

Llwynypia 32" Cast Iron Trunk Sewer Repair

Overview:

Site Location:	>> Llwynypia, Tonypanyd
Client:	>> Dwr Cymru Welsh Water
Contract Value:	>> £535,000
Project Duration:	>> 18 Weeks



An existing concrete boundary/retaining wall positioned along the edge of the river had partly collapsed and was leaning on-top of the foul sewer. The weight of the concrete wall was pushing the cast iron sewer pipe off its support plinths causing the pipeline fail and leak raw sewerage into the river. The main scope of work was to prevent the foul sewerage spill into the river. The sewer pipeline was positioned in the bed of the river tight against the edge of the river. Access to the working area was a huge challenge. The damaged section of sewer was located at the rear of houses and the line of the river on this section was edged by a concrete wall on both banks. The only practical access point into the river bed was via the garden of a property downstream of the working area. The Land Agents for DCWW arranged for emergency access into the garden to enable construction of a stone access ramp from the garden to the river bed. The ramp was steep and required thousands of tonnes of imported crusher run stone to construct. Tree clearance was required to be undertaken within the area of the ramp.

Once the access ramp was formed to the river bed it was necessary to form a raised temporary access roadway, approx. 200m in length, within the river bed. Talks were held with the Environmental Agency and it was agreed that rather than import stone to construct the raised access road we could use the existing river cobble material to form the raised roadway along the river bed to the working area. The edge of this roadway was retained and protected by placing large block stones along the live edge. This would prevent the river from washing away the cobble material from the temporary roadway. The temporary roadway was constructed using 2No. 20 t tracked excavators and wheeled dumpers. We kept in close contact with the EA to discuss the emergency works and the environmental impact on the river. The overall assessment that the foul sewerage pollution entering the river and the risk of a total collapse of the foul sewer was far more important than any suspended sediment caused from entering the river bed with plant and machinery.

Having completed construction of the raised access roadway within the river bed the full effect of the damaged sewer could only then be assessed by DCWW and their designers. It was obvious that the collapsed concrete wall was the problem. The sewer pipeline was sagging under the weight and the pipeline had fractured in several locations. There was foul spillage into the river, especially during times of high flows within the sewer. The sewer appeared as if it could catastrophically fail at any time. Following inspection it was decided that the concrete wall that had collapsed onto the sewer had to be fully removed and the full section of trunk sewer had to be removed and replaced with new pipe. To try and prevent any further movement of the damaged sewer during the wall removal we used the block stone to temporarily support the front edge of the pipeline.



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Prior to beginning the removal of the concrete wall it was necessary to fell 6No. large dead trees that were running along the top of the river bank behind the concrete wall. It is these trees that possibly caused the eventual collapse of the concrete wall. A large telescopic tracked crane was utilised to lower the cut sections of tree trunk to the ground level before further cutting into smaller manageable sections.

Following removal of the trees the concrete wall was demolished using a machine mounted impact hammer and mechanical grab. This operation was carried out very carefully so as not to cause any further damage to the sewer pipeline.



The next stage of the works was to set up over pumping to the section of damaged sewer to enable the damaged section to be removed. The over-pumping comprised of 2No 8" suction pumps. All pumps and hoses were carried in via the access ramp and raised roadway, and were set up in the rear garden of a property. The pumps were run 24/7 for approx. 3 weeks while we removed the damaged section of sewer and replaced with a new steel pipeline supported on a continuous concrete foundation and raised plinth. Although the pumps were "super-silenced" we provided additional noise protection for local residents in the form of a straw bale screen and plywood cover. Again, all materials associated with the new sewer pipeline had to be carried in by the tracked excavators via the access ramp and roadway.



During replacement of the foul pipeline further site meetings were undertaken to discuss the permanent protection to the river bank at the rear of the replaced pipeline where the concrete wall once stood. Following numerous discussions it was decided that the river bank would be protected with large block stone. The designers visited site and a design was issued. The replacement of the concrete wall was considered, but, due to the available space, time and difficulty/cost in construction it was decided to use the block-stone. The risk was that if the river went into flood conditions following replacement of the foul sewer, the flood water could wash away the unprotected river bank, so for this reason it was decided to go with the block-stone protection.



A section of the concrete wall upstream of the sewer replacement was leaning at a precarious angle and appeared if it could also collapse in the near future. This was discussed with DCWW and a decision was made to leave this section of wall, but to protect it by placing the block-stone used for the

temporary raised access road along its base. This would prevent the wall from collapse and prevent any further undermining of the wall from river flows. On completion of the construction works the temporary raised access roadway was removed with all the river cobble material being put back across the bed of the river. In-fact, the river bed was hugely improved by this operation with the water flow being aligned centrally to the river bed.

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The excavators worked their way out of the river bed and finally removed the stone access ramp formed into the river. Reinstatement of the garden then followed.



UTS Engineering Ltd. was used for supply on the new steel sewer pipe line along with 1Nr raised access turret that was specially fabricated for the scheme. UTS also fabricated special encapsulation collars to accommodate the connection of the old onto the new pipe.

Greenman Environmental Management was used to fell 6No.large diameter dead trees. This was a difficult operation due to their location on-top of the partly collapsed river bank to the rear of the damaged sewer pipe line. A tracked telescopic crane was used to support and lower the cut section of tree to the ground as there was a risk of further damage to the pipeline if the cut section of trees came into contact with the sewer pipe.

Sykes Pumps supplied the pumps for over-pumping of the existing sewer. Their fitter attended the pumps every day to ensure that they were working correctly and to carry out the necessary checks so as to reduce the risk of any break downs.

This was a sensitive scheme due to the fact that everyone involved was fully aware that the damaged sewer was leaking raw sewerage into the river. There was always a risk that the sewer could burst/collapse at any time during our works to initially try and stabilise the pipeline before actually beginning the works to replace it with new. We were in constant contact with the EA who were fully understanding of the situation. The workforce was very experienced in sewer replacement works and working in rivers which undoubtedly made the scheme a success.



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