

£4.9m Llandudno Sewer Improvement Scheme

Dwr Cymru Welsh Water's biggest flood protection project

by Catrin Jones

Llandudno is one of the busiest and most popular Victorian seaside resorts in Wales, situated along the picturesque North Wales coast. The town not only attracts holidaymakers throughout the year but is also one of the main retail areas along the coast, with a large potential catchment area. The initial driver for the Llandudno Sewage Flooding Prevention Scheme was the continuous internal flooding, initially of 48 commercial properties within the town centre. Following further investigations this figure was to rise to 87 commercial and residential properties.



Scheme progressing in Chapel Street, Llandudno
(courtesy Daniel Contractors Ltd)



1,200mm dia. slurry microtunnelling system used to install
367m of concrete sewer
(courtesy Daniel Contractors Ltd)

The existing combined sewer network within the town centre has suffered continuous incidents of hydraulic incapacity, with high levels of surcharge in response to modest storm events, where outlet levels are between the invert and soffit level of the existing sewer. The initial modelling was incorporated within the hydraulic model

and outline design of the Ganol Sewage Treatment Works in 1992.

Daniel Contractors Ltd, the main contractor partnering Dwr Cymru Welsh Water on the AMP3 Sewage Prevention Programme, were given the responsibility of offering a long term solution to the

flooding incidents within Llandudno, in February 2002, which included both design and construction phases. In the early stages of the design process value engineering and optioneering workshops were held involving all partners within the scheme.

Preferred option

The preferred option was the construction of a new sewer which allowed for increased capacity at a lower depth. The sewer diameter ranged from 400mm to 1200mm, various methods were used including open cut, tunnelling and directional drilling. The solution also included construction of a new pumping station situated at The Oval; away from the town centre, which included construction of both foul and storm rising mains. This allowed improved management of the system during storm events. The scheme is designed to protect the area against flooding from a 1 in 30 year storm. **At a cost of £4.943 million, it is the largest sewage flooding prevention scheme currently under construction on behalf of Dwr Cymru Welsh Water.**

Following a period of consultation, which included local councillors, retailers and business representatives, construction commenced in September 2002 with a completion programme of 28 weeks. Due to the scale and nature of the scheme which included large lengths of open trench work and thus an extensive road closure programme, close liaison was needed with Conwy County Borough Council Highways Department and North Wales Police Traffic Management. This allowed for continuous monitoring of the situation within sensitive areas which included the secondary retail area within Llandudno.

Weekly meetings with Highway officials followed an opportunity for local groups and interested parties to express opinion and/or criticisms, this allowed us to be proactive in dealing with any problems. To minimise disruption to local businesses and residents and to maintain access along a busy thoroughfare *V J Donegan, tunnelling and pipejacking specialists* were introduced to carry out a trenchless technique which involved using a slurry microtunnelling system. This allowed the successful installation of 367 metres of 1200mm dia concrete sewer within the town centre with two intermediate shafts of 5.5 metre and 4.5 metre dia. along the route Also included was construction of the pumping station shaft 8m dia x 8m deep.

The workforce maintained a 12 hour, five day week with a small works crew employed during weekends. During weekends crew would relay surface water sewers that had to be removed as these occupied the only available space within the highway. Laying and replacing these meant that the existing sewer could stay flowing, and overpumping was not required which helped reduce the programme duration.

It also had the added benefit of replacing a surface water system that had fallen into disrepair, ceased to function correctly and had been cross connected in a number of locations. This reduced surface flows from highway gulleys into the new combined sewer. New surface water sewers were laid in twin wall plastic in sizes from 150dia to 375 dia the length being replaced along three streets.

During construction, where possible, the excavated sand was kept to backfill the trenches. Where the material was unsuitable a slate sand was used for trench fill, a slate MOT was also used for highways reconstruction. As slate is not subject to aggregate tax this helped produce a saving to the contract.

Pumping station

The new sewer discharges with a ‘free outfall’ in the pumping station shaft at the Oval. This is a combined wet well with the ‘dry weather’ foul flow being dealt with a 150mm pump duty/standby, discharging via 150dia rising main to a foul sewer on Gloddaeth Street. Within the same well the storm combined flows are dealt

with via three storm pumps (duty/standby/assist) to a 600dia rising main discharging to the main combined culvert in Gloddaeth Street. The system is protected with a standby generator in the event of mains failure. The siting of the PS in the Oval acts as a buffer to prevent storm flows arriving at West Shore too fast and outpacing the system there;. (One option was to consider relaying down to West Shore and improving the existing system, but was considerably more expensive and would have taken 52 weeks to complete).

The choice to lay off line, together with 12 hour days, working under floodlights did not affect the completion schedule, in spite of a couple of wet months. Indeed, it was possible to remove one pipelaying team to another scheme mid February. The remaining pipe team upon completion of the sewers and whilst the pumping station control building was constructed were diverted to carry out a number of planned maintenance schemes within Llandudno including ‘dig downs’ and relining of defective foul and storm sewers. A total length of approximately 740m of sewer will have been rehabilitated within the scheme’s original programme period. This was also made possible as the relationship developed with the Highways gave them confidence to allow us to spread out and carry out additional works improving the system under the umbrella of the original sewage flooding prevention scheme.

The scheme is almost finished with work in the main thoroughfares completed. A close working relationship within the partnership, which encouraged open channels of communication, allowed any design or construction difficulties to be resolved without impeding progress of the construction programme.■

Note: *The author of this article, Catrin Jones, is Customer Liaison Manager, Daniel Contractors.*



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