

Twenty-kilometre dia. 1,000 mm and 1,400 mm PE pipeline has connected southern Warsaw with the “South” sewage treatment plant and the Vistula river.

The project “Construction of supply and discharge pipelines for the South Sewage Treatment Plant” involved connecting the sewage system in southern Warsaw with a newly built South Sewage Treatment Plant by means of delivery and discharge sewers. The project was performed by several contractors, including the PE pipes supplier for the whole project – KWH Pipe Poland, main contractor for part 1 Hydrobudowa – 6 S. A and main contractor part 2 – Hydrobudowa 9 Poznań.

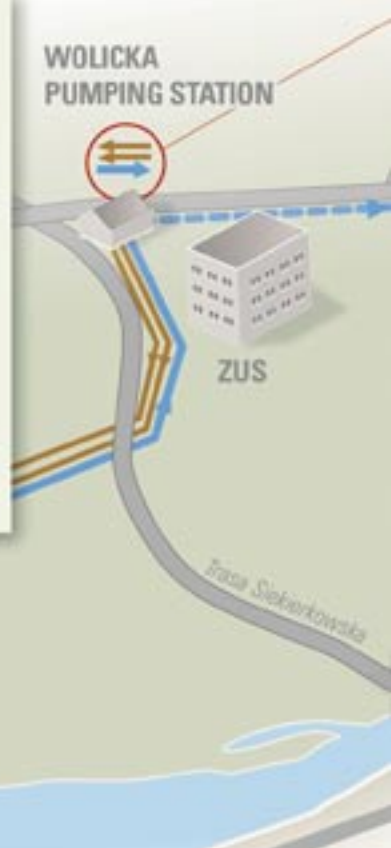
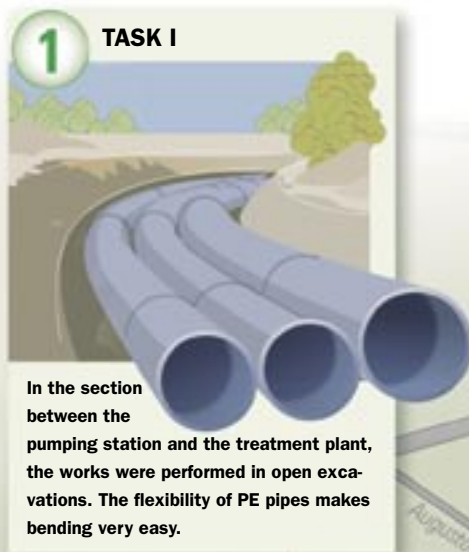
A part of this complex project was made in a conventional trenching technology, and

the whole section under Czerniakowska street and under the road tunnel under Augustówka street was made using a modern microtunnelling method. [pic. 2, pic. 4]

THE SEWERS

South Sewage Treatment Plant is the largest ecological project in Warsaw in recent decades. It cost about 100 million euro. To date, over 70 percent of Warsaw sewage went to the Vistula untreated, posing a problem for the agglomeration itself and also for other towns and villages situated downstream.

Difficult, yet successful project



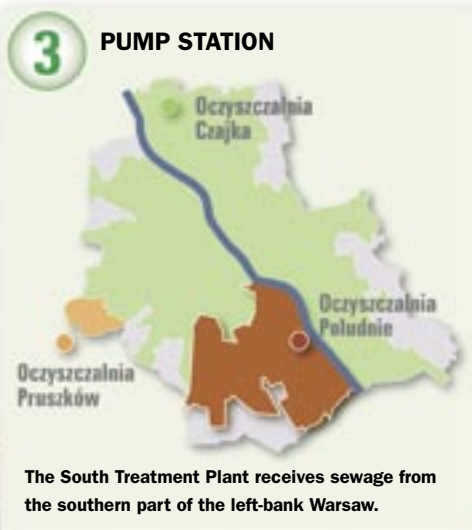
Now, the new treatment plant receives sewage from the southern part of the left-bank city, i.e. from the boroughs of Moko-tów, Wilanów, Ursynów and Powsin [pic. 3]. An imperative for the “South Treatment Plant” operation was construction of delivery and discharge sewers. In other words, we had to build main sewers connecting the plant to the Warsaw sewage system and the pipelines to enable the discharging of treated sewage to the Vistula.

CHALLENGE

The work on the delivery and discharge sewers were split up into two parallel tasks. The first one, made by Hydrobudowa 6, involved the construction of three parallel pipelines between the Wolicka pumping station, located at the junction of the Siekierkowska thoroughway and Czerniakowska street, and the South treatment plant in Zawady. The pipelines (3 x 5,340 metres) ran mainly through green areas

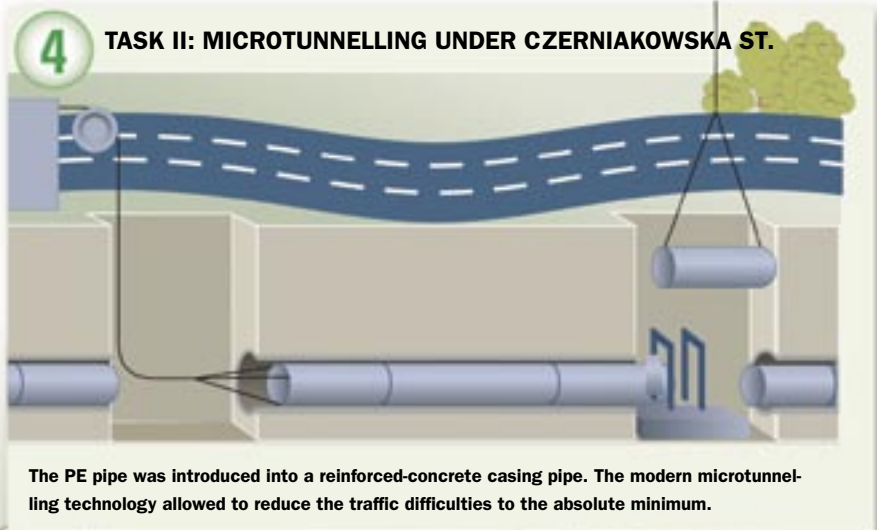
and barren lands, so the open-cut technology was mainly employed. However, the tunnel under Augustówka street (about 300 m in length) was made with the modern and demanding microtunnelling technology, i.e. drilling deep under the ground level [pic. 2]. Many obstacles were found during drilling, such as steel sheet piles driven 20 years ago and not marked on the maps, or drainage chambers. All obstacles were however successfully overcome.

3 PUMP STATION



The South Treatment Plant receives sewage from the southern part of the left-bank Warsaw.




4 TASK II: MICROTUNNELLING UNDER CZERNAKOWSKA ST.



The PE pipe was introduced into a reinforced-concrete casing pipe. The modern microtunnelling technology allowed to reduce the traffic difficulties to the absolute minimum.



LEGEND

-  Two supply pipelines: WehoPipe DN1,000
-  Discharge pipeline WehoPipe DN1,400
-  Microtunnelling

BIG PIPES

The sewage and treated sewage are transported in the PE pipes manufactured by KWH Pipe Poland.

The forced pipelines to the sewage treatment plant comprise two parallel dia. 1,000 mm (1 m) pipes, and the sewage discharge pipeline comprises a single dia. 1,400 mm (1,4 m) pipeline.

Technical specification of the pipelines:

- Supply pipelines: PE DN1,000 PN6 L=10,578 m (2 x 5,289 m)
- Discharge pipeline: PE DN1,400 PN6 L= 9,063 (5,340 m and 3,723 m)





Joining the PE pipes with the KWH welding machine.

Over a year, over 16 kilometres of pipeline of dia. 1,000 mm and 1,400 mm was installed connecting the pump station and the treatment plant.

The other task – the 3,712-metre pipeline – runs under Czerniakowska street. This section was made with microtunneling technology as the investor (the city of Warsaw) decided to minimize difficulties for the citizens. The pipeline was built under Czerniakowska street, which is one of the major communication lines in the city. The employed technology meant that Czerniakowska street never had to be entirely closed to traffic. The only gruelling thing was the need to build a few chambers and, as a result, to close one of the three lanes in Czerniakowska over short sections. The 2-metre diameter tunnel was drilled under the roadway (depth from 7 to 11 metres) using cutting-edge drilling equipment. The contractors encountered many obstacles, i.e. bomb craters filled with rubble, varying geological conditions, and the drilling heads had to drill between existing water pipelines, foundations, or pillars of Łazienkowski Bridge.

The deadlines for both project parts

were very tight, so the work in tunnel was two-shift, simultaneously with four drilling heads.

The project which Hydrobudowa-9 made in such a short time was very complex and posed a great engineering and organizational challenge. For overcoming all obstacles, the company received the renowned Tytan – 2005 prize in the category “Project of the

Year – New System” awarded by the Polish Association of Trenchless Technology and the Polish Foundation of Trenchless Technologies. In 2004, the same award in the “Company of the Year” category went to KWH Pipe, the pipe supplier.

It is worth mentioning that the contract also involved the works in connection with the entry of the pipeline to the Vistula, in-

EXCELLENT PROPERTIES

The PE pipes were chosen for this project due to their excellent operational properties:

- durability
- long service life
- corrosion resistance
- homogenous joints
- high abrasion resistance
- flexibility and resistance to hydraulic surge
- easy jointing into very long sections



Dia. 1,400 mm PE pipes in the factory in Kleszczów.



cluding reinforcement of the bottom of the river against the current, near the intersection of Czerniakowska and Solec street.

Thus, two dia. 1,000 mm PE pipelines transported the sewage from the pump station to the treatment plant and then the treated sewage to the discharge point located near the Monument of Military Engineers.

QUALITY ABOVE ALL

Pivotal for the durability and reliability of the sewer system was the quality of the pipes, the method of installation and joining technology. In this project, the PE pipes were laid in the reinforced concrete casing pipes, made during the microtunnelling works. The empty space between the casing pipe and the main PE main duct was

filled with a special concrete mixture. KWH Pipe supplied the pipes for the pipeline and transport sewers, totalling 19,641 metres. The PE pipes have excellent properties – they are trouble-free, resistant to corrosion and abrasion. The PE pipes are joined by welding successive sections. This is a great advantage, as this technology not only guarantees absolute tightness, but also exceptional durability of the whole pipeline, including the joints.

It is worth adding that using flexible PE pipes, which can be bent in the excavation, has also contributed to reduced costs, as many expensive bends and fittings were not needed.

SUMMARY

In total, the “Construction of supply and discharge sewers for the South Sewage Treatment Plant” project cost about 23 million euro. The works were performed between May 2004 and September 2005 and 62% of them were financed from the European Union funds – ISPA and Cohesion Fund – as well as from the funds of the Warsaw Municipality, the National Fund for Environmental Protection and Water Management and partially from the loan granted by the European Investment Bank (EIB).



Installation of dia. 1,400 mm PE pipes in the pit under Czerniakowska St.