

# HOW IT WORKS...

#### I. EXISTING MILLISCREEN FACILITY

- The existing Milliscreen facility was commissioned in 1991.
- Domestic wastewater passes throug rotating drum screens of 1mm
- Screenings drop onto a conveyor a are then pressed to remove water an dropped into skip bins.
- The skip bins are emptied at Omarur. Landfill
- Approximately two bins of screening are collected each week.
- Napier's domestic effluent will
- continue to be screened prior to treatment by the new Biological Trickling Filter Plant. The outfall pump station is located at
- the southern end of the building. The pumps treated effluent into Hawke B via a 1.5km ocean outfall.

### 2. NEW BIOLOGICAL TRICKLING FILTER FACILITY

- The additional domestic wastewate treatment comprises of a grit remov process, BTF pump station, two biological trickling filters and Raka channels before being pumped to sea.
- Separated industrial wastewater is screened before passing over an industrial Rakahore channel then out to sea.
- The BTF plant is designed to treat up to 1400L/s.
- The plant is built on a 6m deep grave raft that replaced the liquefiable ground material.
- The BTF plant took 15 months to build and was commissioned on 28 August 2014 to meet resource conse requirements.
- An extensive network of site services has been installed around the plant pressure pipelines using DN750 PE pipe and DN600 GRP, large diameter (DN1350) cement-lined steel gravit pipes, 400 volt power, process and potable water, fibre-optic control c network plus copper local control cabling, site sewer and stormwate pump stations, roading and lightin

# 3. GRIT CHANNELS

- Connected to Milliscreen building by cement-lined steel pipes 1350mm diameter.
- Flow control if needed in maintenance or emergency situations will be by manually operated penstocks and slide-gates.
- Each channel is designed for 700 L/s with bypass capability for an additional 700 L/s to provide for full wet weather flow of 1,400 L/s even when a channe is out of operation.
- Grit from the flow is forced to the bottom of the circular tubs by spinn paddles creating a vortex, then pumped up and across to grit classifie equipment in the nearby building.
- Each of the two grit pumps operate for 5 minutes every hour and the paddles spin continuously.

#### 4. ELECTRICAL AND SCREENS BUILDING

- The environment in the screens room has potential to be humid with H<sub>2</sub>S gas so the room has ventilation extraction equipment.
- The external wall cladding, above the 3m high concrete precast panels, is an aluminium-skinned sandwichstyle panel to reduce the risk of corrosion from the humid and gaseous environment.

# 5. GRIT CLASSIFIERS

- Classifier equipment separates the grit from water and discharges to a skip.
- The motor runs 5 minutes every hour (in conjunction with the pump at th bottom of the grit chamber outside
- Skip contents are disposed of at Omarunui Landfill.
- Fans extract foul air to the ventil network connected to the biofilt

#### 6. INDUSTRIAL SCREENS

- Rotating drum screens specifically for industrial flows from Awatoto and Pandora.
- Industrial flows mix in the bifurcat chamber at the east end of this building before splitting to either of the two screens.
- Inflow can be shut off using
- pneumatically actuated valves. Each screen can handle 150L/s.
- Screenings are collected in bins then disposed of at Omarunui Landfill.
- Outflowing effluent leaves via glass reinforced plastic pipes beneath th mezzanine floor.
- Fans extract foul air to the ventilation network connected to the biofilter

# 7. ELECTRICAL ROOM

- Motor control centre (MCC) distribution power to all the various plant components.
- Power to most motors and equip around the plant comes from the MCC
- Control panel contains the programming system for the plant
- Variable speed drives are used to control the speed of various moto around the plant.

# 8. PUMP STATION

- Below ground structure made fron concrete precast panels (400-500m thick, up to 20 tonne), above ground structure made from structural ste portal frame and sandwich-style panel with Coloursteel Maxx skii polystyrene insulation (up to 6m high
- Consists of four wet wells (4m x 4m x 5.5m) each divided internal by a baffle wall, flow intake can be controlled by use of manually operated penstocks, and flow int each pump is via a submerged fibreglass bellmouth intake.
- Foul air from the wet wells is extrac to the biofilter.
- The dry well houses 4x Flygt submersible main pumps (each weighing 2.4 tonne) plus 2x small submersible Flygt pumps used fo recirculating flow (each pump weigh 1.2 tonne).
- Each main pump is driven by a 125 kW motor. The main pumps are rated a 1,400L/s (three pumps duty and on standby). The recycle pumps are driven by 30 kW motors. Each recycle pump can pump 500L/s.
- Recycle pumps will ensure that the minimum flow rate to the BTFs of 486L/s is maintained. Annual cost to power the pumps is estimated at \$210,000.
- Valves installed on each pipeline include two manually actuated valves (each weighing 420kg) on the intake and outlet, plus a non-return valve immediately downstream of each pump (weighing 740kg).
- The electrical area on the upper lev houses a motor control centre, control panel and variable speed drives for each pump.

# 9. BIOLOGICAL TRICKLING FILTERS

- Two concrete precast panel tanks stressed and post-tensioned) eac 25.8m internal diameter, 32 panels p tank, walls are 11m high and 180mm thick but widened to 300mm at the top
- In the centre of each tank is a 2m diameter concrete central colum fitted with an 8-arm rotary distributo
- At the lower level of each tank is a network of glass-reinforced plastic (GRP) ventilation ducting fo ecirculating air back to the tank or extracted out of the tank.
- Inside is a hardwood timber pile, bearer and joist flooring system fron which the ventilation ducting is hung and the plastic media modules are supported on.
- 5km of timber has been used in these tanks, sourced from Republic of Congo and Forest Stewardship Council certified.
- 15 layers of plastic media modules have been installed in the tanks, to a height of 8.4m. The raw material was manufactured in Germany and plastic welded on site.
- Each tank has one 5kW fan that draws air from under the timber floor and recirculates back into the roof, and two 13kW fans (duty/standby) that extract foul air to the bark biofilter odour treatment bed.
- Atop each tank is an aluminium dome roof, manufactured in Texas and assembled on site.

# 10. BIOFILTERS

- Two bark biofilter beds (13m x 26m) have been constructed for treatment of the BTF plant foul air.
- Foul air is from all equipment in the screens building, the final effluent chamber, the BTF pump station and the two BTF tanks.
- Foul air is pushed into the lower level of the biofilter and is biologically treated as it rises up through the layers of bark.

### 11. RAKAHORE CHANNEL AND DETENTION BASIN

- Two parallel rock-lined channels (Rakahore channels) allow domesti effluent to pass over the rocks and be exposed to air before mixing with industrial effluent in the Final Effluen Chamber and flowing to the outfall pump station.
- A detention basin has been built to cater for exceptional flood or plant failure events where the system cannot cope. This basin can hold up to 20 minutes flow at peak flow and up to 2 hours of flow at average flows.

#### FUTURE PROOFING

- Several future expansion options have been allowed for in the plant design and construction.
- Numerous additional pipe connections have been installed now to reduce complexities at the time of any expansion
- Possible future treatments are: a third Biological Trickling Filter; ultra violet treatment; primary sedimentation tanks with associated biosolids handling facilities and two clarifiers.
- The next development will be construction of a new outfall pump station and new ocean outfall with larger diameter pipe in approximately 10 to 15 years' time.

