Decision Report

Picton Treatment, Reuse and Discharge

May 2021

Sydney WATER

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Tables

Abbreviations

AGWR	Australian Guidelines for Water Recycling
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
ARTC	Australian Rail Track Corporation
BC Act	*Biodiversity Conservation (BC) Act 2016*
CCPs	Critical Control Points
CRG	Community Reference Group
DPI	Department of Primary Industries
DPIE	Department of Planning Infrastructure and Environment
EOP	Emergency Operating Protocol
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act* 1979
EP&A Regulation	*Environmental Planning and Assessment Regulation* 2000
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environmental Protection Licence
ESD	Ecologically Sustainable Development
IPART	Independent Pricing and Regulatory Tribunal
LALC	Local Aboriginal Land Council
LGA	Local Government Area
LVA	Licence Variation Application
MERWA	Minerals Energy Resource Environment and Waste Advisory
ML	Mega Litres
NPA	National Parks Association
REF	Review of Environmental Factors
RWQMP	Recycled Water Quality Management Plan
RWUA	Recycled Water User Agreement
SHD	Sydney Hawk Dragonfly
TfNSW	Transport for NSW
µS/cm	micro siemens per centimetre
UV	Ultraviolet
WRP	Water Recycling Plant

1 Introduction

The Picton wastewater system currently services 16,000 people in the townships of Picton, Thirlmere, Tahmoor and the villages of Bargo and Buxton. The original system was approved in 1997 and commissioned in 2000, servicing the area which had relied on on-site septic systems.

The system is made up of wastewater pipes to collect the wastewater centrally at a Water Recycling Plant (WRP), where it is treated to produce recycled water. This recycled water is then used to irrigate adjoining farm land owned by Sydney Water ('Picton farm') and excess recycled water is discharged to Stonequarry Creek under a precautionary discharge regime regulated by an Environmental Protection Licence (EPL).

Due to increasing development in the area, the WRP capacity was upgraded in 2019 to treat a maximum of 4 mega litres (ML) of wastewater per day (current inflows are around 3 ML/day). However, the recycled water capacity, being either irrigation on Picton farm or precautionary discharge to Stonequarry Creek has not increased and remains at around 2 ML/day.

Sydney Water has been investigating alternative options to resolve this recycled water capacity constraint for over five years. We have considered multiple transfer, treatment, reuse and disposal options for this recycled water. We also submitted a licence variation application (LVA) for increased discharge to Stonequarry Creek in 2015, however, this was not approved by the EPA.

Due to the recycled water capacity constraint, we have been unable to accept new connections (from new developments) into the Picton wastewater system for several years. We have also had to discharge to the creek under an 'emergency operating protocol' (EOP) when flows in Stonequarry Creek are less than 8 ML/day, which is non-compliant with our EPL.

The principle objectives of this proposal are to allow new wastewater connections into the WRP to service growth up to 2024-2028, resolve current non-compliance with the EPL, maximise beneficial reuse of recycled water where feasible and maintain community waterway values.

The preferred option as displayed in the REF (November 2020) incorporated additional WRP treatment, expansion of recycled water use to nearby farms west of the WRP ("Farms 1 and 2", subject to landowner agreement), and additional discharges to the waterway. The REF assessed impacts of both a Stonequarry Creek discharge and a new discharge point to the Nepean River.

We exhibited the REF from 16 November 2020 to 13 December 2020 where agencies and other interested stakeholders were invited to comment on the proposal. We received 11 submissions during the display period. This Decision Report responds to the range of topics raised in these submissions. We also received a response from EPA on 16 March 2021, which we have considered in Appendix B of this report.

Since display of the REF, we have received further information which has resulted in a revised scenario to that presented in the REF. We will now be seeking increased discharge to Stonequarry Creek with no additional offsite reuse (amended Scenario 2 from REF). This is explained further in Section 1.4 of this report and the additional waterway health impacts have been assessed in Section 5 of this report.

1.1 The purpose of the decision report

This Decision Report:

- considers the comments raised in the submissions
- identifies any changes to the proposal that have resulted from consideration of the submissions or subsequent planning work
- assesses the impact of the changes since the REF
- identifies whether any new mitigation measures, or changes to existing mitigation measures, are required
- recommends whether we should proceed with the proposal.

1.2 Planning approval framework

The *Environmental Planning and Assessment Act* 1979 (EP&A Act) provides the statutory context for the proposal's environmental assessment. The proposal has been assessed under Part 5.1 of the EP&A Act, with Sydney Water as the determining authority. The State Environmental Planning Policy (Infrastructure) 2007 allows us to undertake the proposal without development consent.

The REF assessed the potential environmental impacts of the Picton Treatment, Reuse and Discharge proposal (Sydney Water, 2020). We considered the potential impacts against matters listed in the clause 228 of the *Environmental Planning and Assessment Regulation* 2000 (EP&A Regulation). We concluded that the proposal is unlikely to have a significant impact on the environment. This report outlines our consideration of the comments in submissions received during the public exhibition of the REF and whether our conclusion has changed as a result.

1.3 Proposal description from the REF

The proposal, as described in the REF, involves enhancing treatment processes at the WRP, expanding the reuse of recycled water in order to minimise discharging to waterways and enabling additional discharges to take place when irrigation is not possible and storage dams are full.

In summary, the REF described the scope of works as:

- treatment - new denitrification filters, new chlorination system and a new UV system to produce a higher quality recycled water product. Upgrades also included pump modification to improve drawdown at the Eastern storage dam and inlet relocation to improve circulation at the Western storage dam
- reuse – new recycled water pipeline to Farms 1 and 2 (subject to landowner agreement) and on-site irrigation infrastructure
- discharge – rehabilitation of the existing Stonequarry Creek discharge (with additional discharge of up to about 1 ML/day) or construction of a new discharge pipeline to the Nepean River and for discharge of up to 2.35 ML/day.

1.4 Updates since the REF display

Recycled Water agreements - Farms 1 and 2 (March 2021)

As discussed in Section 2.2.4 of the REF, expanding offsite reuse to nearby farms relies on securing landowner agreement in the form of a Recycled Water User Agreement and contract. This was anticipated to be resolved in early 2021, however, we have been unable to secure an agreement with Farm 2 due to factors outside Sydney Water's control.

We hope to secure an agreement with Farm 1 by mid-2021, however, the potential reuse capacity of this property is only 10 hectares. We have therefore taken a worst-case scenario of 0ha of additional offsite reuse to include in the revised modelling and Licence Variation Application to the EPA.

Field survey for Sydney Hawk Dragonfly (December 2020)

In December 2020, we commissioned a targeted field survey for the presence of the endangered Sydney Hawk Dragonfly (SHD) and Adams Emerald Dragonfly near the proposed Nepean River discharge point and the lower section of Stonequarry Creek. The surveys were undertaken in early summer during the adult emergent and flying season and were not able to be completed in time for the REF display. The field survey confirmed the presence of 23 exuviae and 1 adult male SHD in a section of the Nepean River from the weir to Maldon Bridge (MPR 2020). One exuviae was found within 20m of the proposed Nepean discharge point. Exuviae are the cast-off skin of an insect larvae, in this case, as they emerge from the water to become a flying adult SHD. There were no Adams Emerald Dragonfly found in either Stonequarry Creek or the section of Nepean River surveyed.

A 7-part test under the *Fisheries Management Act 1994* was prepared to document potential impacts on the SHD under each of the proposed scenarios documented in the REF (Scenario 2, 3 and 4) (MPR, 2021). This concluded that, based on current field survey data, the proposed Nepean discharge (Scenario 3 and 4) could potentially have a significant impact on this species and a Species Impact Statement (SIS) would be required. The proposed increased discharge to Stonequarry Creek (Scenario 2) is unlikely to have a significant impact and a SIS is not required.

Currently there is so little information about this species, including their habitat requirements, lifecycle and distribution, that further field work is required to prepare a SIS. The optimum time to gather additional field survey data for the SHD is late spring/ summer. For these reasons, the proposed Nepean discharge (Scenario 3 and 4) as documented in the REF will not be pursued further at this stage. We aim to repeat the field survey for the SHD in late 2021 to continue to gather vital information on this threatened species.

1.5 Summary - REF scenario compared to current scenario

Table 1 summary of changes since the REF

Component	REF	Decision Report
Treatment upgrade	Denitrification filters	Denitrification filters or other equivalent technology
Recycled water quality	TN 3mg/L, TP 0.1mg/L NOx 1.8 mg/L	TN 2.5 mg/L, TP 0.05mg/L, NOx 0.6mg/L*
Reuse	Picton farm + 60ha (Farms 1 and 2)	Picton farm + 0ha
Discharge	Stonequarry Creek or Nepean River	Stonequarry Creek

* modelled assumptions refined to reflect expected treatment capability

1.6 Proposal objectives

The principle objective of this proposal is to increase the recycled water capacity to 4 ML/day to service current and future growth in the wastewater catchment up until 2024-2028.

Specific objectives are:

- allow new wastewater connections into the WRP
- resolve current non-compliance with the EPL
- maximise beneficial reuse of recycled water and where feasible, minimise discharges
- maintain community waterway values.

The proposal objectives remain the same as documented above and in the REF. Whilst we cannot immediately expand offsite recycled water use to nearby farms (Farm 2), we are continuing to look for opportunities to expand recycled water use where it is cost effective and feasible to do so.

1.7 Description of amended proposal

In summary, the revised proposal now includes:

- treatment - new denitrification filters (or equivalent technology), new chlorination system, a new UV system to produce a higher quality recycled water product, pump modification to improve drawdown at the Eastern storage dam and inlet relocation to improve circulation at the Western storage dam
- discharge – rehabilitation of the existing Stonequarry Creek discharge and additional discharge of up to 1.4ML/day on average to Stonequarry Creek (discharge scenario C2 from Table 4).

1.8 Further Environmental Assessment

The REF was developed based on a concept design of the proposal. Since the REF was placed on public display, we have progressed supplementary specialist studies for waterway assessment (detailed statistical analysis of existing and predicted impacts), fish surveys, field survey for the Sydney Hawk Dragonfly and revised our modelling report for the amended Scenario 2. A summary of the additional environmental assessment is found in Section 5 of this report and the specialist studies will be available on our proposal website.

The detailed design phase of the proposal has yet to occur. If any changes to the design occurs in later stages of the proposal that have not been assessed in the REF or this Decision Report, an REF Addendum will be prepared to assess the environmental impacts and placed on Sydney Water's website.

2 Consultation

Sydney Water is committed to ensuring that all information regarding the Picton Treatment, Reuse and Discharge proposal is clear, accurate and timely.

Consultation with key stakeholders commenced in 2015 and will continue throughout the upcoming proposal phases – detailed design, construction and operation - with community members being consulted where the proposal directly impacts them.

During detailed design and construction, consultation will be undertaken by the team selected by Sydney Water to deliver the proposal communications.

The following sections describe the consultation done to date and proposed future consultation during the detailed design and construction phases of the project.

2.1 Community Reference Group (CRG)

Following a public expression of interest process in 2016, a Community Reference Group (CRG) was established. The CRG members included representatives from local business, environmental groups, community residents and councils in affected local government areas (LGAs), who all had an interest in the outcome of the proposal. CRG members included National Parks Association (NPA) Macarthur Branch, Bushcare, resident representatives, Chamber of Commerce members, Inghams, Wollondilly Shire Council, Camden Council and Campbelltown City Council. The CRG was engaged progressively during the development of initial recycled water capacity options through four workshops and a site visit in 2015/16.

Through this process, the CRG provided feedback on the list of options and recorded its preferences for the assessed recycled water management proposal. In general, the CRG feedback included:

- retaining the WRP and farm
- trial wetlands to improve water quality
- acceptance of increased discharge to Stonequarry Creek up to 4 ML/d
- for larger volumes (e.g. up to 7 ML/d), preference for Nepean River discharges.

2.2 Local community

Alongside the CRG, Sydney Water also sought feedback from the wider community. An initial proposal newsletter was distributed in October 2020 to around 10,000 households in Picton, Tahmoor, Thirlmere, Bargo and Buxton. An extra 1500 copies of the newsletter were distributed for placement at council facilities such as the library, mobile library and administration centre. A follow up newsletter was distributed in November 2020, inviting community members to provide feedback on the REF. During this period, we held meetings with several individuals and groups, including:

- neighbours living next to the Picton WRP
- local water users including Bass Club, water activity consultants, Entomologist studying the dragon fly habitat in the local area, ecology tourism group
- Council's Water Advisory Committee
- wider community members who have requested more information on the Picton WRP.

Over 702 individual users have visited the Picton Treatment, Reuse and Discharge proposal website page on Sydney Water's online engagement platform, Sydney Water Talk. Three households attended an information session held in the local Wollondilly library in December 2020 and one household attended the community online session in December 2020.

2.3 Tharawal Local Aboriginal Land Council

The proposal falls within the land of the traditional owners, the Tharawal (D'harawal) people. Protecting pathways and the environment in this catchment is consistent with the environmental stewardship the traditional owners have provided for thousands of years. As part of our consultation, in September 2020, we held a briefing with the Chief Executive Officer of the Tharawal Local Aboriginal Land Council (LALC). Sydney Water wanted to understand if places of Gumadagul Ngurang (place of personal significance) existed in or near the study area. The CEO asked for additional information to share with the Board and requested a site visit to the proposed Nepean discharge pipeline site with one of the Board members. This site visit took place on 5 December 2020. The CEO and the Board were invited to make a submission on the REF.

2.4 Wollondilly Shire Council

We have actively been consulting with different departments of Wollondilly Shire Council throughout the options development phase. Council departments consulted include Development services, Environmental team, Planning team, Health and regulatory services.

2.5 EPA

We have been working with the EPA since 2015 to develop an acceptable solution to the recycled water capacity constraint at the Picton WRP. This has involved the preparation and submission of two licence variation applications (LVAs) to the EPA, one in 2015 and one in 2017. Neither LVA was approved, however, the EPA issued a series of PRP studies requiring Sydney Water to gain further information on:

- short-term water quality sampling program during three discharge regimes − condition U1
- source control investigations to reduce stormwater and industrial wastewater flows to the Picton Sewerage Treatment System − condition U2
- investigations for additional wastewater recycling and reuse options for Picton STS - condition U3

- trial pilot-scale construction wetlands project − condition U4.

The work on the PRP studies in 2018-2019 were used to inform the preferred solution which was finalised in 2020 and the subject of the REF. Meetings with the EPA in 2020 discussed an LVA, Waterway Analysis report, source modelling and flow gauging, planning approval pathway, water quality and algal monitoring data and key findings of the REF.

Two further meetings were held with the EPA in February 2021 to discuss their overall comments, as well as specific comments on the modelling report and flow gauge data.

2.6 Other government agencies

Other government agencies consulted included:

- Department of Planning Infrastructure and Environment (DPIE) – consulted in September 2020 and was supportive of Sydney Water's approach of assessing this proposal under Division 5.1 of the *EP&A Act*
- NSW Health and DPIE, Animal Health – risk workshop involving NSW Health and DPIE – Animal Health to understand additional public health and animal health risks and controls
- Australian Rail Track Corporation (ARTC) – consultation on the concept design of the recycled water main crossing over the ARTC Main Southern Rail Line
- Department of Primary Industries- Fisheries (DPI- Fisheries) – consultation under the REF display process with Stonequarry Creek and Nepean River mapped as key fish habitat
- Subsidence Advisory NSW – concept design of proposed works to be submitted for approval.

2.7 REF public display

The REF was on public display from Monday 16 November to Sunday 13 December 2020 on the Sydney Water Talk website. The link to the website was also shared on social media through Sydney Water's Facebook page.

This was in turn shared on other community Facebook pages including that of Wollondilly Council, Wollondilly Library's and some local Councilors.

We invited the community and stakeholders to provide written submissions on the REF by:

- delivering the community 2 different newsletter to more than 10,000 local residents. The first newsletter informed the community of our proposed work. The second newsletter provided details of the REF being on display and advised on how to make a submission
- The REF information on the proposal page of the Sydney Water Talk website received in excess of 702 visits during the display period and the REF was downloaded 120 times
- Details of the REF were also shared in Council's newsletter in December 2020. Council has a database of 1017 people subscribed to receive Council's newsletter

- Letters were also sent to relevant government agencies and councils advising of the REF display dates and the submission process. This included:
    - Minister Pavey MP, Minister for Water, Housing and Property
    - Wollondilly Shire Council
    - Environment Protection Authority
- Emails with links to the REF and Sydney Water Talk were sent to:
    - National Parks Association, Macarthur
    - Tharawal Local Aboriginal Land Council
    - Minerals Energy Resource Environment and Waste Advisory (MERWA)
    - Recreational Water user group
    - Community Reference Group
- An email with a link to the REF was sent to 235 subscribers of the proposal website page.

Due to the Covid-19 pandemic and the need to practice physical distancing, the REF display and community engagement was predominantly undertaken through online communication.

2.8 Community information sessions for the REF

Two virtual community information sessions were proposed during the REF display period and one face to face information session at the local library. Due to low registration numbers, only one virtual community information session took place on the 'Zoom' platform. This was held on:

- Wednesday 2 December, 6pm – 7.30pm

One household registered to attend the information session. Whilst a presentation on the proposal was planned, due the low number of registrations, the session was held as a question and answer forum.

The public library information session was also held on:

- Thursday 3 December, 10.30 am – 2 pm

Three households expressed interest and attended the information session at the library.

3 Submissions

This chapter summarises the submissions received, in response to the public display of the REF.

3.1 Number of submissions and comments

A total of 11 submissions were received during the display period (seven emailed, three via Sydney Water Talk and one via a community session). Eight phone calls were received to the community information line. Copies of written submissions received are included in Appendix A. Within the 11 submissions, there were 110 comments or queries that have been addressed in this Decision Report.

The EPA provided comments on the REF three months after the display period ended (16 March 2021) and after the Decision Report had been drafted. Their comments and responses to their queries are included in Appendix B.

3.2 Topics

The submissions were analysed and the comments raised in each submission were roughly grouped into 14 categories. Table 1 lists the 14 topic categories, number of submissions which raised each topic as well as the number of comments within the submissions, related to each particular topic. Each submission usually raised several topics, as well as several comments related to each topic.

The most common topics raised related to the strategic context, along with the scope of works and proposal certainty. There were also many supportive comments for the proposal which can be viewed in the submissions themselves in Appendix A.

Table 2 REF submissions - topics breakdown

Topic	No of submissions	No of comments/queries
Strategic context	6	14
Scope of works and proposal certainty	6	13
Proposal need and alternatives	5	8
Operation and performance	5	8
Human health	5	11
Waterway health	5	12
Social impacts	5	15

Topic	No of submissions	No of comments/queries
Consultation	3	5
Topography, geology and soils	3	6
Flora and fauna	3	6
Additional recycled water opportunities	2	8
Energy	1	1
Traffic and access	1	1
Cumulative impacts	1	2

Table 3 below provides a summary of all 110 comments received across all 11 formal submissions on the REF. Each comment is addressed in Section 4 below.

Table 3 Summary of topics raised in submissions

No.	Question/Comment	Submission/ Agency	Location addressed in this report
Proposal Need and Alternatives			
1	Concern that we would lose the opportunity costs if we do not have a water reuse scheme.	Submission #4	Section 4.1
2	Concern with own continued pumping of water from a creek under a licence to irrigate, particularly low flows in drought conditions and preference to leave water in the ecosystem.	Submission #5	Section 4.1
3	Concern that the REF does not make clear what the effect will be if private irrigation on adjacent farm does not proceed.	Submission #8	Section 4.1
4	Query on what are the alternatives if expanding recycled water use to the west does not occur.	Submission #8	Section 4.1
5	Suggestion of additional possible irrigation area, south east of Boral Cement works	Submission #2	Section 4.1
6	Query noting that trials are being conducted on wetland options and would like to see more mention of this and a statement of commitment to this option.	Submission #4	Section 4.1
7	Concern that lack of treatment capacity has been a significant concern to Council and needs to be resolved without delay.	Wollondilly Shire Council	Section 4.1
8	Concern that the ESD section is far from comprehensive.	Submission #4	Section 4.1

No.	Question/Comment	Submission/ Agency	Location addressed in this report
Scope of Works and Proposal Certainty			
9	Query on how many components a sewerage treatment/ wastewater reuse scheme has and how the components be located and linked in relation to each other.	Submission #4	Section 4.2
10	Query on what infrastructure would be required if resident (farmer) could enter into the agreement.	Submission #5	Section 4.2
11	Query on if the scale and impact of the planned works has been determined with some certainty.	Submission #1	Section 4.2
12	Confirmation from farmer that they are willing to enter into a long-term agreement of 10-20 or more years to provide reassurance to the proposal.	Submission #5	Section 4.2
13	Query on what level of agreement with stakeholders currently exists.	Submission #1	Section 4.2
14	Query on how can we be confident of long term use of privately owned land.	Submission #6	Section 4.2
15	Concern that one of the farms has already applied to subdivide.	Submission #6	Section 4.2
16	Concern that the security of the proposal relies on private agreements. Further detail and certainty is required to ensure the proper long term planning and land uses restrictions are in place for the land subject to the REF.	Submission #8	Section 4.2
17	Concern over reduction of irrigable land due to Picton bypass	Submission #6	Section 4.2
18	Suggestion that alternative alignments for Picton bypass are discussed. Alternatively, the Government may need to explore options to increase the land ownership of Sydney water.	Wollondilly Shire Council	Section 4.2
19	Query on how likely it is to get approval for discharge to the Nepean River.	Submission #8	Section 4.2
20	Suggestion that the REF is unclear as to what land is subject to the REF and a clear map should be provided indicating the subject land and this may need further review of the aboriginal heritage section.	Wollondilly Shire Council	Section 4.2
21	Query on estimated completion date of a pipeline if determined viable to the area of ‘Future recycled water customer 4” on Figure 3 of the REF.	Submission #5	Section 4.2
Operation and Performance			

No.	Question/Comment	Submission/ Agency	Location addressed in this report
22	Query on if farmer could enter into an agreement, what would their responsibilities be in terms of runoff, monitoring and reporting and if there a withholding time for entry into an area that is being irrigated.	Submission #5	Section 4.3
23	Query on RW user agreements and it's requirements of farmers? How will this agreement affect their farming operations?	Submission #8	Section 4.3
24	Concern that long term planning and direct control of management on farms requires competent, effective management.	Submission #6	Section 4.3
25	Query on controls in place to ensure successive owners of the farms continue to meet the requirements?	Submission #8	Section 4.3
26	Suggestion that continued support should be provided to landholders accessing treated wastewater to ensure appropriate use.	Wollondilly Shire Council	Section 4.3
27	Query on who monitors the farmer and how often?	Submission #8	Section 4.3
28	Suggestion to irrigate at levels that are sustainable and capable of producing a diversity of valuable products to maximise production and application of treated wastewater applied per hectare – benefits to amenity and tourism in the region.	Submission #4	Section 4.3
29	Query on if controls are not managed, what effects and to what extent. For example, could there be impacts beyond the farm?	Submission #8	Section 4.3
Consultation			
30	Query on what level of discussions are taking place with people affected as 'we would like to take part'.	Submission #1	Section 4.4
31	Suggestion that continued corporation and keeping local residents well informed is vital to continue.	Submission #6	Section 4.4
32	Suggestion to negotiate with TfNSW concerning Picton bypass and the opportunity to send treated wastewater to paddocks near Maldon (attaching a pipe to the bridge).	Submission #4	Section 4.4
33	Suggestion to liaise with a variety of independent experts who can creatively and carefully help plan a liveable, productive and sustainable city involving reuse of water.	Submission #4	Section 4.4
34	Suggestion to use a various highly qualified independent professionals from relevant branches of science and in other relevant disciplines to review REF.	Submission #4	Section 4.4

No.	Question/Comment	Submission/ Agency	Location addressed in this report
Strategic Context			
35	Query/expression of appreciation for the proposal's outcomes and future management planning align with Council's Integrated Water Management Policy and Strategy.	Wollondilly Shire Council	Section 4.5
36	Suggestion to consider maximising wastewater recycling and reuse in a manner that does not negatively impact the environment and supports the local community.	Wollondilly Shire Council	Section 4.5
37	Query on if plans link in with development initiatives that Local Government talk about?	Submission #1	Section 4.5
38	Concern that the proposal is an interim solution for servicing until 2024-2028 and if the REF and relevant approvals are not supported, there are no connections and there is no short, medium, and long term plan for Picton	Wollondilly Shire Council	Section 4.5
39	Concern that into the future there may not be the land available to use the treated water and we need to think further than 5-10 years down the track.	Submission #6	Section 4.5
40	Suggestion of long-term acquisition of land now and allowing continuation of current farming activities in conjunction with Sydney Water management for long term economically and sustainability viability.	Submission #6	Section 4.5
41	Concern that region is continually affected by short-term fixes. What consequences and what land use controls are needed if the long-term solution (RW pipe to Warragamba catchment) can not be developed in sufficient time? How will land use decisions coincide with short, medium and long-term arrangements?	Submission #8	Section 4.5
42	Figure 1 in REF appears conservative - we encourage to 'plan for more' so that residents within the scheme within suitable lands are able to be serviced and to provide a more 'short term proof' capacity.	Wollondilly Shire Council	Section 4.5
43	Concern that the REF is contrary to the verbal advice by the landowner to Council to date. If the REF proceeds, there is a direct impact to the existing planning proposal which the landowner, Council and Department will need to clearly address.	Wollondilly Shire Council	Section 4.5
44	Query on what action is being taken now and the expected timeline to achieve the Warragamba pipeline?	Submission #8	Section 4.5

No.	Question/Comment	Submission/ Agency	Location addressed in this report
45	Query on what infrastructure redundancy will occur as a result of the short-term fix, in anticipation of a long-term advanced treatment solution.	Submission #8	Section 4.5
46	Concern about lack of sewerage capacity and impact to development approvals including: Concerned about lack of sewerage capacity and impact to development approvals for 50 seniors housing lots next to Antill Park Golf Club and 30 residential lots 100m from the roundabout in Picton which can't proceed due to lack of sewerage capacity.	Submission #2	Section 4.5
47	Concern about lack of sewerage capacity and impact to development approvals including: Would like sewer connection to Stratford House Tahmoor development. DA obtained for 214 unit retirement village and DA adjoining was lodged for 120 bed nursing home with consent expected by Feb 2021.	Submission #7	Section 4.5
48	Concern that there is an 'uneven playing field' with development being approved for Wilton without a REF/EIA and concept for infrastructure versus new connections for new developments not possible in Picton, Tahmoor, Thirlmere.	Submission #8	Section 4.5
Additional Recycled Water Opportunities			
49	Query if plantations from northern NSW could be intermittently irrigated by wastewater containing ideal amounts of nutrients?	Submission #4	Section 4.6
50	Suggestions that in response to global warming and nutrient rich water, consider planting and irrigating suitable north-east NSW tree species for fine timber and amenity.	Submission #4	Section 4.6
51	Suggestion that some tree species can increase the amount of wastewater used per hectare.	Submission #4	Section 4.6
52	Suggestion to carefully use water-reuse farms to increase production and amenity and reduce the urban heat island effect in a warming and drying region.	Submission #4	Section 4.6
53	Suggestion of using water for firefighting if stored in large area - may require water to processed at higher standard.	Submission #6	Section 4.6
54	Suggestion that in light of recent fires, wildlife refuges (during severe heat waves and bushfires) could be created by rich green grass, irrigated by nutrient-rich wastewater so that the fire hazard is greatly reduced	Submission #4	Section 4.6
55	Suggestion of use by smaller farms where water is taken by tankers.	Submission #6	Section 4.6

No.	Question/Comment	Submission/ Agency	Location addressed in this report
56	Suggestion of evaporation ponds, use of water by dust prevention on worksites eg road works. And long term it may be economical to revisit reuse in sports grounds, parks golf course although this would of been a fraction of the price if done as originally planned.	Submission #6	Section 4.6
Topography, geology and soils			
57	Concern about build up of pollutants in soils over time if water cannot be disposed in the river all the time.	Submission #3	Section 4.7
58	Query on accumulation of salt gradually in the soils irrigated by treated wastewater, near Picton, or has salt been flushed from the soils by occasional periods of torrential rain?	Submission #4	Section 4.7
59	Suggestion that reliance of soil results from 30 years ago is not a substitute for soil testing done regularly and after major floods. Ideally such testing for salinity would be done in about a dozen randomly selected sites on the farms.	Submission #4	Section 4.7
60	Suggestion to regularly test the farms' soils to ensure that salt, waterlogging and other problems do not arise as a result of excessive irrigation per hectare.	Submission #4	Section 4.7
61	Query - Are there any natural hazard or infrastructure resilience risks to the expansion of land use and infrastructure provision that could cause a disruption to the service/operation?	Submission #8	Section 4.7
62	Query - Are there any mine subsidence risks in relation to the Nepean Discharge pipe?	Submission #8	Section 4.7
Human health			
63	Concern about growing vegetables and organic status of honey grown on neighbouring land.	Submission #3	Section 4.8
64	Concern about recycled water spray drift onto neighbouring land.	Submission #3	Section 4.8
65	Query if food for human consumption also be grown from using recycled water?	Submission #4	Section 4.8
66	Query – is it possible to economically irrigate orchards and grapevines by using means other than sprays.	Submission #4	Section 4.8
67	Research shows that there is no issue for irrigating under trees and not wetting fruit for harvest.	Submission #5	Section 4.8
68	Query - Orchards have, in the past, been considered unsuitable for water reuse farms but what if there is an	Submission #4	Section 4.8

No.	Question/Comment	Submission/ Agency	Location addressed in this report
	alternative to sprays and what if a computer automatically turns off the supply of water if there is a strong breeze?		
69	Query on, if entering into an agreement, do you have an analysis of what is left in the water after your treatment process (one of our concerns is that we use our dam water to clean our juice press and need to know if it will be suitable for cleaning/food processing/ swimming etc)?	Submission #5	Section 4.8
70	Consider - wastewater is managed in a manner that does not negatively impact on the Upper Nepean River remaining fit for primary human contact.	Wollondilly Shire Council	Section 4.8
71	Query regarding treatments to standard of AGWR, what is required to fully mitigate the health and safety risk as opposed to minimising the risk?	Submission #8	Section 4.8
72	What consequences will minimised health and safety risks create?	Submission #8	Section 4.8
73	Query regarding risks from run-off for recycled water schemes - what are the standard safeguards?	Submission #8	Section 4.8
Waterway health			
74	Suggestion to avoid discharging water directly or indirectly into Stonequarry Creek or Nepean River unless such discharge is necessary due to floods or no flow.	Submission #4	Section 4.9
75	Concern about different environmental flows in rivers and climate change impacts to continuous flows. Suggestion that the amount of water flowing in Stonequarry Creek and Nepean River should be monitored, especially during droughts.	Submission #4	Section 4.9
76	Concern that Stonequarry Creek will sometimes dry up and need assistance from Sydney Water's treatment and reuse scheme near Picton.	Submission #4	Section 4.9
77	Query on how has Stonequarry Creek flood study been considered in the discharge scenario. What consequences would occur in minor, moderate, and major flood events, including up to the probable maximum flood?	Submission #8	Section 4.9
78	Concern – the REF suggests that Stonequarry Creek and Nepean River will receive additional pollution if the quality of the water leaving the site is not greatly improved. Hopefully the technology is improving and will allow much cleaner water for the streams.	Submission #4	Section 4.9

No.	Question/Comment	Submission/ Agency	Location addressed in this report
79	DPI Fisheries supports higher levels of water treatment before discharge to Key Fish Habitat waterways and views the relevant ANZECC Guidelines as a minimum benchmark. Enhanced treatment options should be investigated.	DPI Fisheries	Section 4.9
80	Suggestion to ensure that water discharged into the streams is of a very high quality and continue to consider artificial wetlands as a final treatment method.	Submission #4	Section 4.9
81	Concern that fertiliser/nutrients in wastewater should not be allowed to pollute nearby streams.	Submission #4	Section 4.9
82	Query if higher nutrient discharge controls are required?	Submission #8	Section 4.9
83	Query - If we could enter into agreement, what water capacity will be required to maintain/take per year and what is the water quality going to be like?	Submission #5	Section 4.9
84	Query on how often are quality targets monitored and by whom? Query on where are the critical control points?	Submission #8	Section 4.9
85	Query/expression of interest for Integrated Water Management Plans to be drafted for the area serviced by Picton WRP as well as the Wilton Growth Area in order to better manage the whole of the water cycle into the future.	Wollondilly Shire Council	Section 4.9
Flora and Fauna			
86	Query regarding discharge point north of Maldon Weir - Is this section of the river in pristine condition? If so, how will river ecology be maintained?	Submission #8	Section 4.10
87	Suggestion that wastewater is managed in manner that protects waterways and riparian habitats including threatened aquatic fauna such as the Sydney Hawk Dragonfly and Macquarie Perch.	Wollondilly Shire Council	Section 4.10
88	Confirmation that S.219 permit to block fish passage is not required	DPI – Fisheries	Section 4.10
89	Query regarding typical construction impacts such as some vegetation removal - to what extent and to what effect on ecology? This information needs to be more transparent.	Submission #8	Section 4.10
90	Suggestion to consider a vegetation management plan for land that will be subject to increased nutrient loads or salinity, particularly Shale Sandstone Transition Forest/Western Sydney Dry Rainforest communities.	Wollondilly Shire Council	Section 4.10

No.	Question/Comment	Submission/ Agency	Location addressed in this report
91	Concern that the potential impacts to this land from this proposal are unlikely to align with the Strategic Conservation Area in the Cumberland Plain Conservation Plan. The REF should address this and further advice should be sought from DPIE.	Wollondilly Shire Council	Section 4.10
Energy			
92	Concern that the scheme would use a lot of energy. Other firms have firm commitments on future use of renewables. If those companies can do it, then so can Sydney Water.	Submission #4	Section 4.11
Traffic			
93	Query if traffic volumes be controlled to ensure heavy vehicle movements occur outside of school and commuter peak traffic periods?	Submission #8	Section 4.12
Social impacts			
94	Query on if the areas of work will become Sydney Water property and if so, what will be the impact on adjoining properties?	Submission #1	Section 4.13
95	Query on any disruption to existing consumers during the construction?	Submission #8	Section 4.13
96	Query on how property owners being guided to take advantage of these benefits.	Submission #1	Section 4.13
97	Query on what offer of benefit can you give us as elderly residents living there for 44 years on our pristine farm? Please reply in detail.	Submission #3	Section 4.13
98	Concern regarding unknown negative impacts from extension around Stilton Lane and further places.	Submission #3	Section 4.13
99	Concern regarding pollution and unwanted chemicals impacting honey production (registered beekeepers).	Submission #3	Section 4.13
100	Query if there is compensation due to potential for pollution in soils.	Submission #3	Section 4.13
101	Query if there is compensation due to potential for spray drift impacting vegetables.	Submission #3	Section 4.13
102	Query on land condition if there was a spill (spray impact on neighbouring land) and irreversible impact.	Submission #3	Section 4.13
103	Concern that extensions would devalue property.	Submission #3	Section 4.13

No.	Question/Comment	Submission/ Agency	Location addressed in this report
104	Query if Council will stop us from subdividing our land in the future.	Submission #3	Section 4.13
105	Query if a neighbour who is selling land and leaving area after scheme operates is compensated and we are not?	Submission #3	Section 4.13
106	Suggestion that because of water constraints, we have not been able make use of all the land we own. If we were to receive recycled water, we could look into other income streams from using the remaining land for crops.	Submission #5	Section 4.13
107	Query on a price per megalitre if we could enter into an agreement or will it be free? Do you have an approximation if so?	Submission #5	Section 4.13
108	Query on how will it impact Sydney Water pricing to residential and commercial consumers?	Submission #8	Section 4.13
Cumulative impacts			
109	Concern that the REF must consider the cumulative impact of discharges to the Nepean river system from the Growth SEPP (Wilton) as well.	Submission #8	Section 4.14
110	Query on how road drainage from Picton bypass be managed to avoid cumulative impact to land required for irrigation?	Submission #8	Section 4.14

4 Consideration of comments

This chapter outlines the comments raised from the REF. Specific concerns from each submission have been identified and grouped based upon the key topics in the REF.

The concerns raised by submissions are presented in boxes and our response is provided below. The text from each submission has been paraphrased as per Table 2 in Section 3 above. If a submission raised several comments, only the relevant parts of the submission have been presented for each topic. A full copy of each submission can be found in Appendix A.

4.1 Proposal Need and Alternatives

Concern that we would lose the opportunity costs if we do not have a water reuse scheme.

Concern with own continued pumping of water from a creek under a licence to irrigate, particularly low flows in drought conditions and preference to leave water in the ecosystem.

Concern that the REF does not make clear what the effect will be if private irrigation on adjacent farm does not proceed.

Query on what are the alternatives if expanding recycled water use to the west does not occur.

Suggestion of additional possible irrigation area, south east of Boral Cement works.

Query noting that trials are being conducted on wetland options and would like to see more mention of this and a statement of commitment to this option.

Expanding the water reuse scheme to nearby farms was identified as the most feasible option which provided cost savings and wider economic benefit to the community during the option selection phase (Section 2.2.4. of the REF). One of the four proposal objectives is to maximise beneficial reuse of recycled water where feasible, to minimise discharge to waterways (Section 2.2.3 of the REF). However, the successful expansion of the scheme relies on securing a recycled water agreement and contract with the landowners. As noted in Section 1.4 of this Decision Report, we have been unable to secure a recycled water agreement with Farm 2, although we are hopeful of securing an agreement with Farm 1 by mid-2021. This means that we will need to apply for increased discharge to Stonequarry Creek in a licence variation application to the EPA. Sydney Water is continuing to look for opportunities to expand recycled water use where it is cost effective and feasible to do so.

The provision of recycled water as a resource to nearby farms would reduce the reliance on pumping of water from local waterways where low flows and reduced availability of water may be experienced during drought conditions. However, there are many challenges to resolve with a recycled water scheme between Sydney Water and private landowners. There is continued development pressure to re-zone agricultural land for residential purposes, which reduces the longevity of the private recycled water scheme. In addition, Sydney Water is reliant on private landowners to maximise the irrigation potential of their land which may not always be their priority.

Sydney Water did investigate the possibility of supplying recycled water to Boral Cement works and to other properties on the north side of Stonequarry Creek, however, the volume of potential recycled water use in this area was relatively low compared to the cost of constructing a pipeline to cross under Stonequarry Creek. Sydney Water tried to purchase land in this area in 2015 but was only able to secure a lease for one of the five properties identified for potential recycled water use. These options would be re-considered should the Picton bypass road be constructed by Transport for NSW in the future, as there may be an opportunity to co-locate a recycled water pipeline with the road bridge over the creek.

The pilot wetland trial was required by the EPA to investigate the technology as a pollution reduction study (condition U4 in our EPL). Four pilot wetland cells were constructed in 2019 at the Picton WRP to assess performance and determine sizing and cost relationships required for Sydney Water to have confidence in this treatment investment. Monitoring commenced in 2021 and will continue for two years. The full results of the effectiveness of the wetland trial will be available in 2023 and will inform future planning efforts for Picton beyond 4 ML/day treatment capacity.

Concern that that the lack of treatment capacity has been a significant concern to Council and needs to be resolved without delay.

Concern that the ESD section is far from comprehensive.

Sydney Water acknowledges that the recycled water capacity constraint at Picton has been a significant concern to Council and that this has impacted the ability to allow new development in the local government area (LGA). The upgrade of the WRP in 2019 was to enable treatment of additional wastewater inflows up to 4ML/day. However, the application to vary the EPL to enable additional discharge to Stonequarry Creek at the time was not approved by the EPA and we have been unable to accept new wastewater connections. Sydney Water is seeking to resolve this constraint for the Picton area but cannot do so without the EPA's approval of our pending LVA.

Section 2.3 of the REF considers a high-level summary of the proposal against the principles of ecologically sustainable development (ESD). It summarises how the principles have been considered in making the decision to determine the REF. Further consideration of ESD is found in the specialist's studies prepared to support the REF.

The precautionary principle is a key component of ESD and is the main reason why a Nepean discharge option is not being considered at this stage. There is currently insufficient information about potential impacts on the SHD from a new discharge location into the Nepean River. We aim to collect more field survey data regarding the presence of SHD in the Nepean River in late 2021.

4.2 Scope of Works and Proposal Certainty

Query on how many components should a sewerage treatment/ wastewater reuse scheme have and how should the components be located and linked in relation to each other.

Query on what infrastructure would be required if resident (farmer) could enter into the agreement.

A recycled water scheme such as the one at Picton comprises a wastewater network (pipeline network transferring sewerage from the catchment), a treatment plant to treat the water to required water quality levels (at Picton this is a complex system that is centralised and carefully managed at the WRP) and recycled water pump stations and pipelines to transfer recycled water to users.

We welcome expressions of interest to use recycled water on private farms. The process of expanding recycled water to private farms involves several steps. The first crucial step is obtaining a Land Capability Assessment which determines whether the property is suitable for recycled water use and depends on such factors as slope, soil type and proximity to other sensitive areas (waterways, other properties, dams, etc). If the land is suitable for recycled water use, a concept design for the recycled water supply pipeline and irrigation infrastructure is required. This may involve specialist environmental studies for ecology and heritage values on the private property, as well as planning approval for the infrastructure. Detailed design and construction of the infrastructure is then required.

The irrigation infrastructure would generally include such things as k-line pods, subsurface irrigation lines, portable spray irrigation, above ground balance and storage tanks.

Operations and maintenance of the irrigation infrastructure is then subject to an agreed Recycled Water User Agreement between the Farm and Sydney Water. A Recycled Water Quality Management Plan is also required which documents operational controls to protect the environment and human health. Any private landowners interested in recycled water use on their property should contact WestRegionDelivery@sydneywater.com.au.

Query if the scale and impact of the planned works has been determined with some certainty.

Confirmation from a farmer that they are willing to enter into a long-term agreement of 10-20 or more years to provide reassurance to the project.

The Proposal has three main components (treatment, additional offsite reuse and additional discharge). The WRP treatment upgrade has a level of certainty as it involves designing and constructing additional infrastructure on Sydney Water property. The other two components have a degree of uncertainty, recycled water use on private properties relies on reaching agreement with landowners (which we have been unable to reach with Farm 2) and additional discharge relies on securing approval of the LVA from EPA. Following receipt of additional information since the REF (outlined in Section 1.4 of this Decision Report), we will now need to seek additional discharge to Stonequarry Creek in our LVA.

We are appreciative of the expressions of interest received by other farmers in the area including expressions of long-term agreements to provide reassurance for the Proposal. We will continue to look for opportunities to expand recycled water use where it is cost effective and reasonable to do so.

Query on what level of agreement with stakeholders currently exists.

Query on how we can be confident of long-term use of privately owned land.

Concern that one of the farms has already applied to subdivide.

Concern that the security of the project relies on private agreements. Further detail and certainty are required to ensure the proper long-term planning and land uses restrictions are in place for the land subject to the REF.

Concern over reduction of irrigable land due to Picton bypass.

Suggestion that alternative alignments for Picton bypass are discussed. Alternatively, the Government may need to explore options to increase the land ownership of Sydney water.

We were unable to reach an agreement with Farm 2 for recycled water use on their property, as they have indicated other plans for their land. However, we are still hoping to reach agreement with Farm 1 for recycled water use on their property by mid-2021.

We acknowledge that there is currently not a high level of confidence for long-term water reuse on privately owned land. We will continue to investigate options with current and future landowners to expand the use of recycled water. In the meantime, we will apply to the EPA for a variation to our EPL which allows increased discharge to Stonequarry Creek with no additional offsite reuse.

Reuse agreements would not restrict landowners from subdividing or selling their land in the future. Our cost arrangements for supply of recycled water would provide an incentive to landowners that sign up for more than two years. If private landowners subsequently sell their land, the recycled water pipeline could remain in place, as we continue investigating options to expand recycled water supply to properties further west (such as Farms 3 & 4).

While continuing consultation with Wollondilly Shire Council, as the area develops and land uses change, we cannot impose future land use restrictions on private properties that accept our recycled water. As part of the options selection process, we considered purchasing additional land for water reuse applications but this option was considered too costly.

We are also working with Transport for NSW (TfNSW) regarding the Picton bypass which may present opportunities for new irrigable land to the north east of Stonequarry Creek. We will ensure we maintain or increase the existing management capacity of recycled water at Picton farm should the Picton bypass reduce our irrigable land capacity. Any potential impacts to Picton farm will need to be offset by TfNSW so that there is no net loss of irrigable land due to the Picton bypass.

Query on how likely it is to get approval for discharge to the Nepean River.

The REF assessed impacts associated with discharging excess recycled water into the Nepean River. Since display of the REF, we have conducted a field survey and confirmed the presence of the threatened Sydney Hawk Dragonfly downstream of the proposed Nepean discharge point. A test of significance for the threatened SHD indicates that, based on current scientific knowledge and field data, the proposed Nepean discharge may result in a potentially significant impact on this species. We will not pursue this option in the short term until we have collected further information about this species. The LVA will seek increased discharge at the existing Stonequarry discharge point.

Suggestion that the REF is unclear as to what land is subject to the REF and a clear map should be provided indicating the subject land and this may need further review of the aboriginal heritage section.

The subject land of the REF is given Table 4 and Figures 4, 5 and 6 of the REF. The aboriginal heritage assessment reviewed the study area based on the proposed works. To protect the location of aboriginal sites, a map of this and the heritage assessment have not been made publicly available.

Query on estimated completion date of a pipeline if determined viable to the area of 'Future recycled water customer 4" on Figure 3 of the REF.

The success (or otherwise) of a first phase of offsite recycled water use on private farms will determine a timeline for potential expansion of this further west of the WRP. Initial steps would involve discussions, site visits and land capability assessments. This would be followed by a concept design, detailed design and then construction with an estimate of approximately two years to complete these necessary steps.

4.3 Operation and Performance

Query if a farmer could enter into an agreement, what would their responsibilities be in terms of runoff, monitoring and reporting and if there is a withholding time for entry into an area that is being irrigated.

Query on recycled water user agreements and its requirements of farmers. How will this agreement affect their farming operations?

Concern that long-term planning and direct control of management on farms requires competent, effective management.

Query on controls in place to ensure successive owners of the farms continue to meet the requirements.

Suggestion that continued support should be provided to landholders accessing treated wastewater to ensure appropriate use.

Query on who monitors the farmer and how often?

Suggestion to irrigate at levels that are sustainable and capable of producing a diversity of valuable products to maximise production and application of treated wastewater applied per hectare providing benefits such as to amenity and tourism in the region.

Responsibilities of a farmer using recycled water would be outlined in a Recycled Water Quality Management Plan (RWQMP) to be developed specific to the farm and part of a Recycled Water User Agreement (RWUA). Operational requirements would be based on the Australian Guidelines for Water Recycling (AGWR) and NSW Health requirements. Typical operational controls have been described in Section 3.3 of the REF and include controls such as maintaining buffer distances of 25-30 m to the nearest public access point, maintenance of run-off control structures,

ceasing irrigation during waterlogging or rain events and conducting periodic visual inspections for leaks. If animals graze on the property, there is an exclusion time of five days after irrigation.

The operational requirements set out in a RWQMP and the affect this may have on existing farming operations will vary between farms. Additional controls may require more time of farmers or farm operators to monitor controls, maintain irrigation infrastructure and keep records. It is anticipated that the benefits of having recycled water available include enabling farm operations to continue during dry seasons.

The adoption of using recycled water would be supported by Sydney Water with training and support provided by Picton farm operators to enable farmers or farm operators to be competent with irrigating with recycled water.

Each RWUA would be specific to the current owners. Future landowners would need to sign up to their own RWUA if they wished to continue recycled water use on the property.

Our Picton farm operators would support farmers after initial set up and assist with reasonable requests. Farmers/ farm operators would be required to keep monitoring records under the RWQMP.

An annual report on compliance would include test results audited by the health department (NSW Health) and the EPA and results from environmental performance monitoring. There may be additional audit requirements depending on end uses, such as the purchaser of fodder irrigated with recycled water. Picton farm operators may share their learnings with farmers in exploring ways to optimise the use of recycled water with varying fodder rotations and maximising yields.

Benefits for tourism and local amenity at this stage would be very limited, as re-use opportunities identified to date are located on two small privately owned farms. However, if re-use expands in the future, there may be broader tourism and amenity benefits that help maintain the rural landscape during all seasons.

Query if recycled water use controls are not managed, what effects and to what extent would the impacts be. For example, could there be impacts beyond the farm?

Potential impacts have been assessed in Section 6.1 (Topography, geology and soils) and Section 6.2 (Human health) of the REF. As discussed in these sections, potential impacts if controls were not managed appropriately include run-off from the farms which may extend to drainage lines and nearby waterways, and potential exposure to recycled water by farm operators (via accidental ingestion, inhalation via droplets from sprays or dermal exposure). It was considered unlikely/rare for the public to be exposed near Farms 1 and 2 given the requirement for buffer distances to be the in place. In addition, any recycled water user agreement would include a cease to supply option whereby Sydney Water would cease supply of recycled water if the controls are not being implemented by the farmer.

Safeguards recommended in the REF to prevent these occurrences included:

- development of an RWQMP and proving training support to farm operators

- inbuilt controls via installed infrastructure including spray irrigation and run-off control structures with online monitors when water is captured in the device.

4.4 Consultation

Query on what level of discussions are taking place with people affected as 'we would like to take part'.

Suggestion that continued corporation and keeping local residents well informed is vital to continue.

Residents were consulted through newsletter drops in October and again in November 2020 inviting members of the public to comment on the REF during the public display period. During the public consultation period, we also held one online community information session (reduced from two sessions due to low registration numbers) and one community information session at the local Wollondilly library. We also received calls for more information or queries through our Proposal's 1800 number or via email. Proposal information updates are provided on our proposal information web page at *https://www.sydneywatertalk.com.au/pictontreatment*. We also welcome interested parties to provide their details to us so that we can advise of you of when updates to our web page for your information are being made.

Suggestion to negotiate with TfNSW concerning Picton bypass and the opportunity to send treated wastewater to paddocks near Maldon (attaching a pipe to the bridge).

We are working with Transport for NSW (TfNSW) regarding the Picton bypass to find ways in which the Picton bypass would have no net impact to our recycled water management capacity, as well as potential opportunities to increase our recycled water capacity (such as attaching a pipe to the bypass bridge over Stonequarry Creek).

Suggestion to liaise with a variety of independent experts who can creatively and carefully help plan a liveable, productive and sustainable city involving reuse of water.

Suggestion to use a various highly qualified independent professionals from relevant branches of science and in other relevant disciplines to review REF.

We have consulted with various independent experts since 2015 to assist in coming up with the best possible option to resolve the recycled water capacity constraint in a sustainable way. Our specialist studies have been prepared by highly qualified independent professionals. In addition, Sydney Water's Environment and Heritage team are highly experienced in environmental impact assessment and have authored and reviewed the REF.

We have also consulted with various agencies on relevant components of the REF including NSW Health and DPIE (Animal Health), NSW EPA, DPIE Fisheries and Subsidence Advisory NSW.

4.5 Strategic Context

Query/expression of appreciation for the project's outcomes and future water management planning to align with Council's Integrated Water Management Policy and Strategy.

Suggestion to consider maximising wastewater recycling and reuse in a manner that does not negatively impact the environment and supports the local community.

Query on if plans link in with development initiatives that Local Government talk about?

We have consulted with Wollondilly Shire Council on the proposal and the future of water management in the area. This proposal is consistent with the Council's Integrated Water Management Strategy in that we are seeking to manage excess recycled water through reuse opportunities that are of benefit to the local community. At this stage, we have been unable to reach agreement with Farm 2 for recycled water use on their property. This does not prevent future consideration of viable water reuse proposals that support local community interests. We are continuing to look for opportunities to expand recycled water use where it is cost effective and feasible to do so. We may reach agreement with Farm 1 by mid-2021 for recycled water use on their property.

Our REF assessed the impacts that the proposal would have to the environment and local community. Supplementary assessments were completed following public display of the REF and these are summarised in Section 5.

Our proposal is also consistent with Council's planning and development priorities as outlined in Wollondilly 2040: Local Strategic Planning Statement (Planning priority #3 and #12) and the Draft Wollondilly Rural Lands Study (Section 5.1 of the REF).

Concern that the proposal is an interim solution for servicing until 2024-2028 and if the REF and relevant approvals are not supported, there are no connections and there is no short, medium, and long-term plan for Picton.

Concern that into the future there may not be land available to use the treated water and we need to think further than 5-10 years down the track.

Suggestion of long-term acquisition of land now and allowing continuation of current farming activities in conjunction with Sydney Water management for long term economically and sustainability viability.

Concern that region is continually affected by short-term fixes. What consequences and what land use controls are needed if the long-term solution (RW pipe to Warragamba catchment) can-not be developed in sufficient time? How will land use decisions coincide with short, medium and long-term arrangements?

Figure 1 in REF appears conservative - we encourage to 'plan for more' so that residents within the scheme within suitable lands are able to be serviced and to provide a more 'short term proof' capacity.

One of the objectives of the Picton proposal is to match recycled water capacity to the recently upgraded WRP capacity of 4 ML/day. Current inflows to the WRP are around 3 ML/day. Based on recent growth estimates in the catchment, we expect that 4 ML/day capacity will be reached sometime between 2024-2028. Once we secure a variation to our EPL for management of the

recycled water up to 4 ML/day, we can continue planning for the next Picton WRP capacity upgrade. The EPL variation is necessary to allow both new wastewater connections and protection of waterway values.

Beyond pursuing additional reuse opportunities, we are also trialling different treatment technologies such as wetlands and marcoalgae at Picton WRP. The results may help inform the next upgrade at Picton.

The proposal does not preclude a potential medium to long term option of extending the recycled water pipeline to the Warragamba catchment (Section 2.2.4 of the REF). Increased land values in the area and development pressure make the option of land acquisition very costly and this was not taken forward as a viable option.

The economic assessment of the project considered all short to long-term options (Sydney Water, 2021a). The preferred option was cost-effective reuse, increased discharge and denitrification implemented in the short-term. Wetlands or macro algae treatment may be implemented progressively from 2023-24, pending viability from the trials.

Figure 1 of the REF identifies two future users of the recycled water beyond our proposal. Changes in land use in Picton over time could mean that the desire and need to use recycled water for other purposes may also change. Enhancing the treatment process at the WRP improves the quality of recycled water produced and allows future flexibility for offsite reuse opportunities.

Concern that the REF is contrary to the verbal advice by the landowner to Council to date regarding an existing planning proposal for Stilton Lane. If the REF proceeds, there is a direct impact to the existing planning proposal which the landowner, Council and Department will need to clearly address.

We have worked with Farm 2 to understand the potential for recycled water use in the short and longer term, mindful of the desire to develop the site. Unfortunately, we have been unable to secure a recycled water agreement that would suitably align with the efforts for re-zoning and redevelopment. However, we may still be able to negotiate a recycled water pipeline through Farm 2 to enable recycled water schemes further to the west (eg. Farms 3 & 4), subject to agreement with the landowners.

Query on what action is being taken now and the expected timeline to achieve the Warragamba pipeline?

Query on what infrastructure redundancy will occur as a result of the short-term fix, in anticipation of a long-term advanced treatment solution.

Limited planning has been undertaken on the potential recycled water pipeline to the Warragamba catchment. This is due to the long lead time to gain government and public support and extended approvals and delivery timeframe (Section 2.2.4 of the REF). Future construction of a recycled water pipeline to the west of the WRP would be a first step.

The WRP infrastructure that is part of this proposal will ensure higher recycled water quality for discharge into Stonequarry Creek, as well as any future recycled water customers. There is no

known infrastructure redundancy at this stage. Any long-term advanced treatment solution is yet to be decided.

Concern about lack of sewerage capacity and impact to development approvals including:

- *50 seniors housing lots next to Antill Park Golf Club*
- *30 residential lots 100m from the roundabout in Picton*
- *214 unit retirement village "Stratford House Tahmoor development" and adjoining*
- *120 bed nursing home with consent expected by Feb 2021.*

Concern that there is an 'uneven playing field' with development being approved for Wilton without a REF/EIA and concept for infrastructure versus new connections for new developments not possible in Picton, Tahmoor, Thirlmere.

We understand these concerns and are seeking to resolve the constraint on new connections. The proposal as described in the REF was considered the most feasible solution to address this concern within the next few years, in conjunction with resolving our EPL non-compliance and maintaining waterway values for the community.

All new developments requiring connections to a wastewater network operated by Sydney Water, are subject to the same connection approval requirements. We are working on a solution to service the Wilton growth area, however currently, we do not provide wastewater servicing in Wilton and this is provided by a private entity. In the Picton catchment, we do operate and provide wastewater services, however, we cannot allow new connections to our system until management of excess recycled water and a variation to our EPL are resolved. We cannot comment on Council's development approvals processes or if/how they may differ between the two areas.

4.6 Additional Recycled Water Opportunities

Query if plantations from northern NSW could be intermittently irrigated by wastewater containing ideal amounts of nutrients?

Suggestions that in response to global warming and nutrient rich water, consider planting and irrigating suitable north-east NSW tree species for fine timber and amenity.

Suggestion that some tree species can increase the amount of wastewater used per hectare.

Suggestion to carefully use water-reuse farms to increase production and amenity and reduce the urban heat island effect in a warming and drying region.

Suggestion of using water firefighting if stored in large area - may require water to processed at higher standard.

Suggestion that in light of recent fires, wildlife refuges (during severe heat waves and bushfires) could be created by rich green grass, irrigated by nutrient-rich wastewater so that the fire hazard is greatly reduced.

Suggestion of use by smaller farms where water is taken by tankers.

Suggestion of evaporation ponds, use of water by dust prevention on worksites eg road works. And long term it may be economical to revisit reuse in sports grounds, parks golf course although this would of been a fraction of the price if done as originally planned.

Currently, we irrigate fodder crops on Picton farm and are investigating varying crop rotations to optimise the rate of recycled water uptake.

The use of recycled water for tree plantations has been implemented elsewhere[1] and may have many potential positive benefits ranging from carbon capture, reducing the urban heat island effect, increased amenity, wildlife refuges and timber production. We have not considered tree plantations specifically in our options assessment as Picton Farm is unlikely to provide enough irrigable land. However, we are currently implementing a trial of irrigating trees with recycled water in Western Sydney. A specific objective of the trial is assessing measurable benefits to tree growth and survival when irrigating with recycled water versus potable water. The results of the trial will be used to inform future recycled water use opportunities and integrated management techniques.

Recycled water uses such as for storing water for firefighting, dust suppression for nearby worksites and for tankering by smaller farms requires increased storage areas (dams) which is not available at Picton farm. The demand for these uses is also highly variable. As land uses change over time, there may be increased demand and efficiencies in supplying recycled water for irrigation of public open space, however, at this stage the cost was considered too high for the amount of recycled water which could be applied to the open spaces in Picton.

4.7 Topography, geology and soils

Concern about build-up of pollutants in soils over time if water cannot be disposed in the river all the time.

Query on accumulation of salt gradually in the soils irrigated by treated wastewater, near Picton, or has salt been flushed from the soils by occasional periods of torrential rain?

Suggestion that reliance of soil results from 30 years ago is not a substitute for soil testing done regularly and after major floods. Ideally such testing for salinity would be done in about a dozen randomly selected sites on the farms.

Suggestion to regularly test the farms' soils to ensure that salt, waterlogging and other problems do not arise as a result of excessive irrigation per hectare.

Picton farm and nearby properties share similar soil characteristics. Soil monitoring has been conducted at Picton farm since commissioning of the scheme in 2000 to verify environmental impact predictions made at the time of the scheme approval. Based on the Final Environmental Impact Prediction Verification Report (2017)[2], the results of the soil monitoring program did not

[1] *https://www.westernportwater.com.au/recycled-water-grows-tree-plantation-for-koala-fodder/ and https://www.watercorporation.com.au/About-us/Media-releases/2017/June-2017/Water-recycling-provides-sustainable-irrigation-for-new-trees*

[2] Sydney Water 2016. *Picton Wastewater Scheme. Environmental Impact Prediction Verification Report No. 5 (Final)*, November 2016.

indicate any significant concerns with nutrients and trace metal accumulation. Results also show that salt has not accumulated in the soils at Picton farm where the maximum observed soil conductivity was 320 µS/cm (in the period 2000 to 2015) compared to 2000 µS/cm which is not suitable for crop growth. The successful operation of the Picton Farm indicates that nearby areas with similar soil types and slope could also be used for recycled water irrigation.

Verification monitoring of soils on any future offsite farms would be conducted in accordance with AGWR (2006) requirements. Irrigation would also be based on soil moisture deficits to minimise waterlogging and the potential for run-off.

Query - Are there any natural hazard or infrastructure resilience risks to the expansion of land use and infrastructure provision that could cause a disruption to the service/operation?

Query - Are there any mine subsidence risks in relation to the Nepean Discharge pipe?

Any future recycled water infrastructure would be mostly below ground pipes and largely unimpacted by natural hazards. The main potential risk to pipelines would be from subsidence due to current and historical mining in the area. We have consulted with Subsidence Advisory NSW on the proposed discharge pipe to the Nepean River. No concerns were raised, and approval of the proposal was received on 11 December 2020, although the discharge pipeline to the Nepean River is no longer part of the preferred discharge scenario at this stage.

4.8 Human health

Concern about growing vegetables and organic status of honey grown on neighbouring land.

Concern about recycled water spray drift onto neighbouring land.

Query if food for human consumption also be grown from using recycled water?

Query – is it possible to economically irrigate orchards and grapevines by using means other than sprays. Research shows that there is no issue for irrigating under trees and not wetting fruit for harvest.

Query - Orchards have, in the past, been considered unsuitable for water reuse farms but what if there is an alternative to sprays and what if a computer automatically turns off the supply of water if there is a strong breeze?

Recycled water irrigation would operate with a range of controls in place such that spray drift onto neighbouring land would not occur and any organic status of nearby properties would not be impacted. Controls include the use of low-flow sprinklers, drippers, vegetation screening and buffer distances.

The AGWR specifies a framework for commercial crop irrigation with recycled water indicating that it is possible to irrigate orchards. As this proposal focuses on irrigation for fodder crops, we have not conducted research into the recycled water use for orchards. It is possible that methods such as automatic shut offs for irrigation sprays or drip irrigation may support the expansion of suitable

uses of recycled water including crop irrigation, however these uses are expected to require stringent controls and management systems.

Query on, if entering into an agreement, do you have an analysis of what is left in the water after your treatment process (one of our concerns is that we use our dam water to clean our juice press and need to know if it will be suitable for cleaning/food processing/ swimming etc)?

Consider - wastewater is managed in a manner that does not negatively impact on the Upper Nepean River remaining fit for primary human contact.

We monitor recycled water quality through the treatment processes at the WRP. We would ensure the quality requirements are met for the intended end use prior to transfer to nearby farms. The WRP is being upgraded to improve the quality of recycled water. Further improvements to water quality would be needed to allow the water to be used for food production processes (such as cleaning a juice press) as the quality is similar to drinking water standards. The recycled water quality produced as part of this proposal would be suitable for irrigation of a range of crops. Further detail of the recycled water quality standard will depend on the final specifications and performance of the infrastructure. We would work with any future offsite reuse farms to ensure the scheme is consistent with the AGWR.

The REF assessed risks for swimming in local waterways and the additional risk was considered minimal (Section 6.2). The proposed treatment of water at the WRP will manage public health risks to protect swimmers. There are water quality risks from the broader catchment (e.g. the Picton township) that also need to be understood for direct contact for swimming. We monitor key indicators of recreational water quality and are collaborating with other agencies to improve the safety of swimming sites in other areas with new scientific approaches to understand the source of various pathogens and to develop better management strategies to reduce risks.

Query regarding treatments to standard of AGWR, what is required to fully mitigate the health and safety risk as opposed to minimising the risk? What consequences will minimised health and safety risks create?

Query regarding risks from run-off for recycled water schemes - what are the standard safeguards?

Implementation and verification of controls under the RWQMP would minimise health and safety risks. The AGWR acknowledges the concept of ‘tolerable risk’ and requires potential health risks to be reduced to acceptable levels. It is not possible to fully mitigate the health and safety risks, however, the AGWR is a robust framework, with multiple barriers to reduce risk. The consequences of minimised health and safety risks are potential health impacts, if operators don’t correctly apply the operational controls for recycled water use.

Sydney Water has also engaged a specialist consultant to help assess risks associated with the expansion of this recycled water scheme. There would also be auditing and oversight by NSW Health.

The safeguards in minimising run-off as recommended in the REF (Section 3.2.2) include:

- excavating runoff diversion lines down gradient of irrigation areas and installing runoff control structures with above ground solar powered water level monitoring and alarm systems
- irrigation based on soil moisture deficits to minimise the chance for run-off following irrigation
- maintenance of run-off control structures and conducting water quality testing (with support from Sydney Water) if run-off is collected in run-off drains
- ceasing irrigation in the presence of waterlogging and during rain events.

4.9 Waterway health

Suggestion to avoid discharging water directly or indirectly into Stonequarry Creek or Nepean River unless such discharge is necessary due to floods or no flow.

Concern about different environmental flows in rivers and climate change impacts to continuous flows.

Suggestion that the amount of water flowing in Stonequarry Creek and Nepean River should be monitored, especially during droughts.

Concern that Stonequarry Creek will sometimes dry up and need assistance from Sydney Water's treatment and reuse scheme near Picton.

Query on how has Stonequarry Creek flood study been considered in the discharge scenario. What consequences would occur in minor, moderate, and major flood events, including up to the probable maximum flood?

One of the proposal's main objectives is to maximise beneficial reuse of recycled water. In achieving this we would minimise the amount of discharge into the waterways. However, due to being unable to reach agreement with Farm 2, we will need to seek additional discharge to Stonequarry Creek. The quality of the recycled water will be improved after the WRP upgrade which will assist in minimising impacts of this increased discharge.

The amount of water flowing in both Stonequarry Creek and the Nepean River is being monitored by flow gauges at Stonequarry Creek (since the 1990s) and at the Nepean River (since the 1970s) and will continue to be monitored after the proposal is commissioned. Flow gauge information was used for the hydrology studies for this proposal which indicated that Stonequarry Creek experiences very low (<0.3 ML/d) to median flows (~1.5ML/d) most of the time (Section 6.3.1 of the REF). Additional flows from discharges into the waterways may have other potential impacts such as changes to geomorphology and to aquatic ecology which have been assessed in the REF. Additional flows into Stonequarry Creek as assessed in the REF are considered not to have a significant impact to the waterways and this has been confirmed with additional analysis since the REF display (summary in Section 5 of this report).

During low or no flow conditions (dry periods), re-use on Picton farm would be higher than average which would result in less discharge to the creek. Our preferred discharge regime aims to minimise

the amount of discharge into Stonequarry Creek during low flow periods, in order to minimise the impact of higher nutrient water in the creek.

Council's 2019 flood study was used to inform flood conditions for Stonequarry Creek and results indicated that the discharge will proportionally add less than 1% of the flow during a 1 in 2 year storm event.

The current discharge rate from the Picton WRP during wet weather is around 15 ML/d or 0.17 m3/s. When comparing this to the likely flood events, the additional volumes are negligible. For minor events (i.e. 50% Annual Exceedance Probability (AEP) / an event that is likely to occur at a frequency of around once every 2 years), the proportional increase in discharge via Stonequarry Creek will be less than 1%. This proportional increase reduces further when considering larger and less frequent events, i.e. the proportional increase when assessing a 1% AEP event (or 1 in 100 year event), is expected to be less than 0.04%, for the PMF (based on the 2019 TUFLOW model results) this will drop to less than 0.0065% increase in the discharge flow rates. Any discharge from the plant is thus expected to have a negligible impact on current flooding extents and velocities.

Concern – the REF suggests that Stonequarry Creek and Nepean River will receive additional pollution if the quality of the water leaving the site is not greatly improved. Hopefully the technology is improving and will allow much cleaner water for the streams.

DPI Fisheries supports higher levels of water treatment before discharge to Key Fish Habitat waterways and views the relevant ANZECC Guidelines as a minimum benchmark. Enhanced treatment options should be investigated.

Suggestion to ensure that water discharged into the streams is of a very high quality and continue to consider artificial wetlands as a final treatment method.

Concern that fertiliser/nutrients in wastewater should not be allowed to pollute nearby streams.

Query if higher nutrient discharge controls are required?

This proposal will improve recycled water quality by the addition of denitrification filters (or equivalent technology) which will reduce the total nitrogen (TN) and NOx component of the discharge, as well as a new chlorination system and upgraded UV system. We are continuing to investigate and implement enhanced treatment technologies including the Picton artificial wetland and macro algae trials.

Our REF presented modelled impacts of key water quality indicators (total nitrogen, TN and total phosphorous, TP) for different discharge scenarios. Additional detailed assessment of the proposed discharge scenarios to Stonequarry Creek has been undertaken to support the LVA (summary provided in Section 5). The results showed for all scenarios, an increase in nutrient concentrations is not considered to have significant impacts on the waterways. TN and TP are key ingredients in fertilisers and our treatment processes aim to remove as much of these nutrients as possible. This reduces the potential for algal or aquatic weed growth in the waterways.

We considered higher treatment technology such as reverse osmosis, however, this treatment technology produces a waste product called brine. This brine waste is too high in salt to be used to irrigate farms or for discharge to the waterway. It is also energy intensive which makes it a less favourable option from an environmental perspective.

We will monitor the nutrient levels being discharged from the Picton dams and the levels downstream of any discharge points.

Query - If we could enter into agreement, what water capacity will be required to maintain/take per year and what is the water quality going to be like?

Query on how often are quality targets monitored and by whom?

Query on where are the critical control points?

The amount of recycled water uptake required in a reuse agreement would depend on land capability factors such as area, soil type and slope of specific farms. However, a farm would need to be a certain size to make it cost effective for Sydney Water to design and install the recycled water main to the property (eg. 10ha minimum).

The water quality delivered for reuse on farms will meet AGWR criteria for agricultural reuse (fodder crops). Water quality targets for reuse would be monitored by Sydney Water before the recycled water leaves Picton WRP for reuse on farms. Visual inspections of storage tanks on farms and occasional testing to be conducted by the farm operators would be required under the RWQMP that would be developed in accordance with AGWR requirements.

In our REF, we refer to the critical control points (CCPs) as targets to control the quality of recycled water produced, particularly the log removal values. The CCPs will be set in the RWQMP and include turbidity, pH and free chlorine targets. The WRP treatment upgrades would feature alarms that are raised to alert operators of exceedances and automatic off-spec return points when CCPs are breached.

Query/expression of interest for Integrated Water Management Plans to be drafted for the area serviced by Picton WRP as well as the Wilton Growth Area in order to better manage the whole of the water cycle into the future.

Our Macarthur Regional Planning (which includes Wilton) is underway and considers the whole of the water cycle. Opportunities at a more local scale are being explored with small scale nutrient offset projects in collaboration with developers where there is scope to optimise water management outcomes. We will continue working with Wollondilly Shire Council to improve collaboration and deliver the waterway health and liveability outcomes for the community.

4.10 Flora and fauna

Query regarding discharge point north of Maldon Weir - Is this section of the river in pristine condition? If so, how will river ecology be maintained?

Suggestion that wastewater is managed in manner that protects waterways and riparian habitats including threatened aquatic fauna such as the Sydney Hawk Dragonfly and Macquarie Perch.

Confirmation that S.219 permit to block fish passage is not required.

The Nepean River is considered a slightly to moderately disturbed ecosystem. Within the catchment are industrial, rural and urban land uses. These all contribute to stormwater/ run off impacts to the waterway. Aquatic ecology in the Nepean River near the proposed discharge point (which was just downstream of Maldon Weir) has been monitored for the last six years for fish and macroinvertebrate assemblages. Monitoring results (at sample point N92) indicated this section of the river is influenced by surrounding agricultural land uses which may be causing nutrient influxes and subsequent algae growth. Macroinvertebrate data indicated that downstream of the Maldon Weir, river health was comparable to upstream health.

Tests of significance were applied to threatened species that are potentially present at the site and the initial results indicated that our proposal was unlikely to have significant impact on the lifecycle of these species. Additional environmental assessments including for the Sydney Hawk Dragonfly (SHD) and fish surveys have been completed following the public display of the REF in November and field survey in December 2020. We will be seeking increased discharge into Stonequarry Creek, in order to minimise potential impacts on the local population of SHD in the Nepean River just downstream of the weir. The proposal to increase discharge to Stonequarry Creek has been assessed for potential impacts to waterway values. The assessment indicates that the increased discharge to Stonequarry Creek is unlikely to affect representative habitat sections of the creek and therefore would not affect key valued ecological species (Section 5 of this report).

Recent fish surveys did not observe the Macquarie Perch in the Nepean River. We acknowledge that our proposal would not require a S.219 permit. We will consult with DPIE – Fisheries in the future regarding potential obstruction to fish passage, however, at the moment the proposed Nepean discharge is no longer part of the proposal.

Query regarding typical construction impacts such as some vegetation removal - to what extent and to what effect on ecology? This information needs to be more transparent.

Suggestion to consider a vegetation management plan for land that will be subject to increased nutrient loads or salinity, particularly Shale Sandstone Transition Forest/Western Sydney Dry Rainforest communities.

Concern that the potential impacts to this land from this project are unlikely to align with the Strategic Conservation Area in the Cumberland Plain Conservation Plan. The REF should address this and further advice should be sought from DPIE.

The ecology and vegetation removal impacts from the proposal were assessed in Section 6.4 of the REF. Table 19 of the REF presents the worst-case total area of vegetation that would be cleared for the proposal. The ecology assessments which were made available with the public display of the REF, included tests of significance under the Biodiversity Conservation (BC) Act 2016 and Environment Protection and Biodiversity Conservation (EPBC) Act 1999. The study remains available on our Sydney Talk web page: *https://www.sydneywatertalk.com.au/pictontreatment*.

Picton farm is surrounded by remnant vegetation. Irrigation utilises diversion drains and run-off control devices such that recycled water does not run onto areas outside of the irrigation area. This prevents areas of remnant vegetation, such as adjacent Shale Sandstone Transition Forest/Western Sydney Dry Rainforest communities, from being impacted by increased nutrient loads or salinity.

Much of the vegetation at Picton farm will be protected as we have entered into a voluntary Biodiversity Stewardship agreement with the Biodiversity Conservation Trust. This means that remnant vegetation at Picton farm would be protected and managed to improve its biodiversity values. The proposal does not impact on the Biodiversity Stewardship area. The proposal would not impact on the Cumberland Plain Woodlands and is therefore consistent with the principal of protecting this community in line with the Cumberland Plain Conservation Plan.

4.11 Energy

Concern that the scheme would use a lot of energy. Other firms have firm commitments on future use of renewables. If those companies can do it, then so can Sydney Water.

Sydney Water is committed to improving the energy efficiency of our operations. Our commitment is embedded in our 2020-2030 strategy in embracing circular economy principles. Further information can be found at https://www.sydneywater.com.au/sw/water-the-environment/what-we-re-doing/energy-management/index.htm.

Two years ago, we identified sites owned by Sydney Water that could undergo roof mounted solar installations, based on straightforward installations with reasonable roof space. At Picton WRP, there is approximately 150 m^2 available roof space. This area is less than half the surface area of the smallest of the sites identified with potential for solar installations. However, in the future, we may investigate ground mounted options in combination with roof mounted solar energy generation at Picton.

4.12 Traffic and access

Query if traffic volumes will be controlled to ensure heavy vehicle movements occur outside of school and commuter peak traffic periods?

Traffic impacts would be minimised near schools to ensure no major material deliveries during school drop off or pick up times (Section 6.10 of the REF). We will also ensure that heavy vehicle movements are managed to occur outside of commuter peak traffic periods wherever possible.

4.13 Social impacts

Query on if the areas of work will become Sydney Water property and if so, what will be the impact on adjoining properties?

Query on any disruption to existing consumers during the construction?

The cost of land has increased significantly compared to when Sydney Water was able to purchase the Picton farm site in the 1990s. It is cost prohibitive for us to purchase sufficient land to expand reuse on land that would be then owned and managed by Sydney Water.

We are seeking to expand reuse in collaboration with nearby farms, owned and managed by others, where it is cost effective and feasible to do so. An expanded recycled water network would involve reuse on private property. The AGWR require safeguards to mitigate impacts on adjoining properties, with a focus on protecting human health and the environment.

Upgrade works at the WRP would be conducted on Sydney Water land. Construction works at the WRP and for a future recycled water pipeline and associated irrigation infrastructure would involve some periods with heavy machinery. Potential impacts to adjoining properties during the construction phase were assessed in Section 6 of the REF and include temporary and minor traffic, visual and noise impacts. We will ensure adjacent properties and other potentially affected people are kept informed with community notifications and regular proposal updates. The REF showed that with the implementation of safeguards, the potential impacts would be avoided or minimised.

Query on how property owners are being guided to take advantage of these benefits.

Query on what offer of benefit can you give us as elderly residents living there for 44 years on our pristine farm? Please reply in detail.

Concern regarding unknown negative impacts from extension around Stilton Lane and further places.

Concern regarding pollution and unwanted chemicals impacting honey production (registered beekeepers).

Query if there is compensation due to potential for pollution in soils.

Query if there is compensation due to potential for spray drift impacting vegetables.

Query on land condition if there was a spill (spray impact on neighbouring land) and irreversible impact.

Surveys of surrounding landowners interested in recycled water use were completed in 2015. Work continued in 2018 with evaluation of a broad range of reuse options and a focus on linking larger nearby farms with areas suitable for reuse to create a broader recycled water scheme

beyond the Picton farm. Land capability assessments were completed to confirm what areas within the farms was suitable for irrigation and discussions progressed with those landholders. Sydney Water may consider further expanding recycled water use on private farms, but only where it is cost effective and feasible. Property owners can still contact WestRegionDelivery@sydneywater.com.au directly, if they wish to nominate their property for assessment of reuse suitability of their land.

Any future recycled water scheme would be designed and operated such that adjacent property owners would not be impacted from either spray drift or spills. The water that would be used to irrigate nearby farms would be treated to ensure it is fit for its intended application (consistent with the AGRW). Controls would be used where needed including buffer distances, low throw sprinklers, controlling irrigation in windy conditions and run off control structures. These controls would be documented in the RWUA and RWQMP to be implemented by the operator and would prevent spray drift impacting adjacent properties. As there would be no impact on adjacent properties, compensation would not be required.

Concern that extensions would devalue property.

Query if Council will stop us from subdividing our land in the future.

Query if a neighbour who is selling land and leaving area after scheme operates is compensated and we are not?

Recycled water is a resource that can provide an opportunity for enhanced agricultural productivity, and improved soil health, where it is used appropriately. It is expected that any future recycled water supply would enhance the opportunities for a site and may even positively impact property values, reflecting the expected benefit to current and future landowners.

The pipeline would be installed close to the property boundary where development is usually restricted due to Council planning controls and would not limit the future uses on the site. However, construction over the pipeline would not be permitted. We are not aware that Council would prevent an owner from subdividing the land, if a recycled water pipeline was located on the property.

Sydney Water is seeking to secure mutually beneficial commercial agreements with nearby landowners, with incentives where there is greater longevity with the scheme. There is no expectation that 'compensation' will be required for negative impacts on adjoining properties. We welcome the opportunity to work with interested landholders to ensure any future schemes are well managed.

Suggestion that because of water constraints, we have not been able make use of all the land we own. If we were to receive recycled water, we could look into other income streams from using the remaining land for crops.

We appreciate the value that recycled water can provide for agriculture and farming. We support local community interests toward cost effective and feasible expansion of the recycled water network that delivers broader benefits. Property owners can contact

WestRegionDelivery@sydneywater.com.au, if they wish to discuss these opportunities directly and nominate their property for assessment for recycled water suitability.

Query on a price per megalitre if we could enter into an agreement or will it be free? Do you have an approximation if so?

We would discuss any future recycled water pricing with individual farm owners as charges will depend on the potential volumes of water that can be reused, the cost of storage dams and irrigation infrastructure and the longevity of the scheme. The cost for the water will be lower where a longer-term arrangement can be secured. Agreements with properties will have some cost sharing mechanisms.

Query on how will it impact Sydney Water pricing to residential and commercial consumers?

Our customers pay for water and wastewater services in line with charges set by IPART across Sydney Water's area of operation. There will not be an increase to these charges as a result of this proposal at this time to improve wastewater treatment, reuse and discharge.

4.14 Cumulative impacts

Concern that the REF must consider the cumulative impact of discharges to the Nepean river system from the Growth SEPP (Wilton) as well.

Query on how road drainage from Picton bypass be managed to avoid cumulative impact to land required for irrigation?

The impacts of discharges to the Nepean river system from the Wilton growth area is not yet known. However, our proposal has been guided by and considers the cumulative impacts on water quality and flow from urban development as discussed in Council's Integrated Water Management Strategy. We seek to minimise discharges in the first instance by increasing our capacity to manage recycled water through irrigation with surplus treated water being discharged to Stonequarry Creek. This proposal will meet load limits licensed under EPA's new framework for the Hawksbury-Nepean River system that considers the cumulative load within a subzone.

We are continuing to work with TfNSW on plans for the Picton bypass to minimise cumulative impacts of the bypass development. Road drainage would need to be designed to minimise any impacts to the irrigable land at Picton farm. We would seek to have any reduction of irrigable land at Picton farm offset by TfNSW elsewhere, to ensure no net loss of recycled water capacity at the farm.

5 Additional waterway impact assessment

As noted in Section 5.2 and 6.3.2 of the REF, Sydney Water is preparing detailed statistical analysis and assessment to evaluate the scale of impacts observed in our monitoring over the last six years, when we have discharged under an Emergency Operating Protocol (EOP).

This section provides a summary of the additional waterway impact assessment of the existing discharge arrangement, as well as the predicted impacts of a revised scenario 2 (increased discharge to Stonequarry Creek with no additional offsite reuse).

5.1 Existing impacts

In February 2021, Sydney Water finalised a '*Part A – Existing impacts waterway health report'* (Sydney Water, 2021) which assessed current impacts of existing discharges to receiving waterways, using monitoring data collected between 2014 to 2020. This specialist study can be downloaded from the proposal website.

Key findings of this report include:

- The impact of the existing Picton WRP discharges on receiving waterways between 2014-2020 were found to be localised within Stonequarry Creek and did not negatively impact biological indicator organisms.
- While water quality levels downstream of the discharge point in Stonequarry Creek were approximately twice the upstream levels, there was minimal impact on the Nepean River. Case studies revealed that a fast rate of recovery occurred in Stonequarry Creek.
- Despite downstream variation in nutrients during discharges compared to upstream conditions, macroinvertebrate communities, macrophytes and algae did not show signs of deterioration or WRP-related impact in Stonequarry Creek.
- Community values for the Nepean River, such as swimming and fishing, were not impacted by the discharges to Stonequarry Creek. There was also no impact to valued species such as the Sydney Hawk Dragonfly, Macquarie Perch or the Australian Bass.

5.2 Predicted impacts

A Part B – Predicted impacts waterway health report was finalised in May 2021 to assess potential impacts from a range of discharge scenarios to Stonequarry Creek. The specific discharge scenarios which were modelled and assessed are detailed in Table 4 and further detail can be found in the Picton modelling addendum report (Sydney Water and Alluvium, 2021).

Table 4 Stonequarry discharge regimes assessed for the Licence Variation Application

Parameter	Scenario A Current Baseline	Scenario B EPL compliant *	Scenario C1 SQ_0 'EOP'	Scenario C2 SQ_0 'low freq'	Scenario C3 SQ_0 'low prop'
Description	modelled existing discharges (precautionary discharge + EOP discharge)	modelled EPL compliant (precautionary discharge, no EOP discharge)	future inflows with current discharges	future inflows with reduced discharge frequency at higher creek volumes	future inflows with increased discharge frequency at lower creek volumes
Wastewater inflow volume (ML/d)	2.7	2.25	4	4	4
Total discharges to Stonequarry Creek	451 ML/ yr 1.2 ML/ day	395ML/ yr 1.1ML/ day	915ML/ yr 2.5ML/ day	932 ML/ yr 2.6ML/ day	926ML/ yr 2.5ML/ day
Relative to current EPL compliance	**32%** of discharge when flows below 8ML/ d	**3%** of discharge when flows below 8ML/d	**34%** of discharge when flows below 8ML/ d	**26%** of discharge when flows below 8ML/ d	**31%** of discharge when flows below 8 ML/ d
Irrigation area (ha)	119	119	119	119	119
TN conc. WRP discharge (mg/L)	4.0	4.0	2.5	2.5	2.5
NOx conc. WRP discharge, (mg/L)	3.2	3.2	0.6	0.6	0.6
TP conc. WRP discharge (mg/L)	0.05	0.05	0.05	0.05	0.05

* Scenario B represents a historical scenario when wastewater inflows were only 2.25ML/ day and we were compliant with the EPL (ie no EOP discharge). It is included for comparison purposes (as current wastewater inflows have already exceeded 2.25ML/ day several years ago).

5.2.1 Water quality

Key findings of this report are summarised below and more details can be found in the Technical Memo (Sydney Water, 2021a):

- Flow was a significant determinant of water quality, with generally higher levels of nutrients associated with higher creek flows. This is likely due to the confounding effects associated with stormwater runoff from various land uses across the catchment

- Consistent with existing data (Part A), total nitrogen and oxidised nitrogen played a more significant role in water quality changes when compared with total phosphorus and soluble reactive phosphorus
- The effect of nutrients was much less pronounced and only marginally different between different discharge scenarios in the Nepean River (downstream of the confluence with Stonequarry Creek) compared to Stonequarry Creek
- Of the modelled scenarios, Scenario C2, which is defined by reduced frequency discharges at higher volumes, resulted in a lesser change to water quality compared to other future scenarios (Scenarios C1 and C3), evidenced by both broad descriptive trends and statistical analysis.
- A higher proportion but lower frequency regime (Scenario C2) would increase exceedances of the ANZG default guideline values by 4% relative to existing conditions (Scenario A), and 23% relative to compliant conditions (Scenario B), despite greater inflows. This increase is considered marginal and it is expected these changes would not degrade current water quality conditions.

5.2.2 Hydrology

The potential hydrological impacts of the amended Stonequarry Creek discharge regimes were assessed in a Technical Memo (Arup Aurecon, 2021). The analysis indicates the following for Stonequarry Creek downstream of the discharge location:

- The flow duration curves are expected to shift slightly, with the very low flow thresholds being exceeded more frequently (Scenario C1, C2 and C3) as well as very high flow conditions (all three future scenarios).
- The USIA metrics, looking at total average flowrate, zero flow periods and baseflow are expected to undergo minimal change, with a low risk rating allocated for all scenarios
- Changes in velocities within deep pools are expected to be negligible, remaining below all indicated threshold values except under extreme flood conditions
- Velocities through the restricted flow passages, such as the boulder chute located downstream of the WRP discharge, do currently exceed the stated threshold periodically however these exceedances are not expected to increase in any significant way
- The analysis of the cross-section in the reach directly upstream of the confluence with the Nepean River, indicates a minor increase in time that the potential for bass migration upstream will be impacted. A low risk rating has been allocated for all scenarios here
- Flood impacts are negligible for all scenarios.

5.2.3 Waterway health

An assessment of the potential hydraulic driven impacts to ecological values of Stonequarry Creek was undertaken based on the modelled scenarios (CTEnvironmental, 2021). Three highly valued water dependent species were identified as potentially present in Stonequarry Creek and the Nepean River being: Sydney Hawk Dragonfly (Nepean River only), Australian Bass and the

Platypus. Critical flow thresholds for each of these valued species was then assessed for future modelled scenarios at three representative reaches downstream of the Picton WRP discharge being a deep pool, riffle/ boulder choke and the confluence of Stonequarry Creek and Nepean River sections.

The assessment concluded that future discharge from the WRP, under all scenarios is unlikely to affect the three representative habitat sections of Stonequarry Creek which were assessed and therefore not affect the key valued ecological species of Australia Bass, Platypus and the Sydney Hawk Dragonfly (Nepean River). Scenario C2 showed the least amount of predicted hydraulic driven response related to the macroinvertebrate, sediment and organic material mobilization thresholds, particularly at the confluence of Stonequarry Creek and Nepean River. Further details can be found in the Technical Memo (CTEnvironmental, 2021).

5.3 Consideration of significant impact

This additional waterway analysis has assessed the potential impacts associated with an increased discharge regime to Stonequarry Creek, with improved treatment but without additional offsite reuse. The assessment has confirmed that the amended discharge Scenario C2 is the preferred discharge regime and is unlikely to have a significant impact on Stonequarry Creek.

To determine significance, we have considered all available information to assess the sensitivity of the receiving environment and the magnitude of potential impact.

In considering the sensitivity of the receiving waterways at Picton (Stonequarry Creek and Nepean River), we have considered the existing regulations/ guidance, monitoring data, community values, level of existing disturbance and vulnerability of the waterway to change.

To determine the magnitude of likely impacts from the proposed Picton effluent management expansion, we have considered the extent of impact, duration and severity of potential impact, assuming the successful implementation of proposed mitigation measures.

After considering the sensitivity and magnitude, and with the successful implementation of proposed mitigation measures, we have confirmed that the impact is unlikely to be significant and we will self-determine the proposal under Part 5.1 of the EP&A Act (REF).

6 Next steps

Written submissions from the community and key stakeholders are an important source of information, which helps guide our planning and consultation in the future proposal stage. Detailed design is expected to commence mid-2021, pending receipt of an EPL variation from the EPA. We will also develop a Construction Environmental Management Plan to ensure all safeguards outlined in the REF and Decision Report are implemented onsite.

Sydney Water is committed to delivering this proposal and the next step in the process is to obtain funding approval for delivery of this proposal. Approval is granted by Sydney Water's Board of Directors. Following funding approval, we commence the process of engaging the team that will be responsible for delivering this proposal.

A Community and Stakeholder Engagement Plan will be developed to ensure that the community and key stakeholders are involved and informed. Construction of this proposal is expected to commence late 2021.

7 Conclusion

7.1 Determination of the proposal

Sydney Water has assessed the potential impacts of the proposal on the environment in accordance with the requirements of Part 5.1 of the EP&A Act.

The public consultation process undertaken for the proposal is outlined in Section 2 of this report. A total of 11 written submissions were received during the public display period of the Picton Treatment Reuse and Discharge proposal REF in November 2020.

Topics raised in the submissions were wide ranging with both strong support as well as some opposing submissions. We have considered and responded to the topics raised in the submissions. The most commonly raised topics related to the strategic context, along with the scope of works and proposal certainty. Other topics included the proposal need and alternatives, operation and performance, human health, waterway health and social impacts.

Since the public display of the REF, we have been unable to secure an agreement for recycled water reuse at Farm 2. In addition, a field assessment in December 2020 confirmed presence of the threatened Sydney Hawk Dragonfly (SHD) downstream of the proposed Nepean discharge location. Based on field survey to date, an assessment under the *Fisheries Management Act 1994* has concluded that discharging into the Nepean River could potentially have a significant impact on SHD and discharge to Stonequarry Creek is the preferred option. An amended Stonequarry Creek discharge (Scenario C2, without offsite reuse) is therefore being pursued.

We have completed further environmental impact assessment on the potential waterway health impacts of an increased Stonequarry discharge regime without any additional offsite reuse. This work has concluded that the potential impacts on Stonequarry Creek are unlikely to be significant.

We will continue to work closely with the community as the proposal progresses into the next phases. All other proposed mitigation measures outlined in the REF and Decision Report will be incorporated into the CEMP for implementation on-site. The proposal is not likely to result in a significant impact to the environment.

8 Recommendation

For the purposes of the EP&A Act, it is recommended that the Picton Treatment Reuse and Discharge proposal proceed, as described in the REF and this Decision Report. It is further recommended that the proposal be implemented in accordance with the mitigation measures listed in the REF.

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Reviewed by:

Sally Spedding

A/ Lead Environmental Scientist

Asset Lifecycle

Date: 20/05/21

Reviewed by:

Murray Johnson

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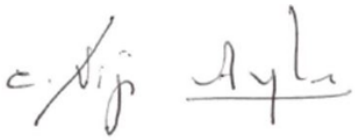
Asset Lifecycle

Date: 25/05/2021

Endorsed by:



Viji Augustus

Senior Project Manager

Asset Lifecycle

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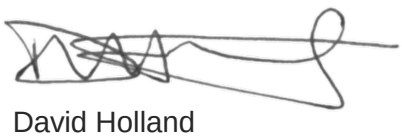
Endorsed by:



David Holland

Head of Work Programming and Optimisation

Customer Delivery

Date:

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Asset Lifecycle

Date: 25/05/2021

9 References

Arup Aurecon (2021), *Picton WRP LVA, Hydrological Impact Study*

CTEnvironmental (2021) *Assessment of Potential Hydraulic Driven Impacts to Ecological Values of Stonequarry Creek,* May 2021

MPM (2020), *Picton WRP Upgrade Discharge Options – Assessment of Dragonfly Habitats at Proposed Discharge Sites*, Marine Pollution Research, December 2020

MPM (2021), *Picton WRP Upgrade Discharge Options – Assessment of Significance for Sydney Hawk Dragonfly (7 Part Test),* Marine Pollution Research, February 2021

Sydney Water (2020), *Review of Environmental Factors Picton Treatment, Reuse and Discharge*, November 2020

Sydney Water (2020a), *Picton Effluent Management Options Assessment and Adaptive Pathways,* November 2020

Sydney Water (2021), *Licence Variation – Waterway Assessment, Part A current impacts*, February 2021

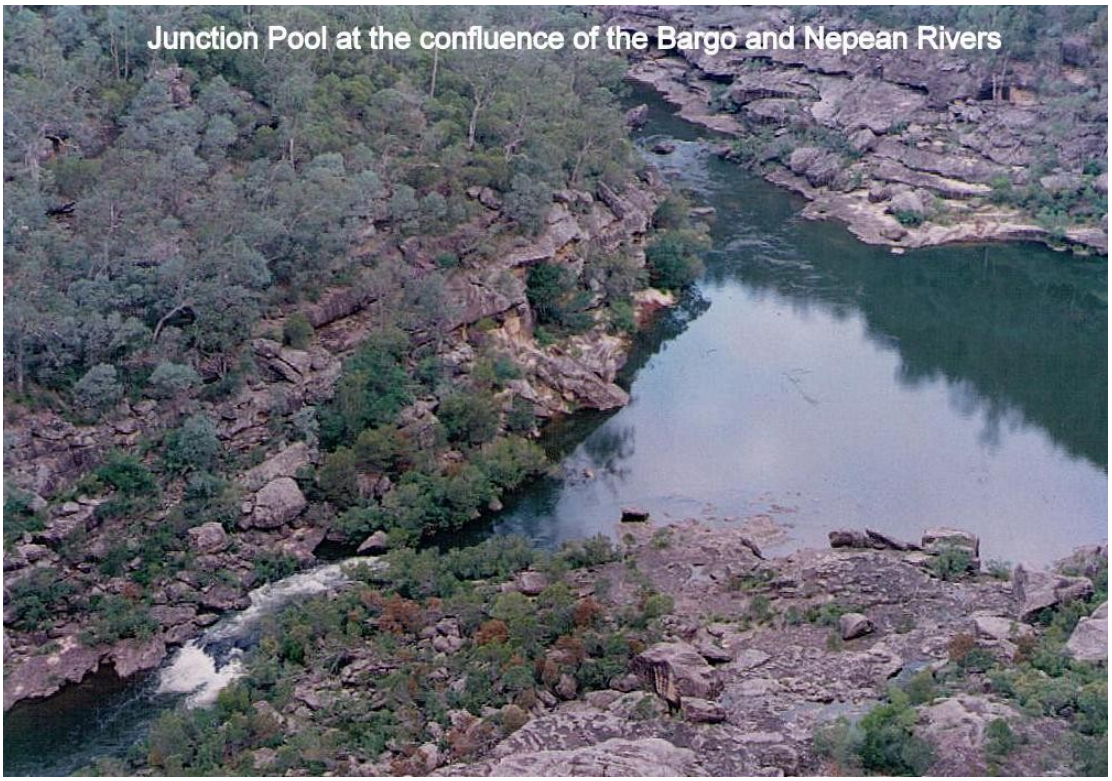
Sydney Water (2021a), *Picton Licence Variation –Water quality assessment, Part B Proposed discharge regimes and their potential impacts on water quality.*

Sydney Water and Alluvium (2021), *Picton Addendum Modelling Report, Stonequarry Creek and Nepean River – Flow and Water Quality,* May 2021.

Appendix A – Submissions received during REF display

Submission 4

REVIEW of ENVIRONMENTAL FACTORS



This is one of the most scenic features of the Upper Nepean River, in Wollondilly Shire. It is just a kilometre or two from the sewerage scheme's irrigation area. Although this feature of the river is not likely to be directly and adversely affected by the scheme, other scenic parts of the river, a little downstream, could be.

A submission in response to Sydney Water's November 2020 proposals concerning the expansion of the Picton area sewerage treatment and water reuse scheme.

NATIONAL PARKS ASSOCIATION, MACARTHUR

10th December 2020

Recommendations

The National Parks Association, Macarthur (NPA), recommends that Sydney Water:

1. **Negotiate with Roads and Maritime Services concerning the Picton bypass and the opportunity to send treated wastewater to paddocks near Maldon.**

2. **Regularly test the farms' soils to ensure that salt, waterlogging and other problems do not arise as a result of excessive irrigation per hectare.**

3. **Avoid discharging water directly or indirectly into Stonequarry Creek or Nepean River unless such discharge is necessary due to floods or no flow.**

4. **Ensure that water discharged into the streams is of a very high quality and continue to consider artificial wetlands as a final treatment method.**

5. **Carefully use water-reuse farms to increase production and amenity and reduce the urban heat island effect in a warming and drying region.**

6. **Use irrigated paddocks to reduce the fire hazard for nearby native vegetation or for woodlots, small plantations etc in the water-reuse farms.**

7. **In response to global warming and nutrient rich water, consider planting and irrigating suitable north-east NSW tree species for fine timber and amenity.**

8. **Liaise with a variety of independent experts who can creatively and carefully help plan a liveable, productive and sustainable city involving reuse of water.**

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Introduction

RATIONALE

The National Parks Association, Macarthur (NPA) applauds the fact that Sydney water is endeavouring to expand the area of land, at Picton, to be irrigated by treated wastewater. The 7 documents we have received suggest that much effort has gone into creating and maintaining a good water reuse scheme for the area.

We have been, and still are, advocates of water reuse. We were first introduced to the idea in the mid 1970s while reading a magazine published by the CSIRO – probably Rural Research, possibly Ecos. The article gave two good reasons for Australia using treated sewage for agriculture etc. 1) Most Australian soils are at least somewhat deficient in the nutrients that are essential for life. These nutrients are abundant in sewage. 2) Long before man-made climate change became a major topic, Australia was a generally dry land of long droughts and occasional floods.

Global warming seems to be intensifying such weather. Thanks to a La Nina, there is plenty of green grass in the Shire today but last year was Australia's hottest and driest year on record and most of the Shire was pale brown. The Sydney Water farm at Picton was a pleasant exception. It seems that global warming will continue into the foreseeable future even though renewable energy is becoming very economic. We have to hope that the positive feedbacks, caused by the warming, will not cause a runaway greenhouse effect. Whether we have already passed a tipping point or not, it seems that most parts of Australia will get drier for at least a few more decades. If so, we have to use water efficiently and, where possible, reuse it.

TESTING our ASSUMPTIONS

Because global warming is continuing – probably at an accelerating rate – we need to consider our assumptions and decide whether or not they are appropriate for the future. What will our environment be like a few decades from now? That is very uncertain but it is likely to involve severe heat waves, long droughts and bushfires much worse than what we have experienced to date. We have already been surprised

by the extent to which Australian forests suffered from fires last summer. They'd still be burning if widespread heavy rain did not arrive early this year. We need to ask if Sydney Water and water reuse can protect wildlife refuges. We also need to ask if Stonequarry Creek will sometimes dry up and need assistance from Sydney Water's treatment and reuse scheme near Picton. Finally, we need to ask if Wollondilly Shire is now a suitable place for plantations and artificial ecosystems etc involving some magnificent species from northern NSW, including north-east NSW. Can these be intermittently irrigated by wastewater containing ideal amounts of nutrients?

COMMITMENT to FURTHER WORK

The above-mentioned matters require much thought and research. We realise that we of the National Parks Association (NPA) have a lot to learn. The 7 lengthy reports given to us by Sydney Water are very much appreciated. However, we lack the expertise to comment on much of the material in those reports. For this submission, we were unable to read them in full but we referred to them often. We of NPA already have difficult projects to work on but we may be able to expand and greatly improve this submission, by the end of next year. If so, it will be for whoever is interested. As we do so, we will completely read the 7 reports from Sydney Water. In the meantime, we recommend the creation of a large team of various independent professionals who are highly qualified in relevant branches of science and in other relevant disciplines. There will be more about this in Concluding Comments.

BALANCING VISION and CAUTION

A car needs both an accelerator and a set of brakes. Civilisation needs both maverick trail-blazers and ultra-cautious team-players. Fortunately, most people are somewhere between those extremes. We urge you and your colleagues to see the big picture and be innovative. But we realise that the project is as much like a hypothesis to be tested as it is like a bold work of art. Importantly, we were very pleased that, on the back of [redacted] card, from Sydney Water, are the words:

"Enhancing Liveable Cities".

OBSTACLES and OPPORTUNITIES

1) The Picton By-pass Opportunity

We've been led to believe that Roads and Maritime Services would like the Picton bypass to be between Picton High School and Sydney Water's treatment and water-reuse farm. It will link Remembrance Drive to Picton Road and will involve a bridge over Stonequarry Creek -- extremely close to land that Sydney Water irrigates with treated wastewater. If that becomes the location of the bypass, there will be an opportunity to attach at least one large pipe to the bridge so that treated wastewater can be sent to the Maldon area. There are paddocks that could be irrigated NE, NW and SW of Maldon. Some of the paddocks are small but there are some large ones.

2) A Vision for Sydney and Beyond?

While planning water-reuse farms, such as the one at Picton, we can try to maximise the value of production per litre of wastewater, or we can simply try to maximise the amount of treated wastewater applied per hectare. If we choose the latter option, we risk making mistakes and using a level of irrigation that actually reduces output (even in the short term) and makes the land almost completely unproductive in the long term. Of course, land is both limited and expensive and for that reason the best option may be something halfway between the 2 above-mentioned options. Hopefully such a compromise would still be sufficiently productive and sustainable. Anyway, we recommend a level of irrigation that is likely to be very sustainable and also capable of producing a diversity of valuable products. In many ways, it may be the most economic option – especially if we examine the big picture which includes amenity and tourism in the region.

Experimentation can be carried out in the Picton-Maldon area and similar schemes can be created in many places in Western Sydney. Also, some of the products can be transported long distances to other parts of NSW. We've been led to believe that drought affected regions far beyond Wollondilly have already benefited from fodder produced by the Picton treatment and reuse scheme. There are many other possible products.

3) Political and Other Obstacles

There is probably no completely original idea in this submission. However, what we are advocating is significantly different to what is happening in most of the Sydney region at present.

The experimentation that we recommend will receive some opposition. Whether such opposition be weak or strong it will arise because: 1) there are probably imperfections in this submission, even if the general thrust is spot on 2) some people are in the habit of being naysayers, especially when the status quo is being challenged 3) there are landowners who are allowing large areas of land to become subject to soil erosion and/or weed infestation because they want to develop their land some day and make windfall profits. Such people will argue that the land is unsuitable for anything but urbanisation 4) During recent decades, the world-wide prevailing ideology has put much faith in the market, competition, privatisation and deregulation. Due to trouble in the USA, the ideology may be replaced. Hopefully that which replaces it will *not* be an equally extreme ideology. It could be argued that we will not have good planning, in NSW, or anywhere else, unless a more middle-of-the-road ideology prevails. However, a discussion about ideology is largely beyond the scope of this submission.

SUSTAINABILITY

4) Sustainability, Generally

We are pleased with the statements on page 13 of the overview document with the title 'REVIEW of ENVIRONMENTAL FACTORS: Picton Treatment, Reuse and Discharge, November 2020' (REF). However, the page is far from comprehensive. For instance, it does not mention some of the very relevant matters raised in this submission. The supplementary reports emphasise waterway health, existing vegetation communities, and temporary problems. These topics are extremely important but so are the many potential benefits and the impact of the scheme on soil health.

5) Salt in the Soils

We can learn a little from the first towns and cities built in the Fertile Crescent. 'Ain Ghazal, started about 10,000 years ago and lasted several hundred years. Some archaeologists claim that the soils were depleted because they had no safe way of recycling nutrients as we do at Picton. Much later, and on a much grander scale, the cities of Mesopotamia slowly died, largely because their extensive irrigation systems allowed salt to gradually accumulate in the soil. This is also a lesson for us as we consider irrigation in Picton. Has salt gradually accumulated in the soils irrigated by treated wastewater, near Picton, or has salt been flushed from the soils by occasional periods of torrential rain?

Page 44 of the overview report (REF) says "*soil salinity and sodicity are both very low, which is ideal for recycled water irrigation sites.*" However, that relevant page also suggests, but does not clearly state, that samples of soil were tested recently after 20 years of irrigation. Hopefully, Sydney Water is not relying too heavily on reports produced 30 or more years ago by the then Soil Conservation Service. Those reports are very detailed but they are for a vast area and are also no substitute for soil testing done fairly regularly and after major floods. Ideally such testing for salinity would be done in about a dozen randomly selected sites on the farms.

6) Other Changes to Soil

The tests, mentioned in section 5, suggest that waterlogging is not a big problem. However, the infiltration rate is not high so the soil may be good but not ideal. In terms of phosphorus and ammonium-nitrogen levels, the soil can benefit from nutrients in wastewater. In fact the report says that the application of fertiliser would help pasture growth. Such fertiliser should not be allowed to pollute nearby streams.

7) Impacts on Local Streams

The report produced in November 2020, (presumably by a consultancy called Alluvium) deals with this important topic in detail. We cannot digest it, together with everything else relating to the scheme, in less than 2 weeks so we will comment on it in a modified and expanded version of this submission some time in the future.

However, we note that the discussion on page 38 suggests that Stonequarry Creek and Nepean River will receive additional pollution if the quality of the water leaving the site is not greatly improved. Hopefully the technology is improving and will allow much cleaner water for the streams.

NPA was represented on the Community Reference Group via a representative ([redacted]) from Council's MEREW committee. This group's preferred option was that wetlands be used for pre-treating discharge waters going to Stonequarry Ck/Nepean River. We note that trials are being conducted on wetlands options but would like to see more mention of this and a statement of commitment to this option.

The report produced by Aurecon / ARUP contains, on page 3, information about the *"benefits of different environmental flows in rivers"*. Ideally, the above-mentioned streams will never stop flowing but global warming and the resulting climate change is causing us to question some of our assumptions. In the past, we and others have argued that wastewater should not be discharged into Stonequarry Creek unless there is flooding rain. That was based on 3 assumptions – 1) that the creek would never stop flowing 2) that the treated wastewater would never be adequately treated for a near pristine natural environment and 3) that floods would greatly reduce the ability of the property to store wastewater. We are not saying that these assumptions should be abandoned – only that we should test them. The amount of water flowing in Stonequarry Creek and Nepean River should be monitored, especially during droughts.

8) Natural Components of a Water Reuse Farm?

It seems likely that, in a mild to warm climate that has occasional wet spells, a sewerage scheme can be created that needs almost no chemicals, fuel, electricity and machinery. Instead such a scheme would be as natural as possible and would harness:

space
soil
topography
gravity
sunlight
wetlands
timber plantations
other living things.

The system would be a productive farm. The wastewater would be a welcome resource rather than a problem to be disposed of. Such a farm could produce food and/or fibre and/or fine timber. However, salt may still be a problem unless periods of heavy rain are sufficient to flush it from the system.

How many components should a sewerage treatment/wastewater reuse scheme have? Also, how should the components be located and linked in relation to each other. It is likely that the ideal layout of a farm would vary from site to site depending on the size of the site, the climate, the soils and the topography. We may write more about this in the future.

9) Use of Energy

Notwithstanding the comments in 8), it is likely that, in the short-term, much energy will need to be used in the Picton scheme and in at least some future water treatment and reuse schemes. We've been told that Sydney Water is already moving down the path of renewable energy. It seems that Aldi and Woolworths have made firm commitments involving future use of renewables. If those companies can do it, then so can Sydney Water.

However, renewable energy requires space that may be very valuable and may be needed for something else. But let us not exaggerate the need for space. Solar panels can be put on the roofs of sheds and perhaps over an aquaculture establishment. They can even be laid out in a field so that sheep can be allowed to graze beside

or even beneath them. They will obviously reduce the amount of sunlight reaching the ground but in summer that may be a good thing.

Wind turbines occupy very little space and so are able to coexist easily with grazing and most other forms of agriculture.

10) Vegetation Communities

Another assumption is that no native vegetation should be planted unless it is endemic to the area. We still very strongly believe that Cumberland Plain Woodland and Shale Sandstone Transition Forest should be protected from development, pollution and other threats of human origin. But it also seems necessary to consider the possibility that global warming is making Wollondilly Shire more suitable for species that occur naturally in northern NSW. It seems at least possible that tree species from the fertile, high-rainfall areas such as north-east NSW may be fine in Wollondilly if they receive nutrient-rich waste-water and are in woodlots, plantations and buffers. However, they should be well away from the Critically Endangered Ecological Communities which we hope will be protected and restored – as pristine and weed-free as possible.

HEALTH

11) Pests and Pathogens

It is likely that, to many people, the presence of pathogens is the most important topic relating to the reuse of sewage. Such people would not want to live too close to a place where dangerous micro-organisms are being sprayed into the air. However, for about 20 years, the scheme has been spraying treated effluent not far from a school and an important road. We have not heard of any health problem associated with the reuse scheme so it seems that the sunlight, ultra violet radiation and chlorine have been having the desired effect.

It seems that the REF document says nothing about micro-organisms, pathogens etc but it does say, on page 25, that the recycled water is subject to a Recycled Water Quality Management Plan which involves NSW Health requirements However, such water is not for the production of food that goes directly to people. It will be used only for pasture and fodder crops.

12) Nutritious Produce

We've been led to believe that a dairy farmer has been using fodder from the water reuse scheme and has received prizes for his farm's products. It seems also that meat from cattle using such fodder is OK. One thing is certain, even unregulated use of wastewater would probably be no more harmful to health than starvation caused by possible extreme droughts in Australia's future, if global warming and the resulting climate change get worse. We wonder if it is possible to economically irrigate orchards and grapevines by using means other than sprays. If so, the fruit would not be covered with wastewater and so the nutrients from the wastewater could go directly to humans – perhaps in a sufficiently efficient way.

13) An Alternative to Heat Islands

One of our members recently remarked that, one day, there will be almost nothing but roofs from Campbelltown to Windsor. We of Wollondilly would say *"Wilton to Windsor*". If so, one can expect temperatures outside of those houses to sometimes exceed 50 centigrade degrees, if the current warming trend continues – and it is likely to do so. If we remember right, lots of temperature records were broken last summer. On one very hot day a daughter of one of us was able to pick up a wild parrot from a relatively shaded spot and give it some water to drink. It must have been close to death. Not only will wildlife die, if we have extreme heatwaves, elderly and frail people will also die – especially if there are blackouts caused by too many people using their air conditioners. It is often said that large green spaces are needed in our cities to combat what is called the *"urban heat island effect*". If so, many schemes like the Picton water-reuse scheme could make Western Sydney a safer and much more pleasant place during heatwaves.

14) Nature and Mental Health

We will not claim that vegetation and green areas are the only solution for mental health, but we note that, before major tranquillisers were developed, some wealthy people sent their insane family members to establishments in the country. Nature is still considered to be useful in various rehabilitation schemes. Of course, it would be hard to measure the contribution to mental health made by natural and agricultural areas but it seems highly likely that Sydney would be more relaxing and liveable if it contains some farms and forests irrigated by treated, recycled water. We urge Sydney Water to strongly believe its slogan: ***"Enhancing liveable cities".***

COSTS and BENEFITS

15) Environmental Costs of Alternatives

The costs of the Picton water reuse scheme can probably be calculated fairly easily. The costs of some of the ideas in this submission can also be calculated fairly easily. Finally, the value of fodder seems easy to calculate over a period of several years but its value depends on demand which depends on drought. The values of native vegetation, pristine streams and various species in the wild are much harder to calculate. Some people seem to think that the natural world is almost worthless while others point out that humanity would be unable to exist without the many benefits, including oxygen, that have been given to us, free of charge, from nature.

Instead of just considering the short term costs of the Picton reuse scheme we should consider the long term benefits of the scheme and the ideas in this submission. Importantly, we should not assume that future generations are not as important as we are, as some economists seem to think when they talk about "*discount rate*". Finally economists refer to "*opportunity costs*". If we do not have a water reuse scheme, we lose the opportunity to enjoy the benefits that such a scheme can create. These include health benefits, amenity and various products.

16) A Variety of Produce

For many years, we were of the impression that only lucerne was grown at the Picton water-reuse farm. We have since found out that a few other species have been grown – presumably all for grazing and fodder. Can food for human consumption also be grown? We will try to answer that question some time in the future. For instance, we may consider the likelihood of aquaculture being undertaken in very salty water – if there is such water. Orchards have, in the past, been considered unsuitable for water reuse farms but what if there is an alternative to sprays and what if a computer automatically turns off the supply of water if there is a strong breeze?

Trees for timber, amenity and wildlife should certainly be considered due to the fact that they are not likely to be hazardous if they are away from houses and surrounded by frequently irrigated grass. Importantly, trees can be a buffer between a re-use farm and residential areas. Whereas spray and odour may be a problem for houses, a suitably located buffer of magnificent trees would not.

Some of the North East NSW tree species, including Brushbox and Silky Oak, already grow in some Wollondilly gardens. They would grow to great heights and be a scenic feature of the Shire if they were irrigated adequately, but not excessively, with wastewater that contains an appropriate level of nutrients. Some species are excellent for timber that is used in high quality kitchens, floorboards and furniture.

Importantly, it is possible that some tree species can increase the amount of waste-water used per hectare. But excessive irrigation of plantations would increase the chances of trees not developing good root systems. Also, excessive irrigation would cause the timber to be not sufficiently hard and may even cause straight trunks to become crooked. But certain species grow well and produce excellent timber in areas that have much more annual rainfall than what we have in Wollondilly.

If we are sufficiently careful, there can be a great result with certain native species. Plantations usually require a few decades before they produce marketable timber so they would *probably* need to be on publicly owned land. Note however, that they can add to amenity if they are not too extensive and monotonous.

17) Benefits to Wildlife?

We still believe that vast areas of rugged and infertile land should be set aside for National Parks – partly because they are of no use to farming or urbanisation and partly because most species require vast areas. But we must consider whether or not Koalas and other native species would require much less land per individual if they were in areas that are fertile in terms of nutrients. Also, the most important natural area of Wollondilly -- the Greater Blue Mountains World Heritage Area – was almost completely burnt early this year. Other world heritage areas were devastated. In light of the above, we must at least consider the possibility of creating refuges for native plants and animals. They could consist of a diversity of chosen native species and they could be surrounded by fences capable of keeping out foxes and feral cats. Of great relevance to Sydney Water, such refuges could be surrounded by rich green grass, irrigated by nutrient-rich wastewater so that the fire hazard is greatly reduced. There is even a case for slight irrigation in the refuge itself – but trees shouldn't be irrigated too frequently (The roots must be encouraged to extend deep into the soil). Also, the worst of weed species must not be allowed to proliferate. But some weed species are likely to be of benefit to some native fauna.

18) Amenity and Property Values

Several years ago, while considering the value of buffers between Tahmoor Gorge and future development, we used the Internet to find out about the effect of nature on property values. Much research has been done on this topic in England and the USA. In England, it was found that natural areas increase the value of houses even if the natural area is several kilometres away. In Sydney, we all know that beaches and the harbour have a very large effect.

What would be the effect of a water reuse farm on property values in Wollondilly and elsewhere in Western Sydney? Much depends on the size and location of such farms. Much also depends on the use of attractive trees on such farms and the degree to which odour can be eliminated. We believe that, if the planning of such farms is done well, and if such farms are a major feature of the

region, Western Sydney may escape the reputation of being a slum that is too hot in summer. If Sydney Water fulfils its promise to make the city more liveable, Western Sydney will be on the way towards being a great place in which to live and work.

Concluding Comments

About 3 decades ago, and right from the beginning of the public consultation concerning the Picton Tahmoor, Thirlmere (PTT) sewerage scheme, we of the National Parks Association were very supportive of the idea of water reuse. We don't know if other similar schemes existed on a small scale in the Sydney region before the early 1990s. We do know that a very different and extremely large farm was used to treat wastewater in Melbourne, for many decades, before the PTT scheme was being considered. We also know that, in the early 1990s, at least one Sydney Water engineer was opposed to water reuse but somehow the current scheme was created and it seems to be working well. We also know that it could face various problems in the future but we admit that we do not have the expertise to overcome those problems.

We are looking at the big picture and are confident that we are generally right but we admit that this submission is about some very complex matters that require much expertise from a wide range of disciplines. We cannot, in a couple of weeks, produce a submission that contains much detail and no errors. Our main message is that, if the PTT scheme has been successful, to date, why not create similar systems elsewhere in Western Sydney before there are dark grey roofs extending from Wilton to Windsor. Vast and monotonous development there would be a somewhat depressing environment that would be dangerously hot during heatwaves and would cover soil that is more suitable for agriculture than most Australian soils. What Sydney needs is a design team comprising some of Sydney's best experts in:

agriculture, silviculture and aquaculture

ecology and wildlife

public health

urban and regional planning

sewerage treatment

civil engineering

landscape architecture

economics

law and politics

tourism

These experts should each question their assumptions about farms, cities and wastewater and be willing to learn from the other participants. They should also be able to say what they honestly believe rather than being constrained by a particular bureaucracy or political party. The latter can become involved at a later date. Hopefully, the team would be able to produce a good discussion paper within a couple of years but, ideally, the team would exist, for at least 10 years.

Importantly, both conservation and development can be winners.

Anyway, we are delighted that things seem to be moving in the right direction. For instance, we were given a card which suggests that Sydney Water is:

"Enhancing Liveable Cities".

Those 3 words say a lot. We would like to use just a dozen words to succinctly sum up the aim of this submission:

Enhancing Sydney's production, liveability and sustainability by reusing wastewater creatively but carefully.

Q4 Suburb (optional)

[redacted]

Optional question (3 response(s), 0 skipped)
Question type: Single Line Question

Q5 Make a submission

[redacted]

Submission 1

We live very much within the area of planned future works for Picton WRP. We would be particularly interested in having more information on: 1.The level of certainty that the works illustrated in the community newsletter will go ahead - what level of agreement with stakeholders currently exists? Has the scale and impact of the planned works been determined with some certainty? 2. With work planned to commence mid-2021 what level of discussions with people affected by the works are taking place, as we would like to be part of that. 3. Will the areas indicated for works become Sydney Water property and if so, what will be the impact on adjoining properties? 4. These works will clearly be of substantial benefit to our community so how are property owners being guided to take advantage of these benefits? 5. Do these plans link-in with area development initiatives that Local Government talk about?

[redacted]

Submission 5

Hi there, I heard there was an opportunity to make a submission and thought it would be a good idea to share our thoughts while the opportunity is there. We are a family orchard ([redacted]) that has been operating out of Thirlmere for almost 84 years now. I am now the 4th generation and am looking forward to what the future holds for our orchard. We have approximately 45ha acres of land which includes 22ha of tree crops and 7.5 ha of potential pasture land. We currently grow peaches nectarines persimmons and apples, along with making apple juice. We also have access to another 10ha which we were previously farming on my Uncles land, he has however needed us to remove these trees, but in the future, there is a possibility of this land being available to use again for farming. We are looking to continue farming into the long term future and hope that nature will permit this. As you can understand water is a vital part of our business and without water we would fail to grow fruit worth selling so

it is extremely valuable to us. We were very excited to hear about the possibility of having access to recycled water to use and to hear that there is a push to dump this water into the river is quite concerning coming from a resource perspective. From 2016-2019 we were facing one of the worst droughts we have ever experienced. During this time we had to sacrifice some crops to prioritise other crops that we believe will serve us better. Unfortunately, some of the trees have not recovered/died off, so that is not only a loss of the crop for 1-2 years, but for the rest of the life of the block. We currently harvest water out of Cedar Creek which only flows during heavy rains, we have weir and water license to pump out of the creek, when the creek occasionally flows after heavy rain we try to fill up our dams as much as possible as we never know when the next rain event will occur. When we fill our dams it is enough for almost 18 months of water usage without decent rainfall. We have 2 dams on the property a 150meg dam and a 40meg dam. About 15 years ago we had a bore installed on the property to help protect us during hardship and it has been a life saver on a few occasions. The worst was between 2017-2019, during this drought we were pumping out of the bore almost 24/7 for approx. 18 months, this was because we were down to approximately 5% of our water capacity. This water was not enough for us to irrigate as required and as mentioned earlier we had to prioritise where the water was needed most. In saying that, having the bore allowed to get at least some water to our trees and the fruit we were able to grow, although small, meant we were able to make the most of an extremely dry period. If we had access to recycled water we would not need to draw anywhere near as much water out of our local ecosystem and therefore allowing more water to flow through our creek and into Stone-quarry creek. We understand how important these creeks and streams are to the ecosystem and so our preference would be to leave as much water in the ecosystem as possible. Up until this point we have not been able to make use of all the land we have due to water constraints, if we were to receive water from the recycling plant it would mean we could look into other income streams as we would have practically as much as was needed and we would be looking into either planting more orchards or planting pasture crops to harvest and sell on from our land. We have recently invested in new irrigation equipment to help us be more water efficient and better monitoring of soil moisture levels and growing conditions etc. This is very expandable to cater for different sections and blocks or pasture we may wish to plant into the future. It is all automated and will allow us to be far more efficient with the water we are using and help to grow a far better crop through analytical data we can now access. I have already done a bit of research into the use for irrigating our trees and it looks like there is no issue there if we are just irrigating under the trees and not wetting the fruit for harvest. Assuming the pricing and requirements are suitable we would be will willing to enter into a long term agreement of 10 -20 or more years to provide reassurance to your project. A few questions we have? What would our responsibilities be? EPA, runoff, monitoring, reporting etc What infrastructure would we be required to implement (fences, catchment runoff basins etc) What water capacity will we be required to

maintain/take per year? What is the water quality going to be like? Do you have an analysis of what is left in the water after your treatment process? (one of our concerns is that we use our dam water to clean our juice press and need to know if it will be suitable for cleaning/food processing, swimming etc). Will there be a price per megalitre or will it be free? Do you have an approximation if so? Is there a withholding time for entry into an area that is being irrigated. Estimated completion date of a pipeline if determined viable to our area? If you have any information or questions I would love to hear from you. Thanks, [redacted]

[redacted]

Submission 7

I would like Sydney Water to consider the connection of sewer to [redacted]. This site has recently obtained development approval for a 214 unit affordable retirement lifestyle village from Wollondilly shire Council. We have lodged a development application on the adjoining land for a 120 bed nursing home which should receive consent by Feb 2021. This development will be the only development within the Picton Tahmoor Thirlmere and Bargo precinct that will offer affordable retirement living with an adjoining facility for the next level of care. The site itself is 33 acres with 21 seperate titles , four road frontage and some titles currently zoned residential. Some of the land has sewer connection currently or available. I am most keen to commence this development knowing that Sydney Water main sewer connection is available. I have approvals , plans and all relevant information available for your reference if required. Kind regards, [redacted]

Optional question (3 response(s), 0 skipped)
Question type: Essay Question

Submission 8

Submission – Picton sewerage scheme expansion REF.

Thank you for the extension in time to respond to the REF. The timing of the REF coincided with many other planning matters being exhibited.

There are a number matters in the REF that raise potential risks that require further information or investigation, and others where the reason provided is not justified with sufficient explanation or evidence. In addition, I am not satisfied that the cumulative impacts of Wilton Growth Centre and its discharges to the Nepean River system have been taken into account and that there is a long-term view to the sustainability of this proposal.

I have provided some comments, albeit that they may already be addressed in the document, which I have not had time to fully absorb. The REF is quite technical to read for a person who does not have good subject matter knowledge. Most of my comments should be read as a checklist of matters that I feel should be addressed, if not already done so.

Regards

[redacted]
[redacted]

REF statement	Comments
The potential option of advanced treatment and piping into the Warragamba Dam water supply as an indirect potable reuse scheme will be considered as part of an adaptive management pathway over the long-term. Irrigating rural land to the west of the WRP in the short-term is consistent with this potential medium to long-term option as the recycled water pipeline can be extended to the Warragamba catchment over time. This option cannot be implemented in the short-term due to the relatively unknown regulatory pathway, infrastructure required, long lead time to gain government and public support and extended approvals and delivery timeframe.”	This region is continually being affected by short-term fixes. What consequences and what land use controls are needed if the long-term solution can not be developed in sufficient time? How will land use decisions coincide with short, medium and long-term arrangements? This needs to be known because the Picton, Thirlmere, Bargo, Tahmoor townships in particular, are in decline and will face further decline once Wilton town centre is built. The REF does not make clear what the effect will be if private farm irrigations arrangements do not proceed. What action is being taken now and the expected timeline to achieve the Warragamba pipeline? What infrastructure redundancy will occur as a result of the short term fix, in anticipation of a long-term advanced treatment solution.
potential challenges and risks such as reliance on private farmers to control and optimise irrigation activities and potential for future development of the land	Where will land use be sterilised in the future if the irrigation extensions to farms and the pipeline to Warragamba cannot eventuate? How will you control the risks (that have already occurred as a result of the irrigation constraints) if the private farm solution does not eventuate.

Providing additional treatment with a new chlorination system was deemed necessary to satisfy the requirements of the Australian Guidelines for Water Recycling (AGWR)(NRMMC et al, 2006). **This will minimise the health and safety risk** associated with recycled water use on farms which are not managed by Sydney Water These controls will be documented in the RWUA and a RWQMP to be put in place by the farmer when using the recycled water supplied by Sydney Water. help prepare a RWQMP and provide training support to Farms 1 and 2 operators (business continuity)	What is required to <u>fully mitigate</u> the health and safety risk <u>as opposed to minimising</u> the risk? What consequences will <u>minimised</u> health and safety risks create? Who monitors the farmer and how often? If controls are not managed, what effects and to what extent. For example, could there be impacts beyond the farm? What controls will be in place to ensure successive owners of the farms continue to meet the requirements?
reuse – expanded use of recycled water on nearby farms west of the WRP (subject to landowner agreement) this relies on securing landowner agreement in the form of a Recycled Water User Agreement and contract	If this does not occur, what are the alternatives What will the recycled water user agreement require of farmers? How will this agreement affect their farming operations?
if we are unable to secure an amended discharge regime to Stonequarry Creek in our EPL, then we will need to construct the Nepean discharge pipeline and seek approval for a new discharge location in our EPL.	How likely are you to get approval for the Nepean? Will you be required to have higher nutrient discharge controls?
recycled water quality targets or critical control points are not achieved at the chlorination plant, monitoring control devices sound an alarm to operators and either automatically shut-down or return off-specification water to the WRP for additional treatment. Water that does not meet the quality targets is prevented from reaching the recycled water delivery pump station.	How often are quality targets monitored and by whom? Where are the critical control points?
discharge point would be located approximately 45 m north of the base of the Maldon Weir (refer Section 6.11)	Is this section of the river in pristine condition? If so, how will river ecology be maintained?
Our current preference is to seek an increase to allow discharge to Stonequarry Creek when the dams are full and when irrigation with recycled water is not possible. This will avoid the need for additional construction impacts of a new discharge pipeline to the Nepean River, and associated costs. Discharge is only permitted when flows in Stonequarry Creek are more than 8 ML/day	How has Stonequarry Creek flood study been considered in the discharge scenario. What consequences would occur in minor, moderate, and major flood events, including up to the probable maximum flood?
We have also worked with representatives of DPIE – Planning to understand strategic land	The REF must consider the cumulative impact of discharges to the Nepean river system from the Growth SEPP (Wilton) as well.

releases and their work with Council to deliver the LEP review in an accelerated timeframe	Why is it that new connections for new developments cannot be made in Picton, Tahmoor, Thirlmere, Bargo, when developments are being approved for Wilton without a REF/EIA and concept for infrastructure? This system of uneven playing field needs to be rectified to ensure the proper and fair planning for the residents of Wollondilly.
Nepean discharge pipeline will be underbored to avoid biodiversity impacts, with construction access via an existing, partially cleared track outside the BSS area.	Are there any mine subsidence risks?
Approximately 30 light vehicle movements per day across the sites are estimated. Heavy vehicle traffic generation will fluctuate depending on the program of work.	Can this be controlled to ensure heavy vehicle movements occur outside of school and commuter peak traffic periods?
Risks from run-off are not uncommon for recycled water irrigation schemes, and can be managed through standard safeguards	What are the standard safeguards?
The preferred bypass route intersects the northern portion of Picton farm and potentially reduces the existing irrigation areas. We understand this project will go on public exhibition in late November. We will continue to work with TfNSW to achieve the best outcome for both projects	How will road drainage be managed to avoid cumulative impact to land required for irrigation?
During construction, the main potential environmental impacts of the proposal are typical construction impacts such as some vegetation removal	To what extent and to what effect on ecology? This information needs to be more transparent.
	Are there any natural hazard or infrastructure resilience risks to the expansion of land use and infrastructure provision that could cause a disruption to the service/operation?
	How will it impact Sydney Water pricing to residential and commercial consumers?
	Will there be any disruption to existing consumers during the construction?

Submission 2

[redacted]

PICTON WATER TREATMENT PLANT

Our family company [redacted] had two sewer pump stations built on land we owned at Picton. SPS776 was [redacted] Water but our company paid for the construction of SPS1171 and its rising main.

I am presently trying to get development approval for 50 seniors housing lots next to the [redacted] in Picton and another 30 residential lots 100 metres from the roundabout [redacted] ton. [redacted] e to proceed due to a lack of sewerage capacity. Hence my desire to assist in any way possible.

In the 1960's my father and I owned 3,000 acres to the east of the Boral Cement Works part of which is outlined in orange on the attached plan. We operated a dairy, the milking shed is shown at the top of the plan. We grew lucerne south of the dairy as shown on the plan.

During dry times we needed water to irrigate the lucerne. Fortunately I had an irrigation licence which enabled us to pump water from the Nepean. We used a 150mm submersible pump west of the road bridge on the A88. The power line and underground water pipe are still in existence but I have not been down to the pump area since 1970 when we sold the farm.

During dry periods we were restricted to pump only at night. The size of the pump meant that the water hole ran dry every few hours and we had to switch to it off in the dark. To overcome this we took cement bags down to the river and built a small wall about 600mm high with rocks and sand to enlarge the water hole. This has most likely been washed away by now but the water hole could easily be enlarged to enable water to be pumped up to the "Possible Irrigation Area" shown on the map.

There have been no soil tests on the area labelled "Possible Irrigation Area". However it could be suitable for treated waste water from the sewerage plant. This area was sold by me to Inghams Enterprises around 1970. I do not know who presently owns it or how it is currently zoned.

North of the railway line is a flour mill and a metal recycling plant (yet to be built). These would not be bothered by any proposed irrigation. The area drains gently southwards to the river and has road access to the A88 near the road bridge over the Nepean. The electricity supply will probably need to be upgraded but the Maldon Sub Station is near the cement works.

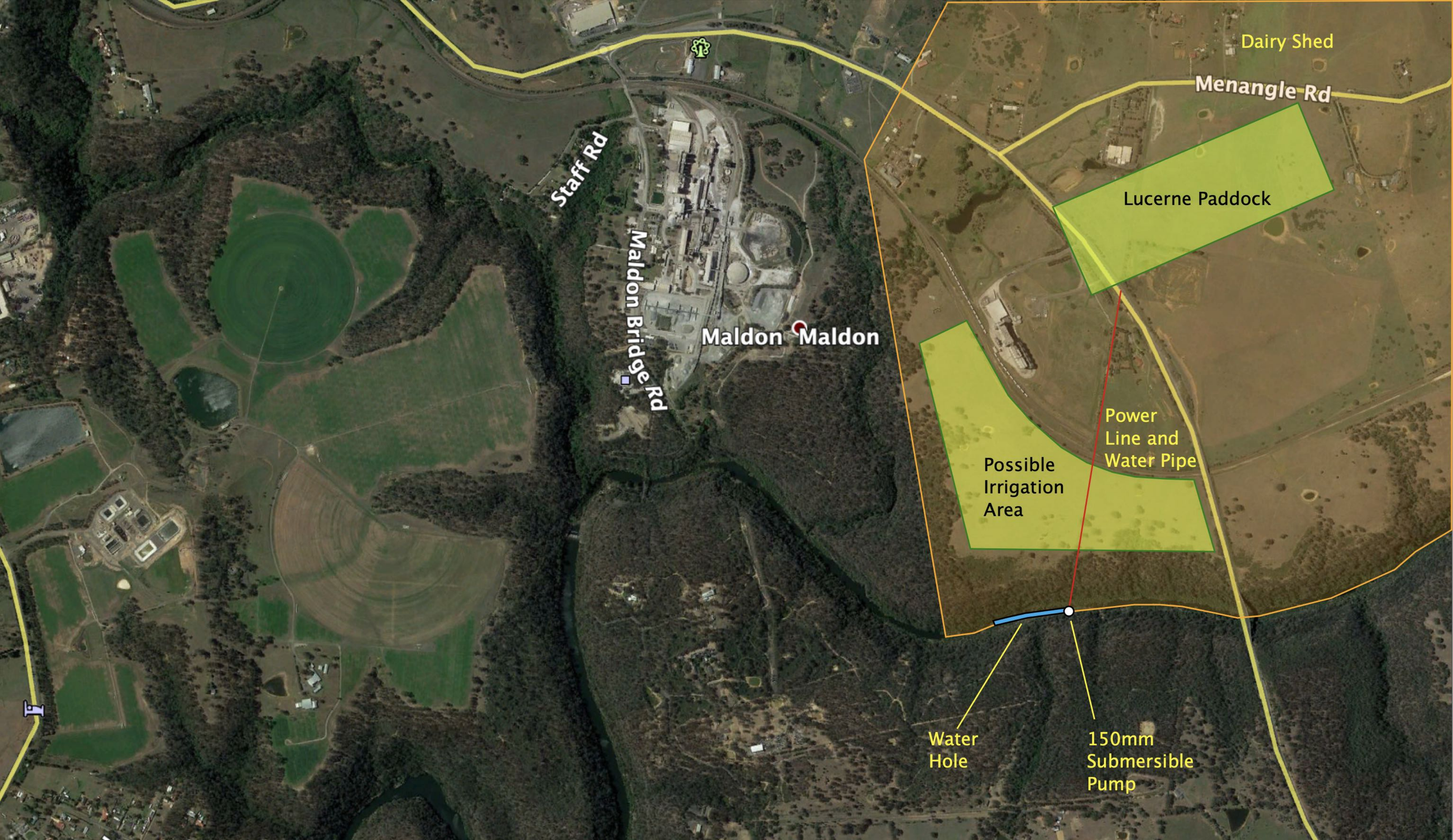
I do not know what it costs to pump treated water from the sewerage plant to the possible irrigation area shown on the map. But it proved too costly for us to grow lucerne for the dairy using river water. I remember one year our electricity cost $17,000.

On18th June 2019 I called in at the sewerage treatment plant at Picton when testing was being undertaken. The manager very kindly offered to help me get more information about the progress being made to upgrade the plant for which I was very grateful.

I hope this may be of some assistance to you regarding the upgrade the Picton Water Treatment Plant.

Regards,

[redacted]


Dairy Shed
Menangle Rd
Lucerne Paddock
Power
Line and
Water Pipe
Possible
Irrigation
Area
Water
Hole
150mm
Submersible
Pump
Staff Rd
Maldon Bridge Rd
Maldon
Maldon
13
1

Wollondilly Shire Council

Frank McKay Building 62-64 Menangle Street Picton NSW 2571
All Correspondence to PO Box 21 Picton NSW 2571
Telephone: 02 4677 1100 Fax: 02 4677 2339
Email: council@wollondilly.nsw.gov.au Web: www.wollondilly.nsw.gov.au
ABN: 93 723 245 808

RURAL LIVING

Our Reference: 2567: SG

Submission 10

Sydney Water
WestRegionDelivery@sydneywater.com.au

Dear Sydney Water

RE: WOLLONDILLY SHIRE COUNCIL SUBMISSION - REVIEW OF ENVIRONMENTAL FACTORS PICTON TREATMENT, REUSE AND DISCHARGE NOVEMBER 2020

I would like to thank you for the opportunity to provide feedback on the review of environmental factors (REF) for the Picton Treatment, Refuse and Discharge.

At the strategic level, our Council recognises the important of water, servicing, infrastructure and the timely delivery of essential public utility infrastructure. We value these critical public utilities and the service they deliver to parts of our community.

Over the past 12 months, Wollondilly Shire Council and Sydney Water have worked collaboratively to discuss our mutual commitment to better serve the local community and we thank you for the ongoing dialog.

It is recognised that the Picton wastewater system currently services about 16,000 peoples within the Picton area, extending to our villages of Buxton and Bargo.

Unfortunately, inflows to the treatment plant currently exceed capacity to reuse all the water resulting in increased discharge to local waterways. For this reason the ability to allow new housing and growth connections are restricted, even in our existing towns and villages.

This lack of capacity has been a significant concern to Council and needs to be resolved without delay. Our staff will continue to offer any assistance to Sydney Water and Government, and will continue to advocate strongly for residents to ensure they receive first class public utility infrastructure.

The attached submission provides feedback on some of the planning and environmental matters, some of which are critically important to address prior to proceeding.

For any further information regarding this matter please contact [redacted] from Council's Strategic Planning Team on [redacted] or email at [redacted]

Yours faithfully

[redacted] 21 December 2020

[redacted]

Attachment 1:

Wollondilly Shire Council Submission

Strategic Planning:

Urgent Need for Upgrade

Wollondilly 2040, Wollondilly Shire Council's (WSC) local strategic planning statement (LSPS), sets our clear 20 year land use vision which is an enviable lifestyle of historic villages, modern living, rural lands and bush. The LSPS provides a structure plan and a series of priorities for our Shire.

Planning Priority 3 – Establish a Framework for sustainable managed growth identifies that local growth will continue to occur in our towns and villages, and that Council will work with Sydney Water to find long-term serving solutions for wastewater disposal and potable water and develop interim measures to address the lack of capacity in Picton Wastewater Scheme and Water Recycling Plant

The proposed REF outlines what we consider to be an interim solution, and we will continue to work with Sydney Water and advocate strongly to Government for the need to find a long term solution for wastewater treatment and disposal.

It should be noted that the REF and Sydney Water website identified the current constraint in capacity. It is further noted that the figure used in table 1 of the REF appear to be conservative, and we would encourage Sydney Water 'plan for more' to ensure that all residents within the scheme within suitable lands are able to be serviced, and to provide a more 'short term proof' capacity.

Picton Bypass

It is noted that the recently announced Picton Bypass Options Report recommends a Corridor (Corridor 9) that transects directly through the Sydney Water site.

Both the Sydney Water site and Wastewater treatment and the Picton Bypass are critically important for Wollondilly, both need to be delivered immediately, and both need to coexist without delay.

Corridor 9 in the Picton Bypass Options Report transects directly through the existing Sydney Water site (that is already over capacity). We suggest that Sydney Water discussed alternative alignments so that both land uses can either collocate or not impact upon one another.

Alternatively, the Government may need to explore options to increase the land ownership of Sydney Water

Existing Planning Proposals

It is noted that there is an existing Planning Proposal – Stilton Lane currently under consideration (by DPIE). Council has been seeking advice from the landowner as to their future intentions for the site and for the planning proposal, however, the proposed REF is contrary to the verbal advice by the landowner to Council to date. Should this proposed REF proceed, there is a direct impact to the existing planning proposal which the landowner, Council and Department will need to clearly address. Continued transparent dialog from Sydney Water is required to ensure that the future land use implications for the land can be resolved.

An extract of WSCs public mapping system below shows the land currently subject to the planning proposal at Stilton Lane.

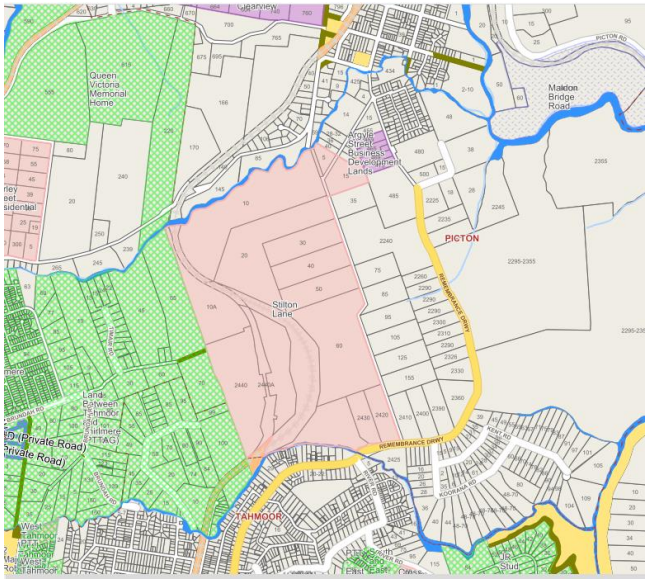


Figure 1 – Existing Planning Proposal sites

Long Term Certainty

WSC sees this proposal as an interim solution. It is also noted that if the relevant approvals are not supported, connections are not provided and if an EPA license is not granted, there is no short medium and long term plan for Picton. The REF indicated that servicing until 2024-2028 is secured under this proposal.

The other concern is the land uses controls and restrictions over the use of the land. There is some uncertainty within the proposal over the security to provide short to medium term solutions for capacity, relying in private agreements. In addition, further detail and certainty is required to ensure the proper long term planning and land uses restrictions are in place for the land subject to the REF.

Proposal Area

The REF is a little unclear as to exactly what land is subject to the REF. In this regard, it is recommended that a clear map be provided indicating the subject land. This may mean needing to undertake a further review of the Aboriginal heritage (section 6.8) depending on which land is subject to the REF.

Environmental Comments

Integrated Water Management Policy and Strategy

WSCs Integrated Water Management Policy and Strategy was adopted on 15 December 2020. The basis of these documents is to promote stormwater and wastewater management practices that protect local waterways, support water conservation, support community liveability and support agriculture and other local economies. We would appreciate it if Sydney Water's outcomes for the Picton STP expansion and future water management planning aligns with Council's Integrated Water Management Policy and Strategy.

Sydney Water South Creek Urban Typologies

WSC greatly appreciated the presentation provided by Sydney Water on their work on Urban Typologies South Creek with Sydney Water CEO Roch Cheroux. This work aligns with Council's

Integrated Water Management Policy, Strategy and WSUD Guidelines. WSC sees great value if Integrated Water Management Plans could be drafted for the area serviced by Picton STP as well as the Wilton Growth Area in order to better manage the whole of the water cycle into the future.

Community Engagement around Water Management

The Wollondilly Shire Community have showed strong support for the protection of local waterways through better management of stormwater, wastewater and water conservation. WSC wishes to emphasise community expectation and would appreciate if Sydney Water strongly consider this when finalising the design for the Picton STP expansion. Two recent examples of community engagement around water management have been provided below:

Integrated Water Management Strategy Community Engagement (July 2019)

WSC consulted with the community to seek a better understanding of the community's expectations and concerns surrounding water management and conservation. The results of the community engagement helped define the direction of the IWM Policy and Strategy. The following is a summary:

- 90% strong agree that water conservation should be factored into planning new development within Wollondilly Shire.
- 87% strongly agree that it's important to ensure native fish and aquatic animals have a healthy natural habitat, for example platypus, bass and Macquarie perch.
- 74% agree or strongly agree that fishing and swimming are important aspects of the recreation and lifestyle available in Wollondilly Shire.

Community Attitudes around Recycling and Reusing Water (June 2020)

WSC consulted with the community about recycling and reusing water with the objective to provide people with information, and explore their attitudes towards options for water recycling. A total of 26 responses to the survey were received. While this is a small sample number, the demographic data showed diversity in participants – residing all over the Shire; an even split between male and female; and an age range fairly evenly spread from 25 to 70+. The surveys were conducted on social media with an overall approximate reach of more than 16,000. Having a high reach with a low number of responses may indicate people are becoming more progressive in their views on holistic water management especially in light of recent drought and bushfires.

The responses received by Council indicate there is support for holistic water management, including emerging support for using purified wastewater for all purposes including drinking; and strong support for use of recycled water in agriculture, industry and irrigation. There is also community concern regarding the health of Wollondilly's waterways if water management methods are not changed.

Summary -

- Strong support for recycling wastewater for irrigation, industry and agriculture uses (100%).
- Interest in purification of wastewater for all water uses including drinking (58% support, 11% neutral, 31% do not support).
- Least support for treating and discharging wastewater in local waterways (65% do not support, 27% neutral/do not know, 8% support) and exporting wastewater to larger treatment plants on the coast (69% do not support, 15.5% neutral/do not know, 15.5% support).

Community and Environmental Considerations

Key community and environmental considerations to be strongly considered for the outcome of the STP expansion and future wastewater management planning are as follows:

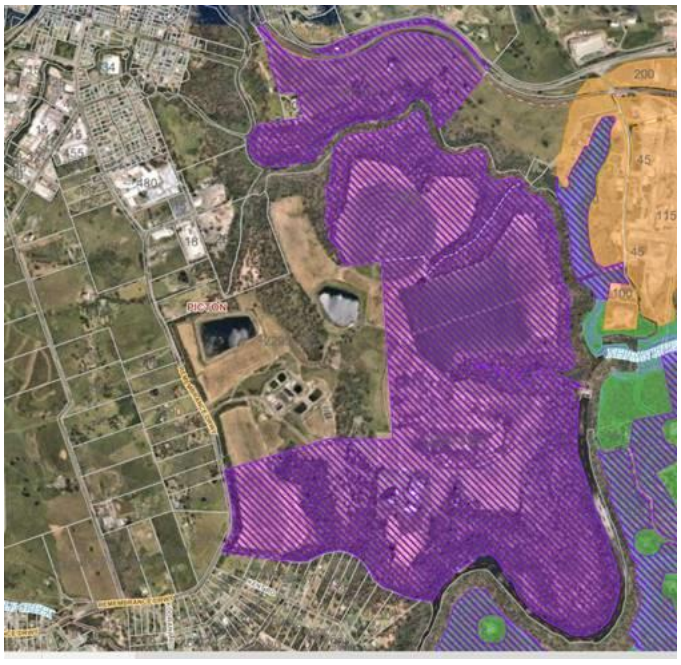
- Wastewater is managed in a manner that does not negatively impact on the Upper Nepean River remaining fit for primary human contact.
- Wastewater is managed in manner that protects waterways and riparian habitats including threatened aquatic fauna such as the Sydney Hawk Dragonfly and Macquarie Perch.
    - The REF states that "Potential water quality impacts have been identified, however, these impacts are not widespread and are unlikely to impact on the aquatic ecology or environmental values of the waterway." To ensure that this is the case, monitoring of water quality (key parameters such as TN, TP, salinity, pH, dissolved oxygen, faecal coliforms, etc.) at set points should be undertaken.
- Wastewater recycling and reuse is maximised as much as possible in a manner that does not negatively impact the environment and supports the local community.
- Vegetation management plans for land that will be subject to increased nutrient loads or salinity, particularly Shale Sandstone Transition Forest/Western Sydney Dry Rainforest communities.
- Continued support should be provided to landholders accessing treated wastewater to ensure appropriate use.

Wollondilly Upper Nepean Water Quality Review – Western Sydney University

WSC engaged WSU to review 20 years of water quality data within Wollondilly Shire in the Upper Nepean River and Stonequarry Creek. The Water quality data was provided by WaterNSW and Sydney Water. One of the recommendations in the conclusion of the document states *'Future uses of treated sewage effluent in the landscape rather than discharging into the Nepean River (or its tributaries) will benefit water quality and stream health of the Nepean River.'*

Cumberland Plain Conservation Plan

Of critical importance, some of the land marked to receive recycled water is mapped as 'Strategic Conservation Area' in the CPCP (purple hashing). The strategic conservation areas have been identified as areas of greatest strategic value to deliver long-term conservation outcomes in the Cumberland subregion which can offset for biodiversity impacts. The potential impacts to this land from this project are unlikely to align with this outcome. The REF should address the CPCP, and further advice should be sought from the Department of Planning, Industry & Environment.



[redacted]

From: [redacted]
Sent: Monday, 14 December 2020 10:04 AM
To: [redacted]
Cc:
Subject: FW: [External] Submission Picton

Hi All,

Below is the submission sent in from [redacted]

Thanks,
[redacted]

-----Original Message-----
From: [redacted]
Sent: Sunday, 13 December 2020 2:55 PM
To: WestRegionDelivery <WestRegionDelivery@sydneywater.com.au>
Subject: [External] Submission Picton

CAUTION: This email originated from outside the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

To whom it may concern.

My submission on proposed expansion of Picton treatment, reuse and discharge November 2020.

I begin with stating that I'm in favour of the areas' waste water being treated locally and reused for beneficial agricultural projects.
The current management I must say has been very cooperative and has kept local residents well informed. With an expansion of the scheme this will be vital to continue.

When the project was first presented to the community a reuse system was included in the project where sports fields parks golf course were to be included.
At a meeting with local residents I brought to the attention of Waterboard representatives present that according to their own figures there wasn't enough water to run both farm and have water for the reuse system. I was told I wasn't an expert and didn't understand the system. Then when input pipes were being laid reuse pipes were not and I was informed that there wasn't enough water to run both systems.

The reason for bringing this up is that I'd like to the scheme remain viable into the future and be able to cater for the areas growth. To do this we need to think further than 5-10 years down the track.

My concern is that into the future there may not be the land available to use the treated water.

If the plant relies on privately owned land the how can the plant be confident of long term use of this land.

It is known that one of the farms has already applied in recent years to subdivide. If an individual sees a greater return in subdivision than growing crops who would blame them for selling and making the land unavailable to the farm.

The current farm is working well because it has certainty of ownership it can plan long term and is under direct control of competent management. Can this be guaranteed with individual farms. Also under one management when any problem arises it can be addressed more effectively.

I feel that while expensive now long term acquiring land but perhaps allowing owners to continue current farming activities if they wanted to in conjunction with Waterboard management would ultimately be better both economically and for the sustainability of the farm.

Already the existing farm land it under threat with a proposed Picton bypass cutting through the farm reducing land area for farming and potentially making other areas isolated and uneconomical to use. Determining the effect of the bypass is difficult as it's a very general idea at present. At the least I would imagine it to quite a few hectares taken. This at a time when the farm needs all available land for farming.

Other possibilities for the water use may include a large area for storage of water for firefighting. In the fires of 2019/ 2020 one of the factors was the lack of water supply available for helicopters tankers etc. if the water is processed to a higher standard as stated this may be an option.

Use by smaller farms where water is taken by tankers.

Possibly evaporation ponds, use of water by dust prevention on worksites eg road works. And long term it may be economical to revisit reuse in sports grounds, parks golf course although this would of been a fraction of the price if done as originally planned.

In conclusion I'm in favour of the farm expansion but I feel it must be with certainty of continuity for the life of the plant. Let's look at the solution long term. Get it right now and make the future bright.

[redacted]
NSW

Phone [redacted]
Email [redacted]

Sent from my iPhone

Submission 3

[redacted]

[redacted]

Owners of Aprox, 4 Ha of land named; [redacted]

Points to consider of extension Picton treatment, reuse and discharge around Stilton Lane and further places.
In first instance it looks like a good idea, But what benefit is there for us as owners of the land, after further thoughts it is **all negative for us.**

Devaluation of our property living next to an extention of the Picton Sewer scheme not for a short time, but forever in larger and larger amounts of disposal of treated Sewer recycled water.

Will the Council stop us from **subdividing our land in the future?** If there is no confirmation of this we say **NO to the scheme,**

If this water cannot be disposed of in the river all the time there must be a reason for it like heavy metals and other polutents for disposal on our lands in the area. These pollutents will built up more and more over time and cannot be removed from the soil once it is there.

We are registered beekeepers (V19) and do not want our honey polluted with unwanted chemicals, how are we compensated for this?

Growing vegetables and loosing the status of a clean enviroment for this is of great concern to us. **Organic status ???**

If the recycled water is disposed on neighbouring lands there will be some of it coming on our lands by the wind as close neighbours, We do not want this to happen to us. W**ill there be compensation for this to us???**

If a spillage of untreated sewerage water occurs (like recently what happened withTahmoor mine to the local river) and sprayed on neighbours land it never can be taken back to the condition as before of the land and surrounds!

Our neighbour indicated he might be selling the lands and leaving the area after this scheme is operating are they be compensated and we not ?
What offer of benefit can you give to us as elderly residents living there for 44 years on our pristine farm ??? Please reply in detail

Suggestion - free drinking water from sydney Water as compa
- bill for $2000 (read?) in

[redacted]

From: [redacted]
Sent: Tuesday, 24 November 2020 11:11 AM
To: [redacted]
Subject: [External] Picton Treatment, Reuse & Discharge Project - REF Comments
Attachments: C20-726.pdf

Hi [redacted]
Please find attached DPI Fisheries comments on the REF for the above project.
If I can be of any further assistance, please contact me.
Regards,
Josi

[redacted] | Fisheries Manager – Coastal Systems Unit
NSW Department of Primary Industries | Fisheries
Block E, Level 3, 84 Crown Street, Wollongong NSW 2500
ALL MAIL TO: DPI Fisheries, Attn: R. Philps,1243 Bruxner Hwy, Wollongbar NSW 2477
[redacted]

Appendix B – EPA comments received

DOC21/169753

16 March 2021

Ms Jenny Rogers
Environmental Regulatory Manager
Sydney Water Corporation
Level 13, 1 Smith Street
Parramatta NSW 2015

Dear Ms Rogers

I refer to Sydney Water Corporation's ("Sydney Water") 2020 report titled *Review of Environmental Factors Picton Treatment, Reuse and Discharge* ("REF") provided to the NSW Environment Protection Authority (EPA) on 18 November 2020.

The EPA has met with Sydney Water about this matter on 2 February 2021 at which we discussed overall concerns and on 19 February 2021 at which concerns about the modelling were covered.

The EPA is required to consider any of the relevant matters under section 45 of the *Protection of the Environment Operations Act 1997* in relation to a licence variation application (LVA) and it is critical that the EPA receives the appropriate information so that adequate consideration can be undertaken.

The EPA considers that the information provided in the REF has not adequately assessed the proposed sewage discharge, including consideration of all practical and reasonable measures to avoid, minimise and mitigate potential impacts on receiving waters.

The EPA encourages Sydney Water to consider the comments provided in:

- Attachment A – high level comments on the REF;
- Attachment B – detailed comments on Sydney Water's *Picton WRP Analysis and interpretation of water quality and ecosystem health – Stonequarry Creek and Nepean River Final Report (2020)* ("modelling report"); and
- Attachment C – supporting figures for Attachment B – detailed comments on the modelling report.

The EPA's comments in Attachment A and B are focussed on water pollution related matters. Please also note that with the submission of a LVA, the EPA will also be examining matters related to air and noise amongst other matters.

Yours sincerely

SARAH THOMSON
A/Manager Regulatory Operations Metro South

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Attachment A: EPA comments on *Review of Environmental Factors Picton Treatment, Reuse and Discharge* (Sydney Water, 2020)

The following comments include the EPA's high-level comments on the REF and also refers to the following accompanying reports provided by Sydney Water:

- Aurecon Arup (2020) *Picton WWTP Discharge Review of Environmental Factors: Hydrology Final* ("Hydrology Report");
- Aurecon Arup (2020) *Review of Environmental Factors: Waterway Health* ("Waterway Health Report");
- Aurecon Arup (2020) *Review of Environmental Factors: Near Field Impact Assessment* ("Near Field Report"); and
- The modelling report.

Consistent with the requirements of section 45 of the *Protection of the Environment Operations Act 1997*, Sydney Water's assessment of the potential impact of discharges must, at a minimum:

a) identify and estimate the quality and quantity of all pollutants that may be introduced into the water cycle by source and discharge point;

b) describe the nature and degree of impact that any discharge(s) may have on the receiving environment, including consideration of all pollutants that pose a risk of non-trivial harm to human health and the environment;

c) assess the potential impact of discharges on the environmental values of the receiving waterway, including average or typical through to worst-case scenarios, with reference to the relevant guideline values consistent with ANZG (2018);

d) where a mixing zone is required, demonstrate how the ANZG (2018) criteria for relevant chemical and non-chemical parameters are met at the edge of the initial mixing zone of the discharge;

e) demonstrate how the proposal will be designed and operated to:

   i. protect the Water Quality Objectives for receiving waters where they are currently being achieved;

   ii. contribute towards achievement of the Water Quality Objectives over time where they are not currently being achieved; and

f) demonstrate that all feasible and reasonable measures to avoid or minimise water pollution and protect human health and the environment from harm are investigated and implemented.

The following provides a summary of the issues regarding the current assessment, including potential approaches to addressing these inadequacies.

Consideration of all options to avoid, minimise and mitigate potential impacts

Infrastructure planning for the Picton area should include clear direction for the provision of sewage services. It should also consider whether proposed growth will result in increased loads of pollution on the receiving environment as a result of additional sewage capacity. It should also identify what practical and cost-effective measures can be taken to maintain or restore the community's uses and values of waterways and protect public health. This includes consideration of impacts from sewage treatment plant discharges.

The EPA's policy is that for new systems there should only be discharge of treated sewage to waters as a last resort. It is acknowledged that the Picton STP is not a new sewage system, however the EPA considers that with the Picton STP augmentation Sydney Water has an opportunity to explore integrated approaches to managing sewage as encouraged in the relevant

planning framework for this area including *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*.

The REF specifies that one of the main objectives of the proposal is to maximise beneficial reuse of recycled water. The EPA supports this objective and encourages Sydney Water to further consider integrated approaches.

Further consideration of alternatives/options

Part 2.2.4 of the REF provides a summary of several key options which were considered to increase recycled water capacity. The EPA considers that the REF does not present a thorough exploration of variations of these options or whether or not they could be combined with a treatment, reuse and discharge scenario.

The EPA acknowledges the work undertaken by Sydney Water to investigate off-site reuse options completed in relation to a Pollution Reduction Program in 2017/18 and encourages Sydney Water to continue to explore this. The EPA notes that newer opportunities for reuse may be available due to recent growth in the area.

The EPA further notes that the Waterway Health Report identifies that the only option to mitigate predicted impacts is more reuse but no details on further investigations into appropriate land for reuse are provided in the REF.

Treatment, reuse and discharge options

The REF and specialist reports consider three options with a total effluent production of 4ML/day (referred to as Scenarios 2 to 4) plus the existing non-compliant discharge producing 2.7ML/day (Scenario 1). However, it appears that not all options and impacts have been assessed.

The REF indicates that Scenario 2 involves discharge to Stonequarry Creek with additional reuse on third party farms (in addition to the Picton Farm) however Sydney Water acknowledges that recycled water agreements with farm/landowners have not been finalised and therefore there is a risk that additional reuse may not be secured.

Variations on the specified scenarios are not considered in the reports. For example a combination of discharges to Stonequarry Creek and Nepean River, and alternative discharge locations on the Nepean River are not explored. Other creek flow-based options where the discharge location and volume are varied with flow are also not considered.

Sydney Water should demonstrate that all feasible and reasonable measures to avoid, minimise or mitigate water pollution and protect human health and the environment from harm are investigated and implemented including securing land for reuse and available discharge options.

Existing environment characterisation

The REF nominates the current existing non-compliant discharge regime (producing 2.7 ML/d) as the ‘baseline’ scenario/environment (Scenario 1). Modelling and water quality impacts of the proposal options (Scenario 2 – 4) are compared to this non-compliant ‘baseline’ scenario. The EPA considers that comparison to this non-compliant ‘baseline’ results in minimisation and underestimation of predicted impacts.

Discharge scenarios should be compared to the compliant baseline using data pre-dating the non-compliant discharge to Stonequarry Creek. It would also be appropriate to demonstrate the non-compliant discharge regime as a scenario and to outline the impacts of that scenario.

Assessment of near field mixing zones

All pollutants in the treated sewage with the potential to cause non-trivial harm need to be appropriately assessed. The near field modelling presented in the Near Field Report has considered just two pollutants: nitrate and ammonia. Additional analytes should be considered including (but not limited to) total nitrogen (TN), total phosphorus (TP) and metals.

Discharges to the Nepean River (and Stonequarry Creek) cannot be appropriately considered until all pollutants with the potential to cause non-trivial harm are modelled to predict the near field mixing zone.

Discharge conditions

Flow-based discharge

The REF does not specify if a flow-based discharge regime was considered, however the Near Field Report indicates that there will be no flow-related constraints on discharges to Stonequarry Creek or the Nepean River. The Near Field Report indicates that the discharge flow rate from the Picton STP exceeds the flow in Stonequarry Creek under all but 'high' flow conditions. This indicates that with no flow constraints on discharges, a 1.3km section of creek (downstream of the Picton STP discharge location) will potentially consist almost entirely of treated sewage 16% of the time.

Furthermore, the Near Field Report concludes that discharges to Stonequarry Creek should be treated to ANZG prior to discharge under all conditions except 'high' creek flows which are defined as >5.6ML/day as a mixing zone cannot be used for regulatory purposes. This does not align with Sydney Water's proposal in the REF.

Lack of clarity in the type of discharge

The REF does not provide adequate description of the nature of Sydney Water's proposed discharges described in Scenarios 2, 3 and 4. For example, does Sydney Water propose a continuous, intermittent, or precautionary discharge or a combination of these?

Furthermore, references to the various discharge options/scenarios (including circumstances for discharge, type of discharge and volumes) within the REF are unclear and/or inconsistent. The Waterway Health Report is also inconsistent with the REF and states that the discharge regime to waterways (either Stonequarry Creek or Nepean River) would consist of intermittent releases from the Western storage dam within the Picton STP rather than continuous discharge (section 1.3, page 7).

Dam related discharge

No information has been provided in the REF about dam operations and management for current or future scenarios. If proposed discharge regimes are linked to dam levels, additional information should be provided about how the current discharge regime works in relation to dams and how this would work under each of the proposed discharge scenarios.

Dam operation and management

Dam operation

It is unclear how the dam interacts with the sewage treatment process and discharge i.e. whether treated sewage from the STP will be sent to a dam for storage before being discharged to waterways or if it will be discharged directly to waterways.

Dam water quality

The REF indicates that water quality of discharge will be improved through denitrification (particularly in relation to TN) in the western dam (section 3.3.2, page 28), but does not consider or discuss whether the quality of treated sewage is affected by storage in the dams and potential deterioration of water quality (including faecal coliforms, total suspended solids, pH and algae) prior to discharge and its potential environmental/public health impacts on receiving waterways.

Impacts of the existing discharge

Table 14 (page 68) of the REF indicates that on average Picton STP discharges approximately 59ML per year under the non-compliant 'baseline' (Scenario 1) however the impacts of this have not been detailed. The REF does include generalised statements and conclusions about the current non-compliant discharge having no significant impact on receiving waterways.

For example, page 69 (section 6.3.2) of the REF indicates that 20 years of discharge have had no impact on Stonequarry Creek, however other sections and specialist studies provide evidence to the contrary:

- The REF (page 61-62, section 6.3.2) notes that analysis of the past six years of data show TN downstream of the discharge is higher than upstream and the modelled and measured nutrient concentrations (TP, TN) for the current discharge also exceed ANZG in Stonequarry Creek downstream of the discharge.
- Algal community structure is very different at the discharge sampling sites on Stonequarry Creek compared to upstream. Upstream is dominated by green algae (90-98% biovolume) with very minor proportions (<10%) of monads, whereas the discharge site and downstream (N911B, N911) has <10% green algae and a mixture of blue green algae, monads, diatoms and others (Waterway Health Report, page 37).
- The Waterway Health Report (page 33) identifies that macroinvertebrate assemblages from Stonequarry Creek and Redbank Creek were indicative of 'moderate organic contamination'. Contributors to this degraded waterway health are not identified but the EPA notes that Picton STP has been discharging to Stonequarry Creek for the past 20 years and encourages Sydney Water to consider its contribution.

The EPA considers that insufficient supporting evidence is provided and further discussion is required to assess the impact of the current non-compliant "baseline" discharge on Stonequarry Creek and the Nepean River.

Predicted impacts on Stonequarry Creek

The REF states that water quality impacts under the proposed scenarios are "*not likely to be significant"* (page 108). However information provided in relation to Scenario 2 does not support this conclusion:

- predicted concentrations of TN and TP in Stonequarry Creek downstream of the discharge point are 2.2 and 1.7 times the ANZG guideline values respectively; and
- the Waterway Health Report states that there will be a "*degradation of overall waterway health due to loss of biodiversity and ecosystem services"* (section 5.7, page 54) as a result of the proposal. The EPA notes that it is not clear if this statement applies to Stonequarry Creek or the Nepean River (or both).

The Modelling Report indicates that the Scenario 2 proposal shows changes in the 1.3km reach of Stonequarry Creek from the STP to the confluence with the Nepean River (section 5.7, page 38). The magnitude of these impacts is not stated but at N911 (downstream of the discharge) TN and TP are 2.2 and 1.7 times the ANZG guideline values respectively. In the absence of adequate near field mixing zone modelling and considering the high proportion of creek flow that the STP discharge constitutes at all but high flows, it is likely that the near field mixing zone extends the majority of the 1.3km reach of Stonequarry Creek to the Nepean River.

Predicted impacts in Nepean River

Cumulative impacts

The REF proposal does not address the cumulative impact of nutrient loads in the Hawkesbury Nepean. The EPA notes that the Hawkesbury Nepean Nutrient Framework currently in place specifies an interim cap on nutrient loads with further load limits to be applied in 2028.

Primary contact water quality

The EPA acknowledges that faecal coliform levels are discussed in relation to swimming locations in the REF. However no further discussion of water quality indicators relevant to primary contact (including enterococci) are included. As mentioned in the above section ("Dam operation and management"), it is not clear how water quality will be impacted by storage in dams prior to discharge. The EPA considers that further discussion/exploration on the potential impacts to water quality and public health risk is needed.

Furthermore, the REF identifies that the Nepean River downstream of Stonequarry Creek is a "*highly valued swimming spot*". It is unclear where the proposed Nepean River discharge location is in relation to this (or other) swimming sites.

Attachment B: EES DPIE/EPA detailed comments on *Picton WRP and Stonequarry Creek – Evaluating flow and water quality* (Alluvium, 2020)

The EPA acknowledges that a significant amount of effort has gone into developing a model to run the provided scenarios however it is considered that further work is required, particularly in relation to:

- detailed calibration and validation of the model for Stonequarry Creek sites;
- flow record and explanation of flow discrepancies for flow gauge 2122006; and
- the limited selection of analytes modelled.

On 12 February 2021 the EPA provided interim comments on the Modelling Report via email to Sydney Water. Refer to the below detailed comments include minor changes from the comments provided earlier.

Data quality - Flow Data

Flow gauge calibration

Section 3.6 (Page 7) of the modelling report states:

"Streamflow data was used to calibrate and validate the rainfall runoff modelling of the Stonequarry Creek catchment and as an input for the Nepean River simulation. Data is available for 3 streamflow gauges:

- *212053 Stonequarry at Picton township (Webster Street near rail viaduct), (approximately 3 km upstream of the WRP discharge point), with data from Water NSW available for the period from December 1990 to January 2019 at a sub-daily timescale (generally 10 to 15 minute intervals).*
- *2122006 Stonequarry Creek at Picton WRP, approximately 60 m downstream of the Picton WRP discharge point) from June 1997 to December 2018 at 15 minute intervals.*
- *212208 Nepean River, measuring flow over Maldon Weir, upstream of the confluence with Stonequarry Creek."*

The two stream gauges in Stonequarry Creek, one operated by WaterNSW (Station 212053) and one by Sydney Water (Station 2122006) are stated to be approximately 3 km apart. Further, it is suggested that 2122006 Stonequarry Creek at Picton STP is *approximately 60 m downstream of the Picton WRP discharge point*. The EPA previously understood that Sydney Water gauging was being conducted upstream of where the discharge joins Stonequarry Creek.

Based on the information from the modelling report, the gauge (2122006) Sydney Water is using to calibrate Stonequarry Creek flows for the model includes upstream flows as well as discharges from the Picton STP. This appears to be a poor choice of flow gauge location for model calibration, given the WaterNSW gauge (212053) measures flows independent of the Picton STP discharge and is located 3km upstream. Only one (now) relatively minor tributary (Redbank Ck) joins Stonequarry Creek in-between the two gauges. The EPA considers that this issue requires further exploration/consideration by Sydney Water.

Furthermore, section 7.3 (page 44) of the modelling report also identifies several events in 2016-2017 in relation to site 2122006 which resulted in alterations to how flow was measured. The EPA requests further clarification on how Sydney Water has reconciled these events to create a consistent flow data set.

Limited data provision

The EPA has previously raised concerns about the flow data for site 2122006 Stonequarry Creek at Picton STP. The data provided by Sydney Water on 15 October 2020 in relation to the modelling report is from 1 January 2014 (entitled *Picton WQ data Aug2020 – for EPA distribution.xlsx*,). However, the modelling report indicates that earlier data (from 1997 to 2003) is used to validate the

model. Please provide the 1997 to 2003 data as it is important in assessing the adequacy of the model.

Comparison of flow gauges 2122006 and 212053

Figure 1 provides an illustration of the flow data for the Sydney Water (2122006) and WaterNSW (212053) gauges in Stonequarry Creek. While they appear similar, the flow exceedance curves[1] identify differences between the observed flows (purple line for 212053; dark green line for 2122006) and modelled flows (red line for 212053; light green line for 2122006).
Differences are especially evident at the lower flows up to 10 ML/day (lower right flow exceedance curve). In this context, it should be kept in mind that the observed median (most typical) flow for Stonequarry Ck is 1.55 ML/day (for 212053) and 2.1 ML/day (for 2122006)[2].

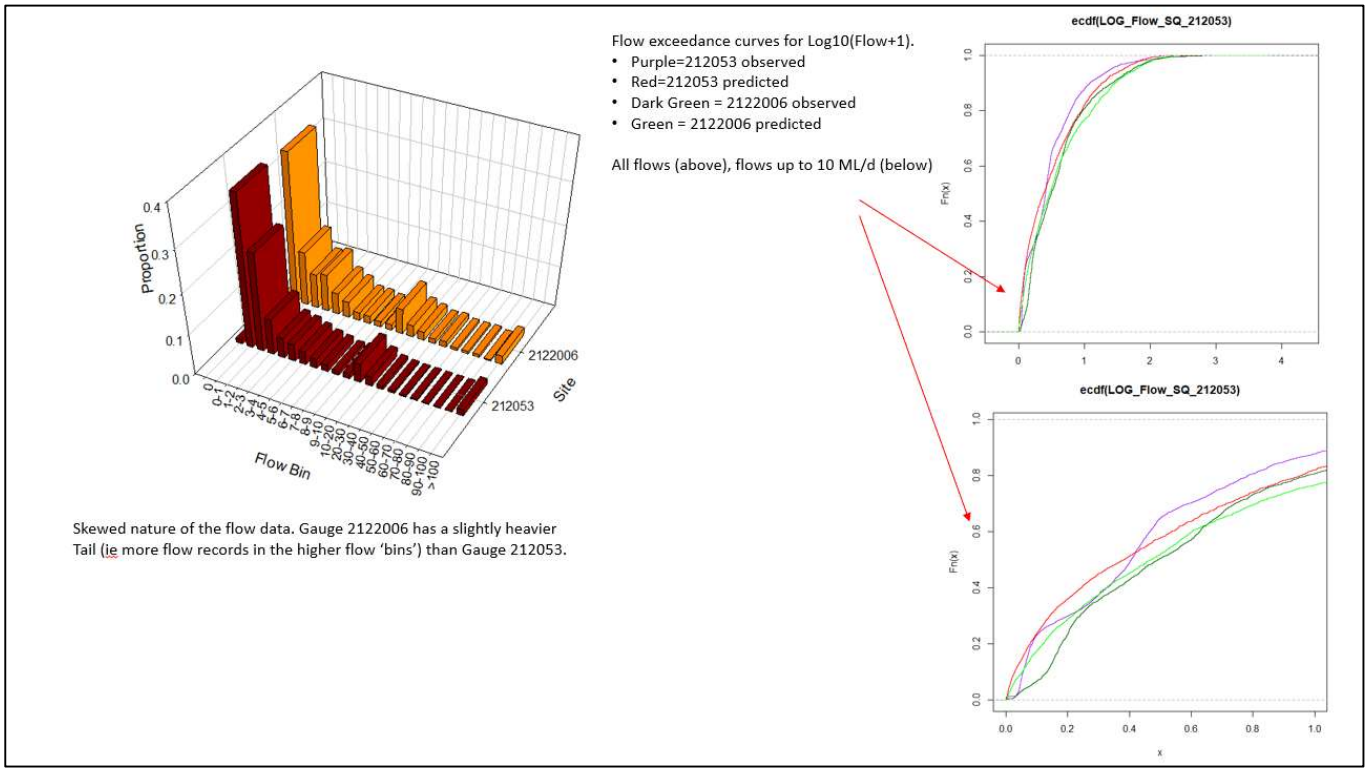


Figure 1. Flows at Stonequarry Ck gauges 2122006 (Sydney Water) and 212053 (WaterNSW)

Since the flow exceedance lines are close to one another it could be suggested that the observed differences potentially make little difference to the overall model or its conclusions. However, this is found not to be the case when the daily observed and modelled flows are explored in greater detail as seen in Figure 2 and Table 1. What can be observed is that the model at times does well in modelling daily flows, but at other times there are some large discrepancies, with the model typically under-predicting flows at times of low (but not negligible) flows. Further exploration of daily and observed flows are provided in Attachment C at the end of this document.

[1] Empirical cumulative distribution frequency curves for observed and modelled daily flow from 1/1/2014 (the dates for which observed and predicted flow data were provided). The scale on the x-axis is on a log scale as the data have been transformed to log10(flow+1).
[2] Since 2014 – the start of the datasets received. The figures for 2122006 also presumably include any discharges from Picton STP.

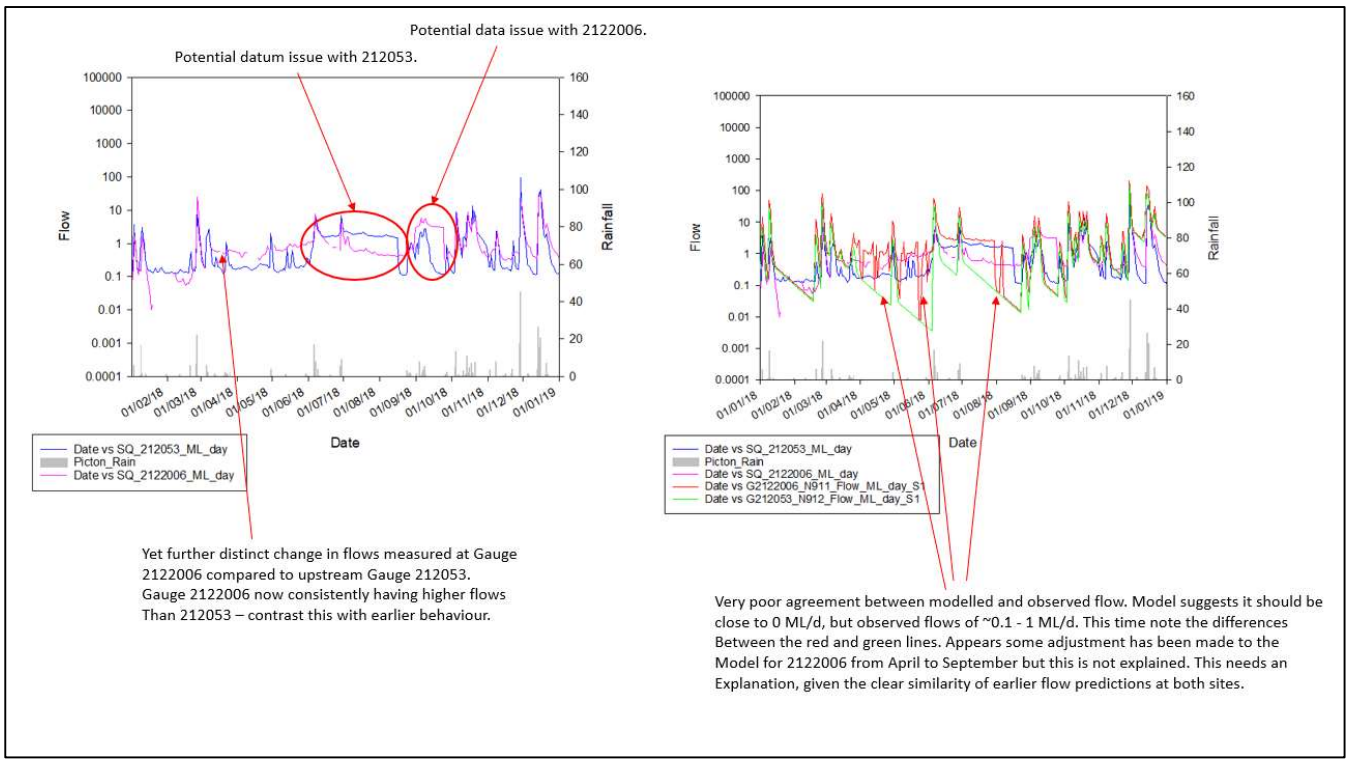


Figure 2. Examples of some of the observed and modelled flow discrepancies at Stonequarry Ck gauges 2122006 (Sydney Water) and 212053 (WaterNSW).

Coupled with this is some inconsistent behaviour in the underlying flow data for Gauge 2122006. Flow measured at Gauge 2122006 is at times consistently lower than that recorded at the upstream Gauge 212053 and at other times flow at 2122006 is consistently higher than that recorded at the upstream Gauge 212053. At other times the two gauges appear to give very similar flow values.

Of greater concern are the magnitude of the discrepancies between individual flows recorded at 212053 and 2122006 (i.e. the observed data; see Table 1). It can be seen from Table 1 that:

- Gauge 212053 recorded 0 ML/day on 26 occasions, whereas gauge 2122006 recorded 0 ML/day on 7 occasions. When gauge 212053 recorded 0 ML/day, the flows recorded at 2122006 ranged between 0.05 and 3.3 ML/day.
- Gauge 212053 recorded flows in the range >0 - 1 ML/day on 891 occasions, whereas gauge 2122006 recorded flows in the range >0 - 1 ML/day on 836 occasions. Importantly, when gauge 212053 recorded flows in the range >0 - 1 ML/day, the flows recorded at 2122006 ranged between 0 and 9.2 ML/day.
- Even larger discrepancies can be seen for other flow ranges (Table 1).

Flow range (ML/day)	212053 Count	2122006 Count	Range of Flows at 2122006 for a given flow range for 212053
0	26	7	0.05 - 3.3
0-1	891	836	0 - 9.2
1-2	586	308	0.1 - 9.6
2-3	214	197	0.2 - 23.5
3-4	119	214	0 - 26.7
4-5	102	122	1.2 - 32
5-6	79	90	1.8 - 38.1
6-7	55	46	3.5 - 42.1
7-8	41	44	1.4 - 50
8-9	25	31	5.2 - 41.2
9-10	31	33	3.5 - 58.2
10-20	114	146	3.9 - 87.6
20-30	56	68	21.6 - 108.2
30-40	22	48	35.8 - 136.5
40-50	12	27	30.1 - 189.3
50-60	7	32	84.6 - 229.1
60-70	7	15	111.3 - 335.1
70-80	4	14	86.2 - 240
80-90	4	16	118.5 - 127.3
90-100	3	5	Missing - 315.95
>100	38	49	97.8 - 24325

Table 1. Observed flow data for gauges 212053 and 2122006 separated into flow ranges.

This inconsistency among flow gauge records may be due to changes in methodology (e.g. changes in datum, ratings curves, and/or flow measurement locations[3]) however the causes are not detailed in the modelling report. There also appear to be edits applied to the flow data compared to previous datasets provided for assessment (e.g. refer to Attachment C at the end of this document). Please provide further discussion on these matters including potential impacts on the reliability of the data.

Given that the modelling report states that "*gauge 2122006 Stonequarry Creek at Picton WRP"* is "*approximately 60 m downstream of the Picton WRP discharge point*" (section 3.6, page 7), it is also possible that the discharges from Picton STP are influencing the 2122006 flow record. This can only be explored by more detailed consideration of the discharge and flow data relative to upstream flows. Consequently, the EPA requests that the suitability of gauge 2122006 to both calibrate and validate the model is given further consideration. If the Stonequarry Creek model does not adequately predict flow in Stonequarry Ck (compared to observed data) then it is also unlikely to accurately predict water quality. This is discussed further in the next section.

Data Quality - Water Quality Data

The following water data quality comments are based on a limited assessment of water quality data i.e. post 1 January 2014 (the period where both observed and modelled data is available).

[3] Sydney Water do acknowledge a change to the actual bed of Stonequarry Creek and loss of the original gauging station due to the June 2016 East Coast low.

Discrepancies in modelled and actual concentrations

In the following analysis, observed data at various sites in Stonequarry Creek (N912, N911A, N911B & N911) and the Nepean River (N91 & N92) have been compared to the modelled data for Scenario 1 (Figures 3, 4, & 5).

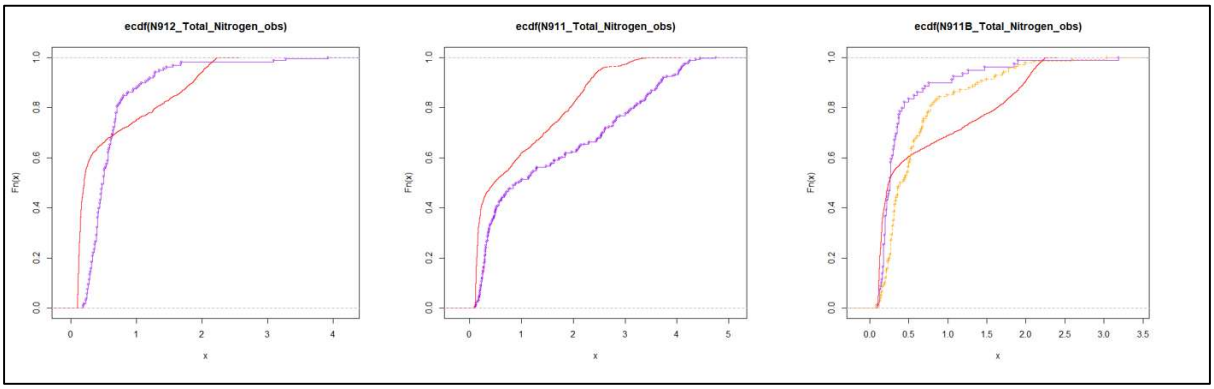


Figure 3. Concentration exceedance curves for Total Nitrogen comparing observed (purple) and modelled (red) distributions for Stonequarry Creek at N912 (upstream), N911B (upstream) and N911 (downstream). Concentration exceedance curve for observed Total Nitrogen at N911A[4] (orange line; upstream but potentially influenced at times by the Picton STP discharge) included with N911B (at right).

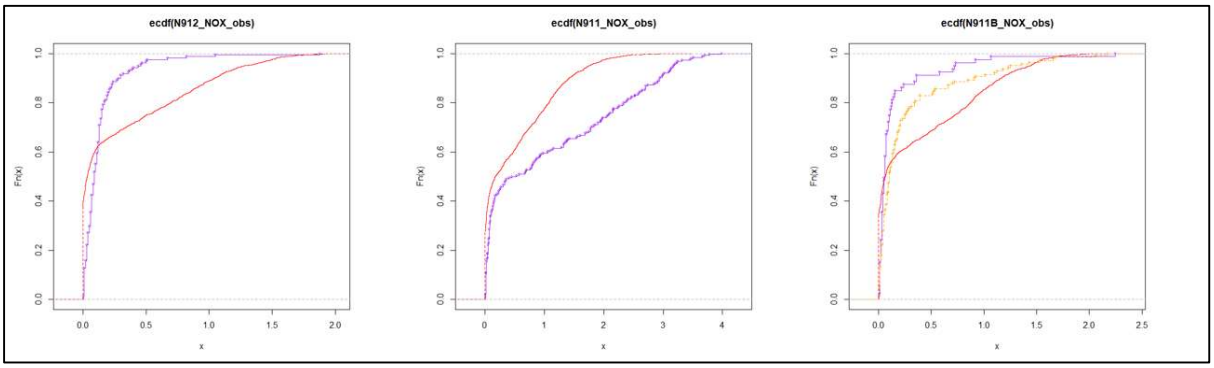


Figure 4. Concentration exceedance curves for Oxidised Nitrogen comparing observed (purple) and modelled (red) distributions for Stonequarry Creek at N912 (upstream), N911B (upstream) and N911 (downstream). Concentration exceedance curve for observed Oxidised Nitrogen at N911A (orange line; upstream but potentially influenced at times by the Picton STP discharge) included with N911B (at right).

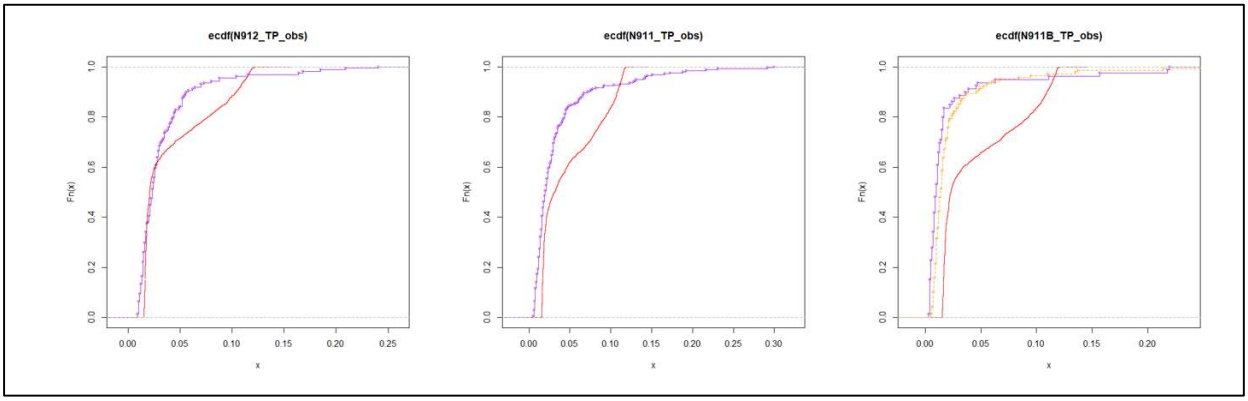


Figure 5. Concentration exceedance curves for Total Phosphorus comparing observed (purple) and modelled (red) distributions for Stonequarry Creek at N912 (upstream), N911B (upstream) and N911 (downstream). Concentration exceedance curve for observed Total Phosphorus at N911A (orange line; upstream but potentially influenced at times by the Picton STP discharge) included with N911B (at right).

[4] No model predictions were made/provided for site N911A.

It is apparent from these graphs (Figure 3 – Figure 5) that:

- At N912 (upstream of Picton STP discharge) the model underestimates the concentration of Total Nitrogen at lower levels and overestimates the concentration of Total Nitrogen at higher levels when compared to observed data. They agree with one another at approximately the 65th percentile value (the point where the two lines cross).
- At N911 (downstream of Picton STP discharge) the model underestimates the concentration of Total Nitrogen when compared to observed data.
- AT N911B (upstream of Picton STP discharge) the model overestimates the concentration of Total Nitrogen when compared to observed data, particularly at higher concentrations.
- At N912 the model overestimates the concentration of Oxidised Nitrogen when compared to observed data, particularly at higher concentrations.
- At N911 (downstream of Picton STP discharge) the model underestimates the concentration of Oxidised Nitrogen when compared to observed data.
- AT N911B (upstream of Picton STP discharge) the model overestimates the concentration of Oxidised Nitrogen when compared to observed data, particularly at higher concentrations.
- At N912 the model overestimates the concentration of Total Phosphorus when compared to observed data, particularly at higher concentrations.
- At N911 (downstream of Picton STP discharge) the model overestimates the concentration of Total Phosphorus when compared to observed data, particularly at higher concentrations.
- AT N911B (upstream of Picton STP discharge) the model overestimates the concentration of Total Phosphorus when compared to observed data, particularly at higher concentrations.

Further upstream-downstream comparisons can also be made together (see Figures 6 & 7).

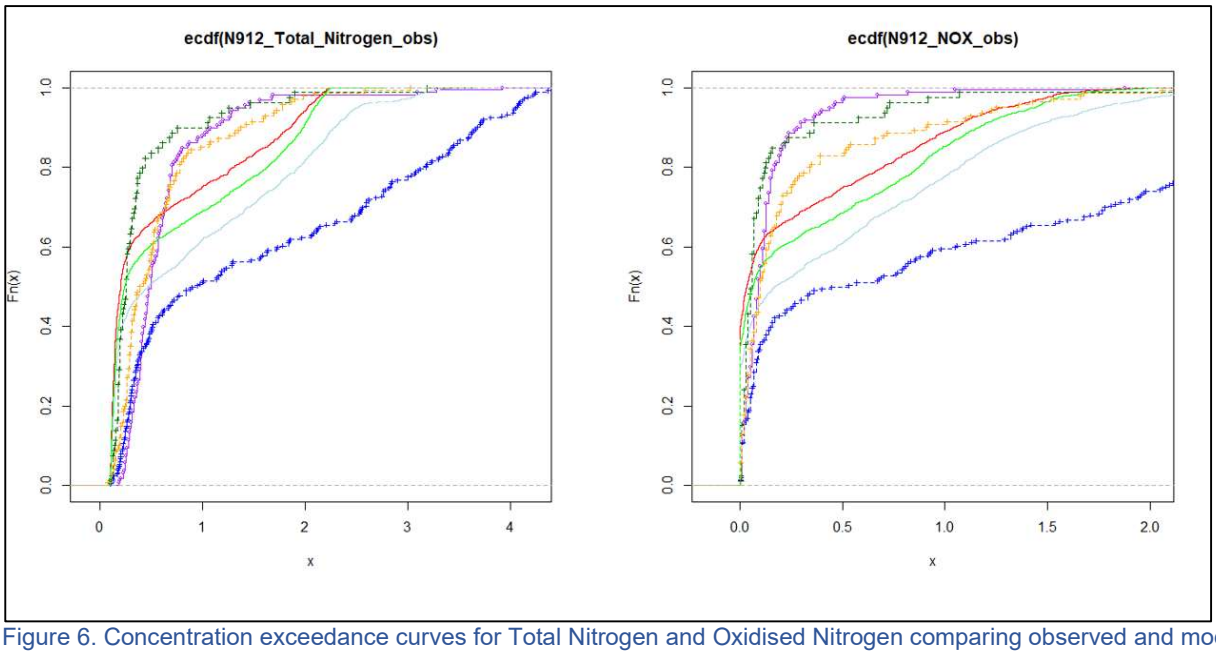


Figure 6. Concentration exceedance curves for Total Nitrogen and Oxidised Nitrogen comparing observed and modelled distributions for Stonequarry Creek at N912 (upstream; observed=purple, modelled=red), N911B (upstream; observed=dark green, modelled=light green) and N911 (downstream; observed=blue, modelled=light blue). Concentration exceedance curve for observed Total Nitrogen and Oxidised Nitrogen at N911A (orange line; upstream but potentially influenced at times by the Picton STP discharge) also included.

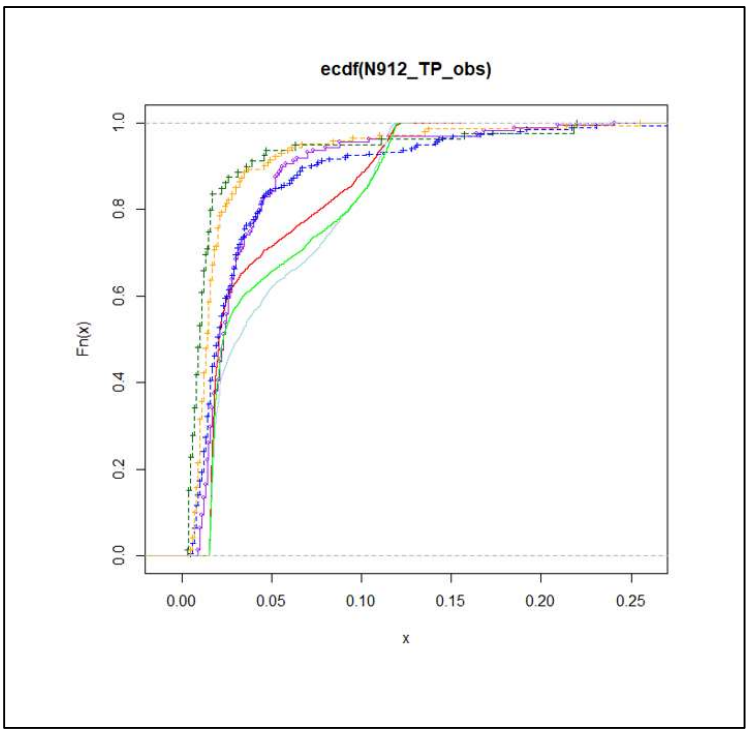


Figure 7. Concentration exceedance curves for Total Phosphorus comparing observed and modelled distributions for Stonequarry Creek at N912 (upstream; observed=purple, modelled=red), N911B (upstream; observed=dark green, modelled=light green) and N911 (downstream; observed=blue, modelled=light blue). Concentration exceedance curve for observed Total Nitrogen and Oxidised Nitrogen at N911A (orange line; upstream but potentially influenced at times by the Picton STP discharge) also included.

These graphs (Figure 6 and 7) suggest that:

- Modelled data overestimates total nitrogen and oxidised nitrogen concentrations at the upstream sites (N912, N911B) and (at times significantly) underestimates total nitrogen and oxidised nitrogen concentrations at the downstream site (N911). The effect is to place the modelled concentration exceedance curves in-between the observed upstream and downstream data.
- Modelled data tends to overestimate total phosphorus at all sites.

If the modelled and observed data is investigated at other sites (N914, N91 and N92; Figures 8 - 10), then this suggests:

- The model overestimates NOX, TN & TP at N914 (and the behaviour of the concentration exceedance graphs for TN and TP look ‘unnatural’ – e.g. constant numbers from 10th percentile to 60th percentile for TP).
- The model appears to do a reasonably good job of predicting N91 nutrient concentrations when compared to observed data (for Base Case Scenario 1).
- The model appears to slightly underestimate NOX and TN at N92 but does a reasonable job of predicting Total Phosphorus levels when compared to observed data (for Base Case Scenario 1).

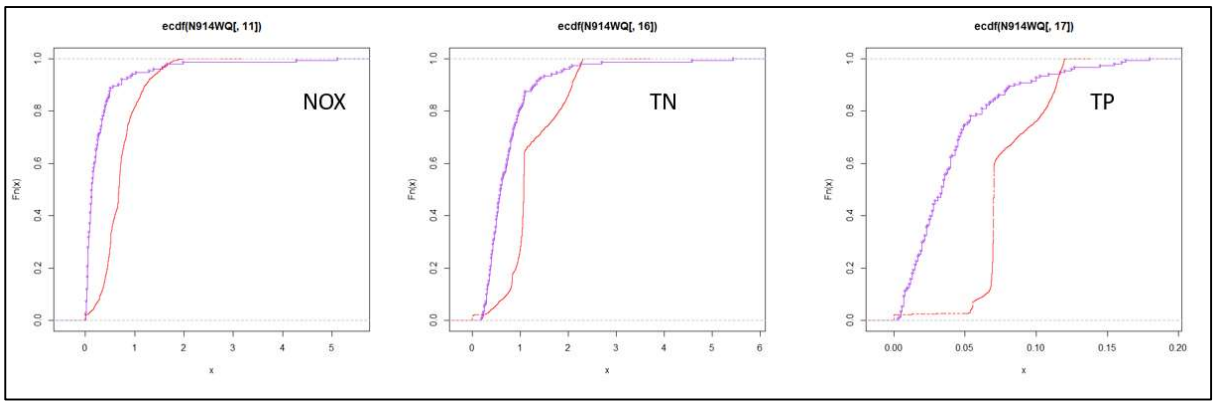


Figure 8. Concentration exceedance curves for Oxidised Nitrogen, Total Nitrogen and Total Phosphorus comparing observed and modelled distributions for Redbank Creek at N914 (tributary to Stonequarry Creek upstream of Picton STP discharge; observed=purple, modelled=red).

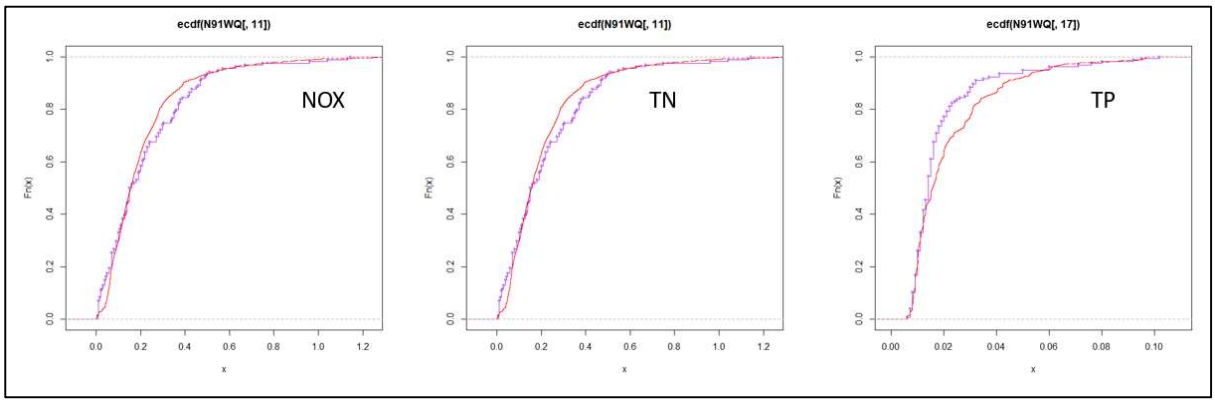


Figure 9. Concentration exceedance curves for Oxidised Nitrogen, Total Nitrogen and Total Phosphorus comparing observed and modelled distributions for Nepean River at N91 (downstream of Stonequarry Creek confluence; observed=purple, modelled=red).

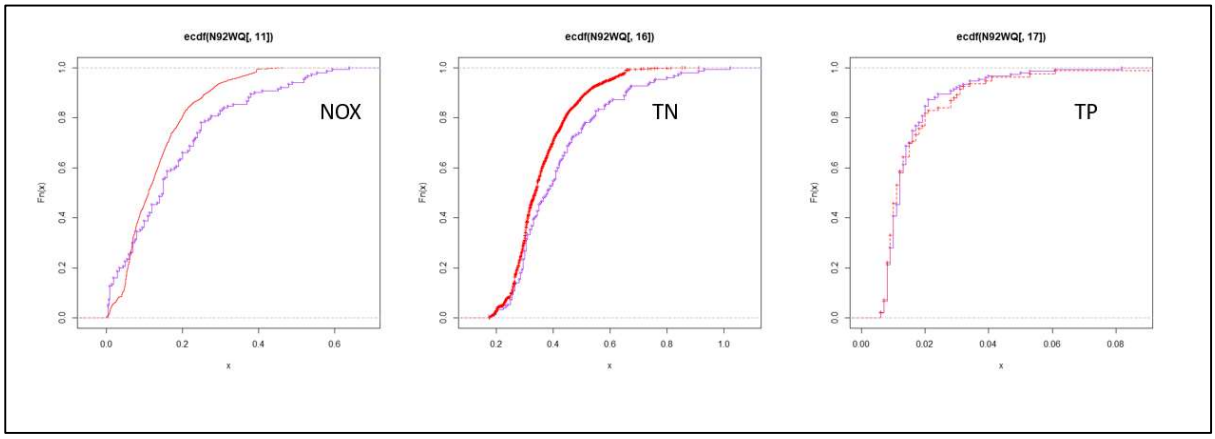


Figure 10. Concentration exceedance curves for Oxidised Nitrogen, Total Nitrogen and Total Phosphorus comparing observed and modelled distributions for Nepean River at N92[5] (upstream of Stonequarry Creek confluence; observed=purple, modelled=red).

In undertaking these analyses it was also observed that the concentration exceedance curve of NOX, TN & TP depended on the modelled period used (Figure 11). When the whole prediction series was used, some unexpected exceedance curves for predictions at Maldon Weir were obtained, suggesting a constant (or near constant) value might have been used for TN & TP. It is unclear why this value would have been utilised (or if it related to the assumptions of the model or differences in the way modelling was undertaken for earlier years). The EPA requests that Sydney Water provide further explanation for this.

[5] Modelled data have been taken from Maldon Weir modelled variables.

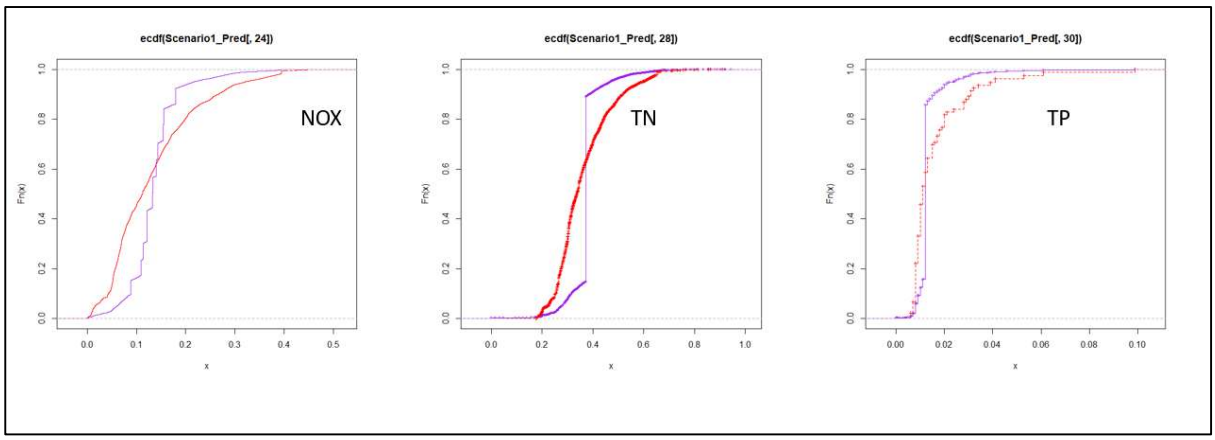


Figure 11. Concentration exceedance curves for Oxidised Nitrogen, Total Nitrogen and Total Phosphorus comparing modelled data from 2014 with modelled data for the whole series at Maldon Weir[6], Nepean River (upstream of Stonequarry Creek confluence; observed=purple, modelled=red).

The modelling report makes the following comment in relation to Figure 12 below (section 4.3, page 15) "*It can be seen from the box plots that the modelled represents the observed Total Nitrogen concentrations appropriately."* However the EPA considers that Alluvium's box plots (Figure 12), which are portrayed on a logarithmic scale have artificially compressed the differences, making them appear more similar than they really are if considered on a linear scale. Figure 10 illustrates concentration exceedance curves on a linear scale.

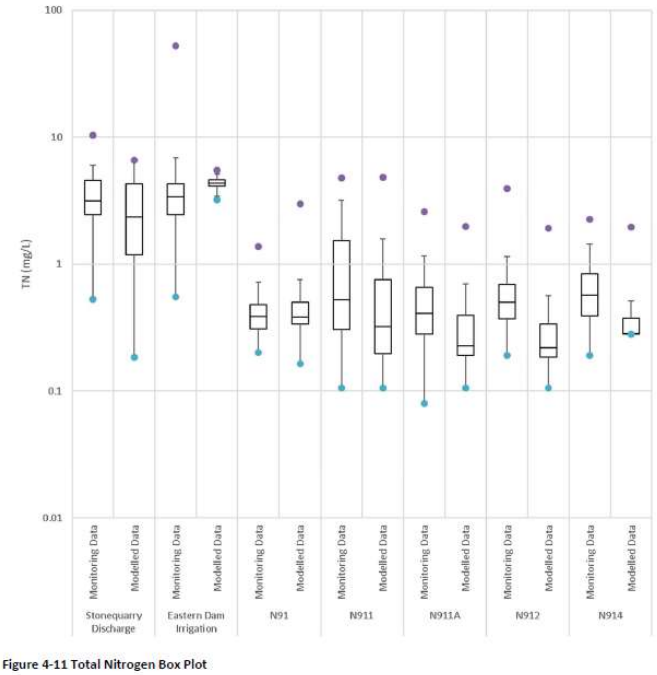


Figure 12. Copy of Figure 4-11 Total Nitrogen Box Plot (source: *Summary Modelling report: Picton WRP and Stonequarry Creek – Evaluating flow and water quality* (Alluvium, 2020))

[6] Presumed to represent N92.

A Table of medians[7] (Table 2) is included below for observed and modelled data to display the potential consequences that underestimation or overestimation may have on conclusions.

Analyte	NOX	SRP[8]	Orthophosphate	TN	TP
N914 observed	0.14	0.008	0.002	0.59	0.034
N914 modelled	0.68	0.052		1.07	0.07
N912 observed	0.09	0.008	0.004	0.5	0.023
N912 modelled	0.034	0.013		0.204	0.02
N911A observed	0.1	0.006	0.002	0.41	0.014
N911B observed	0.06	0.004	0.002	0.26	0.01
N911B modelled	0.028	0.014		0.242	0.023
N911 observed	0.53	0.009	0.003	0.95	0.02
N911 modelled	0.17	0.018		0.47	0.031
N92 observed	0.15	0.005	0.002	0.38	0.015
N92 modelled	0.112	0.005		0.337	0.011
N91 observed	0.155	0.007	0.003	0.4	0.014
N91 modelled	0.156	0.008		0.407	0.016

Table 2. Median observed and modelled nutrient concentrations at N914, N912, N11A, N911B, N911, N91 & N92. Highlighted cells are where the greatest discrepancies lie.

The biggest discrepancies as highlighted in Table 2 are:

- the median **modelled** NOX concentration for N914 is almost 5 times that observed.
- the median **modelled** NOX concentration for N912 is almost 4 times that observed.
- The median **observed** NOX concentration for N911 is approximately 3 times that given by the model.
- the median **modelled** TN concentration for N914 is almost twice that observed.
- the median **observed** TN concentration for N912 is almost 2.5 times that given by the model.
- The median **observed** TN concentration for N911 is approximately twice that given by the model.
- the median **modelled** TP concentration for N914 is almost twice that observed.

It is unclear why the authors suggest that modelling report Figure 10-5 Appendix D (Page 74 - TN at site N911) shows "*N911 captures the range of variability appropriately as shows clearly the effect of discharges from Picton WRP*" (section 4.4, page 16). A copy of the figure is included below as Figure 13. The EPA considers that further work is considered necessary in terms of calibrating the model to the observed water quality at N911.

[7] These medians are based on modelled and observed data from 2014 onwards (the period of overlap for the data provided).

[8] Observed data are for Filtered Total Phosphorus, modelled data is for Soluble Reactive Phosphorus

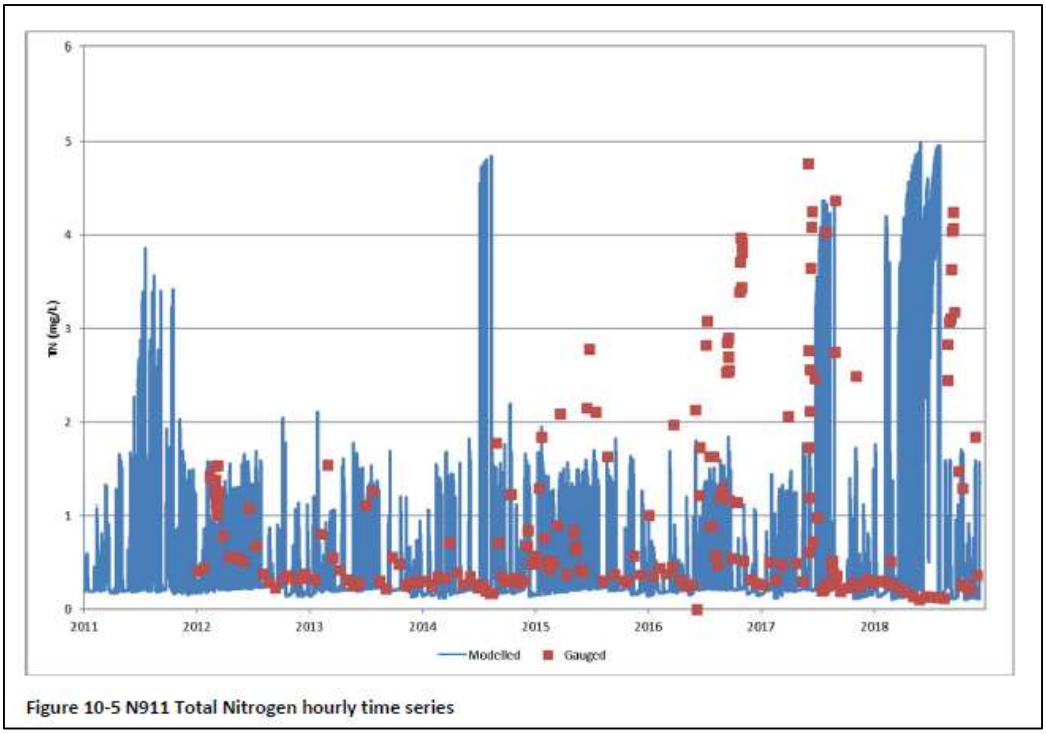


Figure 13. Copy of Figure 10-5 N911 Total Nitrogen Hourly time series (source: *Summary Modelling report: Picton WRP and Stonequarry Creek – Evaluating flow and water quality* (Alluvium, 2020))

Modelled Scenarios

The models of 4 scenarios are summarised on page 20 (Section 5.3) of the modelling report and included as Figure 14 below.

Ultimately, four representative scenarios were selected:

- **Scenario 1** - Baseline "2014-2019"
  - 2.7 ML/d inflow with current irrigation area,
  - Stonequarry discharge, TN 4 mg/L, TP 0.1 mg/L
- **Scenario 2_SQ_60** Future
  - 4 ML/d inflow, 60 ha offsite reuse (179 ha total irrigation area)
  - Stonequarry discharge, TN 3 mg/L, TP 0.1 mg/L
- **Scenario 3_NP_60** Future
  - 4 ML/d inflow, 60 ha offsite reuse (179 ha total irrigation area)
  - Nepean discharge, TN 3 mg/L, TP 0.1 mg/L
- **Scenario 4_NP_0** Future
  - 4 ML/d inflow, 0 ha offsite reuse (119 total),
  - Nepean discharge, TN 3 mg/L, TP 0.1 mg/L

Figure 14. Copy of a portion of page 20 (source: *Summary Modelling report: Picton WRP and Stonequarry Creek – Evaluating flow and water quality* (Alluvium, 2020))

It is unclear if Scenario 1 referred to as “Baseline” (Figure 14) includes the current non-compliant discharge regime. Please provide clarification. Please note that the current non-compliant discharge is not considered to be an appropriate baseline comparison for Stonequarry Ck.

Additionally, if modelling results for the discharge to the Nepean River is considered, then there are several issues that have not been adequately detailed/explained (e.g. see Figure 15). There is no explanation for:

- Modelled flows to NR under Scenario 2 (which should be discharging to Stonequarry Ck)
- Unclear and potentially incorrect ratios for NOx/TN (the majority of the TN discharged from Picton STP has previously been demonstrated to be oxidised nitrogen).

It is unclear what assumptions have been applied for the scenarios that lead to Scenario 2 having an apparent (modelled) discharge to the Nepean River (NR) or what nitrogen ratios have been assumed in modelling these concentrations in the treated sewage. Previous observed measurements (Discharge studies) show that the majority of nitrogen in Total Nitrogen is in the form of NOx. This does not appear to be the case for the modelled data provided and requires explanation.

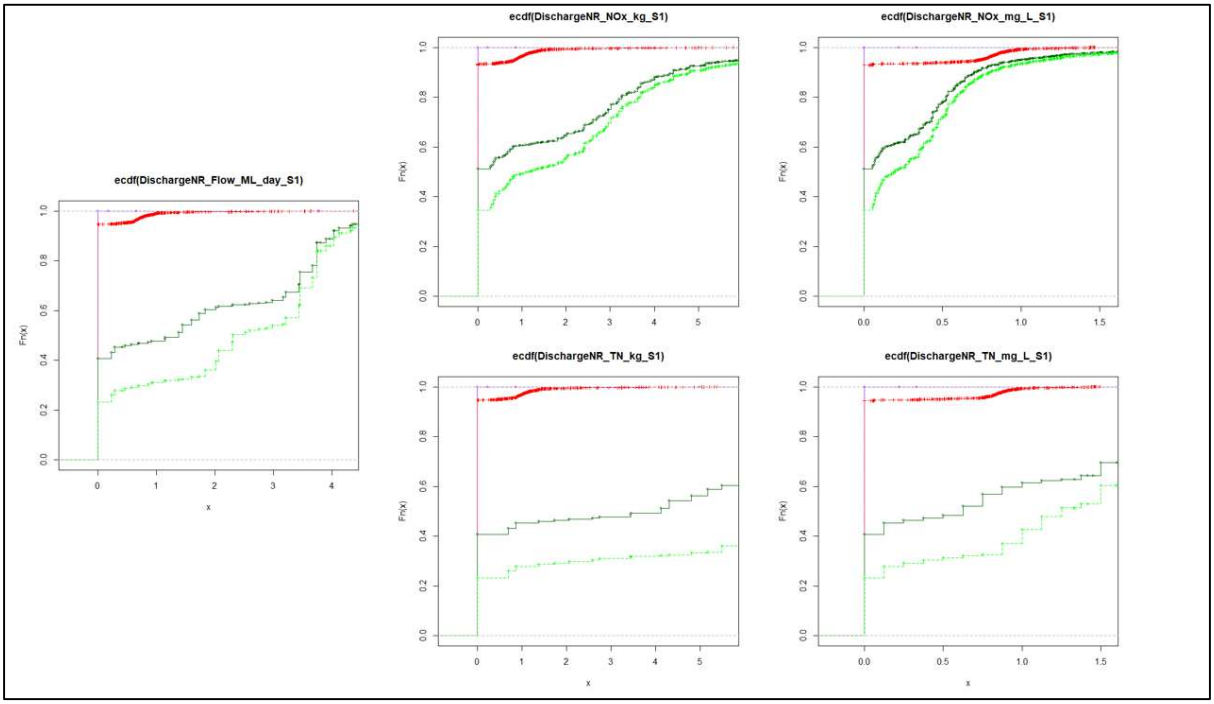


Figure 15. Flow (ML/day), load (kg) and concentration (mg/L) exceedance curves for the modelled DischargeNR variables. Purple Line=Scenario 1; Red = Scenario 2; Dark Green = Scenario 3; Light Green = Scenario 4.

Comparison of modelled data and modelling for each of the scenarios at N91 (Nepean River downstream of Stonequarry Creek confluence) (refer to Figure 16) suggests an increase in TN and NOx at N91, particularly for the discharge scenarios that discharge directly to the Nepean River. Higher TN and NOx concentrations (compared to observed data) occur for all scenarios and there is a suggestion that discharges to Stonequarry Ck would lead to lower concentrations at N91. However, this conclusion appears to be affected by:

- Data quality (see flow discussion)
- Unclear/unstated assumptions in the model
- Over-estimation and under-estimation of actual water quality (see water quality discussion).

The EPA acknowledges the work undertaken to develop a model to run the provided scenarios, however it remains unclear how the proposed management responses for Picton STP address or improve water quality in either Stonequarry Creek or the Nepean River in the vicinity of Picton STP discharges.

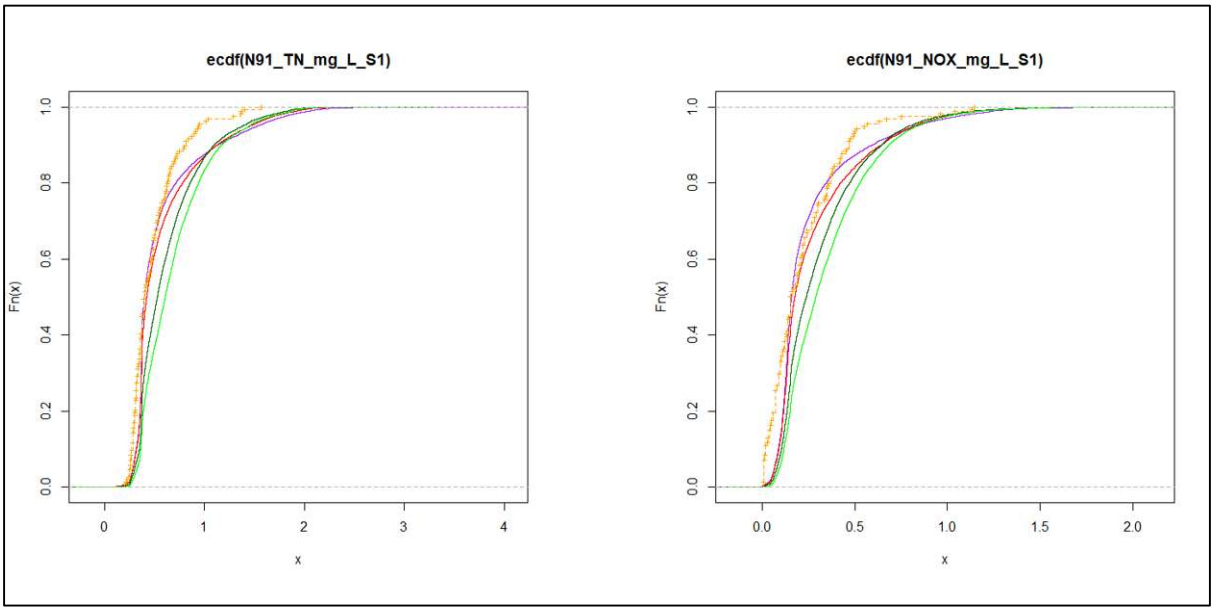


Figure 16. TN and NOx concentration (mg/L) exceedance curves modelled for site N91. Purple Line=Scenario 1; Red = Scenario 2; Dark Green = Scenario 3; Light Green = Scenario 4; orange = observed data.

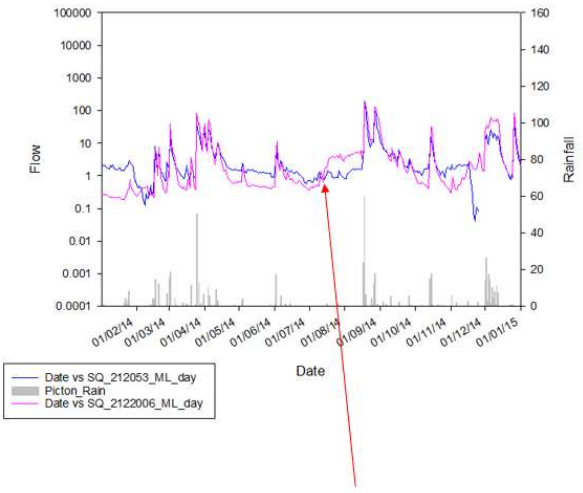
Limited analytes

The modelling report also only considers nutrients and does not address other non-trivial analytes. The EPA considers that all pollutants in the treated sewage with the potential to cause non-trivial harm need to be modelled. This includes but is not limited to total nitrogen, total phosphorus, sulphur and metals.

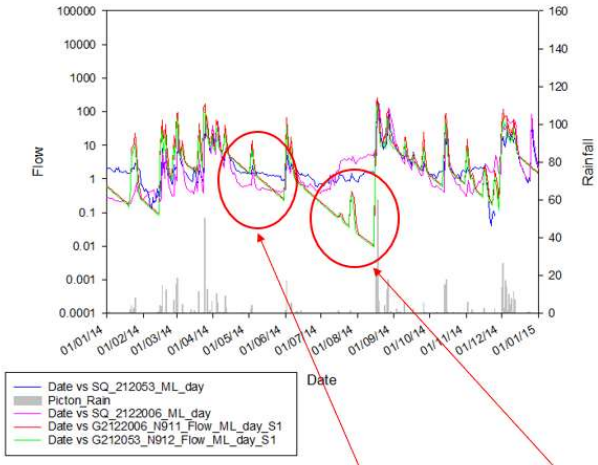
Water quality impacts modelled using elevated total phosphorus

The source modelling uses a discharge total phosphorus (TP) concentration of 0.1mg/L despite the Picton STP achieving much lower TP concentrations in the treated sewage. As a result, the modelling does not reflect the potential impacts. Sydney Water has not provided an explanation for using this concentration.

Attachment C: Supporting figures for Modelling Report Comments

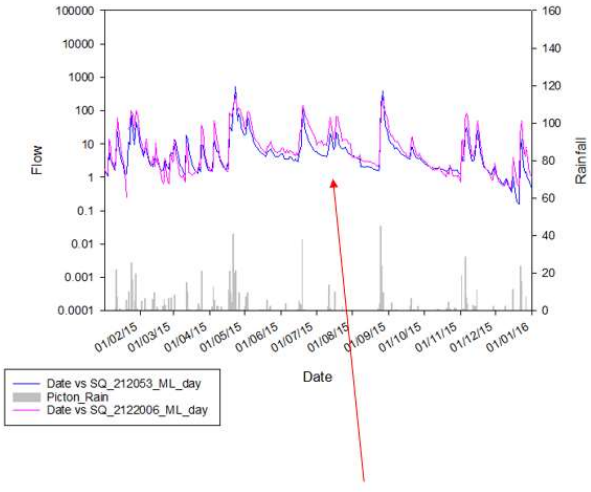


Up until this point flow measured at Gauge 2122006 is lower than that recorded at the upstream Gauge 212053. This is also obvious In the data spreadsheet.

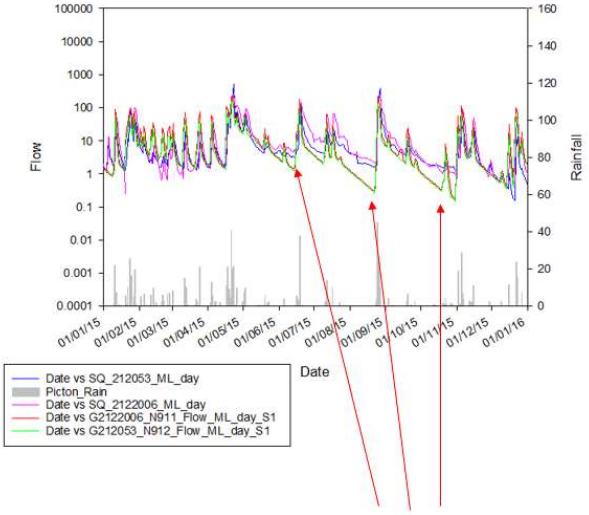


Straight line recession for Model.

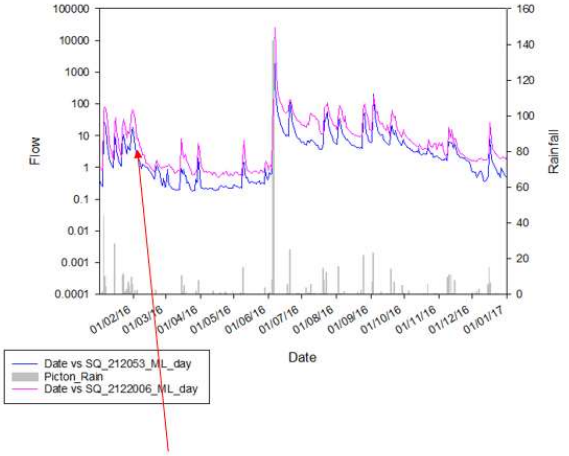
Model performs poorly. Predicts far lower flow Than that recorded by either Gauge.



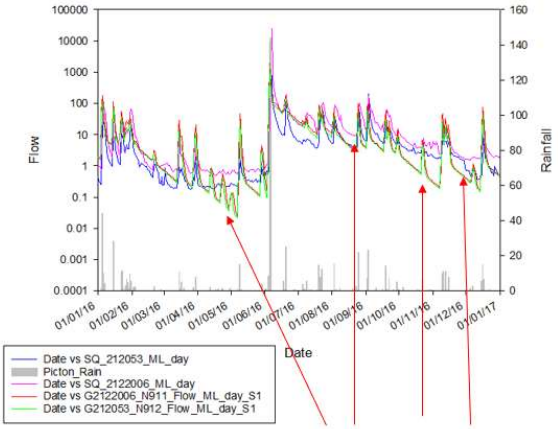
Pretty good agreement between flows measured at Gauge 2122006 and upstream Gauge 212053.



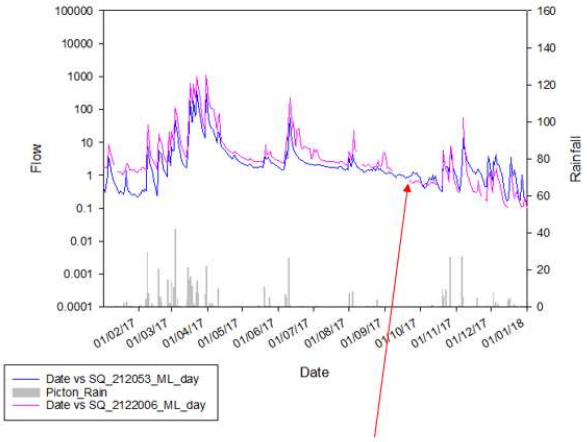
Poor agreement between modelled and observed flow. But predictions consistent for both sites.



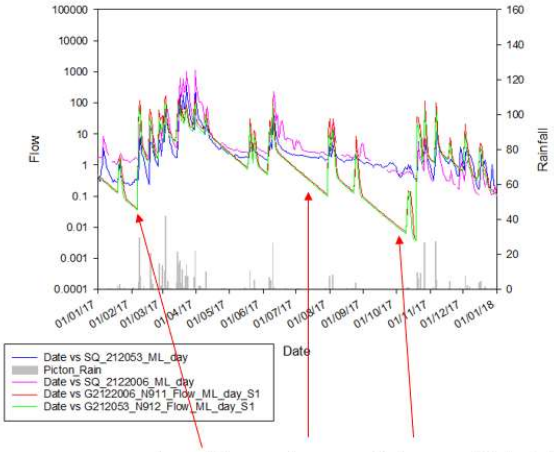
Distinct change in flows measured at Gauge 2122006 compared to upstream Gauge 212053. Gauge 2122006 now consistently having higher flows Than 212053 – contrast this with the behaviour in 2014.



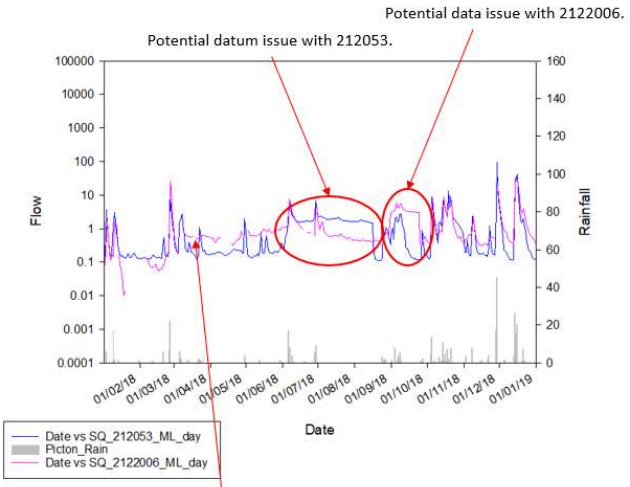
Poor agreement between modelled and observed flow. At times it matches one gauge better than the other and vice versa. Predictions are similar though for both sites. Poorer fit to 2122006 upon which it was supposedly calibrated.



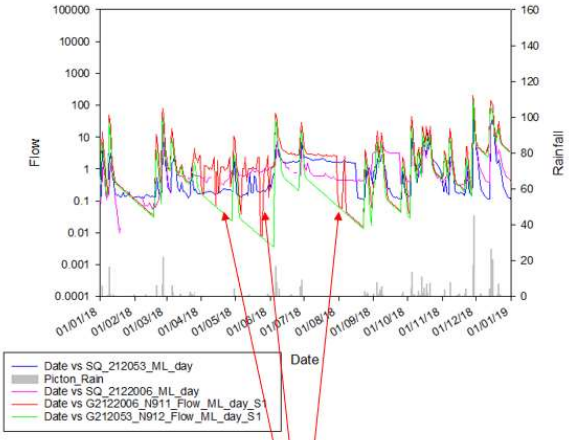
Yet another distinct change in flows measured at Gauge 2122006 compared to upstream Gauge 212053. Gauge 2122006 now consistently having lower flows Than 212053 – contrast this with earlier behaviour. This may be a result of the changes to gauging station identified post June East Coast low.



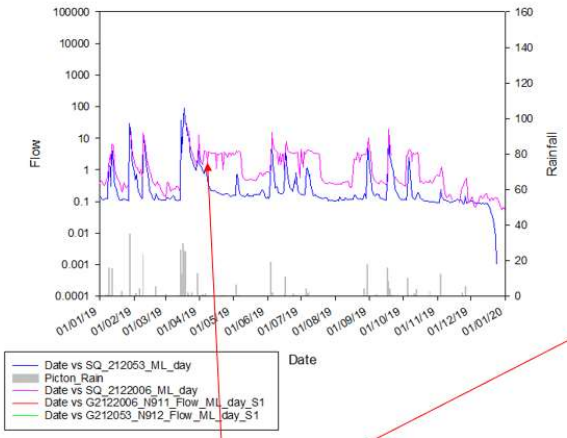
Some of the poorest agreement between modelled and observed flow for The whole record. Model suggests it should be close to 0 ML/d, but both Gauges suggested observed flows of ~1 ML/d. Predictions are similar though for both sites.



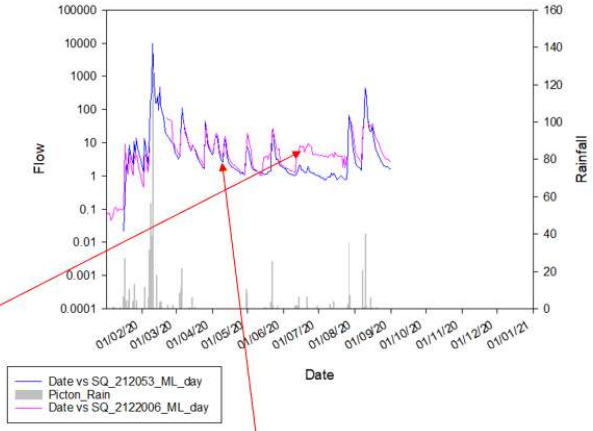
Yet further distinct change in flows measured at Gauge 2122006 compared to upstream Gauge 212053.
Gauge 2122006 now consistently having higher flows Than 212053 – contrast this with earlier behaviour.



Very poor agreement between modelled and observed flow. Model suggests it should be close to 0 ML/d, but observed flows of ~0.1 - 1 ML/d. This time note the differences Between the red and green lines. Appears some adjustment has been made to the Model for 2122006 from April to September but this is not explained. This needs an Explanation, given the clear similarity of earlier flow predictions at both sites.



Yet further distinct changes in flows measured at Gauge 2122006 compared to upstream Gauge 212053.
Gauge 2122006 now consistently having much higher flows Than 212053 – contrast this with earlier behaviour.

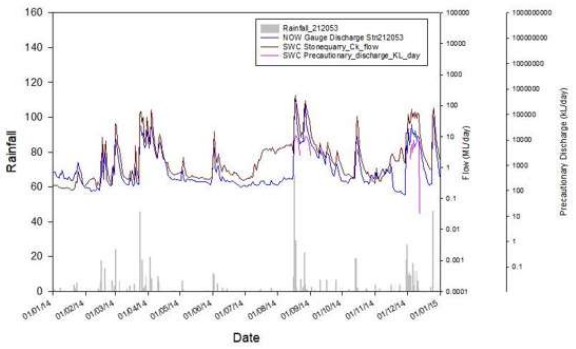


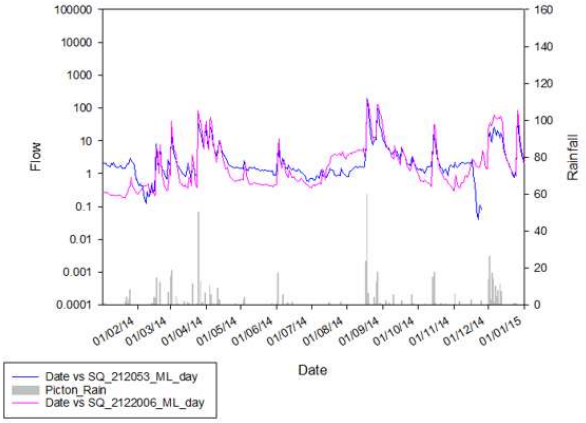
Flows measured at Gauge 2122006 returns to being similar to upstream Gauge 212053.
Gauge 2122006 (until July 2020 when it then has much higher flows Than 212053) – contrast this with earlier behaviour.

Note that predicted flows at these sites were only provided up to end December 2018 (hence no green or red modelled lines)

Date	Picton rain 24_ mm	Picton_rain_rain72_mm	Stonequarry _Ck_flow_ ML_day	Precautionary_ discharge _KL_day	Precautionary _discharge _ML_day	Date	212208	212053	2122006
1/08/2014	0	0	3.740	.		1/08/2014	145.647	0.814	3.609
2/08/2014	0	0	3.800	.		2/08/2014	83.255	0.819	3.725
3/08/2014	0	0	4.136	.		3/08/2014	64.186	1.153	3.957
4/08/2014	0	0	3.982	.		4/08/2014	33.429	1.249	4.108
5/08/2014	0	0	4.286	.		5/08/2014	26.103	1.265	4.031
6/08/2014	0	0	4.518	.		6/08/2014	28.646	1.375	4.449
7/08/2014	0	0	4.494	.		7/08/2014	28.301	1.581	4.488
8/08/2014	0	0	4.774	.		8/08/2014	29.547	1.636	4.532
9/08/2014	0	0	5.161	.		9/08/2014	27.441	1.555	4.884
10/08/2014	0	0	5.112	.		10/08/2014	34.096	1.545	5.296
11/08/2014	0	0	5.191	.		11/08/2014	57.392	1.58	5.066
12/08/2014	0	0	5.164	.		12/08/2014	64.87	1.617	5.25
13/08/2014	0.8	0.8	4.965	.		13/08/2014	60.617	1.573	5.067
14/08/2014	0	0.8	5.963	.		14/08/2014	67.501	1.627	5.121
15/08/2014	0	0.8	4.473	.		15/08/2014	36.675	1.524	6.093
16/08/2014	0	0	2.939	.		16/08/2014	36.302	1.607	3.429
17/08/2014	26.333	26.333	115.088	8797		17/08/2014	46.404	6.816	6.622
18/08/2014	67.167	93.5	183.167	13870		18/08/2014	354.088	193.04	171.225
19/08/2014	6.167	99.667	98.179	13759		19/08/2014	3162.816	171.426	164.068
20/08/2014	0.167	73.5	62.303	11887		20/08/2014	2261.538	33.125	83.183
21/08/2014	0	6.333	35.911	6722		21/08/2014	960.925	19.199	51.767
22/08/2014	0.167	0.333	16.891	2381		22/08/2014	502.423	11.615	28.363
23/08/2014	0.667	0.833	9.324	.		23/08/2014	434.658	7.476	11.158
24/08/2014	4.5	5.333	13.603	.		24/08/2014	641.749	9.902	12.95
25/08/2014	1.6	6.767	12.413	.		25/08/2014	681.283	10.936	11.928
26/08/2014	9.5	15.6	69.484	8279		26/08/2014	764.428	10.806	13.607
27/08/2014	18.767	29.867	146.396	13726		27/08/2014	7333.079	107.997	128.34
28/08/2014	0.167	28.433	84.019	13695		28/08/2014	3743.987	72.571	116.669
29/08/2014	1.767	20.7	61.219	11795		29/08/2014	2194.173	29.375	74.025
30/08/2014	0	1.933	43.757	8317		30/08/2014	1454.963	22.04	54.315
31/08/2014	0	1.767	30.082	5574		31/08/2014	1243.095	15.944	38.222

Table A1. Earlier dataset provided for assessment (in 2015 left; larger discrepancies highlighted in yellow) compared to most recent dataset provided (in 2020 right; larger discrepancies highlighted in green).





Note the differences between the graphs created on earlier flow dataset provided (left) and most recent dataset provided (right)

EPA comment – letter dated 16/03/21	Sydney Water response – May 2021
Consistent with the requirements of s45 of the POEO Act 1997, Sydney Water's assessment of the potential impact of discharges must at a minimum: *a) identify and estimate the quality and quantity of all pollutants that may be introduced into the water cycle by source and discharge point;* *b) describe the nature and degree of impact that any discharge(s) may have on the receiving environment, including consideration of all pollutants that pose a risk of non-trivial harm to human health and the environment;* *c) assess the potential impact of discharges on the environmental values of the receiving waterway, including average or typical through to worst-case scenarios, with reference to the relevant guideline values consistent with ANZG (2018);* *d) where a mixing zone is required, demonstrate how the ANZG (2018) criteria for relevant chemical and non-chemical parameters are met at the edge of the initial mixing zone of the discharge;* *e) demonstrate how the proposal will be designed and operated to:* *i) protect the Water Quality Objectives for receiving waters where they are currently being achieved;* *ii) contribute towards achievement of the Water Quality Objectives over time where they are not currently being achieved; and* *f) demonstrate that all feasible and reasonable measures to avoid or minimise water pollution and protect human health and the environment from harm are investigated and implemented.*	The REF addressed the requirements of s45 in Appendix B of the REF. An updated assessment against s45 will also be provided with the Licence Variation Application.

Consideration of all options to avoid, minimise and mitigate potential impacts *The REF specifies that one of the main objectives of the proposal is to maximise beneficial reuse of recycled water. The EPA supports this objective and encourages Sydney Water to further consider integrated approaches.*	Agree, whilst negotiations with Farm 2 has stalled at this stage and the LVA assesses worst case no additional offsite reuse, Sydney Water is continuing discussions with nearby farms and will expand recycled water use where it is cost-effective and feasible to do so.
Further consideration of alternatives/ options *Part 2.2.4 of the REF provides a summary of several key options which were considered to increased recycled water capacity. The EPA considers that the REF does not present a thorough explanation of variations of these options or whether or not they could be combined with a treatment, reuse and discharge scenario.* *The EPA acknowledges the work undertaken by Sydney Water to investigate off-site reuse options completed in relation to a PRP in 2017/18 and encourages Sydney Water to continue to explore this. The EPA notes that newer opportunities for reuse may be available due to recent growth in the area.* *The EPA further notes that the Waterway Health Report indicates that the only option to mitigate predicted impacts is more reuse but not details on further investigations into appropriate land for reuse are provided in the REF.*	Sydney Water has been investigating all possible transfer, treatment, reuse and discharge options for Picton for over five years. The process for selecting options and reasons for not taking them forward have been documented in several options studies and planning reports. Section 2.2.4 of the REF provides a high-level summary of the main options considered, with further detail provided in Attachment C of the LVA. Following rigorous options assessment and economic analysis, the selected options put forward in the REF were considered the most reasonable and feasible range of options to meet the interim recycled water capacity to 4 ML/day. Ecological constraints with the Nepean River discharge, and constraints with the timing to secure reuse agreements have reduced the range of options from those presented in November 2020 to an increased discharge to Stonequarry Creek with no additional offsite reuse scenario assessed in the Licence Variation Application. Recent growth has not presented new reuse opportunities. Expectation for rezoning of land reduces interest in agricultural reuse. The 2019 investigation into reuse options (condition U3 of EPL) included agricultural reuse on nearby farms and 'purple pipe' – reticulation of treated water to residential properties, as well as many other options. Agricultural reuse is still considered a desirable pathway for recycled water, given the volumes of water that can be productively reused in favourable weather conditions, support for 'rural living' as a defining characteristic of the area, and strategic planning identifying a 'Metropolitan Rural Areas'. The recent growth is widely distributed at the edges of each of the villages and so it is difficult to economically supply a purple pipe network of suitable quality water. Sydney Water will continue to assess the opportunity to supply recycled water for any suitable demands in proximity to the pipeline infrastructure that we are able to build. We recognise that supplying recycled water for other demands (beyond agricultural reuse / irrigation) has a more regular demand, but a higher water quality is needed for internal demands, only small volumes are reused for modern toilets and washing machines, and the scale of spatially distributed growth does not favour a widespread purple pipe network.

	We have dedicated substantial resources to facilitate recycled water use from the Picton treatment plant – in collaboration with nearby farms. We continue to explore potential partnership arrangements. Unfortunately, at this stage, we have been unable to secure the reuse agreements with Farms 1 and 2 as proposed in the REF in 2020 – but will continue to pursue reuse where cost effective and feasible. We expect to secure a reuse agreement with Farm 1 by mid-2021, although, we will assume a worst case scenario of 0 ha of additional offsite reuse in the refined modelling and LVA assessment. Sydney Water has three principle and equal objectives under the *Sydney Water Act 1994* (SW Act): 1. protect public health 2. protect the environment, and 3. be a successful business. Going forward, we will continue to investigate and pursue current and new reuse opportunities on nearby farms to expand recycled water capacity beyond 4 ML/ day (including Farms 3 and 4 further west as shown in Figure 3 of the REF). However, each of these schemes will need to be cost effective and feasible to ensure we continue to meet our overall objectives under the SW Act. Agricultural reuse on nearby farms also relies on farm managers being willing to use and operate a recycled water scheme on their property so there are multiple factors outside Sydney Water's control which affect this.
<u>Treatment, reuse and discharge options</u> *The REF and specialist reports consider three options with a total effluent production of 4ML/day (referred to as Scenarios 2 to 4) plus the existing non-compliant discharge producing 2.7ML/day (Scenario 1). However, it appears that not all options and impacts have been assessed.* *The REF indicates that Scenario 2 involves discharge to Stonequarry Creek with additional reuse on third party farms (in addition to the Picton Farm) however Sydney Water acknowledges that recycled water agreements with farm/landowners have not been finalised and therefore there is a risk that additional reuse may not be secured.* *Variations on the specified scenarios are not considered in the reports. For example a combination of discharges to*	Earlier work considered a broader range of options that were then shortlisted to those presented in the REF. The 3 options included different discharge locations (Stonequarry Creek and Nepean River) and different reuse scales (Picton Farm only and additional 60 ha - being Farm 1 and 2 option at the time). The REF scenarios were considered the most reasonable options which could be implemented within the LVA timeframe, to manage inflows of 4ML/ day and allow new connections. It is a resource intensive and iterative process to fully assess each scenario- ie complete a concept design for the infrastructure required, prepare all the model data inputs/ outputs statistically analyse the outputs in terms of potential waterway health impacts and prepare reports. The three options were assessed in the REF with the information conveyed to the community to facilitate any feedback on additional reuse

Stonequarry Creek and Nepean River, and alternative discharge locations on the *Nepean River are not explored. Other creek flow-based options where the discharge location and volume are varied with flow are also not considered.* *Sydney Water should demonstrate that all feasible and reasonable measures to avoid, minimise or mitigate water pollution and protect human health and the environment from harm are investigated* *and implemented including securing land for reuse and available discharge options.*	options and discharge locations. As noted in Section 2.2.4 of the REF, a more detailed assessment of exact discharge regime is being undertaken for the LVA, and the more detailed statistical analysis of current water quality has been provided to the EPA in the Part A report (Feb 2021). The modelling tools have been used to consider a much broader range of configurations, and to undertake sensitivity analysis on a range of parameters (including discharge ratio to creek flow and creek thresholds for discharge). Further detail is provided in the LVA submission. Since the REF display in November 2020, we have excluded a Nepean discharge option in the short-term as the Sydney Hawk Dragonfly (SHD) was found during a field survey in December 2020, just downstream of the proposed Nepean discharge point. We need to collect more information on the potential impacts on the threatened Sydney Hawk Dragonfly (SHD) prior to proceeding with a potential Nepean discharge point. There will be another opportunity to collect field survey data on the SHD next summer in late 2021 (when the adults emerge and are on the wing). In February 2021, we received a response to our draft reuse agreement from Farm 2 which was contingent on them receiving re-zoning from DPIE, something that is outside Sydney Water's control. Their response also indicated they did not want to operate a recycled water scheme on their land even if we supplied the infrastructure. This has meant we are unable to secure a reuse agreement with Farm 2 at this stage. Discussions continue to secure an easement for a transfer pipeline through Farm 2. The new information on the SHD and the challenges with the reuse agreements has narrowed the feasible options. The preferred option is to increased discharge to Stonequarry Creek for the interim period (up to 4ML/ day), while we pursue other recycled water options. This is considered the worst case scenario and if Sydney Water is able to secure a reuse agreement with nearby farms, there would be less discharge to Stonequarry Creek than for the 'Picton Farm only' scenario assessed in the LVA. Detailed analysis of various Stonequarry Creek discharge regimes has been completed and presented with our LVA submission. This will include creek flow-based options where discharge volumes are varied with creek flows.
Existing environment characterisation *The REF nominates the current existing non-compliant discharge regime (producing 2.7 ML/d) as the 'baseline' scenario/environment (Scenario 1). Modelling and water quality*	The REF nominated Scenario 1 (current situation) as the baseline which includes EOP (non-compliant discharge). This was mainly due to the EOP being in place for the last 4 years and having substantial monitoring data for the non-compliant situation.

impacts of the proposal options (Scenario 2 – 4) are compared to this non-compliant 'baseline' scenario. The EPA considers that comparison to this non-compliant 'baseline' results in minimisation and underestimation of predicted impacts. *Discharge scenarios should be compared to the compliant baseline using data pre-dating the noncompliant discharge to Stonequarry Creek. It would also be appropriate to demonstrate the noncompliant discharge regime as a scenario and to outline the impacts of that scenario.*	Specifically, compliant discharge occurred 5% of the time and non-compliant discharge occurred 20% of the time and no discharge occurred 75% of the time (refer to Part A report submitted to EPA). However, Sydney Water recognises that this may result in underestimating potential impacts of future scenarios and we have addressed this by comparing to both compliant and non-complaint discharge in our Part A Current Impacts (February 2021). Table 4 of the Decision Report and LVA technical memos have now corrected this by assessing 'existing scenario' and 'compliant scenario'.
Assessment of near field mixing zones *All pollutants in the treated sewage with the potential to cause non-trivial harm need to be appropriately assessed.* *The near field modelling presented in the Near Field Report has considered just two pollutants: nitrate and ammonia. Additional analytes should be considered including (but not limited to) total nitrogen (TN), total phosphorus (TP) and metals.* *Discharges to the Nepean River (and Stonequarry Creek) cannot be appropriately considered until all pollutants with the potential to cause non-trivial harm are modelled to predict the near field* *mixing zone.*	**Near field impacts** In line with the ANZG (2018) and ANZECC (2000) guidelines on mixing zones, non-trivial harm in the near field has focussed on analytes that are considered potentially acutely toxic to the receiving waterway environment. The contaminants selected for the near field analysis were Ammonia and Nitrate. These constituents were determined as the toxicants most relevant to the operation of an urban/regional wastewater treatment plant such as the Picton WRP, discharging to a freshwater creek or river. Chlorine was excluded from the toxicity analysis as releases to waterways from Picton WRP are treated using UV disinfection. With respect to metals, the Part A assessment characterised concentrations generally below toxicity thresholds (comparing an extensive list of analytes and monitoring data with available toxicant guidelines or NOEC/LOEC values from literature). In addition to the Near Field Impact Assessment, the potential for non-trivial harm in the near field was also considered through: • Ecotox testing of the treated wastewater (demonstrating no detrimental impact on the water flea *Ceriodaphnia dubia*) • Monitoring water quality upstream and downstream of our discharge point into Stonequarry Creek and statistical analysis of the monitoring data to understand any analytes (including boron, nickel, zinc, aluminium and sulphur) that are elevated due to discharge from the WRP. • Monitoring biological indicators (algae, macroinvertebrates, macrophytes) at a range of waterway sites to identify potential impacts from WRP discharges (and other sources of pollution) • Improving our understanding of waterway values and requirements to mitigate impacts on community values (including swimming and fishing) and ecological

	values (including for valued species like Sydney Hawk Dragonfly, platypus, and Australian Bass). Near field modelling is focused on the immediate initial mixing zone (typically less than 20-30 m). This is to ensure toxicant concentrations are not at levels of concern and that dilution ratios are appropriate for the requirements of a regulatory mixing zone. Far field modelling is more appropriate for analysis of other water quality parameters, including for any other non-trivial pollutants. This approach is more relevant to the downstream reaches of the creek and river, beyond the initial mixing zone. Monitoring is proposed to continually evaluate potential impacts, building on data collected since 2014. A detailed monitoring plan has been developed for 2021-22, demonstrating our commitment to improve understanding of potential impacts on water quality, macro-invertebrate health, macrophytes, diatoms, algae, fishes, Sydney Hawk Dragonfly and other waterway values.
Discharge conditions <u>*Flow-based discharge*</u> *The REF does not specify if a flow-based discharge regime was considered, however the Near Field Report indicates that there will be no flow-related constraints on discharges to Stonequarry Creek or the Nepean River.* *The Near Field Report indicates that the discharge flow rate from the* *Picton STP exceeds the flow in Stonequarry Creek under all but 'high' flow conditions. This indicates that with no flow constraints on discharges, a 1.3km section of creek (downstream of the Picton STP discharge location) will potentially consist almost entirely of treated sewage 16% of the* *time.*	**Proportion of treated water relative to creek flows** Alternative discharge regimes have been considered in the LVA simulating 'worst case' scenarios (with no additional reuse). These scenarios consider alternatives: • maintaining the current EPL discharge proportion and creek flow threshold, with additional releases when dam levels are elevated • minimising the frequency of discharge (but with a greater proportion of highly treated water relative to creek flows) • minimising the proportion of discharge (but increasing how often discharge occurs). Whilst greater 'dilution' could occur with discharge to the Nepean River, the existing discharge to Stonequarry Creek allows disturbance and potential impact to the threatened Sydney Hawk Dragonfly in the Nepean River to be minimised. With adequate treatment, biological indicators and aquatic ecological values would not be impacted by a greater proportion of discharge. For high quality treated water, dilution requirements will not be the key mechanism to mitigate potential impacts on the environment, in the way they have been historically. The proposed treatment will see a substantial reduction in bioavailable nutrients, and continued monitoring of biological indicators in waterways. There is an opportunity for

Furthermore, the Near Field Report concludes that discharges to Stonequarry Creek should be treated to ANZG prior to discharge under all conditions except 'high' creek flows which are defined as >5.6ML/day as a mixing zone cannot be used for regulatory purposes. This does not align with Sydney Water's proposal in the REF.	greater collaboration with Council and relevant agencies to effectively address a range of existing threats to waterway health. Our wetland polishing trials (2021-23) and new 'macroalgae' treatment technologies present a new opportunity for regenerative circular economy approaches. With the improvements in water treatment, all options are on the table for safe use of treated water, and discharge to waterways with minimal impact on aquatic ecosystems. **Managing potential toxicity** (default trigger values / toxicity guidelines) The Near Field Report indicated that there would not be a need for a mixing zone (to manage toxicity) where concentrations were below relevant guidelines: • Total Ammonia as N in the releases was estimated to be below the ANZG (2018) freshwater default trigger value of 0.9 mg/L. Monitoring of the precautionary discharge indicates a 95th percentile concentration of 0.4 mg/L (2014 to 2020). Ammonia is not assumed to be a toxicity risk to the receiving environment. There is not a flow based requirement to manage toxicity. • Following implementation of the proposed WRP upgrade, the maximum concentrations of Nitrate will be below 2 mg/L, and below the emerging understanding of a concentration relevant to toxicity. No default guideline value currently exists for Nitrate in the ANZG (2018) guidelines, but references research that has supported the development of the New Zealand Nitrate toxicity guideline where two trigger values are presented o a "Grading" value of 2.4 mg/L derived from the species No Observed Effect Concentration (NOEC) values and recommended for compliance assessment based on annual median concentrations o a "Surveillance" value of 3.5 mg/L derived from the species Threatened Ecological Communities (TEC) values and is recommended for compliance assessment based on the annual 95th percentile of monitoring data If all toxicant concentrations (including Nitrate) are below the relevant trigger values, the risk of environmental harm from toxicity in the recycled water is mitigated and no regulatory mixing zones are required. In this sense, there is no flow-based constraint on highly treated water discharged from the WRP. Beyond toxicity considerations, preference for discharge in high flows remains given the magnitude of impact on water quality is less when the waterway is impacted by untreated stormwater runoff from the catchment. The frequency of discharge can also be reduced if discharge in higher flows at higher proportions occurs.

	Minimising increases in concentrations above ANZG trigger values Most Stonequarry Creek sites are classified as lowland river/tributaries and are assessed using the default guideline values (DGVs) for slightly to moderately impacted lowland rivers (east flowing coastal rivers). Stakeholders have also agreed to a localised, site-specific Upper Nepean River reference site (Pheasants Nest Weir, N86). No suitable localised tributary reference site with sufficient data has been proposed at this stage. These guideline values differ from the toxicity guidelines referred to in the Near Field Impact Assessment. Discharges to Stonequarry Creek should be treated to ensure all **toxicant concentrations** are below relevant trigger values so that the risk of environmental harm is mitigated and no regulatory mixing zone is required. This does align with Sydney Water's proposal in the REF, where toxicant concentrations (ammonia and nitrate) will be below relevant trigger values.
<u>Lack of clarity in the type of discharge</u> *The REF does not provide adequate description of the nature of Sydney Water's proposed discharges described in Scenarios 2, 3 and 4. For example, does Sydney Water propose a continuous, intermittent, or precautionary discharge or a combination of these?* *Furthermore, references to the various discharge options/scenarios (including circumstances for discharge, type of discharge and volumes) within the REF are unclear and/or inconsistent. The Waterway Health Report is also inconsistent with the REF and states that the discharge regime to waterways (either Stonequarry Creek or Nepean River) would consist of intermittent releases from the Western storage dam within the Picton STP rather than continuous discharge (section 1.3, page 7).* *<u>Dam related discharge</u>* *No information has been provided in the REF about dam operations and management for current or future scenarios. If proposed discharge regimes are linked to dam levels, additional information should be provided about how the current discharge regime works in relation to dams and how this would work under each of the proposed discharge scenarios.*	The discharge scenarios in the REF maintain the current discharge regime in high flow conditions as much as possible, but with additional periods of discharge irrespective of creek flow conditions when dam levels were elevated. The discharge regime descriptions are described in more detail in the documentation supporting the Licence Variation Application. The regime will be a combination of intermittent discharge, with a 'storm-flow' release configuration with a flow-based trigger similar to the precautionary discharge regime. The modelling suggests that there will also be a need for periods of discharge that do not meet the creek flow criteria. This 'spill prevention discharge' does not represent a large proportion of the discharge each year but does occur more often in simulations with increased inflows in our model runs that use a decade of climate data. This was acknowledged in the original scheme approval in the EIS (1996) but never in the EPL #10555, '*some releases may occur when effluent re-use is not possible and when the storage dams are full…and these may occur at any streamflow.' 'During extended wet periods, when effluent irrigation is not possible, the amount of effluent generated could exceed the effluent storage capacity. In order to prevent the storages from overtopping, discharges would be made at any creek flow.' (*EIS page 12.11) This also occurs (to a lesser degree) for simulation of a 'compliant baseline' – reflecting the challenge of managing inflows with the available combination of storage, reuse and

	discharge restrictions. Infrastructure requirements increase significantly to fully restrict discharge to the ideal creek flow thresholds and proportions of discharge to creek flow established in the original EPL in the 1990s. **Intermittent discharge – with dam level and creek flow triggers** The modelling report provides the operating rules that were simulated. With the reuse on our Picton Farm, there are periods when no discharge will occur, hence even with 4 ML/d inflow the discharge regime will not be 'continuous'. Section 2.2.4 of the REF indicated the discharge regime will be assessed in a Part B detailed water quality assessment currently being finalised as part of the LVA submission. The LVA will describe the exact discharge regime being sought for Stonequarry Creek and suggested amended conditions in the EPL. The existing and new treatment process including operation of the dams is shown in Figure 7 of the REF. In addition, Section 9 of the modelling report provides a schematic of the dam configuration for the REF scenarios. This will be further clarified in the LVA submission and addendum to the modelling report where 3 alternative discharge regimes are assessed.
Dam operation and management <u>*Dam operation*</u> *It is unclear how the dam interacts with the sewage treatment process and discharge ie. whether treated sewage from the STP will be sent to a dam for storage before being discharged to waterways or if it will be discharged directly to waterways.* <u>*Dam water quality*</u> *The REF indicates that water quality of discharge will be improved through denitrification (particularly in relation to TN) in the western dam (section 3.3.2, page 28), but does not consider or discuss whether the quality of treated sewage is affected by storage in the dams and potential deteriotion of water quality (including faecal coliforms, total suspended solids, pH and algae) prior to discharge and its potential environmental/ public health impacts on receiving waters.*	The existing and new treatment process including operation of the dams is shown in Figure 7 of the REF. • Water from the Eastern Dam will continue to be used for irrigation only on the lower 92 ha of Picton Farm. • Water from the Western Dam will continue to be used for reuse on the upper part of the Picton Farm and for discharge to Stonequarry Creek. • Any future offsite reuse customers will be supplied directly from the WRP without any storage in the dams due to a range of factors including the likelihood that higher chemical dosing for chlorination would be required when water quality is not ideal. **Impact of the Western Dam on water quality** Water quality improvement is known to occur with residence time in the Western Dam (Figure 9-4 in the modelling report), particularly denitrification with long residence times and reduction in phosphorus concentrations. Algae does occur in the dam particularly in summer when conditions are favourable for growth. The respiration of algae can impact pH, through formation of a weak carbonic acid. Sydney Water has an acid dosing system in place, but it is used only infrequently,

	and as water quality treatment improves (especially bioavailable nutrient concentrations) the risk of algae growth and associated pH fluctuations will be minimised. Algae is also a contributing factor to spikes in total suspended solids. The treatment processes proposed aim to also improve filtration and TSS concentrations. Spikes in faecal coliforms in the Western Dam over many years have resulted in breaches of our Picton EPL requirements. A range of sources have been considered including secondary contamination by birds. Our understanding of the potential processes is improving, specifically: • Monitoring data for the pilot wetland cells in March – May 2021 shows spikes in faecal coliforms particularly for the floating wetland cells, with a 5 day residence time where we have relatively good control on external factors (and no space for large numbers of ducks). With two almost identical floating wetland cells, with same weather conditions and the same water input after 5 days the faecal coliform data suggest at the low range (upto 250 cfu/100 ML) anything from a more than 3-fold increase or more than 3-fold decrease is observed, with inconsistent trends for each of the wetlands week to week and in comparison to each other on any given week. • These data suggest the faecal coliform indicator of treatment efficacy may have some limitations once the treated water enters a pond, wetland, dam, creek or river. • Faecal coliforms are widely and effectively used as an indicator of disinfection treatment efficacy. Monitoring concentrations discharged from a UV system will characterise the performance and reliability of the treatment infrastructure. Monitoring faecal coliform data on discharges is intended as an indicator of treatment efficacy for general microbial reduction • When the treatment indicator regrows subsequently (in a dam, wetland or creek) it ceases to be a suitable indicator of risk and elevated faecal coliforms measured downstream do not provide a reliable assessment of any increased risk to human health. • Faecal coliforms were dropped from most health guidelines about 20 years ago because a) they can occur in the natural environment from non-faecal sources too often and b) some of them can grow to large numbers in the environment independent of faecal inputs. • E. coli have only a few subtypes that occur and grow in the environment independent of faecal inputs, and this is similar for enterococci.

	• Data sets from sites with many years of monitoring information are still valuable in characterising trends observed and processes that may be occurring (e.g. potential of impacts from a poorly managed onsite sewage system, dry weather leakage from an urban sewer network, wet weather overflows) • Monitoring for 2021-22 and for subsequent years will improve the data available and the assessment of public health risks. • Enterococci is recognised as the key indicator for assessing recreational risks. An addendum to the Part A current impacts report will be provided with analysis of enterococci trends and interpretation.
Impacts of the existing discharge *Table 14 (page 68) of the REF indicates that on average Picton STP discharges approximately 59ML per year under the non-compliant 'baseline' (Scenario 1) however the impacts of this have not been detailed. The REF does include generalised statements and conclusions about the current non-compliant discharge having no significant impact on receiving waterways.* *For example, page 69 (section 6.3.2) of the REF indicates that 20 years of discharge have had no impact on Stonequarry Creek, however other sections and specialist studies provide evidence to the contrary:* • *The REF (page 61-62, section 6.3.2) notes that analysis of the past six years of data show TN downstream of the discharge is higher than upstream and the modelled and measured nutrient concentrations (TP, TN) for the current discharge also exceed ANZG in Stonequarry Creek downstream of the discharge.* • *Algal community structure is very different at the discharge sampling sites on Stonequarry Creek compared to upstream. Upstream is dominated by green algae (90-98% biovolume) with very minor proportions (<10%) of monads, whereas the discharge site and downstream (N911B, N911) has <10% green algae and a mixture of blue green algae, monads, diatoms and others (Waterway Health Report, page 37).* • *The Waterway Health Report (page 33) identifies that macroinvertebrate assemblages from Stonequarry*	The EPA comments align with the discussion about the need for a compliant baseline. Additionally, the comments raise questions about • the impact of water quality changes • algal community structure • Causes of degraded waterway health and Sydney Water's contribution. **Compliant scenario B vs existing scenario A** We acknowledge that Scenario 1 in our REF (and the monitoring data 2014-2020) includes periods of non-compliant Emergency Operating Protocol discharges. To address these comments: • The *Licence Variation – Waterway Assessment, Part A current impacts* (Sydney Water, 2021) (referred to as the 'Part A report' provided to EPA in February 2021) included comparison with monitoring data when no discharge from the WRP was occurring (as a compliant baseline). This Part A report includes a statistically robust assessment and interpretation of the monitoring data from 2014-2020. • An addendum to the modelling report (to be supplied with the LVA) will include: o the 'existing scenario A' (former Scenario 1 from REF) and o a new 'compliant' scenario B. Note - scenario B is a historical scenario and is included for comparison purposes when wastewater inflows were only 2.25ML/ day and the system was compliant with the EPL (ie no EOP discharge). • The *Picton Licence Variation – Water quality assessment, Part B proposed discharge regime and their potential impacts on water quality* (Sydney Water 2021a) (referred to as the 'Part B report') will assess predicted water quality impacts against both: o the existing / current baseline (scenario A) o the compliant scenario B

Creek and Redbank Creek were indicative of 'moderate organic contamination'. Contributors to this degraded waterway health are not identified but the EPA notes that Picton STP has been discharging to Stonequarry Creek for the past 20 years and encourages Sydney Water to consider its contribution. *The EPA considers that insufficient supporting evidence is provided and further discussion is required to assess the impact of the current non-compliant "baseline" discharge on Stonequarry Creek and the Nepean River.*	• A similar approach will be used in an updated hydrology report *Picton WRP LVA Hydrological Impact Study* (Arup Aurecon 2021) and ecological values report *Assessment of Potential Hydraulic Driven Impacts to Ecological Values of Stonequarry Creek* (CT Environmental 2021) • The above 4 documents will be included as attachments to the Licence Variation Application (LVA). T**he impact of water quality changes** A statistically different result in TN and TP upstream compared to downstream in Stonequarry Creek illustrates potential for impact in the waterway. However, other relevant factors need to be considered in the assessment of impact such as: • Bioavailable form of the nutrients associated with increasing concentrations • Any impacts on macroinvertebrate, macrophyte or algal communities upstream and downstream because of nutrient concentrations • Any impacts on waterway values downstream in Stonequarry Creek or Nepean River from these nutrient concentrations • Consideration of the existing environment, scale, magnitude and extent of potential change all contribute to the impact assessment. Whilst TN and TP are typically higher downstream compared to upstream as a result of discharge of the treated water, this has not impacted macroinvertebrate communities (and SIGNAL score as indication of waterway health) over the years in Stonequarry Creek. TN and TP also exceed ANZG criteria upstream of the Picton WRP discharge point in high flows and between 70-90% of the time in upper catchment sites. **Algal community structure** We acknowledge the total biovolumes are represented very differently in our reporting for the REF (Nov 2020) – Waterway Health Technical Report and for the LVA Part A – Waterway Assessment Current Impacts (Feb 2021). The biovolume community structure presented previously is distorted by a few individual sampling days with bloom conditions at the upstream sites. These outlier data points impact the proportions of different algae reported at each site. Subsequent statistical analysis (Part A report, Feb 2021) showed that: • there are minimal differences in both total algal abundance (counts and biovolumes) and algal composition between study sites and discharge conditions

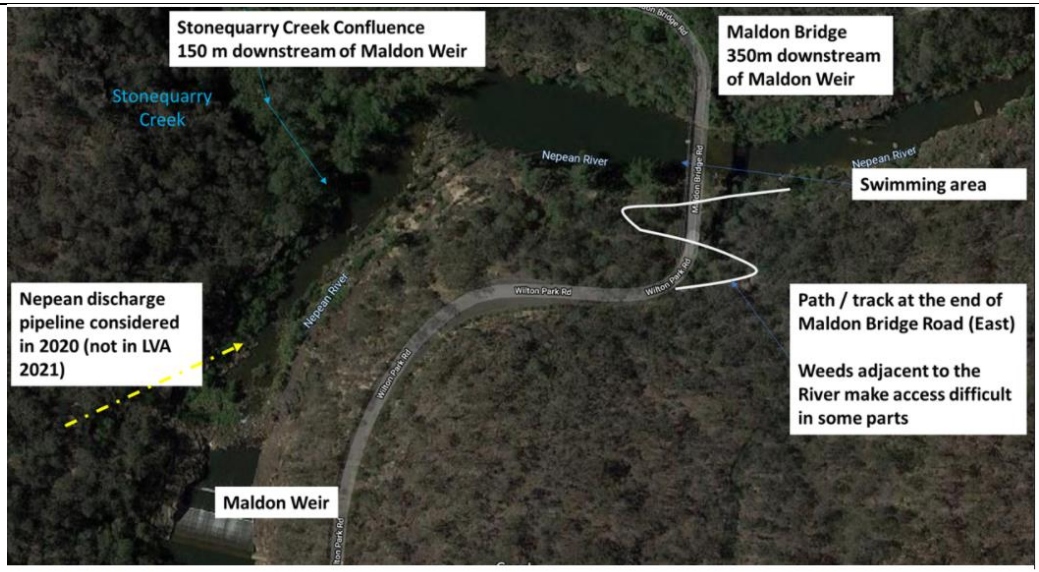
	• across all sites, algal growth fluctuated with changes to hydrology, with higher algae proliferation in lower flow percentiles • algal counts were similar between sites directly upstream and downstream of the discharge point (N911B and N911). ***Causes of degraded waterway health and Sydney Water's contribution*** The SIGNAL-SG scores for the Stonequarry Creek sites and one Redbank Creek site are presented in Figure 7-10 of the Part A report. Results indicate that upper catchment sites (N912 and N194) showed SIGNAL-SG scores ranging from possible mild pollution to probable moderate pollution and appear to be in poorer stream health condition when compared to the downstream sites of N911A and N911, both of which indicate mild pollution. This tends to suggest that stormwater and urban runoff influences are substantial contribution to the health of Stonequarry Creek. In addition to SIGNAL macroinvertebrate analysis, this finding is further supported by assessment of water chemistry and algae in the Part A report which concludes: '*Evidence suggests that pollution impacts were highest in the upstream urban catchment sites at Stonequarry Creek near Picton township (N912) and Redbank Creek (N914) likely due to mining and urban stormwater inputs. These impacts did not extend downstream to lower catchment site N911B, which is upstream of Picton WRP discharges. Overall nutrient levels decreased approximately 3 km downstream at N911B possibly through a range of in-stream processes.* In addition, the Picton wastewater scheme was put in place 20 years ago to improve water quality in local waterways and public health risks in the area which were compromised due to on-site septic systems. There are numerous on-site systems within the catchment and limited resources at council to ensure systems are well maintained. Sydney Water acknowledges that nutrient loads from the Picton WRP are an important factor in understanding water quality impacts (downstream of the discharge location). This is highlighted in the Part A report discussion on algae and phosphorus concentrations. The comparison with the upstream sites provides an important indication of where actions to reduce nutrient inputs are needed to improve waterway health. Sydney Water is pursuing initiatives to support waterway health and improved stormwater management in the catchment.

Predicted impacts on Stonequarry Creek *The REF states that water quality impacts under the proposed scenarios are "not likely to be significant" (page 108). However information provided in relation to Scenario 2 does not support this conclusion:* • *predicted concentrations of TN and TP in Stonequarry Creek downstream of the discharge point are 2.2 and 1.7 times the ANZG guideline values respectively; and* • *the Waterway Health Report states that there will be a "degradation of overall waterway health due to loss of biodiversity and ecosystem services" (section 5.7, page 54) as a result of the proposal. The EPA notes that it is not clear if this statement applies to Stonequarry Creek or the Nepean River (or both).* *The Modelling Report indicates that the Scenario 2 proposal shows changes in the 1.3km reach of Stonequarry Creek from the STP to the confluence with the Nepean River (section 5.7, page 38). The magnitude of these impacts is not stated but at N911 (downstream of the discharge) TN and TP are 2.2 and 1.7 times the ANZG guideline values respectively. In the absence of adequate near field mixing zone modelling and considering the high proportion of creek flow that the STP discharge constitutes at all but high flows, it is likely that the near field mixing zone extends the majority of the 1.3km reach of Stonequarry Creek to the Nepean River.*	As mentioned in Section 2.2.4 and Section 6.3.2 of the REF, a more detailed statistical analysis of potential water quality changes is currently being prepared by our Monitoring, Design and Reporting team (Part B report) to inform the LVA submission in May 2021. More detailed statistical analysis of existing impacts from the Picton WRP was provided to EPA in the Part A technical report (submitted 18/02/21). **Exceeding Guideline Values** The Part A report outlines how TN and TP values upstream in Stonequarry Creek (N912) and Redbank (N914) which are not impacted by Picton WRP also exceed ANZG trigger values for around 70 to 90% of the time in high flow conditions. However, just upstream of the Picton WRP in Stonequarry Creek (N911B), the creek meets ANZG guidelines for all but high and very high flow conditions. This is indicative of the recovery of water quality concentrations within the waterway from upstream impacts. Elevated TN and TP in and of itself, does not equate to a significant impact. Other considerations need to be factored in when considering an impact on a waterway. The impacts of the Picton WRP discharges from 2014-2020 on Stonequarry Creek were found to be localised within Stonequarry Creek and did not negatively impact biological indicator organisms such as macroinvertebrate communities, algae or macrophytes. While water quality levels downstream of the discharge point in Stonequarry Creek were approximately twice the upstream level, there was minimal impact on the Nepean River and case studies revealed that a fast rate of recovery occurred in Stonequarry Creek post discharges (Part A report, Sydney Water 2021). **Potential impacts from increased discharge to Stonequarry Creek** The Part A report considering monitoring data from 2014-2020, where discharge from the Picton WRP occurred 25% of the time, with only 5% considered Compliant and 20% Non-compliant. The analysis also concluded: *"Despite downstream variation in nutrients during discharges compared to upstream conditions, macroinvertebrate communities, macrophytes, and algae did not show signs of deterioration or WRP-related impact in Stonequarry Creek."* The revised 'worst case' scenarios for the LVA, without additional reuse, will see changes to water chemistry continue – however bioavailable nutrient concentration and loads are reduced relative to the current scenario.

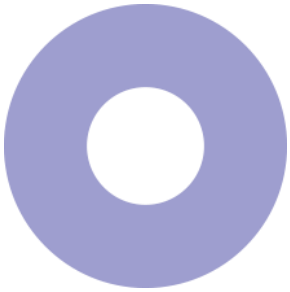
	Further assessment has been done to consider the potential impacts of the proposed scenarios on Stonequarry Creek, with a focus on identified sensitive reaches. These reports are included with the LVA: • updated hydrology report • assessment of potential impacts on ecological values in Stonequarry Creek. A mixing zone is not defined for the 1.3 km section of Stonequarry Creek as we are relying more on treatment than dilution to mitigate impact. Discharges to Stonequarry Creek will be treated to ensure all **toxicant concentrations** are below relevant trigger values so that the risk of environmental harm is mitigated, and no regulatory mixing zone is required. Our proposed infrastructure treats the water to ensure toxicant concentrations (ammonia and nitrate) are below relevant trigger values.
Predicted impacts in Nepean River <u>*Cumulative impacts*</u> *The REF proposal does not address the cumulative impact of nutrient loads in the Hawkesbury Nepean. The EPA notes that the Hawkesbury Nepean Nutrient Framework currently in place specifies an interim cap on nutrient loads with further load limits to be applied in 2028.*	The modelling report addendum provides further information about the predicted increase in loads from the Picton Scheme associated with the wastewater services for more than 20,000 people. Efforts to minimise the increase in loads continue with additional treatment and reuse where cost effective and feasible. The expected increase from Picton is small relative to the upper Nepean River flows and loads (current). • Discharge volumes (mean annual) for a compliant baseline are 0.4% of flows in the Nepean River. This would increase to 1% in the future 'worst case' LVA scenarios. • Discharge loads (mean annual NOx) for future scenarios would decrease. The future NOx loads would represent a 56-57 % reduction relative to the compliant baseline due to increased treatment • Discharge loads (mean annual TN) for a compliant baseline are 3% of Nepean River loads. This would increase to 5% for the future 'worst case scenario due to increased volume of discharge (but with lower concentrations in the water discharged) • Discharge loads (mean annual TP) for a compliant baseline are 0.9% of Nepean River loads. This would increase to 2.1% for the future 'worst case scenario due to increased volume of discharge. Picton will meet the EPA's H-N Nutrient Framework which considers cumulative impacts from all treatment plants within an area. The Hawkesbury Nepean Model is being used to understand the impacts of our Sewage Treatment System with our Impact Monitoring Program reporting on regular intervals. Information from Picton will be included in these assessments allowing continual evaluation of performance.

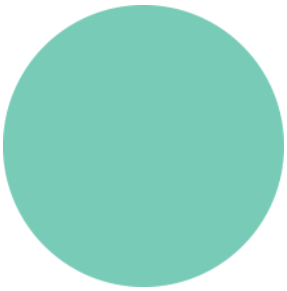
<u>Primary contact water quality</u> *The EPA acknowledges that faecal coliform levels are discussed in relation to swimming locations in the REF. However no further discussion of water quality indicators relevant to primary contact (including enterococci) are included.*	Please see the response above relating to potential impacts of the Western Dam on water quality (and downstream risks to public health). We acknowledge enterococci is recognised as the key indicator for assessing recreational risks. Our Part A Waterway Assessment will be updated to include Enterococci. Sydney Water is working to ensure waterways are clean, healthy and safe for swimming and recreation. Unfortunately waterways are not always safe to swim in due to stormwater runoff from homes, roads, industry and farms across the catchment (and a variety of other sources including overflows from the sewer network in large wet weather events and any privately owned septic systems that are not well maintained). To improve recreational waterway values further work is needed as well as ongoing collaboration with Wollondilly Shire Council, WaterNSW, DPIE, regulators and communities. Sydney Water supports the actions identified in Wollondilly Shire Council's Integrated Water Management Strategy to agree on the monitoring needed and actions to improve the safety for swimmers and improve ecological values in waterway. At Picton WRP the treated water is disinfected with a UV system to meet the requirements in our Environmental Protection Licence. We also monitor Faecal Coliforms and Enterococci every 3 weeks at a range of waterway sites. Further discussion with the EPA is intended on the monitoring proposed for 2021-22 and subsequent years and the proposed location and indicators of disinfection performance. Faecal Coliforms data from our treatment plant is readily available (tested every 6 days) and provides a responsive indicator to issues with treatment performance. Our Faecal Coliform monitoring and analysis shows elevated levels are not linked to discharge from the Picton WRP. Similar trends are observed for enterococci and faecal coliforms. Even with no discharge from the Picton WRP, high levels would be observed due to untreated stormwater runoff from the catchment, contribution from poorly managed on site sewage systems, and other sources. Well treated wastewater will not impact recreational waterway values from a water quality perspective. As part of the planned upgrade, the UV system will be replaced and this will further improve performance. New monitoring techniques are being trialled that can identify the source of microbial contamination (human or animal (horse, cattle,

	chicken, dog etc)). This can help to target the best interventions to improve water quality for primary contact purposes. We are working with other teams in Sydney Water who are aiming to improve swimmability in other rivers. It is recognised that a range of agencies and communities need to work together to identify and fix issues across the catchment to reduce risks to public health at swimming sites. Primary recreational guidelines for enterococci are frequently exceeded at various sites and this illustrates the need to improve stormwater management and regulation of pollution from sources across the catchment.
As mentioned in the above section ("Dam operation and management"), it is not clear how water quality will be impacted by storage in dams prior to discharge. The EPA considers that further discussion/exploration on the potential impacts to water quality and public health risk is needed.	See response above related to Western Dam operation and management. Further discussion with the EPA is intended on the monitoring proposed for 2021-22 and subsequent years and the proposed location and indicators of disinfection performance.
Furthermore, the REF identifies that the Nepean River downstream of Stonequarry Creek is a "highly valued swimming spot". It is unclear where the proposed Nepean River discharge location is in relation to this (or other) swimming sites.	Direct discharge to the Nepean River is not proposed in the LVA (2021) due to the potential to impact the Sydney Hawk Dragonfly. The Nepean River discharge pipeline proposed in the REF has since been re-considered (as stated in earlier responses). Section 6.2 of the REF describes the swimming spot as downstream of the confluence with Stonequarry Creek (under Maldon Bridge as indicated in the figure below). There is public access to the Nepean River via a marked track from the eastern end of Maldon Bridge Road down to the waterway. Recreation may also occur near Maldon Weir, but access is difficult. There are no formal swimming sites managed by Council, or other swimming areas that Sydney Water is aware of. This existing swimming spot below Maldon Bridge is downstream of the confluence with Stonequarry Creek and therefore is exposed to the existing discharges from Picton WRP and catchment runoff. The REF included consideration of a direct discharge point into the Nepean River, just downstream of Maldon Weir (and upstream of the Stonequarry Creek confluence as indicated below).

Note – responses to EPA's detailed comments on modelling have been provided separately in February 2021 and discussed in subsequent meetings with EPA, a copy can be provided upon to request.





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