



**SOLENO**  
Mastering Storm Water

# NATURAL RESOURCES

OUR SUSTAINABLE SOLUTIONS TO PRESERVE THE SURROUNDING ENVIRONMENT





# OUR EXPERTISE





## OUR SUSTAINABLE SOLUTIONS TO PRESERVE THE SURROUNDING ENVIRONMENT

Implementation of the Sustainable Forest Management Regulation in April 2018 has significantly transformed the traditional practices.

Owners and forest managers must consider issues arising out of their activities, forest road construction being one of the activities with the greatest negative impact on aquatic wildlife. Because forest management is a complex challenge, Soleno supports managers by offering a comprehensive line of sustainable solutions for mastering storm water in the rural, forestry and mining sectors. The solutions and products Soleno offers allow optimal access to the forest and provide effective drainage to preserve forest roads and

extend their lifespan. In line with the Sustainable Forest Management Regulation, Soleno also offers products that meet the regulation's objectives.

## INNOVATIVE PRODUCTS

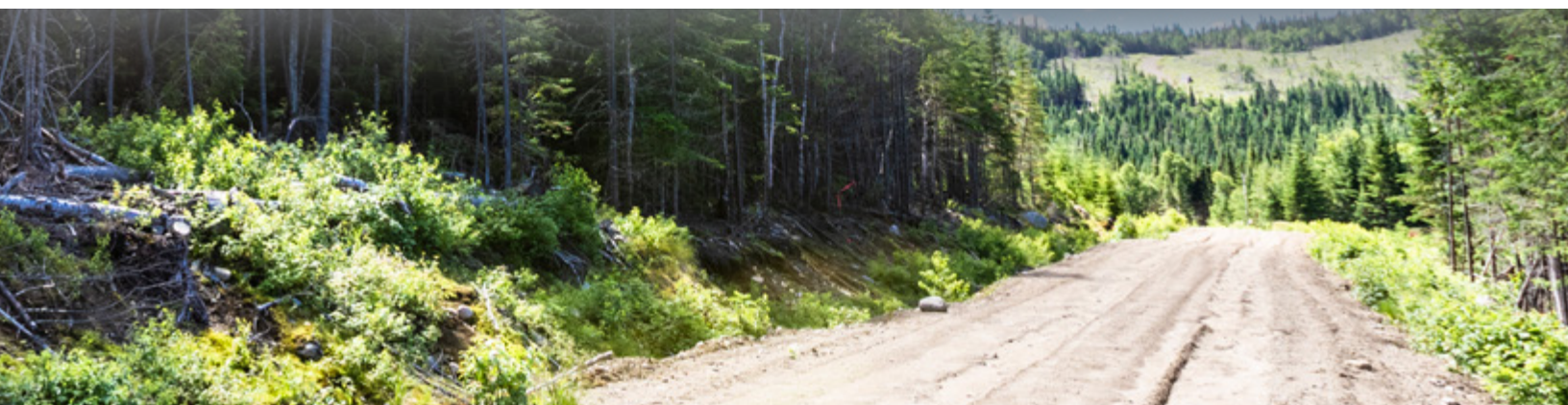
Selecting the right product is paramount for sustainable development. At Soleno, we pool the strengths of our various plants to offer a wide range of products, from geotextiles to steel and high-density polyethylene (HDPE) culverts, an extremely effective, durable material with a lifespan that can exceed 100 years!

Because each project is unique, our culverts and pipes are tailored to the sometimes difficult conditions in the forestry sector, and provide viable drainage while withstanding heavy loads. Product selection depends on the specified service life.

HDPE should be favoured when infrastructure longevity is the primary consideration.

## RESEARCH SUPPORT

As a partner of Laval University for more than 20 years, Soleno committed in 2016 to support the project to modernize the [Montmorency Forest](#). This support is intended to promote the advancement of forestry research and to support researchers, professors and passionate students. Soleno is proud to have contributed to the construction of the only access road to the southern portion of the forest; the [Soleno Road](#).





# RRSDF



## ENVIRONMENTAL REQUIREMENTS RELATED TO THE NEW RRSDF

In April 2018, the Ministry of Forests, Wildlife and Parks (MFFP) implemented Regulations respecting the Sustainable Development of Forests in the state domain (RRSDF). This new regulation, under the Sustainable Forest Development Act, replaces the former Regulation respecting standards of forest management for forests in the domain of the State.

According to Parts II - *Roads* and III - *Bridges, Culverts, Removable Structures and Rudimentary Structures* of Chapter V - *Roads, Sandpits and Forest Infrastructure*, forest owners and managers must comply with the new RRSDF standards, which are to:



ensure the maintenance or restoration of forest cover, the protection of forest, aquatic and wetland environments, and the accommodation of the various activities taking place there;

—

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

—

ensure a linkage with the Fisheries Act with respect to the free movement of fish in structures that allow them to cross watercourses.

## OUR APPLICATIONS AND THE RRSDF

### ROAD AND HIGHWAY DRAINAGE

Our HDPE or steel **drainage pipes** allow to **maintain free flow of water or to drain infiltration water** into a ditch or a culvert, meeting the objectives of Sections 74, 75, 76 and 79 of the RRSDF.

### HDPE AND STEEL CULVERTS

Our HDPE and steel **culverts** allow engineered structures in watercourses, intended to **allow crossing while ensuring the free flow of water**, meeting the objectives of Section 8 of the RRSDF. Section 103 of the RRSDF defines whether or not **free passage of fish** is to be provided, and Sections 104 and 105 summarize the criteria to be met for each of the alternatives.

Product selection depends on the specified service life. **HDPE culverts** should be favoured when infrastructure longevity is the primary consideration. Availability of various diameters and hydraulic capacity (Manning's roughness coefficient, diameter and slope) must also be taken into account. Mainly used in the rural, forestry and mining sectors, **steel culvert** offers great flexibility in terms of non-standard lengths, and are an economical solution for large-diameter pipes.

### ARCH CULVERTS MADE OF POLYMER

An engineered structure over a water stream that **allows crossing while ensuring the free flow of water**, meeting the objectives of Sections 107 and 110 of the RRSDF. These **polymer arches** are mainly used in rural, forestry and mining sectors. They allow crossing of the stream without affecting its banks and bed and without disturbing the flora and fauna of its ecosystem.

### ROADWORK

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

### RETAINING WALLS, EMBANKMENTS AND BERMS

Geosynthetic meeting the objectives of Section 73 of the RRSDF as it allows **erosion control for berm protection**.

### BANK PROTECTION

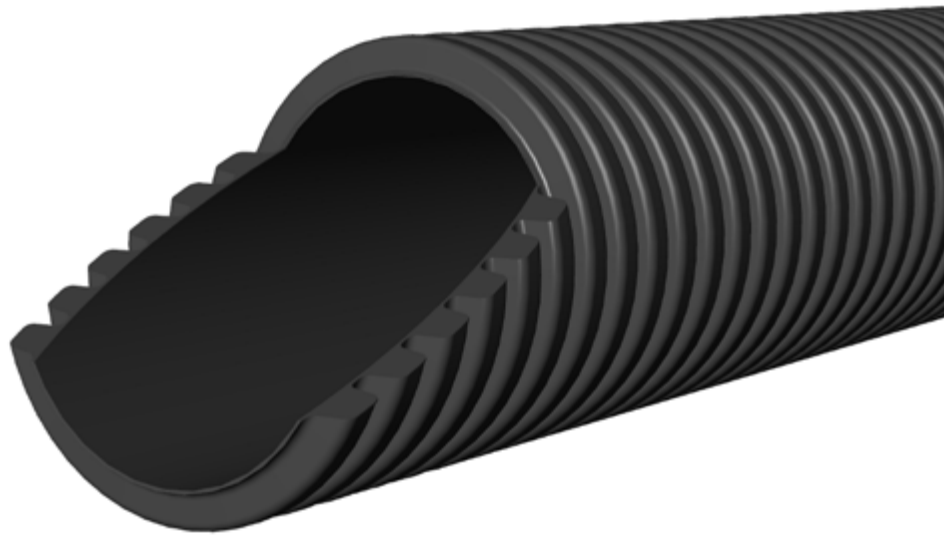
Nonwoven geosynthetic meeting the objectives of Sections 73, 76, 81, 86 and 95 of the RRSDF as it allows to **prevent the erosion of the natural ground** when **placed underneath the river banks' rip-rap**, in streams or open water.

### SEDIMENT RETENTION

Specialized geotextile meeting the objectives of Section 73 of the RRSDF as it allows the **control and limitation of sediment** silting at construction sites, in streams or lakes.



# OUR PRODUCTS



## NON-PERFORATED SOLFLO MAX

**NON-PERFORATED RIGID DUAL WALL PIPE, WITH SMOOTH INTERIOR AND CORRUGATED EXTERIOR WALLS FOR ROADWAY USE.**

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

—  
Provides a compression stiffness of **210 kPa** for 300 mm (12 in) to 900 mm (36 in) diameters.

—  
With an **exceptional service life**, Solflo Max pipes are **strong** and withstand abrasion and corrosion.

—  
The length of the pipes reduces **installation time** and **the number of joints required**.

—  
Fits perfectly with our full range of watertight and non-watertight proof fittings and accessories, designed to meet field requirements or comply with network requirements.

Solenio recommends the use of **Non-Perforated Solflo Max**, for a **road and highway drainage** application to maintain free flow of water or to drain infiltration water into a ditch or a culvert.

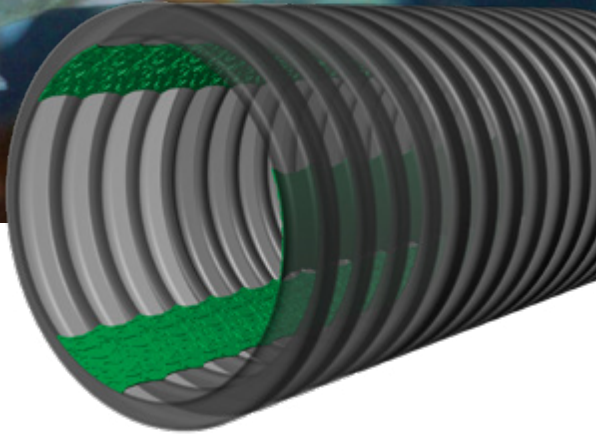
The use of a **Non-Perforated Solflo Max** with a diameter of more than 450 mm (18 in) is ideal for an **HDPE culvert** application.

—  
Bevelled cut (optional) in an HDPE culvert application, increases the flow of water circulating in the culvert in the event of a thunderstorm.



**NEW**

# TURBULENCE CULVERT



In line with the government’s objective of supporting the development and growth of markets for Canadian forestry products derived from sustainable forest management, Soleno continues to innovate with its **Turbulence Culvert** that **provides flow conditions similar to a creek** and **meets the objectives of the new Regulations respecting the Sustainable Development of Forests in the state domain** (RRSDF). In forest management, sustainability is front and centre, and Soleno’s solutions meet forest managers’ needs.

## HDPE CULVERT SPECIALLY ADAPTED FOR THE FOREST INDUSTRY REPRODUCING THE NATURAL BED CONDITIONS OF A CREEK.

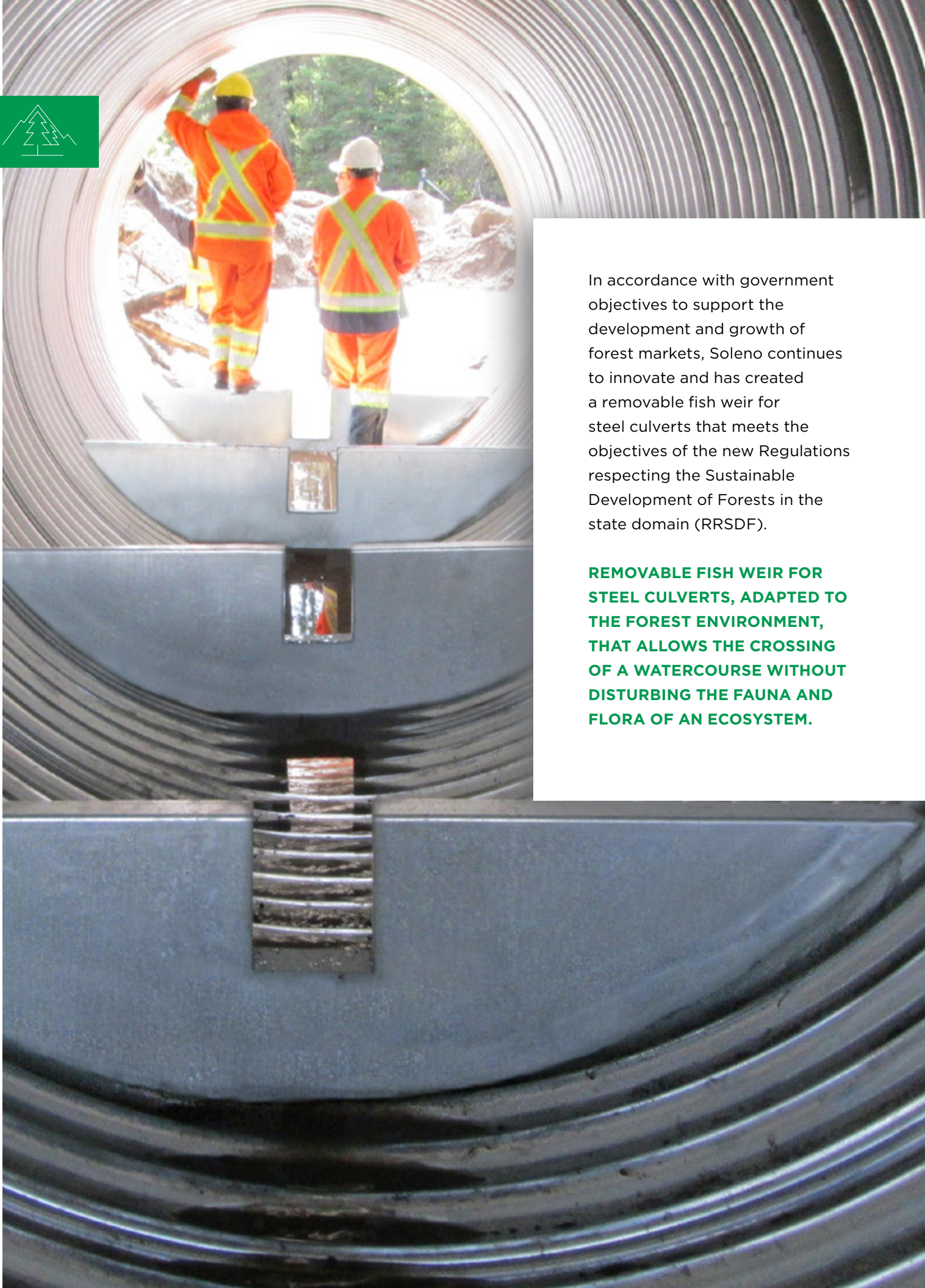
- Culvert supplemented with 3 reinforcement strips maintain the longitudinal strength of the pipe and allow nesting for shipping purpose.
- The corrugated interior wall **reduces the water rapidity and flow.**
- With a high Manning coefficient (0.022)\*, the flow rate in the Turbulence culvert is 28 % lower than for a corrugated steel pipe, which **encourages ecosystem growth and mitigation of erosion.**
- The decrease in water velocity in the culvert reduces erosion at the outlet, which promotes slope conservation and stability.
- Patented product offered in diameter of 450 mm, 600 mm and 750 mm (18 in, 24 in and 30 in).

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

## ADVANTAGES AND BENEFITS

- The Turbulence culvert pipe **meets the Quebec Regulations respecting the Sustainable Development of Forests in the state domain** (RRSDF), as it allows the free flow of water and the free movement of aquatic fauna.
- **By increasing bed roughness,** it eases the passage and countercurrent movement by the fish, while serving as a refuge for wildlife and fish fry.
- This **lightweight and durable** HDPE culvert is easy to install and handle in rural, forestry and mining sectors, wherever water flow and rapidity needs to be reduced.





In accordance with government objectives to support the development and growth of forest markets, Soleno continues to innovate and has created a removable fish weir for steel culverts that meets the objectives of the new Regulations respecting the Sustainable Development of Forests in the state domain (RRSDF).

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



NEW

# REMOVABLE FISH WEIR

## Removable control structure

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

The weir is used in cases where the **free passage of fish must be ensured**, in accordance with the objectives of Section 105 of the RRSDF, and when the conditions of Schedule 9 of the RRSDF cannot be met.

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

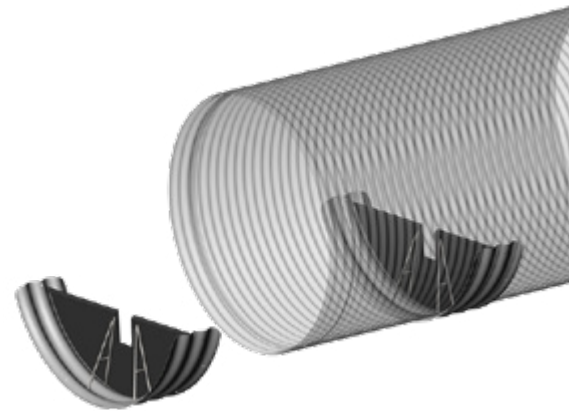
The weir is manufactured in accordance with the requirements of Section 106 and Schedule 10 of the RRSDF.

Because it's removable, our weir preserves the nesting of the pipes during transportation and optimizes the loading space for added savings.

**Easy to install on site**, this structure fits into a steel culvert installed in a watercourse to reduce water flow and reproduce the natural aspect of a stream.

The weir's **wide base** allows **adequate interlocking** with the steel pipe, ensuring the stability of the installation.

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



The sealant joint applied during installation ensures that the system is watertight and perfectly retained.

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

With added buttresses, the weir provides optimal resistance to the pressures exerted by the flow of water, and to impacts caused by natural debris.

Available for steel pipe diameters from 1200 mm to 3600 mm (48 in to 144 in).

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

## ADVANTAGES AND BENEFITS

Soleno's patent-pending removable fish weir meets the objectives of the new **Regulations respecting the Sustainable Development of Forests in the state domain** (RRSDF), by allowing for the free flow of water and the free movement of aquatic wildlife.

By **reducing the water flow**, the Soleno fish weir **facilitates the passage and the countercurrent** movement by the fish, while **servicing as a refuge** for the fauna and the fry.

The flow speed reduction in the culvert **reduces the erosion at the outlet**, which is beneficial to the conservation and stability of the slopes.







# STEEL PIPE

**CORRUGATED GALVANIZED STEEL PIPES (CSP), AN ECONOMICAL SOLUTION USED IN STEEL CULVERTS AND ROAD AND HIGHWAY DRAINAGE APPLICATIONS.**

— Customized **non-standard lengths** up to 18 m (60 ft) for diameters 3600 mm (144 in) and less, allowing less joints to be required.

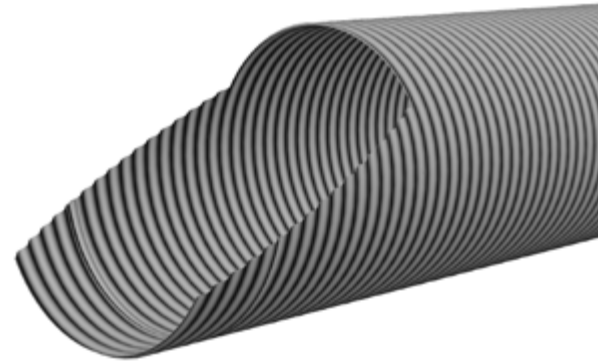
— An **economical** solution in large diameters pipes, allowing savings in transport due to the optimization of the loading space.

— The pipe ends are adjusted to provide annular re-rolled corrugations, which allow couplings to be used to assemble successive lengths on a project.

— Optional **spiral end, bevelled cut** and **arched** pipes.

— With their arched shape, they help minimize depth of the backfill while conveying additional water volume at a low rate.

— Withstands CL-625, H-25 and HS-25 loads.



— **Bevelled cut** in a **steel culvert** application, increases the flow of water circulating in the culvert in the event of a thunderstorm.

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

# STEEL ACCESSORIES

Soleno manufactures **steel clamps** with **3, 5 or 9 corrugations**, that enables the elongation of two steel pipes by reinstating the corrugations parallel to the pipe's endpoint.

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

— **NEW!** Now easier to install with the addition of an 200 mm (8 in) bolt for each set supplied!









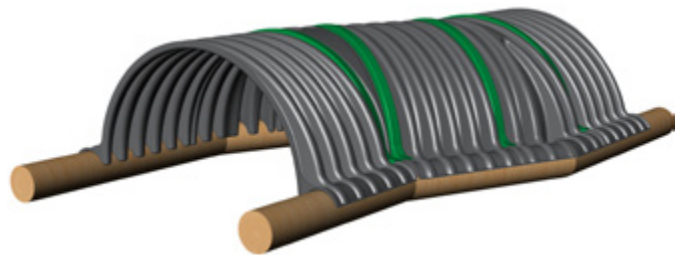
# REMOVABLE ENVIRO-SPAN CULVERT

MODULAR ARCH CULVERT PATENTED SYSTEM ADAPTED FOR THE FOREST INDUSTRY.

- Suitable for use over environmentally sensitive streams, Enviro-Span® arches allow crossing of the stream without affecting its banks and bed.
- Straight or angled sections allow **multiple configurations** for a precise following of the natural stream bed without additional disturbance.
- Produced from polymers, Enviro-Span® arches resulting in a durable and **reusable** non-metallic alternative to heavy metal culverts.

## ADVANTAGES AND BENEFITS

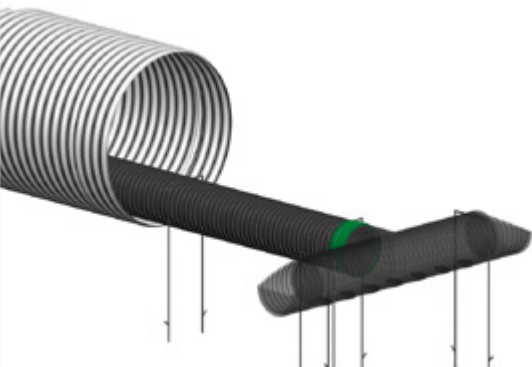
- Due to the lightweight material and innovative design, the bottomless culverts require less time, equipment, and manpower for **environmentally friendly installations** when compared to traditional stream and ditch crossing.
- **Stackable** for easy and economic transport.
- Withstands an L-150 off-highway load of 69,000 lb (31,298 kg) per axle load with tandem axle configuration overlain by 0.91 m (36 in) of backfill.



# BEAVER BARRIER

SUSTAINABLE PERMANENT SOLUTION FOR WATER FLOW PROBLEMS RELATED TO BEAVER DAM OBSTRUCTIONS IN CULVERTS.

- **Maintains water flow continuity** in culverts and prevents the construction of beaver dams.
- The beaver barrier is a pipe with a smooth interior wall and a corrugated exterior wall, tee section with openings, that **allow water to flow** through the pipe.
- The fins stabilize the structure anchored in the bottom of the stream.
- Available in 300 mm (12 in) and 450 mm (18 in) diameters.
- Easy to ship, handle and install.





# OUR GEOSYNTHETICS







## IMPROVE THE PROPERTIES OF YOUR SOIL

Soleno offers a full range of geotextiles that enhance the properties of the surrounding soils responding to the specific needs in the rural, forestry and mining sectors.

## TX-F

**NONWOVEN GEOTEXTILE SPECIALLY DESIGNED FOR THE FOREST INDUSTRY, THE TX-F IS USED FOR HDPE CULVERTS, STEEL CULVERTS, ROAD AND HIGHWAY DRAINAGE OR TEMPORARY ROADWAY APPLICATIONS.**

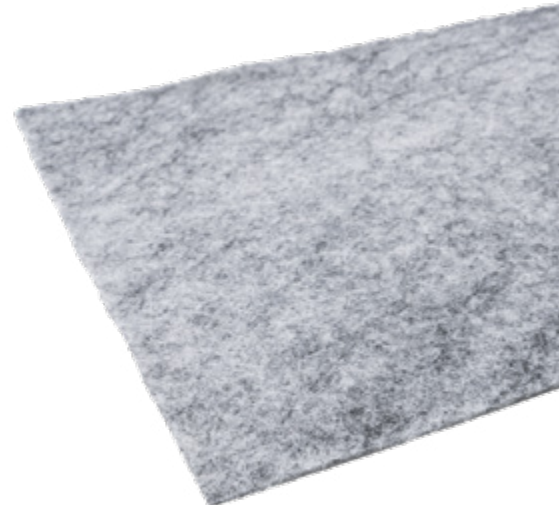
—  
Ideal solution for **stone packs at the ends of the culverts** and **around steel clamps**, as well as for **forest road development**.

—  
**Specially designed separator for the forest industry** (as defined in the RRSDF), and which meets their minimum requirements for tensile strength and filtration openings.

—  
Its superior strength **(1000 Newtons)** and its **machined side** result in a first-class material **to improve mechanical properties of soil** and **maintain integrity of underlying foundation materials**.

—  
Reduces erosion and inflow of particles in streams.

—  
Extends the lifetime of structures near culverts.







# WOOD FIBRE LOGS TO CONTROL EROSION AND GROW VEGETATION

WOOD FIBRE LOGS TO CONTROL EROSION AND GROW VEGETATION, MADE OF WOOD FIBRES, ARE USED FOR CONTROL IN BANK PROTECTION, RETAINING WALLS, EMBANKMENTS AND BERMS OR SEDIMENT RETENTION APPLICATIONS.

- An economical and ecological solution.
- The logs **stabilize the soil, trap sediment** and require no maintenance once installed.
- They **reduce damage** that can occur during the construction roadway and forestry roads; they prevent shoreline erosion and trap leached sediments during landscaping work.
- Consisting mainly of wood fibres, the logs **slow the water flow** and retain the sludge released by works upstream.
- The logs provide a medium **conductive to rooting** of riparian plants and an **immediate protection against erosion** while providing an outstanding landscape integration.
- **Easy to install**, they are resistant to higher water flows during heavy rains.
- The absorbent roll can hold up to seven times its weight in water.
- Lifetime of almost 24 months.
- Meets the objectives of Sections 86 and 90 of the RRSDF.

# BX-2000 AND BX-3000

**GEOGRIDS EXTRUDED IN A SINGLE LAYER, THE BX-2000 AND BX-3000 ARE USED FOR REINFORCEMENT IN ROADWORKS APPLICATIONS.**

—  
Biaxial geogrids are used as reinforcement when **work site constraints** are considered **severe**.

—  
They distribute the loads over a larger area by reducing the vertical pressure applied to the ground.

—  
This **economic and effective alternative**, compared to conventional methods of stabilization, **strengthens the pavement structure** and

**increases the durability of the roadway surface**, while allowing to **reduction of the thickness of the granular layer**.

—  
By facilitating the nesting of aggregates, they also limit the lateral movement of the foundation materials.

—  
Their **quick and easy installation** facilitates access to the work site under difficult conditions.

—  
When the geogrid is used at the interface of two different materials, it is recommended to also use a geotextile separator.



# EROSION CONTROL BLANKETS

**MADE OF A BLEND OF WOOD, COIR OR STRAW FIBRES, EROSION CONTROL BLANKETS ARE USED FOR CONTROL IN BANK PROTECTION OR A RETAINING WALLS, EMBANKMENTS AND BERMS APPLICATIONS.**

—  
They **promote rapid revegetation** of berms and riverbanks.

—  
**Lightweight and easy to install**, they diminish the impact of rainwater, prevent the formation of gullies and reduce the flow of water on sloped surfaces.

—  
Blankets for erosion control **protect the soil from drying and from wind erosion**.

—  
They allow the **development of a good root system** by keeping the soil particles in place and by providing good moisture retention, thus facilitating rapid revegetation.

—  
Meets the objectives of Sections 73, 76, 81, 86 and 95 of the RRSDF.





# TURBIDITY CURTAIN 400W

FLOATING BARRIER MADE OF POLYPROPYLENE AND POLYETHYLENE USED FOR PROTECTION IN A SEDIMENT RETENTION APPLICATION.

Placed in stretch of water, the turbidity curtain 400W minimizes sediment movement caused by a local disturbance, by enclosing the space where the work is done to create a **confinement space**.

It allows the settling of most sediment in the water.

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

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



\*Photo Credit: Terraquavie

Available in lengths of 30 metres, they can be tied together to form a continuous unit.

Meets the objectives of Sections 86 and 90 of the RRSDF.

# TEXGUARD

LAND BARRIER MADE OF POLYPROPYLENE USED FOR PROTECTION IN A SEDIMENT RETENTION APPLICATION.

An **economical solution** for the protection of the environment during construction where the in situ soil can be easily washed away by rain.

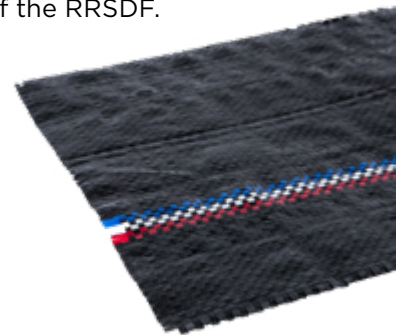
The sediment barrier is specially designed to **ensure the retention of harmful sediments** that could contaminate the surrounding environment.

As a filter, the sediment barrier **controls the leaching of soil and retaining particles of sediment**.

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

With its very high durability, the sediment barrier is **resistant, lightweight and easy to install**.

Meets the objectives of Sections 81, 86 and 90 of the RRSDF.





# OUR EXPERTS

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

and 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 best practices to ensure optimal access to the forest and efficient drainage to preserve the natural environments.







**SOLENO OBTAINED**

its **ECORESPONSIBLE** Certification - level **2. Performance** in sustainable development from the Council for sustainable industries (CSI) **ECORESPONSIBLE™** Program.

(Solenio plant located at 1160, route 133, Saint-Jean-sur-Richelieu only)



**SOLENO IS  
ISO 9001 CERTIFIED**

(Saint-Jean-sur-Richelieu plant only)

**SOLENO IS A MEMBER  
OF THESE AGENCIES:**



**OUR HDPE PRODUCTS AND SOLUTIONS ARE  
DESIGNED AND MANUFACTURED ACCORDING TO  
THE MOST RIGOROUS STANDARDS.**