as follows:

– Priority 1, 0 – 5 years (2021 to 2026)
– Priority 2, 5 – 10 years (2026 – 2031)
– Priority 3, 10 - 20 years plus (2031 – 2041+)

7.1 Area 1 – Nammoona Industrial precinct

As new development occurs in Area 1 and in relation to the northwest residential investigation area, it is recommended that ongoing monitoring of infrastructure capacity be undertaken to provide upgrades as necessary. The strategy for likely infrastructure upgrades to support growth in Area 1 is outlined as follows.

7.1.1 Water supply

– A high-level storage tank/reservoir in the Casino food co-op complex area will supply sufficient pressures to the Nammoona Industrial precinct.
– Extension of the existing DN150 Reynolds Road main to supply industry in the north and extension of mains along Summerland Way to supply water to the southern industries.
– On site storage tanks required to supplement demands during fireflow requirements.

7.1.1.1 Staging and trigger points for upgrades

Staging and trigger points for the water supply upgrades to service the Nammoona Industrial precinct are described in the table below.

Table 7.1 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 1	1-2	Triggered by development of Fairy Hill urban release area and by high water demand development types in Area 1 e.g. industry catalyst site	Fairy Hill urban release area (priority 1-2) planning is estimated to commence 2023 to 2026. Service Fairy Hill in conjunction with staged works to Area 1 is estimated to occur from 2026 to 2031. Water mains extended to site from the South along Summerland Way and North Coast Railway line from 2023 to 2026. On site storage tanks required to supplement demands during fireflow requirements estimated to commence 2026. High-level storage reservoir at Area 2 required by 2026 to give pressure to Area 1.

7.1.2 Wastewater

– A new SPS in the north and rising main in combination with the RVC Reynolds Road SPS (currently under construction and scheduled to be commissioned in 2023) are to service the Nammoona Industrial precinct.
– The combining of the Nammoona Industrial precinct and north of Queensland Road wastewater catchments to be directly connected to the STP via a new SPS and rising main along Queensland and Naughtons Gap Roads.
– RVC's trade waste policy should be applied to new or modified trade waste generators. Section 6.3 includes identification of key quality issues.

7.1.2.1 Staging and trigger points for upgrades

Staging and trigger points for the wastewater upgrades to service the Nammoona Industrial precinct are described in the table below.

Table 7.2 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 1	1-2	Triggered by development of Fairy Hill urban release area and in conjunction with wastewater loads in Area 1. Complete construction of SPS601a and sewer rising main to service area 1 and Fairy Hill.	Fairy Hill urban release area (priority 1-2) planning is estimated to commence 2023 to 2026. Service Fairy Hill in conjunction with staged works to Area 1 is estimated to occur from 2026 to 2031. New SPS and rising main located in residential / industrial area to service Area 1 to be commission 2023. Direct connection to industry catalyst site should be considered.

7.1.3 Stormwater

– Stormwater – conversion of existing ponds/basins to detention/filtering structures can be explored to generally drain to north.
– Stormwater harvesting and treatment measures should be incorporated into the precinct planning utilising the existing basins to the north to capture runoff from the developments for reuse. These include passive irrigation of street trees to improve urban heat impacts and incorporation of permeable landscape features to reduce runoff volumes and promote infiltration.

The stormwater quality assessment performed by BMT in the FIA suggest three potential stormwater quality improvement methods for the Nammoona Industrial precinct. The three options include:

– Wetlands
– Bioretention basins
– Streetscape bioretention

7.1.3.1 Staging and trigger points for upgrades

Staging and trigger points for the stormwater upgrades to service the Nammoona Industrial precinct are described in the table below.

Table 7.3 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 1	1-2	A small proportion of the southern region of the site falls under the drinking water catchment area. Detention/filtering structures and stormwater harvesting triggered by development type and the demand for reuse e.g. industry catalyst site	Works are expected to be ongoing following on from the residential / industrial subdivision from 2023 to 2031. The infrastructure required is dependent on development type. Investigate converting existing ponds/basins to detention/filtering structures (drains north).

7.1.4 Waste management and recycling

– Waste management and recycling – Further investigation of the landfill cell geometry and surrounding geology could be undertaken to better characterise the risk of landfill gas migration for nearby developments.

7.1.4.1 Staging and trigger points for upgrades

Staging and trigger points for the waste management and recycling upgrades to service the Nammoona Industrial precinct are described in the table below.

Table 7.4 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 1	3	Favourable AWTS feasibility study	A new landfill cell is to be constructed in 3 stages (A, B and C) over several years with Stage A expected to reach capacity in 2023. A new leachate pond and stormwater sedimentation pond as well as the first stage of capping of the existing landfill cells will also be constructed. Investigation of the landfill cell geometry and surrounding geology could be undertaken to better characterise the risk of landfill gas migration for nearby developments. The landfill is expected close around 2037.

7.1.5 Electricity

– Consider providing spatial allocations for a future zone substation (ZSS) within the development area (nominally 100 m x 100 m). It is understood there may be an Essential Energy owned site at the north-western corner of Area 2 which may be appropriate for this.
– Consider providing transmission corridors from existing 132kV lines on the southern side of Casino to the future ZSS site.
– Engage with Essential Energy to assess the feasibility of upgrading the existing Casino ZSS to defer costs associated with developing a new ZSS site.
– Assuming existing Casino ZSS can be upgraded, consider building new 11kV feeders such that they can be readily energised at 132kV in the future i.e. build a 132kV line, but energise at 11kV initially.

7.1.5.1 Staging and trigger points for upgrades

Staging and trigger points for the electrical supply upgrades to service the Nammoona Industrial precinct are described in the table below:

Table 7.5 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 1	2	Moderate development of area / increase in electrical load (2-3 years lead time for infrastructure)	Additional 11kV feeder(s) required from existing Casino ZSS. Consider constructing as 132kV or 66kV (depending on future sub-transmission strategy) but energise at 11kV for the initial stages of development.
		Heavy industrial/intensive power loads or generator (2-3 years lead time for infrastructure)	Future ZSS likely required to service Area 1 / Area 2 and Fairy Hill. Consider ~100 m x 100 m area for future ZSS in north-west Casino in south of Area 1 or north-west of Area 2.

7.1.6 Alternative waste treatment solutions

– If an AWTS power plant of considerable capacity is proposed, it would be subject to more detailed investigations, technical studies and community engagement including a capacity assessment and cost estimates of the line to connect to the generator as well as the normal assessment requirements in accordance with NSW State legislation. The Protection of the Environment Operations (Thermal Energy from Waste) Regulation 2022, which commenced on 8 July 2022, aims to adopt a strategic approach to the role of energy from waste infrastructure to ensure it protects the environment and human health into the future, and maximises efficiencies for waste innovation, management, and energy recovery.

7.1.7 Telecommunications

– Telecommunications and internet – There are opportunities to expand the existing NBN Co in ground fibre networks to provide high speed, reliable internet and telecommunications. Further liaison with NBN Co is required once the proposed land uses and end user requirements are understood.

7.1.7.1 Staging and trigger points for upgrades

Staging and trigger points for the telecommunication upgrades to service the Nammoona Industrial precinct are described in the table below.

Table 7.6 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 1	1-2	Triggered in conjunction with utilities and infrastructure development	Planning is estimated to commence 2023 to 2026. Liaison with NBN Co is required once land uses and end user requirements are understood. Works are estimated to be undertaken in conjunction with staged works to Area 1 from 2026 to 2031. Share easements and service corridors with other utilities and infrastructure where possible.

7.2 Area 2 - Casino food Co-op and surrounds precinct

As new development occurs in Area 2 and in relation to the northwest residential investigation area, it is recommended that ongoing monitoring of infrastructure capacity be undertaken to provide upgrades as necessary. The strategy for likely infrastructure upgrades to support growth in Area 2 is outlined as follows:

7.2.1 Water supply

– A 20 m high-level storage reservoir and dedicated booster pump station (BPS) located adjacent to the existing northern reservoirs will supply sufficient pressures to the minimal new developments in the Co-op area development on elevation 45 m or greater. Developments within this area to additionally have onsite storage to supplement demands during fireflow requirements. The storage capacity of the high-level reservoir and booster pump size is dependent on the demand scenario adopted. RVC have adopted demand scenario 2 which was recommended in the *Hydrogeology, Quality and Demand Analysis Report*. The tank is only recommended to be incorporated for scenarios 2 and 3 with sufficient storage for half the peak day flow values. The booster pump is recommended for all scenarios, largest size of the pump for scenario 3 being approx. 5kW.
– Industries developed on elevation less than 45 m to connect to low-level tanks/reservoirs via new mains hot-tapped into the existing DN600 trunk main.

7.2.1.1 Staging and trigger points for upgrades

Staging and trigger points for the water supply upgrades to service the Casino Food Co-op and surrounds precinct are described in the table below.

Table 7.7 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 2	1-2	Area 1 pressure and flow requirements Area 2 fireflow requirements	High-level storage reservoir at Area 2 required by 2026 to give pressure to Area 1. Additional 5kW BPS required to service Area 2 from 2026 to 2031.

7.2.2 Wastewater

– Due to the high elevation of the Casino Food Co-op and surrounds precinct, a new gravity main connection to the SPS601 catchment via extending from the network East of Hotham Street (currently within the Casino Food Co-op and surrounds precinct) will service this area. Due to the proposed reduction of SPS601 catchment area, it will have capacity to accommodate the additional loads from the Casino food Co-op area.

7.2.2.1 Staging and trigger points for upgrades

Staging and trigger points for the wastewater upgrades to service the Casino Food Co-op and surrounds precinct are described in the table below.

Table 7.8 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 2	2	DN150 receiving main is close to capacity and will require upgrading with any new proposals for the Co-op complex.	Extension of the gravity main from the east required to service Area 2 estimated to commence 2026 to 2031, dependent on expansion of Co-op complex.

7.2.3 Trade waste

– RVC's trade waste policy should be applied to new or modified trade waste generators. Trade waste should be treated by the generator to reduce contaminant concentrations so they are broadly similar to municipal sewage. Section 6.3 includes identification of key quality issues.
– RVC should consider revising the trade waste policy to incorporate recent changes to the NSW Model Policy for Discharge of Liquid Trade Waste to the Sewerage System.

7.2.3.1 Staging and trigger points for upgrades

Staging and trigger points for the trade waste upgrades to service the Casino Food Co-op and surrounds precinct are described in the table below.

Table 7.9 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 2	2	Development of trade waste triggered by expansion of co-op complex and development type e.g. AWTS facility, industry catalyst site, logistics services suppliers, engineering services businesses, packaging manufacturers, food processing businesses, medical grade agricultural product processors.	Dependent on new proposals for the Co-op complex.

7.2.4 Stormwater

– Stormwater - The existing stormwater conveyance and treatment systems will require upgrading to accommodate development of the precincts.

7.2.4.1 Staging and trigger points for upgrades

Staging and trigger points for the stormwater upgrades to service the Casino Food Co-op and surrounds precinct are described in the table below.

Table 7.10 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 2	2	Detention/filtering structures and stormwater harvesting triggered by development type and the demand for reuse e.g. industry catalyst site.	Dependent on new proposals for the Co-op complex. Stormwater harvesting, treatment measures and irrigation in precinct should be incorporated with development type.

7.2.5 Electricity

– Align Nammoona Industrial precinct servicing strategy with this area. i.e. if new ZSS is provided, supply to this will come from the new ZSS, otherwise, provide new 11kV feeders from Casino ZSS, and upgrade Casino ZSS accordingly.

7.2.5.1 Staging and trigger points for upgrades

Staging and trigger points for the electrical supply upgrades to service the Casino Food Co-op and surrounds precinct are described in the table below.

Table 7.11 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 2	3	Moderate development of area / increase in electrical load (2-3 years lead time for infrastructure)	Additional 11kV feeder(s) required from existing Casino ZSS. Consider constructing as 132kV or 66kV (depending on future sub-transmission strategy) but energise at 11kV for the initial stages of development. Existing EE possible available land near Co-op.
		Heavy industrial/intensive power loads or generator (2-3 years lead time for infrastructure)	Future ZSS likely required to service Area 1 / Area 2 and Fairy Hill. Consider ~100 m x 100 m area for future ZSS in north-west Casino in south of Area 1 or north-west of Area 2. Existing EE possible available land near Co-op.

7.2.6 Telecommunications

– Telecommunications and internet – There are opportunities to expand the existing NBN Co in ground fibre networks to provide high speed, reliable internet and telecommunications. Further liaison with NBN Co is required once the proposed land uses and end user requirements are understood.

7.2.6.1 Staging and trigger points for upgrades

Staging and trigger points for the telecommunication upgrades to service the Casino Food Co-op and surrounds precinct are described in the table below.

Table 7.12 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 2	2	Triggered in conjunction with utilities and infrastructure development	Dependent on new proposals for the co-op complex. Liaison with NBN Co is required once end user requirements are understood. Share easements and service corridors with other utilities and infrastructure where possible.

7.3 Area 3 - Johnston Street Industrial area and surrounds precinct

As new development occurs in Area 3 and in relation to the northwest residential investigation area, it is recommended that ongoing monitoring of infrastructure capacity be undertaken to provide upgrades as necessary. The staging assessment is based on the stage 1 fill areas determined by BMT in the FIA. Development of the Stage 1 areas could take place in the following staging scenarios:

– Staging scenario 1 - Development of the northern Stage 1 (Area C) fill area:
  a. The period of development of the Stage 1 area development area is likely to be within 20 years as it as part of a larger precinct. Refer to Figure 6.7 and Figure 6.8 for concept designs for Area 3b.

    b. Full development of the northern Stage 1, some development pre 2026, the bulk of development between 2026 and 2031, and final development in the 2031-2036 period.
    c. Cassino Drive intersection will reach an unacceptable Level of Service (LOS) by 2031 trigging the construction of the Arthur Street roundabout.
- Staging scenario 2 - Development of the southern Stage 1 (Area C) areas consisting of:
    a. Potential to areas to be developed in the period to 2026 with access to a new intersection with the Bruxner Highway.
    b. Southern stage 1 fill areas form only part of a larger fill area.
- Staging scenario 3 – Development of the northern and southern Stage 1 areas consisting of:
    a. Feasible to fully develop all Stage 1 areas if the southern Stage 1 areas are developed with access.
    b. The northern Stage 1 Area 3 can be partly developed until Cassino Drive intersection reaches an unacceptable LOS, and then fully developed following construction of a roundabout at Arthur Street on the Bruxner Highway.

The staging notes below also consider the staging details provided in the Traffic and Transport Assessment and allows for staging within a number of scenarios. Utilities infrastructure typically service the lots via the road formation, and due to the proposed staged filling of the development areas, the next stage of utilities services design requires further development of the internal road network design and its impacts on local and wider drainage network. This will enable the location and depth of the services to be constructed within road formations to avoid design or construction clashes at later dates. In particular if a future road connection from Arthur Street to lot 320 is proposed, the most suitable utilities corridor is within the road formation. However, the road level constructed may impact both the efficiency of construction of the roads and clashes or functionality of the utilities (e.g. Pumped sewage, or additional storm water networks to outlet the local road drainage). From a constructability perspective, utilities installed within/ in conjunction with road formation works can avoid excessing foundation treatments, in particular in areas of poor subgrades. Road formations constructed on minimal embankment are also likely to required varying levels of excavation to remove unsuitable foundations, which could clash with installed early utilities if road and utilities are staged separately. Therefore, it is recommended the design of internal access roads be developed and reviewed against the overall drainage impacts together with utilities infrastructure design development.

The broad strategy and staging scenarios for infrastructure upgrades to support growth in Area 3 is outlined as follows:

7.3.1 Water supply

- For the adopted demand scenario 2, the following augmentation is recommended:
    a. Approximately 1 km of DN200 rising lead-in water main attached to the closest existing DN200 main along Hickey Street.
- Due to the water requirements for the industry catalyst site supplied by treated water from the STP, a direct connection between existing water mains near the STP and the industry catalyst site of DN150 water main will be required.
- The northern Stage 1 Area 3c – STP Residue is likely to be the main area of development in the short term Priority 1 (1 to 5 years) ahead of construction of the major drainage works.
- New developments in the southern Stage 1 Area 3b - Arthur Street are to be serviced by extension of water mains along the Bruxner Highway and Irving St and along Arthur Street.

7.3.1.1 Staging and trigger points for upgrades

Staging scenarios and trigger points for the water supply to service the Johnston Street Industrial area and surrounds precinct are detailed in the table below.

Table 7.13 Staging and trigger points for upgrades

Precinct	Staging scenario	Priority	Trigger	Staging
Area 3	1	1-2	Flood mitigation required	Staged filling of Area 3c STP Residue as development proceeds.
		1-2	New developments requiring water supply in northern Stage 1 Area 3c STP Residue.	Water infrastructure developed to service the Stage 1 developments in Area 3c STP Residue, east of the proposed new STP site. This area is likely to be the main area of development in the short term (Priority 1). Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
		1-2	Construction of new STP.	Connect water main to the new STP and extend the water main to connect to the main in Cassino Drive to minimum the number of dead-ends and potential water quality issues in the network.
		1-2	New developments requiring water supply in southern Stage 1 Area 3b Arthur Street.	Water infrastructure developed to service the new Stage 1 developments in southern Area 3b Arthur Street with consideration of the Irving Drive and Arthur Street ultimate design road levels when constructed and ultimate fill levels for Area 3b Arthur Street. The balance of Area 3b is assumed be developed once the major drainage infrastructure around the STP is in place. Pipeline segments under roadways are to be construction at the same time as the road works to eliminate directional drilling at a later date. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
		1-2	Cassino Drive intersection reaches an unacceptable LOS by 2031 triggering construction of Authur St roundabout.	Water infrastructure developed to service the new Stage 1 developments in southern Area 3b Arthur Street with consideration of the Irving Drive and Arthur Street ultimate design road levels when constructed and ultimate fill levels for Area 3b Arthur Street. Pipeline segments under roadways are to be construction at the same time as the road works to eliminate directional drilling at a later date.
		1-2	Filling of non-stage 1 areas (e.g. the Primex site)	Once the major drainage infrastructure is constructed, staging of development at Area 3 can proceed in any of the proposed development subject to staged provision of infrastructure.
		1-3	Future developments require water supply.	Water infrastructure developed to allow connections to future developments. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
	2	1-2	Flood mitigation required.	Staged filling of Area 3b Arthur Street as development proceeds.
		1-2	New developments requiring water supply in southern Stage 1 Area 3b Arthur Street.	Water infrastructure developed to service the new Stage 1 developments in southern Area 3b Arthur Street with consideration of the Irving Drive and Arthur Street ultimate design road levels when constructed and ultimate fill levels for Area 3b Arthur Street. Pipeline segments under roadways are to be construction at the same time as the road works to eliminate directional drilling at a later date. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.

Precinct	Staging scenario	Priority	Trigger	Staging
		1-2	Cassino Drive intersection reaches an unacceptable LOS by 2031 triggering construction of Authur St roundabout.	Water infrastructure developed to service the new Stage 1 developments in southern Area 3b Arthur Street with consideration of the Irving Drive and Arthur Street ultimate design road levels when constructed and ultimate fill levels for Area 3b Arthur Street. Pipeline segments under roadways are to be construction at the same time as the road works to eliminate directional drilling at a later date.
		1-2	Filling of non-stage 1 areas (e.g. the Primex site)	Once the major drainage infrastructure is constructed, staging of development at Area 3 can proceed in any of the proposed development subject to staged provision of infrastructure.
		1-3	Future developments require water supply.	Water infrastructure to be designed and developed to allow connections to future developments. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
	3	1-2	Flood mitigation required.	Staged filling of Area 3c STP Residue as development proceeds. Staged filling of Area 3b Arthur Street as development proceeds.
		1-2	Partial development of water supply infrastructure in northern Stage 1 Area 3c STP Residue.	Water infrastructure developed to service the Stage 1 developments in Area 3c STP Residue, east of the proposed new STP site. This area is to be partially developed until Cassino Drive intersection reaches an unacceptable LOS triggering the construction of the Arthur St roundabout. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
		1-2	Cassino Drive intersection reaches an unacceptable LOS by 2031 triggering construction of Authur St roundabout.	Water infrastructure developed to service the new Stage 1 developments in southern Area 3b Arthur Street with consideration of the Irving Drive and Arthur Street ultimate design road levels when constructed and ultimate fill levels for Area 3b Arthur Street. Pipeline segments under roadways are to be construction at the same time as the road works to eliminate directional drilling at a later date.
		1-2	Full development of water supply infrastructure in northern Stage 1 Area 3c STP Residue.	Water infrastructure developed to service the Stage 1 developments in Area 3c STP Residue, east of the proposed new STP site following the construction of the Arthur St roundabout. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
		1-2	Construction of new STP.	Connect water main to the new STP and extend the water main to connect to the main in Cassino Drive to minimum the number of dead-ends and potential water quality issues in the network.

Precinct	Staging scenario	Priority	Trigger	Staging
		1-2	New developments requiring water supply in southern Stage 1 Area 3b Arthur Street.	Water infrastructure developed to service the new Stage 1 developments in southern Area 3b Arthur Street with consideration of the Irving Drive and Arthur Street ultimate design road levels when constructed and ultimate fill levels for Area 3b Arthur Street. Pipeline segments under roadways are to be construction at the same time as the road works to eliminate directional drilling at a later date. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
		1-2	Filling of non-stage 1 areas (e.g. the Primex site)	Once the major drainage infrastructure is constructed, staging of development at Area 3 can proceed in any of the proposed development subject to staged provision of infrastructure.
		1-3	Future developments require water supply.	Water infrastructure to be designed and developed to allow connections to future developments. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.

7.3.2 Wastewater

– SPS608 requires upgrading as it is currently under capacity and will need to take additional loadings from south of Area 3.
– Area 3b – Arthur Street may be connected to the existing Johnston St estate sewer reticulation into SPS607 or potentially into the northern Stage 1 Area 3c – STP Residue sewerage system. The concept design has allowed for Area 3b – Arthur Street to connect to the existing Johnston St estate sewer reticulation via a new sewer rising main (SRM) along the extension of Irving Drive.
– The northern Stage 1 Area 3c – STP Residue is likely to be the main area of development in the short term Priority 1 (1 to 5 years) ahead of construction of the major drainage works.
– New developments in the northern Stage 1 Area 3c – STP Residue are to be serviced by new reticulation system, sewage pumping station (SPS) and sewer rising main (SRM) discharging to initially to the existing STP and ultimately to the new STP following its construction.

7.3.2.1 Staging and trigger points for upgrades

Staging scenarios and trigger points for the wastewater to service Johnston Street Industrial area and surrounds precinct are detailed in the table below.

Table 7.14 Staging and trigger points for upgrades

Precinct	Staging scenario	Priority	Trigger	Staging
Area 3	1	1-2	Flood mitigation required	Staged filling of Area 3c STP Residue as development proceeds.
		1-2	New developments requiring sewerage infrastructure in northern Stage 1 Area 3c STP Residue.	Sewerage infrastructure developed to service the Stage 1 developments in Area 3c STP Residue, east of the proposed new STP site. This area is likely to be the main area of development in the short term (Priority 1). Timing of the works is suggested to proceed after filling of areas to ensure sewer mains are constructed at minimum depth and not at depth below fill.
		1-2	Construction of new STP.	Divert the SRM from Area 3c – STP Residue to the new STP inlet works.

Precinct	Staging scenario	Priority	Trigger	Staging
		1-2	New developments requiring sewerage infrastructure in southern Stage 1 Area 3b Arthur Street.	Sewerage infrastructure developed to service the new Stage 1 developments in southern Area 3b Arthur Street with consideration of the Irving Drive and Arthur Street ultimate design road levels when constructed and ultimate fill levels for Area 3b Arthur Street. Pipeline segments under roadways are to be construction at the same time as the road works to eliminate directional drilling at a later date. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
		1-2	Cassino Drive intersection reaches an unacceptable LOS by 2031 triggering construction of Authur St roundabout.	Sewerage infrastructure developed to service the new Stage 1 developments in southern Area 3b Arthur Street with consideration of the Irving Drive and Arthur Street ultimate design road levels when constructed and ultimate fill levels for Area 3b Arthur Street. Pipeline segments under roadways are to be construction at the same time as the road works to eliminate directional drilling at a later date.
		1-2	Filling of non-stage 1 areas (e.g. the Primex site)	Once the major drainage infrastructure is constructed, staging of development at Area 3 can proceed in any of the proposed development subject to staged provision of infrastructure.
		1-3	Future developments require sewerage infrastructure.	Sewerage infrastructure to be designed and developed to allow connections to future developments. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
	2	1-2	Flood mitigation required.	Staged filling of Area 3b Arthur Street as development proceeds.
		1-2	New developments requiring sewerage infrastructure in southern Stage 1 Area 3b Arthur Street.	Sewerage infrastructure developed to service the new Stage 1 developments in southern Area 3b Arthur Street with consideration of the Irving Drive and Arthur Street ultimate design road levels when constructed and ultimate fill levels for Area 3b Arthur Street. Pipeline segments under roadways are to be construction at the same time as the road works to eliminate directional drilling at a later date. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
		1-2	Cassino Drive intersection reaches an unacceptable LOS by 2031 triggering construction of Authur St roundabout.	Sewerage infrastructure developed to service the new Stage 1 developments in southern Area 3b Arthur Street with consideration of the Irving Drive and Arthur Street ultimate design road levels when constructed and ultimate fill levels for Area 3b Arthur Street. Pipeline segments under roadways are to be construction at the same time as the road works to eliminate directional drilling at a later date.
		1-2	Filling of non-stage 1 areas (e.g. the Primex site)	Once the major drainage infrastructure is constructed, staging of development at Area 3 can proceed in any of the proposed development subject to staged provision of infrastructure.
		1-3	Future developments require sewerage infrastructure.	Sewerage infrastructure to be designed and developed to allow connections to future developments. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.

Precinct	Staging scenario	Priority	Trigger	Staging
	3	1-2	Flood mitigation required.	Staged filling of Area 3c STP Residue as development proceeds. Staged filling of Area 3b Arthur Street as development proceeds.
		1-2	Partial development of sewerage infrastructure in northern Stage 1 Area 3c STP Residue.	Sewerage infrastructure developed to service the Stage 1 developments in Area 3c STP Residue, east of the proposed new STP site. This area is to be partially developed until Cassino Drive intersection reaches an unacceptable LOS triggering the construction of the Arthur St roundabout. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
		1-2	Cassino Drive intersection reaches an unacceptable LOS by 2031 triggering construction of Authur St roundabout.	Sewerage infrastructure developed to service the new Stage 1 developments in southern Area 3b Arthur Street with consideration of the Irving Drive and Arthur Street ultimate design road levels when constructed and ultimate fill levels for Area 3b Arthur Street. Pipeline segments under roadways are to be construction at the same time as the road works to eliminate directional drilling at a later date.
		1-2	Full development of sewerage infrastructure in northern Stage 1 Area 3c STP Residue.	Water infrastructure developed to service the Stage 1 developments in Area 3c STP Residue, east of the proposed new STP site following the construction of the Arthur St roundabout. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
		1-2	Construction of new STP.	Divert the SRM from Area 3c – STP Residue to the new STP inlet works.
		1-2	New developments requiring sewerage infrastructure in southern Stage 1 Area 3b Arthur Street.	Sewerage infrastructure developed to service the new Stage 1 developments in southern Area 3b Arthur Street with consideration of the Irving Drive and Arthur Street ultimate design road levels when constructed and ultimate fill levels for Area 3b Arthur Street. Pipeline segments under roadways are to be construction at the same time as the road works to eliminate directional drilling at a later date. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.
		1-2	Filling of non-stage 1 areas (e.g. the Primex site)	Once the major drainage infrastructure is constructed, staging of development at Area 3 can proceed in any of the proposed development subject to staged provision of infrastructure.
		1-3	Future developments require sewerage infrastructure.	Sewerage infrastructure to be designed and developed to allow connections to future developments. Timing of the works is suggested to proceed after filling of areas to ensure water mains are constructed at minimum depth and not at depth below fill.

7.3.3 Trade waste

– RVC's trade waste policy should be applied to new or modified trade waste generators. Section 6.3 includes identification of key quality issues.
– RVC should consider revising the trade waste policy to incorporate recent changes to the NSW Model Policy for Discharge of Liquid Trade Waste to the Sewerage System.
– The new STP should include a tankered waste receival facility to facilitate the disposal of septage and other liquid wastes from sources not permanently connected to sewer (see Section 7.3.2).

7.3.3.1 Staging and trigger points for upgrades

Staging and trigger points for the trade waste to service Johnston Street Industrial area and surrounds precinct are described in the table below.

Table 7.15 Staging and trigger points for upgrades

Precinct	Priority	Trigger	Staging
Area 3	1	The new STP should include a tankered waste receival facility New trade waste generators in Area 3	The new STP should include a tankered waste receival estimated to commence around 2026.

7.3.4 Stormwater

– Area specific flood modelling was undertaken BMT in conjunction with finalisation of the RJP *Draft Richmond Valley RJP Structure Plan*. Required freeboards are key consideration in ongoing flood planning by RVC in consultation with the NSW Department of Planning & Environment.
– The FIA has taken into account stakeholder feedback on flood planning levels and acceptable impact criteria.
– The FIA model was updated to include allowance for fill within Area 3 and the FIA identified the need for flood mitigation works involving creating additional capacity for flow from west to east.
– Two mitigation solutions were shown to be viable in the FIA for mitigating peak flood level impacts; one consisted of reinstating a flow path though the land currently occupied by the STP and the second created a flow path in Crown Land north of Spring Grove Road. Extents of filling were then optimised to minimise any residual flooding impacts remaining after mitigation.
– Modelled peak flood levels plus climate change at the STP site and Johnston Street are 1% AEP of 22.25 m AHD.
– The stormwater quality assessment performed by BMT in the FIA suggest three potential stormwater quality improvement methods for the Nammoona Industrial precinct. The three options include:
    a. Wetlands
    b. Bioretention basins
    c. Streetscape bioretention

Figure 7.1 Casino STP site (middle left) and Johnston Street area (middle right) February 2022 flood

Figure 7.2 Casino Primex site (middle left) and Bruxner Highway (middle right) February 2022 flood

– Flooding of Primex site occurred as shown in Figure 7.2 – fill and stormwater drainage upgrades will be required to address flooding and should be included in future planning and floodplain risk management studies.
– Filling of non-Stage 1 areas (e.g. the Primex site) is dependent on construction of the major drainage infrastructure. Once the major drainage infrastructure is constructed, the staging of development at Area 3 can proceed in any of the proposed development areas in Area, subject to the staged provision of infrastructure to the precinct.
– Properties fronting the Bruxner Highway as shown in Figure 7.1 are subject to flooding from the Richmond River and will require filling to be above developable levels.

7.3.4.1 Staging and trigger points for upgrades

Staging and trigger points for the stormwater to service the Johnston Street Industrial area and surrounds precinct are described in the table below.

Table 7.16 Staging and trigger points for upgrades - Stormwater

Precinct	Priority	Trigger	Staging
Area 3	1-2	Flood mitigation required	Staged filling of select areas for development.
	1-2	STP relocation and land development	Development of a major drainage infrastructure (options 1B and 2B).

7.3.5 Electricity

– Align servicing strategy to Pharmaceutical Customer strategy i.e. if a new Essential Energy ZSS is proposed to transformer supply to 11kV and for the customer to take supply at 11kV, utilise the ZSS to service the residual area. Otherwise, provide new 11kV feeders from either upgraded Casino ZSS or new Nammoona area ZSS.

7.3.5.1 Staging and trigger points for upgrades

Staging and trigger points for the electrical supply to service Johnston Street Industrial area and surrounds precinct are described in the table below.

Table 7.17 Staging and trigger points for upgrades - Electricity

Precinct	Priority	Trigger	Staging
Area 3	1-3	Development of the STP site, industry catalyst site and expansion of industrial area to increase in electrical load.	Servicing heavy loads will likely require new 11kV supplies from a ZSS, either the existing or a new one, which could be difficult given the urban areas to be negotiated. Noting commentary against Area 1, 2, it is likely preferrable to target light industry with lower power demands in this area to minimise infrastructure augmentations.

7.3.6 Telecommunications

– Telecommunications and internet - There are opportunities to expand the existing NBN Co in ground fibre networks to provide high speed, reliable internet and telecommunications. Further liaison with NBN Co is required once the proposed land uses and end user requirements are understood.

7.3.6.1 Staging and trigger points for upgrades

Staging and trigger points for the telecommunications to service the Johnston Street Industrial area and surrounds precinct are described in the table below.

Table 7.18 Staging and trigger points for upgrades - Telecommunications

Precinct	Priority	Trigger	Staging
Area 3	1-2	Triggered in conjunction with utilities and infrastructure development	Planning is estimated to commence 2023 to 2026. South Bruxner land excluded from RJP with Council to investigate potential of site for residential. Liaison with NBN Co is required once land uses and end user requirements are understood. Works are estimated to be undertaken in conjunction water and sewerage staging. Share easements and service corridors with other utilities and infrastructure where possible.

8. Development Control Plan provisions

Relevant sections from the *Richmond Valley Development Control Plan 2021* to be considered for planning and design of infrastructure for the RJP's is outlined below*:*

- Part B Commercial:
  - B-3 Building Setbacks
  - B-5 Access and Loading
  - B-6 Car Parking
  - B-8 Safety and Security
  - B-11 Stormwater, Sewage and Water
  - B-12 Earthworks and Retaining Walls
  - Garbage Waste and Storage
  - B-14 Natural Hazards and Constraints
- Part C Industrial:
  - C-3 Building Setbacks
  - C-6 Fencing
  - C-7 Noise and Other Amenity Impacts
  - C-8 Safety and Security
  - C-9 Parking, Loading and Access
  - C-10 Stormwater, Sewage and Water
- Planning and design of water supply, wastewater and stormwater infrastructure.
- Stormwater harvesting and treatment measures should be incorporated into the precinct planning utilising the existing basins to the north to capture runoff from the developments for reuse.
- RVC should consider revising the trade waste policy to incorporate recent changes to the *NSW Model Policy for Discharge of Liquid Trade Waste to the Sewerage System*:
  - C-11 Waste
- Generation of landfill gas at the Nammoona Waste and Resource Recovery Facility (refer to Section 6.5.2).
- An AWTS power plant of considerable capacity requires more detailed investigations, technical studies and community engagement (refer to Section 7.1.6):
  - C-12 Earthworks and Retaining Walls
  - C-13 Natural Hazards and Constraints
  - C-14 Additional Considerations for Specific Uses
- Part H Natural Resources and Hazards:
  - H-1 Flood Planning
- Outcomes of flood study for Area 3 incorporating 2022 event currently being finalised by RVC to inform planning decisions:
  - H-2 Acid Sulfate Soils
  - H-3 Natural Resources
- Drink water catchment - a small proportion of the southern region of Area 2 falls under the drinking water catchment area. Detention/filtering structures and stormwater harvesting works in this area will be triggered by development type and the demand for reuse e.g. industry catalyst site.
- Part I Other Considerations:
  - I-1 Environmental Heritage
- I-1.12 Aboriginal Cultural Heritage:
  - I-2 Development In, On, Over or Under a Public Road

- I-2.2 Roads Authority.
- I-2.3 Structures in, on, over or under a Public Road:
  - I-3 Building Setbacks
  - I-4 Car Parking Provisions
  - I-7 Noise Impact Assessment
  - I-9 Water Sensitive Urban Design—WSUD
  - 1-10 Crime Prevention through Environmental Design—CPTED
  - 1-11 Land Use Conflict Risk Assessment— LUCRA
  - 1-12 Context and Site Analysis
  - 1-13 Use of shipping containers

9. Recommended updates to contribution plans

9.1 Updates to DSPs

Section 64 of the *Local Government Act, 1993* enables a local government Council to levy developer charges for water supply, sewerage and stormwater. This derives from a cross-reference in that Act to Section 306 of the Water Management Act 2000. The Development Servicing Plans (DSPs) for water supply, sewerage and stormwater detail the water supply, sewerage and stormwater developer charges to be levied on development areas using a local utility's water supply, sewerage and stormwater infrastructure.

Council currently has a Water Supply Services DSP 2010. Council is required to prepare DSPs in accordance with the *2016 Developer Charges Guidelines for Water Supply, Sewerage and Stormwater (2016)* issued by the Minister for Lands and Water, pursuant to section 306 (3) of the Water Management Act, 2000. Recommendations for updates to DSPs post 2016 would include updates to the following sections:

- Executive Summary
- 2.7 Out-of-sequence development
- 3.1 Growth projections
- 3.2 Land use information
- 4.1. Existing and future water and sewerage services
- 4.3 Future capital works program
- 7. Calculated developer charges
- 9. Background information
- 13. Equivalent Tenant (ET) Projections
- 15. Future capital works program
- 16. Calculation of capital charge
- 17. Calculation of reduction amount (review)
- 18. Cross-subsidy calculations (review)
- 19. Calculation of developer charge

Information to inform the revised DSPs requires further refinement (design development is required to produce realistic cost estimates). For the water network, water treatment, sewer network and sewer treatment DSP elements relating to approximate cost (noting bulk water are shown in the Hydrogeology, Quality and Demand Analysis Report), refer to the tables below, noting that the other non-ET or cost information listed above is in the project reports. Note that final costs also cannot be determined without existing operational costs that are held by RVC to calculate the 'reduction amount' and that cross subsidies are to be determined by RVC also.

9.2 Future capital works program

Based on the analysis of the proposed RJP developments and *Fairy Hill Sewer and Water Servicing Advice Report*, the estimated future network water supply and wastewater capital works to inform the DSP's for water supply, wastewater and stormwater are listed in the sections below. Note the future bulk water and WTP capital works program is detailed in section 11 of the *Hydrogeology, Water Quality and Demand Analysis Report*. Refer to Table 5.1 of the *Fairy Hill Sewer and Water Servicing Advice Report* for the Fair Hill infrastructure cost estimates.

9.2.1 Water supply

Casino Distribution

Area 1 – Nammoona Industrial precinct

– 1290m DN150 water main from Dargaville Drive north
– 1770m DN150 water main from Summerland Way to Dargaville Drive

Area 2 – Food co-op

– 20m DN150 - DN200 water main
– 20 m high level tank
– WPS (water booster pumping station) < 5kW

Area 3 –Johnston Street Industrial area and surrounds precinct

– 1870m DN150 - DN200 water main east of STP
– 400m DN150 water main south of STP
– DN150 water main to industry catalyst site

Fairy Hill area

– WPS1 – 2 x 75 kW pumps, 88.6 L/s @ 56 m
– WPS2 – 2 x 3 kW pumps, 9.4 L/s @ 20 m
– FH Reservoir 1 – 3.88 ML
– FH Reservoir 2 – 0.45 ML
– 2430m DN300 water main from northern Casino reservoirs site to WPS1
– 2750m DN250 water main from WPS1 to reservoir 1
– 140m DN150 water main from WPS2 to reservoir 2

9.2.2 Wastewater/recycled water system

Casino Distribution

Area 1 – Nammoona Industrial precinct

– DN150 reticulation main – Nammoona (2023)
– SPS – Reynolds Road (2023)
– DN100 SRM Reynolds Rd to Sheppard St (2023)
– SPS SPS601a upgrade 168.5 L/s @ 17 m - Queensland Road / Barling Street
– SRM 4410m from Reynolds Road to Casino STP
– SRM 2130m DN375 from SPS601a to Casino STP

Fairy Hill area

– SPS FH01 130.0 L/s @ 55 m
– SPS FH02 28.5 L/s @ 25 m
– SPS FH03 13 L/s @ 55 m
– SRM FH01 - 4710m DN300 from SPS FH01 to gravity assist section of main
– SRM FH01 (pressure and gravity assist) - 1100m DN300 from gravity assist section of main to existing gravity trunk main on Summerland Way
– SRM FH02 - 250m DN150 from SPS FH02 to FH01
– SRM FH03 - 1390m DN100 from SPS FH03 to FH01
– Refer to *Fairy Hill Sewer and Water Servicing Advice Report* for capital works cost estimates and further details.

West Casino area

- WPS 2x18 kW pumps, 27.4 L/s @ 45 m
- WC Reservoir – 1.29 ML
- 4500m DN250 water main
- 360m DN150 water main
- 2500m DN250 water main
- 4000m DN150 water main
- SPS WC01 112.0 L/s @ 37 m
- SPS WC02 11.5 L/s @ 28 m
- SPS WC03 60.2 L/s @ 54 m
- SPS WC04 33.2 L/s @ 56 m
- SRM WC01 – 4500m DN375
- SRM WC02 – 50 /470m DN100 / DN200
- SRM WC03 – 2380m DN200
- SRM WC04 – 1080m DN150
- Refer to *West Casino Sewer and Water Servicing Advice Report* for capital works cost estimates and further details

Area 2 – Casino Food co-op and surrounds precinct

- 1205m DN150 reticulation main from Hillcrest Lane to Queensland Road

Area 3 – Johnston Street Industrial area and surrounds precinct

- New STP 21,000 EP (design for ultimate capacity)
- DN150 reticulation mains – STP surrounds
- DN150 reticulation mains – Johnston St area
- Reuse main to industry catalyst site

New Casino STP

Some assets may be able to be rehabilitated and repurposed as part of the new STP. The capacity of the first construction stage of the new Casino treatment process should have capacity for 18,400 EP and is likely to include:

- Inlet works including mechanical screening and grit removal.
- Tankered waste receival facility (see Section 7.3.3).
- 2 or 3 no. biological treatment process trains including biological nitrogen removal (BNR) and enhanced biological phosphorus removal (EPBR), such as oxidation ditch, anaerobic-anoxic-aerobic (A2O), intermittent decant extended aeration (IDEA), sequencing batch reactor (SBR) or membrane bioreactor (MBR).
- Supplementary chemical phosphorus removal, which may be integrated into the biological treatment process.
- UV disinfection.
- Sand filtration or membrane filtration for removal of helminth ova from recycled effluent with cattle exposure (not required for the MBR biological process).
- Mechanical sludge thickening.
- Aerobic sludge digestion, which complements EBPR better than sludge ponds; reed beds may also be suitable and do not require mechanical sludge thickening or dewatering.
- Mechanical sludge dewatering.

9.2.3 Stormwater system

Area 1 – Nammoona Industrial precinct

– Stormwater harvesting treatment measures and conversion of existing ponds/basins to detention/filtering structures for reuse

Area 2 – Casino Food co-op and surrounds precinct

– Stormwater harvesting, treatment measures and irrigation systems

Area 3 –Johnston Street Industrial area and surrounds precinct

– Stormwater drainage upgrades - Kent Street alignment, Primex site

9.3 DSP guidance information

– Table 9.1 and Table 9.2 provides guidance information for updating the Council's Water Supply and Wastewater DSP's. Note these values were calculated in 2022/23 and do not include servicing the Fairy Hill development.

Table 9.1 Water distribution DSP guidance information

	Demand Scenario 1	Demand Scenario 2	Demand Scenario 3
ET projections[1]	6603	7729	9290
Future capital works program	High level tank (50 kL) and <5 kW booster for co-op site DN150 Lead-in mains	High level tank (250 kL) and <5 kW booster for co-op site DN150 Lead-in mains	High level tank (300 kL) and <5 kW booster for co-op site Nammoona DN150 Lead-in main Casino food co-op and STP DN200 Lead-in mains
Order of magnitude costs ($M)	$1.5M[3]	$4.5M[4]	$7.5M[4]

– 1. Based on 2.6 EP:ET ratio from Casino STP strategy report (GHD, 2019). 1 EP is 180 L/EP/day

– 2. 'Raw' refers to charge without reduction amount

– 3. Based on NSW reference rates

– 4. Based on NSW reference rates and GHD experience

Table 9.2 Wastewater treatment and distribution DSP guidance information

		Demand Scenario 1	Demand Scenario 2	Demand Scenario 3
ET projections, RJPs[1]		577	1,752	3,376
ET projections, total for STP	6,603	7,729	9,290	
Future capital works program		New SPS601 catchment SPS and rising main (small growth portion only) New SPSs near STP Small upgrade portion of STP upgrade	New SPS601 catchment SPS and rising main (medium growth portion only) New SPSs near STP Medium upgrade portion of STP upgrade	New SPS601 catchment SPS and rising main (large growth portion only) New SPSs near STP Large upgrade portion of STP upgrade
Order of magnitude costs ($M)		$3.5M[3]	$7.5M[4]	$16.5M[4]
Order of magnitude costs ($M), STP works included.	$57.5M	$81.5M	$104.5M	

– 1. Based on 2.6 EP:ET ratio from Casino STP strategy report (GHD, 2019). 1 EP is 180 L/EP/day
– 2. ‘Raw’ refers to charge without reduction amount
– 3. Based on NSW reference rates
– 4. Based on NSW reference rates and GHD experience

A Planning Agreement (PA) is a voluntary agreement or other arrangement between Council and a developer under which the developer is required to:

– Dedicate land free of cost
– Pay a monetary contribution
– Provide any other material benefit or
– Provide any combination of the above
– To be used for or applied towards a public purpose

Council maintains a PA register. The register currently has one agreement listed, VPA2021/0001 between Council and Peter Croke Holdings Pty Ltd. The agreement related to Lots 86 & 87 DP7555627 bounded by Hare Street, East Street and Boundary Street, Casino. The PA does not relate to land within Area 1, 2 and 3 therefore there are no updates to the PA required.

10. References

Arcadis, 2020. NSW North Coast Waste Investment Review

Arcadis, 2020. North Coast Region Waste Investment Review Stocktake

BMT (2023), Regional Jobs Precinct Flood Impact Assessment Stage 4 Final Report

City Water Technology 2021 Richmond Valley Casino WTP Process Assessment and Optimisation

Department of Regional NSW 2022., Casino Place Plan - Casino industrial land demand

Department of Water and Energy, 2007. 2007 Model Policy for Discharge of Liquid Trade Waste to the Sewerage System

NSW Department of Planning and Environment, 2021. Liquid Trade Waste Management Guidelines

GHD 2019. Casino STP long-term strategy report

GHD 2022. Fairy Hill Sewer and Water Servicing Advice Report

GHD 2022. West Casino Sewer and Water Servicing Advice Report

GHD 2022. North Casino Sewer and Water Servicing Advice Report

GHD, 2022. Hydrogeology, Water Quality and Demand Analysis Report

Gyde 2022. Draft Casino Place Plan

Gyde 2022. Draft Richmond Valley Regional Jobs Precinct Master Plan

Gyde 2021. Richmond Valley Regional Job Precincts Action Plan

New South Wales Environment Protection Authority, 2021a. Energy from Waste Infrastructure Plan, Parramatta

New South Wales Environment Protection Authority, 2021b. NSW Waste and Sustainable Materials Strategy 2041, Parramatta

North East Waste 2017. Regional Waste Management Strategy

NSW Department of Planning, Industry and Environment, 2021. *Liquid Trade Waste Management Guidelines*.

NSW EPA 2021. Energy from Waste Infrastructure Plan (the Infrastructure Plan)

NSW EPA 2021 Waste and Sustainable Materials Strategy 2041 (the Waste Strategy)

Public Works Advisory 2021. Casino Water Security Assessment

Public Works Advisory 2022. Casino Water Supply Scoping Study

Richmond Valley Council 2002 Casino Floodplain Risk Management Plan 2002

Richmond Valley Council 2021 Development Control Plan 2021

Richmond Valley Council 2020. Local Strategic Planning Statement Beyond: 20-20 Vision

Richmond Valley Council 2021 GIS data

Sustainability East 2022. RVC Compilation Report

WBM 1998. Casino flood study

WBM 2009 Casino flood model

Appendix A

RJP water demand calculations

					Average Day:				Peak Day:			
					Scenario 1	Scenario 2	Scenario 3		Scenario 1	Scenario 2	Scenario 3	
					11.5	19	26.5					
					kL/d	kL/d	kL/d		kL/d	kL/d	kL/d	
	Area 1 Nammoona Industrial Area											
	Land use yields	**Land Area (sqm)**	**FSR**	**GFA (ha)**				**Factor**	1.20			
1_A	**Existing Industries - General (heavy / high impact) consisting of:**	475,492	0.1	4.75	54.68	90.34	126.01		65.62	108.41	151.21	
	Northern Rivers Livestock Exchange											
	Council Landfill Facility											
	Riverina Stockfeeds											
	Pentach Timber Products											
1_B	**Intermodal - Logistics (Intermodal facility operations)**	42,170	0.3	1.27	14.55	24.04	33.53		17.46	28.84	40.23	
1_C	**Intermodal - Logistics (Warehousing)**	101,942	0.3	3.06	35.17	58.11	81.04		42.20	69.73	97.25	
1_D	**Intermodal - General industrial (low to moderate impact) potentially including:**	124,059	0.3	3.72	42.80	70.71	98.63		51.36	84.86	118.35	
	Logistics suppliers who provide intermodal/cold chain solutions											
1_E	**Heavy Industry - Food Processing – soybeans (heavy/ high impact) - Non Constrained Area**	65,322	0.3	1.96	22.54	37.23	51.93		27.04	44.68	62.32	
1_F	**Heavy Industry - Food Processing – soybeans (heavy / high impact) - Biodiversity Offset Dependent**	15,391	0.3	0.46	5.31	8.77	12.24		6.37	10.53	14.68	
1_G	**Renewable/circular economy energy providers - EfW (heavy / high impact)**	33,726	0.2	0.67	**100**	**150**	**200**		120.00	180.00	240.00	
1_H	**General industrial Stage 1 (low to moderate impact) potentially including:**	48,066	0.3	1.44	16.58	27.40	38.21		19.90	32.88	45.85	
	Bio-degradable and/or compostable packaging manufacturers											
	Technical/ Engineering service providers support to the regional food processing industry											
	Logistics suppliers who provide intermodal/cold chain solutions											
	Medical grade processors (e.g. tea tree and honey)											
1_J	**General industrial Stage 2 (heavy/ high impact)**	79,348	0.3	2.38	27.37	45.23	63.08		32.85	54.27	75.70	
1_K	**General industrial Stage 2 (low to moderate impact) potentially including:**	44,095	0.3	1.32	15.21	25.13	35.06		18.26	30.16	42.07	
	Bio-degradable and/or compostable packaging manufacturers											
	Technical/ Engineering service providers support to the regional food processing industry											
	Logistics suppliers who provide intermodal/cold chain solutions											
	Medical grade processors (e.g. tea tree and honey)											
1_L	**General industrial Stage 3 (low to moderate impact) potentially including:**	117,559	0.3	3.53	40.56	67.01	93.46		48.67	80.41	112.15	
	Bio-degradable and/or compostable packaging manufacturers											
	Technical/ Engineering service providers support to the regional food processing industry											
	Logistics suppliers who provide intermodal/cold chain solutions											
	Medical grade processors (e.g. tea tree and honey)											
	Total	**1,147,169**		**24.57**	**374.77**	**603.98**	**833.18**		**449.73**	**724.77**	**999.81**	**Kl/d**
					136.79	**220.45**	**304.11**					**ML/y**
	Area 2 Northern Co-op Meat Company Complex											
	Land use yields	**Land Area (sqm)**	**FSR**	**GFA (ha)**								
2_A	**Existing Industries - General (heavy / high impact) including future bioenergy facility on Co-op Land**	333,386	0.2	6.67	76.68	126.69	176.69		92.01	152.02	212.03	
2_B	**Catalyst Industries - Light/ General Industrial (Low impact). Uses unspecified at this stage**	110,723	0.2	2.21	25.47	42.07	58.68		30.56	50.49	70.42	
	Total	**444,109**		**8.88**	**102.15**	**168.76**	**235.38**		**122.57**	**202.51**	**282.45**	**Kl/d**
					37.28	**61.60**	**85.91**					**ML/y**
	Area 3a Johnston Street Industrial Area											
	Land use yields	**Land Area (sqm)**	**FSR**	**GFA (ha)**								
3A_A	**Existing Industries - General (low to moderate impact)**	183,767	0.2	3.68	42.27	69.83	97.40		50.72	83.80	116.88	
3A_B	**General industrial (low to moderate impact) - Extension north of Johnston Street potentially including:**	115,857	0.2	2.32	26.65	44.03	61.40		31.98	52.83	73.69	
	Bio-degradable and/or compostable packaging manufacturers											
	Technical/ Engineering service providers support to the regional food processing industry											
	Logistics suppliers who provide intermodal/cold chain solutions											
	Medical grade processors (e.g. tea tree and honey)											
3A_C	**General industrial - South of Johnston Street (low to moderate impact)**	268,631	-	-	-	-	-		-	-	-	
	Total	**568,255**		**5.99**	**68.91**	**113.86**	**158.80**		**82.70**	**136.63**	**190.56**	**Kl/d**
					25.15	**41.56**	**57.96**					**ML/y**
	Area 3b Sewerage Treatment Plant and Surrounds											
	Land use yields	**Land Area (sqm)**	**FSR**	**GFA (ha)**								
3B_A	**Sewerage Treatment Plant (STP)**	154,030	-	-	-	-	-		-	-	-	
3B_B	**Lot 320 - Catalyst | Intensive Agriculture | High Water High Voltage user**	190,329	0.3	5.71	65.66	108.49	151.31		78.80	130.19	181.57	
3B_C	**Primex - Light industrial/ commerical (Low impact industries)**	78,131	0.3	2.34	26.96	44.53	62.11		32.35	53.44	74.54	
	Medical grade processors (e.g. tea tree and honey)											
3B_D	**Primex site - General Industrial (Low to medium impact industries)**	93,364	0.3	2.80	32.21	53.22	74.22		38.65	63.86	89.07	
	Bio-degradable and/or compostable packaging manufacturers											
	Technical/ Engineering service providers support to the regional food processing industry											
	Logistics suppliers who provide intermodal/cold chain solutions											
	Medical grade processors (e.g. tea tree and honey)											
	Total	**515,854**		**10.85**	**124.83**	**206.24**	**287.65**		**149.80**	**247.49**	**345.18**	**Kl/d**
					45.56	**75.28**	**104.99**					**ML/y**

Average Day:				Peak Day:			
1	**2**	**3**		**1**	**2**	**3**	
7.76	12.65	17.53	L/s	9.31	15.18	21.04	**L/s**
0.67	1.09	1.52	**Kl/d**	0.80	1.31	1.82	**ML/d**
244.79	398.88	552.98	**ML/y**				**ML/y**

ADD Development (ML/y):

*no demand percentage reduction

	Scenario	1				2				3			
Year	% Developed	Nammoona	Food Co-op	Johnston St	STP	Nammoona	Food Co-op	Johnston St	STP	Nammoona	Food Co-op	Johnston St	STP
2026	17.45%	23.9	6.5	4.4	8.0	38.5	10.7	7.3	13.1	53.1	15.0	10.1	18.3
2031	48.72%	66.6	18.2	12.3	22.2	107.4	30.0	20.2	36.7	148.2	41.9	28.2	51.2
2036	78.73%	107.7	29.4	19.8	35.9	173.6	48.5	32.7	59.3	239.4	67.6	45.6	82.7
2041	100.00%	136.8	37.3	25.2	45.6	220.5	61.6	41.6	75.3	304.1	85.9	58.0	105.0

Population growth PDD projections

*Source PWA Casino Water Supply Scoping Study (2022)

Year	2020	2025	2030	2035	2040	2045	2050
Population	9920	10170	10430	10690	10960	11240	11520
Average year customer demand (ML/y)	2010	2030	2060	2080	2100	2130	2150
Peak day production (ML/d)	12.86	12.96	13.05	13.15	13.25	13.35	13.45
Fairy Hill peak day prodcution							
Fairy Hill (ML/d)	0.00	0.60	1.40	2.40	3.10	3.70	4.40
Peak day production including scenario demands							
Scenario 1 (ML/d)	12.86	13.68	14.79	16.09	17.04	17.74	18.54
Scenario 2 (ML/d)	12.86	13.75	15.00	16.43	17.47	18.17	18.97
Scenario 3 (ML/d)	12.86	13.83	15.21	16.77	17.90	18.60	19.40

Average day Water Security

*With 15% reduction due to increased water reuse and stormwater capture

			Demand (ML/y)		
Area	% Developed	Year	1	2	3
Nammoona	17.45%	2026	20.3	32.7	45.1
	48.72%	2031	56.6	91.3	125.9
	78.73%	2036	91.5	147.5	203.5
	100.00%	2041	116.3	187.4	258.5
Food Coop	17.45%	2026	5.5	9.1	12.7
	48.72%	2031	15.4	25.5	35.6
	78.73%	2036	24.9	41.2	57.5
	100.00%	2041	31.7	52.4	73.0
Johnston St	17.45%	2026	3.7	6.2	8.6
	48.72%	2031	10.4	17.2	24.0
	78.73%	2036	16.8	27.8	38.8
	100.00%	2041	21.4	35.3	49.3
STP and surrounds	17.45%	2026	6.8	11.2	15.6
	48.72%	2031	18.9	31.2	43.5
	78.73%	2036	30.5	50.4	70.3
	100.00%	2041	38.7	64.0	89.2
Fairy Hill		2025	85.2		
		2030	194.1		
		2035	342.3		
		2040	450.6		
		2045	588.8		
		2050	667.5		
Township ADD		2025	2482.0		
		2030	2500.7		
		2035	2519.5		
		2040	2538.4		
		2045	2557.5		
		2050	2576.8		

Existing secure yield 2355 ML/yr *1 degree climate warming

Deep storage secure yield 3395 ML/yr *1 degree climate warming

Year	1	2	3	1	2	3
2026	2603.5	2626.4	2649.2	2603.5	2626.4	2649.2
2031	2796.1	2860.0	2923.8	2796.1	2860.0	2923.8
2036	3025.6	3128.7	3231.8	3025.6	3128.7	3231.8
2041	3197.1	3328.1	3459.1	3197.1	3328.1	3459.1
2045	3354.4	3485.4	3616.4	3354.4	3485.4	3616.4
2050	3452.3	3583.3	3714.3	3452.3	3583.3	3714.3

Peak day WTP capacity

*With 15% reduction due to increased water reuse and stormwater capture

			Demand (ML/d)		
Area	% Developed	Year	1	2	3
Nammoona	17.45%	2026	0.07	0.11	0.15
	48.72%	2031	0.19	0.30	0.41
	78.73%	2036	0.30	0.49	0.67
	100.00%	2041	0.38	0.62	0.85
Food Coop	17.45%	2026	0.02	0.03	0.04
	48.72%	2031	0.05	0.08	0.12
	78.73%	2036	0.08	0.14	0.19
	100.00%	2041	0.10	0.17	0.24
Johnston St	17.45%	2026	0.01	0.02	0.03
	48.72%	2031	0.03	0.06	0.08
	78.73%	2036	0.06	0.09	0.13
	100.00%	2041	0.07	0.12	0.16
STP and surrounds	17.45%	2026	0.02	0.04	0.05
	48.72%	2031	0.06	0.10	0.14
	78.73%	2036	0.10	0.17	0.23
	100.00%	2041	0.13	0.21	0.29
Fairy Hill		2025	0.60		
		2030	1.40		
		2035	2.40		
		2040	3.10		
		2045	3.70		
		2050	4.40		
Township PDD		2025	12.96		
		2030	13.05		
		2035	13.15		
		2040	13.25		
		2045	13.35		
		2050	13.45		

Typical capacity 18 ML/d *CWT WTP Assessment 2021

Design capacity 22.1 ML/d *CWT WTP Assessment 2021

Year	1	2	3	1	2	3
2026	13.7	13.8	13.8	13.7	13.8	13.8
2031	14.8	15.0	15.2	14.8	15.0	15.2
2036	16.1	16.4	16.8	16.1	16.4	16.8
2041	17.0	17.5	17.9	17.0	17.5	17.9
2045	17.7	18.2	18.6	17.7	18.2	18.6
2050	18.5	19.0	19.4	18.5	19.0	19.4

ghd.com

→ The Power of Commitment