PLASTIPILE™

Recycled plastic sheet piling

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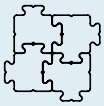
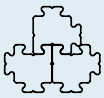
PLASTIPILE™

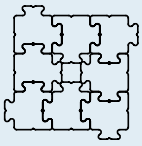
THIS IS A WORLD FIRST IN SOLID PLASTIC SHEET PILING MADE FROM RECYCLED PLASTIC WASTE. DUE TO ITS UNIQUE DESIGN, IT CAN BE INTERLOCKED IN MORE THAN 2 DIRECTIONS TO FORM A WATER TIGHT STRUCTURE OF INFINITE WIDTH AND LENGTH, IN A MODULAR MANNER.

ATTRIBUTES

The Plastipile product encompasses proprietary designs, which yield substantial benefit over competitive products a follows







Features		Benefits
Recycled plastic.	→	Reduces landfill.
Solid profile.	→	Conventional driving methods. Impact tolerant.
Flexible.	→	Tolerates ground movement. Impact resistant.
Water tight seal.	→	No seal required.
Interlocking geometry.	→	Flexibility in structured design.
Buoyant and lightweight.	→	Ease of installation.
Pest resistant.	→	Low maintenance.
No rust or rot.	→	Low maintenance.
Non-obtrusive structure.	→	Minimal disturbance.
Smooth finish.	→	Ease of handling.

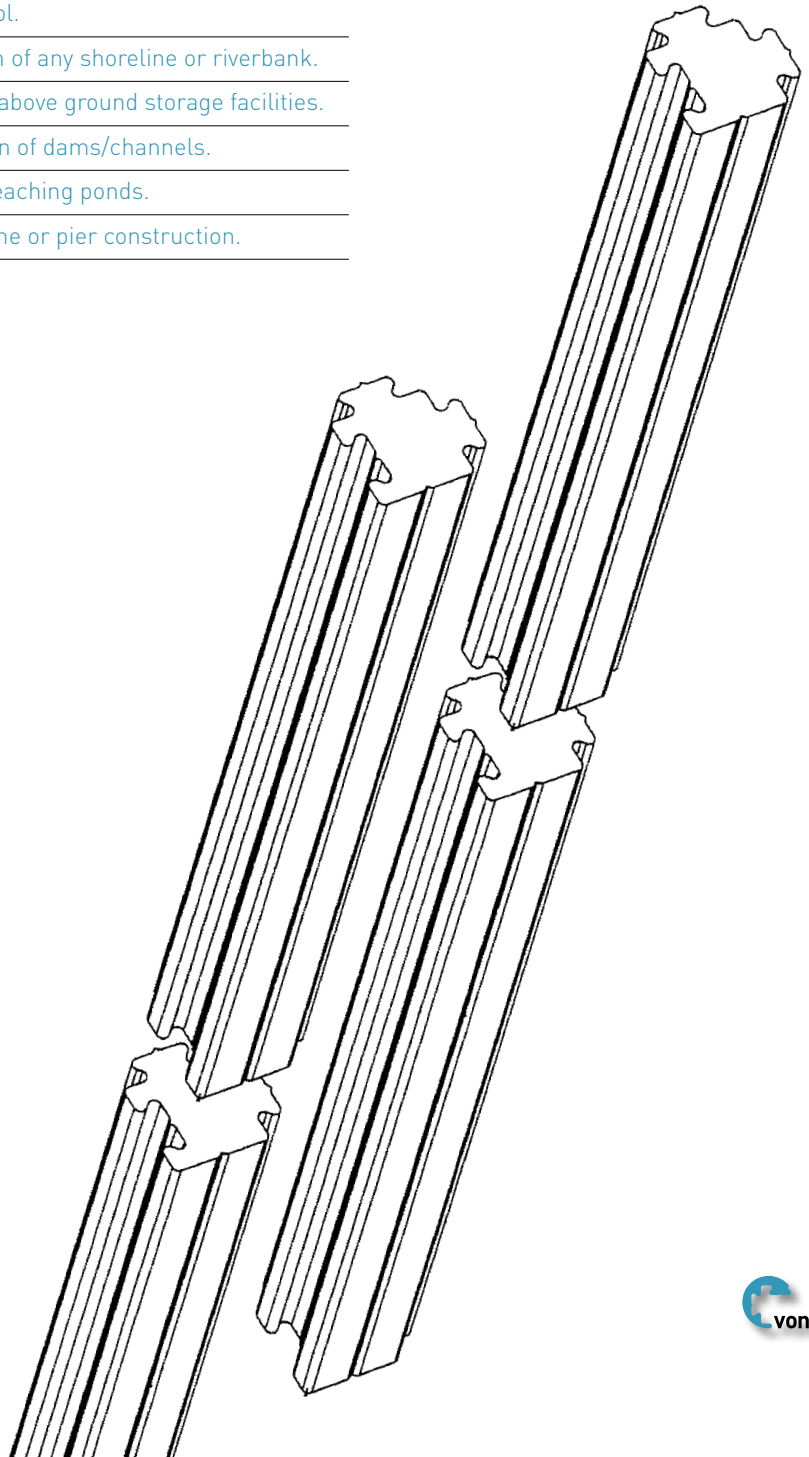
USES

Plastipile is suitable for a wide variety of purposes. The market initially targeted for the product are those projects seeking to rehabilitate Australia's wetlands and waterways, where Plastipile has already been utilised. Secondly, industries utilising fluid holding and containment ponds and/or fluid and soil retaining wall systems.

Projects where Plastipile provides a suitable solution are:

- Rehabilitation of high salinity areas.
- Wetland rehabilitation.
- Control of blue-green algae outbreaks.
- Reduction of water evaporation from floodplains and shallow waterways.
- Increased native fish population growth.
- Carp population control and reduction.
- River mouth blockages from low flow volumes (River Murray, Coorong).
- Offshore beach and sand stabilisation.
- Flood control.
- Stabilisation of any shoreline or riverbank.
- Waterproof above ground storage facilities.
- Construction of dams/channels.
- Retention/leaching ponds.
- Wharf, groyne or pier construction.

Plastipile has the ability to be built into a continuous watertight retaining wall of varying heights, with or without gates, and can be built in locations where access for large equipment is not permitted or is not possible, (concrete pumping and transportation, for example).



ENVIRONMENTAL BENEFITS RECYCLING PLASTIC

A 50M LENGTH OF PLASTIPILE WALL USES 7 SEMI-TRAILER LOADS OF UN-COMPACTED SHOPPING BAGS AND PLASTIC PRODUCTS.

Some facts about plastic bags

(Reference: Clean Up Australia)

Plastics have only been widely used in Australia for the past few decades, but even in this short period of time, they have had a devastating effect on our natural environment.

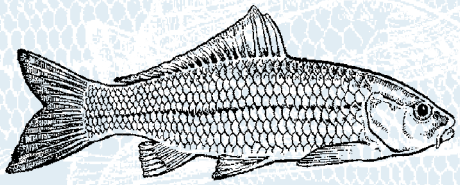
Plastic is a recyclable resource, manufactured from non-renewable resources – crude oil, gas and coal. Just 8.7 checkout bags contain enough embodied petroleum energy to drive a car 1 km.

If the plastic is not recycled, this embodied energy is lost from the resource chain.

It is estimated that 6.67 billion or 36,700 tonnes of plastic bags are disposed of in landfill sites throughout Australia each year.

Plastic bags can take between 20 and 1,000 years to breakdown.

Currently, only 3% of plastic bags used in Australia are recycled.



PLASTIPILE IS BEING USED EXTENSIVELY IN WETLAND REHABILITATION PROJECTS REQUIRING WATER CONTROL STRUCTURES, INCLUDING WEIRS AND 'CARP GATES'.

ENVIRONMENTAL BENEFITS
FISH CONTROL STRUCTURES

Vonmac has successfully used specialized low ground pressure machinery with air operated pile driving equipment to avoid environmental damage during installation.

Why do we need to control carp numbers?

(Reference: Wetland Care Australia)

Carp (Cyprinus Carpio), often wrongly referred to as the European Carp, has been nicknamed the 'rabbit of the river'. It was introduced to Australian inland waterways as early as the 1850s and has been declared a noxious species in a number of Australian states. It is considered a pest in North America, Canada, South Africa and New Zealand. Carp is Australia's most abundant freshwater fish, and the most despised for the following reasons:

Carp feed by sucking in mud from wetland beds and riverbanks, then expelling it through their gills after extracting food particles. This uproots water plants, stirring the water, creating high levels of turbidity or muddiness, and making it difficult for native fish to hunt by sight.

Carp undermine riverbanks in the mainstream by creating hollows under the lip of the bank.

They are hardy and adaptable. They are able to survive in temperatures as low as 4° C, or as high as 35° C, in water with low oxygen levels, high silt concentrations or low salt concentrations.

They are prolific breeders. While native fish only breed in large numbers during flood conditions, carp breed up to twice annually, regardless of flow conditions. A mature female carp can produce between 80,000 and 1,000,000 eggs each year.

How do carp gates work?

(Reference: Wetland Care Australia)

The process for reducing carp impact involves drying then screening the re-entry of adult carp.

1. A water flow control structure is installed and fitted with fish screens.
2. Inflow is closed off at the appropriate season and the wetland dried out to a cracked, firm mud bed.
3. The wetland is refilled to coincide with natural flooding cycles, with fish screens installed to exclude all large fish, targeting carp.
4. Due to the absence of adult carp, and removal of disturbance from their feeding habits, wetland beds remain firm and become densely vegetated.
5. Juvenile carp can still enter, but there is strong competition from small native fish and heavy predation from native birds, slowing the rate of re-infestation by carp.
6. As carp grow, their feeding will be limited by the firm wetland bed and dense plant cover, preventing access to silt.
7. When carp reach breeding age, the wetland can be dried again, starting a new cycle with native species having the advantage.

ENVIRONMENTAL BENEFITS

STRUCTURES FOR WETTING & DRYING WETLANDS

THE DRAMATIC RESULTS OF 'WETTING & DRYING' ARE CLEARLY VISIBLE IN THE PHOTO BELOW. VONMAC USED PLASTIPILE TO INSTALL A WEIR TO CONTROL THE WATER FLOW, WITHOUT DISTURBING THE ENVIRONMENTALLY SENSITIVE FLORA & FAUNA.

Why should we be wetting and drying our wetlands?

(Reference: Wetland Care Australia)

Prior to our regulation of the Murray River's water flow through the introduction of locks, the River's extensive floodplains would be irregularly inundated with water during floods, and dry out during the summer. Native plants and animals thrived in these conditions, because they had evolved to do so.

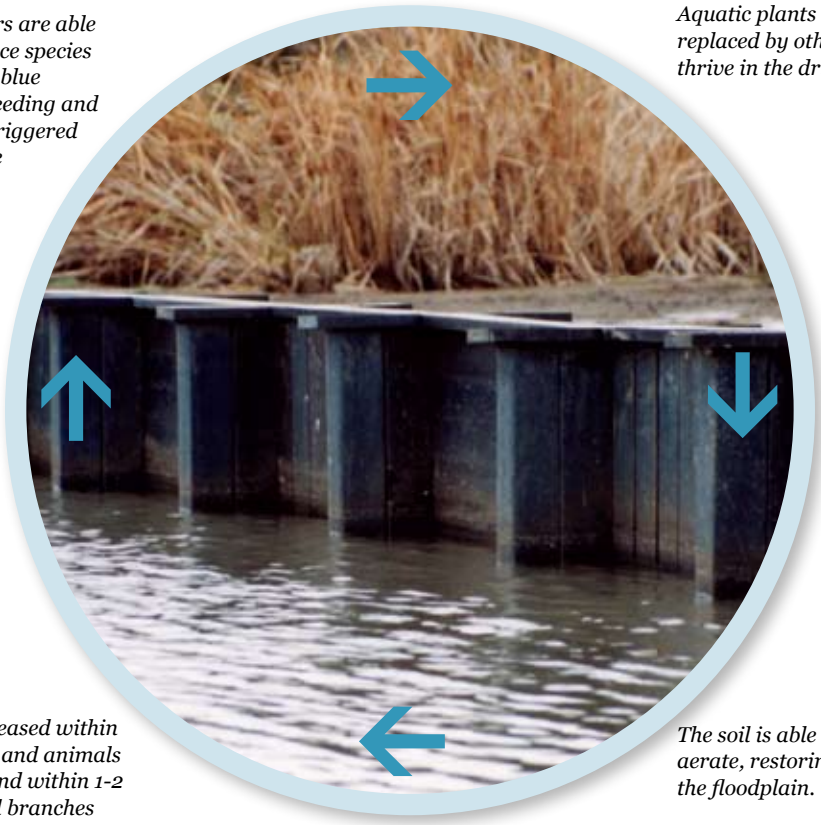
Drying of floodplains does not mean death of wetlands. To the contrary, wetlands survive because of the wetting and drying cycle.

By implementing flow control structures and management we can artificially imitate the natural cycle in wetland areas.

Drying

Natural predators are able to control nuisance species (mosquitoes and blue green algae). Breeding and regeneration is triggered at all levels of the ecosystem.

Aquatic plants die and are replaced by other plants which thrive in the drier conditions.



A firm base disadvantages the feeding habits of juvenile carp. The treated wetland provides a variety of food sources, breeding sites and a nursery for native fish.

Some aquatic plants go into a dormant state until the next flood (red gums seeds won't germinate in water and mature red gums cannot survive in permanent water).

Nutrients are released within hours of refilling and animals and plants respond within 1-2 weeks. Seeds and branches that migrate from nearby waterways establish in the newly refilled lagoon.

The soil is able to dry out and aerate, restoring oxygen into the floodplain.

Wetting

When the water is refilled, simulating a flood, fish screens are added to exclude adult fish.

SPECIFICATIONS

Currently the Plastipile™ is available in 100 mm x 100 mm modules of lengths up to 3.4 metres

Patent Pending No.
1472/02

Registered Design No.
151017

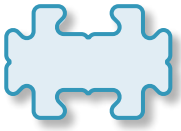
Current Geometry
Nominally 100 x 100 mm

Density
Approximately 900 kg per cubic metre

Note: Other profiles are currently under development and will be progressively released. Specifications may change without notice.

pfpm 100
plain-female-plain-male
100 x 100 mm

pfmm 100
plain-female-male-male
100 x100 mm



fmfm 100
female-male-female-male
100 x 100 mm

pppm 100
plain-plain-plain-female
100 x 100 mm

CASE STUDY **01** REEDY CREEK

Vonmac has completed two projects for Wetland Care Australia, one of which was near Mannum and Berri, South Australia.

The objectives of this project was:

Construct a weir structure to block the wetland from permanent water flows and control the wetting and drying frequency within it.

Minimise the impact of construction to the environment.

Allow for the eventual removal and reuse of the structure to another similar location.

Restrict the movement of carp into wetland and promote the movement of native fish into and out of the wetland.

Include an adjustable gate system that enables the flow rate through, and the water level of the wetland, to be varied seasonally.

Reedy Creek Weir

Vonmac constructed Reedy Creek Weir on Reedy Creek Lagoon, near Mannum, South Australia. It consists of 687 piles varying in length, up to 3 m, and incorporating 20 weir openings 1 m wide and 100 control gate drop boards.

It was designed to retain 1 m of water on an unstable base. A specialist low ground pressure vehicle was used for the installation to safe guard the environment.

CASE STUDY 02 WINDING CREEK

Vonmac has completed another project for Wetland Care Australia at Winding Creek, which is part of the Gurra Gurra Lakes System, near Berri, South Australia.

The objectives of these projects were:

- Construct a weir structure to block the wetland from permanent water flows and control the wetting and drying frequency within it.
- Minimise the impact of construction to the environment.
- Allow for the eventual removal and reuse of the structure to another similar location.
- Restrict the movement of carp into wetland and promote the movement of native fish into an out of the wetland.
- Include an adjustable gate system that enables the flow rate through, and the water level of the wetland, to be varied seasonally.

Winding Creek Weir

The weir spans 36 m with 3 gates, and was installed to reintroduce the natural wetting and drying cycles of the wetland. It has also significantly controlled the numbers of carp accessing the lakes.

CASE STUDY 03

WAIKERIE WHARF STRUCTURE

In December 2003, Vonmac constructed a retaining wall, walk way and wharf structure for the PS Murray River Queen, in Waikerie South Australia.

The objectives of this project was:

Construct a wharf structure which would withstand the constant erosive action of the wake created by the large paddle steamer.

Create a safe walkway for often elderly tourists boarding the PS Murray River Queen.

Waikerie Wharf Structure

It features hand rails and pavers, and was constructed using 260 piles ranging in length up to 3 m.

CASE STUDY 04

BYRON SHIRE SEWERAGE TREATMENT PLANT

In early November 2005 we were involved in a fantastic project for the Byron Shire Council in NSW, suppling Plastipile for the construction of a series of 8 V-notch weirs, as part of their $22 million upgrade to their sewerage treatment plant (STP).

The weirs are a part of their innovative, constructed Melalueca wetland within the West Byron STP and are being improved and enlarged to become an integral component of the final stages of sewage treatment, as well as a significant wildlife area covering 21 hectares. The wetland helps ensure the treated effluent has a minimal environmental impact when discharged into the Belongil Estuary. The techniques used to install the Plastipile weirs fall well within the acid sulphate operational environmental management plan boasting minimal soil disturbance. The regenerated Melaleuca wetland, once mature, has the potential to use 40% of the total annual treated sewerage from the West Byron STP.

The upgraded plant will also enable more opportunities to recycle the treated sewage for irrigation or pasture, crops and forestry, as well urban and council grounds. The Byron Shire Council has a commendable reputation for sustainable development and eco-efficiency – Vonmac is very proud to be associated with such a forward-thinking and environmentally conscious organisation.

West Byron Sewerage Treatment Plant

ABOVE LEFT *One of the Plastipile V-Notch Weirs constructed in the West Byron Sewerage Treatment Plant.*

ABOVE *The regenerated Melaleuca Wetland*

TOP *A stack of Plastipile ready for installation.*

CASE STUDY **05** NELWART SWAMP & MURBKO LAGOON

Nelwart Swamp Weir

RIGHT *The incredible re-vegatation almost obscures the weir 12 months after completion.*

ABOVE (TOP) *Prior to construction of weir (September 2007).*

ABOVE (BOTTOM) *After the lagoon is disconnected from the river by the weir (February 2008).*

In September 2007, Vonmac successfully won a tender to design and construct 3 solid plastic sheet pile weirs with regulators to temporarily or permanently disconnect 2 wetland lagoons from the River Murray as part of South Australia's drought response.

SA Water and the Department of Water, Land and Biodiversity Conservation (DWLBC) supported the SA Murray-Darling Basin Natural Resources Management Board (SAMDB NRM Board) in the management and delivery of the project.

The temporary blocking of river connections will achieve the dual objectives of reducing evaporative losses and, preventing the draining of saline, and/or nutrient rich water into the main river.

Nelwart Swamp is a 21 hectare ox-bow lake, downstream of Renmark, South Australia, holding 316 megalitres of water. The weir site was very shallow, but with over 1 metre of silt and mud. This weir was fitted with 6 custom designed aluminium drop board regulators to provide ongoing wetting and drying of the wetland.

As the inlet was shallow the lagoon dried out fairly rapidly with primary regeneration vegetation plants flourishing almost immediately in the drying lagoon.

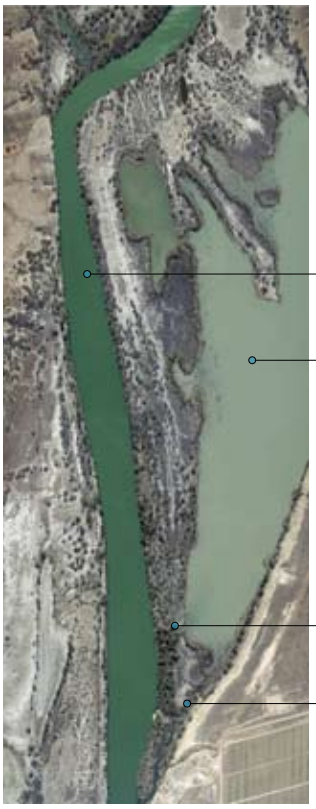
ABOVE (TOP) *Construction was carried out almost entirely from the barge using an excavator fitted with a pile driver. A steel frame was constructed initially to guide the construction.*

ABOVE (BOTTOM) *The completed weir with regulators and capping and regenerated vegetation in foreground.*

CASE STUDY **05** NELWART SWAMP & MURBKO LAGOON (CONTINUED)

Murbko Lagoon is upstream from Blanchetown, South Australia and is 129 hectares holding 1947 megalitres of water. The lagoon is feed from the Murray from an inlet creek - the 'Murbko Inlet Weir' being built just inside the mouth of the creek. The lagoon has an outlet which flows over an old causeway, the site of the second closure.

The inlet weir construction was also carried out primarily from the deck of a barge carrying an excavator fitted with a pile driving hammer and a small crane. The Inlet has 4 regulators installed while the causeway weir has 2. Each regulator needed to be tested, requiring coffer dams to be built either side of the wall at each regulator, so the water could be pumped out and the aluminium regulators checked for leaks.



Murbko Inlet Weir and Causeway Weir

FAR LEFT *Murbko Inlet site was very deep as the visible drop boards show.*

LEFT *The Plastipile is guided into place then driven down as required.*

BELOW LEFT *The completed Causeway Weir.*

CASE STUDY **06** MARGOOYA LAGOON

Vonmac was asked to design and construct this weir for the Mallee Catchment Management Authority, near Robinvale, Victoria. This project is part of the over-arching Margooya Lagoon Wetland Restoration Program, which aims to re-instate a wet and dry water regime to Margooya Lagoon.

Margooya Lagoon is a wetland connected to the River Murray via a small creek known as Talia Creek. Since river regulation it has remained at the same level as the weir pool of the Euston weir (Lock 15). It is estimated to have been permanently inundated for around 60 years. Prior to river regulation Margooya Lagoon would have undergone regular wet and dry cycles as the river level varied according to season and rainfall in the catchment. The structure was fitted with carp screens, which prevent large-bodied fish from passing through.

Murray River

Weir site

Margooya Lagoon

Margooya Lagoon Weir

ABOVE *The completed weir with aluminium checker plate walkway.*

An aluminium and stainless steel, customised regulator was manufactured for easy wetting and drying of the lagoon.

Rotary carp screens prevent large carp from entering the lagoon.

CASE STUDY **07** DAWSON RESERVE DRY CREEK

In September 2009, The City of Tea Tree Gully required a fast and effective method of closing a waterway in the Dry Creek catchment system. The site has a 2m steep bank and is surrounded by numerous significant trees making conventional building methods inappropriate. Geotechnical investigations also revealed a bed of hard rock which would make pile-driving the Plastipile posts difficult.

The weir was constructed using an excavator to dig a narrow trench across the creek and stand pre-assembled sections of the weir, slotting them together, then concreting them in place. The weir was also reinforced using earth anchors. The method proved to be very quick with mobilisation to demarcation taking only 4 days.

Plastipile pre-assembled panels

Geofabric to protect against soil erosion.

Dawson Reserve Weir

Heavy rains within days of completion tested the weir strength, but it has passed with flying colours.