Toohey Waste Water Treatment Plant 2016

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SITE BACKGROUND – Tooheys situated in an urban area surrounded by commercial and residential development, restricting gas and odour emissions and site foot print. Site discharges direct into Sydney's municipal sewer contributing approximately 1% of their intake. Taking energy direct from the grid and utilising natural gas within a cogeneration plant and within its 2 by 10MW boilers.

SITE OVERVIEW - The plant is split into 4 main processing stages.
Stage 1- primary treatment 0.7mm rotating drum screen removing spent grain, crowns, glass. Equalisation tank of 600KL buffer capacity to compensate upstream batch processing fluctuations in pH, temperature and volume. Incoming COD at an average load of 10,965 kg/d

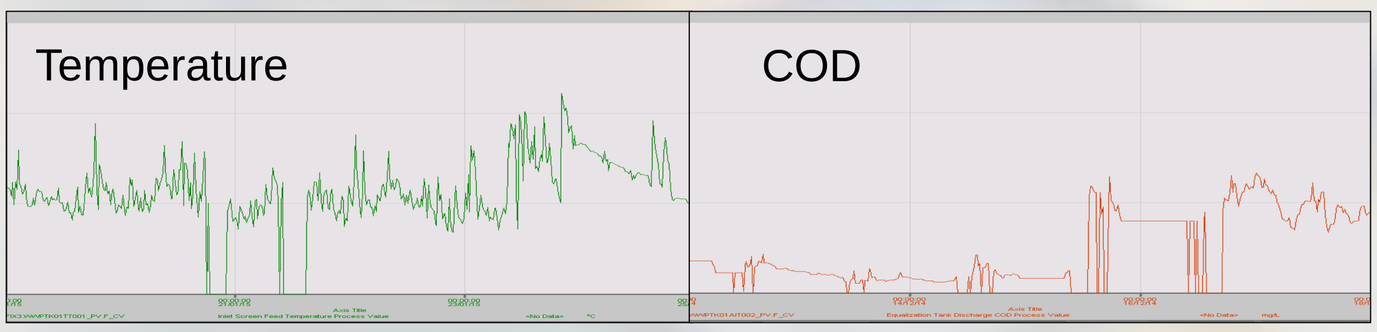

Figure 2 –Fluctuations over 24hr

Stage 2- phase 1 of secondary treatment, reducing foot print via anaerobic digestion broken down into a series of reactors. Pretreatment in the preacidification (PA) reactor to increase soluble organic compounds prior to the PARQUES internal circulation (IC) reactor or biogas production stage. Hydraulic retention time in IC is increased with a 3:1 ratio via a splitter returning effluent back into the mix tank.

Stage 3- phase 2 of secondary treatment 800kL aerobic reactor functioning at 1.4 mg/L DO. Use of a decanter centrifuge to maintain 5000ppm TSS

Stage 4- polishing phase with a 4 train MBR for rapid clarification. Max permeation of 60kL/hr with a RAS to the aeration tank 1:5. Maintenance cleans after 48hr operation of hypochloride and citric back flush system to reduce layer caking and fouling of the membranes. Permeating at an average 90mg/L COD

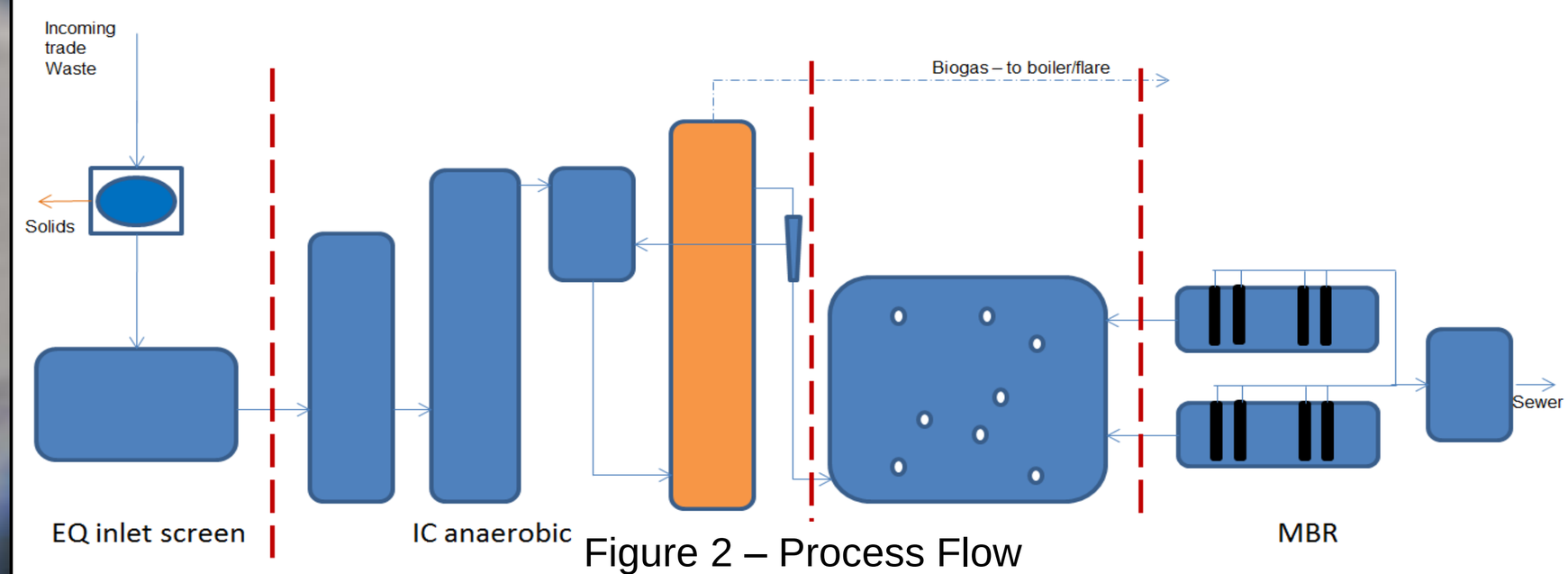

Figure 2 – Process Flow

Image 1 – Western Slab (IC)

Image 2 - Aeration Tank

RESULTS –
95% COD reduction across entire process (85% achieved in IC reactor) - Significantly reducing load on Sydney Water municipal and prolonging their assets by H_2SO_4 reduction

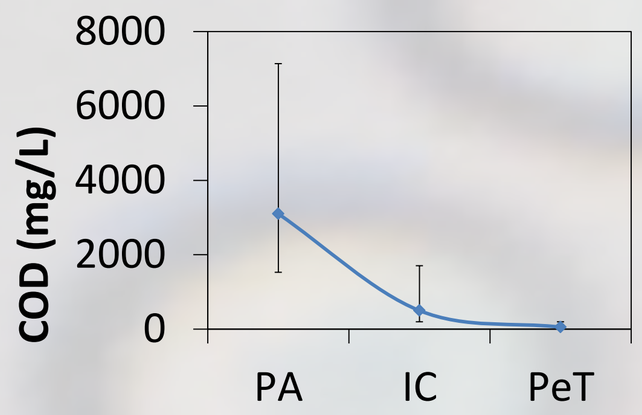

Figure 3 –COD reduction over

Average 250m³/hr biogas production during midweek operations, 5% of boiler 2 powered by biogas at cost reduction of AU$ - Excessive gas is flared off to ensure no gas discharge

Zero odour due to installation of BioAir Units installed on overflow of all anaerobic process vessels – seeded with aerobic sludge function under a trickle bed philosophy to primarily strip H_2S (160ppmv)

Highly automated system can be controlled and monitored remotely

ONGOING CHALLENGES

1. Brewhouse CIP temperature and pH, threatening the IC and gas production by inhibiting PA reactor – resulting in reduced gas production start week

2. Limited feed to Aeration system on weekends – during summer combined high ambient temperatures are leading to filamentous foaming – managing foaming via bypass functionalities

3. Fluctuating H_2S concentrations in biogas – potentially mash product dependent –risk on boiler corrosion

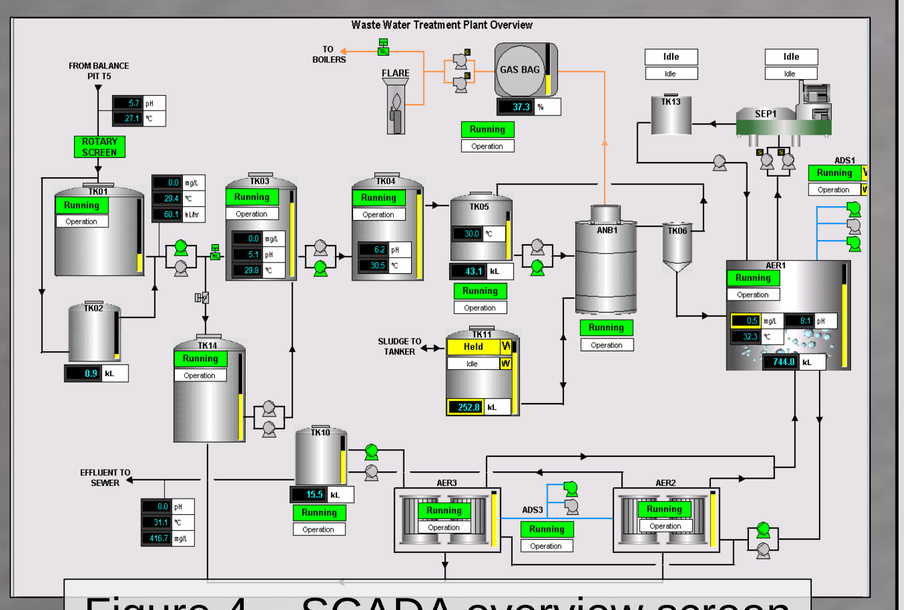

Figure 4 – SCADA overview screen

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