
Kingscliff Wastewater Treatment Plant

THE SITUATION

Kingscliff, in the Tweed Shire Council area, is a rapidly growing population centre in northern New South Wales. Five years ago, the Council determined it needed a new wastewater treatment plant to treat sewage collected from the Kingscliff sewerage catchment, and that this new plant should have a capacity to treat sewage generated by up to 25,000 people, with the facilities to double if the need arose.

THE GRUNDFOS SOLUTION

The task for Tweed Shire Council was enormous, and carried a price tag of \$45 million. It also required compliance with new environmental licence provisions.

Substantial investigations, including an environmental impact study, concept design review and verification, geotechnical report, and a sludge handling concept review were carried out. It was proposed to use new technology in the form of a modified carousel-type activated sludge process to yield very low nutrient levels of ammonia, total nitrogen and total phosphorus.

The project became known as the Kingscliff Wastewater Treatment Plant (KWWTP), and treats sewerage collected from the Kingscliff sewerage catchment which includes Kingscliff, Fingal, Chinderah, Cudgen, Casuarina and South Kingscliff. The treatment process was required to meet stringent effluent discharge requirements, and needed to be simple to operate and extremely robust to guard against shock loads on the plant.

The decision to involve Grundfos and Alldos played an important part of the project as both companies come under the same

TOPIC:

Primary treatment, secondary treatment, tertiary treatment, sludge management

LOCATION:

Kingscliff, Australia

COMPANY:

Tweed Shire Council

ownership. This meant that existing channels of communications could be used without any need to establish new ones.

In essence, the KWWTP involves four processes:

Primary treatment Secondary treatment. Tertiary treatment. Sludge management.

The Primary Treatment's objective is to remove debris, grit and other inorganic material from the raw sewage. The screened and degritted sewage is then ready to enter Secondary Treatment stage.

At the Secondary Treatment Stage, the sewage is mixed with return activated sludge (RAS) in a compartmentalised anaerobic reactor, to promote biological phosphorus removal. Four Grundfos submersible mixers (AMD25.45B.690 2.5 kW) are used to maintain suspension of the sludge for process efficiency. The mixture is also dosed by Alldos hydraulic piston diaphragm metering pumps (KM254-102), which add alum and Magnesium Hydroxide to ensure that the specified effluent quality is achieved. In addition to ensuring that the raw sewage, RAS and chemicals are completely mixed, the Grundfos submersible mixers also help prevent solids settling in the anaerobic chambers.

The mixture now moves through to an oxidation tank, where two Grundfos SEV.80.80.22.4 pumps operate and play a pivotal role in withdrawing waste activated sludge and scum. The mixture is transferred from the oxidation tank, to the secondary anoxic reactor. Another Grundfos submersible AMD25.45B.690 2.5 kW mixer is located in the anoxic reactor to ensure that solids are not able to settle and that the contents are fully mixed. The mixture flows to the secondary aerobic reactor and then on to the mixed liquor distribution chamber via a fixed weir, where six Grundfos SE1.100.150.75.4 7.5 kW pumps operate.

The Tertiary Treatment process filters the effluent received from the secondary treatment system before it is disinfected and discharged via the outfall pumps to the release point. Effluent flows under gravity from the clarifier overflow weirs to the secondary effluent pump station. The secondary effluent pump station comprises a pump well and four Grundfos S1124AE7 12 kW low level lift pumps, which are level triggered and operate in a duty/duty assist/duty assist/standby arrangement. The number of pumps in operation at any one time depends on the instantaneous flow over the clarifier weirs. A second Alldos dosing system doses alum upstream of the secondary effluent pump station.

The secondary effluent is transferred through a micro-screening filtration system, and then flows on to a chlorine contact tank. At the inlet of the chlorine contact tank, the effluent is dosed with Sodium Hypochlorite using an Alldos dosing system. The chlorinated effluent travels through the chlorine contact tank to ensure disinfection and then passes on to the dechlorination stage, which is served by a Grundfos Hydro MPC 2 x CRE45-3 11 kW pump set and Grundfos AFV.08.132.41 vertical mixers.

The filtered and disinfected effluent flows to the disinfection chamber, where it is dosed with sodium bisulphite for dechlorination. Once fully treated, effluent enters the sludge management stage, and is pumped by a Grundfos S2554BM1 55 kW pump to the sludge management lagoon via the Tweed River outfall. An Alldos 412-1000 Polydos polymer dosing system is used for sludge thickening prior to dewatering by the centrifuge.

Supernatant from the lagoon is recycled via a site utility pump station that uses Grundfos NB50-125/135 5.5 kW end suction centrifugal pumps.

THE OUTCOME

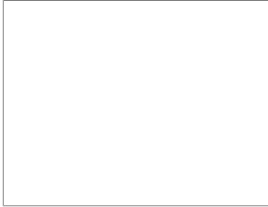
Grundfos pumps and Alldos dosing packages form an integral part of the Kingscliff Wastewater Treatment Plant, and are found in each of the four treatment stages.

Kingscliff is now served by a reliable and effective sewage treatment plant, which can be doubled in size when needed. The effluent quality discharged achieves very low nutrient limits making it a world class treatment facility.

An educational facility, the Sustainable Living Centre, has been incorporated into the plant control building and provides both static and interactive displays to explain the treatment process.

Dewatered sludge from the lagoons is used on cane fields and broad acre farms as a soil conditioner or to supplement fertiliser requirements.

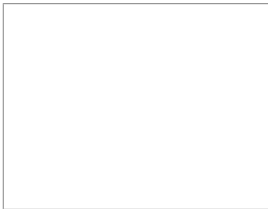
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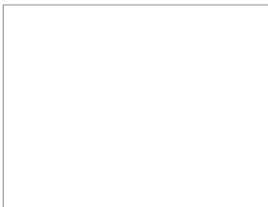
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