

Pressure Sewers Rebuilding Christchurch

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Pressure sewer systems have long been used around the world for their ability to cost-effectively service many types of ground conditions including hilly, rocky, flat, unstable and wet ground. The rebuild of the Christchurch wastewater infrastructure following the earthquakes has been perfectly suited to leverage the benefits of pressure systems for an expedient and cost-effective solution.

Since 2007, over 7,000 Environment One (E/One) Extreme grinder pumps, supplied in New Zealand by Ecoflow Ltd, have been installed in 15 council networks. The largest concentration of units can be found in the Bay of Plenty and Auckland Regions. The systems have been introduced as a means to reticulate existing development that previously relied on failing on-site treatment systems or in new development areas where traditional deep gravity systems were cost prohibitive. Pressure systems are also often used in place of gravity systems due to the sealed nature of the systems, which practically eliminates infiltration and subsequent loading on downstream infrastructure.

After the September 2010 earthquake, Christchurch City Council (CCC) identified the pressure sewer system as an effective method of providing temporary wastewater service to areas damaged by liquefaction and lateral spreading. After the February 2011 earthquake, it was clear that in some areas, pressure sewer systems would be ideal as a resilient permanent solution.

Pressure systems use specially designed pumps at each property or connection. The pumps feature a macerating unit that reduces any solids into slurry. The pumps are then able to transport the wastewater slurry through a small diameter polyethylene pipe to an existing gravity system or wastewater treatment plant. The E/One grinder pump is capable of generating 56m of head allowing it to pump several kilometres or up and over hills. Reticulation pipe sizes range from DN 40 to DN 225 depending on the number of pumps connected and the distances required.

The Stronger Christchurch Infrastructure Rebuild Team (SCIRT) is designing, managing and delivering the infrastructure rebuild. E/One pressure sewers were identified as a key technology to provide cost-effective, permanent wastewater service to a number of catchments with significant damage to the gravity network or significant risk of damage from future seismic events.

The resilience of a pressure sewer system is most apparent in the high strength, flexible reticulation network. Similar in construction to a water main, the network follows the ground movement without breaking, collapsing or separating. All transport of the wastewater is done under pressure so there is no grade requirement for the reticulation and no risk of ground movements affecting the performance as compared to a gravity or vacuum collection system. Additionally, since the network is buried shallow (between 1–1.5m deep), the system is easy to repair if necessary and additional connections can be made with minimum cost and time.



Installation of tank in progress

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To-date there are over 900 commissioned pressure sewer units within the rebuild of Christchurch and several thousand units are due to be installed by 2016. In addition to the rebuild, CCC is using pressure sewers in septic tank replacement programmes at Charteris Bay and Wainui in Banks Peninsula.

Pressure sewers can also be found in new residential and commercial development projects in the Christchurch and Waimakariri districts to sewer difficult ground conditions and accelerate the pace of construction. Economical systems range from single units to thousands in a single catchment.

The simple nature of pressure sewer systems makes the ongoing operation and maintenance easily manageable. Since the equipment is specifically designed for the application, it is incredibly reliable and does not require any preventative maintenance. In the event of a pump issue or homeowner misuse, most problems can be quickly resolved with onsite troubleshooting, and replacing the pump takes no longer than 20 minutes. Due to the 24 hour storage capacity in the pump chamber, emergency response is not required. The straightforward nature of the technology is paramount and operators have no trouble understanding how the system works. There are no complicated control systems or single critical assets to maintain.

Pressure sewers are far from being a new technology and have an excellent track record in New Zealand. The E/One product is utilised in 38 countries with over 500,000 units in operation and continues to lead the market that it invented 45 years ago. The resilience, ease of construction, operation, and maintenance make pressure sewer systems an excellent fit for Christchurch today and into the future. ■



Final inspection of E/One system



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