Upgrading of Hopetown Water Purification plant
Mechanical & electrical equipment
THEMBELIHLE LOCAL MUNICIPALITY

SUMMARY OF WORKS	
Type of Works	Water Treatment Works
Location of Works	Hope Town Northern Cape
Size of Works (Mℓ/D)	5.6 Mℓ/D
Date of Award	February 2012
Date of Completion	May 2014
Completion Value (Including VAT)	R7.09 Million
Client	Thembelihle Local Municipality
Conditions of Contract	GCC 1985

The purpose of the extensions to the Hopetown water treatment plant was to increase the capacity of the plant to 5.6 Ml/day. The treatment plant provides clean drinking water via the following conventional treatment processes:-

Paterson Candy International (SA) (Pty) Ltd, trading as PCI Africa
T +27 11 794 5004
11 Ridge Road, Laser Park, Honeydew, 2170 | PO Box 308, Northriding, 2162
Reg no: 1953/001821/07
www.pciafrica.com

Directors: MS Mokgosi, MJ Hughes, CO Azih, G Burton-Durham

- Raw water flow control & flow measurement at the head of the works
- Lime dosing into the raw water for pH adjustment
- Poly dosing into the raw water for flocculation purposes
- Mixing channels to provide thorough mixing of the chemicals with the incoming raw water
- Rectangular settling tanks for settling and sludge removal
- Rapid gravity filtration for final polishing of the settled water
- Chlorination equipment for final disinfection prior to entering the treated water storage reservoir
- High lift pumps for distribution of the treated drinking water

Sludge from both the settling tanks and filter backwash procedures is pumped to sludge drying beds, whilst the supernatant (recovered settling tank & backwash water) is returned to the works for re-treatment.

Raw water flow control

The raw water flow into the new works is regulated via an inline flow control valve located at the head of the works. The control valve comprises a 250NB Corflex pinch valve fitted with an Auma electric actuator for modulating control. The valve is regulated via the 4 to 20 mA signal received from the 250NB Autento in-line electromagnetic flowmeter located upstream of the control valve.

Chemical dosing equipment

The following chemicals are dosed into the raw water for pH adjustment and flocculation purposes.

Lime is delivered to the treatment works in 25kg bags. The dry lime is dosed directly into the raw water inlet channel via two dry lime screw feeders. Each feeder has a 150kg storage hopper and dedicated bag loader. Lime is manually fed into the hoppers by means of the overhead bag loaders. The screw feeders are designed to dose between 0.5 & 5.0 kg dry lime per hour. The dose rate is manually adjustable via VSD's controlling each feeder drive. The feeder nozzles are fitted with heater tapes and the storage hoppers are fitted with vibrators to prevent lime bridging from occurring.

Polymer storage & dosing equipment (flocculant aid)

Polymer is delivered to the treatment works in a solution form and is stored in the two 5000 litre GRP tanks located next to the chemical dosing building. The polymer solution is dosed directly into the raw water inlet channel via two new poly dosing pumps (one duty, one standby). The dosing pumps are Grundfos DD6 diaphragm pumps. The dosing rate of the pumps can be manually adjusted to suit the incoming raw water flow rate and required dose rate.

Rapid gravity filtration plant

The settled water from the sedimentation tanks is filtered through four rapid gravity sand filters. The filter sizing and loading rates are as follows:-

Filter dimensions	4550mm long x 3100mm wide
Filter area	14.1 m2
Filter loading at design flow (233 m3/hr)	4.1 m3/m2/hr (58.3 m3/hr per filter)
Filter loading when backwashing one filter	5.5 m3/m2/hr (77.6 m3/hr per filter)

The filter media provided in the rapid gravity filters is dual, comprising a 75mm layer of 2.36-4.75 mm grit on top of which is a 825mm layer of standard quartzitic filter sand with an effective particle size range of 0.7mm

The filters are declining rate, variable head filters. All control valves on each filter are standard butterfly valves with extension spindles and headstocks for manual operation at the upper gallery level.

Filter air scour blower

For air scour purposes, low pressure air is provided via a single blower unit. The blower is a standard Sowerby double lobe Roots Dresser blower, coupled to a 15kW motor and mounted on a rigid mild steel baseplate. The blower is capable of delivering 809m3/hr at 40kPa, providing a filter air scour loading rate of just under 60m3/m2/hr per filter. The blower is covered with an acoustic hood to lower the operating sound level to within acceptable operator conditions (<85dBa at 1.0m)

Filter backwash pumps

Water for backwashing the filters is drawn from the clear water well positioned next to the filters via either of two backwash pumps (one duty, one standby). The pumps are standard KSB end-suction centrifugal type pumps, coupled to 11kW motors, and mounted on rigid mild steel baseplates. The pumps are capable of delivering 488m3/hr, providing a backwash loading rate of 35m3/m2/hr per filter.

Chlorination equipment

Chlorine is dosed at two points in the plant, one at the division box ahead of the flocculation channels, and one at the wet sump (chlorine contact channel) after filtration. Motive water to operate the chlorinator is drawn from the clear water well immediately after the filters via the two motive water booster pumps (duty/standby). The chlorinator draws gaseous chlorine from two banks of 68 kg cylinders (three cylinders per bank, one duty bank & one standby bank). The chlorinator is equipped with an automatic changeover valve. The dosing rate of chlorine to both dosing points is manually adjustable.

High lift pumps

The high lift pumpstation consists of four centrifugal pumps providing the following:-

Hopetown pumps

Two Grundfos NK 80-315 pumps (one duty, one standby) provide treated water to the Hopetown clear water reservoir. These are standard end-suction centrifugal pumps fitted with 22kW 4-pole motors and mounted on rigid mild steel baseplates. Each pump is capable of delivering 38 l/sec (136.8 m3/hr) at 34 m head.

Steynville pumps

Two Grundfos NK 100-315 pumps (one duty, one standby) provide treated water to the Steynville clear water reservoir. These are standard end-suction centrifugal pumps fitted with 22kW 4-pole motors and mounted on rigid mild steel baseplates. Each pump is capable of providing the following duty points:-

Initial (current) flow < 50Hz = 26 l/sec (93.6 m3/hr) at 32 m head
Full (future) flow @ 50Hz =50 l/sec (180 m3/hr) at 22 m head

The Contract was awarded to PCI February 2012 with Practical Completion by May 2014.

The final contract sum was ZAR 7.09 Million, with the end of the defects liability period being January 2015.