MEMO

TO:	David Usmar	**DATE:**	30th August 2022
FROM:	Tom Board, James Taylor	**PROJECT NO.:**	J000577
REVIEWED:	Navin Weeraratne		
SUBJECT:	Dargaville Wastewater Treatment Plant Capacity & Condition Assessment - Overview		

EXECUTIVE SUMMARY

A capacity and condition assessment of the Dargaville Wastewater Treatment Plant (WWTP) has concluded the asset condition of Dargaville WWTP to be moderate overall (condition grade 3), with certain critical unit processes (particularly the oxidation & maturation ponds) in poor condition. The plant also has an immediate need for an inlet screen.

This assessment has also found the WWTP to lack capacity for treating current and estimated future wastewater flows. It is therefore recommended that an inlet screen be installed as soon as possible and existing unit processes in poor condition be repaired. Further upgrades should also be considered and scoped to improve treatment capacities to accommodate current shortfalls and predicted future flows. A monitoring programme to validate assumptions (as presented in Awa's *Dargaville WWTP Capacity and Condition Assessment, 2022*) and inform the selection and design of any future system upgrades is recommended.

BACKGROUND

KDC engaged Awa Environmental Ltd to undertake a capacity and condition assessment of the Dargaville Wastewater Treatment Plant (WWTP). The assessment involved a site visit with KDC's operators and assessing system capacities with respect to observations on site and operational data provided by KDC. This assessment, along with assumptions and limitations has been detailed in the report Dargaville WWTP Capacity and Condition Assessment, 2022. Key findings from this report regarding the capacity of the WWTP are summarized in this memo.

LIMITATIONS

This Memorandum is based on the work undertaken by Awa as summarised in *Dargaville WWTP Capacity and Condition Assessment, 2022*. The opinions, conclusions and recommendations in this Memo are based on conditions encountered and information reviewed as part of that report. Within this context, the WWTP has been assessed against the existing Resource Consent requirements for treated effluent quality. The findings and recommendations of this Memorandum will need to be reconsidered if any amendments are made to the current effluent Discharge Consent requirements.

Existing system capacities have been estimated based on site observations and treated effluent data. Comparing these capacities to actual inflows has been difficult due to limited and highly erratic inflow data. Any future WWTP upgrades to accommodate growth will require ongoing investigation and monitoring of

inflows for both quantities and quality; and validating assumptions relating to existing flows provided in *Dargaville WWTP Capacity and Condition Assessment, 2022*.

SITE OBSERVATIONS

The plant is being well kept with neat and tidy grounds. The primary and minor equipment are generally in moderate condition (condition grade 3, refer Table 1), with certain equipment, such as the horizontal floating aerator 1 in very good condition but with other equipment, such as Pump Jet Aerator 2 in poor condition. The Discharge Pumpstation Control Panel Cover and Flowmeter Shed are in good and poor condition, respectively (condition grades 2 and 4, respectively). The Electrical, Instruments and Analytics, are generally in moderate to good condition (condition grades 3 to 2).

Table 1 Infrastructure Grading Guidelines

CONDITION GRADE	DESCRIPTION	GENERAL MEANING
5	Very Poor	Effective life exceeded and incurring excessive costs compared to replacement costs due to unreliability. Will require major overhaul/replacement in the short term. Broken, not working, or failed.
4	Poor	Parts and components function but require significant maintenance to remain operational. Will require overhaul/replacement within the medium term.
3	Moderate	All components functioning acceptably but showing significant wear and tear. Minor failures. Efficiency has diminished. Bearing and gland wear becoming more evident. Corrosion of metal components starting to become evident.
2	Good	As 1 but showing signs of superficial wear and tear. Major overhaul/replacement not needed in the medium term. Efficiency undiminished. Minor oil leaks and gland wear becoming more evident. Corrosion of metal components starting to become evident. Protective coating still evident.
1	Very Good	Sound modern structure. Well maintained. New (1 to 2 years old)

The asset condition of Dargaville WWTP is considered moderate overall (condition grade 3), with certain critical unit processes, particularly the oxidation & maturation ponds, in poor condition and observed as follows:

- The Oxidation Pond, a critical unit process, is in poor condition (condition grade 4). The wavebands are failing or have failed, and the supporting walls are heavily aged and corroded with wall sections missing due to collapse. Some banks are damaged and there is evidence of subsidence.
- The maturation pond is also in poor condition (condition grade 4). The maturation pond polyethylene liner is failing and there is a visible build-up of sludge with evidence of a sludge blanket building just below the surface. This sludge build-up reduces the working volume of this critical unit process.

Mid-range to major repairs will be required to these processes within the medium to short term. The plant also has an immediate need for an inlet screen to remove gross solids from the raw sewage flow and the downstream unit processes. Gross solids are very evident in the oxidation and maturation ponds. The wooden walkways and platforms including any associated handrails are in a state of disrepair (condition grade 4 [poor]).

DARGAVILLE WWTP CAPACITY

The Dargaville WWTP is a conventional wastewater treatment plant, based around very large oxidation and maturation ponds followed by a wetland area prior to discharge of treated effluent to the environment, the Wairoa River (which flows down to the Kaipara Harbour). The Dargaville WWTP treats the wastewater from Dargaville town of some 4,950 people (*Population Projections 2018-2051, Kaipara District Council, October 2020*) and high-strength partially treated effluent from the neighbouring Silver Fern Farms meat works. It also processes return liquors, geobag leachate/filtrate, from three separate dewatering areas adjacent to the plant.

Based on existing population data, the current residential dry weather flow has been estimated at approximately 1,000 m^3/d. Allowing 20% for commercial/industrial discharges and infiltration into the network; the average dry weather flow into the WWTP from Dargaville is estimated at 1,200m m^3/d. Metered data received from KDC indicate a similar dry weather flow during summer months; however, this data was also highly variable on a day-to-day basis. Given the highly variable nature of the data received, the reliability of this data is considered low and further targeted monitoring is strongly recommended. We understand KDC has recalibrated the flow meters measuring inflows from Dargaville in April 2022. It is therefore hoped that flow data over the summer months of 2022/2023 (i.e., December, January and February) will help verify this estimated average dry weather flows.

The additional flow into the WWTP from Silver Fern Farms has been difficult to quantify with highly variable and erratic data being provided by existing flow meters. Silver Fern Farms have however indicated their daily discharges to be in the order of 600-800 m^3/d. If accurate, this would result in an average dry weather flow for treatment at the WWTP of 1,800-2,000m^3/d.

The current Resource Consent permits a monthly rolling average daily effluent discharge of 3,200 m^3/d rising up to a maximum daily 10,000 m^3/d during wet weather. It also requires a treated effluent quality of <40 mg/L (cBOD); <80 mg/L (TSS); <80 mg/L TKN and < 20,000 MPN/100mL (Faecal Coliforms). The theoretical design capacity of the Dargaville WWTP has been estimated as 1,600 m^3/d, based on the calculated biological capacity of the oxidation pond. Within this context, the raw wastewater parameters have been assumed using engineering judgement, as no test data was available of influent qualities.

Based on the above figures, the current WWTP is considered to lack capacity for treating current average dry weather wastewater inflows. Within this context, achieving the theoretical design capacity of 1,600 m^3/d, and complying with the existing Resource Consent, will also require unit processes in poor condition to be improved (i.e., the oxidation and maturation ponds).

It is noted that testing data of the WWTP effluent (obtained during our site visit) suggest the treated wastewater from the WWTP to generally meet Resource Consent requirements, with non-compliances limited to TSS. Repairs to the oxidation and maturation ponds, as recommended in *Dargaville WWTP Capacity and Condition Assessment, 2022* may help further reduce these non-compliances noting sludge

build-up will adversely affect the process performance and could be a contributor to the relatively high TSS readings identified in the treated effluent.

We however note that since the completion of the *Dargaville WWTP Capacity and Condition Assessment, 2022;* we have obtained a PDP report that provides effluent data for a much longer period (i.e., *Assessment of Environmental Effects - Dargaville Wastewater Treatment Plant Discharge, March 2022*). The data provided in the PDP report suggests effluent quality from the WWTP to have also failed to meet Consent Requirements for cBOD, TKN and faecal coliforms from time to time; since 2019.

The population of Dargaville is estimated to grow by approximately 22% by 2051 (*Population Projections 2018-2051, Kaipara District Council, October 2020*). Noting our calculations have indicated the Dargaville WWTP to theoretically be under capacity to treat current dry weather flows, servicing predicted future population growth (or the currently consented dry weather flow of 3,200 m^3/d) will require further upgrades to the plant's capacity. Some options for this has been highlighted in the PDP report referenced above; however given the relative uncertainties with respect to influent quantities and quality, we recommend the following works prior to any additional upgrades and unit processes being selected or sized for the Dargaville WWTP (noting there remains to be a need to better define and quantify the impact of I&I and flows from Silver Fern Farms on treatment requirements at the WWTP).

1. **Flow Monitoring:** Implement targeted monitoring of inflows into the WWTP (i.e., on discharges from both the public network and Silver Fern Farms).
    i) We understand KDC has recalibrated the flow meters measuring inflows from Dargaville in April 2022. Monitor these results for anomalies and use data gathered over the summer months of 2022/2023 (i.e., December, January and February) to verify estimated average dry weather flows.
    ii) Install flow meter on inlet from Silver Fern Farms (or replace/calibrate the existing meter at Silver Ferns Farms to achieve more reliable results).
2. **Influent Quality:** Carry out sampling and lab testing of the raw sewage and Silver Fern Farm liquor. This should include up to 10 samples over a number of weeks, to include a variety of dry and wet weather conditions (on both the raw sewage and Silver Fern Farm liquor).
3. **Upgrade existing infrastructure:**
    i) **Oxidation Ponds:** In poor condition and would be prudent to inspect and undertake required repair works on critical components (such as the waveband, pond baffles, pond banks, supporting walls, and raw sewage inlet pipe) in the short to medium term.
    ii) **Maturation Pond:** The maturation pond liner and sludge build up are adversely affecting the performance of the maturation pond and treatment outcomes. Prudent to undertake de-sludging urgently and inspect and undertake repair works to the maturation pond in general, in the short to medium term.
    iii) **Inlet screen**: The Dargaville WWTP is currently missing a coarse inlet screen that would remove gross pollutants. It is recommended that one be installed in the immediate future.
    iv) **Jet aerator 2:** Is noted to be in poor in condition and will likely require repair or replacement in the medium to long term.
    v) **Flowmeter shed**: Is noted to be in very poor condition, aged, rotten, and not weather tight. It will likely require replacement in the short to medium term.
    vi) **Spare parts:** To ensure the Dargaville WWTP is resilient to disruption, it would be prudent for critical spare parts, such as seal and gasket kits for pumps and critical spares for the aerators, to be held on site (or close by). This should be undertaken in the near future.