THE KWH PIPE CUSTOMER JOURNAL » ISSUE 14 » WWW.KWHPIPE.COM

pipe world

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Project follow up, technical support and outstanding delivery accuracy are highly appreciated services by our customers.






CHEAP MIGHT TURN OUT EXPENSIVE

Price and value – they are the Yin and Yang in any transaction of goods or services and no company can afford to spend money without thinking about price. Unfortunately, many fail to recognise that a low price doesn't necessarily translate into low cost when looking over a long term. Those who have come to realize this have also most likely come to the conclusion that the price doesn't have to be low, but it has to be right.

My point is that more effort should be spent on understanding the value component instead of bargaining for a lower price. If the offerings are identical, then naturally price should be the decisive factor. However, nobody should choose a product that will fail prematurely and require repairs or replacement just because it was a bargain. At KWH Pipe, we take pride in quality and, when it comes to quality, we never compromise. Unfortunately, there are less honest manufacturers that use plastic resin not designated for production of pipes, just to be able to lower prices. Such practices not only confuse customers and create an unhealthy market situation, but they also cause pipe failures that damage the image of plastic pipes everywhere.

To promote fair play, KWH Pipe strives to be a role model and cooperates with raw material suppliers, trade associations and standards organizations. Together with our partners we implement information campaigns to increase quality awareness among customers. Plastic pipes have an excellent image among users because of their superior qualities in many application areas and the long service life. Let's keep it that way.

Jan-Erik Nordmyr
President & CEO, KWH Pipe Ltd.

For more information on the subject:
The European Plastic Pipes and Fittings Association, **www.teppfa.com**
Plastics Pipe Institute, **www.plasticpipe.org**
Thai Industrial Standards Institute, **www.tisi.go.th**

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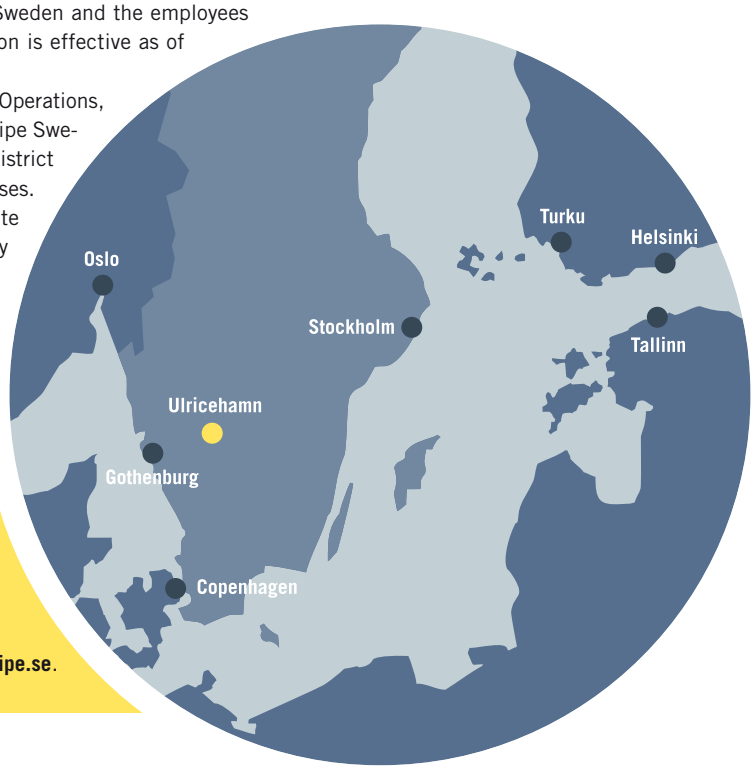
PE PP PVC

KWH Pipe sharpens its focus in Sweden and relocates to new factory

Wavin and KWH Pipe have signed an agreement whereby Wavin Sweden (Aktiebolaget Svenska Wavin) acquires the PE Division of KWH Pipe Sweden (KWH Pipe Sverige AB). The transaction includes KWH Pipe's factory in Borås, Sweden and the employees of the product area PE pipes and fittings. The acquisition is effective as of 1st December, 2010.

Peter Engstrand, Executive Vice President of European Operations, has assumed the position of Managing Director of KWH Pipe Sweden. KWH Pipe will increase its focus in Sweden on its District Energy, Weholite and Environmental (WehoPuts) businesses. Engstrand explains: "We see a huge potential for Weholite as part of the future infrastructure for handling sanitary sewage and storm water. Therefore we have reorganised the business in order to be able to work more flexibly and with greater customer focus in these application areas. Additionally, we will be moving to a new location, highly suitable for the production of pipes, inspection chambers and different types of tank structures." ■



The new production plant is located in Ulricehamn

KWH Pipe Sverige AB
Industrivägen 15, 523 90 Ulricehamn, Sweden
For more contact information, please visit **www.kwhpipe.se**.

Kitemark certification for Weholite

The Kitemark is a quality certification mark awarded by the British Standards Institution (BSI Group). It is a UK certification to identify products and services where safety is paramount. The Kitemark certification is recognised worldwide and gives products a recognised stamp of safety, quality and trust.

KWH Pipe's licensee in the UK, Asset International Ltd, has become the first plastic pipe manufacturer in Europe to achieve a Kitemark to the new BS EN 13476 standard across its entire Weholite product range. The BS EN 13476 accreditation replaces the WIS 4-35-01 for plastic structured wall pipes used in non-pressure underground drainage and sewerage. Asset will undergo regular inspections to guarantee that its large diameter PE-HD Weholite product consistently meets the requirements of the standard.

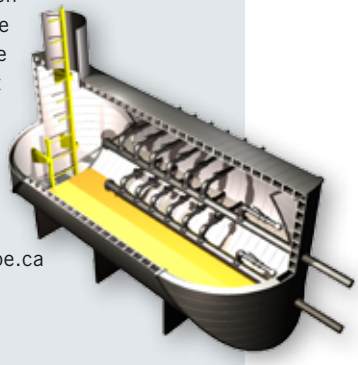
Managing director at Asset, **Simon Thomas**, said: "To achieve a Kitemark certification across our whole product range demonstrates the quality and integrity of Weholite and reinforces what our existing customers already know."

The Kitemark recognition follows Asset's recent achievement of the UVDB Verify accreditation for high standards in health and safety, environmental and quality. ■

WehoEnergy Geothermal Vaults launched

KWH Pipe is excited to be launching the new WehoEnergy Geothermal Vaults this spring in North America. With increasing demand in the marketplace, KWH offers a niche product that provides end users with a long lasting solution unlike other competing products.

The WehoEnergy Geothermal Vaults are custom fabricated to the design requirements of the customer's projects. These vaults are designed to be unique in the marketplace and offer features that other manufactures do not provide. Vaults are manufactured with grey Weholite PE-HD pipe, since the lighter interior is preferred by end users for inspection purposes. Also, to better serve the installers, self balancing headers are offered, which speed up installation time and reduce overall cost. Since the majority of the vault is fabricated with Weholite, it carries the same material and structural qualities that are found in the pipe itself.



For more information about WehoEnergy Geothermal Vaults please contact geothermal@kwhpipe.ca or visit **www.kwhpipe.ca**. ■

Pre-paid water

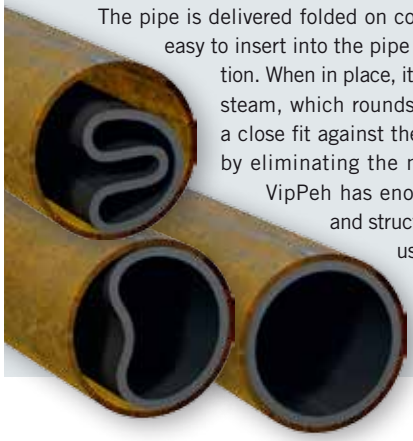
KWH Pipe has developed a water tank station for a Danish public utility that allows the community to fill water tankers or water containers against payment.

The consumer pays a sum of choice and in return receives a data key that registers how much water is consumed and deducts the charge from the balance. The size of the water tank varies depending on the local need, but the principle is the same.

The tank is prefabricated and fully equipped at KWH Pipe's factory and immediately ready for use. ■

VipPeh renovates deteriorated pipes

VipPeh is a folded pipe used for rehabilitation of pressure pipes, available in DN/OD 100–300 mm. Since it is made of PE-HD, it can also be used for potable water applications.



The pipe is delivered folded on coil, which makes it easy to insert into the pipe in need of renovation. When in place, it is pressurised with steam, which rounds the liner, to form a close fit against the host pipe, thereby eliminating the need for grouting. VipPeh has enough ring stiffness and structural strength to be used even if the host pipe is in a very bad condition. ■

APPOINTMENTS

Juha Kainulainen

Paula Erkolahti

Burin Kunatippapong

Peter Engstrand

Henrik Stray Dijohn

Tommy G. Sørensen

KWH Pipe Finland

Mr Juha Kainulainen, B.Sc. (Eng.), has been appointed Executive Vice President, Pipe Finland, and a member of KWH Pipe General Management Team as of 1st September 2010. He has previously worked as Director of Finland in the European organization.

KWH Pipe, Technology

Ms Paula Erkolahti, M.Sc. (Eng.) has been appointed Product Manager as of 1st February 2011. She has previously worked as Sales Engineer for KWH Pipe, Technology.

KWH Pipe Thailand

Mr Burin Kunatippapong, M.Sc. (Eng.), has been appointed CEO and Director of Wiik & Hoeglund PLC and a member of KWH Pipe General Management Team as of 1st January 2011. He has previously worked as Senior Vice President at Pacific Star International (Thailand) Ltd., Real Estate Investment and Development.

KWH Pipe Sweden

Mr Peter Engstrand, M.Sc. (Econ.), has been appointed Managing Director of KWH Pipe Sweden as of 1st December 2010. He continues as Executive Vice President, Europe, and a member of KWH Pipe General Management Team.

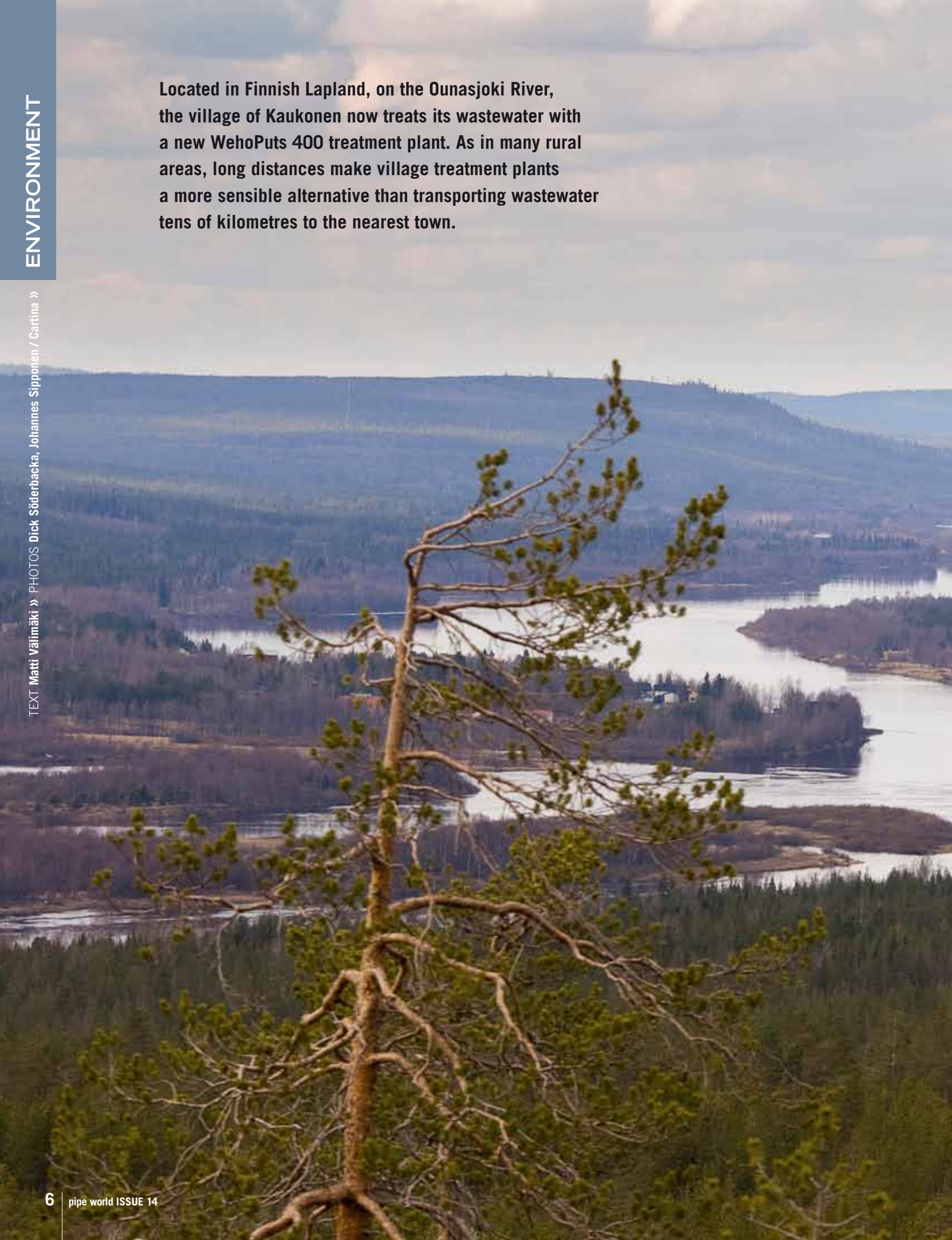
KWH Pipe Denmark

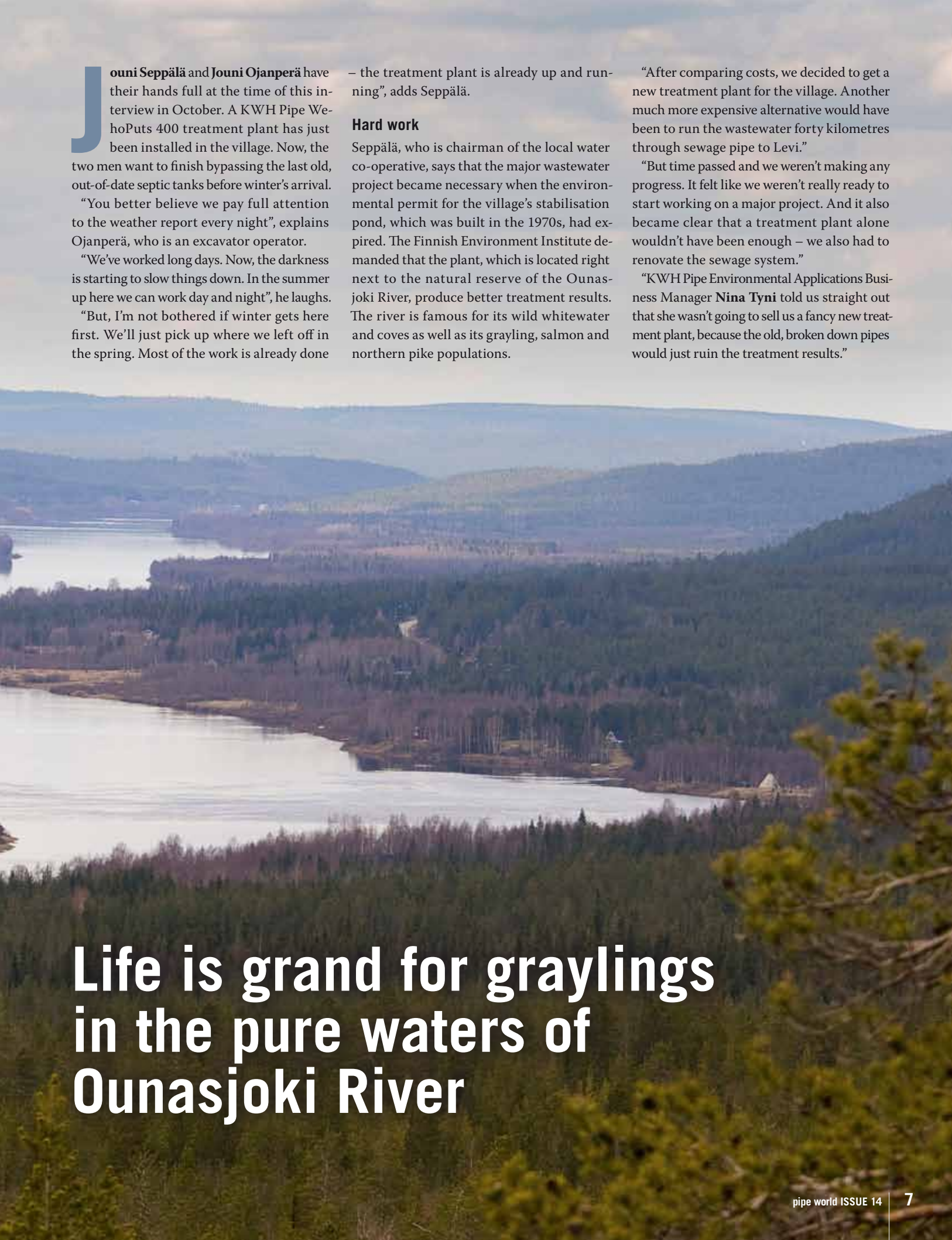
Mr Henrik Stray Dijohn, Manufacturing Engineer, has been appointed Manager, Products and Customer Service, as of 1st February 2011. He has previously worked as Business Controller at Jakon A/S.

Mr Tommy G. Sørensen has been appointed Sales Manager for stormwater and wastewater solutions in the Jutland and Funen areas as of 1st February 2011.

Located in Finnish Lapland, on the Ounasjoki River, the village of Kaukonen now treats its wastewater with a new WehoPuts 400 treatment plant. As in many rural areas, long distances make village treatment plants a more sensible alternative than transporting wastewater tens of kilometres to the nearest town.

TEXT **Matti Välimäki** » PHOTOS **Dick Söderbacka, Johannes Sipponen / Cartina** »





Life is grand for graylings in the pure waters of Ounasjoki River

Jouni Seppälä and **Jouni Ojanperä** have their hands full at the time of this interview in October. A KWH Pipe WehoPuts 400 treatment plant has just been installed in the village. Now, the two men want to finish bypassing the last old, out-of-date septic tanks before winter's arrival.

"You better believe we pay full attention to the weather report every night", explains Ojanperä, who is an excavator operator.

"We've worked long days. Now, the darkness is starting to slow things down. In the summer up here we can work day and night", he laughs.

"But, I'm not bothered if winter gets here first. We'll just pick up where we left off in the spring. Most of the work is already done – the treatment plant is already up and running", adds Seppälä.

Hard work

Seppälä, who is chairman of the local water co-operative, says that the major wastewater project became necessary when the environmental permit for the village's stabilisation pond, which was built in the 1970s, had expired. The Finnish Environment Institute demanded that the plant, which is located right next to the natural reserve of the Ounasjoki River, produce better treatment results. The river is famous for its wild whitewater and coves as well as its grayling, salmon and northern pike populations.

"After comparing costs, we decided to get a new treatment plant for the village. Another much more expensive alternative would have been to run the wastewater forty kilometres through sewage pipe to Levi."

"But time passed and we weren't making any progress. It felt like we weren't really ready to start working on a major project. And it also became clear that a treatment plant alone wouldn't have been enough – we also had to renovate the sewage system."

"KWH Pipe Environmental Applications Business Manager **Nina Tyni** told us straight out that she wasn't going to sell us a fancy new treatment plant, because the old, broken down pipes would just ruin the treatment results."

THE GROUND WHERE THE POND USED TO BE IS NOW A COMPOSTING AREA. THE SLUDGE FROM THE NEW TREATMENT PLANT IS MIXED THERE WITH PEAT AND THE END PRODUCT CAN BE USED AS A SOIL CONDITIONER.

Fixing the system

The water co-operative's project was given new urgency when the Environment Institute fined the co-operative.

"After this happened, we appointed a head for the treatment plant project, **Ari Vaarala** of NCC Roads. Vaarala drafted a comprehensive plan for the project and work was soon underway."

The Environment Institute also withdrew the fine it had issued. The KWH Pipe WehoPuts 400 was chosen as the central system treatment plant.

"WehoPuts was the best fit for the site requirements", explains Vaarala.

The treatment plant was installed in September 2010. Installation work was overseen by NCC Roads and KWH Pipe representatives were involved in the pipe and electrical work as well as the system start-up. KWH Pipe also trained water co-operative personnel.

Effective treatment, with new soil production to boot

Seppälä explains that the treatment results of the WehoPuts plant are significantly better than the old stabilisation pond.

"The treatment plant is also more user-friendly", states satisfied Seppälä.

Only grey water was led to the old stabilisation pond. Each home had its own septic tank, which the homeowners had to have emptied themselves. On top of all this, nutrients were not eliminated from the water in the pond, but rather ended up in the Ounasjoki River.

"Now, the biochemical process treats the wastewater effectively. And local residents don't have to empty their septic tanks."

According to Seppälä, once the old septic tanks were bypassed during construction of the new system, many people realised that the old system had not functioned effectively.

"Pipes leading to houses had in many places been compressed and the wastewater just stayed put."

The new treatment plant is located directly adjacent to the old open pond basin, which has already been filled. As the only elements of the treatment plant visible at ground level are a couple hatches and the control unit, it blends very well into the environment.

The ground where the pond used to be is now a composting area. The sludge from the new treatment plant is mixed there with peat and the end product can be used as a soil conditioner.

"We don't have to bring our sludge to Levi for composting anymore – that means big savings."

Reliable partners

Seppälä says that the water co-operative's desire to partner with large, responsible operators played a major role in their decision-making.

"We wanted to be sure that we'd hear from these guys again after they left town", laughs Seppälä. He also praises, among other things, the treatment plant operation and maintenance training provided by KWH Pipe.

Bank loan paid off with user fees

In addition to the savings earned by the water co-operative, a long-term bank loan was also required for the investment.

"The bank loan is being paid off with user fees. We've also sought investment assistance for the site from the Lapland Centre for Economic Development, Transport and the Environment", explains Seppälä.

Vaarala points out that, even though there will not be a return on the investment for a long time, the system maintenance and repair costs are low.

Kaukonen's far-reaching vision

In Vaarala's opinion the village treatment plant project sets an outstanding example for others to follow.

"These kinds of projects should be handled with the highest standard of professionalism. It's vital to see the treatment of wastewater as a whole, not just focus on specific parts of a network. Naturally, done all at once this is a large scale project – but a chain is only as strong as its weakest link."

"This is an investment that will pay off for decades to come. It also enhances the village image and makes it a more desirable place to live."

Treatment plants perfect for Lapland

Miia John of KWH Pipe notes that, at least where the treatment plant is concerned, the village could handle even more households.

"The plant is dimensioned for 400 people. Right now, the village has a population of around 300."

Miia John feels that there would be a great deal of demand for village treatment plants throughout Lapland.

"There is no shortage of sparsely populated areas in Lapland and distances are long. Village treatment plants are often a considerably more sensible alternative than transporting wastewater tens of kilometres."

"And the terrain is very varied, with lots of difference in elevation and wetlands", she adds. ■

QUICK INSTALLATION, USER-FRIENDLY

WehoPuts 200–1200 treatment plants are designed for the biochemical treatment of residential wastewater. They are dimensioned to serve village communities with multiple households: the model number itself indicates the user capacity. Treatment plants can also be customised for a variety of sites.

WehoPuts 200–1200 treatment plants consist of one or more horizontal in-ground tanks and the necessary process equipment. If there is more than one purification unit, the system also includes a distribution unit. The tough and compact treatment plants have a large safety volume, which stabilises load fluctuations.

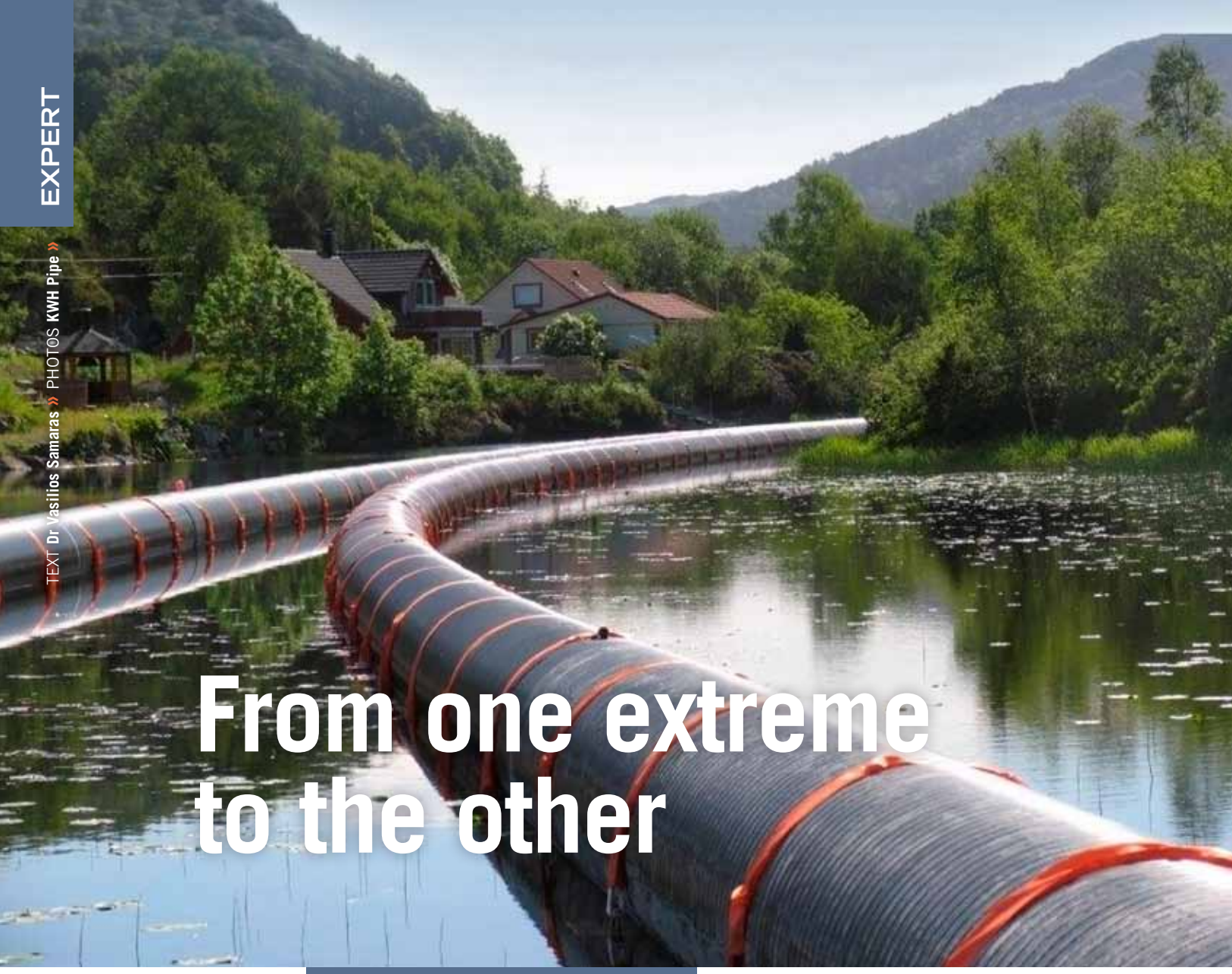
The treatment plants are factory-assembled and ready for installation. It is also easier to ensure a high standard of quality in the factory. Site installation is quick and does not require any external structures.

The treatment plants can be easily blended into the environment and are suitable for even the most delicate natural areas. The only parts of the plant visible at ground level are the tank maintenance hatches. Also, the treatment plants do not emit foul odours. When the process is working properly, only a slight smell of wet soil is produced.

The treatment plant is easy to use and equipped with a remote monitoring system, which sends a message to the service technician's mobile phone in the event of a malfunction even if the power is out, as the plant is equipped with battery back-up.

KWH Pipe provides training for the personnel who will be tending to the treatment plant. ■

TEXT Dr Vasilios Samaras » PHOTOS KWH Pipe »



From one extreme to the other

High density polyethylene pipes (PE-HD) are now commonplace for a variety of purposes and are increasingly being used as a replacement for more traditional materials, such as concrete or iron, thanks to its reliable, long lasting and durable properties.

Dr Vasilios Samaras looks at how the pipe is increasingly being used for projects that subject it to extreme conditions and how the material is able to cope with the most severe forces that Mother Nature can throw at it.

While it is accepted that plastic pipes provide a cost-effective solution for a range of piping applications, PE-HD pipe is increasingly being used for a wide variety of purposes in more extreme environments.

The last three decades have seen a significant increase in the use of plastic pipes in innovative engineering solutions such as marine applications, and hydro projects where temperatures can plummet to extreme lows.

PE-HD PIPE IS THE TOP CHOICE for the growing number of marine applications that require pipelines installed on the sea-bed. Treated ductile iron or concrete pipes do not offer anywhere near the excellent level resistance to abrasion, corrosion and chemicals that PE-HD offers. As a result, the cost does not need to incorporate extras such as surface coatings or other additional preparations.

Rigid pipe materials are susceptible to cracking or breaking completely; whereas PE-HD pipe has a natural ability to flex, which enables it to adjust to different

loading conditions, vibrations, stresses and movements without causing any damage to the pipe system while under water.

FLEXIBLE PIPES are extremely versatile when compared with rigid pipes, and have important structural performance advantages. Unlike rigid pipes, flexible pipes have excellent resistance to differential settlements. When overloaded, the structured-wall pipe will simply deform further to generate greater passive pressures until the system regains equilibrium.

Solid-wall polyethylene pipes reach sizes of up to 2.4 m in diameter, but in many cases it's sufficient and more economical to use structured-wall pipes. Structured-wall polyethylene pipes carry every benefit associated with their older sister, the solid-wall polyethylene pipe, in the marine field. And now plastic pipe manufacturers are able to use high quality structured-wall technology that can reach up to 3.5 m diameter.

LARGER PIPE SIZES generally have a decreasing ability to cater for settlements and uneven seabeds. In this respect, structured-wall pipes have an advantage because their pipe wall design will more readily adjust itself.

The pipe not only has to prove strong and durable once installed, it needs to withstand several testing demands during the sinking process.

Throughout sinking, the pipe is subjected to stresses much higher than those experienced during its actual use. A large bending radius capability is needed to allow for the ideal smooth 'S-bend' sinking operation.

For pipes with a large diameter, the pulling force needed to uphold the bending radius can be extremely high, so a good bending radius capability is crucial. As plastic pipes can be submerged using open ends, the force on the pipe system during sinking is significantly decreased. The smooth and controlled 'S-bend' sinking operation is further enabled by the natural buoyancy of plastic pipes and the bending radius capability of 50 times the outside diameter.

IT IS ALSO CRUCIAL that the pipe must not be overstressed or moved on the seabed, so a suitable weighting system is required. Thanks to the flexibility of structured wall pipe, it corrects itself following any influence from weighting.

As a high-quality structured wall system, this product has proven itself in several marine installations both for water intake lines, cooling water systems and sewage outfalls.

It is also worth noting that an additional benefit of structured-wall pipe for marine applications is the significant time and cost savings procured during installation. Long piping sections can be prepared and welded on land before sinking, saving manpower once the pipe has been laid. As plastic pipes are laid using the simple "float and sink method" minimum equipment, boat and manpower is required, providing further cost and time savings.

The Longman Outfall in Inverness, UK, installed in 1998, is a prime example of such product versatility thanks to the decision to use structured wall pipe for a sea outfall. 500 metres of 1.65 m pipe was installed in 100 metre strings, saving the client installation time and considerable costs.

PE-HD PIPE HAS A NATURAL ABILITY TO FLEX, WHICH ENABLES IT TO ADJUST TO DIFFERENT LOADING CONDITIONS,VIBRATIONS, STRESSES AND MOVEMENTS.

THE LOWER CARBON FOOTPRINT of PE-HD (which can be up to 85% less than concrete) is also an attractive prospect for many end-users keen to meet green initiatives, especially for trans-Atlantic projects. As the pipe is lightweight and can be easily nested, the reduction in deliveries significantly reduces carbon emissions during transportation. Asset International regularly delivers fully-nested loads to the Falklands Government providing dramatic reductions in delivery costs and carbon emissions.

The PE-HD is used in water transportation applications in the Falklands where temperatures can plummet well below freezing, especially in marine environments. PE-HD is an ideal choice as steep variations in temperature will not affect the pipe's structure, unlike concrete and ductile iron pipes which are highly susceptible to cracking or damaging in extreme cold.

PE-HD PIPE IS ALSO USED for projects closer to home that expose water transportation pipes to sharp fluctuations in temperature.

A pioneering hydro-power scheme in Glendoe, near Loch Ness has used PE-HD pipe for transporting vast amounts of water from a reservoir high up in the Glendoe hills down to a power station, covering an area of 15 sq kilometres. Once again the lightweight nature of the pipe meant installation and transportation up the steep mountain-side was quick and easy, saving time and costs. Additionally, it was the ideal choice for an area such as Glendoe where temperatures can reach similar extremes as experienced in the Falklands.

What distinguishes PE-HD from its rivals is the diversity of applications for which the pipe is ideal.

WHILE PE-HD PIPE HAS PROVEN itself in a number of applications, the cost of delivery and speed of installation places it high above traditional pipe materials. Furthermore, its prominent role in green applications and its lower carbon footprint means PE-HD pipe is a highly competitive product and looks set to remain so. ■

Dr Vasilios Samaras is Senior Technical Engineer at water management specialist and Weholite licensee Asset International Limited.

Perforated pipe for Bangkok landmark

TEXT **KWH Pipe** » PHOTOS **KWH Pipe** »

In the end of 2011, Sanam Luang with the 115,000 m² of new dazzling landscape and the new drainage system will be ready to re-open as the newest attraction in Bangkok.

Sanam Luang, situated in front of the Grand Palace and Wat Phra Kaew, the most sacred Buddhist temple in Thailand, is one of Bangkok's most important landmarks. Located in the heart of Bangkok, it is an open field and square used for the Royal family's ceremonies and is frequently visited by tourists. Therefore, in 2010, Bangkok Metropolitan Administration started a land development project in order to improve the landscape and better utilize the area for public and tourist activities. This initiative included installation of a drainage system, supplied by Wiik & Hoeglund, KWH Pipe's subsidiary in Thailand.

"In the past, Sanam Luang had a flooding problem due to slow drainage, so the area could not easily be utilized in the rainy season, but the new landscape plan includes grass and plants, so we needed to install a drainage system that can remove the stormwater faster. That's why we decided to use the WehoDuo system", commented **Mr Jaturong Son-ieam**, Director of Construction, design office, Bangkok Metropolitan Authorities.

In November 2010, 4,728 metres of perforated WehoDuo double-wall pipe was delivered from the KWH factory and installed underground, wrapped in geotextile sheet in order to keep dirt and dust out of the system, while allowing water to flow freely. As late as in the mid-19th century, rice was grown in Sanam Luang and the soil is very soft still today. "We apply a high standard for the trench bedding; however, the soil settlement in this area is still unpredictable. To ensure that the pipe will not crack if the soil settles unexpectedly, we needed a flexible pipe. We don't want to risk having to redo the whole open cut in the landmark and tourist area in the future in order to fix a pipe problem" Mr Jaturong stated. In the end of 2011, Sanam Luang with the 115,000 m² of new dazzling landscape and the new drainage system will be ready to re-open as the newest attraction in Bangkok, Thailand. ■

Weholite to prevent environmental damage

Residents in Clipstone in Nottinghamshire, United Kingdom, can now enjoy the full benefits of country walks thanks to a three-mile-long sewage system upgrade to prevent flooding and reduce pollution.

TEXT **Asset International Ltd** » PHOTOS **Asset International Ltd** »

Heavy rainfall caused the Clipstone outfall sewer to flood into agricultural land near several nature walks. This has previously resulted in pollution spilling into Vicar Water which runs into the River Maun. Severn Trent Water has invested several million euros to help alleviate the problems with a system upgrade.

The flood alleviation project through Kings Clipstone village used Weholite, manufactured by KWH Pipe's licensee Asset International Ltd, for the large diameter pipe work.

Contractors NMC Nomenca installed 300 metres of DN/ID 1,500 mm and 150 metres of DN/ID 1,050 mm Weholite pipe. The large diameter pipes will act as storage chambers during heavy rainfall and release the water slowly back into the sewage system to be treated before being returned to the surrounding environment.

The pipes were installed with Teekay couplings, sealed watertight joints which effectively allow pipes to be joined quickly. Unlike other couplings the Teekays are maintenance-free and do not require 24 hours 'rest' before tightening. The Teekay couplings are also rubber lined to ensure resistance against corrosion and therefore ideal for flood alleviation projects.

Project Manager at NMC Nomenca, **Ian Hawksworth**, said: "We have successfully used Weholite on previous projects so have experience of its advantages. Its lightweight properties and ease of handling within a confined linear site meant it was perfect for this scheme at Clipstone."

Lower carbon footprint

"Cost in this instance was comparable with other materials but given the ease of handling and speed of installation, made it a viable choice of material. Health and safety risks were also reduced as there was less requirement for heavy-lifting machinery on site for installation. All of these factors resulted in the project being scheduled for completion in January 2011, eight months ahead of schedule", said Ian Hawksworth.

Managing Director of Asset International Ltd, **Simon Thomas**, said: "Weholite has a lower carbon footprint than other materials due to its UK manufacture and its lightness when being transported. This is particularly relevant for projects like this one at Clipstone which aims to conserve the environment and reduce flooding and pollution.

"Weholite's versatility allows bespoke designs for a variety of schemes of all sizes such as flood alleviation, marine outfall and ventilation projects." ■

TEXT Matti Välimäki » PHOTOS KWH Pipe »

WehoCoat revolutionises
field jointing of oil and gas pipelines

There has been extremely good field experience with the new WehoCoat technology for surface coating of field joints in oil and gas pipelines. Surface coating of joints is easy and the strength is comparable to the strength of factory coatings.

Gasum's gas pipeline site, Nummela, southern Finland. At the beginning of February there is half a metre of snow and the temperature can be twenty degrees below zero. In these arctic conditions, the WehoCoat robot covers the welding joints on the steel pipe with plastic. The work progresses steadily.

The WehoCoat robot has been working on Gasum's Mäntsälä-Siuntio pipeline construction site in southern Finland since September. This major WehoCoat project has reached the reference stage. The Field Unit Foreman, **Yuri Teterev**, from the Russian company Stroytransgaz, is extremely satisfied with the robot: "The coatings made by the machine are extremely hard wearing, even better than the pipe coating applied in the factory. The quality of the surface of the joint is better than any other joint coating technology."

"The machine is also relatively easy to use. On average, it does three joints an hour. The machine works without any problem even in freezing conditions. The only thing that slows it down is how to get near the pipe in the middle of the snow." Yuri Teterev emphasises that WehoCoat is an example of the very latest technology. No other manufacturer can offer anything like this. "WehoCoat is particularly suitable for horizontal drilling, crossing under roads and other similar installations", he observes.

In horizontal drilling the strength of the

joints is really put to the test as stones, for example, scratch the pipe as it is being pulled through the drilled tunnel.

There is no possibility of human error

KWH Pipe Technology's Head of Engineering, **Kari Karjalainen**, also confirms that the strength values of the joints are in the same class, or even better than the "mill coating" of the pipe done in the factory. "The strength values are many orders of magnitude better than traditional shrink sleeve joints and there is also several positive aspects if compared to the glass fibre reinforced hard shrink sleeves that were intended to be used on the horizontal drilling parts of the pipeline."

"What is also important is that all of the work stages in WehoCoat technology are automated and the robot produces a consistent, good quality. Other technologies require more work by people, especially the hand applied shrink sleeves, so there is more chance of human error", Kari Karjalainen points out.

> **"THE COATINGS MADE BY THE WEHOCOAT MACHINE ARE EXTREMELY HARD WEARING.**

Gasum's pipeline between Mäntsälä and Siuntio runs for 90 kilometres. The WehoCoat robot has worked hard on all the locations involving horizontal drilling and has been used for as many normal pipe joints, i.e conventional shrink sleeve, as possible elsewhere on the pipe line too. "We are halfway through the project now and have coated around 800 field joints. The remarkable thing is that the speed is comparable or even faster than with the less qualitative techniques at about 16–20 minutes cycle time", says Kari Karjalainen.

The result of long product development

The fact that the WehoCoat robot has been working in southern Finland in the middle of snow, is not something that has happened all at once, of course. It all began in 2006. At that time, the world's leading supplier of coating materials for steel pipes, Borealis AG under the leadership of **Leif Leiden**, was developing new polyethylene and polypropylene based field jointing materials. "Our idea was that coating technology for field joints could also utilise molten plastic. We soon noticed that there was no suitable equipment for this. We contacted KWH Pipe, and they were immediately enthusiastic about the idea. We started to develop the equipment together", Leif Leiden, Borealis' Head of Development, explains.

Borealis contributed its high level of knowledge of plastics and KWH Pipe its strong skills in mechanical engineering and automation. Cooperation went well. "The job was extremely demanding, but step by step we succeeded in resolving all the challenges and problems that arose."

"A major stage was, for example, when we worked out how the heating of steel pipe could

be done by induction and online, at the same rate as the machine moved forward. A significant step was also to realise how the robot which was circling the pipe could squeeze molten plastic upwards."

The WehoCoat prototype was tried out on Gasum's pipeline which was under construction. The accumulated experience help in further development and after this we were ready for a really big project. Leif Leiden is satisfied that Gasum understood the possibilities of the new invention and wanted a second generation WehoCoat robot for the Mäntsälä-Siuntio pipeline that is now under construction. "I said to the representative of the contractor, General Manager **Boris K. Panibrattsev** of the Russian firm Stroytransgaz, that we all wanted to be good, to be world champions. I said that now we have that chance", reminisces Leif Leiden.

The robot comes with a specially equipped lorry

As Yuri Teterev emphasises, WehoCoat really is a new kind of technology. The basic idea in short is that the welding joint area is sand blasted clean and then powdered epoxy and a surface coating based on molten plastic is applied using a specially designed robot. The robot carries out all stages of the work completely automatically.

"The coating in this technique is a reactive surface plastic developed by Borealis, which acts as both an adhesive plastic as well as a surface plastic", explains Leif Leiden.

The total WehoCoat package includes a specially designed, four-wheel drive lorry which includes a crane suitable for moving the robot, an electrical and automation system, as well as an extruder in which the surface plastic is melted from pellets to become a molten mass which the robot's plastic cylinder is filled with.

There are huge oppurtunities

Director of KWH Pipe Technology's Vaasa Business Unit, **Kari Punnonen**, believes that there is a large market for the new technology. "There are millions of joints made every year which would be suitable for WehoCoat technology. Of course there is some investment in the equipment needed, but making the joints using WehoCoat can even work out cheaper than with other technologies."

"The greatest savings of course come from the fact that the technology enables firm and uniform quality coatings to the pipeline and then it is not necessary to start to repair the pipeline afterwards because of joint problems", emphasises Kari Punnonen.

Norbert Jansen, Application Marketing Manager for Borealis pipe business, agrees with Kari Punnonen: "The big players in the oil and gas industry are interested in the technology. Many companies have been to see WehoCoat on site and we will organise more displays for companies in the future."

"The oil and gas industry is fairly conservative, but when there is a good opportunity to make operations more efficient it arouses interest."

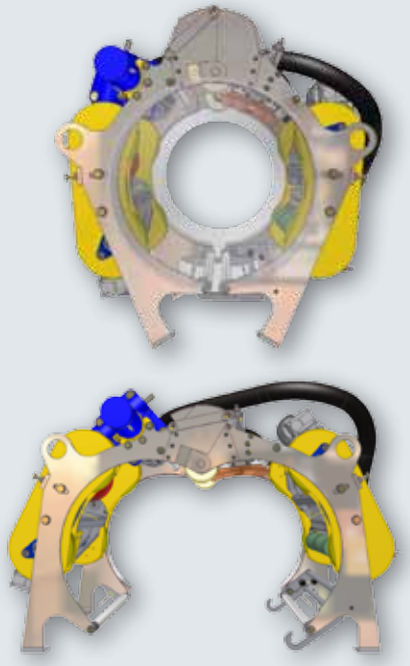
Certification next

Kari Karjalainen explains that the next step is to have the WehoCoat system certified in the manner required by the major players. In practice this means that a third party checks that the technology satisfies all the detailed specifications required by Gasum, Shell and the other major global companies in the oil & gas sector. "Companies' specifications are different and each one of them has specific criteria. Once this certification process is complete, the companies can use the technology easily on different pipeline sites around the world", states Kari Karjalainen. ■

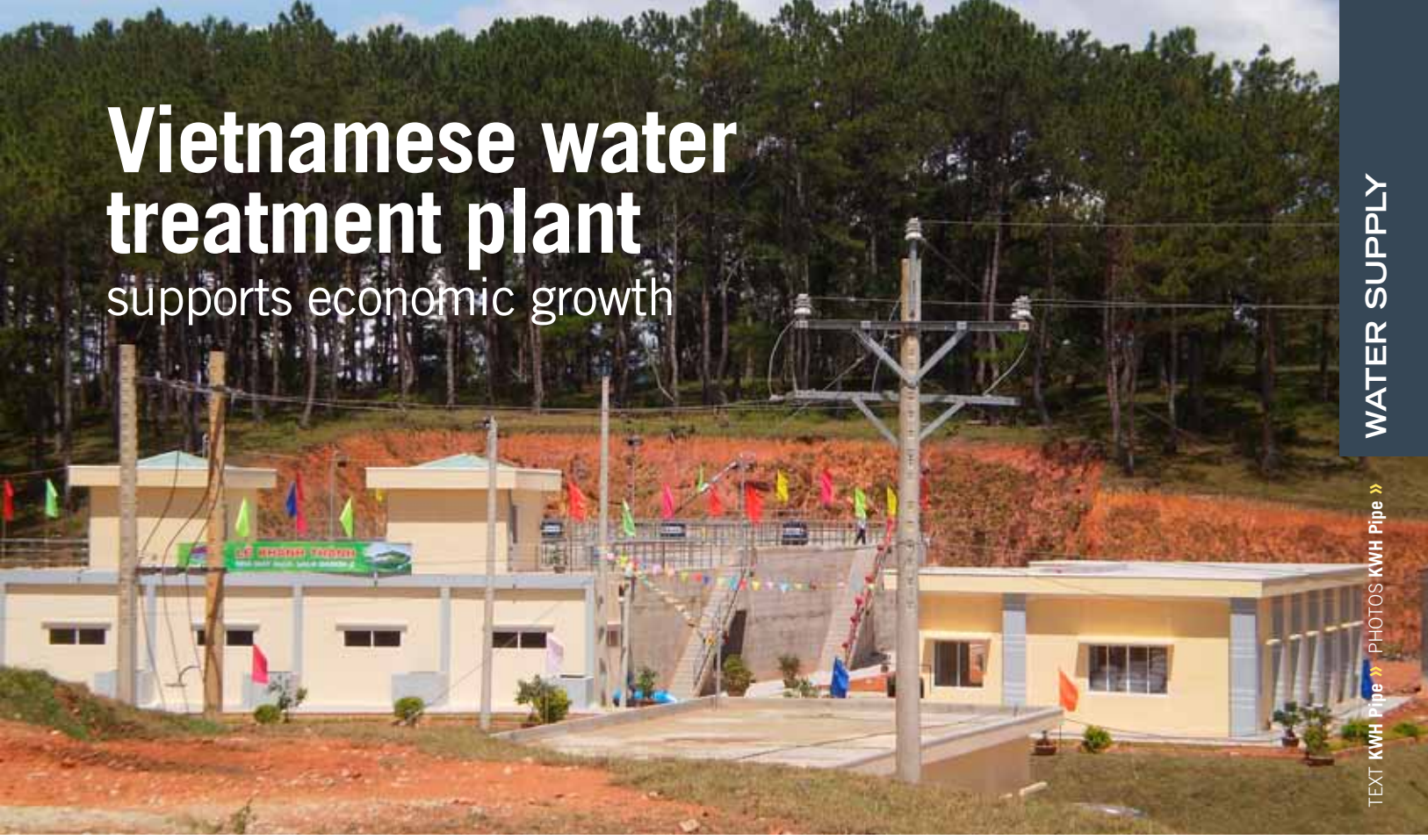
The development of WehoCoat technology was written about earlier in Pipe World issue 11.

WEHOCOAT ROBOT TECHNICAL SPECIFICATION

- Steel pipe size range: 400–1,420 mm
- Capacity: 60kg/h
- Robot max. speed: 1.2 m/min (one rotation on a 500 mm pipe equals approx. 1.5 m)
- Machine weight: approx. 350 kg
- Length in pipe direction: 900 mm
- Required space around/under the pipe: 400 mm
- Adjustable extrusion film thickness and width



Vietnamese water treatment plant
supports economic growth



TEXT KWH Pipe » PHOTOS KWH Pipe »

Vietnam is one of the Asian countries that are enjoying great dynamic growth both in the economy and investments. To sustain the positive trend over long term, the country's water supplies need to be modernized and developed. GELEXIM Corp., the largest general investment corporation in Vietnam decided to carry out two clean water supply projects in Lam Dong province. The first project included construction and commissioning of the Dankia 2 water supply plant.

The Dankia 2 Water Treatment Project, executed using the most advanced technology, was inaugurated on 24th September, 2010. The long-term objective is to supply 30,000 cubic metres of tap water a day for Lam Dong in 2015. The plant itself is located in the municipality of Lat, Lac Duong District, Lam Dong, Vietnam. As the project owner wanted to spend the capital investment of USD 10 million wisely, special emphasis was put on choosing the most suitable solution for the construction of pipelines.

Increased security and sustainability

KWH Pipe's subsidiary in Thailand, Wiik & Hoeglund PLC supplied and installed approximately 8.3 kilometres of DN/OD 630 mm SDR17 PN10 pipe conforming to DIN 8074 standard as raw water intake and main water distribution pipeline.

"Our business is to serve society and to improve the lives as well as the health of inhabitants, which is the key to success" **Phung Duyen Thu**, Gelexim Director clearly stated.

"We are very satisfied with KWH's services and PE-HD products, which are suitable for the terrain in Lam Dong. Currently, Dankia 2 is in operation and supplying clean water to the Lam Dong province. After 2015, this plant will double its production capacity, which is the major reason why we chose PE-HD considering its long life span and expertise for the next water treatment plant project. We see Wiik & Hoeglund not only as a good one-stop-service pipe supplier, but also as our good friend."

Since Dankia 2 commenced the supply of water in September 2010, the economy and production of Lam Dong has enjoyed increased security and sustainability for long term benefit. ■

TEXT KWH Pipe » PHOTOS KWH Pipe »

Swagelining modernises old water line

Thanks to swagelining technology, it was possible to carry out most of the water line modernisation works in the centre of the city of Łódź, in a built-up area, along traffic lanes with heavy traffic of motor vehicles and trams.

The Dąbrowa water line is the oldest and most extensive water system in Łódź in central Poland. It was constructed in the 1940s and has been working exclusively on the basis of deep wells, situated in Łódź and its surroundings. Dąbrowa takes water from 13 wells whose depth ranges from 120 to over 900 m. Its other components are a water treatment unit, where the water from the wells is purified, a chlorination unit, where the water is disinfected and a pumping unit, from where the water is pumped to Stoki Tanks, where it is collected and delivered to 1/3 of the population of 750,000 in Łódź.

With the help of the Cohesion Fund from the European Commission, in mid 2008 the city started a project called Water lines and sewage treatment unit in Łódź II. The total value of the works carried out under this project is EUR 142 million. The project also includes the contract "Dąbrowa Water Line – modernisation of Łódź Water Supply System – Part 02C Dąbrowa Water Line – Modernisation of treated water line" with a value of almost EUR 3.5 million. The contract has been carried out by the consortium of four companies including Wiertmar sp. z o.o. (consortium partner). The water line with a nominal diameter of 750 mm and approximately 5,440 m long, was modernised under this project.

Two technologies in use

The Employer (Łódzka Spółka Infrastrukturalna) suggested that the water line be renovated using two technologies; cementing and swagelining. Whereas the contractors have already mastered the first method, the second posed a special challenge for large diameter systems.

Swagelining is a tight fitting method, which involves PE pipes, and is based on the tight fitting of a polyethylene lining inside the old

It took only four hours to pull a 210-metre pipe length through.

pipeline. Standard polyethylene pipes, whose outer diameter is slightly bigger than the inside diameter of the modernised pipeline, are welded into lengths which are a few metres longer than the length of the renovated pipeline section. Welded lengths are passed through a special reducer, which diminishes their outer diameter so they can be put inside the renovated pipeline. Then, the tension is released and the PE pipes expand to press tightly against the inside wall of the old pipeline.

An advantage of swagelining is the slight reduction of the inside diameter of the renovated pipeline which, with a much smoother inner wall surface, significantly improves the flow capacity. Moreover, the structure of the modernised pipeline is further strengthened.

Problems with the first manufacturer

Swagelining was planned at the first section, just at the Water Treatment Unit, where the old, cast-iron pipeline was mostly worn out and the greatest water hammer was experienced. The method was also applied under the roads with a very heavy traffic load, as well as tram and rail tracks since the PE pipe used in swagelining is a self-supporting pipe, which transfers the external load.

For this purpose the contractor Wiertmar initially used DN/OD 800 SDR17 PE pipes, with a wall thickness 47.4 mm, made by X. "We do not quote the manufacturer's name on purpose since the test has not been successfully completed. The works were carried out in the winter. They started with butt-welding 12-metre pipe lengths. It turned out, however, that the X pipes were stiff, with low plasticity and they did not keep the round dimension", said **Mr Marek Piekarski**, the Chairman of Wiertmar. "It was difficult to position them correctly in the welder." Later, however, a yet more serious problem was identified. After the welding stage, the installation phase followed, during which the weld broke while the pipe was being pulled through the reducer. Therefore, the PE pipe was taken out immediately. Fortunately, the pipe had not relaxed and so was not tightly fitted into the original pipe.

The contractor decided to analyse this situation and sent the X pipes to two laboratories to be tested. On the basis of the test results it was concluded that the pipes did not meet the requirements of PN-EN 12201-2 standard in terms of wall thickness. The other test results met the requirements of the standard.

Therefore, the welder settings as well as different pressure forces, and the temperature of the heater were tested. The welding technology was also improved in the workshop. Thanks to this, the weld no longer broke when pulled through the reducer.

WehoPipe kept its shape

It was decided to keep the X pipes, since extensive tests performed in adverse weather conditions indicated that it was possible. Unfortunately, this time too, the test failed and the weld broke.

Therefore, it was immediately decided to change the pipe manufacturer. This time WehoPipe PE100 DN/OD 800 SDR17 PN10 pipes, wall thickness 47.4 mm, produced by KWH Pipe Poland, were chosen. These pipes were made of a high quality raw material certified by PE100+ Association. On special order, 15-metre pipe lengths were manufactured to shorten the welding time. The pipes were delivered to site a few days later. "It was enough just to look at the pipe surface to see a considerable difference between the KWH and X pipes" said Marek Piekarski. "The pipes delivered

Aims of PE100+ Association

- Assuring consistent quality at the highest level in the production and application of PE 100+ pipe materials
- Establishing a PE100+ logo accessible by any producer of PE pipe materials meeting the enhanced requirements of the Association
- Promoting usage of PE piping systems in general
- Focus towards end-users with more information support
- Creating trust in high quality PE materials globally

kept their round shape, their surface was perfectly smooth while the X pipe surface resembled orange peel. We also noticed that the new pipes had higher plasticity."

Welding was smooth and it was not difficult to position the pipes in the welder pinches. It took only 4 hours to pull a 210-metre pipe length through. When the relaxation process was over, the swagelining equipment was dismantled. Then, the pipe ends were enlarged with an expander and put into the calibrating rings in order to reach the diameter DN/OD 800 at the ends of the PE pipes.

This was the first successful installation performed using the swagelining technology.

Another difficulty came a few months later when a pipeline was being installed under a busy 6-lane street with a tram line running right in the middle. Three trenches were dug, i.e. the starting, final and an additional one at the point of a DN/OD 800/50 tee. Once the pipeline was cleaned, a camera was introduced inside. It appeared that there were two bends which made it impossible to swageline in one length. An additional difficulty was that one bend was located under the street, at the depth of 6 m. The other one (bigger) was situated approx. 5 m from the trench with the tee. An open trench running from one bend to the other was excluded since along the same route, the modernised water line ran with another one, running just underneath. The only thing possible was to enlarge the trench with the tee, make another point trench under the street. Consequently, the renovation was to be performed in three sections.

The contractor decided, however, to take the risk and rely on the WehoPipe properties, such as their flexibility and natural bending radius. Finally, the trench was enlarged and the first bend was eliminated. The point trench was not made and the second bend was grounded and covered with a substance which increased the pipe slip. After calibration, swagelining was performed in two sections. Finally, the sections were joined, fixtures were installed and a leaktightness test was performed. Another difficult installation was completed successfully. The following ones were problem-free.

A great challenge turns to a success

The Łódź contract was another test both for the contractor, Wiertmar and for KWH Pipe, the pipe manufacturer and supplier. Although swagelining technology was a great challenge, thanks to this method it was possible to minimise inconvenience to traffic. Most of the work was carried out in the centre of a city with a population of 750,000, in a built-up area, along traffic lanes with heavy traffic of motor vehicles and trams, in adverse winter-spring conditions. The fact that Wiertmar is ready to continue using swagelining technology can be seen as a special acknowledgement of WehoPipe and KWH Pipe. ■

PARAMETERS OF THE RENOVATED PIPELINE

- outer diameter of the PE pipe used as the lining: 800 mm
- inside diameter of renovated pipeline: 750 mm
- outer diameter of PE pipe after it was pulled through the reducer: approx. 730 mm
- outer diameter of PE pipe after relaxation process: approximately 760 mm

TEXT **Asset International Ltd** » PHOTO **KWH Pipe** »

Wastewater treatment project chooses pioneering alternative

Severn Trent Water's £150 million, three and a half year project upgrade at the Minworth sewage treatment works near Birmingham has just been completed and is set to benefit over 1.8 million homes.

The UK's second largest sewage treatment works used Weholite, manufactured by KWH Pipe's licensee Asset International Ltd, to replace its sewage pipe system. The 18 phase project, which took 42 months to complete, used the high density polyethylene (PE-HD) pipe for the four phases of the project that required pipework.

Contractors BNM Alliance (Biwater Treatment and North Midland Construction Plc) were looking for a lightweight and easy to install material for the various project phases. Weholite pipes are made to order and prefabricated, which allows for a quick and easy installation.

The large-scale project used Weholite pipes in a variety of sizes for different parts of the project, including gravity pipes which will carry up to five million litres of water per second from the distribution chambers. The Weholite pipes were also used for drainage manholes, fabricated chambers and duct pits which required DN/ID 1.2 and 1.5 metre pipes to carry electronic cables across the treatment works.

Strict safety policy required

The project often had up to 400 workers on the 1 km^2 site at a time, and so required a strict health and safety policy to manage risk. Because Weholite is lightweight there was less requirement for heavy-lifting machinery on site for installation and helped remove some health and safety issues associated with this. The pipes also reached heights of up to 2.8 metres so Asset, working with BNM Alliance, ensured the pipes were delivered in strict stacking heights providing easy and safe access for offloading the pipe from delivery lorries.

Pat Heffernan, Biwater Site Manager, said: "Weholite's flexibility and the fact that they are prefabricated means we were able lay longer pipelines and avoid joins. The quick and easy installation allowed us to complete the project safely and on time, especially considering the bad weather we had at the beginning of this year."

Simon Thomas, Managing Director at Asset International added: "We were pleased to be involved in such a large scale project with Severn Trent and BMN Alliance across several phases. Because we manufacture Weholite at our factory in south Wales we are able to produce large orders to bespoke designs quickly and effectively, including the DN/ID 3.5 metre pipe which is the largest plastic pipe in the UK".

"Due to Weholite's lightweight it can dramatically reduce a project's carbon footprint when the overall process, including manufacture, transportation and the laying of the pipes, is considered." ■

TEXT **KWH Pipe** » PHOTO **KWH Pipe** »

Construction and traffic flow smoothly

Construction work on the 407ETR highway was completed with minimal disruption to the motoring public.

The 407ETR operates the world's first all-electronic, barrier-free toll highway stretching 108 kilometres across the northern part of Toronto, Ontario. The 407ETR highway is owned by a consortium of Cintra Concesiones de Infraestructuras de Transporte (major shareholder) from Spain, Macquarie Infrastructure Group, and a Montreal-based engineering firm SNC-Lavalin. Since 1997 the 407ETR highway has seen many extensions and enhancements to accommodate use by hundreds of thousands of drivers every day.

The 407ETR uses a series of cameras and transponder devices to help automate the toll process. The 407ETR is the only highway in Canada that exclusively uses open road tolling. The 407ETR highway is designed to be a quick and efficient transport route, that's why there are no toll booths and instead a radio antenna detects when a vehicle with a transponder has entered and exited the highway and calculates the toll. For vehicles without a transponder, an automatic number plate recognition system is used. The toll is calculated on a kilometre basis and monthly statements are mailed to all users.

Avoiding traffic delays with sliplining

During the initial construction of this highway it was fitted with corrugated metal culverts, at the time this was seen as an economical decision, but due to the harsh climate in southern Ontario, the life of this piping system was drastically reduced. To maintain this fast, safe and reliable highway that people have come to expect, the 407ETR has recently begun refurbishing the culverts. In 2009, the 407ETR made the decision to refurbish eight corrugated metal culverts using a trenchless construction process called sliplining. This method was selected since it does not cause traffic delays and road closures which are typical with traditional 'dig and replace' methods.

Weholite was chosen as the preferred liner material as it has an excellent track record in many places across Canada for sliplining corroded culverts. Another reason for the selection of Weholite was the ingenious threaded joint that provides excellent tensile qualities and helps reduce overall installation time which gives it a clear advantage over other materials.

The existing culverts (DN/ID 600 mm to 2,700 mm) were cleaned, sliplined with Weholite PE-HD pipe and then the annular spaces were grouted to provide additional structural support as well to fill any voids created by previous washouts.

The construction work was completed with minimal disruption to the motoring public while avoiding future post-installation road problems that are common with traditional "dig & replace" methods. The project was a resounding success and the 407ETR plans to expand the culvert rehabilitation programme in the coming years. ■

Saving time and money

TEXT **Borealis and KWH Pipe** » PHOTO **Borealis** »

Porvoo, Finland is the location of a Borealis-owned, fully integrated chemical complex comprising five plants, two of which produce polyethylene and one polypropylene. The site has its own railway terminal and as part of a recent expansion, the terminal's capacity for unloading Liquefied Petroleum Gas and loading butadiene was increased. To ensure the high safety standards in respect of these highly flammable materials, the expansion included the installation of a fire main to serve a water curtain and sprinklers for the new loading stations.

Significant project challenges

In developing the new fire main the pipeline planner, engineering company Neste Jacobs Oy, faced three significant challenges. Firstly, the terrain was comprised mostly of rock, which would be difficult to trench. Secondly, part of the pipeline had to pass under a section of railway line, the services of which could not be disrupted. Thirdly, the pipe would have to be sufficiently tough and durable to resist abrasion and cuts from the rocky terrain. It would also have to be unaffected by wide temperature change: during Finland's winter temperature can fall below -15 °C and in summer rise as high as 30 °C. Moreover, the laid pipe would have to withstand ground vibration caused by heavy traffic traversing the railway yard. The most important requirement was that the pipeline would be capable of delivering water to the fire fighting installations at all times and under all conditions.

In consultation with the installer for the project, it was determined that it would be necessary to lay the fire main at a depth of at least two metres to avoid the possibility of it freezing during the winter months. To achieve this, some of the terrain would need to be blasted in order to cut a trench through the rock. However, blasting was not an option for a 25-metre section passing under the railway line. To eliminate the risk of either damage to the line or disruption to rail traffic it was decided to use the no-dig horizontal drilling technique to create an underground pathway for the pipeline, thereby excluding the need for any surface work.

Speed and economy without compromises

The next step was to identify the type of pipe that would best meet the fire main's in-service performance demands as well as those of the tough laying conditions. Another thing to consider was a tight time schedule to install and bring the system online. The project's start date was November and its completion date February – unavoidably coinciding with the coldest time of the year in Porvoo. Resistance to impacts and abrasions from the rocky ground, particularly in the drilled section, made steel pipe the first pipe proposal. However, the installation time, cost and relatively short life of steel in a corrosive environment led to the consideration of more durable alternatives.

Chief among these was PE-HD pipe because of its durability and non-corrodibility. But, following evaluations involving KWH Pipe, Neste Jacobs, Destia and the end-user, it was decided to choose WehoPipe RC+, which is produced using PE100-RC material. The raw material is manufactured by Borealis, so it was a win-win-situation for all parties.

PE100-RC was specifically developed to complement faster more economical pipe laying techniques especially in tough conditions where installations are subject to high environmental stresses. It provides very high resistance to cuts and abrasions and outstanding resistance to slow crack growth (SCG), as well as excellent resistance to rapid crack propagation (RCP). Consequently, it offers a high level of reliability, over an anticipated service life in excess of 100 years.

The pipe was specified with a pressure rating of PN16 in two dimensions: DN/OD 500 mm for the trench-laid section and DN/OD 300 mm for the under-railway drilled section.

On time, on budget, on-line

Uncompromising in its performance, the material also delivered important economies. Its robust profile meant that some of the rough excavated rocky soil could be used as trench backfilling. Thereby reducing the amount of excavated material to be removed from site and the volume of finer material to be brought on-site for pipe bedding, thus reducing time, cost, and environmental impact.

"This made a useful contribution to time saving," said **Ville Lilja**, Borealis' Project Manager for the company's Porvoo terminal expansion.

"Our work schedule was tight and this advantage helped ease the pressure."

Using PE provided a major reduction in installation time compared with traditional steel piping. It allowed the pipes to be joined by butt fusion welding which offers a 50 % time saving on steel welds, as well as a 40 % cost saving. ■

TRIED AND TESTED QUALITY

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