9. Water use and surface water management

9.1 Overview and scope

This chapter outlines the proposed water use and discharges for the EfW Plant which will be integrated within the existing water systems at the Maryvale Mill.

The existing Maryvale Mill sources 70-80 ML/day of process water from the Moondarra Reservoir (via the Pine Gully Reservoir) and discharges approximately 55-65 ML/day of treated wastewater. It also discharges 15-20 ML/day to Gippsland Water as treated tradewaste. It is anticipated that the water supply for the EfW Plant will be from this supply.

Potable water is sourced from the local water authority (Gippsland Water). Domestic sewerage is discharged to Gippsland Water. It is anticipated that the potable water supply for the Project will be from a connection to this main and the domestic sewer discharge will be via the existing domestic sewer main from the site.

Construction of the Project will include civil, electrical, mechanical and structural activities. During construction there will be a temporary potable water supply available for construction amenity purposes, most likely to be sourced from a temporary tap in to Gippsland Water's potable main. There will also be a temporary domestic sewer discharge for construction purposes, most likely a temporary tap to Gippsland Water's existing main.

During operations, it is anticipated that the Project will not significantly increase the amount of water required by the Mill as a whole. Demand of the EfW Plant is expected to be 5-6 ML of raw water per day, depending on the load and operating mode of the EfW plant. The main source of water to the Project, when in operation, will be untreated water supplied from the Moondarra supply to the existing mill. Potable water will also be required for the Project to supply amenities at the EfW Plant, supplied by the existing potable water main from Gippsland Water.

Water used by the Project and discharged from the Project will be minor (generally less than 1 ML/d) in comparison to the water used and discharged at the existing Maryvale Mill. It is intended that the water effluent discharged by the Project will be to the existing Mill effluent treatment systems – both as wastewater and tradewaste depending of the quality of the discharge water.

Stormwater is currently collected through a drain network in the existing mill which discharges into the 'East Basin'. The East Basin is a holding pond before it joins the treated wastewater discharge from the secondary clarifier and flows into the final settling and polishing pond, and ultimately into the Latrobe River. Stormwater from the EfW Plant will be segregated from contamination and discharged into the existing stormwater network.

Essentially the addition of the EfW Plant will not significantly alter the management of wastewater, tradewaste and stormwater at the Maryvale Mill and the EfW Plant water systems will integrate with the existing Mill systems.

It should be noted that the project is in the feasibility phase. Accordingly, the information in this chapter is preliminary and the optimisation around recycling of water has not yet been formally developed. The descriptions of water volumes and constituents in this chapter are not expected to change significantly during subsequent design phases, however there will be variations to volumes and constituents due to the following reasons:

- There are seasonal fluctuations in the raw water quality from the Moondarra reservoir for parameters such as total dissolved solids (TDS), total suspended solids (TSS), dissolved oxygen and biological activity.
- There is variability in the numerous individual ions in the raw water that can result directly in changes in the relationship between TDS and direct conductivity, noting direct conductivity is an indicator of dissolved solids (TDS) and is a non-linear function of all of the many ions that will be found in the water throughout the year.

- The selection of particular equipment vendors for the cooling tower and water treatment sub-packages will occur during the EPC detailed design and procurement phase of the project.

9.2 EPA requirements

The State Environment Protection Policy (Waters of Victoria) 2003 (SEPP (WoV)) sets the framework for government agencies, businesses and the community to work together to protect and rehabilitate Victoria's surface water environments. The SEPP (WoV) outlines the principles for the protection and management for the State's surface waters. It identifies beneficial uses and environmental quality objectives that, if met, will ensure the protection and management of the State's surface waters and actions to avoid pollution. The design of the operations of the Project will be guided by the principles outlined in this SEPP.

9.2.1 Existing Maryvale Mill EPA licence

The Maryvale Mill operates under an EPA Licence (#46547) that permits discharges to the environment under specific conditions. For the existing Maryvale Mill, the EPA licence stipulates that the wastewater discharge must comply with the following conditions:

- LI_DW1 - You must ensure that surface water discharged from the premises is not contaminated with waste
- LI_DW2 - Discharge of waste to surface waters must be in accordance with the 'Discharge to water' Table (Table 9.1 below)
- LI_DW3 - The mixing zone extends from the discharge point to the "downstream sampling point" at Sandbank Reserve
- LI_DW4 - You must install and maintain signage showing the:
  1) Extent of the mixing zone
  2) Your name
  3) EPA licence number
  4) Discharge point number.

Table 9.1 below shows the current discharge to water table requirements from the EPA licence #46547 for the existing Maryvale Mill.

Table 9.1 : EPA Licence conditions relating to discharge to waters

Discharge Point No	Description of Discharge Points	Indicator	Limit Type	Unit	Discharge Limit
W1	Discharge to Latrobe River	Flow Rate	Annual flow	MLT	20,130
		2,3,7,8-tetrachlorodibenzo-p-dioxin	Maximum	pg/l	20
		Absorbable organohalogen	Maximum	mg/l	1
		Ammonia	Maximum	mg/l	3.1
		Anionic surfactants	Maximum	mg/l	0.5
		Biochemical oxygen demand (5 day)	Maximum	mg/l	30
		Colour	Annual Median	Pt-Co	140
		Colour	Maximum	Pt-Co	200
		Electrical conductivity	Maximum	µS/cm	1,500
		Nitrate as nitrogen	Annual Median	mg/l	0.4
		Nitrate as nitrogen	Maximum	mg/l	1

Discharge Point No	Description of Discharge Points	Indicator	Limit Type	Unit	Discharge Limit
		Sulfate	Maximum	mg/l	500
		Suspended solids	Annual Median	mg/l	30
		Suspended solids	Maximum	mg/l	60
		Total dissolved solids	Annual Median	mg/l	850
		Total dissolved solids	Maximum	mg/l	1,000
		Total phosphorus	Annual Median	mg/l	0.25
		Total phosphorus	Maximum	mg/l	0.3
		pH	Maximum	pH	8.5
		pH	Minimum	pH	6

mg/l = Milligrams/litre

MLT = Megaliter

pg/l = pecograms per litre

pH = pH Units

Pt-Co = Platinum Cobalt Units

μS/cm = Microsiemens per centimetre

9.3 Existing environment

The median rainfall in the Traralgon region is 580 mm per annum (Bureau of Meteorology, climate data). The nearest major surface water feature is the Latrobe River, which meanders from a north-west to the south-easterly direction approximately 1.5 km to the north of the Project site. There are also three small creeks (the Wades, Plough, and Waterhole) approximately 1.4 km southeast of the site (see Figure 9.1). The Latrobe River is an important source of water for industrial and agricultural users in the Latrobe Valley. Although the Latrobe River is within the Gippsland Lakes Ramsar site catchment, the site is more than 70 km downstream from the Maryvale Mill.

A system of large treatment ponds lies adjacent the south riverbank, immediately to the north of the pulp and paper mill. No surface water bodies exist at the Project site, though two dams (Gippsland Water infrastructure) are located approximately 400 m south of the EfW Plant site. There are a few drainage channels in proximity to the Project site running from south to north along the eastern and western Mill site boundaries.

Topographical information (VVG, 2017) indicates the Project site is relatively flat, and slopes gently downward from south to north in the direction of the Latrobe River. The topography of the broader pulp and paper mill also follows this pattern, with surface water draining through a stormwater drain network to the East Basin, east of the wastewater treatment plant.

Figure 9.1 : Surrounding Surface Waters

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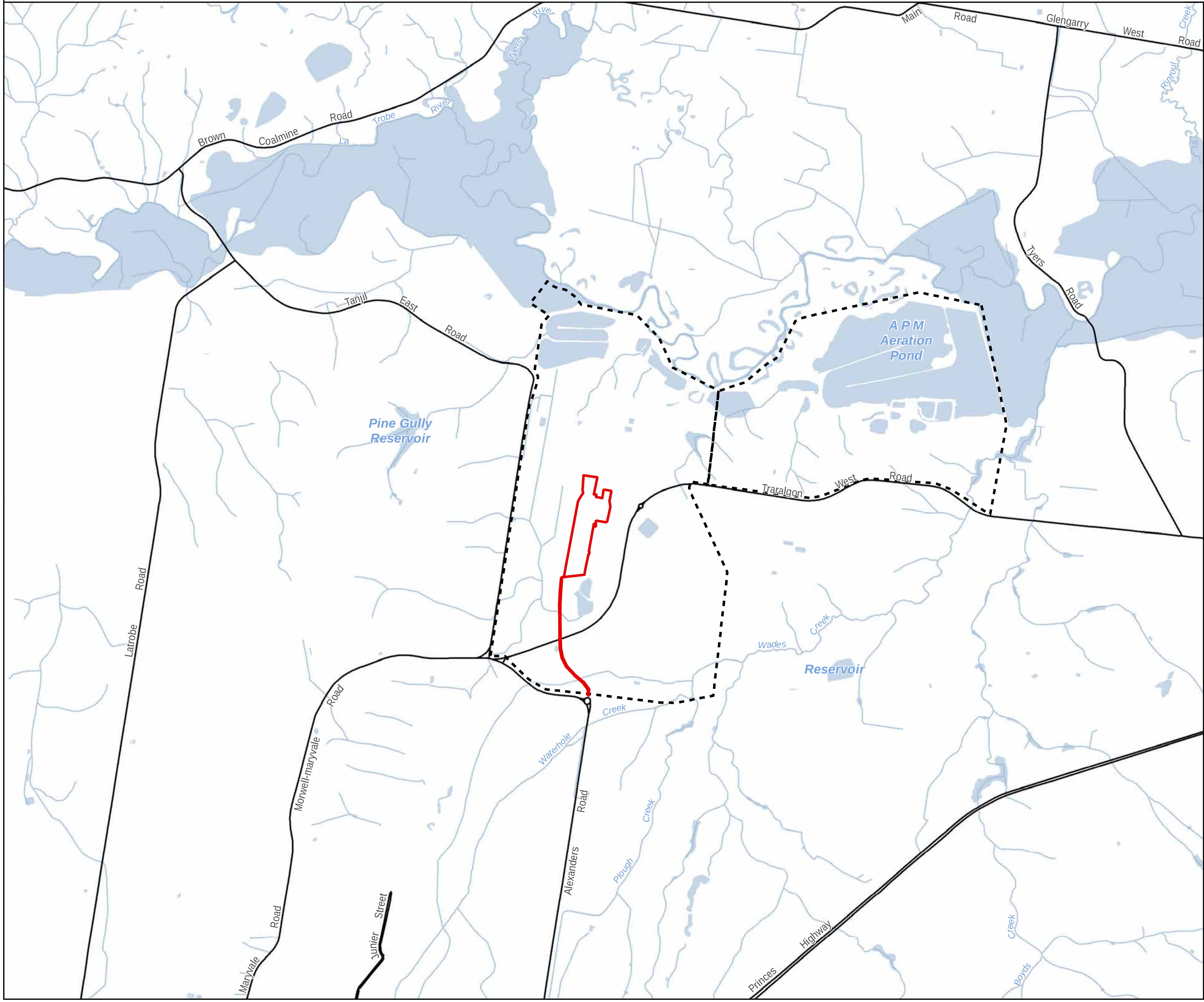


Legend

- Maryvale Mill
- Project Area
- Watercourse
- Waterbody

N

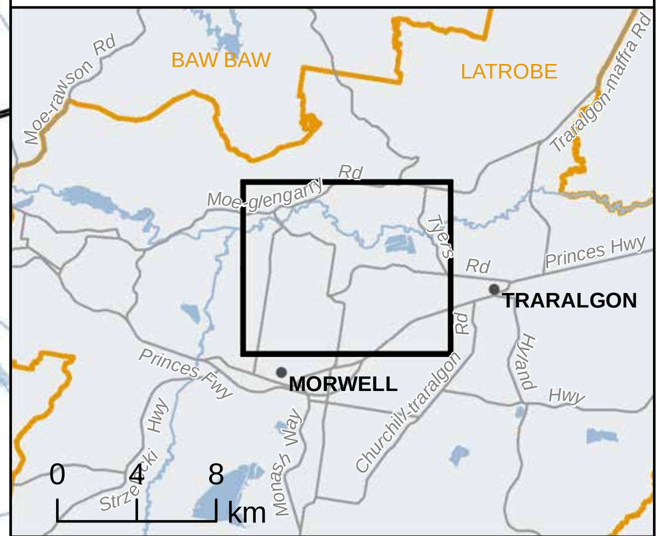
RO097400

GDA 1994 MGA Zone 55

0 0.5 1

Kilometers

DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data © State of Victoria 2017; Department of Environment, Land, Water and Planning 23/04/2017; Jacobs 2017DATA SOURCES © ESRI BaseMap



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9.4 Existing operations

9.4.1 Water use

The existing Maryvale Mill uses raw water sourced from the Moondarra Reservoir. It is not intended to change the existing water sources for the Mill as a result of the Project. The Maryvale Mill's current intake is 70-80 ML/day. The Mill's wastewater discharge is approximately 55-65 ML/day to the Latrobe River (after extensive clarification and treatment), with 15-20ML/day being discharged as trade waste to Gippsland Water (also after clarification and treatment). The existing potable water use of the Mill is around 1 ML/day.

The existing key water uses for the Mill are as follows:

- Water used for the generation of steam for pulp and paper manufacturing
- Cooling water systems
- Process water for pulp and paper manufacturing
- Provision of fire protection services
- Potable water for staff amenities, hygiene facilities and general water uses.

9.4.2 Trade Waste and Wastewater treatment systems

There are two water treatment systems at the Maryvale Mill that collect and treat water from the site and its operations. Figure 9.2 below shows a schematic of the water treatment systems, which are:

- Trade Waste System:
    - This system collects effluent from various processes (including pulp production, pulp bleaching, landfill leachate) and treats the effluent prior to discharge to Gippsland Water as Trade Waste.
    - Key components of the Trade Waste System include the main sewer sump, pH control, two sewer clarifiers and surge basin.
- Wastewater System:
    - This system collects effluent from the woodyard, water treatment, paper machines, and the De-Inking Plant as well as the western and eastern stormwater drains.
    - Key components of the Wastewater System include the eastern drain, western drain, two primary clarifiers, an aeration and mixing pond, one secondary clarifier and one final settling and polishing pond.
    - Clarified water from the secondary clarifier is reclaimed for use on some paper machines.

Stormwater at the Maryvale Mill is collected and flows into the Eastern and Western stormwater drains which are segregated from the wastewater drains. Once collected into the drains, stormwater flows to the north of the site and combines into one open channel drain which ultimately flows into the 'East Basin'. The East Basin is a holding pond before it joins the treated wastewater discharge from the secondary clarifier and flows into the final settling and polishing pond, and ultimately into the Latrobe River. There is a flow meter that measures the volume of stormwater discharging from the East Basin.

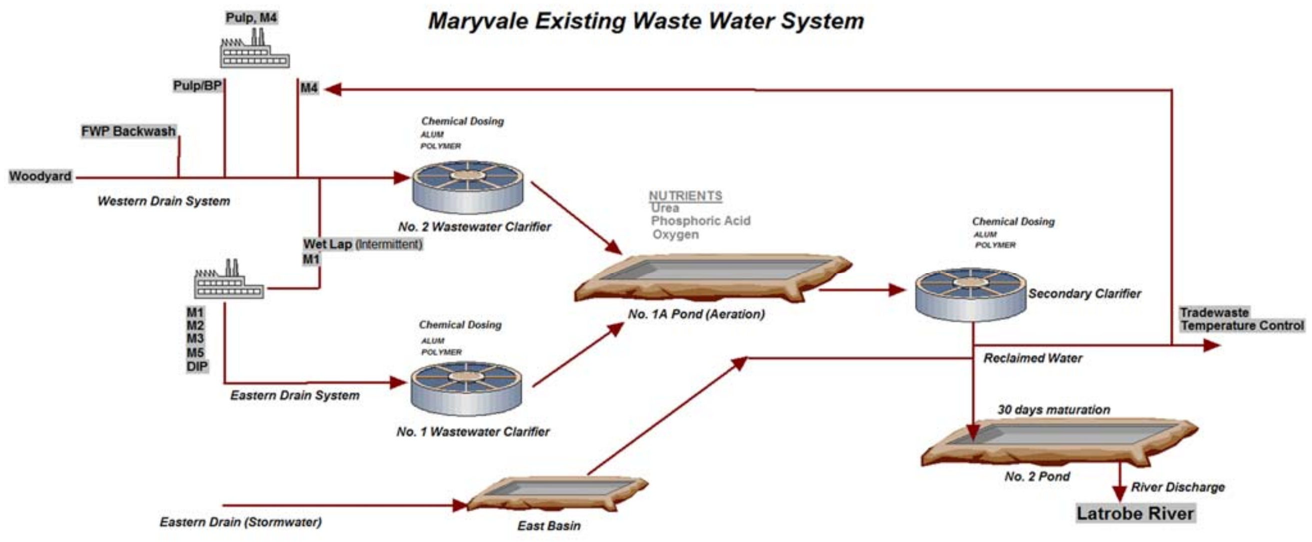

Figure 9.2 : Existing Maryvale Mill water treatment systems

9.4.3 Water testing

Ongoing sampling and testing of the waste water discharged to the Latrobe River is undertaken at the Maryvale Mill in accordance with the requirements and limits as set out in the in the Mill's Monitoring and Reporting Program (ID 20554). Additional process monitoring within the Mill has been implemented as part of the wastewater process control regime.

9.4.4 Ground water systems

Groundwater in the vicinity of the Project site is indicated to flow to the northeast towards the Latrobe River. This is consistent with the topography of the broader Maryvale Mill site and observed groundwater conditions.

9.5 Proposed operations

9.5.1 Proposed water systems

The EfW Plant will require approximately 5-6 ML/day of input water for use in the plant's processes. The key processes requiring water are:

- Raw water system and storage tank
- Cooling water systems
- Demineralised water system and storage tank(s)
- Ash handling system
- Flue gas treatment system
- Return condensate plant
- Potable water systems and storage tank
- Firefighting water systems and storage tank.

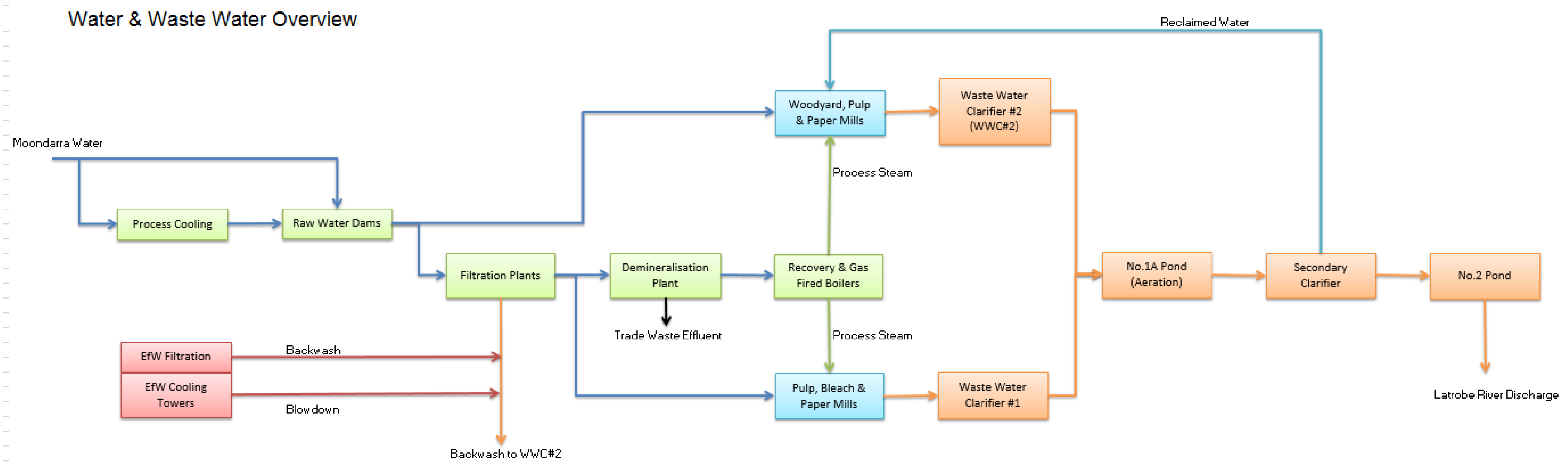

Figure 9.3 : Maryvale Mill water treatment systems with EfW Plant

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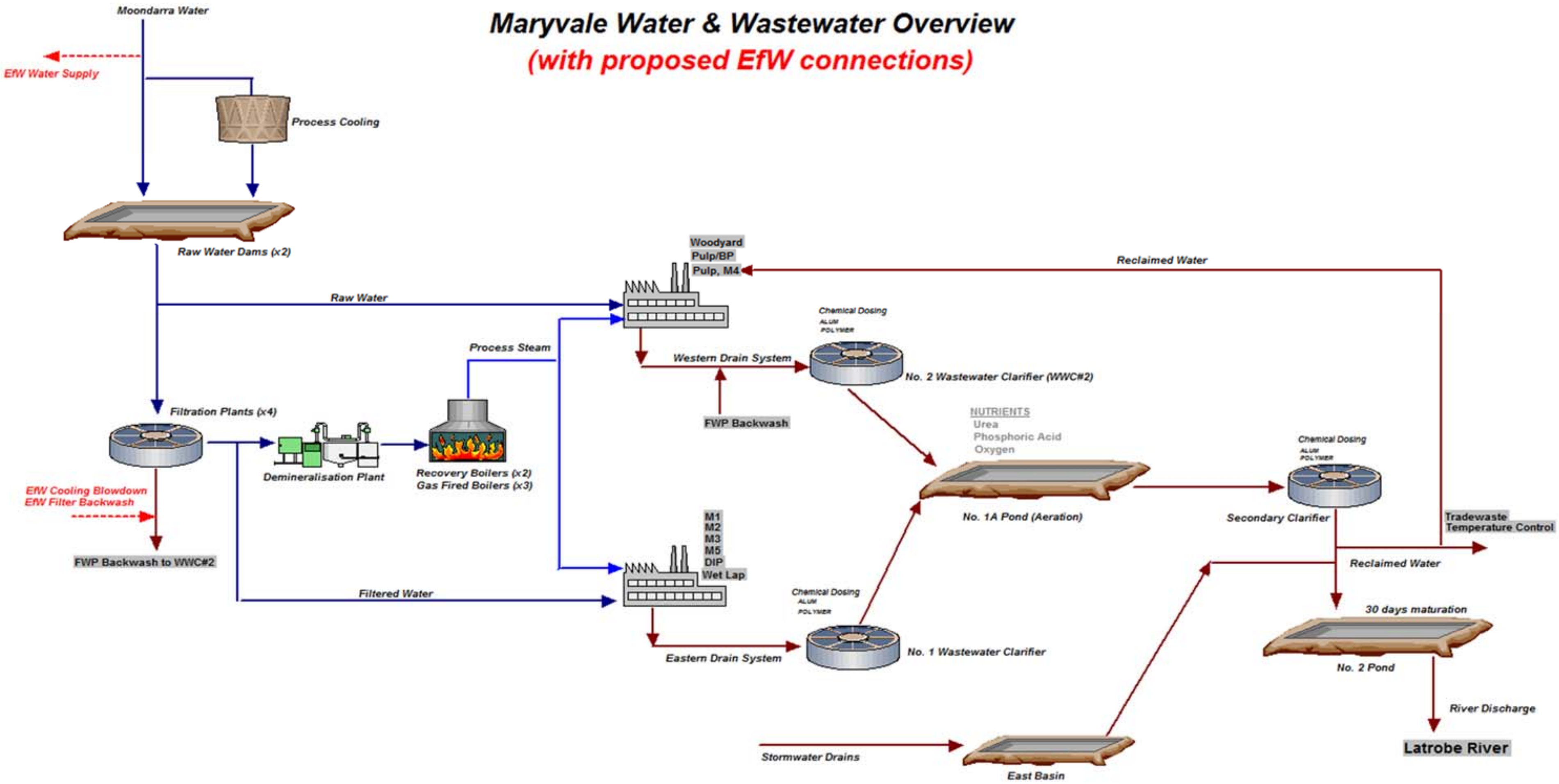

Figure 9.4 : Flow diagram of Maryvale Mill water treatment systems with EfW Plant

9.5.2 Raw water

The existing raw water supply to the Maryvale Mill is supplied from the Moondarra Reservoir (via Pine Gully Reservoir). This will be the primary source of water supply to the Project and will be used for the following processes:

- Cooling tower water make-up
- Ash handling
- Flue gas treatment (if a semi-dry system is used)
- Production of demineralised water for the generation of steam
- Boiler chemistry control and online boiler cleans (soot blowing)
- Fire service system.

Depending on the load and operating mode of the Project, it is likely to require approximately 5-6ML/day (approx. 2000 MLpa) of raw water. The EPC tenderers will be providing a final water balance in which it will be required to recycle as much water as practicable (as an EPC contract condition).

However, in the context of the water use for the existing Maryvale Mill, the water use by the Project will be minor – 5-6Ml/day compared to 60-70ML/day of use by the Mill.

9.5.3 Potable water

Potable water use for the Project will be minor as the key uses for potable water in the EfW Plant are for amenities and ablutions. The existing potable water used at the Maryvale Mill is supplied by Gippsland Water and it is anticipated the potable water for the EfW Plant will also be supplied by Gippsland Water.

Potable water will be supplied to the Project in accordance with the relevant Victorian legislation, being primarily the Safe Drinking Water Act of 2003 and the Safe Drinking Water Regulations 2015. Potable water supply must also comply with the Australian Drinking Water Guidelines 2011. The Plant shall be equipped with facilities to accept and distribute the potable water and all equipment in contact with the potable water shall be in compliance with the relevant Australian Standards.

9.5.4 Key wastewater sources from the EfW Plant

As the project is in the feasibility stage and AP is expecting tenders from EPC contractors, it has not been decided whether the EfW Plant wastewater discharges will be directed to the Mill's wastewater treatment system (eventual discharge to Latrobe River after extensive treatment) or tradewaste treatment system (eventual discharge to Gippsland Water after extensive treatment). For the purposes of this chapter, AP has assumed a 'worst case' scenario whereby the wastewater discharges are eventually discharged to the Latrobe River (under existing EPA Licence conditions) via the Mill's wastewater treatment system.

9.5.4.1 Filter backwash

The raw water supply from the Moondarra Reservoir is reasonably high quality with a typical TSS value of only 3 mg/L. However, for the raw water to be used in the EfW Plant it will need to be backwashed.

The chemical composition of any backwash will be identical to that of the raw incoming water, because the proposed gravity-type sand filter does not introduce any additional contaminants. The backwash stream should thus only consist of a concentrated native stream of the particles inherent in the raw water supply from Moondarra Reservoir, albeit in a slightly more concentrated form.

The total volume of filter backwash per day will be dependent on the backwash frequency which will ultimately be matched to the equipment supplier's operating instructions when available. This will take into account the detailed filter design and the amount of incoming water used on site per day (which is dependent on the nature of operation). It is estimated that for a typical day-to-day operating scenario the amount of filter backwash generated would be in the range of 0.3-0.5ML per day.

Table 9.2 below shows the estimated raw water that is required for use in the EfW Plant and the amount of TSS generated in the filters based on three different operating scenarios.

- Case 1 represents the expected nominal day-to-day operation scenario of the EfW Plant with process steam transfer to the Mill;
- Case 2 represents the scenario where the EfW Plant is operating at full load and there is no process steam transfer to the Mill. Although this operating scenario does require more raw water to be used at the EfW Plant, as no process steam is delivered to the Mill under this operating scenario, the amount of demineralised water (and hence filtered water) reduces significantly.
- Case 3 represents an operating scenario where a significant amount of process steam (approx. 220 tonnes/hour) is required at the Mill and there is no condensate being returned. This results in the need to produce a lot of demineralised water and hence uses more filtered raw water. This scenario is not a normal operating mode and is likely for approximately 5% of the year. However, although this does increase the filter backwash volume and TSS loading, the load of the existing demineralisation plant and filters at the Mill would inherently reduce as a result.

Table 9.2 : Estimated raw water and backwash volumes for the EfW Plant

Parameter	Units	Case 1	Case 2	Case 3
Incoming raw water to be filtered	ML/day	2.85	0.6	6.7
Incoming raw water TSS	mg/L	3	3	3
Filter backwash - Estimated mass emission rate –TSS	kg/day	8.5	1.8	20.1
Filter backwash – Estimated volume of water per day	ML/day	0.03	0.006	0.06
Concentrated TSS in filter backwash stream	mg/L	285	300	335

The estimated mass rate of TSS generated in the filters is based on a typical value in the incoming raw water that was obtained during periodic laboratory testing. Based on the expected operating scenario, as shown in Case 1, the expected daily loading of TSS to be discharged in the filter backwash stream is not considered to be significant compared to that produced by the Mill. In a normal operating scenario (Case 1), the volume of filter backwash is expected to be approximately 0.03 ML/day (30,000L/day) with a corresponding mass of TSS of 8.5 kg/day.

In comparison with the existing Mill filter backwash and wastewater treatment systems, AP has four existing filtration water plants. The most recently commissioned plant (“FWP#4”) has an almost continuous backwash while another plant “FWP#3” operates on a one backwash per day cycle. The other two plants have two filter sets and backwash multiple times per day. The impact of the EfW Plant backwash discharges is very small compared to the existing backwashing processes on the Mill wastewater clarification system (WWC#2) and the feed flow into the clarifier being around 28 ML/day.

In this context, the backwash from the EfW (sand) filter would be hundreds of times lower than the existing Mill backwash volumes and concentrations and is considered of very minor significance. It is expected that the additional filter backwash impact from the EfW Plant (being 0.03 ML/day or 30,000L/day) with a mass of 8.5 kg/day TSS) on the Mill clarifiers and settling ponds would be minimal.

The frequency of filter backwash will be dependent on the design of the filter and the incoming quality of water from the Moondarra Reservoir, more so the amount of suspended solids in the water (sand/dirt, organic debris, etc). The figure may vary with the seasons and with significant rainfall events. It is expected that the frequency of backwash could typically be around once per day (e.g. every 24 hours).

9.5.4.2 Cooling tower blowdown – biocides

The cooling tower system proposed for the EfW Plant is a wet-cooled system – an induced mechanical draft counter flow wet cooling tower with multiple cells. Cooling tower blowdown is the water that is drained from the towers to remove mineral build-up (also known as "bleed water").

The cooling towers will use an oxidising biocide to control growth of algae and other biomass that reduce the cooling system effectiveness due to cooling tower nozzle fouling and surface fouling leading to reduced heat transfer and plant efficiency. Biocide dosing is also required to address the risk of legionella growth in the towers which must be controlled from a health and safety perspective. The most common form of biocide used in the power sector is chlorine, although some power plants use bromine dosing systems, or a combination of the two.

Blowdown from the cooling towers will contain small residuals from the biological (likely to be chlorine) and scale (likely to be sulphate) control systems. Chlorine has a short effective lifespan as a biocide and the residual free chlorine levels in the cooling water circuit will dissipate relatively quickly after exposure of the chlorine to biological matter and exposure to air, such as during the drop from spray nozzles to cooling water pond or within an aeration or open pond.

The cooling towers will have a fibreglass structure and to have antifouling packing installed to minimise the potential for biological growth that might be expected for other materials such as wooden structures. The cooling towers will also comply with Victorian *Public Health and Wellbeing Regulations (2009)* for cooling towers and the use of biocide will be optimised to minimise free chlorine impact on the cooling tower blowdown system through good practice design and materials selection.

Typical industry good practice use of a chlorine biocide is proposed for the EfW Plant, which entails targeting regular 'slug' doses of chlorine to a maintain a minimum free residual concentration of approximately 0.5 ppm and a maximum of around 1 ppm immediately after a dosing period dose. This is a common approach to 'shock' biological growth within the tower and cooling water circuit on a regular periodic basis (e.g. once for a few hours per day, actual frequency will be determined during operations supported by free chlorine testing and microbiological cell count monitoring)[27,28]. It is in the interest of the EfW plant operations to minimise free chlorine in the cooling water system as it will exacerbate corrosion rates of pipes and condenser tubes if not tightly controlled.

For comparative purposes, Melbourne potable/drinking water has average free chlorine levels of between 0.05 and 0.1 ppm.[29] For public swimming pools in Victoria, the Victorian Department of Human Services mandates a free chlorine level of between 1ppm (minimum) and 8ppm (maximum)[30].

The Mill currently has biological control systems on existing cooling towers as required for legionella protection. Other Mill water systems have been progressively closed to increase water re-use and consequently most of the water systems have managed biological treatment programs, especially on the five paper machines. The Bleach Plant at the Mill has two chlorine dioxide addition stages, resulting in small chlorine residuals in the bleached pulp. The chlorine residuals are minimised by the control systems and rapidly consumed when the waters are ultimately purged into the wastewater feed drains, which are biologically treated in the aeration pond after the primary clarifiers.

The free chlorine from the EfW cooling tower blowdown would be consumed prior to or when it is mixed with the other process streams being feed to the primary clarifiers (Waste Water Clarifier #2 in this case) and therefore would have no impact on the biological performance of the aeration pond (No.1A). Consequently, it is expected that there will be no change to the quality of the Mill's discharge to the Latrobe River.

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[27] Cooling Tower Water Systems, Part 2, Ganesh Kamatkar — January 25, 2018, https://www.watertechonline.com/cooling-tower-water-systems-part-2/

[28] General Electric (GE) - Water Technologies Handbook, https://www.suezwatertechnologies.com/handbook/cooling_water_systems/ch_27_chlorine.jsp

[29] Guidance for use of recycled water by Industry, Institute for Sustainability and Innovation, Victoria University, CSIRO Land and Water Fund

[30] Pool operators' handbook, Victorian Government Department of Human Services, February 2008. https://www2.health.vic.gov.au/about/publications/researchandreports/Pool-operators-handbook

Under the normal operating scenario ("Case 1"), the EfW Plant will generate approximately 0.31 ML/day of blowdown water to be directed to the primary clarifiers. An infrequent operating scenario is where the EfW Plant is operating at full load and no process steam is transferred to the Mill ("Case 2"). Under this scenario, the plant will generate approximately 0.79 ML/day of blowdown water to be directed to the primary clarifiers. This compares to existing biological and chlorine containing flows from the Mill of approximately 53 ML/day being directed to the primary clarifiers.

9.5.4.3 Cooling tower blowdown – total dissolved solids

It is noted that electrical conductivity (EC) or direct conductivity is an indicator parameter for total dissolved solids (TDS) concentration. The relationship between TDS and direct conductivity is not directly linear with the concentrations of some ions commonly found in water having exponential or logarithmic relationships between the two water quality parameters. Where there are a number of chemical ions present in varying concentrations in a water stream, such as will be the case for the EfW blowdown system, the direct conductivity meter that will be used to monitor cooling tower blowdown on a continuous basis will need to be calibrated in service against laboratory test results for TDS before it can be considered an accurate control and monitoring device for the plant. This calibration process will be undertaken during the plant commissioning phase so the cooling water cycle chemistry regime can be informed and controlled effectively.

Table 9.3 below shows the estimated Total Dissolved Solids (TDS) in the raw water from the Moondarra Reservoir[31] and the allowable EPA licence limit for discharge to the Latrobe River. It also shows what the estimated TDS would be for the cooling tower blowdown stream based on a cycles of concentration of 5. A concentration factor of 5 is considered an initial estimate of the expected mode of operation of the cooling towers and the final figure will be determined during detailed design once the cooling tower detailed design is finalised. Parameters such as expected evaporation rates, drift losses and the cooling tower chemical dosing regime will affect the final concentration factor adopted.

Table 9.3 : Total Dissolved Solids (TDS) estimates based on test results

Parameter	Units	ALS Lab	Gippsland Water Test Results	
		Test Result	Average	Maximum
TDS - Incoming raw water	mg/l	42	45	70
TDS - Cooling tower blowdown (based on a Cycle of Concentration of 5)	mg/l	210	225	350
EPA TDS licence limit for discharge to Latrobe River	mg/L	1000		

Table 9.3 shows that even at the maximum levels of TDS tested (observed in the Moondarra raw water), the concentration in the cooling tower blowdown stream would still be well below the allowable limit for discharge to the Latrobe River under the existing EPA Licence.

TDS data collected by AP in 21 samples over a period between July 2016 and June 2018 are presented in Table 9.4.

Table 9.4 : Maryvale Mill River Discharge TDS Statistics between July 2016 and June 2018

Parameter	Units	Value
EPA Licence Limits	mg/L	Daily 1000 Annual Median 850
Count	No. of samples	21
Maximum	mg/L	671

[31] The ALS test data was obtained from a laboratory test conducted by ALS on the 20th October 2017 and the Gippsland Water tests were obtained from routine testing between September 2015 to October 2017.

Parameter	Units	Value
Minimum	mg/L	425
Average	mg/L	601
Median value	mg/L	626

Table 9.5 below indicates the estimated cooling tower blowdown volumes for different operating scenarios. Case 1 represents the normal operation scenario of the EfW Plant with process steam transfer to the Mill, whereas Case 2 represents the scenario where the EfW Plant is operating at full load and no process steam is transferred to the Mill. It should be noted that the Case 2 operating scenario is expected to an infrequent mode of operation mainly correlating to periods where the Mill is shit for maintenance. As can be seen, even under Case 2, the cooling tower blowdown would only contribute a small fraction of the allowable discharge limit.

Table 9.5 : TDS discharges from the EfW Plant

Parameter	Units	Case 1	Case 2
Cooling tower (CT) blowdown	ML/day	0.31	0.79
CT blowdown – average mass emission rate of TDS	kg/day	70	178
CT blowdown – maximum mass emission rate of TDS	kg/day	110	278
Average Mill daily flow discharged to the Latrobe River after treatment (20,130 MLpa over 365 days)	ML/day	55,150	
Average Mill TDS concentration (601 mg/L) discharged to Latrobe River	kg/day	33,145	
CT blowdown % of Mill average mass emission rate of TDS	%	0.21	0.54
CT blowdown % of Mill maximum mass emission rate of TDS	%	0.33	0.84

It can be seen that the EfW Plant's TDS contribution in terms of mass rate is almost negligible. Compared to the existing Mill's TDS mass rate discharge to the Latrobe River of 33,145 kg/day, the EfW Plant will contribute a maximum of 110kg/day under normal operating conditions (0.21% of the existing discharge). This would only rise to 278 kg/day (0.54% of the existing discharge) under Case 2, which is an infrequent operating scenario.

In terms of TDS concentrations, the present estimates of TDS for the EfW cooling water blowdown is likely to be lower than those typically observed currently in the Mill wastewater discharge to Latrobe River, assuming a cooling tower concentration factor of around 8 or less. As such the net impact of TDS concentration (and Electrical Conductivity) from the EfW Plant is expected to be a small reduction in the overall TDS concentration from the existing Mill's discharge.

9.5.5 Proposed water testing

The Maryvale Mill currently conducts water monitoring and testing in part to satisfy the conditions of EPA Licence #46547 and in part to effectively manage the Mill water systems. AP will continue with its current monitoring program and update the program as needed to suit any new licence requirements and/or conditions. The additional process monitoring within the Mill that has been implemented as part of the wastewater process control regime will be expanded to cater for the EfW Plant.

9.5.6 Proposed drainage system

The Project will require the design and construction of an on-site drainage system and connections to the existing Maryvale Mill drainage systems. In addition to these works at the EfW plant, minor modifications to the existing Mill drainage systems may also be required. Such modifications will be developed during the detailed design phase and in conjunction with the selected EPC contractor.

There will be small drainage areas of the EfW Plant that could be contaminated by chemicals, namely the bunds around fuel and chemical storages. Rainfall in these bunded areas will be designated as trade waste and will pass through a suitably designed treatment system prior to being discharged into the Mill's existing tradewaste drains and treatment system. This drainage system ultimately discharges to the Gippsland Water Factory for final treatment.

There is a strong emphasis on maximum water efficiency for the Project and to try and reuse as much of the discharge water from within the EfW plant, back within other processes, in order to minimise both water use and discharge.

Wastewater will be generated from the EfW Plant process water flows and other water uses. The wastewater discharged will be minor in comparison to the water discharged from the existing Maryvale Mill. It is estimated that the Project will typically discharge approximately 0.4 ML/day of water (depending on the load and operating mode of the EfW plant) to the Mill's existing tradewaste and wastewater treatment systems. The water discharged to the trade waste and wastewater systems could be up to 1.2 ML/day if the demineralisation plant and polishing plant are regenerating and if higher process steam flows are required by the Mill.

The majority of this water (~60%) will consist of relatively clean waste saline water from the cooling towers, the boilers and raw water filter backwash and will be directed to the Mill's wastewater treatment system. In this system it will be treated to remove excess suspended solids, before eventually being discharged into the Latrobe River under EPA licence conditions.

The remaining water (~40%) will originate from the demineralisation effluent and will be directed to the Mill's tradewaste treatment system. In this system it will be treated to reduce the concentration of suspended solids and salts prior to eventual discharge to Gippsland Water's tradewaste system.

9.5.7 Proposed storm water management

The proposed stormwater management system for the EfW Plant will be an extension of the existing Maryvale Mill stormwater system, which flows into the Mill's wastewater system. This extension is required to capture run off and control flow from the Project's surfaces such as roofing, roads, parking areas, concrete plant surfaces and hardstand areas.

The storm water collected from clean areas of the plant shall be directed towards the eastern drainage system where it will connect into the existing Mill stormwater system. It is proposed that a flow meter be placed upstream of the EfW plant's point of connection to the existing stormwater system to establish the volume of stormwater that it is generating. No emergency storm water ponds or tanks are proposed.

Some of the stormwater that falls on the EfW Plant will be captured and stored at the EfW Plant and reused within the ash conditioning and ash quenching systems. This will save water being drawn from the raw water supply.

9.6 Environmental risk assessment

The environmental management measures outlined below will be incorporated into the construction and operation of the Project.

9.6.1 Construction and operations

The risks to water and associated impacts identified in the projects risk assessment are described in Table 9.6. This table describes the potential risks associated with both the construction and operation of the Project (refer to Chapter 3: Risk Assessment and Appendix C for further information).

Provided that the mitigation measures (outlined in Section 9.2) on top of existing controls are adopted, the risks to water use, surface water, site contamination and groundwater are considered to be acceptable.

Table 9.6 : Construction and operational environmental risks to surface water

Phase of project	Risk identified	Potential impacts	Mitigation measures on top of existing controls	Risk level
Construction	Impact to surface water quality	• Reduced water quality • Public complaints • Non-compliance with SEPP Waters of Victoria • Non-compliance of existing EPA licence • Pollution abatement notice from EPA	• Development and Implementation of Construction Environmental Management Plan (CEMP) by the contractor and approved by owner to ensure adequacy of measures • Lined/ bunded area for wash-down of equipment to capture runoff • Contractor vehicle wash-down procedures • Chemical storage facilities bunded / design in accordance with EPA and Australian Standards • Chemical management and handling procedures • Temporary storm water control system • Spill kits available	Medium
Construction and operations	Extreme regional rainfall eg natural flood event (>1/100 year storm event)	• Site access restricted or cut-off • Non-compliance with SEPP Waters of Victoria • Reduced water quality • Public complaints • Impacts to human health • Health and/or nuisance impacts to employees • Non-compliance with potential EPA operating licence conditions (TBD)	• Construction of new plant and equipment is located above 1:100 year ARI flood level • Emergency Management Plan • Site selection (plant on the highest area of the site) • Chemical storage facilities bunded / design in accordance with EPA and Australian Standards	Low
Construction and operations	Loss of containment from oil/water separator or neutralisation pit	• Reduced water quality (mainly sediment load) • Non-compliance with SEPP Waters of Victoria • Non-compliance with potential EPA operating licence conditions (TBD) • Notice from EPA (pollution abatement notice)	• Maintain a freeboard of 300mm or suitable level • Monitor levels in tanks and pits • Visual/audible alarm on oil/water separator	Low
Construction and operations	Contamination of groundwater during construction and operations	• Local or regional groundwater contamination • Non-compliance with SEPP Waters of Victoria • Non-compliance with potential EPA operating licence conditions (TBD) • Notice from EPA (pollution abatement notice)	• Construction Environmental Management Plan (CEMP) by the contractor and approved by owner to ensure adequacy of measures • Emergency Management Plan • Site selection (plant on the highest area of the site) • Chemical storage facilities bunded / designed in accordance with EPA and Australian	Low

Phase of project	Risk identified	Potential impacts	Mitigation measures on top of existing controls	Risk level
			Standards • Bunded vehicle refilling facility • Bunker design and testing prior to operations • Groundwater monitoring program	
Construction	Existing site contamination	• Contamination of soil • Release of contaminated leachate • Health impacts to employees/contractors	• Excavate material in a manner which minimises disturbance and avoids/minimises off-site environmental disposal • Dispose of contaminated material in a landfill licensed to take the type of contaminated material or wastes	Low
Operation	Impact to surface water quality	• Reduced water quality • Public complaints (environmental damage, social values, recreational usage) • Impacts to human health • Health and/or nuisance impacts to employees • Non-compliance with SEPP Waters of Victoria • Non-compliance with potential EPA operating licence conditions (TBD)	• Design of plant above floodwater levels • First flush system connected to an oil/water separator to collect any contaminants before discharge • Containment of boiler chemical cleaning effluent • Permanent storm water control system • Segregation of dirty and clean storm water systems • Chemical management procedures • Spill kits • Chemical storage facilities bunded / designed in accordance with EPA and Australian Standards • Sediment and erosion management in accordance with approved drainage / erosion / sediment management plans • Regular/scheduled Inspection of installed erosion and containment devices	Low
Operation	Site contamination	• Contamination of soil • Release of contaminated leachate • Health impacts to employees/contractors • Local or regional groundwater contamination	• Dispose of contaminated material in a landfill licensed to take the type of contaminated material or wastes • Conduct soil contamination sampling • Site selection in area not likely previously contaminated	Low

9.7 Environmental management

9.7.1 Construction

A Construction Environmental Management Plan (CEMP) will be developed in accordance with the Environmental Guidelines for Major Construction Sites (EPA Publication 480, 1996) prior to the commencement of construction, refer to Chapter 12.6. The CEMP will be the responsibility of the EPC contractor and reviewed by AP to ensure adequacy of measures. The CEMP will specify strategies outlined in the risk assessment to minimise and mitigate potential impacts on surface waters and/or ground water.

9.7.2 Operation

The existing integrated Maryvale Operations Management System (OMS) will be updated to reflect the need for revised environmental management practices in relation to water use and surface water management. The OMS will outline the requirements to manage surface water and monitor any impacts to the environment in relation to:

- Water systems and use (such as spill response procedures and practices)
- Water testing
- Drainage systems
- Waste water treatment systems
- Storm water management.

The OMS will specify strategies outlined in the risk assessment to minimise and mitigate potential impacts on surface waters.

9.8 Conclusions

The existing Maryvale Mill currently uses on average between approximately 70-80 ML/day and has a variety of water management systems in place in order to manage, treat and discharge process and stormwater for the existing Mill. After extensive clarification and treatment, the paper mill discharges on average between approximately 55-65 ML/day to the Latrobe River and on average between 15-20 ML/day to Gippsland Water as trade waste.

During operations, it is anticipated that the Project will not significantly increase the amount of water consumed or discharged. Demand for water at the Project is predicted to be approximately 5-6 ML of raw water per day, depending on the load and operating mode of the plant. It is anticipated that approximately 0.4-1.2ML per day of water (dependent on the load and operating mode of the EfW plant) will be discharged from the Project which is minor in comparison to the water discharged from the existing Maryvale Mill. The existing Maryvale Mill Trade Waste treatment system and Wastewater treatment systems will be sufficient to treat the 0.4-1.2 ML per day discharged from the EfW Plant without impacting on the Mill's existing water treatment systems.

The management of storm water and wastewater at the Maryvale site will not fundamentally differ following the construction of the Project, however an extension of the existing system may be necessary in order to allow for the additional volumes from the Project.

9.9 References

Commonwealth of Australia, Bureau of Meteorology, 2018, Monthly Rainfall, accessed 16 January 2017 < http://www.bom.gov.au/jsp/ncc/cdio/wData/wdata?p_nccObsCode=139&p_display_type=dataFile&p_stn_num=085009 >