



WASTEWATER TREATMENT SOLUTION FOR THE “RUSSIAN VERSAILLES”

Weholite in road construction | Helping to clean a river in Thailand

PIPE WORLD – THE KWH PIPE CUSTOMER JOURNAL

We cannot stop the rain –



but we can help avoid floods!

6 x 36 m of DN/ID 2,400 mm Weholite pipe, capacity 977 m³

The heavy rainfalls of recent years have shown that the sewer network cannot always cope with large amounts of rain in a short space of time, resulting in flooded roads, cellars and drains. Since by all indications this type of weather will continue to become more frequent, we are stuck with a recurring problem unless something is done.



A sewer overflow system substantially reduces the risk of rainwater flooding. We have expertise in both manufacturing and installing these systems in all sizes. Contact KWH Pipe for a no obligation chat to discuss your options, including pipes for new sewers or sewer renovations.

KWH Pipe
marketing@kwhpipe.com
www.kwhpipe.com



Member of the KWH Group



Constantly listening, learning and improving

Weholite is one of KWH Pipe's success stories and the reason for this is that it helps stakeholders, such as customers, designers and contractors, find solutions to various challenges.

The pipe system has been in use for more than 20 years and can be found in numerous end-use applications throughout the world. Recent projects include a penstock for a hydropower plant, where pipes of up to DN/ID 3.4 metres were used and where the pipeline is operating at a 1.5 bar internal pressure. This is one of the first projects to use Weholite pipes with an internal diameter greater than 3 metres.

Weholite has an impressive track record that motivates us to further improve the Weholite solution. Recent product development has included pipe sizes up to DN/ID 3.5 m, low-pressure pipes up to 2 bar and an innovative weighting system for submarine pipelines.

Although the technical and material properties of Weholite have clear advantages over less advanced materials, the real benefits for stakeholders are achieved when KWH Pipe is involved at an early stage of the project. By working together closely during all stages from design to commissioning, the technical support and other services provided by KWH Pipe will cut costs and save time and will result in a piping system with excellent performance and life cycle costs.

A development programme was recently launched to focus on specific end-use areas and applications in which Weholite has the greatest potential. During this development programme we are gathering experiences and opinions from customers and other stakeholders, thereby allowing us to add further value to the projects. The feedback is used not only to further develop the Weholite solution, but also to improve the conduct of project work and offer a more complete package.

By doing this, we are preparing for the future growth in demand that climate change is expected to bring. Recent market trends show the need for solutions for storm water attenuation systems to manage heavy rains as well as many other infrastructure applications. The only limit for possible end-use areas is our imagination. That's why this issue of Pipe World is dedicated to showcasing the versatility of Weholite.

Paul Zogg
Editor in Chief
Executive Vice President, Business Development

4 NEWS

7 CULVERTS

A real veteran will trust Weholite.

8 WASTEWATER TREATMENT

Reconstruction of the Petrodvorets wastewater treatment plant.

11 WATER SUPPLY

Florida's Everglades will be revitalized by a big water supply project.

12 EXPERT INTERVIEW

"Flexibility increases the safety of a buried pipe" says Dr Vasilios Samaras.

14 ROAD CONSTRUCTION

The innovative use of Weholite pipes in the construction of a viaduct.



16 DISTRICT COOLING

Göteborg Energi is broadening its services by offering a new and environmentally way of cooling.

18 SEWER OVERFLOW SYSTEMS

How to protect a delicate stream in Denmark.

20 WASTEWATER SYSTEMS

Weholite helps to clean river in Thailand.

22 PIPING SYSTEMS

The versatility of Weholite has made it a popular solution in numerous application areas.

PIPE WORLD

KWH Pipe Ltd, P.O.Box 21
FI-65101 Vaasa, Finland
Telephone +358 6 326 5511
Telefax +358 6 316 7115
www.kwhpipe.com

Editor in Chief: Mr Paul Zogg
Pipe World Editorial Board: Mr Noppadol Dhammaniyom, Ms Marlene Fremleson-Ohlis, Mr Niels Christian Maare, Mr John Reinlund, Mr David Siteman and Mr Paul Zogg, KWH Pipe.
Editors: Kynämies Oy, Tel. +358 9 1566 8510
Press: Frenckellin Kirjapaino Oy





NEWS

Europe's largest nickel mine chose KWH Pipe as its partner

| **THE LARGEST NICKEL MINE** in Europe is under construction in Sotkamo, in the north of Finland. The company in charge of the project, Talvivaara Mining Company Ltd, has chosen KWH Pipe as its partner.

The pipes that Talvivaara has purchased are of considerable size: the Weholite structured-wall pipes are up to 1,200 mm and the WehoPipe solid-wall pipes are up to 1,000 mm. In addition to the pipes themselves, KWH Pipe will supply inspection chambers and is responsible for the on-site welding of the pipes.

Talvivaara uses a modern heap leaching process to extract the nickel, which requires a massive amount of high-quality and durable pipes in combination with reliable installation. Pipe World will continue to follow this project in future issues.



Weholite licensee now capable of producing DN/ID 3,500 mm pipes

| **IN SEPTEMBER 2007**, a new Weholite production line capable of manufacturing Weholite pipes up to DN/ID 3,500 mm was delivered to Asset International in Wales. The new line will be installed in an extension of the factory in Newport and will add more capacity for large-sized Weholite pipes that are mainly used for storm water attenuation tank systems.

Development based on stakeholders' needs

| **DURING OCTOBER**, a research company contacted customers and partners to find out more about what makes their business successful. Overall, our company and Weholite received very positive feedback, but we want to do even better in the future. Based on the feedback, a project has been launched to respond to the needs of our stakeholders by further developing and clarifying what Weholite has to offer.

A new concept will be presented at the beginning of 2008 so look out for that and visit our websites regularly!

**What do you think about Weholite?
Please tell us! Contact Mr John Reinlund at
john.reinlund@kwhpipe.com.**

APPOINTMENTS



KWH Pipe Group

Mr Jan-Erik Nordmyr was appointed COO and Executive Vice President of KWH Pipe Ltd as of July 1, 2007. Mr Nordmyr will continue to be in charge of KWH Pipe's operations in Europe.



Mr Paul Zogg, B.Sc. (Eng.), was appointed Executive Vice President, Business Development as of May 21, 2007. He was previously Business Development Director for UPM and UPM Raflatac. Mr Zogg has also worked for his own consulting bureau.



KWH Thermopipe

Mr Patrick Kjellman was appointed Sales Manager of KWH Thermopipe Sweden as of October 10, 2007. Mr Kjellman was previously in charge of sales to central Sweden.



KWH Pipe, Technology

Ms Paula Erkolahti, M.Sc. (Eng.) was appointed Sales Engineer as of October 1, 2007. Ms Erkolahti was previously a Project Engineer for Pöyry Forest Industry.



Mr Kari Karjalainen was appointed Chief Design Engineer as of September 19, 2007. Mr Karjalainen was previously Chief Design Engineer at Citec Engineering.

KWH Pipe Finland

Mr Juha Kainulainen, B.Sc. (Eng.), was appointed Director for KWH Pipe Finland as of September 1, 2007. He is in charge of KWH Pipe Finland's plastic pipe business. Mr Kainulainen has previously held various positions within KWH Pipe Finland, the most recent being Business Manager of the Environmental Business, for which he will continue to be responsible for the time being.



Mr Alf Hjerpe, M.Sc. (Eng.) was appointed Development Manager in charge of Quality and Processes as of May 2, 2007.



KWH Pipe Poland

Mr Jacek Kamiński, M.Sc. (Eng.) was appointed Marketing Manager as of September 24, 2007. Mr Kamiński was previously Sales and Marketing Manager for SBS Group.



KWH Pipe Russia

Mr Evgeny Lipatnikov was appointed Head of the Branch in Yekaterinburg, Russia, as of April 28, 2007. Mr Lipatnikov is in charge of sales policy and implementation of projects in the Urals Federal District.

Weholite used for mesocosm laboratory

THE MESOCOSM RESEARCH FACILITY at the Umeå Marine Sciences Centre (UMSC) in Sweden was taken into use in September 2007. It consists of a wet laboratory for biological and chemical analyses and a hall with 12 advanced cylinder constructions, each with a volume of approximately 2,000 litres and made of Weholite.

The mesocosm facility is a unique research installation where scientists can simulate different climatic scenarios and study the effects on the aquatic ecosystem. It is also a valuable tool for studying the effects of eutrophication (e.g. overload of nutrients in sewage), environmental pollution, and consequences of algal blooms.

The tanks are large enough to realistically include the major components in pelagic food webs. The number of tanks (12) means that experiments can be designed on a statistical basis.

The mesocosm installation is one of the few in the world that is based indoors. It was used for the first time by a group of international research students (17 students from seven countries) participating in a course sponsored by the Nordic Marine Academy.

The course, which ended on October 6, 2007 focused on aquatic production and food web efficiency, and used different water treatments to evaluate which factors are of importance for the biological production in the sea.



In the mesocosm, scientists can simulate different climatic scenarios and study the effects on the aquatic ecosystem.



NEWS

Weholite family meets to exchange ideas

| **ON SEPTEMBER 3 and 4, 2007,** Weholite licensees from around the world gathered together once again at the birthplace of Weholite. The bi-annual seminar in Vaasa, Finland, allows licensees to meet and exchange ideas and success stories.

It also provides licensees with the opportunity to see the latest Weholite technology and machinery at KWH Pipe's plant, to receive information about new innovations from the R&D department and learn about planned marketing efforts. Although market characteristics vary from country to country, the input from these seminars has proven to be valuable for developing the Weholite business.

The licensees voiced their optimism



regarding future business and spoke about a number of investments in additional state-of-the-art machinery that are at the planning stage.

Says Lars Häggblom, Director of Weholite License Sales: "We truly are a Weholite family. KWH Pipe is continuously in contact with its licensees and assists them with technical support, for example, but meeting like this also facilitates cooperation between the licensees themselves. They share business concepts and use each other's experiences to make their Weholite business flow. People look forward to these seminars."

Fighting abrasion up to OD 800 mm

| **IN PIPE WORLD 2/2006,** there was an article about WehoSlurry, an innovative solution for the economical transportation of abrasive sludge and slurry. This multi-layer piping system combines the easy handling, durability and excellent corrosion resistance of PE-HD pipes with an extremely abrasion resistant inner layer.

By providing a sample of the slurry or solid material to be transported in the pipeline KWH Pipe's testing equipment makes it possible for the WehoSlurry system to be customized at a competitive price. It is possible to provide long sections of pipe which further improves performance, as fewer joints are required.

Now WehoSlurry pipes are available up to OD 800 mm, which means even more opportunities for replacing failing steel pipelines in the mining industry, the paper industry and fish farms.

Branch office opened in the Ural region of Russia

| **2007 HAS BEEN ONE OF** the most exciting years for KWH Pipe's subsidiary in Russia. The company's 10th anniversary, celebrated in August 2007, was successfully preceded by the launch of the domestic wastewater treatment systems WehoPuts and WehoSeptic on the Russian market. A branch office was also opened in Yekaterinburg, Russia's fifth largest city.

The Urals economic region provides plenty of business opportunities for the recently established sales office: the industrial, construction and transport sectors, especially in Sverdlovsk Oblast, provide vast investment potential both in the public and private sectors. By setting up the branch office in Yekaterinburg, ZAO KWH Pipe aims to efficiently meet constantly growing demand for plastic pipes in the Ural region.

ADDRESS:

**ZAO KWH Pipe
Branch in Yekaterinburg
11/2, Kosmonavtov Pr., 4-5
620017, Yekaterinburg
Russia**

Tel: + 7 343 321 98 49

Fax: + 7 343 321 98 48





"Weholite is the best thing that has happened in the market for road culverts as long as I have been in business," says Mr Helge Ragnarsson.

A real veteran will trust Weholite

Mr Helge Ragnarsson, owner of Helge's Excavating Grönahög Company, founded in 1962, has worked in the road and construction business since the mid 1950s. Today he's 79 years old and still going strong.

Among other construction work, he has installed numerous road culverts made from different materials in the vicinity of the city of Borås, Sweden.

It was at the end of the 1990s that Helge first came into contact with Weholite and started to use this as an alternative for road culverts, which is something he has never regretted.

"Weholite has huge advantages when it comes to road culverts. The long lifecycle and low weight, and the possibility of using long lengths all saves a lot of money and enables quick installation, as joints are not usually needed, and the length of time that roads have to be closed for traffic and the inconvenience to road users is at a minimum," says Helge.

It was a beautiful day in August when we met Helge and his son Christer, who has inherited an interest in the road and construction business from his father. They were in the middle of replacing an old stone culvert with a new Weholite one in Skärvenäs, 60 km south of Borås.



After some preparation it took Helge and Christer less than half an hour to put in the new culvert, measuring 16 m in length and 1,500 mm in diameter.

"This is the best thing that has happened in the market for road culverts as long as I have been in business," says Helge with a happy smile, having been asked for his opinion on Weholite. He was enjoying a well-deserved cup of coffee after yet another successful installation. •

Wastewater treatment solution

for the “Russian Versailles”





Untreated wastewater from the town of Petrodvorets is one of the major pollution point sources of pollution entering the Baltic Sea. The nutrients, phosphorus and nitrogen are contributing to the destructive impact on the aquatic environment.

Located about 20 km west and 6 km south of St. Petersburg and overlooking the Gulf of Finland, Petrodvorets (often called the “Russian Versailles” or Peterhof) has a unique water supply system. The town’s hydraulic complex, a historic engineering monument dating back to the 18th century, provides almost 65,000 inhabitants, 150 fountains and 4 cascades with water.

The high pace of development in the Petrodvorets district means constant modernization of the water supply and sewerage systems. This is being carried out by the South-West Vodokanal Company, a branch of SUI Vodokanal of St. Petersburg.

INCREASING THE DAILY TREATMENT CAPACITY

The Petrodvorets wastewater treatment plants were put into operation in 1976 and nowadays treat all of Petrodvorets’ wastewater and some of the sewage of the nearby town of Lomonosov. A tentative status was set initially: various elements were tested there for subsequent implementation in St. Petersburg’s wastewater treatment plants. Due to the heavy workload of the Petrodvorets wastewater treatment **▀ ▀**



The major goal of the project is to increase the daily treatment capacity to 65,000 m³ during dry weather and to 72,000 m³ during rain and snowmelt.

plant and the fact that it was wearing out, a reconstruction project was launched by the St. Petersburg Construction Committee at the end of 2006.

The major goal of the project, which is being implemented by ZAO Vodokanalstroy, is to increase the daily treatment capacity to 65,000 m³ during dry weather (and to 72,000 m³ during rain and snowmelt) using modern technologies that remove biogenic elements. The reconstruction of the wastewater treatment plant also promotes compliance with the requirements of the Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area: the total phosphorus value will be reduced to < 1.5 mg/l, and the nitrogen value to < 10 mg/l.

PREVIOUS EXPERIENCE CAME IN HANDY

In order to implement the project in Petrodvorets, KWH Pipe supplied over 1,000 m of Weholite pipe in June 2007 for the

construction of an underwater outlet leading to the Gulf of Finland. Welding works were completed by KWH Pipe specialists in August 2007.

This is the second significant wastewater treatment plant reconstruction project in which KWH Pipe is involved in Russia: over 42 km of pipeline, including 1,400 m of Weholite, were supplied by the company for the South-West Wastewater Treatment Plant (UZOS) in 2005. Based on the experience gained, KWH Pipe was able to offer a reliable and expedient engineering solution for a successful sewer upgrading project. Weholite is durable, corrosion resistant and leak proof, which naturally benefits the customer's operations.

Reconstruction of the Petrodvorets wastewater treatment facilities is to be completed by the 3rd quarter 2008. It will ultimately improve the environmental situation in the Baltic region and achieve the status of a cost-effective water protection measure. ●

PROJECT DETAILS

- **Project:** Reconstruction of the Petrodvorets Wastewater Treatment Plant
- **Owner:** SUI Vodokanal of St. Petersburg
- **Application:** Water outlet to the Gulf of Finland – Approx. 1,050 m, DN/ID 1,200 mm, SN4, Weholite
- **Designer:** GUP Lengiproinzhpoeekt
- **General contractor:** ZAO Vodokanalstroy
- **Sub-contractor:** 000 Sprut

BASED ON PREVIOUS EXPERIENCE, KWH PIPE WAS ABLE TO OFFER
A RELIABLE AND EXPEDIENT ENGINEERING SOLUTION.





and revive a dying ecosystem. The remaining water will benefit cities and farmers by enhancing water supplies to benefit south Florida's economy.

This plan will take more than 30 years to construct and will cost an estimated USD 7.8 billion.

The agenda was clear. Drawing on its pool of talent and engineering know-how, the CERP first targeted the Big Cypress Seminole Indian Reservation Western Water Conservation Restoration Project and a number of other key challenges. When the selection of a fully capable piping system was made, the Corps of Engineers chose Weholite.

INSTALLATION MADE EASY BY LOW WEIGHT

The authorities highly valued its long life capabilities and its ease of installation which was of great importance to this project. Delivery and on-site handling at

The Sunshine State opts for a brilliant technology

Florida, the land of sun and sparkling blue water, eulogized by millions of visitors, has a dark little secret: The extraordinary ecosystem of the Everglades is dying. A smart and concerted solution was needed fast.

It is sad to think that Everglades was once a vibrant, free-flowing river of grass that provided clean water from Lake Okeechobee to the Florida Bay. The U.S. Army Corps of Engineers, in partnership with the South Florida Water Management District and many other partners including federal, state, local and tribal partners, responded by creating the Comprehensive Everglades Restoration Plan (CERP).

The goal was to restore and preserve this American treasure and enhance the water supply from it, while ensuring flood protection systems are fully functional.

ENVIRONMENTAL RESTORATION

CERP's objective is to retain the fresh water that now flows unused to the ocean and the gulf and to redirect it to the areas that need it most. The water will mainly be used for environmental restoration, to try

the remote area were as smooth as a south Florida breeze, thanks to Weholite's low weight.

The wet conditions did not pose a problem. The main barrel of the first siphon was assembled on the bank and then lowered into the trench as a single item 162 ft (49.4 m) long. The second barrel was assembled in the trench, since the water table was no longer an issue.

Once this project was complete, the U.S Army Corps of Engineers and the South Florida Water Management District truly realized how versatile Weholite is and they were very impressed with the system. Weholite will undoubtedly play a big part in the revitalization of the Florida Everglades for future generations. ●

As the debate regarding the use of concrete or plastic continues to remain high on the agenda within the water management industry, Dr Vasilios Samaras of Asset International Ltd, considers the specific benefits that are offered through the use of plastic in water storage systems and pipe infrastructure.

The strength of flexibility

A flexible pipe is, by definition, a pipe which will deflect when subjected to external loads. It is a commonly held assumption that any deformation of a plastic pipe is inherently detrimental and will result in the failure of the pipe to perform properly. This is a fundamental misconception – it is actually an advantage, and demonstrates the strength behind the flexibility of Weholite and PE-HD materials.

Flexibility is a desired attribute in buried pipes. Understanding how a flexible pipe interacts with its neighbouring soil, thereby establishing a functional pipe/soil composite structure, is the key to successful design.

ONLY A SLIGHT DEFLECTION

Provided they are installed correctly even the most flexible pipes will only experience a small amount of deflection as a result of loading. When a buried pipe is being installed, backfill is placed around the pipe in the trench. Irrespective of how well the backfill is compacted adjacent to the pipe (side-fill) during installation, further compaction will develop with time.

Additional settlement will then take place in the side-fill and a flexible pipe will

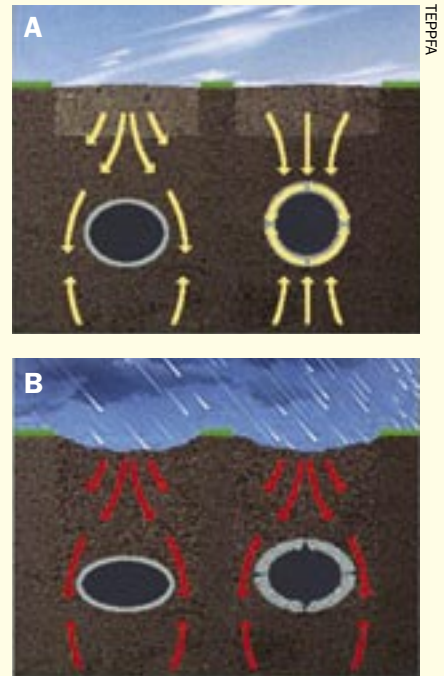
deflect more and more. A rigid pipe which does not noticeably deflect will be continuously subject to an increased load.

A buried pipe and the adjacent soil will attract earth loads and live loads in accordance with the fundamental principle of structural analysis: stiffer elements will attract greater proportions of shared load than those that are more flexible. In other words, a more flexible pipe will attract less crown load than a rigid pipe of the same outer diameter.

This is because a rigid pipe does not transmit the load into the surrounding material. Instead, the load is transferred through the pipe wall into the bedding and a rigid pipe will therefore be subjected to a much greater load than a flexible one.

Flexible pipes rely upon the fact that they deform as a result of imposed loads, mobilizing the support of the embedment material on both sides of the pipe. Their primary structural function is to distribute the imposed vertical loads to the surrounding soil. Only a small portion of the imposed loads are actually carried by the flexible pipe itself. Instead, the load is transferred to the surrounding bedding material.





Deflection is safety. Flexible pipes are shown on the left of illustration A and B, with rigid pipes shown on the right. Illustration B demonstrates the effects of overloading in which flexible pipe simply deforms further whilst the rigid pipe fractures.

DEEP INSTALLATIONS

In the case of a rigid pipe, all the loading has to be resisted by the pipe. This simply means that where there is overloading, a flexible pipe will simply deform further whilst a rigid pipe will fracture.

Both flexible and rigid pipes require proper backfill, although the pipe/backfill interaction differs. In general terms, a flexible pipe offers significant structural benefits to the project designer. In many situations it will be possible to bury a properly installed flexible pipe much deeper than a similarly installed rigid pipe due to the flexible pipe/backfill interaction.

A rigid pipe is often stronger than the backfill material surrounding it, thus it must support earth loads well in excess of

the prism load above the pipe. Conversely, a flexible pipe is not as strong as the surrounding backfill: this mobilizes the backfill envelope to carry the earth load.

The interaction between a flexible pipe and its backfill is so effective at maximizing the structural characteristics of the pipe that it allows very deep installations that exceed the allowable cover for rigid pipes many times when identically installed.

In summary, flexible pipes are versatile compared with rigid pipes, and have important structural performance advantages. Unlike rigid pipes, flexible pipes have excellent resistance to differential settlement. When overloaded, plastic pipes will simply deform further to generate greater passive earth pressures, until the system regains

equilibrium. In contrast, overloaded rigid pipes are likely to fracture and this can result in catastrophic failure.

INCREASED SAFETY

Comparison of the behaviour of rigid and flexible pipes demonstrates clearly that flexibility is a positive factor which increases the safety of a buried pipe.

The strength of flexibility in combination with the unique properties of polyethylene makes Weholite an ideal product for water management solutions. ●

For more information on the benefits of plastic piping, visit The European Plastic Pipes and Fittings Association's website www.teppfa.org

In 2006, increasing traffic problems in Grudziądz, in north-central Poland, led the local authorities to approve the Diameter Route project, designed to link the southern and northern parts of the city. The innovative use of Weholite pipes in the construction of a viaduct for a key collector road not only helped to lighten the structure but also lowered the project cost.

Doing it light



The Diameter Route project, financed from the European Regional Development Fund and municipal funds, and estimated at almost EUR 24 million, is the largest investment in the city's history. One of the principal objectives of the three-stage venture is to limit traffic density by redirecting transit traffic to the outskirts of the city.

Local authorities hope the investment will not only limit existing inconvenience to residents and drivers passing through Grudziądz but also stimulate the region's economic growth.

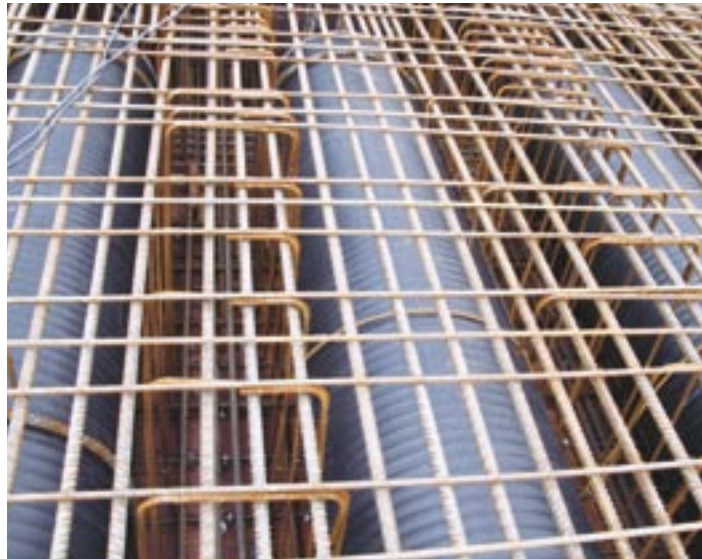
AGAINST CORROSION

The first stage of the project, expected to be completed in the first quarter of 2008, includes the construction of a three-kilometre section of the Diameter Route, which, together with the simultaneously built collector road, will form a bypass around the city centre.

The collector road will start at the intersection of national roads n16 and 55, located just outside the city centre. The 260-metre viaduct, designed to link the existing intersection with the current collector road, was constructed using Weholite (PE-HD) pipes. Overseeing the construction was Mosty Łódź S.A., the contractor responsible for all the bridge works in the investment.

The decision to use plastic pipes to lighten the viaduct's structure was a pioneering one. Until recently, engineering designers relied on steel pipes as their component of choice in similar projects.

As noted by Mr Wojciech Fedorońko, Vice President of Mosty Łódź, steel pipes are not only significantly heavier than plastic pipes but also susceptible to damage from chemicals and adverse environmental factors. Weholite pipes provided the perfect answer to the challenges of the project: they are lightweight, air-tight,



The pipes were placed between the reinforcement bars of the viaduct spans. They were then secured with additional reinforcement to prevent ejection by uplift force during the pumping of concrete.

extremely durable and easy to install, they not only successfully lightened the viaduct's structure but also put an end to the problem of corrosion.

SMOOTH INSTALLATION

KWH Pipe delivered almost 900 m of Weholite (PE-HD) pipes, of ring stiffness class SN2 and size DN/ID 600–800 mm to the construction site. The length of the pipe sections, ranging from 4,060 to 6,760 mm, was customized at the plant to match the dimensions of the viaduct spans and reinforcement structure precisely. The pipes were also fitted with stub pipes (condensates drainage system), which were cut to size at the installation site according to customer specifications.

After the prerequisite construction work on the viaduct was completed, the pipes were sealed, hoisted by crane and placed between the reinforcement bars of the viaduct spans. The pipes were then secured with additional reinforcement to prevent ejection by uplift force during the pumping of concrete. Pumping concrete grout into the spans constituted the final stage of the installation. According to the contrac-

tor overseeing the project, everything went smoothly and to plan.

Making the viaduct's structure lighter, extending its service life due to the exceptional qualities of polyethylene and the problem-free installation were not the only advantages of using plastic pipes in this project. As the volume of air in the pipes is 430 m³, which constitutes almost 14% of the volume of the ferro-concrete structure, savings were made in the use of concrete grout and reinforcing steel, which further lowered the overall project cost.

Considering the above, one can safely say that plastic pipes will continue to grow in popularity when it comes to similar investments in the future, while the emergence of new applications in road construction, and other sectors, is just a matter of time. ●

For more information on Weholite applications

in road construction, please visit www.kwhpipe.com, section: Piping Applications/Infrastructure/Road Construction and Culverts.



Helping Gothenburg stay

Göteborg Energi is the leading energy company in the western part of Sweden, with a long history of supplying district heating, ready heat, energy services, cooling, etc. Göteborg Energi is now broadening its services by offering a new and environmentally friendly way of cooling – district cooling.

In 2006, a long-term plan was devised to construct for a fully prospected district cooling system around the city of Gothenburg by 2013. The design and construction will include connections for potential customers.

A project that enables Göteborg Energi to supply Sahlgrenska University Hospital with district cooling is currently in the final months of the construction phase.

A key part of this vast district cooling project, referred to as the Rosenlund Project, is to keep the system supplied with cooling water and to facilitate the outflow of water from the system.

RIVER WATER USED IN COOLING

Göteborg Energi AB has used water from the Göta Älv river for cooling different processes in the production of heat and power at the Rosenlund plant. The Göta Älv river will now also be used for the production of district cooling.

The proposal by Göteborgs Dykeriteknik (GDA) and Frog Dyk AB to replace old pipes with Weholite was chosen by Göteborg Energi.

Considerable progress with the design and construction process was made between May and October. The solution itself, co-developed by GDA, has been used



Cement mortar provides a keel

The technique behind the solution is that the space between the double walls of the Weholite pipe is filled with cement mortar to a certain level, thereby creating a keel and weight for keeping the pipe in place, while the pipe is lowered into position. The actual sinking process involves filling the space between the double walls with water to increase the weight of the pipe. At the same time water flows into the pipe from one end.

GDA Managing Director, Mr Jan Jacobssen, and Project Manager, Mr Mats Nilsson, say they are very satisfied with this method. They believe that the solution has great potential for their clients to save money as less material is used compared with the method where concrete weights are used, thereby minimizing the time and material lost.

GDA and Frog Dyk AB have been working in close co-operation with KWH Pipe during the project. Regarding technical support KWH Pipe has helped with the design of screens and chambers at each end of the pipes.



During the construction phase, KWH Pipe's Field Service welded sections of the pipes together on the north shore of Göta Älv. These sections were then lifted into the river using five cranes and towed to the south shore, where they were sunk into place.

cool

successfully in a previous project with Göteborg Energi.

The solution is now being used on two main pipes with a diameter of 1,500 millimetres. One of them will be for the cooling water intake, sunk to a depth of 7 metres in the Göta Älv river. This pipe is 107.5 metres long with one end at the quay, where it will be connected to an existing pipe.

The other pipe, used for the outflow of water is 144 metres long. One end is located in one of city's canals, just outside the Göteborg Energi plant, and the other is 40 metres into the Göta Älv river. ●

Højen Ådal, located south of Vejle in Denmark, is a beautifully situated and unusually undulating erosion valley. It branches out into many directions and is covered with dense forest vegetation. The Højen stream and surrounding forests represent a rather unusual biotope, and the area is part of a larger protected zone. The biotope is home to a richly varied population of insects, for example an extremely rare species of dragonfly, *Rhithrogena germanica*. The Højen stream is classified as a grade A waterway, which means, among other things, that the waterway must remain untouched or be subject only to minimal human activity.

“This is a great challenge, since the waterway is surrounded by urban habitation. We had to choose to either expand the old wastewater treatment plant in Højen or close it down, pumping the wastewater to the central wastewater treatment plant in Vejle instead,” explains project manager Finn Reese from the municipality of Vejle and continues:

“We chose the latter solution to protect the vulnerable Højen stream from the daily impact of cleaned wastewater, while at the same time advancing the municipality of Vejle’s long-term plan to minimize flooding

from drains that easily fill with rainwater. We closed down the two combined sewer overflow systems in the area covered by the municipal sewage network in the town of Ny Højen, and thus we needed to build a large buffer basin so that the pumping station could cope with heavy rainfall. Having reviewed several different solutions, we chose a basin made of pipes as the best solution for this location.”

RINSING NEEDED EVERY 1–2 YEARS

The new sewer overflow system consists of 6 lengths of DN/ID 2,400 mm Weholite pipe 36 metres long. Its total capacity is 976.8 m³, which in the context of Vejle means that it will only be completely filled up once every two to three years, thus preventing the wastewater from the higher ground from contaminating the protected Højen stream.

According to Finn Reese, the facility has functioned satisfactorily and as intended. The pipes keep relatively clean, which means an accumulation of about 20 mm of deposit in certain places, typically in the distribution chambers. It is therefore expected that the pipes will only need to be rinsed at intervals of one to two years.

How to protect a delicate stream

The vulnerable Højen stream had to be protected from the daily impact of cleaned wastewater, while at the same time advancing the long-term plan to minimize flooding from drains that easily fill with rainwater. This called for a construction of a new sewer overflow system.





The excavation was performed by an independent company, Østergaard A/S, but KWH Pipe was responsible for the construction of the sewer overflow system itself.

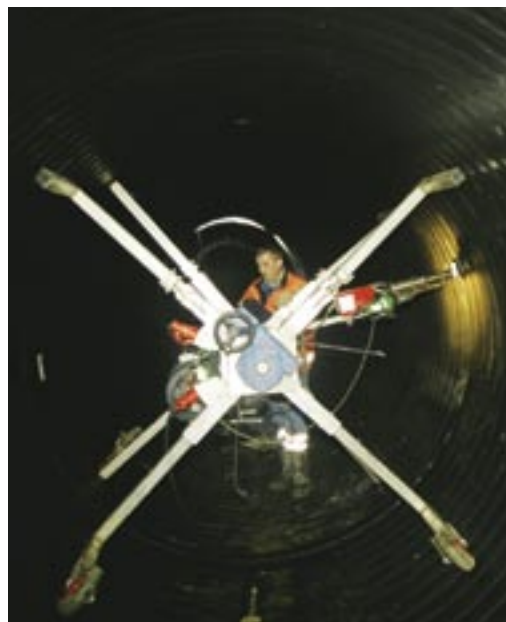
The 6 x 36 metre arrangement of pipes actually consists of 12 sections of pipe 18 metres long. Based on drawings made by the technical administration of the municipality of Vejle, KWH Pipe customized the individual pipes at the company's large facility in Svinninge. KWH Pipe has the capabilities of preparing the work drawings themselves, but in this particular case, the client – that is, the municipality of Vejle – had already prepared a highly detailed project plan.

TWELVE PIPES WELDED TOGETHER

Following initial preparations, the individual pipe sections were transported by road to the installation site, where Østergaard A/S had completed the substantial excavation to house the new sewer overflow system. One by one, the large pipes were laid and then welded together.

Yes, contrary to popular belief, plastic can also be welded, and the result is a 100% leakproof and pull-resistant joint. This case involved 12 pipes with a diameter of DN/ID 2,400 mm being welded together – inside and out – to form an assembly of 6 pipes. KWH Pipe employs qualified personnel for this type of welding work: KWH Pipe Denmark has a mobile welding team whose only job is to travel around the country to assist with welding at any site where welding is needed. The assignment at Højen stream was one such case. The external welding was done manually, but for the internal welding a 'welding robot' was used.

Once welding was completed, all six pipes were internally linked with OD 1,000 mm WehoPipe pressure pipes so that the water flow will be divided evenly between the pipes at all times. Six riser pipes of OD 450 mm diameter and two distribution chambers of DN/ID 1,250 mm diameter were also installed. ●



Weholite helps to clean river in Thailand

In the past, wastewater systems in Thailand used concrete pipes to collect the wastewater and transfer it to the treatment plants. With its superior properties and qualifications compared with other kinds of pipe, Weholite is now increasingly being used in the design and construction of wastewater systems in both the public and private sector.



The Chao Praya River is one of the main rivers in Thailand. It flows from Nakhon Sawan through many provinces in the country. It is the most important waterway and water resource for many industries and for a majority of the people in the central region of Thailand.

In 2006 the Ministry of Natural Resources and Environment was urged by the Office of Natural Resources and Environmental Policy and Planning to cooperate with Nakhon Sawan Municipality to prevent wastewater from contaminating the Chao Praya River, since there was no proper combined wastewater treatment system in the area at that time.

SEVERE POLLUTION IN CHAO PRAYA RIVER

The total volume of wastewater from the local population is around 36,000 m³ per day. This has caused continuous pollution problems in the Chao Praya River and for the local community.

The plan was to design a pipeline system for wastewater collection, especially in the area by

the riverside. In the specification, the pipeline was required to be leakproof, and so the Weholite pipe system was chosen.

The size of the pipes ranges from DN/ID 800 to 1,200 mm, with a total pipe length of around 3,800 metres. The total budget for this project was around 600 million baht, or EUR 13.3 million.

Construction and civil works were carried out by Samprasit and Bangsaen Mahanakorn. The project was planned for completion within 48 months. KWH Pipe was also able to do all of the welding work on the Weholite pipes.

PUBLIC SECTOR ALSO REQUIRES WEHOLITE

Another project in Thailand is in the public sector. The 304 Industrial Park is one of the largest industrial estates in the eastern part of Thailand. It is owned by 304 Industrial Park Ltd and promoted by the Board of Investment of Thailand as an investment source for both domestic and foreign entrepreneurs. 304's objective is to provide a good utility system to



DUE TO ITS LIGHT WEIGHT AND ITS AVAILABILITY IN LONGER LENGTHS – IN THIS CASE 12 METRES – WEHOLITE PIPE IS QUICK TO INSTALL AND REQUIRES LESS HEAVY EQUIPMENT.

support increasing demand and make a good impression on investors and clients by choosing high quality and easy-to-maintain equipment and facilities, such as its wastewater collection pipes.

In the past, 304 used asbestos cement for its drainage pipes and PE-HD pipes to collect wastewater on the industrial estate.

“But when we heard about the Weholite pipe and its benefits, we decided to use Weholite instead of asbestos cement pipes for the drainage system and our new wastewater collection pipeline,” said

Mr Kitja Rassameejam, Project Manager, Inter Project Management Co., Ltd, the consultant for 304.

HIGH CHEMICAL RESISTANCE WAS CRUCIAL

“The main reason is that PE-HD has high chemical resistance and the system was a gravity application, so we decided to use Weholite pipe instead,” Mr Kitja explained.

“The cost of Weholite pipe together with installation was 20% lower than that of cement pipe,” he added.

With Weholite pipe, one can cut down working procedures and labour costs because it is an easy-to-install pipe. Due to its light weight and its availability in longer lengths (in this case 12 metres), Weholite pipe is quick to install and requires less heavy equipment.

The project started in the beginning of 2007 and took less than four months to complete. The total length of this pipeline is 6,840 metres, with a size range from DN/ID 350 mm to DN/ID 800 mm. ●

In many places around the world, high density polyethylene (PE-HD) is still a relatively unknown material for piping systems. However, KWH Pipe produced its first PE-HD pipe as early as in 1955 and this has at least partly contributed to the fact that today plastic pipes almost completely dominate the market in Northern Europe.

Versatility of Weholite

In fact, KWH Pipe was a pioneer in the development of large-diameter piping, being the first company to produce OD 1,600 mm solid-wall pipes. Once Weholite was invented, further advances were made.

By spiral welding PE-HD or PP profiles, it is possible to manufacture structured-wall pipes in sizes that would be impossible for solid-wall plastic pipes. Weholite has been further developed and today comprises a complete pipework system for conveying liquids or air, underground, under water or above ground for gravity and low-pressure applications.

For years, the maximum size was DN/ID 3,000 mm, but in 2007

the range was expanded in order to respond to customer demand for even larger pipes and currently the largest size available is an astounding DN/ID 3,500 mm! This makes it possible to offer a long-lasting, maintenance-free system in even more gravity or low-pressure application areas.

PIPING PROJECTS MADE EASY

Piping professionals appreciate long-lasting, maintenance-free systems. Compared to pipes made of less advanced materials, Weholite offers excellent corrosion resistance, chemical resistance and abrasion resistance – this is all included in the same price with no extra





Important factors for installation are the low weight of the pipes, ease of handling, transportation to the job-site and method of installation.



Tried and tested in all climates

The versatility of Weholite has made it a popular solution in numerous application areas:

gravity sewerage, drainage, storm water, road and railroad culverts, retention tank systems, irrigation, penstock for hydropower plants, industry applications, ventilation, biofilters, service tunnels, intakes and outfalls.

The system is proving itself daily on five continents, from the freezing cold of the Siberian plains and the Andes mountain range to the scorching heat of the Omani deserts and the savannahs of Africa. In addition to KWH Pipe, the Weholite piping system is also produced by eight licensees in Chile, Oman, the United Kingdom, South Africa, Iceland, Malaysia, Italy and Japan.

KWH Pipe offers a flexible and innovative concept for large projects in areas situated out of reach of its own and its licensees' factories. Mobile plants make it possible for Weholite to be produced to factory quality in the dimension range of up to DN/ID 3,000 mm at the installation site, or close to it, anywhere in the world.

The entire production machinery, consisting of modular units, fits into 20 and 40 foot containers to enable easy transportation and fast mobilization. The mobile plants are operated by skilled personnel, which means that the concept can range from pipe supply to a complete turnkey solution.

Even though the piping system itself offers unique benefits, the technical support and a knowledgeable sales force is what makes Weholite a true "solution" and what sets it apart from the competition. The sooner KWH Pipe is consulted in a project, the more value can be added. ●

INSTALLED CORRECTLY, PE PIPEWORK SYSTEMS CAN PROVIDE A 100 PER CENT LEAKPROOF CONSTRUCTION WITH AN EFFECTIVE WORKING LIFE IN EXCESS OF 100 YEARS.

cost for surface coatings and other special preparations.

Where rigid pipe materials crack or break, Weholite's natural ability to flex enables it to adjust to different loading conditions, vibrations, stresses and soil movements without causing any damage to the pipe system.

The benefits of Weholite can be seen over time, but contractors will notice the difference immediately. Installing it is simple and easy. Longer pipe lengths mean less jointing, which significantly speeds up the installation time, thus reducing overall installation costs for the customer.

Weholite excels in a special niche market: complete systems for submarine intakes and outfalls, including inspection chambers and diffuser ports. In these applications, corrosion resistance is a must and installation is facilitated by the system's low weight and high flexibility.

QUICK INSTALLATION

The natural buoyancy of PE-HD, extrusion-welded joints and a bending radius capability of 50 times the outside diameter enable a smooth and controlled S-bend sinking operation. The time needed for installation is significantly reduced by the fact that longer piping sections can be welded and prepared for installation on land.

Another Weholite feature that reduces investment costs is its weighting system. PE-HD pipes are traditionally weighted using external weights, most often made of concrete. However, the weighting process is done quicker, easier and requires less expensive materials when the space between the inner and outer wall of the Weholite pipe is filled with cement mortar. ●

Versatile Weholite for industry and infrastructure



Weholite, from KWH Pipe, is a flexible and durable solution for large diameter piping in demanding industrial and infrastructure applications. We also offer a wide range of tank products, turnkey solutions as well as pipework for renovation of existing pipelines. KWH Pipe has over 50 years experience of demanding piping applications.



KWH Pipe Ltd
P.O.Box 21
FI-65101 Vaasa, Finland
Tel. +358 6 326 5511
Telefax +358 6 316 7115
www.kwhpipe.com