

Darraby Pty Ltd
 22-24 Junction Street
 Forest Lodge NSW 2037

19th March 2025

Attention: Mr David Matthews

Re: Equinox Marulan Stage 3 – Private Sewer Treatment Plant Upgrade Report – Rev 2.1

Please find below a summary of the proposed IPSTP upgrade for Equinox Marulan Stage 3. This report is designed to detail the calculations and infrastructure required to upgrade the existing Wastewater Management System (WWMS) approved under DA/0162/2324. This report details the requirements and methodology to upgrade the system so it is capable of effectively treating sewage from lots 301 to 407 in DA/0275/2324 (Stage 3).

1. Background

The existing Interim Private Sewer Treatment Plant (IPSTP) and associated irrigation area is located in the South-western portion of the development site at 49 Wilson Drive, Marulan. The plant was approved under DA/0162/2223 to act as an interim sewage treatment solution for Stage 1 and 2 of the Equinox Subdivision (149 residential lots). The current plant has the capacity to treat ~77.48KL of effluent / day.

2. System Upgrade Purpose

Due to the uncertainty in timing around the Marulan WWTP upgrade, Darraby propose to upgrade the IPSTP by 55KL/day to manage the effluent from lots 301 to 407 (106 total). The design upgrade of the IPSTP increases the plants' total treatment capacity to 133KL/day.

The proposed upgrade design is based on maximizing the operational parameters of the existing constructed tested and certified WWTS (ASBR+80-A-X-A-S-P-C), and provide additional treatment process up to additional 55KL/day, with the same feed and treated water characteristics as shown below;

Influent Quality	Type	Domestic strength sewage (Metcalf and Eddy 5th Ed)
	Temperature	15~35°C
	pH	6.5~8.5
	BOD	≤350 mg/L
	TSS	≤350 mg/L
	T-N	<80 mg/L
	T-P	<16 mg/L
	TDS	<2,000 mg/L
Effluent quality	Risk Level	Medium (Class A)
	BOD	<20 mg/L
	TSS	<30 mg/L
	pH	6.5~8.5
	T-N	<30 mg/L
	T-P	<6 mg/L
	Turbidity	<5 NTU [Class A]
	E.Coli	<10 CFU/100 mL [Class A]
	Free Chlorine	0.2~2 mg/L
	Plant capacity	133 m3/day

3. System Upgrade Conditions

The System (Upgrade) must be operated in a manner that:

1. Ensures that treated sewage (and any by-product of any sewage) is removed from the Site in a safe and hygienic manner.
2. Achieves the following performance standards:
 - (a) the prevention of the spread of disease by micro-organisms.
 - (b) the prevention of the spread of foul odours.
 - (c) the prevention of contamination of water.
 - (d) the prevention of degradation of soil and vegetation; and
 - (e) the discouragement of insects and vermin.
3. Does not cause pollution or contamination of land.
4. Ensures that persons (other than employees, agents, contractors or subcontractors who are engaged to operate or maintain the System) do not come into contact with raw sewage or effluent; and
5. Ensures that there is no wastewater run-off, seepage or irrigation from the Site to the environment beyond the boundary of the Site.
6. Implemented as per the issued Effluent Disposal Site Assessment report (1732-EDSA-01-010824.v1f)
7. Adheres to all Conditions of Approval to the local and state Authorities (Goulburn Mulwaree Council / Water NSW)

The Design of the Effluent Irrigation (upgrade) from the System shall:

8. Be discharged and contained within the expanded approved irrigation area as identified in the Development approved area; and
9. Be managed to ensure there are no discharges from the irrigation area.
10. Irrigation from the System is fully designed, constructed and operated in accordance with manufacturers specialist design and operational procedures, to ensure the compliant discharge conditions.
11. All operations, Maintenance, reporting process are undertaken by a suitably trained and competent operator.

4. System Plant Upgrade Scope

The upgrade of the current private WWTP System is to treat additional transferred / gravity flows based on the following capacities;

- EP is based on 1ET = 2.6EP (GMC Development Servicing Plan, Section 8.3, Marulan occupancy rate) Transfer Capacity required: Stage 3 = additional 106 lots = 275.6EP of 55KL.

The calculation formula for assessing the system operational capacity is provided below;

Existing System

$$\begin{aligned}
 1\text{ET} &= 2.6\text{EP} \\
 2.6\text{EP} * 149 \text{ Lots} &= 387.4\text{EP} \\
 387.4\text{EP} * 200\text{L} &= 77.48\text{KL/day}
 \end{aligned}$$

Proposed Upgrade

$$\begin{aligned}
 1\text{ET} &= 2.6\text{EP} \\
 2.6\text{EP} * 106 \text{ Lots} &= 275.6\text{EP} \\
 275.6\text{EP} * 200\text{L} &= 55.12\text{KL/day}
 \end{aligned}$$

Total System Capacity

$$\begin{aligned}
 1\text{ET} &= 2.6\text{EP} \\
 2.6\text{EP} * 255 \text{ Lots} &= 663\text{EP} \\
 663\text{EP} * 200\text{L} &= 132.6\text{KL/day}
 \end{aligned}$$

The purpose of this staged development upgrade is to further allow the scheduling / development of the Marulan Wastewater Treatment Plant replacement / upgrade (by Goulburn Mulwaree Council).

This ASBR+ Sewage Treatment Plant Upgrade to Capacity 133m³/day of sewage / Effluent quality Class A as per the MakWater '27112024 - ASBR Upgrade – 23390'. In addition TWSe shall assist / direct / review the following in this proposed Upgrade.

4.1 Installation, Commissioning, Stabilisation & Operator Training:

Commissioning of the initial MAK Water ASBR+80 Plant is completed. This next stage 3 submission will action the upgrade of the ASBR+80/53–133 WWTP System in four stages, outlined in the subsequent section below:

4.1.1 Stage 1 – Installation / Testing / Commissioning Existing Plant;

Mechanical installation of the tanks, piping, pumps, bioreactor(s) and container(s) is completed onsite. Testing has been undertaken, with livening the plant electrically, and using potable water.

The MAK Water commissioning team has remote login access, and has completed testing of the PLC, pumps and motors and verified the plant is ready for wet commissioning. Influent / sewage / sludge is then introduced into the plant.

The MAK Water commissioning engineer assisted by Darraby's trained certified Operator(s) shall provide informal training / plant familiarisation for Council Waste Water inspectors, with Ongoing training courses available.

4.1.2 Stage 2 – Stabilisation existing Plant;

The bioreactor tank is seeded with microbiology (sewage material). The type of seed used will impact the duration of the stabilisation period; these options are outlined below;

Stage 3: Stabilisation	5 - 7 days using activated sludge 6 weeks using raw sewage and MAK-BSWD 12 weeks using only raw sewage. Plant to be operated by the clients operator, with remote assistance by MAK Water.
Stage 4: Commissioning Validation	6 weeks

During the stabilisation period, the microbiology in the bioreactor is grown until the suspended solids and other levels such as TKN, pH and DO are stable / sufficient. This is verified by laboratory tests of water samples taken from the influent sewage, bioreactor tank and treated effluent.

During stabilisation, the plant will be operated by Darraby's Trained operators with remote assistance by MAK Water.

Disposal of treated effluent produced during stabilisation, as well as influent / effluent sampling and lab testing, will be managed by the Darraby's trained Operators until the plant is validated.

4.1.3 Stage 3 – Commissioning Validation

Commissioning Validation is undertaken in accordance with the relevant local guidelines and usually takes place over a minimum of six weeks to gain a minimum of 6 samples from both the sewage influent and treated effluent discharged from the plant.

This is essential to ensure the system works to the established operation limits and that, where applicable, appropriate approvals are received before treated effluent is reused onsite.

After completion of the Commissioning Validation, routine monitoring (Operational Monitoring) is carried out accordance with the applicable local guidelines.

MAK Water offers remote access through proprietary ClearAccess™ software. This allows their service department to action immediately any plant anomalies to prevent unnecessary shutdowns.

ClearAccess™ comprises online monitoring, analysis and control tools for the plant. This smart system keeps operators informed of potential issues in real-time which gives facility managers peace of mind knowing they have reliable access 24 hours a day, 7 days a week. It also analyses performance trends, to proactively identify issues well before they develop.

4.1.4 Stage 4 – Installation plant equipment to reach 133KL/day / Testing / Commissioning;

During the Operation of the initial MAK Water ASBR+80 (+53/133) Plant, pending Stage 3 subdivision development, this 'WWMS Upgrade' plan stipulates the action scheduling required. These works are to include;

- Operation & Maintenance Manual Update
- Drawing Stage 3 MAK6010-VA-001_TWSe A1 Model (detailing Future Plant included)
- MAK6010 Electrical Load List rev 2 - Upgrade to 94Amps / per phase (NB this is assuming all plant operational simultaneous (not likely), however is to include start current / fault load restarts.
- MAK6010-VJ-000 1 AB Piping & Instrumentation Diagram(s) (P&ID) 1/2/3/4 to be updated
- Process design specifications reviewed in accordance with Australian Standards, including AS 3000 for the electrical component.

- The anticipated lead time for delivery of this equipment (some Perth / some NSW) is 14 to 16 weeks.
- We estimate 4 to 6 working weeks is required for delivery, installation, testing, then livening additional equipment into the operational process (Commissioning).

4.2 Equipment Upgrade: These (above) existing plant drawings / operational conditions have been assessed to the extent of the 'plant / equipment' being supplied by MakWater, and to be installed / integrated in this upgrade by TWSe:

1. Installation of two (2) Raw sewerage storage tanks (for site emergency storage in case of plant failure – These tanks are individually isolatable, and able to then be pumped out through the inlet works / through the WWTS process. Alternatively if extended plant issues, these tanks have vacuum sludge truck connections for emptying and would be transferred to Goulburn STP authorised receiptal point.
2. Installation of additional 46KL Balance tank and associated pipeworks
3. Installation Balance tank mixing pump (Regent - 50V-139-T23G-11kw Vorbloc 50V/13, CI.CI.SS 11kw 2p 415v)
4. Installation of additional 30KL Aeration (Aerobic) tank and associated pipeworks
5. Installation New 2.2KW Aerator (Tsurumi - 50TRN42.2)
6. Installation additional 9KL Clarifier ('in parallel') and associated pipeworks - the connection to be added into the new clarifier at equal lengths from the branch in order for each clarifier to receive equal flow.
7. Installation new RAS/WAS pump (Netzsch - NM031BY01P05B) with additional pipeworks for Endress & Hauser flow meter (5DBB40-AAADBJM0A3I4SGAA1).
8. (TWSe to undertake) Removal of media vessels (re-install external to the container 'on new skid' – Additional media filter (24x72" Composite Blue Tank Tripod Base 4" T&B) vessel, media and controls installation.
9. Installation of the Supplied automated and manual valves, skimmer hoses, brackets, and instrumentation – Pipeworks / fittings by TWSe.
10. New Control panel installation (for 1.5kW & 1 x 4kW Bosch Rexroth VSDs c/w door keypads, and additional VSD's for RAS/WAS and Aerator as well additional instrumentation and actuated valves)
11. Installation of Allen Bradley PLC and HMI – ('AB' brand - CompactLogix 5370 L3 Controller, 2Mb Memory, 12.1" PanelView Plus 7 Performance HMI or equivalent / pending timeframe / model upgrade) Programming and testing prior to delivery / confirm remote login active for operational and further testing with MakWater interface / control – Support testing / commissioning TWSe Electrical / Mechanical.
12. PLC – to allow for 'future plant additions' - Capacity calculation assessment undertaken - the additional future upgrades could include the Dewatering Screw Press (details below) for reduced sludge volume (future option), Further plant modifications for efficiency (Disappointingly, the current smaller PLC does not allow for any further additions as it is at it's memory capacity).
13. Darraby undertake civil works to enable the spaces / heights for the tanks / equipment as above – Attached is the current updated GA.

5. Further assessed scope

1. Effluent Irrigation extension; These added treatment plant facilities, are to then feed to an expanded added section of the existing Effluent Irrigation system (refer to Netafim Drawing '0823002p1-D' Equinox Marulan Overall Option 1 Netafim Services Irrigation layout drawing). This shows the fully designed automatic effluent irrigation area of 4.72Ha.
2. Dewatering Screw Press (DSP) - designed for efficient thickening and dewatering of liquid sludges that emanate from the wastewater treatment process. The process mechanically / automatically dewater thickened or unthickened waste activated sludge (WAS), and digested sludge from aerobic process. This would remove the requirement for sludge removal every 3-4 months, and reduce the associated discharge costs / fees. Refer the MAK Water DSP data sheet. We note the option (costing) offered by MakWater is too substantial in its current Containerised format, and re-design / configuration is required. This plant is not viewed currently required.
3. Detailed Design will be developed during the section 68 or construction certificate process. Darraby are seeking modification approval in parallel with the Stage 3 Development Application. Conditional approval seeks that if the Marulan WWTP is not complete at the time of subdivision certificate, the IPSTP may be upgraded to suitably accommodate the additional (part thereof) residential lots.

6. Expansion WWT Plant Upgrade Summary:

1. This Stage 3 MakWater equipment supply / Site attendance and commissioning by MakWater engineer (likely to only be 1 day with TWSe completing all installation / testing prior / remote login interface with MakWater as required) - note the freight is inclusive of all tanks to site, but the smaller components are excluding freight to site). Costs summary update email from MakWater 13/03/2025.
2. Monthly additional costs: Note: these operational costs are generally as already included / required for the plant sizing in place, however should be reviewed annually - Chemicals \$100 / Testing \$250 / Service & Maintenance (\$12,000 annual = \$1000 Av month) / Vacuum pump out of sludge estimate (3 times yearly estimate \$6000 each = \$18,000 = \$1500 Av month) / Data package for alarm access (\$50) = \$2,900 average cost monthly. This may be borne / shared by all interested parties.
3. TWSe Estimate Project coordination / management / construction / testing / commissioning cost for the Upgrade work is \$55,000.00 + GST
4. Electrical assessment as follows:
Darraby to assess the transformer to consumers' mains (415V 3-phase power supply) from the Transformer (point of attachment) to the SPS / STP / EPS Switchboard (SCA) to verify the available load (current) per phase.

This scope assessment is summary of the proposed IPSTP upgrade for Equinox Marulan Stage 3, including the requirements and methodology scope. Please advise if any queries.

Yours Sincerely,

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