

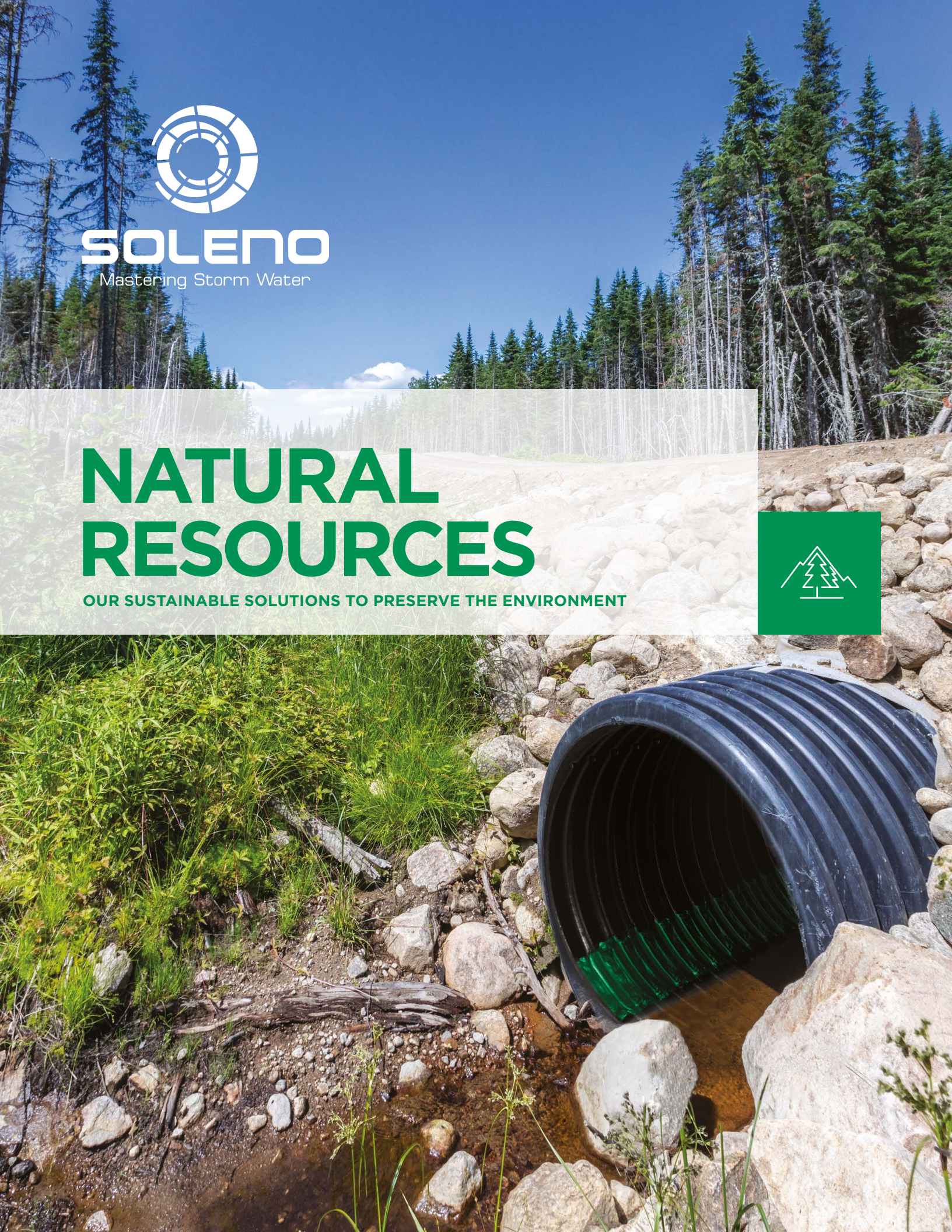


**SOLENO**

Mastering Storm Water

# NATURAL RESOURCES

OUR SUSTAINABLE SOLUTIONS TO PRESERVE THE ENVIRONMENT







# OUR EXPERTISE





## OUR SUSTAINABLE SOLUTIONS TO PRESERVE THE ENVIRONMENT

The implementation of the Regulation respecting the sustainable development of forests (RSDF) in the domain of the State in April 2018 has significantly transformed traditional practices.

Forest owners and managers must take into account the problems caused by their interventions, since the construction of forest roads is one of the activities that have the most negative impact on aquatic fauna. Since forest management is a complex challenge, Soleno assists managers and offers a complete range of sustainable solutions for stormwater control in rural, forest and mining environments.

The solutions and products offered by Soleno allow for

optimal access to the forest and efficient drainage in order to preserve and extend the life of forest roads. In accordance with the Regulation, Soleno also offers products that meet its objectives.

## INNOVATIVE PRODUCTS

Sustainable development starts with the right product selection. Thanks to the combined strength of our various plants, Soleno offers a wide range of products from geotextiles to steel and high density polyethylene (HDPE) culverts, an extremely high performance and durable material that can exceed a lifespan of 100 years!

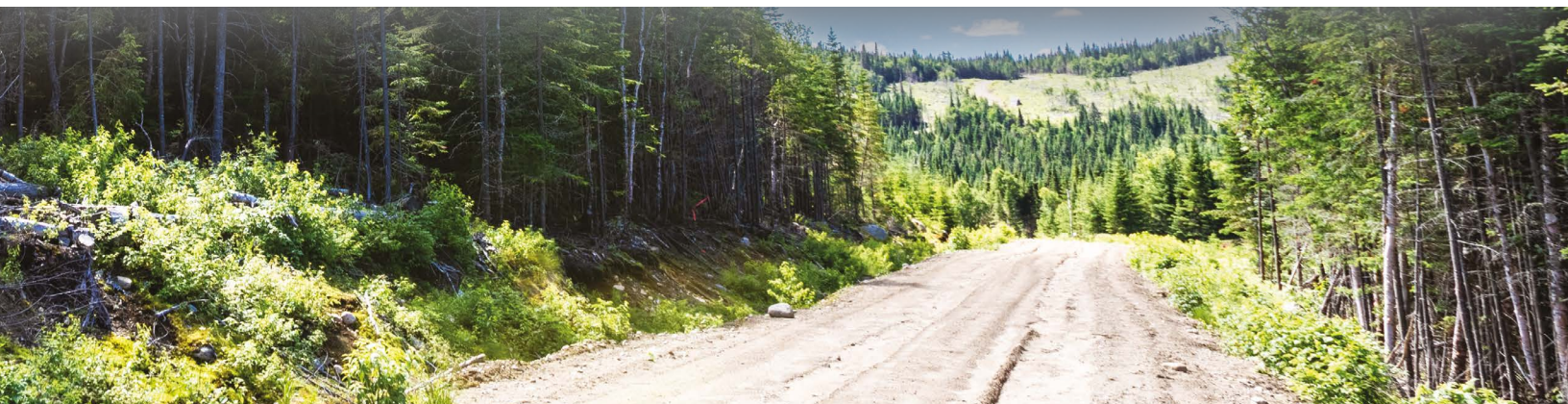
As each project is unique, our culverts and pipes are adapted for the sometimes difficult conditions of the forestry sector and allow effective drainage, while resisting heavy loads.

The choice of product depends on the specified service life.

When the durability of the infrastructure is the overriding factor, HDPE is preferred.

## RESEARCH SUPPORT

A partner of Laval University for over 20 years, Soleno committed in 2016 to support the [Montmorency Forest](#) modernization project. This support aims to promote the advancement of forestry research and support passionate researchers, professors and students. Soleno is proud to have contributed to the construction of the only road giving access to the southern portion of the forest, now called [Chemin Soleno](#).







# RSDF



## **ENVIRONMENTAL REQUIREMENTS RELATED TO THE NEW RSDF**

In April 2018, the ministère des Forêts, de la Faune et des Parcs (MFFP) put into effect a Regulation respecting the sustainable development of forests in the domain of the State (RSDF). This new regulation, under the Sustainable Forest Development Act, replaces the Regulation respecting standards of forest management for forests in the domain of the State.

According to Division II - Roads and III - Bridges, Culverts, Removable Structures and Rudimentary Structures of Chapter V - Roads, Sandpits and Forest Infrastructures, forest owners and managers must meet the new standards of the RSDF, which are :



ensuring the maintenance or reconstitution of the forest cover, the protection of forest, aquatic and wetland environments, and the conciliation of the various activities taking place there;

—

supervising the forest management activities carried out by the forest industry;

—

ensuring consistency with the Fisheries Act, with respect to the free movement of fish through waterway crossings.

## OUR APPLICATIONS AND THE RSDF

### ROAD DRAINAGE

Our **drainage pipes**, made of HDPE or steel, **maintain the free flow of water and evacuate runoff or infiltration water** towards a ditch or a culvert, meeting the objectives of articles 74, 75, 76 and 79 of the RSDF.

### PEHD AND STEEL CULVERTS

Our HDPE or steel **culverts** allow for the installation of structures in a waterway to **allow for the crossing while ensuring the free flow of water**, meeting the objectives of section 86 of the RSDF. Section 103 of the RSDF defines whether or not the **free passage of fish** must be provided, and Sections 104 and 105 summarize the criteria for each option.

The choice of product depends on the specified service life. When the durability of the infrastructure is the overriding factor, the HDPE culvert is preferred. The availability of diameters and hydraulic capacity (Manning's «n» coefficient, diameter and slope) must also be considered. Mainly used in rural, forestry and mining areas, steel culverts offer great flexibility in terms of non-standard lengths and are an economical solution for large diameters.

### POLYMER ARCH CULVERTS

This type of culvert is installed in a waterway to **allow the free flow of water** and meets the objectives of sections 107 and 110 of the RSDF. **Polymer arches** are mainly used in rural, forestry and mining areas. They allow crossing without

affecting the bed or banks and without disturbing the fauna and flora of an ecosystem.

### ROAD WORKS

Our geotextiles and geogrids are used to **improve the structural behaviour of in-situ foundation materials**.

### REVEGETATION ZONE AND RETAINING WALL, EMBANKMENTS AND SLOPES

Soleno provides a range of geosynthetics that meet the objectives of section 73 of the RSDF as they provide **erosion control for slope protection**.

### BANK PROTECTION

Our selection of nonwoven geotextiles meet the objectives of sections 73, 76, 81, 86 and 95 of the RSDF as they **prevent natural soil erosion** when placed **under streambank or water body fill**.

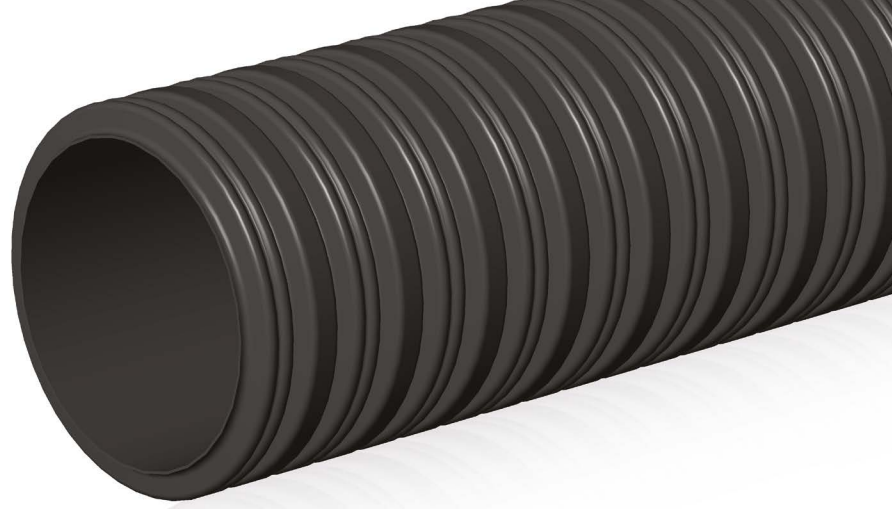
### RETENTION OF SEDIMENTS

Our specific geotextiles meet the objectives of sections 86 and 90 of the RSDF since they **control and limit the transport of sediments in the** vicinity of construction sites, in waterways or lakes.





# OUR PRODUCTS



## SOLFLO MAX UNPERFORATED

**NON-PERFORATED DOUBLE-WALLED RIGID PIPE, SMOOTH INTERIOR AND CORRUGATED EXTERIOR FOR UNDER-ROAD APPLICATION.**

— Available in diameters from 300 mm (12 in.) to 1500 mm (60 in.) and in standard lengths of 6, 9 and 12 m.

— Provides **210 kPa** compressive stiffness for diameters from 300 mm (12 in.) to 900 mm (36 in.).

— Solflo Max pipes are **exceptionally** durable, abrasion and corrosion **resistant**.

— Due to the length of the pipes, the **installation time** and the **number of joints are reduced**.

— Fits perfectly with our full line of fittings and accessories designed to meet field requirements or conform to network requirements.

Soleno recommends the use of **unperforated Solflo Max** for **road drainage** applications to maintain free flow of water and to discharge runoff or seepage water to a ditch or culvert.

An **unperforated Solflo Max** pipe larger than 450 mm (18 in.) in diameter is ideal for **HDPE culvert** applications.

— The optional bevel cut, in an HDPE culvert application, allows for increased water flow through the culvert during storm events.





# TURBULENCE CULVERT

In line with the government's objectives to support the development and growth of markets for Canadian forest products derived from sustainable forest management, Soleno continues to innovate with its **Turbulence culvert** which (RSDF). **reproduces the natural bed of a waterway and meets the objectives of the new Regulation respecting the sustainable development of forests.** Sustainable forest management is at the heart of forest management and the solutions proposed by Soleno meet the needs of forest managers.

## PEHD CULVERT SPECIFICALLY ADAPTED TO THE FOREST ENVIRONMENT REPRODUCING THE NATURAL BED OF A WATERWAY.

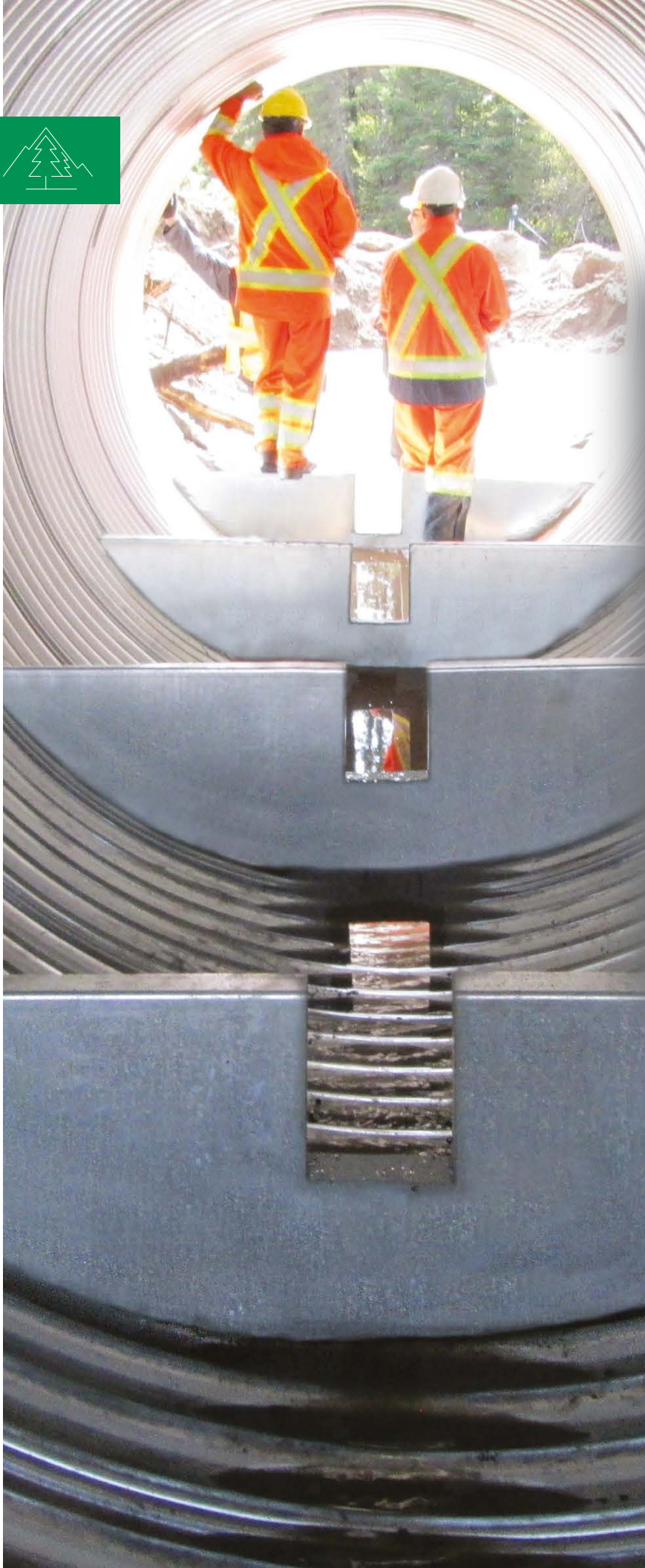
- Ringed culvert with 3 reinforcement bands that maintain the longitudinal strength of the pipe and allow interlocking.
- The ringed interior **slows the speed and flow of water.**
- With a high Manning coefficient (0.022)\*, the flow rate through the Turbulence culvert is 28% less than a corrugated steel pipe, which **promotes ecosystem growth and reduces erosion.**
- The reduction of water velocity in the culvert allows for the reduction of erosion at the outlet, which promotes the conservation and stability of the slopes.
- Patented product available in 600 mm and 750 mm (24 in. and 30 in.) diameters.

\*Calculated for a 600 mm (24 in.) diameter pipe.

## ADVANTAGES AND BENEFITS

- The Turbulence culvert meets **the objectives of the new Regulation respecting the sustainable development of forests** (RSDF) by allowing free flow of water and free movement of aquatic wildlife.
- By **reducing the flow of water**, it facilitates the passage and upstream movement of fish while providing a refuge for wildlife and fry.
- **Lightweight and durable**, HDPE culvert is easy to install and handle in forestry, mining and rural environments, wherever flow and velocity need to be reduced.





In line with the government's objectives to support the development and growth of forestry markets, Soleno continues to innovate by developing a removable fish weir for steel culverts that meets the objectives of the new Regulation respecting the sustainable development of forests (RSDF).

**REMOVABLE FISH WEIR FOR STEEL CULVERT, ADAPTED TO THE FOREST ENVIRONMENT, WHICH ALLOWS THE CROSSING OF A WATERWAY WITHOUT DISTURBING THE FAUNA AND FLORA OF AN ECOSYSTEM.**





Please note that the direction of water flow must be respected when installing the fish weirs.

# REMOVABLE FISH WEIR

## Removable control structure

made of galvanized steel, manufactured with a half-moon shaped base and a slowing down plate with an **opening for the passage of fish.**

The weir is used where **free passage of fish must be ensured**, based on the objectives of Section 105 of the RSDF and where the conditions of Schedule 9 of the RSDF cannot be met.

The use of a steel culvert with fish weirs is recommended for **high slope** situations, from 2% to 6% slope.

The weir shall be manufactured in accordance with the requirements of Section 106 and Schedule 10 of the RSDF.

Removable, our weir preserves the interlocking of the pipes during transportation, while reducing costs thanks to the optimization of the loading space.

**Easy to install on-site**, this structure is inserted in a steel culvert built in a waterway to reduce the water flow and reproduce the natural appearance of a stream.

The **wide base of** the weir allows a **proper interlocking** with the steel pipe, ensuring the stability of the installation.

Made of hot-dipped galvanized steel, the weir is **corrosion resistant.**

The sealant applied at the time of installation ensures that the system is perfectly sealed and integral.

Riveted or bolted to the steel pipe, the weir is **strong and vibration resistant.**

With the addition of buttresses, the weir provides optimum resistance to the pressures of water flow and the impact of natural debris.

Available for steel pipes from 1200 mm to 3600 mm (48 in. to 144 in.) in diameter

The weir can be installed in the pipe at the factory upon request.

## ADVANTAGES AND BENEFITS

Soleno's patent-pending removable fish weir meets **the objectives of the new Regulation respecting the sustainable development of forests (RSDF)** allowing free flow of water and free movement of aquatic wildlife.

By **reducing the flow of water**, fish weirs **facilitate the passage and upstream movement** of fish while **providing a refuge** for wildlife and fry.

The reduction of the flow speed in the culvert **reduces erosion at the outlet**, promoting the conservation and stability of the slopes.







# STEEL PIPE

**GALVANIZED CORRUGATED METAL PIPE, AN ECONOMICAL SOLUTION USED IN STEEL CULVERT AND ROAD DRAINAGE APPLICATIONS.**

— Very high flexibility in **non-standard lengths up to 18 m (60 ft)** for diameters of 3600 mm (144 in) and smaller, allowing for a reduction in the number of joints.

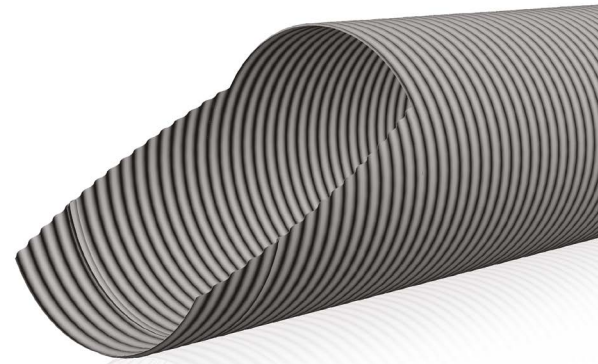
— **Cost-effective** solution in large diameters, reducing costs in transportation due to optimization of the loading space.

— The ends of the pipes are ground to provide annular corrugations that allow the use of collars for joining successive lengths on a project.

— **Spiral end, bevel cut and arched** pipes are also available on request.

— Due to their flattened shape, **arched pipes** minimize the height of the embankment while conveying an additional volume of water with a low flow rate.

— Resistant to CL-625, H-25 and HS-25 loads.



— The **bevel cut**, in a **steel culvert** application, increases the flow of water through the culvert during a storm.

**Factory-welded lifting lugs available on request.**

# STEEL ACCESSORY

Soleno manufactures **steel collars** with **3, 5 or 9 corrugations**, which allow the elongation of two steel pipes by restoring the corrugation parallel to the pipe end.

— Steel collars ensure a **strong and durable connection**.

— Easy to install thanks to the addition of bolts provided as needed according to the diameter of the pipe.









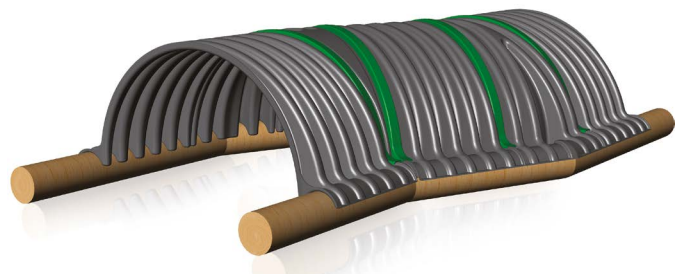
# ENVIRO-SPAN REMOVABLE CULVERT

PATENTED MODULAR ARCH CULVERT SYSTEM ADAPTED TO THE FOREST ENVIRONMENT.

- Suitable for use in ecologically sensitive streams, Enviro-Span® arches provide a passageway without disturbing the stream bed or banks.
- The straight or angled modules can be installed in **multiple configurations**, in accordance with the course of the waterway.
- Made from polymer, Enviro-Span® arches offer a durable and **reusable** temporary or permanent non-metallic alternative to heavy metal culverts.

## ADVANTAGES AND BENEFITS

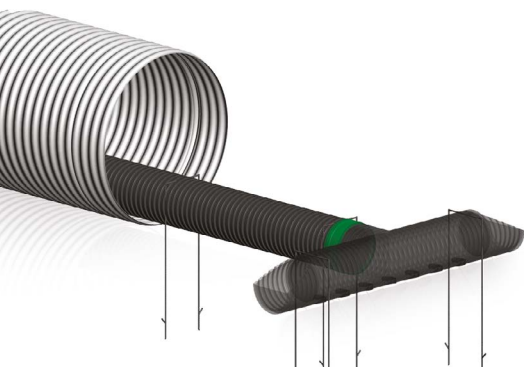
- Because of the lightweight material and innovative design, arch culverts require less time and equipment to **complete environmentally friendly installations** compared to traditional stream and ditch crossing methods.
- **Stackable**, the arch culverts allow for easy transportation and reduce the cost of transporting products.
- Withstands L-150 off-road loads of 69,000 lb (31,298 kg) per axle with 36 in. (0.91 m) overlap.



# BEAVER BARRIER

PERMANENT AND SUSTAINABLE SOLUTION TO WATER FLOW PROBLEMS ASSOCIATED WITH CULVERT BLOCKAGES CAUSED BY BEAVER DAMS.

- **Ensures continuity of water flow** through a culvert and prevents the construction of a beaver dam.
- The beaver barrier is a smooth interior and corrugated exterior pipe, assembled in a tee shape with openings placed downward that **allow water to flow** into the pipe.
- The fins stabilize the structure anchored in the stream bottom.
- Available in 300 mm (12 in.) and 450 mm (18 in.) diameters.
- Easy to transport, handle and install.



**Our beaver barrier includes openings with fins to add weight to ensure partial immersion of the structure.**





# OUR GEOSYNTHETICS



Designed specifically for the natural resources sector, the TX-F offers an exclusive 1000 Newton strength to meet RSDF requirements. Multiple sizes are available.





## IMPROVE SOIL PROPERTIES

Soleno offers a range of geosynthetics to improve the properties of surrounding soils and meet the specific needs of rural, forestry and mining environments.

## TX-F

**NONWOVEN GEOTEXTILE SPECIFICALLY ADAPTED TO THE FOREST ENVIRONMENT, TX-F IS USED FOR PEHD CULVERT, STEEL CULVERT, ROAD DRAINAGE OR TEMPORARY ROAD APPLICATIONS.**

— Ideal solution for **grading at the ends of culverts and around steel collars**, as well as for **road construction in forested areas**.

— Separator **specifically designed for the forestry industry** (as defined by the RSDF), and which meets their minimum requirements for tensile strength and filter openings.

— Its high strength (**1000 Newtons**) and **machined side** make it a first choice material to **improve the mechanical properties of the soil** and to **maintain the integrity of the underlying foundation materials**.

— Limits erosion and particle input into waterways.

— Extends the life of structures near culverts.







# WOOD FIBRES LOGS TO CONTROL EROSION AND REVEGETATION

**SEDIMENT RETENTION AND REVEGETATION LOGS, MADE OF WOOD FIBRES, ARE USED FOR THEIR CONTROL FUNCTION IN BANK PROTECTION, RETAINING WALL, BERM AND SLOPE APPLICATIONS, OR SEDIMENT RETENTION.**

- Economic and ecological solution.
- The logs **stabilize the soil, retain sediment** and require no maintenance once installed.
- **Reduces damage** from road or forestry road development, control bank erosion and sediment capture washed out during landscaping work.
- Composed mainly of wood fibres, the logs slow down the **water flow** and retain the sludge brought by the upstream works.
- The logs provide **an environment conducive to the rooting** of riparian plants and **immediate protection against erosion**, while ensuring a remarkable landscape integration.
- **Easy to install**, they resist well to higher water inputs during heavy rains.
- Absorbent, the log can hold up to 7 times its weight in water.
- Lifetime of almost 24 months.
- Meet the objectives of sections 86 and 90 of the RSDF.

**Wood fibre, straw and coconut fibre sediment erosion control blankets are also available.**



The BX-3000 geogrid offers 50% higher tensile strength, elongation and fracture resistance than the BX-2000.

# BX-2000 AND BX-3000

POLYPROPYLENE GEOGRIDS, BX-2000 AND BX-3000 ARE USED FOR THEIR REINFORCEMENT FUNCTION IN ROAD CONSTRUCTION APPLICATIONS.

- When the constraints in the field are severe, geogrids present an economical and efficient alternative for construction or repair work on the infrastructures of your forestry facilities.
- Applicable for reinforcing the soil of your access roads, operating roads, storage and handling areas and loading and unloading zones.

- Our geogrids resolve the problem of soil instability caused by the presence of clay silt, topsoil or wood chips.
- Biaxial geogrids, therefore effective in both directions, allow for the multidirectional circulation of heavy vehicles called upon to make repetitive passages.



ADVANTAGES AND BENEFITS

- Facilitates access to the site in difficult conditions
- Stabilizes the soil in place
- Reduces the risk of rutting
- Improves the bearing capacity of the infrastructure surface

- Distributes loads over a larger area and reduces the pressure applied on the ground
- Separates clean foundation materials from contaminated soils in situ
- Strengthens the pavement

- structure and increases its durability
- Reduces the thickness of the granular layer
- Extends the life of infrastructure
- Reduces the transportation costs of granular materials

# EROSION CONTROL BLANKETS

MADE FROM A BLEND OF STRAW, COCONUT OR WOOD FIBRES, EROSION CONTROL BLANKETS ARE USED FOR THEIR CONTROL FUNCTION IN BANK OR RETAINING WALL, BERMS AND SLOPE PROTECTION APPLICATIONS.

- They **promote the rapid revegetation** of berms and riverbanks.
- **Lightweight and easy to install**, they reduce the impact of rainwater, avoid the formation of gullies and reduce the flow of water

- from sloping surfaces.
- Erosion control blankets **protect the soil from desiccation and wind erosion**.
- They allow the **development of a good root system** by protecting the seed and ensuring

- good moisture retention, thus facilitating the rapid development of the plant cover.
- Meet the objectives of sections 73, 76, 81, 86 and 95 of the RSDF.





# TURBIDITY CURTAIN 400W

FLOATING BARRIER MADE OF POLYPROPYLENE AND POLYETHYLENE USED FOR ITS PROTECTIVE FUNCTION IN A SEDIMENT RETENTION APPLICATION.

Placed in a water body, the 400W Turbidity Curtain minimizes sediment movement related to local disturbance by enclosing the area where the work is taking place to create a **containment space**.

It allows the decantation of a good part of the sediments present in the water.

A tubular, UV-resistant polyethylene float installed at the top and a ballast chain threaded through a specially designed sheath at the base of the curtain keep the membrane in place in the water.

Made of a **highly resistant permeable membrane**, turbidity curtains are manufactured in a **wide variety of sizes**.



\*Photo credit: Terraquavie

Made to measure according to the desired dimensions.

Meets the objectives of sections 86 and 90 of the RSDF.

# TEXGUARD

SEDIMENT BARRIER MADE OF POLYPROPYLENE USED FOR ITS PROTECTIVE FUNCTION IN A SEDIMENT RETENTION APPLICATION.

**Cost-effective solution** for environmental protection in construction projects where the soil in place can be easily displaced by rain.

The Texguard sediment barrier is specially designed to **ensure the retention of harmful sediments** that could contaminate the surrounding environment.

As a filter, the sediment barrier helps **control soil leaching** and **retain fine sediment particles**.

Its composition allows water to pass freely through the filter fabric while **reducing its velocity**.

Very durable, the sediment barrier is **resistant, light and easy to install**.

Meets the objectives of sections 81, 86 and 90 of the RSDF.



**Routexguard also available.**



# OUR EXPERTS

## THE EXCELLENCE OF OUR SOLUTIONS IS BASED ON OUR CONSULTING SERVICES

and on the expertise developed over the years with forest owners and managers responsible for forest management. Our team is available to help you identify and implement the best practices for optimal forest access and efficient drainage to preserve natural environments.



On request, Soleno offers a document on the transport logistics according to the desired pipe diameters and the trailers used. Get details!





**SOLENO HAS EARNED**  
its **ECORESPONSIBLE™** Certification  
- Level **2. Performance** in sustainable  
development from the Council in  
Sustainable Industries.

(Saint-Jean-sur-Richelieu plant only)



**SOLENO IS  
CERTIFIED ISO 9001**

(Saint-Jean-sur-Richelieu plant only)

**SOLENO IS A MEMBER OF THE FOLLOWING  
ORGANIZATIONS:**



**OUR PRODUCTS AND SOLUTIONS ARE  
DESIGNED AND MANUFACTURED TO THE  
HIGHEST STANDARDS.**

**SOLENO.COM**