

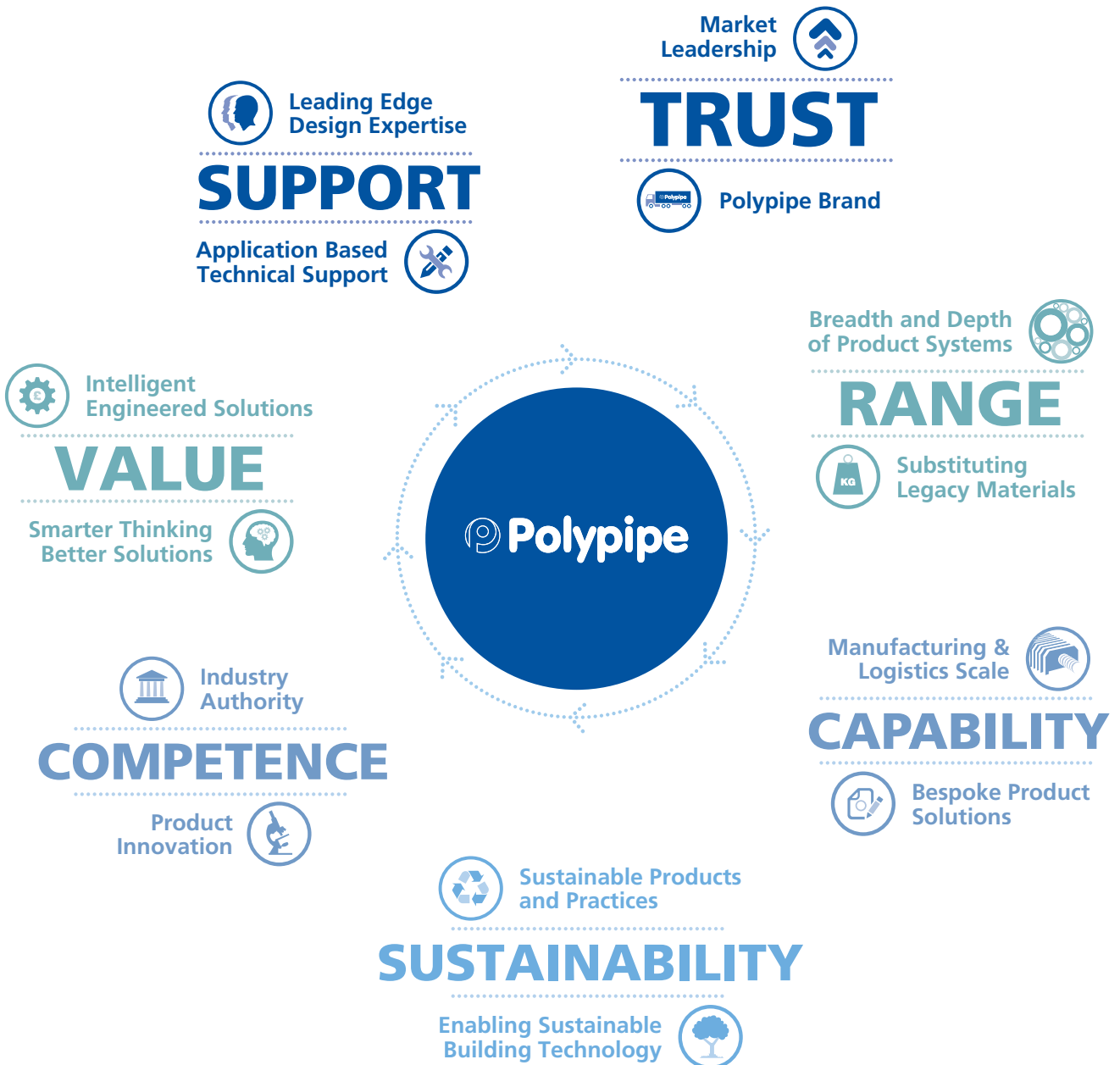
Mining



Water Management in Mining

Polypipe

At Polypipe, conceiving, designing, manufacturing and delivering the most advanced products and systems isn't merely an occupation. It's a passion. One that's based around a few simple beliefs. Expertise isn't an option. Quality always beats quantity. Products are nothing without service and support. Sustainability isn't just a 'green' word. And working with our customers is much better than simply supplying them.



Polypipe and Mining

In mines, where mineral extraction processes rely heavily on water, effective water management is essential. Polypipe provides plastic pipe systems for a variety of gravity and pressurised applications, which provide solutions to a number of mining processes, including transport infrastructure, water delivery and distribution, de-watering and storage, processing, water treatment, as well as welfare infrastructure.

To meet the needs of any mining project, Polypipe is able to engage at an early stage to deliver technical support throughout the project, from concept development to installation, and customise its plastic pipe systems accordingly. Polypipe is therefore able to meet the most challenging supply demands and minimize downtime, ensuring quality systems are delivered on time to customer specifications.

Polypipe offers the widest plastic piping product range available from one manufacturer in the UK, providing a one stop shop solution to our customers with one point of contact for all project enquiries.

Contents

Leading the Market	4 – 5
Water – a Precious Resource	6 – 7
Water Management in Mining	8 – 13
Making the Right Choice	14 – 15
Case Studies	16 – 17
Technical Support	18
Enabling Sustainable Building Technology	19

Leading the Market

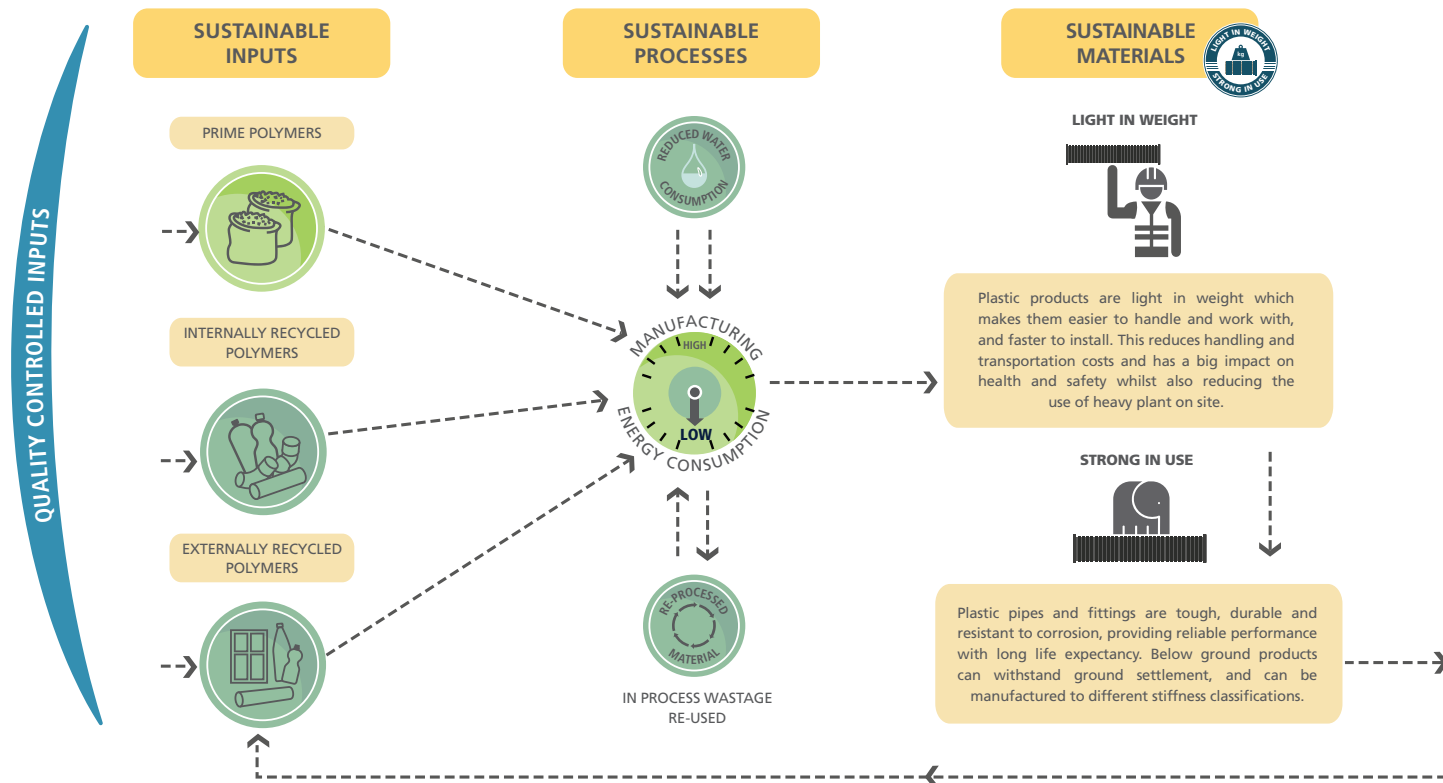
It's not just what we do but also the way that we do it that makes Polypipe number one in the UK for plastic piping systems.



An award-winning history of innovation and expertise

Polypipe's success has led to many awards and recognitions such as **Building** Manufacturer of the Year and approval under the London 2012 Supplier Recognition Scheme, culminating in being awarded Top 100 Superbrand status in 2013 and 2014.

The Polypipe sustainable journey



Product Approvals*

Polypipe products are manufactured to the highest quality standards and carry all relevant third party product approvals and accreditations from the major recognised bodies.



Quality Standards*

Polypipe operate to the highest quality standards, in particular:



We are also especially proud of our health and safety record.

*For more information, please visit www.polypipe.com

Polypipe takes its responsibility as a market leader seriously, with key participative roles in a number of major industry bodies, such as:



How we've achieved this...

Quality controlled inputs

We source all of our raw materials according to a sustainable use policy meeting the highest sustainability standards with ISO 9000 and ISO 14001 accreditation.

Sustainable materials

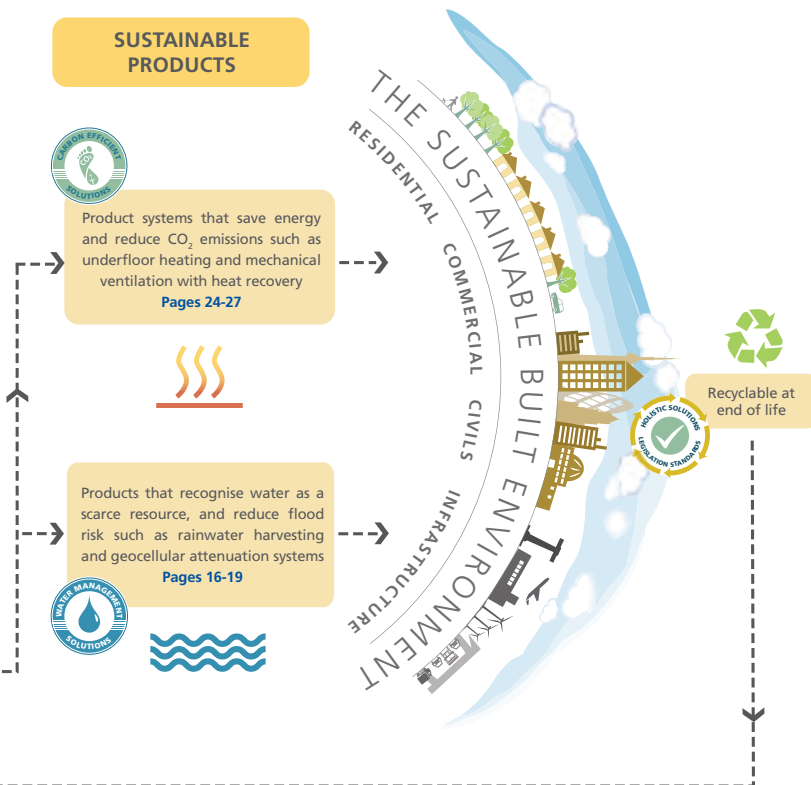
Plastic is a by-product of oil, using less than 4% of the world's oil output. It is substantially lighter than alternative materials which gives it many advantages such as reducing fuel consumption for transportation.

Sustainable processes

We operate modern manufacturing facilities which are fully committed to minimising energy use and re-using any waste created in our processes.

Sustainable products

Most of our products are 100% recyclable, which creates a sustainable path back into re-use.

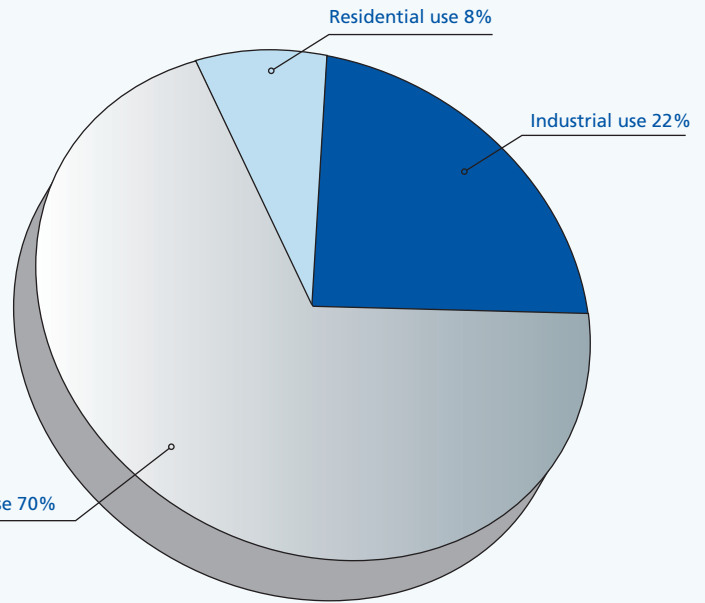


Water – a Precious Resource

Global Use of Water

Current global demand for water is at the level of 4,500 billion m³ a year and is expected to rise to 6,900 billion m³ by 2030.¹

70% of water use is agricultural, with industrial accounting for 22% of its use and residential use representing 8%.²

















22%

of global water supply is used by industry....


Water Use in Mining


- Mining uses between seven and nine billion cubic metres of water per year, which is about as much water as a country like Nigeria or Malaysia uses in total in a year.³
- Mining and burning coal accounts for half of all water withdrawals in the United States, which is the same amount of water that pours over Niagara Falls in five months.⁴
- An estimated 18.28 billion litres of water is withdrawn for mining a year in the United States.⁵
- Demand for water by the mining sector is likely to increase, with projections ranging from 810 billion litres of water used a year to 940 billion litres of water used a year by 2020 for Western Australia alone.⁶


The table below illustrates water use for processing and extraction by mineral/metal type⁷

Mineral/metal type	Water use for processing and extraction
Coal 	
Copper 	
Diamond 	
Gold 	
Nickel 	
Iron Ore 	
Platinum 	

Key

High 

Medium High 

Medium Low 

With different types of mines having different water requirements, platinum and diamond mines rely on water the least while copper and gold mines are most water intensive.

Mining and mineral processing cannot take place without water

Polypipe plastic piping systems provide effective water management solutions for the following six applications, where water is used in mines:

- **Transport Infrastructure**
Drainage for the mine's road and rail infrastructure which may suffer during extensive rain periods or sudden storms.
- **Water Delivery and Distribution**
Delivery and distribution of water for mine operations from a number of sources from local bore holes to desalination plants.
- **De-watering and Storage**
Removal of waste water from mines and processing into tailings ponds as well as control of storm water.
- **Processing**
Once extracted, mineral ores are transported to the processing plant, where water is used to extract the metal or mineral from the host rock.
- **Water Treatment**
Removal of waste water to a processing or sewerage plant for treatment and possible re-use.
- **Welfare Infrastructure**
Water delivery and drainage systems, delivering welfare for the mine workers and local communities.

Sources:

- 1 National Intelligence Council's Global Trends 2030, 2012
- 2 Water facts and trends, World Business Council for Sustainable Development, 2006
- 3 Don't waste a drop, Mining Magazine, October 2011
- 4 Coal and Water, a Resource Mismatch, Circle of Blue, 2010
- 5 Estimated use of water in the United States in 2005, U.S. Geological Survey Circular, 2009
- 6 Water in Mining and Industry, CSIRO, 2011
- 7 Frost & Sullivan, 2011
- 8 Mott Macdonald Presentation to the British Water International Forum, MiningSub-Group, July 2013
- 9 Metals & Mining: a sector under water pressure. Analysis for institutional investors of critical issues facing the industry, CDP, July 2013

Water is a precious resource that needs to be protected and managed to enable the smooth running of any mining operation

Water – a resource to be protected

The use of water is essential for the effective operation of any mine. It is therefore of paramount importance to protect this valuable resource, to enable:

- The process of recovering valuable minerals from the host rock
- The protection of local water courses and the wider environment
- The delivery of clean water for the welfare infrastructure of the mine and surrounding communities.⁸

Water – a resource to be managed

The detrimental impacts of the mismanagement of water are:

- Cost increase
- Production disruption
- Transport disruption

The top three water risks that pose a significant constraint to business operation, revenue and expenditure are:

- Increased water stress
- Flooding
- Declining water quality

Managed properly by introducing effective drainage, storage, treatment and transportation, water can be repurposed and used as a valuable resource for mining operations.⁹



Mining and mineral processing cannot take place without water

Polypipe provides innovative solutions for water management in mining





Polypipe provides innovative plastic piping solutions for the following applications where water is used in mines:

Transport Infrastructure

Flooding is one of the biggest risks to the smooth operation of a mine. Water mismanagement can lead to disruption in the movement of people and materials to and from the mine.

Polypipe's solutions for controlling storm-water include:

- Surface and sub-surface drainage
- Cellular crate systems to capture and store water
- Filtration systems
- Robust, leak-tight, large diameter pipes

Water Delivery and Distribution

Getting water to and from the mine is critical for it to operate effectively. Water comes from numerous sources, including local bore holes through to desalination plants, which could be hundreds of miles away. It is then distributed to numerous areas around the mine.

Polypipe's solutions for water supply pipework include:

- Chemical and corrosion resistant pressure systems
- Large and small diameter pressure pipes

De-watering and Storage

Water is a business critical commodity, which needs to be carefully managed and controlled. This includes the removal of waste water to tailings ponds and the control of storm water.

Polypipe's solutions for the control and management of water include:

- Chemical and corrosion resistant pressure systems
- Robust, leak-tight, large diameter pipes
- Surface and sub-surface drainage systems
- Cellular crate systems to capture and store water



Water Management in Mining



Water Delivery and Distribution



Transport Infrastructure



De-watering and Storage





Water Treatment



Processing



Welfare Infrastructure





Polypipe provides innovative plastic piping solutions for the following applications where water is used in mines:

Processing

Water is at the heart of the processing application. Once extracted, the mineral ores are transported to the processing plant, where water is used to extract the metal or mineral from the host rock.

Polypipe's solutions for the extraction process include:

- Chemical and corrosion resistant pressure systems
- Large and small diameter pressure pipes
- Robust, leak-tight, large and small diameter pipes

Water Treatment

The removal of waste water to a processing or sewerage plant for treatment and possible re-use.

Polypipe's solutions for the removal of waste water include:

- Chemical and corrosion resistant pressure systems
- Robust, leak-tight, large diameter pipes

Welfare Infrastructure

The welfare of a mine worker is of paramount importance. With water a scarce resource in many regions, ensuring a constant fresh and clean water supply and the removal of waste water for both the mining and local communities is critical.

Polypipe's solutions for the welfare of mine workers and local communities include:

- Plumbing systems
- Above ground drainage systems
- Below ground drainage systems

Making the Right Choice

Polypipe provides a number of plastic piping systems for a variety of gravity and pressurised applications, manufactured to appropriate International accreditations, which provide solutions to a number of mining processes.

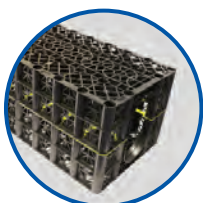


PE100

PE100, manufactured from high-density polyethylene (HDPE), is an ideal solution for a number of mining applications, including water delivery and distribution, processing, water treatment, as well as de-watering and storage.

Key features:

- Corrosion proof, break resistant and secure
- Leak free joints using electro fusion or butt-welding installation
- Operating in extreme temperatures from -40°C to +60 °C
- Can handle up to 25 Bar pressure depending on the temperature
- Flexible to expand with internal pressure surges, reducing maintenance costs and assisting longevity of the pipeline
- Low friction and resistance to blockages due to smooth internal surfaces

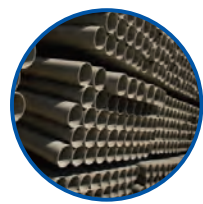


Polystorm

Polystorm, manufactured from polypropylene is an ideal solution for de-watering and storage and transport infrastructure.

Key features:

- 95% void ratio – providing greater water storage capacity
- Modular units – allow flexibility of shape – ideal for shallow excavation systems, narrow strips or use in restricted areas
- Light weight and robust
- Easy to handle – unique rounded corners for ease of handling and reduces likelihood of punctures to membranes
- Recyclable – 100% recyclable at the end of its useful life
- Suitable for both attenuation and soakaway systems



Above Ground Drainage

Polypipe's above ground drainage systems, manufactured from HDPE, PVC or ABS, are an ideal solution for the mine's welfare infrastructure.

Key features:

- Light weight and easy to handle
- Diameters available from 32mm to 160mm, and up to 315mm in Terrain FUZE (HDPE)
- Quick and easy installation
- Comprehensive range of fittings



Below Ground Drainage

Polypipe offer comprehensive PVC below ground drainage solutions for the mine's welfare infrastructure.

Key features:

- Simple to install
- Flexible – accommodates normal ground movement
- Adaptable – can be connected to existing drainage systems
- Customised solutions available

PE100



Polystorm



Above Ground Drainage



<p>Transport Infrastructure</p> <p>Road and rail infrastructure facilitating the movement of people and materials to and from the mine</p>				
<p>Water Delivery and Distribution</p> <p>Delivering water for mine operations from a number of sources from local bore holes to desalination plants</p>				
<p>De-watering and Storage</p> <p>Removal of waste water from mines and processing into tailings ponds and control of storm water</p>				
<p>Processing</p> <p>Once extracted the mineral ores require significant processing to extract the metal, very often involving water used for extracting minerals</p>				
<p>Water Treatment</p> <p>Removal of used water to a processing or sewerage plant</p>				
<p>Welfare Infrastructure</p> <p>Facilities for mine workers, housing, schools, hospitals</p>				

Below Ground Drainage

Ridgidrain

Ridgistorm-XL

Storm-X4

Polyfast



	•	•	•	
	•	•	•	
	•	•	•	
	•	•	•	
	•	•	•	



Ridgidrain

Ridgidrain, manufactured from HDPE, is a perfect solution for surface and sub-surface water drainage, including mining applications such as de-watering and storage and transport infrastructure.

Key features:

- Structured wall design for high ring stiffness and strength
- Twin wall pipe solution for non-pressurised surface and subsurface drainage applications
- High strength to weight ratio
- Flexibility that allows it to resist high traffic loads and settlement without cracking or leaking
- Up to 94% lighter than concrete
- Extremely smooth bore, so less likely to block and more easily maintained
- Integral sockets in diameter 150mm to 600mm for ease of installation – greater joint integrity



Ridgistorm-XL

Ridgistorm-XL, manufactured from HDPE, is a great choice for water treatment, de-watering and storage and transport infrastructure.

Key features:

- Flexible structure to minimise the effects of ground movement and prevent leaks from the pipeline or attenuation structure
- Large diameter – from 750mm to 3000mm
- Reduced number of joints, compared to traditional systems
- Robust, durable and adaptable solution
- Lighter in weight than traditional materials



Storm-X4

Storm-X4 can be used in a number of mining applications such as de-watering and storage and transport infrastructure.

Key features:

- Improves water quality at source
- No moving parts, providing a low maintenance solution for all surface water run-off applications
- Easy to install
- Removes heavy particles, silt, oil, phosphorus and heavy metal pollutants, as well as dissolved pollutants.



Polyfast

Polyfast, manufactured from medium-density polyethylene (MDPE), is an ideal choice for the welfare infrastructure and processing applications.

Key features:

- Quick installation
- Excellent flow rates
- No hot works required
- Corrosion resistant
- Full range of manual valves

Experience Counts

Polypipe has extensive experience of supplying innovative plastic piping solutions to mines around the world.

Polypipe is working with a number of partners to supply mining projects in West Africa, Southern Africa and Australia.

Projects include:



CASE STUDY

Mine: Tonkolilli Mine
Country: Sierra Leone
Client: Africa Minerals
Product Supplied: PE100 / Ridgidrain



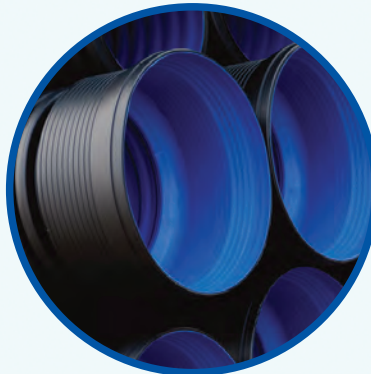
CASE STUDY

Mine: Twangiza Mine
Country: DR Congo
Client: Banro Corporation
Product Supplied: Ridgidrain



CASE STUDY

Mine: Marampa Mine
Country: Sierra Leone
Client: London Mining
Product Supplied: PE100



CASE STUDY

Mine: Western Ranges Iron Ore Mine
Country: Liberia
Client: Banlaw Africa
Product Supplied: Ridgiduct / Ridgidrain / Ridgistorm XL / Land Drainage

CASE STUDY

Mine: Marampa Mine Valley B
Country: Sierra Leone
Client: Dawnus
Product Supplied: Ridgidrain

To find out more visit
www.polypipe.com/mining



Case Study

MARAMPA MINE

Polypipe meets tight logistics schedule for supply to Marampa Mine. A twinwall drainage system from Polypipe has been installed in the first phase of the infrastructure work at the Marampa Mine project in Sierra Leone. The Ridgidrain pipes were shipped from the UK, meeting an extremely tight logistics schedule, a key part of the supply arrangement.

The Challenge

Appointed as the principal mining contractor for the first phase of the works, Dawnus commenced the £122m mining operations in December 2012. Included in the infrastructure being created by Dawnus to support the mining operations, there is an internationally accredited training centre which will focus on the ongoing training and development of the local workforce.

Dawnus were subsequently awarded an additional package of work to drain and stabilise an existing tailings dam. The work involved installing a pipeline that will drain the water within the tailings dam to a local water treatment area. High Density Polyethylene (HDPE) is the material of choice in many mining applications, being ideally suited to rugged terrain, extreme climates and changing site environments.

The business was placed via a competitive tender and a key requirement was the ability to manufacture to extremely tight supply deadlines. Space had already been booked on a container ship due to deliver construction supplies to the project, so the winning company had to be able to manufacture the various pipes and fittings required and ensure that they were available at the dockside to meet the shipping date.

CASE STUDY

Project: Marampa Mine

Client: Dawnus

Application: Waste water management

Product: Ridgidrain

The Solution

UK-based Polypipe won the order to supply its Ridgidrain HDPE product by demonstrating the ability to manufacture to extremely tight supply deadlines and to pull together products from its various manufacturing sites into one consignment.

The Polypipe Ridgidrain twinwall system, which offers a complete solution for non-pressurised surface and sub-surface drainage applications, is lightweight and offers exceptional compression strength with easy push-fit installation. It delivers time and cost savings over traditional systems and requires no heavy lifting equipment on site. Normally manufactured in 6m lengths the consignment for Dawnus was made to 5.8m lengths, to allow for the internal dimensions of the shipping containers and maximise their capacity.

“Polypipe was the supplier who could meet our needs in terms of speed of manufacture. They were aware that we had a specific shipping date already booked and were able to work to our timescales, supplying pipes to lengths suitable for maximising container capacity. The communications between our two teams were excellent and the flexibility that Polypipe were able to demonstrate meant that the whole supply process went very smoothly.”

Jonathan Lewis, Dawnus



Innovation, Support and Training

Polypipe's reputation for innovation and customer service is well earned through our technical expertise and commitment to research. We have consistently led the way with new products and services and ever more efficient solutions, which enables us to be able to offer the widest and broadest range of products available from one manufacturer in the UK. This means we can offer a one stop shop solution to our customers with one point of contact for all enquiries.

Polypipe continues to invest heavily in our manufacturing facilities and people to further enhance our market leading position. A large proportion of this investment has been in new plant and machinery. A key consideration was our wish to reduce energy and raw material consumption and increase output.

All products from Polypipe are backed by a comprehensive technical advisory service, available to provide advice and guidance on all aspects of application, design and installation, seeing through the project from the beginning to the end.



FABRICATION SERVICES

Polypipe's advanced fabrication facilities allow for a level of precision and quality that simply cannot be achieved on-site.

- Fabricated solutions for the most challenging applications, e.g. pre-flanged PE100 pressure pipework
- Bespoke project specific solutions
- Early engagement with the customer ensuring high quality and customer satisfaction
- Experienced Polypipe Technical and Manufacturing teams, using the latest I.T. and manufacturing equipment to deliver quality engineered solutions

QUALITY CONTROL

We pride ourselves in providing a consistently high level of product quality. Where possible all of our products and processes are covered by independent third party accreditation, including:

- BSI to ISO 9001 : 2008
- International accreditations

LOGISTICS

Polypipe offer innovative logistic solutions to ensure deliveries against a customer's project time scale. Our experienced Export Commercial team provide expertise, ensuring:

- Effective container loading
- Containers packed to minimise wasted space
- High delivery capability
- All relevant paperwork completed

SUPPORT AND TRAINING

Polypipe are proud of the technical support and training that we deliver via a number of different means, including:

- Full suite of technical literature
- Dedicated technical bulletins on specific solutions
- On-site training
- Installation training
- Installation training videos
- Online Polypipe Training Academy
- Experienced Technical Services and Field Sales teams

To find out more details on Polypipe's support and training services, please visit www.polypipe.com

Polypipe Enabling Sustainable Building Technology

Polypipe provides plastic piping systems that enable the effective installation and performance of sustainable building technology, meeting the twin global challenges of carbon reduction and water management.

CARBON EFFICIENT SOLUTIONS

'SUSTAINABLE INDOOR ENVIRONMENTS'

Ever stricter building regulations and ever more environmentally conscious customers are driving the demand for greener building products and technologies. Polypipe fulfils that demand with a full range of systems that enable collection, transmission, emission and control in heating, ventilation and cooling systems.

WATER MANAGEMENT SOLUTIONS

'ROOF TO RIVER'

Offering a comprehensive range of standalone and modular SUDS products, rainwater harvesting and surface water treatment solutions plus legislative and technical support services, Polypipe Water Management Solutions address the surface water requirements of every construction and civil engineering project.



Sector Focus

Our product systems respond directly to sector-specific requirements thanks to focused technical and development teams with hands on expertise in the following areas.

COMMERCIAL

Major commercial projects from car parks and high rise office blocks to hospitals, educational premises and shopping centres have all benefited from Polypipe's range of value engineered products and comprehensive service support.

CIVILS AND INFRASTRUCTURE

Delivering performance and sustainability, Polypipe's surface water drainage and cable management systems, supported by our in-house fabrications team, offer civils and infrastructure project planners a complete suite of solutions.

RESIDENTIAL

Polypipe offers the broadest range of residential product and service solutions for both new build and RMI applications, as well as innovative solutions in response to legislative and industry targets for more sustainable housing.

INDUSTRIAL

Backed by excellent technical support and fabrication services, Polypipe delivers a wide range of plastic piping systems for industrial applications, including mining, waste water treatment and chemical processing.

Mining



Polypipe International

New Hythe Business Park
College Rd
Aylesford
Kent
ME20 7PJ
United Kingdom

Tel: +44 (0) 1622 795200

Fax: +44 (0) 1622 716796

Email: international@polypipe.com

www.polypipe.com/mining

