NSW Public Works

Department of Regional NSW

Rappville Sewerage Scheme
Review of Environmental Factors



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June 2024

Prepared for:

Richmond Valley Council

NSW Public Works
Department of Regional NSW

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Cover photo: Aerial view of Rappville Village.

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Certification

This Review of Environmental Factors (REF) has been prepared by NSW Public Works, Department of Regional NSW on behalf of Richmond Valley Council. The report presents the assessment of potential impacts that may result from activities associated with the proposal to construct a reticulated sewerage scheme for the village of Rappville, to replace the existing onsite septic tank sewage management systems which have been affected by bushfire.

Richmond Valley Council is a public authority and a determining authority as defined in the *Environmental Planning & Assessment Act 1979* (EP&A Act). The proposal satisfies the definition of an activity under the Act, and as such Richmond Valley Council must assess and consider the environmental impacts of the proposal before determining whether to proceed.

This REF has been prepared in accordance with Sections 5.5 and 5.7 of the EP&A Act and Section 171 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Reg). It provides a true and fair assessment of the proposed activity in relation to its likely effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposed activity.

On the basis of this REF it is concluded that:

(1) the proposed activity is not likely to have a significant impact on the environment. An Environmental Impact Statement is not required.

(2) the proposed activity is not likely to significantly affect threatened species, populations, ecological communities, or critical habitat. A Species Impact Statement (SIS) / Biodiversity Development Assessment Report (BDAR) is not required.

(3) the proposed activity is not likely to affect or being carried out on any Commonwealth land, or significantly affect any Matters of National Environmental Significance.

Subject to implementation of the measures to avoid, minimise or manage environmental impacts listed in this REF, the proposed activity is recommended to proceed.

Author & Qualifications	Kristen Parmeter BSc (Hons), GradDipUrbRegPlan
Designation	Senior Environmental Scientist
I certify that I have reviewed and endorsed the contents of this REF document and, to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines approved under section 170 of the EP&A Regulation, and the information it contains is neither false nor misleading.	
Certifier & Qualifications	Liz Mathieson BSc
Designation	Principal Scientist
Organisation	NSW Public Works, Department of Regional NSW
Signature	
Date	27 June 2024

Decision Statement

I, Daniel Rowlands, as an authorised person on behalf Richmond Valley Council, have examined and considered the REF for the proposed Rappville Sewerage Scheme, prepared in accordance with section 5.5 of the Environmental Planning and Assessment Act 1979.

I have reviewed the contents of the REF and I have gained an understanding of the impacts of the proposed activity. Based on the findings of the REF:

- The proposed Activity is not likely to have a significant impact on the environment and therefore an Environmental Impact Statement is not required.
- The proposed Activity will not be carried out in a declared area of outstanding biodiversity value and is not likely to significantly affect threatened species, populations or ecological communities, or their habitats or impact biodiversity values, meaning a Species Impact Statement and/or Biodiversity Development Assessment Report is not required.
- The proposed Activity is not likely to affect any Commonwealth land, is not being carried out on Commonwealth land, or significantly affect any matters of national environmental significance.
- The proposed Activity may proceed subject to the implementation of the mitigation measures identified in the REF.

Authorised Representative	Richmond Valley Council
Delegation	Manager Asset Delivery & Projects
Organisation	Richmond Valley Council
Signature	
Date	9.4.2025

Executive Summary

This REF has been prepared by NSW Public Works, Department of Regional NSW on behalf of Richmond Valley Council. The REF presents the investigations undertaken into the environmental impacts that may result from a proposed new reticulated sewerage scheme in the village of Rappville. The new sewerage scheme would replace the existing onsite septic tank sewage management systems which were affected by bushfire in 2019. The REF assesses the construction and operation of the two packages of works for the sewerage scheme. Stage 1 works would include the sewer rising main, village reticulation network (including reticulation mains and on-property pressure sewerage scheme units) and a new sewage pump station. Stage 2 works would comprise the construction of the new Sewage Treatment Plant (the Proposal).

Environmental Planning

The applicable environmental planning instrument for the Proposal is State Environmental Planning Policy (SEPP) (Transport and Infrastructure) 2021. Sections 2.126(1), 2.126(2), 2.126(4) and 2.126(6) of SEPP (Transport and Infrastructure) 2021 allow development for the purpose of sewage treatment plants with onsite treated effluent reuse for irrigation to be carried out by or on behalf of a public authority in a prescribed zone, and sewage reticulation systems to be carried out by or on behalf of a public authority without consent on any land in the prescribed circumstances.

Accordingly, the Proposal meets the requirements of the SEPP (Transport and Infrastructure) 2021. As SEPP (Transport and Infrastructure) 2021 removes the need for development consent for the Proposal, these works are assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Richmond Valley Council is the determining authority for the development.

This REF provides a true and fair assessment of the proposed activity in relation to its likely effects on the environment. It addresses, to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the proposed activity.

Impacts and Mitigation

A number of short-term construction impacts are predicted, associated predominantly with amenity, dust, traffic and noise. It has been assessed that these impacts can be either managed or avoided altogether by implementing appropriate mitigation measures. The impacts associated with the construction works would be short term and can be managed so as not to result in adverse environmental impacts. No adverse operational impacts are anticipated as a result of the works.

The Proposal would not significantly affect any Aboriginal heritage sites, listed threatened species, fauna populations or communities provided appropriate mitigation measures are implemented.

Based on the outcomes of the assessment presented in this REF, it is concluded that by adopting the identified safeguards it is unlikely that the Proposal would result in significant adverse environmental impacts.

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Abbreviations and Notations

Item	Description
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
APZ	Asset Protection Zone
ARTC	Australian Rail Track Corporation
BC Act	*Biodiversity Conservation Act 2016*
BPMs	Bushfire Protection Measures
CEMP	Construction Environmental Management Plan
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
DoP	NSW Department of Planning
DPHI – <agency>	NSW Department of Planning, Housing and Infrastructure
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021*
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESCP	Erosion and Sediment Control Plan
FM Act	*Fisheries Management Act 1994*
HDPE	High Density Polyethylene
LEP	Local Environmental Plan
NPW Act	*National Parks and Wildlife Act 1974*
OEH	Office of Environment and Heritage (now NSW Department of Climate Change, Energy, the Environment and Water)
OEMP	Operation Environmental Management Plan
OIA	Odour Impact Assessment
POEO Act	*Protection of The Environment Operations Act 1997*
PSS	Pressure Sewerage System
REF	Review of Environmental Factors
RVC	Richmond Valley Council
SEPP	State Environmental Planning Policy
SPS	Sewage Pump Station
STP	Sewage Treatment Plant
TfNSW	Transport for NSW

TMP	Traffic Management Plan
WM Act	*Water Management Act 2000*

1 Introduction

This section provides an overview of the Proposal.

1.1 Background

The village of Rappville is located in the North Coast Region of New South Wales, approximately 60 km southwest of Lismore within the Richmond Valley local government area (LGA).

Richmond Valley Council (RVC) is proposing to construct a new centralised reticulated collection, transfer and treatment sewerage scheme to service the Rappville village area, as part of the development masterplan for the village. The new reticulated sewerage scheme would replace the existing onsite sewage management systems (septic tanks) within the village which were impacted by bushfires in 2019.

The Rappville Sewerage Scheme works (the Proposal are being constructed as two packages of works including:

1. Package 1 - Sewage Transfer System (including a Rising Main and Sewage Pump Station (SPS)), Village Sewage Reticulation Network (including 2.4 km long pressure sewer reticulation mains network) and on-property Pressure Sewerage System (PSS) Units (including collection tank and property boundary assembly) at properties within the Rappville village area,
2. Package 2 - New Sewage Treatment Plant (STP), comprising a 220 EP oxidation pond based plant with onsite treated effluent reuse irrigation system, located approximately 2 km south of the village on Myrtle Creek Road within Lot 160 DP 755620.

NSW Public Works (NSW PW) has been engaged by RVC to prepare a Review of Environmental Factors (REF) for two works packages for the new Rappville sewerage scheme (the Proposal).

1.2 Proposal Objectives

The Proposal is to meet the following objectives:

- Provide a centralised reticulated sewage collection and transfer system in Rappville to replace the existing onsite septic tank sewage management systems which have been affected by bushfire.

1.3 Overview of the Proposal

The proposed Rappville Sewerage Scheme works include:

Package 1:

- Sewage Transfer System
  - A sewage pump station (SPS) comprising in-ground wet well and odour control on Nandabah Street (within Lot 30 DP 5405),
  - new approximately 2.4 km long PE 180 rising main along Nandabah Street and Myrtle Creek Road to transfer wastewater flows from the village reticulation network to the STP site.
- Village Reticulation Network
  - An approximately 2.45 km long pressure sewer reticulation mains network located within the road reserves of the Rappville village area,
- On-Property PSS Units
  - New PSS units at each of the residential and commercial properties (tenements) within the village (including 47 residential properties, 27 vacant lots and 6 commercial properties). PSS on-property infrastructure would comprise Collection tank (incl. grinder pump) and property boundary assembly within the property boundary.

Package 2 :

- New Sewage Treatment Plant (STP),
  - A 220 EP oxidation pond based sewage treatment plant (within Lot 160 DP 755620).
  - Onsite treated effluent reuse irrigation paddocks and associated irrigation scheme.

A location map and aerial overviews of the Proposal works are shown in Figure 1.1 to Figure 1.5. Photographs of the Proposal area are provided in the Biodiversity and Aboriginal Heritage Due Diligence assessments provided in Appendix B and D. Detailed plans of the works are provided in Appendix E.

1.4 Land Ownership

The sewerage scheme rising main and reticulation mains network would be located within public road reserve or public land under the control of RVC.

The SPS would be located within Transport for NSW (TfNSW) land (Lot 30 DP 5405) managed by the Australian Rail Track Corporation (ARTC).

The on-property PSS units would be installed within the frontage of residential and commercial properties (tenements) within the village. Access to numerous private freehold properties within Rappville village would be required for installation of the PSS units to service the property and to install pipe connections to the sewer reticulation mains located in the road reserve.

The STP would be located within part of Lot 160 DP 755620 which is freehold land. Council is currently in the process of acquiring the land required for the new STP and associated onsite treated effluent reuse irrigation system.

Land tenure of the Proposal works areas is summarised in Table 1-1 below.

Table 1-1 Rappville Sewerage Scheme Land Tenure

Infrastructure	Land Parcel	Land Tenure/Authority
Rappville STP	Lot 160 DP 755620 – Part Lot	Freehold- pending acquisition by RVC
Rappville SPS	Lot 30 DP 5405	TfNSW/ARTC
	Nandabah Street road reserve	RVC
Sewer Rising Main (north to south)	Lot 30 DP 5405 (Chainage (Ch) 0 – 49 m)	TfNSW/ARTC
	Nandabah Street - Road Reserve (Ch 49 – 485 m)	RVC
	Myrtle Creek Road - Road Reserve (Ch 485 – 2337 m)	RVC
Village Reticulation Network	Nandabah Street - Road Reserve	RVC
	Lot 30 DP 5405 and Lot 1 DP 1180600 – Road reserve and railway corridor	TfNSW/ARTC and RVC
	Murray Street – Road Reserve	RVC
	Pearse Street – Road Reserve	RVC
	Unnamed (unformed) Crown Road Reserve (off Pearse Street)	Crown land/ DPHI - Crown lands
	McLean Street – Road Reserve	RVC
	Lyons Street – Road Reserve	RVC
	James Lane - Road Reserve	RVC
	Bailey Street – Road Reserve	RVC
	Unnamed (unformed) Road Reserve (off Lyons Street)	RVC
	47 residential properties, 27 vacant lots and 6 commercial properties within Rappville Village	Freehold/ Private Land Owners



Figure 1.1 Location map of Rappville in NSW

Source: NSW Public Works 2022

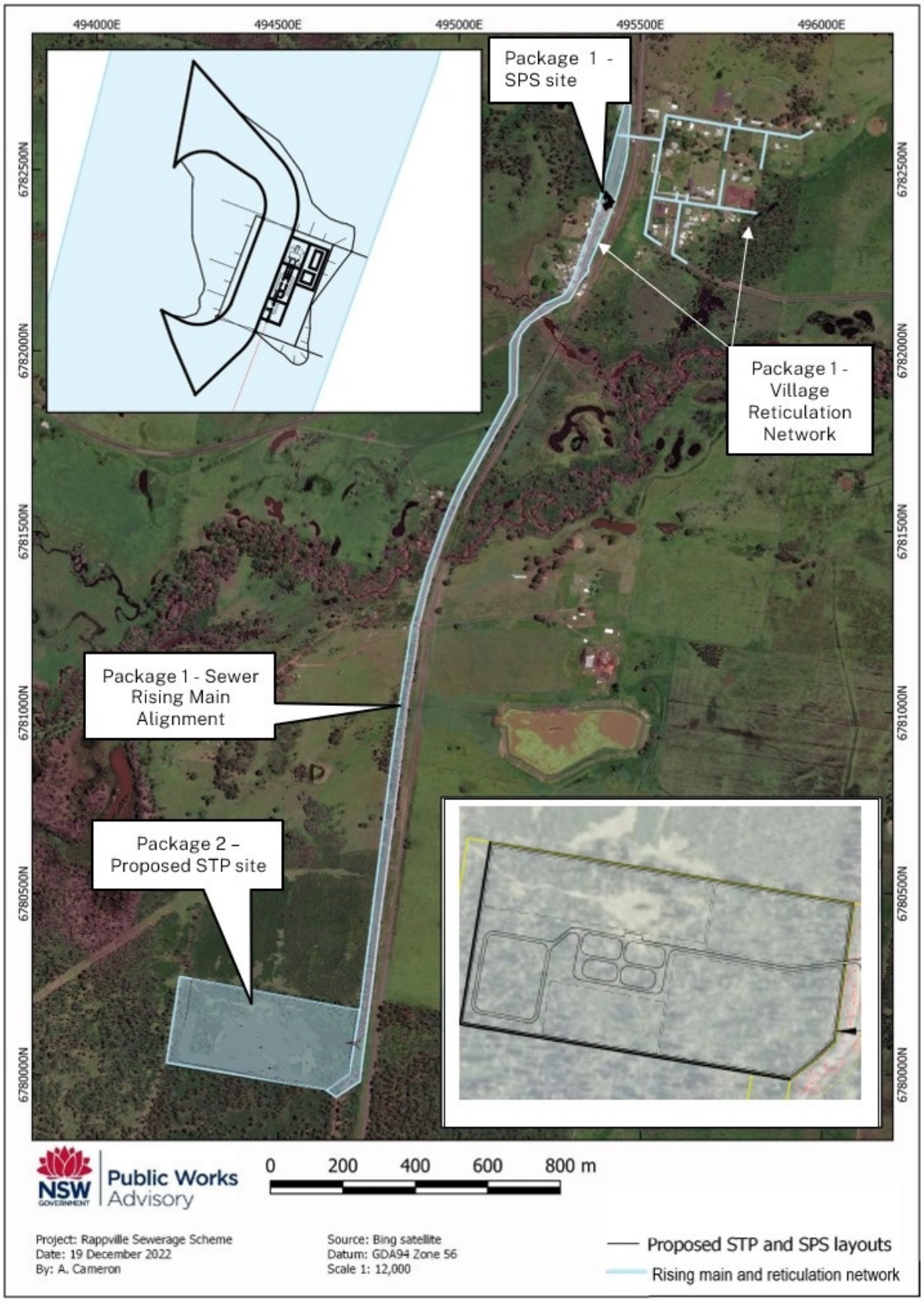


Figure 1.2 Aerial overview of the Rappville Sewerage Scheme Proposal Components (including both Package 1 and Package 2 works locations)

Source: NSW PW, 2022

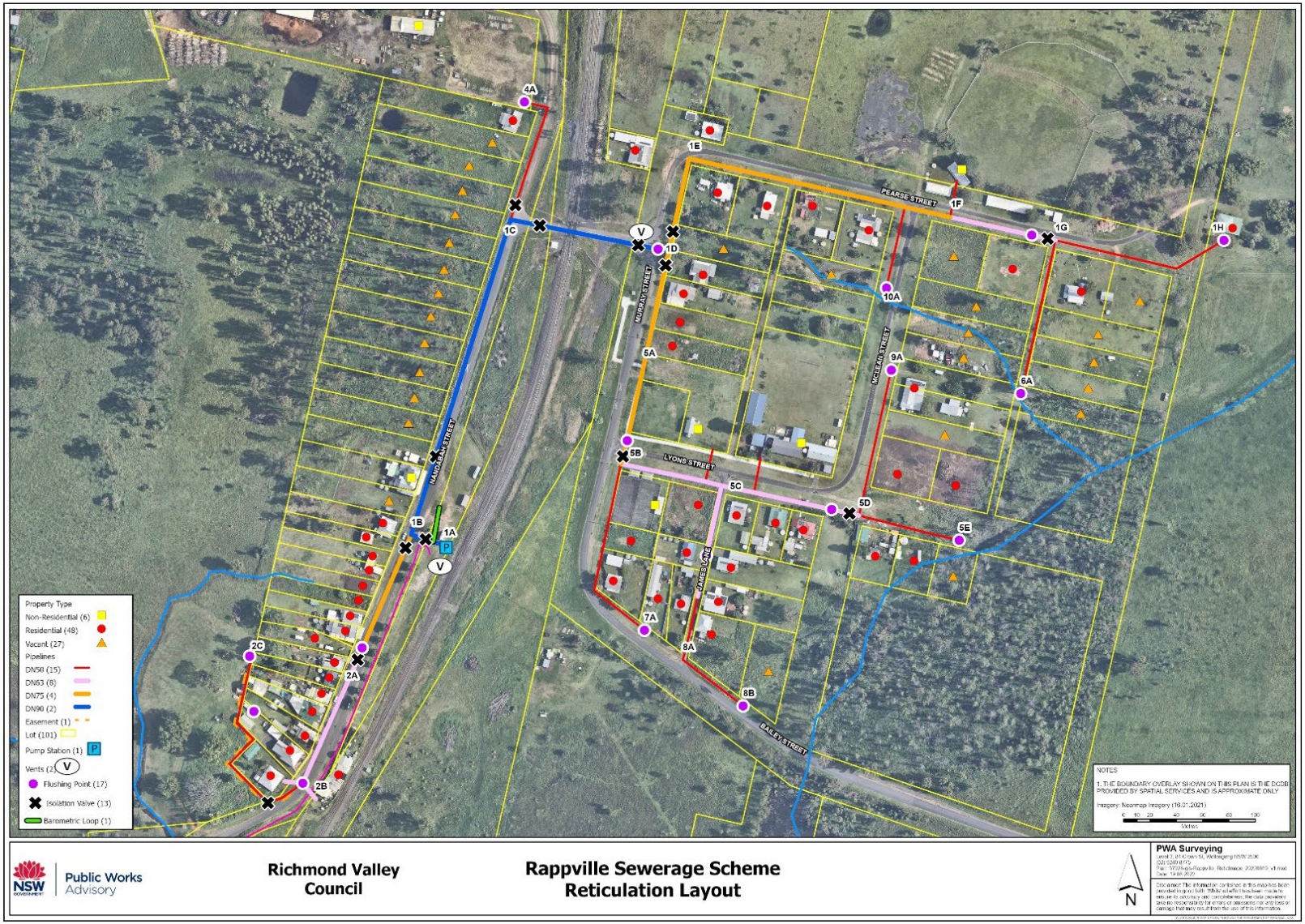


Figure 1.3 Indicative Village Reticulation Network Layout

Source: NSW PW, 2022

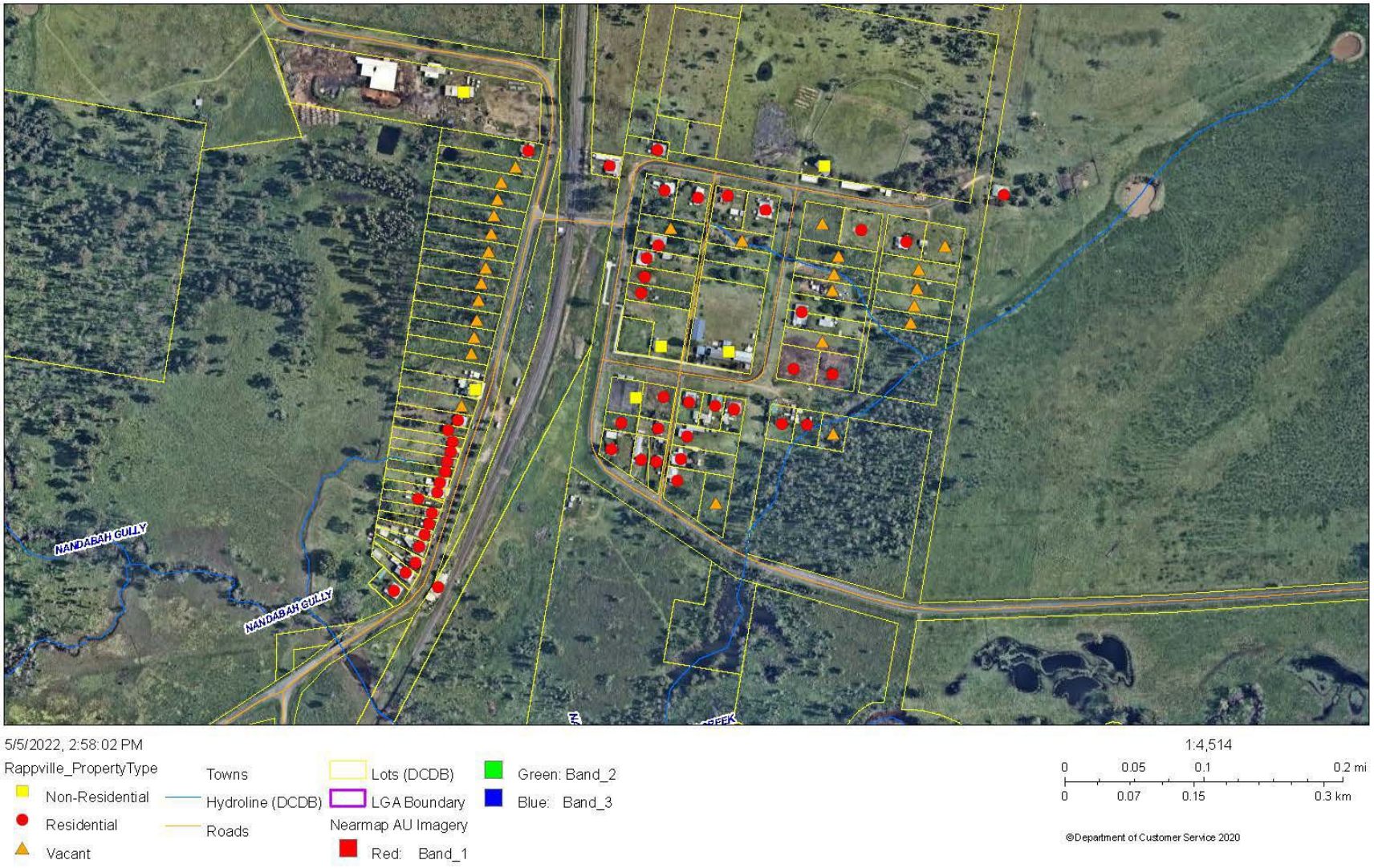


Figure 1.4 Proposed properties (tenements) to be serviced as part of the Rappville Sewerage Scheme (PSS installation properties)

Source: NSW PW, 2022

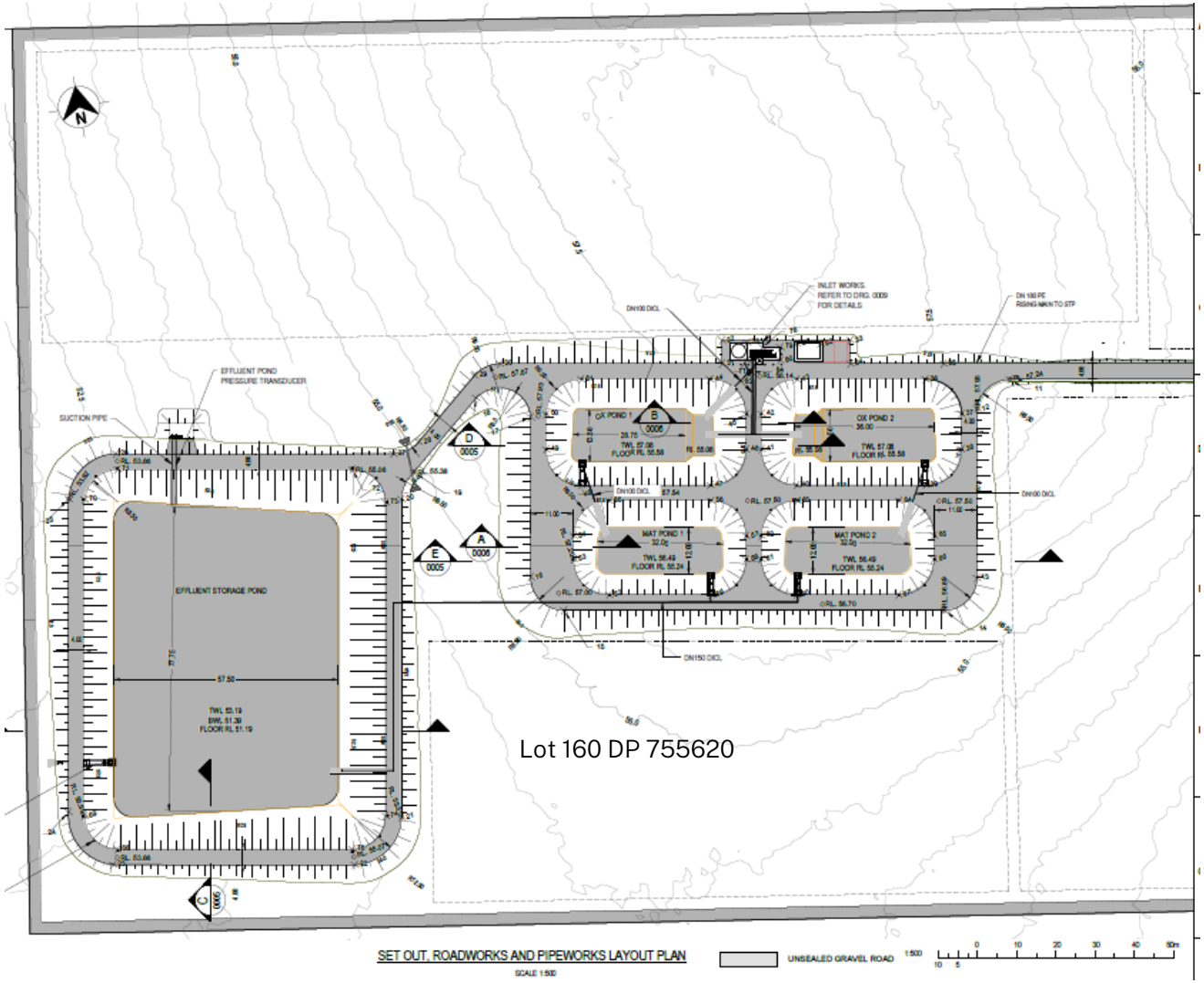


Figure 1.5 Proposed Rappville STP layout including proposed access (refer to Appendix E for annotations)

Source: NSW PW, 2024

2 Statutory Planning Framework

This section presents the statutory planning and strategic policy context for the Proposal.

2.1 Environmental Planning Instruments

2.1.1 Richmond Valley Local Environmental Plan 2012

The Proposal is located within the RVC LGA. The proposed works would traverse a number of land use zones under the *Richmond Valley Local Environment Plan 2012* (LEP), as shown in Figure 2.1 and listed in Table 2-1.

The Richmond Valley LEP 2012 defines a sewage treatment plant to mean *a building or place used for the treatment and disposal of sewage, whether or not the facility supplies recycled water for use as an alternative water supply,* and a sewage reticulation system as *a building or place used for the collection and transfer of sewage to a sewage treatment plant or water recycling facility for treatment, or transfer of the treated waste for use or disposal, including associated:*

(a) pipelines and tunnels, and

(b) pumping stations, and

(c) dosing facilities, and

(d) odour control works, and

(e) sewage overflow structures, and

(f) vent stacks.

In addition, the irrigation scheme to be constructed at the STP site for the reuse of treated effluent meets the definition of a water recycling facility under the LEP, which is defined to mean *a building or place used for the treatment of sewage effluent, stormwater or waste water for use as an alternative supply to mains water, groundwater or river water (including, in particular, sewer mining works), whether the facility stands alone or is associated with other development, and includes associated —*

(a) retention structures, and

(b) treatment works, and

(c) irrigation schemes.

The Proposal is prohibited in all land zonings under the LEP. However, Section 5.12 (1) of the Richmond Valley LEP states that the LEP *does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, by or on behalf of a public authority, that is permitted to be carried out with or without development consent, or that is*

exempt development, under State Environmental Planning Policy (Transport Infrastructure) 2021, Chapter 2.

As discussed in Section 2.1.2, *State Environmental Planning Policy (Transport and Infrastructure) 2021* is the relevant environmental planning instrument for the Proposal and therefore the development controls contained within the LEP would not be applicable to the proposed development.

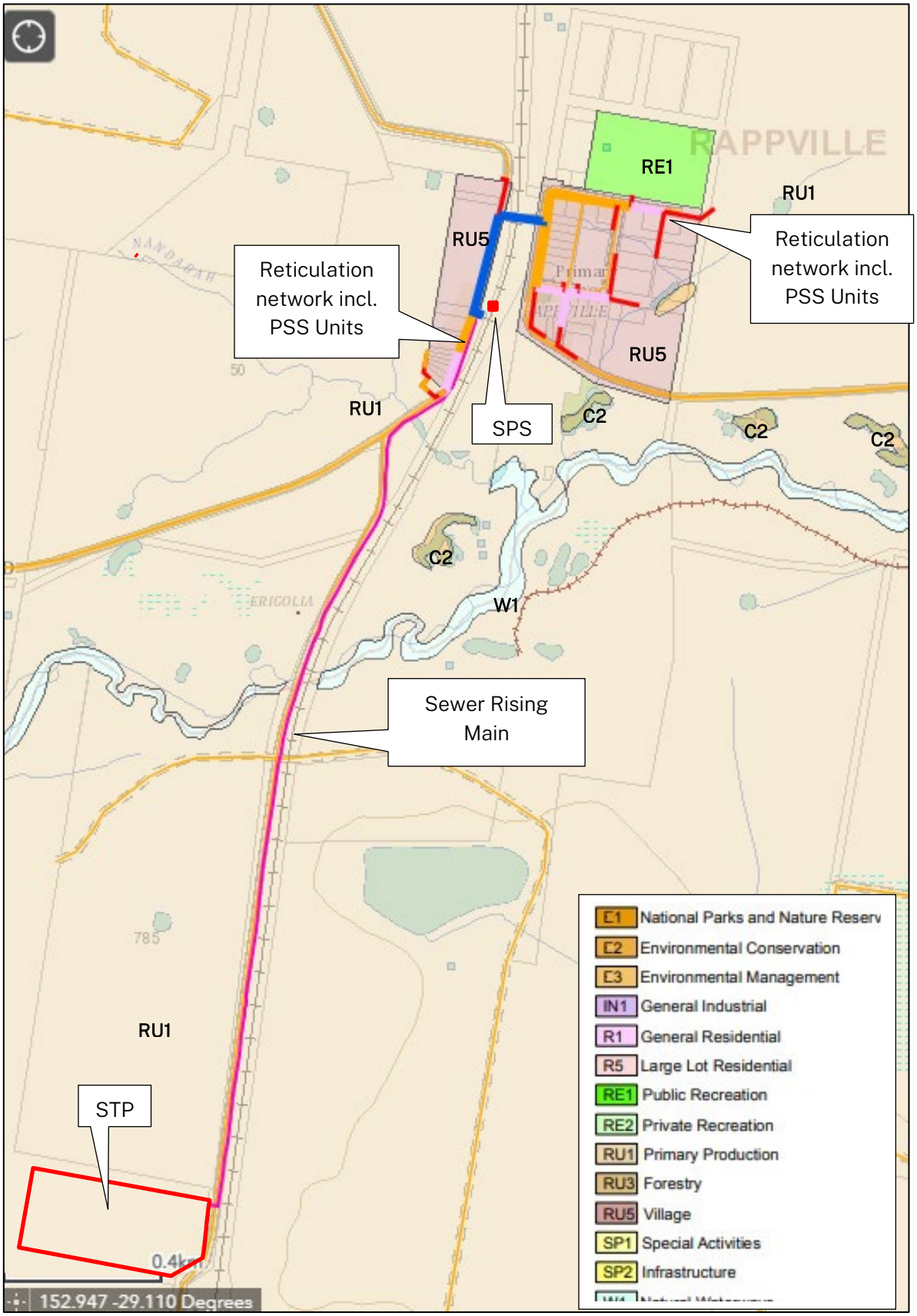


Figure 2.1 Land Zoning in the Rappville Sewerage Scheme Package 1 works area (incl. sewer rising main, SPS and village reticulation network and on-property PSS units)

Source: NSW PW, 2022

Table 2-1: Land Zoning

Location	Zoning	LEP Permissibility
Sewage Treatment Plant (and Reuse Irrigation Scheme)	RU1 Primary Production	Prohibited
SPS	RU1 Primary Production	Prohibited
Rising Main	RU1 Primary Production	Prohibited
	RU5 Village	Prohibited
	RU1 Primary Production	Prohibited
Village Reticulation Network including PSS Units	RU5 Village	Prohibited
	RU1 Primary Production	Prohibited
	RE1 Public Recreation	Prohibited

Heritage

As shown in Figure 2.2, several local heritage items listed under schedule 5 of the Richmond Valley LEP are in the general vicinity of the proposed works in Rappville village. There are no listed heritage items in proximity to the rising main alignment along Myrtle Creek Road or the STP site.

Section 5.10(3)(a) of the LEP states that development consent is not required if the consent authority is satisfied that the development is of minor nature or is for the maintenance of a heritage item and would not adversely affect the heritage significance of the heritage item. It is noted that the Proposal does not require development consent and therefore these provisions do not apply. Nevertheless, as discussed in Section 5.7, the Proposal works would not adversely impact these heritage items.

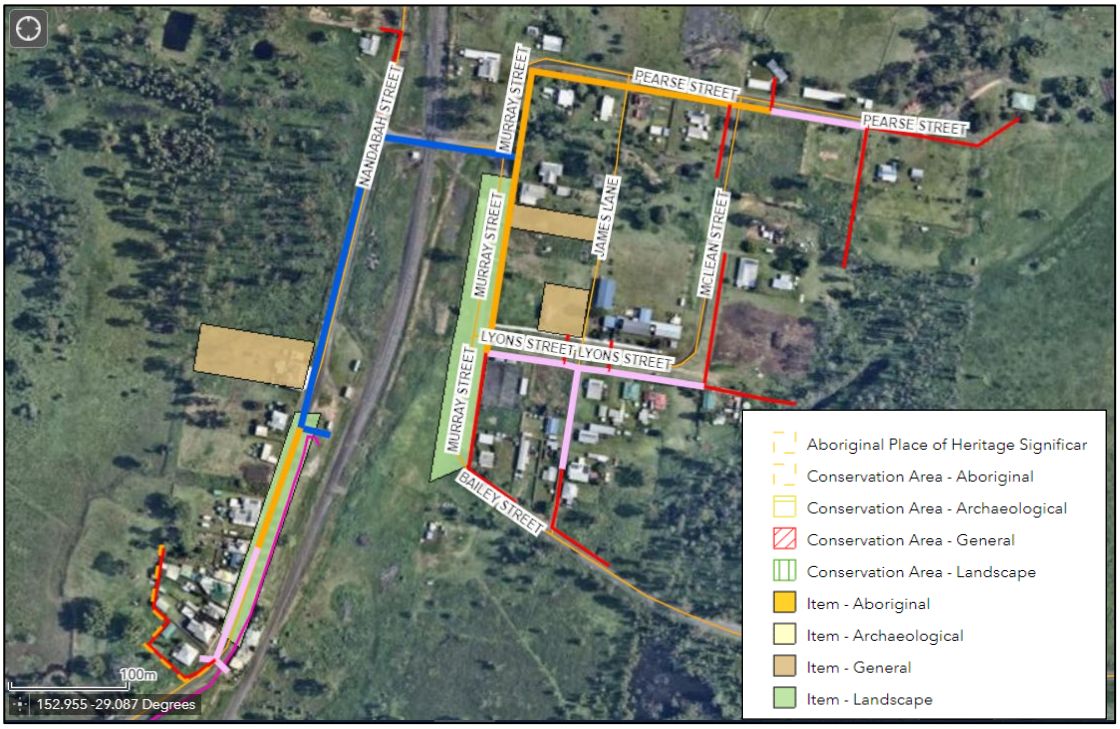


Figure 2.2 Richmond Valley LEP Heritage Map showing the Proposal works area
Source: NSW PW, 2022

Terrestrial Biodiversity

The Richmond Valley LEP Terrestrial Biodiversity map identifies some works areas of the Proposal as having Terrestrial Biodiversity value as shown in Figure 2.3 below. Section 6.6 of the LEP requires a consent authority to consider impacts to terrestrial biodiversity before determining a development application. It is noted that the Proposal does not require development consent and therefore these provisions do not apply. Nevertheless, potential impacts to biodiversity are discussed in Section 5.4.

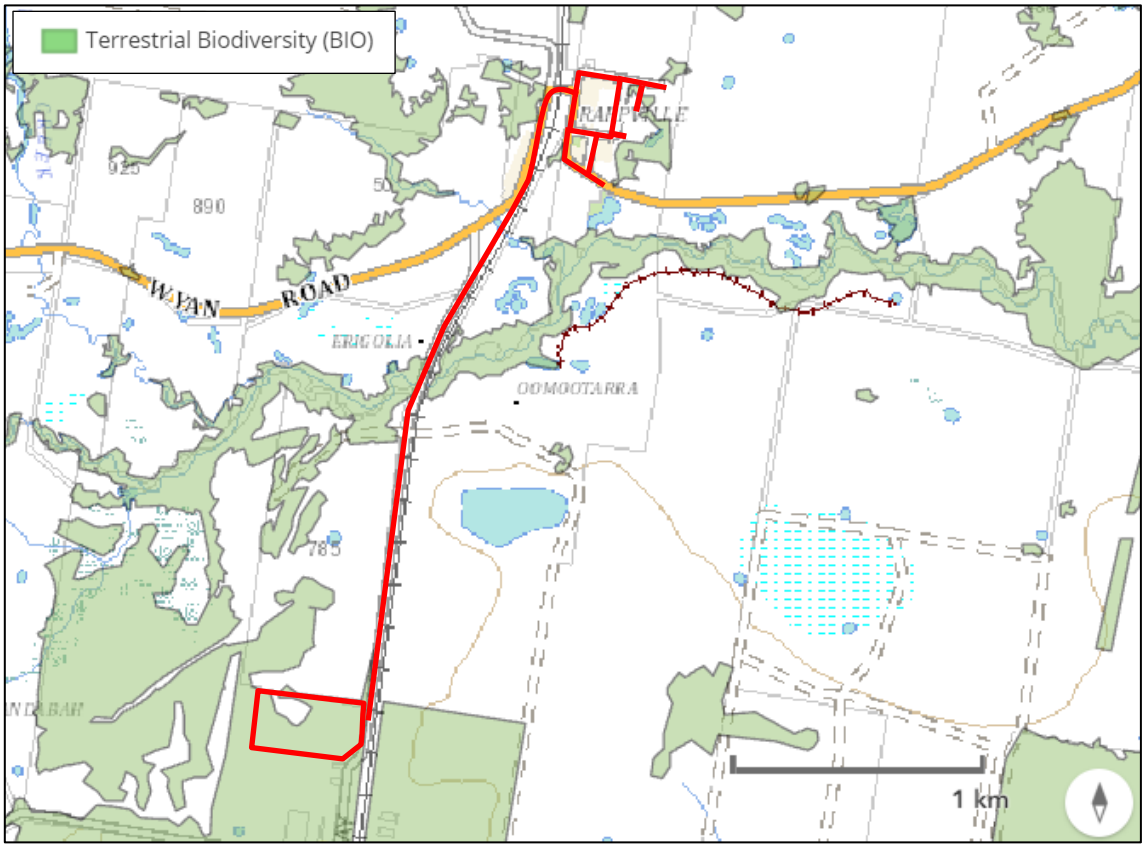


Figure 2.3 Richmond Valley LEP Terrestrial Biodiversity Mapping in the Proposal area

Source: NSW Planning Portal Spatial Viewer, accessed March 2023

Riparian Land and Watercourses

Myrtle Creek is identified as Environmental Sensitive Land on the Richmond Valley LEP 2012 Riparian Lands and Watercourses Map (see Figure 2.4 below). The sewer rising main would be attached to the existing road bridge and cross over the watercourse. Section 6.8 of the LEP requires a consent authority to consider impacts to riparian land and watercourses before determining a development application. It is noted that the Proposal does not require development consent and therefore these provisions do not apply. Nevertheless, a biodiversity assessment has been carried out to assess the potential impact on riparian land adjacent Myrtle Creek associated with the Proposal (refer to Section 5.4).

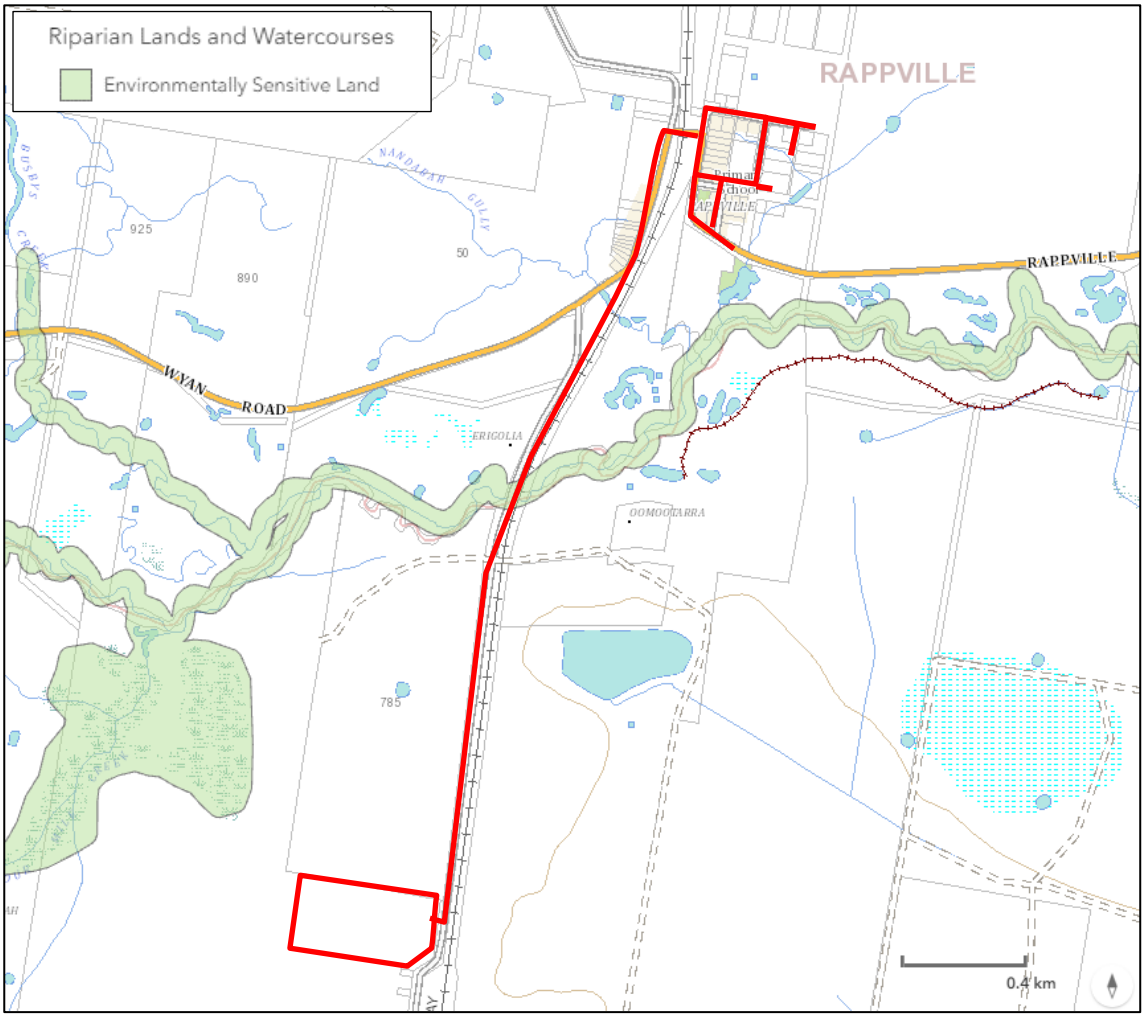


Figure 2.4 Richmond Valley LEP Riparian Land and Watercourses Mapping in the Proposal area

Source: NSW Planning Portal Spatial Viewer, accessed March 2023

Flood Plannning

The majority of the Proposal area is mapped within the Probable Maximum Flood (PMF) Flood Extent area within the Richmond Valley Flood Study (BMT, 2021 (refer to Figure 2.5).

The majority of the Proposal infrastructure would be installed below the ground surface and would not result in a significant increase in the impermeable surface area of the site nor affect flood waters in any way. Therefore, the proposed works are not anticipated to adversely impact the existing flood conditions or flood behaviour at the site. Assessment of the impact on flood planning, as well as proposed mitigation measures are discussed in Section 5.3.

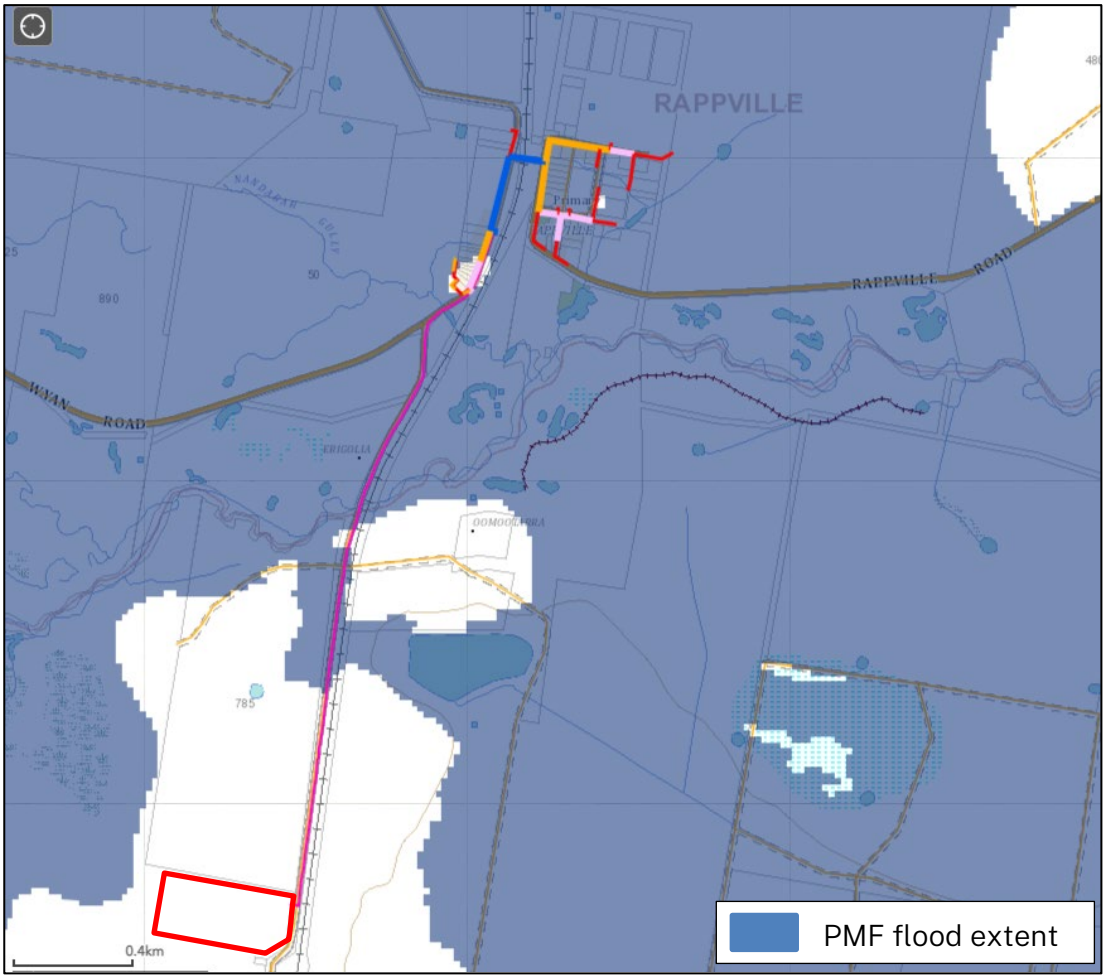


Figure 2.5 Richmond Valley Probable Maximum Flood (PMF) Level Planning Map for the Rappville area.

Source: NSW PW, 2022

2.1.2 State Environmental Planning Policy SEPP (Transport and Infrastructure) 2021

Chapter 2 of SEPP (Transport and Infrastructure) 2021 aims to assist in the effective delivery of public infrastructure throughout the State by improving certainty and regulatory efficiency through a consistent planning assessment and approvals regime for public infrastructure and services across NSW. The SEPP provides clear definition of environmental assessment and approval process for public infrastructure and services facilities.

Under Section 2.125 of the SEPP (Transport and Infrastructure) 2021, 'sewage treatment plant', 'water recycling facility' and 'sewage reticulation system' are defined to have the same meaning as the LEP. The proposed Rappville Sewerage Scheme infrastructure therefore meet the definitions of sewage treatment plant, water recycling facility and sewage reticulation system.

Sections 2.126(1)(a), 2.16(2), 2.126(4) and 2.126(6) of SEPP (Transport and Infrastructure) 2021 allow development for the purpose of sewage treatment plants, water recycling facilities and sewage reticulation systems and be carried out by or on behalf of a public authority without consent on any land. Therefore, as the SEPP removes the need for development consent for the Proposal, the sewerage scheme works would be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

2.1.3 State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapters 3 and 4 of the *State Environmental Planning Policy (Biodiversity and Conservation)* 2021 aim to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline. The Richmond Valley LGA is identified under Schedule 2 – Local Government Areas of the SEPP, being a local government area to which this part applies. It is noted that the SEPP does not apply to proposals assessed under Part 5 of the EP&A Act, nevertheless as a best practice measure consideration of this SEPP has been undertaken as part of the REF.

A Biodiversity Assessment undertaken for the Proposal (refer to Appendix B) found that habitat in the Proposal area is dominated by Spotted Gum and does not comprise potential Koala habitat as defined by Chapter 3 of SEPP (Biodiversity and Conservation) 2021. The assessment concluded that on this basis, core Koala habitat is absent from the Proposal footprint. Therefore, an individual Plan of Management for the conservation and management of areas of Koala habitat is not required for the Proposal.

2.2 Relevant Legislation

2.2.1 Environmental Planning and Assessment Act 1979 (NSW)

The applicable environmental planning instrument for the Proposal is SEPP (Transport and Infrastructure) 2021 (refer to Section 2.1.2) which removes the requirement to obtain development consent. Therefore, the Proposal has been assessed under Division 5.1 of the EP&A Act. Richmond Valley Council is the proponent and the determining authority for the development.

This REF has been prepared in accordance with Section 5.5 of the Act, which requires that the proponent take into account to the fullest extent possible all matters affecting or likely to affect the environment due to the proposed activity. Consideration of the factors listed under Section 171(2) of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) has been used to assist in assessing the significance of the development and is provided in Appendix A.

Ecologically Sustainable Development

The encouragement of ecologically sustainable development (ESD) is one of the objects of the EP&A Act. The principles of ESD are:

The reasons justifying the carrying out of the development or activity in the manner proposed, having regard to biophysical, economic and social considerations, including the following principles of ecologically sustainable development:

(a) the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, public and private decisions should be guided by:

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk-weighted consequences of various options,

(b) inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

(c) conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

(d) improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:

(i) *polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*

(ii) *the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*

(iii) *environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

The proposed works are considered consistent with these principles. Environmental safeguards have been proposed to be implemented during construction works to prevent long term and irreversible environmental degradation in accordance with the precautionary principle and inter-generational integrity.

2.2.2 Local Government Act 1993 (NSW)

Section 60(c) of the *Local Government Act 1993* (LG Act) states that a Council must seek approval from NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) - Water to provide for sewage from its area to be discharged, treated or supplied to any person. As the Proposal involves the construction of a new STP with onsite water recycling capability and reticulated sewage collection network, this requirement is applicable to these works.

Under Section 59A(2) and 191A(1) of the LG Act, Council, as a sewerage system operator, is permitted to enter premises (excluding National Parks and Wildlife reserve land) without a licence or permit to undertake sewerage supply connection and associated works. Accordingly, the Proposal works would be permissible by Council within both private and public land (excluding National Parks and Wildlife reserve land), subject to appropriate prior written notification by Council or prior consent from the land owner or relevant government authority.

2.2.3 Pipelines Act 1967 (NSW)

The *Pipelines Act 1967* aims to:

- implement a timely and efficient approvals system to facilitate the construction of cross-country transmission pipelines in New South Wales;
- ensure the effect of a pipeline project commenced under the Act on the environment, landowners and native titleholders is properly considered and managed;

- ensure pipeline licensees protect the environment, pipeline employees and the public from dangers arising from both pipeline construction and the transmission of potentially hazardous substances.

Under the *Pipelines Act 1967*, any person who wishes to construct and operate a pipeline for the purposes of any substance, can do so under an authorisation or Licence.

However, Section 5 of the *Pipelines Act 1967* has a number of exemptions to a licence under that Act, including a pipeline constructed by a public authority. Therefore, this Act does not apply to the Proposal.

2.2.4 National Parks and Wildlife Act 1974 (NSW)

The *National Parks and Wildlife Act 1974* (NPW Act) provides for the statutory protection of Aboriginal cultural heritage places, objects and features. Part 6 of the NPW Act provides specific protection for Aboriginal objects and declared Aboriginal places by establishing offences of harm. It is a defence against prosecution for unintentionally harming Aboriginal Objects if due diligence had been exercised to determine that no Aboriginal object would be harmed, or the harm or desecration was authorised by an Aboriginal heritage impact permit (AHIP).

Investigations have been undertaken into the Aboriginal cultural heritage impacts of the Proposal, including an Aboriginal Due Diligence Assessment (ADDA) (see Appendix C). The assessment concluded that further archaeological investigations and/or an Aboriginal Heritage Impact Permit (AHIP) are not required and that the works can proceed with caution and in accordance with the mitigation measures in this REF (see Section 5.6).

2.2.5 Heritage Act 1977 (NSW)

The *Heritage Act 1977* protects and aims to conserve the environmental heritage of New South Wales. Environmental heritage is broadly defined under Section 4 of the *Heritage Act* 1977 as consisting of "those places, buildings, works, relics, moveable objects, and precincts, of State or local heritage significance" (Heritage Branch, DoP 2009:4). Aboriginal places or objects that are recognised as having high cultural value (potentially of local and State significance) can be listed on the State Heritage Register and protected under the provisions of the *Heritage Act* 1977.

The STP, SPS and rising main, reticulation network pipeline installation and PPS unit works would not impact any listed State or locally listed heritage items. It is considered that Proposal can be carried out to avoid impacting any listed heritage items, as discussed in Section 5.7.

2.2.6 Protection of the Environment Operations Act 1997 (NSW)

The *Protection of the Environment Operations Act 1997* (POEO Act) regulates air, noise, land and water pollution. The Environment Protection Authority (EPA) is generally responsible

for implementing the POEO Act and would be the appropriate regulatory authority for the Proposal.

Schedule 1 of the POEO Act lists scheduled activities which are required to be licensed by the EPA. Section 36 identifies sewage treatment as a scheduled activity which is defined as *the operation of sewage treatment systems (including the treatment works, pumping stations, sewage overflow structures and the reticulation system) that involve the discharge or likely discharge of wastes or by-products to land or waters*. The STP including onsite treated effluent reuse for irrigation, SPS, rising main, reticulation network would form part of the new Rappville sewerage scheme, which would require an environment protection licence (EPL) for the operation of the sewage treatment system if the processing capacity exceeds the listed thresholds of 2,500 EP load or 750 kL/day (whichever is greater) or discharge of treated effluent to waters. The new Rappville sewage treatment system processing capacity is anticipated to be below both of these thresholds (with a design for 220 EP treatment capacity and 39.2 kL/day at full development of currently vacant allotments.) and would not discharge treated effluent to a waterway. Therefore it is anticipated than an EPL would not be required. However, an EPL would be obtained by RVC from the EPA if the new STP exceeds these thresholds, or for the sewage treatment system to operate and discharge treated effluent to waters.

The Proposal is being undertaken by a Public Authority and therefore the EPA will be the Appropriate Regulatory Authority in relation to environmental pollution matters.

Section 120 of the POEO Act makes it an offence to pollute waters. It is considered that the construction and operation of the Proposal can be carried out without causing water pollution; as appropriate mitigation measures would be implemented to prevent water pollution during the works. Therefore, it is unlikely that a licence would be required under Section 120 of the POEO Act for the pollution of waters.

Other relevant provisions of the POEO Act that the Proposal would need to comply with include:

- Section 115 – It is an offence to dispose of waste in a manner that harms or is likely to harm the environment.
- Section 116 – It is an offence to cause any substance to leak, spill or otherwise escape (whether or not from a container) in a manner that harms or is likely to harm the environment.
- Section 124 - The occupier of any premises who operates any plant in or on those premises in such a manner as to cause air pollution from those premises is guilty of an offence if the air pollution so caused, or any part of the air pollution so caused,

is caused by the occupier's failure to maintain the plant in an efficient condition, or to operate the plant in a proper and efficient manner.

- Section 129 - The occupier of any premises at which scheduled activities are carried on under the authority conferred by a licence must not cause or permit the emission of any offensive odour from the premises to which the licence applies.
- Section 139 – The occupier of any premises who operates any plant (other than control equipment) at those premises in such a manner as to cause the emission of noise from those premises is guilty of an offence if the noise so caused, or any part of it, is caused by the occupier's failure: (a) to maintain the plant in an efficient condition, or (b) to operate the plant in a proper and efficient manner.
- Section 142A – A person who pollutes land is guilty of an offence.
- Section 167 – The occupier of any premises must maintain any control equipment installed at the premises in an efficient condition. The occupier of any premises must operate any control equipment installed at the premises in a proper and efficient manner.

Odour Impact assessments have been prepared for both the Rappville STP and SPS. Both assessments concluded that odour emissions during operation would not impact surrounding sensitive receptors (refer to Section 5.9 and Appendix F).

2.2.7 Protection of the Environment Operations (Waste) Regulation 2014 (NSW)

The *Protection of the Environment Operations (Waste) Regulation* 2014 sets out the provisions with regards to non-licensed waste activities and non-licensed waste transporting, in relation to the way in which waste must be stored, transported, and the reporting and record-keeping requirements.

The proposed works (in particular aspects such as removal of spoil) would be undertaken to be consistent with the requirements of this regulation.

2.2.8 Water Management Act 2000 (NSW)

The objects of the *Water Management Act 2000* (WM Act) are to provide for the sustainable and integrated management of the water sources of the state for the benefit of both present and future generations.

The proposed works involves the carrying out of a controlled activity (that is, carrying out of work or excavation) as defined under the WM Act. Section 91(E) of the WM Act states that a controlled activity cannot be carried out in, on or under waterfront land otherwise than in accordance with a controlled activity approval. However, Section 41 of the *Water Management (General) Regulation 2018* (WM (General) Reg) states that public authorities

are exempt from the requirement to obtain a controlled activity approval. Therefore, this approval would not be applicable to the works.

Section 91(F) of the WM Act states that an aquifer interference activity cannot be carried out without, or otherwise than as authorised by, an aquifer interference approval. However, extracting less than 3ML of groundwater per annum is exempt from requiring an aquifer interference water access licence (WAL).

If more than 3ML of groundwater dewatering is required during construction works, an aquifer interference approval would be required for the works. If dewatering of less than 3ML is required for the Proposal, a water supply work approval under Section 91(B) should be lodged for pumped dewatering and WAL exemption for aquifer interference activities taking 3 ML or less of groundwater per year should be lodged with DCCEEW- Water.

2.2.9 Roads Act 1993 (NSW)

Under Section 138 of the *Roads Act 1993* a person must not erect a structure or carry out a work in, on or over a public road, otherwise than with the consent of the appropriate roads authority. However, Schedule 2 Section 5(1) of the Act does not require a public authority to obtain a roads authority's consent to exercise the public authority's functions in, on or over an unclassified road other than a Crown road.

Council is the roads authority for the unclassified roads impacted by the proposed works. with the exception of one unformed Crown road reserve, and by undertaking these works would be exercising their function as the local sewerage authority. As such, approval under the *Roads Act* 1993 would not be required. Approval for works in Crown road reserves is subject to the provisions of the CLM Act (see Section 2.2.10 below).

2.2.10 Crown Land Management Act 2016 (NSW)

A small section of the village reticulation main (southern branch off Pearse Street) would be constructed within an unformed Crown road reserve.

Section 9.2 of the *Crown Land Management Act 2016* (CLM Act) states that a person shall not, without lawful authority, erect a structure on, clear, dig up or cultivate public land. As such, works within Crown land require authorisation by a lease, licence or other permit from the Department of Planning, Housing and Infrastructure (DPHI) – Crown Lands, or, in relation to formed and unformed Crown roads, acquisition by RVC. Section 5.21 of the CLM Act allows for the granting of licenses to occupy and use Crown land for a particular purpose. Alternatively, RVC may lodge an application with DPHI- Crown lands to transfer the unformed Crown road reserve where the village reticulation main would be installed to RVC as a council road reserve.

2.2.11 Biodiversity Conservation Act 2016 (NSW)

The Biodiversity Conservation Act 2016 (BC Act) protects species of threatened flora and fauna, endangered populations and endangered ecological communities and their habitats in NSW. It also lists Key Threatening Process that adversely affects threatened species, populations or ecological communities or that may cause species, populations or ecological communities that are not threatened to become threatened.

Amongst other matters, offences are established for damage to habitats of threatened species or threatened ecological communities. Defences to those offences include that the act was necessary for the carrying out of an activity by a determining authority within the meaning of, and after compliance with, Part 5 of the EP&A Act .

A Biodiversity Assessment has been prepared to assess impacts to threatened species and is attached in Appendix B. The assessment concluded that there would be no significant impact to threatened flora or fauna species or their habitat, endangered populations or endangered ecological communities of State conservation significance, provided that the mitigation measures proposed are implemented (see Section 5.4). No approval under the BC Act is therefore required.

2.2.12 Biosecurity Act 2015 (NSW)

The *Biosecurity Act 2015* guides the management of weeds at the regional level throughout NSW. Under the Act, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant who knows or ought to know of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. Individual land holders and managers are required under the Act to control priority weeds for their area according to the relevant biosecurity toolset.

One controlled weed species (Tropical Soda Apple (*Solanum viarum*)) was identified within the Proposal works area and is discussed further in Section 5.4. This weed species would be managed in accordance with the *Biosecurity Act 2015* and the *Biosecurity Regulation 2017*.

2.2.13 Fisheries Management Act 1994 (NSW)

The objects of *the Fisheries Management Act 1994* (FM Act) are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. In particular, the objects of this Act include:

- to conserve fish stocks and key fish habitats, and
- to conserve threatened species, populations and ecological communities of fish and marine vegetation, and

- to promote ecologically sustainable development, including the conservation of biological diversity.

The Act includes schedules of threatened aquatic species, populations and ecological communities, which must be considered in accordance with Section 5A of the EP&A Act.

Section 200 of the FM Act requires a local government authority to obtain a permit for dredging or reclamation work in waterland. For the purposes of Section 200 of the FM Act, dredging works includes any work that involves excavating waterland, and reclamation work includes:

(a) using any material (such as sand, soil, silt, gravel, concrete, oyster shells, tyres, timber or rocks) to fill in or reclaim water land, or

(b) depositing any such material on water land for the purpose of constructing anything over water land (such as a bridge), or

(c) Draining water from water land for the purpose of its reclamation.

Waterland includes land submerged by water whether permanently or intermittently, or whether forming an artificial or natural body of water.

Myrtle Creek is identified as Key Fish Habitat and as potential distribution for the Southern Purple Spotted Gudgeon listed as endangered under the FM Act. The sewer rising main would cross Myrtle Creek and Nandabah Gully. However, as an aerial crossing is proposed, the works would not impact fish habitat or passage and would not involve excavation works within waterland. Therefore a permit for dredging and reclamation works from DPI Fisheries under Section 200 of the FM Act would not be required.

A Biodiversity Assessment was undertaken for the Proposal to assess the vegetation surrounding the two waterways at the location of the pipeline crossings. The assessment concluded that the Proposal would be located within an existing disturbed areas with no unique habitat value. The works may result in the disturbance and temporary removal of a very small area of riparian vegetation surrounding the two waterways. However, the area is expected to return to pre-works condition following completion of the works. Refer to Section 5.4 and Appendix B.

The proposed works do not involve harm to mangroves or other protected marine vegetation or species, or blocking of fish passage and therefore a permit under the FM Act is not required.

2.2.14 Rural Fires Act 1997 (NSW)

Parts of the Proposal area are located within bushfire prone land (Vegetation Category 2 and Vegetation Buffer) as identified on the Bushfire Prone Land Map, certified by the NSW Rural Fire Service (refer to Figure 5.3). However, the Proposal is not a special fire

protection purpose and therefore does not require approval from the NSW Rural Fire Service (RFS) under the *Rural Fires Act 1997*.

A bushfire assessment has been prepared for the new STP site (refer to Section 5.5 and Appendix G). Overall, the bushfire risk associated with the Proposal is considered low and the new infrastructure proposed would not increase bushfire hazard in the area.

2.2.15 Native Title Act 1993 (Commonwealth)

The *Native Title Act 1993* sets up processes to determine where native title exists, how future activity impacting upon native title may be undertaken, and to provide compensation where native title is impaired or extinguished. The Act gives Indigenous Australians who hold native title rights and interests or who have made a native title claim, the right to be consulted and, in some cases, to participate in decisions about activities proposed to be undertaken on the land.

A search of the National Native Title Register found one determined application which covers land in the vicinity of the Proposal area (Tribunal ID: NCD2013/002 Bandjalang People #2). However, the works would not impact land where Native title exists.

2.2.16 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for Commonwealth involvement in development assessment and approval in circumstances where there exist 'matters of national environmental significance'. Matters of national environmental significance include:

- world heritage properties
- national heritage places
- wetlands of international importance
- nationally threatened species and ecological communities
- migratory species
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mining)
- a water resource, in relation to coal seam gas development and large coal mining development.

A Biodiversity Assessment has been prepared to assess impacts to threatened species and is attached in Appendix B. The assessment concluded that it is unlikely that the Proposal would significantly impact any matters of national environmental significance as listed

under the EPBC Act, therefore referral to the Commonwealth under the EPBC Act is not required (see Section 5.4).

2.3 Relevant Policies, Guidelines and Standards

The following general policies, guidelines and standards would need to be considered as part of the Proposal and are addressed in this REF;

- *Interim Construction Noise Guidelines* (DECC, 2009)
- *Managing Urban Stormwater: Soils and Construction - Volume 1, 4th Edition* (Landcom, 2004)
- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW, 2010)
- *Controlled Activities on Waterfront Land – Guidelines for watercourse crossings on waterfront land* (NOW,2012)
- *Environmental Guidelines for the Use and Disposal of Biosolids Products* (EPA, 2000)
- *Environmental Guidelines: Use of Effluent by Irrigation* (DEC 2004)
- *The Australian Guidelines for Recycled Water* (NHMRC et al 2006).
- *Recycled Water Management Systems* (Dept of Primary Industries, 2015)
- Draft *NSW Best Practice Odour Guideline - Sewerage systems including sewage treatment plants, water recycling facilities, sewage reticulation systems and sewer mining* (NSW Department of Planning (DoP), 2010)

2.3.1 Licensing Guidelines for Sewage Treatment Plants (EPA, 2003)

These guidelines have been prepared by the NSW Environment Protection Authority (EPA) to help licensees in non-metropolitan areas, generally local councils and other water authorities, understand the process for licensing whole sewage treatment systems.

The guideline is largely concerned with reducing overflows from sewerage systems. The design of the proposed STP and SPS have been based upon the review of the existing sewer catchment ensuring that they have sufficient capacity and emergency storage to minimise the risk of any discharges to the environment.

2.3.2 Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW (DECCW, 2006)

The framework adopts odour performance criteria, which are based on a sliding scale relating to the population density of an area, as the response to an odour impact, can vary significantly over a given population. The criteria assumes that within a densely populated area there would be a greater potential for individuals within the community to be 'annoyed' by a given odour event as detailed in Table 2-2 below.

Table 2-2 Odour Unit Criteria and Population Density

Population of Affected Community	Criteria (OU)
Urban (>~2000) and/or schools and hospitals	2
~ 500	3
~ 125	4
~ 30	5
~ 10	6
Rural single residence (≤ 2)	7

Source: Department of Environment, Climate Change and Water Technical framework: assessment and management of odour from stationary sources in NSW November 2006

The new STP would be located approximately 2 km south of the Rappville township surrounded by bushland and agricultural land use, with few surrounding sensitive receptors on close proximity. The area immediately surrounding the proposed new SPS site comprises commercial and several residential properties within a rural / village type environment. Accordingly, the impact assessment criterion of 5-6 OU at surrounding residents for both the STP and SPS would apply, depending on the final population density. It is considered that the STP and SPS can meet this odour criteria due to the proposed design and the outcome of the Odour Impact Assessments (OIAs) prepared for the Proposal (see Sections 4.3 and 5.9).

2.4 Summary of Approvals

Table 2-3 provides a summary of the approvals required for the Proposal. Council would be responsible for ensuring that all permits and approvals are obtained, either by Council or by others on behalf of Council, prior to commencement of the relevant works.

Table 2-3 Summary of Approvals and Requirements

Agency	Requirements	Reference
Richmond Valley Council	Determination of the Proposal	Part 5 of EP&A Act
DCCEEW - Water	Approval for new STP with recycling capability and new sewage collection network.	Section 60(c) of the LG Act and Section 292 of WM Act
	Aquifer Interference Licence (if more than 3ML of groundwater is likely to be extracted per annum during construction works). Alternately, a water access licence exemption and water supply work approval should be lodged with DCCEEW - Water for aquifer interference activities taking 3ML or less of groundwater per year.	Sections 91B and 91F of the WM Act
DPHI- Crown lands	Licence to lay a structure in a Crown Land	Section 9.2 of CLM Act
ARTC	Third party approval to enter the rail corridor. Approval for pipeline laying within the rail corridor and SPS installation of the SPS within Lot 30 DP 5405.	-
Private Landowners	Landowner/ occupier consent or notification for Council infrastructure works within private land/	Sections 191A(1) and 193 of LG Act

2.5 Consultation

A number of government agencies were consulted during the preparation of the REF. A list of agencies contacted, and a summary of their response is provided in Table 2-4 below. Copies of the responses received are provided in Appendix D.

Table 2-4 Agency consultation applicable to the Proposal works

Agency	Summary of Comments	Addressed in REF
DCCEEW - Water	As discussed the general approach of developing a REF will deliver the product we expect council to own by signing it before they submit it to us as part of their S60 approval. The Regulatory and Assurance Framework is available at: https://water.nsw.gov.au/__data/assets/pdf_file/0004/518566/regulatory-and-assurance framework for- local-water-utilities.pdf	Noted and considered during preparation of the REF. Refer to Sections 2.2.2, 2.2.8 and 4
Department of Primary Industries (DPI) Fisheries	It is noted that the sewerage scheme includes installation of a transfer main that will cross Myrtle Creek. Myrtle Creek is considered Type 1 Highly Sensitive Key Fish Habitat as it is as known or indicative habitat for the threatened fish species Southern Purple Spotted Gudgeon. The remainder of the transfer main alignment and other works required as part of the sewerage scheme do not appear to intersect key fish habitat elsewhere other than that if Myrtle Creek.	Noted. Refer to Sections 2.2.13 and 5.4
	The DPI Fisheries impact mitigation hierarchy is to first avoid impacts to key fish habitats. Where avoidance is impossible or impractical, then proposals should minimise impacts to key fish habitats. All unavoidable impacts should be appropriately mitigated and offset.	Noted. Refer to Sections 5.3 and 5.4
	To achieve this policy position, it should be investigated as to whether the transfer main could be directionally drilled beneath Myrtle Creek. Directional drilling is considered best practice with regard to achieving service crossings of waterways, and this method would avoid impacts to the creek and result in no approvals being required under the FM Act (providing entry and exit bore holes were located outside of the waterway).	Noted. Excavation works are not anticipated to occur within Myrtle Creek or Nandabah Gully, as the sewer rising main would be attached to the

Agency	Summary of Comments	Addressed in REF
	Other crossing options that require excavation within the creek would require a permit in accordance with the dredging and reclamation provisions of ss198-202 of the FM Act, and such options would only be considered for approval where other non-impacting options were not possible e.g. directional drilling was not possible due to the presence of rock. Where such options requiring a permit are necessary, DPI Fisheries would require justification for the proposed crossing methodology; and details of the works including design drawings, construction methodology (e.g. where excavation will occur, design/duration of any temporary structures, dewatering procedure etc.) and environmental impact mitigation measures (e.g. detailed erosion and sediment control plan and CEMP).	existing road bridges at both waterway crossings. Refer to Section 2.2.13 and 5.4
DCCEEW-Biodiversity and Conservation Directorate	We note that the project will be assessed in accordance with Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Review of Environmental Factors (REF) EARs provided by the BCD are limited to biodiversity, NPWS estate, acid sulfate soils, flooding, and coastal processes and associated hazards. The proponent should ensure that the REF will be sufficiently comprehensive to enable unambiguous assessment of all direct and indirect impacts of the proposed activity. In particular, the REF should include consideration of the direct and indirect impacts of the proposal on the important biodiversity values of the area including, but not limited to the threatened species which are known to occur in the locality (species listed in correspondence in Appendix D)	Noted. Biodiversity is addressed in Section 5.4 Acid sulfate soils are addressed in Section 5.3 Flooding is addressed in Section 2.1.1 and 5.3 A specialist biodiversity assessment has been prepared to assess the direct and indirect impacts to biodiversity values associated with the Proposal.

Agency	Summary of Comments	Addressed in REF
	The full list of our requirements that may need to be addressed in the REF is provided in Attachment 1. In preparing the REF, the proponent should refer to the relevant guidance material listed in Attachment 2. (refer to Appendix D)	Refer to Section 5.4 and Appendix B
Environment Protection Authority (EPA)	No response received.	N/A
ARTC	No response received.	N/A
NSW Health	No response received	N/A

3 Need for the Proposal

This section provides the need and justification for the Proposal.

The village of Rappville is currently serviced by on-property septic tank sewage collection systems which were severely impacted by bushfire in 2019. RVC is looking to provide a reliable and effective sewerage scheme for Rappville and is proposing to construct a new centralised reticulated collection, transfer and treatment sewerage scheme to service Rappville village, as part of a regional development masterplan for the village. The new reticulated sewerage scheme would replace the existing onsite septic tanks.

The construction of the sewerage scheme infrastructure including the new STP, rising main, SPS and village reticulation network including on-property PSS units which form part of the Rappville Sewerage Scheme would be carried out as two separate packages of works.

Local treatment with onsite irrigation requires RVC to acquire land to site the new STP and onsite irrigation system. The STP site land acquisition process is currently pending completion. As a result, the STP construction would be undertaken as the second package of works for the sewerage scheme after the SPS and reticulation network have been constructed as part of the first works package.

3.1 Option Assessment

The *Rappville Sewerage Scheme Options Study Report* (PWA, 2021) considered options for the implementation of reticulated sewerage services for Rappville.

The do- nothing was not considered a suitable option, as the existing onsite septic tanks were damaged during significant bushfires in 2019 and the current onsite systems cannot be upgraded at a reasonable cost. Therefore, a new sewerage management system is required for the village.

The four potential options for provision of a reticulated sewerage system to Rappville assessed in the Options Study (PWA, 2021) included:

- Option 1 – Pressure Sewer System: Each property is provided with a pressure pump unit in its own small tank. The pump unit is located close to the existing septic tanks. The village is served with a network of pressure mains connecting all pump stations. With this system, the placement of pipes is very flexible and has a minimal construction impact. The system is suited where the terrain is flat or there are multiple small gravity catchments or large block sizes. The pressure sewer system is a lower cost option than a conventional gravity sewer system.
- Option 2 – Conventional Gravity Sewer System: Consists of a gravity reticulation, pumping stations and rising mains. Sewage from individual lots flows through the

gravity mains to a downstream pumping station. It is then lifted through a pressurised rising main to either another gravity main, transfer pumping station or sewage treatment plant. Ultimately it will reach a treatment plant via a pressure main. During wet weather gravity sewers can receive inflow/infiltration of stormwater which has to be accommodated in the design of the system. In addition, gravity sewers need sufficient flow velocity to keep pipes clean by preventing deposition of solids. Some pressure units are provided to service difficult properties.

- Option 3 – Common Effluent Drainage/Septic Tank Effluent Pumping (STEP): This involves retention of the current onsite systems, upgraded as required, and provision of a pump system or gravity system taking effluent from the systems. The disadvantages are that tenements need to continue to maintain their systems and the upgrading cost may be higher than the provision of a new pressure system. The STP savings would be negligible.
- Option 4 – Vacuum Sewerage: This type of scheme is not seen as being suited to Rappville. Very few installations have been undertaken in NSW and all are in areas with difficult ground conditions. The system itself is best suited to larger villages and where constraints such as a high water table are present and high environmental constraints. As such this system wasn't investigated in detail.

3.1.1 Preferred Option

The preferred option is for a Pressure Sewer System (Option 1) for the village, where each property would be provided with a pressure pump unit in its own small tank. Sewage would be transferred via a rising main and SPS for treatment at a new oxidation pond STP located approximately 2 km south of the village. The pressure sewer system is best suited to Rappville as it has a number of small gravity catchments, large blocks and a tank water system.

4 Description of the Proposal

This section provides a description of the Proposal which is assessed in this REF.

4.1 Overview of the Proposed Works

The Proposal works include the provision of sewerage scheme rising main, a new SPS and a reticulated sewer collection network (mains and PPS units) for the village of Rappville.

4.2 Population and Design Loading

4.2.1 Design Criteria

The following design criteria has been adopted for the sewerage scheme:

- Ultimate (Stage 2) design population of 220 Equivalent Persons (EP)
- Peak occupancy rate of 2.6 EP per existing tenements and 3 EP for future residential tenements and based on EPs as detailed in Table A1 of the Sewerage Code of Australia WSAA 02-2002 and discussions with relevant stakeholders
- Sewage load per EP of 180 L/d
- ADWL – STP Stage 1: 22kL/day and Stage 2: 40kL/day

4.2.2 Design Flows for Wastewater

Anticipated sewage flows as calculated for Rappville for the Proposal are provided below for the gravity transfer sewer system and the village pressure sewerage system (PSS).

Pressure System Design Flows

- Design population – Stage 1: 120 EP and Stage 2: 220 EP
- Standard ADWF allowance – 180 L/EP/d
- ADWF = 0.45 L/s
- PWWF = 4 x ADWF = 1.8 L/s (pressure sewer)

Gravity System Design Flows

- ADWF = 0.45 L/s
- PDWF = 1.1 L/s
- SA (0.04 L/s/ET) = 3.28 L/s
- PWWF = 4.8 L/s

Note: ADWF – average dry weather flow, PDWF - peak dry weather flow, PWWF - peak wastewater flow, SA- storm allowance

4.3 Sewerage Scheme

4.3.1 Sewage Treatment Plant

A new oxidation pond STP would be constructed within Lot 160 DP 755620 , located approximately 2 km south of the Rappville village. The STP would occupy an area of approximately 1.5 ha.

The STP would have an Stage 1 treatment capacity of 120 EP and future (Stage 2) treatment capacity of 220 EP. The STP annual flows would be approximately 9.2 ML (ADWF plus 10% wet weather) rising to 15.9 ML with full development of currently vacant allotments. As such, the projected ADWF would be 22.7 kL per day, increasing to 40 kL/day at full development (Stage 2).

The oxidation pond treatment system would include the below new infrastructure:

- an inlet structure/chamber
- one effluent storage pond, approximately 78 m x 58 m in size
- two oxidation ponds, approximately 36 m x 13.5 m in size, per pond
- two maturation ponds (total of 25 day hydraulic residence time), approximately 32 m x 12 m in size, per pond
- a pumping system to transfer treated effluent from the storage pond to the onsite recycled water irrigation reuse system
- an overflow structure from the storage pond for emergency discharge (to the ground)
- an irrigation system to cater for a combined 7 Ha irrigation area (maximum area - over 3 stages)
- 23 Kl capacity treated water storage tank
- associated site services including access roads to and around the ponds, car park (including 2 parking spaces), pole mounted transformer, switchboard and operator amenities shed and irrigation pump shed, fencing (perimeter and cattle fences), cattle grids and lighting.

The ponds would be constructed from onsite compacted clay earth fill material, lined with geotextile and 200 mm thick rip rap protection at the top of the embankment. If 600 mm thick clay liner cannot be constructed from onsite material, the ponds would include a geosynthetic clay liner (GCL). The outer side of the embankment would include a 200 mm thick topsoil layer and grass cover.

The proposed layout of the STP including onsite irrigation areas is provided in Figure 4.1 below. General cross sections of the STP ponds embankments are provided in Figure 4.2.

An Odour Impact Assessment (OIA) has been prepared for the new STP (provided in Appendix F). It is not anticipated that operational odours would impact surrounding sensitive receivers, as discussed in Section 5.9.

Onsite Treated Effluent Irrigation Reuse Scheme

An irrigation scheme comprising dispersion pipelines, valves, pump station and gun-style nozzles would be installed at the STP site for reuse of treated effluent onsite. The recycled water reuse irrigation scheme would occupy an area of approximately 7 hectares over three stages of development.

Operation of the STP site recycled water reuse irrigation scheme would be staged, based on the treated effluent reuse requirements. The irrigation scheme operation would be carried out in accordance with the *Rappville Recycled Water Irrigation Management Plan - Section 3 Standard Operational procedures* document (Agsol, 2023) (provided in Appendix H) and *Environmental Guidelines: Use of Effluent by Irrigation* (DEC 2004) . The onsite irrigation areas would be fenced off and used for livestock grazing.

The oxidation pond treatment system has a low to very low power demand and would produce a quality of treated effluent that is suitable for onsite reuse for irrigation of land but not for regular discharges to waterways.

The target level of treated effluent reuse to be achieved would be 100% in 50% of years. This target is based on the assumption that the recycled water would be 'low strength' (as defined by *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004) (Agsol, 2023).

Proposed layout of the STP's recycled water reuse irrigation scheme dispersion system layout is shown in Figure 4.3.

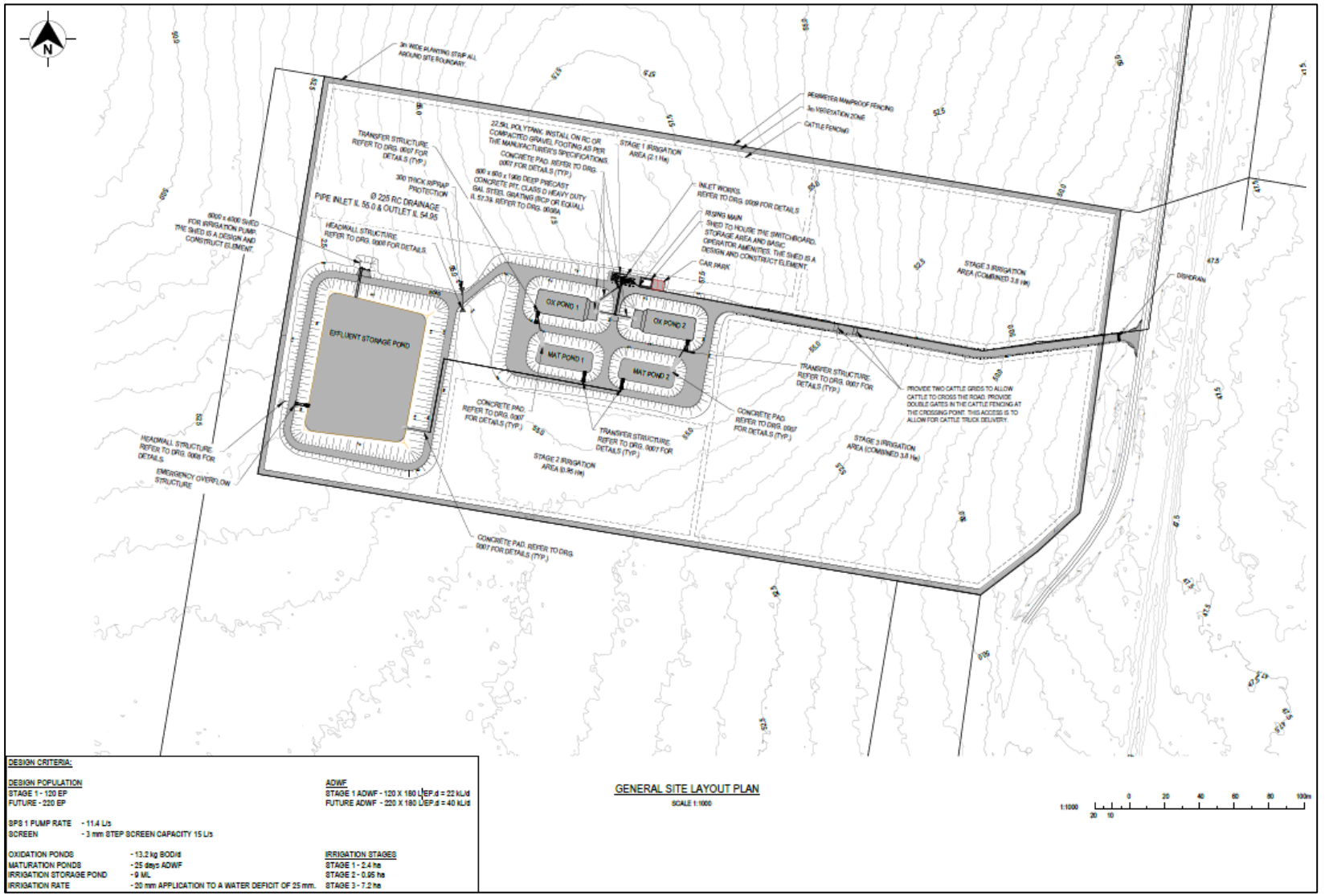


Figure 4.1 General STP site layout plan (refer to Appendix E for annotations)

Source: NSW PW, 2024

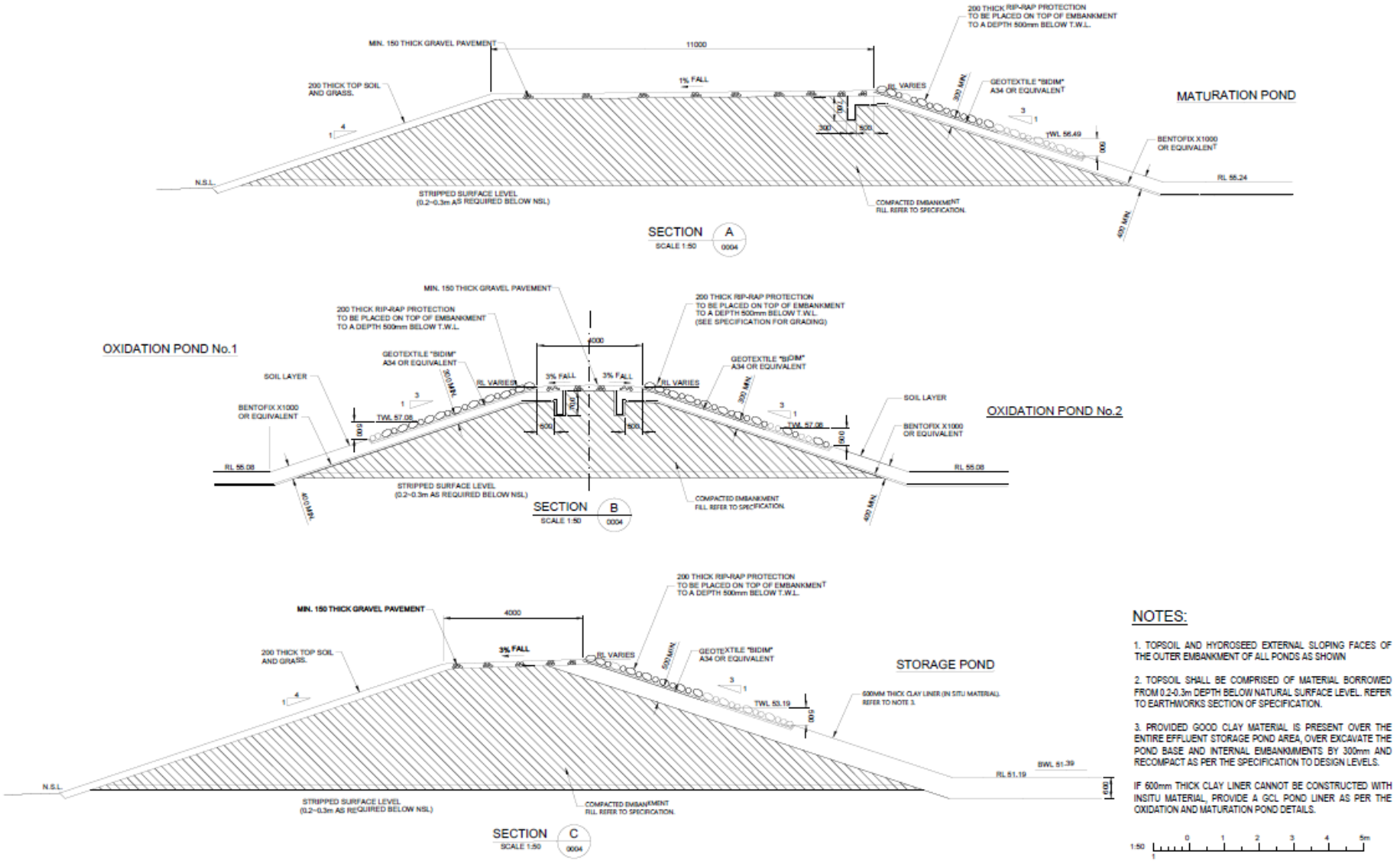


Figure 4.2 STP ponds embankment detail cross sections (refer to Appendix E for annotations)

Source: NSW PW, 2024

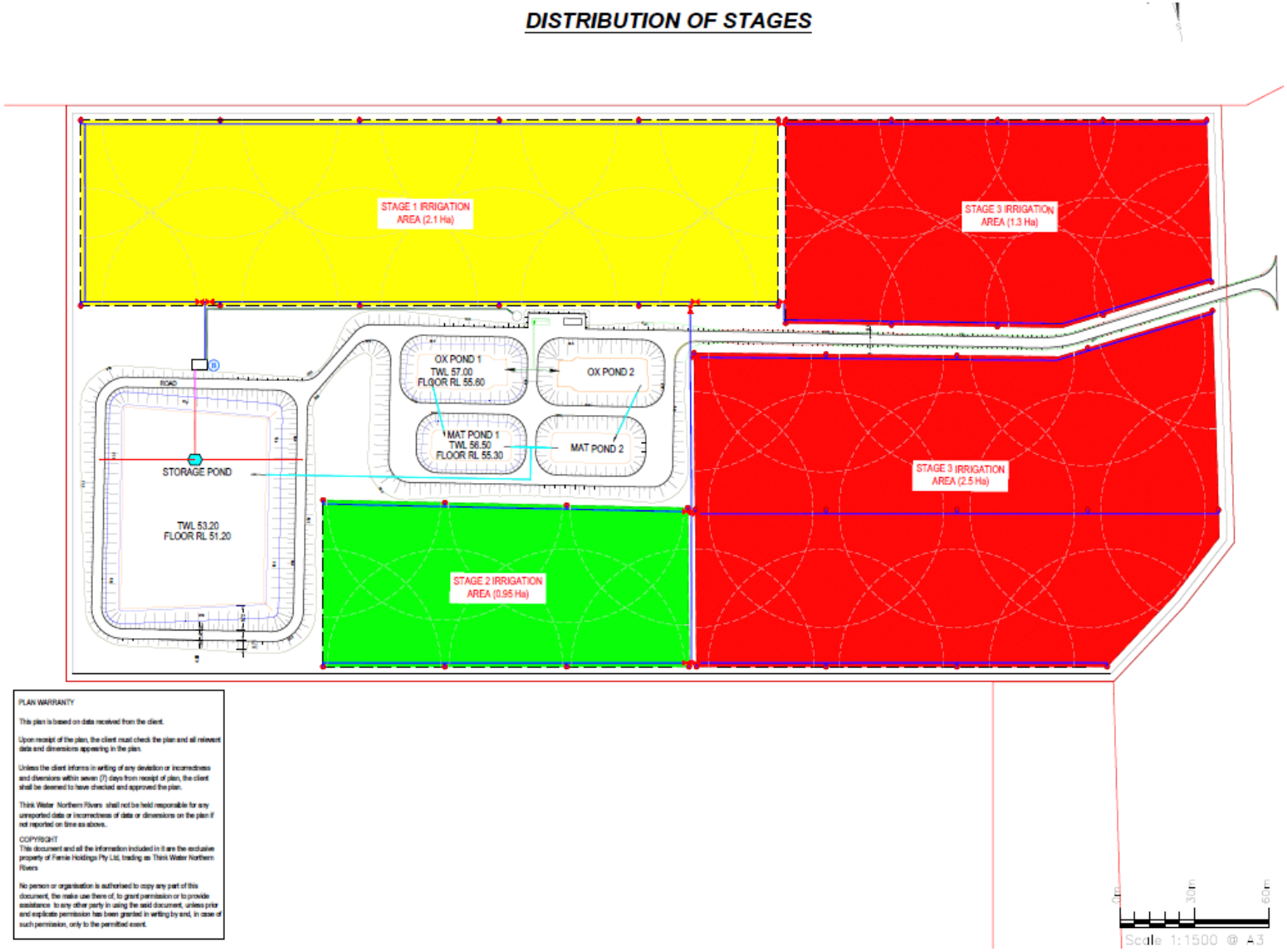


Figure 4.3 STP onsite treated effluent reuse irrigation scheme dispersion layout and three stages

Source: Think Water, 2023

4.3.2 Sewer Rising Main

A new approximately 2.337 km long, DN 180 mm PE100 (PN16) High Density Polyethylene (HDPE) sewer rising main would be constructed from the new SPS at Rappville to convey sewage to the new Rappville STP located to the south of the village. The pipeline would be constructed within the road shoulder of Nandabah Street and Myrtle Creek Road adjacent to the formed road.

Construction of the pipeline would generally be via the open trench method, except for the two waterway aerial crossings where the pipe would be attached to existing road bridges (using DN 150 mm Ductile Iron Cement Lining (DICL) pipes) .

Ancillary works associated with the rising main would include the provision of scour valves, air valves and gate valves.

4.3.3 Sewage Pump Station

Transfer of sewage for treatment at the new STP located to the south of the village would require pumping from Rappville village to the STP site.

A new SPS is therefore proposed, to be located at 2 Nandabah Street, within Lot 30 DP 5405. The location and layout of the SPS is shown in Figure 4.4 and Figure 4.5 respectively. A copy of the SPS plans is provided in Appendix E.

The SPS would comprise a sub-surface (below ground) pump station including a below ground reinforced concrete wet well / storage tank with a submersible duty/stand by 11.5 L/s pump system (within the 2.8 m DIA x approx. 3.5 m deep wet well), valve and flow metre pits. The electrical control equipment (e.g. electrical Switchgear & Control Gear Assembly (SCA)) and an odour control unit would be housed within a secure enclosure to the east of (behind) the wet well. The enclosure (approximately 6.3 m long x 2.6 m wide x 2.5 m high) would be constructed from concrete block walls with a concrete slab roof. A covered landing and single and double door access would be provided for operational maintenance.

The SPS infrastructure would be surrounded by a 1.8 m high chain link mesh security fence and gate. A row of trees would be planted along the outside of the street-facing fence line to provide a visual screen for the STP . An access road off Nandabah Street would also be constructed for operational maintenance.

System Overflows and Emergency Storage

System overflows can principally occur due to four main causes:

- Power/mechanical failure at a pump station.
- Reticulation system blockage/leakage.
- Rising main break/failure.

- Excessive system inflows which exceed the capacity of the system.

Unusual excessive inflows, greater than the design peak wet weather flow may occur during extreme flood events resulting in overflows, if the capacity of the reticulation main delivering flows to a pump station is greater than the station capacity. In order to minimise the potential for overflows, a sewerage system must have sufficient capacity to store sewage, which continues to flow from a catchment during extended mechanical breakdowns, electrical failures or blockages of sewer mains. To avoid this and minimise the pumping requirements, the reticulation system will be a low pressure system that significantly reduces wet weather inflow.

Odour Control

As the SPS is located in proximity to surrounding residential dwellings, odour control is proposed to be housed within an enclosure adjacent to the SPS wet well.

Odour would be generated at the SPS when sewage is discharged into the SPS. Odorous gases would be treated to an acceptable level prior to discharge to the atmosphere.

A McBerns activated carbon unit (ACU) or a biological treatment system followed by an ACU type installation with a forced ventilation system (extraction fan) within filter unit housing (green HDPE) is proposed for odour control at the SPS.

An OIA prepared for the proposed SPS, indicates that operational odours would not significantly impact surrounding land occupiers (refer to Section 5.9).

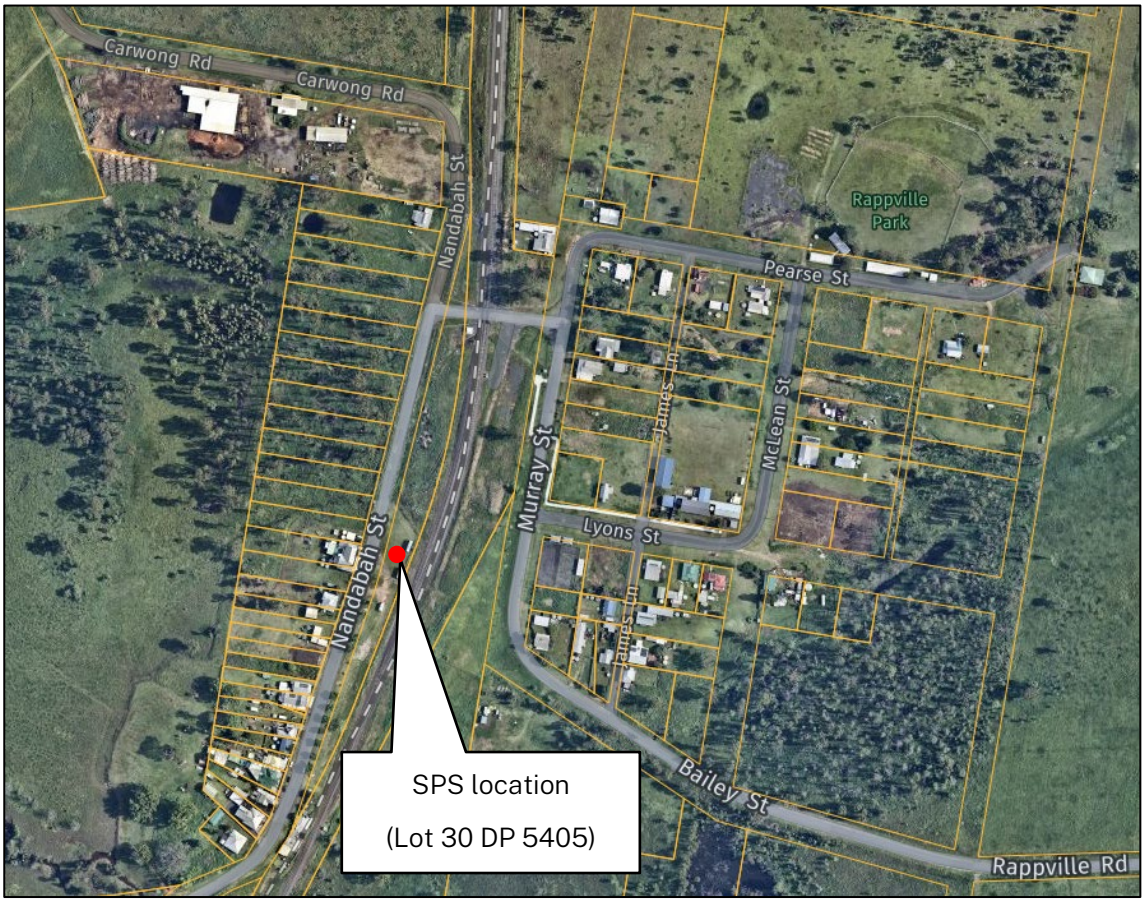


Figure 4.4 Site location of the proposed new SPS in Rappville in Nandabah Street (Lot 30 DP 5405)

Source: Nearmap, 2023

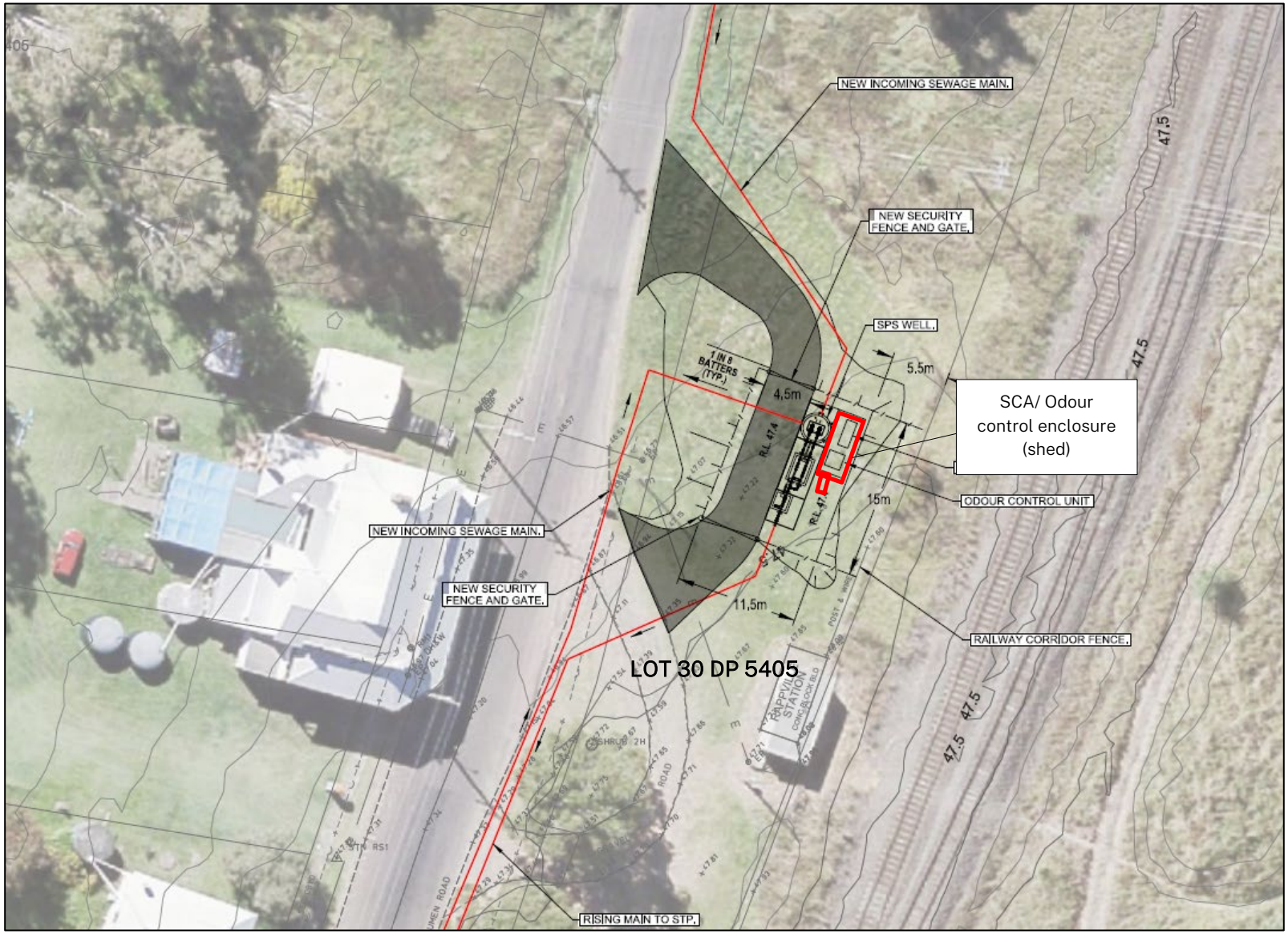


Figure 4.5 Proposed layout of Sewage Pump Station (refer to Appendix E for detailed plan and annotations)

Source: NSW, 2023

4.3.4 Village Reticulation and Pressure Sewerage Collection System

The village reticulation network would receive flow from each of the on-property grinder pump units within the sewerage system. The network is pressurised and designed to transfer flows to the STP via the SPS.

The reticulation network would comprise approximately 2.45 kms of pipeline of various sizes between DN 50/63/75/90 PE100 Class PN16 within the Rappville village.

The sewer reticulation network mains would be constructed via open trench method within the road reserves of the village and connect to the individual pressure sewer systems installed at residential properties in the village.

One crossing of the North Coast Railway Line within the road reserve would be required to connect the eastern side of the village reticulation system to the western side of the reticulation network. The railway crossing would be constructed via directional drilling method in accordance with ARTC requirements and the relevant Australian Standards.

Isolation valves and flushing points would be installed at intervals along the street mains. A barometric loop would be installed at the SPS connection point and air/odour management facilities (e.g. vents, activated carbon canisters) would also be installed at two locations. Flood prone areas would have additional installation requirements to prevent uncontrolled stormwater discharge into the system.

A plan of the Rappville village sewer reticulation network alignment is shown in Figure 1.3 and provided in Appendix E.

Pressure Sewerage System

Under this system, 47 existing and 27 future residential properties and 6 commercial properties (including the Commercial Hotel, St Johns Church and future Community Centre, Rappville Ground, Tennis Courts, Rappville Public school and the Timber Mill) within Rappville would be provided with a pressure pump unit in its own small below ground tank within the front yard. The village would be served with a network of low pressure sewer mains connecting all on-property pump units. The location of on-property PSS units connections is shown in Figure 1.4. Council would own and operate the pump units but each property would be required to pay the power costs of running the pump.

Individual Pump Units

The pressure sewerage system (PSS) has a grinder pump located inside a holding tank (pump/tank unit) and a boundary box located at every property. The dwellings are connected to the tank inlets via conventional house drains. Each residence would have its own pump/tank unit. The pump unit would typically be located between the house and the existing septic tank and would intercept the existing household sewer line.

The new PSS on-property infrastructure would include a collection tank (incl. grinder pump), control/alarm panel, discharge line, control and power cabling and property boundary assembly within a small plastic pit/access box (incl. isolation ball valve, swing check non-return valve and inspection tee) within the property boundary at existing residential properties and a property boundary assembly (only) at all vacant lots. Figure 4.6 provides a cross section of the on-property arrangement and a typical design layout is shown in Figure 4.7.

The house plumbing (customer sanitary drain) discharges to a collection tank (see Figure 4.8). The grinder pump located inside the collection tank then macerates the sewerage and pumps it though a small polyethylene pipeline (property discharge line) to the pressurised street network. The anticipated pipe material for the pressure sewerage collection system would be black pipe with a cream stripe PE100, PN16 polyethylene material.

A control/alarm panel (see Figure 4.8) is generally located on the dwelling near the collection tank, providing power and control signals to the grinder pump, and is connected to the house's electrical distribution board. An audio and/or visual alarm beacon is included to warn of failure..

A property boundary assembly (also called a property boundary kit) is located within the property boundary and includes a stop valve and reflux valve (within a small plastic pit) connected to the property discharge line and within the property boundary. These valves allow the system within the property to be isolated from the street network if necessary.

Each time the grinder pump is activated, the majority of the contents of the holding tank are removed. In a completely pressurised collection system, all the piping downstream from the grinder pump (including laterals and mains) would be under pressure (45 m or less).

To ensure stormwater is excluded from the system the current sewer plumbing on each block would be audited when the system is being designed. Should there be stormwater connections, low boundary traps or separate grey water systems these would need to be rectified. Rectification works if simple, would be undertaken as part of the sewer connection works.

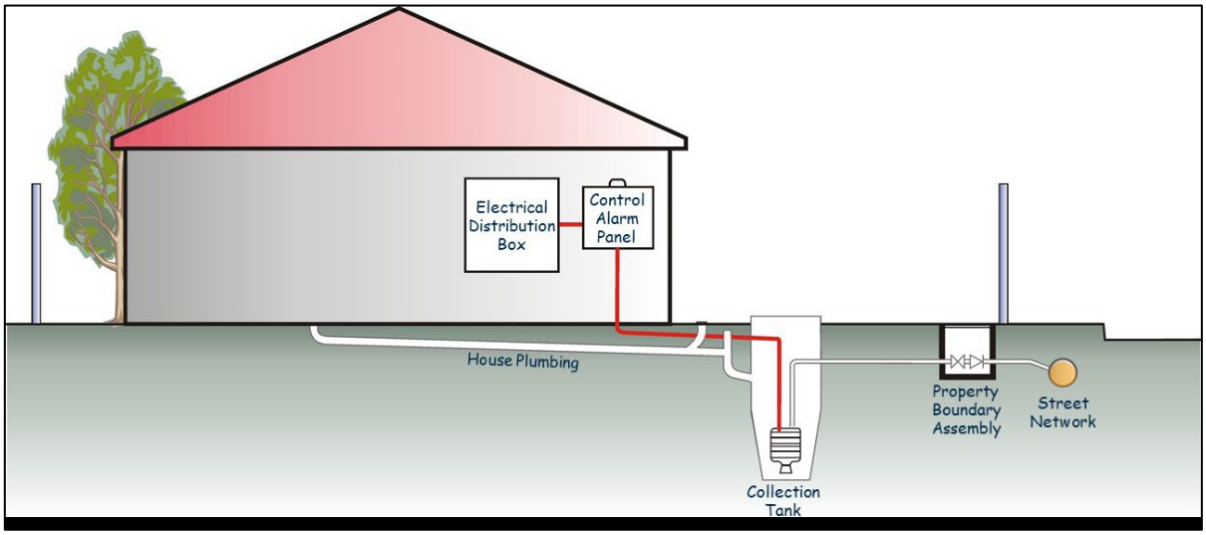


Figure 4.6 On-Property PSS Infrastructure

Source: PWA (NSW PW), 2022

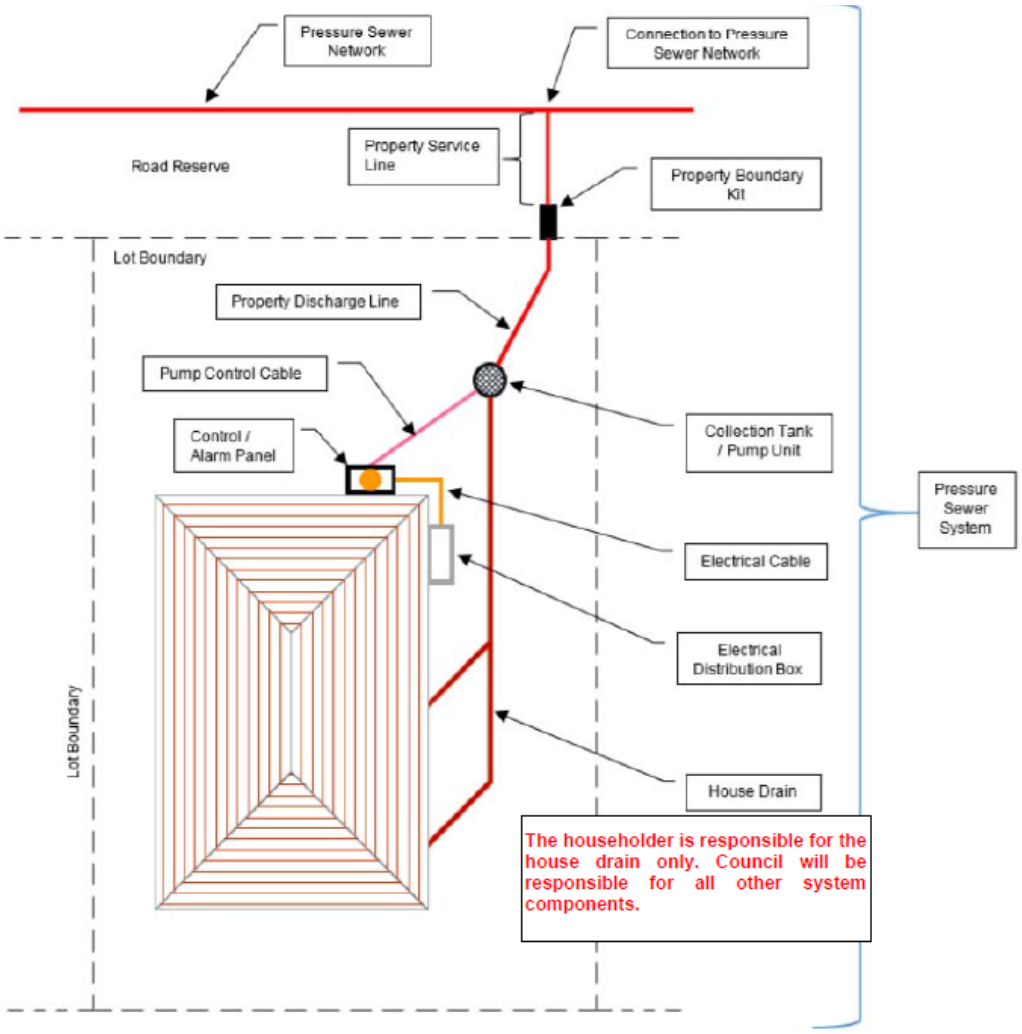


Figure 4.7 Typical Property Design Layout for Pressure Sewerage System

Source: Water NZ Pressure Sewer Guidelines



Figure 4.8 Typical Installed Pressure Unit (left) and Power Installation (right)

Source: PWA (NSW PW), 2022

4.4 Construction Methodology

The proposed construction methodology would be dependent on several factors including the contractor's chosen method, equipment, and program. A construction methodology has been predicted based on previously constructed similar sized projects.

The general methodology for the Proposal STP and rising main, SPS and reticulation network construction works is anticipated to involve the following steps:

- Establish environmental and traffic controls
- Establish worker compound, storage and set down areas
- Clearing of groundcover/ vegetation (as required)
- Excavate trenches/wells/pits
- Stockpile excavated topsoil separately
- Construction of STP/pipelines/ SPS/ on- property PSS components
- Install associated components and electrical/ control equipment
- Backfill using excavated soil and topsoil.
- Restore disturbed areas

- Remove environmental controls only once the site is stabilised

For the sections of reticulation pipeline which would be underbored at the railway line crossing within the road reserve; a general construction sequence would generally be as follows:

- Establish environmental controls
- Set up boring machine and ancillary equipment in previously cleared/disturbed area
- Bore
- Commence pipe pull back process
- Test pipeline
- Remove drilling rig and ancillary equipment
- Dispose any excess drilling fluids and spoil
- Restore site

In general, pipeline excavations should be readily achievable using conventional equipment such as a backhoe or excavator. A large hydraulic excavator may achieve depths of up to 1.5 m/ 2 m with occasional assistance from a rock breaker.

The rising main would cross two waterways (Myrtle Creek and Nandabah Gully). At these locations the construction of the rising main would be undertaken as aerial crossings, whereby the pipe would be attached to the existing road bridges.

Restoration of disturbed surfaces to pre-construction condition would be undertaken for all ground disturbing works.

4.4.1 Construction Equipment

Construction equipment and machinery required to carry out the works would be dependent on the methodology proposed by the contractor.

It is expected to include the following general equipment:

- Backhoe/Excavator
- Boring machine
- Trench diggers
- Air Compressor
- Pumps for dewatering (if required)
- Dump trucks
- /Rock breaker
- Concrete Agitator Truck
- Staff vehicles
- Hand Tools

4.4.2 Construction Timeframe

Construction of the Proposal is anticipated to commence mid to late 2024 with a construction period of up to 24 months forte two packages.

The Interim Construction Noise Guidelines (DECC 2009) outlines recommended standard construction working hours as:

- Monday to Friday 7am to 6pm
- Saturdays 8am to 1pm
- No work on Sundays or public holidays.

The construction would comply with these recommended hours.

4.4.3 Construction Compound

The location of the construction compounds would be determined by the successful construction contractor. The construction compounds would be located in previously cleared and disturbed areas and would include the following facilities;

- Site offices and contractor works area,
- Storage of construction equipment and materials,
- Portable toilets,
- Parking areas.

4.5 Construction Environmental Management

Construction of the Proposal would be undertaken in accordance with a Construction Environmental Management Plan (CEMP) that would be prepared by the construction contractor/s and approved by RVC prior to commencement. The CEMP would incorporate all of the mitigation measures identified in this REF as well as management of the full extent of the works including any site compounds to be established for the construction works, any conditions of approval and any other licence/approval conditions. The CEMP would also incorporate an emergency response plan in case of a pollution incident, a complaints handling procedure and a 24-hour telephone contact number. The complete list of the mitigation measures recommended in this REF is provided in Section 6.

4.6 Operational Considerations

4.6.1 Operation and Maintenance

STP

After construction, the operation of the STP would continue in accordance with established DCCEEW - Water and RVC procedures.

An Operational Environmental Management Plan (OEMP) should be prepared for the new STP and the onsite treated effluent reuse irrigation scheme. The OEMP should include the operational mitigation measures detailed in this REF and any additional conditions to ensure adequate safeguards are in place and routinely monitored to avoid environmental impacts during the operation of the STP and onsite treated effluent reuse irrigation scheme.

Operational and maintenance of the STP and irrigation scheme dispersion system are important to maintain effective facility operations, to reduce operations and maintenance costs and minimise future environmental impacts. An ongoing program of systematic inspections, preventative maintenance and equipment overhaul is required to ensure operational efficiently, to achieve adequate service life, and to minimise the risk of odours, leakages and overflows.

The new STP ponds would require regular maintenance anticipated to comprise:

Daily/weekly/monthly

- Visual inspection of embankments, transfer/overflow structures, inlet structures, checking for obstructions;
- Removal of screenings; and
- Visual inspection of pond colour and odour etc.

Quarterly

- Manual hosing down (using a portable sump and effluent serviced from the maturation ponds) the scum accumulation around transfer/overflow structures to prevent the scum becoming crusted.

Six Monthly

- Operation of stopboards in their frames and valve exercising to ensure they remain serviceable.
- Weed growth to be removed in and around ponds - keeping the water edge clear of vegetation prevents mosquitoes from breeding in sheltered areas

Annual

- Inspect condition of pond embankments and, where necessary, undertake embankment maintenance works;
- Inspect sludge accumulation for all ponds, where necessary, schedule pond desludging works; and
- Inspect fencing, access platforms and handrails.

Pond Desludging

Periodic desludging of the ponds would be required once the sludge layer becomes appreciable to the extent that treatment performance is affected, which is typically after a period of about 15 to 20 years. Depending on the suitability (waste classification) biosolids would be captured for reuse.

Treated Effluent Reuse Irrigation Scheme

The *Rappville Recycled Water Irrigation Management Plan* (RWIMP) has been prepared by Agsol (2023) to assess the STP site's soil infiltration capability and provide a range of 'preventative measures' and operational management procedures to guide the operation of the STP's onsite recycled water reuse irrigation system by RVC operational staff. The RWIMP also identifies critical operational control points in the STP's recycled water irrigation system. A copy of the RWIMP is provided in Appendix H.

The STP's onsite recycled water irrigation reuse scheme would require scheduled inspection and maintenance to ensure the irrigation dispersion system components including pipework, valves, nozzles and pumps are in good operational condition.

Irrigation area fencing should also be inspected periodically to ensure grazing livestock are securely corralled.

SPS and Pipelines

During operation of the SPS, PSS units, rising main and reticulation pipelines, access may be required for inspections and maintenance. Maintenance activities would be located at points where control units and valves are located, and inspections of the pipelines may also require localised excavation to allow pipeline access. General pipeline maintenance procedures are outlined below:

Cleaning

The pipelines would have section and scour valves at regular spacing for:

- regular flushing to remove any deposits in the pipeline if any, and
- draining the pipeline in case of a pipe repair.

Scour valve arrangement typically consists of a "T" branch of the main pipeline with a valve, a hydrant outlet and a discharge pipe to road table drain or natural drainage path.

Regular Flushing

The water conveyed in pipelines is unlikely to contain significant amount of silt. However, silt deposits along the pipelines would be removed by regular flushing.

Scour valves would be opened for a few seconds to discharge silt and this would release relatively small volumes of water. Regular flushing is likely to occur as part of routine annual maintenance work.

5 Environmental Assessment

This section identifies and characterises the existing environment, the likely potential impacts associated with the construction and operational phases of the Proposal and any associated mitigation measures. Where considered necessary, feasible mitigation measures are identified for implementation as part of the proponent's environmental management.

5.1 Assessment Methodology

The key objectives of this assessment are to:

- Identify those facets of the environment likely to be affected by the Proposal during construction and operation;
- Identify the sensitivity of the site;
- Identify and characterise the associated impacts; and
- Identify and evaluate feasible mitigation measures for the identified impacts.

Environmental issues of potential relevance to the Proposal include:

- Land use
- Geology, soils and water
- Biodiversity
- Bushfire
- Heritage (Aboriginal and historic)
- Noise and vibration
- Air quality
- Traffic and access
- Waste management
- Hazards and risks
- Visual amenity
- Utilities and infrastructure

5.2 Land Use

The land tenure which the sewerage scheme infrastructure would traverse is provided in Table 1-1.

The Rappville STP and associated onsite irrigation reuse system would be constructed within the northern section of Lot 160 P 755620 (see Figure 4.1), which is freehold land to be acquired by RVC for the new STP. The site comprises native regrowth vegetation, as it

was impacted by the bushfire event in 2019. Land uses adjoining the STP site comprises rural agricultural land and bushland, with a public road to the east. The closest residences are located approximately 650 m to the north and 950 m west of the STP site. Four Mile Creek is located approximately 700 m to the west, and Myrtle Creek is approximately 1 km north of the STP site.

The proposed village reticulation mains and on-property PSS units would be located along existing road reserves and within the front yards of numerous residential and commercial properties. The subsurface pump and tank collection units, which form part of the PSS units, would be installed between the existing septic tank systems and the house. One section of unformed, unnamed road reserve off Pearse Street where the reticulation main would be installed is mapped as a Crown road reserve.

The new Rappville SPS would be located within a previously cleared lot (part Lot 30 DP 5405) which is owned by TfNSW and managed by ARTC. The SPS site is situated within the western Rappville village area on the eastern side of Nandabah Street, near the former Rappville Railway Station.

The sewer rising main would commence at the SPS site and travel along the Nandabah Street and Myrtle Creek Road reserves, crossing over two waterways (Nandabah Gully and Myrtle Creek) via bridge attachment and terminate near the proposed STP site approximately 2 km south of the village.

Adjoining land uses along the pipeline alignments are varied and include developed rural properties and village residential areas as well as commercial properties and public recreational space (oval) (refer to Figure 1.1 and Figure 1.2). The majority of the Proposal area is highly modified land that has been cleared of native bushland and comprises a mix of exotic and hardy native groundcovers, shrubs and trees. The village was also heavily impacted by bushfire in 2019.

Overall, the Rappville sewerage scheme including the STP and onsite irrigation reuse scheme, rising main, SPS and village reticulation network works area is generally disturbed due to previous rural agricultural, residential and public infrastructure development impacts, and has been highly modified and cleared of native vegetation. Previous ground disturbance in the general Proposal area is likely to be variable, ranging from deep to shallow disturbance, with this area having experienced high levels of previous impact primarily in the form of road verge clearance, deep earthworks and trenching events, and residential construction within the Rappville area.

5.2.1 Construction Impacts

The area of the Proposal works is subject to a number of land uses and ownership as described in Table 1-1. The STP and much of the sewer rising main and village reticulation

network and ancillary works would be located within Council-owned land and road reserves.

The a small section of the reticulation main at the railway crossing and the SPS site is located within TfNSW owned, ARTC managed land. Accordingly, installation of the SPS at the site and underboring of the railway line would require ARTC approval prior to the commencement of works and should be carried out in accordance with ARTC requirements. In addition, it is recommended that Council should receive concurrence from DPHI- Crown lands to install the reticulation pipeline within the Crown road reserve off Pearse Street, or alternately have the unformed and unnamed Crown road reserve transferred to Council control as a council road reserve.

Installation of the PSS collection system (grinder pump located inside a holding tank) would be required in each property to be connected to the sewerage scheme within village. These works may be undertaken within freehold land under the provisions of the *Local Government Act 1993* subject to prior notification, as RVC is the local sewerage services provider.

Construction works associated with the Proposal may cause some temporary disruption to users/owners of adjoining private and public land, and to the residents and local road users along the alignment. Due to the relatively isolated location of the STP site and large distance to surrounding residences, the temporary nature of the works at the STP and SPS sites, and the relocation of the pipeline works as the construction and property connections progress along the alignments the construction works impacts associated with the Proposal are not anticipated to be significant, assuming implementation of the mitigation measures listed below.

The Rappville SPS would be located near residential properties and access to the site would be via Nandabah Street. Therefore, the proposed works may have an impact on surrounding residents during construction works. However, the construction duration would be relatively short term and activity at the SPS site during operation would be associated with relatively infrequent scheduled maintenance activities.

5.2.2 Operational Impacts

During operation, the STP irrigation reuse system would be consistent with the surrounding agricultural land use, as the STP site would be planted with *Setaria* pasture (or similar) to allow the cattle to graze over the entire irrigation area. The operation of the STP, SPS, pipelines and on-property PS units would not significantly impact existing land use in the village. Overall, the Rappville SS would result in positive outcomes for the local community by providing a new, reliable, reticulated wastewater management system for the village, to accommodate current and future expected loads and reduced potential for sewage leakage from on-property septic tanks. Post construction, a new perimeter

security fence would be installed around the SPS and the STP and irrigation site boundary to prevent unauthorised access by people and/or livestock.

Given the proper implementation of the mitigation measure provided in 5.2.3, the impact of the Proposal on land use during construction and operation is not expected to be significant.

5.2.3 Mitigation Measures

- Prior to commencement of construction activities on private properties, all landowners would be notified under the provisions of the *Local Government Act 1993.* All other necessary notification, approvals, permits, licenses and agreements would be obtained from the relevant landowners/authorities (including DCCEEW- Water, ARTC, DPHI – Crown lands, property owners).
- Affected landowners and the community would be notified of the potential impact on land uses during construction and any safeguards or mitigation measures that would be implemented during the works.
- The contractor would be required to undertake pre-construction dilapidation report/photographic record to ensure the necessary care and maintenance of property facilities and operations. However, if any damage does occur to public or private property, it would be restored to a condition equivalent to the original condition.
- Any works on private property would be designed to minimise impacts to existing vegetation, structures, access and services.
- No construction activities (e.g. tree clearing, stockpiling etc.) would be undertaken on property adjoining the works areas without prior notification to or approval of the landowner.
- Appropriate security (including temporary fencing), supervision and access controls would be put in place and properly monitored to ensure no access by unauthorised personnel, either to the work area or via the work area to adjoining areas. This should include appropriate measures for the protection of the public where construction works would adjoin areas subject to regular use by the general public.
- Appropriate security fencing and access controls would be put in place and properly monitored at the STP and SPS sites to prevent unauthorised access by the general public, wildlife, or livestock
- As operator of the sewerage scheme infrastructure, RVC should provide a 24-hour telephone number so that any issues relating to the operation of the new infrastructure can be clarified and complaints dealt with by those able to respond.

5.3 Geology, Soils and Water

Regional Geology

The Grafton 1:250,000 Geological Series Sheet SH/56-06 (First Edition, 1976) indicates that majority of the Proposal area within Rappville village is located within Quaternary stream alluvial deposits, sandy to silty, with minor gravels.

The exception to the above is the area of the sewer rising main works south of Myrtle Creek, where there the Jurassic-Cretaceous Grafton Formation is present, comprising sandstone, siltstone claystone and minor coal.

Soils

A search of the NSW Government *Sharing and Enabling Environmental Data* in NSW (SEED) Portal (accessed March, 2023) indicates that soils in the Proposal area are mapped as Kurosols under Australian Soil Type Classification (ASC) and as either red or yellow podzolic soils under Great Soils Group soil classification.

Based on (SEED) Portal Acid Sulfate Soils (ASS) mapping (accessed, March 2023), the Proposal area is not mapped within areas containing ASS sediments.

Surface Water and Flooding

The sewer rising main would cross both Nandabah Gully and Myrtle Creek. The village reticulation and SPS works would not impact any waterways.

The majority of the Proposal area in the vicinity of Rappville village is identified as being located within a flood planning area based on RVC flood assessment. However, the STP site is not mapped as flood prone land. (Refer to Figure 2.5).

Groundwater

A geotechnical investigation will be undertaken for the Proposal in April 2023 to provide an indication of groundwater levels in the various works areas. However, there is a possibility of encountering groundwater/seepage during construction, especially if the construction is carried out during adverse weather conditions.

5.3.1 Construction Impacts

Erosion and Sediment Control

The construction of the Proposal would result in ground disturbance due to excavation required for the STP works including construction of the new oxidation and maturation ponds, pipeline connections, operational plant and sheds, and associated onsite irrigation infrastructure. In general, earthworks and ground disturbances associated with the STP construction works could result in sediment and other materials leaving the site via wind

or water movement. Aspects of the proposal identified as potentially impacting on water quality includes:

- General earthworks for the STP ponds, operational plant and pipeline connections construction,
- Access to and from the site by construction vehicles,
- The movement of spoil around the site, and
- Temporary spoil stockpiles.

The Rappville SS transfer and reticulation network would require installation of the sewer rising main, village reticulation, the SPS and the railway line underboring activities. The trenches for the installation of the pipelines would be 0.7 m to 1 m deep and 1 m wide and within an approximately 3-4 m wide disturbance corridor. It is noted that this is a conservative assumption based on open trench construction methodology. The contractor would undertake an alternative construction approach utilising underboring for a section of the reticulation main where it crosses the railway line and the rising main would be attached to the side of existing road bridges for the two waterway crossings.

The excavation and ground disturbing activities proposed to be undertaken during the SS construction works (including STP ponds excavation, underboring drilling, open trenching and ground levelling) have the potential to cause erosion and sedimentation if excavated materials are transported off-site. Therefore, construction erosion and sediment controls and stabilisation following the works would be required for activities in these areas to prevent any impacts off-site, including sedimentation of drainage lines and waterways.

Runoff from cleared areas and stockpiles of soil and disturbance by construction works could lead to short-term increases in sediment loading. Implementation of an Erosion and Sediment Control Plan (ESCP) in accordance with *NSW Landcom (2004) Managing Urban Stormwater – Soils and Construction* and remediation of construction sites post construction would mitigate the risk of construction impacts on waterways in the vicinity.

It should be noted that although a number of mitigation measures to protect water quality have been listed in this REF, further site specific plans and construction details would be included in the CEMP (including the ESCP) for the works. Although a substantial volume of earthworks at multiple sites are proposed for the SS, it is assessed that the impacts can be adequately managed through the implementation of an ESCP and appropriate mitigation measures and therefore the overall impact is assessed to be low.

The Proposal involves directional drilling (underboring) that would traverse the North Coast railway line. Bentonite, used to transport the cuttings, cool the drill bit and to seal and support the drilled hole is likely to be used which would generate a slurry. Bentonite is a naturally occurring clay which is self-sealing and therefore used as a lining material to

seal any cracks which may result from the drilling process. The use of drilling fluid could potentially result in soil erosion and waterway contamination if it is not contained onsite. Drilling fluid would be recirculated and therefore any loss of fluid would adversely affect drilling operations and would be immediately apparent to the drilling rig operators via a loss in pressure and fluid ceasing to be pumped to the drill-head. Appropriate management measures would be implemented to ensure drill waters are appropriately recycled and contained onsite such as through the use of holding tanks.

The proposed underboring would be carried out such that the entry and exit points of the drilling would be within a highly disturbed road reserve that does not support native vegetation. Similarly, the aerial crossings of the two waterways would be designed to minimise disturbance to adjoining vegetation. Therefore, disturbance to the railway line, native vegetation or the bed or banks of Nandabah Gully and Myrtle Creek is not anticipated during the construction works.

Some water runoff is necessary during the drilling process; however, by-product sludge is normally removed from the site with the use of a vacuum sucker truck. The site where the sludge is disposed of would require bunding and appropriate treatment until the sludge is considered to be safe for disposal or re-use. The proponent or the drilling contractor should be required to prepare an ESCP. It is anticipated that RVC has designated disposal areas for drilling sludge, which could be utilised for appropriate disposal of drilling waste. This would be confirmed by RVC.

The construction of the proposed SPS would comprise excavation for slabs and the wet well. The site is not located in close proximity to any watercourses and therefore no adverse impacts to water quality are anticipated due to the works provided suitable erosion and sediment controls are implemented.

Mitigation measures listed in Section 5.4.3 of this REF for protection of aquatic habitat would assist to minimise any adverse impacts to water quality, including water courses, as a result of these works. Appropriate mitigation measures would also be implemented in the event of accidental spills of fuel and other materials from vehicles and machinery.

Groundwater

The groundwater depth in the proposed works area would be established as part of geotechnical investigations.

Depending on groundwater depth, dewatering may potentially be required during construction works, particularly if the construction is preceded or carried out during prolonged wet weather periods.

Where groundwater is encountered during the construction works, it would need to be managed so that it does not result in pollution, including sedimentation, of any local

waterways. Groundwater devoid of sediment or contaminants would be disposed of in a way that does not cause erosion.

If groundwater is encountered during the works, dewatering, settling, treating and filtering techniques would be required to be implemented. If it is anticipated that more than 3 ML of groundwater would be extracted in the course of construction works, an aquifer interference approval water access licence (WAL) would be required from DCCEEW - Water prior to the commencement of construction works. However, it is anticipated that less than 3 ML of groundwater in total would be extracted during the works. As such, it is recommended that the volume of water extracted during the course of the works each day should be recorded and an aquifer interference WAL exemption and associated water supply works approval obtained if groundwater dewatering utilises a pump should be lodged through DCCEEW - Water by the construction contractor on behalf of the proponent (Further information on groundwater aquifer exemption requirements is available at https://www.dpie.nsw.gov.au/water/our-work/licensing-and-trade/water-access-licences-and-approvals/exemptions-for-water-licences-and-works-and-or-use-approvals/groundwater-wal-exemptions).

Assuming appropriate safeguards and mitigation measures are implemented, the Proposal is not anticipated to contribute to a cumulative adverse impact on groundwater. If dewatering is required, groundwater devoid of sediment or contaminants would be disposed of in a way that does not cause erosion. Groundwater may need to be suitably settled (i.e. using baffle tanks or similar) or filtered prior to being dispersed of over vegetated ground surfaces.

Flooding

There may be some risk associated with flooding of the construction site due to the location of the works on flood prone land. If the construction area becomes flooded, the greatest impact would be associated with the loss of construction equipment, plant, materials (including stored fuels) and sediment from the site. This could result in adverse water quality impacts and potential safety issues if large plant is washed from the site. However, it is likely that sufficient warning of any potential flood events would be readily available through ongoing review of weather and river levels by the Contractor throughout the construction period which would significantly reduce the risk of impacts associated with flooding.

Spill Management

Accidental spillage of fuels, hydraulic fluids and lubricating oils used in the operation of construction equipment could result in the release of hydrocarbons and metals which may be transported to nearby watercourses. The significance of the impact would depend on the type of fuel or oil used, the quantity spilt, the prevailing weather conditions and rate of

flow of the watercourse. Several mitigation measures are recommended below to manage and mitigate potential spill incidents.

Overall, given the proper implementation of mitigation measures provided below the impacts on water quality during construction is not considered to be significant.

5.3.2 Operational Impacts

STP

The STP site would be appropriately stabilised post construction, including topsoiling and grassing to design level/grades, which would significantly reduce the potential for erosion at the site and the STP site and the irrigation recycled water reuse areas fenced-off to prevent unauthorised access.

The new STP ponds would provide adequate storage capacity to manage high inflows to accommodate future requirements and high rainfall events. Operational discharges of treated effluent to surrounding land as part of onsite recycled water reuse for irrigation, would be managed and controlled during operation of the STP, and subsurface seepage would not occur from the new ponds during operation. Surface overflows are not anticipated to impact any waterbodies or waterways during operation, due to the large distance to surrounding waterways/waterbodies and the relatively flat site topography.

The new STP ponds would be constructed so as to minimise the potential for impacts to the local groundwater resources during operation, through the use of appropriate liner materials and installation of monitoring equipment. If a 600 mm thick clay liner cannot be constructed from onsite material, the ponds would include a geosynthetic clay liner (GCL), and the outer side of the embankment would include a 200 mm thick topsoil layer and grass cover. The risk of human or livestock exposure to contaminated soil at the site is considered unlikely during operation, as the recycled irrigation reuse water would have been treated to safe levels prior to use at the site, and the site is not known to be contaminated. Furthermore, a Soil Capability assessment and associated *Rappville Recycled Water Irrigation Management Plan (*RWIMP) has been prepared by Agsol (2023) for the Proposal and for the operation of the onsite irrigation system at the STP site. The Agsol RWIMP (2023) determined that the site has suitable soil absorption capacity for irrigation reuse and identified procedures to assure that the irrigation scheme would operate in accordance with the applicable recycled water irrigation guidelines for non-human use crops and pastures. The RWIMP outlines a range of 'preventative measures' and operational management procedures which RVC should adhere to during operation of the STP recycled water reuse irrigation system, to assist in the control of critical points in the STP's recycled water irrigation system during operation (Agsol, 2023). A copy of the RWIMP is provided in Appendix H.

As such, adverse impacts are not anticipated to groundwater during operation of the STP associated with surface or subsurface seepage from the ponds.

SPS Overflows

The potential for adverse water quality impacts during operation of the new SPS infrastructure has been minimised by the inclusion of a wet well storage, as described in Section 4.3. Due to the selection of a the low pressure sewer system design, inflow and infiltration volumes have been minimised. It is noted that there are no drainage lines in the vicinity of the SPS and therefore, in the unlikely event of an overflow, impacts to surrounding waterways would be minimal.

Flooding

The SPS is located within a flood planning area. The SPS building would include appropriate stormwater drainage connections to manage runoff and design features to maintain operation and prevent overflows during a flood event. Overall, the presence of the SPS in this area is not anticipated to significantly adversely affect flood behaviour. It is noted that the surrounding area has previously been subject to residential development.

The rising main and reticulation network would be installed below ground, as aerial crossings (bridge attachments) at watercourses and underbored across the railway line. All pipeline and PSS excavations would be infilled and compacted once installed to minimise impacts to the stability of the ground surface and to minimise erosion and siltation. Therefore, it is considered that no operational flooding impacts would occur.

There are approximately 25 existing properties, 27 vacant lots and 3 non-residential properties (Commercial Hotel, Rappville Showground and the timber mill) where the ground level is 1.5m or more below the recent flood level of RL 48.5m. There are a number of potential operational impacts associated with flooding and on-property PSS infrastructure. These include inundation of the collection tank from floodwaters, potential for continual operation of the pump during flood events and associated damage to the pumps, flooding of the control panel, and tank floatation.

Little can be done to stop inundation of the on-property collection tanks when the surrounding area is flooded. However, the small vent holes in the collection tank can be sealed to prevent ingress through them but flooding through the house plumbing (typically the gully trap) is still likely to occur. There are two approaches which may be adopted to address this risk. The first is to seal the tank vents and provide a new vent which would need to breath above the flood level which is usually provided by connecting the house plumbing vent or installation of a new vent pipe. The second is to allow the collection tank to flood but protect the pump from damage from continuously operating by using a control system which turns the pump off when the level in the tank reaches the top water level.

During flooding events, all the pumps located in the flooded area would generally be operating and some would shut down due to overpressure controls. However, this may still leave some pumps operating much longer than desirable and they may continue to operate if the over pressure control does not operate. To protect the pumps from operating during flood events there are a number of approaches, which either limit the run time of the pumps or identify that the collection tank is full and turns the pump off. A flood control system (EOone) could be provided which uses a float switch to indicate that the collection tank is full and stops the pump from operating. It is suggested that this or a similar system be adopted for the Rappville scheme to mitigate operational impacts in the event of a major flood event.

5.3.3 Mitigation Measures

- The contractor is to develop a flood contingency plan as part of the CEMP, which describe the site-specific measures to be implemented for all works areas prior to the flood event (monitoring), during the flood event (evacuation and response) and post the flood event (assessment of damage and recovery).
- All personnel involved in construction works should be aware of the details of the works plans, legislation and associated pollution controls and the environmental sensitivity of the surrounding receiving waters before any works. All activities must be carried out with due diligence, duty of care and in accordance with best management practices.
- A detailed Erosion and Sediment Control Plan (ESCP) shall be prepared as part of the CEMP. The ESCP would describe the site specific measures to be implemented for all works areas, in accordance with the guidelines outlined in the 2004 Landcom publication *Managing Urban Stormwater: Soils and Construction*, 4th edition ("The Blue Book") and *Volume 2a Installation of Services*. The ESCP would need to be site-specific and would need to address the following issues to prevent erosion, sediment loss and water quality impacts:
  - Minimisation of disturbance to soil and water adjacent to, and within, all watercourses in the works area.
  - Identification of site specific sediment and erosion control measures wherever erosion is likely to occur, including around the drilling entry and exit points.
  - Identification of any environmentally sensitive areas on or near construction sites to ensure runoff is diverted away from sensitive areas.
  - Requirements for vegetation clearing to be kept to a minimum.
  - Retention of all surface runoff on-site and where possible stormwater from off site would be diverted around the construction site.

  - Backfilling and stabilising of trenches once pipelines are installed.
  - Location of construction compounds (at least 50m from any drainage lines).
  - Location and management of stockpiles, such as locating stockpiles away from any drainage lines near the works areas.
  - Regular inspection of all erosion and sediment controls, especially when rain is expected and directly after any rain events.

- The CEMP would incorporate a pollution incident response management plan that defines appropriate procedures for the management and notification of pollution incidents in accordance with s. 147 to 153 of the POEO Act. The EPA is to be notified immediately of any pollution incidents or harm to the environment (as defined under Part 5.7 of the POEO Act).
- Workers are to be made aware of the provisions of Section 120 of the POEO Act with regards to water pollution.
- A drilling management plan / procedures would be developed as part of the CEMP to detail the appropriate management and disposal of drilling slurry to avoid off site impacts. This would include requirements that:
  - All sludge and drilling medium extracted is to be removed from the site.
  - The site where the sludge would be disposed of would require bunding and appropriate treatment until the sludge is considered to be safe for disposal or re-use.
- A site-specific spill management plan would be prepared and include the following requirements:
  - Emergency spill kits are to be kept at the site (vehicle kits).
  - Refueling of machinery to be undertaken in a dedicated area within the construction compound appropriately protected as outlined in the spill management plan.
  - Any chemicals and fuels are to be stored in a bunded area at least 50 metres from any waterway or drainage line.
  - Any hazardous materials stored on site would be stored in the compounds and within impervious and bunded enclosures capable of storing 120% of the volume of material stored there.
  - Workers would be trained in the spill management plan and the use of the spill kits.
- The drill operator must be appropriately experienced and licensed.

- Monitor the Bureau of Meteorology (BoM) online Flood Warning Service and latest river heights to determine whether rainfall in the catchment is predicted to cause flooding at the site during the construction phase.
- If flood events occur during construction, the construction contractor should prepare the site prior to the commencement of the flood event (i.e. secure / remove machinery and equipment that are likely to be inundated or damaged and remove chemicals from flood prone areas).
- Works should not be scheduled when heavy rainfall is forecast and works involving soil disturbance should not take place during heavy rainfall periods, other than work necessary to stabilise the site.
- Any excess spoil would be either spread across the ground in nearby areas in such a manner as to avoid creating an erosion hazard removed off site for disposal in accordance with RVC and EPA requirements.
- All stockpiles of materials would be protected from scour and erosion.
- Access tracks would be designed so as to provide adequate drainage and stormwater control.
- If the works are considered likely to encounter groundwater therefore mitigation measures to manage groundwater would be incorporated into the CEMP, including:
  - Dewatering techniques during excavation;
  - Measures to ensure groundwater quality is not impacted during construction;
  - Techniques to settle, treat or filter groundwater encountered during excavation works i.e. diverting groundwater through baffle tanks or filter membranes; and
  - Appropriate treatment and monitoring regimes in the event that groundwater flows come to the surface, including disposal of groundwater in such a way as to prevent adverse impacts (such as erosion and water pollution). Groundwater should not be discharged to a waterway during construction.
- Where less than 3 ML of groundwater is dewatered during the works. An water supply works approval for pumped dewatering would be required form DCCEEW -Water. The volume of water extracted during dewatering should be recorded daily and an aquifer interference activity WAL exemption should be lodged through DCCEEW - Water by the construction contractor on behalf of the proponent on the completion of works (Further information is available at Groundwater access licence exemptions | Water (nsw.gov.au)https://www.dpie.nsw.gov.au/nrar/how-to-apply/water-licences/Groundwater. If more than 3 ML of groundwater is anticipated to extracted during the works, an aquifer interference WAL approval and associated water supply

works approval for pumped dewatering would be required from DCCEEW - Water prior to the commencement of works.

- All areas where ground disturbance has occurred would be stabilised following completion of works to ensure there is no erosion hazard and restored to their pre-construction condition. This would involve, where required, reshaping the ground surface, covering it with topsoil excavated from the site and re-establishing an appropriate vegetation cover (this may include respreading dead accumulated or cleared vegetation where possible).
- During operation of the pipelines, any water containing silt and sediment generated as a result of scouring pipelines would be treated (if required) and disposed of as appropriate. Depending on the resultant water quality, this may involve discharge to a waterway or land application. Any water discharged to a waterway or recycled must be consistent with the requirements of the *Protection of the Environment Operations Act 1997*.
- A flood control system (EOone) should be adopted to protect the on-property PSS pumps from operating during flood events.
- The Rappville STP onsite recycled water reuse irrigation system must be operated in accordance with the *Rappville Recycled Water Irrigation Management Plan - Section 3 Standard Operational procedures* document prepared by Agsol (2023).

5.4 Biodiversity

A specialist biodiversity assessment has been prepared by Australian Wetlands Consulting (2022) for the entire Rappville Sewerage Scheme Proposal footprint. The following information has been summarised from the assessment. A copy of the report is provided in Appendix B.

A field assessment was carried out on 12 August 2022. The survey effort was focused on the entire Proposal development footprint and adjacent habitats, comprising mapping and assessment of vegetation communities and identification of threatened ecological communities (TECs), opportunistic survey of fauna and targeted surveys for threatened flora, survey and GSP of hollow-bearing trees, inspection of bridges to assess roost suitability for *microchiropteran* bats and counts and identification of trees likely to be affected within the road reserve and ground truthing of surveyed trees within Rappville village. No private residences were assessed, however brief assessments were completed from the adjoining road reserve which identified that land within the residences are cleared and modified with some landscaping and the land is of low biodiversity value.

Vegetation within the village and road reserve has been historically cleared and affected by the 2019 wildfires, and as a result, these areas are highly disturbed and native

vegetation is generally absent. At the STP site, wildfire has resulted in substantial tree loss and a very open and sparse canopy occurs, with most trees still in post fire recovery. Vegetation mapping for the entire Proposal area is provided in Figure 5.1 and Figure 5.2. No threatened flora species were recorded at the Proposal area during the survey.

Vegetation Communities

Five vegetation communities occur within the Proposal area including:

- Open forest (Spotted Gum, Grey Box) - Plant Community Type (PCT) 1209 Spotted Gum – Grey Box - Grey Ironbark dry open forest of the Clarence Valley lowlands of the NSW North Coast Bioregion
- Open woodland (Spotted Gum) - PCT 1209 Spotted Gum – Grey Box - Grey Ironbark dry open forest of the Clarence Valley lowlands of the NSW North Coast Bioregion (Disturbed variant – fire affected)
- Open forest (Forest Red Gum, Swamp Box) – PCT 837 Forest Red Gum -Swamp Box of the Clarence Valley lowlands of the NSW North Coast Bioregion
- Landscaping - Avenue of landscape plantings adjacent to the rail corridor (Nandabah Street). Dominated by Camphor Laurel* (*Cinnamomum camphora*) with several Flame Tree (*Brachychiton acerifolius*). These trees are heritage listed under the Richmond Valley LEP 2012 and require protection during the works (refer to Section 5.7).
- Grassland - Exotic pasture grasses in the road reserve, typically dominated by Rhodes Grass*, Setaria* (S. sphacelata) and Red Natal Grass*. Along village streets Couch (*Cynodon dactylon*) is dominant.
- Wetland - PCT 780 Coastal floodplain sedgelands, rushlands, and forblands of the North Coast. Small patch along eastern boundary of the STP site, dominated by Pin Rush (*Juncus polyanthemos*).

Two threatened ecological communities (TEC) listed under the BC Act occur in the Proposal area. The location of the TECs are shown in Figure 5.1 and Figure 5.2:

- PCT 837 is characteristic of the TEC '*Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion*'

This PCT is present along the sewer rising main alignment near Myrtle Creek. Areas of PCT 1209 *Spotted Gum – Grey Box - Grey Ironbark dry open forest of the Clarence Valley lowlands of the NSW North Coast Bioregion* along Myrtle Creek Road may also be characteristic of the 'Subtropical eucalypt floodplain forest' TEC.

- PCT 780, while disturbed and small in area is characteristic of the TEC '*Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin*

and South East Corner Bioregions'. The location TECs are shown Figure 5.1 and Figure 5.2

This PCT is occurs at the eastern boundary of the STP site, near the southern termination point of the sewer rising main.

Terrestrial Habitat

A range of common bird species in agricultural environments were recorded during the survey. Habitats present in the study area are fragmented and modified, with usage limited to animals dispersing between habitats in the locality. Both creeks provide habitat for common waterfowl and a range of frogs, in addition to freshwater tortoises. While not recorded, several species of macropod are likely to utilise the Proposal area, in addition to common species such as brushtail and ringtail possums. A range of microchiropteran bats would forage throughout the Proposal area.

Three hollow bearing trees were recorded in the railway reserve (2 x Camphor Laurel, potential hollows in mature Flame Tree). Two stags with hollows occur in the STP site. Numerous stags occur throughout the STP site – these represent immature/sub-mature eucalypts which have been killed by fire, these trees typically range from 10 – 30 cm dbh (diameter at breast height) and do not support hollows. Nine stags without hollows also occur in the Myrtle Creek Road reserve and would require removal.

Potential Koala habitat occurs in the northern portion of the Myrtle Creek Road reserve, where the majority of scattered trees are Forest Red Gum (a schedule 1 tree species). No opportunistic signs of Koala use were observed (scratch marks, scats) and it is highly unlikely a resident Koala population occurs due to significant habitat fragmentation, recent wildfire events and the lack of records in the immediate locality. Habitat at the STP site is dominated by Spotted Gum and does not comprise potential Koala habitat as defined by the Koala SEPP.

Neither of the bridges provide suitable roost habitat for microchiropteran bats due to joint sealing, a lack of suitable accessible microhabitats and vulnerability to flooding. No signs of bat use were observed. Several Welcome Swallow nests occur at Smalls Bridge over Myrtle Creek.

The Proposal area does not lie within any mapped wildlife corridors. The STP site enjoys connectivity to substantial forested areas (albeit which are highly disturbed post bushfire) to the south which connect to Myrtle SF to the east and adjacent tracts of forest to the west. Habitat around the village is highly fragmented and isolated, while along Myrtle Creek Road a patchy tree corridor provides 'stepping stone' connectivity for dispersing birds.

A single plant of the notifiable weed Tropical Soda Apple (*Solanum viarum*) species was observed in the road reserve – this plant was removed and fruit disposed of.

Aquatic Habitat and Values

Due to recent flooding, both watercourses (Nandabah Gully and Myrtle Creek) have been scoured out, snags removed, and sediment deposited; little aquatic vegetation remains. Habitat for common fish, eels and turtles occurs.

The Fisheries Spatial Data Portal maps Myrtle Creek as Key Fish Habitat. Potential habitat for the threatened Southern Purple Spotted Gudgeon is also identified.

Fauna

A NSW BioNet Atlas search returned confirmed records of 25 threatened fauna species within the search area, including several species listed in the EPBC Act. The EPBC Act Protected Matters Search Tool (PMST) search results identified habitat for 24 threatened fauna species and 14 migratory species within the search area. NSW Bionet Atlas and PMST searches were also carried out on 19 March 2024 and the search results were the same as for the 2022 database search results.

Two threatened fauna species, both listed as vulnerable under the BC Act, were confirmed during field survey of the Proposal site.

- A pair of Little Lorikeets (*Glossopsitta pusilla*) were heard and briefly glimpsed overflying the STP site.
- A family group of six Grey-crowned Babblers *(Pomatostomus temporalis)* were observed feeding in the garden of an outlying residence in Rappville village and are therefore likely to forage within surrounding lawns and woodland.

Based on the desktop analysis and habitat present, several threatened fauna species have potential to occur at the site and surrounds, including:

- Black-chinned Honeyeater *(Melithreptus gularis gulari)* – Vulnerable, BC Act
- Dusky Woodswallow *(Artamus cyanopterus cyanopterus)* – Vulnerable, BC Act
- Hoary Wattled Bat (Chalinolobus nigrogriseus) – Vulnerable, BC Act
- Little Bent-winged Bat *(Miniopterus australis)* – Vulnerable, BC Act
- Rufous Bettong (Aepyprymnus rufescens) – Vulnerable, BC Act
- Yellow-bellied Sheathtail-bat *(Saccolaimus flaviventris)* – Vulnerable, BC Act
- Grey-headed Flying-fox *(Pteropus poliocephalus)* – Vulnerable, BC Act & EPBC Act

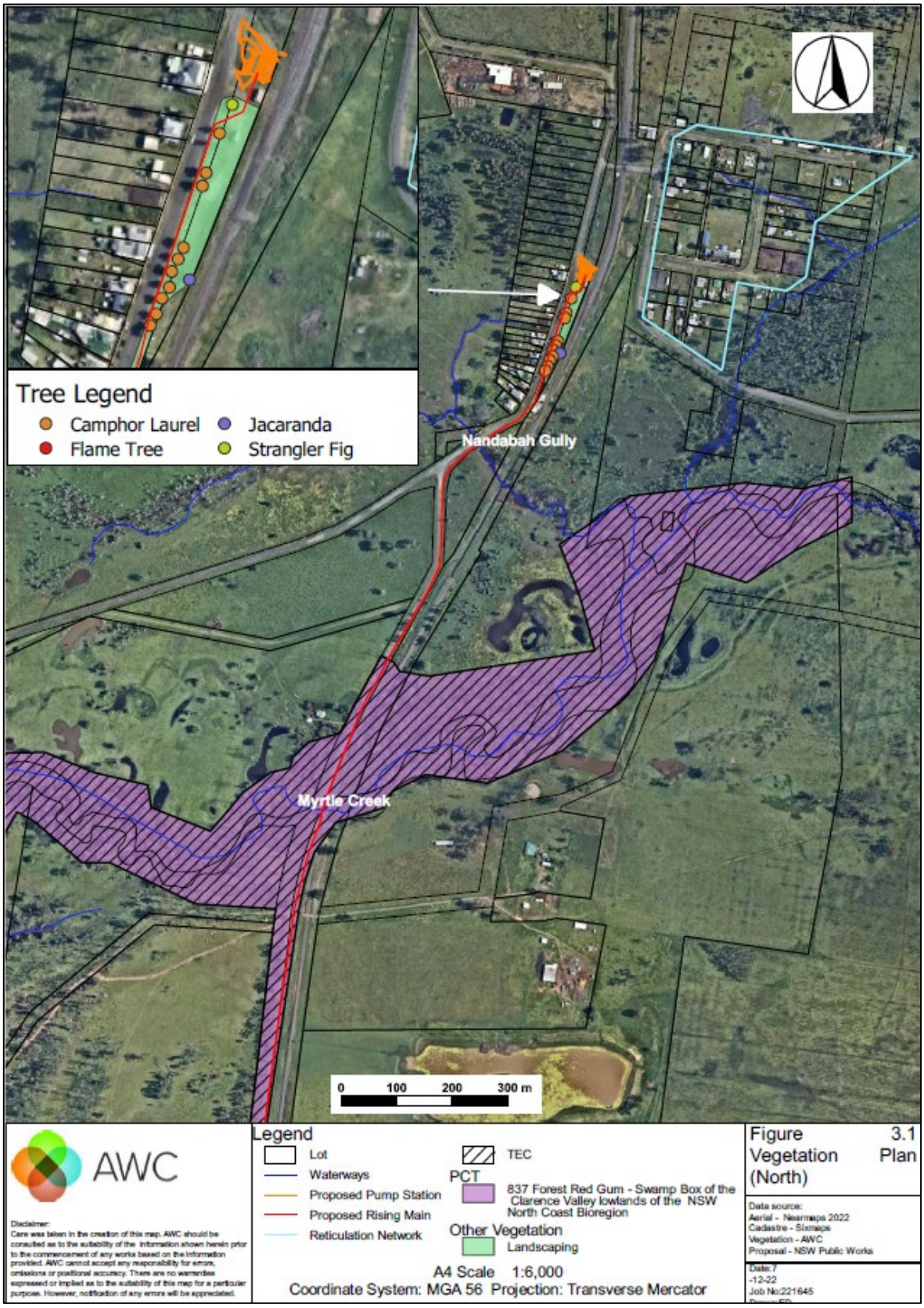


Figure 5.1 PTC vegetation mapping in the Rappville village area and the northern section of the sewer rising main

Source: AWC, 2022

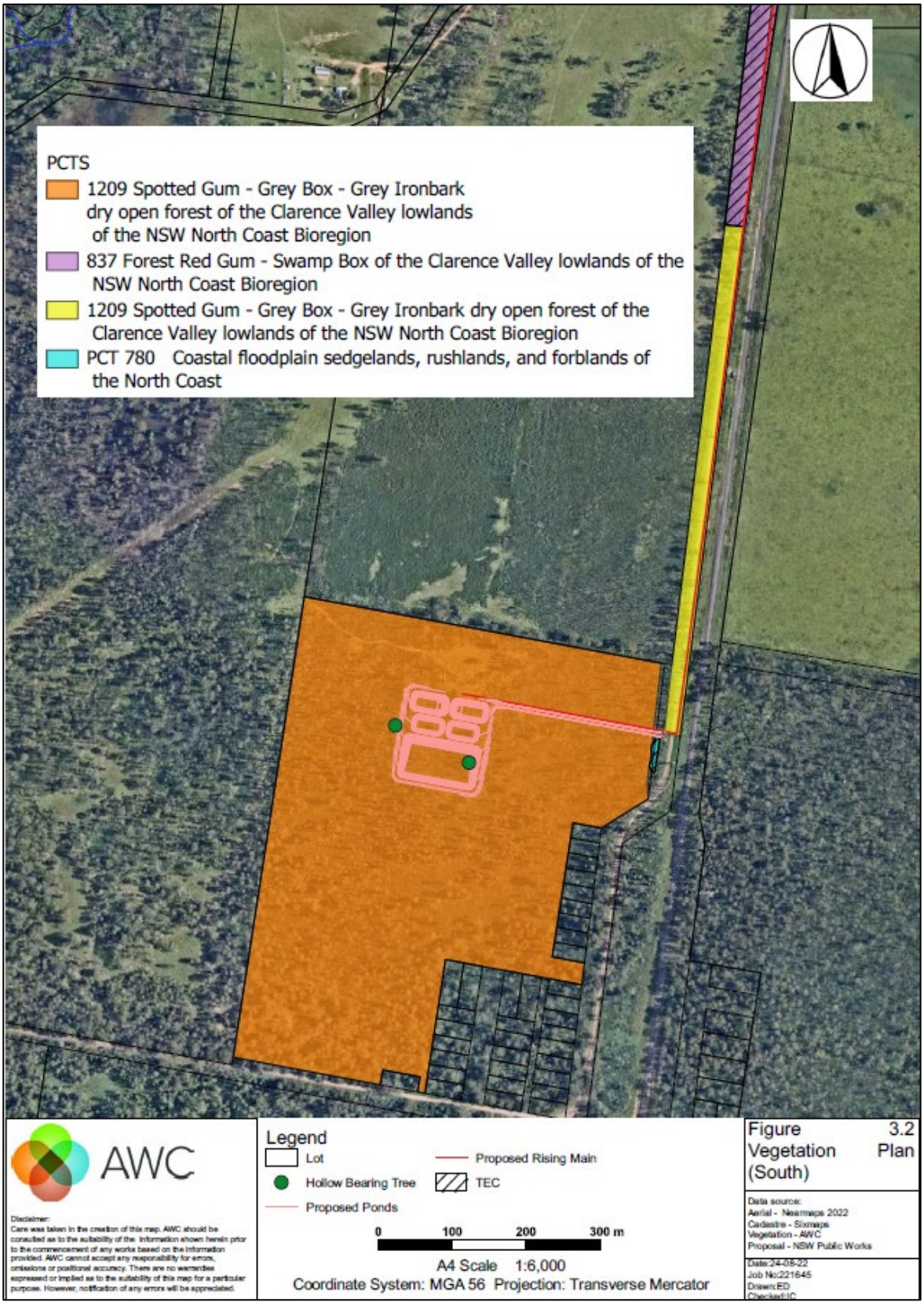


Figure 5.2 PTC vegetation mapping in the southern section of the sewer rising main alignment (and the proposed STP site)

Source: AWC, 2022

5.4.1 Construction Impacts

All parts of the site have been subject to historic clearing and modification. Outside of Rappville village, all vegetation has been significantly affected by wildfire, with mature trees killed or in post recovery. Pasture grasses and common agricultural weeds dominate the ground layer in road reserves and village areas.

The Proposal has potential biodiversity impacts as part of the construction process including:

- Loss of native vegetation comprising up to a maximum of 90 trees (Spotted Gum x 34, Grey Box x 24, Forest Red Gum x 13, Swamp Oak x 7, Grey Ironbark x 6, Swamp Box x 2, Paperbark x 2) within PCT 837 & 1209.) within the eastern road reserve of Myrtle Creek Road (PCT 837, PCT 1209). An estimated 34 of these trees lie within an area characteristic of the TEC 'Subtropical coastal floodplain forest' under the BC Act and broadly characteristic of the TEC 'Subtropical eucalypt floodplain forest' under the EPBC Act
- Loss of vegetation comprising approximately 30 (Spotted Gum) within approx. 4 ha (PCT 1209 – disturbed).
- Impact to an area representative of the TEC 'Subtropical coastal floodplain forest' (albeit in a highly disturbed and modified state) such that loss of 34 trees (and minor regrowth) within Myrtle Creek Road reserve over an area of approximately 0.39 ha would occur. This community is analogous with the federally listed community 'Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions'.
- Loss of two hollow-bearing trees at the STP site.
- Loss of numerous stags without hollows a the STP site and nine stags in the road reserve.
- Disturbance of piled logs and debris (fauna habitat) along the boundary of the STP site.
- Noise and disturbance to fauna during construction (including to foraging habitat for the Grey-crowned Babbler).
- Potential for introduction of weed species to the road reserve and STP site.

It should be noted that a 'worst case' scenario has been assessed with regard to impacts to trees in the Myrtle Creek Road reserve and it is anticipated that less than 90 trees would require removal for the works. A 3 metre wide disturbance footprint is anticipated for the pipeline construction works and therefore some trees may be retained. However, a broad

assumption has been made that all trees in the road reserve shoulder (an approximately 4 m wide area) may be affected, and tree removal impacts have been assessed on this basis.

Operation of the Proposal sewerage scheme infrastructure would be unlikely have any biodiversity impacts. However, post-works Council should consider compensatory tree planting in the area to replace up to 90 trees to be removed for the sewer rising main along Myrtle Creek Road.

Koala Habitat

Core Koala habitat is absent from the Proposal footprint and the Proposal activity is unlikely to impact upon Koalas or their habitats. Therefore, the Proposal does not require the preparation of a Plan of Management for the conservation and management of areas of Koala habitat.

Weeds

Where the priority weed species Tropical Soda Apple (*Solanum viarum*) occurs, it must be controlled to result in its suppression. This should be done at the commencement of work to avoid the further spread of this species.

Assessments of Significance

Section 7.3 of the BC Act requires a test of significance (five-part test) when assessing whether an action, development or activity is likely to significantly affect threatened species, ecological communities or their habitats. In addition to the TECs and threatened fauna recorded, there is potential for several additional threatened fauna species to occur; tests of significance were therefore completed (refer to Appendix B). The tests concluded that the Proposal activity would be unlikely to significantly increase the risk of extinction for any fauna species and no significant impacts would occur to threatened species or communities, and hence a BDAR is not required.

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of national environmental significance (MNES) require approval from the Australian Government Minister for the Environment (the Minister). Based on the search results and site assessment, no significant impacts to any MNES would be likely to result from the Proposal activity, therefore referral to the Minister for the Environment is not required.

The FM Act requires an assessment of significance when there may be potential to impact on any species, populations and communities listed in the FM Act. Based on the construction methodology (underboring or pipe suspension), it is unlikely the Proposal activity would impact on habitat for any species, populations or communities listed in the FM Act which may occur within Nandabah Gully or Myrtle Creek; as such an assessment of significance ('7 part test') is not required. As the Proposal activity does not comprise

'dredging and excavation', a Part 7 Fisheries Management Act permit is not required prior to commencing works. No significant impacts would occur to threatened species, populations or communities listed in the FM Act and therefore a Species Impact Statement (SIS) is not required.

It is considered that with adherence to the recommendations provided in Section 5.4.3, no biodiversity constraints to the Proposal proceeding as planned were identified or considered likely to occur. The adoption of the mitigation measures provided below would ensure that the development is undertaken in an ecologically sustainable manner.

5.4.2 Operational Impacts

Operation of the completed Rappville SS would be unlikely have any biodiversity impacts other than an increase in noise and human disturbance within the STP during daylight hours. It is unlikely this minor disturbance would be significant in a local context. The terrestrial flora and fauna habitat within the Proposal area could be improved in the long term with the planting of endemic native tree species in the village and surrounds.

5.4.3 Mitigation Measures

- The heritage listed trees in Nandabah Street must be assessed by a certified and experienced arborist to advise on protection measures and safeguards from trenching during construction works. This advice must be completed by the contractor prior to finalisation of the construction methodology and remarks and protection measures included in the CEMP. Council should be advised on the outcome of the arborist assessment to demonstrate that heritage trees will not be unduly impacted.
- Vegetation removal (including any pruning) must be completed sensitively using appropriate equipment and to the minimum extent necessary.
- The extent of the Proposal works must be clearly pegged/marked on site by a registered surveyor, consistent with final approved plans/designs so that potential impacts to vegetation or individual tree are minimised.
- Wherever construction requirements permit, native trees should be retained wherever possible (eg. within the Myrtle Creek Road reserve).
- If lopping or pruning of any vegetation is required, it must be completed by a certified and experienced arborist in accordance with AS 4970-2009 *Protection of trees on development sites.*
- Large logs and woody debris requiring removal within the STP site shall be completed sensitively and all material moved into adjacent areas to continue to serve as habitat.

- Laydown /storage areas must be stablished on cleared land/pasture where native trees are absent. Use of the Nandabah Street reserve where planted heritage listed trees occur is not suitable.
- All trees within the road reserve and STP site should be subject to a pre-clearing survey by an ecologist to ensure that trees are not occupied by fauna. In the unlikely event that a Koala is present in a tree to be cleared, works must not continue, and 24 hrs must be provided for the animal/s to disperse into adjacent habitats. If the pre-clearing inspection does not determine any Koalas (or other fauna) are present, clearing works may proceed without further supervision (NB. Removal of wattle regrowth within the STP may be required to enable better visibility and site access – a pre-clearing assessment is not required for this task).
- All hollow-bearing trees (HBT) must be clearly marked by an ecologist prior to clearing and a two-stage clearing procedure implemented such that any HBT are cleared after all other vegetation is removed, with a minimum of 24 hrs between clearing events. A spotter-catcher must be present during the removal of any HBT in the event that wildlife is present and require relocation or veterinary care.
- Compensatory nest boxes shall be installed within retained mature trees at the STP site. Host trees must be semi mature and in good condition. Nest boxes shall be installed a ratio of 1:2 – ie. as two hollow-bearing trees are removed, four (4) nest boxes shall be installed. Sizing of nest boxes should be suitable for small parrots and microbats.
- Any animals injured during the clearing work should be collected and taken to a local veterinarian or wildlife carer.
- The works should be planned and staged to ensure that long sections of trench are not left open. If left open overnight:
  - the pipeline trench should be inspected for entrapped animals (such as ground traversing native species – reptiles, frogs, mammals).
  - options to permit entrapped animals to escape (e.g. hessian bags, long branches, 'ladders') should be placed within the trench.
- Vehicles and machinery should be stored and parked in cleared areas away from trees.
- The storage of materials and stockpiling of equipment should also occur within sites/areas that have been previously disturbed and cleared.
- Measures must be implemented during construction works so that machinery and plant do not introduce weed seed or propagules to the site (eg. by adoption and

implementation of the 'Arrive Clean, Leave Clean' guidelines [DoE 2015]). This measure is particularly relevant for the notifiable species Tropical Soda Apple.

- Any landscaping or screening at the STP site should utilise locally endemic species including trees such as Spotted Gum, Grey Box, Forest Red Gum, Flax-leaved Paperbark (refer to the species inventory within the biodiversity assessment in Appendix B for guidance).
- Post-development, the pipeline alignments, STP and SPS site should be regularly monitored to manage any occurrences of weeds and other non-native species.

5.5 Bushfire

The proposed Rappville SS works would traverse areas of land which is identified as bushfire prone, including vegetation category 2 and vegetation buffer (refer to Figure 5.3).

The SPS site is not mapped as bushfire prone land. The majority of the rinsing main and reticulation network pipeline alignments would also be located within non bushfire prone land. However, some short sections of pipelines traverse land mapped as vegetation category 3 or vegetation buffer bushfire prone land.

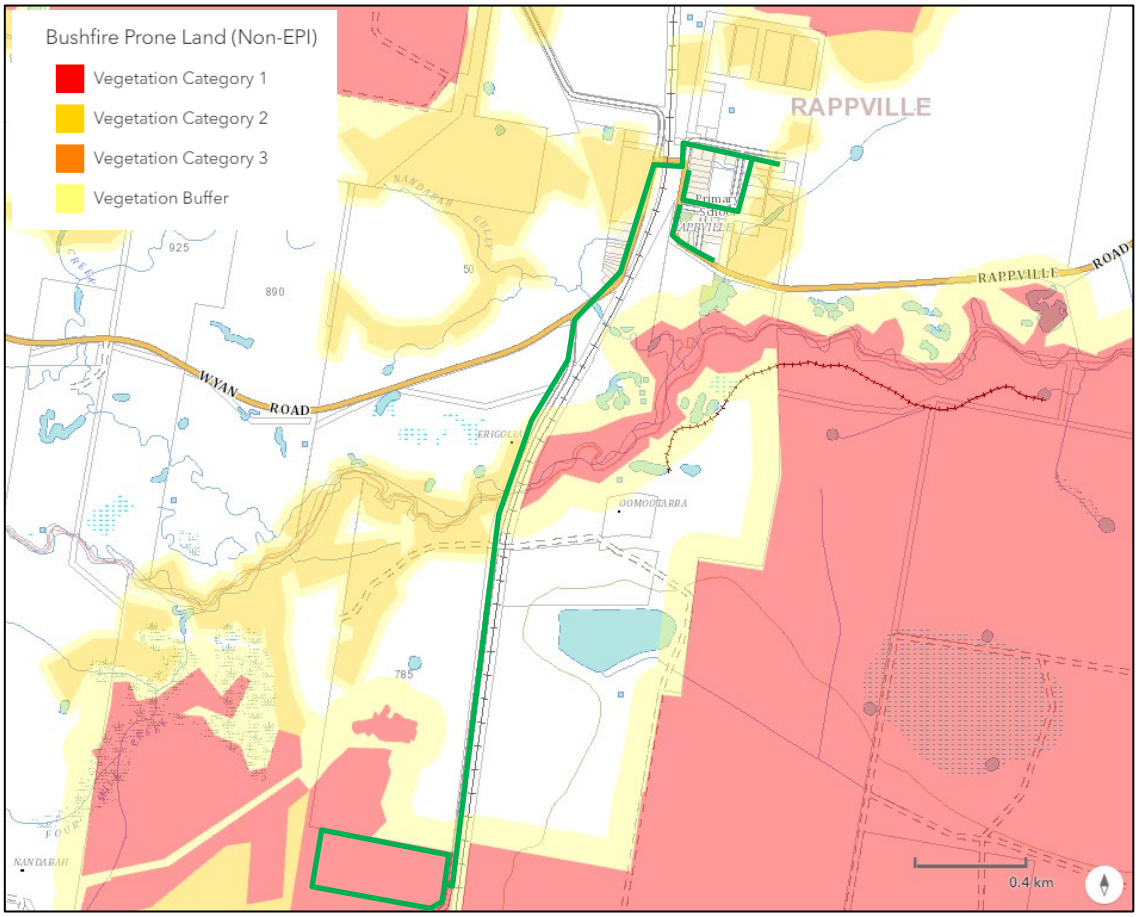


Figure 5.3 Bushfire Prone Land Map for the area of the Rappville sewerage scheme works (shown in green).

Source: NSW Planning Portal ePlanning spatial viewer, accessed 2023

Whilst bushfire is not captured in the National Construction Code (NCC), the proposed STP development must satisfy the relevant consent authority that it can conform to the relevant provisions within *Planning for Bushfire Protection 2019* (PBP 2019), and *AS3959:2018 'Construction of Buildings in Bushfire-prone Areas'.*

A bushfire assessment was undertaken for the STP site by Firetech Bushfire Consulting (2023), as the site is classified as bushfire prone land (vegetation category 1). The bushfire assessment focused both on the vegetation to be retained within the STP site and external to the lot. *Buildings in Bushfire-prone Areas'.* The following information is taken from the assessment. A copy of the report is provided in Appendix G.

Onsite assessment of the STP site (subject site) was undertaken on 14/11/2023 in accordance with the *Site Assessment Methodology* as described in Appendix 1 of PBP 2019.

Subject site vegetation analysis (shown in Figure 5.4) found that the northern area of the STP site consists of forest on level ground and surrounding land to the north-east of the site comprises grassland on a 0-5 degree downslope.

Myrtle Creek Road is present to the east of the STP site , then the railway line, then forest on a 0-5 degree downslope.

Forest is present to the south on level ground, and land to the west comprises forest on a 0-5 degree downslope.

The Forest Fire Danger Index (FFDI) for the STP site was determined to be 80.

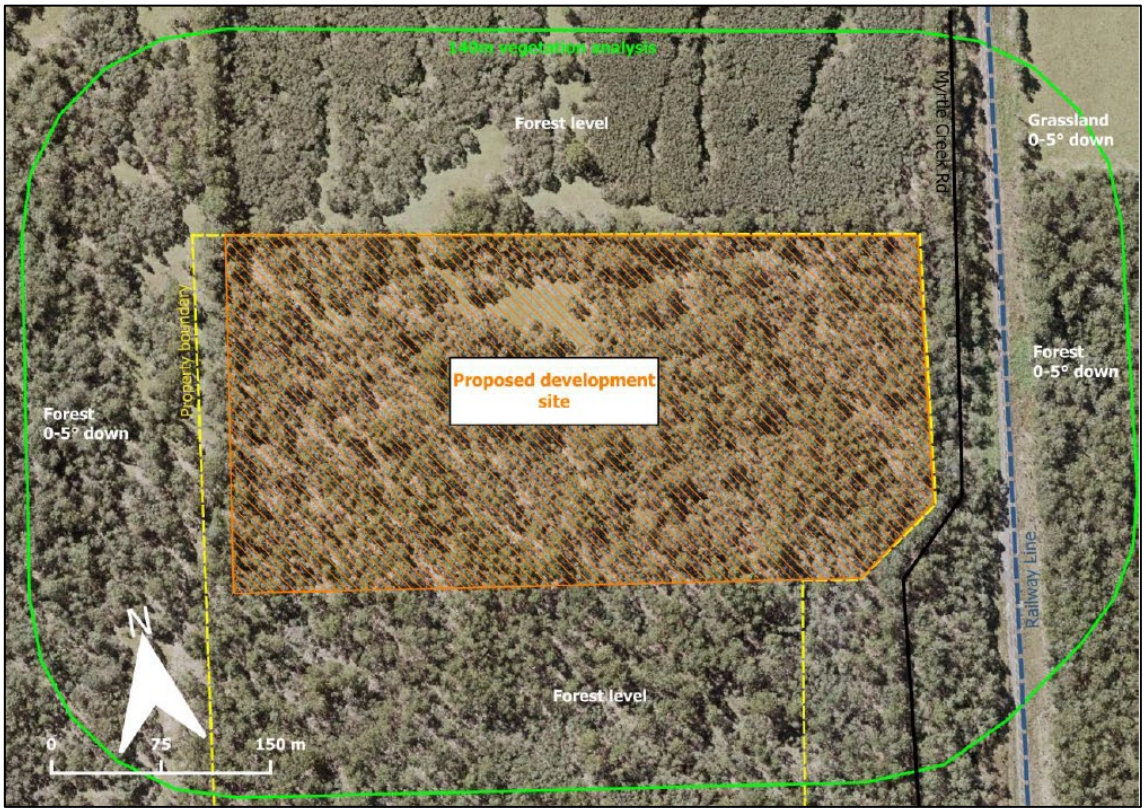


Figure 5.4 Vegetation analysis for Rappville STP Site

Source: Firetech Bushfire Consulting, 2023.

5.5.1 Construction Impacts

Design of the aboveground infrastructure at the STP and SPS sites should take into consideration the potential bushfire risk at the site, in accordance with the relevant principles of the RFS publication *Planning for Bushfire Protection 2019* (PBP 2019). However, it is noted that the clearing of vegetation would reduce the ongoing risk of bushfire at the STP site.

The STP development area includes the provision of irrigation areas surrounding the proposed Class 10a buildings which will be used for grazing purposes. Grass fires burn at a higher intensity, spread more rapidly, but have a shorter residence time (PBP 2019). Based upon this, and that the subject site is isolated, it is recommended to construct the Class 10a building used by the operator(s) to Bushfire Attack Level (BAL) BAL-29 to provide extra protection in the incident any occupants require the need to shelter-in-place.

Accordingly, construction should comply with *AS3959:2018 'Construction of Buildings in Bushfire-prone Areas'* section 3 – Construction General and section 7 – Construction Requirements for BAL-29 (entire Class 10a building used by operator). Fencing and gates at the STP should be constructed from non-combustible materials, in accordance with section 7.6 of PBP 2019.

In addition, the assessment recommended that a minimum 20,000L non-combustible Static Water Supply (SWS), with a 65mm Storz valve, should be provided at the STP site for the protection of buildings during and after the passage of bush fire. A hardened ground surface should also be provided within 4 m of the water supply to allow access for firefighting vehicles. Furthermore, electricity and gas services (where installed) should be located to limit the possibility of ignition of the surrounding vegetation or fabric of the building. Landscaping should also be designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions

Although the construction activities are not anticipated to pose a significant bushfire risk, mitigation measures listed below would be implemented to ensure that the works do not start a bushfire in grassland and surrounding vegetated areas.

5.5.2 Operational Impacts

There are no specific bushfire requirements for Class 10a buildings included in PBP 2019, however for industrial developments such as the STP, Bushfire Protection Measures (BPMs) are recommended commensurate with the scale of development, level of risk to the development, and the number of people likely to be occupying the site. Therefore, the below BPMs are recommended during operation of the STP:

- Asset Protection Zone (APZ)
  - a defendable space of 10 m is provided around the new STP buildings (categorised as Class 10b buildings) to allow for a minimal fuel area for undertaking of firefighting activities.
  - The defendable space should be maintained as an Inner Protection Area (IPA) and must comply with *Appendix 4 – Asset Protection Zone Requirements* (PBP 2019) (provided in Appendix B of the bushfire assessment prepared for the STP (refer to Appendix G).

The SPS would be located in a previously cleared site and proposed rising and reticulation mains and PSS units would be installed underground and are therefore unlikely to be affected by bushfire during operation.

5.5.3 Mitigation Measures

- Design of the above ground infrastructure at the SPS should take into consideration the potential bushfire risk at the site, in accordance with the relevant principles of the RFS publication *Planning for Bushfire Protection 2019* (PBP 2019).
- Class 10a building used by the STP operator(s) shall be constructed to BAL – 29, as per *AS3959:2018 'Construction of Buildings in Bushfire-prone Areas'* section 3 – Construction General and section 7 – Construction Requirements, in addition to the NSW variations detailed in section 7.5.2 of PBP 2019 and the National Construction Code.
- Where any associated structure is situated within 6 m of STP buildings, it is recommended that structure is also constructed to BAL-29.
- It is recommended that fencing and gates at the STP site should be made of non-combustible materials and comply with section 7.6 of PBP 2019.
- A water supply of at least 20,000 L, with a 65mm Storz valve, should be available at the STP site for firefighting purposes.
- All above-ground water service pipes external to the STP sheds should be metal, including and up to any taps.
- For all Static Water Sources (SWS): Where a tank is used for this purpose, it must be non-combustible & have a 65 mm Storz valve installed, or underground tanks must have an access hole of 200 mm to allow tankers to refill direct from the tank;
  - Where pumps are provided, they are a minimum 5 hp or 3 kW petrol or diesel-powered pump and are shielded against bush fire attack;
  - Ball valve and pipes are adequate for water flow and are metal;
  - Supply pipes from tank to ball valve have the same bore size to ensure flow volume;
  - All exposed water pipes external to the building are metal, including any fittings;
  - A hardened ground surface shall be provided within 4 m of the water supply to allow access for firefighting vehicles, and the connection for firefighting purposes is located within the IPA or non-hazard side, and away from the building.
- Where practicable, electrical transmission lines are underground; and where overhead, electrical transmission lines are proposed as follows:•
  - Lines are installed with short pole spacing of 30 m, unless crossing gullies, gorges, or riparian areas; and
  - No part of a tree is closer to a power line than the distance set out in I*SSC3 Guideline for Managing Vegetation Near Power Lines.*

- Reticulated or bottled gas (if required) should be installed and maintained in accordance with AS/NZS 1596:2014 - The storage and handling of LP Gas, and the requirements of relevant authorities, and metal piping is used.
  - All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side.
  - Connections to and from gas cylinders are metal.
  - Polymer-sheathed flexible gas supply lines are not used; and
  - Above-ground gas service pipes are metal, including and up to any outlets.
- Construction staff to be made aware of the location of the proposed works in bushfire prone land and the potential for bushfire risk.
- During high to catastrophic bush fire danger rating days, no construction activities would be undertaken that pose a risk of starting a bushfire (e.g. welding).
- A defendable space (Asset Protection Zone (APZ)) of 10m should be provided around the Class 10a buildings to allow for firefighting activities.
- The defendable space (APZ) shall be maintained as an Inner Protection Area (IPA) and must comply with *Appendix 4 – Asset Protection Zone Requirements* (PBP 2019).
- A clear area of low-cut lawn or pavement should be maintained adjacent to the STP sheds.
- Trees and shrubs near the STP sheds should be located so that:
  - The branches will not overhang the roof;
  - The tree canopy is not continuous; and
  - Any proposed windbreak is located on the elevation from which fires are likely to approach.
- No maintenance activities should be undertaken at the STP or SPS site which pose a risk of starting a bushfire during high to catastrophic risk bush fire danger rating days.

5.6 Aboriginal Heritage

An Aboriginal Heritage Due Diligence Assessment was undertaken by NSW Public Works (2022) for the Rappville Sewerage Scheme Proposal. The assessment was carried out in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (Due Diligence; DECCW 2010a) and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010b). The following information is taken from the report. A copy of the report is provided in Appendix C.

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 24 June 2022. The search covered the entire proposed Rappville Sewerage Scheme works area and an approximate 20-kilometre area surrounding it. The search area is defined by:

- Latitude, Longitude: -29.2669, 152.7198
- Latitude, Longitude: -28.967, 153.2142

The extensive search resulted in 51 Aboriginal sites and zero Aboriginal Places being identified within the study search area.

A basic AHIMS search including the Proposal area (Latitude, Longitude: -29.1142, 152.9207; Latitude, Longitude: -29.0767, 152.9825) was also undertaken on 19 March 2024. No Aboriginal sites and zero Aboriginal Places were identified within the Proposal search area.

A summary of previously recorded Aboriginal site types in close proximity to the study area is provided in Table 5-1. Figure 5.5 shows previously recorded sites located in the Proposal study area and an approximate 20 kilometre area surrounding it and Figure 5.6 provides an aerial view of the study area.

A field survey was conducted by Dr Alyce Cameron (Archaeologist, Public Works) on 12 July 2022. The survey covered the rising main alignment on the east side of Myrtle Creek Road into Rappville village, the SPS and STP sites (northern area of Lot 160 DP 755620) and the village reticulation alignment (study area).

Ground surface visibility and exposure was variable across the study area. The study area was divided into three sections based on the proposed works: STP site, the rising main and SPS, and the reticulation main alignment. Inside the STP site area (Survey unit 1) slopes are the predominate landform, though a low-lying crest is present. The rising main (Survey unit 2) intersects through creek flats and slopes on the east side of the road corridor for Myrtle Creek Road. The reticulation main alignment (Survey unit 3) covers mostly flat or gently sloping landforms.

The STP site location (Survey unit 1) is heavily vegetated by regrowth following bushfires and heavy rain. The area is predominately vegetated with young and whippy saplings. Due to the dense vegetation, traditional transects across the area were abandoned, and instead cleared tracks were used where possible during the survey, or minor tracks where the vegetation was not quite as thick were used. Overall, the STP site had low ground surface visibility and exposure, with heavy vegetation, thick grasses, mud and leaf litter obscuring much of the ground surface. However, the cleared tracks used to access areas around the STP site had moderate visibility and exposure. The soils across the STP site were

waterlogged, including at the top of the crest and tended to be a mid-brown silty clay where visible.

The rising main alignment (Survey unit 2) is located on the eastern side of Myrtle Creek Road in the road reserve. The North Coast Railway line and rail reserve is directly to the east of the road reserve. The western side of the road reserve is adjacent to private properties and agriculture lands. The western side of the road reserve is approximately 8 metres wide from the edge of the road (including the culvert) to the fence line, while the eastern side of the road reserve is approximately 3 metres wide to the fence line (also including the culvert).

The eastern side of the road reserve along Myrtle Creek Road is predominately unnatural ground surface and has been previously disturbed by ongoing maintenance of the road. It consists mostly of fill and disturbed soils mixed with imported gravels, such as road base or railway ballast. The vegetation consists mostly of regrowth and grasses. All trees on the eastern side of the road reserve were checked for cultural modifications during the survey. The rising main alignment also crosses two water courses: Myrtle Creek and Nandabah Gully. Myrtle Creek as viewed from Smalls Bridge, shows erosion along the lower banks, and steep banks into the creek, indicating that past flooding events have likely resulted in a movement of soils. All locations inside the road reserve adjacent to the watercourses have previously been disturbed through various prior impacts, such as cutting and grading. Ground visibility and exposure along the rising main alignment was variable and tended to be low to moderate. Grass obscured much of the ground surface along the eastern side of the road reserve, though exposures were present in some areas.

The reticulation main alignment (Survey unit 3) is located along the edges of streets and residential properties in Rappville Village. The SPS site is in Survey unit 3 adjacent to Nandabah Road and across the road from the Commercial Hotel. Not all the reticulation main alignment was surveyed, as the area has been modified and landscaped during the village development, though the SPS site was included. Ground surface visibility and exposure through the village was moderate.

No Aboriginal sites or objects were identified during the survey. Though the study area intersects two creek lines, the creek flats inside the road reserve have been previously disturbed through road construction and maintenance works and is unlikely to have undisturbed archaeological deposits present. Furthermore, the sensitive areas as defined by the Due Diligence Code inside the study area are also prone to flooding. Floodplains were utilised by Aboriginal groups as a rich resource zone, however longer term or semi-permanent occupation would have tended to be sparser on the floodplains and would have been focused on elevated flat areas adjacent to them. Furthermore, even periodic flooding of these areas is likely to have obscured or eroded physical evidence of camp sites away

(i.e., stone artefacts, hearths, etc.). Overall, there is low potential of in situ archaeological deposits to be present inside the study area.

Table 5-1 AHIMS site types in the vicinity of the study area

Site Type	Number	Frequency (%)
Open camp site / artefact scatter	13	25.5
Isolated find	8	15.7
Modified tree	6	11.8
Shelter with art	6	11.8
Restricted site	4	7.8
Bora/ceremonial	3	5.9
Shelter with deposit	3	5.9
Artefact scatter and PAD	1	2.0
Artefact scatter, art, and PAD	1	2.0
Artefact scatter, PAD, and shell	1	2.0
Burial	1	2.0
Modified tree	1	2.0
Modified tree and Aboriginal resource and gathering	1	2.0
Rock engraving	1	2.0
Shelter with art & deposit	1	2.0
Total	**51**	**100.0**

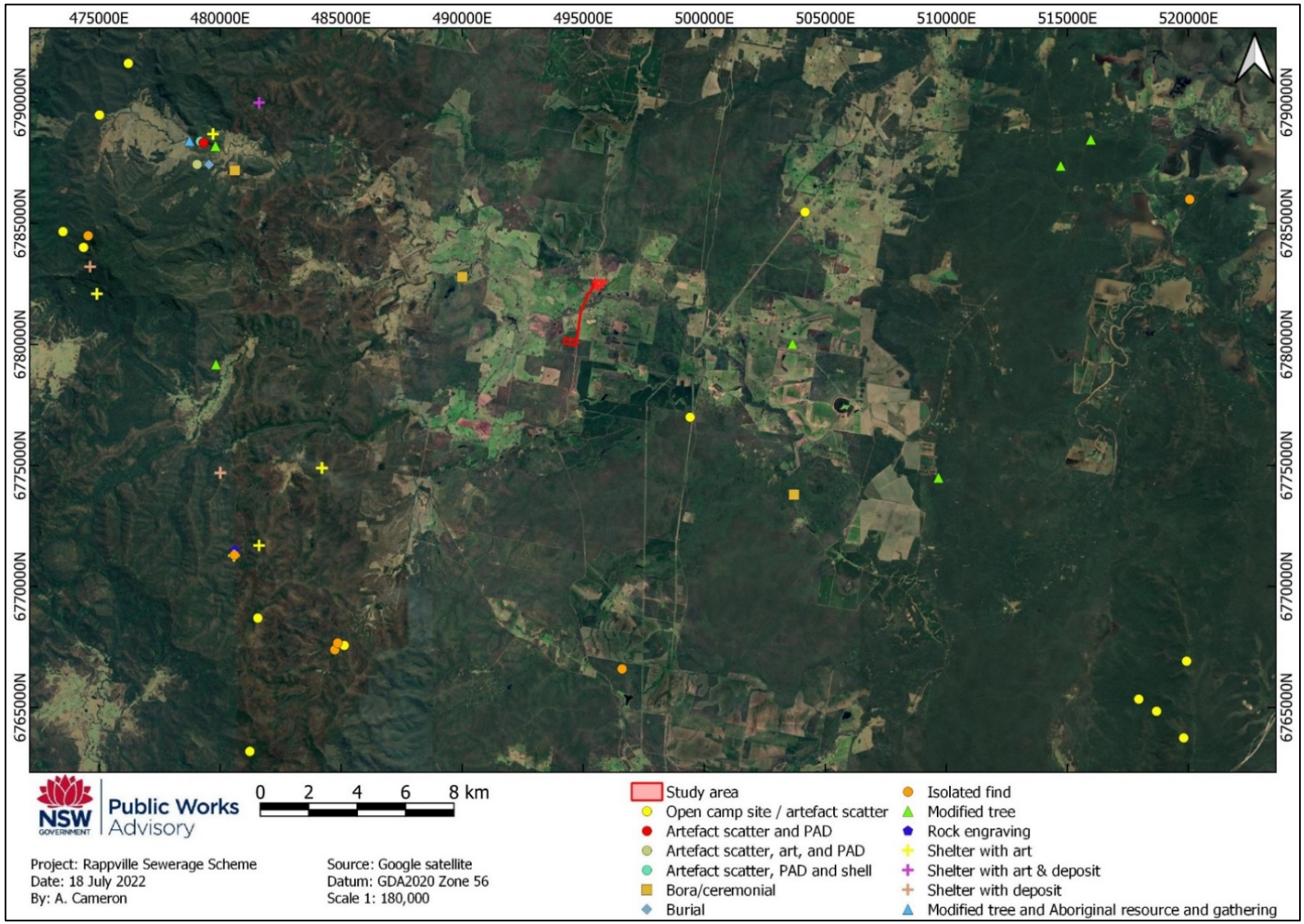


Figure 5.5 Location of AHIMS sites in respect of the proposed works – north west end.

Source: NSW PW, 2022



Figure 5.6 Aerial view of the Aboriginal heritage DD study area

Source: NSW PW, 2022

5.6.1 Construction Impacts

The results of the assessment determined the Proposal is unlikely to impact Aboriginal objects and would not impact on any known places or sites of cultural significance to the Aboriginal community. No Aboriginal sites or objects have been recorded inside the study area. The study area has a low potential for archaeological deposits to be present. Past disturbances such as natural events like bushfire and flooding, as well as vegetation clearance, road construction, road maintenance, and landscaping in the village, has left little of the study area undisturbed.

The Aboriginal Heritage Due Diligence Assessment concluded that the proposed works would have an impact on the ground surface. However, no Aboriginal objects or intact archaeological deposits would be harmed by the Proposal, based on the below factors:

- An AHIMS search indicated that there are no known Aboriginal sites within the Proposal area.
- The proposed works would have an impact on the ground surface, but no Aboriginal objects or intact archaeological deposits would be harmed due the extensive levels of existing disturbance.
- Whilst parts of the study area are in a sensitive landform according to the Due Diligence Code, being within 200 metres of a watercourse, the study area has a low potential for archaeological deposits to be present due to past disturbances.
- Desktop searches and the visual inspection recorded no Aboriginal objects in the Proposal area.

Therefore, further archaeological investigation is not required and an AHIP application is not necessary for the Proposal and construction works may proceed with caution. However, if any Aboriginal objects are found, stop work and notify Heritage NSW (131 555 or info@environment.nsw.gov.au). If human remains are found, stop work, secure the site and notify NSW Police and Heritage NSW.

5.6.2 Operational Impacts

It is considered that there would be no Aboriginal heritage impacts during operation of the Proposal.

5.6.3 Mitigation Measures

- The Proposal may proceed at the study area with no further archaeological investigation. The Proposal and all land and ground disturbance activities must be confined to inside the study area. Should the Proposal extent outside the study area then further archaeological assessment may be required.

- All staff and contractors involved in the proposed work should be made aware of legislative protection under the NPW Act for all Aboriginal sites and objects, and the contents of the Unanticipated Finds Protocols.
- This assessment has concluded that Aboriginal objects are unlikely to be harmed by the proposed works. However, if during works, Aboriginal objects, artefacts, or skeletal material are noted the Unanticipated Finds Protocol should be followed (Refer to Appendix B of the ADDA provided in Appendix C) .

5.7 Historic Heritage

The Australian Heritage Database, State Heritage Register and Inventory and Richmond Valley LEP 2012 were reviewed and searched for historical heritage items in the vicinity of the Proposal works areas.

Five historic heritage items listed under Schedule 5 of the Richmond Valley LEP 2012 are located in the general vicinity of the proposed rising main, village reticulation mains and SPS sites. The heritage items are all located in the Rappville village area and there are no local or State listed heritage items located near the STP site.

No heritage items listed on the State Heritage Register under the *Heritage Act 1977* are located in the vicinity of the proposed works in Rappville village.

A list of the heritage items in the vicinity of the Proposal works areas is provided in Table 5-2 and their locations are shown in Figure 5.7.

Table 5-2 Historic Heritage Listings in proximity to the Proposal works

Type of Heritage Listing/ Register	Name of Heritage Listing	Item Number	Heritage Significance on Listing	Location
Richmond Valley LEP 2012	St Johns Church	I151	Local Item - General	3 Lyons Street
Richmond Valley LEP 2012	Rappville Public Hall	I152	Local Item - General	14 Murray Street
Richmond Valley LEP 2012	Murray Street Memorial tree planting (jacaranda trees)	I153	Local Item - Landscape	Murray Street
Richmond Valley 2012	Commercial Hotel	I154	Local Item - General	33–55 Nandabah Street
Richmond Valley LEP 2012	Nandabah Street War Memorial and tree planting	I155	Local Item - Landscape	Nandabah Street

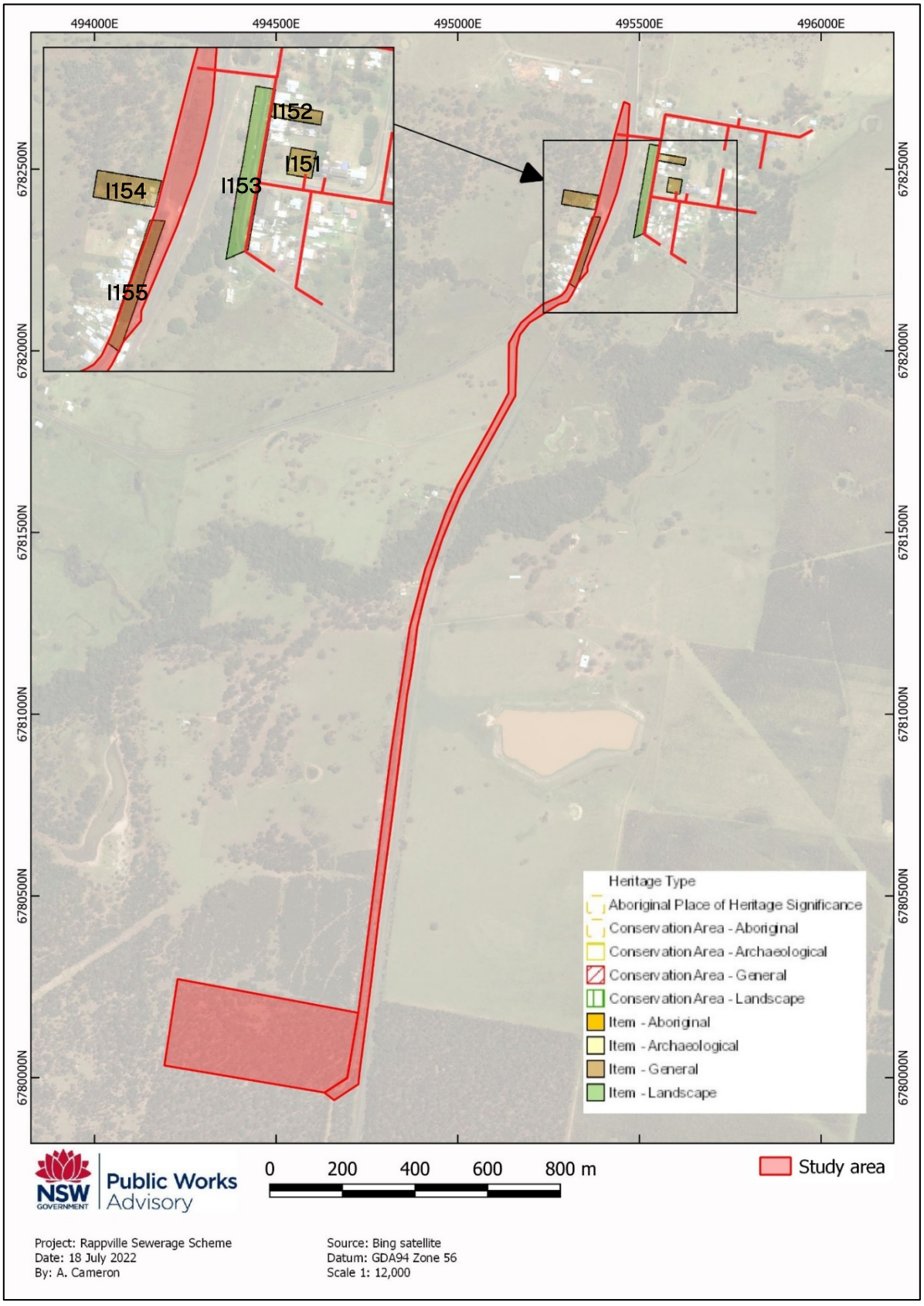


Figure 5.7 Location of listed heritage items under the Richmond Valley LEP 2012 in the vicinity of the Proposal area

Source: NSW Public Work, 2022

5.7.1 Construction Impacts

The proposed SPS would be located in the vicinity of two listed local heritage items (Item: I154 Commercial Hotel and I155: Nandabah Street War Memorial and tree planting (comprising a row of 10 Camphor Laurels and 2 Flame trees)) and the village reticulation would be adjacent to four heritage items in the village (Item I151: St Johns Church, Item: I152 Rappville Public Hall and Item: I153 Murray Street Memorial tree planting (jacaranda trees) and Item: I154 The Commercial Hotel), as summarised in Table 5-2 above.

No impacts are anticipated to occur to the three built (general) heritage items, as the proposed works for the rising main and village reticulation would be subsurface, would not be undertaken in close proximity to the heritage listed buildings, and would be located within the road reserve. The pressure sewer household connections would be located in cleared areas at the front of properties using existing pipeline connections to buildings and would not directly impact the existing built structures. However, pre-construction dilapidation reports should be considered for built heritage items in proximity to construction works and vibration should be monitored and minimised during construction works adjacent to listed heritage items in the Rappville village to avoid inadvertent indirect impacts to the heritage items.

The sewer rising main would be located adjacent to the Nandabah Street War Memorial and tree planting (Item I155) landscape heritage item which is situated at the edge of the road reserve. However, suitable clearance has been allowed between the rising main trench which (would run immediately adjacent to the edge of the formed road) and the Memorial and trees to avoid impacting either the Memorial or tree root system. The canopy of the Camphor Laurel trees is also small with minimal or no overhang due to pollarding, as the trees were burnt and damaged during the 2019 bushfires. The Heritage NSW State Heritage Inventory (Heritage NSW, 2023) listing for the item notes that *consideration should be given to the management of these trees which will eventually die, and which are a declared noxious weed.* The heritage management recommendation indicates that the trees are likely to be removed and replaced in the future, noting *that at some time in the future the trees will be removed. It would be best that the trees were replaced in stages giving time for the new trees to establish before the next stage of replanting takes place.* As discussed in Section 5.4, it is recommended that a suitably qualified arborist be engaged to assess the potential impacts to the heritage listed trees in Nandabah Street and to provide advice on measures to protect and avoid impacts to these trees.

The village reticulation network pipeline would also be located in proximity to the Murray Street Memorial tree planting (jacaranda trees) landscape heritage item (Item: I154), comprising a memorial avenue of Jacarandas. The 11 heritage listed Jacaranda trees were destroyed during the 2019 bushfires and have since been removed and replaced with

juvenile trees. The village reticulation network pipeline would be constructed along Murray Street on the opposite side of the road to the Jacarandas, and as such, the listed trees would not be impacted by the works.

The new SPS would be located across the road from the Commercial Hotel. However, the SPS would comprise a relatively small scale, low-rise structure which would be predominantly installed below ground and therefore would not obscure or impact views to or from the Commercial Hotel. The original SPS design sited the SPS adjacent to the War Memorial. However, in consideration of the heritage significance of the War Memorial and potential visual impacts, the SPS was relocated approximately 40 m to the north of the War Memorial.

No listed heritage items are located at or in the vicinity of the proposed STP site. Accordingly, no heritage impacts are anticipated during the construction of the new STP and onsite irrigation system.

Overall, no historic archaeological items are considered likely to be found during construction works, as the Proposal works area comprises previously disturbed land and road reserve. However, in the unlikely event that any historical relics or sites are identified, all works must cease and the area be protected until a qualified archaeologist inspects the site and provides management advice in consultation with Heritage NSW.

5.7.2 Operational Impacts

Post-construction, the Proposal is not anticipated to impact on any historic item or place having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations.

5.7.3 Mitigation Measures

- Construction staff would be made aware that archaeological relics are protected under the *Heritage Act 1977*. In the event that any relics are discovered during the course of the works, work would cease in the affected area and a qualified archaeologist and/or Heritage NSW would be contacted.
- The contractor shall undertake pre-construction works dilapidation reporting and vibration monitoring during construction works for identified built heritage items in the Rappville village area which are potentially susceptible to indirect impact from the proposed works. If damage or risk to the heritage item is identified, vibratory activities should cease and alternative work methods should be implemented so that vibration impacts are reduced to acceptable levels.
- Listed built and landscape heritage items in the Rappville village area as shown in Figure 5.7 of the REF must be fenced off to prevent impacts during adjacent construction works. The heritage listed trees located along the Nandabah Street and

Murray Street, must be fenced off and protected in accordance with AS 4970-2009: *Protection of trees on development sites* to prevent damage during construction works.

5.8 Noise and Vibration

The STP site is located approximately 2 km south of Rappville village. The closest sensitive noise receptors are located approximately 650 m to the north-west and 950 m west of the STP site.

The area immediately surrounding the sewer rising main and reticulation network alignment is a mixture of rural bushland areas and low density residential and commercial development within the Rappville village area.

Residences are located within 10 m of the village reticulation alignments and works for the PSS units would occur within the front yard of residential properties. The SPS site is located within a low density residential village area. A non-residential property (The Commercial Hotel) is present on the opposite site of Nandabah Street approximately 30 m to the west of the SPS site. A railway line and the former Rappville Railway Station is located to the east and the land immediately to the north and south largely is undeveloped, comprising grass cover, a line of trees adjacent to Nandabah Street and a War Memorial.

Noise monitoring was not undertaken as part of the REF, however background noise levels in the Proposal areas are likely to vary from affA) outside of the village, up to 55 dB(A) in the village residential area.

5.8.1 Construction Impacts

Construction

The typical A-weighted sound power levels for equipment which may be required to undertake the construction works are listed in Table 5-3 below (it is noted that this list is not definitive and these levels are taken from the *Australian Standard AS2436-2010 Guide to Noise Control on Construction, Demolition and Maintenance Sites*).

Table 5-3 Construction Equipment Sound Power Level

Equipment	Typical Sound Power Levels (dB)	Sound Pressure Level at 10m distance (dB(A))	Sound Pressure Level at 30m distance (dB(A))	Sound Pressure Level at 100m distance (dB(A))
Excavator/Backhoe	118	87	80	70
Truck (>20t)	117	86	79	69
Light vehicles	106	75	68	58
Rock breaker	118	87	80	70
Machine mounted boring machine	116	85	78	68
Compressor (silenced)	101	70	63	53
Concrete agitator truck	109	78	71	61
Hand Tools (electric)	102	71	64	54

Notes: The method specified in AS2436 suggests that errors are introduced for distances greater than 100m from the sound source.

The total duration of the Proposal construction works is anticipated to be approximately 24 months in total. However, construction of the rising main and reticulation network would progress relatively steadily along the pipeline alignments and thereby minimise noise and vibration impacts at any one location. Noise and vibration impacts would be experienced at the STP and SPS sites for longer than the rest of the proposed pipeline installation works however this would be less than the total 18 month construction period. Furthermore, the rising main, STP and SPS sites are located in areas with few surrounding sensitive noise receivers; therefore, noise and vibration during construction works would impact a relatively small number of sensitive receivers.

Under the *Interim Construction Noise Guideline* (DECCW, 2009) construction noise criteria for residences where the construction duration is greater than three weeks is the rating background noise plus 10 dB(A), and the resultant noise management level for the residential areas would be 65 dB(A) within the village area. Based on the typical sound power levels in Table 5-3 and using the methodology in the *Australian Standard Guide to*

Noise Control on Construction, Demolition and Maintenance Sites and the *Interim Noise Construction Guideline*, the maximum predicted noise levels at the closest sensitive receivers during construction may exceed the recommended noise affected level as well as the highly affected noise level (75 dB(A)) above which there may be strong community reaction to noise (DECCW, 2009).

Noise levels would vary depending on the nature of the activities being undertaken. The use of several items of construction equipment simultaneously is only expected to occur intermittently, if at all. In addition, construction hours would be restricted to the normal daytime construction hours as specified by EPA and the nature of the works would be temporary. Works would progress rapidly along the rising main and village reticulation pipeline alignments and therefore there would not be impacts in the same area for the entire construction duration. Although construction works would have a longer duration at the STP and SPS sites compared to the works at any one location along the pipeline alignments, any impacts are not anticipated to be significant due to the limited development in the immediate vicinity of the STP and SPS sites.

The use of the construction equipment listed in Table 5-3 also has the potential to cause some vibration impacts, although it should be noted that no blasting would be undertaken during the works.

The vibration generated from construction works for the STP, rising main, reticulation network and SPS would vary depending on the level and type of activity carried out at each site during each activity. Potential vibration generated to receivers for the works would be dependent on separation distances, the intervening soil and rock strata, dominant frequencies of vibration and the receiver structure.

Dominant vibration generating plant include:

- Drilling
- Bulldozer
- Excavator
- Compactor
- Truck movements along unsealed roads
- Rock Breaker (heavy)

In some areas along the rising main, reticulation network alignment and at the SPS site, there is the potential for the nearest affected receivers to be affected by the above listed construction plant.

It is recommended that any required site-specific buffer distances for vibration significant plant items (e.g. vibratory rollers, compactors) be determined on site where works are

within 10-15 m from a building or structure depending on the blow energy used as, unlike noise, vibration cannot be readily predicted.

For any residences, particularly heritage listed buildings, located in close proximity to any such works, more accurate buffer distances should be determined on site by measuring vibration emission levels from each plant item prior to its operation or alternative construction methods and equipment are to be used and dilapidation reporting should be undertaken if required. Control measures to minimise noise and vibration impacts would be implemented during construction for all components of the Proposal as part of the contractor's Construction Environmental Management Plan (CEMP).

5.8.2 Operational Impacts

During operation, the proposed STP and SPS would generate some operational noise due to the operation of the STP operational plant and SPS pumps located within the wet well. These would be new noise sources in the immediate vicinity, as there is no existing mechanical equipment at the STP or SPS sites. However, the STP would be located approximately 650 m from the closest noise sensitive receptor and operational noise is not anticipated to be noticeable at this distance. The SPS pumps would generate minimal operational noise and would be located within a covered concrete wet well below ground. However, the operational noise level of the pumps would low and would not be noticeable outside of the property. As such, operational noise emissions associated with the STP and SPS are anticipated to be minimal and would not significantly impact on surrounding residential or other land users. The detailed design of the STP and SPS pump station must comply with the requirements of the EPA Industrial Noise Policy, which limits noise increases to 5 dB(A) above background noise level at the closest receiver. Therefore, it is not anticipated to significantly impact on nearby residential or other land users.

The PSS collection units would be installed below ground at each property are not anticipated to produce significant noise during operation. Some low-level operational noise would occur during maintenance works. However, maintenance works are not anticipated to significantly impact on nearby residential or other land users.

5.8.3 Mitigation Measures

- The new STP and SPS would be designed to comply with the *Noise Policy for Industry (EPA, 2017)*.
- The contractor is to undertake a risk assessment to identify buildings and structures, in the Rappville village area, particularly buildings with heritage significance, that have the potential to be affected by vibration and consider undertaking pre-dilapidation survey/report for the heritage structures if located in close proximity to construction works. These surveys are used to address potential community concerns that perceived vibration may have caused damage to property.

- Community notification would be undertaken where appropriate and where work is likely to cause vibration or offensive noise and impact the public and nearby residents.
- Works would be undertaken during normal work hours i.e. 7am to 6pm Monday to Friday; 8am to 1pm Saturdays; and no work would be undertaken on Sundays, Public Holidays or outside these work hours without notification to the affected community and EPA. Notification would provide the following details:
  - The locations and types of surrounding receivers likely to be affected;
  - The nature of the proposed works;
  - The noise characteristics of any powered equipment likely to be used;
  - Measures to be taken to reduce noise emissions; and
  - Any other information EPA may request.
  - All reasonable practical steps shall be undertaken to reduce noise and vibration from the site.
- Control measures to minimise noise and vibration impacts on adjoining land would be implemented during construction as part of the contractor's CEMP, which would require review by RVC prior to commencement of works. The CEMP would address site specific issues, including limited work hours and noise and vibration reduction practices, taking into consideration DECCW's Interim Construction Noise Guideline (in particular Tables 4 – 10) and Assessing Vibration: A Technical Guideline (in particular mitigation measures in Section 3). Mitigation measures to minimise noise and vibration impacts may include the following:
  - Optimum siting of work areas, vehicle and plant parking areas, materials stockpiles and equipment storage areas in locations where potential acoustic and vibration impacts would be minimised;
  - Regular maintenance of all plant and machinery used for the Proposal;
  - Identify locations where construction noise and vibration is most intrusive and develop strategies to reduce impacts for these areas.
- Work generating high noise levels should be scheduled during less sensitive time periods if practicable.
- Noise generating activities with impulsive, tonal or low frequency characteristics (such as rock breaking, etc) should only be carried out:
  - in continuous blocks, up to but not exceeding 3 hours each; and
  - with a minimum respite period of one hour between each block.

- Use quieter and less noise emitting construction methods where feasible and reasonable.
- All plant and equipment to be appropriately maintained to ensure optimum running conditions, with periodic monitoring.
- Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be limited/ avoided where possible.
- The offset distance between noisy plant and adjacent sensitive receivers is to be maximised where practicable.
- Plant/machinery used intermittently to be throttled down or shut down when not in use where practicable.
- Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
- Non-tonal reversing beepers (or an equivalent mechanism) should be fitted and used on all construction vehicles and mobile plant regularly used on site for periods of over two months where practicable.
- Where reasonable and feasible, use structures to shield residential receivers from noise such as:
  - site sheds placement;
  - earth bunds;
  - temporary or mobile noise screens (where practicable)
  - enclosures to shield fixed noise sources such as pumps, compressors, fans etc (where practicable); and
  - consideration of site topography when situating plant.
- High noise generating plant and equipment, such as rock hammers, should be used only when required (if hard rock is encountered).

5.9 Air Quality

Air quality is expected to be good, with the main influence on air quality in the area being vehicle emissions associated with moderate and low traffic volumes along Nandabah Street, Myrtle Creek Road and local roads. There are no point sources of air pollution in the vicinity of the Proposal works area. However, in high wind events, dust can be a major source of air particulates.

The nearest sensitive receiver to the SPS site is the Commercial Hotel which is located approximately 40 m west of the site. The nearest sensitive receiver to the STP site is approximately 650 m to the north

5.9.1 Construction Impacts

The main impact to air quality during construction would be expected to arise from the generation of airborne localised dust associated with earthworks and from trucks transporting materials to and around the construction sites on unsealed roads. This is not anticipated to cause notable adverse environmental impacts unless the weather is particularly windy. Dust suppression methods, including the use of water carts, would be applied on windy days to prevent dust being transported off site.

Local air quality may be affected by emissions from construction traffic. These emissions would, however, occur only intermittently, and are expected to be minor and temporary. It would be unlikely that they would contribute to a permanent detectable reduction in local air quality.

Construction vehicles and machinery would generate greenhouse gas emissions during the works. The Proposal involves the pumping of sewage which would require energy derived from fossil fuel use and therefore result in the generation of greenhouse gases. The greenhouse gas emissions generated from the construction and operation of the Proposal would not be expected to be significant.

With implementation of the recommended mitigation measures, potential air quality impacts during construction are considered minor and unlikely to be significant.

5.9.2 Operational Impacts

Qualitative Odour Impact Assessments (OIAs) were prepared for the proposed new STP and SPS by SLR Consulting in November 2023 and June 2023, respectively. The following information is taken directly from the STP and SPS OIA assessments. Copies of the OIA reports are provided in Appendix F.

STP

The nearest sensitive receptors to the STP site boundary are the residences located approximately 650 m north of the STP site and 950 m to its west.

The main potential odour sources at the STP are the inlet works, oxidation ponds, maturation ponds, and to a lesser degree, the storage pond. No significant odour emissions an expected from the irrigation areas. Given the STP capacity is 220 EP, a separation distance of 150 m recommended by Australian Capital Territory (ACT) EPA and South Australia (SA) EPA and a separation distance of 148 m calculated based on Northern Territory (NT) EPA and EPA Victoria guidelines are considered relevant for the Proposal. As illustrated in Figure 5.8, no sensitive receptors are located within these buffers.

The potential for odour impacts from a source at the sensitive receptors may be evaluated by addressing the frequency, intensity, duration, offensiveness and location factors, as outlined below.

- Frequency - the nearest sensitive receptors are located to the north and west of the STP site have a low potential to experience odour impacts since southerly and easterly winds occur less than 9% of the time, therefore there is a low likelihood that these receptors would experience frequent potential odour impacts from the Site.
- Intensity – based on the distance between the STP and the nearest sensitive receptors, the odour intensity is expected to be negligible at the receptors. Given this, odours from the STP are likely to be of low intensity.
- Duration - Given that conducive wind directions only occur less than 9% of the time, the potential duration of any odour impacts is concluded to be low.
- Offensiveness – Given the scale of operations at the STP site and the separation distance between the STP site and identified sensitive receptors, odours at these receptors are expected to have a low level of offensiveness.
- Location - the impact of location on the acceptability of odours from the STP site has been accounted for by the surrounding receptors sensitivity classifications detailed in Appendix A of the STP OIA (high).

Given the above, the potential impact of odour emissions from the STP Site is considered to be ***negligible*** (ie Impact is predicted to cause no significant consequences) for the nearest sensitive receptors. Therefore, additional physical controls are deemed not necessary for the STP during operation. However, to ensure that impacts on off-site air quality are minimised, it is recommended that good management procedures be adopted. It is recommended that the management procedures are documented in an Odour Management Plan (OMP). The OMP should outline the management structure and strategies for odour performance during the operation of the STP. It is recommended that the OMP be developed as per the recommendations of the *NSW Best Practice Odour Guideline - Sewerage systems including sewage treatment plants, water recycling facilities, sewage reticulation systems and sewer mining* (DoP, 2010) and that it includes procedures for complaints registering and investigation.

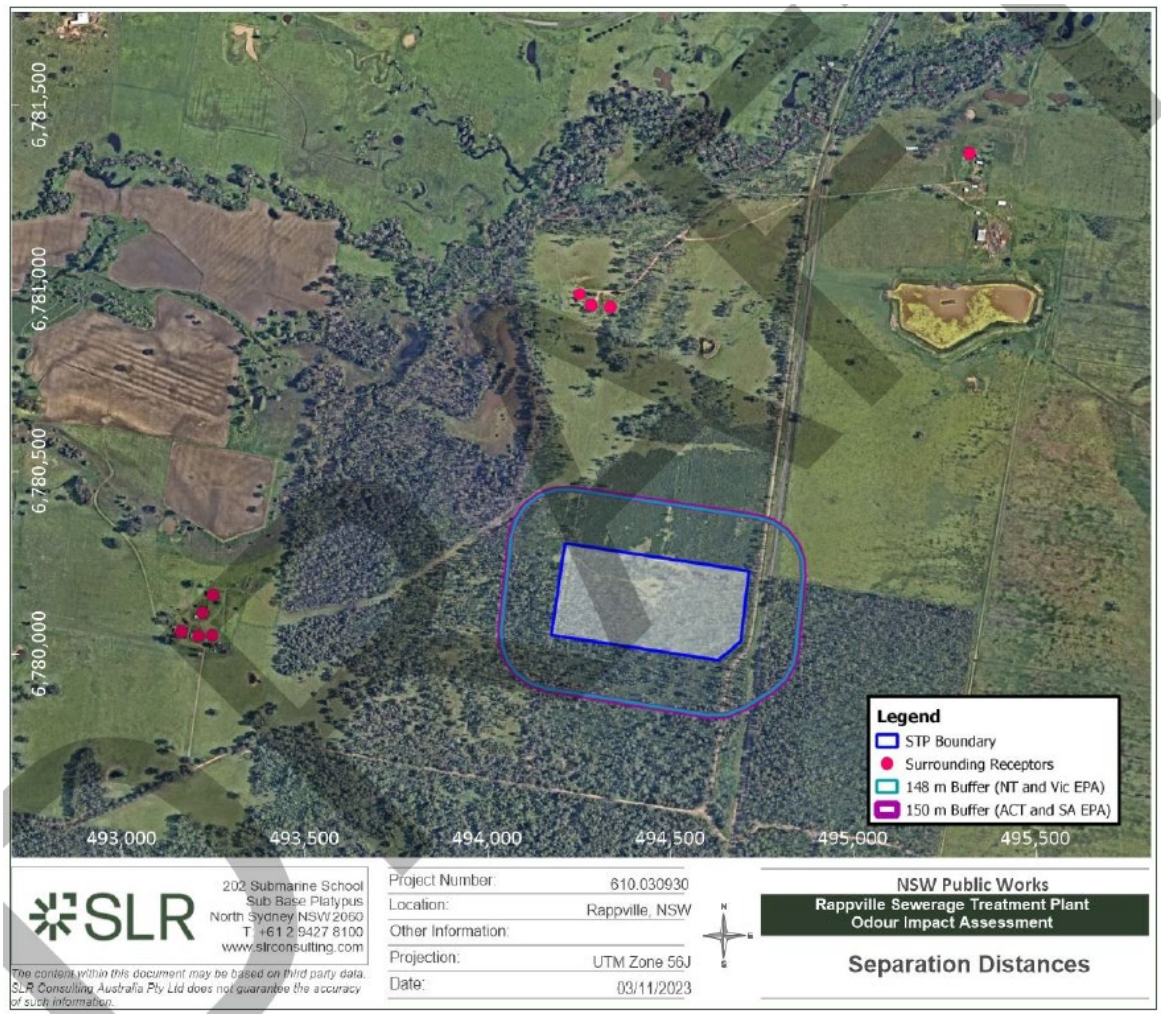


Figure 5.8 STP Boundary and NT, ACT, and SA EPA Guideline Separation Distances

Source: SLR Consulting, November 2023

SPS

Odour emissions associated with the proposed SPS predominantly relate to the wet well. Given the incoming airflow rate of the SPS is 11.4 L/s, a separation distance of 25 m as recommended by NT EPA and a separation distance of 10 m as recommended by the Western Australia (WA) EPA are considered relevant for the Proposal. As illustrated in Figure 5.9, no sensitive receivers are located within these buffers.

Based on the Odour Risk Methodology detailed in Appendix A of the OIA, the sensitivity of the surrounding area to odour emissions generated by the SPS has been classified as high. The potential for odour impacts at the sensitive receptors was evaluated by addressing the frequency, intensity, duration, offensiveness and location of the source odour.

The potential for the nearest sensitive receiver to experience odour impacts were considered low given the low likelihood (less than 9% of the time) for north-easterly winds to occur, the distance from the site and nature of the proposed activity and proposed odour

control system to be installed. Given this, the potential impact of odour emissions from the site is considered to be negligible and is unlikely to cause significant consequences to nearby receptors. Given the high sensitivity of the potentially affected receivers and the negligible magnitude of the potential impacts from the SPS activities, the impact significance for the local receptors is concluded to be of neutral negligible significance for the closest receptors and no additional odour control treatments were considered necessary.

Air quality impacts associated with the operation of the rising main, reticulation network and on-property collection units are not anticipated during the operation of the sewerage scheme. The grinder pump and tank to be located within the yard of properties would be installed below ground and are not anticipated to result in odour emissions.

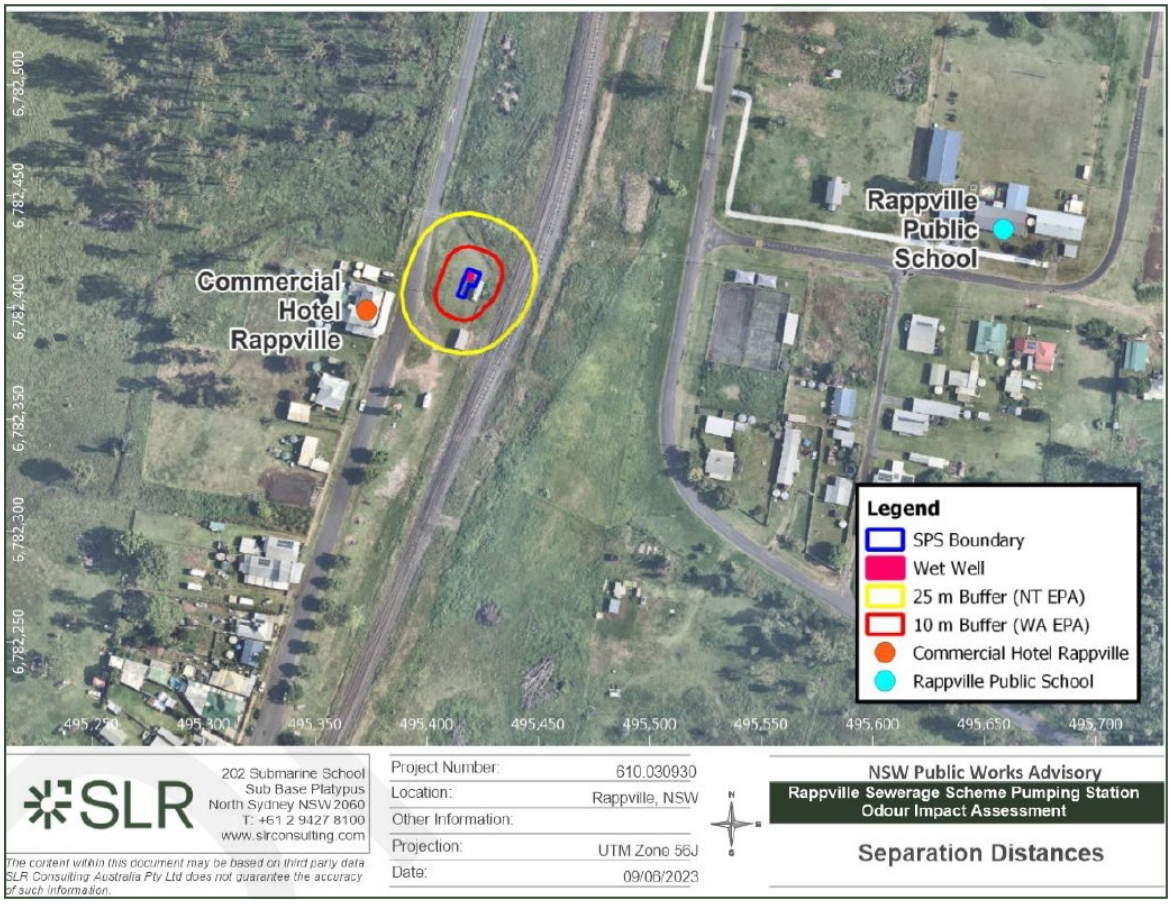


Figure 5.9: SPS boundary and NT and WA EPA Guideline Separation Distances

Source: SLR Consulting, June 2023

5.9.3 Mitigation Measures

- Construction vehicles and equipment would be suitably serviced within the six-month period prior to commencement of construction activities and all necessary maintenance undertaken during the construction period to meet EPA air quality requirements.

- All construction machinery/plant would be turned off when not in use to minimise emissions.
- Construction contractors would monitor dust generation potential.
- Dust suppression methods including the use of water carts would be applied where required (i.e. on windy days when earthworks and vehicle movements are generating dust).
- Any stockpiled spoil/fill would be protected to minimise dust generation to avoid sediment moving offsite.
- Vehicles transporting spoil from the sites would be covered.
- Good management procedures are to be documented in an Odour Management Plan (OMP) for the STP and SPS. The OMP should outline the management structure and strategies for odour performance during the operation of the STP and SPS. The OMP should be developed as per the recommendations of the *NSW Best Practice Odour Guideline* (NSW Department of Planning, 2010) and include procedures for the registration and investigation of complaints.

5.10 Traffic and Access

The new STP site would be located approximately 2 km south of Rappville village and be accessible via a private sealed driveway off Myrtle Creek Road, which experiences moderate levels of traffic.

The sewer rising main and reticulation network would be predominantly located within road reserves in Rappville under the control of RVC. Nandabah Street and Myrtle Creek Road experience moderate levels of traffic, with local roads in and around the village generally experiencing low levels of traffic with moderate traffic levels during holiday periods.

The SPS site would be located on Nandabah Street, which experiences moderate traffic flows as it is the village main street.

5.10.1 Construction Impacts

The majority of the Proposal works areas would be accessed via existing sealed roads and unsealed access tracks. However, clearing of groundcover vegetation and the creation of a new temporary access track would be required for the STP works and may also potentially be required for a section of reticulation network at Nandabah Street. No access would be required from waterways, with all construction areas suitably accessible by land.

Impacts to vehicle and pedestrian traffic and access would occur during the construction works however such impacts would be minimised as the works would progress rapidly along the rising main and reticulation network alignment, or be located outside of the

village and overall, any impacts would be short term only. Although construction works would have a longer duration at the STP and SPS sites, compared to the works at any one location along the pipeline alignments and for PSS unit installation, any impacts are not anticipated to be significant due to the low density development in the immediate vicinity of the STP and SPS sites.

Existing access roads may require upgrades to be made suitable for heavy vehicles and machinery. The anticipated increased traffic movements due to construction vehicles would be short term and relatively infrequent in any given area along the rising main and village reticulation alignments, and therefore are not expected to result in a significant impact on the local road network. Works would be carried out so as to minimise interruption to access for adjoining landowners. There is likely to be some impacts to road users such as through reduced speed limits, part road closures and general temporary disruptions to traffic flows.

5.10.2 Operational Impacts

During operation of the Rappville SS, scheduled access to the STP and SPS sites, and some sections of the rising main and reticulation network would be required for operational and maintenance activities. Heavy vehicles would routinely access the STP for maintenance and deliveries, and maintenance personnel would also access the STP and SPS site to undertake routine operational and maintenance works. Overall, vehicular access requirements the STP, SPS, pipelines and on-property PSS units during the operation of the SS would not be of a high volume or frequency. Accordingly no, adverse traffic impacts are expected during operation of the Proposal.

5.10.3 Mitigation Measures

- The contractor would prepare a Traffic Management Plan (TMP) as part of the CEMP, to be reviewed by RVC prior to commencement of works. The TMP would include measures to minimise traffic impacts ensure public safety and would be prepared in accordance with:
  - *TfNSW's Traffic Control at Work Sites Manual, (February 2022), and*
  - *Australian Standard 1742.3 - 2009 Traffic Control for Works on Roads.*
- Prior to the commencement of works, existing access tracks and roads that would be used by heavy vehicles would be assessed for adequacy and upgraded where necessary. Any upgrades would be subject to further impact assessment if the upgrades extend outside the existing road alignment. Appropriate drainage would be provided for any unsealed tracks utilised during the works to ensure that vehicle movements do not cause erosion and sedimentation of nearby waterways.

- Any disturbance to landowners as a result of vehicle movements and noise would be minimised by adhering to the working hours outlined in Section 5.8.3 of the REF. The contractor would avoid any inconvenience to residences/landowners, and all access gates would be in their original condition following completion of the works.
- Any temporary access tracks required for the works would be located so as to minimise disturbance to the existing environment, with preference given to traversing and driving over ground cover and understorey vegetation, as opposed to clearing it, to facilitate vegetation regeneration post-works. Following completion of the works the temporary tracks would be removed, topsoil provided and re-grassed. Damage to existing tracks would be restored after completion of the works.
- Trucks would not access the sites in weather conditions that would cause damage to ground surface or properties.
- All traffic would comply with all applicable traffic laws and regulations including speed limits. All construction vehicles would comply with the speed limits set for the roads accessing the site.

5.11 Waste Management

5.11.1 Construction Impacts

The construction of the Proposal would generate waste including excess spoil, vegetation and general building wastes such as packaging, off cuts, excess materials and workers wastes such as drinks containers, food scraps, etc. Portable toilets would be provided for workers at the STP and SPS sites, and along the pipeline alignments as necessary. Excavated material would generally be used to backfill pipe trenches and minimal excess spoil is predicted.

Directional drilling (underboring) for the railway line crossing would generate drilling fluid / slurry, which would need to be disposed of at the completion of the works at an appropriately licensed waste facility. Drilling works and associated waste can be managed to avoid any adverse environmental impacts (See Section 5.3 above).

Dewatering of trenches may be required due to infiltration of rain water. A Dewatering Plan would be prepared as part of the Contractor's CEMP. Liquid waste may be generated due to dewatering.

To ensure that environmental harm does not occur as a result of uncontrolled or inappropriate collection, transport and disposal, the relevant provisions of the following Acts would be implemented:

- *Waste Avoidance and Resource Recovery Act 2001*
- *Protection of the Environment Operations Act 1997*

- *Protection of the Environment Operations (Waste) Regulation 2014*

The waste management and contamination control procedures and/or measures listed below would be implemented for the proposed works.

5.11.2 Operational Impacts

The STP would produce minor general waste, solid waste (stabilised biosolids and screenings and grit from the inlet works) and wastewater (treated effluent) during operation. The treated effluent would be reused onsite for irrigation of paddocks on which livestock would subsequently graze.

General STP operational waste, stabilised biosolids and screenings and grit would be disposed of offsite, in accordance with the EPA's waste classification guidelines. Periodic desludging would be required for the new ponds over the operational life of the STP, which is typically after a period of about 15 to 20 years. Biosolid waste is anticipated to be relatively inoffensive following stabilisation in the ponds due to the absence of heavy industry in the Rappville village area and lack of chemical use in the treatment stream. To minimise any soil contamination or human exposure risks associated with stabilised biosolid management, the EPA's *Environmental Guidelines for the Use and Disposal of Biosolids Products* (EPA, 2000) would be complied with for the handling and disposal of any biosolids generated at the STP. The treated effluent reuse irrigation system would operate in accordance with the *Rappville Recycled Water Irrigation Management Plan* (Agsol,2023) and *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004). The STP OEMP would include operational waste procedures and guidelines to meet EPA and WHS best practice and requirements for the management of all STP operational solid waste and wastewater.

Some minor waste may be associated within the SPS operational maintenance, however wastewater would be disposed of through the SS transfer and treatment network. Wastewater and sediment generated from pipeline maintenance (scouring) activities may be undertaken during operation of the pipelines. All wastewater and sediment resulting from pipe scouring would be captured and allowed to infiltrate / evaporate with the remaining silt and sediment to be removed off site for disposal in accordance with the appropriate waste classification.

5.11.3 Mitigation Measures

- The contractor undertaking the works would detail waste management procedures in a Waste Management Plan to be incorporated into the CEMP. The contractor is to assume responsibility for the appropriate disposal of any waste generated. Adequate procedures should be established and detailed in the CEMP, including notification requirements to EPA for incidents that cause material harm to the environment. The

WMP would also follow the resource management hierarchy principles embodied in the *Waste Avoidance and Resource Recovery Act 2001*. Namely, to:

  - avoid unnecessary resource consumption;
  - recover resources (including reuse, reprocessing, recycling and energy recovery); and
  - dispose (as a last resort).

- Any required concrete would be mixed off-site and transported to the construction areas. Excess concrete would be removed off-site for recycling.
- All waste removed from works sites, including waste from drilling operations, would be classified as per the *Waste Classification Guideline: Part 1* (EPA 2014) and disposed of appropriately, and all non-recyclable waste would be disposed of at an appropriate licensed waste disposal facility.
- If any contaminated material is encountered during earthworks, work shall cease, the site secured, and a safe work method statement(s) and appropriate practices shall be implemented. Any contaminated material would be classified first and then stored, transported and disposed of in accordance with EPA requirements at an EPA licensed waste facility.
- Cleared vegetation (devoid of weeds) would be spread out on site or alternatively disposed of off site in accordance with EPA requirements.
- All equipment should be cleaned of soil and vegetation before being brought to the site to minimise the risk of spreading weeds.
- Any noxious or controlled weeds must be controlled and disposed of at a landfill site in accordance with EPA requirements and not mixed with soil to be reused on site or elsewhere.
- If practicable, surplus excavated materials/fill would be reused onsite as part of rehabilitation and restoration works. Any surplus spoil disposed of in this manner would be seeded to minimise the likelihood of it being transported offsite through wind or water action.
- Waste management practices during operation of the STP would follow the resource management hierarchy principles embodied in the *Waste Avoidance and Resource Recovery Act 2001*. These practices include avoiding unnecessary resource consumption, recovery of resources (including reuse, reprocessing, recycling and energy recovery) and disposal to a licensed landfill (as a last resort). Where feasible, operational waste would be recycled in accordance with the *NSW Government Resource Efficiency Policy 2014*.

- Biosolids would be managed in accordance with a Biosolids Management Plan to be prepared for the STP.
- Biosolids management would be consistent with the EPA's *Environmental Guidelines: Use and Disposal of Biosolids Products* (EPA, 2000).
- Land application of biosolids (if proposed) should be controlled to prevent any off-site migration.
- The STP's onsite treated effluent reuse irrigation system should operate in accordance with the requirements of the *Rappville Recycled Water Irrigation Management Plan* (Agsol,2023) and *Environmental Guidelines: Use of Effluent by Irrigation* (DEC, 2004).

5.12 Visual Amenity

5.12.1 Construction Impacts

There would be some minor visual impacts within the village during construction of the Proposal due to the presence of construction equipment within the village area and surrounds. However, this would generally only occur for short periods at any one location as construction of the sewer rising main and reticulation network installation progresses along the alignment, with slightly longer impacts during construction of the SPS. This impact is not anticipated to be significant due to the temporary nature of the construction works, and the location of the mains predominantly within existing road reserves.

There would also be a visual impact associated with vegetation removal required to construct the new STP, the rising main, village reticulation mains within road reserves and sewerage scheme collection unit works within the yard of properties in the Rappville village. These visual impacts are unlikely to be significant within the village area as the reticulation network pipelines and associated sewerage collection unit property connections would be installed in previously cleared areas. Over time the vegetation clearing impacts associated with the Proposal would decrease as vegetation regenerates and any ongoing / maintained clearing would be restricted to that required for operational maintenance purposes. These visual impacts are unlikely to be significant.

Visual impacts would result from the removal of up to 90 trees along Myrtle Creek road for the construction of the sewer rising main. Therefore, it is recommended that compensatory tree planting with endemic native species is undertaken in the area to mitigate visual impacts over the long term.

5.12.2 Operational Impacts

As the majority of the sewerage scheme infrastructure would be located underground, operational visual impacts would primarily be associated with the STP, SPS and vegetation clearing along the Myrtle Creek road reserve for the rising main. The STP and SPS would

be a new elements in the visual landscape. However, visual impacts are not anticipated to be significant during operation, as the STP as the site is located 2 km south of the village and a 3 m wide planting strip would be retained along the boundary of the STP site to act as a visual screen around the property.

The SPS well would be located below ground and located in an area which has been subject to residential development including vegetation clearing. The new SPS enclosure would be consistent with the surrounding village built environment. Trees would be planted along the outer street-facing side of the security fence to provide a visual screen from the street frontage and the enclosure and well would be set back from the road to minimise visual impacts. Therefore, this element of the Proposal is not anticipated to have an adverse impact on the visual amenity of the surrounding area.

5.12.3 Mitigation Measures

- The clearing of vegetation would be kept to the minimum required for the works.
- Construction compounds and areas for the parking of vehicles and storing of equipment would be located in cleared areas wherever possible.
- Replanting of suitable replacement trees (endemic native species) within the local area should be considered to compensate for up to 90 trees to be removed along Myrtle Creek Road for the Proposal.
- A row of trees (an endemic native variety) should be planted along the outer side of the security fencing at the SPS site to provide a visual screen for the SPS from the property's street frontage.
- A 3 m wide planting (vegetation) strip must be retained/planted along the boundary of the STP site.

5.13 Utilities and Infrastructure

5.13.1 Construction Impacts

Relevant utilities and infrastructure providers, including ARTC for works in the vicinity of the railway infrastructure, would be consulted further regarding the design and construction requirements for the SS infrastructure in Rappville. Consultation should occur where the new sewerage scheme infrastructure is located within or in close proximity to existing utilities and services infrastructure, or has the potential to impact on, existing power supply and telecommunications infrastructure. Those requirements would be incorporated into the design and construction of the proposed new Rappville SS infrastructure.

5.13.2 Operational Impacts

Existing infrastructure and utilities servicing Rappville and surrounding areas (including telecommunications, mains water, sewerage, stormwater drainage, and electricity) would not be adversely affected during operation of the Proposal.

5.13.3 Mitigation Measures

- The final design plans for works within ARTC land are to be supplied to ARTC for concurrence prior to the commencement of construction works.
- Works within ARTC land must be undertaken in accordance with Australian Standard AS4799-2000 and ARTC Standards ETG-17-01. Where conflict exists between the two standards the standard providing the greater degree of protection to ARTC assets will apply.
- Utilities and services which may be impacted by the Proposal would be accurately located prior to commencement of works using Before You Dig Australia (BYDA) and confirmed by physical location and marking prior to construction.
- Utility and telecommunications infrastructure service providers would be consulted prior to the commencement of and during construction works.

6 Environmental Management

6.1 Construction Environmental Management Plan

Preparation of a Construction Environmental Management Plan (CEMP) is mandatory for all projects undertaken by or on behalf of government agencies or where funding is being provided by the government.

The CEMP would be developed to ensure that appropriate environmental management practices are followed during a project's construction and/or operation. RVC would review the CEMP for this Proposal, which should include the following elements, as described in the Guideline for the Preparation of Environmental Management Plans (DIPNR, 2004):

Table 6-1 Construction Environmental Management Plan Structure

Background	Introduction to the document Description of the Proposal and project details The context for the CEMP with regard to the overall project The CEMP objectives The contractor's environmental policy
Environmental Management	Environmental management structure of the organisation and specific team responsibilities with respect to the CEMP and its implementation Approval and licensing requirements relevant to the project Reporting requirements Environmental training Emergency contacts and response
Implementation	A project specific risk assessment A detailed list of environmental management safeguards and controls CEMP sub plans for specific environmental controls A detailed schedule assigning responsibility to each environmental management activity and control
Monitor and Review	Environmental monitoring Environmental auditing

	Corrective action CEMP review and document control procedures

The CEMP would include a risk assessment which ensures that the safeguards identified in this REF, as well as any others that are considered relevant, are effectively translated into actual construction techniques and environmental management activities, controls and monitoring/verification to prevent or minimise environmental impacts. The CEMP should also identify the requirements for compliance with relevant legislation and any other regulatory requirements to ensure environmental safeguards described throughout this REF are implemented. The environmental management objectives and supporting actions presented in this section are intended to assist in this process.

The following details the environmental objectives during construction and the proposed mitigation to be included in the CEMP. This list is not definitive, and additional measures detailed as part of the determination of the Project and conditions of any other approvals must also be included. Operational safeguards are also included.

6.2 Environmental Management Measures

Implementation of the mitigation measures outlined below would be undertaken during several phases of the project. These phases comprise:

- Detailed design – refinement of the design details
- Pre-construction – prior to the contractor arriving on site to carry out the works
- Construction – during construction phase
- Operation – post construction

6.2.1 Land Use

Action/Phase	Responsibility
Pre-construction	
Prior to commencement of construction activities on private properties, all landowners would be notified under the provisions of the *Local Government Act 1993*. All other necessary notification, approvals, permits, licenses and agreements would be obtained from the relevant landowners/authorities (including DCCEEW - Water, ARTC, DPHI – Crown lands, property owners).	RVC / Contractor

Affected landowners and the community would be notified of the potential impact on land uses during construction and any safeguards or mitigation measures that would be implemented during the works.	RVC / Contractor
The contractor would be required to under pre-construction dilapidation report/photographic record to ensure the necessary care and maintenance of property facilities and operations. However, if any damage does occur to public or private property, it would be restored to a condition equivalent to the original condition.	RVC / Contractor
Construction	
Any works on private property would be designed to minimise impacts to existing vegetation, structures, access and services.	Contractor
No construction activities (e.g. tree clearing, stockpiling etc.) would be undertaken on property adjoining the works areas without prior notification to or approval of the landowner.	Contractor
Appropriate security (including temporary fencing), supervision and access controls would be put in place and properly monitored to ensure no access by unauthorised personnel, either to the work area or via the work area to adjoining areas. This should include appropriate measures for the protection of the public where construction works would adjoin areas subject to regular use by the general public.	Contractor
Operation	
Appropriate security fencing and access controls would be put in place and properly monitored at the STP and SPS sites to prevent unauthorised access by the general public, wildlife, or livestock.	Contractor/RVC
As operator of the sewerage scheme infrastructure, RVC should provide a 24-hour telephone number so that any issues relating to the operation of the new infrastructure can be clarified and complaints dealt with by those able to respond.	RVC

6.2.2 Water Quality, Erosion and Sediment Control and Flooding

Action/Phase	Responsibility
Pre-construction	
The contractor is to develop a flood contingency plan as part of the CEMP, which describe the site-specific measures to be implemented for all works areas prior to the flood event (monitoring), during the flood event (evacuation and response) and post the flood event (assessment of damage and recovery).	Contractor
All personnel involved in construction works should be aware of the details of the works plans, legislation and associated pollution controls and the environmental sensitivity of the surrounding receiving waters before any works. All activities must be carried out with due diligence, duty of care and in accordance with best management practices.	Contractor
A detailed Erosion and Sediment Control Plan (ESCP) shall be prepared as part of the CEMP. The ESCP would describe the site specific measures to be implemented for all works areas, in accordance with the guidelines outlined in the 2004 Landcom publication *Managing Urban Stormwater: Soils and Construction*, 4th edition ("The Blue Book") and *Volume 2a Installation of Services*. The ESCP would need to be site-specific and would need to address the following issues to prevent erosion, sediment loss and water quality impacts: • Minimisation of disturbance to soil and water adjacent to, and within, all watercourses in the works area. • Identification of site specific sediment and erosion control measures wherever erosion is likely to occur, including around the drilling entry and exit points. • Identification of any environmentally sensitive areas on or near construction sites to ensure runoff is diverted away from sensitive areas. • Requirements for vegetation clearing to be kept to a minimum. • Retention of all surface runoff on-site and where possible stormwater from off site would be diverted around the construction site.	Contractor

Action/Phase	Responsibility
• Backfilling and stabilising of trenches once pipelines are installed. • Location of construction compounds (at least 50m from any drainage lines). • Location and management of stockpiles, such as locating stockpiles away from any drainage lines near the works areas. • Regular inspection of all erosion and sediment controls, especially when rain is expected and directly after any rain events.	
The CEMP would incorporate a pollution incident response management plan that defines appropriate procedures for the management and notification of pollution incidents in accordance with s. 147 to 153 of the POEO Act. The EPA is to be notified immediately of any pollution incidents or harm to the environment (as defined under Part 5.7 of the POEO Act).	Contractor
Workers are to be made aware of the provisions of Section 120 of the POEO Act with regards to water pollution.	Contractor
A drilling management plan / procedures would be developed as part of the CEMP to detail the appropriate management and disposal of drilling slurry to avoid off site impacts. This would include requirements that: • All sludge and drilling medium extracted is to be removed from the site. • The site where the sludge would be disposed of would require bunding and appropriate treatment until the sludge is considered to be safe for disposal or re-use.	Contractor
Construction	
A site-specific spill management plan would be prepared and include the following requirements: • Emergency spill kits are to be kept at the site (vehicle kits). • Refueling of machinery to be undertaken in a dedicated area within the construction compound appropriately protected as outlined in the spill management plan.	Contractor

Action/Phase	Responsibility
• Any chemicals and fuels are to be stored in a bunded area at least 50 metres from any waterway or drainage line. • Any hazardous materials stored on site would be stored in the compounds and within impervious and bunded enclosures capable of storing 120% of the volume of material stored there. • Workers would be trained in the spill management plan and the use of the spill kits.	
The drill operator must be appropriately experienced and licensed.	Contractor
Monitor the Bureau of Meteorology (BoM) online Flood Warning Service and latest river heights to determine whether rainfall in the catchment is predicted to cause flooding at the site during the construction phase.	Contractor
If flood events occur during construction, the construction contractor should prepare the site prior to the commencement of the flood event (i.e. secure / remove machinery and equipment that are likely to be inundated or damaged and remove chemicals from flood prone areas).	Contractor
Works should not be scheduled when heavy rainfall is forecast and works involving soil disturbance should not take place during heavy rainfall periods, other than work necessary to stabilise the site.	Contractor
Any excess spoil would be either spread across the ground in nearby areas in such a manner as to avoid creating an erosion hazard removed off site for disposal in accordance with RVC and EPA requirements.	Contractor
All stockpiles of materials would be protected from scour and erosion.	Contractor
Access tracks would be designed so as to provide adequate drainage and stormwater control.	Contractor
If the works are considered likely to encounter groundwater therefore mitigation measures to manage groundwater would be incorporated into the CEMP, including: • Dewatering techniques during excavation; • Measures to ensure groundwater quality is not impacted during construction;	Contractor

Action/Phase	Responsibility
• Techniques to settle, treat or filter groundwater encountered during excavation works i.e. diverting groundwater through baffle tanks or filter membranes; and • Appropriate treatment and monitoring regimes in the event that groundwater flows come to the surface, including disposal of groundwater in such a way as to prevent adverse impacts (such as erosion and water pollution). Groundwater should not be discharged to a waterway during construction.	
Where less than 3 ML of groundwater is dewatered during the works. An water supply works approval for pumped dewatering would be required form DCCEEW -Water. The volume of water extracted during dewatering should be recorded daily and an aquifer interference activity WAL exemption should be lodged through DCCEEW - Water (NRAR) by the construction contractor on behalf of the proponent on the completion of works (Further information is available at Groundwater access licence exemptions | Water (nsw.gov.au)). If more than 3 ML of groundwater is anticipated to extracted during the works, an aquifer interference WAL approval and associated water supply works approval for pumped dewatering would be required from DCCEEW - Water prior to the commencement of works.	Contractor
All areas where ground disturbance has occurred would be stabilised following completion of works to ensure there is no erosion hazard and restored to their pre-construction condition. This would involve, where required, reshaping the ground surface, covering it with topsoil excavated from the site and re-establishing an appropriate vegetation cover (this may include respreading dead accumulated or cleared vegetation where possible).	Contractor
Operation	
During operation of the pipelines, any water containing silt and sediment generated as a result of scouring pipelines would be treated (if required) and disposed of as appropriate. Depending on the resultant water quality, this may involve discharge to a waterway or land application. Any water discharged to a waterway or recycled must be consistent with the requirements of the *Protection of the Environment Operations Act 1997*.	RVC

Action/Phase	Responsibility
A flood control system (EOone) should be adopted to protect the on-property PSS pumps from operating during flood events.	RVC
The Rappville STP onsite recycled water reuse irrigation system must be operated in accordance with the *Rappville Recycled Water Irrigation Management Plan - Section 3 Standard Operational procedures* document prepared by Agsol (2023).	RVC

6.2.3 Biodiversity

Action/Phase	Responsibility
Pre-construction	
The heritage listed trees in Nandabah Street must be assessed by a certified and experienced arborist to advise on protection measures and safeguards from trenching during construction works. This advice must be completed by the contractor prior to finalisation of the construction methodology and remarks and protection measures included in the CEMP. Council should be advised on the outcome of the arborist assessment to demonstrate that heritage trees will not be unduly impacted.	Contractor
The extent of the Proposal works must be clearly pegged/marked on site by a registered surveyor, consistent with final approved plans/designs so that potential impacts to vegetation or individual tree are minimised.	Contractor
Construction	
Vegetation removal (including any pruning) must be completed sensitively using appropriate equipment and to the minimum extent necessary.	Contractor
Wherever construction requirements permit, native trees should be retained wherever possible (eg. within the Myrtle Creek Road reserve).	Contractor
If lopping or pruning of any vegetation is required, it must be completed by a certified and experienced arborist in accordance with AS 4970-2009 *Protection of trees on development sites.*	Contractor

Action/Phase	Responsibility
Laydown /storage areas must be stablished on cleared land/pasture where native trees are absent. Use of the Nandabah Street reserve where planted heritage listed tree occur is not suitable.	Contractor
Large logs and woody debris requiring removal within the STP site shall be completed sensitively and all material moved into adjacent areas to continue to serve as habitat.	Contractor
All trees within the road reserve and STP site should be subject to a pre-clearing survey by an ecologist to ensure that trees are not occupied by fauna. In the unlikely event that a Koala is present in a tree to be cleared, works must not continue, and 24 hrs must be provided for the animal/s to disperse into adjacent habitats. If the pre-clearing inspection does not determine any Koalas (or other fauna) are present, clearing works may proceed without further supervision NB. Removal of wattle regrowth within the STP may be required to enable better visibility and site access – a pre-clearing assessment is not required for this task).	Contractor
All hollow-bearing trees (HBT) must be clearly marked by an ecologist prior to clearing and a two-stage clearing procedure implemented such that any HBT are cleared after all other vegetation is removed, with a minimum of 24 hrs between clearing events. A spotter-catcher must be present during the removal of any HBT in the event that wildlife is present and require relocation or veterinary care.	Contractor
Compensatory nest boxes shall be installed within retained mature trees at the STP site. Host trees must be semi mature and in good condition. Nest boxes shall be installed a ratio of 1:2 – ie. as two hollow-bearing trees are removed, four (4) nest boxes shall be installed. Sizing of nest boxes should be suitable for small parrots and microbats.	Contractor
Any animals injured during the clearing work should be collected and taken to a local veterinarian or wildlife carer.	Contractor
The works should be planned and staged to ensure that long sections of trench are not left open. If left open overnight: • the pipeline trench should be inspected for entrapped animals (such as ground traversing native species – reptiles, frogs, mammals).	Contractor

Action/Phase	Responsibility
• options to permit entrapped animals to escape (e.g. hessian bags, long branches, 'ladders') should be placed within the trench.	
Vehicles and machinery should be stored and parked in cleared areas away from trees.	Contractor
The storage of materials and stockpiling of equipment should also occur within sites/areas that have been previously disturbed and cleared.	Contractor
Measures must be implemented during construction works so that machinery and plant do not introduce weed seed or propagules to the site (eg. by adoption and implementation of the 'Arrive Clean, Leave Clean' guidelines [DoE 2015]). This measure is particularly relevant for the notifiable species Tropical Soda Apple.	Contractor
Operation	
Any landscaping or screening at the STP site should utilise locally endemic species including trees such as Spotted Gum, Grey Box, Forest Red Gum, Flax-leaved Paperbark (refer to the species inventory within the biodiversity assessment in Appendix B for guidance).	Contractor/RVC
Post-development, the pipeline alignments, STP and SPS sites should be regularly monitored to manage any occurrences of weeds and other non-native species.	RVC

6.2.4 Bushfire

Action/Phase	Responsibility
Pre-construction	
Design of the above ground infrastructure at the SPS should take into consideration the potential bushfire risk at the site, in accordance with the relevant principles of the RFS publication *Planning for Bushfire Protection 2019*.	RVC
Construction	

Action/Phase	Responsibility
Class 10a building used by the STP operator(s) shall be constructed to BAL – 29, as per *AS3959:2018 'Construction of Buildings in Bushfire-prone Areas'* section 3 – Construction General and section 7 – Construction Requirements, in addition to the NSW variations detailed in section 7.5.2 of PBP 2019 and the National Construction Code.	Contractor
Where any associated structure is situated within 6 m of STP buildings, it is recommended that structure is also constructed to BAL-29.	Contractor
It is recommended that fencing and gates at the STP site should be made of non-combustible materials and comply with section 7.6 of PBP 2019.	Contractor
A water supply of at least 20,000 L, with a 65mm Storz valve, should be available at the STP site for firefighting purposes.	Contractor
All above-ground water service pipes external to the STP sheds should be metal, including and up to any taps.	Contractor
For all Static Water Sources (SWS): Where a tank is used for this purpose, it must be non-combustible & have a 65 mm Storz valve installed, or underground tanks must have an access hole of 200 mm to allow tankers to refill direct from the tank; • Where pumps are provided, they are a minimum 5 hp or 3 kW petrol or diesel-powered pump and are shielded against bush fire attack; • Ball valve and pipes are adequate for water flow and are metal; • Supply pipes from tank to ball valve have the same bore size to ensure flow volume; • All exposed water pipes external to the building are metal, including any fittings; • A hardened ground surface shall be provided within 4 m of the water supply to allow access for firefighting vehicles, and the connection for firefighting purposes is located within the IPA or non-hazard side, and away from the building.	Contractor

Action/Phase	Responsibility
Where practicable, electrical transmission lines are underground; and Where overhead, electrical transmission lines are proposed as follows:• • Lines are installed with short pole spacing of 30 m, unless crossing gullies, gorges, or riparian areas; and • No part of a tree is closer to a power line than the distance set out in I*SSC3 Guideline for Managing Vegetation Near Power Lines.*	Contractor
Reticulated or bottled gas (if required) should be installed and maintained in accordance with AS/NZS 1596:2014 - The storage and handling of LP Gas, and the requirements of relevant authorities, and metal piping is used. • All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side. • Connections to and from gas cylinders are metal. • Polymer-sheathed flexible gas supply lines are not used; and • Above-ground gas service pipes are metal, including and up to any outlets.	Contractor
Construction staff to be made aware of the location of the proposed works in bushfire prone land and the potential for bushfire risk.	Contractor
During high to catastrophic bush fire danger rating days, no construction activities would be undertaken that pose a risk of starting a bushfire (e.g. welding).	Contractor
Operation	
A defendable space (Asset Protection Zone (APZ)) of 10m should be provided around the Class 10a buildings to allow for firefighting activities.	RVC/Contractor
The defendable space (APZ) shall be maintained as an Inner Protection Area (IPA) and must comply with *Appendix 4 – Asset Protection Zone Requirements* (PBP 2019).	RVC

Action/Phase	Responsibility
A clear area of low-cut lawn or pavement should be maintained adjacent to the STP sheds.	RVC
Trees and shrubs near the STP sheds should be located so that: • The branches will not overhang the roof; • The tree canopy is not continuous; and • Any proposed windbreak is located on the elevation from which fires are likely to approach.	Contractor/RVC
No maintenance activities should be undertaken at the STP or SPS sites which pose a risk of starting a bushfire during high to catastrophic risk bush fire danger rating days.	RVC

6.2.5 Aboriginal Heritage

Action/Phase	Responsibility
Pre-construction	
The Proposal may proceed at the study area with no further archaeological investigation. The Proposal and all land and ground disturbance activities must be confined to inside the study area. Should the Proposal extent outside the study area then further archaeological assessment may be required.	RVC/Contractor
Construction	
All staff and contractors involved in the proposed work should be made aware of legislative protection under the NPW Act for all Aboriginal sites and objects, and the contents of the Unanticipated Finds Protocols.	Contractor
This assessment has concluded that Aboriginal objects are unlikely to be harmed by the proposed works. However, if during works, Aboriginal objects, artefacts, or skeletal material are noted the Unanticipated Finds Protocol should be followed (Refer to Appendix B of the ADDA provided in Appendix C) .	Contractor

6.2.6 Historic Heritage

Action/Phase	Responsibility
Pre-construction/Construction	
Construction staff would be made aware that archaeological relics are protected under the *Heritage Act 1977*. In the event that any relics are discovered during the course of the works, work would cease in the affected area and a qualified archaeologist and/or Heritage NSW would be contacted.	Contractor
The contractor shall undertake pre-construction works dilapidation reporting and vibration monitoring during construction works for identified built heritage items in the Rappville village area which are potentially susceptible to indirect impact from the proposed works. If damage or risk to the heritage item is identified, vibratory activities should cease and alternative work methods should be implemented so that vibration impacts are reduced to acceptable levels.	Contractor
Listed built and landscape heritage items in the Rappville village area as shown in Figure 5.7 of the REF must be fenced off to prevent impacts during adjacent construction works. The heritage listed trees located along the Nandabah Street and Murray Street, must be fenced off and protected in accordance with AS 4970-2009: *Protection of trees on development sites* to prevent damage during construction works.	Contractor

6.2.7 Noise and Vibration

Action/Phase	Responsibility
Pre-construction	
The new STP and SPS would be designed to comply with the *Noise Policy for Industry (EPA, 2017)*.	RVC
The contractor is to undertake a risk assessment to identify buildings and structures, in the Rappville village area, particularly buildings with heritage significance, that have the potential to be affected by vibration and consider undertaking pre-dilapidation survey/report for the heritage structures if located in close proximity to construction	Contractor

Action/Phase	Responsibility
works. These surveys are used to address potential community concerns that perceived vibration may have caused damage to property.	
Community notification would be undertaken where appropriate and where work is likely to cause vibration or offensive noise and impact the public and nearby residents.	RVC /Contractor
Construction	
Works would be undertaken during normal work hours i.e. 7am to 6pm Monday to Friday; 8am to 1pm Saturdays; and no work would be undertaken on Sundays, Public Holidays or outside these work hours without notification to the affected community and EPA. Notification would provide the following details: • The locations and types of surrounding receivers likely to be affected; • The nature of the proposed works; • The noise characteristics of any powered equipment likely to be used; • Measures to be taken to reduce noise emissions; and • Any other information EPA may request. • All reasonable practical steps shall be undertaken to reduce noise and vibration from the site.	Contractor
Control measures to minimise noise and vibration impacts on adjoining land would be implemented during construction as part of the contractor's CEMP, which would require review by RVC prior to commencement of works. The CEMP would address site specific issues, including limited work hours and noise and vibration reduction practices, taking into consideration DECCW's Interim Construction Noise Guideline (in particular Tables 4 – 10) and Assessing Vibration: A Technical Guideline (in particular mitigation measures in Section 3). Mitigation measures to minimise noise and vibration impacts may include the following:	Contractor

Action/Phase	Responsibility
• Optimum siting of work areas, vehicle and plant parking areas, materials stockpiles and equipment storage areas in locations where potential acoustic and vibration impacts would be minimised; • Regular maintenance of all plant and machinery used for the Proposal; • Identify locations where construction noise and vibration is most intrusive and develop strategies to reduce impacts for these areas.	
Work generating high noise levels should be scheduled during less sensitive time periods if practicable.	Contractor
Noise generating activities with impulsive, tonal or low frequency characteristics (such as rock breaking, etc) should only be carried out: • in continuous blocks, up to but not exceeding 3 hours each; and • with a minimum respite period of one hour between each block.	Contractor
Use quieter and less noise emitting construction methods where feasible and reasonable.	Contractor
All plant and equipment to be appropriately maintained to ensure optimum running conditions, with periodic monitoring.	Contractor
Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be limited/ avoided where possible.	Contractor
The offset distance between noisy plant and adjacent sensitive receivers is to be maximised where practicable.	Contractor
Plant/machinery used intermittently to be throttled down or shut down when not in use where practicable.	Contractor
Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.	Contractor
Non-tonal reversing beepers (or an equivalent mechanism) should be fitted and used on all construction vehicles and mobile plant regularly used on site for periods of over two months where practicable.	Contractor

Action/Phase	Responsibility
Where reasonable and feasible, use structures to shield residential receivers from noise such as: • site shed placement; • earth bunds; • temporary or mobile noise screens (where practicable) • enclosures to shield fixed noise sources such as pumps, compressors, fans etc (where practicable); and • consideration of site topography when situating plant.	Contractor
High noise generating plant and equipment, such as rock hammers, should be used only when required (if hard rock is encountered).	Contractor

6.2.8 Air Quality

Action/Phase	Responsibility
Pre-construction	
Construction vehicles and equipment would be suitably serviced within the six-month period prior to commencement of construction activities and all necessary maintenance undertaken during the construction period to meet EPA air quality requirements.	Contractor
Construction	
All construction machinery/plant would be turned off when not in use to minimise emissions.	Contractor
Construction contractors would monitor dust generation potential.	Contractor
Dust suppression methods including the use of water carts would be applied where required (i.e. on windy days when earthworks and vehicle movements are generating dust).	Contractor
Any stockpiled spoil/fill would be protected to minimise dust generation to avoid sediment moving offsite.	Contractor
Vehicles transporting spoil from the sites would be covered.	Contractor

Action/Phase	Responsibility
Operation	
Good management procedures are to be documented in an Odour Management Plan (OMP) for the STP and SPS. The OMP should outline the management structure and strategies for odour performance during the operation of the STP and SPS. The OMP should be developed as per the recommendations of the *NSW Best Practice Odour Guideline* (NSW Department of Planning, 2010) and include procedures for the registration and investigation of complaints.	RVC

6.2.9 Traffic and Access

Action/Phase	Responsibility
Pre-construction	
The contractor would prepare a Traffic Management Plan (TMP) as part of the CEMP, to be reviewed by RVC prior to commencement of works. The TMP would include measures to minimise traffic impacts ensure public safety and would be prepared in accordance with: ▪ *TfNSW's Traffic Control at Work Sites Manual, (February 2022), and* ▪ *Australian Standard 1742.3 - 2009 Traffic Control for Works on Roads.*	RVC/Contractor
Prior to the commencement of works, existing access tracks and roads that would be used by heavy vehicles would be assessed for adequacy and upgraded where necessary. Any upgrades would be subject to further impact assessment if the upgrades extend outside the existing road alignment. Appropriate drainage would be provided for any unsealed tracks utilised during the works to ensure that vehicle movements do not cause erosion and sedimentation of nearby waterways.	Contractor
Construction	
Any disturbance to landowners as a result of vehicle movements and noise would be minimised by adhering to the working hours outlined in Section 5.8.3 of the REF. The contractor would avoid any	Contractor

Action/Phase	Responsibility
inconvenience to residences/landowners, and all access gates would be in their original condition following completion of the works.	
Any temporary access tracks required for the works would be located so as to minimise disturbance to the existing environment, with preference given to traversing and driving over ground cover and understorey vegetation, as opposed to clearing it, to facilitate vegetation regeneration post-works. Following completion of the works the temporary tracks would be removed, topsoil provided and re-grassed. Damage to existing tracks would be restored after completion of the works.	Contractor
Trucks would not access the sites in weather conditions that would cause damage to ground surface or properties.	Contractor
All traffic would comply with all applicable traffic laws and regulations including speed limits. All construction vehicles would comply with the speed limits set for the roads accessing the site.	Contractor

6.2.10 Waste Management

Action/Phase	Responsibility
Construction	
The contractor undertaking the works would detail waste management procedures in a Waste Management Plan to be incorporated into the CEMP. The contractor is to assume responsibility for the appropriate disposal of any waste generated. Adequate procedures should be established and detailed in the CEMP, including notification requirements to EPA for incidents that cause material harm to the environment. The WMP would also follow the resource management hierarchy principles embodied in the *Waste Avoidance and Resource Recovery Act 2001*. Namely, to: • avoid unnecessary resource consumption; • recover resources (including reuse, reprocessing, recycling and energy recovery); and • dispose (as a last resort).	Contractor

Action/Phase	Responsibility
Any required concrete would be mixed off-site and transported to the construction areas. Excess concrete would be removed off-site for recycling.	Contractor
All waste removed from works sites, including waste from drilling operations, would be classified as per the *Waste Classification Guideline: Part 1* (EPA 2014) and disposed of appropriately, and all non-recyclable waste would be disposed of at an appropriate licensed waste disposal facility.	Contractor
If any contaminated material is encountered during earthworks, work shall cease, the site secured, and a safe work method statement(s) and appropriate practices shall be implemented. Any contaminated material would be classified first and then stored, transported and disposed of in accordance with EPA requirements at an EPA licensed waste facility.	Contractor
Cleared vegetation (devoid of weeds) would be spread out on site or alternatively disposed of off site in accordance with EPA requirements.	Contractor
All equipment should be cleaned of soil and vegetation before being brought to the site to minimise the risk of spreading weeds.	Contractor
Any noxious or controlled weeds must be controlled and disposed of at a landfill site in accordance with EPA requirements and not mixed with soil to be reused on site or elsewhere.	Contractor
If practicable, surplus excavated materials/fill would be reused onsite as part of rehabilitation and restoration works. Any surplus spoil disposed of in this manner would be seeded to minimise the likelihood of it being transported offsite through wind or water action.	Contractor
Operation	
Waste management practices during operation of the STP would follow the resource management hierarchy principles embodied in the *Waste Avoidance and Resource Recovery Act 2001*. These practices include avoiding unnecessary resource consumption, recovery of	RVC

Action/Phase	Responsibility
resources (including reuse, reprocessing, recycling and energy recovery) and disposal to a licensed landfill (as a last resort). Where feasible, operational waste would be recycled in accordance with the *NSW Government Resource Efficiency Policy 2014*.	
Biosolids would be managed in accordance with a Biosolids Management Plan to be prepared for the STP.	RVC
Biosolids management would be consistent with the EPA's *Environmental Guidelines: Use and Disposal of Biosolids Products* (EPA, 2000).	RVC
Land application of biosolids (if proposed) should be controlled to prevent any off-site migration.	RVC
The STP's onsite treated effluent reuse irrigation system should operate in accordance with the requirements of the *Rappville Recycled Water Irrigation Management Plan* (Agsol,2023) and Environmental Guidelines: Use of Effluent by Irrigation (DEC, 2004).	RVC

6.2.11 Visual Amenity

Action/Phase	Responsibility
Construction	
The clearing of vegetation would be kept to the minimum required for the works.	Contractor
Construction compounds and areas for the parking of vehicles and storing of equipment would be located in cleared areas wherever possible.	Contractor
Operation	
Replanting of suitable replacement trees (endemic native species) within the local area should be considered to compensate for up to 90 trees to be removed along Myrtle Creek Road for the Proposal.	Contractor/RVC

Action/Phase	Responsibility
A row of trees (an endemic native variety) should be planted along the outer side of the security fencing at the SPS site to provide a visual screen for the SPS from the property's street frontage.	Contractor/RVC
A 3 m wide planting (vegetation) strip must be retained/planted along the boundary of the STP site.	Contractor/RVC

6.2.12 Utilities and Infrastructure

Action/Phase	Responsibility
Pre-construction	
The final design plans for works with ARTC land are to be supplied to ARTC for concurrence prior to the commencement of construction works.	RVC
Construction	
Works within ARTC land must be undertaken in accordance with Australian Standard AS4799-2000 ARTC Standards ETG-17-01. Where conflict exists between the two standards the standard providing the greater degree of protection to ARTC assets will apply.	Contractor
Utilities and services which may be impacted by the Proposal would be accurately located prior to commencement of works using Before You Dig Australia (BYDA) and confirmed by physical location and marking prior to construction.	Contractor
Utility and telecommunications infrastructure service providers would be consulted prior to the commencement of and during construction works.	Contractor

7 Conclusion and Recommendations

7.1 Conclusion

Rappville currently has on site sewerage management systems and households rely on septic tanks to dispose of sewage waste. The existing onsite sewerage management systems were damaged during significant bushfires which impacted Rappville in 2019. To ameliorate the risks associated with the existing on site sewerage management systems, RVC plans to install a new reticulated sewerage scheme for the village. Package 1 of the Rappville Sewerage Scheme comprises the construction of a sewer rising main, village reticulation network with on-property pressure sewerage systems and a new sewage pump station to provide sewerage services to the Rappville village. While Package 2 works would include construction of the new Rappville STP.

The Proposal would result in short term impacts such as increased noise, dust and traffic and a reduction in community amenity for the residents and users of local roads during the construction phase. However, the works are temporary and are able to be managed to minimise impacts. It is anticipated that the Proposal would benefit the local community by removing their reliance on septic tanks and issues associated with the current on-site septic systems.

Investigations into the Aboriginal cultural heritage impacts of the Proposal have been undertaken, including an Aboriginal Due Diligence Assessment (see Appendix C). The ADDA determined that an AHIP would not be required and that works may proceed without further assessment.

A Biodiversity assessment report prepared for the works found that the Proposal would be unlikely to impact any listed threatened species, fauna populations or ecological communities, provided appropriate mitigation measures are implemented.

Given that the works predominantly comprise underground sewerage system pipelines, a SPS and on-property PSS units and associated infrastructure in previously disturbed areas and a new STP constructed at a site located over 2 km south of Rappville village which has been subject to previous rural land use and bushfire disturbance; adverse environmental impacts potentially associated with the operational phase of the Proposal are expected to be minimal. Potential operational impacts of the STP and SPS, such as odour or noise impacts, have been mitigated as part of the design.

This REF has been prepared in accordance with Sections 5.5 and 5.7 of the *Environmental Planning and Assessment Act 1979* and Section 171 of the *Environmental Planning and Assessment Regulation 2021*. It provides a true and fair assessment of the proposed activity in relation to its likely effects on the environment, it addresses to the fullest extent

possible all matters affecting or likely to affect the environment as a result of the proposed activity.

Based on the information in this REF, it is concluded that:

(1) the proposed activity is not likely to have a significant impact on the environment and therefore an Environmental Impact Statement is not required.

(2) the proposed activity is not likely to significantly affect threatened species, populations, ecological communities, or critical habitat. Therefore, a Species Impact Statement (SIS) / Biodiversity Development Assessment Report (BDAR) is not required

(3) the proposed activity is not likely to affect any Commonwealth land, is not being carried out on Commonwealth land, or significantly affect any Matters of National Environmental Significance.

The proposed activity is recommended to proceed subject to implementation of the measures to avoid, minimise or manage environmental impacts listed in this REF.

7.2 Recommendations

It is recommended that the Proposal for the Rappville Sewerage Scheme be approved with the following condition:

- a CEMP would be developed for the Proposal incorporating the mitigation measures outlined in Section 6 of this REF and any other appropriate environmental management measures. The CEMP must be reviewed and approved by RVC prior to the commencement of construction.
- An OEMP would be developed for the Rappville STP, incorporating the mitigation measures outlined in Section 6 of this REF and any other appropriate operational environmental management measures and procedures. The OEMP must be reviewed and approved by RVC prior to the commencement of operation of the STP and Rappville reticulated sewerage scheme.

.

8 References

Agsol, 2023, *Rappville Recycled Water Irrigation Management Plan – Sections 1-3.*

Australian Standard *AS2436-2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites.*

Australian Wetlands Consulting, 2022, *Rappville Sewerage Scheme Augmentation Biodiversity Assessment.* Project #221645b

Brunker R.L. and Chesnut W.S., 1976, *Grafton 1:250 000 Geological Sheet* SH/56-06, 1st edition, Geological Survey of New South Wales, Sydney

DEC, 2006, *Assessing Vibration: A Technical Guide.*

DECCW, 2009, *Interim Construction Noise Guideline.*

DPINR, 2004, *Guideline for the Preparation of Environmental Management Plans.*

NSW Public Works, 2022, *Rappville Sewerage Scheme Augmentation Aboriginal Due Diligence Assessment Report.* Report Number: P-FY20210016-PWO-ENV-RP-0002-A0

Public Works Advisory, 2021, *Rappville Sewerage Scheme Options Report.* Report Number: WSR21004

SLR Consulting, July 2023, *Rappville Sewerage Scheme Pumping Station, Odour Impact Assessment.* SLR Project No.: 610.030930.00001

SLR Consulting, November 2023, *Rappville Sewerage Treatment Plant, Odour Impact Assessment.* SLR Project No.: 610.030930.00001

Appendix A – Consideration of Section 171

Section 171 of the EP&A Regulation 2021 indicates, for purposes of Part 5 of the Act, the factors that must be taken into account when consideration is being given to the likely impact of an activity on the environment.

A determining authority is only required to consider the following matters where an EIS has been prepared for a Part 5 activity under the EP&A Act. However, the following information is provided to assist determining authorities in making determinations consistent with those made for an activity requiring preparation of an EIS.

The various factors and findings following environmental assessment are presented below.

(a) the environmental impact on the community,

There is the potential for some minor and temporary noise, dust and traffic and access impacts during construction works for the sewerage scheme. Suitable mitigation measures will be employed to minimise such impacts.

(b) the transformation of the locality,

The proposed construction of the STP and SPS would result in a minor transformation of an existing, previously cleared and undeveloped area. However, the STP would be constructed is an area with few surrounding visual receptors outside of the village and the SPS would be consistent with the surrounding built environment and the new structure is not expected to result in a significant transformation of the locality.

(c) the environmental impact on the ecosystems of the locality,

Mitigation measures have been proposed to minimise impacts on the sensitive ecosystems of the locality, including aerial pipeline crossings of creek lines. No significant impact to threatened species or ecosystems is anticipated.

(d) reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality,

None identified.

(e) the effects on any locality, place or building that has -

(i) aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance, or

(ii) other special value for present or future generations

The Proposal sewerage scheme works would not impact Aboriginal cultural or historic heritage values. Mitigation measures have been identified to minimise impacts on the heritage listed trees on Nandabah Street and the SPS has been located to avoid impacts on this heritage item.

(f) the impact on the habitat of protected animals within the meaning of the Biodiversity Conservation Act 2016,

Mitigation measures have been proposed to minimise impacts on the sensitive ecosystems of the locality, including aerial crossings of two water courses. No significant impact to threatened species is anticipated.

(g) the endangering of a species of animal, plant or other form of life, whether living on land, in water or in the air,

No significant impact to threatened species is anticipated.

(h) long-term effects on the environment,

None identified

(i) degradation of the quality of the environment,

Temporary and minor degradation of the quality of the environment during the construction phase which would involve shrubs, immature trees and groundcover vegetation clearing and excavation works. The works would result in some short-term impacts including construction noise and dust during the construction period. Control measures to minimise these impacts would be implemented during construction as part of the contractor's Construction Environmental Management Plan (CEMP).

(j) risk to the safety of the environment,

There are minor potential traffic safety risks to construction staff, residents and visitors in the vicinity of road reserves and village areas during construction of the Proposal. However, control measures to minimise this safety risk would be implemented during construction as part of the contractor's TMP.

(k) reduction in the range of beneficial uses of the environment,

None identified.

(l) pollution of the environment,

There is the potential for some minor and temporary noise and air pollution during the construction works. With the implementation of appropriate mitigation measures during construction there would be no long term or significant pollution of the environment.

(m) environmental problems associated with the disposal of waste,

None identified as minimal waste is predicted. All construction waste would be taken off site for disposal at a licensed landfill. The Contractor would prepare a Waste Management Plan to ensure waste is managed appropriately during construction works, so as not to cause off-site impacts

(n) increased demands on natural or other resources that are, or are likely to become, in short supply,

None identified.

(o) the cumulative environmental effect with other existing or likely future activities,

None identified.

(p) the impact on coastal processes and coastal hazards, including those under projected climate change conditions.

Not applicable.

(q) applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1.

The provision of a reticulated sewerage scheme by RVC for Rappville village is considered to be compatible with RVC's Local Strategic Planning Statement: Beyond 20-20 Vision: Theme 1 – Our Community, Planning Priority 2 Align Development, Growth and Infrastructure (RVC, May 2020). The Proposal is also considered consistent with Direction 21: Coordinate local infrastructure and Direction 24: Deliver well-planned rural residential housing areas of the *North Coast Regional Plan 2036.*

(r) other relevant environmental factors.

None identified.

Appendix B – Biodiversity Assessment



Rappville Sewerage Scheme Augmentation

Biodiversity Assessment

Client	: Department of Regional NSW – Public Works
Prepared by	: Australian Wetlands Consulting Pty Ltd
Project #	: 221645
Date	: December 2022

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AWC



Rappville Sewerage Scheme Augmentation

Biodiversity Assessment

Project control

Project name: **Rappville Sewerage Scheme Augmentation**
Biodiversity Assessment

Project #: 221645
Client: Department of Regional NSW – Public Works
Contact: Kristen Parmeter

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AWC's management system has been certified to ISO 9001.

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Executive Summary

This Biodiversity Assessment has been completed on behalf of NSW Public Works for the proposed Rappville Sewerage Scheme to replace existing onsite systems affected by the October 2019 bushfires. Components of the scheme ('the Activity') include:

- Construction of a new pressure reticulation system throughout the village and 2.4 km long rising main
- Construction of a new sewage pump station opposite the Commercial Hotel on Nandabah Street
- Construction of a new oxidation pond STP and irrigation (reuse) of treated effluent within the STP site (Lot 160 DP755260).

This assessment supports a Review of Environmental Factors (REF) for the project, prepared under part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and submitted to Richmond Valley Council (RVC).

Field assessment confirmed that:

- Vegetation at the site is highly disturbed and modified
- Several native vegetation communities occur, the most prominent being plant community type (PCT) *1209 Spotted Gum - Grey Box - Grey Ironbark dry open forest of the Clarence Valley lowlands of the NSW North Coast Bioregion* and *PCT 837 Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the NSW North Coast Bioregion*
- No threatened flora species were recorded
- Two Threatened Ecological Communities (TECs) listed in the BC Act occur – Subtropical Coastal Floodplain Forest, Freshwater Wetlands.
- One TEC listed in the EPBC Act occurs - the recently listed community 'Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions'.
- Two threatened fauna species were confirmed (Little Lorikeet, Grey-crowned Babbler). Based on the habitat present and the site location there is potential for several additional threatened fauna species to occur on an opportunistic or seasonal basis.

Biodiversity impacts from the Activity (refer **Section 5.1**) are likely to include:

- Loss of native vegetation (refer **Table 5.1**):
  - removal of all trees (n = 90) within the eastern road reserve of Myrtle Creek Road (PCT 837, PCT 1209)
  - removal of scattered trees and wattle regrowth within Lot 160 (northern portion only) – approximately 4 ha (PCT 1209 – disturbed)
- Impact to an area representative of the TEC 'Subtropical coastal floodplain forest' (albeit in a highly disturbed and modified state) such that loss of 34 trees (and minor regrowth) within Myrtle Creek Road reserve over an area of ~ 0.39 ha would occur. This community is analogous with the federally listed community 'Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions'.
- Loss of two hollow-bearing trees (Lot 160)
- Loss of numerous stags without hollows in Lot 160 and nine stags in the road reserve
- Disturbance of piled logs and debris (fauna habitat) along the boundary of Lot 160

- Noise and disturbance to fauna during construction (including to foraging habitat for the Grey-crowned Babbler)
- Potential for introduction of weed species to the road reserve and STP site.

Operation of the infrastructure would be unlikely have any biodiversity impacts other than an increase in noise and human disturbance within the STP during daylight hours. It is unlikely this minor disturbance would be significant in a local context.

Statutory assessment of the Activity has been completed with regard to:

- *Biodiversity Conservation Act 2016* (BC Act)
- *Fisheries Management Act 1994* (FM Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Statutory assessment determined that:

- No significant impacts would occur to threatened species or communities listed in the BC Act and hence a Biodiversity Development Assessment Report (BDAR) is not required.
- No significant impacts would occur to threatened species, populations or communities listed in the FM Act and hence a Species Impact Statement (SIS) is not required.
- Impacts on Matters of National Environmental Significance (MNES) in the EPBC Act are unlikely to be significant and referral to the Minister of the Environment is not required.

To minimise biodiversity impacts of the Activity, a range of recommendations have been prescribed (refer **Section 5.2**).

1 Introduction and Background

1.1 Introduction

Australian Wetlands Consulting (AWC) has prepared this Biodiversity Assessment for the proposed Rappville Sewerage Scheme to replace existing onsite systems affected by the October 2019 bushfires.

Components of the scheme ('the Activity') include:

- Construction of a new pressure reticulation system throughout the village and 2.4 km long rising main
- Construction of a new sewage pump station opposite the Commercial Hotel on Nandabah Street
- Construction of a new oxidation pond STP and irrigation (reuse) of treated effluent within the STP site (Lot 160 DP755260).

This assessment supports a Review of Environmental Factors (REF) for the project, prepared under part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and submitted to Richmond Valley Council (RVC).

This assessment has been prepared to:

- Identify the conservation values of the site inclusive of habitat for threatened species or communities listed in the *Biodiversity Conservation Act 2016* (BC Act) or *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- Identify any significant features of biodiversity importance
- Determine potential direct and indirect impacts of the proposal
- Assess the proposal against relevant statutory requirements.

1.2 The Site

The site comprises the village of Rappville, the eastern road shoulder of Myrtle Creek Road and the STP site within the northern portion of Lot 160 DP755260 (refer **Figure 1.1**). Site characteristics are as follows:

- Rappville village: urban land, vegetation mostly absent, minor landscaping/street trees within mown grassland along Nandabah Street
- Myrtle Creek Road: road reserve of 30m total width; disturbed road verge which is mostly cleared – some scattered trees and regrowth occur in the southern portion. Much of this area was affected by the 2019 bushfires. The road crosses two watercourses: Nandabah Gully and Myrtle Creek (both ephemeral watercourses)
- Lot 160: forested land, which was severely burnt in the 2019 bushfires. As a result, tree cover is very low (<10%) with a monoculture of dense wattle regrowth in the midstorey.

The site occurs within the Clarence Lowlands subregion of the South Eastern Queensland Bioregion as per the Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (refer Thackway & Cresswell, 1995). The site lies within two Mitchell landscapes: Grafton - Whiporie Basin; Clarence - Richmond Alluvial Plains.

1.3 Proposed Activity

The proposed Activity comprises the following (refer **Figure 1.1 and Appendix A**):

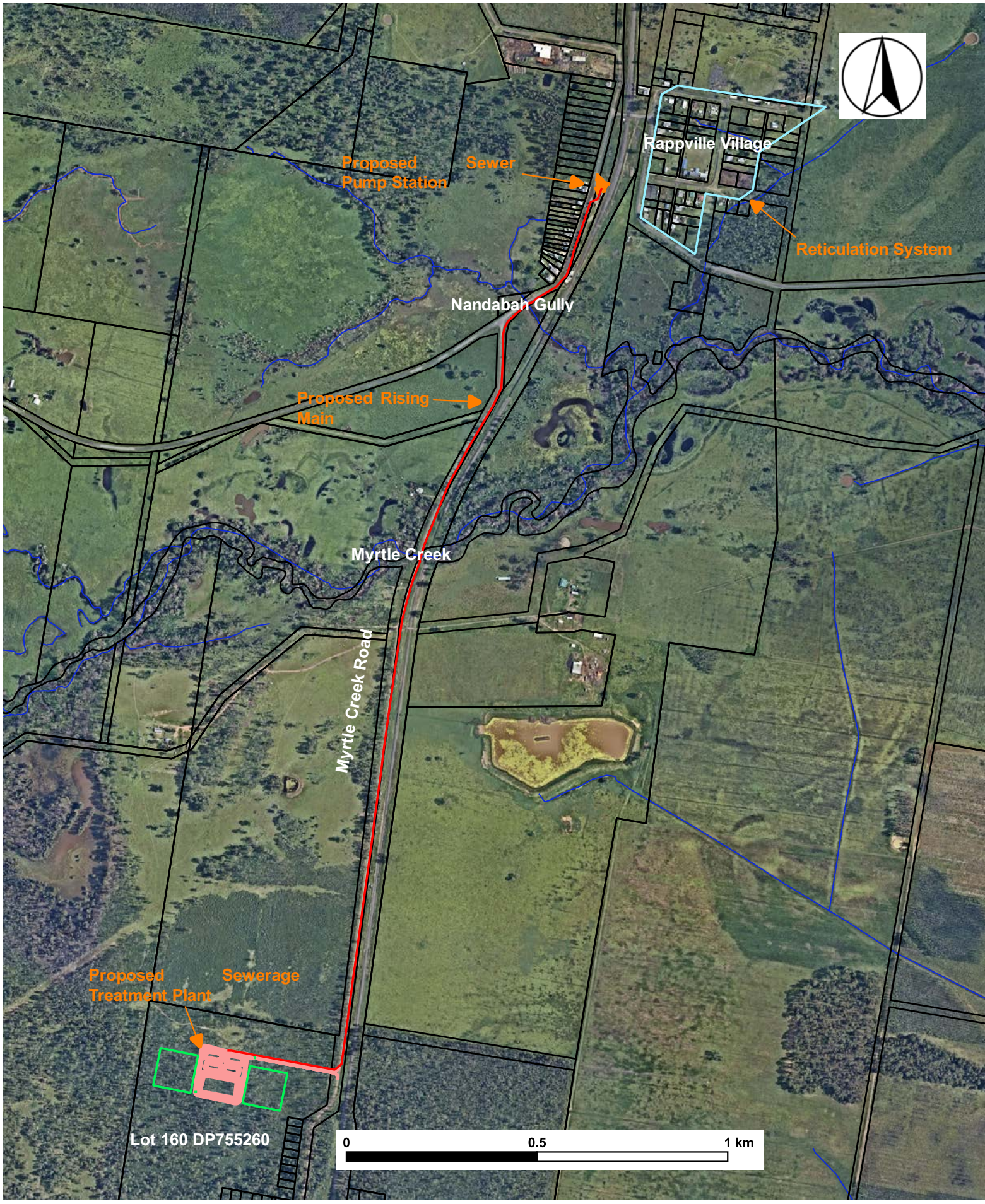
1. Construction of a new pressure reticulation system throughout Rappville village requiring a disturbance corridor of up to 4m width, including trenching of up to 1m width and between 0.7 – 1.2m depth. The reticulation pipeline is intended to be located in the village road reserve (unless in the circumstance that access to a property is particularly difficult). The reticulation network will be a pressure sewerage system (PSS); each residential and commercial property in the village will have a subsurface tank and pump installed in the front yard (on-property infrastructure = control/alarm panel, a collection tank containing the grinder pump, a property discharge line and property boundary assembly as part of the reticulation system.
2. Construction of a sewer pump station at Nandabah Street adjacent to the railway line. A construction footprint of approximately 615 m² will be required.
3. Construction of a 2.4 km long rising main on the eastern side of Myrtle Creek Road with trenching requirements as above.
4. Construction of Sewerage Treatment Plant (STP) at Lot 160: the northern portion of the allotment (~ 11 ha) has been identified for the STP and a concept design has been prepared which cover approximately 4 ha (refer **Appendix A**). The concept is subject to refinement and additional disturbance will be required for site access, drainage etc.

Vegetation removal will be required for all trenching works, hence all vegetation in the road reserve along Myrtle Creek Road will require removal. Planted heritage trees along Nandabah Street at the pump station will be retained insitu with this section of the rising main being underbored.

Two creek crossings (Mandarin Gully and Myrtle Creek) are required for the rising main – these may be underbored or pipes attached to existing bridges.

Laydown /storage areas for the project (including a project office/lunchroom) have not been established and will be selected by the construction contractor.

Construction works will be tendered in two or three packages – the STP, rising main, and the village reticulation system. The reticulation network is currently under design, while the STP layout is a concept only.



AWC

Disclaimer:
Care was taken in the creation of this map. AWC should be consulted as to the suitability of the information shown herein prior to the commencement of any works based on the information provided. AWC cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties expressed or implied as to the suitability of this map for a particular purpose. However, notification of any errors will be appreciated.

Legend

- Lot
- Waterways

Proposal

- Sewerage Treatment Plant
- STP Irrigation Area
- Rising Main Alignment
- Pump station
- Reticulation Network

A4 Scale 1:12,500
Coordinate System: MGA 56 Projection: Transverse Mercator

Figure 1.1 Site Plan

Data source:
Aerial - Nearmaps 2022
Cadraste - Sixmaps
Waterways - Sixmaps
Proposal - NSW Public Works

Date:7-12-22
Job No:221645
Drawn:ED
Checked:IC

2 Methods

2.1 Desktop Assessment

A desktop study was completed prior to field assessment to gather relevant information and data. The following databases and Geographic Information System (GIS) layers were searched/analysed:

- BioNet Atlas (DPE): 10 km x 10 km grid centred on the site (completed 07/07/2022)
- Protected Matters Search Tool (Department of Climate Change, Energy, the Environment and Water [DCCEEW]): 5km radius of the site (revised search completed 1/11/2022 to account for recent listings)
- Fisheries Spatial Data Portal.

2.2 Field Assessment

Field assessment was completed on 12/08/2022 with the following tasks completed within the project footprint:

- Mapping and assessment of vegetation communities and identification of threatened ecological communities (TECs)
- Targeted survey for threatened flora
- Opportunistic fauna survey based on visual or aural observations
- Survey and GPS of any hollow-bearing trees within the Activity footprint
- Inspection of bridges to assess roost suitability for microchiropteran bats
- Counts and identification of trees likely to be affected within the road reserve and ground-truthing of surveyed trees within Rappville village
- Transects surveys within the eastern boundary of Lot 160 for the aquatic herb *Rotala tripartita* (Endangered – BC Act). Potential habitat for this species is present, typical companion species occur, and there are scant records from the Casino locality.
- Targeted Koala scat survey within the STP site at Lot 160. A single plot was assessed using the Spot Assessment Technique (SAT), as per Phillips & Callaghan (2011); dense wattle regrowth and a scarcity of trees >10cm diameter at breast height (dbh) made further assessment difficult.

2.3 Survey Limitations

Survey effort was focused on the Activity footprint and adjacent habitats. The flora survey completed is considered adequate for determining vegetation communities at the site, their condition and conservation significance and determining the occurrence of threatened flora species.

Given the high levels of existing clearing and modification within the Rappville and the road reserve, the scope of assessment in this area is considered adequate. No private residences were assessed, and brief assessments were completed from the road reserve – residences are cleared and modified land with some landscaping – land of low biodiversity value. More targeted survey (hollow-bearing trees, SATs) within the proposed STP site is reflective of more intact forested environments which comprises potential habitat for threatened species, although this area is significantly compromised after the 2019 wildfires and is highly disturbed.

3 Flora

3.1 Desktop Assessment

3.1.1 BioNet Atlas and PMST Search Tool

BioNet returned confirmed records of five threatened flora species within the search area, including two species listed in the EPBC Act (refer **Table 3.1**). Habitat for numerous threatened ecological communities (including several listed in the EPBC Act) may occur within the locality (refer **Table 3.2**). PMST search results identified habitat for 12 threatened flora species and three threatened ecological communities within the search area (refer **Appendix B**).

Table 3.1 Threatened flora recorded within 5 km of the site

Scientific Name	Common Name	BC Act	EPBC Act	No. Records
Eucalyptus glaucina	Slaty Red Gum	V	V	41
Melaleuca irbyana	Weeping Paperbark	E		3
Oldenlandia galioides		E		2
Polygala linariifolia	Native Milkwort	E		3
Rhodomyrtus psidioides	Native Guava	CE	CE	1

E = Endangered; V = Vulnerable; X = Extinct

Table 3.2 Threatened ecological communities in the locality

Community	BC Act	EPBC Act
Coastal Cypress Pine Forest in the New South Wales North Coast Bioregion	E	
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	
Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community		E
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	E	
Lowland Rainforest of Subtropical Australia		CE
Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion	E	
Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion	E	
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	E
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E	

CE = Critically Endangered; E = Endangered; V = Vulnerable

3.1.2 Vegetation map review

The 'Trees Near Me' website depicts several vegetation communities in the locality of the Activity:

- *PCT 4046 Northern Lowland Swamp Turpentine-Red Gum Forest*: tall sclerophyll open forest with a mid-stratum of Melaleucas and soft-leaved species and a grassy ground layer, occurring on floodplains and low rises of the southern Richmond River and Lower Clarence valleys. *Lophostemon suaveolens* is almost always present in the canopy or sub-canopy, very frequently with red gums (*E. tereticornis, E. seeana*). Scattered *Eucalyptus siderophloia* and *Corymbia intermedia* are also occasionally present. A small tree layer includes a diverse range of species. Acacias are almost always present, *Alphitonia excelsa* and melaleucas are very frequent and *Glochidion ferdinandi* is common. The more frequent acacias and melaleucas are *Acacia aulacocarpa, Acacia disparrima* and *Melaleuca alternifolia*. The shrub layer is sparse and commonly includes scattered *Breynia oblongifolia*.
- *PCT 3971 Northern Sandy Floodplain Sedge Paperbark Wetland*: freshwater sedgeland or closed sedgeland occurring in poorly drained areas of alluvial plains of the North Coast botanical division, usually on sandy alluvium towards the narrower part of the coastal floodplain (rather than the main river valley) at elevations of below 10 metres asl. *Lepironia articulata* frequently forms a mid-dense to dense sedge layer, occasionally accompanied by other sedges, aquatic forbs and grasses such as *Persicaria strigosa, Pseudoraphis paradoxa, Baumea rubiginosa, Baumea articulata* and very sparse *Lachnagrostis filiformis*. A sparse or very sparse tree layer is often present, commonly including *Melaleuca quinquenervia*, occasionally *Lophostemon suaveolens* and *Melaleuca alternifolia*, or rarely *Eucalyptus robusta* or other Melaleucas and eucalypts. Occasionally there are scattered individuals of the shrub or small tree *Leptospermum brachyandrum*.
- *PCT 3019 Northern Hinterland Baloghia-Booyong Subtropical Rainforest*: dense rainforest, widespread on coastal ranges and hinterland north from Bulahdelah. Tree species richness is very high and the tree canopy is of very variable composition, however it very frequently includes *Baloghia inophylla* and *Diploglottis australis*, commonly *Heritiera actinophylla* and *Dendrocnide excelsa* and occasionally *Lophostemon confertus*. Other sub-canopy or mid-stratum tree species very frequently include *Ficus coronata*, and commonly *Alectryon subcinereus, Neolitsea dealbata* and *Cleistanthus cunninghamii*, any of which may be locally common.
- *PCT 3421 Clarence Sandstone Pink Bloodwood Grassy Forest*: tall sclerophyll open forest with a mid-stratum of soft-leaved shrubs and small trees and a grassy ground cover found on gently undulating sandstone hills from Nana Glen to Yorklea in the Lower Clarence and Richmond River valleys on the North Coast. The canopy very frequently includes bloodwoods (*C. intermedia, C. gummifera*), commonly accompanied by mahoganies and apples of which *Eucalyptus resinifera, Angophora subvelutina, Eucalyptus acmenoides* and *Angophora robur* are the most frequent. The canopy may also include *Eucalyptus siderophloia* which is only occasional present however may be locally prominent. A sparse mid-stratum almost always includes *Alphitonia excelsa* and one or more Acacia species, of which *Acacia concurrens* and *Acacia aulacocarpa* are most frequent and abundant. *Allocasuarina torulosa* or *Allocasuarina littoralis* and scattered *Persoonia stradbrokensis, Banksia integrifolia* and *Leucopogon lanceolatus* are also commonly present.
- *PCT 3420 Clarence Lowland Ironbark-Spotted Gum Grassy Forest*: tall sclerophyll open forest with a grassy ground cover on rolling siltstone and claystone hills in the lowlands of the lower Clarence and Richmond valleys, from the Glenugie area to Yorklea in the North Coast hinterland. The canopy has a diverse suite of trees, almost always including ironbarks (*E. siderophloia, E. crebra*), very frequently *Corymbia henryi* and commonly *Eucalyptus moluccana*. In addition, red gums (*E. glaucina, E. amplifolia)* may occasionally occur. The

sparse mid-stratum is layered and includes small trees and shrubs. The tallest component of the mid-stratum very frequently comprises scattered individuals of *Alphitonia excelsa*. The lower layers almost always include one or more species of Acacia, commonly *Acacia concurrens* or more rarely *Acacia aulacocarpa* or *Acacia leiocalyx subsp. leiocalyx*. Occasional shrubs such as *Breynia oblongifolia* complete the mid-stratum.

3.2 Site Assessment

3.2.1 Vegetation Communities

Vegetation within the village and road reserve has been historically cleared and affected by the 2019 wildfires, as a result these areas are highly disturbed and native vegetation is generally absent. At Lot 160 wildfire has resulted in substantial tree loss and a very open and sparse canopy occurs, with most trees still in post fire recovery. Vegetation at the site is characteristic of several plant community types (PCTs) in the BioNet Vegetation Classification system (refer **Table 3.3**). Vegetation mapping is provided at **Figure 3.1**. Photographs of vegetation communities at the site are provided at **Appendix C**. A flora inventory is provided at **Appendix D**.

Table 3.3 Vegetation communities

	Community Description	PCT
1	**Open forest (Spotted Gum, Grey Box)** Disturbed forest dominated by Large-leaved Spotted Gum (*Corymbia henryi*) with occasional Grey Box (*Eucalyptus moluccana*) and Grey Ironbark (*E. siderophloia*). Midstorey generally absent. Ground layer highly disturbed and modified – dominated by Rhodes Grass* (*Chloris gayana*) with Setaria* (*S. sphacelata*), Torpedo Grass* (*Panicum repens*), Red Natal Grass* (*Melinis repens*) and occasional Purpletop* (*Verbena bonariensis*).	1209 Spotted Gum - Grey Box - Grey Ironbark dry open forest of the Clarence Valley lowlands of the NSW North Coast Bioregion
1x	**Open woodland (Spotted Gum)** Disturbed variant – fire affected. Exclusively dominated by Large-leaved Spotted Gum. A very dense midstorey of Curracabah (*Acacia concurrens*) occurs in the midstorey to 5 m in height following recent fire. The ground cover is a mixture of dense leaf litter with occasional grasses (*Entolasia stricta, Eragrostis leptostachya, Panicum simile*).	1209 Spotted Gum - Grey Box - Grey Ironbark dry open forest of the Clarence Valley lowlands of the NSW North Coast Bioregion
2	**Open forest (Forest Red Gum, Swamp Box)** Disturbed forest dominated by Forest Red Gum (*E. tereticornis*) with occasional Swamp Box (*Lophostemon suaveolens*) and/or Swamp Oak (*Casuarina glauca*). Occasional regrowth Curracabah in the midstorey. Ground layer as for Community 1.	837 Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the NSW North Coast Bioregion
3	**Landscaping** Avenue of landscape plantings adjacent to the rail corridor (Nandabah Street). Dominated by Camphor Laurel* (*Cinnamomum camphora*) with several Flame Tree (*Brachychiton acerifolius*). These trees are heritage listed in the Richmond Valley LEP 2012.	No equivalent
4	**Grassland#** Exotic pasture grasses in the road reserve, typically dominated by Rhodes Grass*, Setaria* (*S. sphacelata*) and Red Natal Grass*. Along village streets Couch (*Cynodon dactylon*) is dominant.	No equivalent
5	**Wetland** Small patch along eastern boundary of Lot 160 dominated by Pin Rush (*Juncus polyanthemos*). Other species include Spike-rush (*Eleocharis equisetina*), Brooklime (*Gratiola pedunculata*), Wild Aster* (*A. subulatus*) and *Juncus planifolius*.	PCT 780 Coastal floodplain sedgelands, rushlands, and forblands of the North Coast

*Introduced species

Not depicted in vegetation mapping

3.2.2 Threatened Flora

No threatened flora species were recorded at the site.

3.2.3 Threatened Ecological Communities (TECs)

TECs listed in the BC Act

Two PCTs listed in the BC Act occur:

- PCT 837 is characteristic of the TEC 'Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion'.
- PCT 780, while disturbed and small in area is characteristic of the TEC 'Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions'.

TECs are mapped at **Figure 3.1**.

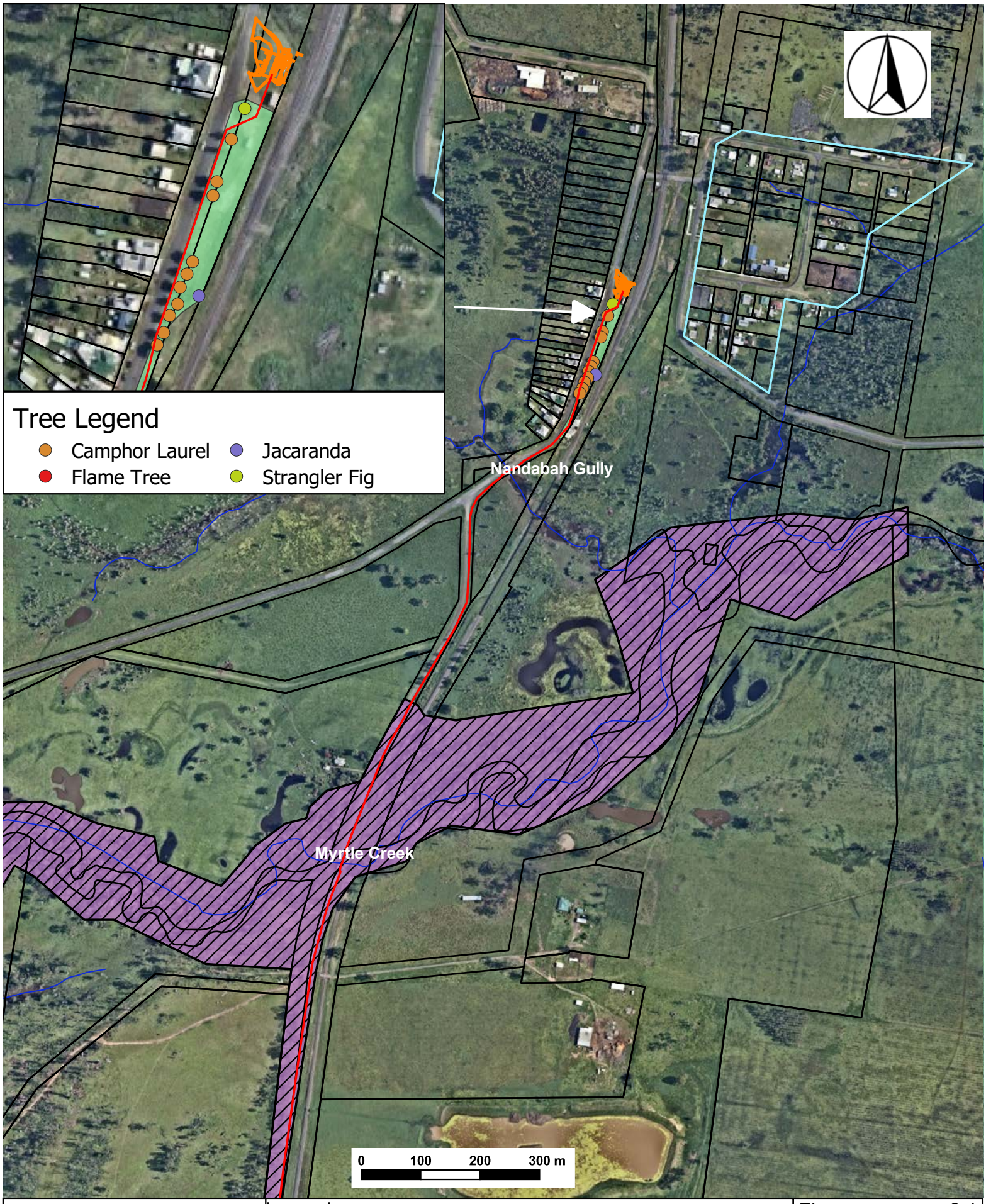
TECs listed in the EPBC Act

PCT 837 is also characteristic of the recently listed community 'Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions'. This community was not listed at the time of field assessment and so sample plots to determine meeting threshold condition were not completed. However, given the community occurs broadly around Myrtle Creek and is reasonably well established, on a precautionary basis, vegetation within the site is considered part of a larger consistent with Class C2 (Large or contiguous patch, with moderate quality understorey and/or some very large native trees); refer Threatened Species Scientific Committee (2022).

Areas of PCT 1209 along Myrtle Creek Road may also be characteristic of the 'Subtropical eucalypt floodplain forest' TEC. Within the STP site, PCT 1209 has a canopy cover of < 20% (due to bushfire impacts) and so does not meet condition thresholds for the TEC.

3.2.4 Vegetation Condition

All parts of the site have been subject to historic clearing and modification. Outside of Rappville village, all vegetation has been significantly affected by wildfire, with mature trees killed or in post recovery. Pasture grasses and common agricultural weeds dominate the ground layer in road reserves and village areas. A single plant of the notifiable weed Tropical Soda Apple (*Solanum viarum*) was observed in the road reserve – this plant was removed and fruit disposed of.



AWC

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Care was taken in the creation of this map. AWC should be consulted as to the suitability of the information shown herein prior to the commencement of any works based on the information provided. AWC cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties expressed or implied as to the suitability of this map for a particular purpose. However, notification of any errors will be appreciated.

Legend

- Lot
- Waterways
- Proposed Pump Station
- Proposed Rising Main
- Reticulation Network
- TEC

PCT

- 837 Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the NSW North Coast Bioregion

Other Vegetation

- Landscaping

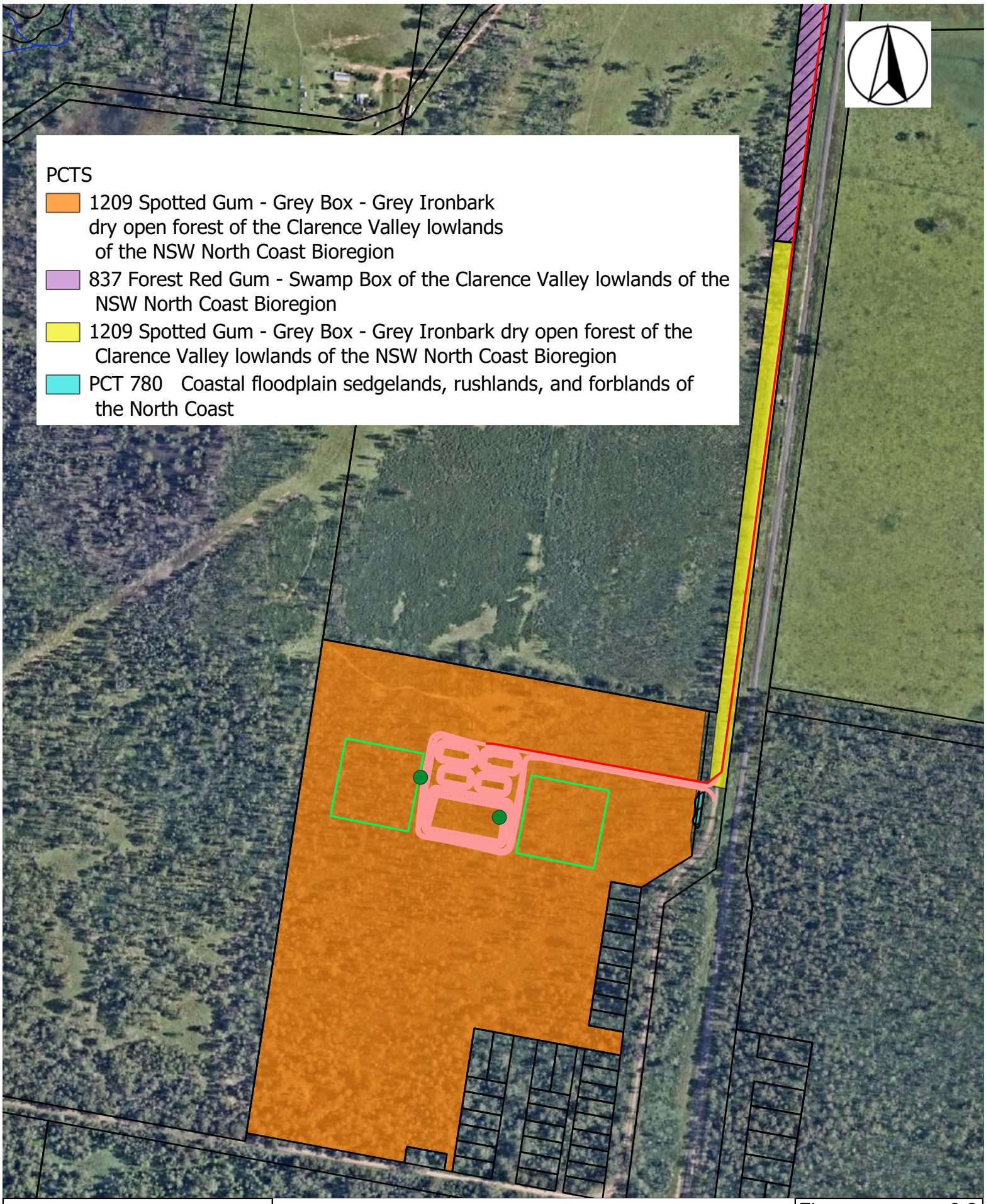
A4 Scale 1:6,000

Coordinate System: MGA 56 Projection: Transverse Mercator

Figure 3.1
Vegetation Plan (North)

Data source:
Aerial - Nearmaps 2022
Cadastre - Sixmaps
Vegetation - AWC
Proposal - NSW Public Works

Date:7
-12-22
Job No:221645
Drawn:ED



AWC

Disclaimer:
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Legend

- Lot
- Hollow Bearing Tree
- Proposed Sewerage Treatment Plant
- STP Irrigation Area
- Proposed Rising Main
- TEC

0 100 200 300 m

A4 Scale 1:6,000

Coordinate System: MGA 56 Projection: Transverse Mercator

Figure 3.2 Vegetation Plan (South)

Data source:
Aerial - Nearmaps 2022
Cadastre - Sixmaps
Vegetation - AWC
Proposal - NSW Public Works

Date:7-12-22
Job No:221645
Drawn:ED
Checked:IC

4 Fauna

4.1 Desktop Assessment

4.1.1 BioNet Atlas and PMST Search Tool

BioNet returned confirmed records of 25 threatened fauna species within the search area, including several species listed in the EPBC Act (refer **Table 4.1**). PMST search results identified habitat for 24 threatened fauna species and 14 migratory species within the search area (refer to Appendix B).

Table 4.1 Threatened fauna recorded within 5 km of the site

Scientific Name	Common Name	BC Act	EPBC Act	No. Records
Birds				
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V		8
Chthonicola sagittata	Speckled Warbler	V		1
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V		16
Ephippiorhynchus asiaticus	Black-necked Stork	E		8
Glossopsitta pusilla	Little Lorikeet	V		21
Lophoictinia isura	Square-tailed Kite	V		2
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V		5
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V		14
Ninox connivens	Barking Owl	V		1
Ninox strenua	Powerful Owl	V		5
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V		4
Stagonopleura guttata	Diamond Firetail	V		4
Tyto novaehollandiae	Masked Owl	V		4
Mammals				
Aepyprymnus rufescens	Rufous Bettong	V		7
Chalinolobus nigrogriseus	Hoary Wattled Bat	V		5
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		2
Miniopterus australis	Little Bent-winged Bat	V		39
Miniopterus orianae oceanensis	Large Bent-winged Bat	V		5
Petauroides volans	Greater Glider		E	19
Petaurus australis	Yellow-bellied Glider	V	V	6
Petaurus norfolcensis	Squirrel Glider	V		5
Phascogale tapoatafa	Brush-tailed Phascogale	V		1
Phascolarctos cinereus	Koala	E	E	420
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	3

Scientific Name	Common Name	BC Act	EPBC Act	No. Records
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		1

CE = Critically Endangered; E = Endangered; V = Vulnerable

4.1.2 Wildlife Corridors

The Activity does not lie within any mapped wildlife corridors.

4.1.3 Aquatic Values

The Fisheries Spatial Data Portal maps Myrtle Creek as Key Fish Habitat; potential habitat for the Southern Purple Spotted Gudgen is also identified.

4.2 Site Assessment

4.2.1 Habitat Values

A range of common bird species in agricultural environments were recorded (refer fauna inventory at **Appendix D**). Habitats present in the study area are fragmented and modified, with usage limited to animals dispersing between habitats in the locality. Both creeks provide habitat for common waterfowl and a range of frogs, in addition to freshwater tortoises. While not recorded several species of macropod are likely to utilise the study area, in addition to common species such as brushtail and ringtail possums. A range of microchiropteran bats would forage throughout the site.

Several hollow-bearing trees were recorded as follows (**Figure 4.1**):

- Three trees in the railway reserve contain hollows (2 x Camphor Laurel, potential hollows in mature Flame Tree)
- Two stags with hollows occur in the STP site. Numerous stags occur throughout the STP site – these represent immature/sub-mature eucalypts which have been killed by fire, these trees typically range from 10 – 30 cm dbh and do not support hollows. Nine stags without hollows also occur in the Myrtle Creek Road reserve and would require removal.

The preferred Koala food tree (PKFT) Forest Red Gum occurs occasionally. Neither of the bridges provide suitable roost habitat for microchiropteran bats due to joint sealing, a lack of suitable accessible microhabitats and vulnerability to flooding. No signs of bat use were observed. Several Welcome Swallow nests occur at Smalls Bridge over Myrtle Creek.

4.2.2 Aquatic habitat

Due to recent flooding, both watercourses have been scoured out, snags removed, and sediment deposited; little aquatic vegetation remains. Habitat for common fish, eels and turtles occurs.

4.2.3 Threatened Species Habitat

Two threatened fauna species were confirmed during field survey:

- Little Lorikeet: pair heard and briefly glimpsed overflying the STP.
- Grey-crowned Babbler: family group of six birds observed feeding in the garden of an outlying residence in Rappville village (Lot 1 DP843816). Babblers are therefore likely to forage within surrounding lawns and woodland.

Potential Occurrence

Based on the desktop analysis and habitat present, several threatened fauna species have potential to occur at the site and surrounds (refer to potential occurrence table at **Appendix D**). Tests of significance ('five-part tests') under Section 7.3 of the BC Act have been completed for threatened species recorded or considered as having potential to occur (refer to **Section 6.4.1** and **Appendix E**).

4.2.4 Connectivity

The STP site enjoys connectivity to substantial forested areas (albeit which are highly disturbed post bushfire) to the south which connect to Myrtle SF to the east and adjacent tracts of forest to the west. Habitat around the village is highly fragmented and isolated, while along Myrtle Creek Road a patchy tree corridor provides 'stepping stone' connectivity for dispersing birds.

5 Impact Assessment

5.1 Biodiversity Impacts

The Activity has potential biodiversity impacts as part of the construction process:

- Loss of native vegetation (refer **Table 5.1**):
  - removal of all trees within the eastern road reserve of Myrtle Creek Road (PCT 837, PCT 1209)
  - removal of scattered trees and wattle regrowth within Lot 160 (northern portion only) – approximately 4ha (PCT 1209 – disturbed)
- Impact to an area representative of the TEC 'Subtropical coastal floodplain forest' (albeit in a highly disturbed and modified state) such that loss of 34 trees (and minor regrowth) within Myrtle Creek Road reserve over an area of ~ 0.39 ha would occur. This community is analogous with the federally listed community 'Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions'.
- Loss of two hollow-bearing trees (Lot 160)
- Loss of numerous stags without hollows in Lot 160 and nine stags in the road reserve
- Disturbance of piled logs and debris (fauna habitat) along the boundary of Lot 160
- Noise and disturbance to fauna during construction (including to foraging habitat for the Grey-crowned Babbler)
- Potential for introduction of weed species to the road reserve and STP site.

NOTE: A 'worst case' scenario has been assessed with regard to impacts to trees in the Myrtle Creek Road reserve. Engineers have advised that a 3 metre trenching width may be sufficient and therefore some trees may be retained. However, a broad assumption has been made that all trees in the road reserve shoulder may be affected, and impacts have been assessed on this basis.

Table 5.1 Vegetation impacts

Zone	Regrowth impacts	Tree loss
Village	Nil	Nil
Road Reserve	Minor – Curracabah, Swamp Oak	90 trees (Spotted Gum x 34, Grey Box x 24, Forest Red Gum x 13, Swamp Oak x 7, Grey Ironbark x 6, Swamp Box x 2, Paperbark x 2) within PCT 837 & 1209. **NOTES:** 1. An estimated 34 of these trees lie within an area characteristic of the TEC 'Subtropical coastal floodplain forest' – BC Act 2. All of these trees are broadly characteristic of the TEC 'Subtropical eucalypt floodplain forest' – EPBC Act.
Lot 160	High - Curracabah	(est) ~ 30 (Spotted Gum) within approx. 4 ha (PCT 1209 – disturbed)
	TOTAL	**~ 120**

Operation of the completed infrastructure would be unlikely have any biodiversity impacts other than an increase in noise and human disturbance within the STP during daylight hours. It is unlikely this minor disturbance would be significant in a local context.

5.2 Mitigation

Measures to minimise biodiversity impacts during construction and operation of the Activity are prescribed in **Table 5.1**. All mitigations measures must be included in a project specific Construction Environmental Management Plan (CEMP) and clearly communicated to all relevant personal/contractors.

Table 5.2 Mitigation measures

Impact	Mitigation	Responsibility
CONSTRUCTION		
Vegetation	1. The extent of the Activity must be clearly pegged/marked on site by a registered surveyor, consistent with final approved plans/designs so that potential impacts to vegetation or individual tree are minimised.	Project contractor
	2. Wherever construction requirements permit, native trees should be retained wherever possible (eg. within the Myrtle Creek Road reserve).	Project contractor
	3. Vegetation removal (including any pruning) must be completed sensitively using appropriate equipment and to the minimum extent necessary.	Project contractor
	4. If lopping or pruning of any vegetation is required, it must be completed by a certified and experienced arborist in accordance with *AS 4970-2009 Protection of trees on development sites*.	Project contractor/arborist
	5. Heritage trees in Nandabah Street must be assessed by a certified and experienced arborist to advise on protection measures and safeguards from trenching/underboring works. This advice must be completed prior to finalisation of the construction methodology, and remarks included in the final methods. Council should be advised on the outcome of the arborist assessment to demonstrate that heritage trees will not be unduly impacted. Any safeguards must be included within the project CEMP.	Project contractor/arborist
	6. Laydown /storage areas must be stablished on cleared land/pasture where native trees are absent. Use of the Nandabah Street reserve where planted heritage listed tree occur is not suitable.	Project contractor
Fauna	7. Large logs and woody debris requiring removal within Lot 160 (for access, works) shall be completed sensitively and all material moved into adjacent areas to continue to serve as habitat.	Project contractor
	8. All trees within the road reserve and STP site should be subject to a pre-clearing survey by an ecologist to ensure that trees are not occupied by fauna. In the unlikely event that a Koala is present in a tree to be cleared, works must not continue, and 24 hrs must be provided for the animal/s to disperse into adjacent habitats. If the pre-clearing inspection does not determine any Koalas (or other fauna) are present, clearing works may proceed without further	Project ecologist

Impact	Mitigation	Responsibility
	supervision. Removal of wattle regrowth within the STP may be required to enable better visibility and site access – a pre-clearing assessment is not required for this task.	
	9. All hollow-bearing trees (HBT) must be clearly marked by an ecologist prior to clearing and a two-stage clearing procedure implemented such that any HBT are cleared after all other vegetation is removed, with a minimum of 24 hrs between clearing events. A spotter-catcher must be present during the removal of any HBT in the event that wildlife is present and require relocation or veterinary care.	Project ecologist
	10. Compensatory nest boxes shall be installed within retained mature trees in Lot 160. Host trees must be semi mature and in good condition. Nest boxes shall be installed a ratio of 1:2 – ie. as two hollow-bearing trees are removed, four (4) nest boxes shall be installed. Sizing of nest boxes should be suitable for small parrots and microbats.	Project ecologist
Soil and water	11. Appropriate soil and erosion control measures must be implemented and maintained for the duration of construction.	Project contractor
Biosecurity	12. Measures must be implemented during construction works so that machinery and plant do not introduce weed seed or propagules to the site (eg. by adoption and implementation of the 'Arrive Clean, Leave Clean' guidelines [DoE 2015]). This measure is particularly relevant for the notifiable species Tropical Soda Apple.	Project contractor
OPERATION/OCCUPATION		
Landscaping	13. Any landscaping or screening at the STP should utilise locally endemic species including trees such as Spotted Gum, Grey Box, Forest Red Gum, Flax-leaved Paperbark (refer species inventory at **Appendix D** for guidance).	Project contractor

6 Statutory Assessment

6.1 Introduction

The Activity has been assessed in the context of environmental legislation relevant to part 5 assessments under the EP&A Act including:

- *Biodiversity Conservation Act 2016*
- *Fisheries Management Act 1994*
- *Environment Protection and Biodiversity Conservation Act 1999*.

NOTE: While not required for part 5 assessments, it is Public Works policy that Koala Habitat Protection, as per State Environmental Planning Policy (SEPP) (Biodiversity and Conservation) 2021 is addressed.

6.2 NSW Legislation

6.2.1 Biodiversity Conservation Act 2016

Section 7.3 of the BC Act requires a test of significance (five-part test) when assessing whether an action, development or activity is likely to significantly affect threatened species, ecological communities or their habitats.

In addition to the TECs and threatened fauna recorded, there is potential for several additional threatened fauna species to occur; tests of significance have therefore been completed (refer to **Appendix F**). The tests concluded that the Activity would be unlikely to significantly increase the risk of extinction for any fauna species, and hence a BDAR is not required.

6.2.2 Fisheries Management Act 1994

The FM Act requires an assessment of significance when there may be potential to impact on any species, populations and communities listed in the FM Act. Based on the construction methodology (underboring or pipe suspension), it is unlikely the Activity would impact on habitat for any species, populations or communities listed in the FM Act which may occur within Nandabah Gully or Myrtle Creek; as such an assessment of significance ('7 part test') is not required.

As the Activity does not comprise 'dredging and excavation', a Part 7 Fisheries Management Act permit is not required prior to commencing works.

6.2.3 SEPP (Biodiversity and Conservation) 2021

State Environmental Planning Policy (Biodiversity and Conservation) 2021 commenced March 2022 and consolidates, transfers and repeals provisions of several SEPPs, including SEPP (Vegetation in Non-Rural Areas) 2017 ('Vegetation SEPP'), SEPP (Koala Habitat Protection) 2020 ('Koala SEPP 2020') and SEPP (Koala Habitat Protection) 2021 ('Koala SEPP 2021').

Previous Koala SEPPS (now repealed) are established as Chapters 3 and 4 of the Biodiversity and Conservation SEPP 2021:

Chapter 3: Koala habitat protection 2020

Chapter 3 applies to land > 1 ha in area in the following land use zones, or an equivalent land use zone outside the Sydney region:

a) Zone RU1 Primary Production,
b) Zone RU2 Rural Landscape,
c) Zone RU3 Forestry.

Relevant definitions in Chapter 3 with regard to assessment where an approved KPoM does not apply include:

- ***core koala habitat*** *means an area of land with a resident population of koalas, evidenced by attributes such as breeding females, being females with young, and recent sightings of and historical records of a population.*
- ***potential koala habitat*** *means areas of native vegetation where trees of the types listed in Schedule 1 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.*

The entire project is located on land zoned RU1 Primary Production, therefore Chapter 3 of the Policy applies. Chapter 3 of the Policy reverts to the (now repealed) SEPP 44 provisions with regard to determining potential and core Koala habitat.

Potential Koala habitat occurs in the northern portion of the Myrtle Creek Road reserve, where the majority of scattered trees are Forest Red Gum (a schedule 1 tree species). No opportunistic signs of Koala use were observed (scratch marks, scats) and it is highly unlikely a resident Koala population occurs due to significant habitat fragmentation, recent wildfire events and the lack of records in the immediate locality (refer **Figure 6.1**).

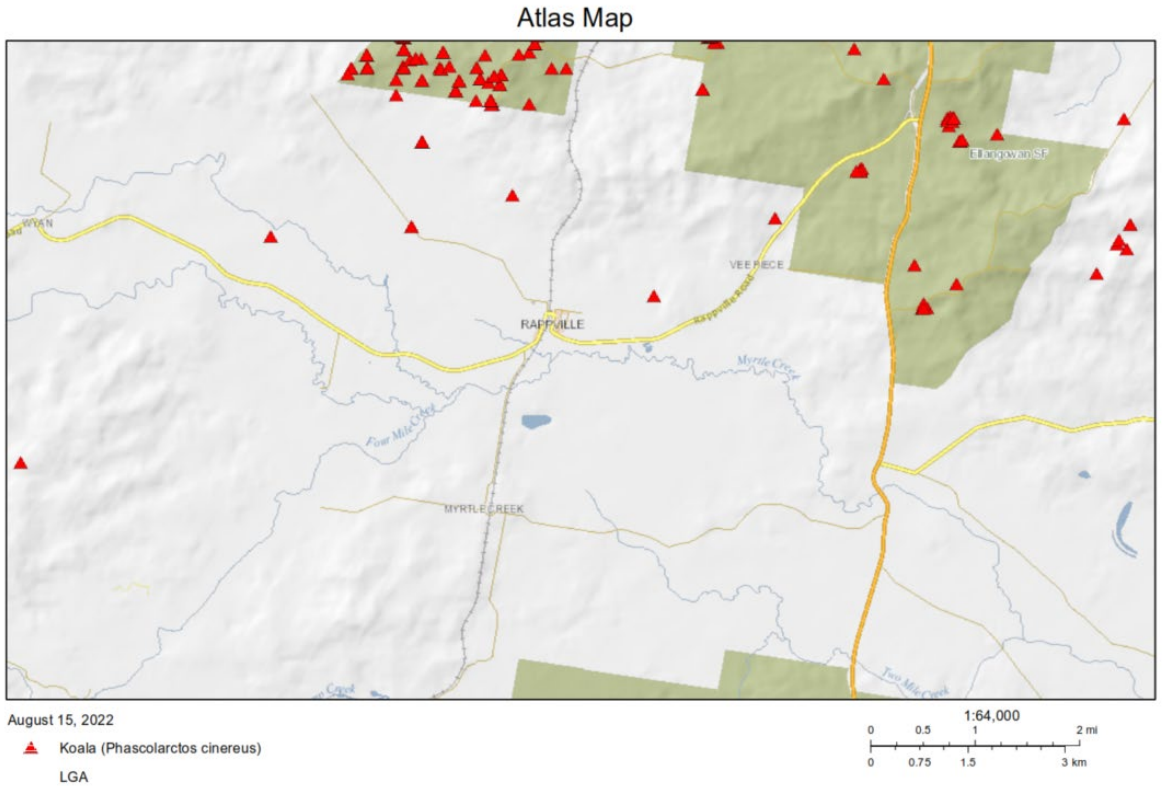


Figure 6.1 Koala records in the locality (Source: BioNet)

Koalas in the broader locality are linked to consolidated habitats in Carwong and Braemar State Forests to the north of the site. There are very few records of animals outside these habitats within fragmented farming land.

Habitat in Lot 160 is dominated by Spotted Gum and does not comprise potential Koala habitat as defined by the Policy. On this basis, core Koala habitat is absent from the project footprint and the Activity is unlikely to impact upon Koalas or their habitats.

6.3 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act considers nine matters of national environmental significance (MNES):

- World heritage properties
- National heritage places
- Wetlands of international importance ('Ramsar' wetlands)
- Nationally threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mining)
- A water resource, in relation to coal seam gas development and large coal mining development.

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of national environmental significance (MNES) require approval from the Australian Government Minister for the Environment (the Minister). Based on the search results and site assessment, no significant impacts to any MNES would be likely to result from the Activity (refer **Table 6.1**), therefore referral to the Minister for the Environment is not required.

Table 6.1 Assessment of MNES

MNES	Impact
Any impact on a World Heritage property?	
No World Heritage properties occur within five kilometres of the site.	Nil
Any impact on National heritage places?	
No National Heritage places occur within five kilometres of the site.	Nil
Any impact on wetlands of international importance?	
No wetlands of international importance occur within five kilometres of the site.	Nil
Any impact on nationally threatened species and ecological communities?	
Habitat for four threatened ecological communities (TECs) and 39 threatened species is identified within 5 km of the site. No threatened flora species occur at the site. PCT 837 and 1209 along Myrtle Creek Road are considered characteristic of the recently listed TEC 'Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions', with an estimated 90 trees impacted. A Significant Impact Assessment was completed for this community on the basis of its Endangered status (refer **Appendix G**); the assessment determined that the Activity would be unlikely to have a significant impact on this community in a local context. While no listed threatened fauna species were recorded at the site, several may use the site and surrounds on an opportunistic or seasonal basis (e.g. Grey-headed Flying-fox). A test of significance for the Grey-headed Flying-fox determined that the Activity would be unlikely to	Low

MNES	Impact
have a significant impact on this species (refer **Appendix F**). The Activity would not result in the removal of habitat important to any threatened fauna species in a local context and is unlikely to significantly impact on any nationally threatened species or ecological communities.	
Any impact on migratory species?	
Habitat for 14 migratory species is identified within 5 km of the site. No migratory species were recorded. No migratory species are likely to be significantly affected by the Activity given that no significant habitat would be affected.	Negligible
Any impact on Commonwealth marine areas?	
No Commonwealth marine areas occur within 5 km of the site.	Nil
Any impact on the Great Barrier Reef Marine Park?	
Not applicable.	Nil
Does the activity involve a nuclear action (including uranium mining)?	
Not applicable.	Nil
Any impact on a water resource from coal seam gas development or a large coal mining development?	
Not applicable.	Nil

7 References

Department of the Environment (DoE) (2015). *Arrive Clean, Leave Clean. Guidelines to help prevent the spread of invasive plant diseases and weeds threatening our native plants, animals and ecosystems*. Commonwealth of Australia 2015.

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Scotts, D. (2003). *Key Habitats and Corridors for Forest Fauna. Occasional Paper 32.* NSW NPWS.

Thackway R. & Cresswell I. (1995). *An Interim Biogeographic Regionalisation for Australia: a framework for setting priorities in the National Reserves System Cooperative Program Version 4*, Australian Nature Conservation Agency, Canberra.

Threatened Species Scientific Committee (2022). *Approved Conservation Advice for the Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions*. Department of Climate Change, Energy, the Environment and Water.

Appendix A – Proposed Activity



REV.	AMENDMENT DETAILS	APPROVED	DATE
-	DRAFT FOR REVIEW	-	23.03.2022

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RAPPVILLE SEWERAGE SCHEME
SPS, RISING MAIN AND STP WORKS

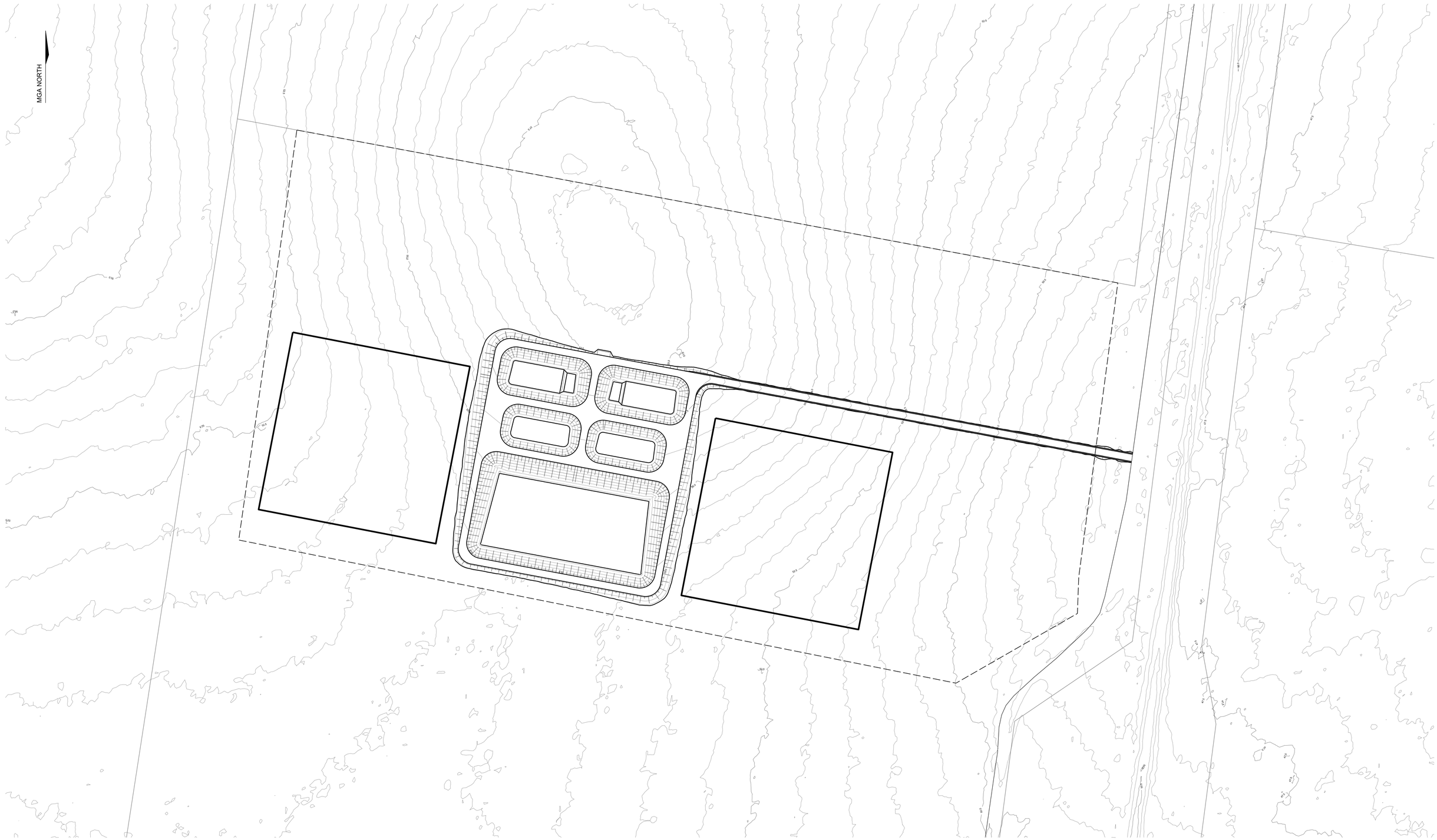
RAPPVILLE SPS
DRAFT LAYOUT FOR DISCUSSION

CONTRACT NO. ---
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TRIM FILE ---
DRAWING NO.
REV.

CONFIRM SCALE — 100mm ON ORIGINAL

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PLOT TIME: 4:26:36 PM PLOT DATE: 26/10/2022 PLOT BY: perust01 FILE PATH: G:\Watersenv\Projects\Richmond_VC\Rappville sewerage\Design\Drawings\P-C601_RAPPVILLE_SEWERAGE-SPS_LAYOUT.dgn



REV.	AMENDMENT DETAILS	APPROVED	DATE
-	DRAFT FOR REVIEW	-	23.03.2022

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RAPPVILLE SEWERAGE SCHEME
SPS, RISING MAIN AND STP WORKS

OVERALL LAYOUT

CONTRACT NO. - - -	A1
SCALE @ A1 1:1000	TRIM FILE - - -
DRAWING NO. C100	REV. -

CONFIRM SCALE 100mm ON ORIGINAL

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FILE PATH: G:\Waterserv\Projects\Richmond_VC\Rappville sewerage\Design\Drawings\P-C101_RAPPVILLE_SEWERAGE-FLOW LAYOUT.dgn
PLOT BY: perust01
PLOT DATE: 3/05/2022
PLOT TIME: 2:35:20 PM

MGA NORTH

A
C102

SCREEN AND
FLOW DIVIDER

RISING MAIN FROM RAPPVILLE SPS

OX POND 1

OX POND 2

MAT POND 1

MAT POND 2

STORAGE POND

1ha IRRIGATION AREA

1ha IRRIGATION AREA

1:500

0 10 20 30 40 50m

10 5

REV.	AMENDMENT DETAILS	APPROVED	DATE
-	DRAFT FOR REVIEW	-	23.03.2022

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RAPPVILLE SEWERAGE SCHEME
SPS, RISING MAIN AND STP WORKS

FLOW LAYOUT

CONTRACT NO. ---

A1

SCALE @ A1 1:1000

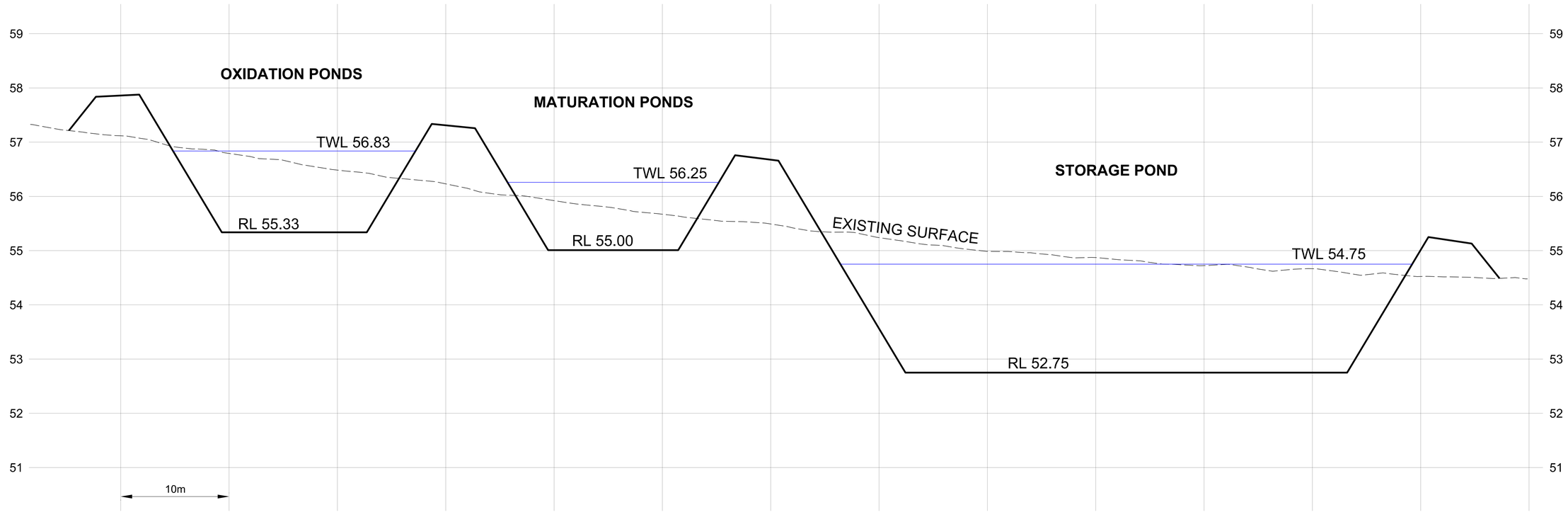
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REV. -

CONFIRM SCALE ◄ 100mm ON ORIGINAL ►

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SECTION A
SCALE 1:200H 1:40V

A
-

1:40V 0 800 1600 2400 3200 4000 mm
1:200H 800 400 0 4 8 12 16 20 m
4 2

REV.	AMENDMENT DETAILS	APPROVED	DATE
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RAPPVILLE SEWERAGE SCHEME
SPS, RISING MAIN AND STP WORKS

STP SECTION

CONTRACT NO. - - -
A1
SCALE @ A1 1:200H, 1:200V
TRIM FILE - - -
DRAWING NO. C102
REV. -

CONFIRM SCALE 100mm ON ORIGINAL

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PLOT DATE: 3/05/2022
PLOT BY: perust01
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Appendix B – BioNet and PMST Search Results

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Plants in selected area [North: -29.04 West: 152.90 East: 153.00 South: -29.14] returned a total of 50 records of 5 species.
Report generated on 7/07/2022 4:23 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Plantae	Flora	Myrtaceae	4096	*Eucalyptus glaucina*		Slaty Red Gum	V	V	41	
Plantae	Flora	Myrtaceae	4255	*Melaleuca irbyana*		Weeping Paperbark	E1		3	
Plantae	Flora	Myrtaceae	4284	*Rhodomyrtus psidioides*		Native Guava	E4A	CE	1	
Plantae	Flora	Polygalaceae	5260	*Polygala linariifolia*		Native Milkwort	E1		3	
Plantae	Flora	Rubiaceae	6449	*Oldenlandia galioides*			E1		2	

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Communities in selected area [North: -29.04 West: 152.90 East: 153.00 South: -29.14] returned 0 records for 12 entities.

Report generated on 7/07/2022 4:29 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Community				*Coastal Cypress Pine Forest in the New South Wales North Coast Bioregion*		Coastal Cypress Pine Forest in the New South Wales North Coast Bioregion	E3		K	
Community				*Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*		Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K	
Community				*Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community*		Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community		E	K	

Community	*Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K	
Community	*Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*	Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K	
Community	*Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions*	Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	E3		K	
Community	*Lowland Rainforest of Subtropical Australia*	Lowland Rainforest of Subtropical Australia		CE	K	
Community	*Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion*	Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion	E3		K	
Community	*Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion*	Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion	E3		K	

Community	*Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	K	
Community	*Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	K	
Community	*Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions*	Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E3	K	

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Animals in selected area [North: -29.04 West: 152.90 East: 153.00 South: -29.14] returned a total of 606 records of 25 species.
Report generated on 7/07/2022 4:26 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Aves	Ciconiidae	0183	*Ephippiorhynchus asiaticus*		Black-necked Stork	E1,P		8	
Animalia	Aves	Accipitridae	0230	*^^Lophoictinia isura*		Square-tailed Kite	V,P,3		2	
Animalia	Aves	Psittacidae	0260	*Glossopsitta pusilla*		Little Lorikeet	V,P		21	
Animalia	Aves	Strigidae	0246	*^^Ninox connivens*		Barking Owl	V,P,3		1	
Animalia	Aves	Strigidae	0248	*^^Ninox strenua*		Powerful Owl	V,P,3		5	
Animalia	Aves	Tytonidae	0250	*^^Tyto novaehollandiae*		Masked Owl	V,P,3		4	
Animalia	Aves	Climacteridae	8127	*Climacteris picumnus victoriae*		Brown Treecreeper (eastern subspecies)	V,P		16	
Animalia	Aves	Acanthizidae	0504	*Chthonicola sagittata*		Speckled Warbler	V,P		1	
Animalia	Aves	Meliphagidae	8303	*Melithreptus gularis gularis*		Black-chinned Honeyeater (eastern subspecies)	V,P		14	
Animalia	Aves	Pomatostomidae	8388	*Pomatostomus temporalis temporalis*		Grey-crowned Babbler (eastern subspecies)	V,P		4	

Animalia	Aves	Artamidae	8519	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V,P		8	
Animalia	Aves	Petroicidae	8367	*Melanodryas cucullata cucullata*	Hooded Robin (south-eastern form)	V,P		5	
Animalia	Aves	Estrildidae	0652	*Stagonopleura guttata*	Diamond Firetail	V,P		4	
Animalia	Mammalia	Dasyuridae	1017	*Phascogale tapoatafa*	Brush-tailed Phascogale	V,P		1	
Animalia	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*	Koala	E1,P	E	420	
Animalia	Mammalia	Petauridae	1136	*Petaurus australis*	Yellow-bellied Glider	V,P	V	6	
Animalia	Mammalia	Petauridae	1137	*Petaurus norfolcensis*	Squirrel Glider	V,P		5	
Animalia	Mammalia	Pseudocheiridae	1133	*Petauroides volans*	Greater Glider	P	V	19	
Animalia	Mammalia	Potoroidae	1187	*Aepyprymnus rufescens*	Rufous Bettong	V,P		7	
Animalia	Mammalia	Pteropodidae	1280	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	3	
Animalia	Mammalia	Emballonuridae	1321	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V,P		1	
Animalia	Mammalia	Vespertilionidae	1354	*Chalinolobus nigrogriseus*	Hoary Wattled Bat	V,P		5	
Animalia	Mammalia	Vespertilionidae	1372	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V,P		2	
Animalia	Mammalia	Miniopteridae	1346	*Miniopterus australis*	Little Bent-winged Bat	V,P		39	
Animalia	Mammalia	Miniopteridae	3330	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V,P		5	

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 01-Nov-2022

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	39
Listed Migratory Species:	14

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	19
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	1
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	2
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area	In feature area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community likely to occur within area	In feature area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area	In feature area
Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions	Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat may occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat may occur within area	In feature area
FROG			
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Mixophyes iteratus Giant Barred Frog, Southern Barred Frog [1944]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
INSECT			
Argynnis hyperbius inconstans Australian Fritillary [88056]	Critically Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area	In feature area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area	In feature area
Petauroides volans Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area	In feature area
Petaurus australis australis Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat known to occur within area	In feature area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Potorous tridactylus tridactylus Long-nosed Potoroo (northern) [66645]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
PLANT			
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area	In feature area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eucalyptus glaucina Slaty Red Gum [5670]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eucalyptus tetrapleura Square-fruited Ironbark [7490]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Grevillea quadricauda [64651]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat may occur within area	In feature area
Macadamia tetraphylla Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Paspalidium grandispiculatum a grass [10838]	Vulnerable	Species or species habitat may occur within area	In feature area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area	In feature area
REPTILE			
Coeranoscincus reticulatus Three-toed Snake-tooth Skink [59628]	Vulnerable	Species or species habitat may occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat likely to occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]	
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat likely to occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat known to occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Selection Flat	Flora Reserve	NSW	In buffer area only

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

RFA Name	State	Buffer Status
North East NSW RFA	New South Wales	In feature area

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
330 kV Transmission Line, 205km in Length	2010/5326	Controlled Action	Completed	In feature area
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area

Bioregional Assessments

SubRegion	BioRegion	Website	Buffer Status
Clarence-Moreton	Clarence-Moreton	BA website	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Appendix C – Photographs

	*Plate 1. Planted avenue of Camphor Laurel in Nandabah Street – trees will be underbored*
	*Plate 2. Wattle regrowth north of Nandabah Gully – to be removed*
	*Plate 3. Nandabah Gully crossing (view to south)*

	*Plate 4. Pasture grass in disturbed road reserve at northern end of Myrtle Creek Road*
	*Plate 5. Small grove of Swamp Oak on Myrtle Creek Road (view to south) – to be removed*
	*Plate 6. Myrtle Creek (view to north) - disturbed and affected by fire*

	*Plate 7. Wattle regrowth along on Myrtle Creek Road (view to south) – to be removed*
	*Plate 8. Myrtle Creek Road (view to south) – all trees on left hand side to be removed*
	*Plate 9. Detail of Plate 8 (view to south)*

	*Plate 10. Eastern boundary of Lot 160 with stacked logs and dense wattle regrowth*
	*Plate 11. Small patch of freshwater wetlands TEC inside eastern boundary of Lot 160*
	*Plate 12. Very sparse tree cover and dense wattle regrowth within Lot 160; note numerous trees killed by fire (stags)*

Appendix D – Flora and Fauna Inventory

Table D.1 Flora records

Family	Scientific name	Common name
Adiantaceae	*Cheilanthes sieberi*	Mulga Fern
Aloeaceae	*Aloe spp.**	Aloe
Apiaceae	*Centella asiatica*	Pennywort
Apiaceae	*Cyclospermum leptophyllum**	Slender Celery
Apocynaceae	*Gomphocarpus physocarpus**	Balloon Cotton Bush
Apocynaceae	*Parsonsia straminea*	Common Silkpod
Arecaceae	*Syagrus romanzoffiana**	Cocos Palm
Asteraceae	*Ageratum houstonianum**	Blue Billygoat Weed
Asteraceae	*Ambrosia artemisiifolia**	Annual Ragweed
Asteraceae	*Aster subulatus**	Wild Aster
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Asteraceae	*Centipeda cunninghamii*	Commmon Sneezeweed
Asteraceae	*Cirsium vulgare**	Spear Thistle
Asteraceae	*Conyza bonariensis**	Flaxleaf Fleabane
Asteraceae	*Crassocephalum crepidioides**	Thickhead
Asteraceae	*Eclipta prostrata*	Eclipta
Asteraceae	*Emilia sonchifolia**	Purple Sow Thistle
Asteraceae	*Galinsoga parviflora**	Potato Weed
Asteraceae	*Hypochaeris radicata**	Catsear
Asteraceae	*Senecio madagascariensis**	Fireweed
Asteraceae	*Sonchus oleraceus**	Common Sowthistle
Asteraceae	*Tagetes minuta**	Stinking Roger
Bignoniaceae	*Dolichandra unguis-cati **	Cat's Claw Creeper
Bignoniaceae	*Jacaranda mimosifolia**	Jacaranda
Brassicacea	*Rorippa laciniata*	Watercress
Caryophyllaceae	*Cerastium glomeratum**	Mouse-ear Chickweed
Casuarinaceae	*Casuarina glauca*	Swamp Oak
Convolvulaceae	*Polymeria calycina*	Bindweed
Cyperaceae	*Cyperus haspan*	
Cyperaceae	*Cyperus polystachyos*	Bunchy Sedge
Cyperaceae	*Eleocharis equisetina*	Spike Rush
Cyperaceae	*Gahnia aspera*	Rough Saw-sedge
Cyperaceae	*Juncus planifolius*	
Cyperaceae	*Juncus polyanthemos*	
Cyperaceae	*Juncus usitatus*	Pin Rush
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Dracaenaceae	*Sansevieria trifasciata**	Mother-in-law's Tongue
Euphorbiaceae	*Breynia oblongifolia*	Coffee Bush
Euphorbiaceae	*Euphorbia prostrata**	Caustic Weed
Euphorbiaceae	*Glochidion ferdinandi var. ferdinandi*	Cheese Tree
Fabaceae (Caesalpinioideae)	*Senna pendula var. glabrata**	Winter Senna
Fabaceae (Caesalpinioideae)	*Senna septemtrionalis**	Smooth Senna
Fabaceae (Faboideae)	*Aeschynomene indica*	Budda Pea
Fabaceae (Faboideae)	*Crotalaria lanceolata**	Lance-leaf Rattlepod
Fabaceae (Faboideae)	*Daviesia squarrosa*	Bitter Pea
Fabaceae (Faboideae)	*Daviesia ulicifolia*	Gorse Bitter Pea
Fabaceae (Faboideae)	*Desmodium uncinatum**	Silver-leaf Desmodium

Family	Scientific name	Common name
Fabaceae (Faboideae)	*Glycine clandestina*	Twining Glycine
Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla
Fabaceae (Faboideae)	*Macroptilium atropurpureum* *	Siratro
Fabaceae (Faboideae)	*Macroptilium lathyroides**	Phasey Bean
Fabaceae (Faboideae)	*Pullenia gunnii*	Slender Tick Trefoil
Fabaceae (Faboideae)	*Trifolium dubium**	Yellow Suckling Clover
Fabaceae (Faboideae)	*Trifolium repens**	White Clover
Fabaceae (Mimosoideae)	*Acacia aulocarpa*	Salwood
Fabaceae (Mimosoideae)	*Acacia concurrens*	Curracabah
Fabaceae (Mimosoideae)	*Acacia melanoxylon*	Blackwood
Gentianaceae	*Centaurium erythraea**	Common Centaury
Haloragaceae	*Gonocarpus micranthus subsp. micranthus*	Raspwort
Lauraceae	*Cinnamomum camphora* (p)*	Camphor Laurel
Lobeliaceae	*Pratia purpurascens*	Whiteroot
Lomandraceae	*Lomandra hystrix*	Creek Mat-rush
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily
Lythraceae	*Cuphea carthagenensis**	Cuphea
Malvaceae	*Sida rhombifolia**	Paddy's Lucerne
Menispermaceae	*Stephania japonica var. discolor*	Snake Vine
Moraceae	*Ficus watkinsiana*	Strangler Fig
Moraceae	*Maclura cochinchinensis*	Cockspur Thorn
Myrtaceae	*Callistemon salignus*	Willow Bottlebrush
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush
Myrtaceae	*Corymbia henryi*	Large-leaved Spotted Gum
Myrtaceae	*Eucalyptus moluccana*	Grey Box
Myrtaceae	*Eucalyptus siderophloia*	Grey Ironbark
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum
Myrtaceae	*Leptospermum brachyandrum*	Teatree
Myrtaceae	*Lophostemon suaveolens*	Swamp Box
Myrtaceae	*Melaleuca nodosa*	Prickly-leaved Paperbark
Myrtaceae	*Waterhousea floribunda*	Weeping Lilly Pilly
Oleaceae	*Ligustrum sinense**	Small-leaved Privet
Onagraceae	*Ludwigia peploides subsp. montevidensis*	Water Primrose
Pinaceae	*Pinus elliottii**	Slash Pine
Pittosporaceae	*Pittosporum revolutum*	Rough Fruit Pittosporum
Plantaginaceae	*Gratiola pedunculata*	Brooklime
Plantaginaceae	*Plantago lanceolata**	Lamb's Tongues
Poaceae	*Cenchrus clandestinus**	Kikuyu
Poaceae	*Chloris gayana**	Rhodes Grass
Poaceae	*Cynodon dactylon*	Common Couch
Poaceae	*Entolasia stricta*	Wiry Panic
Poaceae	*Eragrostis brownii*	Brown's Lovegrass
Poaceae	*Eragrostis cilianensis**	Stinkgrass
Poaceae	*Eragrostis curvula**	African Lovegrass
Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass
Poaceae	*Imperata cylindrica*	Blady Grass
Poaceae	*Melinis repens**	Red Natal Grass
Poaceae	*Oplismenus aemulus*	Basket Grass
Poaceae	*Oplismenus undulatifolius*	Basket Grass
Poaceae	*Panicum repens**	Torpedo Grass
Poaceae	*Panicum simile*	Two-colour Panic
Poaceae	*Paspalum dilatatum**	Paspalum
Poaceae	*Setaria sphacelata**	Pigeon Grass
Poaceae	*Sporobolus africanus**	Parramatta Grass
Poaceae	*Themeda triandra*	Kangaroo Grass

Family	Scientific name	Common name
Polygonaceae	*Acetosa sagittata**	Turkey Rhubarb
Polygonaceae	*Persicaria attenuata*	Smartweed
Polygonaceae	*Rumex crispus**	Curled Dock
Polypodiaceae	*Platycerium bifurcatum*	Elkhorn
Proteaceae	*Grevillea robusta*	Silky Oak
Rhamnaceae	*Alphitonia excelsa*	Red Ash
Solanaceae	*Solanum nigrum**	Blackberry Nightshade
Solanaceae	*Solanum prinophyllum*	Forest Nightshade
Solanaceae	*Solanum viarum**	Tropical Soda Apple
Sterculiaceae	Brachychiton acerifolius (p)	Flame Tree
Verbenaceae	*Lantana camara**	Lantana
Verbenaceae	*Verbena bonariensis**	Purpletop

**introduced species*

(p) = planted tree

Table D.2 Fauna records

Scientific name	Common name	Record
Amphibians		
Litoria fallax	Dwarf Green Tree Frog	C
Reptiles		
Intellagama lesueurii	Eastern Water Dragon	O
Birds		
*Acridotheres tristis**	Common Myna	O
Alisterus scapularis	Australian King Parrot	C
Anthochaera chrysoptera	Little Wattlebird	C
Ardea intermedia	Intermediate Egret	O
Chenonetta jubata	Australian Wood Duck	C
Cisticola exilis	Golden-headed Cisticola	C
Coracina novaehollandiae	Black-faced Cuckoo Shrike	O
Corvus orru	Torresian Crow	O
Dacelo novaeguineae	Laughing Kookaburra	O
Egretta garzetta	Little Egret	O
Entomyzon cyanotis	Blue-faced Honeyeater	O
Falco berigora	Brown Falcon	O
Geopelia humeralis	Bar-shouldered Dove	O
*Glossopsitta pusilla^*	Little Lorikeet	O
Grallina cyanoleuca	Magpie-lark	O
Gymnorhina tibicen	Australian Magpie	O
Haliastur sphenurus	Whistling Kite	C
Hirundo neoxena	Welcome Swallow	O
Lichenostomus chrysops	Yellow-faced Honeyeater	C
Lichenostomus penicillatus	White-plumed Honeyeater	O
Lichmera indistincta	Brown Honeyeater	C
Malurus cyaneus	Superb Fairy-wren	O
Malurus lamberti	Variegated Fairy-wren	O
Malurus melanocephalus	Red-backed Fairy-wren	O
Megalurus timoriensis	Tawny Grassbird	C
Meliphaga lewinii	Lewin's Honeyeater	C
Myiagra inquieta	Restless Flycatcher	O
Myzomela sanguinolenta	Scarlet Honeyeater	C
Neochmia temporalis	Red-browed Finch	O
Ocyphaps lophotes	Crested Pigeon	O
Pachycephala rufiventris	Rufous Whistler	C
Pardalotus striatus	Striated Pardalote	O
*Passer domesticus**	House Sparrow	C
Philemon citreogularis	Little Friarbird	C
Philemon corniculatus	Noisy Friarbird	C
*Pomatostomus temporalis^*	Grey-crowned Babbler	O
Rhipidura albiscapa	Grey Fantail	O
Rhipidura leucophrys	Willie Wagtail	O
*Spilopelia chinensis**	Spotted Turtle-dove	O
Strepera graculina	Pied Currawong	C
Trichoglossus haematodus	Rainbow Lorikeet	O
Zosterops lateralis	Silvereye	C

O= observed; C = call

**introduced species*

^ threatened species (BC Act)

Appendix E – Potential Occurrence Table

Table E.1 Threatened Fauna Potential Occurrence Assessment

Species	BC Act	EPBC Act	Habitat Requirements (DPIE/SPRAT)	Potential Occurrence/Test of Significance
Birds				
Barking Owl	✓		Eucalypt woodland, open forest, swamp woodlands and timber along watercourses.	Unlikely, habitat disturbed, fragmented and unlikely to support a significant prey base. Test of Significance not required.
Black-chinned Honeyeater	✓		Drier open forests or woodlands dominated by box and ironbark eucalypts, and open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees.	**Potential habitat occurs. Test of Significance completed.**
Black-necked Stork	✓		Swamps, mangroves, mudflats, dry floodplains.	No suitable habitat. Test of Significance not required.
Brown Treecreeper	✓		Eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range, and less commonly on coastal plains and ranges.	Unlikely, habitat substantially disturbed. Test of Significance not required.
Diamond Firetail	✓		Open woodlands dominated by mature eucalypts, with regenerating trees, tall shrubs, and an intact ground cover of grass and forbs.	No suitable habitat. Test of Significance not required.
Dusky Woodswallow	✓		Primarily inhabits dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris.	**Potential habitat occurs. Test of Significance completed.**
Grey-crowned Babbler	✓		Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions.	**Recorded. Test of Significance completed.**
Hooded Robin	✓		Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Unlikely, habitat substantially disturbed. Test of Significance not required.
Little Lorikeet	✓		Forages in open Eucalypt forest and woodland; also feeds on Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	**Recorded. Test of Significance completed.**
Masked Owl	✓		Dry eucalypt forest and woodlands.	Unlikely, habitat disturbed, fragmented and

Species	BC Act	EPBC Act	Habitat Requirements (DPIE/SPRAT)	Potential Occurrence/Test of Significance
				unlikely to support a significant prey base. Test of Significance not required.
Powerful Owl	✓		Woodland and open forest to tall moist forest and rainforest. Requires large tracts of forest or woodland habitat but may also occur in fragmented landscapes.	Unlikely, habitat disturbed, fragmented and unlikely to support a significant prey base. Test of Significance not required.
Speckled Warbler	✓		Eucalyptus dominated communities with sparse shrubs and grassy understorey.	Unlikely, habitat substantially disturbed. Test of Significance not required.
Square-tailed Kite	✓		Dry woodland and open forest, particularly along major rivers and belts of trees in urban or semi-urban areas.	Unlikely, habitat disturbed, fragmented and unlikely to support a significant prey base. Test of Significance not required.
Mammals				
Brush-tailed Phascogale	✓		Drier forests and woodlands with hollow-bearing trees and sparse ground cover.	Unlikely, habitat disturbed, fragmented and without hollow-bearing trees. Test of Significance not required.
Eastern False Pipistrelle	✓		Moist and dry eucalypt forest and rainforest, particularly at high elevations.	No suitable habitat. Test of Significance not required.
Greater Glider		✓	Ranges and coastal plains of eastern Australia; inhabits a variety of eucalypt forests and woodlands.	Assessed under EPBC Act.
Grey-headed Flying-fox	✓	✓	Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	**Potential foraging habitat occurs. Test of Significance completed.**
Hoary Wattled Bat	✓		Dry open eucalypt forest dominated by spotted gum, boxes and ironbarks. Also healthy coastal forests where Red Bloodwood and Scribbly Gum are common. Naturally sparse understorey is favourable.	**Potential foraging habitat occurs. Test of Significance completed.**
Koala	✓	✓	Appropriate food trees in forests and woodlands, and treed urban areas.	Habitat highly fragmented and fire affected – no records in immediate locality of site (~ 3km). Test of Significance not required.
Large Bent-winged Bat	✓		Forest or woodland, roost in caves, old mines and stormwater channels.	**Potential foraging habitat occurs. Test of Significance completed.**
Little Bent-winged Bat	✓		Moist eucalypt forest, rainforest and dense coastal scrub.	**Potential foraging habitat occurs. Test of Significance completed.**
Rufous Bettong	✓		Tall moist eucalypt forest to open woodland with tussock grass understorey.	**Potential foraging habitat occurs. Test of Significance completed.**
Squirrel Glider	✓		Blackbutt, bloodwood and ironbark eucalypt forest with heath	Unlikely, habitat disturbed, fragmented and

Species	BC Act	EPBC Act	Habitat Requirements (DPIE/SPRAT)	Potential Occurrence/Test of Significance
			understorey in coastal areas, and box-ironbark woodlands and River Red Gum forest inland.	without hollow-bearing trees. Test of Significance not required.
Yellow-bellied Glider	✓		Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.	Unlikely, habitat disturbed, fragmented and without hollow-bearing trees. Test of Significance not required.
Yellow-bellied Sheathtail-bat	✓		Forages in a variety of habitats, roosts in tree hollows and buildings.	**Potential foraging habitat occurs. Test of Significance completed.**

Appendix F – Tests of Significance (BC Act)

Based on the field results and potential occurrence assessment, tests of significance ('five-part tests') under Section 7.3 of the BC Act have been completed as follows:

TECs:

- Freshwater wetlands
- Subtropical floodplain forest

Fauna:

Forest birds

- Black-chinned Honeyeater
- Dusky Woodswallow
- Grey-crowned Babbler
- Little Lorikeet

Flying-foxes

- Grey-headed Flying-fox

Macropods

- Rufous Bettong

Microbats

- Hoary Wattled Bat
- Large/Little Bent-winged Bat
- Yellow-bellied Sheathtail-bat.

Species profiles are provided below:

Black-chinned Honeyeater	Vulnerable – BC Act
Habitat description/ life cycle components	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) and Forest Red Gum (*E. tereticornis*). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees. A gregarious species usually seen in pairs and small groups of up to 12 birds. Feeding territories are large making the species locally nomadic. Recent studies have found that the Black-chinned Honeyeater tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares. Moves quickly from tree to tree, foraging rapidly along outer twigs, underside of branches and trunks, probing for insects. Nectar is taken from flowers, and honeydew is gleaned from foliage. Breeds solitarily or co-operatively, with up to five or six adults, from June to December. The nest is placed high in the crown of a tree, in the uppermost lateral branches, hidden by foliage. It is a compact, suspended, cup-shaped nest. Two or three eggs are laid and both parents and occasionally helpers feed the young.
Threats	• Clearing of remnant open forest and woodland habitat. • Poor regeneration of open forest and woodland habitats because of intense grazing. • May be excluded from smaller remnants by aggressive species such as the Noisy Miner

Black-chinned Honeyeater	Vulnerable – BC Act
	• Fragmentation of woodland habitat. • Infestation by invasive weeds. • Inappropriate fire regimes. • Climate change and reduction in resources due to drought.

Dusky Woodswallow	Vulnerable – BC Act
Habitat description/ life cycle components	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland. Primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water. Also frequently hovers, sallies and pounces under the canopy, primarily over leaf litter and dead timber. Also occasionally take nectar, fruit and seed. Depending on location and local climatic conditions (primarily temperature and rainfall), the dusky woodswallow can be resident year round or migratory. In NSW, after breeding, birds migrate to the north of the state and to southeastern Queensland, while Tasmanian birds migrate to southeastern NSW after breeding. Migrants generally depart between March and May, heading south to breed again in spring. There is some evidence of site fidelity for breeding. Although dusky woodswallows generally breed as solitary pairs or occasionally in small flocks, large flocks may form around abundant food sources in winter. Large flocks may also form before migration, which is often undertaken with other species. Nest is an open, cup-shape, made of twigs, grass, fibrous rootlets and occasionally casuarina needles, and may be lined with grass, rootlets or infrequently horsehair, occasionally unlined. Nest sites vary greatly, but generally occur in shrubs or low trees, living or dead, horizontal or upright forks in branches, spouts, hollow stumps or logs, behind loose bark or in a hollow in the top of a wooden fence post. Nest sites may be exposed or well concealed by foliage.
Threats	• Historical and ongoing loss of woodlands and dry open sclerophyll forests, including mallee because of agriculture, mining, forestry and residential development. • Reduction in area, and increased isolation of patches of remnant woodland and open forest. • Ongoing degradation of habitat through the loss of dead timber, removal of coarse woody debris and other disturbances of the ground layer. • Aggressive exclusion by over abundant noisy miners. • Reduction in the availability of food resources due to overgrazing and loss of leaf litter. • Lack of knowledge within the community regarding the species and its habitat requirements. • Habitat degradation from invasion by weeds including exotic grasses and woody weeds, and inappropriate land uses.

Grey-crowned Babbler	Vulnerable – BC Act
Habitat description/ life cycle components	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains; in coastal regions Woodlands on fertile soils are typical habitat. Babblers live in family groups that consist of a breeding pair and young from previous breeding seasons. A group may consist of up to fifteen birds. They feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses. Grey-crowned Babblers build and maintain several conspicuous, dome-shaped stick nests about the size of a football, which are used as a dormitory for roosting each night. Nests are usually located in shrubs or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts. Nests are maintained year round, and old nests are often dismantled to build new ones. Breeding occurs between July and February. Usually two to three eggs are laid and incubated by the female. During incubation, the adult male and several helpers in the group may feed the female as she sits on the nest. Young birds are fed by all other members of the group. Territories range from one to fifty hectares (usually around ten hectares) and are defended all year.
Threats	• Loss, degradation and fragmentation of woodland habitat on high fertility soils. • Excessive total grazing pressure and loss of coarse woody debris is resulting in degradation and loss of important habitat components. • Infestation of habitat by invasive weeds including exotic perennial grasses. • Inappropriate fire regimes - excessive fires lead to loss of tree and shrub regeneration and absence of fire may lead to the grass sward being too dense and therefore unsuitable for foraging by babblers. • Aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners. • Climate change impacts including reduction in resources due to drought. • Nest predation by species such as ravens and butcherbirds may be an issue in some regions where populations are small and fragmented.

Little Lorikeet	Vulnerable – BC Act
Habitat description/ life cycle components	The Little Lorikeet mostly forages in the canopy of open eucalypt forest and woodland, utilising Eucalyptus, Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. This species feeds mostly on nectar and pollen, but occasionally also on native fruits such as mistletoe. Nests are generally located in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of a smooth-barked Eucalyptus. Entrance is small (3.0 cm) and usually high above the ground (2.0–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees are often chosen, including species like Allocasuarina. Nesting season extends from May to September.
Threats	• Clearing of woodlands for agriculture. • The loss of old hollow bearing trees. • Competition with the introduced Honeybee.

Little Lorikeet	Vulnerable – BC Act
	• Infestation of habitat by invasive weeds. • Inappropriate fire regimes. • Aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners. • Climate change impacts including reduction in resources due to drought. • Degradation of woodland habitat and vegetation structure due to overgrazing.

Grey-headed Flying-fox (GHFF)	Vulnerable – BC Act, EPBC Act
Habitat description/ life cycle components	Occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands. The species forages on nectar and pollen of native trees, in particular Eucalypts, Melaleuca and fruits of rainforest trees and vines, in addition to cultivated gardens and fruit crops. Congregation camps of up to the tens of thousands are used for roosting, often in stands of riparian rainforest, Paperbark or Casuarina forest.
Threats	• Loss of foraging habitat. • Disturbance of roosting sites. • Unregulated shooting. • Electrocution on powerlines.

Hoary Wattled Bat	Vulnerable – BC Act
Habitat description/ life cycle components	In NSW the Hoary Wattled Bat occurs in dry open eucalypt forests, favouring forests dominated by Spotted Gum, boxes and ironbarks, and heathy coastal forests where Red Bloodwood and Scribbly Gum are common. Because it flies fast below the canopy level, forests with naturally sparse understorey layers may provide the best habitat. The species roosts in hollows and rock crevices and will occupy urban areas with suitable habitat. Birthing usually occurs during October and November when twins are born.
Threats	• Clearing and fragmentation of dry forest and woodland habitat through clearing for agriculture and development. • Loss of tree hollows for roosting and maternity sites from forest management favouring younger stands of trees. • Loss of hollow-bearing trees used for roosting and maternity sites as a result of too-frequent burning for grazing and forestry management activities. • Pesticides on insects and in water consumed by bats bio accumulates, resulting in poisoning of individuals. The use of pesticides also reduces available insect food sources.

Bent-winged Bats	Vulnerable – BC Act
Habitat description/ life cycle components	Bent-winged bats occur in moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Roosting occurs in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. Little Bentwinged-bats often share roosting sites with the Large Bent-winged Bat and, in winter, the two species may form mixed clusters. In NSW, the largest maternity colony is in close association with a large maternity colony of Large Bent-winged Bats and appears to depend on the large colony to provide the high temperatures needed to rear its young. Maternity colonies form in spring and birthing occurs in early summer. Males and juveniles disperse in summer. Only five nursery sites/ maternity colonies are known in Australia.
Threats	• Disturbance of colonies, especially in nursery or hibernating caves, may be catastrophic. • Destruction of caves that provide seasonal or potential roosting sites. • Changes to habitat, especially surrounding maternity/ nursery caves and winter roosts. • Pesticides on insects and in water consumed by bats bio accumulates, resulting in poisoning of individuals. • Predation from foxes, particularly around maternity caves, winter roosts and roosts within culverts, tunnels and under bridges. • Predation from feral cats, particularly around maternity caves, winter roosts and roosts within culverts, tunnels and under bridges. • Introduction of exotic pathogens such as the White-nosed fungus. • Hazard reduction and wildfire fires during the breeding season. • Large scale wildfire or hazard reduction can impact on foraging resources. • Poor knowledge of reproductive success and population dynamics.

Rufous Bettong	Vulnerable – BC Act
Habitat description/ life cycle components	Inhabit a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. A dense cover of tall native grasses is the preferred shelter. They sleep during the day in cone-shaped nests constructed of grass in a shallow depression at the base of a tussock or fallen log. At night they feed on grasses, herbs, seeds, flowers, roots, tubers, fungi and occasionally insects.
Threats	• Changes to the grassy understorey by inappropriate burning and grazing. • Competition from rabbits. • Predation by feral cats and foxes, whose numbers appear to increase when dingoes are reduced through baiting. • Loss of habitat through clearing, logging and collection of fallen timber. • Poor knowledge of the species' abundance and distribution in the western parts of its range.

Yellow-bellied Sheathtail-bat	Vulnerable – BC Act
Habitat description/ life cycle components	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.
Threats	• Disturbance to roosting and summer breeding sites. • Foraging habitats are being cleared for residential and agricultural developments, including clearing by residents within rural subdivisions. • Loss of hollow-bearing trees; clearing and fragmentation of forest and woodland habitat. • Pesticides and herbicides may reduce the availability of insects or result in the accumulation of toxic residues in individuals' fat stores.

a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Forest birds (Black-chinned Honeyeater, Dusky Woodswallow, Grey-crowned Babbler, Little Lorikeet): the Activity would result in the loss of up to 90 trees and minor regrowth along Myrtle Creek Road and up to ~4 ha of fire affected sparsely treed Spotted Gum open woodland in the STP (inclusive of two hollow-bearing trees). Vegetation loss represents a small proportion of disturbed and fragmented foraging habitats in the locality which would be unlikely to place local populations of the subject species at risk of extinction.

Flying-foxes (Grey-headed Flying-fox [GHFF]): the Activity would result in the loss of up to 90 trees along Myrtle Creek Road and up to ~4 ha of fire affected sparsely treed Spotted Gum open woodland in the STP (inclusive of two hollow-bearing trees). Vegetation loss represents a small proportion of at risk of extinction.

Macropods (Rufous Bettong): the habitat to be removed represents very poor habitat for the Rufous Bettong due to fragmentation and degradation (road reserve) or a lack of cover within the STP. The loss of habitat in the STP represents a minor contraction of potential foraging habitat for the species in a local context.

Microbats (Hoary Wattled Bat, Large/Little Bent-winged Bat, Yellow-bellied Sheathtail-bat): Foraging habitat for all microbats remain largely unaffected. Loss of two hollow-bearing trees and stags with decorticating bark is unlikely to significantly reduce roosting opportunities for any of the subject species.

b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological

community such that its local occurrence is likely to be placed at risk of extinction,

- Freshwater wetlands: no habitat would be removed.
- Subtropical coastal floodplain forest (SCFF): the Activity would result in the loss of 34 trees and minor regrowth over an area of ~ 0.39 ha from the disturbed and modified road reserve of Myrtle Creek Road. SCFF is widely established along Myrtle Creek and the western side of the road. The minor tree loss required would not impact this community in a local context.

c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

TECs:

- Freshwater wetlands: no habitat would be removed.
- Subtropical coastal floodplain forest (SCFF): an estimated 0.39 ha of habitat (34 trees and minor regrowth) will be removed from the verge of Myrtle Creek Road. This is negligible in a local context where this TEC is well established along Myrtle Creek.

Forest birds (Black-chinned Honeyeater, Dusky Woodswallow, Grey-crowned Babbler, Little Lorikeet): the loss of trees from within the road reserve and ~4 ha of sparse woodland in the STP represents a minor loss of foraging habitat for the subject species. The balance of vegetation on Lot 160 and the western side of Myrtle Creek Road will continue to provide well-connected foraging habitat.

Flying-foxes (Grey-headed Flying-fox): the Activity would result in a minor loss of foraging habitat in a local context; eucalypt foraging is common in the locality and will continue to provide adequate foraging resources for the GHFF.

Macropods (Rufous Bettong): loss of ~4 ha of foraging habitat within the STP represents a minor loss of habitat for the Rufous bettong; retained vegetation within Lot160 will continue to provide foraging and refuge habitat.

Microbats (Hoary Wattled Bat, Large/Little Bent-winged Bat, Yellow-bellied Sheathtail-bat): no significant loss of foraging habitat would occur; loss of two potential roost trees is unlikely to be significant in a local context.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

TECs:

- Freshwater wetlands: the small patch present on lot 160 is already fragmented and isolated; the Activity will not increase these processes.
- Subtropical coastal floodplain forest (SCFF): this community is already fragmented where it occurs in the road reserve. The Activity will not further fragment the extent of the community such that genetic exchange between local patches of SCFF is compromised.

Forest birds (Black-chinned Honeyeater, Dusky Woodswallow, Grey-crowned Babbler, Little Lorikeet): no habitat would be significantly fragmented or isolated such that dispersal opportunities for the subject species is substantially compromised.

Flying-foxes (Grey-headed Flying-fox): vegetation removal would not reduce dispersal opportunities for the GHFF.

Macropods (Rufous Bettong): as a highly mobile species, dispersal opportunities for the Rufous Bettong would not be substantially compromised.

Microbats (Hoary Wattled Bat, Large/Little Bent-winged Bat, Yellow-bellied Sheathtail-bat): vegetation removal would not reduce dispersal opportunities for microbat species.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

TECs:

- Freshwater wetlands: no habitat will be removed.
- Subtropical coastal floodplain forest (SCFF): the small area of habitat to be removed along Myrtle Creek Road is already isolated and modified.

Threatened fauna: No significant habitat for any of the subject species will be removed or modified as a result of the Activity. No barriers to dispersal for any of the subject species would be created. The habitat to be removed is unlikely to be of any significant importance to the subject species in a local context.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No areas of outstanding biodiversity value have been declared in Richmond Valley LGA.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

A threat may be listed as a key threatening process (KTP) under the BC Act if it adversely affects threatened species or ecological communities OR could cause species or ecological communities to become threatened. KTPs listed under the BC Act are shown in **Table F.1**, with an indication whether the proposal may contribute to any KTP.

Table F.1 Key Threatening Processes

Key Threatening Processes	Applicable to proposal
Aggressive exclusion of birds by noisy miners (*Manorina melanocephala*)	N
Alteration of habitat following subsidence due to longwall mining	N
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	N
Anthropogenic climate change	N
Bushrock removal	N
Clearing of native vegetation	**Y**
Competition and grazing by the feral European Rabbit (*Oryctolagus cuniculus*)	N
Competition and habitat degradation by feral goats (*Capra hircus*)	N
Competition from feral honeybees (*Apis mellifera*)	N
Death or injury to marine species following capture in shark control programs on ocean	N

Key Threatening Processes	Applicable to proposal
beaches	
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments	N
Forest eucalypt dieback associated with over-abundant psyllids and bell miners	N
Habitat degradation and loss by Feral Horses, *Equus caballus*	N
Herbivory and environmental degradation caused by feral deer	N
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	N
Importation of red imported fire ants (*Solenopsis invicta*)	N
Infection by Psittacine circoviral (beak and feather) disease affecting endangered psittacine species and populations	N
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	N
Infection of native plants by *Phytophthora cinnamomi*	N
Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	N
Introduction of the large earth bumblebee (*Bombus terrestris*)	N
Invasion and establishment of exotic vines and scramblers	N
Invasion and establishment of Scotch Broom (*Cytisus scoparius*)	N
Invasion and establishment of the Cane Toad (*Bufo marinus*)	N
Invasion, establishment and spread of Lantana (*Lantana camara*)	N
Invasion of native plant communities by African Olive (*Olea europaea L. subsp. cuspidata*)	N
Invasion of native plant communities by *Chrysanthemoides monilifera*	N
Invasion of native plant communities by exotic perennial grasses	N
Invasion of the Yellow Crazy Ant (*Anoplolepis gracilipes*) into NSW	N
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	N
Loss of hollow-bearing trees	**Y**
Loss or degradation (or both) of sites used for hill-topping by butterflies	N
Predation and hybridisation by feral dogs (*Canis lupus familiaris*)	N
Predation by the European Red Fox (*Vulpes vulpes*)	N
Predation by the feral cat (*Felis catus*)	N
Predation by *Gambusia holbrooki* (Plague Minnow or Mosquito Fish)	N
Predation by the Ship Rat (*Rattus rattus*) on Lord Howe Island	N
Predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*)	N
Removal of dead wood and dead trees	**Y**

The Activity is characteristic of the following KTPs:

- Clearing of native vegetation: the Activity would result in the loss of up to 90 trees and minor regrowth along Myrtle Creek Road and up to 4 ha of fire affected sparsely treed Spotted Gum open woodland in the STP. This represents a small impact in the local context, with the balance of Lot 160 retaining forest and continuing to recover from bushfire impacts.
- Loss of hollow-bearing trees: two hollow-bearing trees will be removed within the STP – this is unlikely to significant compromise roosting or breeding opportunities for any of the subject species.
- Removal of dead wood and dead trees: numerous immature stags (fire killed trees) will

require removal within the STP. Stags occur widely over the balance of Lot 160 and will continue to provide potential roosting or breeding opportunities should hollows develop in the future.

Appendix G – Significant Impact Assessment (EPBC Act)

This Significant Impact Assessment has been prepared in accordance with the Matters of National Environmental Significance Significant Impact Guidelines (v1.1; DoE 2013) for the recently listed (Endangered) community 'Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions'.

Significant Impact Assessment - Critically endangered and endangered ecological communities listed in the EPBC Act

Significant impact criteria: An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- *reduce the extent of an ecological community*
- *fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines*
- *adversely affect habitat critical to the survival of an ecological community*
- *modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns*
- *cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting*
- *cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:*

  - assisting invasive species, that are harmful to the listed ecological community, to become established, or

  - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or

- *interfere with the recovery of an ecological community.*

An assessment has been completed for the endangered ecological community 'Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions' (hereafter abbreviated as 'SEFFW') as follows.

Is there possibility that the activity will:

- *reduce the extent of an ecological community?*

Vegetation disturbance for the works (90 isolated trees within a degraded road reserve) represents a fraction of the substantial areas of SEFFW flanking floodplain areas surrounding Myrtle Creek. The construction works required for the Activity would not result in any significant reduction to SEFFW which would reduce the extent of this community in a local context.

- *fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines?*

Isolated trees within the road shoulder which represent SEFFW have already been historically fragmented. The Activity will not fragment or increase fragmentation of SEFFW in more intact areas within the locality.

- *adversely affect habitat critical to the survival of an ecological community?*

The relatively minor impacts of the Activity are negligible in a local context to the extent that they would not adversely affect habitat critical to the survival of SEFFW.

- *modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns?*

The construction and operation of the Activity (as previously described) are of a relatively small scale such that impacts on abiotic factors such as soil/nutrients would be minimal and would be appropriately managed through erosion and sediment control measures. The minor nature of works would not have potential to impact on groundwater or surface water drainage patterns in the locality.

- *cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting?*

Construction works would minor vegetation loss only, and these impacts would be reduced wherever possible during the construction process. The flora species impacted are all common within SEFFW and their loss would not substantially alter species composition or hasten the decline of these species within SEFFW in the locality.

- *cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:*
  - assisting invasive species, that are harmful to the listed ecological community, to become established, or
  - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or

While the Activity may have minor potential for increasing the incidence of weeds, these risks are relatively low and can be capably managed by prescribed mitigation measures (ie. hygiene procedures). It would be unlikely that any other invasive species harmful to SEFFW may be introduced, or their influence increased by the construction or operation of the Activity.

Any risks of pollutants (eg. oils, fuel) entering waterways during the construction phase of the Activity can be managed via standard environmental strategies (eg. refuelling policies, bunding, booms, spill kits etc).

- *interfere with the recovery of an ecological community?*

The construction or operation of the Activity is of low risk to SEFFW in the broader landscape, and the relatively low impacts of construction would be unlikely to interfere with the recovery of this community in a local context.



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Appendix C – Aboriginal Due Diligence Assessment Report



Rappville Sewerage Scheme Augmentation

Aboriginal Due Diligence Assessment Report

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Prepared for:

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Executive Summary

This Aboriginal Due Diligence Assessment (ADD) has been prepared by NSW Public Works, Department of Regional NSW. This report presents the results of the ADD assessment for the proposed construction of a new sewerage scheme at Rappville, New South Wales (NSW).

Background

There are zero previously recorded AHIMS sites or Aboriginal Places inside or adjacent to the study area. Parts of the study area are in a sensitive landform according to the Due Diligence Code, being within 200 metres of a watercourse.

Field survey

A field survey was conducted by Dr Alyce Cameron (Archaeologist, NSW Public Works) on 12 July 2022. The survey covered the Sewerage Treatment Plant (STP) location, Sewerage Pump Station (SPS), the rising main alignment adjacent to Myrtle Creek Road into Rappville Village, and the reticulation alignment. Ground surface visibility and exposure was variable across the study area. No Aboriginal sites or areas of potential archaeological deposit were identified during the survey. Past disturbances such as natural events like bushfire and flooding, as well as vegetation clearance, road construction, road maintenance, and landscaping in the village, has left little of the study area undisturbed.

Conclusions

The results of the ADD assessment have determined the Proposal is unlikely to impact Aboriginal objects and will not impact on any known places or sites of cultural significance to the Aboriginal community.

No Aboriginal sites or objects have been recorded inside the study area. The study area has a low potential for archaeological deposits to be present. Based on the results of this assessment, no further archaeological assessments are necessary.

Recommendations

The undertaking of the ADD process has resulted in the conclusion that the proposed works will have an impact on the ground surface, but no Aboriginal objects or intact archaeological deposits will be harmed. The following recommendations are provided as a precautionary measure to ensure the greatest possible protection to the area's Aboriginal cultural heritage values:

1. The Proposal may proceed at the study area with no further archaeological investigation. The Proposal and all land and ground disturbance activities must be confined to inside the study area. Should the Proposal extent outside the study area then further archaeological assessment may be required.
2. All staff and contractors involved in the proposed work should be made aware of legislative protection under the NPW Act for all Aboriginal sites and objects, and the contents of the Unanticipated Finds Protocols.
3. This assessment has concluded that Aboriginal objects are unlikely to be harmed by the proposed works. However, if during works, Aboriginal objects, artefacts, or skeletal material are noted the Unanticipated Finds Protocol (Appendix B) should be followed.

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Abbreviations

ADD	Aboriginal Due Diligence
AHIMS	Aboriginal Heritage Information Management System
DECCW	Department of Environment, Climate Change and Water
CEMP	Construction Environmental Management Plan
CMP	Conservation Management Plan
DPE- Biodiversity and Heritage	Department of Planning and Environment - Biodiversity and Heritage
EMP	Environmental Management Plan
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021*
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
T & I SEPP	*State Environmental Planning Policy (Transport & Infrastructure) 2021*
LEP	Local Environmental Plan
LGA	Local Government Area
NPW Act	*National Parks and Wildlife Act 1974*
OEH	Office of Environment and Heritage (now Heritage NSW)
POEO Act	*Protection of the Environment Operations Act 1997*
PSS	Pressure Sewer System
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy
SPS	Sewerage Pump Station
STP	Sewerage Treatment Plant
WHS	Work Health and Safety

1. Introduction

This section provides a brief description of the proposal, the background to the proposal and its objectives.

1.1 Purpose of the Proposal

Richmond Valley Council is replacing the existing sewerage system at Rappville which was affected by bushfire in October 2019. Richmond Valley Council have endorsed the Rappville Sewerage Scheme Options Study (PW 2021) which recommended a Pressure Sewerage System (PSS), a sewage pumping station (SPS) and a new Sewage Treatment Plant (STP).

This Aboriginal Due Diligence (ADD) assessment will support a Review of Environmental Factors (REF) required for the project in accordance with Part 5 and Sections 5.5 and 5.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Section 171 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Reg). Richmond Valley Council is both the proponent and the determining authority for the proposal.

1.2 Site Description and Setting

The village of Rappville is in the North Coast Region of New South Wales, approximately 60 kilometres (km) southwest of Lismore.

The study area is defined as the village of Rappville, the eastern road shoulder of Myrtle Creek Road and the proposed STP site within the northern portion of Lot 160 DP755260. The study area is within the Richmond Valley local government area (LGA).

A location map and aerial views of the study area are provided in Figure 1-1 and Figure 1-2.

1.3 Proposed Works

It is proposed to undertake the following works in the study area:

- Construction of an oxidation pond Sewage Treatment Plant (STP) including an onsite treated effluent reuse irrigation area
- Construction of Sewage Transfer System rising main from Rappville Village to the new Rappville STP (approximately 2.4 km long)
- Construction of the Pressure Sewerage System (PSS) throughout Rappville Village, including a Sewage Pump Station (SPS), reticulation mains and residential property pump units

The location and extent of the proposed works are shown in Figure 1-3, Figure 1-4 and Figure 1-5.

1.4 Assessment Methodology

This ADD assessment has been undertaken in compliance with the following:

- Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW 2010a).

The site inspection / survey of the study area was undertaken in compliance with Requirements 5–10 of the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010b).

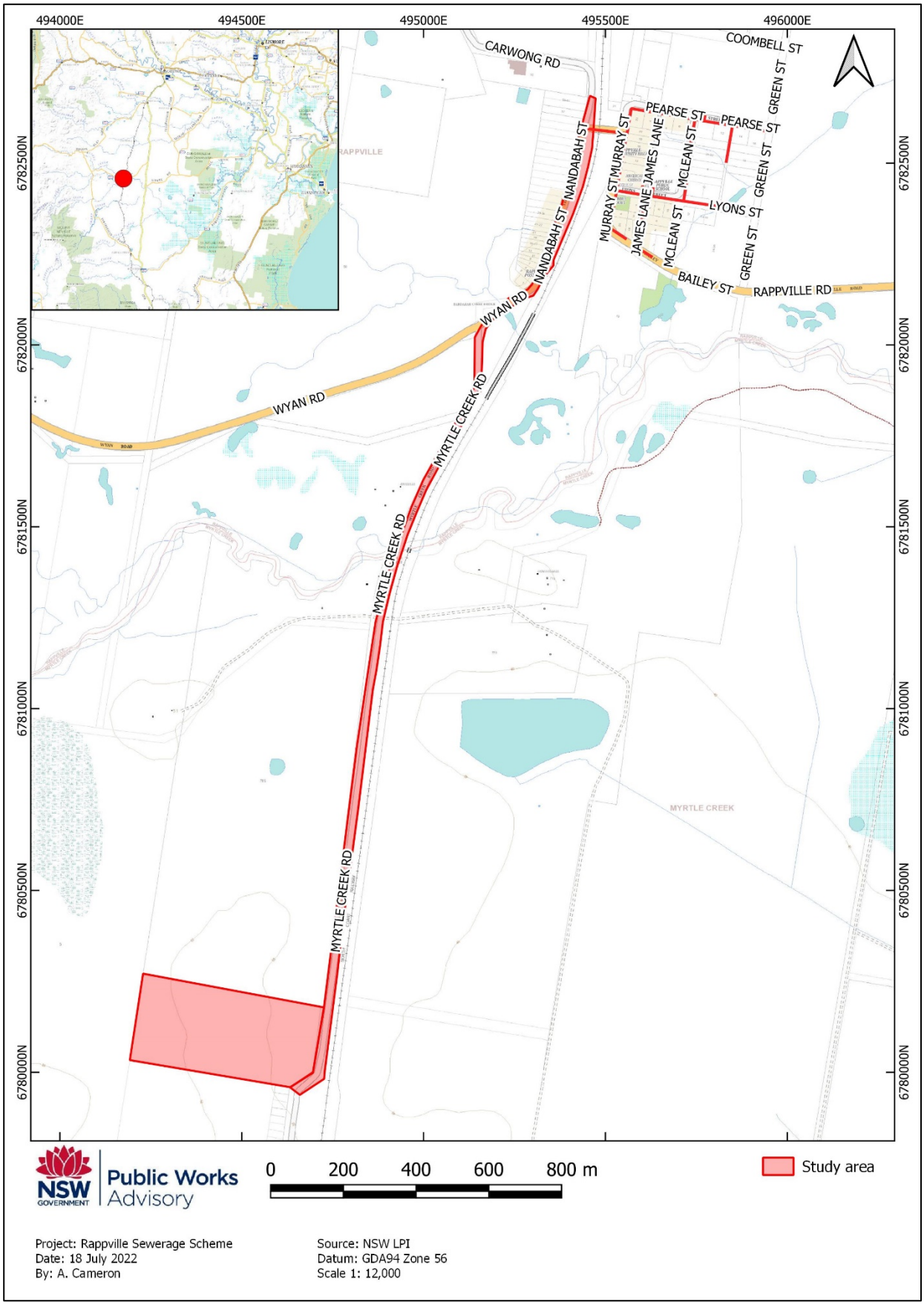


Figure 1-1: Rappville Sewerage Scheme location map

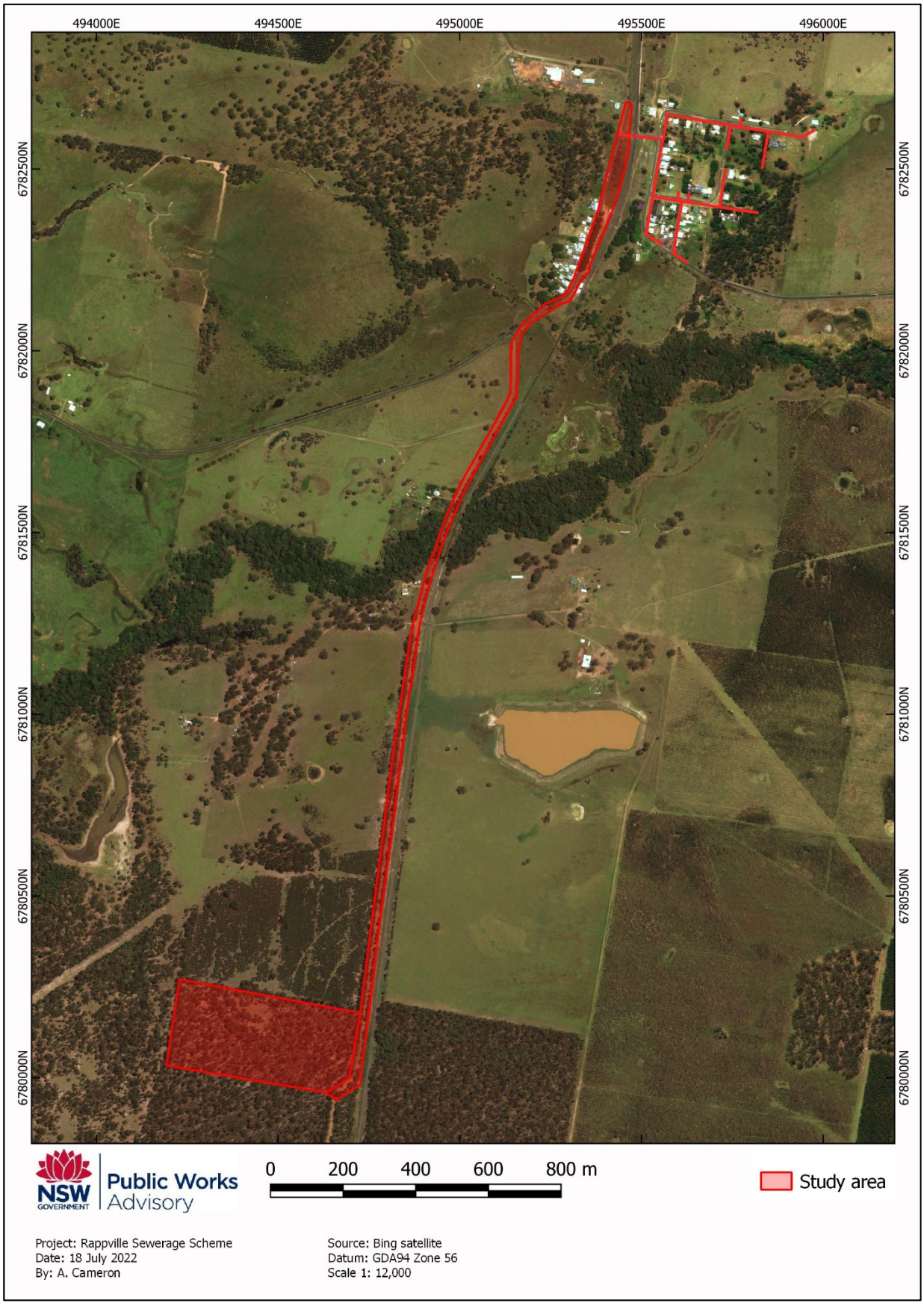


Figure 1-2: Aerial view of study area



Figure 1-3: Proposed impacts

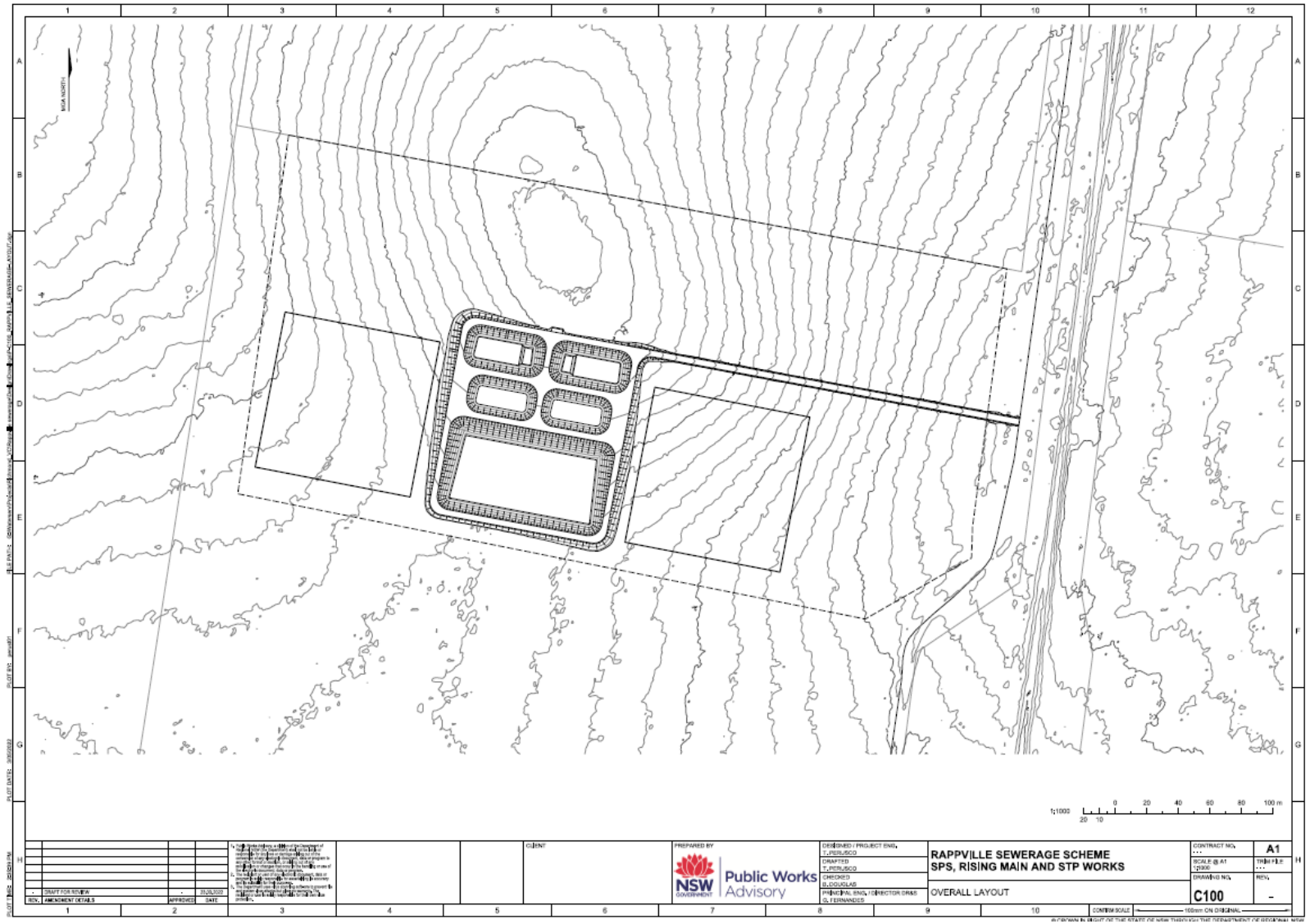


Figure 1-4: Rappville Sewerage Scheme proposed works (STP site)

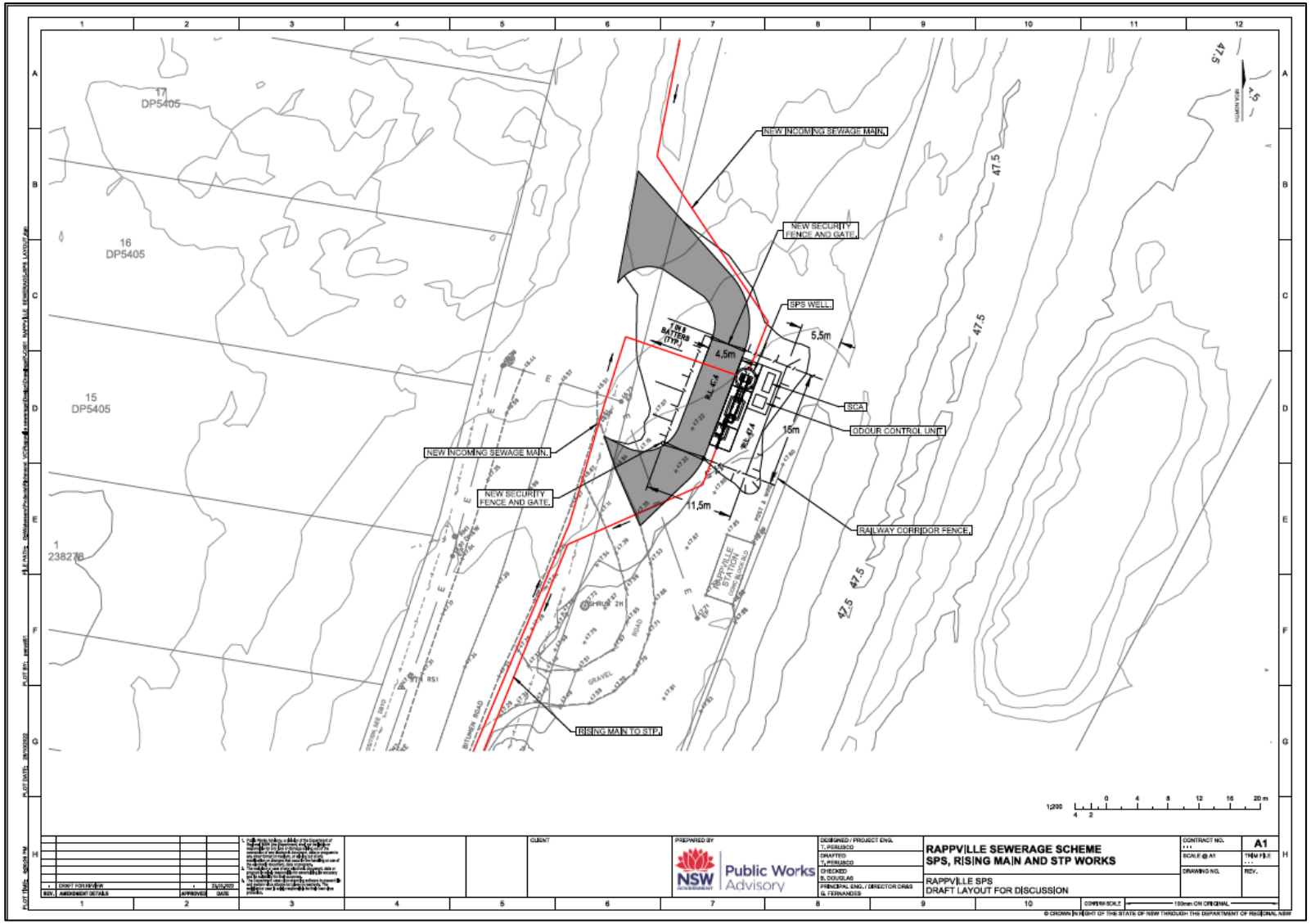


Figure 1-5: Rappville Sewerage Scheme proposed works (SPS site)

2. Statutory Considerations

2.1 Heritage Act 1977

The *Heritage Act 1977* protects and aims to conserve the environmental heritage of New South Wales. Environmental heritage is broadly defined under Section 4 of the *Heritage Act 1977* as consisting of "those places, buildings, works, relics, moveable objects, and precincts, of State or local heritage significance" (Heritage Branch, DoP 2009:4). Aboriginal places or objects that are recognised as having high cultural value (potentially of local and State significance) can also be listed on the State Heritage Register and protected under the provisions of the *Heritage Act 1977.*

2.2 National Parks and Wildlife Act 1974

The National Parks and Wildlife Act 1974 (NPW Act) provides for the statutory protection of Aboriginal cultural heritage places, objects, and features. One of the objects of the NPW Act is the conservation of places, objects, and features of significance to Aboriginal people (Section 2A). The NPW Act provides for the management of both Aboriginal Objects and Aboriginal Places and is administrated by Heritage NSW within the Department of Premier and Cabinet.

Aboriginal Objects and Aboriginal Places are protected under Part 6 of the NPW Act and there are legislative penalties if a person harms or desecrates an Aboriginal Place or Object (s. 86). Harm to an Aboriginal Place or Object includes any act or omission that destroys, defaces, or damages the object or place, or, in relation to an Aboriginal object, moves the object from the land on which it had been situated. However, harm to an Aboriginal Object that is 'trivial or negligible' does not constitute an offence. Also, it is a defence against prosecution for unintentionally harming Aboriginal Objects if due diligence had been exercised to determine that no Aboriginal object would be harmed, or the harm or desecration was authorised by an Aboriginal Heritage Impact Permit (AHIP). The *National Parks and Wildlife Regulation 2009* made under the NPW Act advocates a Due Diligence process to determining likely impacts on Aboriginal objects.

The *National Parks and Wildlife Regulation 2019* (NPW Regulation) made under the NPW Act allows a due diligence process in determining potential impacts of proposed works and actions to Aboriginal objects. The ADD process provides a defence to the offence of harming Aboriginal objects. The *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW, 2010) outlines a series of low impact activities, definitions of disturbed land, and a series of 'steps' for the ADD process.

3. Environmental context

3.1 Topography and Hydrology

The study area is in two landscape types as defined by Mitchell (2002). These are the Clarence–Richmond Alluvial Plains and the Grafton–Whiporie Basin. As shown on Figure 3-3, the Rappville Village and Myrtle Creek Road south to where it intersects with Myrtle Creek is classified as the Clarence–Richmond Alluvial Plains. The remainder of Myrtle Creek Road south towards the STP site, and the STP site is classified as Grafton–Whiporie Basin.

The Clarence–Richmond Alluvial Plains is characterised by wide valleys, channels, floodplains, terraces and estuaries of the Clarence and Richmond Rivers, as well as other coastal streams, while the Grafton–Whiporie Basin is characterised by extensive low undulating hills and large drainage basins (Mitchell 2002: 145). The topography across the study area conforms with these landform features. Rappville Village and Myrtle Creek is generally a flat plain, with some localised areas of slightly higher elevation present. The STP site includes a small hill and crest which form the end of a ridge spur line running southwest to northeast. The STP site includes moderate slopes to the east and west and part of the saddle between the connecting the hill crest to the spur line. The topography of the study area is shown in Figure 3-1.

There are several water courses in the vicinity of the study area, or that intersect the study area. Myrtle Creek and Nandabah Gully intersect the sewer rising main alignment between Rappville Village and the STP site. Also, in the vicinity of the study area is Busbys Creek approximately 600 metres west of the study area, and Four Mile Creek which is approximately 790 metres northwest of the proposed STP and study area.

Parts of the study area are also flood prone according to flood modelling for the Richmond Valley LGA. The modelling for 1:500-year floods and Probable Maximum Flood (PMF) are shown in Figure 3-2 Flooding can cause bioturbation at Aboriginal archaeological sites, both removing and depositing soil as well as stone artefacts. In flood prone areas, it is important to consider the impact flooding can have on archaeological sites.

3.2 Geology and Soils

The Grafton–Whiporie Basin has soils located on upper Jurassic quartz sandstone, lithic sandstone, clayey siltstone and coal measures. General soils present in this landscape type include yellow and brown texture-contrast soils on the slopes, and dark grey clays on the valley floors (Mitchell 2002: 145). Soils in the Clarence–Richmond Alluvial Plains landscape tend to be deep brown earths and brown clay on floodplains, while terraces have yellow texture contrast soils with ironstone concretions (Mitchell 2002: 145).

3.3 Vegetation

Parts of the study area have been cleared of original vegetation. Further removal of the original or remnant vegetation that may have been present was impacted by the 2019 bushfire which affected the region.

The vegetation present in or adjacent to the study area is mostly regrowth of native trees, shrubs and grasses following the 2019 bushfires.

3.4 Past Land Use

The NSW Land Use 2017 (DPE 2020) dataset categorises most of the study area into grazing native vegetation. The location of the reticulation main is generally located in areas classified as residential / farm infrastructure.

Historically the area around Rappville was used for grazing. The town was once a stop on the North Coast Railway line, which opened between Casino and Grafton in 1904.

Historical aerials from 1964 to 1994 are shown in Figure 3-4, Figure 3-5 and Figure 3-6. The aerials show the gradual clearance of vegetation in the area, with the greatest proportion occurring south of Myrtle Creek and east of the North Coast Railway line. Apart from the gradual decrease in vegetation, and the effects of bushfires and flooding, there has been limited visual changes in the area over the past fifty years.



Figure 3-1: Topography and hydrology of the study area

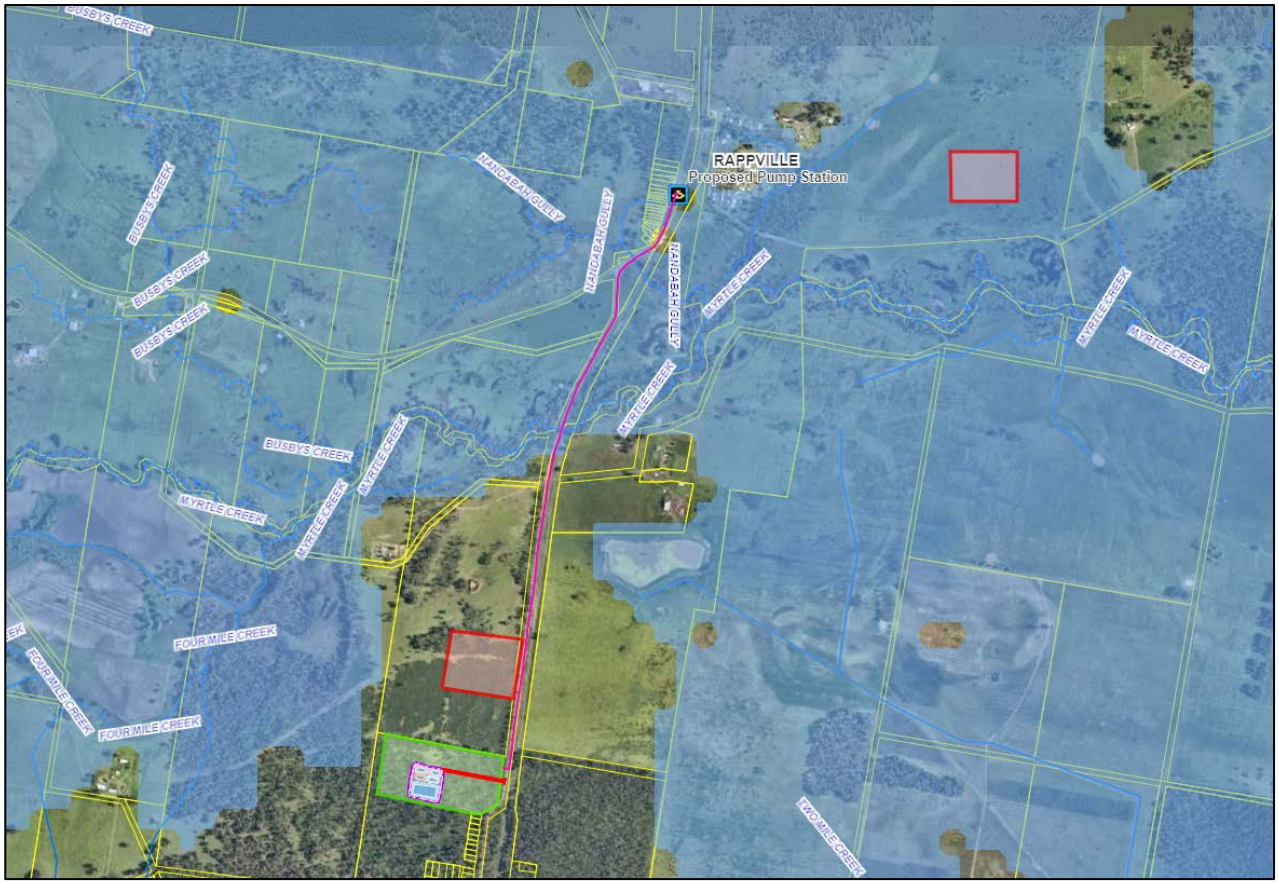


Figure 3-2: The study area and 1 in 500 year Richmond Valley flood study extents (blue shading)



Figure 3-3: Soil landscapes of the Study Area and surrounds

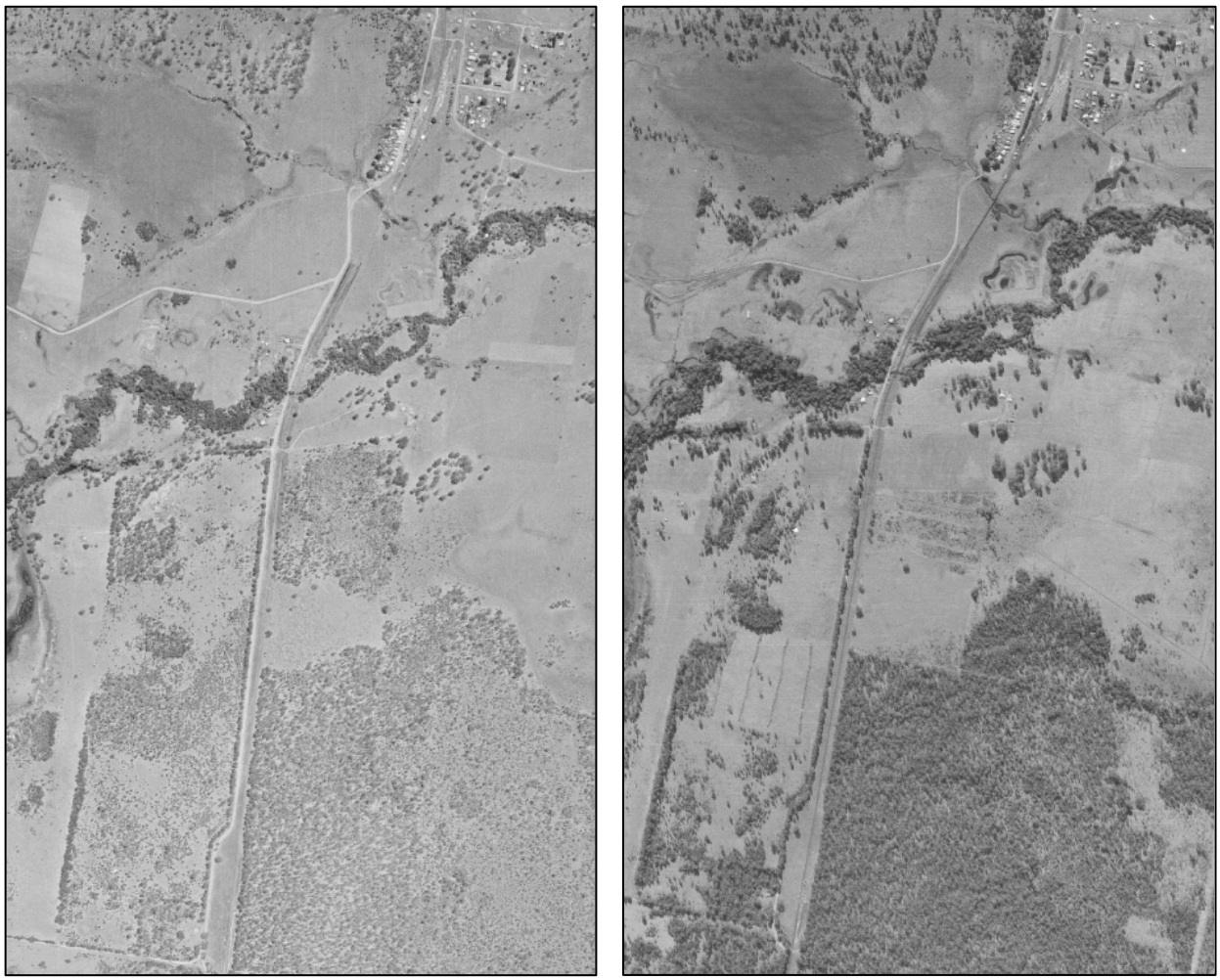


Figure 3-4: Historical aerials 1964 and 1971

Source: NSW Spatial Services, June 2022

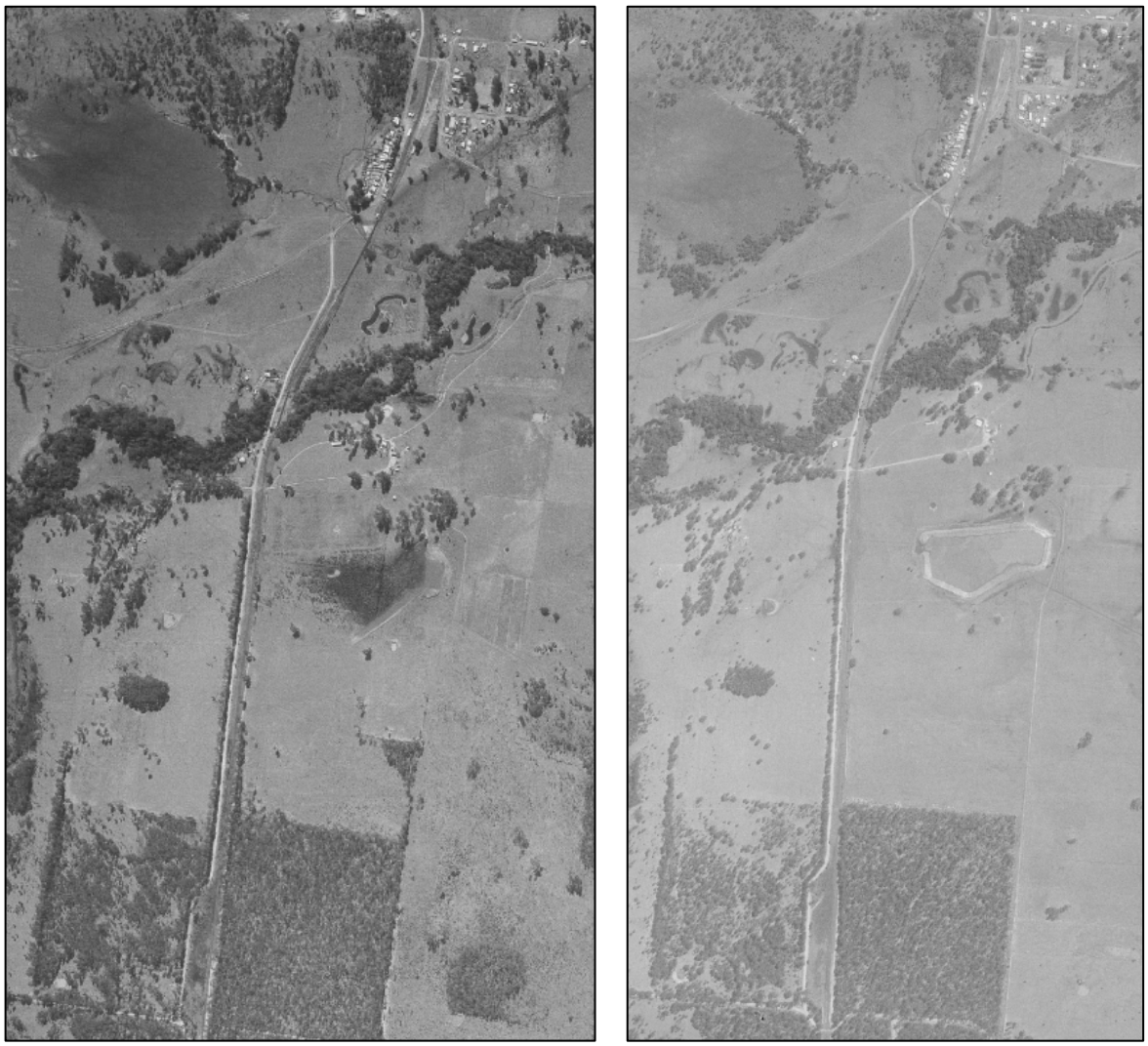


Figure 3-5: Historical aerials 1980 and 1988

Source: NSW Spatial Services, June 2022



Figure 3-6: Historical aerials 1991 and 1994

Source: NSW Spatial Services, June 2022

4. Aboriginal Due Diligence Assessment

There are series of questions used to determine whether it is necessary to follow the ADD process:

- Is the activity a declared project under Part 3A of the EP&A Act?
  - No. The new sewerage scheme and associated works will be assessed under Part 5 of the EP&A Act.
- Is the activity an exempt activity listed in the National Parks and Wildlife Act or other legislation?
  - The construction and works associated with the new sewerage scheme are not a listed as an exempt activity.
- Will the activity involve harm that is trivial or negligible?
  - No. The Proposal includes construction of a STP, and installation of a SPS, rising main, reticulation mains and onsite pump units at each property in the village.
- Is the activity in an Aboriginal Place or are you already aware of Aboriginal objects on the land?
  - The activity is not in an Aboriginal Place, and there are no recorded AHIMS sites in or adjacent to the study area.

4.1 Low Impact Activities

The NPW Regulation removes the need to follow the ADD process provided the proposed works are a specifically defined low impact activity. It is important to note that this does not apply to situations where there are already known Aboriginal object/s and that the defence does not authorise harm to known Aboriginal objects (DEECW 2010a: 6–8).

The proposal is not considered a low impact activity as defined by the Due Diligence Code (DECCW 2010a: 6–7).

4.2 Disturbed Lands

Disturbed lands are defined as (DEECW 2010a: 7–8):

> *Land is disturbed if it has been the subject of human activity that has changes the land's surface, being changes that remain clear and observable.*
>
> *Examples of activities that may have disturbed land include the following:*
>
> *(a) Soil ploughing*
>
> *(b) Construction of rural infrastructure (such as dams and fences)*
>
> *(c) Construction of roads, trails and tracks (including fire trails and tracks and walking tracks)*
>
> *(d) Clearing of vegetation*
>
> *(e) Construction of buildings and the erection of other structures*
>
> *(f) Construction or installation of utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure*
>
> *(g) Substantial grazing involving the construction of rural infrastructure*
>
> *(h) Construction of earthworks associated with anything referred to in paragraphs (a)(g).*

Parts of the study area considered to be in disturbed lands as defined by the Due Diligence Code. The STP site has been previously cleared of vegetation as shown in Section 3.4. Recent bushfires and flooding have exacerbated regrowth of vegetation which is also periodically cleared. The rising main alignment is situated inside a road corridor which has been cut and graded for construction and maintenance. The reticulation main alignment is situated throughout Rappville Village which has been previously landscaped.

4.3 Step 1

Will the activity disturb the ground surface?

The proposed STP, SPS, rising main and reticulation will disturb the ground surface inside the study area. The proposed works include:

- Oxidation Pond STP with onsite irrigation areas - approximately 5-hectare (ha) area of Lot 160 DP 755620
- SPS and access road within Lot 30 DP5405 – approximately 1000 m^2 impact footprint
- Construction of a rising main between the SPS and STP sites (approximately 2.4 km long)
- PSS reticulation through Rappville Village.

4.4 Step 2a

Are there any sites registered on the Aboriginal Heritage Information Management System?

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 24 June 2022 (Client Service ID: 695477). The search covered the study area and an approximate 20-kilometre area surrounding it. The search area is defined by:

Latitude, Longitude: 29.2669, 152.7198

Latitude, Longitude: -28.967, 153.2142

The extensive search resulted in 51 Aboriginal sites and zero Aboriginal Places being identified. The location of the AHIMS sites in relation to the project area are shown on Figure 4-1. The sites which are recorded with AGD coordinates have been converted into GDA coordinates. It is also important to note that the sites recorded on AHIMS are generally due to specific surveys for developments and as such are not a complete and comprehensive record of all Aboriginal sites, though are useful for general predictive modelling. Furthermore, as some sites are recorded in the AGD coordinate system, which were in turn converted from recordings on topographic maps, these points are not always correctly showing the location of the recorded site and there can be an error margin in terms of location.

As summarised in Table 4-1, the most frequent site type present in the vicinity of the study area is artefact scatters / open camp sites (25.5%), followed by isolated finds (15.7%). Other site types such as modified trees (11.8%), shelters with art (11.8%), bora/ceremonial sites (5.9%) and shelters with deposit (5.9%) are also present though to a lesser frequency. There are four restricted sites inside the extensive search area. AHIMS was contacted by email on 1 July 2022 to determine whether the restricted sites are inside or adjacent to the study area. A reply was received from AHIMS on 5 July 2022 stating the restricted sites are not inside or immediately adjacent to the study area.

The closest recorded sites on AHIMS to the study area are:

- 12-3-0010: located approximately 4.8 km northwest of the study area and consisting of a bora/ceremonial site recorded by Isabel McBryde in 1974.
- 12-3-0045: located approximately 5.6 km southeast of the study area and consisting of an open camp site / artefact scatter recorded by Peter Kuskie in 1993.

Searches of additional heritage databases and the AHIP public register were conducted on 27 June 2022. The results of these searches are summarised in Table 4-2. There are five items listed on Schedule 5 of the Richmond Valley LEP 2012 which are in proximity of the study area, specifically the proposed SPS, rising water main and reticulation main throughout Rappville Village (Figure 4-2).

Table 4-1: AHIMS site types in the vicinity of the Study Area

Site type	Number	Frequency (%)
Open camp site / artefact scatter	13	25.5
Isolated find	8	15.7
Modified tree	6	11.8
Shelter with art	6	11.8
Restricted site	4	7.8
Bora/ceremonial	3	5.9
Shelter with deposit	3	5.9
Artefact scatter and PAD	1	2.0
Artefact scatter, art, and PAD	1	2.0
Artefact scatter, PAD, and shell	1	2.0
Burial	1	2.0
Modified tree	1	2.0
Modified tree and Aboriginal resource and gathering	1	2.0
Rock engraving	1	2.0
Shelter with art & deposit	1	2.0
Total	**51**	**100.0**

Table 4-2: Additional databases and registers

Name	Comments
State Heritage Register (SHR) and Inventory (SHI)	No SHR or SHI items are within 5 kilometres of the study area.
Richmond Valley Local Environmental Plan 2012	There are five items listed on Schedule 5 in proximity to the study area: I153: Murray Street Memorial Tree Planting (Jacaranda Trees) I155: Nandabah Street Memorial Tree Planting (Camphor Laurel Trees) I151: St Johns Church I154: Commercial Hotel I152: Rappville Public Hall
Register of the National Estate	No items are listed inside the study area or within 5 kilometres of the study area.
Commonwealth Heritage List	No items are listed inside the study area or within 5 kilometres of the study area.
National Heritage List	No items are listed inside the study area or within 5 kilometres of the study area.
World Heritage List	No items are listed inside the study area or within 5 kilometres of the study area.
AHIP Public Register	No AHIPs listed on the public register are for Rappville or Myrtle Creek.

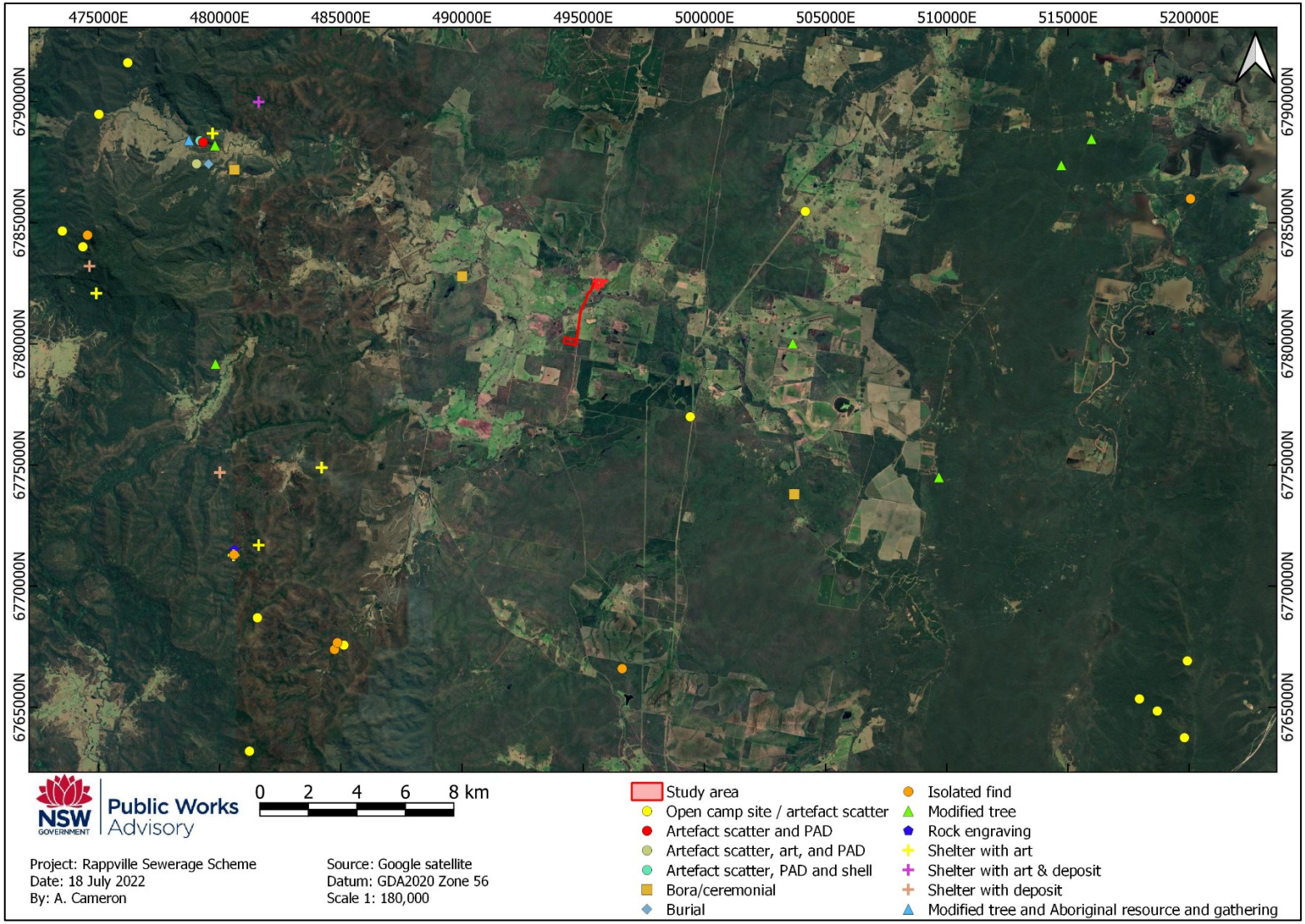


Figure 4-1: AHIMS sites in vicinity of the study area

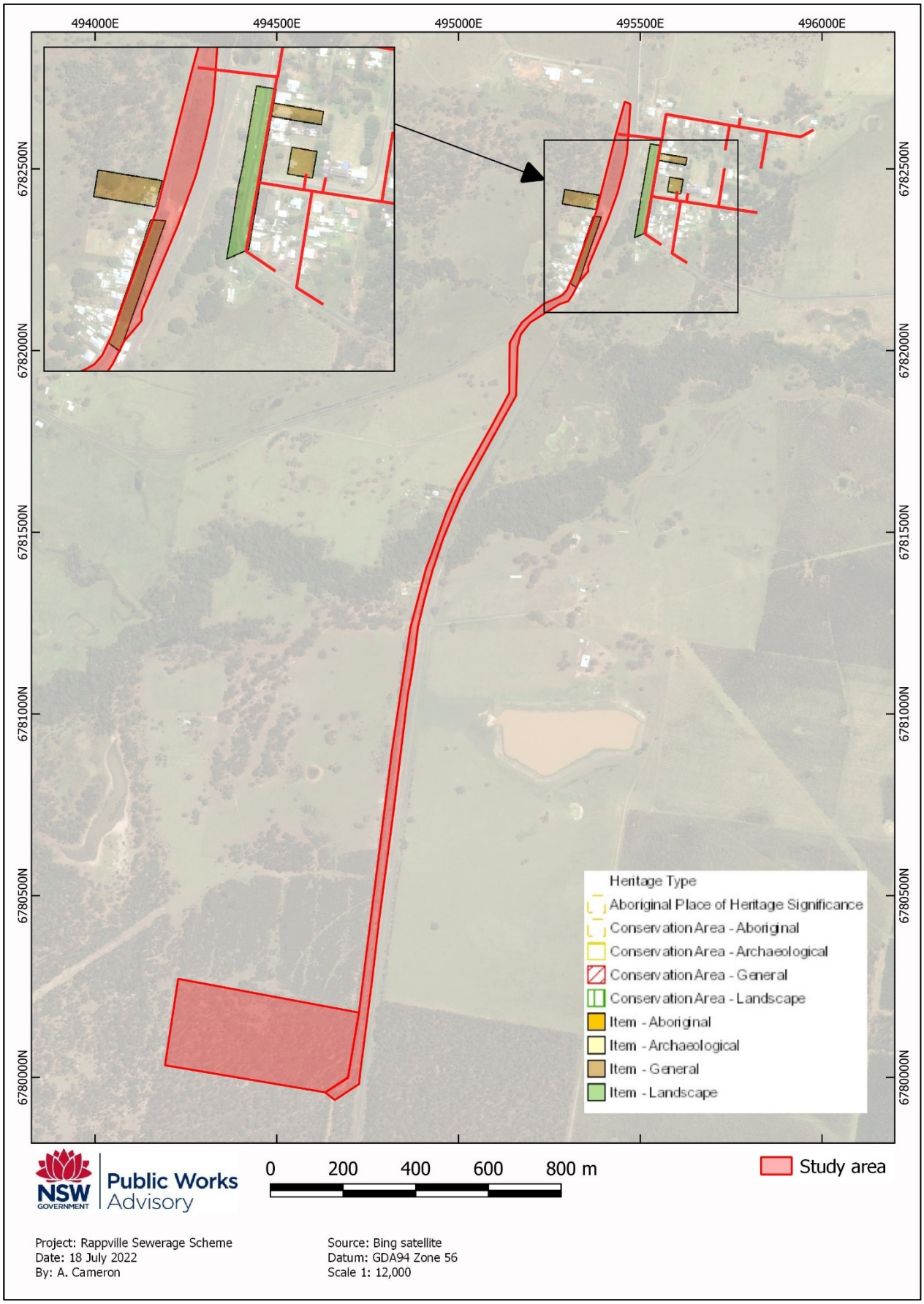


Figure 4-2: LEP items in vicinity of the study area

4.5 Step 2b

Are there any other sources of information?

One of the main regional studies which cover the study area is Isabel's McBryde's work in the Northern Rivers and New England regions during the 1970s (McBryde 1974). McBryde's work emphasised wide ranging population movements on a seasonal basis and suggested that migration occurred annual between the coast and the tableland foothills. Other settlement models have also been proposed including a more sedentary pattern which focused on coastal areas. Hall and Lomax (1993) suggested that the more sedentary occupation of coastal zones with rich natural resources, would have been associated with smaller transitory groups using marginal resource areas such as ridge lines and watercourses. Hall and Lomax (1993) noted that these movements would depend on the topography and characterised by small briefly inhabited sites.

There have been limited archaeological assessments conducted in the vicinity of the study area. One assessment for a proposed 330kV electricity transmission line between Grafton and Lismore was conducted by Byrne (1981). This assessment was approximately 4.5 kilometres east from the study area. During the survey three artefact sites were recorded, consisting of chert, quartzite, quartz and silcrete artefacts that were identified on spurs slopes and ridges. Two isolated stone artefacts were also identified during the survey.

Another large scale linear archaeological assessment in the general region of Rappville, was the assessment conducted for the Pacific Highway Upgrades. The Woolgoolga to Ballina Pacific Highway Upgrade was reassessed by Jacobs in 2012, which also compiled information from previous assessments relating to the project. Overall, the assessment conducted for the Woolgoolga to Ballina upgrade identified 54 Aboriginal sites within or near the project boundary. The locations of the sites indicate that Aboriginal people in the area were using low hills and undulating rises in an ephemeral way, moving between the coast, major rivers and hinterland (NSW RMS 2012).

The previous assessments conducted in the general region indicate that artefact scatters are the most likely site types to be present in the study area, mostly along ridge lines or on spurs.

4.6 Step 2c

Are there any landscape features that are likely to indicate presence of Aboriginal objects?

The Due Diligence Code lists several landscape features that indicate the likely existence of Aboriginal Objects (DEECW 2010a: 12). These include:

- Within 200 metres of waters (including the whole or any part of a river, stream, lake, lagoon, swamp, wetlands, natural watercourse, tidal waters (including the sea)
- Located within a sand dune system
- Located on a ridge top, ridge line or headland
- Located within 200 metres below or above a cliff face
- Within 20 metres of or in a cave, rock shelter, or a cave mouth.

The study area is located within 200 metres of several natural watercourses. The rising main between the STP and Rappville Village will cross Myrtle Creek and Nandabah Gully.

4.7 Step 3

Can harm to Aboriginal objects listed on AHIMS or identified by other sources of information and /or can the carrying out of the activity at the relevant landscape features be avoided?

Harm to AHIMS sites will be avoided. There are no registered AHIMS sites inside or adjacent to the study area.

To determine the archaeological potential of the study area a site inspection was also conducted (see Section 4.8). The site inspection resulted in the determination that the potentially sensitive areas inside the study area, such as near the creek lines and the crest, have been previously disturbed, and there is low potential for in situ archaeological deposits to be present.

4.8 Step 4

Does a desktop assessment and visual inspection confirm that there are Aboriginal objects or that they are likely?

A visual inspection of the study area was conducted by Dr Alyce Cameron (Archaeologist, Public Works) on 12 July 2022. The visual inspection included a survey of the study area conducted to the survey requirements of the Code of Practice (DEECW 2010b: 16–19).

The study area was divided into three sections based on the proposed works: STP site, the rising main and SPS, and the reticulation main alignment. Inside the STP site area (Survey unit 1) slopes are the predominate landform, though a low-lying crest is present as shown in Figure 3-1. The rising main (Survey unit 2) intersects through creek flats and slopes on the east side of the road corridor for Myrtle Creek Road. The reticulation main alignment (Survey unit 3) covers mostly flat or gently sloping landforms.

Survey coverage for each survey unit and associated landform is detailed in Table 4-3 and Table 4-4 shows the pedestrian survey coverage of the study area. The pedestrian survey was conducted by one surveyor and included transects across the STP site, along the rising main alignment, and along parts of the proposed reticulation main alignment. Ground surface visibility and exposure was variable for each survey unit.

The STP site location (Survey unit 1) is heavily vegetated by regrowth following bushfires and heavy rain (Figure 4-4). The area is predominately vegetated with young and whippy saplings. Due to the dense vegetation, traditional transects across the area were abandoned, and instead cleared tracks were used where possible during the survey (Figure 4-5), or minor tracks where the vegetation was not quite as thick were used. Overall, the STP site had low ground surface visibility and exposure (Table 4-3), with heavy vegetation, thick grasses, mud and leaf litter obscuring much of the ground surface. However, the cleared tracks used to access areas around the STP site had moderate visibility and exposure. The soils across the STP site were waterlogged, including at the top of the crest and tended to be a mid-brown silty clay where visible (Figure 4-6).

The rising main alignment (Survey unit 2) is located on the eastern side of Myrtle Creek Road in the road reserve. The North Coast Railway line and rail reserve is directly to the east of the road reserve. The western side of the road reserve is adjacent to private properties and agriculture lands. The western side of the road reserve is approximately 8 metres wide from the edge of the road (including the culvert) to the fence line, while the eastern side of the road reserve is approximately 3 metres wide to the fence line (also including the culvert).

The eastern side of the road reserve along Myrtle Creek Road is predominately unnatural ground surface and has been previously disturbed by ongoing maintenance of the road. It consists mostly of fill and disturbed soils mixed with imported gravels, such as road base or railway ballast (Figure 4-7). The vegetation consists mostly of regrowth and grasses (Figure 4-8 and Figure 4-9). All trees on the eastern side of the road reserve were checked for cultural modifications during the survey. The rising main alignment also crosses two water courses: Myrtle Creek (Figure 4-10) and Nandabah Gully (Figure 4-11). Myrtle Creek as viewed from Smalls Bridge, shows erosion along the lower banks, and steep banks into the creek, indicating that past flooding events have likely resulted in a movement of soils. No locations inside the road reserve adjacent to the watercourses have not already been disturbed through various prior impacts, such as cutting and grading. Ground visibility and exposure along the rising main alignment was variable and tended to be low to moderate. Grass obscured much of the ground surface along the eastern side of the road reserve, though exposures were present in some areas (Figure 4-12).

The reticulation main alignment (Survey unit 3) is located along the edges of streets and residential properties in Rappville Village. The SPS site is in Survey unit 3 adjacent to Nandabah Road and across the road from the Commercial Hotel. Not all the reticulation main alignment was surveyed, as the area has been modified and landscaped during the village development, though the SPS site was included. Representative photographs of the reticulation main alignment through the village are shown in Figure 4-13 to Figure 4-14 and Figure 4-15 shows the location of the SPS site. Ground surface visibility and exposure through the village was moderate.

There were no Aboriginal sites or objects identified during the survey. Though the study area intersects two creek lines, the creek flats inside the road reserve have been previously disturbed through road construction and maintenance works and is unlikely to have undisturbed archaeological deposits present. Furthermore, the sensitive areas as defined by the Due Diligence Code inside the study area are also prone to flooding (see Section 3.1). Floodplains were utilised by Aboriginal groups as a rich resource zone, however longer term or semi-permanent occupation would have tended to be sparser on the floodplains and would have been focused on elevated flat areas adjacent to them. Furthermore, even periodic flooding of these areas is likely to have obscured or eroded physical evidence of camp sites away (i.e., stone artefacts, hearths, etc.). There is low potential of in situ archaeological deposits to be present inside the study area.

Table 4-3: Survey coverage

Survey unit	Landform	Survey unit area (m^2)	Visibility (%)	Exposure (%)	Effective coverage area (m^2)	Effective coverage (%)
1	Slopes	106140	20	50	10614	10
1	Crest	11500	30	60	2070	18
2	Slopes	5295	30	40	635.4	12
2	Creek flats	3552	40	50	710.4	20
3	Slopes	1680	60	70	705.6	42
3	Flats	5169	50	60	1550.7	30

Table 4-4: Landform summary

Landform	Landform area (m^2)	Area Effectively surveyed (m^2)	% of landform effectively surveyed (%)	Number of sites	Number of artefacts or features
Slopes	113115	11955	11	0	0
Crest	11500	2070	18	0	0
Creek flats	3552	710.4	20	0	0
Flats	5169	1550.7	30	0	0



Figure 4-3: Survey coverage



Figure 4-4: View west of the STP site from Myrtle Creek Road



Figure 4-5: View west along cleared track inside the STP site



Figure 4-6: Ground surface visibility along cleared track inside the STP site



Figure 4-7: View north along the rising main alignment along Myrtle Creek Road



Figure 4-8: View north of the rising main alignment along Myrtle Creek Road



Figure 4-9: Ground surface exposure along the rising main alignment on Myrtle Creek Road



Figure 4-10: View north of Smalls Bridge crossing Myrtle Creek



Figure 4-11: View northeast of bridge across Nandabah Gully



Figure 4-12: Example of ground surface exposure along the rising main alignment



Figure 4-13: View west of the reticulation main alignment along Pearse Street



Figure 4-14: View east of the reticulation main alignment along Lyons Street



Figure 4-15: View east of the SPS site

5. Conclusion and Recommendations

5.1 Conclusion

The results of the ADD assessment have determined the Proposal is unlikely to impact Aboriginal objects and will not impact on any known places or sites of cultural significance to the Aboriginal community.

No Aboriginal sites or objects have been recorded inside the study area. The study area has a low potential for archaeological deposits to be present. Based on the results of this assessment, no further archaeological assessments are necessary.

5.2 Recommendations

The undertaking of the ADD process has resulted in the conclusion that the proposed works will have an impact on the ground surface, but no Aboriginal objects or intact archaeological deposits will be harmed. The following recommendations are provided as a precautionary measure to ensure the greatest possible protection to the area's Aboriginal cultural heritage values:

1. The Proposal may proceed at the study area with no further archaeological investigation. The Proposal and all land and ground disturbance activities must be confined to inside the study area. Should the Proposal extent outside the study area then further archaeological assessment may be required.
2. All staff and contractors involved in the proposed work should be made aware of legislative protection under the NPW Act for all Aboriginal sites and objects, and the contents of the Unanticipated Finds Protocols.
3. This assessment has concluded that Aboriginal objects are unlikely to be harmed by the proposed works. However, if during works, Aboriginal objects, artefacts, or skeletal material are noted the Unanticipated Finds Protocol (Appendix B) should be followed.

6. References

Byrne, D. 1981. *Archaeological survey of the Grafton-Lismore transmission line.* Unpublished report to the NSW Electrical Commission.

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McBryde, I. 1974. A*boriginal Prehistory in New England.* Sydney University Press: Sydney.

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Appendix A – AHIMS extensive search

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Rappville STP ADD2

Client Service ID : 695477

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
13-1-0099	Bunggwalbin Sheild Tree	GDA	56	514725	6787375	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	Recorders	B Caldwell,Miss.Rachel (Elle) Lillis,Virtus Heritage Pty Ltd - Pottsville					Permits		
13-1-0100	Coraki Land Fill 1	AGD	56	519950	6785800	Open site	Valid	Artefact : -	Isolated Find	
	Contact	Recorders	Ms.Jacqueline Collins					Permits		
12-3-0058	Jarrawarra Ridge;Mt. Belmore State Forest;	AGD	56	479900	6774500	Closed site	Valid	Artefact : -	Shelter with Deposit	
	Contact	Recorders	B Caldwell,Ray Fife,D Walker					Permits		
12-3-0059	Camira State Forest - isolated find	AGD	56	496500	6766400	Open site	Valid	Artefact : -	Isolated Find	
	Contact	Recorders	B Caldwell,Ray Fife					Permits		
12-3-0003	Busbys Flat Cherry Tree State Forest 2	AGD	56	480500	6787000	Open site	Valid	Ceremonial Ring (Stone or Earth) : -	Bora/Ceremonial	
	Contact	Recorders	Isabel McBryde					Permits		
12-3-0010	Wyan;Myrtle Creek;	AGD	56	489900	6782600	Open site	Valid	Ceremonial Ring (Stone or Earth) : -	Bora/Ceremonial	
	Contact	Recorders	Isabel McBryde					Permits		
12-3-0011	Fullers Sate Forest;Cabbage Tree Creek;	AGD	56	484100	6774700	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	Recorders	Isabel McBryde					Permits		
13-1-0086	Island Rd 4-1;	AGD	56	519700	6763550	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	R Hall					Permits		
13-1-0087	Island Rd 2-1;	AGD	56	518580	6764650	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	R Hall					Permits		
13-1-0088	Island Rd 1-1;	GDA	56	517950	6765340	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	R Hall,Miss.Rachel (Elle) Lillis,Virtus Heritage Pty Ltd - Pottsville					Permits		
13-1-0090	Lookout 1-1;	AGD	56	519820	6766720	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	R Hall					Permits		
12-3-0012	Fullers State Forest;Cabbage Tree Creek;	AGD	56	484100	6774700	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	Recorders	Isabel McBryde					Permits		
12-3-0014	Mt Neville;Cabbage Tree Creek;	AGD	56	481500	6771500	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	Recorders	Isabel McBryde					Permits		
12-3-0016	Cabbage Tree Creek;Mt Neville;	AGD	56	480500	6771300	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	Recorders	Lindsey					Permits		
12-3-0030	Busby Creek #1 Pikibene National Forest	AGD	56	474910	6789290	Open site	Valid	Artefact : -	Open Camp Site	939
	Contact	Recorders	Denis Byrne					Permits		

Report generated by AHIMS Web Service on 24/06/2022 for Alyce Cameron for the following area at Lat, Long From : -29.2669, 152.7198 - Lat, Long To : -28.967, 153.2142. Number of Aboriginal sites and Aboriginal objects found is 51

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Rappville STP ADD2
Client Service ID : 695477

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
12-3-0031	Cabbage Tree Creek;	AGD	56	474800	6781900	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	Recorders	Colin Roberts					Permits		
12-3-0032	Mt Belmore Axe Shelter;	AGD	56	474520	6783020	Closed site	Valid	Artefact : -	Shelter with Deposit	
	Contact	Recorders	R Hall					Permits		
12-3-0035	Mt Marsh 3;14-1;	AGD	56	484630	6767190	Open site	Valid	Artefact : -	Isolated Find	
	Contact	Recorders	R Hall					Permits		
12-3-0036	Mt Marsh 3;8-1;	AGD	56	484630	6767190	Open site	Valid	Artefact : -	Isolated Find	
	Contact	Recorders	R Hall					Permits		
12-3-0037	Mt Marsh 3;11-1;	AGD	56	485020	6767370	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	R Hall					Permits		
12-3-0038	Mt Marsh 4;1-1;	AGD	56	481450	6768500	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	R Hall					Permits		
12-3-0039	Forty Acre RD 3-1;	AGD	56	473400	6784470	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	R Hall					Permits		
12-3-0040	Forty Acre RD 2-1;	AGD	56	474440	6784300	Open site	Valid	Artefact : -	Isolated Find	
	Contact	Recorders	R Hall					Permits		
12-3-0041	Mt belmore 3-1;	AGD	56	474250	6783820	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	R Hall					Permits		
12-3-0042	Mt Marsh 3, 10-1;	AGD	56	484750	6767470	Open site	Valid	Artefact : -	Isolated Find	
	Contact	Recorders	R Hall					Permits		
12-3-0043	Lollback Ck 2-1;	AGD	56	476100	6791420	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	R Hall					Permits		
12-3-0044	Mt Marsh 5,10-1;	AGD	56	481120	6762990	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	R Hall					Permits		
12-3-0045	Two Mile Creek 1	AGD	56	499310	6776800	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	Mr.Peter Kuskie					Permits		
12-3-0056	Camira State Forest;	AGD	56	496500	6766400	Open site	Valid	Artefact : -	Isolated Find	
	Contact	Recorders	B Caldwell,Ray Fife					Permits		
12-3-0057	Jarrawarra Ridge Rockshelter;JR_R;	AGD	56	479900	6774500	Closed site	Valid	Artefact : -	Shelter with Deposit	
	Contact	Recorders	Ray Fife,D Walker,R Caldwell					Permits		
13-1-0065	Woodburn	AGD	56	504060	6785280	Open site	Valid	Artefact : -	Open Camp Site	198
	Contact	Recorders	Denis Byrne					Permits		
12-6-0121	Cabbage Tree Creek Grafton	AGD	56	480465	6771082	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	Recorders	Warren Bluff					Permits		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Rappville STP ADD2
Client Service ID : 695477

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
12-3-0063	Mt Neville NR ISF1	AGD	56	480482	6771104	Closed site	Valid	Artefact : 1		
	Contact	Recorders	Ms.Jill Ruig					Permits		
13-1-0035	Myrtle Creek Bora Ground	AGD	56	503600	6773600	Open site	Valid	Ceremonial Ring (Stone or Earth) : -	Bora/Ceremonial	
	Contact	Recorders	Harry Creamer					Permits		
12-3-0001	Sandy Arm Busbys Flat	AGD	56	479600	6788500	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	Recorders	Huilbron					Permits		
12-3-0002	Busbys Flat Cherry Tree State Forest	AGD	56	481500	6789800	Closed site	Valid	Artefact : -, Art (Pigment or Engraved) : -	Shelter with Art,Shelter with Deposit	
	Contact	Recorders	Isabel McBryde					Permits		
13-1-0060	Physics Lagoon Myrtle Creek	AGD	56	509570	6774300	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	Recorders	J Gonda					Permits		
12-3-0024	Busbys Flat Cherry Tree State Forest 3	AGD	56	479720	6778980	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	Recorders	J Gonda					Permits		
13-1-0116	Culgoa St38	AGD	56	503538	6779833	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact Gerry Saals	Recorders	Craig Wall					Permits		
13-1-0160	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact Mr.Lauire Wlison	Recorders	Claude McDermott,Damien Hofmeyer					Permits		
13-1-0136	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact Mr.Lauire Wlison	Recorders	Claude McDermott,Damien Hofmeyer					Permits		
13-1-0140	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact Mr.Lauire Wlison	Recorders	Claude McDermott,Damien Hofmeyer					Permits		
13-1-0144	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact Mr.Lauire Wlison	Recorders	Claude McDermott,Damien Hofmeyer					Permits		
12-3-0068	Busby's Flat MT	AGD	56	478626	6788216	Open site	Valid	Modified Tree (Carved or Scarred) : 1, Aboriginal Resource and Gathering : -		
	Contact Lyndsay Bryen	Recorders	Claude McDermott					Permits		

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AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Rappville STP ADD2
Client Service ID : 695477

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
12-3-0069	Busb'y Flat MT2	AGD	56	479699	6788008	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Claude McDermott					Permits		
12-3-0071	Busby Flat Burial Ground	GDA	56	479541	6787428	Open site	Valid	Burial : 1		
	Contact Boolangle LALC	Recorders	Mr.Ashley Moran					Permits		
12-3-0072	Busby's Flat Rockshelter 01	GDA	56	479187	6788388	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -, Shell : -		
	Contact	Recorders	Doctor.Graham KNUCKEY,Remnant Archaeology					Permits		
12-3-0073	Busby's Flat Rockshelter 02	GDA	56	479311	6788335	Open site	Valid	Artefact : -, Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Doctor.Graham KNUCKEY,Remnant Archaeology					Permits		
12-3-0074	Busby's Flat Rockshelter 03	GDA	56	479047	6787435	Open site	Valid	Artefact : -, Art (Pigment or Engraved) : -, Non-Human Bone and Organic Material : -, Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	Doctor.Graham KNUCKEY,Remnant Archaeology					Permits		
13-1-0224	BACFST1	GDA	56	514725	6787375	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Mr.Jac Carr,Virtus Heritage Pty Ltd - Pottsville					Permits		
13-1-0225	BACFST2	GDA	56	515970	6788463	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	Recorders	Mr.Jac Carr,Virtus Heritage Pty Ltd - Pottsville					Permits		

** **Site Status**
Valid - The site has been recorded and accepted onto the system as valid
Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.
Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground
Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

Report generated by AHIMS Web Service on 24/06/2022 for Alyce Cameron for the following area at Lat, Long From : -29.2669, 152.7198 - Lat, Long To : -28.967, 153.2142. Number of Aboriginal sites and Aboriginal objects found is 51

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Appendix B – Unexpected Finds Protocol

If an unrecorded or unanticipated Aboriginal object, artefact, or culturally modified tree, are uncovered or identified while onsite, the following protocol is to be followed:

1. Do not further harm the Aboriginal object and immediately cease all work at that location
2. Secure the area to avoid further harm to the Aboriginal object
3. Notify Heritage NSW as soon as practical on 131 555 providing details of the Aboriginal objects and its location
4. Do not recommence any work at the location unless authorised in writing by Heritage NSW.

If Aboriginal burials are unexpectedly encountered during the works:

1. All works must immediately cease
2. The area should be secured to prevent unauthorised access
3. NSW Police and Heritage NSW should be contacted.

Everybody should cooperate with the appropriate authorities and relevant Aboriginal community representatives. They should help facilitate the recording and assessment of the find/s, the fulfilment of legal constraints, including complying with Heritage NSW directions.

If find/s have been determined to be Aboriginal objects, the recommencement of work around the find/s can only occur after gaining written approval from Heritage NSW, usually in the form of an Aboriginal Heritage Impact Permit (AHIP).



Appendix D – Consultation Responses

Your ref: letter dated 13/02/2023
Our ref: DOC23/104469-2

Department of Regional NSW
NSW Public Works
Locked Bag 5022
PARRAMATTA NSW 2124

Attention: Ms Kristen Parmeter

Dear Ms Parmeter

Re: Request for Biodiversity and Conservation Division's Review of Environmental Factors Environmental Assessment Requirements – Rappville Sewerage Scheme Augmentation

Thank you for your letter dated 13 February 2023 about the Rappville Sewerage Scheme Augmentation seeking Environmental Assessment Requirements (EARs) from the Biodiversity and Conservation Division (BCD) of the Biodiversity, Conservation and Science Directorate in the Environment and Heritage Group of the Department of Planning and Environment. I appreciate the opportunity to provide input.

We note that the project will be assessed in accordance with Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Review of Environmental Factors (REF) EARs provided by the BCD are limited to biodiversity, NPWS estate, acid sulfate soils, flooding, and coastal processes and associated hazards.

The proponent should ensure that the REF will be sufficiently comprehensive to enable unambiguous assessment of all direct and indirect impacts of the proposed activity.

In particular, the REF should include consideration of the direct and indirect impacts of the proposal on the important biodiversity values of the area including, but not limited to, the following threatened species which are known to occur in the locality:

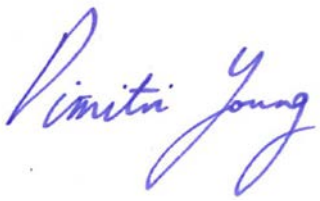
- Weeping paperbark (*Melaleuca irbyana*)
- Slaty red gum (*Eucalyptus glaucina)*
- Sweet false galium (*Oldenlandia galioides*)
- *Rotala tripartita*
- Swamp foxglove (*Centrananthera conchinchinensis*)
- Native milkwort (*Polygala linarifolia*)
- Austral toadflax (*Thesium australe*)
- Koala (*Phascolarctos cinereus*)
- Brush-tailed phascogale (*Phascogale tapoatafa*)
- Squirrel glider (*Petaurus norfolcensis*)
- Black-necked stork (*Ephippiorhynchus asiaticus*)
- Grey-crowned Babbler (*Pomatostamus temporalis temporalis*)
- Little lorikeet (*Glossopsitta pusilla*)
- Square-tailed Kite (*Lophoictinia isura*)
- Southern myotis (*Myotis macropus*)

We consider that this information is necessary for a comprehensive REF for the proposed activity.

The full list of our requirements that may need to be addressed in the REF is provided in **Attachment 1**. In preparing the REF, the proponent should refer to the relevant guidance material listed in **Attachment 2.**

If you have any further questions about this advice, please do not hesitate to contact Mr Tom Schmidt, Senior Conservation Planning Officer, at tom.schmidt@environment.nsw.gov.au or on 6659 8227.

Yours sincerely



16 February 2023

DIMITRI YOUNG
Senior Team Leader Planning, North East Branch
Biodiversity and Conservation

Enclosures:
Attachment 1 - BCD Recommended Environmental Assessment Requirements for REF – Rappville Sewerage Scheme Augmentation
Attachment 2 - REF Guidance Material

Attachment 1

Biodiversity and Conservation Division's Recommended Environmental Assessment Requirements (EARs)

Review of Environmental Factors

Rappville Sewerage Scheme Augmentation

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A The Proposed Activity 2

B Environmental Impacts of the Proposed Activity 3

C Biodiversity 4

D Flooding and Associated Hazards 6

E Cumulative Impacts 6

A. The Proposed Activity

The Review of Environmental Factors (REF) should fully and clearly describe the proposed activity, including any environmental impact mitigation measures, and identify all the processes and activities intended for the site during the life of the proposed activity.

The description of the proposed activity in the REF should, where relevant, include:

1. the location of the proposed activity and details of the surrounding environment;
2. appropriate land use zoning;
3. the size and type of the proposed activity and its operation;
4. the proposed layout of the site;
5. the staging and timing of the proposed activity;
6. the proposed activity's relationship to any other proposal.
7. all equipment proposed for use at the site;
8. chemicals, including fuel, used on the site and proposed methods for the transportation, storage, use and emergency management;
9. waste generation, storage and disposal;
10. the anticipated environment impacts of the proposed activity, both direct and indirect,
11. a plan showing the distribution of any threatened flora or fauna species and the vegetation communities on or adjacent to the subject site, and the extent of vegetation proposed to be cleared;
12. ownership details of any residence and/or land likely to be affected by the proposed activity;
13. maps/diagrams showing the location of residences and properties likely to be affected and other industrial developments, conservation areas, wetlands, etc. in the locality that may be affected by the proposed activity;
14. methods to mitigate any expected environmental impacts of the proposed activity; and
15. the anticipated level of performance in meeting required environmental standards.

B. Environmental Impacts of the Proposed Activity

Impacts related to Biodiversity, NPWS Estate, Acid Sulfate Soils, Flooding, Coastal Processes and Associated Hazards, and Cumulative Impacts, should be assessed, quantified, and reported on in the EIS, as required.

The EIS should address the specific requirements outlined under each heading below, where necessary, and assess impacts in accordance with the relevant guidelines mentioned. A full list of guidelines is at **Attachment 2**.

C. Biodiversity

1. The REF must assess the impacts of the proposed activity on biodiversity values to determine if the proposed activity is "likely to significantly affect threatened species" for the purposes of Section 7.8 of the *Biodiversity Conservation Act 2016* (BC Act) as follows:

   A. The REF must demonstrate whether the proposed activity is to be carried out in a declared area of outstanding biodiversity value.

   B. If the proposed activity is not carried out in a declared area of outstanding biodiversity value, then the REF must document *the test for determining whether proposed development or activity is likely to significantly affect threatened species or ecological communities* as outlined in Section 7.3 of the BC Act, by preparing an ecological assessment that should include:

      I. A field survey of the site of the proposed activity conducted and documented in accordance with relevant guidelines, including:

         a. *Field survey methods for environmental consultants and surveyors when assessing proposed developments or other activities on sites containing threatened species* (OEH undated) https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/field-survey-method-guidelines.pdf

         b. *NSW Survey Guide for Threatened Frogs (DPIE 2020)* https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-survey-guide-for-threatened-frogs

         c. *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE 2020) https://www.environment.nsw.gov.au/research-and-publications/publications-search/surveying-threatened-plants-and-their-habitats-survey-guide-for-the-biodiversity-assessment-method

         d. *"Species credit' threatened bats and their habitats* https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/species-credit-threatened-bats-survey-guide-180466.pdf

         e. *Threatened Reptiles Biodiversity Assessment Method survey guide* https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/threatened-reptiles-biodiversity-assessment-method-survey-guide-20220563.pdf

         f. *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft* (DEC, 2004), https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/draft-threatened-biodiversity-survey-guide.pdf.

      If a proposed field survey methodology is likely to vary significantly from the methods in the guidelines above, then the proponent should discuss the proposed methodology with the Biodiversity and Conservation Division prior to

undertaking surveys for the REF, to determine whether the Biodiversity and Conservation Division considers the proposed methodology appropriate.

The results of recent (less than five years old) field surveys may be used. However, the results of previous field surveys should not be used if they have:

- been undertaken in seasons, weather conditions or following extensive disturbance events when the subject species are unlikely to be detected or present, or
- utilised methodologies, survey sampling intensities, timeframes or baits that are not the most appropriate for detecting the target subject species,

unless these differences can be clearly demonstrated to have had an insignificant impact upon the outcomes of the field surveys.

If the results of previous field surveys are used, then field surveys for any additional threatened entities listed under the BC Act since the previous field surveys took place, must be undertaken and documented.

The list of potential threatened species, populations, ecological communities, or their habitats for the site should be determined in accordance with:

- the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft* (DEC, 2004) https://www.environment.nsw.gov.au/research-and-publications/publications-search/threatened-biodiversity-survey-and-assessment, and
- the Department's Threatened Species website http://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species ,and
- the *Bionet Atlas of NSW* http://www.environment.nsw.gov.au/wildlifeatlas/about.htm , and
- the Vegetation Information System (BioNet Vegetation Classification) http://www.environment.nsw.gov.au/research/Visclassification.htm , and
- other data sources (e.g. SEED, PlantNET, Online Zoological Collections of Australian Museums (http://www.ozcam.org/), previous or nearby surveys etc.) may also be used to compile the list.

II. The following information as a minimum:

a. A description, spatial data files, and geo-referenced mapping of the study area, (overlays on topographic maps, satellite images and /or aerial photos, including details of map datum, projection and zone), showing all field survey locations, vegetation communities classified in accordance with the BioNet Vegetation Classification (http://www.environment.nsw.gov.au/research/Visclassification.htm), key habitat features and reported locations of threatened species and ecological communities present in the subject site and study area.

b. A description of survey methodologies used, including timing, location and weather conditions.

c. Details, including qualifications and experience, of all staff undertaking the surveys, mapping and assessment of impacts as part of the EIS.

d. Identification of national and state listed threatened biota known or likely to occur in the study area and their conservation status.

e. A description of the likely impacts of the proposed activity on biodiversity values, including direct and indirect impacts and construction and operation impacts, with impacts quantified, wherever possible, such as the amount of each vegetation community or species habitat to be cleared or impacted, and/or the degree of fragmentation of a habitat connectivity.

f. Identification of the avoidance, mitigation and management measures that will be put in place as part of the proposed activity to avoid or minimise biodiversity impacts, including details about alternative options considered and how long-term management arrangements will be guaranteed.

g. A description of the residual impacts of the proposed activity.

III. The '*test for determining whether proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats'* as outlined in Section 7.3 of the BC Act undertaken in accordance with the gazetted *Threatened Species Test of Significance Guidelines* (OEH 2018) available at: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/threatened-species-test-significance-guidelines-170634.pdf.

2. If the REF determines under 1 above that the proposed activity is likely to significantly affect threatened species, then in accordance with Section 7.8 of the BC Act, an Environmental Impact Statement must be prepared that is accompanied by a Species Impact Statement prepared in accordance with Part 7, Division 5 of the BC Act, or, if the proponent so elects, a Biodiversity Development Assessment Report prepared in accordance with Part 6, Division 3 of the BC Act.

3. If the REF determines under 1 above that the proposed activity is unlikely to significantly affect threatened species, then the proposed activity should:

   a. be designed to avoid and minimise impacts on biodiversity values to the fullest extent possible, and

   b. include a biodiversity offset package to offset remaining direct and indirect impacts on biodiversity values, prepared in accordance with the Department's 13 offsetting principles available at http://www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip.htm:

Note:

For the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999,* the REF should identify any relevant Matters of National Environmental Significance and whether the proposal has been referred to the Commonwealth or already determined to be a controlled action.

D. Flooding and Associated Hazards

The REF should include an assessment of the following referring to the relevant guidelines in Attachment 2:

1. Whether the proposed activity is consistent with any floodplain risk management plans.
2. Whether the proposed activity is compatible with the flood hazard of the land.
3. Whether the proposed activity will significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other proposals or properties.
4. Whether the proposed activity will significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.
5. Whether the proposed activity incorporates appropriate measures to manage risk to life from flood.
6. Whether the proposed activity is likely to result in unsustainable social and economic costs to the community as a consequence of flooding.
7. The implications of flooding over the full range of potential flooding, including the probable maximum flood, should be considered as set out in the NSW Government Floodplain Development Manual. This should include the provision of:
    a. Full details of the flood assessment and modelling undertaken in determining any design flood levels (if applicable), including the 1 in 100 year flood levels.
    b. A sensitivity assessment of the potential impacts of an increase in rainfall intensity and runoff (10%, 20% and 30%) and sea level rise on the flood behaviour for the 1 in 100 year design flood if applicable.
8. All site drainage, stormwater quality devices and erosion / sedimentation control measures should be identified and the onsite treatment of stormwater and effluent runoff and predicted stormwater discharge quality from the proposed activity should be detailed.

E. Cumulative Impacts

The REF should include an assessment of the following:

1. The cumulative impacts, including both construction and operational impacts, from all clearing activities and operations, associated edge effects and other indirect impacts on cultural heritage, biodiversity and NPWS Estate in accordance with the *Environmental Planning and Assessment Act 1979*.
2. The cumulative impacts, including both construction and operational impacts, of the proponent's existing proposals and other proposals and associated infrastructure (such as access tracks etc.), as well as the cumulative impact of the proposed activity in the context of other proposals located in the vicinity.

Attachment 2 – REF Guidance material

Title	Web address
Relevant Legislation	
Biodiversity Conservation *Act 2016*	https://www.legislation.nsw.gov.au/#/view/act/2016/63/full
Coastal Management Act 2016	https://www.legislation.nsw.gov.au/#/view/act/2016/20/full
Commonwealth Environment Protection and Biodiversity Conservation Act 1999	http://www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
Environmental Planning and Assessment Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
Fisheries Management Act 1994	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+38+1994+cd+0+N
Marine Parks Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+64+1997+cd+0+N
National Parks and Wildlife Act 1974	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
Protection of the Environment Operations Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+156+1997+cd+0+N
Water Management Act 2000	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+92+2000+cd+0+N
Wilderness Act 1987	http://www.legislation.nsw.gov.au/viewtop/inforce/act+196+1987+FIRST+0+N
Biodiversity	
Biodiversity Assessment Method (DPIE, 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/biodiversity-assessment-method-2020
Biodiversity Development Assessment Report	https://www.legislation.nsw.gov.au/#/view/act/2016/63/part6/div3/sec6.12
Guidance and Criteria to assist a decision maker to determine a serious and irreversible impact (OEH, 2017)	http://www.environment.nsw.gov.au/resources/bcact/guidance-decision-makers-determine-serious-irreversible-impact-170204.pdf

Title	Web address
Accreditation Scheme for Application of the Biodiversity Assessment Method Order 2017	https://www.legislation.nsw.gov.au/regulations/2017-471.pdf
Biodiversity conservation actions	www.environment.nsw.gov.au/resources/bcact/ancillary-rules-biodiversity-actions-170496.pdf
Reasonable steps to seek like-for-like biodiversity credits for the purpose of applying the variation rules	www.environment.nsw.gov.au/resources/bcact/ancillary-rules-reasonable-steps-170498.pdf
Threatened Species Website	www.environment.nsw.gov.au/threatenedspecies/
NSW BioNet (Atlas of NSW Wildlife)	www.bionet.nsw.gov.au/
Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/surveying-threatened-plants-and-their-habitats-survey-guide-for-the-biodiversity-assessment-method
Threatened biodiversity survey and assessment - Guidelines for developments and activities (2004 working draft)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/threatened-biodiversity-survey-and-assessment
Field survey methods for environmental consultants and surveyors when assessing proposed developments or other activities on sites containing threatened species (OEH undated)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/field-survey-method-guidelines.pdf
NSW Survey Guide for Threatened Frogs (DPIE 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-survey-guide-for-threatened-frogs
Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (DPE 2022)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/koala-phascolarctos-cinereus-biodiversity-assessment-method-survey-guide-220249.pdf

Title	Web address
Threatened Reptiles Biodiversity Assessment Method survey guide (DPE 2022)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/threatened-reptiles-biodiversity-assessment-method-survey-guide-20220563.pdf
'Species credit' threatened bats and their habitats (OEH 2018)	https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/species-credit-threatened-bats-survey-guide-180466.pdf
BioNet Vegetation Classification - NSW Plant Community Type (PCT) database	www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm
SEED Data Portal (access to online spatial data)	http://data.environment.nsw.gov.au/
Department of Primary Industry Policy and guidelines for fish habitat conservation and management (update 2013)	https://www.dpi.nsw.gov.au/fishing/habitat/publications/pubs/fish-habitat-conservation
List of national parks	http://www.environment.nsw.gov.au/NationalParks/parksearchatoz.aspx
Revocation, recategorisation and road adjustment policy (OEH, 2012)	http://www.environment.nsw.gov.au/policies/RevocationOfLandPolicy.htm
Developments adjacent to NPWS lands Guidelines for consent and planning authorities (DPIE 2020)	https://www.environment.nsw.gov.au/research-and-publications/publications-search/developments-adjacent-to-national-parks-and-wildlife-service-lands
Acid Sulfate Soils	
Acid Sulfate Soils Planning Maps	http://data.nsw.gov.au/data/
Acid Sulfate Soils Manual (Stone et al. 1998)	http://www.environment.nsw.gov.au/resources/epa/Acid-Sulfate-Manual-1998.pdf
National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT. (Sullivan, L, Ward, N, Toppler, N and Lancaster, G. 2018a)	https://www.waterquality.gov.au/sites/default/files/documents/dewatering-acid-sulfate-soils.pdf

Title	Web address
National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual, Department of Agriculture and Water Resources, Canberra ACT.(Sullivan, L, Ward, N, Toppler, N and Lancaster, G. 2018b)	https://www.waterquality.gov.au/issues/acid-sulfate-soils/sampling-and-identification-methods-manual.pdf
National Acid Sulfate soils Guidance: Overview and management of monosulfidic black ooze (MBO) accumulations in waterways and wetlands, Department of Agriculture and Water Resources, Canberra ACT. (Sullivan, LA, Ward, NJ, Bush, RT, Toppler, NR, Choppala, G. 2018c)	https://www.waterquality.gov.au/issues/acid-sulfate-soils/monosulfidic-black-ooze-accumulation.pdf
National Acid sulfate soils guidance: Guidelines for the dredging of acid sulfate soil sediments and associated dredge spoil management, Department of Agriculture and Water Resources, Canberra, ACT (Simpson, SL, Mosley, L, Batley, GE and Shand P. 2018)	https://www.waterquality.gov.au/sites/default/files/documents/dredging-sediments-spoil.pdf
National Acid Sulfate Soils Guidance: Guidance for the dewatering of acid sulfate soils in shallow groundwater environments, Department of Agriculture and Water Resources, Canberra, ACT. (Shand, P, Appleyard, S, Simpson, SL, Degens, B, Mosley, LM 2018)	https://www.waterquality.gov.au/issues/acid-sulfate-soils/dewatering-groundwater-environments.pdf
Flooding, Coastal Processes and Associated Hazards	
Reforms to coastal erosion management	http://www.environment.nsw.gov.au/coasts/coastalerosionmgmt.htm
Floodplain development manual	http://www.environment.nsw.gov.au/floodplains/manual.htm
Guidelines for Preparing Coastal Zone Management Plans	http://www.environment.nsw.gov.au/resources/coasts/130224CZMPGuide.pdf

Title	Web address
NSW Climate Impact Profile	http://climatechange.environment.nsw.gov.au/
Climate Change Impacts and Risk Management	Climate Change Impacts and Risk Management: A Guide for Business and Government, AGIC Guidelines for Climate Change Adaptation

From:	Nicholas Sutton on behalf of DPIE Water Section 60 Mailbox
To:	Kristen Parmeter
Subject:	Re: Rappville Sewerage Scheme - DPE Water REF Notification Letter
Date:	Thursday, 23 February 2023 10:20:13 AM
Attachments:	image001.png image002.png image003.png image005.png image006.png

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Hi Kristen
Thanks for the time at our online meet.
As discussed the general approach of developing a REF will deliver the product we expect council to own by signing it before they submit it to us as part of their S60 approval.

The Regulatory and Assurance Framework is available at :
https://water.nsw.gov.au/__data/assets/pdf_file/0004/518566/regulatory-and-assurance-framework-for-local-water-utilities.pdf
Any more questions pls get in contact,
Thanks
Nick

From: Kristen Parmeter <kristen.parmeter@pwa.nsw.gov.au>
Date: Tuesday, 21 February 2023 at 10:05 am
To: DPIE Water Section 60 Mailbox <section60@dpie.nsw.gov.au>
Subject: RE: Rappville Sewerage Scheme - DPE Water REF Notification Letter

Hi Nick,

My apologies for the confusion, I've provided some clarification below. Please let me know if you have any other questions or need any additional information.

I noted that you've accepted the meeting request for Thursday at 9:30am. Thanks very much.

Thanks and kind regards,

Kristen

Kristen Parmeter *(she/her)*
Senior Environmental Scientist, Heritage, Environment and Planning
NSW Public Works | Department of Regional NSW

T (02) 9769 9849 **M** 0436697139 **E** kristen.parmeter@pwa.nsw.gov.au

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From: Nicholas Sutton <nicholas.sutton@dpie.nsw.gov.au> **On Behalf Of** DPIE Water Section 60 Mailbox
Sent: Monday, 20 February 2023 3:53 PM
To: Kristen Parmeter <kristen.parmeter@pwa.nsw.gov.au>
Subject: Re: Rappville Sewerage Scheme - DPE Water REF Notification Letter

Hi Kristen
I'm available after 430 today and Thursday 930-1030, Friday 1-3pm. Pls send an invite through.
It will be helpful to explain the way we assess applications for Section 60 under the LGA.

I'm confused by this section in your letter:

The purpose of this letter is to notify the **NSW Environment Protection Authority (EPA)** of the proposed works and to provide the opportunity to comment on any approvals required from DPE - Water and/or matters that your organisation would like to see addressed in the REF.

Sorry, this is a typo as a letter was also issued to the EPA in relation to the project, it should read DPE – Water.
The sentence below is just re-stating the letter's purpose but also noting that any comments received from DPE- water would recorded in the REF (i.e. The comments received from the various stakeholder government agencies are listed in the consultation section and it is noted which section of the REF addresses the comments).

And later on:
The purpose of this letter is to seek comments from DPE - Water on the proposal for inclusion in the environmental assessment and receive advice regarding the relevant approvals required from DPE – Water for the new Rappville Sewerage Scheme.

We aren't usually asked to contribute advice on what to include in an environmental assessment. This assessment is pretty common in the sector and I would have imagined public works have done numerous of these in the past?

Yes, PW has prepared environmental assessments for sewerage schemes/ infrastructure previously and we have a general REF format including a range of matters to be addressed as part of the impact assessment.
The intent is more so to provide an opportunity for DPE- Water to highlight or provide comment on any specific matters that DPE- Water would like to see addressed in the REF, as the REF is often requested by DPE- Water for inclusion with the LGA Section 60 application.

Thanks
Nick

From: Kristen Parmeter <kristen.parmeter@pwa.nsw.gov.au>
Date: Monday, 20 February 2023 at 10:32 am
To: DPIE Water Section 60 Mailbox <section60@dpie.nsw.gov.au>
Subject: RE: Rappville Sewerage Scheme - DPE Water REF Notification Letter

Hi Nick,

Thanks for getting back to me and my apologies for missing your calls.

I'm available tomorrow any time other than 2-3:30 pm and Wednesday any time other than 11-12pm. However, please let me know if later in the week suits you.

Will DPE Water be providing a written response via email post-discussion? The reason for the request is that a written response would provide a record of DPEs comments/requirements in relation to the proposed sewerage scheme and facilitate the referral of DPE Water's comments to Council and the design engineers and for inclusion in the REF.

Thanks and kind regards,

Kristen

Kristen Parmeter *(she/her)*
Senior Environmental Scientist, Heritage, Environment and Planning
NSW Public Works | Department of Regional NSW

T (02) 9769 9849 **M** 0436697139 **E** kristen.parmeter@pwa.nsw.gov.au

From: Nicholas Sutton <nicholas.sutton@dpie.nsw.gov.au> **On Behalf Of** DPIE Water Section 60 Mailbox
Sent: Friday, 17 February 2023 11:29 AM
To: Kristen Parmeter <kristen.parmeter@pwa.nsw.gov.au>
Subject: Re: Rappville Sewerage Scheme - DPE Water REF Notification Letter

11-12pm.
Hi Kristen

I think an online call will enable us to explore your questions and provide some answers.
What time slots are you available next week?

Thanks
Nick

Nicholas Sutton
Manager Regulatory Assessments, Local Water Utilities Branch

Water | Department of Planning and Environment
M 0436915659 | **E** nicholas.sutton@dpie.nsw.gov.au
Level 17, 4 Parramatta Square, Parramatta NSW 2150
www.dpie.nsw.gov.au

NSW GOVERNMENT

The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

Our Vision: Together, we create thriving environments, communities and economies.

Daring | Collaborative | Creative | Kind | Inclusive

From: Kristen Parmeter <kristen.parmeter@pwa.nsw.gov.au>
Date: Monday, 13 February 2023 at 12:05 pm
To: DPIE Water Section 60 Mailbox <section60@dpie.nsw.gov.au>
Subject: Rappville Sewerage Scheme - DPE Water REF Notification Letter

Dear Sir or Madam,

NSW Public Works has been engaged on behalf of Richmond Valley Council to prepare a Review of Environmental Factors (REF) for a proposal to construct and operate a reticulated sewerage scheme for the town of Rappville in NSW.

The purpose of the attached letter is to notify the Department of Planning and Environment - Water of the proposal and provide the opportunity to comment on any approvals or environmental impact assessment requirements which your organisation would like to see included in the REF.

If you have any comments on the proposal, it would be appreciated if you could provide a response prior to 7th March 2023 to Kristen Parmeter at kristen.parmeter@pwa.nsw.gov.au

Thanks and kind regards,

Kristen Parmeter *(she/her)*
Senior Environmental Scientist | Heritage, Environment and Planning
NSW Public Works| Department of Regional NSW

T 02 9769 9849 | **M** 0436 697 139 | **E** kristen.parmeter@pwa.nsw.gov.au
66 Harrington Street, The Rocks, NSW, 2000
On **Gadigal Land**

Public Works
Department of Regional NSW

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The Department of Regional New South Wales acknowledges that it stands on Country which always was and always will be Aboriginal land. We acknowledge the Traditional Custodians of the land and waters, and we show our respect for Elders past, present and emerging. We are committed to providing places in which Aboriginal people are included socially, culturally and economically through thoughtful and collaborative approaches to our work.

From: Jonathan Yantsch
To: Kristen Parmeter
Subject: RE: Rappville Sewerage Scheme - DPI Fisheries REF Notification Letter
Date: Friday, 24 February 2023 2:28:45 PM
Attachments: image006.png
image008.png
image012.png
image014.png

Hi Kristen

I refer to your letter of 13 February 2023 seeking comment on the preparation of a review of environmental factors (REF) for the Rappville Sewerage Scheme. The above mentioned proposal intersects with key fish habitats. Cognisant of this, I have outlined below design considerations and environmental study requirements necessary to facilitate appropriate assessment of the above-mentioned proposal.

DPI Fisheries is responsible for ensuring that fish stocks are conserved and that there is "no net loss" of key fish habitats upon which they depend. To achieve this, the Coastal Systems Unit assesses activities under Part 4 and 5 of the *Environmental Planning and Assessment Act 1979* in accordance with the objectives of the *Fisheries Management Act 1994* (FM Act), the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the FM Act, and the *Policy and Guidelines for Fish Habitat Conservation and Management (2013 Update)* (DPI Fisheries P&G). In addition, DPI Fisheries is responsible for ensuring the sustainable management of commercial fishing and aquaculture, quality recreational fishing and the continuation of Aboriginal cultural fishing within NSW.

It is noted that the sewerage scheme includes installation of a transfer main that will cross Myrtle Creek. Myrtle Creek is considered Type 1 Highly Sensitive Key Fish Habitat as it is mapped as known or indicative habitat for the threatened fish species Southern Purple Spotted Gudgeon. The remainder of the transfer main alignment and other works required as part of the sewerage scheme do not appear to intersect key fish habitat elsewhere other than that if Myrtle Creek.

The DPI Fisheries impact mitigation hierarchy is to first avoid impacts to key fish habitats. Where avoidance is impossible or impractical, then proposals should minimise impacts to key fish habitats. All unavoidable impacts should be appropriately mitigated and offset.

To achieve this policy position, it should be investigated as to whether the transfer main could be directionally drilled beneath Myrtle Creek. Directional drilling is considered best practice with regard to achieving service crossings of waterways, and this method would avoid impacts to the creek and result in no approvals being required under the FM Act (providing entry and exit bore holes were located outside of the waterway).

Other crossing options that require excavation within the creek would require a permit in accordance with the dredging and reclamation provisions of ss198-202 of the FM Act, and such options would only be considered for approval where other non-impacting options were not possible e.g. directional drilling was not possible due to the presence of rock. Where such options requiring a permit are necessary, DPI Fisheries would require justification for the proposed crossing methodology; and details of the works including design drawings, construction methodology (e.g. where excavation will occur, design/duration of any temporary structures, dewatering procedure etc.) and environmental impact mitigation measures (e.g. detailed erosion and sediment control plan and CEMP).

Further information on DPI Fisheries' information requirements can be found within the DPI Fisheries P&G. Permit applications can be found here: https://www.dpi.nsw.gov.au/fishing/habitat/help/permit.

Please contact me on the details below if you wish to discuss the proposal in further detail.

Regards

Jonathan

Jonathan Yantsch
Senior Fisheries Manager, Coastal Systems (North Coast)
Aboriginal Fishing & Marine & Coastal Environment
Department of Regional NSW

P 02 6626 1375 E jonathan.yantsch@dpi.nsw.gov.au

regional.nsw.gov.au

Wollongbar Agricultural Institute

Department of Regional NSW

We stand on Country that always was and always will be Aboriginal land. We acknowledge the Traditional Custodians of the land and waters, and we show our respect for Elders past, present and emerging. We are committed to providing places in which Aboriginal people are included socially, culturally and economically through thoughtful and collaborative approaches to our work.

From: DPI Fisheries Info Mailbox <fisheries.info@dpi.nsw.gov.au>
Sent: Monday, 13 February 2023 12:51 PM
To: DPI AHP Central Mailbox <ahp.central@dpi.nsw.gov.au>
Subject: Rappville Sewerage Scheme - DPI Fisheries REF Notification Letter

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From: Kristen Parmeter <kristen.parmeter@pwa.nsw.gov.au>
Sent: Monday, 13 February 2023 12:15 PM
To: DPI Fisheries Info Mailbox <fisheries.info@dpi.nsw.gov.au>
Subject: Rappville Sewerage Scheme - DPI Fisheries REF Notification Letter

Dear Sir or Madam,

NSW Public Works has been engaged on behalf of Richmond Valley Council to prepare a Review of Environmental Factors (REF) for a proposal to construct and operate a reticulated sewerage scheme for the town of Rappville in NSW.

The purpose of the attached letter is to notify the Department of Primary Industries – Fisheries of the proposal and provide the opportunity to comment on any approvals or environmental impact assessment requirements which your organisation would like to see included in the REF.

If you have any comments on the proposal, it would be appreciated if you could provide a response prior to 7th March 2023 to Kristen Parmeter at kristen.parmeter@pwa.nsw.gov.au

Thanks and kind regards,

Kristen Parmeter *(she/her)*
Senior Environmental Scientist | Heritage, Environment and Planning
NSW Public Works | Department of Regional NSW

T 02 9769 9849 | **M** 0436 697 139 | **E** kristen.parmeter@pwa.nsw.gov.au
66 Harrington Street, The Rocks, NSW, 2000

On **Gadigal Land**

Public Works

Department of Regional NSW



The Department of Regional New South Wales acknowledges that it stands on Country which always was and always will be Aboriginal land. We acknowledge the Traditional Custodians of the land and waters, and we show our respect for Elders past, present and emerging. We are committed to providing places in which Aboriginal people are included socially, culturally and economically through thoughtful and collaborative approaches to our work.

NSW GOVERNMENT

NSW RURAL FIRE SERVICE

NSW Public Works
Locked Bag 5022
PARRAMATTA NSW 2124

Your reference: Rappville STW
Our reference: DA20230816003593-Original-1

ATTENTION: Kristen Parmeter

Date: 30 August 2023

Development Application
Other – SEPP Transport and Infrastructure – Waste or Resource Management Facility
Rappville Sewage Treatment Plant RAPPVILLE NSW 2469 - 160//DP755620

I refer to your correspondence regarding the above proposal which was received by the NSW Rural Fire Service on 11 August 2023.

The proposal is to construct a Sewage Treatment Plant (STP) for the village of Rappville in Northern NSW. The proposed works are permissible under Sections 2.126(1), 2.216(2) and 2.126(4) of State Environmental Planning Policy (Transport and Infrastructure) 2021 (T & I SEPP).

The proposed STP site is mapped as vegetation category 1 bushfire prone land. The referral is to notify the NSW Rural Fire Service (NSW RFS) of the proposed works and to provide the opportunity to comment on the proposal and to identify if any approvals are required.

The NSW RFS advises that the REF Environmental Assessment shall include a bushfire report. That report shall identify potential risks and recommend bushfire prevention measures to minimise said risks. It is suggested that treatment plant infrastructure requires an asset protection zone that ensures no flame contact, construction outcome commensurate to the radiant heat exposure, internal access including a trafficable defendable space around the perimeter of the site, accessible potable water supply, landscaping and an Emergency Management and Evacuation plan.

No approval are required under the Rural Fires Act 1997 unless 'hot work' during the construction phase, is been undertaken on total fire ban days.

For any queries regarding this correspondence, please contact Alan Bawden on 1300 NSW RFS.

Yours sincerely

Allyn Purkiss

Acting Manager – Planning and Environment Services North
Built and Natural Environment

Postal address
NSW Rural Fire Service
Locked Bag 17
GRANVILLE NSW 2142

Street address
NSW Rural Fire Service
4 Murray Rose Ave
SYDNEY OLYMPIC PARK NSW 2127

T (02) 8741 5555
F (02) 8741 5550
www.rfs.nsw.gov.au

Appendix E – Designs

RAPPVILLE SEWAGE TREATMENT PLANT

DETAILED DESIGN - DRAWINGS

PREPARED FOR

Richmond Valley Council

MARCH 2024

REV	AMENDMENT DETAILS	APPROVED	DATE
B	ISSUED FOR 100% REVIEW	B.D	05.03.24
A	ISSUED FOR REVIEW	B.D	06.10.23

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FOR REVIEW

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AZIMUTH:	VERIFIED:
FOLDER:	
L. G. A:	VALIDATED:
SURVEYOR:	
SURVEY DATE:	APPROVED MANAGER:
CADD:	

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

SEWAGE TREATMENT PLANT
COVER SHEET

PROJECT/CONTRACT No. FY20210016

A1 | SCALE @ A1 N.T.S.

DRAWING No. P-FY20210016-PWO-GEN-DW-50-XXXX-ZZ-0001

REV B

CONFIRM SCALE ◄ 100mm ON A1 ORIGINAL ►

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GENERAL NOTES:

G1 SPECIFICATIONS AND CODES
CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SPECIFICATION FOR THE WORKS TOGETHER WITH THE REQUIREMENTS OF ALL CODES OF PRACTICE REFERRED TO THEREIN AND THE REQUIREMENTS OF ALL STATUTORY AUTHORITIES.

G2 DIMENSIONS
ALL DIMENSIONS SHALL BE VERIFIED ON SITE BEFORE COMMENCING ANY WORK. STRUCTURAL DIMENSIONS CONTROLLED BY OR RELATED TO MECHANICAL OR ELECTRICAL EQUIPMENT SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

G3 PROVISION FOR EQUIPMENT
MECHANICAL AND ELECTRICAL EQUIPMENT SUPPORTS, ANCHORAGES, OPENINGS, RECESSES AND REVEALS NOT SHOWN ON THE STRUCTURAL DRAWINGS BUT REQUIRED BY OTHER CONTRACT DRAWINGS, SHALL BE VERIFIED BY CONTRACTOR PRIOR TO PLACING CONCRETE.

G4 CONSTRUCTION LOADS
COMPLETE STRUCTURES. DURING CONSTRUCTION, THE STRUCTURES SHALL BE PROTECTED BY BRACING AND PROPPING WHEREVER CONSTRUCTION LOADS MAY OCCUR.

G5 CO-ORDINATION
ALL STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH CIVIL, MECHANICAL, ELECTRICAL, HYDRAULIC AND FABRICATION DRAWINGS TOGETHER WITH SPECIFICATIONS AND SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED BY THE PRINCIPAL FROM TIME TO TIME.

G6 ENVIRONMENTAL CONTROLS
SILT STOP FENCING OR STRAW BALE FENCING TO BE INSTALLED DOWN SLOPE OF ALL WORKS PRIOR TO ANY CONSTRUCTION ACTIVITY, EFFECTIVELY MAINTAINED AND REMOVED ONLY AFTER THE AREA HAD BEEN SATISFACTORILY REVEGETATED.

ALL CONDITIONS CONTAINED WITHIN THE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP) FOR THIS PROJECT IS TO BE MET. THE CONTRACTOR MUST HAVE A COPY OF THE CEMP ON SITE AT ALL TIMES.

G7 EXISTING SERVICES
THE CONTRACTOR MUST VERIFY THE EXACT LOCATION OF ALL EXISTING SERVICES WITH RELEVANT AUTHORITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION AND REPORT ANY DISCREPANCIES TO THE PRINCIPAL.

G8 RESTORATION
THE CONTRACTOR SHALL RESTORE LIKE FOR LIKE ANY FENCE, WALL, GARDEN, FOOTWAYS, DRIVEWAYS, PAVEMENT OR OTHER ASSETS THAT ARE IMPACTED BY THE CONSTRUCTION OF THE SEWER RISING MAIN AND SEWER PUMP STATION.

G9 FITTING RECOVERY
THE CONTRACTOR MUST RECOVER ALL EXISTING FITTINGS THAT ARE TO BE DECOMMISSIONED.

G10
TO AVOID THE RISK OF ELECTRIC SHOCK FROM METALLIC SEWER SERVICE PIPES DURING THE DISCONNECTION AND CONNECTION OF SEWER SERVICES, THE CONTRACTOR MUST ADHERE TO AS3500 (PLUMBING STANDARDS) PART 1 SECTION 5.2.

G11 HYDROSTATIC TESTING
THE HYDROSTATIC TEST PRESSURE OF THE SEWER RISING MAIN IS TO BE CONFIRMED BY THE PRINCIPAL.

CONCRETE:

(REFER TO CONCRETE SPECIFICATION)

C1 DESIGN CODES
DESIGN IS IN ACCORDANCE WITH THE FOLLOWING SAA CODES:-
AS 3600 SAA CONCRETE STRUCTURES CODE.
AS 1170 SAA LOADING CODES PART 1 & 2.
AS 3735-2001 CONCRETE STRUCTURES FOR RETAINING LIQUIDS.

C2 MATERIALS
CONSTRUCTION MATERIALS AND WORKMANSHIP FOR CONCRETE WORKS SHALL BE IN ACCORDANCE WITH THE SPECIFICATION AND THE SAA CODE AS 3600.

C3 CONCRETE PROPERTIES
FOR CONCRETE PROPERTIES REFER TO SPECIFICATION.

C4 CURING
CURING SHALL BE IN ACCORDANCE WITH THE SPECIFICATION.

C5 JOINTING IN CONCRETE STRUCTURES
LOCATION OF ALL EXPANSION AND CONTRACTION JOINTS SHALL BE AS SHOWN ON THE DRAWINGS. LOCATION OF SUCH JOINTS SHALL NOT BE CHANGED WITHOUT APPROVAL OF THE PRINCIPAL
IF ADEQUATE CONSTRUCTION JOINTS ARE NOT SHOWN IN THE DRAWINGS THE CONTRACTOR SHALL SUBMIT PROPOSED LOCATION OF REQUIRED CONSTRUCTION JOINTS FOR APPROVAL BEFORE CONSTRUCTION.

C6 CHAMFERS
EXCEPT AS OTHERWISE REQUIRED, EXPOSED CONCRETE CORNERS AND EDGES SHALL HAVE 20mm CHAMFERS. ALL CHAMFERS TO PROVIDE SMOOTH AND CLEAN EDGES.

C7 NO HOLES OR CHASES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE WITHOUT PRIOR APPROVAL OF THE PRINCIPAL.

REINFORCEMENT:

(REFER TO CONCRETE SPECIFICATION)

R1 REINFORCEMENT DESIGNATION
SYMBOLS INDICATED ON DRAWINGS FOR GRADE AND TYPE OF REINFOCEMENT ARE AS FOLLOWS:-

SL - COLD ROLLED, HIGH STRENGTH FABRIC OF GRADE R500N TO AS/NZS 4671.

N - HOT ROLLED, HIGH STRENGTH DEFORMED BARS OF GRADE D500N TO AS/NZS 4671.

R2 BAR NOTATION
BAR NOTATION AS FOLLOWS:-
GRADE(TYPE),BAR(DIA.),BAR SPACING LOCATION SYMBOLS
e.g. N12-200 E.W.
E.W. - EACH WAY
E.F. - EACH FACE B.F. - BOTH FACES
B - BOTTOM N.F. - NEAR FACE
C.P. - CENTRALLY PLACED

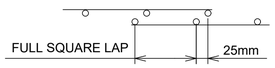
R3 COVER
CLEAR CONCRETE COVER TO REINFORCEMENT UNLESS NOTED OTHERWISE SHALL BE:-

SURFACES IN CONTACT WITH SEWAGE OR GROUNDWATER	65mm
SURFACES CAST AGAINST GROUND WITHOUT BLINDING SLAB	65mm
SURFACES CAST AGAINST GROUND WITH BLINDING SLAB	50mm
REMAINDER	40mm

R4 SPLICES AND LAPS
WHERE NOT DETAILED ON DRAWING,LOCATION OF REINFORCEMENT SPLICES SHALL BE APPROVED BY THE PRINCIPAL. LENGTH OF SPLICES ARE SUBJECT TO CODE AS 3600 REQUIREMENTS.
MIN. LAP LENGTH SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:-

BAR SIZE	LAP LENGTH		
	HORIZONTAL		VERTICAL
	SLAB LESS THAN 350mm THICK	OTHER	
N12	350	460	440
N16	470	610	590
N20	580	760	730
N24	700	910	880

FABRIC SHALL BE LAPPED WITH AT LEAST ONE FULL SQUARE OR RECTANGULAR LAP WITH BARS ON FOUR SIDES PLUS 25mm AS SHOWN BELOW



R5 TRIMMER BARS
ALL TRIMMER BARS AROUND OPENINGS,BLOCKOUTS,PIPE PENETRATIONS AND CORNERS,WHERE REQUIRED BUT NOT DIMENSIONED,SHALL EXTEND A MIN. ANCHORAGE DISTANCE OF 25 BAR DIAMETERS PAST THE POINT OF INTERSECTION WITH THE CROSSING TRIMMER BARS UNLESS NOTED OTHERWISE.

R6 MINIMUM COG LENGTH SHALL BE AS FOLLOWS UNLESS STATED OTHERWISE

BAR SIZE	COG LENGTH (mm)
N12	200
N16	470
N20	580
N24	700

R7 LAPS AND SPLICES TO BE POSITIONED TO MAINTAIN THE SAME COVER.

R8 LAP LENGTHS FOR DIFFERENT BAR SIZES SHALL BE BASED ON THE LARGER SIZE BAR. LAPS ARE TO BE STAGGERED.

R9 REINFORCEMENT DEVELOPMENT LENGTHS, HOOKS, BENDS AND COGS ARE TO BE IN ACCORDANCE WITH AS3600 FOR THE FULL YIELD STRENGTH OF THE BAR UNLESS OTHERWISE SHOWN. BENDS, HOOKS AND COGS SHALL BE FORMED WITHOUT STRAIGHTENING AND / OR RE BENDING

EARTHWORKS:

(REFER TO EARTHWORKS SPECIFICATION)

E1 EXCAVATION, STOCKPILE, EMBANKMENTS, COMPACTIONS, ETC, SHALL BE IN ACCORDANCE WITH THE SPECIFICATION AND THE PW GEOTECHNICAL REPORT. REFER TO THE RAPPVILLE SEWERAGE SCHEME TBA.

DATUM:

D1 AUSTRALIAN HEIGHT DATUM.

METALWORKS:

(REFER TO METALWORK SPECIFICATION)

M1 DESIGN IS IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS:
- STEEL STRUCTURES AS 4100
- FIXED PLATFORMS, WALKWAYS,STAIRWAYS AND LADDERS AS 1657

M2 SPECIFICATION AND CODES
ALL STEEL CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL CONFORM TO AS 4100.

M3 MATERIALS
ALL STRUCTURAL SHAPES,BARS AND PLATES UNLESS NOTED OTHERWISE,SHALL BE 10mm THICK OF GRADE 250 STEEL IN ACCORDANCE WITH AS 3678 & 3679.

M4 SURFACE PREPARATION

ELEMENT	SURFACE PREPARATION	TREATMENT
ALL MILD STEEL WORK INCLUDING STEPIRONS	ABRASIVE BLAST CLEANING (AS 1627.4) OR CHEMICALLY DESCALE (AS 1627.5)	HOT DIP GALVANISED AFTER FABRICATION

M5 FABRICATION DRAWINGS
CONTRACTOR SHALL PREPARE AND SUBMIT TWO COPIES OF ALL STRUCTURAL STEELWORK FABRICATION DRAWINGS TO THE PRINCIPAL PRIOR TO COMMENCING FABRICATION.

M6 WELDING
ALL WELDING SHALL BE IN ACCORDANCE WITH THE STRUCTURA STEEL WELDING CODE AS 1554. ALL WELDS SHALL BE 6mm CONTINUOUS FILLET WELD CATEGORY SP UNLESS NOTED OTHERWISE.

M7 ALUMINIUM
ALUMINIUM PRODUCTS SHALL BE OF ALUMINIUM ALLOY AS FOLLOWS:

PRODUCT	ALLOY
PLATES,SHEETS	5251
EXTRUSIONS,	6061
GRATINGS	6063

AND SHALL BE IN ACCORDANCE WITH AS/NZS 1664, AS/NZS 1734, AS/NZS1866, UNLESS NOTED OTHERWISE.

M8 REFER TO SPECIFICATION FOR TREATMENT OF ALUMINIUM SURFACES IN CONTACT WITH OTHER MATERIALS.

M9 FIBRE GLASS REINFORCED PLASTIC (FRP) GRATINGS

- RESINS SHALL BE VINYL ESTHER AND UV STABILISED
- ALL METAL ACCESSORIES SHALL BE MANUFACTURED FROM 316 STAINLESS STEEL

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L. G. A:	VALIDATED:
SURVEYOR:	
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CADD:	

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
SEWAGE TREATMENT PLANT
GENERAL NOTES

PROJECT/CONTRACT No. FY20210016
A1 SCALE @ A1 N.T.S.
DRAWING No. P-FY20210016-PWO-GEN-DW-50-X000-ZZ-0002
REV B

CONFIRM SCALE 100mm ON A1 ORIGINAL

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PIPEWORK:

(REFER TO PIPEWORK SPECIFICATION)

P1 ALL DUCTILE IRON PIPES SHALL BE LIGHT CEMENT LINED WITH TYPE SR CEMENT.
PIPE CLASS SHALL BE TYTONXTREME PN20 RUBBER RING JOINT OR PN35 FLANGED.
ALL DUCTILE IRON FITTINGS TO AS 2280.
ALL FLANGES SHALL BE TO AS 4087,CLASS PN16.
ALL BURIED DI PIPES TO BE WRAPPED AND ALL EXPOSED PIPES TO BE EPOXY COATED AS SPECIFIED IN SECTION SP2 OF WS-SPEC.

P2 ALL PRESSURE PVC PIPES SHALL BE PVC-U CLASS 12 SERIES 2 WITH RUBBER RING JOINTS TO AS 1477 UNLESS NOTED OTHERWISE.

P3. ALL PE PIPES SHALL BE PE100 TO AS 4130 WITH ELECTROFUSION JOINTS

P4. ALL NON-PRESSURE SEWER PIPES SHALL BE SOLVENT OR RUBBER RING JOINT TO AS 1260.

P5. FOR MINIMUM COVER TO PIPES, REFER TO STANDARD SPECIFICATION SECTION TR13 AND TR14.

P6. DELETED

P7. PIPES SHALL BE PROTECTED EXTERNALLY AS SPECIFIED.

P8. LAY PIPES BETWEEN PITS/STRUCTURES ON A CONTINUOUS RISING OR FALLING GRADE.

P9. PROVIDE SUITABLE PLUG WHERE EXISTING PIPES ARE TO BE DISCONNECTED.

P10. ALL VALVE COVERS ARE TO BE CLASS D.

P11. MAXIMUM ALLOWABLE DEFLECTION IN THE PIPEWORK SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

P12. ALL STOP VALVES SHALL BE PN16 FLANGED, RESILIENT SEATED IN ACCORDANCE WITH AS2638.1.

P13. PROVIDE 3mm THICK EPDM GASKETS BETWEEN ALL PN16 FLANGES. JOINTING FLANGES SHALL BE CARRIED OUT IN ACCORDANCE WITH THE SUPPLIER'S INSTRUCTIONS.

P14. ALL FLANGES SHALL BE CLASS ON16 TO AS4087 RAISED FACE AND SHALL MATCH THOSE OF THE ADJACENT PIPEWORK.

P15. ALL PIPE FITTINGS WITH FLEXIBLE JOINTS, SUCH AS BENDS, TEES, TAPERS AND THE LIKE, SHALL BE RESTRAINED AGAINST UNBALANCED THRUST FORCES USING THRUST BLOCKS, OR AS OTHERWISE APPROVED BY THE PRINCIPAL.

PIPEWORK STANDARDS:

THE PIPELINE HAS BEEN DESIGNED TO MEET THE FOLLOWING STANDARDS:

AS4799	INSTALLATION OF UNDERGROUND UTILITY SERVICES
WSA02-2014	SEWERAGE CODE OF AUSTRALIA
WSA04-2005	SEWAGE PUMPING STATION CODE OF AUSTRALIA

THE PIPELINE INSTALLATION IS TO BE UNDERTAKEN IN ACCORDANCE WITH THESE STANDARDS OR OTHERWISE APPROVED BY THE PRINCIPAL.

THE CONTRACTOR IS TO HAVE A COPY OF THESE DOCUMENTS ON SITE AT ALL TIMES.

DRAWING NO. DRAWING TITLE

P-FY20210016-PWO-GEN-DW-50-X000-ZZ-0001	COVER SHEET
P-FY20210016-PWO-GEN-DW-50-X000-ZZ-0002	GENERAL NOTES
P-FY20210016-PWO-GEN-DW-50-X000-ZZ-0003	DRAWING SCHEDULE AND SITE AREA PLAN
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0001	HYDRAULIC PROFILE
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0002	GENERAL SITE LAYOUT PLAN
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0003	SETOUT, ROADWORKS AND PIPEWORKS LAYOUT PLAN SHEET 1
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0004	SETOUT, ROADWORKS AND PIPEWORKS LAYOUT PLAN SHEET 2
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0005	POND SECTIONS
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0006	POND DETAILS
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0007	TRANSFER STRUCTURE PLAN AND SECTIONS
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0008	ROAD PAVEMENT, HEADWALL SECTION AND DETAILS
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0008A	INLET STRUCTURE AND DRAINAGE PIT DETAILS
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0009	INLET STRUCTURE PLAN
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0010	INLET STRUCTURE SECTIONS
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0011	INLET STRUCTURE REINFORCEMENT DETAILS
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0012	INLET STRUCTURE GRATING PLAN
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0040	MISCELLANEOUS DETAILS SHEET 1 OF 3
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0041	MISCELLANEOUS DETAILS SHEET 2 OF 3
P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0042	MISCELLANEOUS DETAILS SHEET 3 OF 3
P-FY20210016-PWO-ELE-DW-70-RAPV-TP-0027	LIGHT & POWER GENERAL ARRANGEMENT
P-FY20210016-PWO-CIV-DW-50-S001-ZZ-0011	SEWER RISING MAIN - PLAN AND LONG SECTION CH 2337.00 TO CH 2748.60
P-FY20210016-PWO-PRO-DW-50-S003-ZZ-0001	PROCESS AND INSTRUMENTATION DIAGRAM SHEET 1 OF 2
P-FY20210016-PWO-PRO-DW-50-S003-ZZ-0002	PROCESS AND INSTRUMENTATION DIAGRAM SHEET 2 OF 2



SITE AREA PLAN

SCALE: NTS

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Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
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DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
SEWAGE TREATMENT PLANT
NOTES, DRAWING SCHEDULE AND SITE AREA PLAN

PROJECT/CONTRACT No. FY20210016

A1 SCALE @ A1 N.T.S.

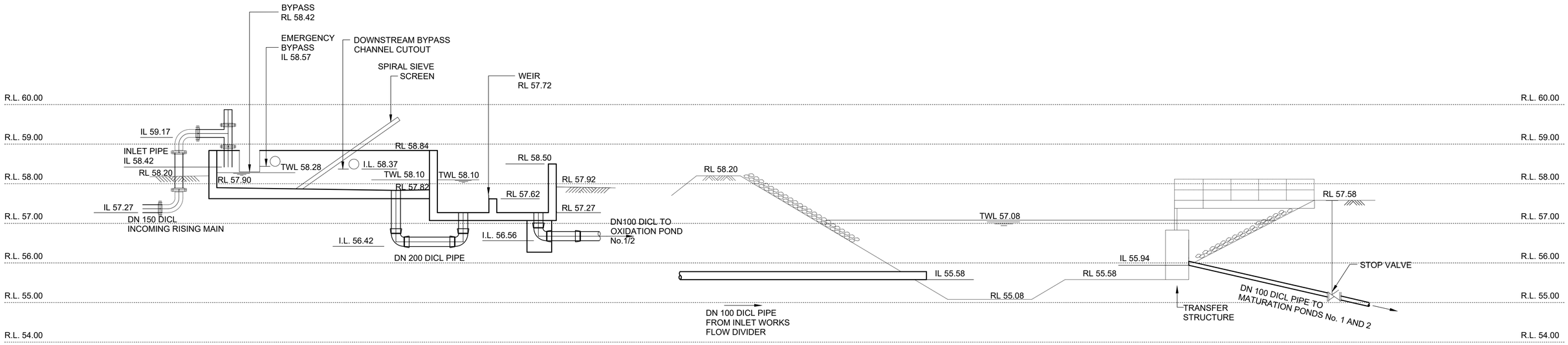
DRAWING No. P-FY20210016-PWO-GEN-DW-50-X000-ZZ-0003

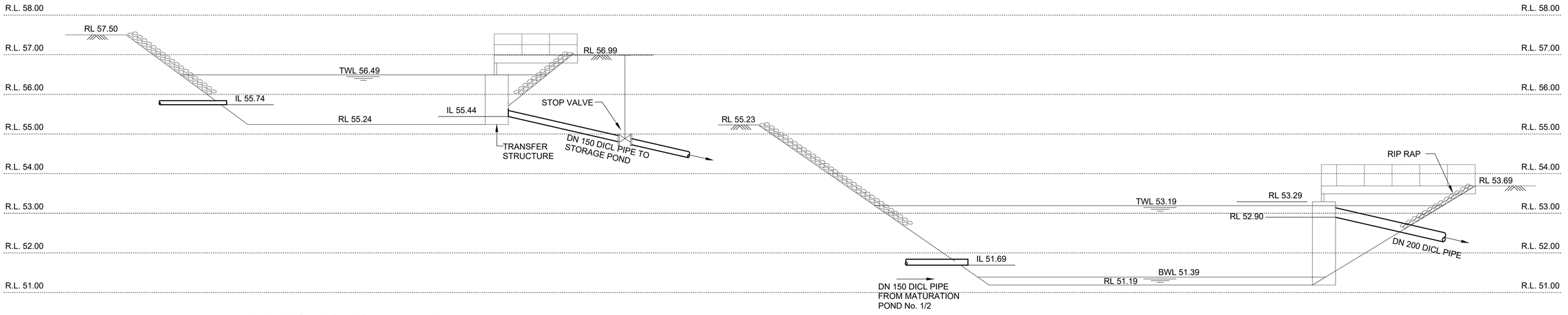
REV B

CONFIRM SCALE 100mm ON A1 ORIGINAL

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Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE
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RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

SEWAGE TREATMENT PLANT
HYDRAULIC PROFILE

PROJECT/CONTRACT No. FY20210016

A1 | SCALE @ A1 NTS

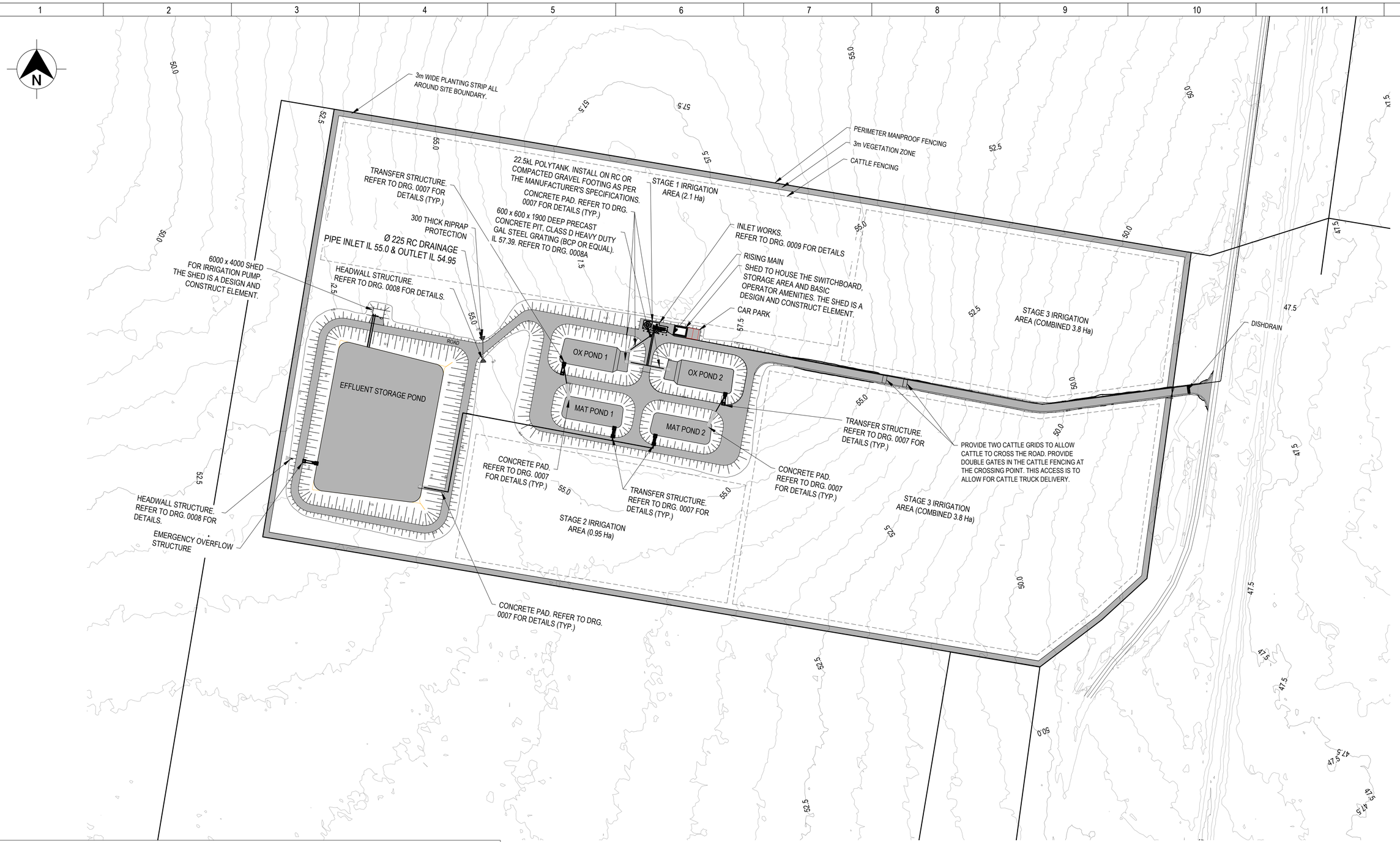
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0001

REV B

CONFIRM SCALE — 100mm ON A1 ORIGINAL

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DESIGN CRITERIA:

DESIGN POPULATION
STAGE 1 - 120 EP
FUTURE - 220 EP

ADWF
STAGE 1 ADWF - 120 X 180 L/EP.d = 22 kL/d
FUTURE ADWF - 220 X 180 L/EP.d = 40 kL/d

SPS 1 PUMP RATE - 11.4 L/s
SCREEN - 3 mm STEP SCREEN CAPACITY 15 L/s

OXIDATION PONDS	- 13.2 kg BOD/d	IRRIGATION STAGES
MATURATION PONDS	- 25 days ADWF	STAGE 1 - 2.4 ha
IRRIGATION STORAGE POND	- 9 ML	STAGE 2 - 0.95 ha
IRRIGATION RATE	- 20 mm APPLICATION TO A WATER DEFICIT OF 25 mm.	STAGE 3 - 7.2 ha

GENERAL SITE LAYOUT PLAN

SCALE 1:1000

1:1000 0 20 40 60 80 100m; 20 10

REV	AMENDMENT DETAILS	APPROVED	DATE
B	ISSUED FOR 100% REVIEW	B.D	05.03.24
A	ISSUED FOR REVIEW	B.D	06.10.23

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FOR REVIEW

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FOLDER:	
L. G. A:	VALIDATED:
SURVEYOR:	
SURVEY DATE:	APPROVED MANAGER:
CADD:	

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE	RICHMOND VALLEY COUNCIL RAPPVILLE SEWERAGE SCHEME
CHECKED	T. PERUSCO	
DRAFTED	S. HAQUE	SEWAGE TREATMENT PLANT GENERAL SITE LAYOUT PLAN
CHECKED	B. DOUGLAS	
DIRECTOR WS & WW	G. FERNANDES	

PROJECT/CONTRACT No. FY20210016

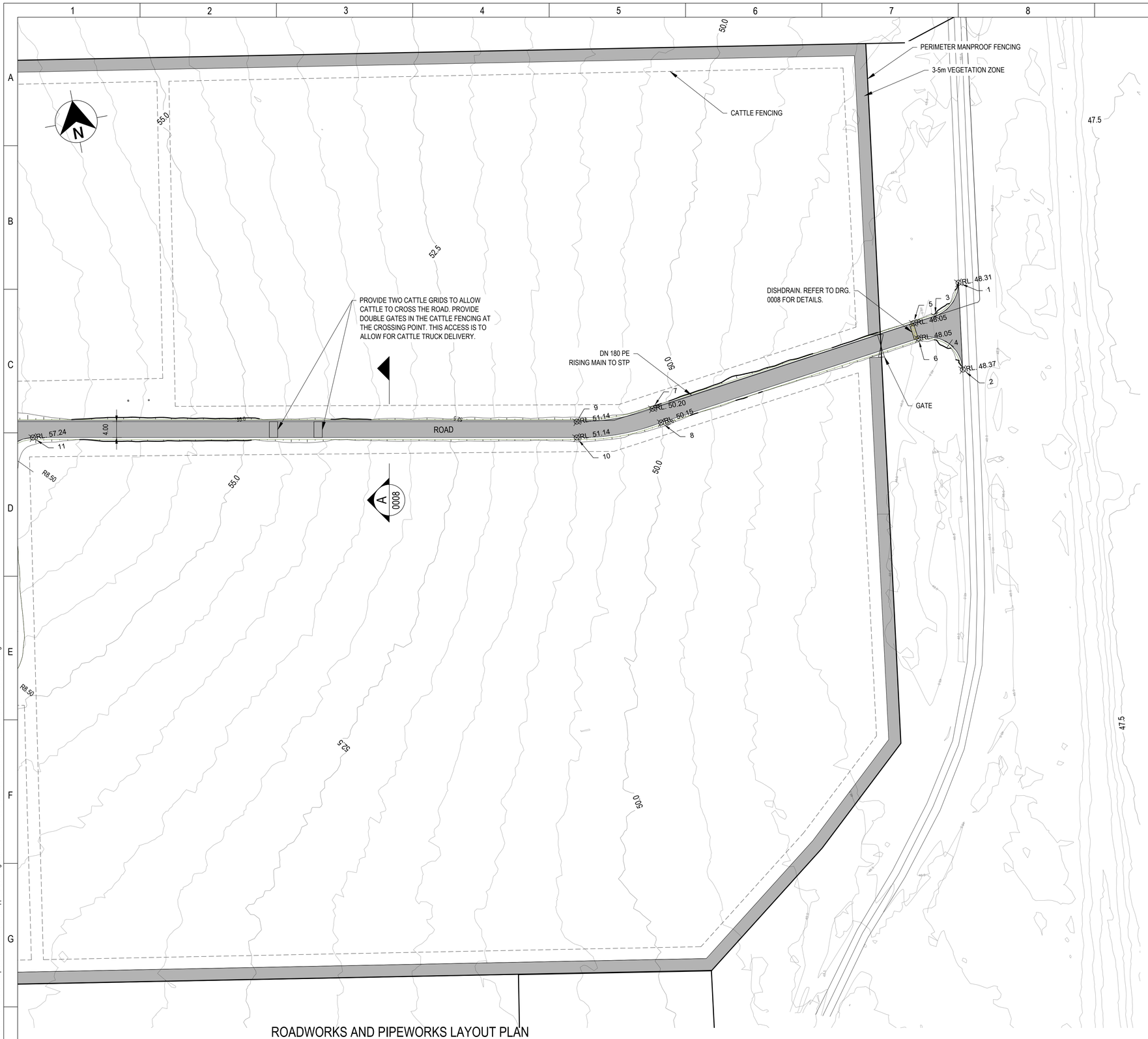
A1 | SCALE @ A1 1:1000

DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0002 | REV B

CONFIRM SCALE — 100mm ON A1 ORIGINAL

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COORDINATE SCHEDULE			
POINT	STRUCTURE	EASTING	NORTHING
1	ROAD	494732.06	6780130.36
2	ROAD	494729.11	6780108.81
3	ROAD	494724.77	6780123.21
4	ROAD	494727.02	6780115.76
5	ROAD	494719.07	6780122.46
6	ROAD	494719.59	6780118.50
7	ROAD	494650.88	6780113.51
8	ROAD	494652.39	6780109.67
9	ROAD	494631.63	6780113.83
10	ROAD	494630.89	6780109.89
11	ROAD	494497.00	6780135.00

UNSEALED GRAVEL ROAD

1:500 0 10 20 30 40 50m

10 5

ROADWORKS AND PIPEWORKS LAYOUT PLAN

SCALE 1:500

REV	AMENDMENT DETAILS	APPROVED	DATE
B	ISSUED FOR 100% REVIEW	B.D	05.03.24
A	ISSUED FOR REVIEW	B.D	06.10.23

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CADD:	

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
SEWAGE TREATMENT PLANT
SETOUT, ROADWORKS AND PIPEWORKS LAYOUT PLAN SHEET 1

PROJECT/CONTRACT No. FY20210016

A1 SCALE @ A1 1:500

DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0003

REV B

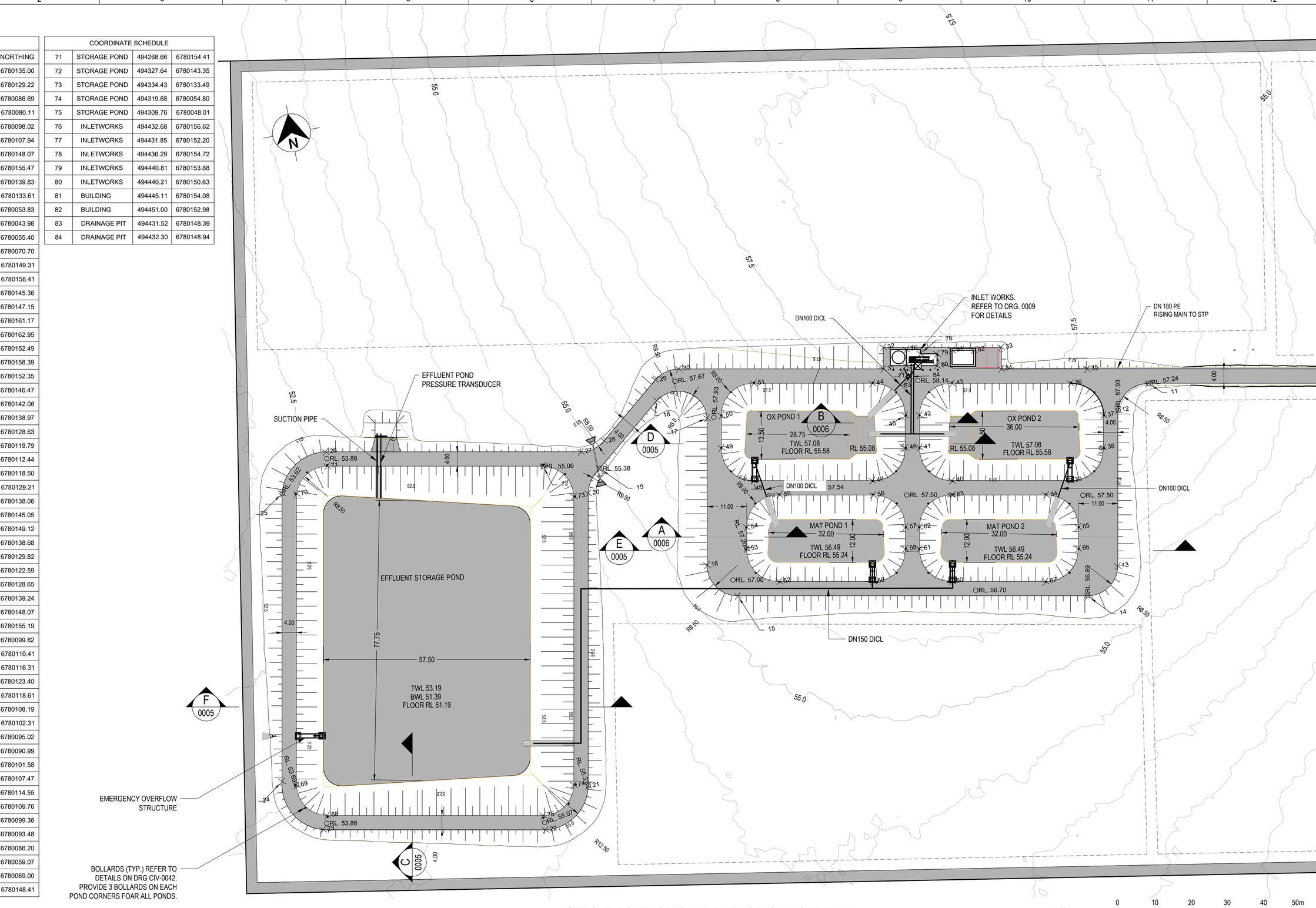
CONFIRM SCALE ◄—— 100mm ON A1 ORIGINAL ——►

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COORDINATE SCHEDULE			
POINT	STRUCTURE	EASTING	NORTHING
11	ROAD	494497.00	6780135.00
12	ROAD	494487.33	6780129.22
13	ROAD	494479.28	6780086.69
14	ROAD	494469.59	6780080.11
15	ROAD	494374.08	6780098.02
16	ROAD	494367.29	6780107.94
17	ROAD	494374.79	6780148.07
18	ROAD	494362.04	6780155.47
19	ROAD	494342.94	6780139.83
20	ROAD	494338.53	6780133.61
21	ROAD	494323.56	6780053.83
22	ROAD	494309.66	6780043.98
23	ROAD	494248.97	6780055.40
24	ROAD	494240.25	6780070.70
25	ROAD	494255.03	6780149.31
26	ROAD	494268.99	6780158.41
27	ROAD	494338.62	6780145.36
28	ROAD	494345.58	6780147.15
29	ROAD	494362.66	6780161.17
30	ROAD	494369.61	6780162.95
31	ROAD	494425.39	6780152.49
32	ROAD	494426.50	6780158.39
33	ROAD	494458.73	6780152.35
34	ROAD	494457.59	6780146.47
35	ROAD	494481.01	6780142.06
36	OX POND 2	494475.78	6780138.97
37	OX POND 2	494483.07	6780128.63
38	OX POND 2	494481.41	6780119.79
39	OX POND 2	494470.81	6780112.44
40	OX POND 2	494438.44	6780118.50
41	OX POND 2	494431.29	6780129.21
42	OX POND 2	494432.95	6780138.06
43	OX POND 2	494443.40	6780145.05
44	OX POND 1	494421.67	6780149.12
45	OX POND 1	494428.98	6780138.68
46	OX POND 1	494427.34	6780129.82
47	OX POND 1	494416.70	6780122.59
48	OX POND 1	494384.32	6780128.65
49	OX POND 1	494377.21	6780139.24
50	OX POND 1	494378.85	6780148.07
51	OX POND 1	494389.29	6780155.19
52	MAT POND 1	494386.18	6780099.82
53	MAT POND 1	494378.94	6780110.41
54	MAT POND 1	494380.05	6780116.31
55	MAT POND 1	494390.64	6780123.40
56	MAT POND 1	494416.21	6780118.61
57	MAT POND 1	494423.31	6780108.19
58	MAT POND 1	494422.19	6780102.31
59	MAT POND 1	494411.79	6780095.02
60	MAT POND 2	494433.26	6780090.99
61	MAT POND 2	494426.12	6780101.58
62	MAT POND 2	494427.23	6780107.47
63	MAT POND 2	494437.84	6780114.55
64	MAT POND 2	494463.40	6780109.76
65	MAT POND 2	494470.49	6780099.36
66	MAT POND 2	494469.37	6780093.48
67	MAT POND 2	494458.81	6780086.20
68	STORAGE POND	494250.79	6780059.07
69	STORAGE POND	494244.00	6780069.00
70	STORAGE POND	494258.97	6780148.41

COORDINATE SCHEDULE			
71	STORAGE POND	494268.66	6780154.41
72	STORAGE POND	494327.64	6780143.35
73	STORAGE POND	494334.43	6780133.49
74	STORAGE POND	494319.68	6780054.80
75	STORAGE POND	494309.76	6780048.01
76	INLETWORKS	494432.68	6780156.62
77	INLETWORKS	494431.85	6780152.20
78	INLETWORKS	494436.29	6780154.72
79	INLETWORKS	494440.81	6780153.88
80	INLETWORKS	494440.21	6780150.63
81	BUILDING	494445.11	6780154.08
82	BUILDING	494451.00	6780152.98
83	DRAINAGE PIT	494431.52	6780148.39
84	DRAINAGE PIT	494432.30	6780148.94



SET OUT, ROADWORKS AND PIPEWORKS LAYOUT PLAN

SCALE 1:500

1:500 0 10 20 30 40 50m

10 5

REV	AMENDMENT DETAILS	APPROVED	DATE
B	ISSUED FOR 100% REVIEW	B.D	05.03.24
A	ISSUED FOR REVIEW	B.D	06.10.23

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FOR REVIEW

DATUM:	
ORIGIN OF LEVELS:	
AZIMUTH:	
FOLDER:	
L. G. A:	
SURVEYOR:	
SURVEY DATE:	
CADD:	

SURVEY PLAN NO.

VERIFIED:

VALIDATED:

APPROVED MANAGER:

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
SEWAGE TREATMENT PLANT
SETOUT, ROADWORKS AND PIPEWORKS LAYOUT PLAN SHEET 2

PROJECT/CONTRACT No. FY20210016

A1 SCALE @ A1 1:500

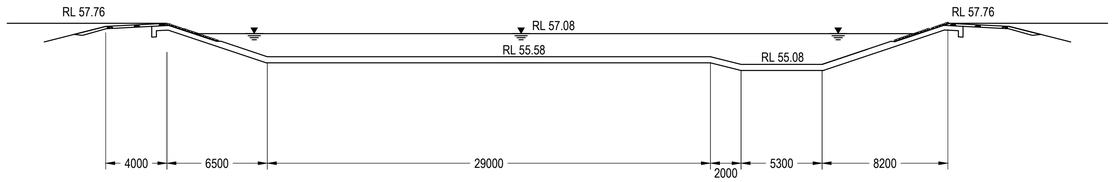
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0004

REV B

CONFIRM SCALE 100mm ON A1 ORIGINAL

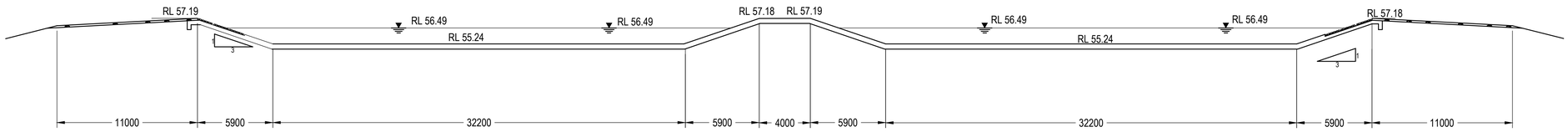
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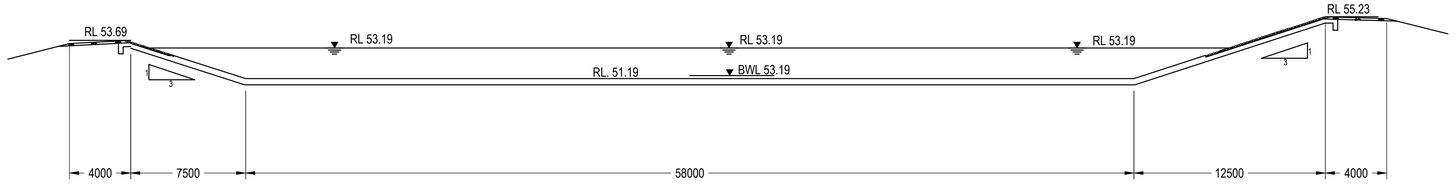
OXIDATION POND 1

SECTION D
SCALE 1: 200
0004



MATURATION POND 1 AND 2

SECTION E
SCALE 1: 200
0004



SCALE 1:200

EFFLUENT STORAGE POND

SECTION F
SCALE 1: 200
0004

REV	AMENDMENT DETAILS	APPROVED	DATE
B	ISSUED FOR 100% REVIEW	B.D	05.03.24
A	ISSUED FOR REVIEW	B.D	06.10.23

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FOLDER:	
L. G. A:	VALIDATED:
SURVEYOR:	
SURVEY DATE:	APPROVED MANAGER:
CADD:	

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

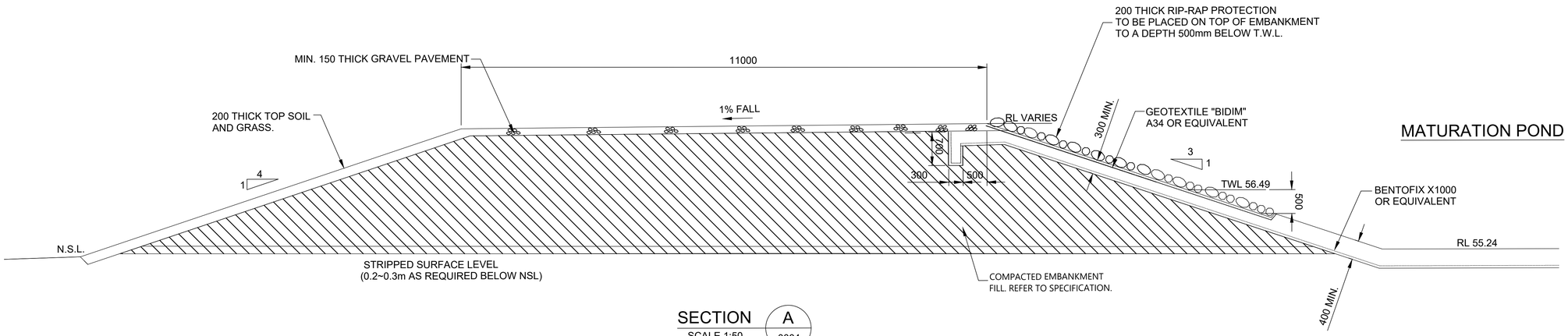
RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
SEWAGE TREATMENT PLANT
POND SECTIONS

PROJECT/CONTRACT No. FY20210016
A1
SCALE @ A1 1:200
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0005
REV B

CONFIRM SCALE 100mm ON A1 ORIGINAL

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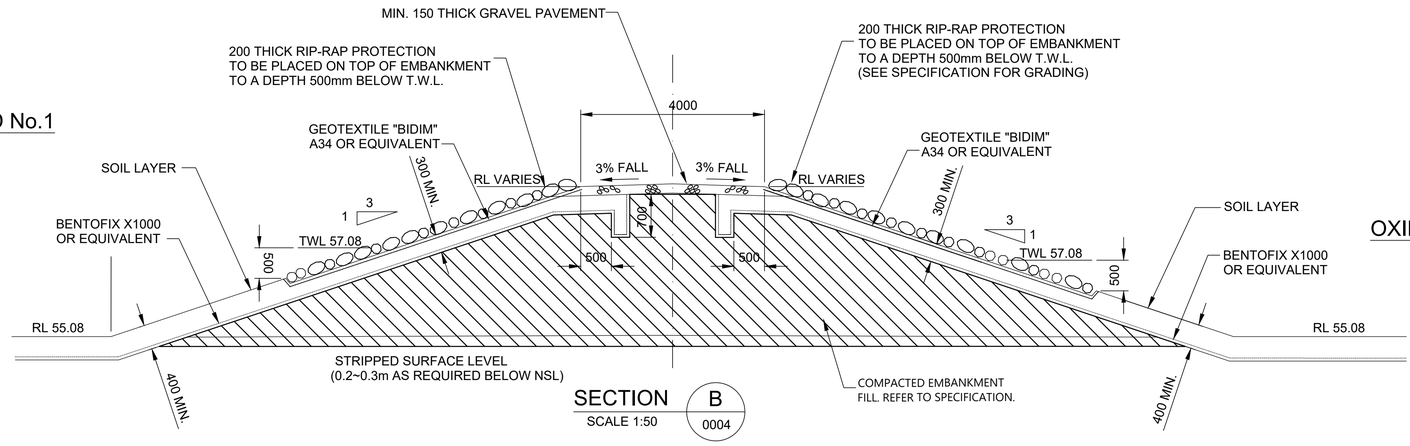
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MATURATION POND

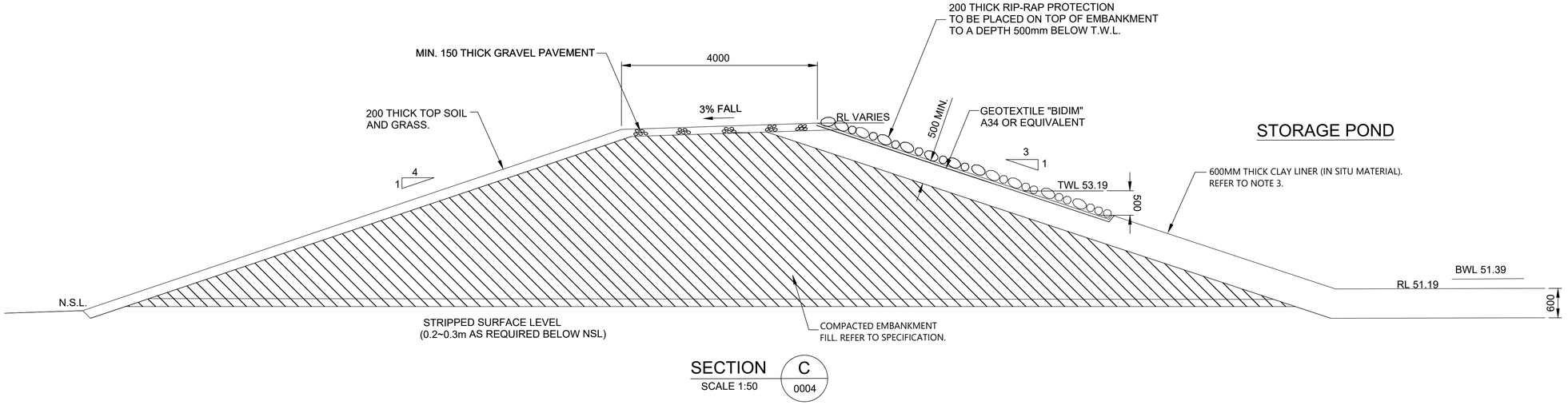
SECTION A
SCALE 1:50
0004

OXIDATION POND No.1



SECTION B
SCALE 1:50
0004

OXIDATION POND No.2



STORAGE POND

SECTION C
SCALE 1:50
0004

NOTES:

1. TOPSOIL AND HYDROSEED EXTERNAL SLOPING FACES OF THE OUTER EMBANKMENT OF ALL PONDS AS SHOWN

2. TOPSOIL SHALL BE COMPRISED OF MATERIAL BORROWED FROM 0.2-0.3m DEPTH BELOW NATURAL SURFACE LEVEL. REFER TO EARTHWORKS SECTION OF SPECIFICATION.

3. PROVIDED GOOD CLAY MATERIAL IS PRESENT OVER THE ENTIRE EFFLUENT STORAGE POND AREA, OVER EXCAVATE THE POND BASE AND INTERNAL EMBANKMMENTS BY 300mm AND RECOMPACT AS PER THE SPECIFICATION TO DESIGN LEVELS.

IF 600mm THICK CLAY LINER CANNOT BE CONSTRUCTED WITH INSITU MATERIAL, PROVIDE A GCL POND LINER AS PER THE OXIDATION AND MATURATION POND DETAILS.

1:50 0 1 2 3 4 5m
1

REV	AMENDMENT DETAILS	APPROVED	DATE
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Richmond Valley Council

NSW GOVERNMENT

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CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

SEWAGE TREATMENT PLANT
POND DETAILS

PROJECT/CONTRACT No. FY20210016

A1 | SCALE @ A1 1:50

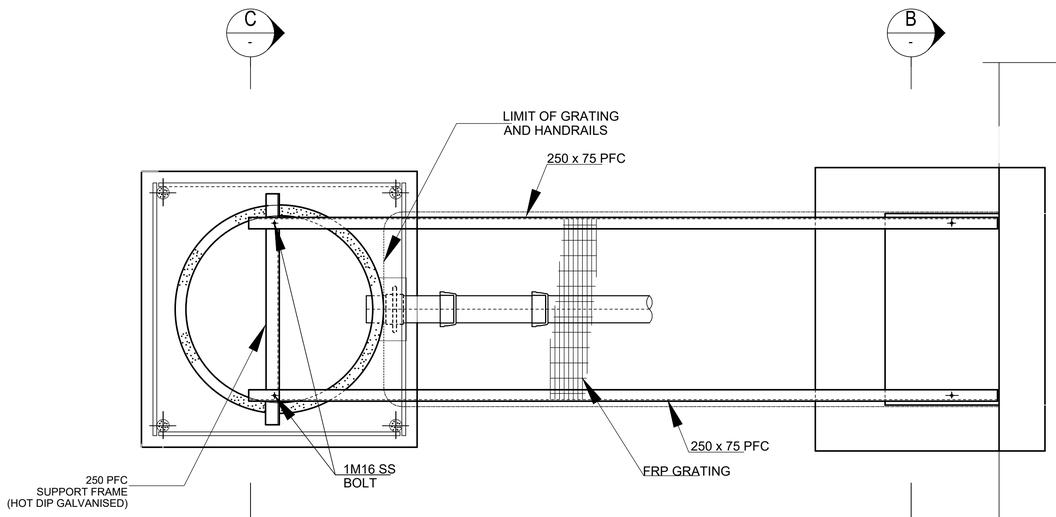
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REV B

CONFIRM SCALE — 100mm ON A1 ORIGINAL

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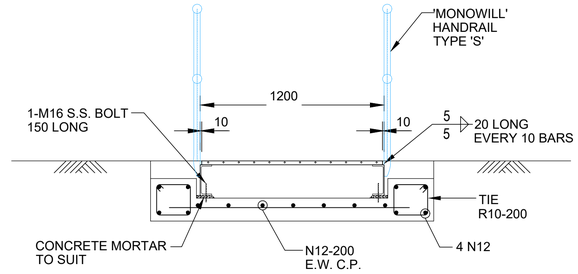
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TRANSFER STRUCTURE - PLAN

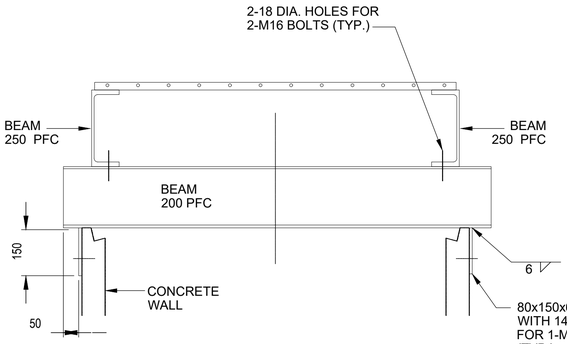
SCALE 1:20

ROAD



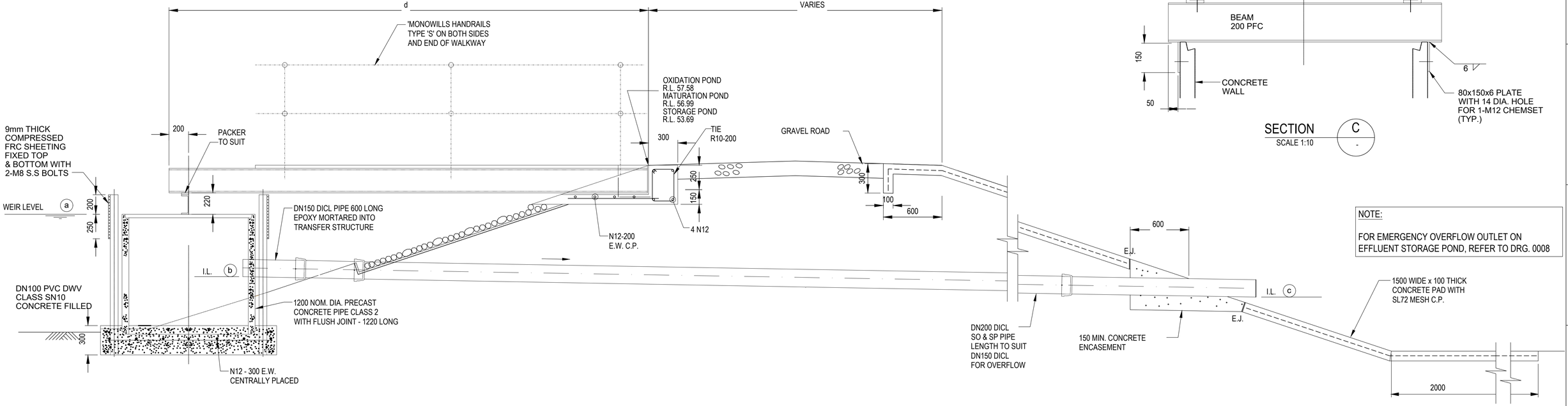
SECTION B

SCALE 1:20



SECTION C

SCALE 1:10



SECTION A

SCALE 1:20

NOTE:

FOR EMERGENCY OVERFLOW OUTLET ON EFFLUENT STORAGE POND, REFER TO DRG. 0008

ITEM	RL (mAHD)			(m)
	a	b	c	d
OXIDATION POND NO. 1 & 2	57.08	55.94	55.74	5.30
MATURATION POND NO. 1 & 2	56.49	55.44	51.69	4.50
EFFLUENT STORAGE POND	53.29	51.39	52.77	6.80

1:10 0 200 400 600 800 1000mm
200 100
1:20 0 400 800 1200 1600 2000mm
400 200

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FOLDER:
L. G. A:
SURVEYOR:
SURVEY DATE:
CADD:

SURVEY PLAN NO.
VERIFIED:
VALIDATED:
APPROVED MANAGER:

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

SEWAGE TREATMENT PLANT
TRANSFER STRUCTURE PLAN AND SECTIONS

PROJECT/CONTRACT No. FY20210016

A1 | SCALE @ A1 1:10, 1:20

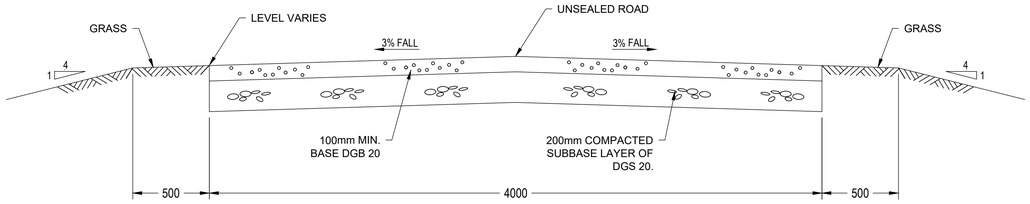
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REV B

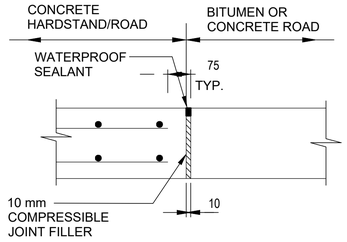
CONFIRM SCALE — 100mm ON A1 ORIGINAL

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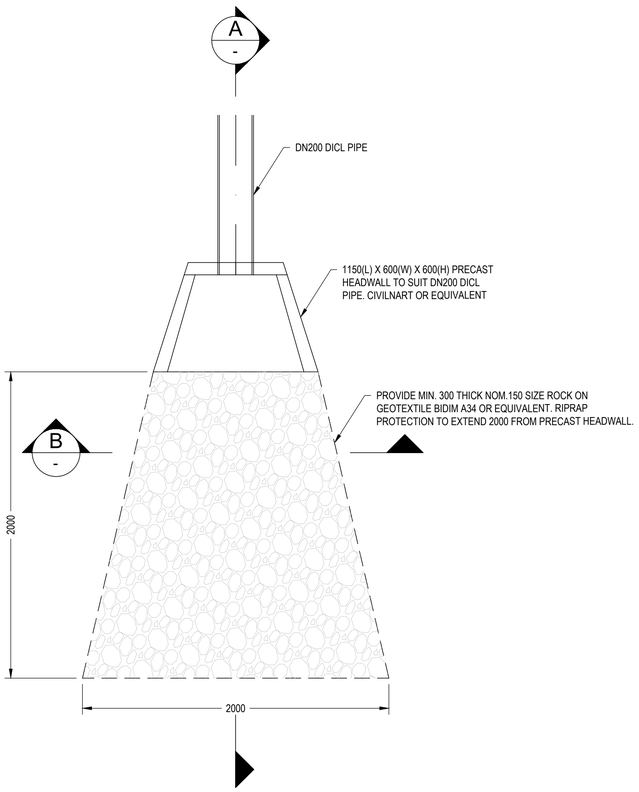
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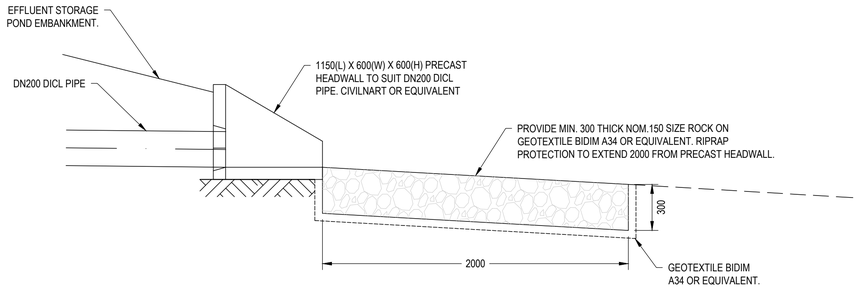
SECTION A
SCALE 1: 20
0003



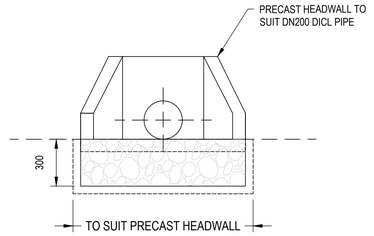
ISOLATION JOINT (I.J.)
SCALE 1:10



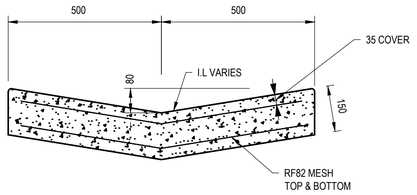
EMERGENCY OVERFLOW OUTLET HEADWALL PLAN
SCALE 1:20



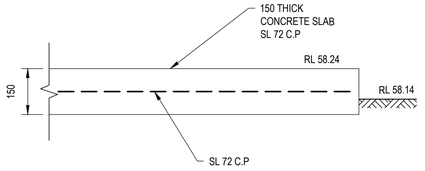
SECTION A
SCALE 1: 20



SECTION B
SCALE 1: 20



CONCRETE DISH DRAIN
SCALE 1:10



CONCRETE SLAB FOR SHED
SCALE 1:10

1:20 0 400 800 1200 1600 2000mm
400 200
1:10 0 200 400 600 800 1000mm
200 100

REV	AMENDMENT DETAILS	APPROVED	DATE
B	ISSUED FOR 100% REVIEW	B.D	05.03.24
A	ISSUED FOR REVIEW	B.D	06.10.23

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L. G. A:	VALIDATED:
SURVEYOR:	
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CADD:	

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

PROJECT/CONTRACT No. FY20210016

SEWAGE TREATMENT PLANT
ROAD PAVEMENT, HEADWALL SECTION AND DETAILS

A1 | SCALE @ A1 1:10, 1:20

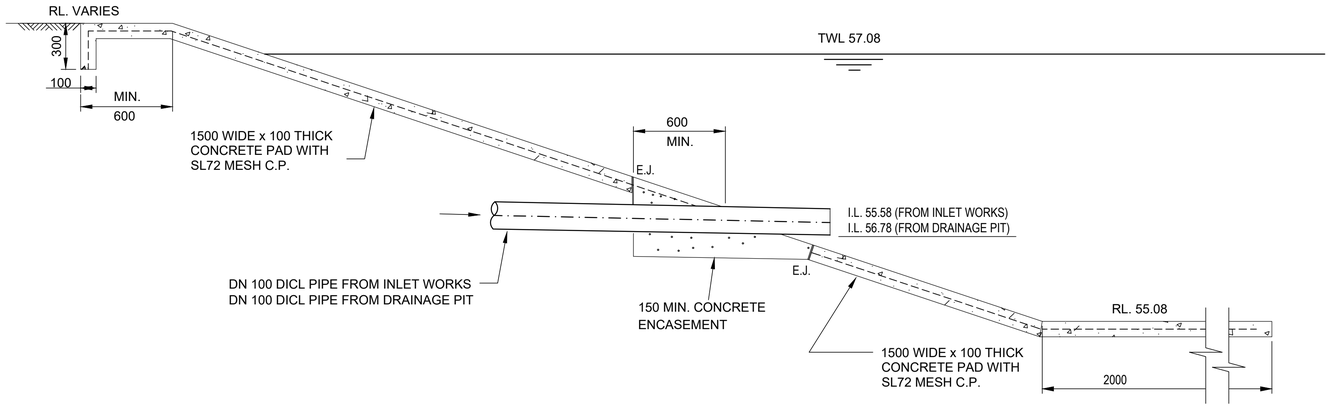
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0008

REV B

CONFIRM SCALE — 100mm ON A1 ORIGINAL

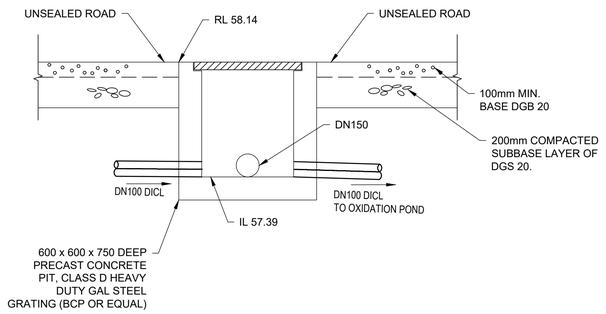
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INLET STRUCTURE

N.T.S.



DRAINAGE PIT PLAN

SCALE 1:20

1:20 — 0, 400, 800, 1200, 1600, 2000mm; 400, 200

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Richmond Valley Council

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DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

SEWAGE TREATMENT PLANT
INLET STRUCTURE AND DRAINAGE PIT DETAILS

PROJECT/CONTRACT No. FY20210016

A1 | SCALE @ A1 -

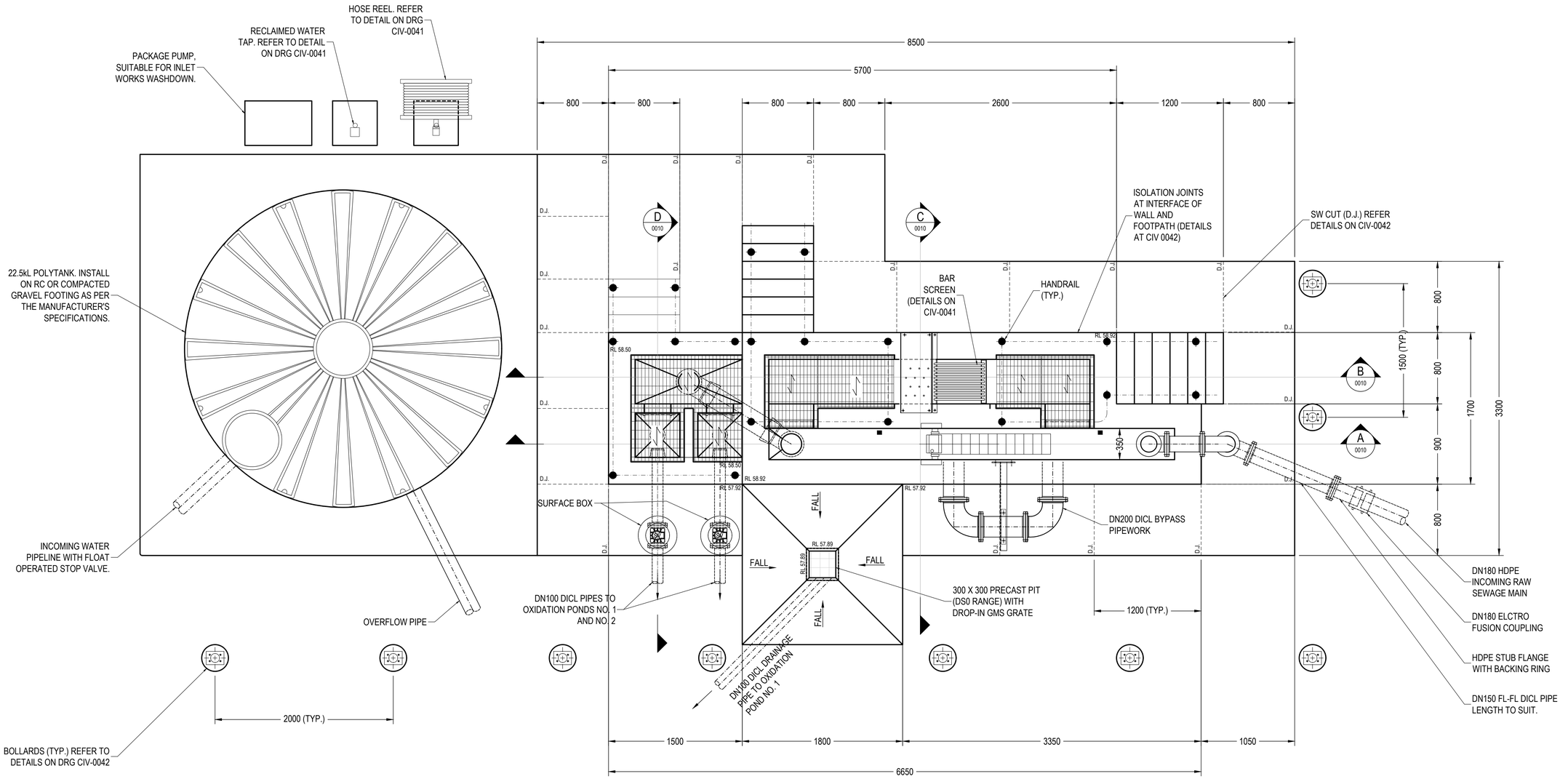
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0008A

REV B

CONFIRM SCALE — 100mm ON A1 ORIGINAL

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INLET WORKS - GENERAL ARRANGEMENTS PLAN

SCALE 1:25

1:25 0 500 1000 1500 2000 2500mm
500

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Richmond Valley Council

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DIRECTOR WS & WW	G. FERNANDES

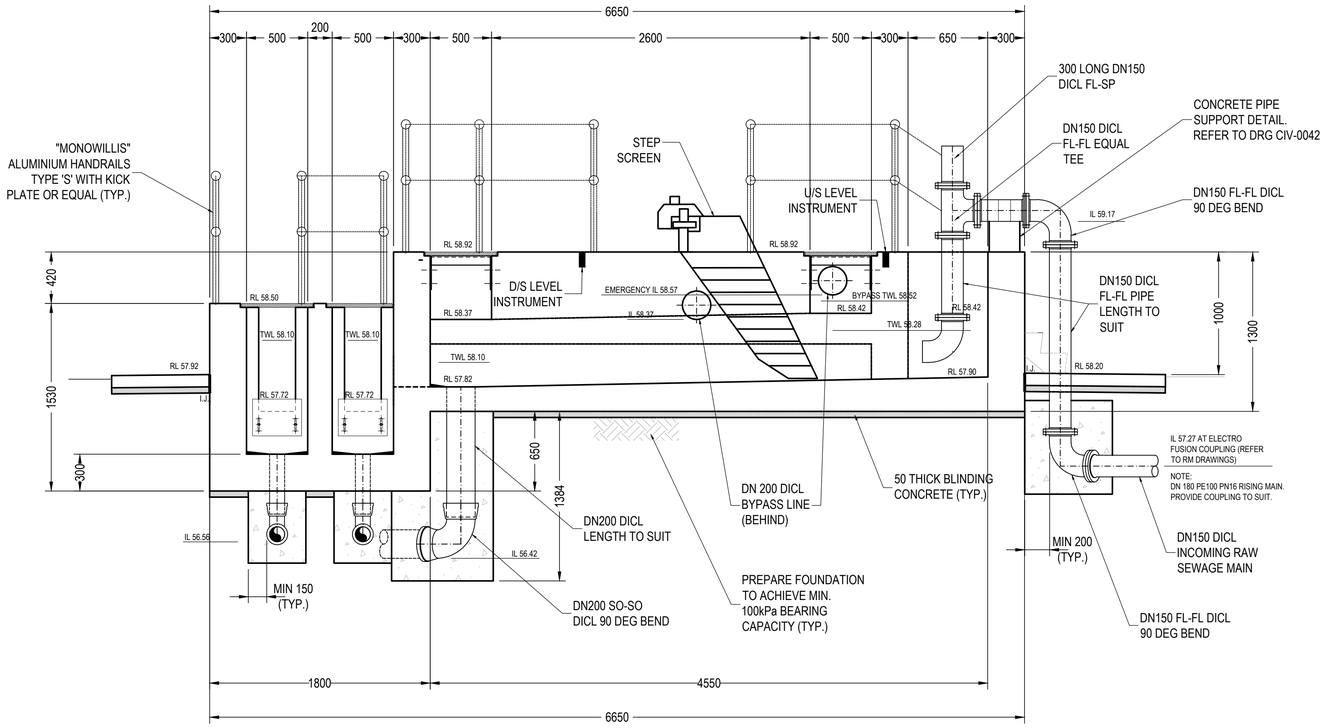
RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
SEWAGE TREATMENT PLANT
INLET STRUCTURE PLAN

PROJECT/CONTRACT No. FY20210016
A1
SCALE @ A1 1:25
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0009
REV B

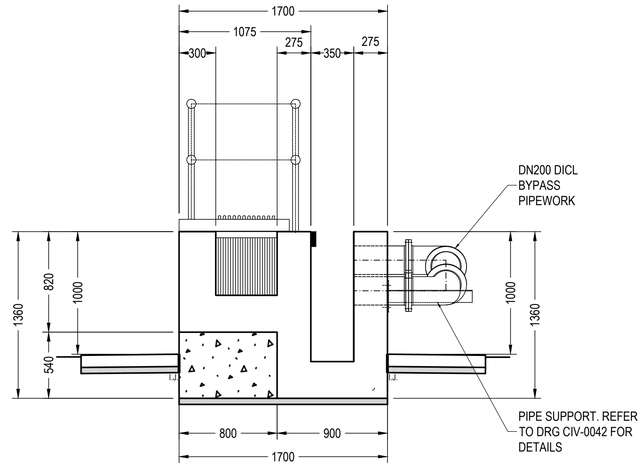
CONFIRM SCALE 100mm ON A1 ORIGINAL

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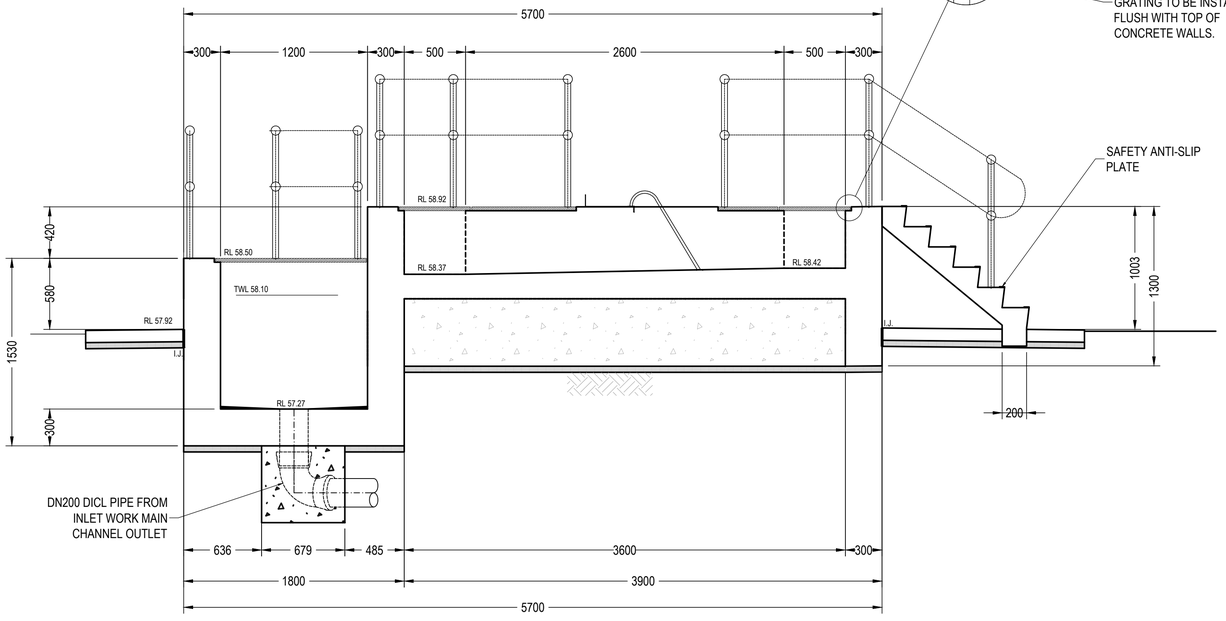
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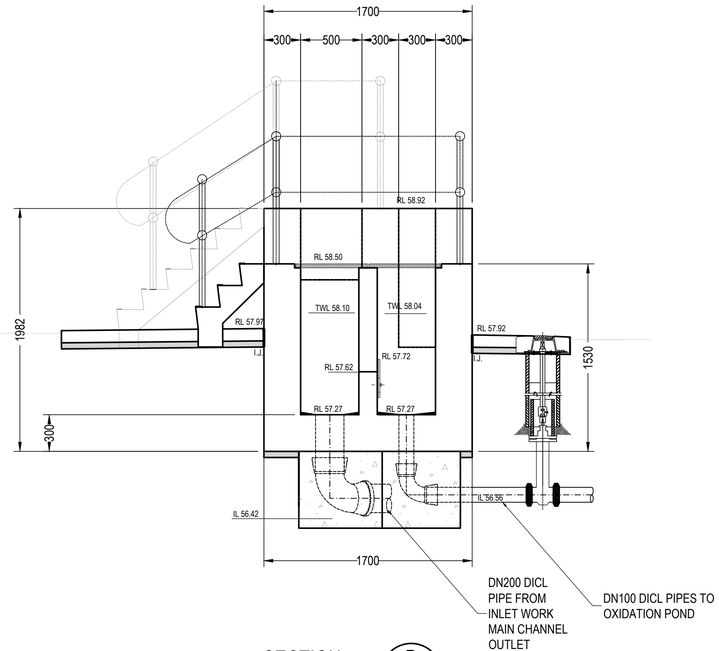
SECTION A
SCALE 1:25
0009



SECTION C
SCALE 1:25
0009



SECTION B
SCALE 1:25
0009



SECTION D
SCALE 1:25
0009

1:25 0 500 1000 1500 2000 2500mm
500

REV	AMENDMENT DETAILS	APPROVED	DATE
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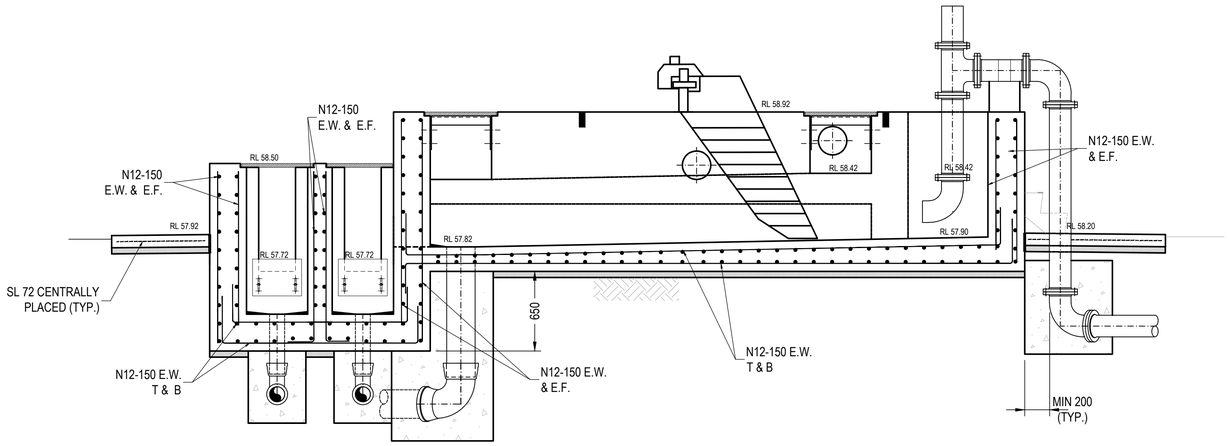
RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
SEWAGE TREATMENT PLANT
INLET STRUCTURE SECTIONS

PROJECT/CONTRACT No. FY20210016
A1 SCALE @ A1 1:25
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0010
REV B

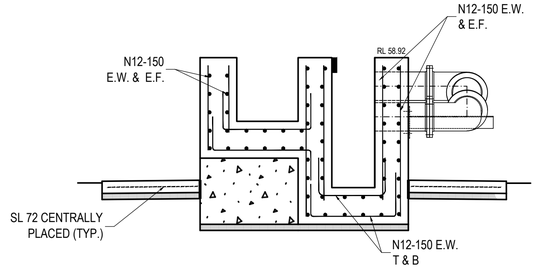
CONFIRM SCALE 100mm ON A1 ORIGINAL

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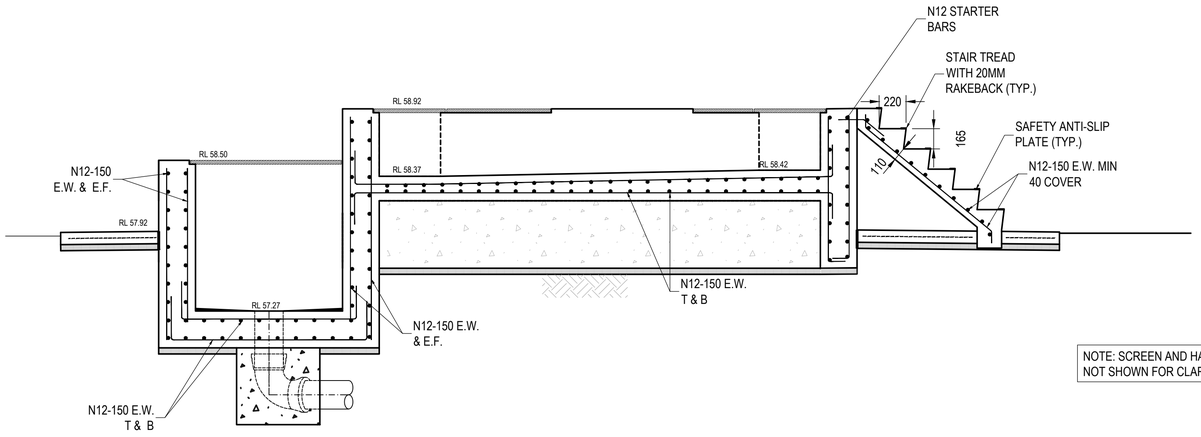
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SECTION A
SCALE 1:25
0009

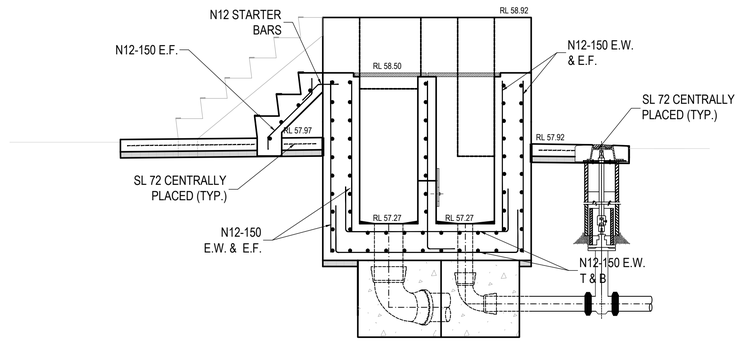


SECTION C
SCALE 1:25
0009



NOTE: SCREEN AND HANDRAILS
NOT SHOWN FOR CLARITY.

SECTION B
SCALE 1:25
0009



SECTION D
SCALE 1:25
0009

1:25 0 500 1000 1500 2000 2500mm
500

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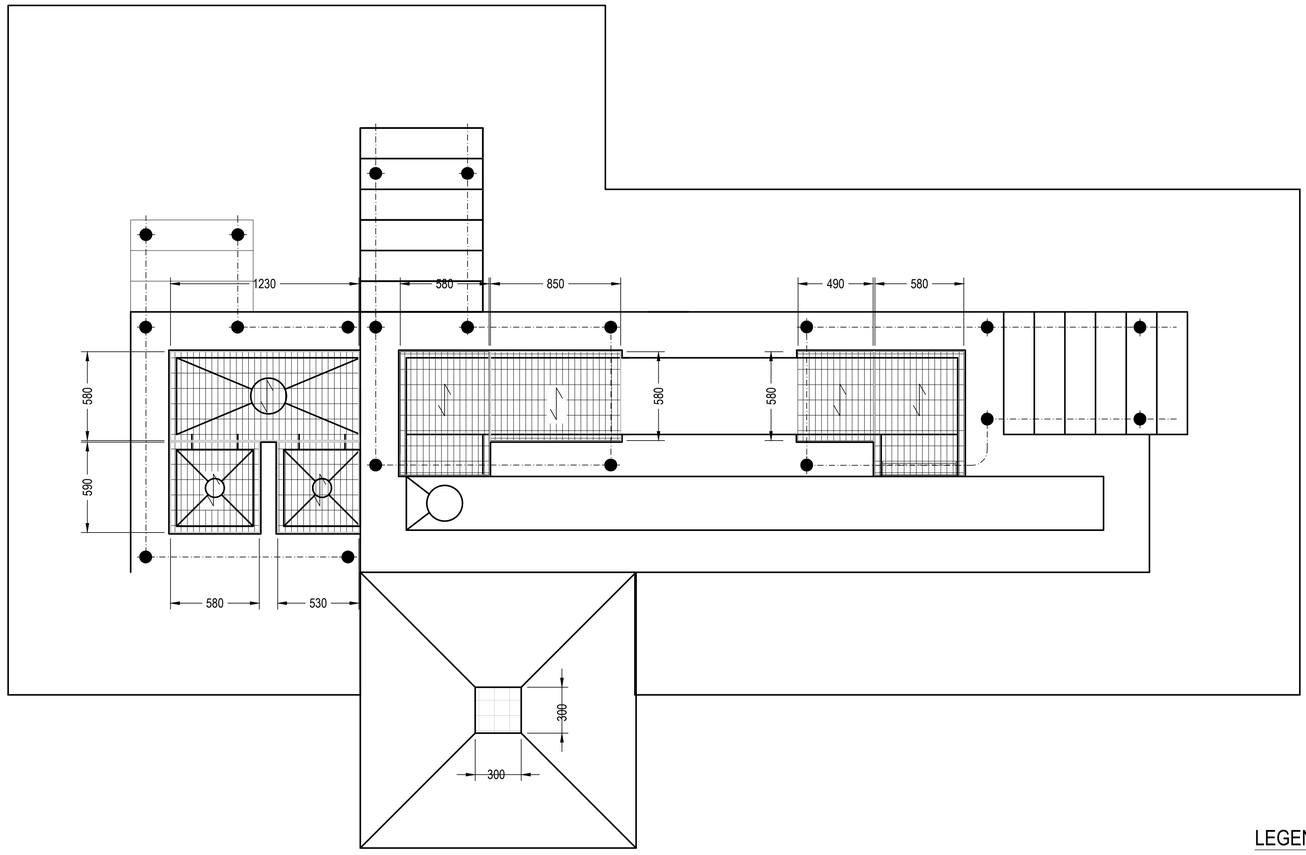
RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
SEWAGE TREATMENT PLANT
REINFORCEMENT DETAILS

PROJECT/CONTRACT No. FY20210016
A1
SCALE @ A1 1:25
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0011
REV B

CONFIRM SCALE ◄ 100mm ON A1 ORIGINAL ►

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INLET WORKS - GRATINGS LAYOUT PLAN

SCALE 1:20

LEGEND

FRP GRATING

LOAD BAR DIRECTION

NOTES

- DESIGN AND CONSTRUCT FRP GRATING OR EQUIVALENT.
- CONFIRM ALL DIMENSIONS BEFORE FABRICATION.
- GRATING TO BE FLUSH WITH TOP OF CONCRETE. PROVIDE RECESS TO SUIT SECURE WITH CLIPS TO MANUFACTURER'S REQUIREMENTS.
- ALL ALUMINIUM/CONCRETE AND ALUMINIUM/STEEL INTERFACES TO BE PAINTED WITH ALKALI RESISTANT BITUMINOUS PAINT.
- PROTECT INTERNAL CONCRETE SURFACES AND TOP OF WALLS WITH SYSTEM CS-07-UHB EPOXY TO SYDNEY WATER PCS 100 PROTECTIVE COATING STD.

1:20 0 400 800 1200 1600 2000mm
400 200

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DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

SEWAGE TREATMENT PLANT
INLET STRUCTURE GRATING LAYOUT PLAN

PROJECT/CONTRACT No. FY20210016

A1 | SCALE @ A1 1:20

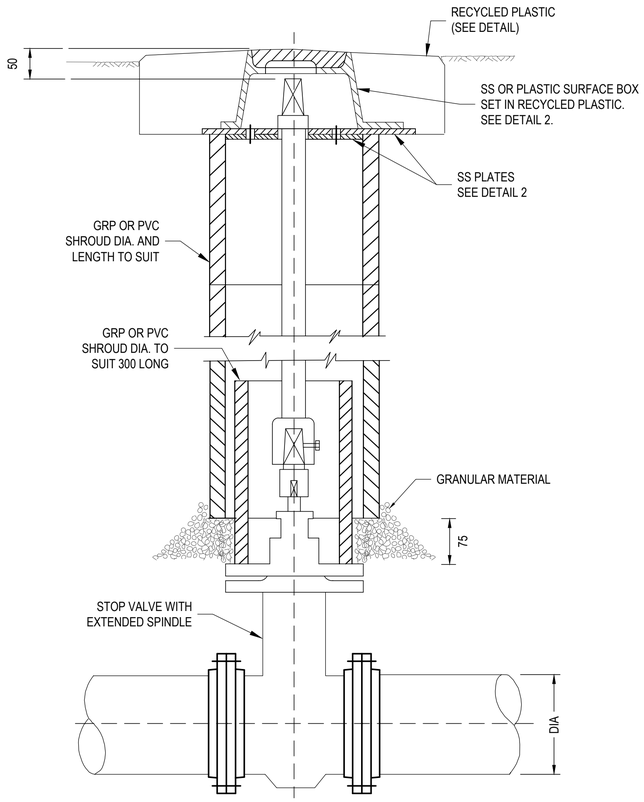
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REV B

CONFIRM SCALE ← 100mm ON A1 ORIGINAL →

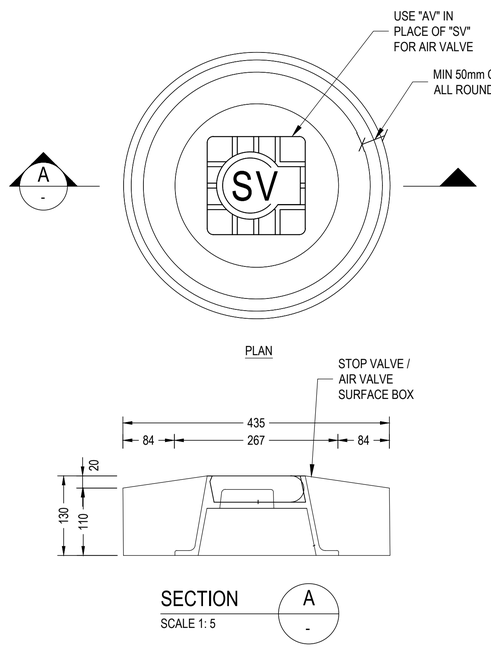
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ARRANGEMENT OF SLEEVE PIPE AND SURFACE BOX FOR VALVES IN GROUND

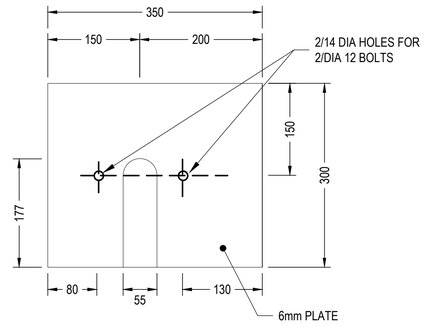
SCALE 1:5

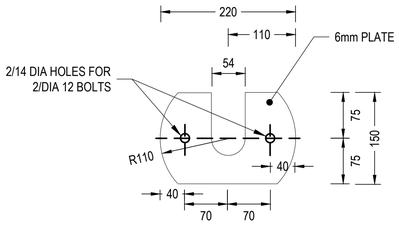


SECTION A - SCALE 1: 5

VALVE SURFACE BOX DETAILS (TYP.)

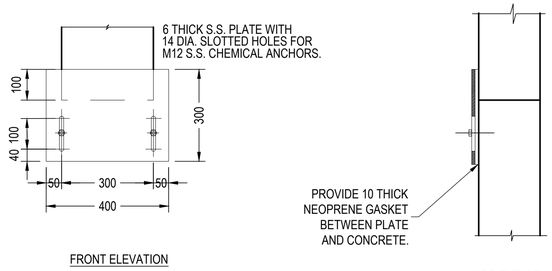
SCALE 1:5





DETAIL 2

SCALE 1: 5

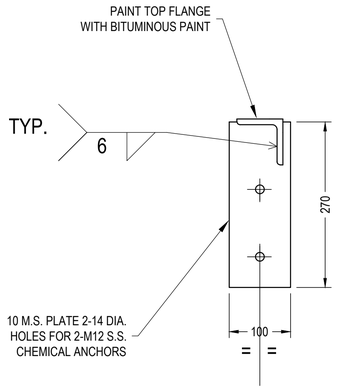


FRONT ELEVATION

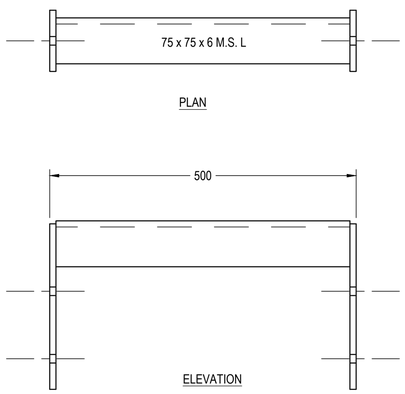
SIDE ELEVATION

WEIR PLATE DETAILS

SCALE 1:10

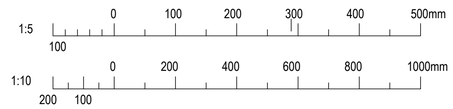


SIDE ELEVATION



GRATING SUPPORT BEAM

SCALE 1:5



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DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

SEWAGE TREATMENT PLANT
MISCELLANEOUS DETAITS 1 OF 3

PROJECT/CONTRACT No. FY20210016

A1 | SCALE @ A1 -

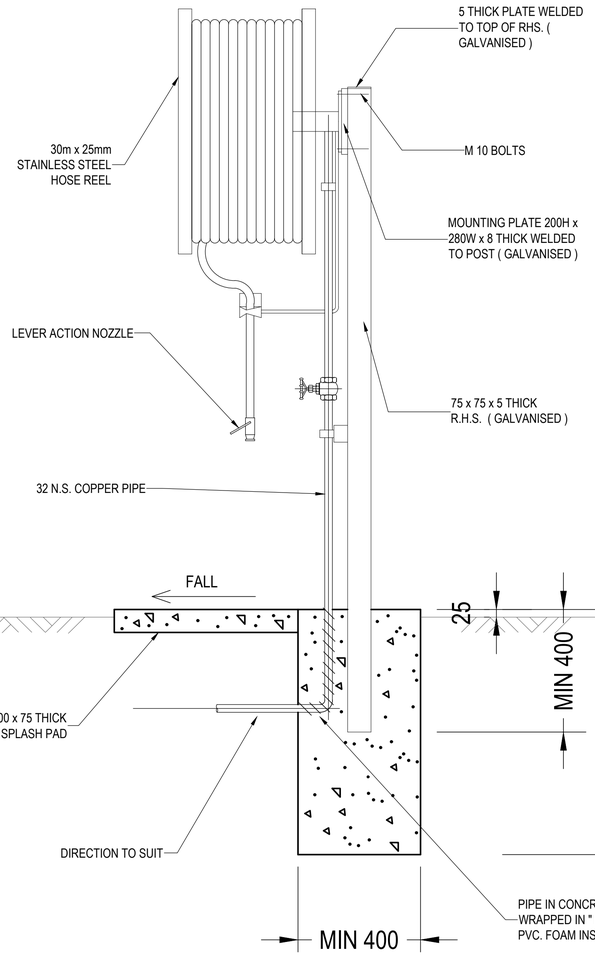
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0040

REV B

CONFIRM SCALE — 100mm ON A1 ORIGINAL

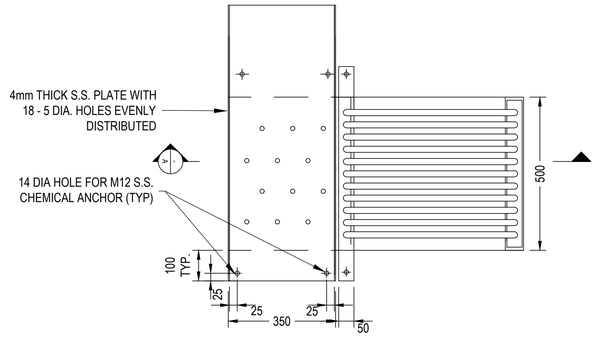
© CROWN IN RIGHT OF NSW THROUGH THE DEPARTMENT OF REGIONAL NSW T/A PUBLIC WORKS

last plotted - 04.03.24, 3:11:26 PM by THAPAR01 . File - C:\Users\haques01\ACCDocs\PWO\Rappville Sewerage Scheme\01-WIP\02-CIV\DRG\P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0040.dwg



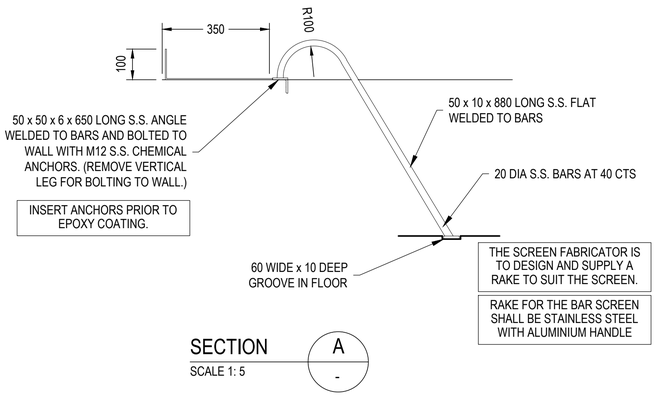
WASHDOWN OUTLET HOSE (FOR RECLAIMED WATER)

SCALE 1:10



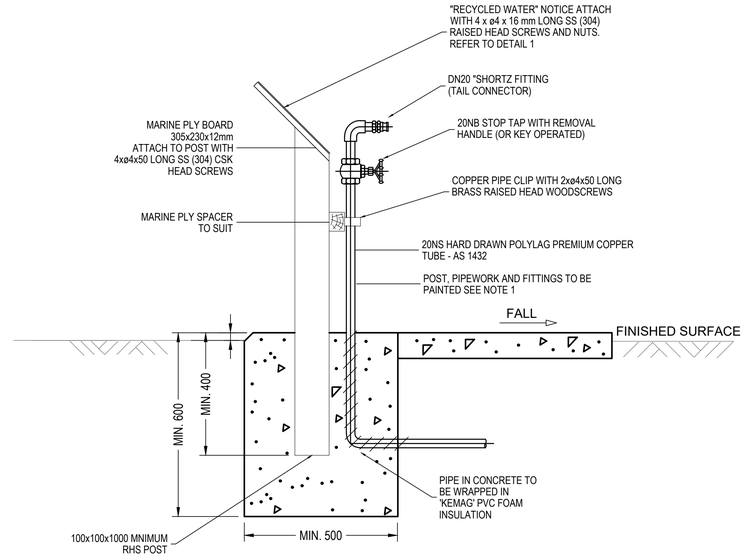
MANUALLY RAKED BAR SCREEN

SCALE 1:5



WASHDOWN OUTLET (FOR RECLAIMED WATER)

SCALE 1:10



WASHDOWN OUTLET (FOR RECLAIMED WATER)

SCALE 1:10



DETAIL 1

RECLAIMED WATER NOTICE

SCALE 1:2

1:5 — 0, 100, 200, 300, 400, 500mm — 100

REV	AMENDMENT DETAILS	APPROVED	DATE
B	ISSUED FOR 100% REVIEW	B.D	05.03.24
A	ISSUED FOR REVIEW	B.D	06.10.23

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FOR REVIEW

DATUM:	SURVEY PLAN NO.
ORIGIN OF LEVELS:	
AZIMUTH:	VERIFIED:
FOLDER:	
L. G. A:	VALIDATED:
SURVEYOR:	
SURVEY DATE:	APPROVED MANAGER:
CADD:	

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	R.THAPA
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

SEWAGE TREATMENT PLANT
MISCELLANEOUS DETAILS 2 OF 3

PROJECT/CONTRACT No. FY20210016

A1 | SCALE @ A1 -

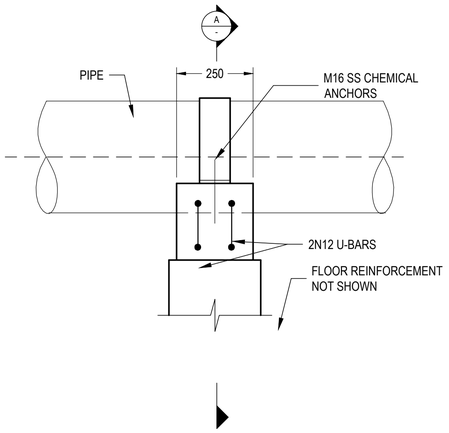
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0041

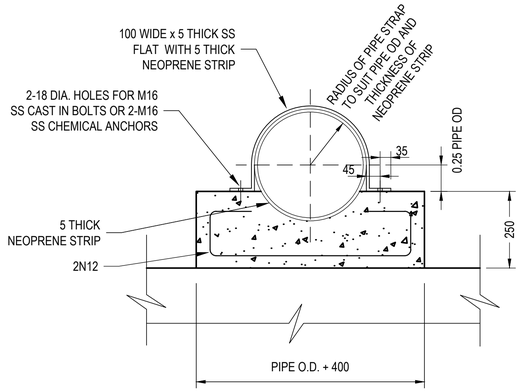
REV B

CONFIRM SCALE — 100mm ON A1 ORIGINAL

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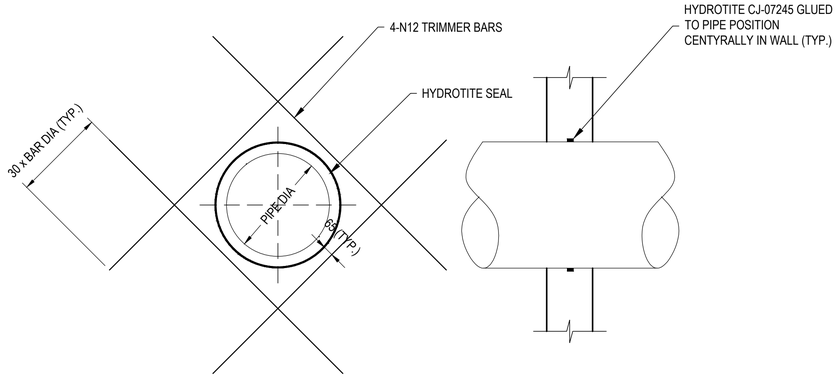




SECTION A
SCALE 1: 10

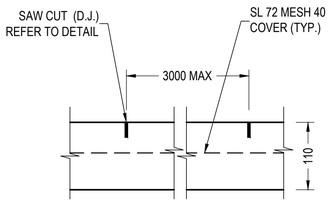
CONCRETE PIPE SUPPORT DETAILS

SCALE 1:10



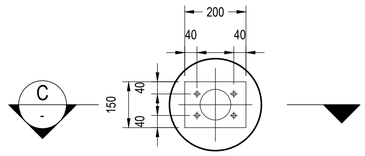
PIPE PENETRATION DETAILS

SCALE 1:20



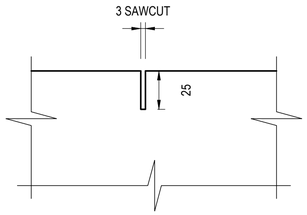
CONCRETE FOOTPATH DETAILS

SCALE 1:5



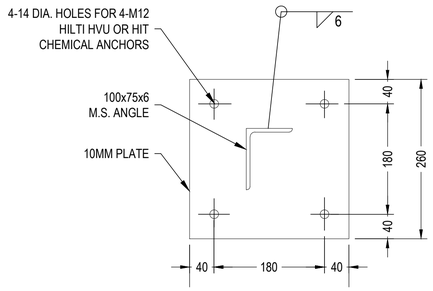
BOLLARDS DETAILS

SCALE 1:10

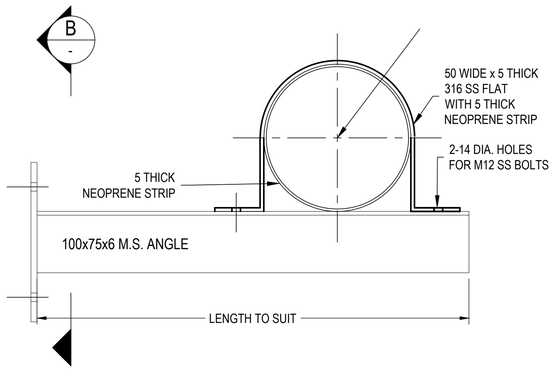


SAW CUT (D.J.) DETAIL

SCALE 1:2

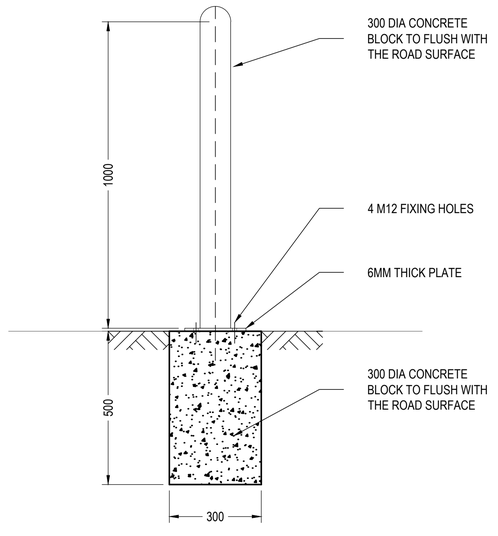


SECTION B
SCALE 1: 5

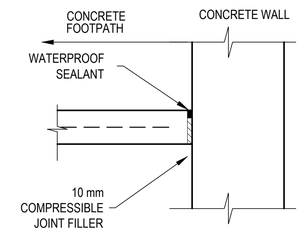


PIPE SUPPORT DETAILS

SCALE 1:5

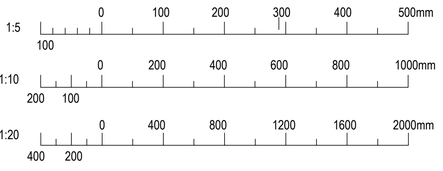


SECTION C
SCALE 1: 10



ISOLATION JOINTS (IJ) BETWEEN FOOTPATH AND CONCRETE WALL

SCALE 1:10



REV	AMENDMENT DETAILS	APPROVED	DATE
B	ISSUED FOR 100% REVIEW	B.D	05.03.24
A	ISSUED FOR REVIEW	B.D	06.10.23

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L. G. A:	VALIDATED:
SURVEYOR:	
SURVEY DATE:	APPROVED MANAGER:
CADD:	

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	R.THAPA
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

SEWAGE TREATMENT PLANT
MISCELLANEOUS DETAILS 3 OF 3

PROJECT/CONTRACT No. FY20210016

A1 | SCALE @ A1 -

DRAWING No. P-FY20210016-PWO-CIV-DW-50-S003-ZZ-0042

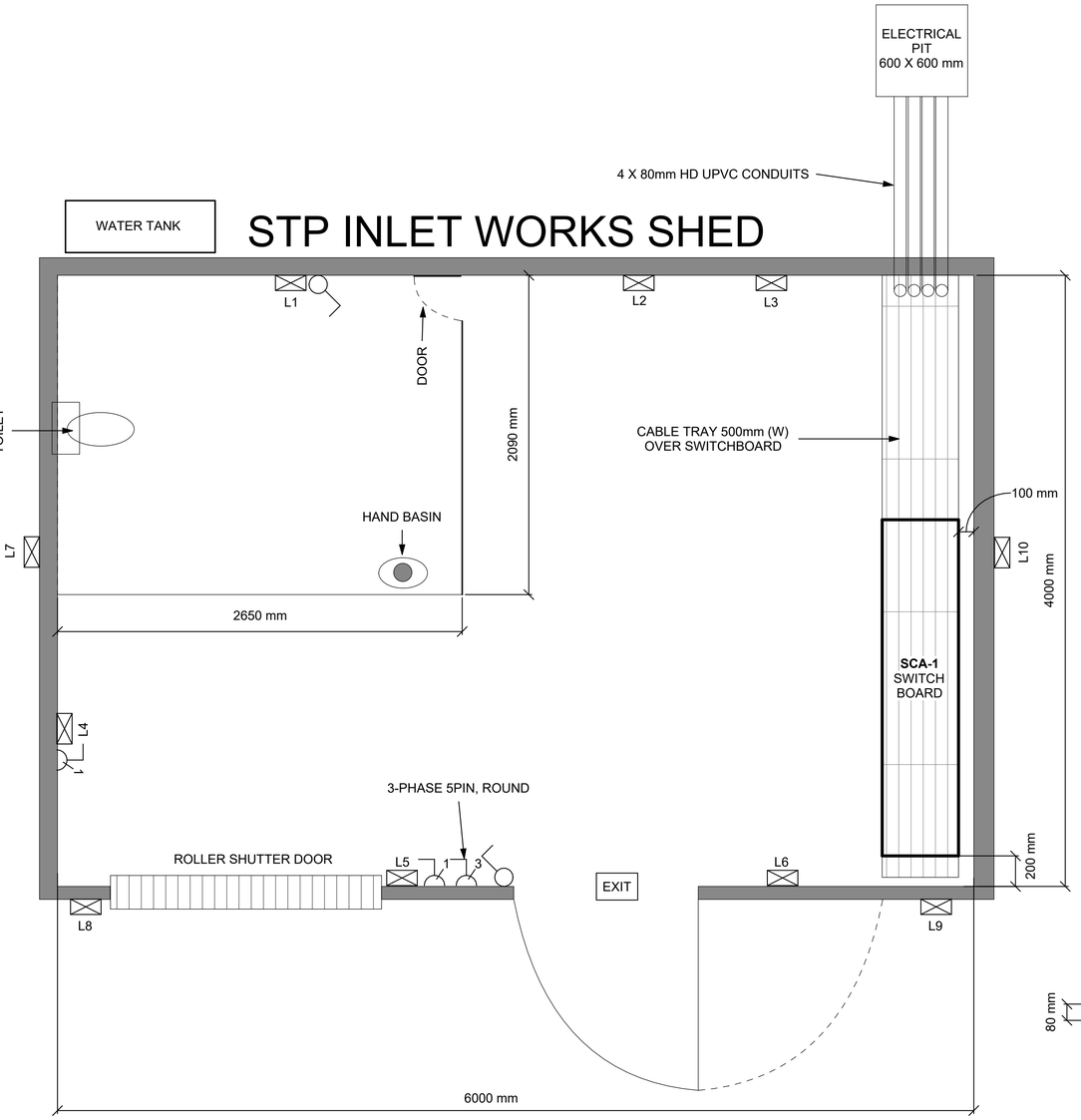
REV B

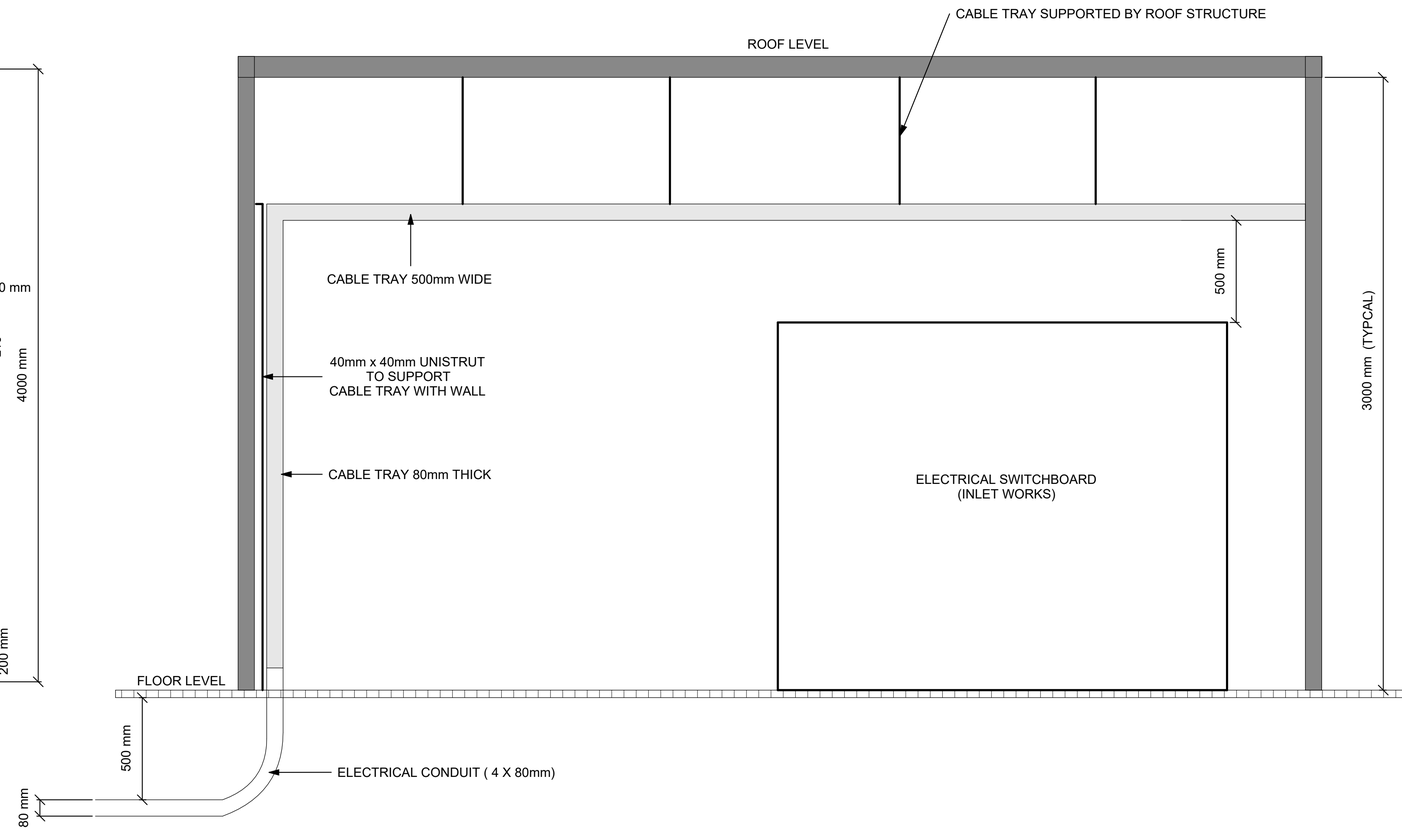
CONFIRM SCALE — 100mm ON A1 ORIGINAL

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STP INLET WORKS SHED





NOT TO SCALE

LEGEND:

- LIGHT SWITCH, INDUSTRIAL TYPE, IP56 RATED
- WALL MOUNTED, 120W LED, IP65 RATED (MUNTED 2000MM ABOVE FINISHED FLOOR LEVEL)
- 1-PHASE SOCKET OUTLET, INDUSTRIAL TYPE, IP56 RATED
- 3-PHASE SOCKET OUTLET, INDUSTRIAL TYPE, IP56 RATED

REV	AMENDMENT DETAILS	APPROVED	DATE
B	ISSUED FOR 100% REVIEW	B.D	05/03/2024
A	ISSUED FOR REVIEW	B.D	23/11/2023

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L. G. A:	
SURVEYOR:	VALIDATED:
SURVEY DATE:	
CADD:	APPROVED MANAGER:

CLIENT: Richmond Valley Council

NSW GOVERNMENT

DESIGNED	ABU JAFAR SIDDIQUE
CHECKED	ABDUR RAZZAK
DRAFTED	ABU JAFAR SIDDIQUE
CHECKED	ABDUR RAZZAK
DIRECTOR WRM	GLEN FERNANDES

PROJECT: RICHMOND VALLEY COUNCIL
RAPVILLE SEWERAGE SCHEME

PROJECT/CONTRACT No.: FY20210016

TITLE: RAPVILLE STP
LIGHT & POWER GENERAL ARRANGEMENT

A1 | SCALE (@ A1) N.T.S

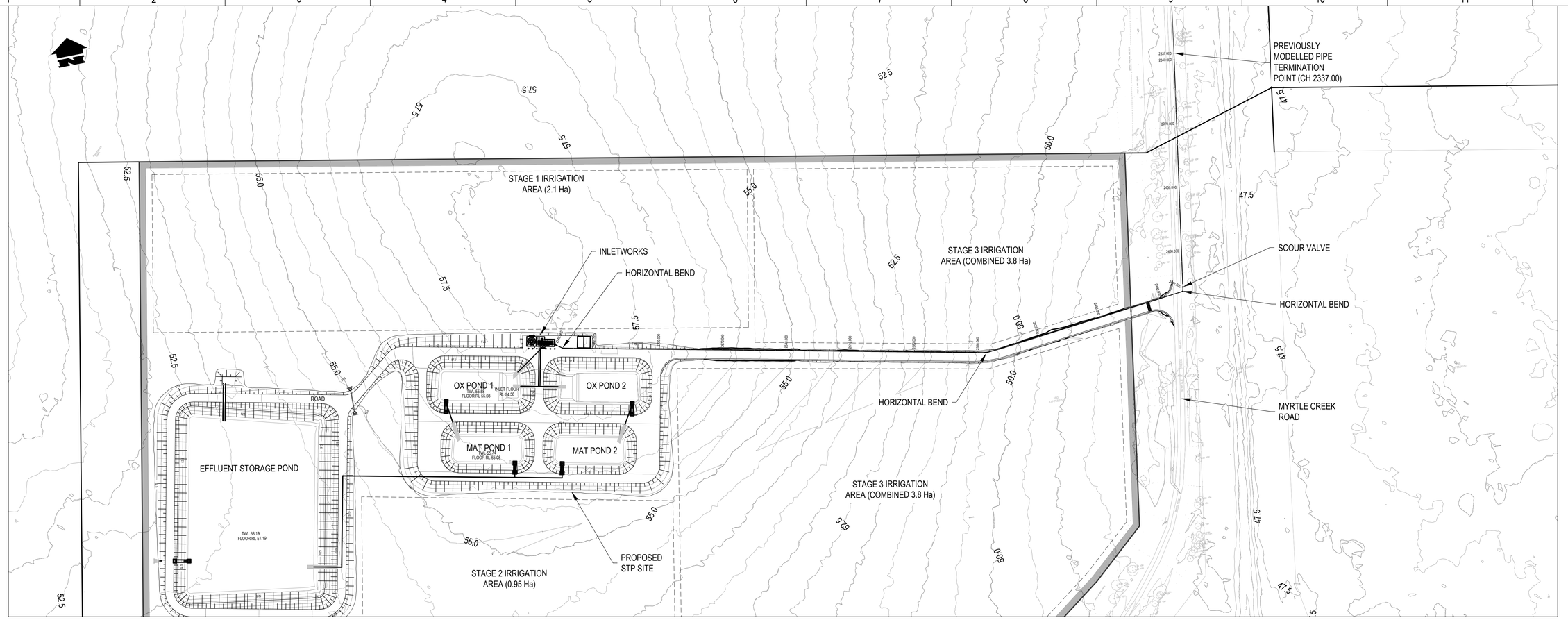
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REV: A

CONFIRM SCALE — 100mm ON A1 ORIGINAL

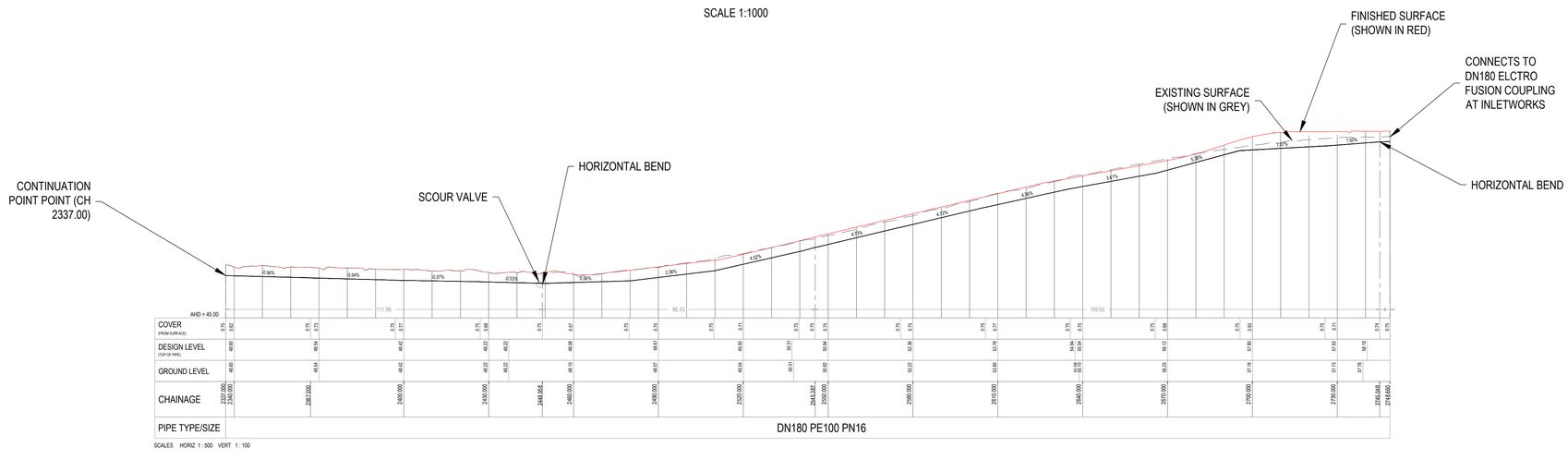
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SEWER RISING MAIN PLAN (CH 2337.00 TO (CH 2337.00 TO CH 2748.66 (INLETWORKS))

SCALE 1:1000



SEWER RISING MAIN LONG SECTION (CH 2337.00 TO CH 2748.66 (INLETWORKS))

SCALE 1:1000

1:1000 0 20 40 60 80 100m (20 10)

REV	AMENDMENT DETAILS	APPROVED	DATE
B	ISSUED FOR 100% REVIEW	B.D	05.03.24
A	ISSUED FOR REVIEW	B.D	XX/XX/XXXX

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FOLDER:	
L. G. A:	VALIDATED:
SURVEYOR:	
SURVEY DATE:	APPROVED MANAGER:
CADD:	

DESIGNED	R. THAPA
CHECKED	T. PERUSCO/S. HAQUE
DRAFTED	R. THAPA
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

PROJECT/CONTRACT No. FY20210016

SEWAGE TREATMENT PLANT
RISING MAIN PLAN AND LONG SECTION

SCALE @ A1 A1 1:1000

DRAWING No. P-FY20210016-PWO-CIV-DW-50-S001-ZZ-0011

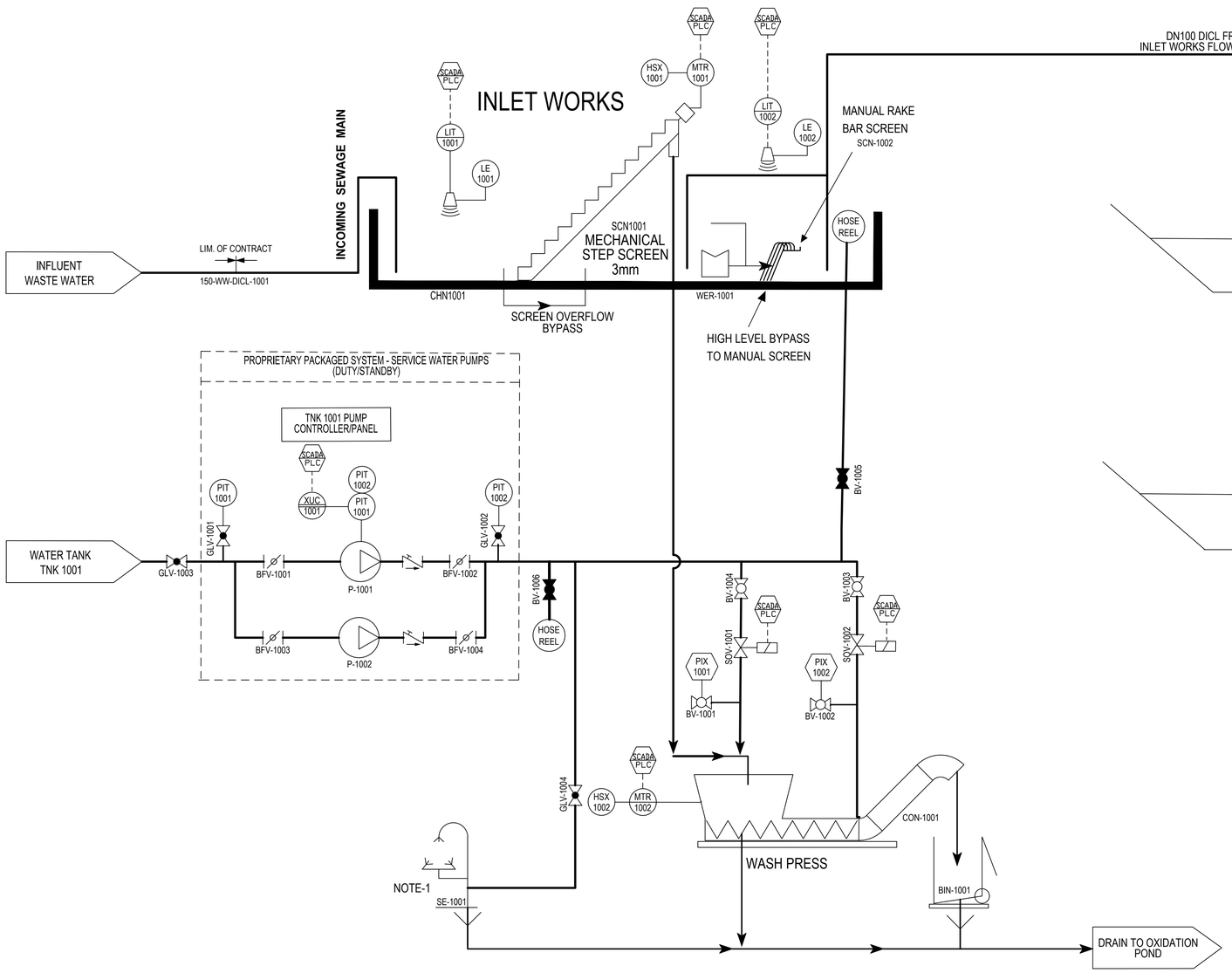
REV B

CONFIRM SCALE — 100mm ON A1 ORIGINAL

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NOTES:
1. LOCATED IN SHED/BUILDING. SAFETY SHOWER, HAND WASH AND TOILET. DRAIN TO OXIDATION POND.



REV	AMENDMENT DETAILS	APPROVED	DATE
B	ISSUED FOR 100% REVIEW	B.D	05/03/2024
A	ISSUED FOR REVIEW	B.D	10/11/2023

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L. G. A:	
SURVEYOR:	VALIDATED:
SURVEY DATE:	
CADD:	APPROVED MANAGER:

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	B.DOUGLAS
CHECKED	A.RAZZAK
DRAFTED	A.JAFAR
CHECKED	Z.SLAVNIC
DIRECTOR WS & WW	G.FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

SEWAGE TREATMENT PLANT
PROCESS AND INSTRUMENTATION DIAGRAM SHEET 1 OF 2

PROJECT/CONTRACT No. FY20210016

A1 | SCALE @ A1 NTS

DRAWING No. P-FY20210016-PWO-PRO-DW-50-S003-ZZ-0001

REV A

CONFIRM SCALE — 100mm ON A1 ORIGINAL

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PROPRIETARY PACKAGED SYSTEM
IRRIGATION PUMP SYSTEM

EFFLUENT STORAGE POND

200-EF-DICL-5001

WATER TANK TNK-1001

BV-1007

HOSE REEL

PUMP CONTROLLER/PANEL

SCADA PLC

FS 5001

XUC 5001

PIT 5002

LIT 4001

PIT 5001

GLV-5001

BFV-5002

P-5001

BFV-5003

BFV-5001

P-5002

BFV-5004

SCADA PLC

PIT 5002

GLV-5002

FS 5001

PRESSURE TANK

GLV-5003

PIT 5003

SCADA PLC

IRRIGATION PUMP STATION

FLOOR DRAIN TO EFFLUENT STORAGE POND

FUTURE CHEMICAL STORAGE TANK

P-6001

GLV-5004

FILTER BACKWASH

GLV-5005

BACKWASH CONTROLLER

FLOOR DRAIN TO EFFLUENT STORAGE POND

AMIAD FILTER 5 X 2"

VLV-5001

VLV-5002

VLV-5003

SCADA PLC

XUC 5002

FM-5001

IRRIGATION CONTROLLER

SCADA PLC

XUC 5002

SCADA PLC

PIT 5004

PRV-5001

GLV-5006

VLV-5004

AV-5001

GLV-5007

IRRIGATION SYSTEMS

GLV-5008

SCADA PLC

LIT 1003

LE 1003

FCV-5001

GLV-5009

VLV-1001

OVERFLOW TO OXIDATION POND

SERVICE WATER PUMPS

TNK 1001
WATER TANK

REV	AMENDMENT DETAILS	APPROVED	DATE
B	ISSUED FOR 100% REVIEW	B.D	05/03/2024
A	ISSUED FOR REVIEW	B.D	10/11/2023

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L. G. A:	
SURVEYOR:	VALIDATED:
SURVEY DATE:	
CADD:	APPROVED MANAGER:

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	B.DOUGLAS
CHECKED	A.RAZZAK
DRAFTED	A.JAFAR
CHECKED	Z.SLAVNIC
DIRECTOR WS & WW	G.FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

PROJECT/CONTRACT No. FY20210016

IRRIGATION SYSTEM
PROCESS AND INSTRUMENTATION DIAGRAM SHEET 2 OF 2

A1 | SCALE @ A1 NTS

DRAWING No. P-FY20210016-PWO-PRO-DW-50-S003-ZZ-0002

REV A

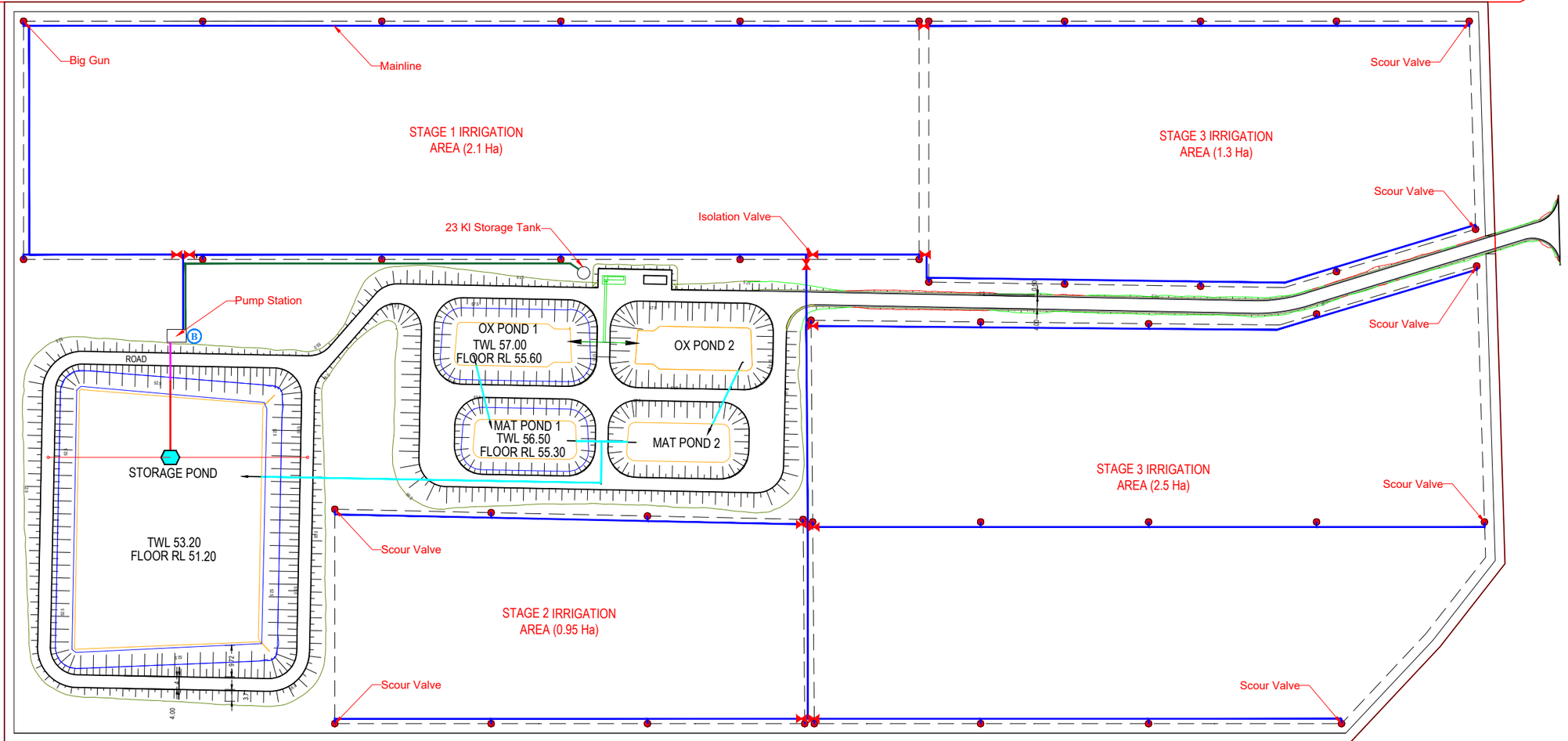
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DRAFT VERSION ONLY

MAIN VIEW



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Upon receipt of the plan, the client must check the plan and all relevant data and dimensions appearing in the plan.

Unless the client informs in writing of any deviation or incorrectness and diversions within seven (7) days from receipt of plan, the client shall be deemed to have checked and approved the plan.

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Do not scale from drawing. Use indicated dimensions at all times. Verify all dimensions and set-outs on site before commencing work. Clarify discrepancies before commencing work.

ISSUE	REV.	AMENDMENT	BY	DATE
1		FOR REVIEW	RB	01.09.23
2		FOR REVIEW	RB	22.09.23
3		FOR REVIEW	LR	06.10.23
4		FOR REVIEW	LR	19.10.23

DUCTILE IRON PIPE 150mm	
POLY PIPE 160mm PN16	
POLY PIPE 125mm PN12.5	
POLY PIPE 50mm PN12.5	
PERIMETER	
ROAD	
FOOTVALVE	
PUMPING STATION	B
BIG GUN SR/FR 100 WITH VALVE	
AIR VALVE 2"	
ISOLATION VALVE	

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water
Irrigation System

DRAWING TITLE:

Main View

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 667 481
24 - 26 Russellton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

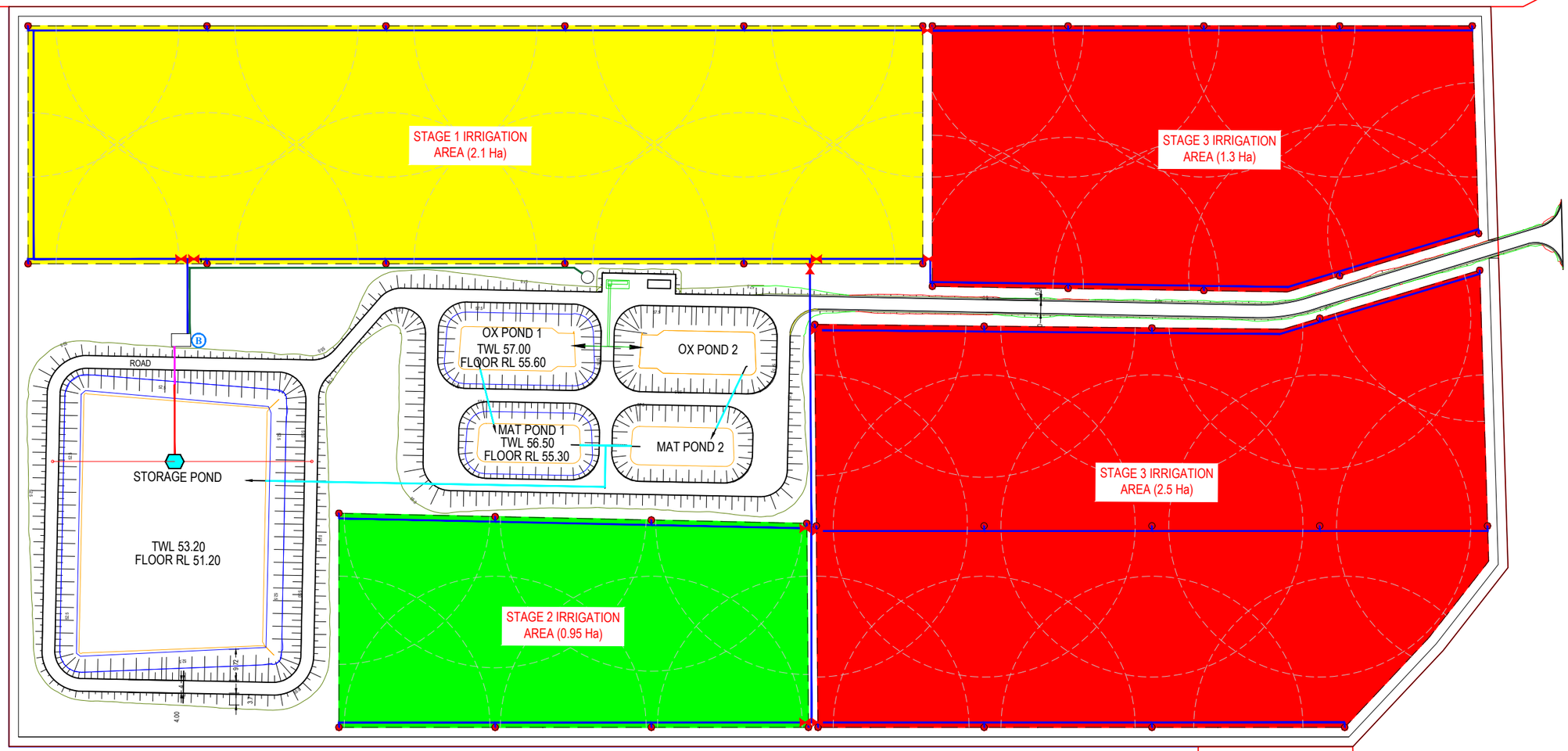
SCALE @ A1: 1/750
SCALE @ A3: 1/1500
SCALE BAR:
NORTH

PROJECT NUMBER:	DRAWING NUMBER:	REVISION NUMBER:
1625	1625-0	4

FILENAME: C:\USERS\RICHARD\BITHINK WATER PTY LTD\ - ALL STAFF - GENERAL\PROJECTS\NSW PUBLIC WORKS\1625-HART RAPPVILLE WWTP IRRIGATION DESIGN\DESIGN\GIS DESIGN REV4.DWG CREATED: 19/10/2023 16:38 SAVED: 19/10/2023 17:01 PLOTTED: 19/10/2023 17:02

DRAFT VERSION ONLY

DISTRIBUTION OF STAGES



PLAN WARRANTY

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0m 30m 60m

Scale 1:1500 @ A3

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1		FOR REVIEW	RB	01.09.23
2		FOR REVIEW	RB	22.09.23
3		FOR REVIEW	LR	06.10.23
4		FOR REVIEW	LR	19.10.23

ISSUE	REV.	AMENDMENT	BY	DATE

DUCTILE IRON PIPE 150mm	
POLY PIPE 160mm PN16	
POLY PIPE 125mm PN12.5	
POLY PIPE 50mm PN12.5	
PERIMETER	
ROAD	
FOOTVALVE	
PUMPING STATION	
BIG GUN SR/FR 100 WITH VALVE	
AIR VALVE 2"	
ISOLATION VALVE	

STAGE 1	
STAGE 2	
STAGE 3	

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water Irrigation System

DRAWING TITLE:

Main View - Project Stages

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 867 481
24 - 26 Russellton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

SCALE @ A1: 1/750

SCALE @ A3: 1/1500

SCALE BAR:

NORTH

PROJECT NUMBER: 1625

DRAWING NUMBER: 1625-1

REVISION NUMBER: 4

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DRAFT VERSION ONLY

STAGE 1

PLAN WARRANTY

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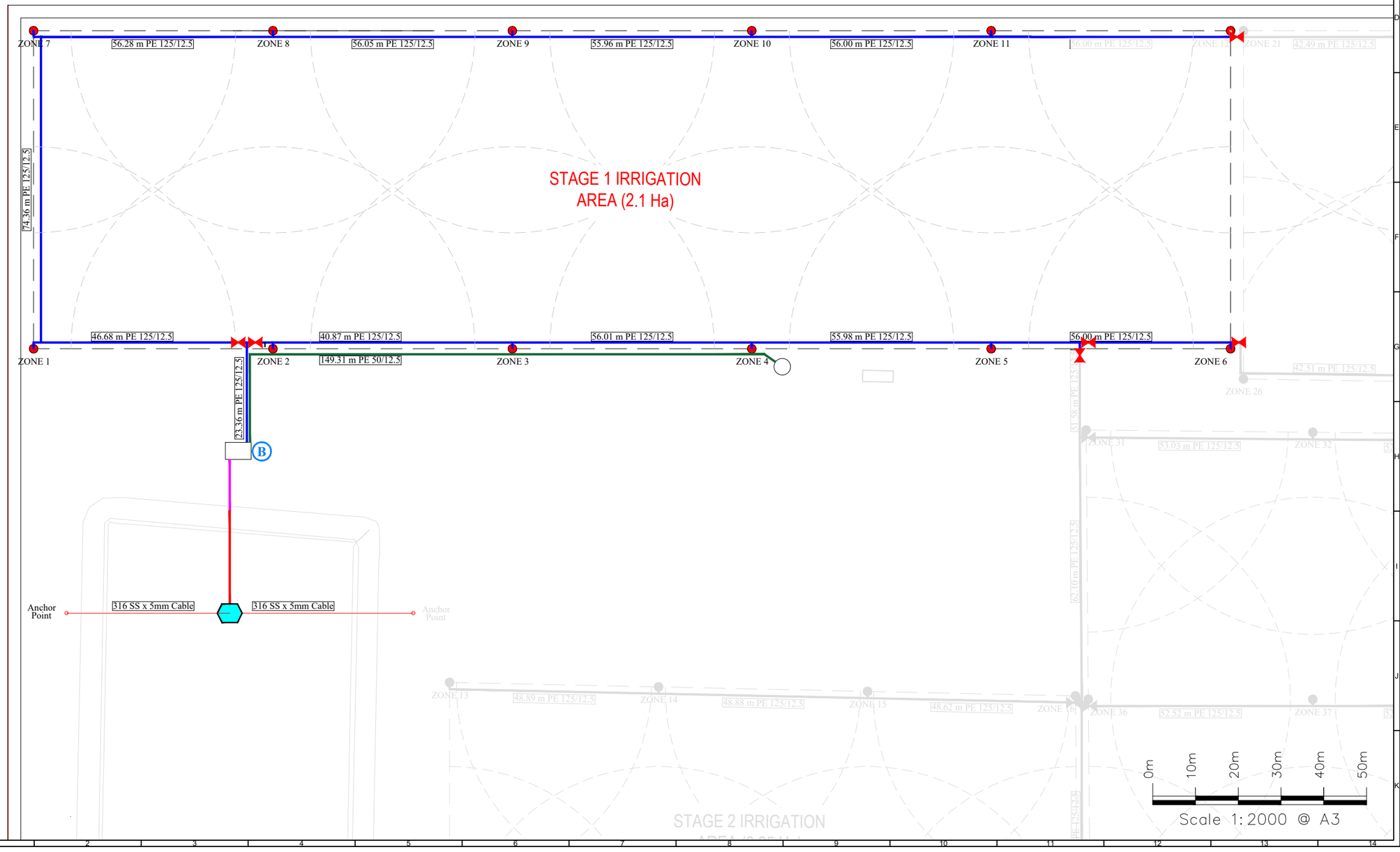
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DUCTILE IRON PIPE 150mm	
POLY PIPE 160mm PN16	
POLY PIPE 125mm PN12.5	
POLY PIPE 50mm PN12.5	
PERIMETER	
ROAD	
FOOTVALVE	
PUMPING STATION	B
BIG GUN SR/FR 100 WITH VALVE	
AIR VALVE 2"	
ISOLATION VALVE	

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water Irrigation System

DRAWING TITLE:

Mainline Distribution Network Stage 1

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 667 481
24 - 26 Russelton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

SCALE @ A1: 1/1000

SCALE @ A3: 1/2000

SCALE BAR:

NORTH

PROJECT NUMBER: 1625 | DRAWING NUMBER: 1625-2 | REVISION NUMBER: 4

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DRAFT VERSION ONLY

STAGE 2

STAGE 1 IRRIGATION
AREA (2.1 Ha)

23 Kl Storage Tank

STAGE 2 IRRIGATION
AREA (0.95 Ha)

ZONE 1 — 46.68 m PE 125/12.5 — ZONE 2 — 40.87 m PE 125/12.5 — ZONE 3 — 56.01 m PE 125/12.5 — ZONE 4 — 55.98 m PE 125/12.5 — ZONE 5 — 56.00 m PE 125/12.5 — ZONE 6

ZONE 2 — 149.31 m PE 50/12.5 — ZONE 26 — 42.51 m PE 125/12.5 — ZONE 27

23.36 m PE 125/12.5

B

316 SS x 5mm Cable — 316 SS x 5mm Cable

Anchor Point — Anchor Point

51.58 m PE 125/12.5

ZONE 31 — 53.03 m PE 125/12.5 — ZONE 32 — 52.55 m PE 125/12.5

62.10 m PE 125/12.5

ZONE 13 — 48.89 m PE 125/12.5 — ZONE 14 — 48.88 m PE 125/12.5 — ZONE 15 — 48.62 m PE 125/12.5 — ZONE 16

ZONE 36 — 52.52 m PE 125/12.5 — ZONE 37 — 52.49 m PE 125/12.5

63.85 m PE 125/12.5

49.30 m PE 125/12.5 — ZONE 17 — 48.87 m PE 125/12.5 — ZONE 18 — 49.13 m PE 125/12.5 — ZONE 19 — ZONE 20

51.98 m PE 125/12.5 — 52.50 m PE 125/12.5

NOTE:
PROVIDE STAGE 2 PIPELINES AND
VALVES ONLY UNDER THIS CONTRACT.

0m 10m 20m 30m 40m 50m

Scale 1: 2000 @ A3

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POLY PIPE 125mm PN12.5	
POLY PIPE 50mm PN12.5	
PERIMETER	
ROAD	
FOOTVALVE	
PUMPING STATION	B
BIG GUN SR/FR 100 WITH VALVE	
AIR VALVE 2"	
ISOLATION VALVE	

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water
Irrigation System

DRAWING TITLE:

Mainline Distribution Network
Stage 2

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 667 481
24 - 26 Russellton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

SCALE @ A1: 1/1000
SCALE @ A3: 1/2000
SCALE BAR:

NORTH

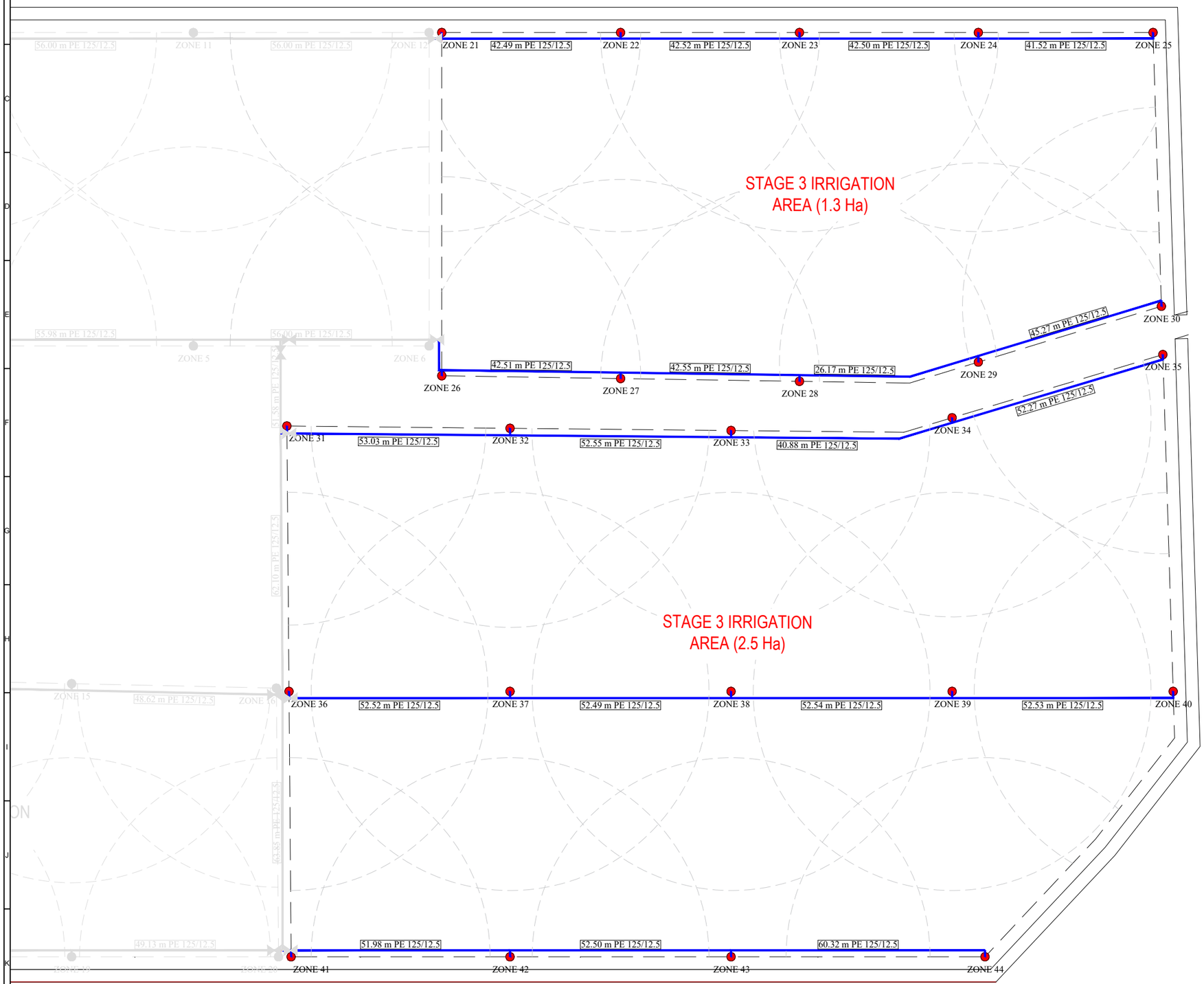
PROJECT NUMBER: 1625
DRAWING NUMBER: 1625-3
REVISION NUMBER: 4

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NOTE:
PROVIDE STAGE 3 PIPELINES AND VALVES ONLY UNDER THIS CONTRACT.

STAGE 3



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POLY PIPE 160mm PN16	
POLY PIPE 125mm PN12.5	
POLY PIPE 50mm PN12.5	
PERIMETER	
ROAD	
FOOTVALVE	
PUMPING STATION	
BIG GUN SR/FR 100 WITH VALVE	
AIR VALVE 2"	
ISOLATION VALVE	

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water Irrigation System

DRAWING TITLE:

Mainline Distribution Network Stage 3

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 667 481
24 - 26 Russellton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

SCALE @ A1: 1/1000
SCALE @ A3: 1/2000
SCALE BAR:
NORTH

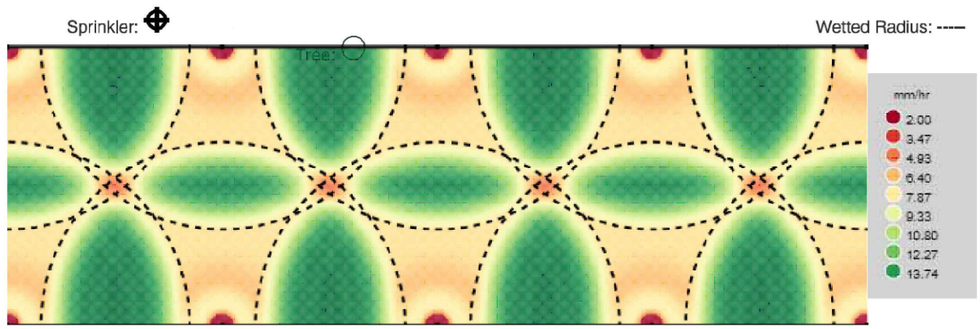
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DRAWING NUMBER: 1625-4
REVISION NUMBER: 4

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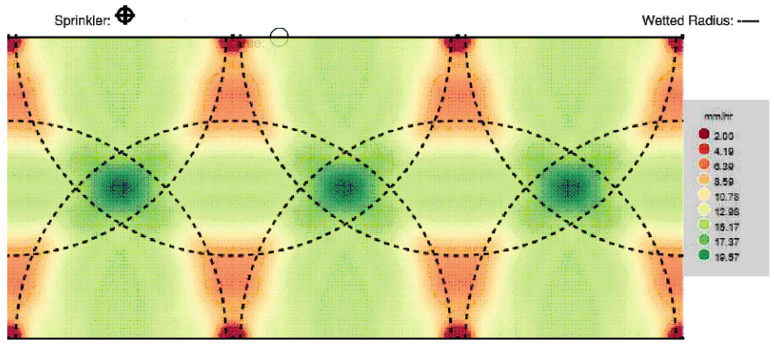
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STAGE 1 IRRIGATION AREA (2.1 Ha)



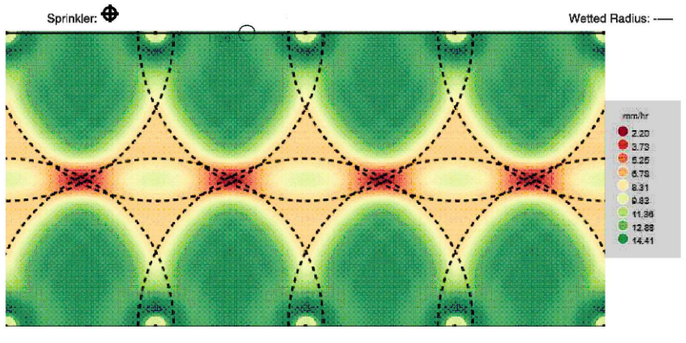
CU:	73	%
DU:	66	%
SC:	1.54	%
Mean Precip:	10.38	mm/hr
Min Precip:	2.00	mm/hr
Max Precip:	15.20	mm/hr

STAGE 2 IRRIGATION AREA (0.95 Ha)



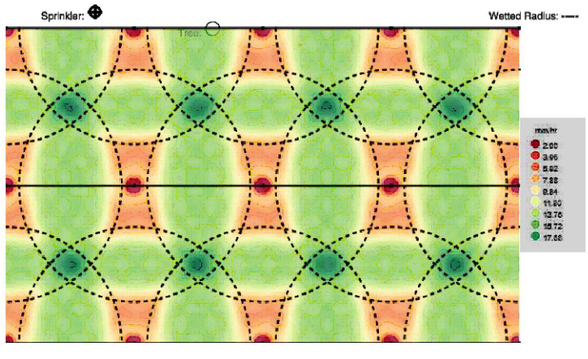
CU:	82	%
DU:	65	%
SC:	1.75	%
Mean Precip:	13.08	mm/hr
Min Precip:	2.00	mm/hr
Max Precip:	21.76	mm/hr

STAGE 3 IRRIGATION AREA (1.3 Ha)



CU:	77	%
DU:	61	%
SC:	1.89	%
Mean Precip:	11.93	mm/hr
Min Precip:	2.20	mm/hr
Max Precip:	15.94	mm/hr

STAGE 3 IRRIGATION AREA (2.5 Ha)



CU:	78	%
DU:	61	%
SC:	1.87	%
Mean Precip:	12.39	mm/hr
Min Precip:	2.00	mm/hr
Max Precip:	19.64	mm/hr

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Christiansen Coefficient of Uniformity (%CU)

The %CU is a measurement of uniformity, expressed as the average rate (%) of deviation from the overall average application. A perfectly uniform application is represented by a CU of 100%. Lower uniformity applications are represented by lower percentages.

Distribution Uniformity (%DU)

The %DU is a measurement of uniformity, based on comparison of the driest 25% of the surveyed area with the overall average net application, as a percentage. A perfectly uniform application is represented by a DU of 100%. A less uniform application is represented by a lower percentage.

Scheduling Coefficient (SC)

The Scheduling Coefficient is a run time multiplier. It is the amount of time one needs to over irrigate to achieve the average application rate of the entire area in the driest part of the irrigated area. A perfectly uniform application is represented by an SC of 1.0. A less uniform application is represented by a higher SC value.

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POLY PIPE 50mm PN12.5	
PERIMETER	
ROAD	
FOOTVALVE	
PUMPING STATION	
BIG GUN SR/FR 100 WITH VALVE	
AIR VALVE 2"	
ISOLATION VALVE	

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water Irrigation System

DRAWING TITLE:

Sprinkler System Uniformity

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 567 481
24 - 26 Russellton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

SCALE @ A1:

SCALE @ A3:

SCALE BAR:

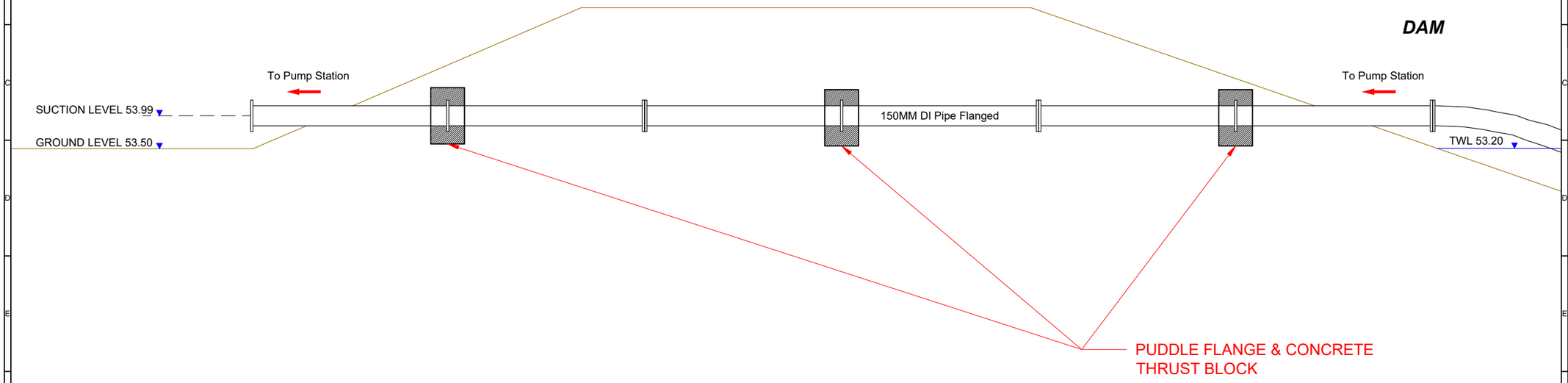
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PROJECT NUMBER:	DRAWING NUMBER:	REVISION NUMBER:
1625	1625-5	4

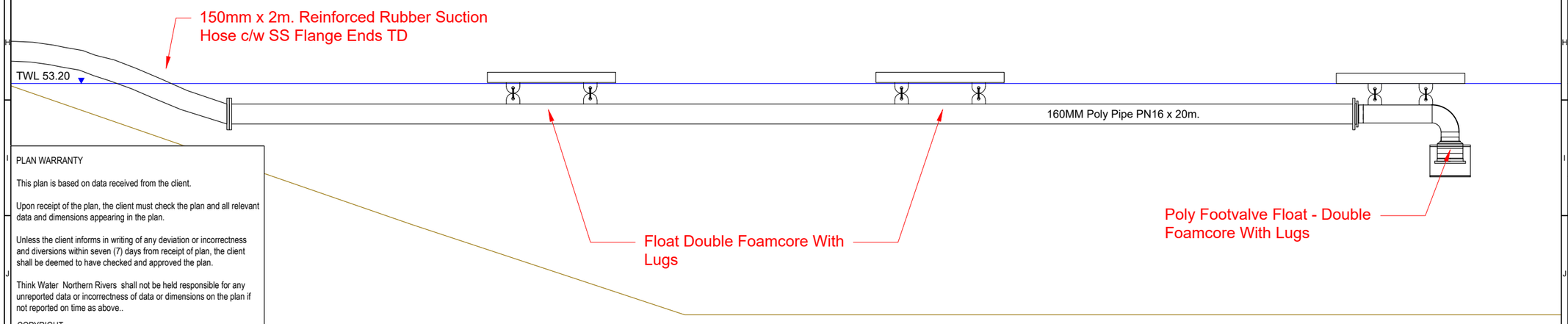
FILENAME: C:\USERS\RICHARD\THINK WATER PTY LTD\ - ALL STAFF - GENERAL\PROJECTS\NSW PUBLIC WORKS\1625-1625 RAPPVILLE WWTP IRRIGATION DESIGN\DESIGN\1625 DESIGN REVIEW.DWG CREATED: 19/10/2023 15:38 SAVED: 19/10/2023 17:01 PLOTTED: 19/10/2023 17:03

DRAFT VERSION ONLY

SUCTION LINE - DUCTILE IRON SECTION



SUCTION LINE - FLOATING SECTION



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POLY PIPE 50mm PN12.5	
PERIMETER	
ROAD	
FOOTVALVE	
PUMPING STATION	
BIG GUN SR/FR 100 WITH VALVE	
AIR VALVE 2"	
ISOLATION VALVE	

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water Irrigation System

DRAWING TITLE:

Floating Suction Line

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 867 481
24 - 26 Russellton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

SCALE @ A1: 1/200

SCALE @ A3: 1/400

SCALE BAR:

NORTH

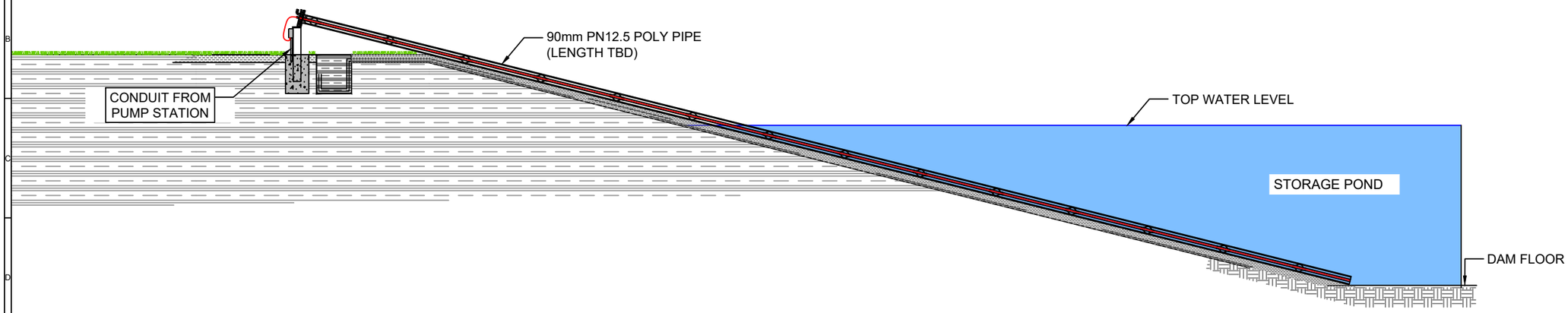
PROJECT NUMBER: 1625

DRAWING NUMBER: 1625-6

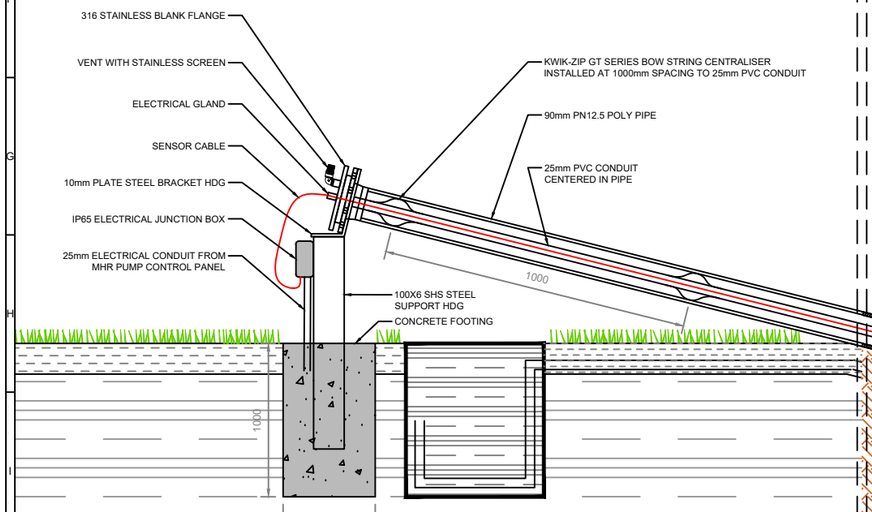
REVISION NUMBER: 4

FILENAME: C:\USERS\RICHARD\THINK WATER PTY LTD\ - ALL STAFF - GENERAL\PROJECTS\NSW PUBLIC WORKS\1625-1587 RAPPVILLE WWTP IRRIGATION DESIGN\DESIGN\1625 DESIGN REV4.DWG CREATED: 19/10/2023 16:38 SAVED: 19/10/2023 17:01 PLOTTED: 19/10/2023 17:02

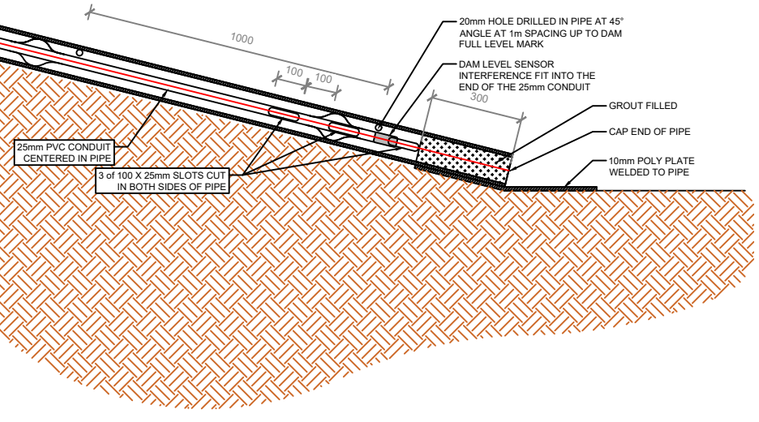
DRAFT VERSION ONLY



TOP OF DAM LEVEL SENSOR - TYPICAL DETAIL



IN-DAM LEVEL SENSOR - TYPICAL DETAIL



DAM LEVEL SENSOR - DRAINAGE HOLE LAYOUT

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ISSUE	REV.	AMENDMENT	BY	DATE

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POLY PIPE 125mm PN12.5	
POLY PIPE 50mm PN12.5	
PERIMETER	
ROAD	
FOOTVALVE	
PUMPING STATION	
BIG GUN SR/FR 100 WITH VALVE	
AIR VALVE 2"	
ISOLATION VALVE	

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water
Irrigation System

DRAWING TITLE:

Dam Level Sensor Typical Detail

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 667 481
24 - 26 Russellton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

SCALE @ A1: 1/200

SCALE @ A3: 1/400

SCALE BAR:

NORTH

PROJECT NUMBER: 1625

DRAWING NUMBER: 1625-7

REVISION NUMBER: 4

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DIAL BEFORE YOU DIG
www.1100.com.au

DRIVEWAY

DN125 Poly Pipe
To Big Guns

DN32 Poly Pipe
To Storage Tank

CONCRETE SLAB
6000 x 4000 mm
RL TBD

AC Conduit

4.00

Pipe Supports

Pipe Supports

6.00

DN150 DI From
Storage Pond

6.00

0.96 | 1.72 | 1.02 | 0.77 | 0.68 | 0.79

Ground Level

Concrete Plinth

Concrete Slab

Concrete Plinth

DN150 DI From
Storage Pond

Ground Level

DN32 Poly Pipe

0m 0.15m 0.30m 0.45m 0.60m 0.75m 1.5m
Scale 1:30 @ A3

ORIGINAL PLANS SUPPLIED BY:

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2		FOR REVIEW	RB	22.09.23
3		FOR REVIEW	LR	06.10.23
4		FOR REVIEW	LR	19.10.23

DUCTILE IRON PIPE 150mm	
POLY PIPE 160mm PN16	
POLY PIPE 125mm PN12.5	
POLY PIPE 50mm PN12.5	
PERIMETER	
ROAD	
FOOTVALVE	
PUMPING STATION	
BIG GUN SR/FR 100 WITH VALVE	
AIR VALVE 2"	
ISOLATION VALVE	
AC Conduit	

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water
Irrigation System

DRAWING TITLE:

Pump Station.

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 667 481
24 - 26 Russelton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

SCALE @ A1: 1/15

SCALE @ A3: 1/30

SCALE BAR:

NORTH

PROJECT NUMBER:	DRAWING NUMBER:	REVISION NUMBER:
1625	1625-8	4

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www.1100.com.au

PUMP STATION COMPONENT IDENTIFICATION TABLE

ID Ref.	Component Description
1	DI Flange 150mm From the Dam
2	DN150 Stainless Steel Pipe Sch10
3	DN150 Sluice Valve with Gear Wheel
4	DN150xDN100 316SS Eccentric Coupling
5	DN100 Rubber Bellows Coupling
6	1m3 Bunded Chemical Storage (Future Tank)
7	Pressure Sensor (range 1 up to 1 bar)
8	Grundfos MPC E 2 CRNE 32-05 c/w Pressure Tank (or Equiv)
9	Pressure Sensor (range 16 bar)
10	DN100 Sluice Valve with Gear Wheel
11	DN50 Sample Point
12	Grundfos DDA or Equiv. With Chemical Resistant Cover (Future Dosing)
13	Kelco F25 Flow Switch
14	DN100 Stainless Steel Pipe Sch10
15	DN50 Bermad Pressure Relief Valve or Equiv.
16	DN75 PVC Pipe PN16
17	5 x 2" Arkal Automatic Disc Filtration System (130 micron)
18	Backwash Controller Filtron 5 zones
19	DN80 Gate Valve
20	DN80 PVC Pipe PN16
21	DN100 Water Meter with Pulse
22	DN100 x DN80 Hydraulic Solenoid Master / Pressure Sustaining Valve with Effluent Filter
23	DN50 Manual Ball Valve
24	DN100 Wafer Check Valve
25	Heavy Duty Plastic Valve box
26	Maric Valve (Wafer) Installed in Heavy Duty Valve Box (Max ***L/min)
27	DN80 PVC Pipe PN12.5
28	DN50 Automatic Air Relief Valve c/w Isolation Valve
29	Irrigation Controller
30	Future Scada
31	SDS Information Center Cabinet
32	DN125 Poly Pipe PN12.5
33	DN50 Poly Pipe PN12.5

APPLICABLE STANDARDS AND CODES

Code	Description
1289	Methods of testing soils for engineering purposes; Soil compaction and density tests.
2129	Flanges for pipes, valves, and fittings.
2638	Gate valves for waterworks purposes Metal seated.
2832.1	Cathodic protetion of metals Pipes and cables.
4041	Pressure piping.
4087	Metallic flanges for water works purposes.
1554	Structural steel welding.
2280	Ductile iron pressure pipes and fittings.
2566	Buried flexible pipelines.
2566.1	Part 1: Structural design of buried flexible pipe.
2566.2	Part 2: Installation.
2845	Water supply Backflow prevention devices.
2845.1	Water supply Backflow prevention devices - Materials, design, and performance requirements.
3000	Electrical installations (Known As The Australian / New Zealand Wiring Rules).
3500.1	Plumbing and drainage Water services.
4020	Testing of products for use in contact with drinking water.
4158	Thermal Bonded Polymeric coating on valves and fittings for water industry purposes.
4331.1	Metalic flanges - Steel flanges.
POP001	Electrofusion jointing of PE pipe and fittings for pressure applications.
POP003	Butt fusion jointing of PE pipes and fittings recommended parameters.
POP007	Metal backing flanges for use with poliethylene (PE) pipe flange adaptors.

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3		FOR REVIEW	LR	06.10.23
4		FOR REVIEW	LR	19.10.23

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water
Irrigation System

DRAWING TITLE:

Pump Station List of Major Components

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 867 481
24 - 26 Russellton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

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SCALE @ A3:

SCALE BAR:

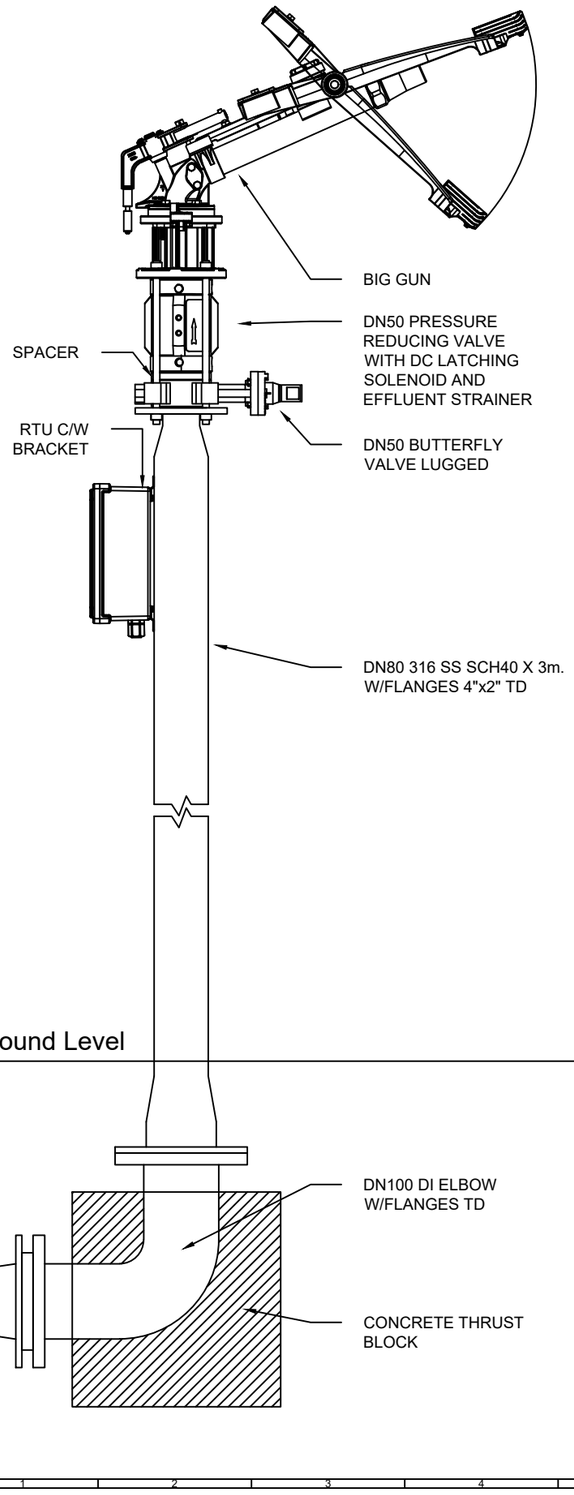
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PROJECT NUMBER:	DRAWING NUMBER:	REVISION NUMBER:
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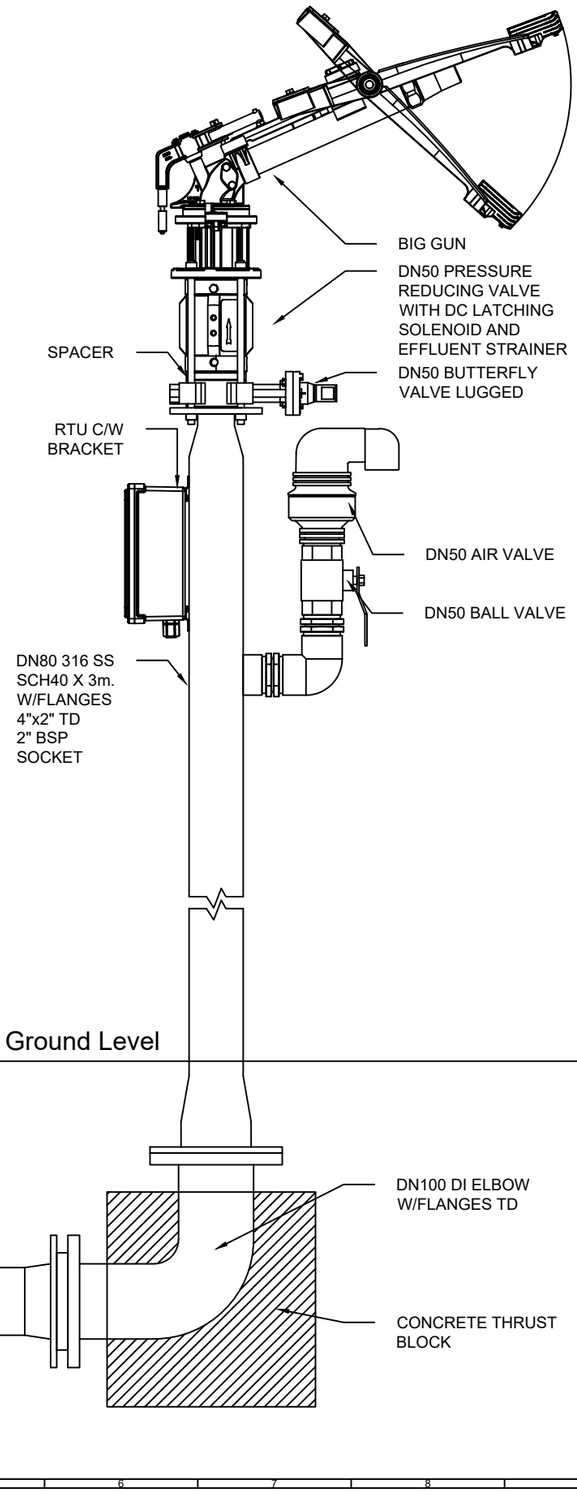
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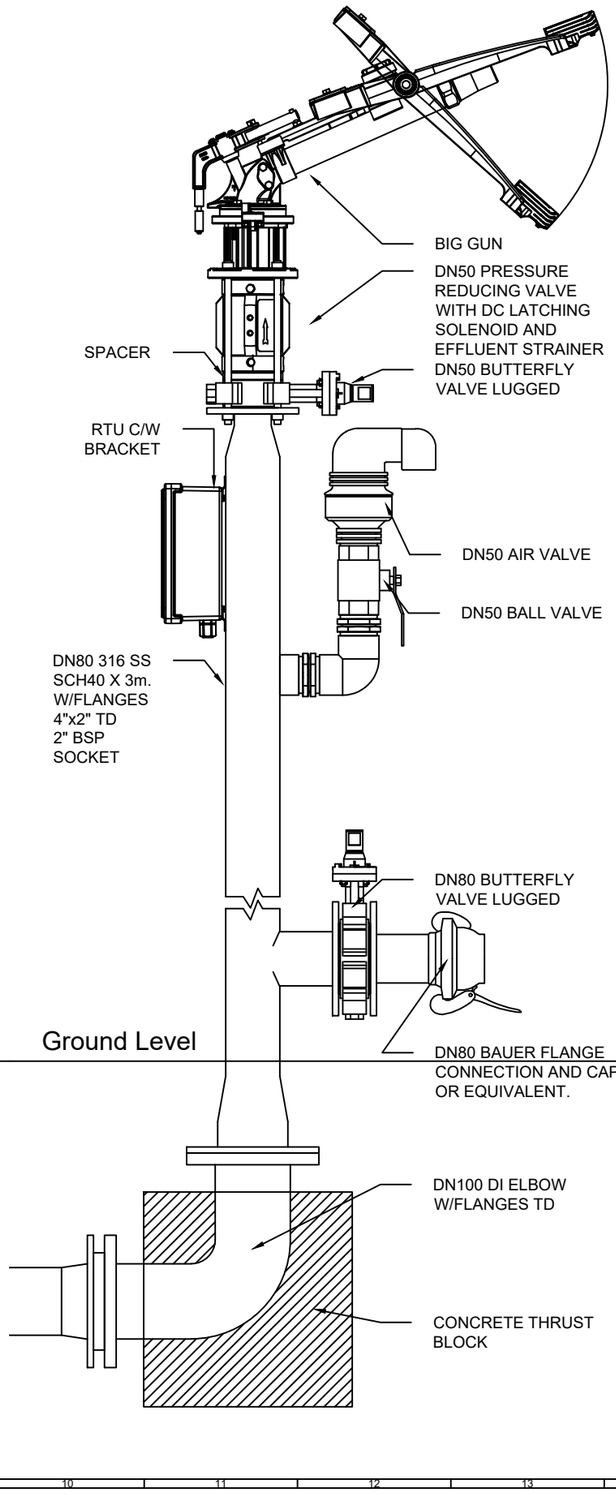
DETAIL 1 - TYPE A



DETAIL 2 - TYPE B



DETAIL 3 - TYPE C



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CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water Irrigation System

DRAWING TITLE:

Big Gun Assembly - Typical Detail

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 667 481
24 - 26 Russellton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

SCALE @ A1: NTS
SCALE @ A3: NTS
SCALE BAR:
NORTH

PROJECT NUMBER:	DRAWING NUMBER:	REVISION NUMBER:
1625	1625-10	4

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BIG GUN	FLOW (m3/h)	PRESSURE REQUIRED (bar)	TYPICAL DETAIL
Zone 1	45.00	5.52	TYPE B
Zone 2	45.00	5.52	TYPE A
Zone 3	45.00	5.52	TYPE A
Zone 4	45.00	5.52	TYPE A
Zone 5	45.00	5.52	TYPE A
Zone 6	45.00	5.52	TYPE C
Zone 7	45.00	5.52	TYPE B
Zone 8	45.00	5.52	TYPE A
Zone 9	45.00	5.52	TYPE A
Zone 10	45.00	5.52	TYPE A
Zone 11	45.00	5.52	TYPE A
Zone 12	45.00	5.52	TYPE C
Zone 13	45.00	5.52	TYPE C
Zone 14	45.00	5.52	TYPE A
Zone 15	45.00	5.52	TYPE A
Zone 16	45.00	5.52	TYPE A
Zone 17	45.00	5.52	TYPE C
Zone 18	45.00	5.52	TYPE A
Zone 19	45.00	5.52	TYPE A
Zone 20	45.00	5.52	TYPE A
Zone 21	45.00	5.52	TYPE B
Zone 22	45.00	5.52	TYPE A

BIG GUN	FLOW (m3/h)	PRESSURE REQUIRED (bar)	TYPICAL DETAIL
Zone 23	45.00	5.52	TYPE A
Zone 24	45.00	5.52	TYPE A
Zone 25	45.00	5.52	TYPE C
Zone 26	45.00	5.52	TYPE B
Zone 27	45.00	5.52	TYPE A
Zone 28	45.00	5.52	TYPE A
Zone 29	45.00	5.52	TYPE A
Zone 30	45.00	5.52	TYPE C
Zone 31	45.00	5.52	TYPE B
Zone 32	45.00	5.52	TYPE A
Zone 33	45.00	5.52	TYPE A
Zone 34	45.00	5.52	TYPE A
Zone 35	45.00	5.52	TYPE C
Zone 36	45.00	5.52	TYPE A
Zone 37	45.00	5.52	TYPE A
Zone 38	45.00	5.52	TYPE A
Zone 39	45.00	5.52	TYPE A
Zone 40	45.00	5.52	TYPE C
Zone 41	45.00	5.52	TYPE A
Zone 42	45.00	5.52	TYPE A
Zone 43	45.00	5.52	TYPE A
Zone 44	45.00	5.52	TYPE C

NOTE:
PROVIDE BIG GUN SPRINKLERS 1-12 ONLY UNDER THIS CONTRACT.

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2		FOR REVIEW	RB	22.09.23
3		FOR REVIEW	LR	06.10.23
4		FOR REVIEW	LR	19.10.23

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water
Irrigation System

DRAWING TITLE:

Big Gun Assembly - Typical Detail

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 667 481
24 - 26 Russelton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

SCALE @ A1:
SCALE @ A3:
SCALE BAR:
NORTH

PROJECT NUMBER:	DRAWING NUMBER:	REVISION NUMBER:
1625	1625-11	4

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NOTES

NOTES 1:

1. THE PUMP SET IS A CONSTANT PRESSURE SYSTEM.
2. THE PUMP CONTROL PANEL (CU 352) IS EQUIPPED WITH AN ETHERNET CONNECTION FOR COMMUNICATION WITH A COMPUTER, EITHER DIRECT OR VIA INTERNET.
3. THE IRRIGATION CONTROLLER OPEN/CLOSE THE ZONE VALVES AT THE BIG GUNS RISER THROUGHOUT RADIO SIGNAL.
4. THE FILTER SYSTEM HAS AN STAND-ALONE BACKWASH CONTROLLER
5. THE PUMP SET WILL BE AUTOMATICALLY TURNED OFF WHEN THE LEVEL AT THE DAM IS LOW OR WHEN THE PUMP IS RUNNING AND THERE IS NO PRESSURE AT THE DISCHARGE.

NOTES 2:

1. THE PRIMARY PURPOSE OF THE SYSTEM IS RECYCLED WATER DISPERSION BACK INTO THE ENVIRONMENT
2. MAXIMIZING UNIFORMITY APPLICATION OF WATER IS NOT THE PRIMARY PARAMETER FOR THIS DESING.
3. THE POSITION OF THE PIPES ARE INDICATIVE ONLY THE ACTUAL LOCATION MAY VARY ACCORDING TO THE INSTALLATION REQUIREMENTS AND THE PRACTICAL CONSIDERATIONS.

NOTES 3:

1. BIG GUN SR100/ FR100 NELSON NOZZLE 0.90 100T (45M3/H @ 55.2M).
2. THE 44 BIG GUNS CAN DISPERSE UP TO 1.0 ML IN 24 HOURS OF CONTINUOUS OPERATION.
3. THE OPERATION WAS DESIGNED IN SHIFTS OF 1 BIG GUN AT A TIME.
4. SYSTEM FLOW RATE (1 BIG GUN + FILTER BACKWASH + M3/H TO FILL THE 23KL TANK).
5. THE PUMP DUTY REQUIREMENT IS 64 M3/H @ 84.6 M.
6. IT IS ADVISABLE TO FILL THE STORAGE TANK WHEN THE PUMP SYSTEM IS IRRIGATING TO MAKE SURE THAT THE PUMPS ARE OPERATING AT THE BEST EFFICIENCY POINT.

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CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water Irrigation System

DRAWING TITLE:

P&ID DRAWING

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 667 481
24 - 26 Russellton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au Phone: (02) 6628 6609

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SCALE @ A3: NTS
SCALE BAR:

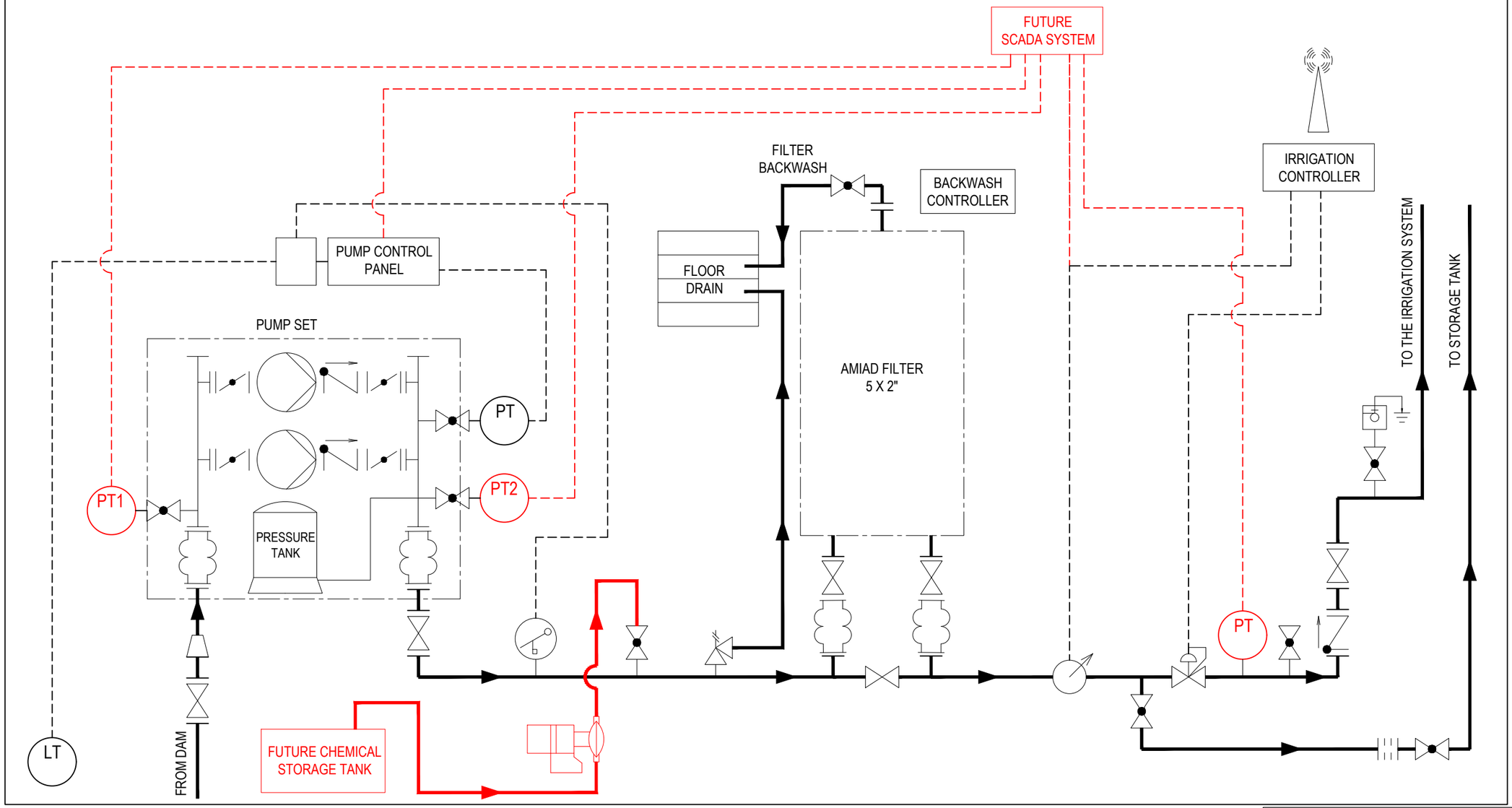
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SYMBOLS LEGEND

- GATE VALVE
- GLOBE VALVE
- CHECK VALVE
- AIR RELEASE VALVE
- BUTTERFLY VALVE
- MASTER SOLENOID/SUSTAINING VALVE
- FLOW METER
- N/O FLOW SWITCH
- FLOW CONTROL VALVE
- PT — PRESSURE TRANSDUCER
- LT — LEVEL TRANSDUCER
- DOSING PUMP

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water Irrigation System

DRAWING TITLE:

P&ID DRAWING

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 667 481
24 - 26 Russellton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

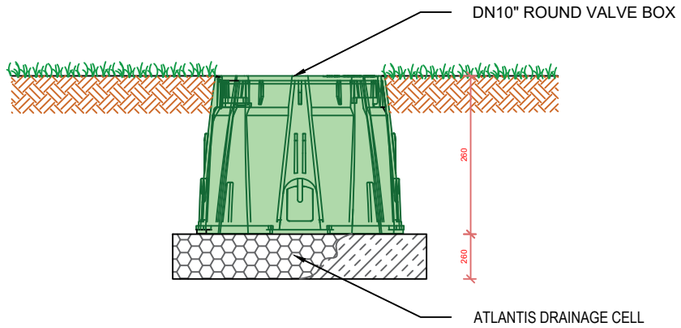
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DRAWING NUMBER: 1625-13
REVISION NUMBER: 4

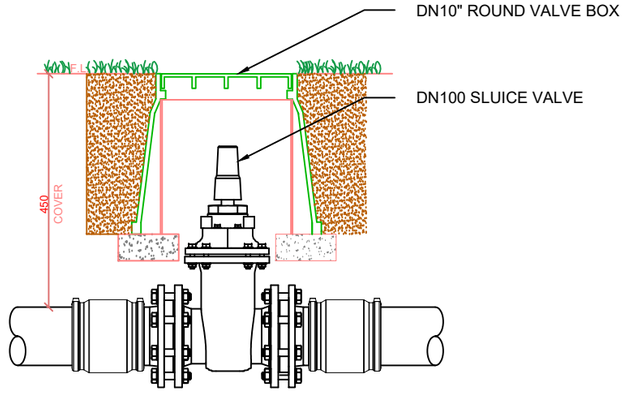
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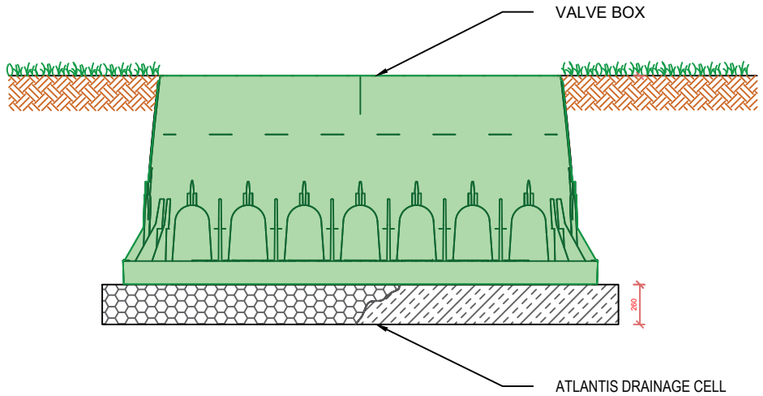
INSTALLATION DETAILS



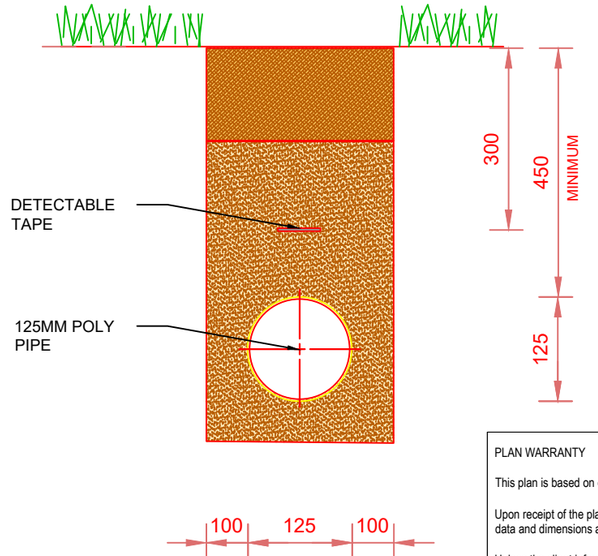
ROUND VALVE BOX



ISOLATION VALVE



VALVE BOX



TYPICAL TRENCH

PLAN WARRANTY

This plan is based on data received from the client.

Upon receipt of the plan, the client must check the plan and all relevant data and dimensions appearing in the plan.

Unless the client informs in writing of any deviation or incorrectness and diversions within seven (7) days from receipt of plan, the client shall be deemed to have checked and approved the plan.

Think Water Northern Rivers shall not be held responsible for any unreported data or incorrectness of data or dimensions on the plan if not reported on time as above..

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ORIGINAL PLANS SUPPLIED BY:

NSW PUBLIC WORKS

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Do not scale from drawing. Use indicated dimensions at all times. Verify all dimensions and set-outs on site before commencing work. Clarify discrepancies before commencing work.

ISSUE	REV.	AMENDMENT	BY	DATE
1		FOR REVIEW	RB	01.09.23
2		FOR REVIEW	RB	22.09.23
3		FOR REVIEW	LR	06.10.23
4		FOR REVIEW	LR	19.10.23

SYMBOLS LEGEND

- GATE VALVE
- GLOBE VALVE
- CHECK VALVE
- AIR RELEASE VALVE
- BUTTERFLY VALVE
- MASTER SOLENOID/SUSTAINING VALVE
- FLOW METER
- N/O FLOW SWITCH
- FLOW CONTROL VALVE
- PT — PRESSURE TRANSDUCER
- LT — LEVEL TRANSDUCER
- DOSING PUMP

CLIENT:

NSW PUBLIC WORKS.
4 Parramatta Square
12 Darcy Street
Parramatta
NSW 2150

PROJECT TITLE:

Rappville Recycled Water
Irrigation System

DRAWING TITLE:

INSTALLATION DETAILS

thinkwater.
BEYOND IRRIGATION
Fernie Holdings Pty Ltd
ABN 97 003 667 481
24 - 26 Russelton Drive
Alstonville NSW 2477
lee.rothwell@thinkwater.com.au
Phone: (02) 6628 6609

SCALE @ A1: NTS

SCALE @ A3: NTS

SCALE BAR:

NORTH

PROJECT NUMBER: 1625 | DRAWING NUMBER: 1625-14 | REVISION NUMBER: 4

FILENAME: C:\USERS\RICHARD\BITHINK WATER PTY LTD - ALL STAFF - GENERAL\PROJECTS\NSW PUBLIC WORKS\1625-HARP RAPPVILLE WWTP IRRIGATION DESIGN\DESIGN\1625 DESIGN REVA.DWG CREATED: 19/10/2023 16:38 SAVED: 19/10/2023 17:01 PLOTTED: 19/10/2023 17:02

RAPPVILLE SEWERAGE SCHEME

DETAILED DESIGN - DRAWINGS

PREPARED FOR

Richmond Valley Council

FEBRUARY 2023

REV	AMENDMENT DETAILS	APPROVED	DATE
A	ISSUED FOR REVIEW	X.X.	XX.XX.XXXX

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FOR REVIEW

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AZIMUTH:	VERIFIED:
FOLDER:	
L. G. A:	VALIDATED:
SURVEYOR:	
SURVEY DATE:	APPROVED MANAGER:
CADD:	

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

GENERAL
COVER SHEET

PROJECT/CONTRACT No. XXXXXXXX

A1 | SCALE @ A1 N.T.S.

DRAWING No. P-FY20210016-PWO-GEN-DW-50-XXXX-ZZ-0001

REV A

CONFIRM SCALE 100mm ON A1 ORIGINAL

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GENERAL NOTES:

G1 SPECIFICATIONS AND CODES
CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SPECIFICATION FOR THE WORKS TOGETHER WITH THE REQUIREMENTS OF ALL CODES OF PRACTICE REFERRED TO THEREIN AND THE REQUIREMENTS OF ALL STATUTORY AUTHORITIES.

G2 DIMENSIONS
ALL DIMENSIONS SHALL BE VERIFIED ON SITE BEFORE COMMENCING ANY WORK. STRUCTURAL DIMENSIONS CONTROLLED BY OR RELATED TO MECHANICAL OR ELECTRICAL EQUIPMENT SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

G3 PROVISION FOR EQUIPMENT
MECHANICAL AND ELECTRICAL EQUIPMENT SUPPORTS, ANCHORAGES, OPENINGS, RECESSES AND REVEALS NOT SHOWN ON THE STRUCTURAL DRAWINGS BUT REQUIRED BY OTHER CONTRACT DRAWINGS, SHALL BE VERIFIED BY CONTRACTOR PRIOR TO PLACING CONCRETE.

G4 CONSTRUCTION LOADS
COMPLETE STRUCTURES. DURING CONSTRUCTION, THE STRUCTURES SHALL BE PROTECTED BY BRACING AND PROPPING WHEREVER CONSTRUCTION LOADS MAY OCCUR.

G5 CO-ORDINATION
ALL STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH CIVIL, MECHANICAL, ELECTRICAL, HYDRAULIC AND FABRICATION DRAWINGS TOGETHER WITH SPECIFICATIONS AND SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED BY THE PRINCIPAL FROM TIME TO TIME.

CONCRETE:

(REFER TO CONCRETE SPECIFICATION)

C1 DESIGN CODES
DESIGN IS IN ACCORDANCE WITH THE FOLLOWING SAA CODES:-
AS 3600 SAA CONCRETE STRUCTURES CODE.
AS 1170 SAA LOADING CODES PART 1 & 2.
AS 3735-2001 CONCRETE STRUCTURES FOR RETAINING LIQUIDS.

C2 MATERIALS
CONSTRUCTION MATERIALS AND WORKMANSHIP FOR CONCRETE WORKS SHALL BE IN ACCORDANCE WITH THE SPECIFICATION AND THE SAA CODE AS 3600.

C3 CONCRETE PROPERTIES
FOR CONCRETE PROPERTIES REFER TO SPECIFICATION.

C4 CURING
CURING SHALL BE IN ACCORDANCE WITH THE SPECIFICATION.

C5 JOINTING IN CONCRETE STRUCTURES
LOCATION OF ALL EXPANSION AND CONTRACTION JOINTS SHALL BE AS SHOWN ON THE DRAWINGS. LOCATION OF SUCH JOINTS SHALL NOT BE CHANGED WITHOUT APPROVAL OF THE PRINCIPAL
IF ADEQUATE CONSTRUCTION JOINTS ARE NOT SHOWN IN THE DRAWINGS THE CONTRACTOR SHALL SUBMIT PROPOSED LOCATION OF REQUIRED CONSTRUCTION JOINTS FOR APPROVAL BEFORE CONSTRUCTION.

C6 CHAMFERS
EXCEPT AS OTHERWISE REQUIRED, EXPOSED CONCRETE CORNERS AND EDGES SHALL HAVE 20mm CHAMFERS. ALL CHAMFERS TO PROVIDE SMOOTH AND CLEAN EDGES.

C7 NO HOLES OR CHASES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE WITHOUT PRIOR APPROVAL OF THE PRINCIPAL.

REINFORCEMENT:

(REFER TO CONCRETE SPECIFICATION)

R1 REINFORCEMENT DESIGNATION
SYMBOLS INDICATED ON DRAWINGS FOR GRADE AND TYPE OF REINFOCEMENT ARE AS FOLLOWS:-

SL - COLD ROLLED, HIGH STRENGTH FABRIC OF GRADE R500N TO AS/NZS 4671.

N - HOT ROLLED, HIGH STRENGTH DEFORMED BARS OF GRADE D500N TO AS/NZS 4671.

R2 BAR NOTATION
BAR NOTATION AS FOLLOWS:-
GRADE(TYPE),BAR(DIA.),BAR SPACING LOCATION SYMBOLS
e.g. N12-200 E.W.
E.W. - EACH WAY
E.F. - EACH FACE B.F. - BOTH FACES
B - BOTTOM N.F. - NEAR FACE
C.P. - CENTRALLY PLACED

R3 COVER
CLEAR CONCRETE COVER TO REINFORCEMENT UNLESS NOTED OTHERWISE SHALL BE:-

SURFACES IN CONTACT WITH SEWAGE OR GROUNDWATER	65mm
SURFACES CAST AGAINST GROUND WITHOUT BLINDING SLAB	65mm
SURFACES CAST AGAINST GROUND WITH BLINDING SLAB	50mm
REMAINDER	40mm

R4 SPLICES AND LAPS
WHERE NOT DETAILED ON DRAWING,LOCATION OF REINFORCEMENT SPLICES SHALL BE APPROVED BY THE PRINCIPAL. LENGTH OF SPLICES ARE SUBJECT TO CODE AS 3600 REQUIREMENTS.
MIN. LAP LENGTH SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE:-

BAR SIZE	LAP LENGTH		
	HORIZONTAL		VERTICAL
	SLAB LESS THAN 350mm THICK	OTHER	
N12	300	400	300
N16	400	500	400
N20	500	650	500
N24	600	750	600

FABRIC SHALL BE LAPPED WITH AT LEAST ONE FULL SQUARE OR RECTANGULAR LAP WITH BARS ON FOUR SIDES PLUS 25mm AS SHOWN BELOW

R5 TRIMMER BARS
ALL TRIMMER BARS AROUND OPENINGS,BLOCKOUTS,PIPE PENETRATIONS AND CORNERS,WHERE REQUIRED BUT NOT DIMENSIONED,SHALL EXTEND A MIN. ANCHORAGE DISTANCE OF 25 BAR DIAMETERS PAST THE POINT OF INTERSECTION WITH THE CROSSING TRIMMER BARS UNLESS NOTED OTHERWISE.

R6 MINIMUM COG AND HOOK LENGTHS SHALL BE IN ACCORDANCE WITH SECTION 13 OF AS 3600.

R7 LAPS AND SPLICES TO BE POSITIONED TO MAINTAIN THE SAME COVER.

R8 LAP LENGTHS FOR DIFFERENT BAR SIZES SHALL BE BASED ON THE LARGER SIZE BAR. LAPS ARE TO BE STAGGERED.

EARTHWORKS:

(REFER TO EARTHWORKS SPECIFICATION)

E1 ASSESSMENTS OF IN-SITU MATERIAL ARE CONTAINED IN THE ST HELIERS CORRECTIONAL CENTRE GEOTECHNICAL INVESTIGATION REPORT ISR 18014 JUNE 2018

E2 EXCAVATION, STOCKPILE, EMBANKMENTS, COMPACTIONS, ETC, SHALL BE IN ACCORDANCE WITH THE SPECIFICATION.

DATUM:

D1 SURVEY LEVELS ARE IN METER TO AHD (AUSTRALIAN HEIGHT DATUM).

METALWORKS:

(REFER TO METALWORK SPECIFICATION)

M1 DESIGN IS IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS:
- STEEL STRUCTURES AS 4100
- FIXED PLATFORMS, WALKWAYS,STAIRWAYS AND LADDERS AS 1657

M2 SPECIFICATION AND CODES
ALL STEEL CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL CONFORM TO AS 4100.

M3 MATERIALS
ALL STRUCTURAL SHAPES,BARS AND PLATES UNLESS NOTED OTHERWISE,SHALL BE 10mm THICK OF GRADE 250 STEEL IN ACCORDANCE WITH AS 3678 & 3679.

M4 SURFACE PREPARATION

ELEMENT	SURFACE PREPARATION	TREATMENT
ALL MILD STEEL WORK INCLUDING STEPIRONS	ABRASIVE BLAST CLEANING (AS 1627.4) OR CHEMICALLY DESCALE (AS 1627.5)	HOT DIP GALVANISED AFTER FABRICATION

M5 FABRICATION DRAWINGS
CONTRACTOR SHALL PREPARE AND SUBMIT TWO COPIES OF ALL STRUCTURAL STEELWORK FABRICATION DRAWINGS TO THE PRINCIPAL PRIOR TO COMMENCING FABRICATION.

M6 WELDING
ALL WELDING SHALL BE IN ACCORDANCE WITH THE STRUCTURA STEEL WELDING CODE AS 1554. ALL WELDS SHALL BE 6mm CONTINUOUS FILLET WELD CATEGORY SP UNLESS NOTED OTHERWISE.

M7 ALUMINIUM
ALUMINIUM PRODUCTS SHALL BE OF ALUMINIUM ALLOY AS FOLLOWS:

PRODUCT	ALLOY
PLATES,SHEETS	5251
EXTRUSIONS,	6061
GRATINGS	6063

AND SHALL BE IN ACCORDANCE WITH AS/NZS 1664, AS/NZS 1734, AS/NZS1866, UNLESS NOTED OTHERWISE.

M8 REFER TO SPECIFICATION FOR TREATMENT OF ALUMINIUM SURFACES IN CONTACT WITH OTHER MATERIALS.

M9 FIBRE GLASS REINFORCED PLASTIC (FRP) GRATINGS
- RESINS SHALL BE VINYL ESTHER AND UV STABILISED
- ALL METAL ACCESSORIES SHALL BE MANUFACTURED FROM 316 STAINLESS STEEL

PIPEWORK:

(REFER TO PIPEWORK SPECIFICATION)

P1 ALL DUCTILE IRON PIPES SHALL BE LIGHT CEMENT LINED WITH TYPE SR CEMENT.
PIPE CLASS SHALL BE TYTONXTREME PN20 RUBBER RING JOINT OR PN35 FLANGED.
ALL DUCTILE IRON FITTINGS TO AS 2280.
ALL FLANGES SHALL BE TO AS 4087,CLASS PN16.
ALL BURIED DI PIPES TO BE WRAPPED AND ALL EXPOSED PIPES TO BE EPOXY COATED AS SPECIFIED IN SECTION SP2 OF WS-SPEC.

P2 ALL PRESSURE PVC PIPES SHALL BE PVC-U CLASS 12 SERIES 2 WITH RUBBER RING JOINTS TO AS 1477 UNLESS NOTED OTHERWISE.

P3. ALL PE PIPES SHALL BE PE100 TO AS 4130 WITH ELECTROFUSION JOINTS

P4. ALL NON-PRESSURE UPVC PIPES SHALL BE WITH RUBBER RING JOINTS TO AS 1260 AS FOLLOWS:
DWV SEWER PIPE GLASS SN8 UNLESS NOTED OTHERWISE

P5. FOR MINIMUM COVER TO PIPES, REFER TO STANDARD SPECIFICATION SECTION TR13 AND TR14.

P6. PIPES WITH LESS COVER THAN INDICATED IN NOTE P5 SHALL BE MASS CONCRETE ENCASED 150 ALL AROUND UNLESS OTHERWISE STATED.

P7. PIPES SHALL BE PROTECTED EXTERNALLY AS SPECIFIED.

P8. LAY PIPES BETWEEN PITS/STRUCTURES ON A CONTINUOUS RISING OR FALLING GRADE.

P9. PROVIDE THRUST BLOCKS AT ALL LOCATIONS (EG BENDS AND VALVES) WHERE UNBALANCED THRUST CAN DEVELOP. DRAWINGS MAY NOT SHOW REQUIRED THRUST BLOCKS.

REV	AMENDMENT DETAILS	APPROVED	DATE
A	ISSUED FOR REVIEW	X.X.	XX.XX.XXXX

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FOLDER:	
L. G. A:	VALIDATED:
SURVEYOR:	
SURVEY DATE:	APPROVED MANAGER:
CADD:	

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
GENERAL NOTES

PROJECT/CONTRACT No. XXXXXXXX
A1 SCALE @ A1 N.T.S.
DRAWING No. P-FY20210016-PWO-GEN-DW-50-XXXX-ZZ-0004
REV A

CONFIRM SCALE 100mm ON A1 ORIGINAL

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GENERAL NOTES:

G1 SPECIFICATIONS AND CODES
CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SPECIFICATION FOR THE WORKS TOGETHER WITH THE REQUIREMENTS OF ALL CODES OF PRACTICE REFERRED TO THEREIN AND THE REQUIREMENTS OF ALL STATUTORY AUTHORITIES.

G2 DIMENSIONS
ALL DIMENSIONS SHALL BE VERIFIED ON-SITE BEFORE COMMENCING ANY WORKS. STRUCTURAL DIMENSIONS CONTROLLED BY OR RELATED TO MECHANICAL OR ELECTRICAL EQUIPMENT SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

G3 PROVISION FOR EQUIPMENT
MECHANICAL AND ELECTRICAL EQUIPMENT SUPPORTS, ANCHORAGES, OPENINGS, RECESSES AND REVEALS NOT SHWON ON THE STRUCTURAL DRAWINGS BUT REQUIRED BY OTHER CONTRACT DRAWINGS, SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO PLACING CONCRETE.

G4 CONSTRUCTION LOADS
STRUCTURES HAVE BEEN DESIGNED FOR OPERATIONAL LOADS ON THE COMPLETE STRUCTURES. DURING CONSTRUCTION, THE STRUCTURES SHALL BE PROTECTED BY BRACING AND PROPPING WHEREVER CONSTRUCTION LOADS MAY OCCUR.

G5 CO-ORDINATION
ALL STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH CIVIL, MECHANICAL, ELECTRICAL, HYDRAULIC AND FABRICATION DRAWINGS TOGETHER WITH SPECIFICATIONS AND SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED BY THE PRINCIPAL FROM TIME TO TIME.

G6 ENVIRONMENTAL CONTROLS
SILT STOP FENCING OR STRAW BALE FENCING TO BE INSTALLED DOWNSLOPE OF ALL WORKS PRIOR TO ANY CONSTRUCTION ACTIVITY, EFFECTIVELY MAINTAINED AND REMOVED ONLY AFTER THE AREA HAD BEEN SATISFACTORILY REVEGETATED.

ALL CONDITIONS CONTAINED WITHIN THE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP) FOR THIS PROJECT IS TO BE MET. THE CONTRACTOR MUST HAVE A COPY OF THE CEMP ON SITE AT ALL TIMES.

G7 EXISTING SERVICES
THE CONTRACTOR MUST VERIFY THE EXACT LOCATION OF ALL EXISTING SERVICES WITH RELEVANT AUTHORITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION AND REPORT ANY DISCREPANCIES TO THE PRINCIPAL.

G8 RESTORATION
THE CONTRACTOR SHALL RESTORE LIKE FOR LIKE ANY FENCE, WALL, GARDEN, FOOTWAYS, DRIVEWAYS, PAVEMENT OR OTHER ASSETS THAT ARE IMPACTED BY THE CONSTRUCTION OF THE SEWER RISING MAIN AND SEWER PUMP STATION.

G9 FITTING RECOVERY
THE CONTRACTOR MUST RECOVER ALL EXISTING FITTINGS THAT ARE TO BE DECOMMISSIONED.

G10
TO AVOID THE RISK OF ELECTRIC SHOCK FROM METALLIC SEWER SERVICE PIPES DURING THE DISCONNECTION AND CONNECTION OF SEWER SERVICES, THE CONTRACTOR MUST ADHERE TO AS3500 (PLUMBING STANDARDS) PART 1 SECTION 5.2.

G11 HYDROSTATIC TESTING
THE HYDROSTATIC TEST PRESSURE OF THE SEWER RISING MAIN IS TO BE CONFIRMED BY THE PRINCIPAL.

CONCRETE:

C1 MATERIALS
CONSTRUCTION MATERIALS AND WORKMANSHIP FOR CONCRETE WORKS SHALL BE IN ACCORDANCE WITH THE SPECIFICATION AND THE SAA CODE AS 3600.

C2 CONCRETE PROPERTIES
FOR CONCRETE PROPERTIES REFER TO SPECIFICATION.

C3 CURING
CURING SHALL BE IN ACCORDANCE WITH THE SPECIFICATION. MOIST CURING MUST BE USED FOR ALL LIQUID RETAINING STRUCTURES.

C4 JOINTING IN CONCRETE STRUCTURES
LOCATION OF ALL EXPANSION AND CONTRACTION JOINTS SHALL BE AS SHOWN ON THE DRAWINGS. LOCATION OF SUCH JOINTS SHALL NOT BE CHANGED WITHOUT APPROVAL OF THE PRINCIPAL.

C5 CHAMFERS
EXCEPT AS OTHERWISE REQUIRED, EXPOSED CONCRETE CORNERS AND EDGES SHALL HAVE 20mm CHAMFERS. ALL CHAMFERS TO PROVIDE SMOOTH AND CLEAN EDGES.

C6
NO HOLES OR CHASES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWNGS SHALL BE MADE IN CONCRETE WITHOUT PRIOR APPROVAL OF THE PRINCIPAL.

C7 COVER
CONCRETE COVER MUST MEET REQUIREMENTS SET IN SPECIFICATION AND DRAWING SHEET 0005.

EARTHWORKS:

E1 THE DESIGN IS BASED ON INFORMED ASSUMPTIONS OF THE SOIL CONDITIONS. THE CONTRACTOR MUST ENGAGE A GEOTECHNICAL EXPERT TO CONFIRM GROUND CHARACTERISTICS AND CONFIRM THE DESIGN PRIOR TO COMMENCEMENT OF WORKS.

E2 EXCAVATION, STOCKPILE, EMBANKMENTS, COMPACTIONS ETC SHALL BE IN ACCORDANCE WITH THE SPECIFICATION.

DATUM:

D1 SURVEY LEVELS ARE TO AHD (AUSTRALIAN HEIGHT DATUM), MGA 54 GDA 94.

PIPEWORKS:

(REFER TO SPECIFICATION SECTION - PIPEWORK AND VALVES)

P1 ALL NON-PRESSURE SEWER PIPES SHALL BE SOLVENT OR RUBBER RING JOINT TO AS 1260.

P2 FOR MINIMUM COVER TO PIPES REFER TO WS-SPEC SECTION TR13 AND TR14.

P3 PIPES WITH LESS COVER THAN INDICATED IN STANDARDS SHALL BE MASS CONCRETE ENCASED, MINIMUM 150mm ALL AROUND UNLESS OTHERWISE STATED.

P4 LAY PIPES BETWEEN PITS/ STRUCTURES ON A CONTINUOUS FALLING GRADE.

P5 PROVIDE SUITABLE PLUG WHERE EXISTING PIPES ARE TO BE DISCONNECTED.

P6 ALL VALVE COVERS ARE TO BE CLASS D.

P7 MAXIMUM ALLOWABLE DEFLECTION IN THE PIPEWORK SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

P8 ALL STOP VALVES SHALL BE PN16 FLANGED, RESILIENT SEATED IN ACCORDANCE WITH AS2638.1.

P9 PROVIDE 3mm THICK EPDM GASKETS BETWEEN ALL PN16 FLANGES. JOINTING FLANGES SHALL BE CARRIED OUT IN ACCORDANCE WITH THE SUPPLIER'S INSTRUCTIONS.

P10 ALL FLANGES SHALL BE CLASS ON16 TO AS4087 RAISED FACE AND SHALL MATCH THOSE OF THE ADJACENT PIPEWORK.

P11 ALL PIPE FITTINGS WITH FLEXIBLE JOINTS, SUCH AS BENDS, TEES, TAPERS AND THE LIKE, SHALL BE RESTRAINED AGAINST UNBALANCED THRUST FORCES USING THRUST BLOCKS, OR AS OTHERWISE APPROVED BY THE PRINCIPAL.

PIPEWORK STANDARDS:

THE PIPELINE HAS BEEN DESIGNED TO MEET THE FOLLOWING STANDARDS:

AS4799	INSTALLATION OF UNDERGROUND UTILITY SERVICES
WSA02-2014	SEWERAGE CODE OF AUSTRALIA
WSA04-2005	SEWAGE PUMPING STATION CODE OF AUSTRALIA

THE PIPELINE INSTALLATION IS TO BE UNDERTAKEN IN ACCORDANCE WITH THESE STANDARDS OR OTHERWISE APPROVED BY THE PRINCIPAL.

THE CONTRACTOR IS TO HAVE A COPY OF THESE DOCUMENTS ON SITE AT ALL TIMES.

DRAWING LEGEND:

EXISTING SERVICES		PROPOSED SERVICES
W	WATER	W
OC	TELECOMMUNICATION	OC
S	SEWER	S
D	DRAINAGE	D
E	ELECTRICITY	E
G	GAS	G
	WATER STOP VALVE	
	WATER HYDRANT	
	WATER AIR VALVE	
	SEWER MH	

REV	AMENDMENT DETAILS	APPROVED	DATE
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FOLDER:	
L. G. A:	
SURVEYOR:	
SURVEY DATE:	
CADD:	

SURVEY PLAN NO.

VERIFIED:

VALIDATED:

APPROVED MANAGER:

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
GENERAL
NOTES - SHEET 2 OF 2

PROJECT/CONTRACT No. XXXXXXXX

A1 | SCALE @ A1 N.T.S.

DRAWING No. P-FY20210016-PWO-GEN-DW-50-XXXX-ZZ-0005

REV A

CONFIRM SCALE — 100mm ON A1 ORIGINAL

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17
DP5405

16
5405

NEW INCOMING
SEWER MAIN

VEHICLE ACCESS
ROAD

14.75

NEW SECURITY
FENCE AND GATE

1 IN 8
BATTERS
(TYP.)

SPS WELL

4.50

5.40

SCA

ODOUR
CONTROL UNIT

15.00

1.50

NEW SECURITY
FENCE AND GATE

RISING MAIN TO
STP.

RAPPVILLE
STATION
CONC BLOCK BLD

POST & WIRE FCE

GRAVEL

BITUMEN ROAD

STN RS1

ROX POSITION, SEE DBYD

CRM1

CRM2

46.44 46.57 46.51 46.59 47.07 47.22 47.48 47.60 47.35 46.99 47.15 46.94 47.32 47.60 47.35 47.11 47.39 47.67 47.85 47.95 47.04 47.20 47.17 47.31 47.34 47.33 47.28 47.29 47.33 47.40 47.51 47.70 47.59 47.49 47.34 47.29 47.45 47.81 47.93

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CADD:	

Richmond Valley Council

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DESIGNED	T. PERUSCO
CHECKED	B. DOUGLAS
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

SEWER PUMPING STATION
GENERAL ARRANGEMENT

PROJECT/CONTRACT No. XXXXXXXX

A1 | SCALE @ A1 1:100

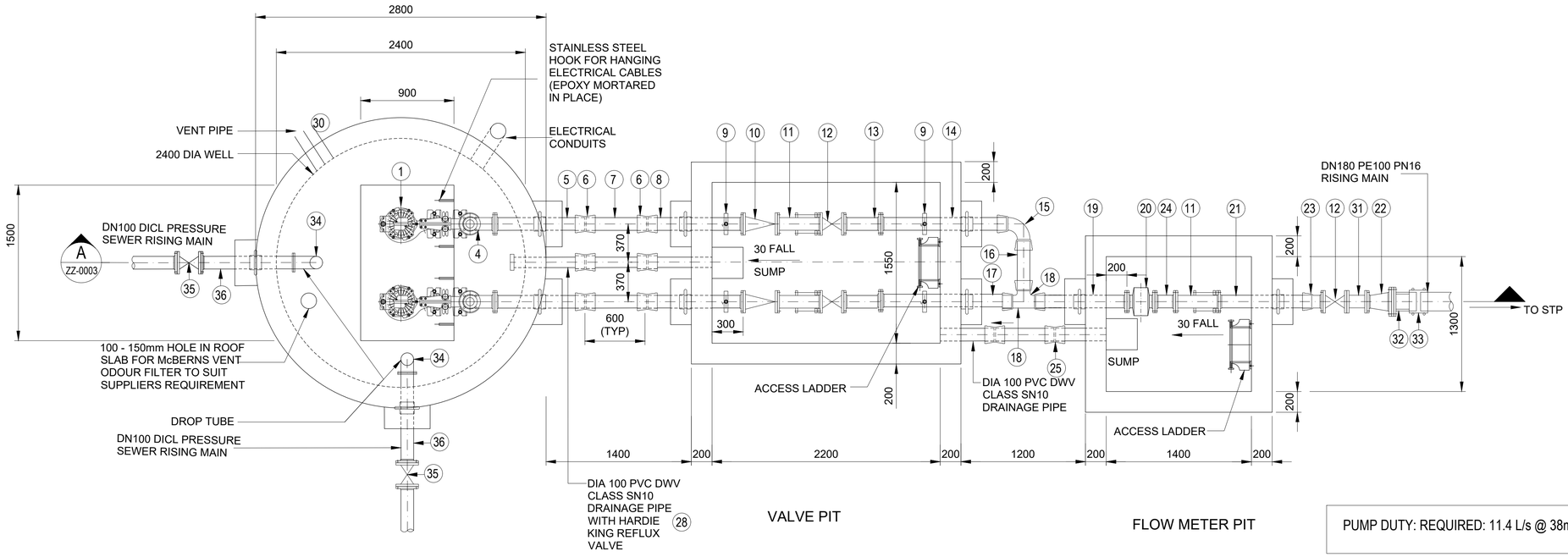
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S002-ZZ-0001

REV A

CONFIRM SCALE — 100mm ON A1 ORIGINAL

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PUMPING STATION

PUMP WELL / VALVE PIT / FLOWMETER PIT PLAN

SCALE: 1:25

PUMP DUTY: REQUIRED: 11.4 L/s @ 38m HEAD

TABLE 1: PIPEWORK SCHEDULE

ITEM No.	ITEM DESCRIPTION	DIA(mm)
1	SUBMERSIBLE PUMPS	
2	DICL TAPER (IF REQUIRED)	100/80
3	DICL FL-FL PIPE L.T.S.	100
4	DICL FL-FL 90 DEG BEND	100
5	DICL FL-SP PIPE WITH THRUST FLANGE L.T.S.	100
6	DICL SO-SO CONNECTOR	100
7	DICL SP-SP PIPE 600 LONG	100
8	DICL SP-FL PIPE WITH THRUST FLANGE L.T.S.	100
9	B.S.P. TAPPING SADDLE WITH VALVE COCK FOR PRESSURE GAUGES	15
10	NON-RETURN VALVE	100
11	DICL THRUST TYPE DISMANTLING JOINT	100
12	STOP VALVE	100
13	DICL FL-FL PIPE L.T.S	100
14	DICL FL-SP PIPE WITH THRUST FLANGE L.T.S.	100
15	DICL SO-SO 90 DEG BEND	100
16	DICL SP-SP PIPE	100
17	DICL FL-SP PIPE WITH THRUST FLANGE L.T.S.	100
18	DICL ALL SOCKET EQUAL TEE	100

ITEM No.	ITEM DESCRIPTION	DIA(mm)
19	DICL SP-FL PIPE WITH THRUST FLANGE L.T.S.	100
20	ELECTROMAGNETIC FLOW METER	100
21	DICL FL-SP PIPE WITH THRUST FLANGE L.T.S.	100
22	DICL FL-FL TAPER	150/100
23	DICL SO-FL CONNECTOR	100
24	DICL FL-FL PIPE 220mm LONG	100
25	DICL SO-SO CONNECTOR	100
26	DICL DROPPER PIPE	100
27	PVC-U DRAIN LINE	100
28	PVC-U DRAIN LINE WITH REFLEX VALVE	100
29	STOP VALVE WITH-IN CHAMBER	100
30	INDUCT VENT PIPE	150
31	DICL FL-FL CONNECTOR	100
32	HDPE STUB FLANGE WITH BACKING RING	180
33	ELECTRO FUSION COUPLING	180
34	DICL ALL FLANGE EQUAL TEE	100
35	STOP VALVE WITH SURFACE BOX	100
36	DICL FL-FL PIPE WITH THRUST FLANGE L.T.S.	100

NOTE: L.T.S. DENOTES LENGTH TO SUIT

NOTES:

1. CONFIRM POSITION AND DIMENSIONS OF WET WELL OPENING AND POSITION OF PUMPS (TO COMPLY WITH PUMP SUPPLIER'S REQUIREMENTS PRIOR TO CONSTRUCTION)
2. INSTALL PUMP PEDESTAL TO PUMP SUPPLIER'S REQUIREMENTS.
3. PUMP SUPPLIER TO PROVIDE ECCENTRIC TAPER IF REQUIRED.
4. THE FOLLOWING SURFACES TO BE EPOXY COATED IN ACCORDANCE WITH CLAUSE 6.8 SECTION TR20 OF WS-SPEC (APPLY SYSTEM W3-C EPOXY HIGH BUILD EPOXY) :-
   - INTERNAL FACE OF PUMP WELL (OR ALTERNATIVE PLASTILINER BY HUMES OR EQUAL)
   - BASE
   - UNDERSIDE OF ROOF AND SIDES OF ROOF OPENING
5. SCABBLE WALLS AT INTERFACE WITH CONCRETE FLOOR / BENCHING.
6. FLANGES TO BE DRILLED TO PN16.
7. PRE-CAST PUMP WELL SHALL BE SUITABLE FOR USE IN SEWERAGE APPLICATION.

1:25 0 500 1000 1500 2000 2500mm
500

REV	AMENDMENT DETAILS	APPROVED	DATE
A	ISSUED FOR REVIEW	X.X.	04.11.2022

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FOR REVIEW

DATUM:	
ORIGIN OF LEVELS:	
AZIMUTH:	
FOLDER:	
L. G. A:	
SURVEYOR:	
SURVEY DATE:	
CADD:	

SURVEY PLAN NO.
VERIFIED:
VALIDATED:
APPROVED MANAGER:

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	M. BREAKENRIDGE
CHECKED	T. PERUSCO
DRAFTED	M. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

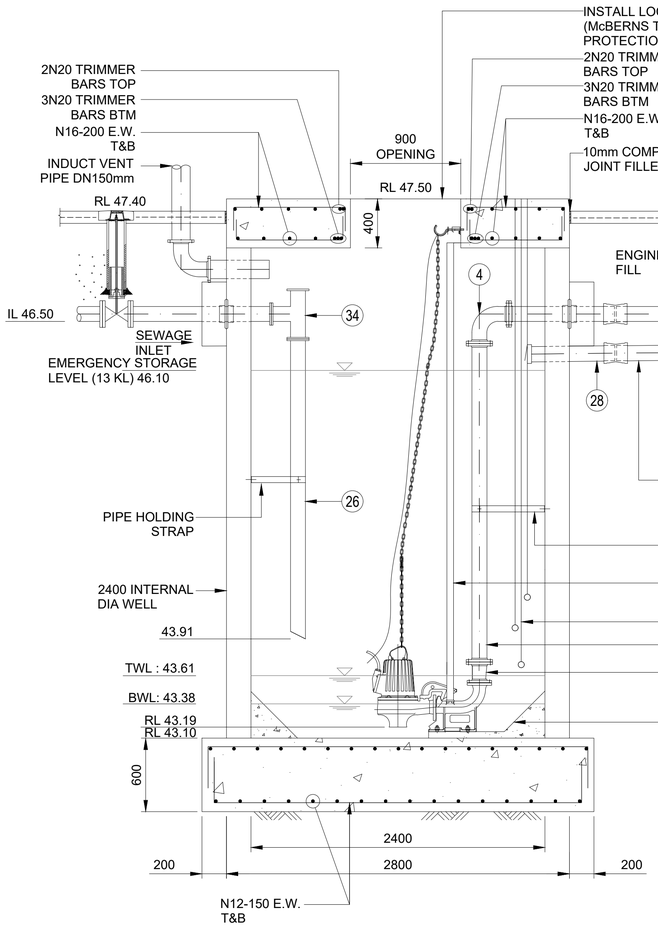
RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
SEWER PUMPING STATION PLAN DETAIL

PROJECT/CONTRACT No. XXXXXXXX
A1 SCALE @ A1 1:25
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S002-ZZ-0002
REV A

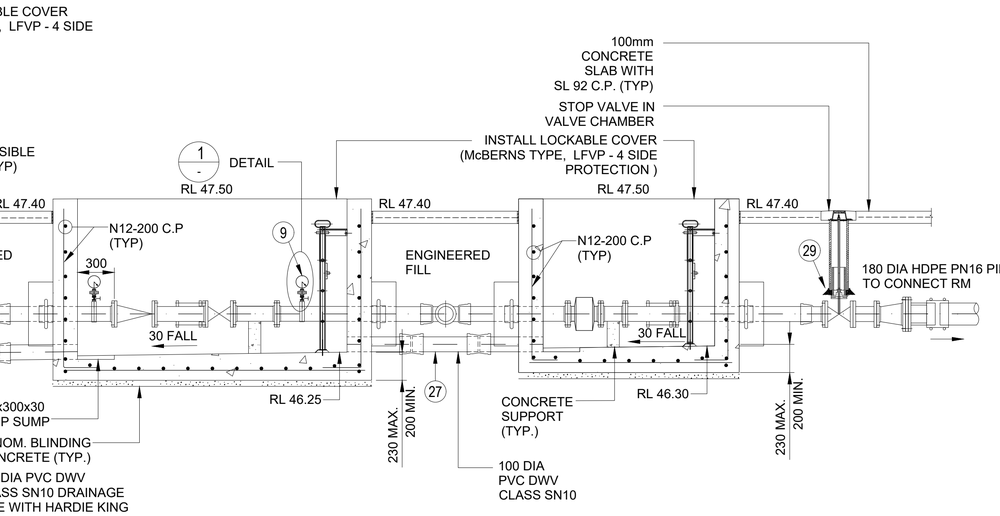
CONFIRM SCALE — 100mm ON A1 ORIGINAL

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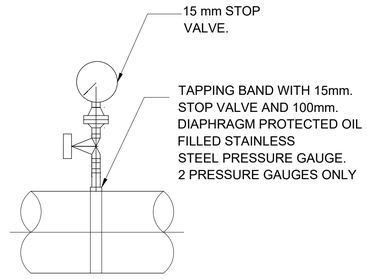


SECTION A
SCALE 1:25
ZZ-0002



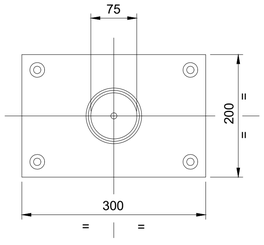
VALVE PIT

FLOW METER PIT

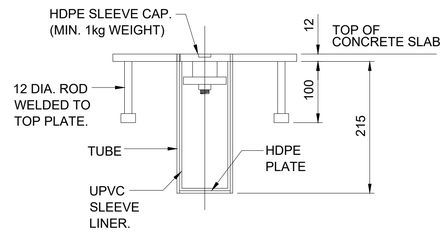


DETAIL 1
N.T.S.
-

NOTE:
1. BASE MATERIAL - STAINLESS STEEL.
2. WORKING LOAD - MIN. 200 KG
3. AS SUPPLIED BY UCL SAFETY SYSTEM OR APPROVED EQUIVALENT.
4. FOR USE WITH ACCESSORIES MANUFACTURED BY UCL SAFETY SYSTEM OR APPROVED EQUIVALENT



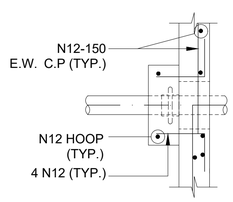
PLAN



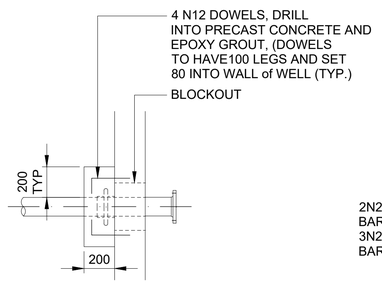
DAVIT BASE DETAILS
SEE NOTE BELOW
N.T.S.

NOTE:

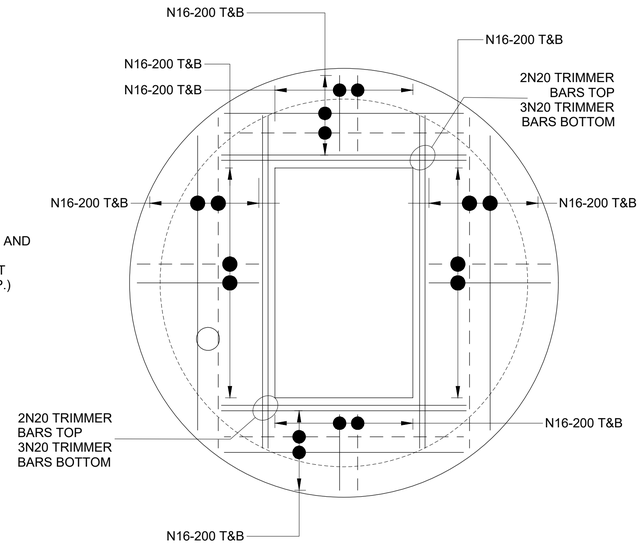
PROVIDE ADVANCED PORTABLE ANCHOR POST/ DAVIT ARM ASSEMBLY AS AN ALTERNATIVE ARRANGEMENT TO UCL SAFETY SYSTEM SHOWN.



TYPICAL PIPE ENTRY DETAIL (PIT)
SCALE: 1:20



TYPICAL PIPE ENTRY DETAIL (WET WELL)
SCALE: 1:20



ROOF SLAB REINFORCEMENT DETAILS
SCALE: 1:20

1:20 0 400 800 1200 1600 2000mm
400 200
1:25 0 500 1000 1500 2000 2500mm
500

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DIRECTOR WS & WW	G. FERNANDES

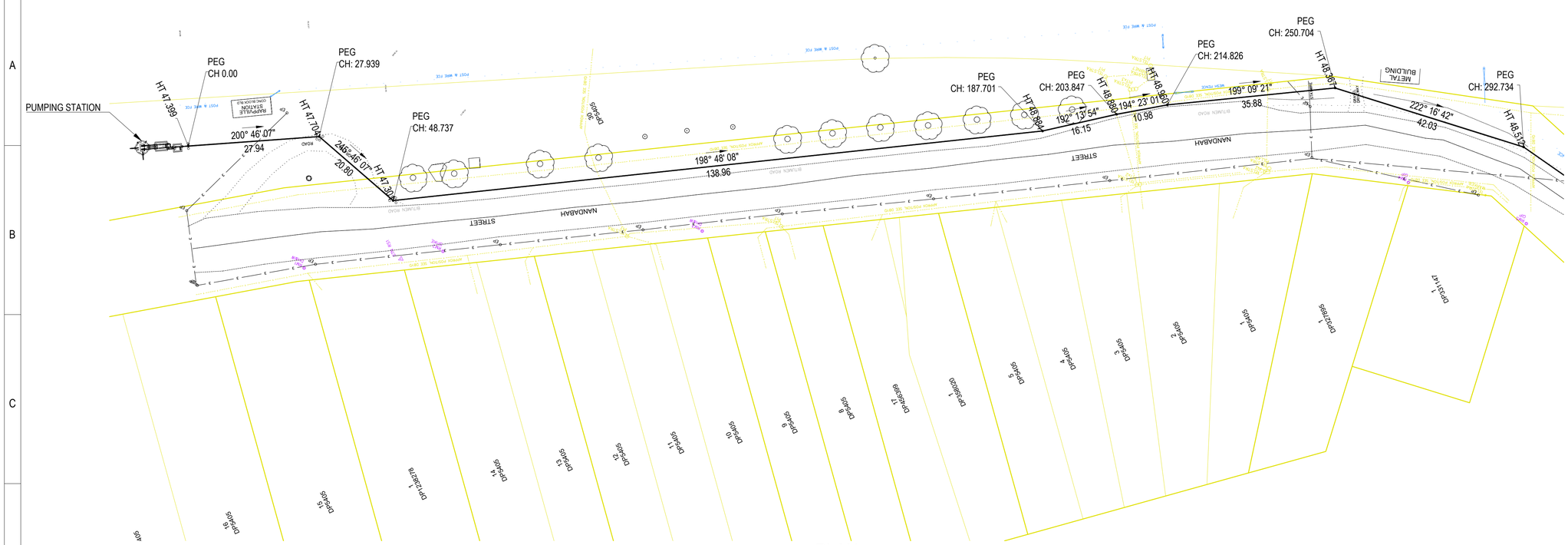
RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
SEWER PUMPING STATION
SECTION DETAIL

PROJECT/CONTRACT No. XXXXXXXX
A1
SCALE @ A1 1:25, 1:20
DRAWING No. P-FY20210016-PWO-CIV-DW-50-S002-ZZ-0003
REV A

CONFIRM SCALE — 100mm ON A1 ORIGINAL

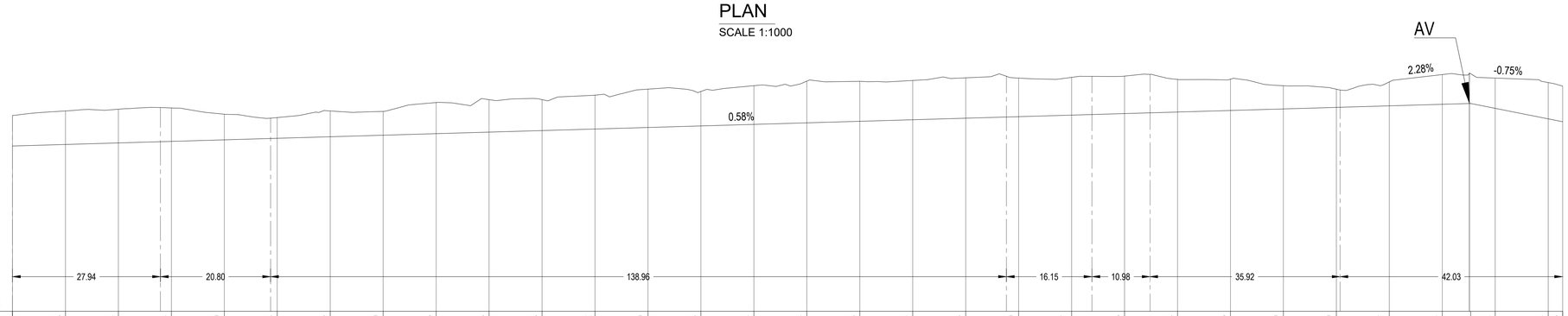
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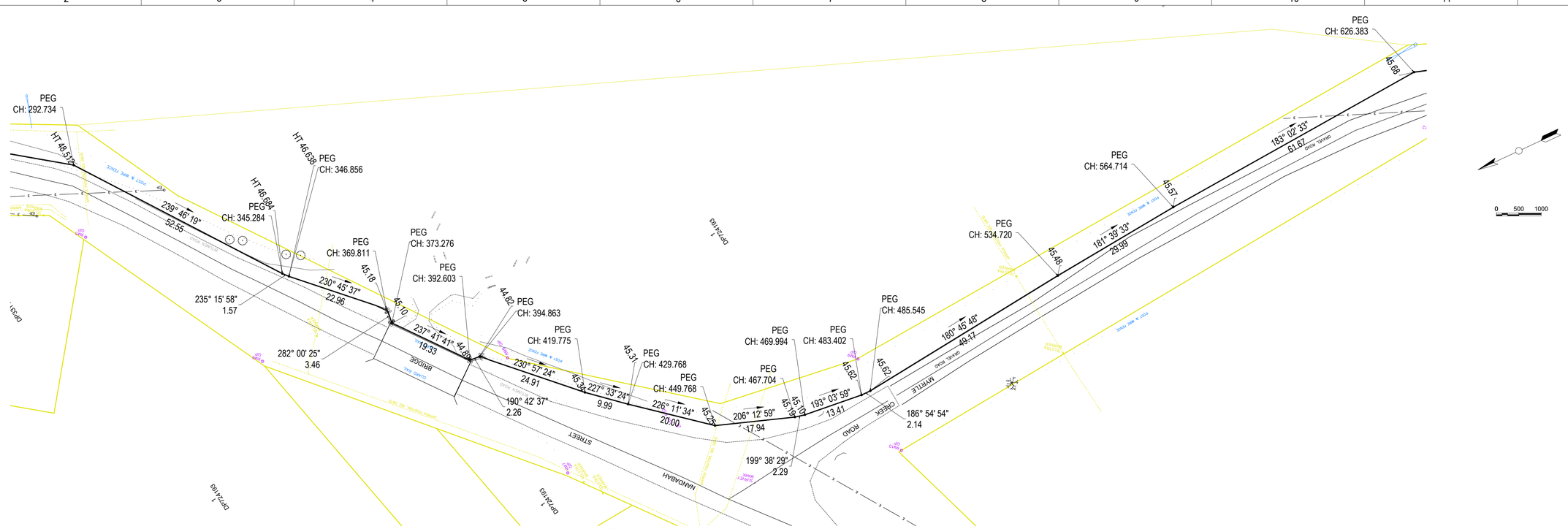


PLAN

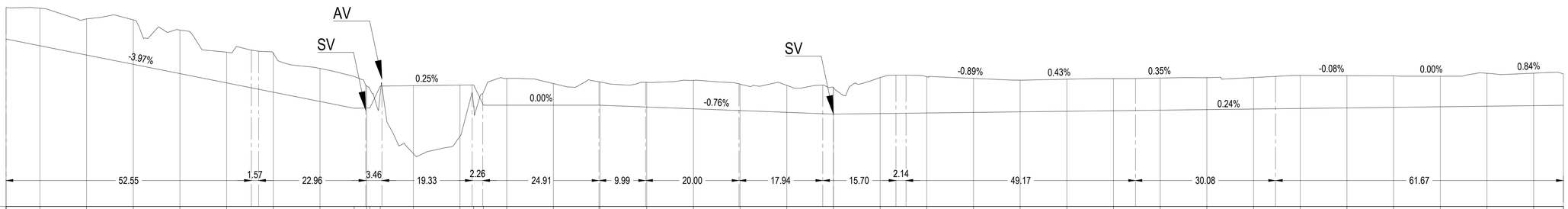
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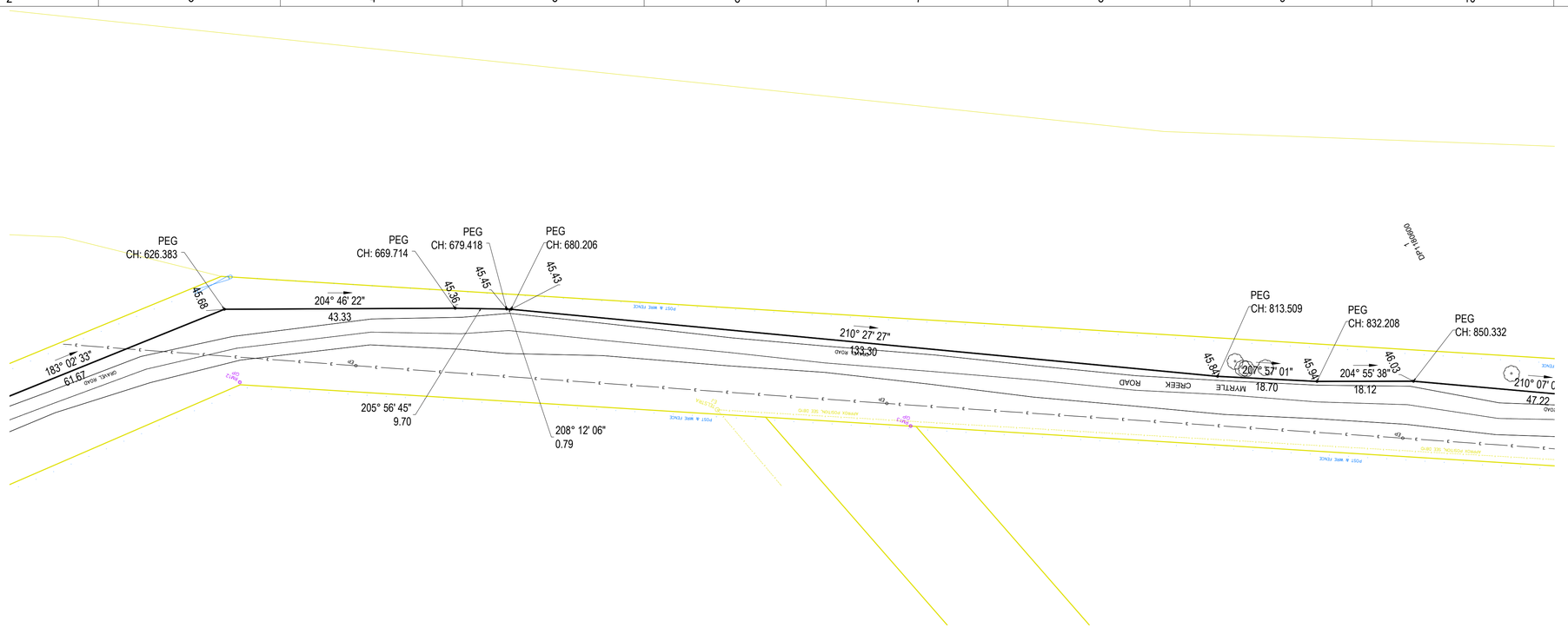


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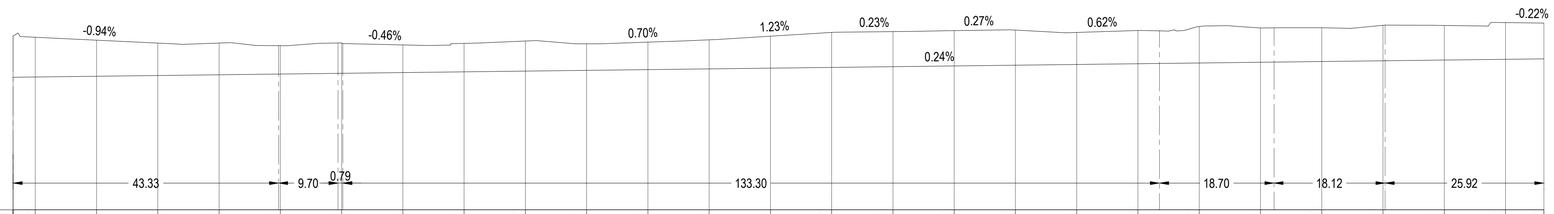
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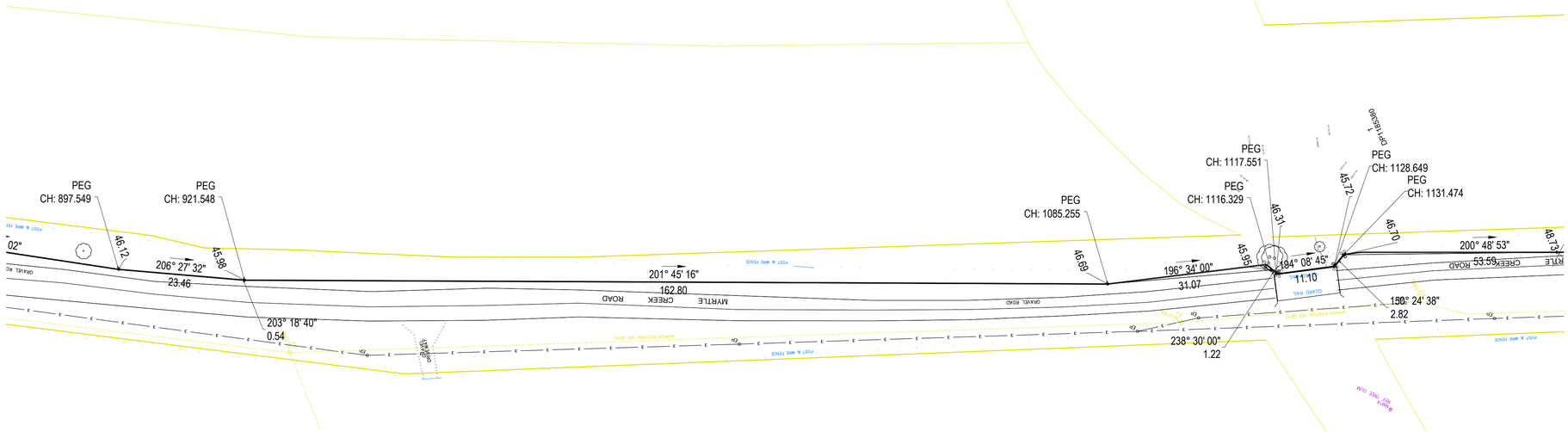


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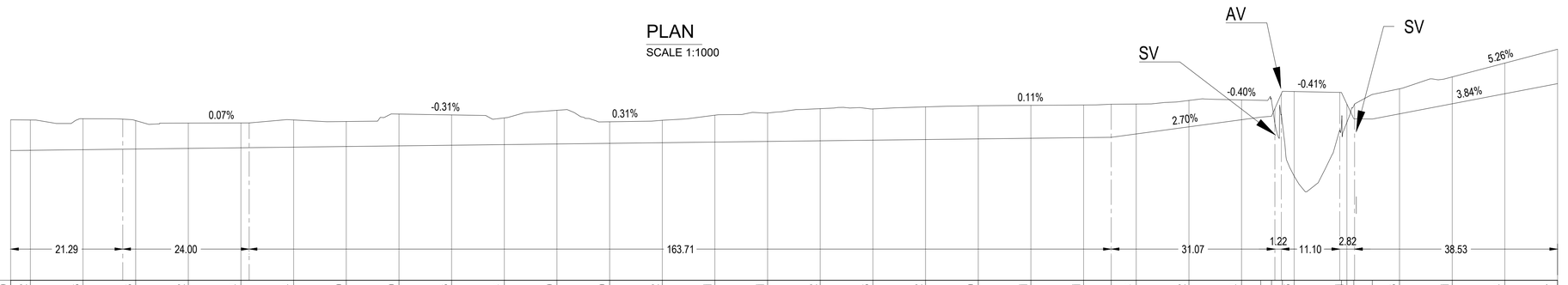


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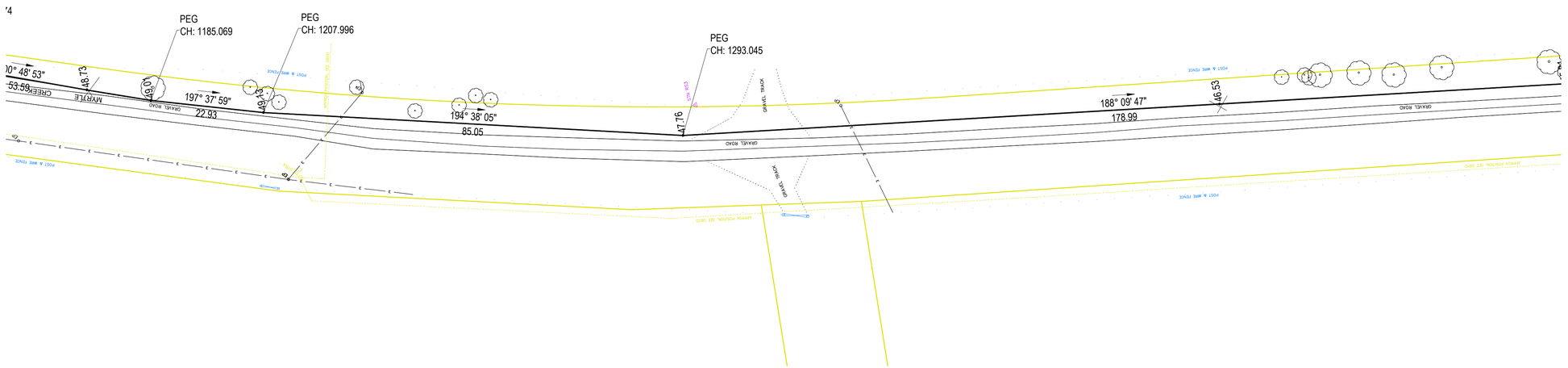


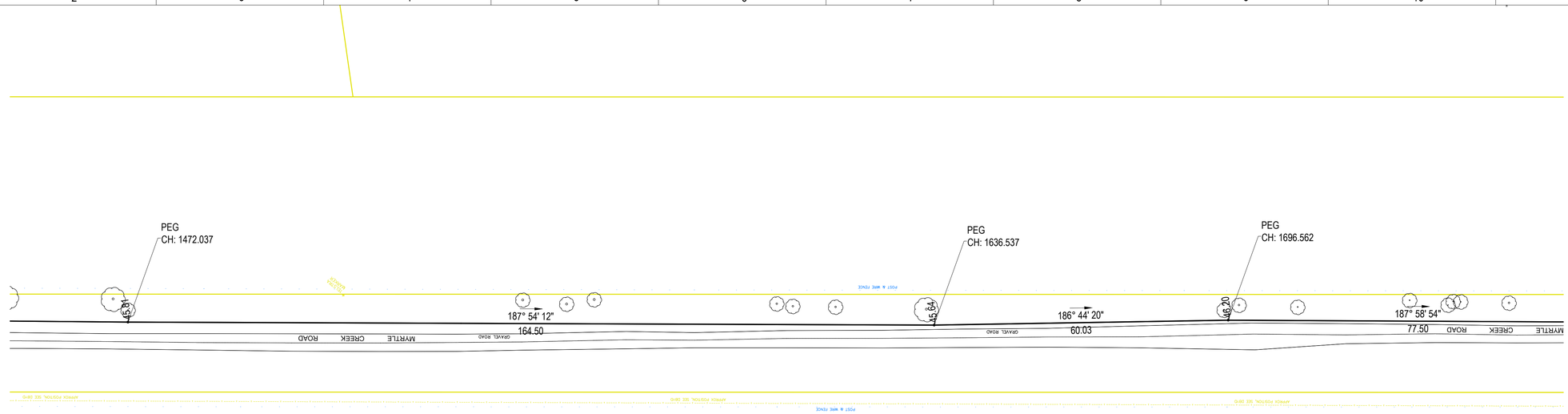
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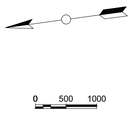
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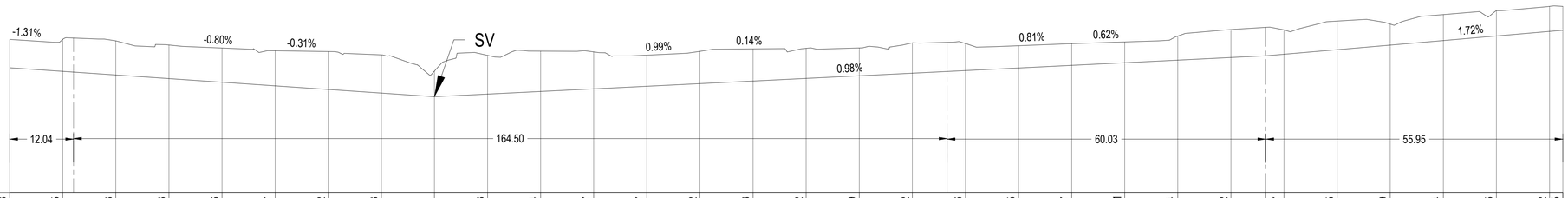

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PEG
CH: 1207.996
PEG
CH: 1293.045
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22.93
194° 38' 05"
85.05
188° 09' 47"
178.99
DRAIN BACK
DRAIN BACK
DRAIN BACK





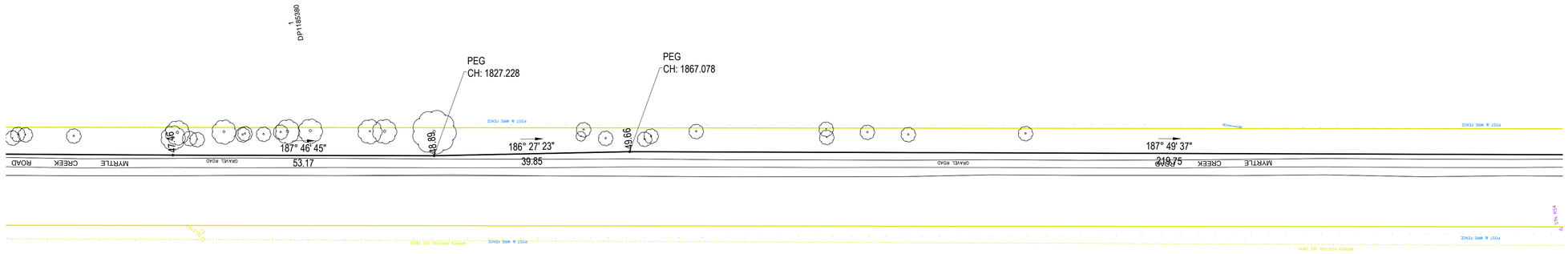
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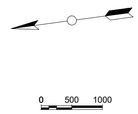
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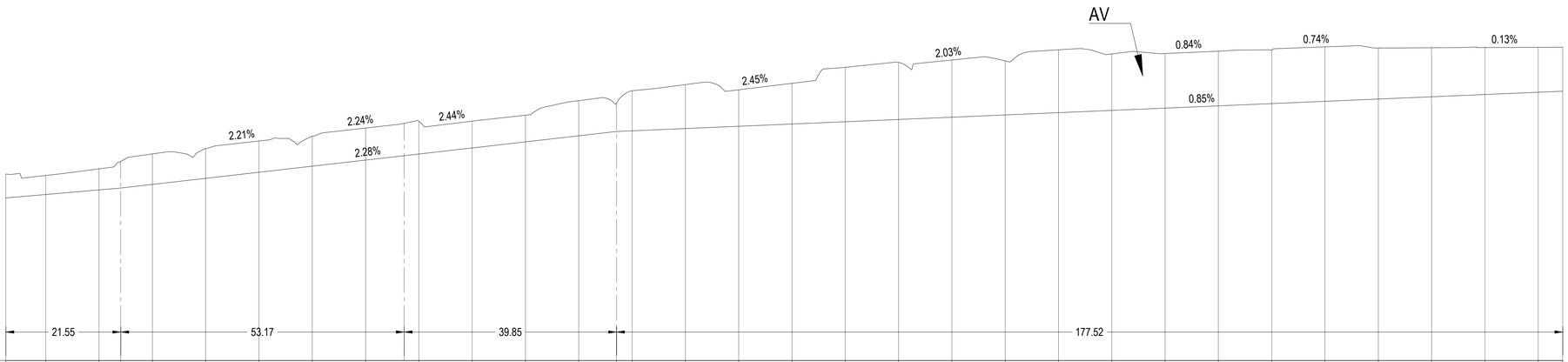
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PLAN

SCALE 1:1000



AHD = 40.00

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DESIGN LEVEL	46.10	46.23	46.40	47.46	46.60	46.83	47.06	47.29	47.51	47.74	47.97	48.20	48.43	49.66	48.61	48.70	48.78	48.87	48.95	49.04	49.12	49.21	49.29	49.38	49.46	49.55	49.63	49.72	49.81	49.89	49.98	50.06	50.10
GROUND LEVEL	46.99	46.94	47.19	47.46	47.75	47.95	48.23	48.41	48.72	48.97	48.98	49.20	49.75	49.66	50.12	50.35	50.15	50.40	51.00	51.18	51.27	51.24	51.65	51.50	51.51	51.60	51.65	51.76	51.72	51.73	51.74	51.75	51.75
CHAINAGE	1753	1760	1770		1780	1790	1800	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020	2030	2040	2045
PIPE TYPE	DN 180 PE100 PN16																															

1:1000 0 20 40 60 80 100m (20 10)

1:200 0 4 8 12 16 20m (4 2)

REV	AMENDMENT DETAILS	APPROVED	DATE
A	ISSUED FOR REVIEW	X.X.	XX.XX.XXXX

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DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
SEWER RISING MAIN
PLAN & LONG SECTION CH 1753.00 TO 2045.00

PROJECT/CONTRACT No. XXXXXXXX

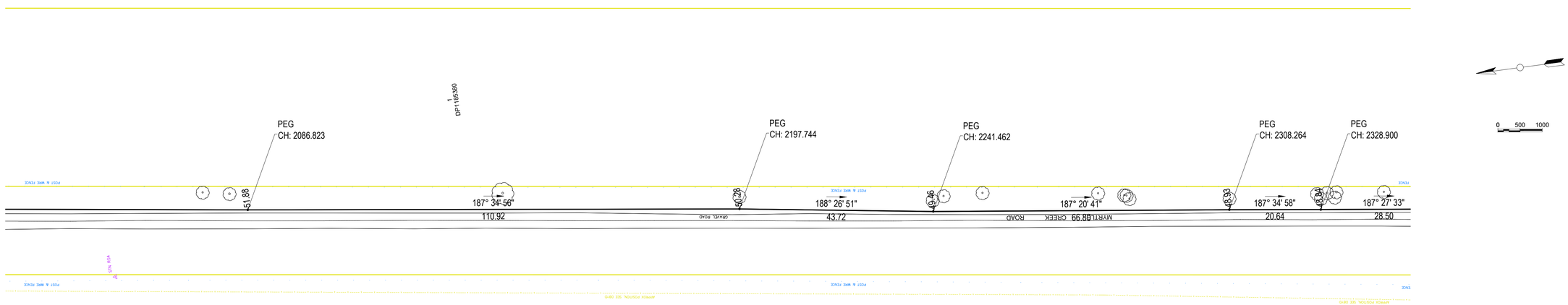
A1 | SCALE @ A1 N.T.S.

DRAWING No. C207 | REV A

CONFIRM SCALE — 100mm ON A1 ORIGINAL

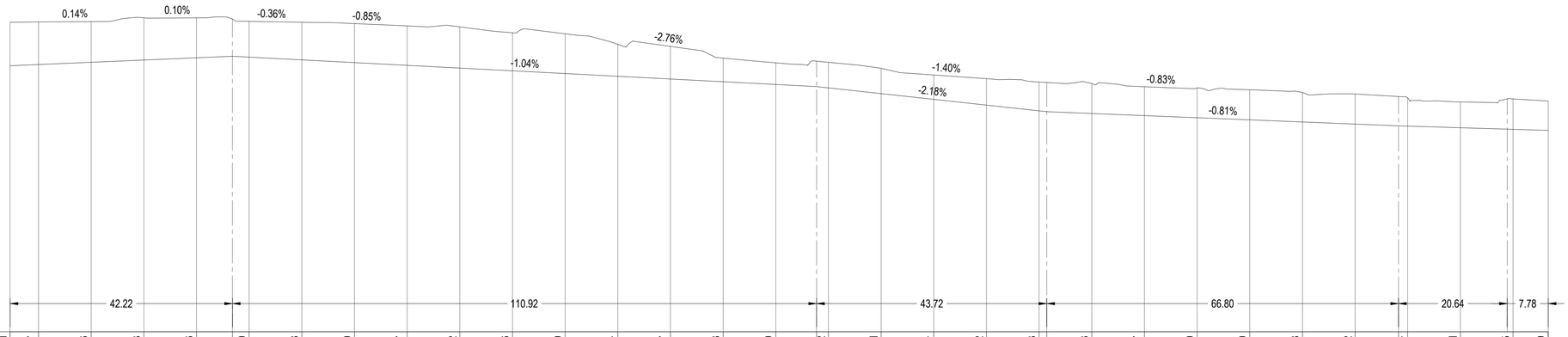
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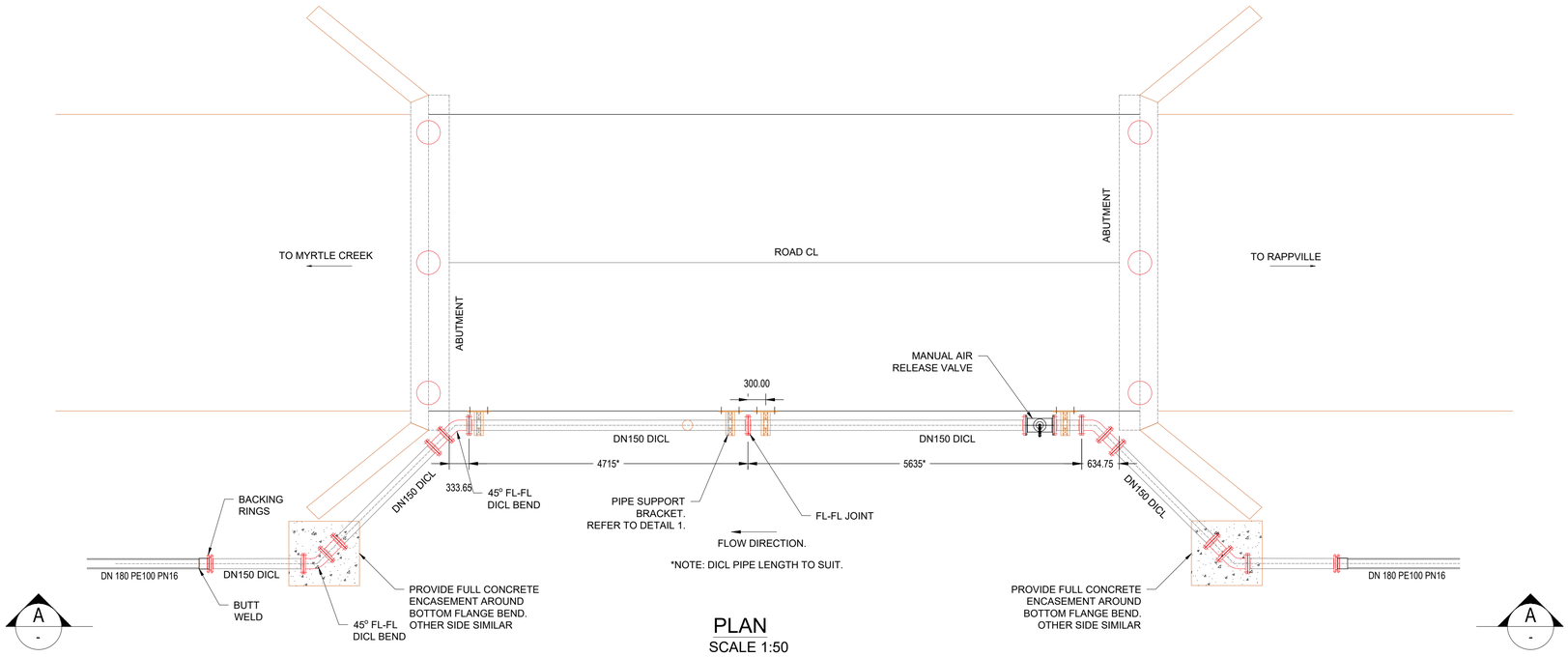
PLAN

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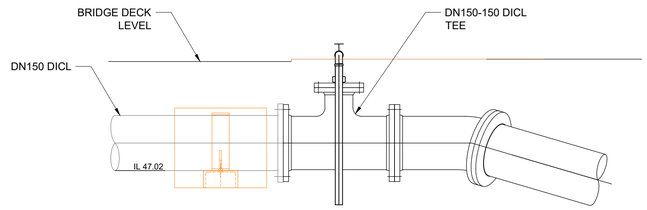


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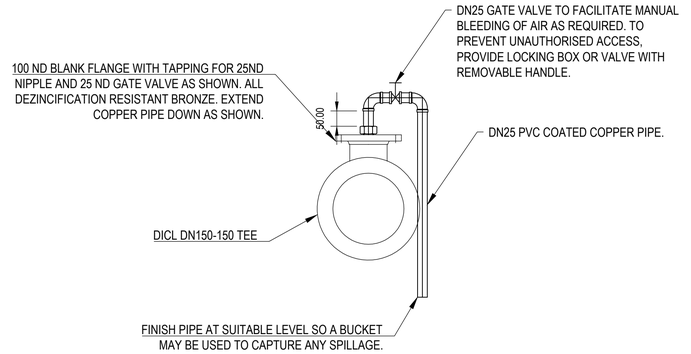
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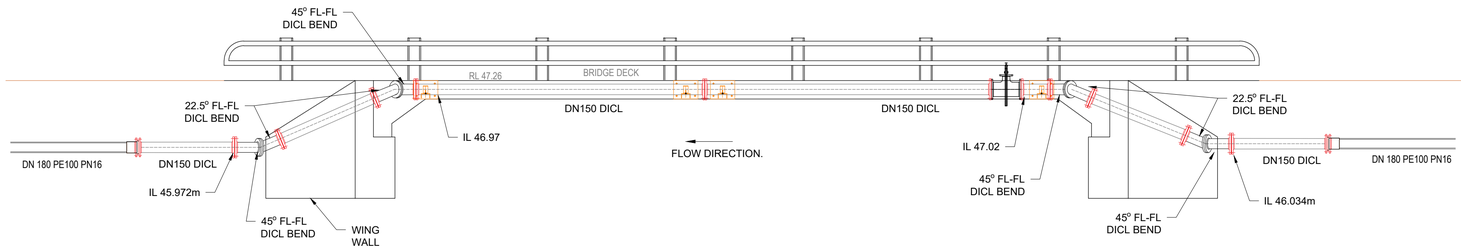


PLAN
SCALE 1:50

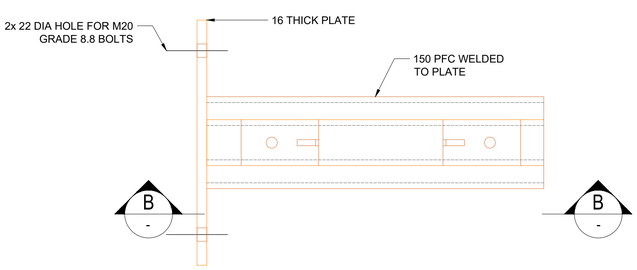


PLAN VIEW MANUAL AIR RELEASE VALVE
SCALE NTS

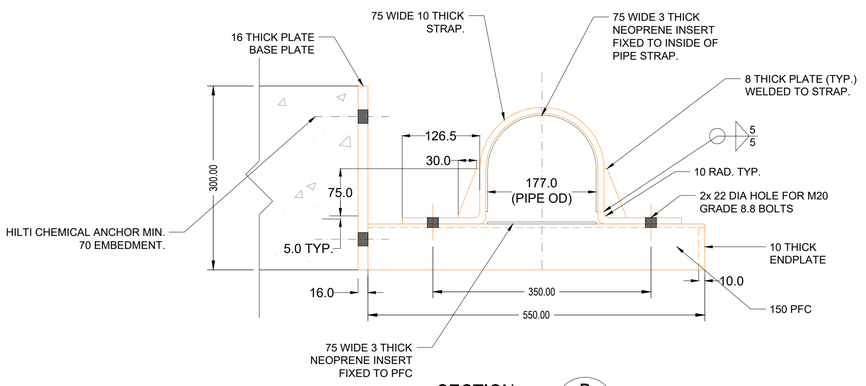




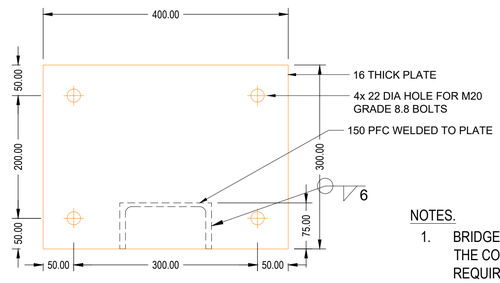
ELEVATION A
SCALE 1:50



PLAN VIEW BASE PLATE AND BRACKET
SCALE 1:5



SECTION B
SCALE 1:5



MANUAL AIR-RELEASE VALVE DETAIL 2
SCALE 1:5

NOTES.

1. BRIDGE STRUCTURE IS INDICATIVE ONLY. THE CONTRACTOR MUST CONFIRM DESIGN REQUIREMENTS WITH BRIDGE ARRANGEMENT ON SITE. DESIGN CHANGES ARE TO BE CONFIRMED BY THE PRINCIPAL.

BASE PLATE DETAIL 1
SCALE 1:5

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VERIFIED:

VALIDATED:

APPROVED MANAGER:

Richmond Valley Council

NSW GOVERNMENT

DESIGNED	S. HAQUE
CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME
SEWER RISING MAIN
BRIDGE CROSSING DETAIL (MYRTLE CREEK) SHEET 1 OF 2

PROJECT/CONTRACT No. XXXXXXXX

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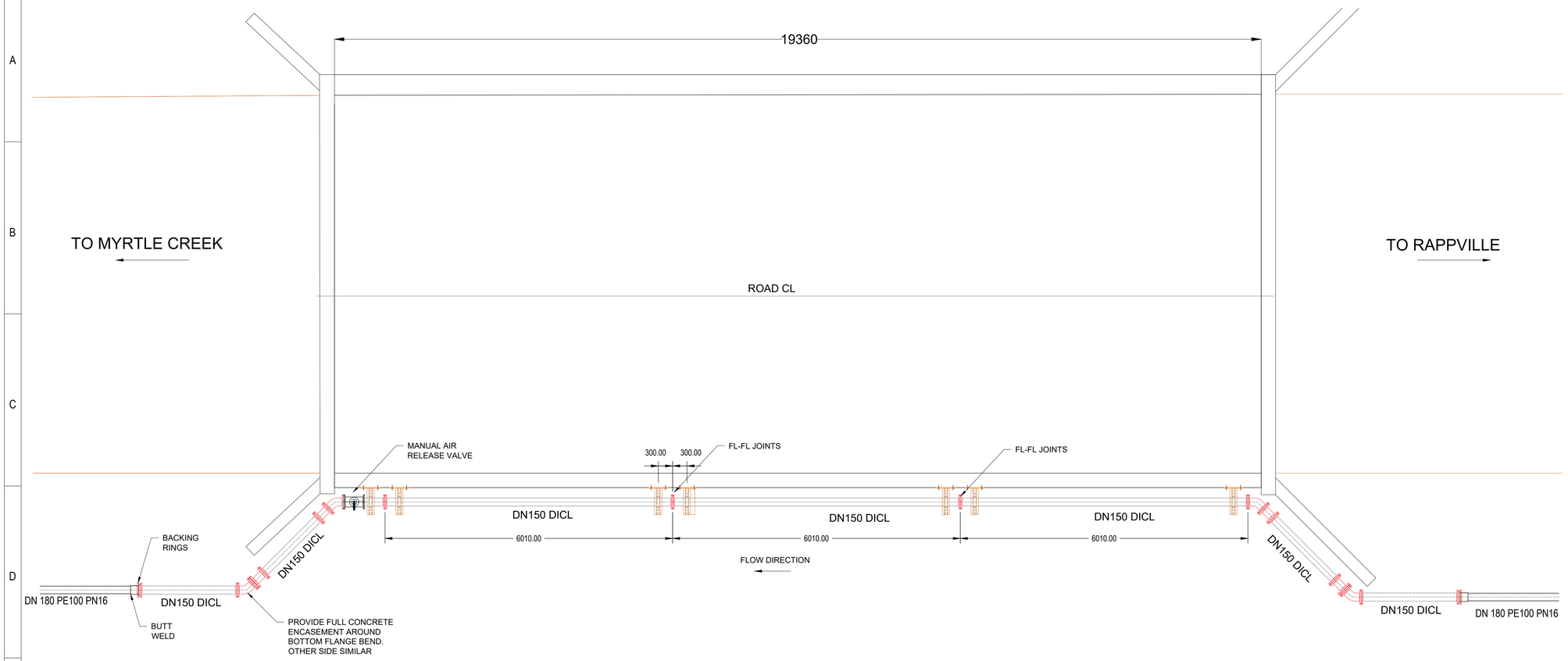
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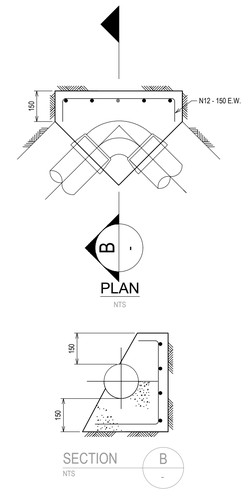
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PLAN
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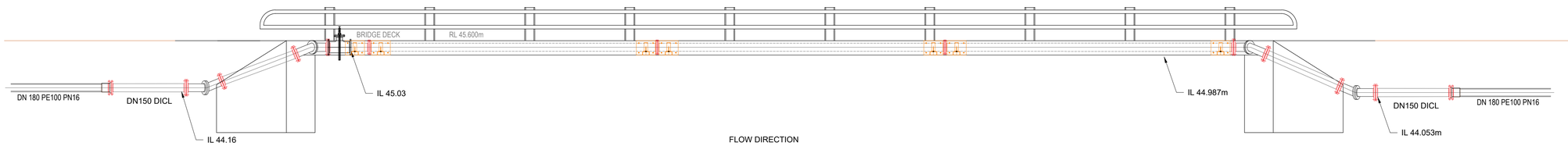


HORIZONTAL AND DOWNTURNED VERTICAL BEND
THRUST BLOCK DETAILS

MINIMUM THRUST BLOCK
BEARING AREA (m) [2] ※

PIPE DIA.	90° BEND	TEE/CLOSE END OR VALVE	45° BEND	22.5° BEND	11.25° BEND
150	0.48	0.34	0.26	0.13	0.07
200	0.82	0.58	0.44	0.23	0.11

※ ASSUMED ALLOWABLE BEARING PRESSURE
OF UNDISTURBED GROUND - 100 kPa.
CONTRACTOR TO CONFIRM BEARING CAPACITY OF SOIL.



ELEVATION A -
SCALE 1:50

NOTES.

1. LOCATION OF THE EXISTING BRIDGE ELEMENTS HAVE BEEN BASED ON SURVAYED BRIDGE DECK EXTENTS AND AERIAL IMAGERY, AND SHALL BE CONSIDERED APPROXIMATE ONLY.
2. BRIDGE STRUCTURE IS INDICATIVE ONLY. THE CONTRACTOR MUST CONFIRM DESIGN REQUIREMENTS WITH BRIDGE ARRANGEMENT ON SITE. DESIGN CHANGES ARE TO BE CONFIRMED BY THE PRINCIPAL.

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CHECKED	T. PERUSCO
DRAFTED	S. HAQUE
CHECKED	B. DOUGLAS
DIRECTOR WS & WW	G. FERNANDES

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RAPPVILLE SEWERAGE SCHEME

SEWER RISING MAIN
BRIDGE CROSSING DETAIL SHEET 2 OF 2

PROJECT/CONTRACT No. XXXXXXXX

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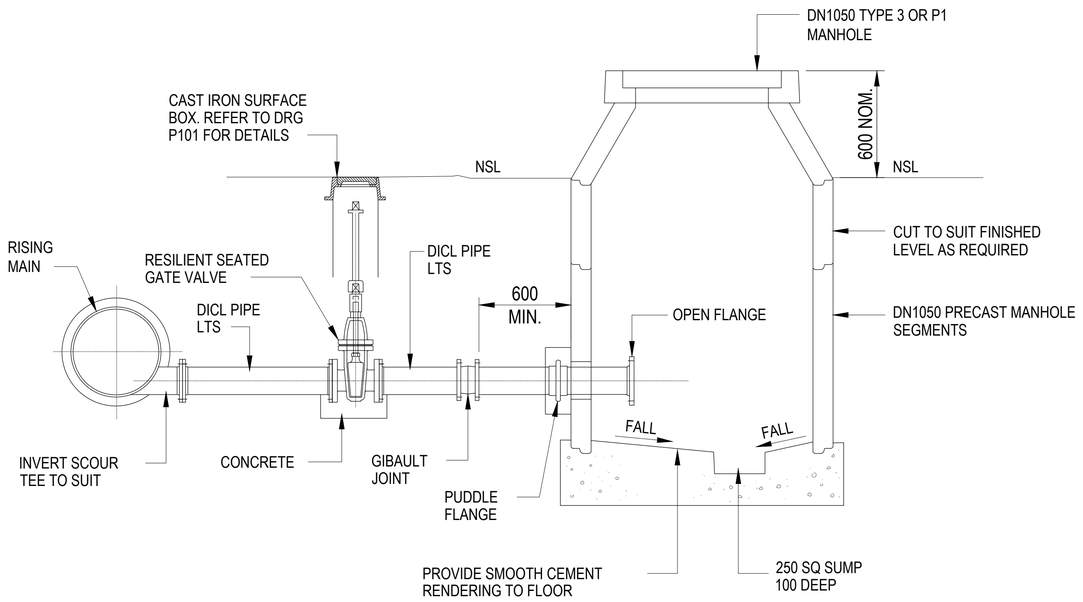
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SCOUR VALVE INSTALLATION

SCALE 1:20

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Richmond Valley Council

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CHECKED	T. PERUSCO
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DIRECTOR WS & WW	G. FERNANDES

RICHMOND VALLEY COUNCIL
RAPPVILLE SEWERAGE SCHEME

SEWER RISING MAIN
SCOUR VALVE DETAILS

PROJECT/CONTRACT No. XXXXXXXX

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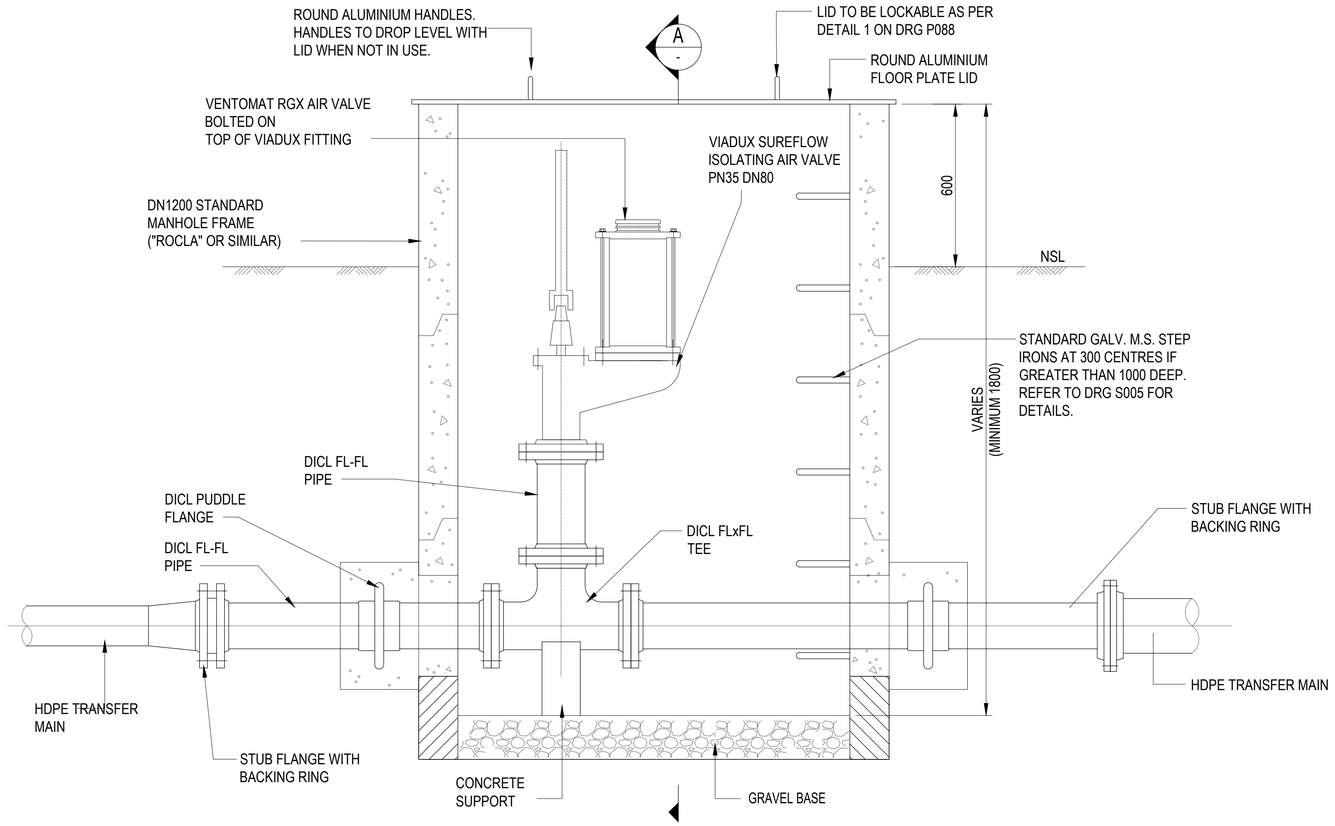
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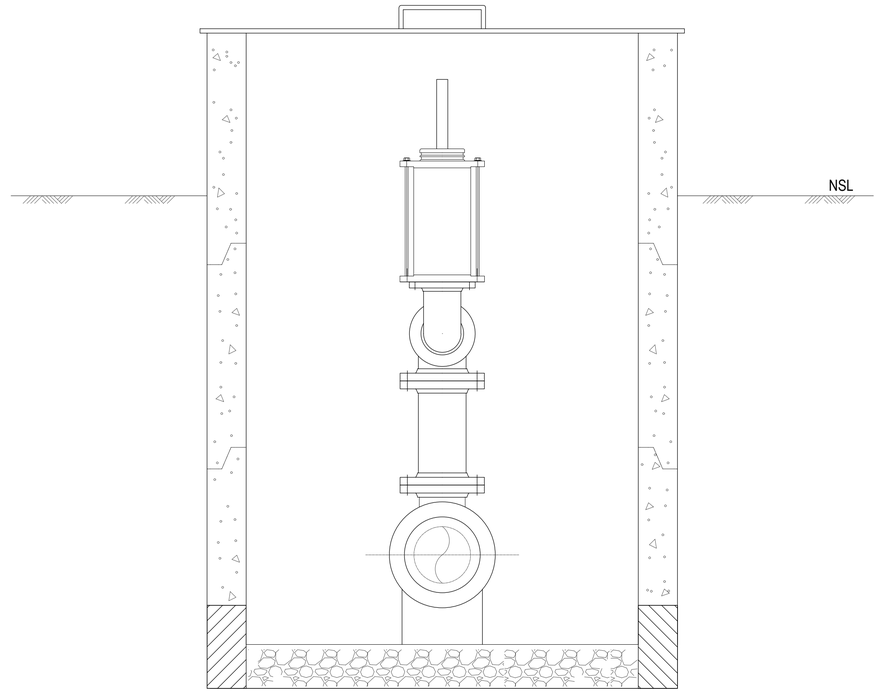
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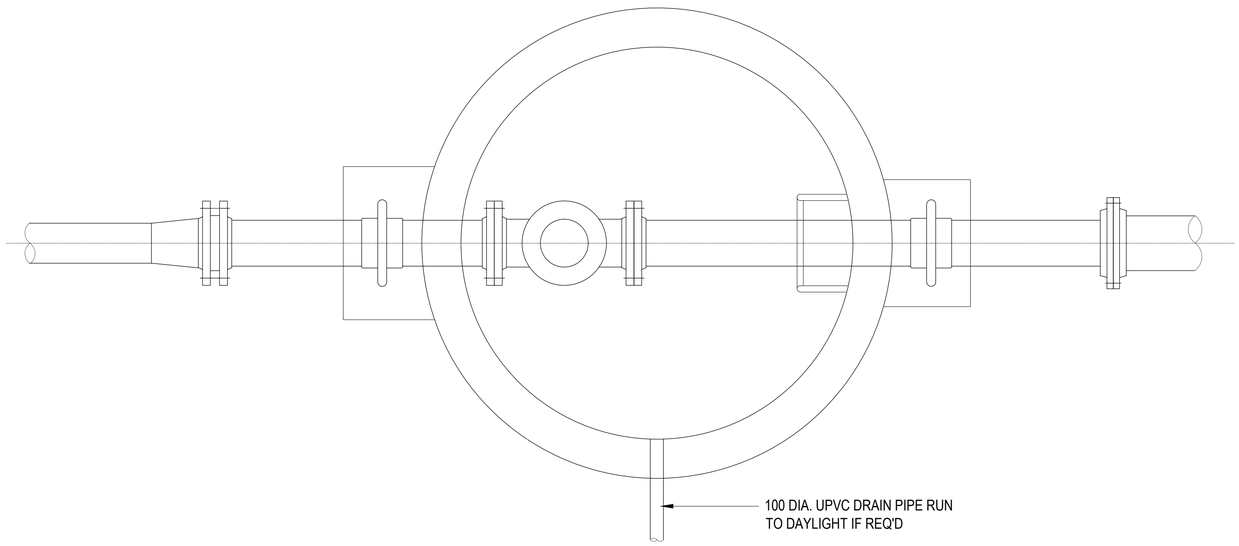
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AIR VALVE PIT INSTALLATION - TYPE 1

SCALE 1:10





PIT PLAN

SCALE 1:10

NOTES

1. REFER TO TECHNICAL SPECIFICATION FOR TYPE OF AIR VALVES.
2. COVER AND FIXING BARS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.
3. SIZE OF DICL PIPE TO SUIT EACH RISING MAIN

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SEWER RISING MAIN
AIR VALVE DETAILS

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Appendix F – Odour Impact Assessments

Rappville Sewerage Scheme Pumping Station

Odour Impact Assessment

NSW Public Works

Level 2, 66 Harrington Street
The Rocks, NSW 2000

Prepared by:

SLR Consulting Australia Pty Ltd

Tenancy 202 Submarine School, Sub Base Platypus, 120 High Street, North Sydney NSW 2060, Australia

SLR Project No.: 610.030930.00001

19 June 2023

Revision: V1.0

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
V1.0	20 June 2023	S Bagheri	A Naghizadeh	A Naghizadeh

Basis of Report

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with NSW Public Works (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

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1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by NSW Public Works (NSW PW) to prepare an Odour Impact Assessment (OIA) for a new Sewage Pump Station (SPS) at Rappville (the Project).

An Options Study Report prepared by the NSW PW in 2021 recommended the construction of a Pressure Sewerage System transferring flows from the village via a SPS to a new STP located to the south of Rappville at 5 Bailey Road, Myrtle Creek (part Lot 160 DP755260). The Proposal, which replaces the existing onsite systems which have been affected by the October 2019 bushfires includes:

- Construction of a new SPS opposite the Commercial Hotel on Nandabah Street (Lot 30 DP5 405). The proposed SPS comprises subsurface wet well and is equipped with an odour control unit/ Switch Control enclosure.
- Construction of a new sewage treatment plant (STP) and onsite irrigation (reuse) of treated effluent within the proposed STP site (Lot 160 DP 755260).
- Construction of a new pressure reticulation system throughout the village and a 2.4 kilometer(km) long rising main.

The scope of this OIA is limited to the assessment of impacts associated with the operation of the SPS. Impacts associated with the operation of the STP will be assessed separately.

1.1 Assessment Approach

SLR has performed a qualitative risk-based assessment of the impacts associated with the operation of the SPS (based on the information available), to identify if the proposed sources have the potential for off-site air quality impacts. A quantitative (i.e., air dispersion modelling) assessment was not performed since at the time of the assessment detailed information on the proposed operations and details of the facility design (potential emission rates, specification of stack, etc.) was not available. Considering the limited information available a detailed (quantitative) assessment was considered to be of limited value.

The risk-based assessment methodology takes account of a range of impact descriptors, including the following:

- Nature of Impact: does the impact result in an adverse or beneficial environment?
- Sensitivity: how sensitive is the receiving environment to the anticipated impacts? This may be applied to the sensitivity of the environment in a regional context or specific receptor locations.
- Magnitude: what is the anticipated scale of the impact?

The integration of sensitivity with impact magnitude is used to derive the predicted significance of the change. Given the nature of the proposed operations, and the limited design data currently available, it is considered that this approach is appropriate to identify if the proposed activities have the potential to give rise to off-site air quality impacts. See **Appendix A** for a full description of the assessment methodology.

2.0 Project Overview

2.1 Site Location

The SPS is located opposite the Commercial Hotel on Nandabah Street, Rappville (the Site). Rappville is located within the Richmond Valley Council local government area and is situated approximately 70 kilometres (km) north of Grafton. The Site covers approximately 60 square metres (m^2) of land (see **Figure 1)**.

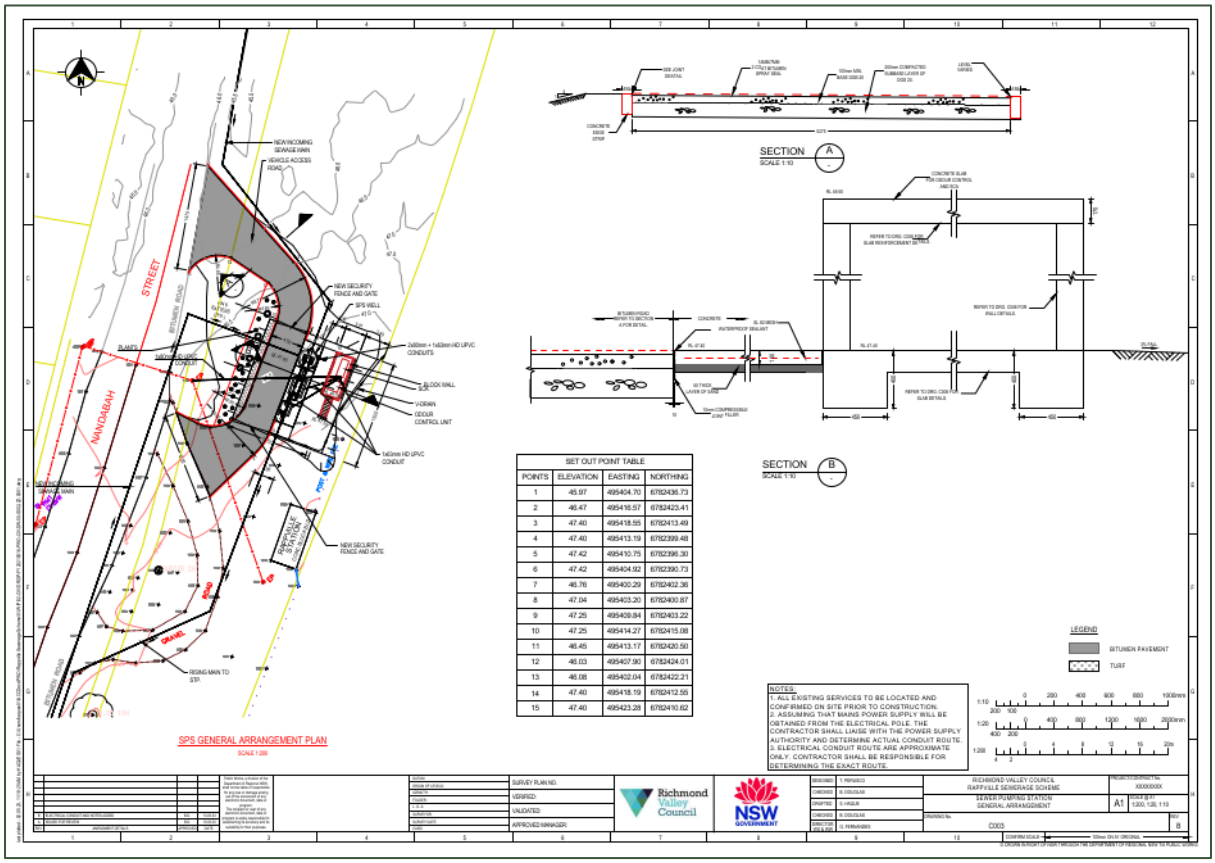
Figure 1 Site Location



2.2 Proposed SPS Design

The proposed SPS comprises a subsurface wet well and is equipped with an odour control unit and switch control enclosure. The SPS general arrangement is shown in **Figure 2**.

Figure 2 SPS General Arrangement



According to the Rappville Sewage Scheme odour control document provided by NSW PW, the proposed SPS system includes:

- Extraction fan - The fan would be provided with a screen, being a pull-out type and easily able to be changed and be intrinsically safe to lower risks of explosion.
- Treatment system
  - One biological treatment system with engineered inorganic media or organic media; or
  - An activated carbon unit (ACU) for treatment; or
  - A biological treatment system followed by an activated carbon unit.
- Drainage pipework back to the pump station
- A concrete slab.

The system specifications are as presented in **Table 1**.

Table 1 Odour Control System Specifications

Parameter	Value
Incoming airflow rate (pump rate)	11.4 litres per second (L/s)
Peak H_2S Loading	up to 100 ppm
Average H_2S Loading	5 ppm

2.3 Identification of Odour Sources

The main potential odour source at the SPS is the wet well. It is understood that the wet well is enclosed and foul air from the wet well will be extracted and passed through the proposed odour control system prior to release to atmosphere. Depending on the final design of the wet well, there may be potential for fugitive emissions through the cover openings.

The location of the wet well is illustrated in **Figure 3**.

Figure 3 Odour Sources Location

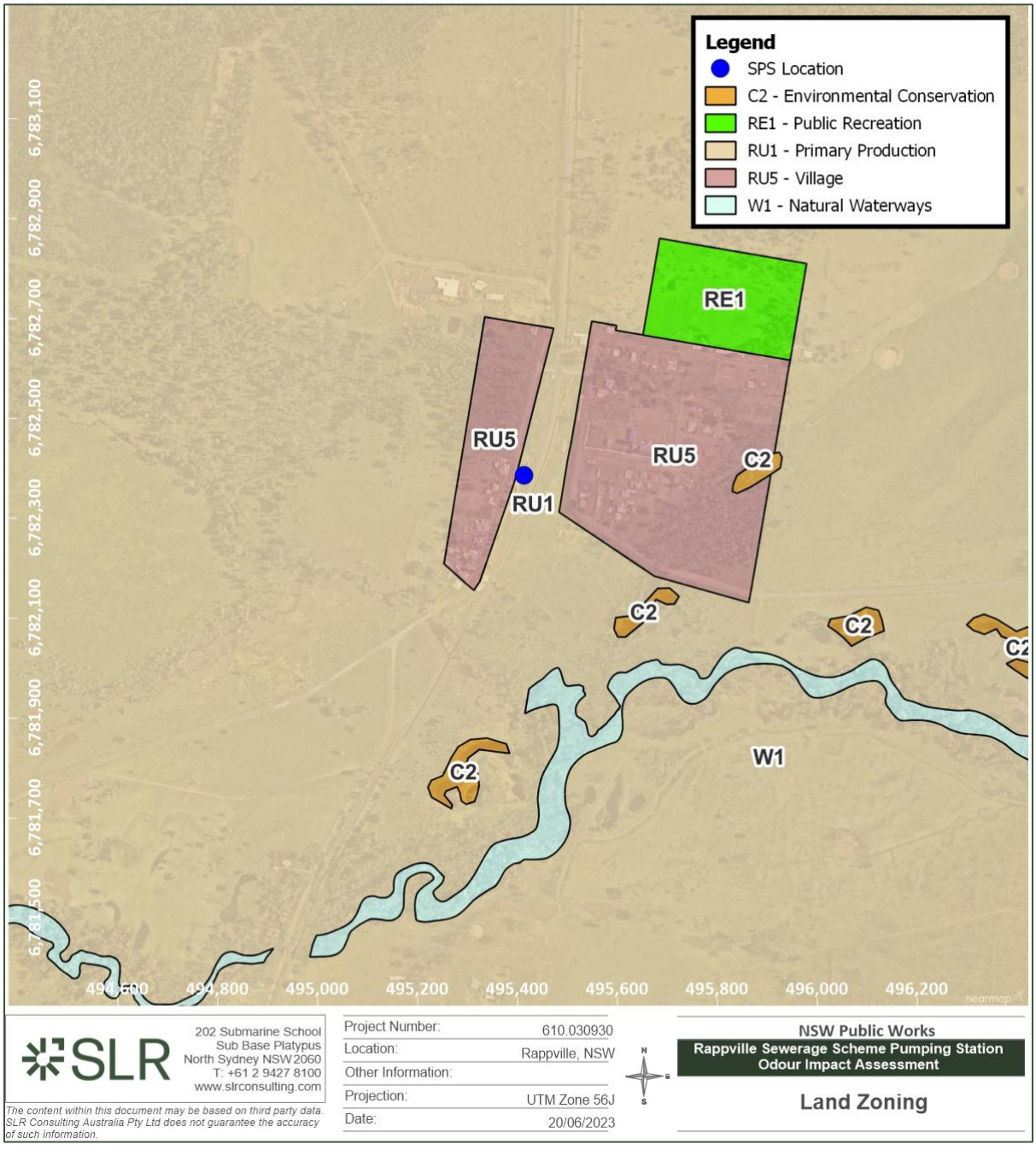


3.0 Project Setting

3.1 Surrounding Land Use and Sensitive Receptors

As shown in **Figure 4**, the Site is located within Primary Production (RU1) zoned land. The lands to the north, south, and east of the Site are zoned RU1. There are lands zoned village (RU5) to the west of the Site and beyond the RU1 land to the east of the Site.

Figure 4 Surrounding Land Uses



As presented in **Figure 5** the nearest sensitive receptor to the Site boundary is the Commercial Hotel Rappville (the Hotel) located approximately 40 m west of the Site.

Figure 5 Surrounding Receptors

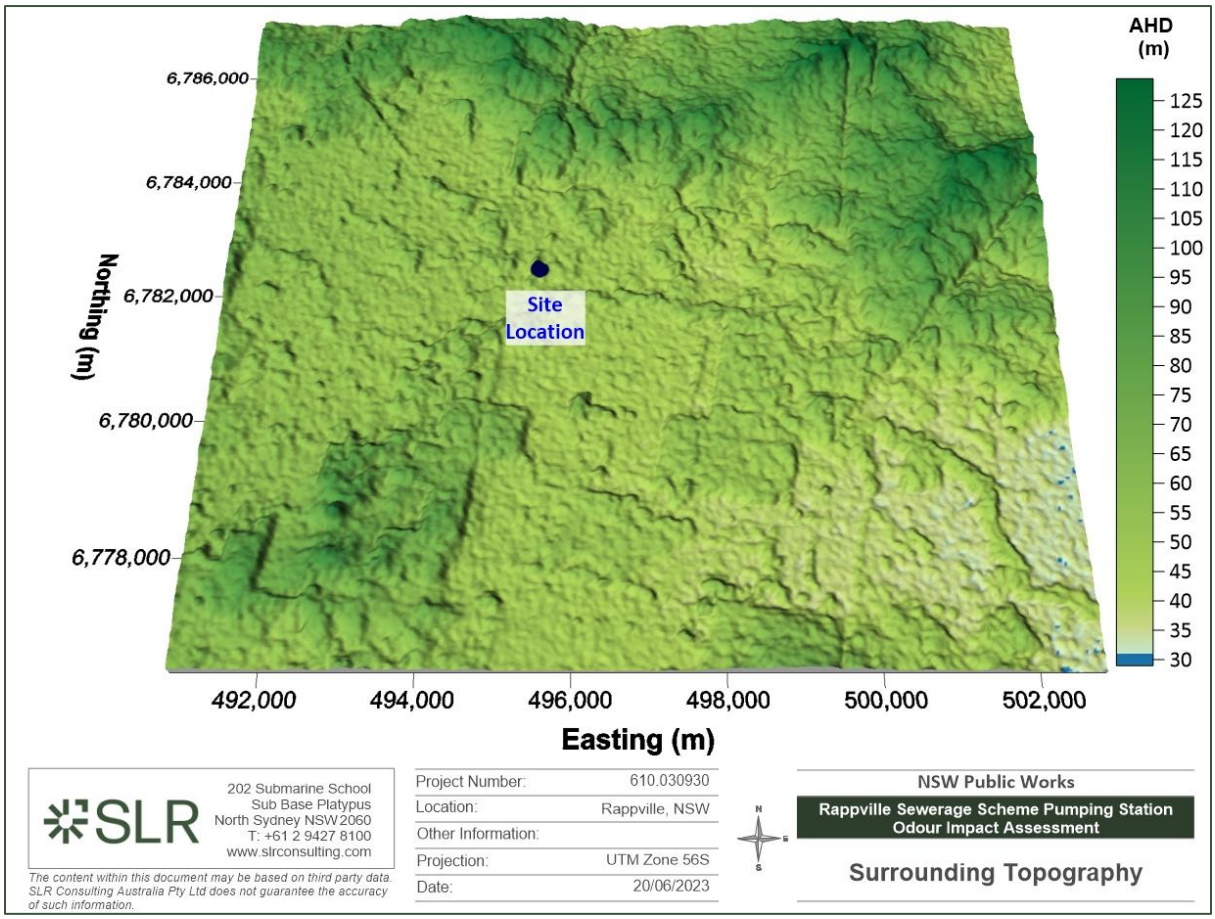


3.2 Local Topography

Local topography is important in air quality studies as local atmospheric dispersion can be influenced by night-time katabatic (downhill) drainage flows from elevated terrain or channelling effects in valleys or gullies.

The topography of the Site and near surrounds is relatively flat with an elevation of the approximately 50 m Australian Height Datum (AHD). A three-dimensional representation of the area surrounding the Site is presented in **Figure 6**.

Figure 6 Regional Topography



3.3 Local Meteorological Conditions

Local wind speed and direction influence the dispersion of air pollutants. Wind speed determines both the distance of downwind transport and the rate of dilution as a result of 'plume' stretching. Wind direction, and the variability in wind direction, determines the general path pollutants will follow and the extent of crosswind spreading. Surface roughness (characterised by features such as the topography of the land and the presence of buildings, structures and trees) will also influence dispersion.

The Bureau of Meteorology (BoM) maintains and publishes data from weather stations across Australia. The closest such station is the Casino Airport Automatic Weather Station (AWS) (Station ID: 58208), which is located approximately 25 km to the northeast of the Site. Considering the distance between the Site location and the Casino Airport AWS, the recordings from this AWS are not considered to be a reasonable representation of the wind conditions in the area surrounding the Site. Therefore, in order to compile a more site-representative dataset for the Site, The Air Pollution Model (TAPM) meteorological model was used.

TAPM, developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) of Australia, is a prognostic model which can be used to compile a site-representative meteorological dataset in areas where there is limited observational data available, and has been widely used for meteorological and pollutant dispersion modeling studies throughout Australia. The model allows the user to generate synthetic observations by referencing databases (covering terrain, vegetation and soil type, sea surface temperature and synoptic scale meteorological analyses).

The CSIRO has a global data set of synoptic meteorological data that is required as input to the TAPM model. It is derived from analysis data used by meteorological services for weather forecasting. The synoptic meteorological data used in the modelling has been obtained from the CSIRO for the Asia Pacific region for the years of 2018-2022 (inclusive). **Table 2** details the parameters used in the TAPM meteorological model for this assessment.

Table 2 TAPM Input Parameters Used in this Study

Parameter	Site
Number of grids (spacing)	4 (30 km, 10 km, 3 km, 1 km)
Number of grid points	25 x 25 x 25
Year of analysis	2018-2022
Centre of analysis	495,945 mE 6,782,781 mS (UTM zone 56s)

A summary of the average annual and seasonal wind behaviour predicted by TAPM for the modelled years (2018-2022) at Site is presented as wind roses in **Figure 7**.

Wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points (degrees from North). The bar at the top of each wind rose diagram represents winds blowing from the north (i.e., northerly winds), and so on. The length of the bar represents the frequency of occurrence of winds from that direction, and the widths of the bar sections correspond to wind speed categories, the narrowest representing the lightest winds. Thus, it is possible to visualise how often winds of a certain direction and strength occur over a long period, either for all hours of the day, or for particular periods during the day.

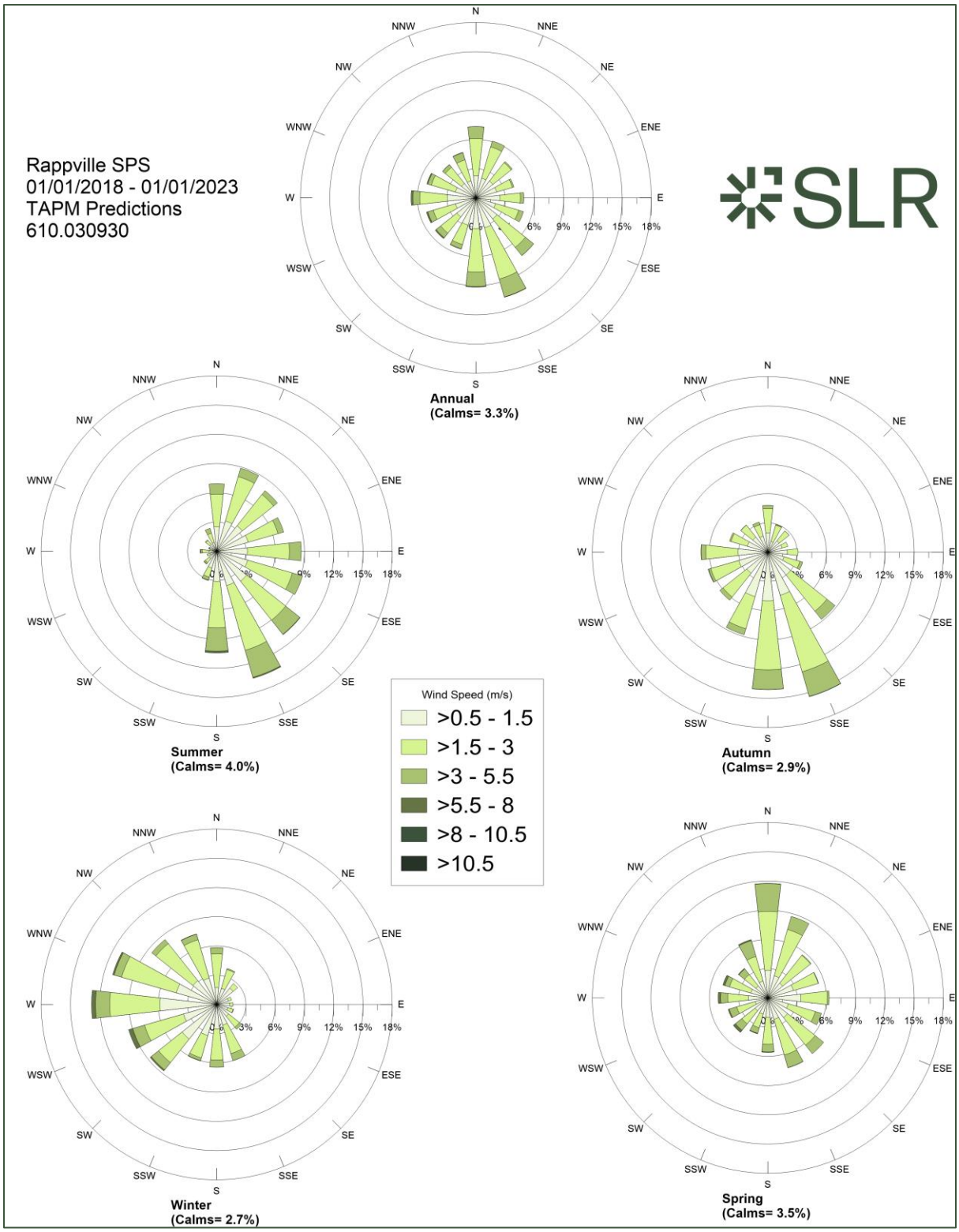
The annual wind rose for the years 2018-2022 indicates that throughout the year, winds are mostly light to gentle (between 1.5 m/s and 8.2 m/s) and blow from all directions with more winds from south-eastern quadrant and north direction. Calm wind conditions (wind speed less than 0.5 m/s) were predicted to occur approximately 3.3% of the time.

The seasonal wind roses for the years 2018-2022 indicate that:

- In summer, winds are predominantly north-easterly and southerly, with few westerly winds. Calms were predicted to occur approximately 4.0% of the time.
- In autumn, winds are predominantly from the south-eastern and western quadrants. Calms were predicted to occur approximately 2.9% of the time.
- In winter, winds are predominantly from western quadrant. Calms were predicted to occur approximately 2.7% of the time.
- In spring, winds blow from all directions with more winds from south-eastern quadrant and north direction. Calms were predicted to occur approximately 3.5% of the time.

As identified in **Section 3.1**, the closest sensitive receptor (Commercial Hotel Rappville) is located to the southwest of the SPS. Winds from the north-eastern direction, which would blow air emissions from the SPS towards this receptor, occur less than 9% of the time.

Figure 7 Site Annual and Seasonal Wind Roses, 2018-2022



4.0 Air Quality Policy and Guidance

The following air quality policy and guidance documents have been referenced within this assessment and have been used to identify the relevant air quality criteria (see **Section 4.5**).

4.1 Protection of the Environment Operations (POEO) Act 1997

The POEO Act is a key piece of environment protection legislation administered by the NSW Department of Planning and Environment which enables the Government to establish instruments for setting environmental standards, goals, protocols and guidelines.

The following sections of the POEO Act are of general relevance to the Project:

- Section 124 and 125 of the POEO Act states that any plant located at a premise should be maintained in an efficient condition and operated in a proper and efficient manner to reduce the potential for air pollution.
- Section 126 of the POEO Act requires that materials (e.g., waste storage/disposal at the Project Site) are managed in a proper and efficient manner to prevent air pollution (e.g. odour).
- Section 128 of the POEO Act states:
    1. The occupier of a premises must not carry out any activity or operate any plant in or on the premises in such a manner to cause or permit the emission at any point specified in or determined in accordance with the regulation of air impurities in excess of [the standard of concentration and/or the rate] prescribed by the regulations in respect of any such activity or any such plant.
    2. Where neither such a standard nor rate has been so prescribed, the occupier of any premises must carry on activity, or operate any plant, in or on the premises by such practicable means as may be necessary to prevent or minimise air pollution.

4.2 Approved Methods for Modelling and Assessment

State air quality guidelines adopted by the NSW EPA are published in the NSW EPA's *Approved Methods for Modelling and Assessment of Air Pollutants in NSW* publication (NSW EPA 2022), hereafter referred as the Approved Methods.

The Approved Methods lists the statutory methods for modelling and assessing air pollutants (including odour) from stationary sources and specifies criteria which reflect the environmental outcomes adopted by the EPA. The Approved Methods are referred to in the *POEO (Clean Air) Regulation 2022* (NSW Parliament 2022) for assessment of impacts of air pollutants.

The odour impact assessment criteria set out in the Approved Methods relevant to the Project are reproduced and discussed in **Section 4.5.2**.

4.3 Odour Technical Framework and Notes

The EPA's *Assessment and Management of Odour from Stationary Sources in NSW* (Technical Framework and Technical Notes) publications provide a policy framework for assessing and managing activities that emit odour and offer guidance on dealing with odour issues. These documents are required to be referenced when assessing any odour issue in NSW. These documents do not provide specific guidance for qualitative, or Level 1 assessment of impacts associated with SPS operations.

4.4 NSW DoP Best Practice Odour Guideline

The draft *NSW Best Practice Odour Guideline - Sewerage systems including sewage treatment plants, water recycling facilities, sewage reticulation systems and sewer mining* published in April 2010 (DoP NSW 2010) hereafter referred to as the Odour Guideline, covers sewerage system infrastructure in urban areas including sewage treatment plants, water recycling facilities, sewage reticulation systems and sewer mining. It is noted that the Odour Guideline is a draft document that is not legally enforceable and is not official government policy but provides best practice guidance for managing odour for existing, new and expanding sewage treatment plants.

The following guidance provided in the DoP Odour Guideline is relevant to the new STPs and pumping stations:

- For new pumping stations best practice is the achievement of a 2-ou odour assessment criterion at the boundary of the facility in order to protect the general community and to ensure residents complaints are minimised. Best practice includes:
  - designing pump stations either the ultimate population catchment size, or a specific long-term time horizon
  - designing to ensure that the sulphide generation potential achieves the 2OU odour assessment criteria at the boundary of the facility
  - undertaking wind direction and strength analysis; and
  - adopting new technology that overcomes specific odour problems as the technology becomes available.
- Adoption of good operational practices such as an Odour Management Plan (OMP). An OMP would specify odour operational and management standards and practices and set out strategies and measures for minimising the risks of odour incidents and contingency actions for managing odour issues if they occur.
- Adoption of ‘good neighbour’ procedures and practices and encouraging staff to:
  - communicate and consult with neighbours
  - seek opportunities to explain and interpret management practices
  - provide detailed information about proposed activities or works in progress
  - actively participate in community forums on issues relating to the sewerage system, its management and community values
  - be responsive to neighbour’s concerns and professionally conciliate any issues; and
  - cooperate with neighbours to resolve concerns.

4.5 Air Quality Criteria

4.5.1 Odour Concentration and Emission Rate Definitions

Odour concentration is measured in terms of odour units (ou). 1 ou is the concentration of odour-containing air that can just be detected by 50% of members of an odour panel (persons chosen as representative of the average population sensitivity to odour). This process is defined within Australian Standard AS4323.3: *Stationary Source Emissions – Part 3: Determination of Odour Concentration by Dynamic Olfactometry* (Standards Australia 2001).

The Specific Odour Emission Rate (SOER) is a measure of odour released from an area source and is expressed in odour units emitted per surface and time unit (ou. m^3/ m^2/s or ou. m^3/ m^2/min).

An Odour Emission Rate (OER) is the product of the odour concentration (ou) and the volumetric flow rate (e.g. m^3/s or m^3/min), and is often annotated as ou.m^3/s, or ou.m^3/min. For area sources, the SOER is multiplied by the area of the source to obtain the OER.

4.5.2 Odour Impact Assessment Criteria

Impacts from odorous air contaminants are often nuisance-related rather than health-related. Odour performance goals guide decisions on odour management but are generally not intended to achieve “no odour”.

The detectability of an odour is a sensory property that refers to the theoretical minimum concentration that produces an olfactory response or sensation. This point is called the odour threshold and defines 1 ou. An odour goal of less than 1 ou would theoretically result in no odour impact being experienced.

In practice, the character of a particular odour can only be judged by the receiver’s reaction to it, and preferably only compared to another odour under similar social and regional conditions. Based on the literature available, the level at which an odour is perceived to be a nuisance can range significantly depending on a combination of the following factors:

- *Odour Quality*: whether an odour results from a pure compound or from a mixture of compounds. Pure compounds tend to have a higher threshold (lower offensiveness) than a mixture of compounds.
- *Population sensitivity:* any given population contains individuals with a range of sensitivities to odour. The larger a population, the greater the number of sensitive individuals it may contain.
- *Background level:* whether a given odour source, because of its location, is likely to contribute to a cumulative odour impact. In areas with more closely located sources it may be necessary to apply a lower threshold to prevent offensive odour.
- *Public expectation:* whether a given community is tolerant of a particular type of odour and does not find it offensive, even at relatively high concentrations. For example, background agricultural odours may not be considered offensive, particularly in a rural or semi-rural environment, until a higher threshold is reached than for odours from a landfill facility.
- *Source characteristics:* whether the odour is emitted from a stack (point source) or from an area (diffuse source). Generally, the components of point source emissions can be identified and treated more easily than diffuse sources. Emissions from point sources can be more easily controlled using control equipment.
- *Health Effects:* whether a particular odour is likely to be associated with adverse health effects. In general, odours from agricultural activities are less likely to present a health risk than emissions from industrial facilities.

Experience gained through odour assessments from proposed and existing facilities in NSW indicates that an odour performance goal of 7 ou is likely to represent the level below which “offensive” odours should not occur (for an individual with a ‘standard sensitivity’ to odours). The OEH recommends within the Odour Framework that, as a design goal, no individual be exposed to ambient odour levels of greater than 7 ou. This is expressed as the 99th percentile value, as a nose response time average (approximately one second).

Odour performance goals need to be designed to take into account the range in sensitivities to odours within the community and provide additional protection for individuals with a heightened response to odours. In NSW this is done using a statistical approach which

depends on the size of the affected population. As the affected population size increases, the number of sensitive individuals is also likely to increase, which suggests that more stringent goals are necessary in these situations. In addition, the potential for cumulative odour impacts in relatively sparsely populated areas can be more easily defined and assessed than in highly populated urban areas. It is often not possible or practical to determine and assess the cumulative odour impacts of all odour sources that may impact on a receptor in an urban environment. Therefore, the proposed odour performance goals allow for population density, cumulative impacts, anticipated odour levels during adverse meteorological conditions and community expectations of amenity.

The equation used by the OEH to determine the appropriate impact assessment criteria for complex mixtures of odorous air pollutants, as specified in the Approved Methods, is expressed as follows:

Impact assessment criterion (ou) = (log10(population)-4.5)/-0.6

A summary of the impact assessment criteria given for various population densities, as drawn from the Approved Methods, is given in **Table 3**.

Table 3 NSW EPA Impact Assessment Criteria for Complex Mixtures of Odorous Air Pollutants

Population of Affected Community	Impact Assessment Criteria for Complex Mixtures of Odours (ou) (nose-response-time average, 99th percentile)
Urban area (> 2000)	2.0
~500	3.0
~125	4.0
~30	5.0
~10	6.0
Single residence (< 2)	7.0

Source: The Approved Methods (NSW EPA 2022)

4.6 Minimum Separation Distances

The application of minimum recommended separation distances (or 'buffer' distances) provides a valuable screening tool to judge whether a detailed assessment is required to evaluate the potential risk of conflicting land uses. Separation distances provide guidance on the appropriate level of separation between a source of emissions and sensitive land uses in order to mitigate the impacts of intended and unintended emissions on people. This approach relies on the knowledge that impacts on the environment generally decrease with increasing distance from the source of emissions. Separation distances are based on an understanding of the types of emissions associated with various industries and their potential impacts on people. These distances can vary based on the scale and size of the industry, location, topography, prevailing winds and other factors.

In the absence of separation distance guidelines for NSW, separation distances from other Australian jurisdictions have been reviewed for the purpose of this report, including:

- Separation distance guidelines for air emissions (ACT Government 2018)
- Recommended separation distances for industrial residual air emissions (EPAV 2013)
- Recommended land use separation distances (NTEPA 2017)
- Brisbane City Council Industrial Amenity Overlay Code (BCC 2014)
- Evaluation Distances for Effective Air Quality and Noise Management (SA EPA 2016)
- Recommended separation distances for industrial residual air emissions (WA EPA 2015)

Table 4 summarises relevant separation distances for sewage pumping stations. It is noted that these recommended separation distances have been developed to be applied to sensitive uses, such as residential dwellings, schools, hospitals and childcare centres.

Table 4 List of Evaluation Distances for Sewage Pump Stations Set by Australian Authorities

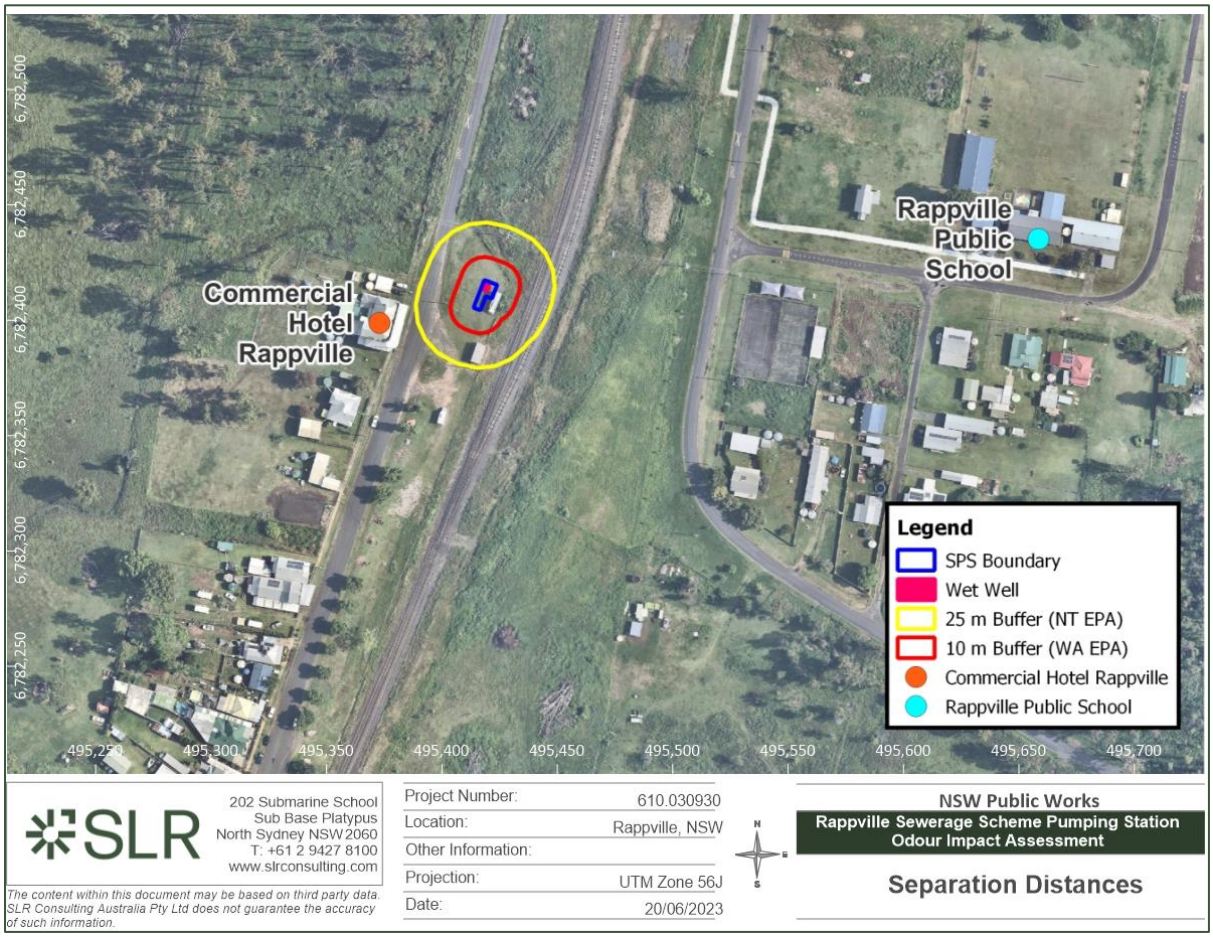
Industry Type	Description	Recommended Separation Distance (m)
NT EPA		
Sewage Pumping Station	Premises on which sewage is pumped (excluding the pumping to and from septic tanks). Total pump rate >= 100 L/s	100
	Total pump rate > 50 L/s but < 100 L/s	50
	Total pump rate <= 50 L/s	25
WA EPA		
Wastewater Pumping Stations	vacuum pumping station	20
	Wastewater pumping station (</= 40L/s)	10
	Wastewater pumping station (</= 90L/s)	20
	Wastewater pumping station (</= 180L/s)	30
	Wastewater pumping station (</= 350L/s)	50
	Wastewater pumping station - major	150

5.0 Odour Risk Assessment

5.1 Separation Distance

As discussed in **Section 2.3**, odour emissions associated with the Project predominantly relate to the wet well. Given the incoming airflow rate of the SPS is 11.4 L/s, a separation distance of 25 m recommended by NT EPA and a separation distance of 10 m recommended by the WA EPA guidelines are considered relevant for the Project (see **Table 4**). As illustrated in **Figure 8**, no sensitive receptors are located within these buffers.

Figure 8 SPS Boundary and NT and WA EPA Guideline Separation Distances



5.2 Assessment of Impacts

As mentioned in **Section 1.1**, the potential for odour impacts from a source at the sensitive receptors may be evaluated by addressing the frequency, intensity, duration, offensiveness and location (refer **Section 4.5.2**) factors.

- Frequency - the nearest sensitive receptor is located to the southwest of the Site (see Section 3.1) have a low potential to experience odour impacts since north-easterly winds occur less than 9% of the time, therefore there is a low likelihood that this receptor would experience frequent potential odour impacts from the Site.
- Intensity – based on the distance between the SPS and the nearest sensitive receptor, the odour intensity is expected to be negligible at the receptor. Given this, odours from the SPS are likely to be of low intensity and generally of intermittent nature.

- Duration - Given that conducive wind directions only occur less than 9% of the time, the potential duration of any odour impacts is concluded to be low.
- Offensiveness – Given the nature of the activities held during the operation of the SPS, the very low intensity odours that may be detectable beyond the boundary of the Site would be expected to have a low level of offensiveness.
- Location - the impact of location on the acceptability of odours from the Site has been accounted for by the surrounding receptors sensitivity classifications detailed in Appendix A (high).

Given the above, the potential impact of odour emissions from the Site is considered to be ***negligible*** (ie Impact is predicted to cause no significant consequences) for the Site (see **Table 5**).

Table 5 Impact Significance – Odour from the SPS

Potential Odour Exposure Impact	Receptor Sensitivity		
	Low	Medium	High
Very Large	Moderate adverse	Substantial adverse	Substantial adverse
Large	Slight adverse	Moderate adverse	Substantial adverse
Medium	Negligible	Slight adverse	Moderate adverse
Small	Negligible	Negligible	Slight adverse
Negligible	Negligible	Negligible	Negligible

In line with the odour IAQM method, it is concluded that the overall effect is **'negligible'**.

6.0 Mitigation Measures

As outlined in **Section 4.6**, the risk of odour impacts at the nearby sensitive receptors is anticipated to be negligible. Therefore, additional physical controls are deemed not necessary.

However, to ensure that impacts on off-site air quality are minimised, it is recommended that good management procedures be adopted. It is recommended that the management procedures are documented in an Odour Management Plan (OMP). The OMP should outline the management structure and strategies for odour performance during the operation of the SPS. It is recommended that the OMP be developed as per the recommendations of the Odour Guideline and that it includes procedures for complaints registering and investigation.

7.0 Conclusion

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by NSW Public Works (NSW PW) to prepare an Odour Impact Assessment for a new Sewage Pump Station at Rappville. The main potential source of emissions to air was identified to be the SPS wet well and associated pollution control system.

The potential for off-site odour impacts due to the SPS operations was assessed using a qualitative risk-based approach.

The findings of the assessment indicate that given the scale and nature of the SPS operations and the distance between the SPS and the surrounding receptors, there is a negligible risk of off-site odour issues during the operation of the SPS.

To further reduce the potential for odour impacts, it is recommended that management measures including an Odour Management Plan, good neighbour procedures and a complaints register be adopted in line with the recommendations of the DoP Odour Guideline.

8.0 References

ACT Government. 2018. “Separation Distance Guidelines for Air Emissions.”

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NSW Parliament. 2022. *Protection of the Environment Operations (Clean Air) Regulation 2022.* December.

NTEPA. 2017. *Guideline: Recommended Land Use Separation Distances.* Northern Territory Environment Protection Authority.

SA EPA. 2016. “Evaluation distances for Effective Air Quality and Noise Management.”

WA EPA. 2015. *Separation distances between Industrial and Sensitive Land Uses.*

Appendix A Odour Risk Assessment Methodology

Rappville Sewerage Scheme Pumping Station

Odour Impact Assessment

NSW Public Works

SLR Project No.: 610.030930.00001

19 June 2023

Nature of Impact

Predicted impacts may be described in terms of the overall effect upon the environment:

- **Beneficial:** the predicted impact will cause a beneficial effect on the receiving environment.
- **Neutral:** the predicted impact will cause neither a beneficial nor adverse effect.
- **Adverse:** the predicted impact will cause an adverse effect on the receiving environment.

Receptor Sensitivity

Sensitivity may vary with the anticipated impact or effect. A receptor may be determined to have varying sensitivity to different environmental changes, for example, a high sensitivity to changes in air quality, but low sensitivity to noise impacts. Sensitivity may also be derived from statutory designation which is designed to protect the receptor from such impacts.

Sensitivity terminology may vary depending upon the environmental effect, but generally this may be described in accordance with the following broad categories - Very high, High, Medium and Low.

Table A1 outlines the methodology used in this study to define the sensitivity of receptors to air quality impacts.

Table A1 Receptor Sensitivity to Odours

Sensitivity	Criteria
High	Surrounding land where: • users can reasonably expect enjoyment of a high level of amenity; and • people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.
Medium	Surrounding land where: • users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or • people wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Low	Surrounding land where: • the enjoyment of amenity would not reasonably be expected; or • there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial use, farms, footpaths and roads.

Magnitude

Magnitude describes the anticipated scale of the anticipated environmental change in terms of how that impact may cause a change to baseline conditions. Magnitude may be described quantitatively or qualitatively. Where an impact is defined by qualitative assessment, suitable justification is provided in the text.

Table A2 Magnitude of Impacts

Magnitude	Description
Very Large	Impact is predicted to cause significant consequences on the receiving environment (may be adverse or beneficial)
Large	Impact is predicted to possibly cause statutory objectives/standards to be exceeded (may be adverse)
Medium	Predicted impact may be tolerated for most of the days, but maybe intolerable for some days.
Small	Predicted impact may be tolerated.
Negligible	Impact is predicted to cause no significant consequences.

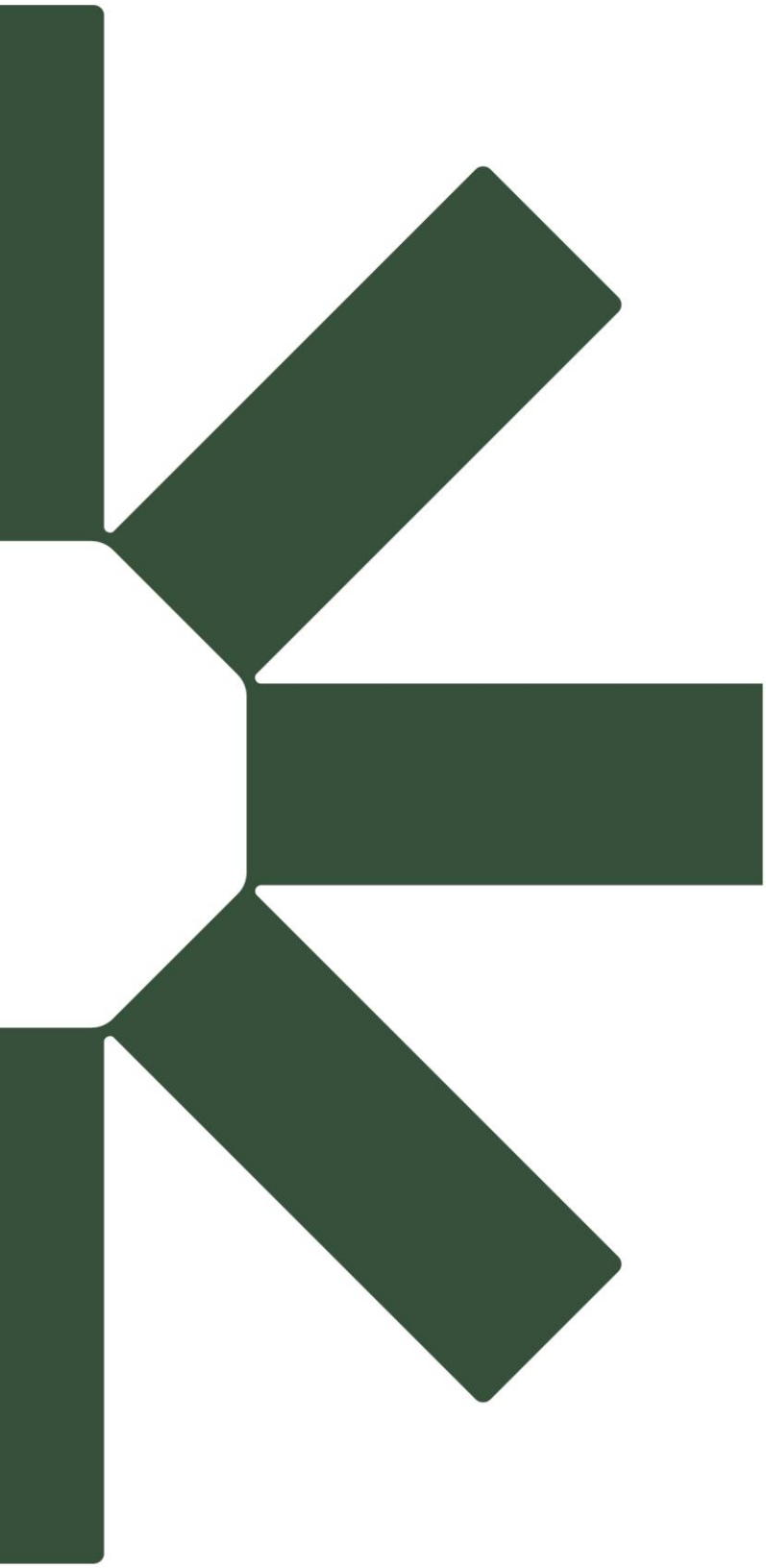
Significance

The risk-based matrix provided below illustrates how the definition of the sensitivity and magnitude interact to produce impact significance.

Table A3 Impact Significance Matrix

Potential Odour Exposure Impact	Receptor Sensitivity		
	Low	Medium	High
Very Large	Moderate adverse	Substantial adverse	Substantial adverse
Large	Slight adverse	Moderate adverse	Substantial adverse
Medium	Negligible	Slight adverse	Moderate adverse
Small	Negligible	Negligible	Slight adverse
Negligible	Negligible	Negligible	Negligible

Where the overall effect is greater than “slight adverse”, the effect is likely to be considered significant. Note that this is a binary judgement: either it is “significant”, or it is “not significant”. Concluding that an effect is significant should not mean, of itself, that a development proposal is unacceptable, and the planning application should be refused; rather, it should mean that careful consideration needs to be given to the consequences, scope for securing further mitigation, and the balance with any wider environmental, social and economic benefits that the proposal would bring.



Making Sustainability Happen

Appendix G – Bushfire Assessment

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FIRETECH
BUSHFIRE CONSULTING

Bushfire Assessment Report

Proposed Development: Rappville Sewerage Treatment Plant – Industrial development including construction of Class 10a buildings

Client: The Department of Regional NSW - NSW Public Works

Property Details: Lot 160 DP 755620

5 Bailey Road Myrtle Creek NSW 2469

LGA: Richmond Valley

Date of Issue: 16/11/2023

Report prepared by:

Peter Mamone
GCert (Bushfire Protection) *UWS*
BEnvSci (Resource Mgt) *SCU*
FPAA Member #56127

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

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Document Control

Version	Date	Description	Prepared by	Authorised by
0.1	16/11/2023	Draft	PM	PM

Executive Summary

This report has been prepared to assess the Rappville Sewerage Treatment Plant at Lot 160 DP 755620, 5 Bailey Road Myrtle Creek NSW 2469 to determine the Bushfire Attack Level (BAL) for the site and relevant requirements under '*Planning for Bushfire Protection 2019*' (PBP).

The results of the site assessment undertaken on 14/11/2023 are summarised below.

Bushfire Attack Level (BAL) rating (PBP 2019):	*BAL-29 (entire Class 10a building used by operator)*
Does the development comply with PBP 2019:	*YES.*
Are Performance Solutions presented:	*NO.*

Full results and recommendations are presented in Section 3 & Section 4.

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1. Introduction

1.1 Proposed Development

This bushfire assessment report has been prepared by FireTech Bushfire Consulting on behalf of NSW Public Works for, Rappville Sewerage Treatment Plant (STP) located at Lot 160 DP 755620, 5 Bailey Road Myrtle Creek NSW 2469 (Figure 1).

The proposal is to design and construct a new reticulated sewerage scheme for the village of Rappville and includes construction of a new oxidation pond STP, onsite irrigation (reuse) of treated effluent within the proposed STP site, and sheds to house pumps & operator amenities. The proposed works will be assessed in accordance with Part 5 of the *Environment Planning and Assessment Act* (EP&A Act).

Whilst bushfire is not captured in the National Construction Code (NCC), the proposed development must satisfy the relevant consent authority that it can conform to the relevant provisions within *Planning for Bushfire Protection 2019* (PBP), and *AS3959:2018 'Construction of Buildings in Bushfire-prone Areas'*.

The subject site and surrounds are currently heavily vegetated, consisting of mature & regrowth forest species. The proposed development shall require the clearing of vegetation within the development area, to then be maintained as grass, and will also allow for a 3-5m vegetation zone around the entire perimeter (Ref. Appendix A). It is the intention to reuse treated effluent onsite for irrigation of the grassy areas and allow grazing of this grass.

This assessment shall be focused both on the vegetation to be retained within the subject lot and external to the lot.

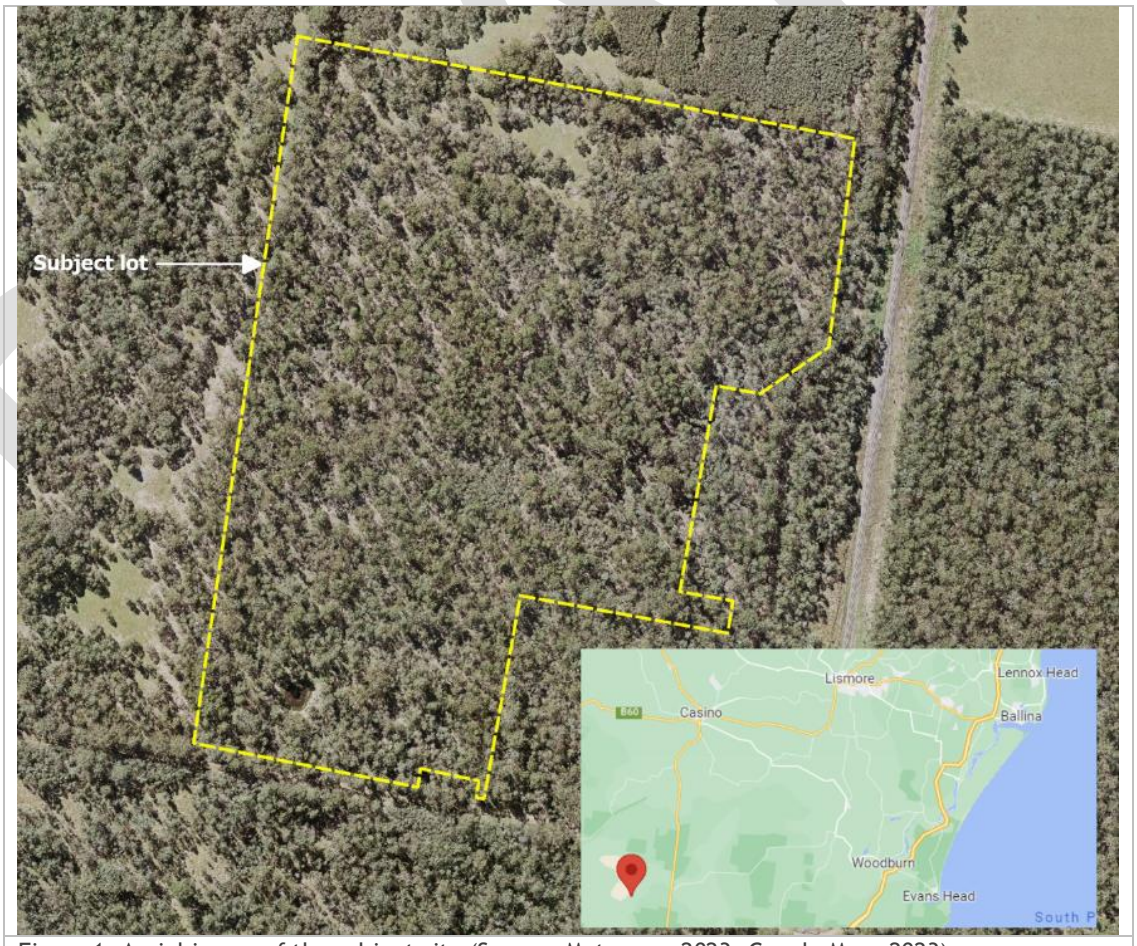


Figure 1: Aerial image of the subject site (Source: Metromap 2023; Google Maps 2023)

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1.2 BUSHFIRE PRONE LAND

The proposed development site is mapped as 'Bush Fire Prone Land' (BFPL) under section 10.3 of the Environmental Planning and Assessment Act (1979), thus triggering the legislative requirements for construction on bushfire prone land (Figure 2).

The proposed development site and surrounds are currently mapped as Category 1 & 2 Vegetation zones (Figure 2).



Figure 2: BFPL Map (Source: NSW Government 2023; Metromap 2023)

1.3 AIM & OBJECTIVES

All development on BFPL must satisfy the aim and objectives of *Planning for Bush Fire Protection* (PBP). The aim of PBP is to provide for the protection of human life and minimise impacts on property from the threat of bush fire, while having due regard to development potential, site characteristics and protection of the environment (PBP).

The aim of this report is to demonstrate how the proposed development shall conform to the specific objectives of infill development of industrial developments by recommending & ensuring that appropriate Bushfire Protection Measures (BPMs) are commensurate to the bushfire risk to the site (Ref. Tables 3-8).

1.4 Limitations of this Report

This bushfire report does not include an environmental, ecological or Aboriginal assessment. A Statement of Environmental Effects (SEE) and any supporting assessments, not limited to the list below, in support of the DA shall be the responsibility of the client.

- State Environmental Planning Policy (Biodiversity and Conservation) 2021
- State Environmental Planning Policy (Resilience and Hazards) 2021
- Biodiversity Conservation Act 2016 (NSW)
- Local Land Services Act 2013 (NSW)
- National Parks and Wildlife Act 1974 (NSW)
- Environmental Protection and Biodiversity Conservation Act 1999

1.5 Method

An onsite assessment of the subject site was undertaken on 14/11/2023 in accordance with the *Site Assessment Methodology* as described in Appendix 1 of PBP.

The Forest Fire Danger Index (FFDI) for the site is 80.

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2. Bushfire Threat Assessment

2.1 Vegetation Analysis

Assessment of vegetation formations are undertaken in accordance with Keith (2004) and s.A1.2 of PBP, to at least 140m from the development site or building (Table 1; Figure 3).

Table 1. Vegetation formation analysis

North – Forest, Northeast – Grassland This area consists of forest on level ground to the north. Beyond Myrtle Creek Road, and the railway line to the northeast is grassland on a 0-5 degree downslope.	 *Photo 1: Forest north*  *Photo 2: Grassland northeast*

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East, South & West – Forest

To the east is Myrtle Creek Road, the railway line, then forest on a 0-5 degree downslope.

To the south is forest on level ground, and to the west is forest on a 0-5 degree downslope.



Photo 3: Forest east



Photo 4: Forest south



Photo 5: Forest west

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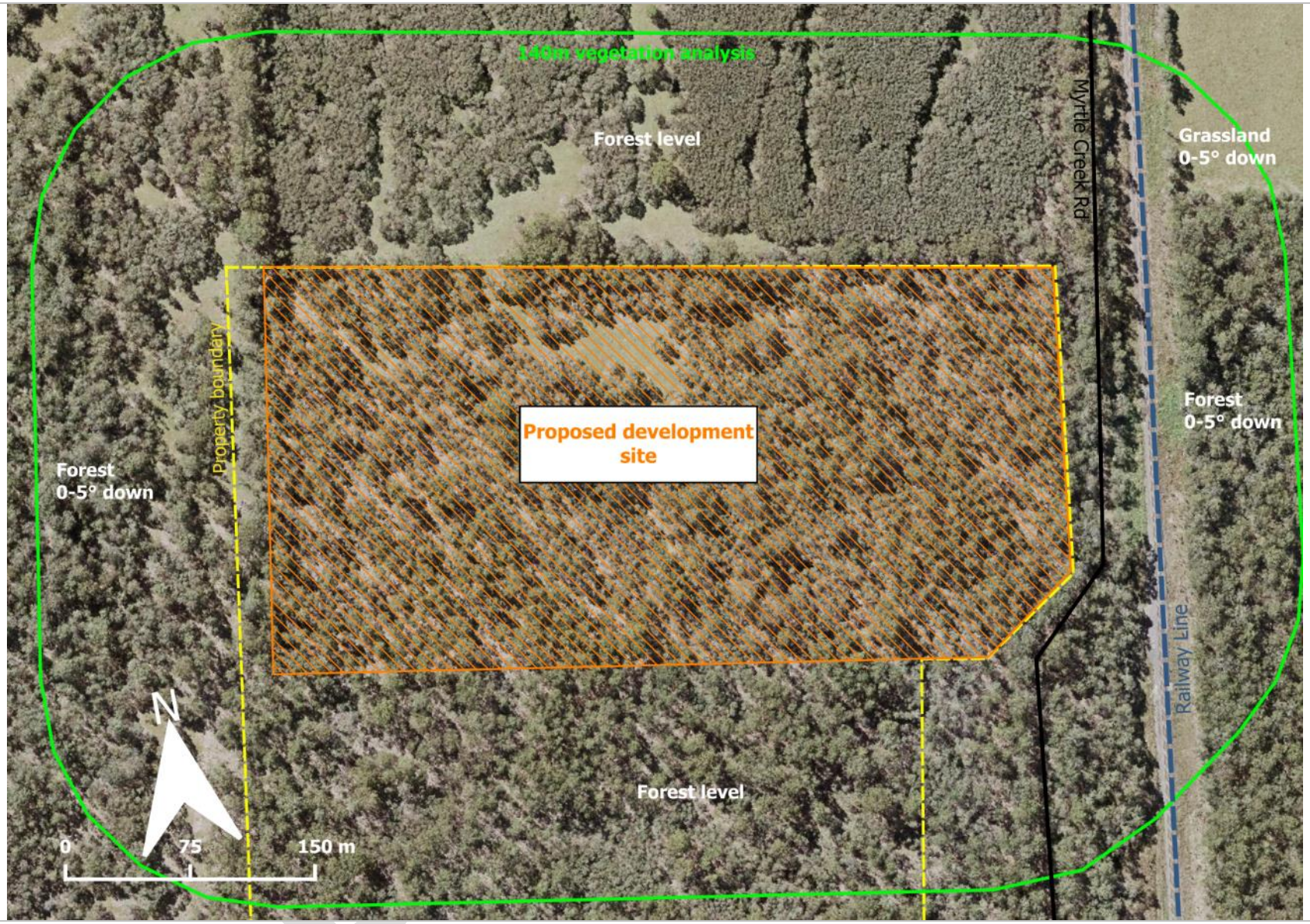


Figure 3: Vegetation analysis for Rappville STP (Source: Metromap 2023)

3. Results

PBP 2019 advises that there are no bushfire requirements for Class 10a buildings, however for industrial developments, Bushfire Protection Measures shall be proposed commensurate with the scale of development, level of risk to the development, and the number of people likely to be occupying the site. Therefore, the following BPMs are proposed.

3.1 Asset Protection Zones (APZs)

The setbacks from the vegetation external to the development site are detailed in Table 2.

Table 2. Summary Bushfire Attack Level (BAL) Assessment for Class 10a buildings

Direction	Vegetation formation	Distance to hazard (m)	Slope	BAL rating
North	Forest	78	Level	BAL-29*
Northeast	Grassland	>100	0-5° down	-
East	Forest	>100	0-5° down	-
South	Forest	>100	Level	-
West	Forest	>100	0-5° down	-

*refer section 3.2 for detail.

Location of the Class 10a buildings are detailed in Figure 4. It is recommended that a defendable space of 10m is provided around these buildings to allow for a minimal fuel area for undertaking of firefighting activities. The defendable space shall be maintained as an Inner Protection Area (IPA) and must comply with *Appendix 4 - Asset Protection Zone Requirements* (PBP 2019) which is presented in Appendix B herein this report.

Table 3. BPM Compliance - APZs

BPM	Performance Criteria	Acceptable Solutions	Complies
Asset Protection Zones	APZs are provided commensurate with the construction of the building; and A defendable space is provided.	An APZ is provided in accordance with Table A1.12.2 or A1.12.3 in Appendix 1.	YES – complies with performance criteria whereby a defendable space shall be provided.
	APZs are managed and maintained to prevent the spread of a fire to the building.	APZs are managed in accordance with the requirements of Appendix 4 of PBP.	YES
	The APZ is provided in perpetuity. APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	APZs are wholly within the boundaries of the development site. APZ are located on lands with a slope less than 18 degrees.	YES

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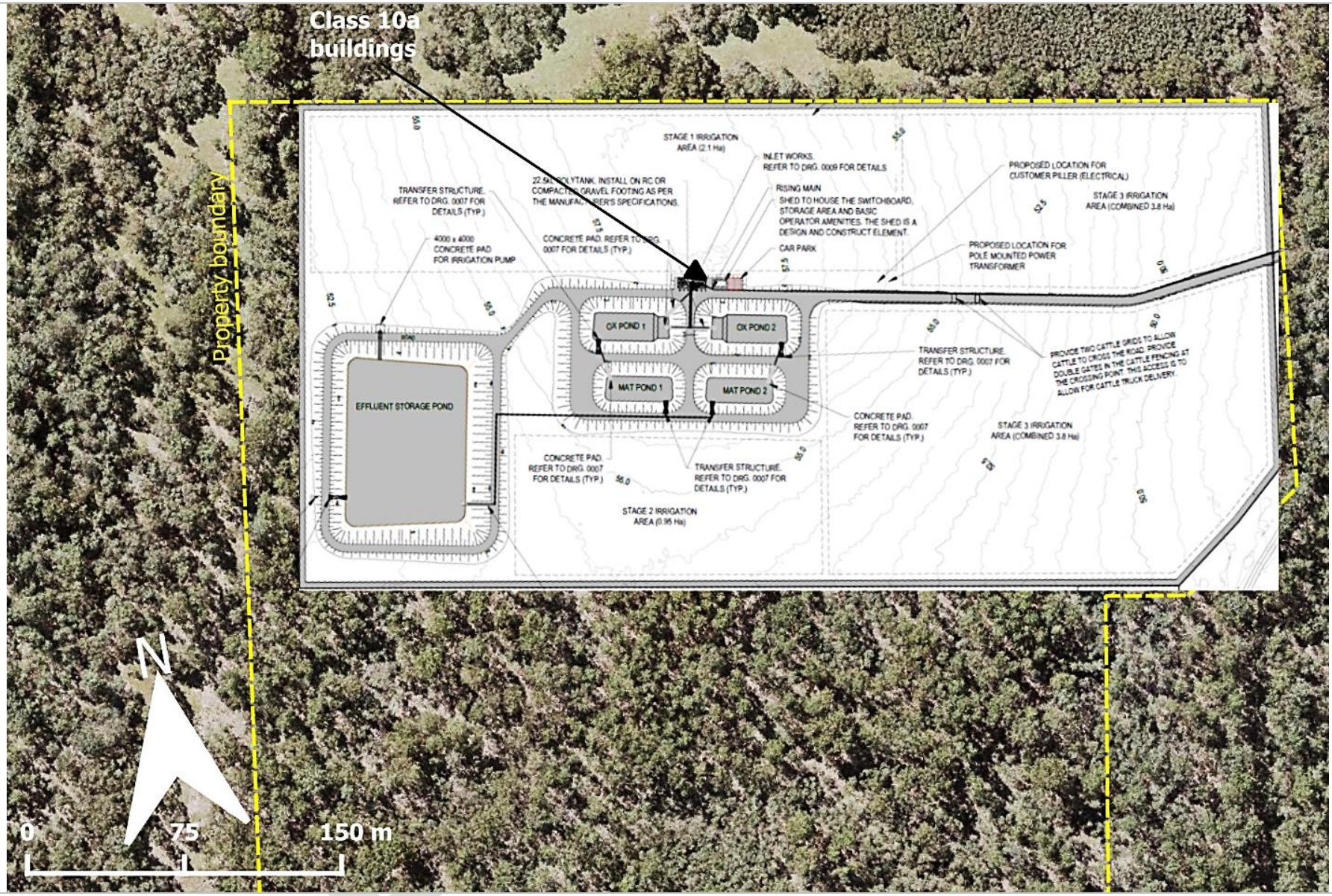


Figure 4: Location of Class 10a buildings (Source: Metromap 2023)

3.2 CONSTRUCTION LEVEL

The development area includes the provision of irrigation areas surrounding the proposed Class 10a buildings which will be used for grazing purposes. Grass fires burn at a higher intensity, spread more rapidly, but have a shorter residence time (PBP 2019). Based upon this, and that the subject site is isolated, it is recommended to construct the Class 10a building used by the operator(s) to BAL-29 to provide extra protection in the incident any occupants require the need to shelter-in-place.

Therefore, construction shall comply with *AS3959:2018 'Construction of Buildings in Bushfire-prone Areas'* s.3 – Construction General and s.7 – Construction Requirements for BAL-29 (entire Class 10a building used by operator).

Table 4. BPM Compliance – Construction

BPM	Performance Criteria	Acceptable Solutions	Complies
Construction Standards	The proposed building can withstand bush fire attack in the form of embers, radiant heat, and flame contact.	BAL is determined in accordance with Tables A1.12.5 to A1.12.7; and Construction provided in accordance with the NCC and as modified by section 7.5 (please see advice on construction in the flame zone).	YES – however a higher BAL rating has been assigned due to the isolation of the subject site.
	Proposed fences and gates are designed to minimise the spread of bush fire.	Fencing and gates are constructed in accordance with section 7.6.	YES
	Proposed Class 10a buildings are designed to minimise the spread of bush fire.	Class 10a buildings are constructed in accordance with section 8.3.2.	YES

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3.3 ACCESS

Access is to comply with Table 7.4a of PBP 2019 (Ref. Table 5).

Access to the subject site is by way of a Council-managed, all-weather, two-way road (Myrtle Creek Road).

A two-way, sealed road is proposed to provide access within and throughout the lot. The road shall traverse primarily through managed land and provides for various passing and turning/reversing opportunities (Ref. Appendix A).

Table 5. BPM Compliance - Access

BPM	Performance Criteria	Acceptable Solutions	Complies
Access	Firefighting vehicles are provided with safe, all-weather access to structures and hazard vegetation.	Property access roads are two-wheel drive, all-weather roads.	YES
	The capacity of access roads is adequate for firefighting vehicles.	The capacity of road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes), bridges and causeways are to clearly indicate load rating.	YES
	There is appropriate access to water supply.	Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2021; There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available.	YES
	Firefighting vehicles can access the dwelling and exit the property safely.	At least one alternative property access road is provided for individual dwellings or groups of dwellings that are located more than 200 metres from a public through road. There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles.	YES – complies with performance criteria. Being a Class 10a building, provision of safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupant egress for evacuation shall be provided.

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3.4 Water Supply

Water supply is to comply with Table 7.4a of PBP 2019 (Ref. Table 6).

A minimum 20,000L non-combustible Static Water Supply (SWS), with a 65mm Storz valve, shall be provided for the protection of buildings during and after the passage of bush fire. A hardened ground surface shall be provided within 4m of the water supply to allow access for firefighting vehicles.

Table 6. BPM Compliance - Water Supply

BPM	Performance Criteria	Acceptable Solutions	Complies
Water Supplies	An adequate water supply is provided for firefighting purposes.	Reticulated water is to be provided to the development where available. A static water supply is provided where no reticulated water supply is available.	YES
	Water supplies are located at regular intervals; and The water supply is accessible and reliable for firefighting operations.	Fire hydrant spacing, design and sizing comply with the relevant clauses of AS 2419.1:2021; Hydrants are not located within any road carriageway; and Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	N/A
	Flows and pressure are appropriate.	Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2021.	N/A
	The integrity of the water supply is maintained.	All above-ground water service pipes external to the building are metal, including and up to any taps.	YES
	A static water supply is provided for firefighting purposes in areas where reticulated water is not available.	Where no reticulated water supply is available, water for firefighting purposes is provided in accordance with Table 5.3d (PBP).	YES

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3.5 UTILITIES – ELECTRICITY & GAS SUPPLY

Electricity & Gas services are to comply with Table 7.4a of PBP 2019 (Ref. Table 7).

Electricity & Gas services (where installed) shall be located to limit the possibility of ignition of the surrounding vegetation or fabric of the building.

An underground electricity supply within the site is proposed.

Table 7. BPM Compliance - Electricity & Gas Supply

BPM	Performance Criteria	Acceptable Solutions	Complies
Electricity	Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	Where practicable, electrical transmission lines are underground; and Where overhead, electrical transmission lines are proposed as follows: • Lines are installed with short pole spacing of 30m, unless crossing gullies, gorges, or riparian areas; and • No part of a tree is closer to a power line than the distance set out in ISSC3 *Guideline for Managing Vegetation Near Power Lines*.	YES
Gas	Location and design of gas services will not lead to ignition of surrounding Bushland or the fabric of buildings.	Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 - The storage and handling of LP Gas, and the requirements of relevant authorities, and metal piping is used. All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side. Connections to and from gas cylinders are metal. Polymer-sheathed flexible gas supply lines are not used; and Above-ground gas service pipes are metal, including and up to any outlets.	N/A

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3.6 LANDSCAPING

Landscaping is to comply with Table 7.4a of PBP 2019 (Ref. Table 8).

Landscaping should be designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.

Table 8. BPM Compliance - Landscaping

BPM	Performance Criteria	Acceptable Solutions	Complies
Landscaping	Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	Compliance with the NSW RFS '*Asset protection zone standards*' (see Appendix 4). A clear area of low-cut lawn or pavement is maintained adjacent to the house; Fencing is constructed in accordance with section 7.6; and Trees and shrubs are located so that: • The branches will not overhang the roof; • The tree canopy is not continuous; and • Any proposed windbreak is located on the elevation from which fires are likely to approach.	YES – refer s.4.

3.7 EMERGENCY PLANNING

It is highly recommended that a bushfire survival plan is created for all developments situated on BFPL. A plan can be downloaded via www.rfs.nsw.gov.au/resources/bush-fire-survival-plan (NSW RFS 2022).

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4. Recommendations

APZ

- A defendable space of 10m shall be provided around the Class 10a buildings to allow for firefighting activities.
- The defendable space shall be maintained as an Inner Protection Area (IPA) and must comply with *Appendix 4 – Asset Protection Zone Requirements* (PBP 2019).

Construction Level

- Class 10a building used by the operator(s) shall be constructed as per s.3 – Construction General and s.7 – Construction Requirements, in addition to the NSW variations detailed in s.7.5.2 of PBP 2019 and the National Construction Code.
- Where any associated structure is situated within 6m of this building it is recommended that structure is also constructed to BAL-29.
- Where a fence is within 6m of a building or in areas of BAL-29 or greater, they should be made of non-combustible material only.

Access

- The proposed access within the site complies with PBP 2019. No further requirements in relation to bushfire.

Water Supply

- A water supply of at least 20,000L shall be provided for firefighting purposes.
- For all Static Water Sources (SWS):
    - Where a tank is used for this purpose, it must be non-combustible & have a 65mm Storz valve installed, or underground tanks must have an access hole of 200mm to allow tankers to refill direct from the tank;
    - Where pumps are provided, they are a minimum 5hp or 3kW petrol or diesel-powered pump and are shielded against bush fire attack;
    - Ball valve and pipes are adequate for water flow and are metal;
    - Supply pipes from tank to ball valve have the same bore size to ensure flow volume;
    - All exposed water pipes external to the building are metal, including any fittings;
    - A hardened ground surface shall be provided within 4m of the water supply to allow access for firefighting vehicles, and the connection for firefighting purposes is located within the IPA or non-hazard side, and away from the building.

Landscaping

- Landscaping shall be undertaken to comply with *Appendix 4 – Asset Protection Zone Requirements* (PBP) & RFS guide '*Standards for Asset Protection Zones*'.

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5. Conclusion

This report has demonstrated that the proposed development shall comply with the acceptable solutions and the specific objectives for industrial development as set out in *Planning for Bush Fire Protection* (2019), based upon compliance with the proposed Bushfire Protection Measures and recommendations contained within this report (Ref. Sections 3 & 4 herein).

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Disclaimer

This report has been prepared exclusively for the client and their purposes stated in the opening page above. The report is valid for twelve (12) months from the date of issue, however, where there have been significant alterations to the site, this report will become invalid, and a new site assessment may be required.

Recommendations made within this report are made in good faith and are based on requirements set out in *Planning for Bush Fire Protection 2019*, *AS3959 'Construction of Buildings in Bushfire-prone Areas'*, and the National Construction Code to reduce the risk to life and property. However, it is noted that bushfires are by nature unpredictable therefore the recommendations contained within this report does not guarantee against adverse impacts created by bushfire.

DRAFT

References

NSW Rural Fire Service. (2005). *Standards for Asset Protection Zones*. Sydney: NSW Rural Fire Service.

NSW Rural Fire Service. (2019). *Planning for Bush Fire Protection: A guide for councils, planners, fire authorities and developers*. Granville: NSWRFS.

Standards Australia. (2020). Australian Standard 3959:2018 – Construction of buildings in bush fire prone areas. Sydney: SAI Global.

Legislation

NSW Government. *Environmental Planning and Assessment Act 1979*.

NSW Government. *Rural Fires Act 1997*.

NSW Government. *State Environmental Planning Policy (Transport and Infrastructure) 2021*.

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Appendix A – Site Plans

To add...

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APPENDIX 4

ASSET PROTECTION ZONE REQUIREMENTS

In combination with other BPMs, a bush fire hazard can be reduced by implementing simple steps to reduce vegetation levels. This can be done by designing and managing landscaping to implement an APZ around the property.

Careful attention should be paid to species selection, their location relative to their flammability, minimising continuity of vegetation (horizontally and vertically), and ongoing maintenance to remove flammable fuels (leaf litter, twigs and debris).

This Appendix sets the standards which need to be met within an APZ.

A4.1 Asset Protection Zones

An APZ is a fuel-reduced area surrounding a building or structure. It is located between the building or structure and the bush fire hazard.

For a complete guide to APZs and landscaping, download the NSW RFS document *Standards for Asset Protection Zones* at the NSW RFS Website www.rfs.nsw.gov.au.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows for suppression of fire;
- an area from which backburning or hazard reduction can be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Bush fire fuels should be minimised within an APZ. This is so that the vegetation within the zone does not provide a path for the spread of fire to the building, either from the ground level or through the tree canopy.

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the building;
- damage to the building asset from intense radiant heat; and
- ember attack.

The methodology for calculating the required APZ distance is contained within Appendix 1. The width of the APZ required will depend upon the development type and bush fire threat. APZs for new development are set out within Chapters 5, 6 and 7 of this document.

In forest vegetation, the APZ can be made up of an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defendable space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

Trees

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

When establishing and maintaining an OPA the following requirements apply:

Trees

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

Shrubs

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

Grass

- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.

APPENDIX 3

ACCESS

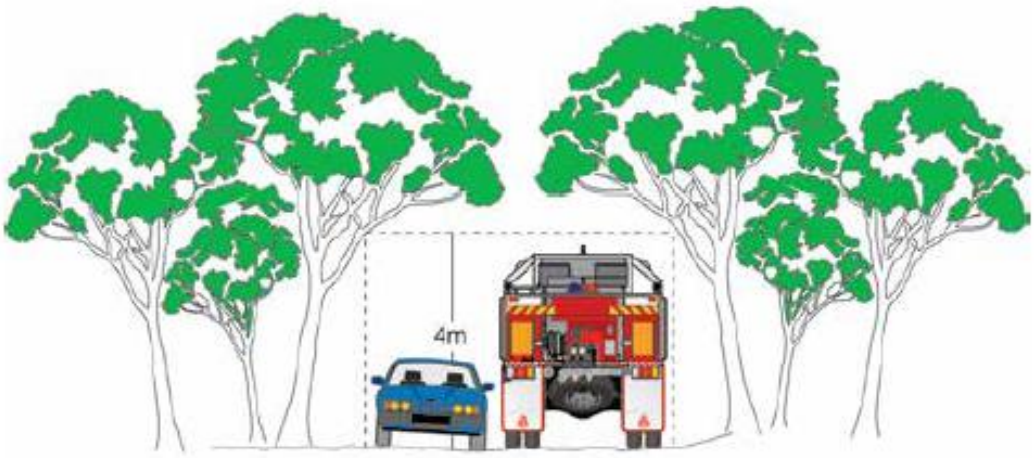
This appendix provides design principles for emergency service vehicle access.

A3.1 Vertical clearance

An unobstructed clearance height of 4 metres should be maintained above all access ways including clearance from building construction, archways, gateways and overhanging structures (e.g. ducts, pipes, sprinklers, walkways, signs and beams). This also applies to vegetation overhanging roads.

Figure A3.1

Vertical clearance.



A3.2 Vehicle turning requirements

Curved carriageways should be constructed using the minimum swept path as outlined in Table A3.2.

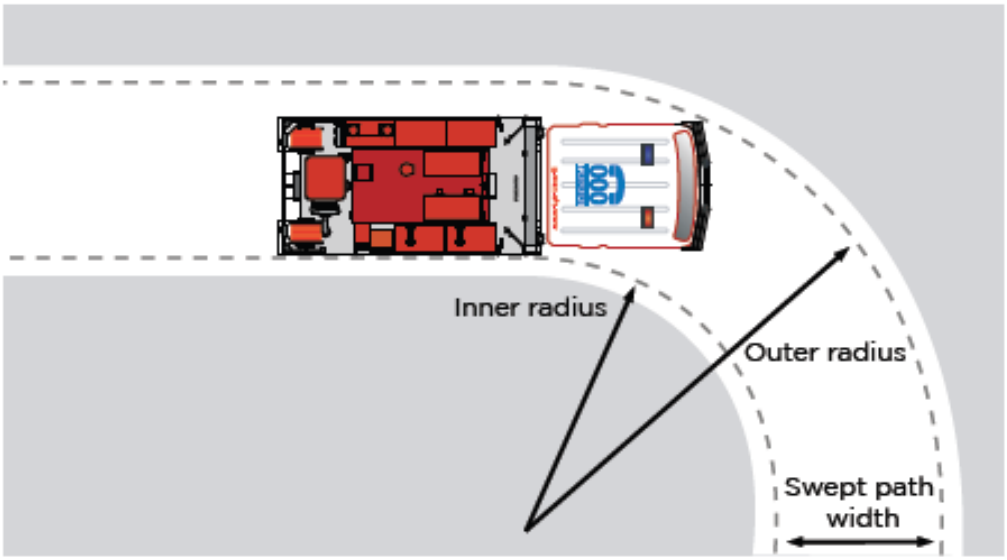
Table A3.2

Minimum curve radius for turning vehicles.

Curve radius (inside edge in metres)	Swept path (metres width)
< 40	4.0
40 - 69	3.0
70 - 100	2.7
> 100	2.5

Figure A3.2a

Swept path width for turning vehicles.



The radius dimensions given are for wall to wall clearance where body overhangs travel a wider arc than the wheel tracks (vehicle swept path). The swept path shall include an additional 500mm clearance either side of the vehicle.

Figure A3.2b

Roundabout swept path.



Example of a swept path as applied to a roundabout. The distance between inner and outer turning arcs allows for expected vehicle body swing of front and rear overhanging sections (the swept path).

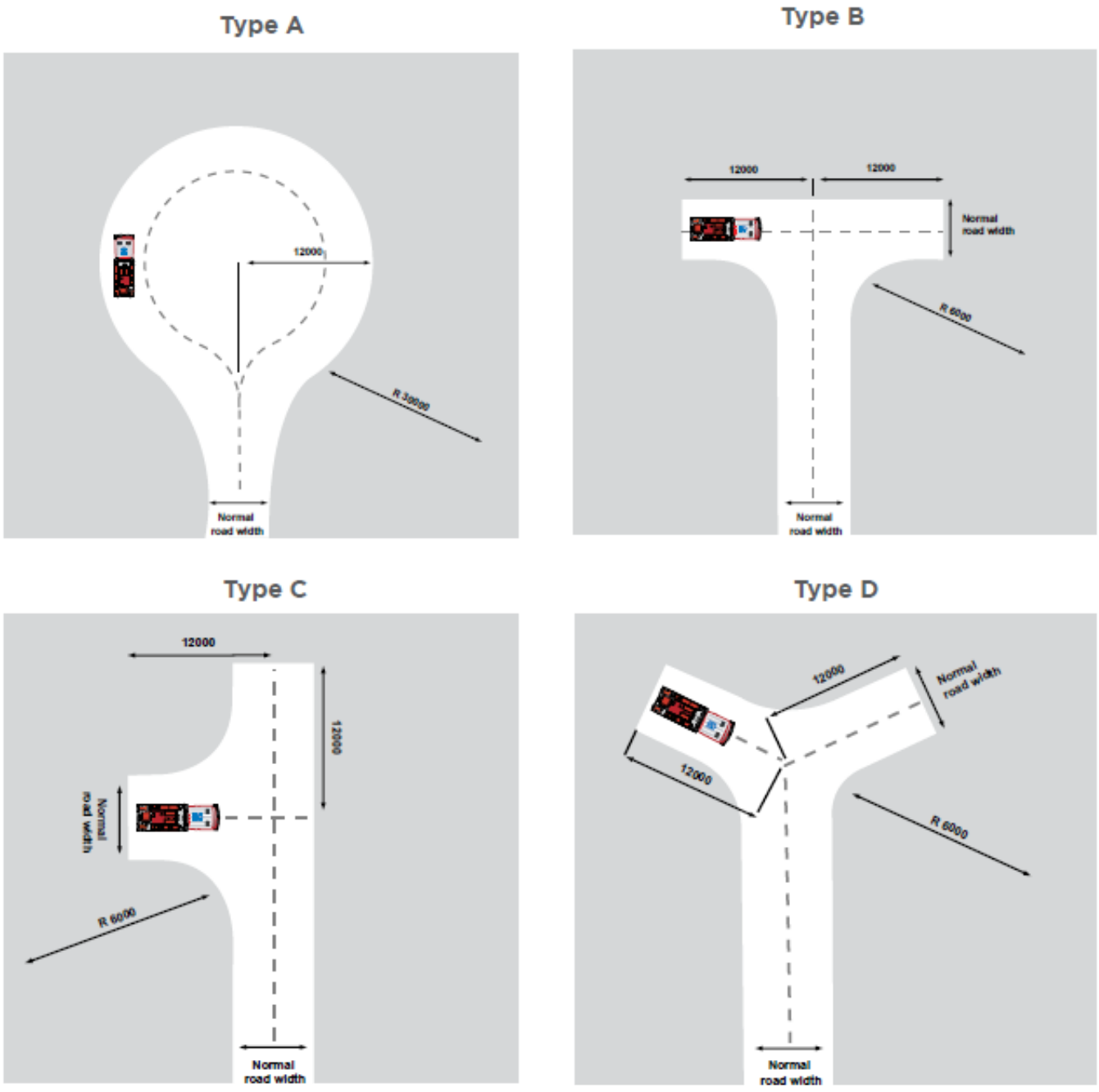
A3.3 Vehicle turning head requirements

Dead ends that are longer then 200m must be provided with a turning head area that avoids multipoint turns. "No parking" signs are to be erected within the turning head.

The minimum turning radius shall be in accordance with Table A3.2. Where multipoint turning is proposed the NSW RFS will consider the following options:

Figure A3.3

Multipoint turning options.



A3.4 Passing bays

The construction of passing bays, where required, shall be 20m in length and provide a minimum trafficable width at the passing point of 6m.

Figure A3.4

Passing bays can provide advantages when designed correctly. Poor design can and does severely impede access.



A3.9.3 Property access

Property access roads are to be a minimum of 4m wide.

Figure A3.9c

Property access road widths.



Appendix H- Rappville Recycled Water Irrigation Management Plan

2023

Rappville Recycled Water Irrigation Management Plan Section 1

This section describes the investigations undertaken to identify the preferred recycled water irrigation scheme for the proposed new wastewater system at Rappville.

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10/20/2023

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1 Summary

The village of Rappville located within the Richmond Valley Council was affected by bushfires in October 2019. The affected parts of the village are now being rebuilt. Council have assessed options to replace the existing onsite septic tanks with a reticulated collection system and centralised sewage treatment plant (STP). In conjunction with Public Works NSW (PW) a 10 ha site (Figure 1) alongside Myrtle Creek Rd about 7 km south of the village has been selected to house the STP as well as an irrigation area that will allow treated effluent (recycled water) to be safely returned to the environment.

Agsol has undertaken investigations to determine practical solutions to allow irrigation of the recycled water to avoid uncontrolled discharges that could potentially damage local water resources.

The selected Rappville STP and irrigation site has the following characteristics

- Area of approximately 10 ha of which 1.5 ha will be set aside for the STP and bulk storage of recycled water
- Low undulating upland currently covered with Eucalypt regrowth requiring substantial clearing and land preparation to establish the STP and the irrigated land use
- Soils that are generally about 50 cm deep underlain by either heavy clays or weathering regolith of varying texture. The soils are sodic requiring amelioration with lime.
- Annual rainfall averaging about 1100 mm with most occurring in summer and autumn thereby significantly reducing irrigation opportunities

Given that STP treatment is likely to produce a water quality that is suitable for irrigation of grazed beef pastures this land use is recommended. Summer growing *Setaria* pastures or similar are preferred to minimise management requirements. However, such species have a low water use during the cooler months and thus *add to the required volume of the wet weather storage.*

To reduce the recommended wet weather storage alternative species such as ryegrass that use more water during the cooler months could be established. However there would be a need to replant this crop on a regular basis. Trees are another alternative but the irrigation systems are difficult to maintain thereby increasing ongoing management.

Using the low maintenance *Setaria* option and identified site constraints, a water balance was constructed to optimise the irrigation land area and wet weather storage needs based on the DEC (2004) recommendation of 100% reuse by irrigation in 50% of years. To minimise the costs associated with expanding the wet weather storage as population grows, a future flow rate (ADWF) of 39.6 kL/day (plus an average 5.6% increase due to stormwater infiltration) was initially examined. This showed that bulk storage of 9 ML with an irrigation area of 6 ha would meet the aforesaid requirement.

By constructing the 9ML storage at the beginning of the scheme (ADWF 22.9 kL/day) only 2.4 ha of irrigation land would initially be required. As the inflow rate increases the irrigation area can be increased in line with the Irrigation Management Plan (IMP) described in Part 3 of this report.

A risk assessment of this scheme has been prepared as shown in Section 2 of this report. This assessment was reviewed and modified through a meeting of all key stakeholders on 17 October 2023. Based on the final risk assessment Agsol has prepared a draft Irrigation Management Plan

as outlined in Section 3 to assist Council to manage the return of recycled water to the environment in a sustainable manner.

Section 1 of this report provides the background to and investigations undertaken for the proposed new scheme, the organisations with legislative responsibility and the guidelines used to develop sustainable recycled water reuse schemes.

Section 2 describes the risk assessment process including the identification of organisations responsible for various components of the scheme, critical control points, critical limits, preventative measures and monitoring requirements

Section 3 identifies Standard Operating Procedures associated with the IMP that protect human and animal health as well as the environment. Verification, monitoring, corrective actions and reporting are also identified.

2 Background

The village of Rappville located within the Richmond Valley Council was affected by bushfires in October 2019. The affected parts of the village are being rebuilt. Council assessed options to replace the existing onsite septic tanks with a reticulated collection system, and a centralised sewage treatment plant (STP).

Currently the village has 49 dwellings as well as a Hotel, community hall, church and recreational facilities including tennis courts and showground/oval. It is understood that 30 additional residential blocks are vacant.

In a recent options report, Public Work Advisory (PWA 2021) identified a future equivalent population (EP) of 220 based on an ADWF of 180 L/EP/d (39.6 kL/day). The current population is expected to produce an ADWF of 22.9 kL/day.

A pressure sewer is the preferred option by Council and Public Works. It is noted that this would not result in wet weather infiltration but under-estimates of potable water use and/or illegal connections to stormwater could increase the ADWF above predicted levels by about 5% (pers comm. Brett Douglas).

Based on a preliminary cost analysis by PWA the cheapest sewage treatment option is an oxidation pond STP. The oxidation pond system would consist of:

- an inlet structure/chamber
- two oxidation ponds 34 m x 34 m
- two maturation ponds (total of 25 day hydraulic residence time) 34 m x 18 m

The STP site would need to be constructed above the 1:100 year flood level and contain

- a wet weather storage pond (size determined by water balance as described in Section 5)
- a pumping system to transfer effluent from the storage pond to the irrigation system
- an overflow from the storage pond for discharge (to the ground or alternatively to the nearby creek)
- an irrigation system for the required irrigation area determined from a water balance (See Section 7)
- associated site services including access road, fencing and lighting of critical elements

PW noted that the oxidation pond system has a low to very low power demand but produces a basic quality of effluent that is suitable for onsite uses such as evaporation and irrigation of land but not for regular discharges to waterways.

3 Legislative Framework and Guidelines

Richmond Valley Council will be the proponent, local consent authority and owner/ operator of the Sewerage Scheme and provide the services to meet best practice targets including;

- Service coverage
- Strategic service planning
- Integrated water supply management
- Efficiency and pricing

As the STP will treat much less than 750 kL/day of raw sewage an Environment Protection Licence (EPL) issued by the EPA is not likely to be required. Hence Council will be the appropriate regulatory authority.

Nonetheless the scheme will need to demonstrate that water pollution is unlikely to occur. Guidelines are available which describe the investigations and modelling that needs to be undertaken to identify sustainable irrigation schemes. These guidelines include.

- 'Reuse of Effluent by Irrigation' - Environmental Guideline (DEC 2004)
- The Australian Guidelines for Recycled Water (NHMRC et al 2006).
- Recycled Water Management Systems Dept of Primary Industries (2015)

These guidelines identify acceptable frequency of unavoidable overflows from the sewage treatment system (such as unusually prolonged periods of wet and cold periods where irrigation cannot be employed). Guidelines also identify suitable quality of water based on the proposed land uses and the ability to minimise contact with humans.

3.1 Frequency of uncontrolled discharges

Based on the DEC 2004, the target level of reuse to be achieved in this scheme is 100% in 50% of years. This target is based on the assumption that the recycled water will be 'low strength' (as defined by DEC 2004).

3.2 Recycled water quality requirements

The surrounding area of Rappville is predominantly used for agriculture and forestry including beef cattle grazing. This land use activity is recommended as it requires little management input and allows local graziers to manage the pastures on behalf of Council in-line with procedures identified in the IMP (Section 3).

Cattle exposed to ova (eggs) of *Taenia saginata*, the human tapeworm, may develop the parasitic cysts of 'beef measles', or *Cysticercus bovis*. *Cysticercus bovis* not only causes cysts in cattle, but also has potential to affect human health — eating poorly cooked, contaminated meat can result in infection with the tapeworm. In addition to human-health risks, the detection of *T. saginata* in export beef can have economic implications by affecting trade.

The control of *T. saginata* in treated sewage that is to be used in contact with cattle has previously been prescribed through either 25 days of detention in waste stabilisation ponds or equivalent treatment (NHMRC and ARMCANZ 2000). Given that the proposed sewage treatment will involve two maturation ponds holding water for 25 days - this land use activity is deemed suitable.

Table 3.1 shows the guidelines for non human use crops and pastures. The Table shows that the 25 days lagoon detention (in proposed maturation ponds) will be required unless cattle can be easily 'withheld' from the irrigation site for 5 days. The latter is not recommended as it would significantly increase the management needs at the site.

Table 3.1 guidelines for agricultural use –non human food crops (Source AGRW 2006)

Use	**Indicative treatment process**	**On-site preventative measures**	**Water quality objectives**
Pasture or fodder crop with limited withholding period	Secondary treatment with helminth reduction (>25 days lagoon detention or filtration) and disinfection	Exclude lactating dairy cattle from pasture or until pasture is dry. Fodder to be dried or ensiled No public access during irrigation, 20-30 m buffer to nearest access point Spray drift control through low flow sprinklers, vegetation screening or anemometer control	TSS<30 mg/l
			Soluble BOD <20 mg/l
			Disinfectant residual (Chlorine) or UV dose
			E.Coli <100 cfu/100 mL

4 The site

The proposed site for the STP and irrigation scheme is shown on Figures 1 and 2 below. The total area of the site is approximately 10 ha. The proposed STP and bulk recycled water storage will occupy an area of approximately 1.5 ha. Taking account the need for buffer zones (DEC 2004) to adjoining properties there is potentially at least 7 ha available for irrigation.

At the time of Agsol's survey (9 May 2023) the site had been unused since the catastrophic bushfires of October 2019. Since that time significant rainfall has occurred leading to substantial regrowth of Eucalyptus trees and other shrubs as shown in Figure 3.



Figure 1 Location of site

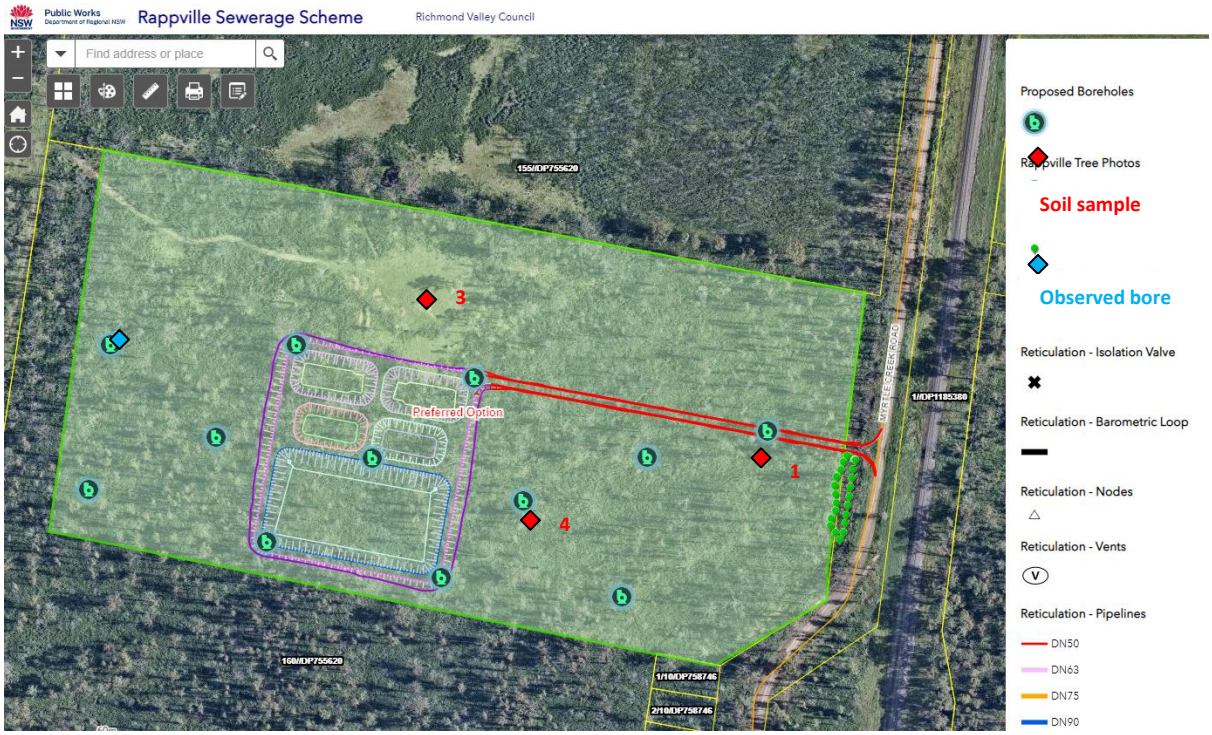


Figure 2 Site detail showing potential STP site and approximate location of soil sampling/observation sites



Figure 3 Condition of site May 2023

4.1 Landform and geology

The site is in the catchment of Rocky Creek, a tributary of the Richmond River. Topography is low undulating to flat at an elevation of between 68 and 59 m above sea level with the highest points occurring through the centre of the site. Drainage from the site appears to go north-west towards Four Mile Creek (Figure 4) as well as east into low lying floodplains and swamps. It is understood that the Rappville area is subject to floods but the location of the proposed STP and surrounding irrigation lands are probably above the known flood zones.

The site probably occurs on Kangaroo Creek Sandstone. This is classified as a separate stratigraphical unit overlying the Walloon Coal Measures in New South Wales (e.g. McElroy, 1969, Wells and O'Brien, 1994b). The Kangaroo Creek Sandstone Member, as defined by Doig and Stanmore (2012) is composed of massive, quartzose, medium- to coarse-grained sandstone, interbedded with layers of siltstone and carbonaceous mudstone and finer-grained sandstone. It is a fluvial channel sandstone with small to large planar cross-bedding.



Figure 4 – Assumed drainage patterns (shown in blue)- proposed irrigation areas

4.2 Groundwater

There are no groundwater bores within or near the site. Two groundwater bores are registered 2 km north of the site as shown on Figure 5 below. There is little information except that they are located on quaternary alluviums and were dug privately for stock watering. Both sites yielded water and one bore showed the final drilled depth to be 20m.

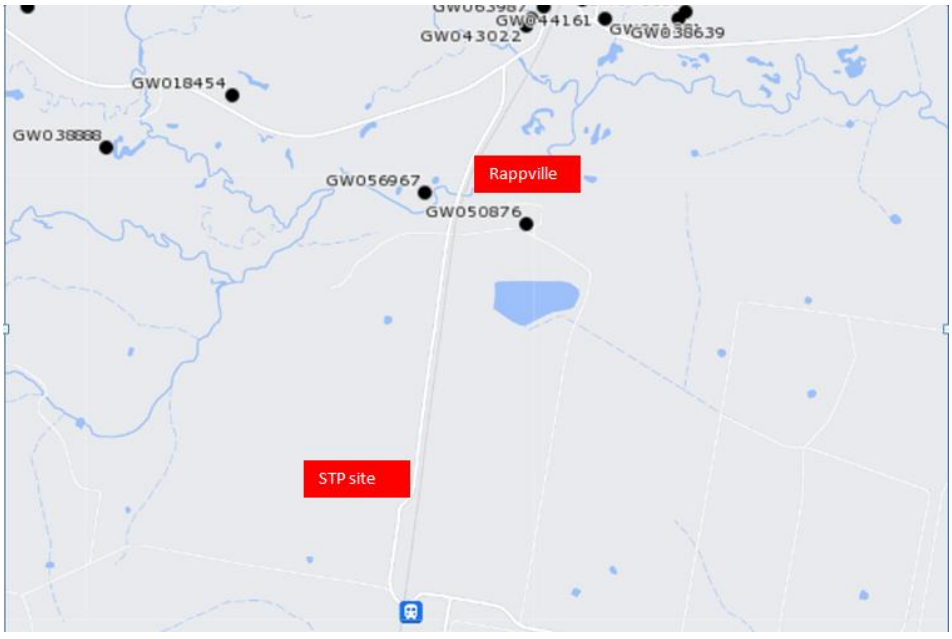


Figure 5 Location of known groundwater bores near proposed STP site

4.3 Soils

Catherine and Lew Hird of Agsol visited the site on 9 May 2023 and augured 3 sites within areas that had been recently cleared by a bulldozer as shown on Figure 3. In addition observations and discussion were held with the team digging bore holes to ascertain subsoil conditions.

Details of the soil sites are shown in Tables 4.1 and 4.2

Table 4.1 Field description of soil sites

Site	Coordinates 56J	Site description	Soil description
1	0494578 6780089	Bulldozer cleared dense eucalypt regrowth. Dry	0-10 cm dark brown silty sand clear to 10-15 cm bleached and slightly mottled A2. Small stone inclusions gradual to yellow brown mottled light clay with small stones 60 cm augur refusal due to rock
2	0494457 6780149	Existing clearing covered by couch, kikuyu minor broadleaf including fire weed. Minor regrowth. Moist	0-10 cm Brown silty clay loam gradual to 10-35 cm brown light clay gradual to 35-50 cm yellow pale grey silty clay with minor stone inclusions 50 cm augur refusal – hard rock
3	0494578 6779979	Bulldozer cleared dense eucalypt regrowth. Moist to wet	0-10 cm brown silty clay loam clear to 10-29 cm pale grey stony A2 clear to 29-80cm+ Brown heavy clay – minor yellow mottles at depth

The bore holes excavated by the groundwater boring equipment suggested that below 50cm there was random layering to depths of more than 2 metres of regolith materials between hard rock and soft sandy silts or silty to heavy clays.

Composite soil samples representing the 0-20 and 20-40 layers were sent to SESL's NATA registered laboratory at Pennant Hills.

As sites 1 and 2 could not be hand augured beyond 50 cm, the sample of 40-100 cm was taken at Site 3. It should be noted that a wide variety of subsoils and regolith would be expected below 50 cm given the characteristics of the parent rock material and local drainage conditions. It is estimated that some lateral movement of water is likely to occur below 50 cm.

Results of the soil sampling are shown in Table 4.2 below.

Table 4.2 Results of soil tests undertaken by SESL

Site	Comp 0-20 cm	Comp 20-40 cm	Site 3 40-100 cm	Comment
pH 1:5	5.4	5.4	4.9	Very acid requires additions of lime
pH $CaCl_2$	4.5	4.2	4.0	As above
EC dS/m 1:5	0.1	0.14	0.69	Not saline
ECe	1.0	1.4	0.4	
P sorption	439	501.7	538.2	Good potential to adsorb excess phosphorus to soil- requires P fertiliser
Exchangeable Sodium meq%	0.702	2	8.26	
Exchangeable Potassium meq%	0.221	0.21	0.27	Deficient-K fertiliser required
Exchangeable Calcium meq%	2.49	1.18	0.319	Deficient- apply lime
Exchangeable Magnesium meq %	3.91	9.44	17.8	
Exchangeable Aluminium meq%	0.458	1.68	3.54	Requires lime to amend
Estimated cation exchange capacity (ECEC) meq %	11.6	17.8	32	Low in topsoil – requires additional organic matter
Sodium %of ECEC	6.1	11.5	25.8	Sodic –increasing to extreme values with depth
Ca/Mg	0.6	0.1	<0.05	Requires significant inputs of lime
Soil texture	Silty clay loam	Silty clay loam	Heavy clay	Good moisture retention potential provided structural issues related to sodicity and lack of calcium/organic matter are addressed
Approximate clay content	25-35%	25-35%	>50%	
Stoniness	Soil is not gravelly	Soil is not gravelly	Soil is not gravelly	
Emerson Aggregate test (EAT)	3/3	2/2	2/2	Slightly dispersible at surface becoming very dispersible at depth

The field and laboratory estimates of soil texture used to estimate the physical properties for the water balance (Section 5) are shown in Table 4.3.

Table 4.3 Estimates of physical properties of soil used in the water balance

Depth (cm)	Texture	K_{sat} (mm/d)	WHC (mm)
0 – 10	Silty clay loam	15	16
10 - 30	Light clay	35	28
30 – 50	Medium to heavy clay	7.6	24
> 50	Substrate	1.5	
K_{sat} = near-saturated hydraulic conductivity WHC = total available water holding capacity within profile depth			

The hydraulic conductivities are near-saturated values. As such they allow for the drainage-induced reduction in conductivity below the saturated value during the course of a day that began with a saturated soil. The near-saturated values are more appropriate for use in a daily time-step model than saturated hydraulic conductivities (Ostrowski et al 2010).

4.3.1 Land use influence on soil quality

Given that the proposed STP will achieve a quality suitable for cattle grazing it is recommended that cattle be introduced to the entire site (not including the STP area) (Figure 4). This will allow the distribution of the phosphorus (P) and nitrogen (N) in recycled water over a much larger area (Section 6). This practice will also improve soil quality by adding organic matter to the soil from cattle manure. The stocking rate should generally be between 1 and 3 head per ha once the irrigated pasture is established. The stocking rate may need to vary depending on seasonal conditions as it will be important to avoid over-grazing that could lead to soil compaction and increased risk of runoff from the site.

5 Water balance

A water balance has been constructed to optimise land area and storage requirements to minimise the likelihood of uncontrolled discharges that would potentially damage local water resources. The model estimates daily changes in the soil water content over the potential reuse area over 63 years, based on the historical rainfall and rates of evapotranspiration. The estimated soil water content is used to schedule irrigation and the inflow/irrigation balance is then used to calculate how much recycled water was stored and when discharges would occur from a full storage. The assumptions used are briefly described below as well as in the previous sections. Further detail can be found in Appendix 1.

5.1 Predicted flow rates (ADWF)

There are 49 dwellings or community facilities with toilets inside the village border plus 33 vacant that may be developed in the future.

PWA have estimated from this data an equivalent population (EP) of 220. However they note that there may be some usage coming from people residing outside the village such as children going to school. Agsol notes that the hotel currently attracts outside visitors from Wednesday to Sunday. These latter tenements will be assessed individually for their input to the system when designing the reticulation system.

Notwithstanding the above PWA expect that the STP annual flows will be around 9.2 ML (ADWF plus 10% wet weather) rising to 15.9 ML with full development of vacant allotments.

Hence average dry weather flow is 22.7 kL per day rising to 39.2 kL/day. For the purposes of the water balance wet weather infiltration was determined from a low infiltration scenario as defined by Anderson and Ruge. This increased the dry-weather flow by an average of 5.8% close to the PW estimate of 5%.

Use of this algorithm ensures that stormwater infiltration is added only during wet weather events.

5.2 Rainfall and evaporation

The frequency of irrigation and the need for storage is based on the local rainfall and potential evaporation for the proposed land use system.

The local mean monthly rainfall and potential evapotranspiration are based on rainfall data sets at Casino (station no. 058063) and Whiporie (station no. 058099), with gaps being filled with data from Casino Airport (station no. 058208). This data set covered 63 years from 1960 and included a variety of wet and dry years.

Evapotranspiration was based on the estimated pan evaporation at Casino, taken from the SILO data set (DES 2021). Pan evaporation was converted to potential reference crop evapotranspiration by multiplying by a pan coefficient of 0.8, and the reference crop evapotranspiration was then converted to the potential evapotranspiration by multiplying by the appropriate crop and overwintering coefficients (Figure 5).

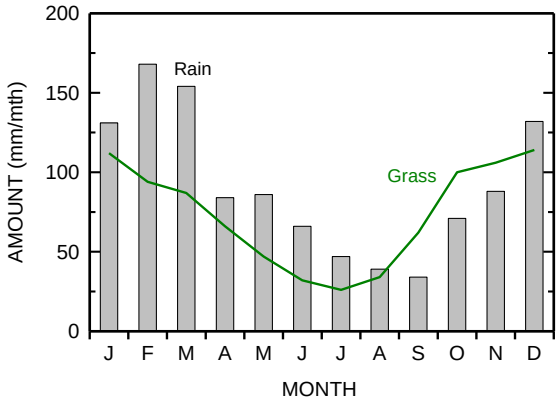


Figure 6 Mean monthly rainfall, and evapotranspiration from grass at Rappville.

The annual rainfall distribution varied as follows:

Driest	1/10-dry	Median	1/10-wet	Wettest
393mm	719mm	1061mm	1470mm	1860mm

Points of note are:

- The area receives a medium rainfall that averages 1101 mm/yr.
- The mean monthly rainfall exceeds the potential evapotranspiration from December to August and these are the months when there are limited, if any, irrigation opportunities.

- The best irrigation opportunities usually occur during September-November when the average evapotranspiration significantly exceeds rainfall.

In addition local rainfall and evaporation also impacted on the amount of water held in the open oxidation and maturation ponds as well the bulk storage dam. The balance between evaporation from ponds less additions from rainfall interception caused a net loss from the treatment ponds of 0.43 ML/yr. In contrast there was a small net gain in the wet weather storage. The gain with a 9ML storage averaged 0.15 ML/yr. However it should be noted that the storage was sometimes empty or nearly so during dry periods.

5.3 Irrigation system

The water balance assumed a fixed upright medium pressure spray system. This was estimated to operate at 85% efficiency. Hence, the volume of effluent that reached the ground was 85% of the pumped volume.

An irrigation volume of 20mm was applied when the soil dried to a soil water deficit of 25mm. The difference between the two amounts provided a safety margin to avoid overwatering or runoff should rain fall soon after an irrigation event.

5.4 Results

The aim of the analyses was to determine the best sizing of the reuse scheme to achieve the target of having no discharges from a full storage in 50% of years, as per the Department of Environment and Conservation (NSW) Guidelines for low-strength effluent reuse (DEC 2004).

The initial analyses used the future flow rate. This was done to select a storage capacity that suited both the current and future flows, thus avoiding the need to increase storage capacity as inflows increased.

5.4.1 Future (ultimate flow rate)

The sizing of the reuse scheme represents a balance between the size of the irrigation area and the capacity of the wet-weather storage. The aim is to provide a balance between what area is required to reuse most of the recycled water when irrigation is possible versus having too large an area that will not be adequately watered.

Various combinations of irrigation area and storage capacity that gave zero discharges in 50% of years with the future ADWF of 39.2 kL/d are plotted in Figure 7.

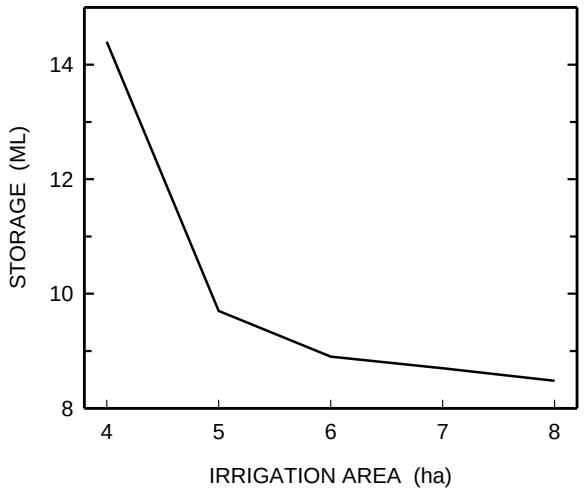


Figure 7 Various combinations of irrigation area and storage capacity that provided zero discharges in 50% of years with the future flow rate

Progressively increasing the irrigation area enabled a corresponding reduction in the required storage capacity. The larger areas enabled more recycled water to be reused at every irrigation opportunity rather than carrying considerable amounts over to prime irrigation times.

Figure 7 suggests that 9ML storage with 6.0ha of irrigation to be the most efficient when future estimated inflows are reached.

Table 5.1 Mean results with the future ADWF, 9ML storage and 6.0ha irrigation.

Rain (mm/yr)	Irrigation (ML/yr)	Reuse (%)	Discharges (ML/yr)	Discharge days (d/yr)
1101	12.7	85	2.2	51

On average, there was 85% reuse and 2.2 ML/yr of discharges which occurred on 51 days per year. However the discharges were unevenly divided between years and while there were no discharges in 50% of years the discharges averaged 4.4 ML/yr which were spread over 102 days in the remaining years.

Daily results in dry (1966) and wet (2010) years are presented in the following figures (8 and 9) to illustrate the very different performance of the system between such years.

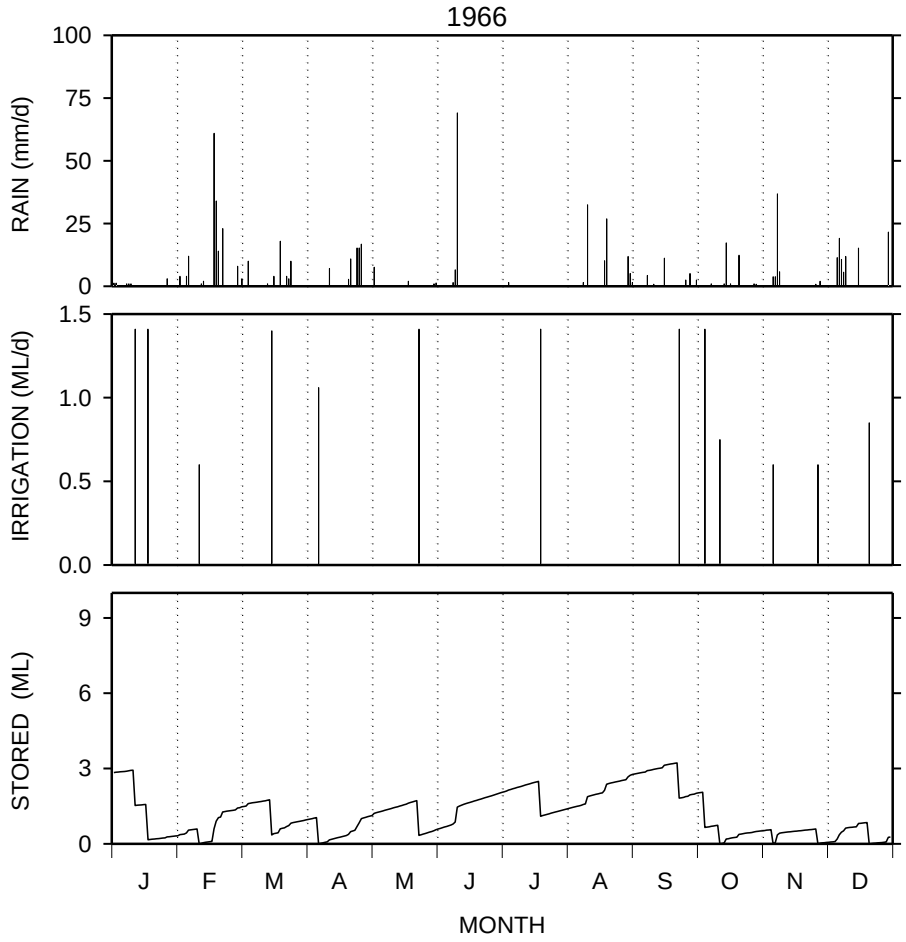


Figure 8 Daily rainfall, irrigation and stored volume in 1966, a dry year.

The annual rainfall in 1966 was 685mm and it was reasonably distributed throughout the year. This gave a good spread of irrigation opportunities and as a result the stored volume only once exceeded 3ML much less than the total capacity of 9ML. The storage was also near empty for significant periods of time[1].

In contrast, 2010 was wet with a total annual rainfall of 1452mm (Figure 9). Furthermore, the monthly rainfall was sufficient to keep the soil wet and to preclude the need for irrigation in all but a few instances. Consequently the stored volume basically increased from January to the end of August when it reached capacity and thereafter the current flow of recycled water was discharged until the end of the year (and probably beyond). The 2010 results illustrate the need for a relatively large storage to limit discharges in wet years.

1. The likely possibility of prolonged periods of empty storage will need to be taken into account in the storage design as discussed later in this report

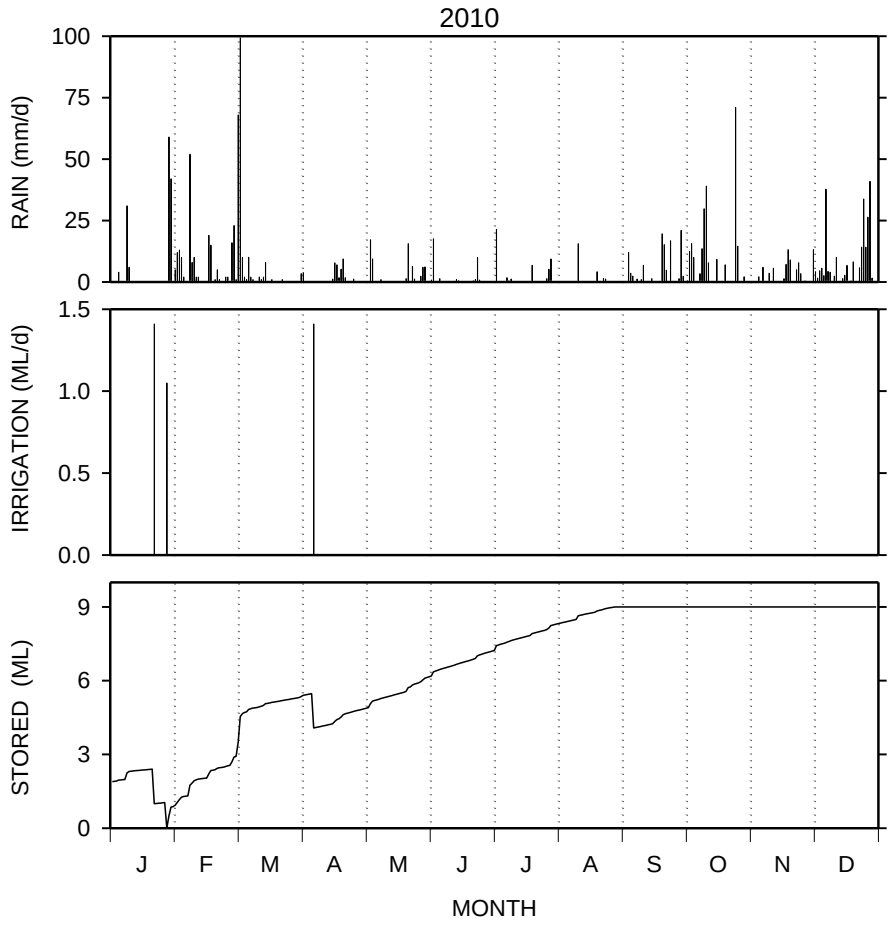


Figure 9 Daily rainfall, irrigation and stored volume in 2010, a wet year.

5.4.2 Current flow

With the current ADWF of 22.9 kL/d and 9ML storage in the reuse system, an irrigation area of 2.4ha was sufficient to obtain the target of no discharges in 50% of years.

Table 5.2 Mean results with the current ADWF, a 9ML storage and 2.4ha irrigation.

Rain (mm/yr)	Irrigation (ML/yr)	Reuse (%)	Discharges (ML/yr)	Discharge days (d/yr)
1101	6.6	80	1.2	46

The 9ML wet weather storage was sized to accommodate the future flow and when utilised with the much smaller current flow it provided a generous storage capability which enabled the irrigation area to be limited to 2.4ha.

6 Nutrient budgets

Nutrient budgets are undertaken to determine the risk that nitrogen (N) and/or phosphorus (P) that will be present in irrigated recycled water will leach or runoff into local surface or groundwater resources. The amount of nitrogen and phosphorus that will be present in the recycled water to be irrigated is unknown. To ensure a very conservative approach, nutrient budgets were undertaken based on concentrations of 50 mg N/L and 10 mg P/L. These equal the upper limits of typical nutrient concentrations in discharges from municipal sewage treatment plants (DEC 2004).

Where there are grazed pastures the N in the irrigation water will be lost mainly through volatilisation from excreta. Some N and P will be removed through the redistribution of excreta by grazing stock when they graze outside the irrigation area. The remaining N and P will accumulate in the soil but if those limits are exceeded the surplus will leach.

For the purposes of this analysis applications were taken to be sustainable if they caused no nutrient leaching below 50cm depth over the long term (15 years). Leaching below 50cm was taken as an indication that nutrients were potentially moving towards groundwater resources.

The budgets used mean irrigation volumes of 2.75 and 2.12 ML/ha/yr with the current and future systems respectively (Tables 5.1 and 5.2). At the beginning of the scheme it was assumed that the grazing cattle also had access to up to 6 ha outside of the irrigation area where no fertiliser had been applied. That gave the opportunity for some of the N and P that were applied during irrigation to be redistributed in excreta to the outside area. *However this would be reduced to about 2 ha when the STP was operating at full capacity.*

Surplus P that the pasture could not absorb was adsorbed by soil up to a threshold level which stopped P leaching. The leaching threshold was taken to be one third of the total phosphorus sorption capacity (PSC) of the soil to 0.5 m depth and equalled 1027 kg/ha.

6.1 Results

Table 6.1 shows the results of the nutrient budget.

Table 6.1 Results of nitrogen budgets for recycled water applications at year 15.

Scheme	N concentration (mg/L)	Applied (kg/ha/yr)	Removed or lost (kg/ha/yr)	Held in organic forms (kg/ha)	Sorbed to soil (kg/ha)	Leached (kg/ha/yr)
Current	50	137	137	159	-	0
Future	50	106	106	195	-	0

By year 15, an equilibrium was established between the amount of applied N (137-106 kg N/ha/yr) and that lost during irrigation, lost from decaying biomass, or removed in product or redistribution of excreta. Hence there was no surplus N that would leach.

Table 6.2 Results of phosphorus budgets for recycled water applications at year 15.

Scheme	P concentration (mg/L)	Applied in effluent (kg/ha/yr)	Removed (kg/ha/yr)	Held in organic forms (kg/ha)	Sorbed to soil (kg/ha)	Leached (kg/ha/yr)
Current	10	19	10	18	122	0
Future	10	15	2	25	167	0

In contrast to the N budgets, there were no gaseous losses of P, and the ability of the soil to adsorb P was a dominant process that stopped P leaching with the grazed pasture. The amounts adsorbed by year 15 (122-167 kg/ha) were much less than the total adsorption capacity of 1027 kg/ha, thus indicating that the reuse system can operate for many more years without a risk of P leaching.

7 Establishing the irrigation site

The above discussion has identified the optimum irrigation area. However the poor existing site conditions will require significant works to enable both the construction of the STP and the establishment of an irrigation area.

Figure 4 shows how the site could be laid out. Whilst only 'Irrigation area 1' will be needed for the current population of Rappville, the remaining area (apart from the tree buffer perimeter- Figure 4) will need to be cleared and planted with *Setaria* pasture (or similar) to allow the cattle to graze over the entire area – thereby ensuring wider distribution of potentially polluting nitrogen and phosphorus in the early stages of the scheme. Cattle dung will also add organic matter to these relatively infertile soils.

It will also be important to introduce cattle (at a much lower stocking rate) as soon as the pasture is established even though sufficient recycled water for irrigation may not be available for a significant period of time. Cattle grazing will reduce the risk of eucalypt and other shrubs regrowing within the pasture area.

The time taken to connect households to the sewage treatment system in the first place will be an important factor. In addition the large wet weather storage designed for a significantly greater population will take some time to fill.

The clearing of the site and establishment of pasture will require as a minimum.

1 Gaining permissions and permits from relevant authorities
2 Bull dozing and/or use of an excavator to push down trees and clear brush
3 Removing stumps with grinders or excavators
4 Clearing debris which may include minor rock and tree branches
5 Deep ripping the soil to allow incorporation of agricultural lime at a rate of 5 tonnes per ha.
6 Addition of starter fertiliser that would include nitrogen, potassium, and phosphorus
7 Planting low maintenance summer growing pasture species such as Setaria

Once the scheme is operational the thick band of trees retained around the perimeter of the site will act to impede the flow of any discharges from the bulk storage during extreme wet weather events. The unirrigated tree band will also have some potential to absorb potential pollutants in the expected runoff. Some reshaping of the pasture area may be needed to direct any surface runoff or bulk storage overflows to the tree perimeter.

7.1 Recommended irrigation infrastructure

Irrigation infrastructure should initially be confined to 2.4 ha (Site 1 Figure 4). However the system should be designed to allow increases in irrigation area up to 6 ha over time.

Whilst potentially more costly, a permanent solid set irrigation system is recommended as it will require less labour and maintenance. Because of the tree barriers and absence of nearby houses big gun sprinkler heads are likely to be suitable because of their large throw diameter thereby minimising the number required. At the predicted 1st stage of the scheme (2.4 ha) about 2 sprinkler heads should suffice. (For example the Nelson 150 series big gun will deliver at a flow rate of 20-143 m^2 per hour with a pressure of 50-120 psi and a radius of 36-73 m.) As there will be cattle grazing the pastures individual sprinklers will need to be reinforced to avoid damage by the cattle.

It would be preferable that the system be automated irrigation preferably using a SCADA system so that irrigation can be scheduled without personnel being on site. The system should be able to start and stop pumps using a programmed irrigation schedule; change the water supply to another area/sprinkler; and stop a programmed irrigation if there be a significant rainfall event.

More details on establishment and management of the site are provided by the Irrigation Management Plan given (Section 3 of this report).

8 References

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Rappville Recycled Water Irrigation Management Plan Section 2

This section describes the risk assessment process undertaken to confirm the preferred wastewater management scheme. The organisations responsible for each section of the scheme, critical control points and monitoring requirements are identified.

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Agsol Pty Ltd ABN 89082247176 20 October 2023

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9 Risk assessment

The Australian Guidelines for Water Recycling (AGWR (2006) have introduced a risk-based framework known as the Hazard Analysis and Critical Control Point (HACCP) method for the establishment and management of recycled water schemes. This framework has been adopted by the NSW government as a scientifically defensible method for developing and managing recycled water schemes.

A risk management framework comprises 12 elements that fall into four main categories:

- **Commitment to responsible use and management of recycled water**. This commitment requires active participation of senior managers, and a supportive organisational philosophy within agencies responsible for operating and managing recycled water schemes.

- **System analysis and management**. This requires an understanding of the entire recycled water system, the hazards and events that can compromise recycled water quality, and the preventive measures and operational control necessary for assuring safe and reliable use of recycled water.

- **Supporting requirements** such as employee training, community involvement, research and development, validation, and documentation and reporting systems as described in Section 3 of this document

- **Review** (e.g. evaluation and audit processes) (Section 3).

The 12 elements are related, and all need to be implemented for the risk management approach to be successful. An important feature of the approach is that multiple barriers are used to control hazards, meaning that if one measure fails, other measures continue to provide control.

An important feature of the HACCP approach is identifying critical control points (i.e. an activity, procedure or process where control can be applied and are essential for preventing or reducing high risk). Furthermore if one measure fails, other measures continue to provide control.

10 Commitment to Responsible Use and Management of Recycled Water

The following organisations that have responsibilities for the recycled water irrigation scheme are shown in Figure 10 and include

- **Richmond Valley Council**, - the proponent owner and operator of the Scheme.
- **Operations Manager –** Senior manager overseeing STPs within Richmond Valley Local Government Area (LGA)
- **STP Operator** – person appointed by Operations Manager to oversea the day to day management of the STP
- **Irrigation System Operations** –Automatic system primarily operated within Council premises
- **Pasture manager – local private pastoralist leasing irrigation site (ajistment) to graze some of their cattle**
- **NSW Department of Health** - a statutory role to ensure that the provision of sewerage facilities is consistent with public health protection objectives.
- **Environment Protection Authority (EPA)** - statutory role in protecting pollution of water resource
- **NSW Dept of Industry-(Water) -** oversees sustainable water management for the State's surface and groundwater systems.
- **NSW Department of Primary Industries (DPI) -** has a range of responsibilities related to bio-security. It is responsible for the safety of food products produced in NSW including ensuring sustainable abattoir practices.
- **Work Cover Authority of NSW,** which has the statutory responsibility to enforce WH&S Act and associated regulations.

Figure 10 – Schematic showing relationships between responsible organisations

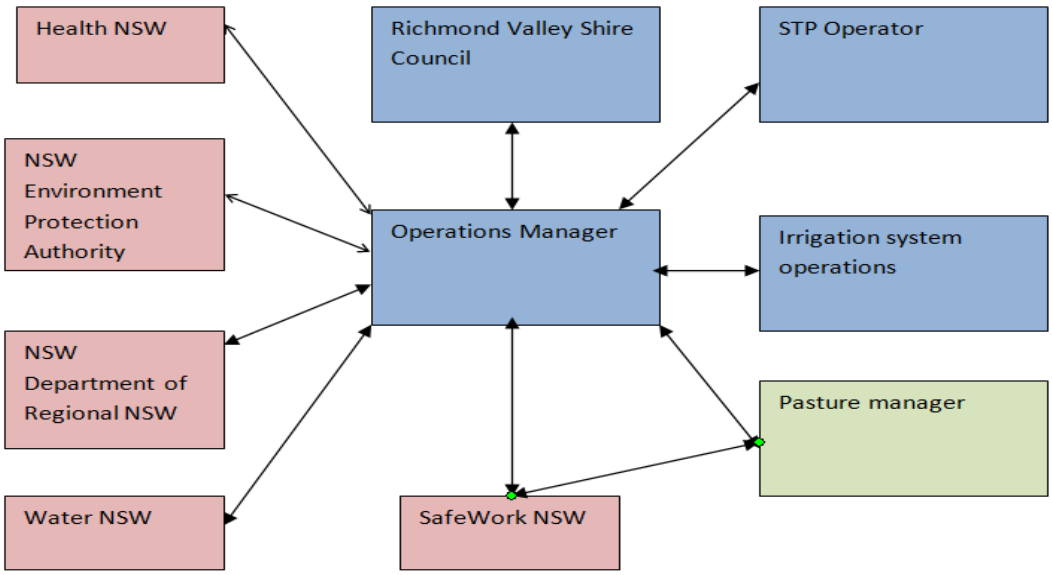


Table 10.1 Details of responsibilities for Richmond Valley Council in establishing and operating the scheme

Position	Responsibilities with regard reuse scheme	Detail	Reporting/Documentation	Position held by
Richmond Valley Council	Overall responsibility for the recycled water scheme	Responsibility for all elements of the scheme including construction, operation, training and review	Formal reports that need to be made available to relevant NSW agencies (see Figure 10) as appropriate. Agreements between any private organisations and Council	General Manager and appointed delegates
Operations Manager	In conjunction with PW delivery of the STP. Ongoing operation of the Rappville sewerage system	Responsible for the delivery of sewerage infrastructure within the village including the delivery pipe to the STP. Oversees and manages/negotiates with other staff and private organisations with responsibilities such as STP operator, pastoralist ajisting the site, irrigation system supplier. Addresses complaints from users and the community	Reports covering existing and future installations that will predict rate of change in inflows to the STP. Regular reports to General Manager summarising the performance of the scheme and resolution of any failures or complaints. Any reports as required by other relevant government agencies. Reports to non-council users on quantity and quality of recycled water as well as any soil monitoring	TBA
STP operator	Oversees the performance and maintenance of the STP	Monitors and maintains STP to ensure performance and quality targets are met. Collects data on inflows and water quality as required by the operations manager. Monitors and maintains recycled water delivery to bulk storage system including pipes, pumps, storage and discharges Alerts operations manager if problem detected	Reports as required by the Operations manager	TBA
Irrigation system operations	Appointed by Operations Manager to operate automatically controlled irrigation system. Alerts irrigation installer of problems and issues.	Manages the irrigation system to ensure correct scheduling and maintenance. Undertakes repairs as necessary.	Written advice to Operations manager documenting Volume reused, and any complaints or issues with the operation of the system	TBA

Table 10.1 (Cont) Details of responsibilities for Richmond Valley Council in establishing and operating the scheme

Manager of the irrigated and non-irrigated pastoral area	Manages ajistment arrangements re cattle and pasture conditions onsite	Responsible for stocking rates and pasture condition	Reports on Number of cattle on site at any one time	TBA

11 System analysis and management –risk workshop

A risk management workshop with representatives from key agencies was undertaken on 17 October 2023 with the list of participants as shown in Table 11.1. Details about the risk assessment process are described in Appendix 1.

Table 11.1 Participants at the risk management workshop

Organisation	Participant	Expertise
NSW Public Works	Luigi Molinari	Project Manager- Northern Rivers
NSW Public Works	Brett Douglas	Principal Engineer Water Resources Management
Richmond Valley Council	Daniel Rowlands	STP installation and Management
Agsol Pty Ltd	Catherine Hird	Recycled Water irrigation design and management

Participants were provided with the background and details of the proposed wastewater management system for their review. The participants then reached agreement on

- The scheme concept and associated critical control points as shown in Figure 10
- Available preventative measures
- The level of residual risk at each identified critical control point on the process flow diagram
- The final risk assessment as agreed by the workshop shown in Table 12.3 based on the likelihood and consequence colour scheme shown in Table 12.2.
- Agreed on appropriate management, monitoring and emergency responses at each critical control point (Table 12.4)
- The parties responsible for taking action and reporting at each critical control point (Table12.4)

12 Critical Control Points

A critical control point (CCP) is a step in the process at which control can be applied and is essential to prevent or eliminate an identified hazard or reduce it to an acceptable level.

Critical control points require:

- operational parameters that can be measured in real time, and for which critical limits can be set to define effectiveness (e.g. time of residence in a maturation pond)
- operational parameters that can be monitored sufficiently frequently to reveal any failures in a timely manner
- procedures for corrective action that can be implemented quickly in response to deviation from critical limits

Critical control points for the scheme covered by this IMP are shown in Figure 10 below and Table 12.3. This does not include measurements that may be taken at the end of the oxidation pond/maturation pond system that could be undertaken to verify the performance of the STP itself. These measurements will change after the recycled water is delivered to the bulk storage. Hence the relevant measuring point to ascertain the performance of the irrigation scheme is at the point of discharge to the reuse area.

12.1 Critical Limits

A critical limit is a prescribed tolerance that distinguishes acceptable from unacceptable performance. When a process that represents a critical control point is operating within critical limits, performance in terms of hazard removal is regarded as being acceptable.

Critical control points are shown in Figure 10 below.

However, deviation from a critical limit represents loss of control of a process and indicates that there may be an unacceptable health or environmental risk. Corrective actions should be instituted immediately to resume control of the process, and the health or environmental regulator may need to be notified.

The limits relate to health of users and workers as well as risks to surface and ground water. These limits are monitored over time by the persons responsible and should be reviewed periodically.

Critical limits for the Rappville recycled water scheme are shown in Table 12.4.

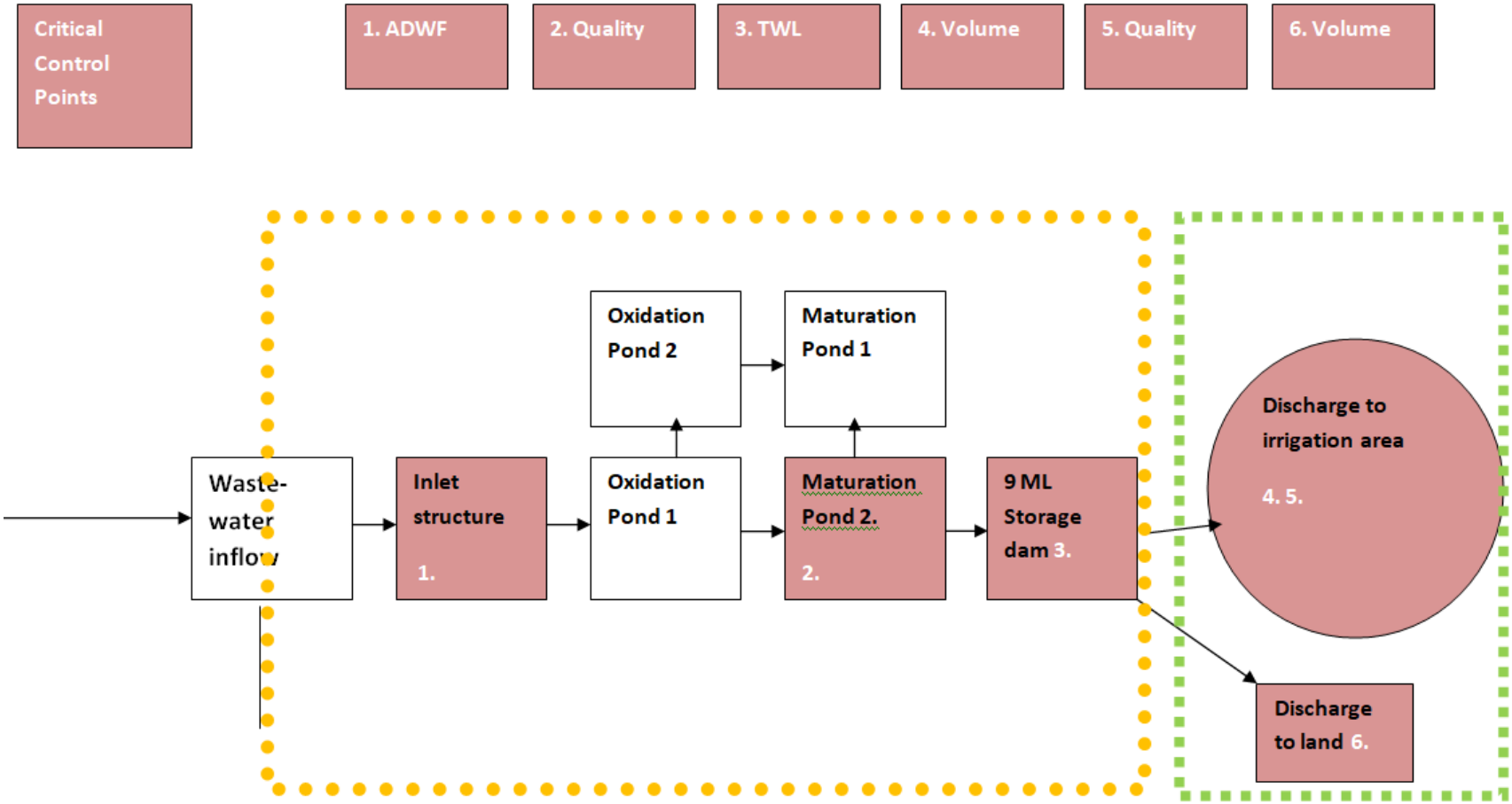


Figure 10 Proposed wastewater system and critical control points specific to reuse scheme

12.2 Preventative measures

The application of 'preventative measures' can assist in the control of critical points in the recycled water system. Preventative measures available for this recycled water scheme include:

- Documentation and reporting of procedures to maintain STP treatment system
- Signage and colour coding of recycled water infrastructure to minimise the possibility of cross connections with any 'potable' water supply to humans or animals.
- Surface pipelines and connections coloured according to current Australian recycled water standards.
- Australian standard signage installed advising irrigation workers, staff and visitors of health hazards associated with irrigation of recycled water or tampering with irrigation infrastructure.
- Lockable gates that effectively restrict public during irrigation events and for a period after. Safe work practices manual for irrigation workers that incorporate a special section on hygiene practices when handling recycled water irrigation infrastructure.
- Formal irrigation scheduling arrangements so that only recycled water sufficient to satisfy soil moisture needs is applied and hence no runoff or leaching (of recycled water) is likely to occur.
- Ability to switch off irrigation after a significant rainfall event or in high winds
- Fertiliser applications that occur only in response to a demonstrated need.
- Tree barrier around the perimeter of the property

Table 12.1 Risk assessment outcomes based on degree of likelihood and level of impact (see Appendix 1)

		Consequence				
		Insignificant	Minor	Moderate	Major	Severe
Likelihood	Almost certain	Medium	High	High	Extreme	Extreme
	Likely	Medium	Medium	High	Extreme	Extreme
	Possible	Low	Medium	Medium	High	Extreme
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

Table 12.2 Residual Risk Assessment of the Rappville Recycled Water Management Scheme # represent Critical Control Points identified in Figure 10.

#	Process step	Hazardous event	Hazard	Control measure	Residual Risk			Follow-up actions
					Likelihood	Consequence	Risk	
1	Waste inputs Sewer network	Cleaning chemicals in sewage	Interferes with sewage treatment, makes recycled water too saline	Council's hazardous waste management policy	Unlikely	Minor		Confirm Council's existing policies
		Wet weather infiltration	Uncontrolled discharges	Significant wet weather storage for treated effluent	Unlikely	Minor		Identify and manage wet weather release location
		ADWF lower than expected	Unable to meet commitments to private users	Reduce stocking rate as necessary	Possible	Insignificant		Liaise with organisation ajisting the site to-ensure issue addressed in any agreement. Pre-empt risk with timely reporting of ADWF and dam volumes
		ADWF higher than expected	More frequent discharges from storage	Increase irrigation of pasture	Unlikely	Minor		Increase irrigation areas
2	STP	Insufficient treatment	Significant algae growth, odour from bulk storage– impacts on irrigation delivery infrastructure. Potential to harm animal health	Review design and operation of oxidation and maturation ponds	Rare	Minor		Modify STP design
	Transfer between ponds and bulk storage	Damaged	uncontrolled discharge of treated sewage to land	Regular monitoring	Rare	Minor		Repair damage

Table 12.2 (cont) Residual Risk Assessment of Rappville Recycled Water Management Scheme

#	Process step	Hazardous event	Hazard	Control measure	Residual Risk			Follow-up actions
					Likelihood	Consequence	Risk	
3	Bulk storage	Leak	Local pollution of groundwater, insufficient irrigation water	Seal leak	Unlikely	Minor		Increased check of dam levels and apply sealant if needed
		Algae	Clogs downstream irrigation infrastructure	Inspection, appropriate treatment	Likely	Minor		Increased maintenance of downstream infrastructure
		Pathogen contamination by wildlife	Infection of humans and animals	n.a.	Almost certain	Insignificant		Not controllable but contributes to algae risk. Species barrier will reduce risk
		Uncontrolled discharges	Pollution of receiving waters	Manage height in dam through irrigation.	Unlikely	Minor		Identify and maintain appropriate discharge pathways. Consider precautionary discharges
	Delivery pipes to irrigation areas	Algae and biofilm development in pipes	Functionality	Flushing of pipes as required. Ensure pump rate is such that cleansing velocity is achieved.	Almost certain	Minor		Regular flushing, ensure necessary equipment/chemicals available
4	Irrigation systems	Breakdown	Uneven irrigation, failure to cover irrigation area	Regular maintenance- automatic detection of problems desirable	Likely	Minor		Address cause
		Damage by cattle	Operational failure	Automatic detection? - repair	Likely	Minor		Design of irrigation sprays to take account of likely damage by cattle
		Poor distribution	Poor pasture growth potentially leading to surface and groundwater pollution	Regular inspection. Verify and repair sprinklers as necessary	Unlikely	Minor		Irrigation system management to be addressed in IMP
	Irrigation area	Undersized/not functioning	Frequent uncontrolled discharges from bulk storage	Sufficient irrigation area and storage to minimise discharges.	Rare	Minor		Ongoing monitoring and review of discharges to determine size of irrigation area
		Contact with operational staff	Pathogens	Safe work practices	Possible	Minor		Update work safe manuals to include safe work practices
		Contact with residents and visitors – spray drift	Pathogens	High level of sewage treatment. Irrigation site fenced off from public and more than 7 km from residential areas.	Rare	Moderate		Ensure restricted access at all times
		Drinking – Cross contamination	Pathogens	Taps/coloured pipes/signage	Rare	Moderate		Ensure compliance with existing systems

Table 12.3 (Cont) Residual Risk Assessment of the Rappville Recycled Water Management Scheme

#	Process step	Hazardous event	Hazard	Control measure	Residual Risk			Follow-up actions
					Likelihood	Consequence	Risk	
5	Irrigation area (pasture management system)	Poor growth	Potential for surface and groundwater pollution	Hardy perennial pastures selected	Rare	Minor		Address in IMP
		Salt accumulation	Salts	Ensure good establishment procedures and ongoing management. Selection of salt tolerant species. Good irrigation practice	Rare	Minor		Address in IMP
		Too wet or too dry	Surface and groundwater pollution	Inspection. Check moisture content before and after irrigation	Likely	Insignificant		–Address in IMP
		Irrigation site becomes unavailable	Surface and groundwater pollution	Council owns irrigation site	Rare	Major		Anticipate problem and find alternative solution
6	Uncontrolled discharge	Prolonged wet weather	Runoff/ infiltration of recycled water to ground and water bodies	Sufficient irrigation area.	Likely	Insignificant		Consider precautionary discharges

Table 12.4 Monitoring, critical limits, corrective/emergency responses and responsibilities

CCP #	CCP	Monitoring Process/type	Frequency	Critical limit	Corrective action (as appropriate)	Responsibility
1	STP inlet	Automatic Flow meter	Daily	Greater than capacity of STP	Design STP to meet expected or possible future inflows. Monitor population growth and development. Increase capacity of oxidation and maturation ponds	PWA on behalf of RSC General Manager
			Annual total	Increases by more than 10% of original flow predictions	Increase irrigation area proportionally	Operations manager
				Decreases by more than 10% on previous year	Advise person ajisting cattle to potentially reduce stocking rates if season is drier than normal.	Operations Manager
2	End of maturation Pond 2	Quality	Yearly	BOD<30 pH 6-8 SS<30	Investigate oxidation pond treatment	PWA
3	Bulk storage -	Volume (Top Water Line)	Monthly	< 1.5 m below TWL	Irrigate if possible or instigate precautionary discharge	Operations Manager/STP operator
				Water level < 1 m above submerged irrigation pump	Cease irrigation	
4	Water quality to irrigation system	BOD, pH, nitrogen and phosphorus	Annually	BOD >30 mg/l	Investigate cause and repair which could be failure of oxidation pond/maturation system or build up of algae in bulk storage. Withhold cattle from irrigation area for 5 days.	Operations manager/pastoralist
				N> 50mg/l P>10mg/l	harvest pasture	
				Less than crop fertiliser needs	Option to add fertiliser to pasture area but not critical	

Table 12.4 (Cont) monitoring, critical limits, corrective/emergency responses and responsibilities

CCP #	CCP	Monitoring Process/type	Frequency	Critical limit	Corrective action (as appropriate)	Responsibility
5	Irrigation system	Functionality	Automated system to detect	As defined by irrigation system manual	Repair	Operations manager
	Irrigation system	Functionality	During verification – then annually or problem is observed	Even distribution Delivery rate/volume	Investigate causes and repair	Irrigation supplier and operator
	Soil moisture	Effectiveness of reuse		Before irrigation - top 10 cm is dry or moderately moist No running rivulets after an irrigation event	Increase period of time between irrigations	
	Soil Moisture	Effectiveness of reuse		After irrigation – soil feels moist to at least 25 cm	If not increase volume of irrigation if possible	
	Pasture condition	Effectiveness of reuse	Monthly	Growth in-line with expectations	Review stocking rates, irrigation and fertiliser management	Operations Manager may seek professional advice
6	Discharge point	Impact of discharges on location	Daily following discharge event	No significant run-on to surrounding lands	Review strategy e.g. consider using precautionary discharges	Operations Manager

APPENDIX

Rappville Recycled Water Irrigation scheme
Risk Assessment Workshop
17 October 2023

Following a review by Public Works Advisory and Agsol, Richmond Valley Shire Council proposes to upgrade its sewage management system as outlined in the attached background paper.

Key findings of the review showed that the proposed STP upgrade will produce a recycled water that complies with both the NSW Guidelines for Recycled Water Management published by Department of Planning, Industries Water (DPIE- Water) and the Australian Guidelines for Recycled Water (2006)(AGWR)

Robust contractual arrangements with existing and potential non-Council users need to be put in place.

The aim of this risk management workshop is to discuss and confirm risks and the control measures to be put in place to reduce various hazards associated with the management of sewage.

When recycling wastewater, it is essential to protect the health of both the public and the environment, and a risk management approach based on the Hazard Analysis and Critical Control point system (HACCP) is the best way to achieve this.

The first step is to look at hazards in the recycled water that could potentially affect human or environmental health (i.e. 'what might happen and how it might occur?').

The next step is to estimate the risk from each hazard by assessing the likelihood that the event will happen (Table 1) and the consequences (Table 2) if it did (i.e. 'How likely that it will happen, and how serious will it be if it does?') The likelihood of hazards occurring and their assessed impacts are then combined according the risk matrix shown In Table 1-3**.**

Table 1.4 will be the basis to assess the 'residual risk' (i.e. the risk remaining after the scheme design and associated preventative measures that have been identified in the review are incorporated) into the recycled water scheme. The scheme design and the recommended preventative measures for the Coolamon Recycled Water scheme are outlined in the 'Background paper' that accompanies this document.

Please note that the residual risk assessment shown in Table 1.4 is an example only. This will be reviewed by all participants attending the risk management workshop.

Workshop participants will also be asked to comment on suitable monitoring and verification procedures that will be used to establish the schemes ongoing sustainability. This discussion will be

reflected in the Irrigation and Drainage Management Plan (IDMP) to be developed for the scheme. The role of the IMP is to identify the operational, monitoring and verification requirements for the recycled water scheme.

The monitoring and verification required should be commensurate with the assessed residual risks for the scheme

Table 1: Definitions of Likelihood

Level	Likelihood	Description
A	Almost certain	The event is expected to occur often (several times per year)
B	Likely	The event will probably occur often (once every 1 to 3 years)
C	Possible	The event might occur at some time (once every 3 to 10 years)
D	Unlikely	The event could occur at some time (once every 20 years)
E	Rare	The event may occur only in exceptional circumstances (once every 100 years)

Table 2 Definitions of Consequence/Impact

Level	Classification	Example Definition Human Health	Example Definition Environment
1	Insignificant	No detectable human health illness.	No detectable environmental impact.
2	Minor	Short term, low level illness affecting a small population	Localised, short term environmental impact.
3	Moderate	Short term, low level illness affecting a large population	Localised, medium term environmental impact.
4	Major	Severe illness or death affecting a small population	Severe long term environmental impact.
5	Catastrophic	Severe illness or death affecting a large population	Severe permanent environmental impact.

2023

Rappville Recycled Water Irrigation Management Plan Section 3 Standard Operational procedures

Based on the risk assessment procedures and practices related to the sustainable management of irrigated grazing pastures. The document also provides a mechanism by which the operations can be monitored and continually assessed allowing continued compliance with all relevant legislation and conditions of approval.

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Agsol Pty Ltd ABN 89082247176 20 October 2023

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13 Introduction and summary of monitoring requirements

This irrigation management plan identifies a number of standard operating procedures (SOPs) to ensure the sustainability of the recycled water scheme at Rappville. Sustainability is defined in terms of human and animal health as well as the natural environment. The procedures do not include procedures for managing the actual STP as this will be covered in a separate document.

In addition to procedures for the day to day management of the bulk storage and irrigation area the SOPs include guidelines for establishing the site for pasture irrigation (SOP 5) as well as verification procedures (Section 15) that need to be undertaken before the scheme is deemed operational according to its design. Of particular importance is the verification of irrigation system.

The SOPs should be read and understood by all personnel with responsibility for the successful operation of the scheme.

Once the scheme is operational the following monitoring program is to be commenced..

The data should be reviewed yearly and corrective actions (if needed) undertaken following the review (See Section 16).

Table S1 Recommended monitoring after verification completed

Target critical limits or item	Monitoring frequency	Method	When corrective action required	Action
ADWF	Daily using automatic recorder	Inflow Meter continuous recording	ADWF exceeds 22.9 kL/day averaged over a 12 month period	Increase irrigation area commensurate with increase (e.g. 0.5 ha increase per 2.4 kL/day increase in ADWF)
Top Water line in bulk storage	Monthly except during wet periods then weekly	Direct measurement	With 300mm of metre of TWL	Irrigate or instigate precautionary discharge
	Monthly except during wet periods then weekly		Within 1 meter of any submersible pump	Stop irrigation until water level above pump reaches 1 m
Inflow to irrigation system (pump)	Daily	Automated reading	Fault detected	Repair or replace as necessary

Table S1 (cont) Recommended monitoring after verification completed

Target critical limits or item	Monitoring frequency	Method	When corrective action required	Action
Usage of recycled water at irrigation site	Daily	Automated readings	Fault detected (i.e. no irrigation during dry summer months)	Repair fault
Water quality pH, BOD N and P from irrigation pump system	Yearly	Grab samples from pump/irrigation sprinklers	pH <6 or >8 BOD >30 mg/l N>50 mg/l, P>10 mg/l	Investigate whether algae build up in bulk storage or sewage treatment system and treat appropriately (e.g. algaecide) High N and P most unlikely but issued discussed under table 15.1 Low N reading (i.e. less than 10 mg/l suggest that applications of N fertiliser would be desirable.

14 Standard operational procedures

The following operational procedures identify specific tasks to be carried out or overseen by various personnel to minimise risks associated with the irrigation of grazing to ensure that preventative measures are in place and that actions are taken if critical limits are exceeded. These tasks are known as standard operational procedures (SOPs).

A separate manual will be developed by RVC to cover the standard operational procedures regarding the operation of the STP.

14.1 SOP 1a Protection of Human Health

This operating procedure is aimed at protecting the health of staff, users and visitors to the irrigation sites. Refer to SOP 9 for protection of health of irrigation workers who are the most exposed to recycled water.

Timely knowledge of the quality of the recycled water is essential to the sustainable operation of the recycled water irrigation scheme.

14.1.1 Hazards addressed

- End-user exposure to pathogens

14.1.2 Preventative measures

The following preventative measures are available to reduce health hazards. These preventative measures will reduce risks to humans to acceptable levels.

- More than 25 days within Maturation Ponds
- Colour coding of surface and any new sub-surface infrastructure
- Signage alerting the hazards associated with recycled water at entrance gates to property
- Lockable gates
- Irrigation areas located at significant distance (at least 7 km) from residential areas

14.1.3 Operational Procedures

This procedure involves:

1. Good oversight of STP and associated tertiary treatment processes
2. Ensuring gates are locked during irrigation
3. Recording and acting on complaints about recycled water irrigation from site workers or the public
4. Documentation of significant incidents

14.1.4 Responsibilities and Authorities

The responsibilities are as follows:

The Operations Manager is to:

1. Oversee the installation and maintenance of the sewage treatment and irrigation infrastructure
2. Ensure all the establishment and ongoing maintenance of preventive measures as outlined in Section 14.1.2)

3. Monitoring of recycled water quality at the end of the maturation pond treatment at least annually or in response to a complaint

If the recycled water is found to be not fit for purpose (See Table 3.2 in Section 1) the operations manager must

- undertake additional testing as required by the specific issue
- advise (in a timely manner) persons working at the STP and/or irrigation area
    a. appropriate actions (including no action) being taken and the likely outcome
    b. advise of the likely time period before the non-compliance can be rectified and what actions (if any) should be undertaken by those responsible for managing irrigation at affected sites
- report and document all complaints and any resolutions associated with those complaints to the **General Manager**

14.1.5 Operational parameters

Section 14.1.2 describes all preventive measures requirements

Table 3.2 (in Section 1) identifies the water quality targets for control of potential human and animal health hazards on irrigation sites.

14.1.6 Documentation

- Records as required by the monitoring – Table S1 to be kept by the **Operations Manager**
- Records of instances where recycled water quality did not meet quality targets by **the Operations Manager**
- Records of actions taken when quality targets not met **by the Operations Manager**

14.2 SOP 1b Protection of animal health and products

This operating procedure is aimed specifically at protecting any animals that graze the site. Failure to do so could result in rejection of stock at the abattoir or meat products that are unsuitable for human consumption.

Timely knowledge of the quality of the recycled water is essential to the sustainable operation of the recycled water irrigation scheme.

14.2.1 Hazards addressed

- End-user exposure to pathogens (particularly helminth species)

14.2.2 Preventative measures

The following preventative measures are available to reduce animal health hazards

- Tertiary STP treatment with at least 25 days detention in the bulk storage
- Ability to withhold any cattle from irrigation site
- If required by government authorities documentation attached to meat products indicating the use of recycled water.

14.2.3 Operational Procedures

This procedure involves:

- Management of STP to ensure water quality targets are met
- Ability to withhold cattle grazing from recently irrigation sites for at least 5 days after an irrigation event (if there is a suspicion that water quality targets are not being met)
- If required by government authorities documentation to accompany the sale of animals to include. 'This product has been produced using recycled water' or similar.

14.2.4 Responsibilities and Authorities

The responsibilities are as follows:

1. The **Operations Manager** is to:
   - verify at least annually that disinfection targets have been met at the end of the maturation pond treatment
   - advise the users of the irrigation site of any suspected water quality problem as well as appropriate actions such as temporarily withdrawing any cattle grazing the site
   - maintain a record of all complaints/concerns by the **STP operator**, other users or the general public
2. The General **Manager is responsible for reporting any significant incidents** and their resolution to affected stakeholders and relevant government agencies such **NSW DPI**.

14.2.5 Operational parameters

Table 3.2 (in Section 1) identifies the water quality targets and corrective actions for control of animal health hazards on irrigation sites.

14.2.6 Documentation

- Records of instances where recycled water quality did not meet quality targets **by the operations manager**
- Records of Actions taken when quality targets not met **by the Operations Manager**

14.3 SOP3 Use of data generated from a weather station

A weather station located on or near the Rappville STP site (e.g. Casino) should be used to schedule irrigation events. (Irrigation scheduling is covered in SOP6).

14.3.1 Hazards addressed

- Potential contamination of surface and ground waters.

14.3.2 Preventative measures

1. Well maintained weather station run by Bureau of meteorology

14.3.3 Operational Procedures

This procedure involves collecting data from any weather station and ensuring information is relayed to all persons managing irrigation scheduling and bulk storages.

14.3.4 Responsibilities and Authorities

1. **Irrigation operators (as delegated by the Operations Manager)** must consider rainfall, wind and temperature conditions (in addition to other factors) and modify irrigation

scheduling arrangements (SOP6) accordingly.

14.3.5 Documentation

Records of climate data that are held by Bureau of Meteorology.

14.4 SOP 4 Management of uncontrolled discharges

Extreme rainfall conditions or mismanagement of the recycled water management system may lead to uncontrolled discharges to the environment. Uncontrolled discharges may occur as a result of

- Over-irrigation leading to runoff from irrigation sites (addressed in SOP 6)
- Under-utilisation of available recycled water (addressed in SOP 6)
- Weather events exceed the design capability of the STP or cause the bulk storage to overtop

This special operation procedure is specific to management of uncontrolled discharge.

14.4.1 Hazards addressed

- Potential contamination of surface and ground waters.

14.4.2 Preventative measures

1. Ensuring STP has sufficient capacity to manage most peak wet weather events
2. Significant bulk storage particularly for expected current inflows.
2. Management of irrigation and recycled water bulk storage volume as outlined in SOP 6
3. Retention of existing Eucalypt tree cover around the perimeter of the 10 ha STP site (Figure 4 in Section 1 of this report).

14.4.3 Operational Procedures

This procedure involves:

- Identifying properties potentially impacted by uncontrolled discharges from the bulk storage or STP **by the Operations Manager**
- Monitoring the impacts of each uncontrolled discharge events **by the Operations Manager**.
- Instigation of precautionary discharges based on volume of in bulk storage and weather forecasts **by the Operations Manager**

14.4.4 Responsibilities and Authorities

2. The **Operations manager** must identify properties that may be impacted by uncontrolled discharges.
3. The **Operations manager (or delegate such as the STP operator)** must monitor the top water line bulk storage at least monthly.
4. The **Operations manager** must monitor rainfall forecasts when the bulk storage top water line is above 300 mm
5. Based on assessments of bulk storage volumes and weather forecasts the **Operations Manager** must alert potentially affected property owners of likely discharge event and/or instigate a precautionary discharge

14.4.5 Documentation

- Records of uncontrolled discharges **by the Operations Manager**
- Records of precautionary discharges **by the Operations Manager**

14.5 SOP5 Establishment and maintenance of pastures

Effective pasture cover essential to ensure that the water, nutrients and pollutants in recycled water are being immobilised by the plant /soil system.

The pasture should be established as soon as possible after clearing. Otherwise new shrub growth will occur from seeds that have accumulated in soil or re-growth from underground roots.

Setaria grass is recommended as it is palatable, persists well under moderate grazing and is adapted to a wide range of soils. It responds well to flooding and water logging and competes well with fireweed. Production is best during early spring, summer and autumn. Little growth in winter but the green leaf carries well into the colder months.

14.5.1 Establishment

The following establishment procedures for *Setaria* or similar pasture species are required.

1 Gaining permission to clear the site. Richmond Valley Council will be the approving authority. Leave an approximately 5 metre wide barrier of trees around the perimeter of the 10 ha site
2 Determine the most cost-effective way to clear the site. This could include bull-dozing and/or excavation to push down trees and clear bush
3 Remove stumps by grinding and/or further excavation
4 Clear remaining debris which may include minor rock and tree branches
5 The pasture should be established as soon as possible after the above procedures.
6 Plough soil to a depth of around 50 cm and incorporate agricultural lime at a rate of 5 tonnes per ha. The lime will increase soil infiltration and hydraulic conductivity. Soil pH will also increase to more optimum levels for pasture growth
7 Add starter fertiliser that includes 200-300 kg/ha of superphosphate and 50g/ha of muriate of potash.
8 The seed should be planted in spring to early autumn in moist soil.
9 Post emergence - 100 kg/ha of urea should be added.

14.5.2 Maintenance and ongoing use of fertiliser

Prior to any irrigation annual dressings of up to 200 kg/ha of superphosphate and 100 kg/ha of muriate of potash should be applied. Nitrogen should be applied more frequently (up to three times per year) at a rate of 300 kg/ha. *Setaria* will decline if nitrogen fertiliser is low and could be taken over by couch or mat grass if grazed too heavily.

Once irrigation is available fertilisation with phosphorus and potash can be reduced or eliminated as this will be present in the recycled water. However ongoing nitrogen applications will be required. Regular testing of recycled water at the irrigation point can be used to determine future fertilisations as well as any need for further lime applications.

To minimise risk of certain diseases young cattle and dairy cows should not graze the site. Use of *Solanda, Splenda* or *Nandi* cultivars of *Setaria* will minimise risk

14.5.3 Managing salt

Recycled water contains higher salt concentrations than many other water sources. However the naturally high rainfall and the salt tolerance of grass species such as *Setaria* significantly reduce any risk.

Salt affected sites may exhibit bare patches, poor soil structure leading to permeability problems, loss of root volume and increased susceptibility to weeds and disease.

Preventative management options to minimise potential salinity impacts include:

- Ensuring the irrigation system has a high distribution efficiency;
- Improved soil drainage by incorporating lime prior to establishing the pasture
- Proper irrigation scheduling;

14.5.4 Pest and disease control

- Major pests include armyworm and grass seed caterpillars
- Major diseases include *pyricularia* leaf spot in hot humid conditions that can retard growth in ungrazed areas

14.5.5 Grazing

Stocking rates should be governed by seasonal conditions and appearance of pasture. Overstocking will lead to bare patches leading to runoff in wet conditions and hard-setting soil that will not readily re-establish new growth.

14.5.6 Hazards addressed

- Poor quality pastures that fail to immobilise potential contaminants in recycled water leading to potential contamination of surface and ground waters

14.5.7 Preventative measures

The availability of preventative measures to reduce hazards associated with poor crop cover includes:

- Use of appropriate species as described above.
- Establishment and maintenance procedures as described above
- Stocking rates that reflect the condition of the pasture and the availability of recycled water irrigation
- Potential operators of the scheme to demonstrate their competence before any contract to grow and manage the site is awarded
- Robust contract that covers identified issues as described above

14.5.8 Operational Procedures

This procedure involves:

- Establishment of a quality crop as described in Sections 14.5.1 -
- Best practice pastoral management as described in Sections 14.5.2-14.5.5
- Irrigation scheduling (see SOP6)

14.5.9 Responsibilities and Authorities

1. The **STP Manager** is to:
    - maintain the STP to achieve recycled water standards
    - Keep records of inflows and volume of recycled water held in storage
    - Alert the **Operations Manager** on the likely time when sufficient recycled water is available for the irrigation scheme to commence
2. The **Operations Manager is** to
    - ensure the early establishment of pasture as outlined in Section 14.5.2
    - ensure the installation of an irrigation system (that can be remotely operated and scheduled) covering an area of 2.4 ha
    - organise for beef cattle to graze the site once the pasture is established (even if there is no irrigation water)
    - ensure irrigation is scheduled as described in SOP6
    - ensure the quality of the pasture and rectify the cause of any poor quality by undertaking appropriate actions (for example taking soil tests and then applying soil amendments as required)
    - Maintain documentation as described below
3. The **Pasture Manager** is to
    - Ensure an appropriate number of grazing cattle are kept on site
    - Alert the Operations Manager of any issues with the pasture such as bare areas and weed invasion

14.5.10 Documentation

- Annual Records of inflows and irrigation frequency **by the Operations Manager**
- Records of stock movements and numbers by the Pasture Manager
- Records of any fertiliser applications, pest or weed control to be kept by the **Operations Manager**
- Summary of the above to be provided at the request of the **General Manager**

14.6 SOP6 Irrigation scheduling

Once the irrigation system is established and verified (see Section 15), ongoing appropriate irrigation scheduling is probably the most important activity to be undertaken for this scheme. This is due to the variability in weather particularly rainfall and temperature and the need to meet irrigation demand so as to avoid unnecessary discharges from the bulk storage.

Irrigation scheduling arrangements determine the rate and volume of irrigation water delivered to the site. If the volume is too great runoff/ponding may occur (creating a health risk to human and animals, potentially contaminating surface and ground waters and potentially reducing pasture growth). If the volume delivered is too low, pasture growth may be adversely impacted to the extent that recovery would be prolonged.

14.6.1 Strategies for irrigation scheduling

The frequency of irrigation events will vary throughout the year. Peak irrigation demand is likely to exceed 6 mm per day but may be limited to November through end of March. For the autumn and

months year demand will be less (e.g. 4 mm/day). The Setaria pasture is relatively inactive during June and July and will require little irrigation.

In addition natural variations in rainfall will necessitate the irrigation system to be switched off until there is a sufficient soil moisture deficit.

It is desirable to leave a soil moisture deficit after irrigation in case rain falls soon after. This will encourage deep root growth that will maintain crop quality for short periods when insufficient irrigation water is available help; and avoid ponding, soil saturation and runoff.

An example of how much irrigation to apply and the time between irrigation events is shown in Table 14.1. Alternatively soil moisture monitors can be used to schedule irrigation. If soil moisture monitors are not used then the system must be able to be controlled by daily temperature and rainfall data available from the Bureau of Meteorology at Casino.

Table 14.1 Example of a Seasonal Irrigation Schedule for Setaria Pasture

Season	Maximum frequency of Irrigation	Maximum amount applied	Conditions to miss an irrigation event
November, January, February, March	Every 3-4 days	20 mm	10-15 mm of rainfall over preceding 2 days
April, May, June, August September and October,	Every 4-5 days	20mm	10-15 mm of rainfall over preceding 3 days
June and, July,	Every 10 days	20mm	10-15 mm over preceding 5 days

14.6.2 Hazards addressed

- Potential contamination of surface and ground waters through over irrigation.

14.6.3 Preventative measures

- Ability to manually alter irrigation schedule in response to weather events
- Automated system particularly one with soil moisture control

14.6.4 Operational Procedures

Establishing a suitable irrigation scheduling (similar to that described in Table 13.1) which takes account of

- Variations in irrigation demand due to seasonal effects and recent rainfall events
- Observing the state of the irrigation site prior to and at the completion of an irrigation event.

Alternatively use soil moisture monitors to schedule irrigation so that 20mm are applied when there is a soil moisture deficit of 25 mm.

14.6.5 Responsibilities and Authorities

1. The **Operations Manager** is responsible for
    - Establishing a suitable irrigation system and scheduling as described above
    - Ensuring that the volume of water held in the bulk storage is recorded on a frequent basis (e.g. monthly)
    - maintaining documentation as described in the next section (14.6.6)
2. The **STP operator** at each site is responsible for:
    - providing the **Operations Manager** with regular updates on the volume of water in the bulk storage

3. **The Pasture Manager**
    - Advise the **Operations Manager** of any issues associated with irrigation such as over or under watering

14.6.6 Documentation

- Records of recycled water delivered to the irrigation sites **by the Operations Manager**
- Records the volume of irrigation water used within any 12 month period by the **Operations Manager**
- Annual summary and discussion of results (including whether the amount used was reasonable) to the **General Manager.**

14.7 SOP7 Maintenance of irrigation equipment

Maintenance and repair of irrigation infrastructure would occur irrespective of the source of water. However recycled water is more likely to contain algae and other biomaterial that increases the level of maintenance.

14.7.1 Hazards Addressed

Potential contamination of surface and ground waters

14.7.2 Preventative measures

The availability of preventative measures to reduce health and environmental hazards associated with irrigation equipment maintenance includes:

- Appropriate site operator training
- Routine maintenance schedules for each piece of significant equipment

14.7.3 Operational Procedures

The following operational procedures are required:

- Establishing a budget to cover costs of routine maintenance
- Regular maintenance of each piece of significant irrigation equipment according to manufacturer's instructions
- Regular flushing of irrigation pipes
- Observations of algae/weed build up in storage dam
- Timely replacement of equipment near the end of its life cycle
- Identifying malfunctioning equipment and undertaking repairs in a timely manner

14.7.4 Responsibilities and Authorities

1. The **Operations Manager** is responsible for:
    - routine inspections, preventative maintenance and identifying and responding to breakdowns and emergencies
    - documentation as described below

It is noted that a properly functioning automated system should alert the operator of problems with the irrigation system

14.7.5 Documentation

It is recommended that the **Operations Manager** keep records of

- Lists of irrigation equipment to be maintained
- Records of any maintenance
- Spare part inventories
- Incident/follow up action reports

14.8 SOP8 Prevention of cross connections

A hazard at each irrigation site is related to the possibility of cross connections between the human and animal drinking water supplies and the recycled water supply. Accidental cross connections could occur whenever installation or maintenance is undertaken on recycled water or any drinking water supply lines.

14.8.1 Hazards addressed

- Human and animal exposure to pathogens

14.8.2 Preventative measures

- Site auditing during the verification and validation stages and after subsequent onsite works are undertaken
- Use of qualified and trained plumbers or approved contractors
- All above ground infrastructure at sites with existing irrigation to be colour coded
- All new irrigation subsurface installations will be colour coded according to the Australian standard for recycled water

14.8.3 Operational Procedures

1. Education and training of plumbers for works involving recycled water
2. Use of qualified plumbers
3. Identifying the location of drinking water and recycled water supply lines and connections
4. Use of Australian Standards for colour coding and signposting all recycled water and drinking water surface infrastructure
5. Use of Australian Standard for plumbing work carried out
6. When replacing subsurface infrastructure use of Australian standard procedures (colour codes pipe size etc)

14.8.4 Responsibilities and Authorities

1. The **Operations Manager** will be responsible for
    - identifying and mapping the recycled water pipelines and the drinking water pipelines

- alerting/training all contractors and staff who maintain or repair water supply infrastructure at the irrigation sites of the locations of both water supplies
- supervision of water infrastructure works to ensure no cross connections
- documentation as described below

14.8.5 Documentation

- Records of installations and maps of recycled water and potable water infrastructure by the **Operations Manager**
- Records of work and audits undertaken on above infrastructure by the **Operations Manager** The **Operations Manager is** to provide reports of any relevant works to the **General Manager**

14.9 SOP9 Irrigation Worker Health and Safety

Recycled water contains bacteria, fungi, parasites, and viruses that can cause intestinal, lung, and other infections. If equipment, work practices, and personal protective equipment (PPE) don't protect workers sickness may result. Irrigation workers are the most exposed end-user to potential hazards in recycled water.

14.9.1 Hazards addressed

End-user exposure to pathogens

14.9.2 Preventative measures

1. Training and education about the hazards of irrigating with wastewater (see SOP10)
2. Use of standard signage to alert workers of hazards and appropriate work safe practices in the staff rooms and at all sites where exposure to recycled water is possible
3. Inclusion of operational procedures in Work Safe Manuals
4. A place onsite or nearby with clean water for washing hands
5. A place to wash and clean up after work
6. Maintaining a supply of disposable gloves
7. Clean areas set aside for eating and smoking
8. Cleaning facilities or services for clothing (e.g. If clothing is contaminated with recycled water, it should be changed for clean clothing prior to the worker leaving the site).
9. Up to date inoculations including tetanus and relevant hepatitis strains

14.9.3 Operational Procedures

1. **Operators attending to onsite maintenance are**
    - to wash hands well with clean water and soap before eating or smoking and after work
    - avoid touching their noses, mouths, eyes, or ears with their hands, unless they have just washed
    - wear waterproof gloves when handling irrigation equipment
    - should not keep soiled work clothes with other clothes
    - report any injury or illness that could be related to the use of recycled water to the **Operations Manager**
    - In the event of illness, irrigation workers to advise their doctor that they work with recycled water.
    - Recording and documentation of incidents by the **Operations Manager**

14.9.4 Responsibilities and Authorities

1. The **Operational Manager** is responsible for
    - inducting all irrigation workers in the operational practices described above
    - updating the current Safe Work Method Statement document considering the procedures described above
    - documentation as described in the next section
2. A **potentially infected irrigation Operator** is responsible for advising the **Operational Manager (STP site)** of any illness potentially caused by the recycled water
3. The **Operations Manager** is to be advise the **General Manager** of significant incidents

14.9.5 Documentation

- Updates to Safe Work manuals by the Operation**n Manager**
- Incident reports by the **Operation Manager**

14.10 SOP10 Training and Awareness

14.10.1 Hazards addressed

- Operator/s exposure to pathogens
- Potential contamination of surface and ground waters

14.10.2 Preventative measures

- Training programs
- Appropriate signage
- Regular follow up training

14.10.3 Operational Procedures

1. The irrigation managers (as delegated by the Operations Manager) must have appropriate training and experience in the operation of the selected irrigation scheme including scheduling and use of an automated system if appropriate.
2. Training of relevant staff covering the issues set out in this document.
3. Results of any training program with information including but not limited to:
    a. who was trained and made aware;
    b. any incidents, emergencies or complaints that arose because of lack of appropriate training
    c. recommendations on future training, awareness programs

14.10.4 Responsibilities and Authorities

1. The **Operations Manager** is responsible for
    - ensuring all staff that will work or are potentially exposed by the recycled water irrigation scheme are trained
    - preparation of suitable training programs and awareness campaigns for staff, contractors and visitors
    - Documentation as described below

14.10.5 Documentation

- Lists of staff holding various positions affected by the recycled water scheme including any

farmer who is responsible for providing cattle on the property by the **Operation Manager**
- Lists of potentially affected neighbours by the **Operation Manager**
- Written training and awareness programs by the **Operation Manager**
- Incidents and emergencies arising and follow up actions by the **Operation Manager**

15 On-site verification procedures

15.1 Overview

This section discusses on-site verification procedures for the irrigated areas that must be undertaken once sufficient recycled water is available for irrigation. The verification processes demonstrate that the scheme is in a condition where it does not pose unacceptable risks to human and animal health or the environment.

A summary of the verification locations and monitoring process is shown in Table 15.1 and

15.2 Verification of irrigation water quality

15.2.1 Measurements and monitoring

The following measurements are to be made to ensure the recycled water quality is achieved. These would include (but may not be limited to):

- The current ADWF is established using an automatic flow meter that measures inflow at the inlet works.
- The effectiveness of potential disinfection achieved after 25 days detention in the maturation ponds
    - The pH of recycled water delivered to any bulk storage pond is between 6 and 8.
    - E.coli readings at the point of discharge to the bulk storage are less than 1000cfu/100 mL
    - No detection of Taenia spores

15.2.2 Hazards addressed

- Operator and end-user exposure to pathogens
- Potential contamination of surface and ground waters

15.2.3 Responsibilities and Authorities

The responsibility for irrigation water quality delivered to each site is the **Operations Manager**

15.2.4 Documentation

- Results of at least 4 weeks monitoring of ADWF
- Results of monitoring as described in Section 15.2.1
- Report by the **Operations Manager** to the **General Manager** demonstrating that the water quality is suitable for the end use.

Table 15.1 Verification Procedures

Critical Control Point (Refer to Figure 10 in Section 2)	Potential critical control point	Target critical limits or item	Monitoring frequency	Sampling procedure	Corrective action	Responsibility for action
1	Daily inflow		Daily	Automated Meter	Adjust irrigation area if ADWF greater than 22.9 kL/day e.g. 0.5 ha increase per 2.4 kL/day increase in ADWF	Operations Manager
2	Water quality at end of maturation pond system	BOD <30 mg/l No detection of taenia spores pH 6-8	Two samples 1 month apart	Grab sample at end of maturation pond	Investigate functioning of the oxidation/maturation pond system	Operations manager
3	Bulk Storage	TWL	Monthly for 3 months	Height below emergency discharge point consistent with inflow rate/ rainfall conditions	Investigate and seal storage if required	Operations manager
4	Irrigation coverage	2.4 ha	At scheme commencement	Visual inspection	Change sprinkler head or install more sprinklers	Operations Manager
	Irrigation system scheduling	Flow meter calibration to irrigation system	3 tests over a 2-week period at each site	Sample (volume over set time period) to check flow meter is calibrated[1]	Repair	Operations Manager
	Irrigation system components	Measurements as per manufacturer's instructions for optimal performance of the irrigation system	At each irrigation during the verification period	Once irrigation system is verified check performance of irrigation scheduling	Repair	Operations manager
	Irrigation system coverage	Even coverage	Once during verification period	As per manufacturer's Instructions (See section 14.3)	Adjust as necessary	Operations manager

Table 15.1 (cont) Verification Procedures

Critical Control Point (Refer to Figure 10 in Section 2)	Potential critical control point	Target critical limits or item	Monitoring frequency	Sampling procedure	Corrective action	Responsibility for action
5	Water quality to irrigation system	N<50 mg/l P<10 mg/l pH 6-8	2 samples 2 weeks apart	Grab sample	Very Unlikely – re-check in one month Then test these nutrients at end of maturation pond If problem continues redo nutrient budget to determine maximum area of irrigation with average recorded concentrations of N and P	Operations Manager
6	Discharges from bulk storage during unusually wet periods	No concentrated flows into adjacent property	Check topography of irrigation area and ensure tree buffer is established	Observation	Plant more trees and/or reshape potential irrigation area	Operations manager

15.3 Verification of irrigation system

The irrigation system needs to be verified at scheme commencement as well as during the life of the recycled water scheme. Verification is required to determine effective delivery (rate and 'evenness' of application). Failure to have an even application will result in ponding and surface run-off, poor performing pasture and at worst potentially creating runoff or leachate to ground and surface waters.

1. Irrigation controllers are to be checked during the verification program and at the beginning of every irrigation season.
2. First consult the manual for the controller.
3. Open the controller's cabinet and clean out any cobwebs, dirt, or debris, change the battery and check wiring for loose connections. Wire connections, include any rain or wind sensor or soil moisture monitor.
4. The time and day showing on the controller should be checked and corrected if necessary.
5. An irrigation schedule should be checked to see if it is consistent with the principles outlined in SOP(6)
6. Before running the system, remove the last sprinkler head in each line and let the water run for a few minutes to flush out any dirt and debris. Replace the sprinkler head and turn the system on, running one valve at a time.
7. Observe the spray patterns and position of the sprinklers for obvious problems such as clogged or misaligned heads.
8. Any sprinklers with built-in filter screens should be cleaned and replaced if necessary.
9. Leaks and misting from sprinkler heads may indicate high water pressure problems.
10. High pressure problems may be corrected by plumbing a pressure regulator into the sprinkler system. Pressure-regulating sprinkler heads are also available.
11. Adjustment and repair in order to apply the water as evenly as possible. The flow control on the valves may also be adjusted to fine-tune the system.
12. Turn the irrigation system on manually to make sure it is operating as programmed.

15.3.1 Responsibilities

The responsibility for evaluation of the irrigation system is with the **Operations Manager**.

15.3.2 Documentation

Results of irrigation system tests and observations and any corrective actions are to be documented by the **Operations Manager**

16 Ongoing Review

At the end of the first year of operation and then yearly the recycled water management system should be reviewed by all staff that have responsibility for the scheme.

Such a review would entail (but not be limited to)

- Average dry weather flow over the preceding 12 months
- Usage by the irrigation sites
- Water quality results in the bulk storage at the point where recycled water is delivered to the showground irrigation system
- Any uncontrolled discharges in response to wet weather
- Any pipeline or pump failures
- Pasture performance and stocking rate
- Any 'incidents' such as cattle being rejected by abattoir, public health complaints
- Who was trained and when

The results should be compared with results from the previous year as well as the critical limits outlined in this OEMP. This review may result in an update to this document.