



Summary Document for Kyneton WRP EPA Licence Amendment Application

May 2022

Executive Summary

In November 2021, the Board of Coliban Water endorsed an updated Environment and Sustainability Policy Statement for the organisation (**Attachment L**). This Policy Statement sets a new direction for Coliban Water with respect to both environmental stewardship and environmental performance.

In the context of this licence amendment application, the desired outcomes of the Policy Statement are reflected in Coliban Water's commitment that the amended discharge licence for the Kyneton Water Reclamation Plant will be:

- protective of, and likely improve, river health
- protective of downstream beneficial uses

The desired outcomes of the Policy Statement are also reflected in the \$17M Kyneton Solutions Project. The major outcome of the Kyneton Solutions Project is that Coliban Water will no longer need to undertake blended discharges (i.e. a discharge of a blend of Biological Nutrient Removal (BNR)-treated water and water sourced from onsite lagoons that contain wastewater sourced from trade waste customers) to the Campaspe River. That is, the only water that will be discharged to the river, under normal operating conditions, will have been treated by the onsite BNR treatment process.

The BNR treatment process produces a high quality treated water that is considered equivalent in quality to Class B recycled water, which can be put to a range of beneficial uses.

The discharge of only BNR-treated water to the river will result in:

- A decrease in the annual volume of treated water that will be discharged
- An improvement in the quality of the treated water that will be discharged. In practical terms, this improvement in discharge quality will result in:
 - At least a **50% reduction** in the annual load of total nitrogen going to the river
 - At least a **95% reduction** in the annual load of total phosphorus going to the river
 - An improvement in pathogen management through the installation of an upgraded UV disinfection system

The improvement in discharge quality is complemented by the Kyneton Environmental Offsets Project, which is a long-term investment in improved river health for the Campaspe River. The environmental offsets for both total nitrogen and total phosphorus are modelled as being greater than 100% of any nitrogen and phosphorus discharged to the river.

To verify the resulting river health benefits of the environmental offsets work, a supporting five-year monitoring program is being undertaken.

As a consequence of the improvements detailed above, it is proposed that the allowable dilution ratio is set at a maximum of 66.7%. This proposed change will not compromise any downstream beneficial uses, as the discharge of only BNR-treated water will reduce both the volume of treated water that is discharged annually, and improve the overall quality of the discharge.

The treated water that will be discharged to the river is exactly the same as the Class B recycled water used to irrigate the Kyneton Racecourse, the Kyneton Botanic Gardens, and various sporting ovals across the Kyneton township.

The supporting documentation for this licence amendment application is summarised below, and the full reports are provided as accompanying attachments.

Introduction

The purpose of this document is to provide a succinct overview of Coliban Water's proposed licence conditions, along with a summary of the supporting evidence for the proposed conditions, which is based on the documents that have been prepared to support Coliban Water's licence amendment application for the discharge of treated water from its Kyneton Water Reclamation Plant (WRP) to the Campaspe River.

Summary of supporting documentation

GHD (2022) – *Discharge Risk Assessment*

GHD (2022) – *Hydrological Assessment and Water Balance Model Report*

GHD (2022) - *Water Quality Data Report*

RMIT AQUEST (2019) - *Monitoring Program for Assessing the Benefits of Environmental Offsets on the Condition of the Campaspe River: Year 1 (2018-2019)*

RMIT AQUEST (2020) - *Monitoring Program for Assessing the Benefits of Environmental Offsets on the Condition of the Campaspe River: Year 2 (2019)*

RMIT AQUEST (2022) - *Monitoring Program for Assessing the Benefits of Environmental Offsets on the Condition of the Campaspe River: Year 3 (2020)*

Cesar Australia (2021) - *Assessing habitat suitability for platypuses in Upper Campaspe River and Campbells Creek*

Summary of consulted EPA documentation

EPA Publication 1287: *Guidelines for Risk Assessment of Wastewater Discharges to Waterways*

EPA Publication 1850.2: *Guidance for operating licences*

EPA Publication 1851.1: *Implementing the General Environmental Duty: A guide for licence holders*

EPA Publication 1856: *Reasonably practicable*

EPA Publication 1910.2: *Victorian Guideline for Water Recycling*

EPA Publication 1911.2: *Technical information for the Victorian guideline for water recycling*

Victoria's Environment Reference Standard (ERS)

Background context

In November 2021, the Board of Coliban Water endorsed an updated Environment and Sustainability Policy Statement for the organisation (**Attachment L**). This Policy Statement sets a new direction for Coliban Water with respect to both environmental stewardship and environmental performance.

Consistent with this policy statement, Coliban Water's stated vision for the Kyneton Water Reclamation Plant (WRP) site is that the maximum possible amount of treated wastewater is recycled for community benefit. This community benefit consists primarily of the irrigation of community facilities, such as local parks and gardens (which are supplied with Class B recycled water) and suitable irrigatable land (which is supplied with Class C recycled water).

Coliban Water's Kyneton Solution's Project (<https://coliban.com.au/kyneton-solutions-project>), which consists of \$17M of expenditure, has enabled the maximisation of reuse options for the trade waste-sourced wastewater at the WRP (which is primarily treated to a Class C recycled water standard prior to being used for irrigation purposes).

In addition to the reuse of suitably treated wastewater for irrigation, at certain times of the year, a volume of suitably-treated wastewater will be discharged to the Campaspe River, under a licence issued by the EPA.

As a result of the Kyneton Solutions Project, Coliban Water will no longer need to undertake blended discharges (i.e. a discharge of a blend of Biological Nutrient Removal (BNR)-treated water and water sourced from onsite lagoons that contain wastewater sourced from trade waste customers) to the Campaspe River. That is, the only water that will be discharged to the river will have been treated by the onsite BNR treatment process.

It is important to note that the commitment to only discharge BNR-treated water to the Campaspe River is contingent on the completion of the Kyneton Solutions Project, which includes the construction of the irrigation pipeline that is currently in the pre-delivery phase.

The change to discharging only BNR-treated water to the Campaspe River will result in a range of water quality improvements, as detailed in the sections below.

It is also important to note that the treated water that will be discharged to the river is exactly the same as the Class B recycled water used to irrigate the Kyneton Racecourse, the Kyneton Botanic Gardens, and various sporting ovals across the Kyneton township.

Campaspe River context

The Campaspe River above Lake Eppalock is a stressed river system. The supporting evidence for this statement is summarised in Section 2 of **Attachment A** (GHD (2022) - *Discharge Risk Assessment*).

Further evidence on the state of the river above Lake Eppalock can be found in **Attachments B, C, and D** (RMIT AQUEST (2019) - *Monitoring Program for Assessing the Benefits of Environmental Offsets on the Condition of the Campaspe River: Year 1 (2018-2019)*; RMIT AQUEST (2020) - *Monitoring Program for Assessing the Benefits of Environmental Offsets on the Condition of the Campaspe River: Year 2 (2019)*; *Monitoring Program for Assessing the Benefits of Environmental Offsets on the Condition of the Campaspe River: Year 3 (2020)*).

What these reports show is that there are multiple sources of potential contaminants across the catchment area of interest, **in addition to** any impact associate with the current treated water discharge from the Kyneton WRP.

In addition to multiple potential contaminant sources, a step change in streamflow occurred around 1997, at about the time of the commencement of the Millennium Drought. Figure 1 from **Attachment E** (GHD (2022) – *Hydrological Assessment and Water Balance Model Report*) illustrates this point. It shows Campaspe River flows as measured at the streamflow gauging station at Ashbourne.

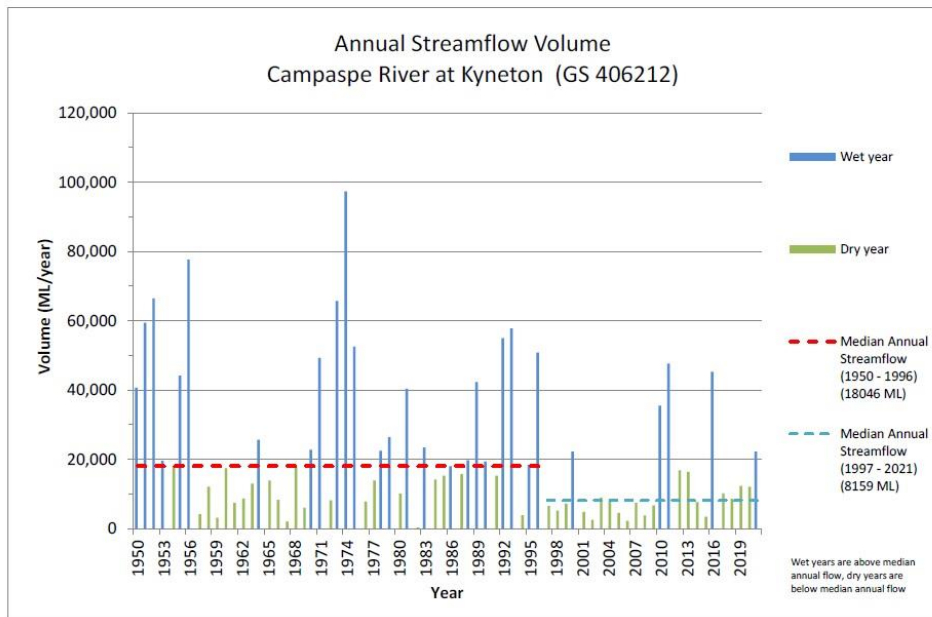


Figure 1 Modelled annual streamflow volume for Campaspe River at Kyneton – 1950 – 2021

More specifically, what the above figure shows is that when the median streamflow, for the period from 1933 to 1996, as measured at the Ashbourne gauging station, is compared to the median streamflow for the period from 1997 to 2021, there has been an **83% decrease** in median streamflow between the two periods.

The exact causes for the significant decrease in streamflow are not clear, but regardless of whether it is being driven by the impacts of climate change, or by some other mechanism, the flow in the river is vastly different to what it was only 30 years ago.

Providing the above background information on the current state of the Campaspe River is not meant to suggest that because the river is in a stressed state that Coliban Water is relieved of any obligation to improve river health. Consistent with Coliban Water’s updated Environment and Sustainability Policy Statement (**Attachment L**), Coliban Water’s commitment is that the amended discharge licence for the Kyneton Water Reclamation Plant will be:

- protective of, and likely improve, river health
- protective of downstream beneficial uses

What the background information does show, though, is that past and future waterway health issues are not solely related to discharges from the Kyneton WRP.

Proposed licence parameters and associated licence conditions

The table below (Table 1) details the proposed licence parameters for the amended licence. These are generally the same parameters that Coliban Water submitted to EPA, in correspondence dated 22 March 2021 (**Attachment F**). EPA indicated in-principle support for the chemical parameters, in correspondence dated 16 September 2021 (**Attachment G**). Separate correspondence, dated 8 October 2021, was received from EPA on the microbiological parameters (**Attachment H**), which contained alternate licence limits for *E. coli*.

Further advice was received from EPA on 13 April 2022 (**Attachment M**) and 21 April 2022 (**Attachment N**). Coliban Water's responses to the issues raised Attachments M and N are summarised in **Attachment O**. **Attachment A** provides the detailed science that underpins the responses.

This document provides a summarised version of the supporting documentation.

Table 1: Proposed water quality parameters

Parameter	Measurement	Licence limit
BOD ₅	Rolling Annual Median	5 mg/L
Total Suspended Solids	Rolling Annual Median	10 mg/L
Total Dissolved Solids	Rolling Annual Median	1,000 mg/L
pH	Within the range	pH 6 to 9
Ammonia	Rolling 90 th percentile	1.4 mg/L
Total Phosphorus	Rolling Annual Median	0.5 mg/L
Total Nitrogen	Rolling Annual Median	10 mg/L
<i>E. coli</i>	Maximum	400 orgs/100 mL
	Rolling Annual Median	100 orgs/100 mL
Helminths	Maximum	1 <i>Taenia</i> egg/L

These licence limits are being put forward based on three supporting principles:

- that under normal operating conditions the discharge to the Campaspe River will only consist of BNR-treated water. The qualifier "under normal operating conditions" is used to signify that in 90th percentile wet years it may be necessary to discharge lesser treated water to the river, which is allowable under current EPA licencing arrangements (licence condition – DW2.8 - discharge of treated wastewater during wet weather conditions will be done in accordance with specifications in "Discharge to Water" section of EPA Publication 1322 'Licence Management Guidelines)
- that the discharge to the river must not exceed 66.7% of the flow in the river
- Dilution measurement described in the preceding dot point is calculated at the Kyneton Gauging Station

It is recognised that the value of 66.7% is greater than the 33.3% figure that EPA put forward in **Attachment G**, but, based on a comprehensive assessment of the available data, and the supporting documentation that accompanies this summary document, it is considered that this dilution ratio will be protective of the beneficial uses of the river. This issue is discussed in greater detail later in this document.

The proposed licence limits in Table 1 set the upper limit of what is considered acceptable, and Coliban Water does not consider these values as representing the limit that you discharge up to, more that these values set a quality envelop that must not be exceeded. This approach to

discharge quality is consistent with Coliban Water's Environment and Sustainability Policy (**Attachment L**).

Coliban Water's commitment in seeking this licence amendment is that the quality of the discharge will always be the best that it can be, within the limits of the current onsite treatment processes, and, as is detailed below, current data suggest that the quality of BNR-treated water is well within the proposed limits.

Attachment A and **Attachment I** (GHD (2022) - *Water Quality Data Report*) provide detailed supporting evidence for the licence limits in Table 1.

The following sections provide summaries of the supporting evidence detailed in **Attachments A** and **I**.

Total Suspended Solids, Total Dissolved Solids and pH

Noting EPA's in principle support for the proposed licence limits for the parameters Total Suspended Solids, Total Dissolved Solids and pH (**Attachment G**), this summary document will not be going into great detail on these parameters. A far more detailed analysis of these parameters can be found in **Attachment A**.

In the interests of transparency, tabulated summaries of the results for samples collected post the BNR treatment process for the past seven financial years are presented below.

Table 2: Total Dissolved Solids (TDS) results post BNR treatment process at Kyneton WRP

TDS results per financial year post BNR treatment process	Max (mg/L)	Min (mg/L)	Median (mg/L)
2015-16	420	320	380
2016-17	440	260	410
2017-18	430	300	400
2018-19	450	360	410
2019-20	460	310	410
2020-21	450	320	390
2021-22 (Year to Date)	420	300	360
Full Data Set	460	260	390
Proposed licence limit – rolling annual median - 1000 mg/L			

Table 3: Total Suspended Solids (TSS) results post BNR treatment process at Kyneton WRP

TSS results per financial year post BNR treatment process	Max (mg/L)	Min (mg/L)	Median (mg/L)
2015-16	17	1	6
2016-17	130	1	4
2017-18	19	1	4
2018-19	26	1	3
2019-20	13	1	2
2020-21	10	1	3
2021-22 (Year to Date)	24	1	1
Full Data Set	130	1	4
Proposed licence limit – rolling annual median - 10 mg/L			

Table 4: pH results post BNR treatment process at Kyneton WRP

pH results per financial year post BNR treatment process	Max (mg/L)	Min (mg/L)	Median (mg/L)
2015-16	7.9	7	7.6
2016-17	8.1	7.2	7.5
2017-18	8.3	7.2	7.9
2018-19	8.1	7.3	7.8
2019-20	8.5	7.5	8.0
2020-21	8.4	7.3	7.8
2021-22 (Year to Date)	8.3	7.3	7.8
Full Data Set	8.5	7	7.7
Proposed Licence limit – within the range 6 to 9			

As is stated, the proposed licence limits summarised above are based on rolling 12-month median values.

Rolling 12-month median values are being proposed, as the use of a median value is consistent with the approach used to monitor the water quality performance of various classes of recycled water, as detailed in EPA Publication 1910.2 - *Victorian Guideline for Water Recycling*.

In addition to being consistent with the approach generally used to assess the quality of recycled water, moving to a rolling 12-month median value means that performance assessment is ongoing and assessments of compliance with licence conditions will no longer be “reset” at 1 July each year.

It is important to note, though, that the use of rolling 12-month median values means that it will not be possible to look at a single result and determine compliance with the licence limit, but, the summarised water quality performance data for BNR-treated water, presented Table 2 to 6 above, demonstrate that during normal operational performance, the median value of the discharged water will be well below the licence limit.

Total Nitrogen (TN)

It is acknowledged that the historical practice of blended discharges (i.e. a discharge of a blend of Biological Nutrient Removal (BNR)-treated water and water sourced from onsite lagoons that contain wastewater sourced from trade waste customers) from the Kyneton WRP to the Campaspe River elevated the concentration of total nitrogen in the river, and that this in all likelihood had an impact on the river. This is illustrated in Figure 41 from **Attachment A**.

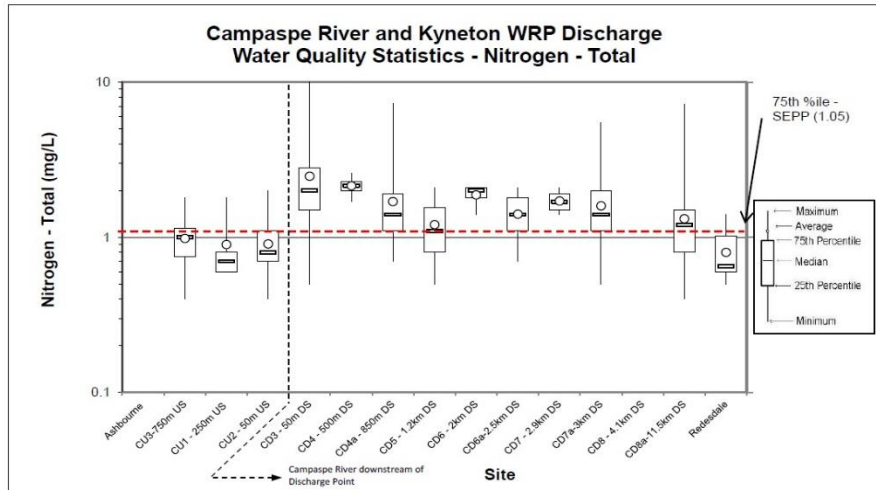


Figure 41 Statistics of total nitrogen data (on discharge days only – July 2020 – December 2021) showing changes in concentration with distance downstream

Under the proposed licence, there will be a reduction in the concentration of total nitrogen discharged to the river, which is likely to result in an improvement in river health.

Table 7 summarises total nitrogen values for treated water post the BNR process.

Table 7: Total Nitrogen results post BNR treatment process at Kyneton WRP

Total Nitrogen results per financial year post BNR treatment process	Max (mg/L)	Min (mg/L)	Median (mg/L)
2015-16	11.0	2	7.0
2016-17	15	2.2	5.9
2017-18	11	2.5	6.3
2018-19	12	2.1	7.3
2019-20	11.0	1.5	7.2
2020-21	11	2	6.4
2021-22 (Year to Date)	8.9	2.8	5.5
Full Data Set	15	1.5	6.5
Proposed Licence limit - rolling annual median - 10 mg/L			

Table 7 illustrates the concentration of total nitrogen in the BNR-treated water, but a more indicative measure of the overall reduction in total nitrogen that will be discharged to the river under the proposed licence is to look at the change in the annual load of total nitrogen that will be discharged.

Table 8 summarises the decrease in the annual load of total nitrogen that will be achieved through moving to only BNR-treated water discharges. As summarised in Table 8, the annual load will decrease by at least 50%. More details on the calculations that sit behind the figures in Table 8 can be found in **Attachment A**.

Table 8: Total Nitrogen – Blended Discharge vs BNR treated water

Measure	Blended discharge	BNR treated water	Change
Load in kg/year in 2022	5,056	1,625	68% decrease
Load in kg/year in 2036	5,056	2,349	54% decrease

The reductions in both the concentration and load of total nitrogen that will be discharged to the river under the proposed licence amendment, which are detailed above, do not account for any additional reduction in in-stream total nitrogen concentrations that may arise from the environmental offsets work that has been undertaken along the Campaspe River.

Attachment A contains a theoretical assessment of the expected reduction in total nitrogen as a result of the environmental offsets work. This assessment suggests that there will be at least a 100% offset of instream total nitrogen.

To monitor whether theoretical matches the actual, AQUEST is undertaking an associated 5-year river health monitoring program to look at any river health improvements that may arise as a result of the environmental offsets work. **Attachments B, C, and D** present the results for the first three years of the monitoring program.

As is noted in the Executive Summary of the Year 3 report (**Attachment D**):

While the benefits of SFM [Stream Frontage Management] are not likely to be observed in three years of monitoring, results to date show evidence of differences in river condition emerging between sites based on riparian condition e.g., between SFMW sites, native vegetation sites and sites where no interventions have occurred (remain willow dominated with stock access)

It should also be noted that over the first three years of the monitoring program blended discharges have been undertaken, and with the move to only BNR treated water discharges further improvements in waterway health should become evident.

Total Phosphorus (TP)

It is acknowledged that the historical practice of blended discharges (i.e. a discharge of a blend of Biological Nutrient Removal (BNR)-treated water and water sourced from onsite lagoons that contain wastewater sourced from trade waste customers) from the Kyneton WRP to the Campaspe River elevated the concentration of total phosphorus in the river, and that this in all likelihood had an impact on the river. This is illustrated in Figure 43 from **Attachment A**.

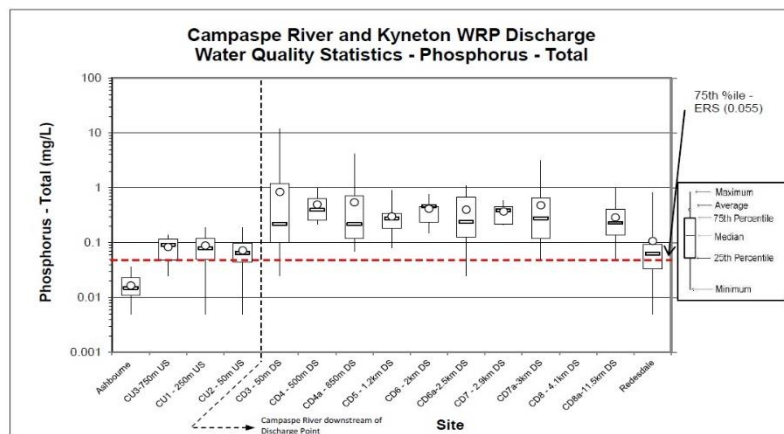


Figure 43 Statistics of total phosphorus data (on discharge days only – July 2020 – December 2021) showing changes in concentration with distance downstream

Under the proposed licence, there will be a reduction in the concentration of total phosphorus discharged to the river, which is likely to result in an improvement in river health.

Table 9 summarises total phosphorus values for treated water post the BNR process.

Table 9: Total Phosphorus results post BNR treatment process at Kyneton WRP

Total Phosphorus results per financial year post BNR treatment process	Max (mg/L)	Min (mg/L)	Median (mg/L)
2015-16	0.79	0.06	0.21
2016-17	0.62	0.01	0.18
2017-18	0.64	0.01	0.20
2018-19	0.65	0.04	0.17
2019-20	0.82	0.10	0.20
2020-21	0.59	0.07	0.26
2021-22 (Year to Date)	0.71	0.1	0.17
Full Data Set	0.82	0.005	0.2
Proposed Licence limit – rolling annual median - 0.5 mg/L			

Table 9 illustrates the concentration of total phosphorus in the BNR-treated water, but a more indicative measure of the overall reduction in total phosphorus that will be discharged to the river under the proposed licence is to look at the change in the annual load of total phosphorus that will be discharged.

Table 10 summarises the decrease in the annual load of total phosphorus that will be achieved through moving to only BNR-treated water discharges. As summarised in Table 10, the annual load will decrease by at least 95%. More details on the calculations that sit behind the figures in Table 10 can be found in **Attachment A**.

Table 10: Total Phosphorus – Blended Discharge vs BNR treated water

Measure	Blended discharge	BNR treated water	Change
Load in kg/year in 2022	2040	52	97% decrease
Load in kg/year in 2036	2040	77	96% decrease

The reductions in both the concentration and load of total phosphorus that will be discharged to the river under the proposed licence amendment, which are detailed above, do not account for any additional reduction in in-stream total phosphorus concentrations that may arise from the environmental offsets work that has been undertaken along the Campaspe River.

Attachment A contains a theoretical assessment of the expected reduction in total phosphorus as a result of the environmental offsets work. This assessment suggests that there will be at least a 100% offset of instream total phosphorus.

To monitor whether theoretical matches the actual, AQUEST is undertaking an associated 5-year river health monitoring program to look at any river health improvements that may arise as a result of the environmental offsets work. **Attachments B, C, and D** present the results for the first three years of the monitoring program.

As is noted above in the total nitrogen section, Executive Summary of the Year 3 report (**Attachment D**) notes:

While the benefits of SFM [Stream Frontage Management] are not likely to be observed in three years of monitoring, results to date show evidence of differences in river condition emerging between sites based on riparian condition e.g., between SFMW sites, native

vegetation sites and sites where no interventions have occurred (remain willow dominated with stock access)

It should also be noted that over the first three years of the monitoring program blended discharges have been undertaken, and with the move to only BNR-treated water discharges further improvements in waterway health should become evident.

Ammonia

EPA, in its correspondence dated 13 April 2022, raised concerns that Coliban Water had not adequately assessed the issue of ammonia toxicity within its previously submitted documentation.

In response to this feedback, the ERA (**Attachment A**) now contains a specific section looking at the issue ammonia toxicity, and the potential for it to arise as part of the proposed discharge (see section 6.3.1 of the ERA).

To ensure that toxicity does not occur, the proposed licence limit is a rolling 90th percentile of 1.4 mg/L, which will provide 90% level of species protection.

Table 11 details the ammonia results post the BNR treatment process at the Kyneton WRP, and the ammonia values under normal operational conditions are very low, and would not lead to instream toxicity. In addition, the instream ammonia values are also very low.

Table 11: Ammonia results post BNR treatment process at Kyneton WRP

Ammonia results per financial year post BNR treatment process	Max (mg/L)	Min (mg/L)	Median (mg/L)
2015-16	2.10	0.05	0.20
2016-17	0.8	0.05	0.05
2017-18	0.70	0.05	0.05
2018-19	6.7	0.05	0.05
2019-20	0.60	0.05	0.05
2020-21	1.1	0.05	0.05
2021-22 (Year to Date)	1.1	0.05	0.05
Full Data Set	6.7	0.05	0.05
Proposed licence limit – rolling 90th percentile – 1.4 mg/L			

Based on the revised licence limit, and the assessment of the potential for ammonia toxicity to arise as a result of the discharge, Coliban Water has a high degree of confidence that the proposed discharge does not present an unacceptable toxicity risk to the Campaspe River downstream of the discharge point.

BOD₅

EPA, in its correspondence dated 13 April 2022, raised concerns that Coliban Water had not adequately assessed the issue of biological oxygen demand (BOD₅) of the proposed discharge, and its potential to result in critically low instream oxygen levels, within its previously submitted documentation.

In response to this feedback, the ERA (**Attachment A**) now contains a specific section looking at the issue biological oxygen demand, (see section 6.3.2 of the ERA).

Table 12 details the BOD₅ results post the BNR treatment process at the Kyneton WRP, and the BOD₅ values under normal operational conditions are very low.

Table 12: BOD₅ results post BNR treatment process at Kyneton WRP

BOD ₅ results per financial year post BNR treatment process	Max (mg/L)	Min (mg/L)	Median (mg/L)
2015-16	2	0.05	0
2016-17	5	1	1
2017-18	7	1	3
2018-19	17	1	3
2019-20	4	1	1
2020-21	6	1	1
2021-22 (Year to Date)	6	1	1
Full Data Set	17	0.05	1
Proposed licence limit – rolling annual median - 5 mg/L			

The State’s Environment Reference Standard for this stretch of the Campaspe River sets the dissolved oxygen (percentage saturation) trigger values at a 25thile value of ≥70% and a maximum value of 130%. The AQUEST monitoring program looks at dissolved oxygen (percentage saturation) at sites along the river (**Attachment B** – Table 2; **Attachment C** – Table 4; **Attachment D** – Table 4).

Each data set is small, but the available data shows that dissolved oxygen (percentage saturation) varies widely, both upstream and downstream of the discharge point. Additionally, there is no available evidence that the discharge is depressing dissolved oxygen levels to dangerously low levels.

Other toxicants

EPA, in its correspondence dated 13 April 2022, raised concerns that Coliban Water had not adequately assessed the issue of the potential of other toxicants within the proposed discharge to adversely impact on the waterway health.

Multiple lines of evidence for presence of instream toxicity are presented in the three available AQUEST reports (**Attachment B** – page 33; **Attachment C** – page 41; **Attachment D** – page 45). This work has been undertaken whilst a blended, lesser quality, discharge has been occurring from the Kyneton WRP. The available results do not show any discernible toxicity at the assessed sites below the discharge point.

Therefore, Coliban Water has a high degree of confidence that the proposed discharge does not present an unacceptable toxicity risk to the Campaspe River downstream of the discharge point.

Environmental offsets

In addition to the improvements in the quality of the discharge to Campaspe River described above, Coliban Water has made a significant investment in environmental offsets along the Campaspe River, upstream of the discharge point.

In October 2018, Coliban Water reached in-principle agreement with EPA to implement an environmental offsets arrangement associated with the Kyneton WRP (**Attachment K**). For a range of reasons, that agreement did not proceed, but as part of the current licence amendment application, Coliban Water is seeking recognition of the environmental offsets within the amended licence.

There is an in-depth discussion and analysis of the likely benefits of the environmental offsets in **Attachment A**, but, in summary, the likely achievable offset is greater than 100% for both total nitrogen and total phosphorus.

It is also likely that, given the offsets are based around stock exclusion from waterways and revegetation of riparian zones, there will be reductions in the instream concentrations of both the faecal indicator bacterium *Escherichia coli* (*E. coli*) and the protozoan pathogen *Cryptosporidium*.

As the offsets work is not structured around the management of onsite wastewater management systems there is unlikely to be any offset with respect to waterborne human infectious viruses.

To provide an assessment as to whether the environmental offsets work delivers an environmental benefit to the Campaspe River, Coliban Water has engaged AQUEST to undertake a five-year river health monitoring program. The reports for Years 1, 2 and 3 form **Attachments B, C and D** to this summary document. It should be noted that the ERA that forms **Attachment A** does not include a discussion of the Year 3 report, as it was received too late for inclusion in the ERA, but it has been provided as part of the application to provide additional information and context.

As is noted in the sections dealing with total nitrogen and total phosphorus, three years is likely to be insufficient time to demonstrate the benefits of the environmental offsets, but the Year 3 report does note:

Continued improvements to the ecological health of the river is expected at sites influenced by SFMW [Stream Frontage Management Works] in subsequent monitoring years. However, improvements in the condition of many of these sites is complicated by the surrounding residential, industrial and agricultural land-uses which create additional challenges for stream management.

Coliban Water remains confident that over the longer term the environmental offset works will contribute to an overall improvement in river health.

Escherichia coli (E. coli)

As is mentioned in the *Background Context* section, the treated wastewater that will be discharged to the river is exactly the same water that, when it is not being discharged, is classified as Class B recycled water, and is used to irrigate the Kyneton Racecourse, the Kyneton Botanic Gardens, and various sporting ovals across the Kyneton township.

In EPA publication 1911.2 *Technical information for the Victorian guideline for water recycling* Table 26 details the acceptable uses that Class B can be put to, without further treatment. Whilst some of the potential public exposure pathways are different when the Class B recycled water is discharged the Campaspe River, the discharged water will not compromise the vast majority of downstream beneficial uses.

Therefore, in formulating the proposed licence values for *E. coli*, alignment was made with the *E. coli* requirement for Class B recycled water; that is a median value of 100 orgs/100mL.

In recognition that *E. coli* is also a faecal indicator organism for the suitability of waterways for primary contact recreation, Coliban Water are also proposing a maximum *E. coli* value of 500 orgs/100mL, based on the single sample *E. coli* criterion for primary recreation in the state's ERS of 550 orgs/100mL (the proposed maximum value being lower than that).

Table 13 below provided the *E. coli* values for treated water post the BNR process.

The important thing to note with these results is that a new UV unit was installed during the 2021-22 financial year, as part of the \$17M Kyneton WRP solutions project, and the maximum result since the new UV duty/standby system went live is 30 orgs/100mL.

In its correspondence, dated 8 October 2021, **Attachment H**, EPA put forward a counter proposal of a 100 orgs/100mL based on the 95th percentile, with an EPA notification limit of 200 orgs/100mL.

Coliban Water have firstly reviewed published EPA documentation and guidance, and could find no published reference for the basis of EPA's proposed values. Additionally, it is Coliban Water's view that the statistical construct between the 95th percentile value and the notification limit is such that one elevated result could result in both proposed values being breached, which would suggest that combining these proposed values based on the small number of data points (approximately 26 values) each year that will be used to assess licence compliance. Therefore, Coliban Water is not supportive of EPA's suggested values.

In further correspondence, dated 21 April 2022 (**Attachment N**), EPA raised concerns with the proposed maximum figure of 500 orgs/100mL, in that it did align with the Class B trigger value of 400 orgs/100mL for notifications to EPA detailed in Publication 1910.2.

Coliban Water accepts that a maximum value of 400 orgs/100mL is a better reflection of the Class B recycled water reporting requirements, and this is now being put forward as the proposed licence limit for *E. coli*.

Table 13: *E. coli* results post BNR treatment process at Kyneton WRP

<i>E. coli</i> results per financial year post BNR treatment process	Max (Org/100mL)	Min (Org/100mL)	Median (Org/100mL)
2015-16	870	0	1
2016-17	2000	0	6
2017-18	24000	0	3
2018-19	7600	0	3
2019-20	2700	0	10
2020-21	2400	0	3
2021-22 (Year to Date)	30	0	0
Full Data Set	24000	0	3
Proposed Licence limit – rolling annual median - 100 org/100mL			
Proposed Licence limit - maximum - 400 org/100mL			

It is recognised that *E. coli* is only a faecal indicator organism, and its presence or absence may not be fully representative of the presence of all human-infectious pathogens. In response to concerns raised by EPA, Coliban Water and GHD reviewed the likelihood of human-infectious pathogens compromising downstream beneficial uses. The review concluded that, under normal operating conditions, the proposed discharge does not create an unacceptable risk to these downstream beneficial uses. The details of this review can be found in Appendix C of **Attachment A**.

Helminths

To avoid outbreaks of beef measles, the Chief Veterinary Officer (CVO) requires a helminth log removal value (LRV) of 4 for any recycled water that is supplied to livestock as drinking water, with a particular emphasis on the removal or absence of *Taenia saginata* (*T. saginata*), the causative agent of beef measles.

The CVO's original advice was structured around the direct supply of recycled water to a property, not recycled water discharged to a waterway that then blends with surface water, prior to being used for livestock drinking water. It is important to note that under normal operating conditions no livestock downstream of the discharge point for the Kyneton WRP would ever be given undiluted discharge water to use as drinking water.

Having said this, it is recognised that in **Attachment H** EPA has set a strong expectation that, nonetheless, an LRV of 4 is necessary for helminth control at the Kyneton WRP.

It is noted that Footnote 5, of Table 1, in EPA Publication 1910.2 states:

Helminth reduction requirements are up to 4 log10 and can include lagoon detention of primary treated effluent for ≥ 50 days or secondary treated effluent for ≥ 25 days, or some other equivalent Chief Veterinary Officer (CVO) and EPA approved process, such as media or membrane filtration. Alternatively, a risk-based assessment and derivation of the level of reduction required can be separately agreed with the CVO and EPA. Note that where the objective is to protect human health directly (for example no livestock involved in the transmission process) the treatment requirements for helminths can potentially be different to, and potentially less stringent than, where the recycled water will supply livestock. Therefore,

risks associated with direct human exposures and the related health impacts on humans can be assessed separately from risks associated with exposures of livestock.

Consistent with this footnote, the principles that underpin the concept of *reasonably practicable*, as detailed in EPA Publication 1856 (i.e. in accordance with the guiding principles of the new EP Act), and noting that *T. saginata* is not endemic to Australia, GHD undertook a risk-based assessment that looked at how many infected individuals would need to be excreting *T. saginata* eggs into the Kyneton sewerage system to potentially create an unacceptable risk to downstream livestock. The risk assessment itself can be found in Section 7.7 of **Attachment A**.

In summary, the risk assessment found that under a worst-case scenario the number of infected people that would need to be shedding helminths to create an unacceptable risk to downstream livestock 1.5 (i.e. at least 2) infected people.

Given the currently-available information about the prevalence of *T. saginata* in Australia, the worst-case scenario is considered to be a highly unlikely event. Therefore, at this point in time, Coliban Water is of the view that no additional treatment for helminths is required at the Kyneton WRP site.

Despite this, Coliban Water recognises the seriousness of beef measles as a livestock disease, and is therefore proposing that the amended licence include a licence limit for *T. saginata*. If this licence limit is ever breached, then Coliban Water would reopen discussions with CVO and EPA on additional helminth control measures for the Kyneton WRP.

Mixing zones

It is Coliban Water's understanding that mixing zones are used to define the river distance below a discharge point that it takes a parameter of interest to return to, typically, the concentration of that parameter upstream of the discharge point (i.e. the nominal background level).

Traditionally, mixing zones have only been used in relation to parameters that are known to represent a potential human health impact (e.g. *E. coli*), but Coliban Water accepts that under General Environmental Duty, a mixing zone could be applied to parameters of ecological importance.

In response to this, GHD looked at potential mixing zones to total nitrogen, total phosphorus and *E. coli*. The detailed calculations and assumptions related to the suggested mixing zones can be found in **Attachment A**.

In the case of total nitrogen, the 90th percentile value under the 2036 discharge scenario sets mixing zone of **6km**.

In the case of total phosphorus, the 90th percentile value under the 2036 discharge scenario sets mixing zone of **2.5km**.

This does not necessarily mean that beneficial uses will be compromised within the mixing zone, just that both total nitrogen and total phosphorus will be elevated over this stretch of river, above the concentration of these two parameters upstream of the discharge point.

With respect to *E. coli*, available upstream data shows the concentration of *E. coli* above the discharge point is typically greater than the concentration in the discharge (Figure 51 from **Attachment A**); therefore, it is not clear what the length of a mixing zone for *E. coli* would be.

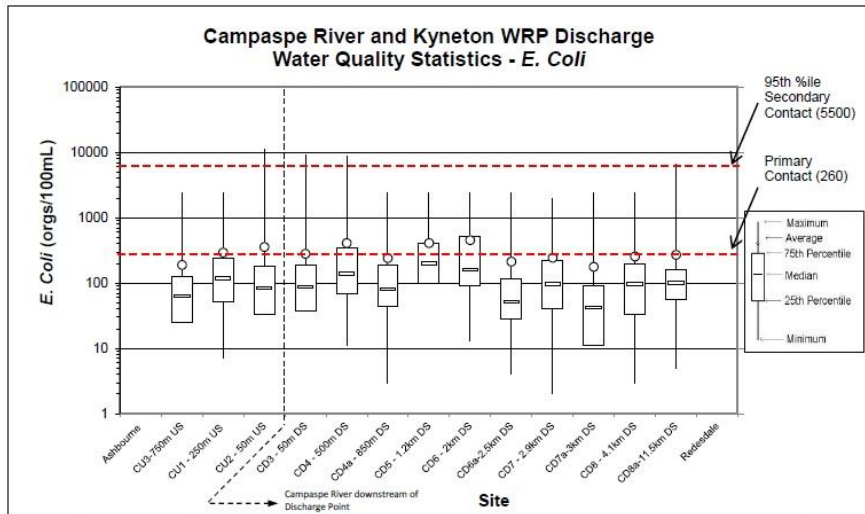


Figure 51 Statistics for *E. coli* data in Campaspe River upstream and downstream of the discharge point (all data 2007 – 2021)

It is recognised that *E. coli* is only a faecal indicator organism, but given the lack of data on the concentration of specific human pathogens in the river means that it is not possible to set a mixing zone based on specific pathogens.

If a mixing zone is requested to be put in place for *E. coli*, it is likely to be an arbitrary value given the current in-stream water quality of the Campaspe River.

Therefore, at this point in time, Coliban Water is not proposing a mixing zone for *E. coli*.

Proposed dilution ratio

Introduction

The current assets at the Kyneton WRP are sized to meet the existing licence, the water balance for which relies on sending suitably treated wastewater to the Campaspe River during times when the river is flowing and then irrigating the balance of the treated wastewater.

The pipeline through which treated wastewater is discharged to the Campaspe River was constructed in 2005/06, and the discharge to the Campaspe River was included on Coliban Water's amended EPA licence amendment for the site, which was dated 8 March 2006 (licence EX55). Condition 1.4 of this licence stated that: "*Waste may only be discharged to water from the premises when there is a 5:1 dilution in the Campaspe River at the Redesdale Gauging station and at a rate not exceeding Table 1*". [Table 1 references the water quality parameters and maximum flow requirements].

In July 2008, the licence was amalgamated, and the reference to Redesdale as the location was removed. Coliban Water continued to use the Redesdale location as part of 'custom and practice', it was the closest existing downstream flow gauging station, and it was used for annual performance statements, which was accepted by the EPA until the enforcement action was undertaken in 2019.

This background context is important, as the current assets, including the recent upgrade works, have been sized based on flow assumptions using the Redesdale location.

While it is correct that the licence now states that discharges can occur up to a maximum 20% of passing flow, without defining the location, in looking to shift the point of flow measurement from the Redesdale gauging station to Kyneton gauging station, it is unfortunately not a simple matter of changing where the flow is measured.

The available streamflow data indicates that, on average, the river flow measured at the Kyneton gauging station is approximately 10% of the river flow measured at the Redesdale gauging station. If this evidence is not supported, adopting the existing 20% dilution ratio based on flows at the Kyneton gauging station would, in the short-term, result in the lagoons reaching capacity, resulting in a high probability that a blended release to the Campaspe River may occur, and, in the long-term, the need for additional lagoons and irrigation areas. The supporting information for this is detailed in **Attachment E** (GHD (2022) – *Hydrological Assessment and Water Balance Model Report*).

There is a strong caveat that needs to be noted, which is the flow comparison between the two gauging stations is based on a very small data set, and most comparable water balance models are based on at least ten years-worth of flow data. Because of this lack of long-term flow data, the water balance has been built using data generated by a hydrological model, not actual flow data.

Therefore, the statistical accuracy of the model for flows below 5ML/day is not considered accurate enough to base decisions on, but it does have a good degree of accuracy for flows above 5ML/day.

Therefore, the model should be used as a guide only, and the outputs of the water balance should be used conservatively.

Chosen dilution ratio

It is important to note that there appears to have been no strong ecological or environmental basis for the selection of the 20% dilution ratio in the 2006 licence.

In putting together this licence amended application, Coliban Water has reviewed the modelling data (**Attachment E**), and the outcomes of the environment risk assessment (**Attachment A**), and noting that the commitment is to only discharge BNR-treated water, the proposed dilution ratio is up to 66.7% of instream flow, as measured at the Kyneton gauging station.

It is also important to note that the 66.7% figure represents the **maximum allowable** dilution ratio, not what will occur on most days. This is because the pump station to the river can only discharge 10 ML/day, so that on many of the days when a discharge is undertaken, the percentage of river flow that the discharge represents will be well below 66.7%.

As was noted above, the commitment to only discharge BNR-treated water to the Campaspe River is contingent on the completion of the Kyneton Solutions Project, which includes the construction of the irrigation pipeline that is currently in the pre-delivery phase.

Mean daily flow

Coliban Water's current discharge licence for the Kyneton WRP contains the licence parameter *mean daily flow*, in addition to a dilution ratio.

Having both of these measures within the licence is considered ineffective, because having a capped mean daily flow potentially means that you may not be able to fully utilise the dilution ratio (as the permissible discharge volume set by the mean daily flow may be less than the permissible discharge volume allowed against the dilution ratio).

If the dilution ratio is assessed as being protective of beneficial uses, and ecological and human health, then the mean daily flow value serves no regulatory purpose, with respect to protecting or enhancing the environment.

Additionally, there is already an artificial flow constraint, which is the maximum daily volume that can be sent through the pump station to the river (nominally 10 ML/day).

Therefore, the proposed licence amendment only includes a dilution ratio.

Yearly cap

In **Attachment F**, EPA put forward the concept of a yearly cap on the volume that is discharged to the Campaspe River. Coliban Water have considered the yearly cap concept, and have decided not to pursue it because:

- The level of uncertainty with respect to predicting future flows in the Campaspe River, which would make a yearly cap hard to administer, and create a high risk of non-compliance if predicted flows did not eventuate
- For a similar reason to not putting forward for not supporting a mean daily flow, that is, if the dilution ratio is assessed as being protective of beneficial uses, and ecological and human health, then the application of a yearly cap serves no regulatory purpose, with respect to protecting or enhancing the environment

Additionally, there is already an artificial cap, which is the maximum daily volume that can be sent through the pump station to the river (nominally 10 ML/day).

Platypus in the Upper Campaspe River

It is acknowledged that there is community concern with respect to the absence of platypus in the Campaspe River, both upstream and downstream of discharge point for the Kyneton WRP, and any water quality impacts that the discharge may be having in contributing to the absence of platypus.

The water quality concern is centred around a 2005 journal article that looked at water quality parameters and observed platypus numbers in urban waterways in and around Melbourne (<https://doi.org/10.1899/04-024.1>)

The abstract for this paper states, in part:

Capture rate was not significantly correlated with median summer discharge, but was inversely correlated with stream water TP and TKN. Further studies are needed to determine if pollutants may limit urban O. anatinus populations through direct toxicity or indirectly by pollutants reducing their benthic macroinvertebrate food resource

This finding from the study is being used to suggest that elevated Total Phosphorus (TP) values lead to an absence of platypus in all waterways.

It is important to note that correlation is not always the same a causation and, as the abstract notes, at that time, further research was needed to understand the mechanisms that may explain this correlation.

In response to the noted community concern, Coliban Water engaged an experienced platypus ecologist from Cesar Australia, to prepare a report (**Attachment J**) with the following aims:

- Assess the suitability of the Upper Campaspe River (i.e. the stretch of river between Carlsruhe and Redesdale) to support the presence of a healthy platypus population
- In preparing the final report, if the assessment finds that either waterway is unlikely to be able to support the presence of a healthy platypus population, to the extent that it is possible to do so, the final report is to state the reasons or factors that are likely contributing to this being the case

Quoting from the Executive Summary of the Cesar Australia report:

- *There was no evidence of negative impacts from the treated water discharges on platypus populations, despite some degraded water quality parameters. Macroinvertebrate communities [from a previous study] are relatively depauperate both up- and downstream of discharge points and the only occurrence of platypuses [in this study] were detected directly downstream of the [waste]water treatment plant in Castlemaine. Several other waterways in Victoria that receive treated water discharges appear to support healthy platypus populations*

- *Rather, sparse platypus populations in the upper Campaspe River and Campbells Creek are likely a reflection of overall poor habitat conditions from heavily modified catchment areas and seasonal cease-to-flow events*

Consistent with its Environment and Sustainability Policy, Coliban Water is committed to ensuring that its activities along and within waterways do not adversely affect instream ecosystems.

Ancillary matters

Sample collection

In order to ensure that there is absolute clarity as to how compliance with the licence limits will be measured, or assessed, the only sample results that will be used for the maximum or median calculations are those that are collected under the compliance sampling program, not sample results from the site's operational monitoring program.

Whilst a licensed discharge is occurring, samples for compliance sampling program will be collected once a week, from a sample point that is representative of what is being discharged to the river.

For all chemical parameters, the sample will be a 24-hour composite sample, collected in an appropriate autosampler.

For all microbiological samples, the sample will be a grab sample.

Additionally, whilst a licensed discharge is occurring, weekly river water samples will be collected and analysed for the licenced parameters, both upstream and downstream of the discharge point, from the sites shown in Figure 22 of **Attachment A**.

All collected samples will be analysed by an independent NATA-accredited laboratory.

Monitoring and reporting performance

Most of the proposed licence parameters are based on an annual median value (except for the maximum values used for *E. coli* and Helminths).

For those licence parameters that are based on annual median values, in line with the principles of General Environmental Duty (GED), licence performance will be assessed using 12-month rolling median values.

Flow measurement

As is detailed above, Coliban Water is proposing a dilution ratio of 66.7% for the discharge to the Campaspe River, and to achieve that flow measurements will need to be taken to ensure that during periods of discharge the dilution ratio is not exceeded.

Undertaking instantaneous flow measurements is not considered feasible, as this would require a continuous adjustment of flow rate of the discharge over the course of the day when a discharge may be occurring, and this would either require a large amount of complicated automation or a high level of manual operator control.

As an alternative, Coliban Water is proposing to use the measured river flow for the preceding day (24 hours up to midnight on that day) as the basis of the calculation for the current day's discharge volume. Whilst this creates a slight offset, it will allow for a much more accurate calculation of the allowable discharge volume, and an avoidance of any doubt as to whether Coliban Water has met the permissible discharge licence condition.

Signage

In **Attachment H**, EPA have suggested that signage should be erected along the river to advise river users of the presence of treated water discharge to the river.

Coliban Water agrees that, in order to improve and increase transparency with respect to discharges from the Kyneton WRP to the Campaspe River, signage should be erected at the point of discharge.

Coliban Water does not agree that signage is necessary any further downstream of the discharge point, as the available data indicates that, from a human health perspective, the quality of river water is of a similar or poorer quality than the quality of the discharge, such that the river is likely to be unsuitable for some uses, regardless of whether a discharge is occurring.

It is also important to note that a discharge will not occur every day to the river (currently, a discharge only occurs on 52% of days in any one year), so the value of year-round signage to the community is likely to be limited.

However, Coliban Water is supportive of signage being erected at the closest publicly-accessible points to 500m and 1km downstream of the discharge point, in order to ensure the public is aware of the upstream discharge.

Boundary of licensed premises

When the additional storage lagoons were constructed at the Kyneton WRP, they were constructed on land owned by Coliban Water, but the land fell outside the boundary of the currently licensed premises.

As part of this licence amendment application for the amended discharge, Coliban Water are also seeking to have the boundary of the licensed premises amended so that all onsite infrastructure that has been constructed to support the Kyneton Solutions Project sits within the licence boundary. Refer to Attachment P for revised site boundary.

Second discharge point to Snipes Creek

In **Attachment G**, EPA raise the possibility of a second licensed discharge point for the Kyneton WRP, which would permit a licensed discharge to occur into the Snipes Creek.

Coliban Water has investigated the feasibility of such a discharge, and, because of limitations in available water quality data to inform an environment risk assessment for such a discharge, Coliban Water has decided not to pursue this option.

Community Consultation

As part of the licence amendment application, a community engagement plan has been prepared, which details previous and proposed engagement activities with respect to the application. Refer to **Attachment R** for details.

EPA, in its correspondence dated 13 April 2022 (**Attachment M**), raised the issue the level of community consultation that Coliban Water has undertaken in relation to the amendment application.

EPA, in correspondence dated 2 October 2020 (**Attachment Q**), advised Coliban Water that it would be taking the lead role in engagement with the community on the licence amendment. Coliban Water respects EPA's position.

Attachments

Attachment A - GHD (2022) – *Discharge Risk Assessment*

Attachment B - RMIT AQUEST (2019) - *Monitoring Program for Assessing the Benefits of Environmental Offsets on the Condition of the Campaspe River: Year 1 (2018-2019)*

Attachment C - RMIT AQUEST (2020) - *Monitoring Program for Assessing the Benefits of Environmental Offsets on the Condition of the Campaspe River: Year 2 (2019)*

Attachment D - RMIT AQUEST (2022) - *Monitoring Program for Assessing the Benefits of Environmental Offsets on the Condition of the Campaspe River: Year 3 (2020)*

Attachment E - GHD (2022) – *Hydrological Assessment and Water Balance Model Report*

Attachment F – Coliban Water correspondence to EPA, 22 March 2021

Attachment G – EPA correspondence to Coliban Water, 16 September 2021

Attachment H - EPA correspondence to Coliban Water, 8 October 2021

Attachment I - GHD (2022) - Water Quality Data Report

Attachment J - Cesar Australia (2021) - *Assessing habitat suitability for platypuses in Upper Campaspe River and Campbells Creek*

Attachment K – EPA Correspondence endorsing environmental offsets

Attachment L – Coliban Water Environment and Sustainability Policy Statement

Attachment M - EPA correspondence to Coliban Water, 13 April 2022

Attachment N - EPA correspondence to Coliban Water, 21 April 2022

Attachment O – Coliban Water’s responses to issues raised in EPA’s April 2022 correspondence

Attachment P – Map of proposed boundary of licensed premises for the Kyneton WRP

Attachment Q - EPA correspondence to Coliban Water, 02 October 2020

Attachment R - Kyneton Licence Amendment Communications and Engagement Plan May2022