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New sewage system improves water quality of Whanganui river

Effectively managing the sewage, wastewater and stormwater flows in a modern city is essential to the health and welfare of the community and the environment. Unfortunately in so many cities around the world the underground networks have been allowed to deteriorate, and now the difficulties in upgrading them seem to be insurmountable. In the city of Wanganui, New Zealand, the city engineers utilised modern plastic pipeline materials and the latest installation technology to help them develop their new network, and now their citizens are benefiting from the improvements to the environment.



The Whanganui is New Zealand's third longest river and originates high on the volcanic plateau of the North Island and drains into the Tasman Sea at the city of Wanganui, some 290 km downstream.

As with virtually every city, the Wanganui sewerage system had developed in a piecemeal fashion as its community had grown. Many of the pipes were old and leaking, and there was no separation of storm water from sewage, which at times caused the system to overload. The old pipes were in bad condition, and there were many untreated industrial outflows discharging directly into the river, significantly reducing the river's water quality.

By the end of the 1990s it was clear that the Wanganui sewerage system required a major upgrade to reduce leakage and infiltration, to separate the storm water from the sewage and to improve the quality of the river water. The development of a new system posed a number of major challenges but would create a better quality of life and a cleaner and healthier environment for the city's inhabitants.

In 2002 the Wanganui city council developed a comprehensive plan to separate storm water and sewage, and to eliminate the discharges into the river by installing an 18 km sea outfall off nearby South Beach. This outfall would be served by a pumping station on the city side of the river. Allied to this plan was the design and construction of an interceptor main to convey screened sewage and industrial wastewater to a new treatment plant prior to discharge into the sea.

One of the major problems was that the new treatment plant was on the opposite side of the river to the existing pumping station. There was an existing large-diameter concrete pipe under the river, but this pipe could not withstand the design pressure. Therefore the council was faced with three options: build an additional pumping station, upgrade the current submarine pipe or build a new one.

A solution that saved NZD 2.5 million

After a feasibility study it was decided that the most effective solution would be to insert a welded 1,000 mm diameter polyethylene pipe inside the existing concrete pipe. The new pipe could easily cope with the pressure, but it would need to be 600 meters long and would weigh 116 tonnes.

However, there was the added complication of four bends in the concrete host pipe, which could mean that the force required to insert the polyethylene pipe would be very high. Although nothing of this magnitude of insertion had been attempted before in New Zealand, the city council decided to go ahead as it was such an attractive solution and had the added benefit that it would save the city NZD 2.5 million compared to alternative solutions.

Carrying 32,000 m³ wastewater daily

To resist the stresses and strains of the installation, high-quality PE100 polyethylene material from Borouge was selected for the manufacture of the pipe. Specialist contractors and engineering consultants were appointed to carry out this unique installation.

The insertion of the pipe took place in April 2007, and it went without a hitch. Because polyethylene has a lower density than water, the pipe floated inside the flooded concrete host pipe and the pulling forces were significantly lower than had been expected.

The complete network including the new treatment plant was commissioned in July 2007, and today it transports 32,000 m³ of wastewater every day, which has led to a great improvement in the water quality of the mighty Whanganui River.

Greatly improved river water quality

Polyethylene provided an effective solution to an otherwise difficult engineering problem and saved overall cost. The challenging project was completed without a hitch and this new pipeline forms a key element in the city's upgraded sewage and wastewater network.

The new system deals much more efficiently with the sewage, stormwater and wastewater flows, and by eliminating discharges into the river, it provides for a greatly improved environment for Wanganui's citizens today and for future generations.

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To learn more about the Wanganui sewerage scheme visit:
www.wanganui.govt.nz

For more information on this project
contact: infopipe@borouge.com

