

Llandarcy 43" Main

Overview:

Site Location:	>> Llandarcy, Swansea
Client:	>> Dwr Cymru Welsh Water
Contract Value:	>> £2,209,578.00
Project Duration:	>> 32 Weeks



The work was carried out on the Felindre to Margam 43" diameter high pressure steel water main. The main was in poor condition and was leaking significant volumes of potable water. We were informed that the leaking main is sleeved and was safe enough for our work to proceed. The water main remained in operation throughout the course of our work.

Our work involved installing approximately 65m of 1200mm diameter welded steel pipe through a newly constructed micro tunnel. The tunnel was constructed using 1500mm diameter pre-cast concrete pipe sections and passed under a regional Network Rail owned and operated by Network Rail and under the Tennant Canal.

The tunnel was designed by Vital Consultancy and approved by Network Rail. The tunnel was driven at a depth of approximately 5m using a "Full Faced Shield Tunnel Boring Machine" (TBM). To reduce the risk of the canal water breaking into the tunnel, the canal was "stanked off" using two large diameter flume pipes and sealed with blue puddle clay. The water was then be drained down leaving the canal dry in the section directly above the tunnel. The tunnelling operation was carried out by B & W Tunnelling.



Once the report was analysed and the construction methods confirmed by the designers then two "Coffer Dam" excavations were sunk, one on the east and one of the west side. The depth of the excavations were in the region of 5m to 6m deep. The Coffer Dams were designed by Groundforce and checked by an independent chartered engineer. The Coffer Dams consisted of heavy duty sheet piles and a series of hydraulic frames inserted at strategic depths within the excavation. During the excavation process the sheets were pushed / vibrated into the ground to a desired depth or to the point of refusal. Once driven the spoil was excavated ensuring continual support throughout the excavation process.

The installations of the Coffer Dams were carried out by trained competent operatives with experience in deep digs. This is a speciality for Lewis Civil Engineering.

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On completion of the tunnelling operation a specialist approved sub-contractor "UTS Engineering" attended site to weld the new 1200mm \varnothing steel pipes. Once welded, the pipes were pulled through the newly constructed tunnel using the Groundburst Hydraulic Rig. The annulus between the steel main and tunnel wall was then grouted up.

New 1200mm \varnothing pipes were then be laid (by means of open cut methods) alongside the existing water main. Under pressure Tee's were welded around the existing 43" water main and the pipe drilled under pressure to allow connection to the new 1200mm \varnothing pipe. Once the new pipe was charged and proven to be free of any leaks, the old 43" pipe was isolated by way of under pressure line stops. Concrete thrust blocks were then cast to restrain the new 1200mm \varnothing pipe and once cured the old 43" pipe was then grouted up.



Access to the Skewen (Western side) of the Tennant Canal/railway line required the construction of a 1Km long access track through fields to provide access for the heavy plant required.

There was an unmanned railway crossing for which a Network Rails Site Safety Representative was required to be on site to control any crossing of the railway line.

Due to the works having to be carried out on the existing tidal salt marsh on the Eastern side, there was a requirement to deal with a high volume of ground water.

24/7 dewatering was required to keep the ground water at a manageable level. We constructed 2Nr silt settlement lagoons to contain all pumped ground water prior to discharge into the existing channels on the salt marsh. The construction and operation of the settlement lagoons were overseen by the EA.



Also, due to the fact that the salt marsh was tidal, we used the stripped surface material from the working area to create a flood bund to surround the working area to prevent ingress of tidal water during high tides and to provide protection in the event of an accidental pollution incident.



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Techniques Utilised:



Full Faced Shield Tunnel Boring Machine" (TBM) was used by B&W Tunneling Ltd to bore and pipe jack the 1500mm dia concrete pipes beneath the railway line and Tennant Canal.

Final connections using under pressure tee connections and line stopping.

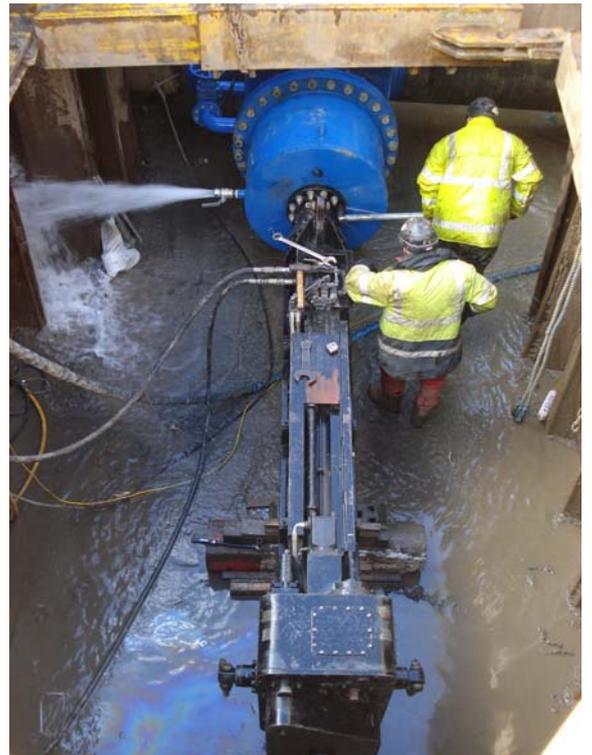
Installation of cofferdams for trust and reception pits.

Open cut excavations.

Benefits delivered:

Environmental protection of the salt marsh working area was achieved by installation of 2No. "silt settlement lagoons" for pumping of ground water from the works and forming of a flood bund around the salt marsh working area to prevent the ingress of tidal water and also to provide a physical barrier to contain any accidental spillage/pollution event.

Construction of a 1Km long stone access track through fields to provide access for the heavy plant required.



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