

# Salix AquaRockBag®



# Salix

## Building with Nature



# Product Overview

The AquaRockBag® has been developed as a result of Salix's 25 years of soil bioengineering experience using high performance nets filled with graded rocks as flexible, but ecologically advantageous, revetments.

- The AquaRockBag nets have been proven to be the most robust nets in fresh and saline water environments and have the highest UV resilience and anti-abrasion properties of any net product. Aqua Rock bags complete the family of sustainable rock revetments that Salix manufacture, which also includes Rock Rolls and Rock Roll Mattresses - <http://bit.ly/RockRolls>, <http://bit.ly/RockMattress>.
- AquaRockBags are a flexible and sustainable solution that are suitable alternatives to concrete, gabions, blockstone and rip rap revetments.
- The smaller graded rock within the AquaRockBag reduces flow velocities by absorbing water energy into the high interstitial spaces between the rocks. These high interstitial spaces also provide enhanced habitat for invertebrates, accrete fines, gravels and silts which allow vegetation to establish naturally over time.
- AquaRockBags can be used independently or as part of a bioengineering design with Salix's vegetated systems above water level, providing the most effective scour and erosion control solutions available in the market. Working with nature rather than against it to provide habitat biodiversity simultaneously with an engineered approach for asset protection.









# Applications

AquaRockBags® are used in both freshwater and saline conditions.

They are flexible, work far better with natural processes than other revetments, provide ecological benefits and can be vegetated over relatively short time scales.

AquaRockBags work best under water and can be combined with softer soil bioengineering solutions above water level.

## Applications

- River bank revetments
- Scour protection around bridges and other structures
- Temporary works solutions







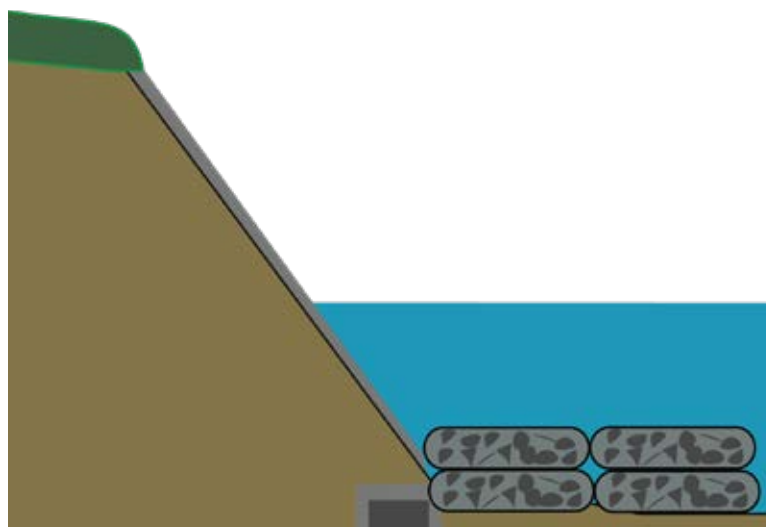
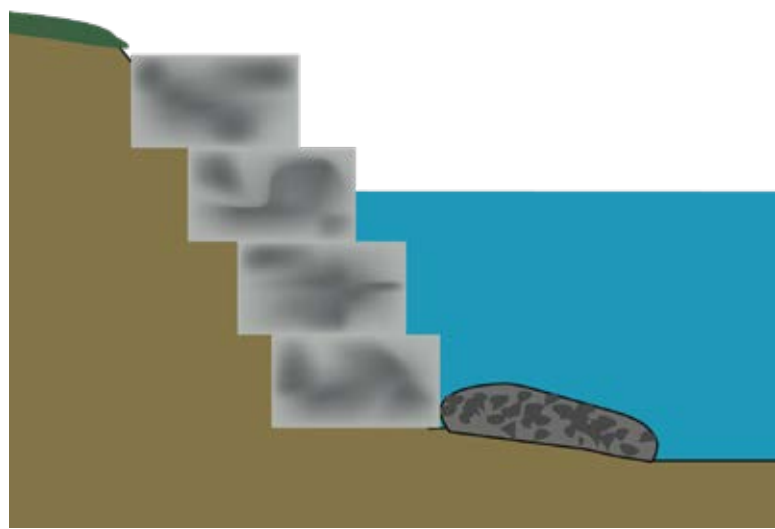
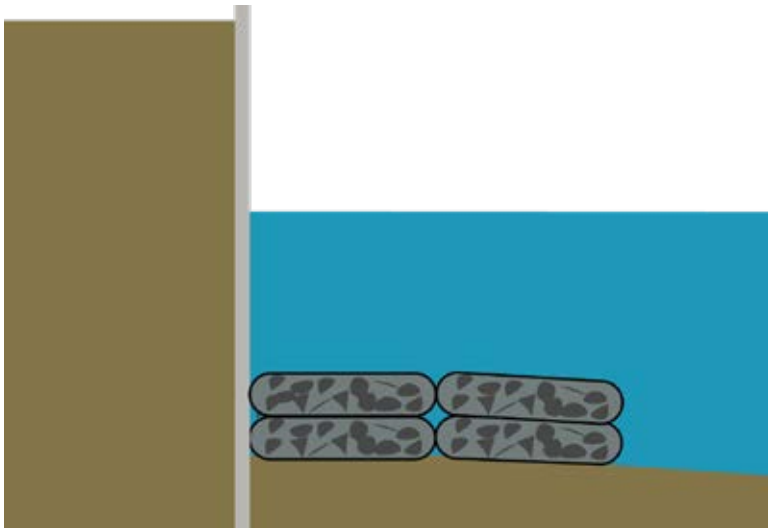
## Applications

- Artificial reefs
- Shoreline protection
- Marine and coastal structures

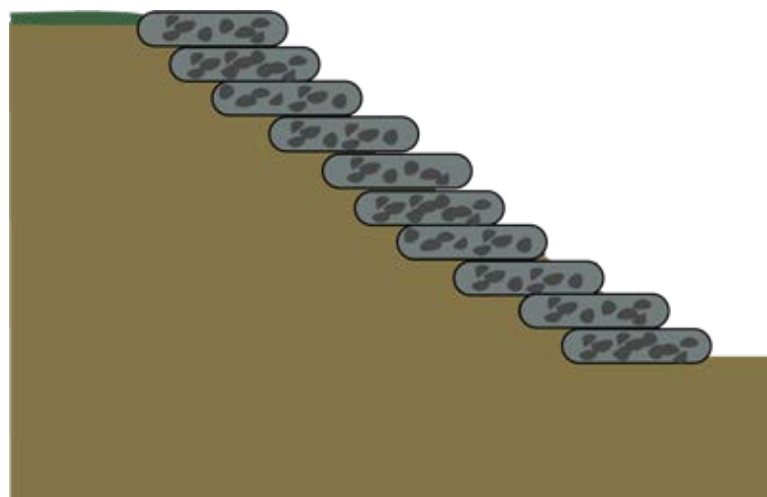
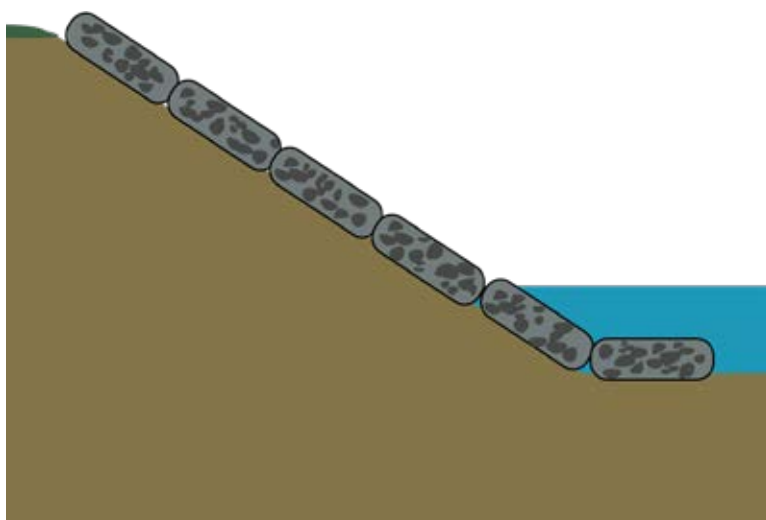
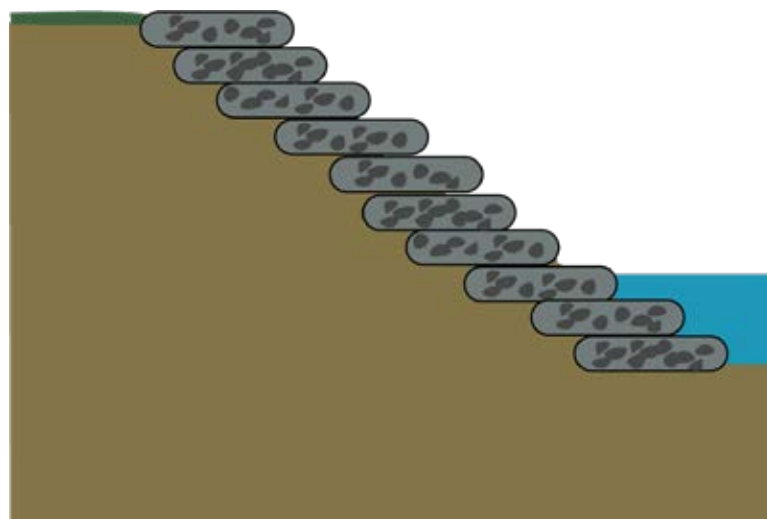
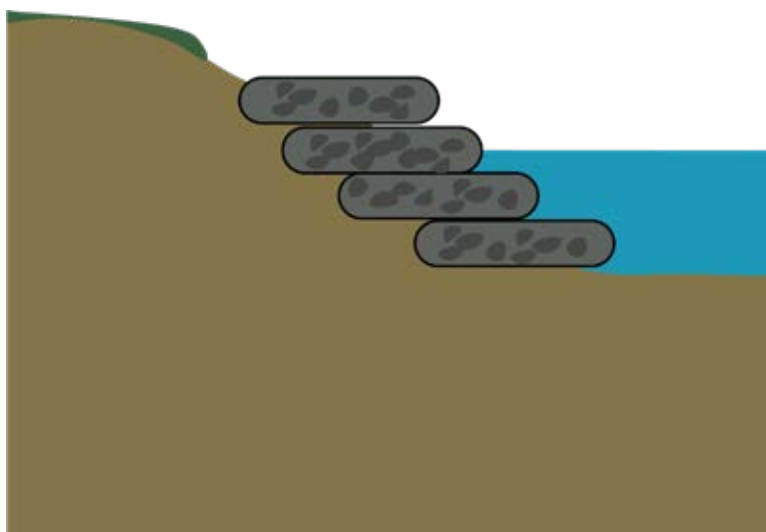


# Applications

## Protection of Bank Structures



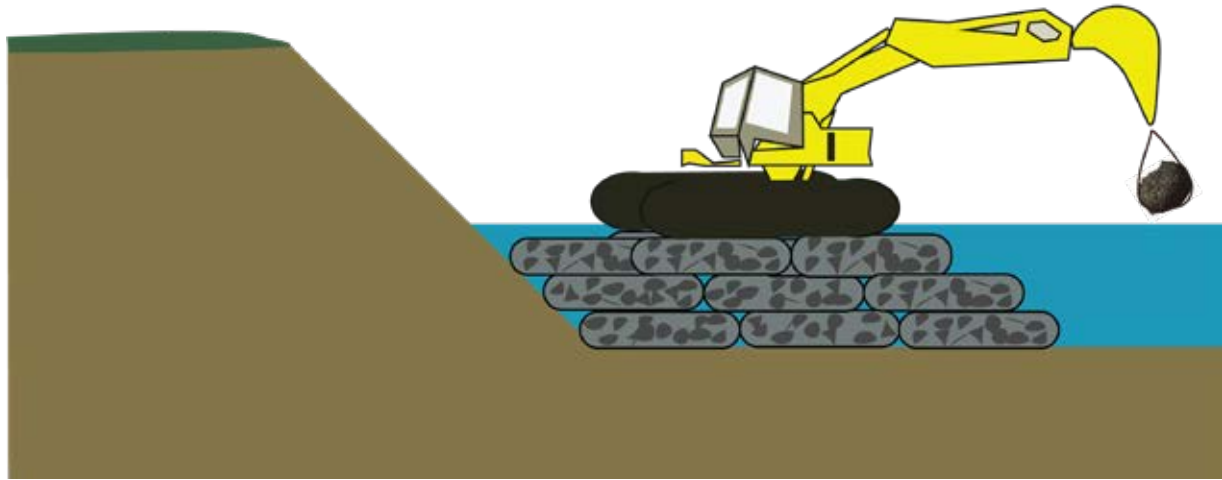
## Bank Erosion Revetments



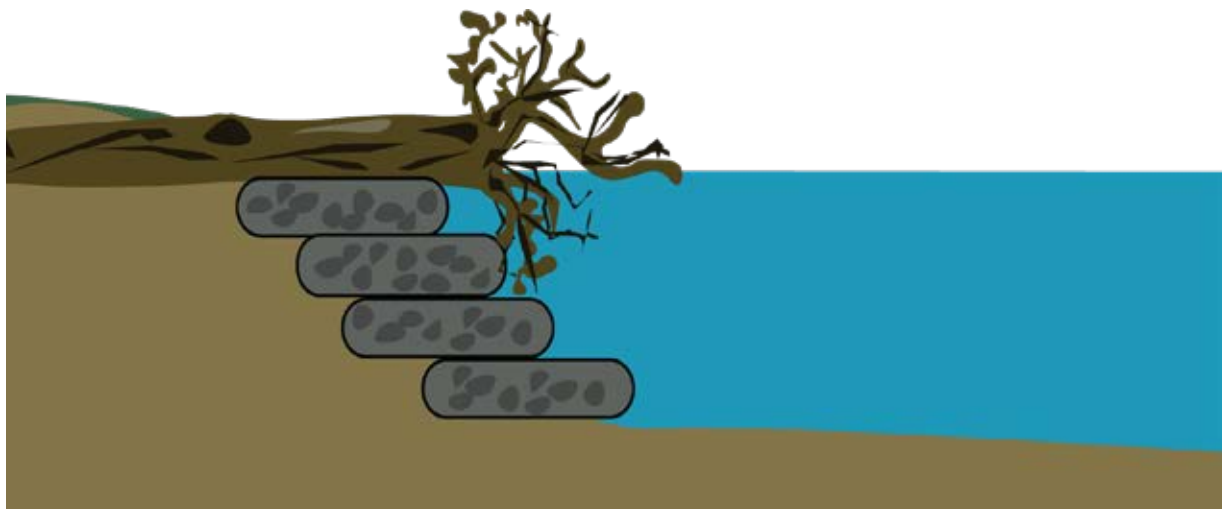


# Applications

## Temporary Works Solutions

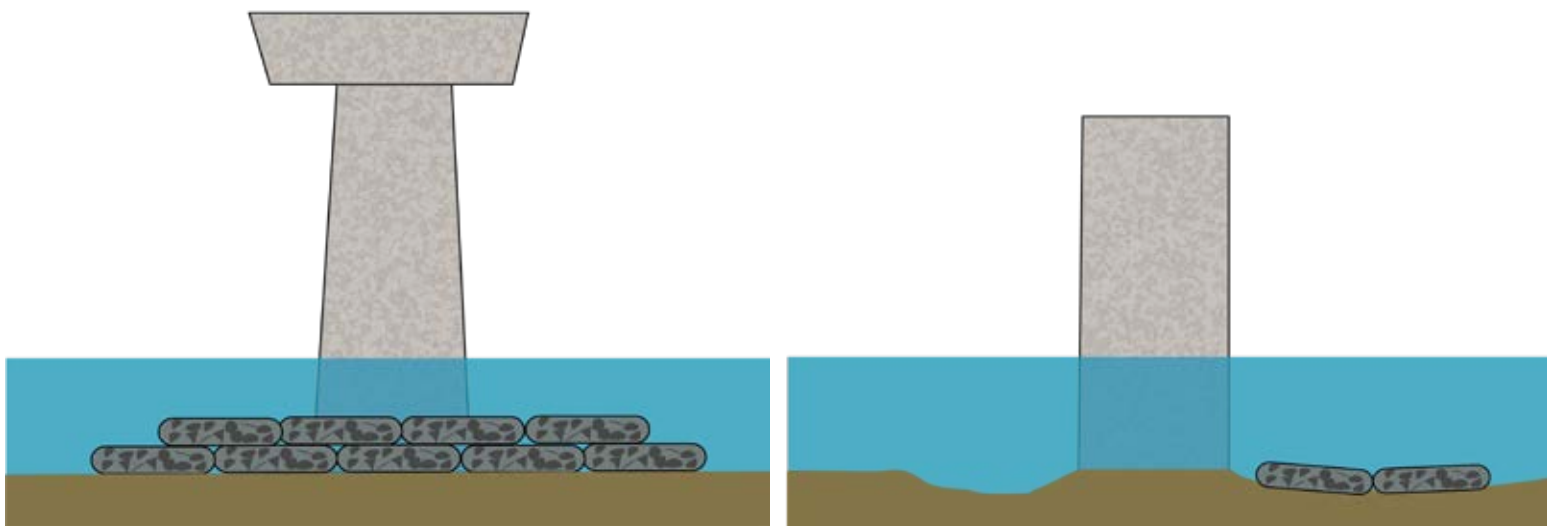


## Combine with Soil Bioengineering Solutions

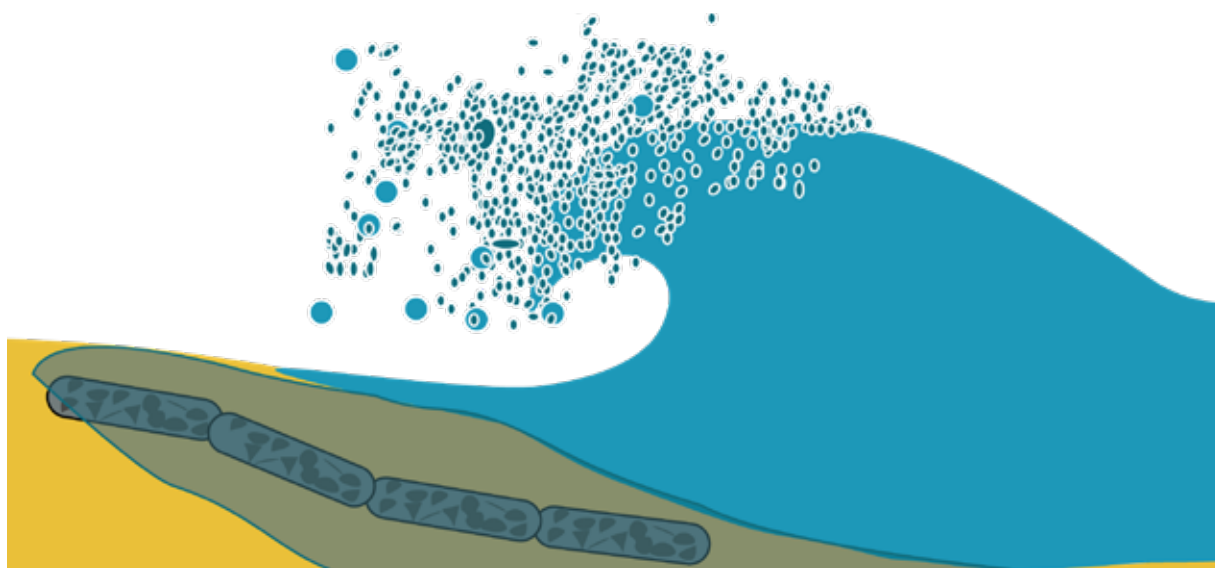




## Scour Protection Around Bridges & Other Structures



## Coastal Defence and Artificial Reefs





# Benefits

## Rapid and Safe Installation

- Rapid installation compared to filling wire mattresses on site with big savings on labour costs
- Can be installed in flowing water or below water level
- Units are pre-filled so less labour is required to install (90% labour savings over gabions)
- Simple and quick to fill on site
- Can often replace large rock armour, concrete and rip rap plus provide long term protection for soft/green engineering solutions
- Can be used in fresh or salt water
- Flexible system that contours to the surface
- UV stabilised nets are abrasion resistant and do not suffer from corrosion
- Health & Safety benefits due to no fabrication on site reducing accident risks
- Easy to move on site





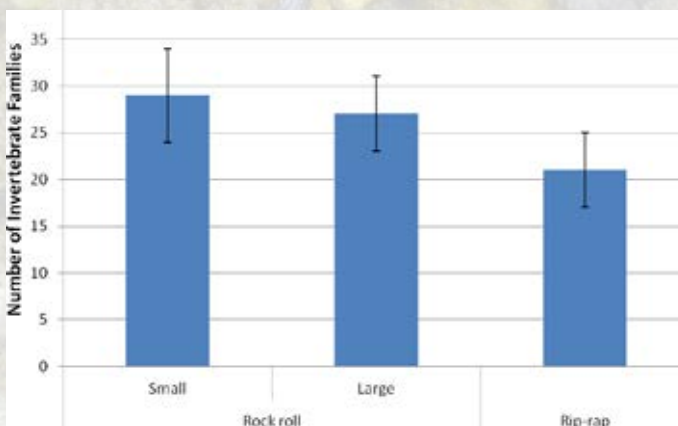
# Resilient protection whilst also providing habitats



AquaRockBags® provide habitats for a diverse range of marine and freshwater invertebrates. Examples found in research from Swansea University include: Top left to right: *Phyllodoce maculate*, *Capitella capitata*, *Scoloplos armiger*; Bottom left to right: *Melita palmate*, *Carcinus meanus*, *Idothea pelagica*.

## Ecological Benefits

- The stone sizing and grading within the AquaRockBag has been developed to provide a balance between the structural interlock needed to provide a robust revetment and the optimum grading for ecosystem development and diverse biotic community habitat
- AquaRockBag encourages fine accretion of sediment to enable vegetation establishment providing habitat for insects, molluscs and other invertebrates, which in turn supports fish and water bird populations
- Unvegetated Salix AquaRockBag blend in easily with natural freshwater and marine sediments and provide substratum for numerous faunal and invertebrate species
- Many hard revetments (e.g. concrete blocks, blockstone, rip-rap, gabions) deflect and reflect water energy which can cause erosion and scour issues elsewhere. AquaRockBags are absorptive rather than reflective due to the high interstitial spaces between the rocks. As such, water energy is absorbed, resulting in natural processes being retained and minimising the impacts downstream or around the AquaRockBag revetment
- AquaRockBags can be used in conjunction with Soil Bioengineering techniques as a hybrid solution to create genuine ecological enhancements within the revetment design.



Swansea University





# Advanced Net Technology

- The AquaRockBags® are made from the most abrasion resistant and UV resistant materials available, ensuring the highest performance levels, greatest longevity and lowest risk to the natural environment
- Independent research has shown that the AquaRockBags nets are significantly more stable than nets made from recycled polymers, so last longest and are more abrasion resistant
- Constant investment is made in net technology to improve engineering performance and to ensure minimal environmental impact





## Materials and dimensions

Salix AquaRockBag® products use HDPE or Polyester nets from virgin Polymers because of their lower risk of abrasion and fragmentation

### AquaRockBag dimensions

Rock Bag XL	Rock Sizes	Height (m)	Diameter (m)	Volume (m <sup>3</sup> )	Weight (Tonne)	Lifting height till ring (m)	Flow velocity (single bag)	Flow velocity (stacked bags)
2 ton	40-80 mm	0.55	2.1	1.25	1.86	2.2	3.1 m/s	4.7 m/s
2 ton	56-120 mm	0.6	2.15	1.25	1.92	2.4	3.1 m/s	4.7 m/s
2 ton	75-200 mm	0.6	2.15	1.25	1.92	2.4	3.5 m/s	5.3 m/s
4 ton	40-80 mm	0.67	2.6	2.5	3.74	3.13	3.1 m/s	4.7 m/s
4 ton	56-120 mm	0.7	2.7	2.5	3.86	3	3.1 m/s	4.7 m/s
4 ton	75-200 mm	0.7	2.7	2.5	3.86	3	3.5 m/s	5.3 m/s

Different stone types and grading will influence final bag dimensions +/- 10%



# Filling AquaRockBags®

- AquaRockBags are typically filled at the job site using a portable filling jig
- AquaRockBags are very quick to fill and require basic site staff training
- Each net comes with a lifting eye and all ties



1.



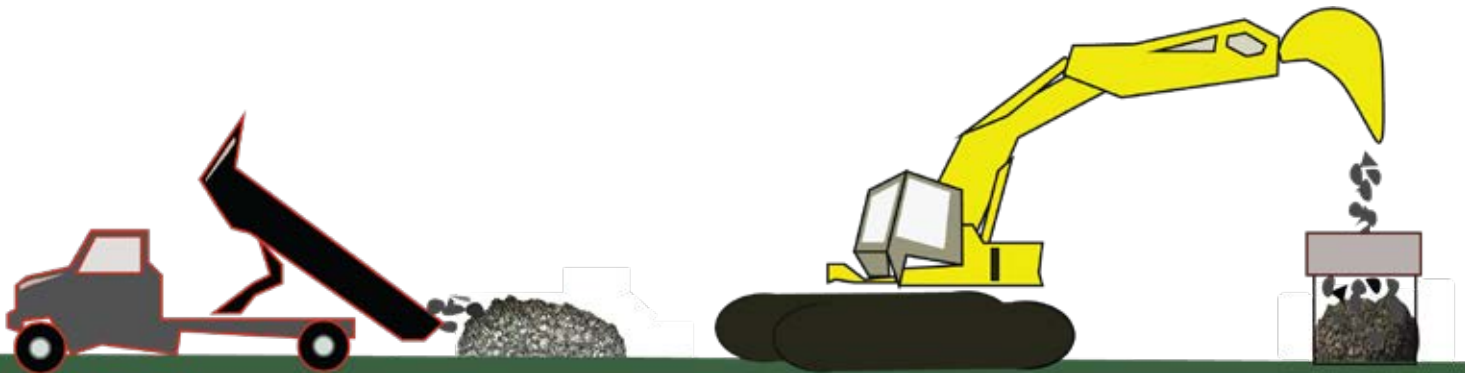
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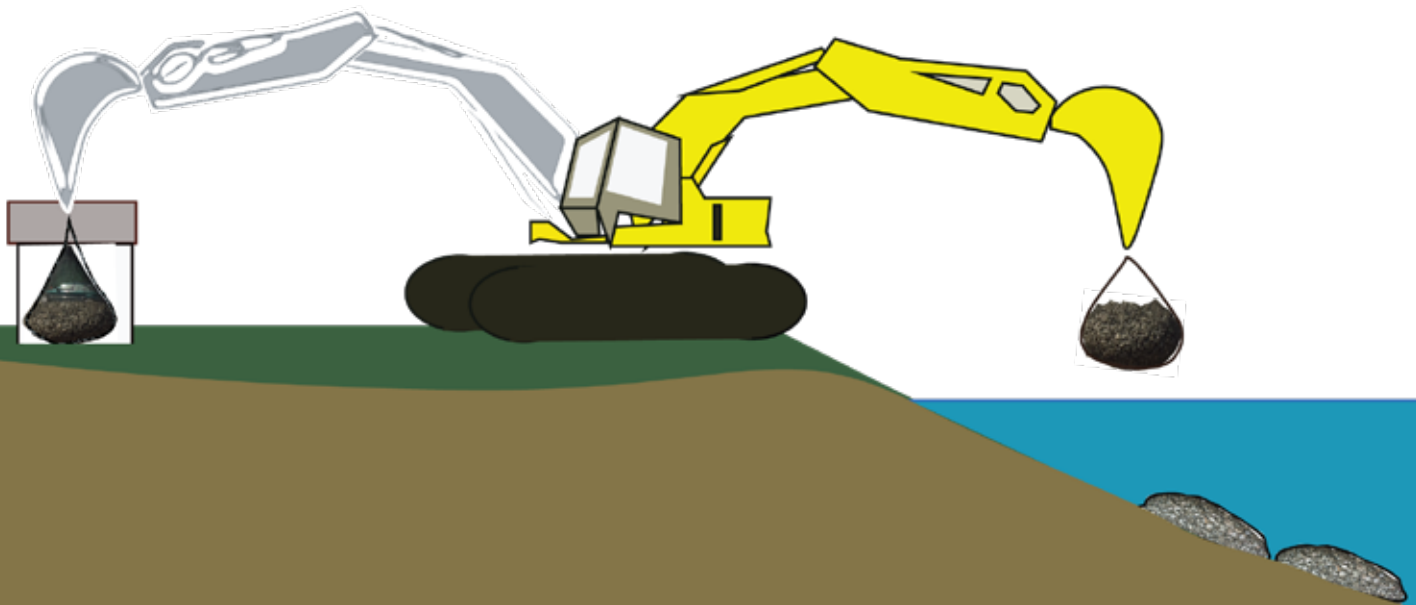
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# Installation

- AquaRockBags® are very quick and simple to fill on or off site and can be installed far quicker than other revetment types, saving site resources and cutting construction programme time on site
- AquaRockBags are flexible and conform well to undulations on the surface of the ground. As a result, less ground preparation is required, compared to concrete block, rip-rap or gabion mattresses
- AquaRockBags are easy to transport around site, are rapidly installed and can be positioned using GPS and released automatically using a quick hitch when installed under water





# Pre-Filled Rock Solutions

Salix supply a range of pre-filled rock solutions including Rock Rolls and Rock Roll Mattresses. These robust and permanent revetments can be used on reservoirs, shorelines, lake edges, streams, riverbanks and spillways.

They are cost-effective revetments that are suitable alternatives to rip rap, blockstone, concrete and gabions in many scour applications.

Salix's ecologically sensitive rock solutions are quick and easy to install, saving time and money whilst blending quickly into the environment providing habitat for flora and fauna.

They are also flexible in design and absorb wave energy and flow velocity rather than reflect it like most traditional hard revetments. These systems often form part of a sustainable soil bioengineering solution below and above water level.



*Pre-filled Rock Mattress installation before and after*



*Pre-filled Rock Rolls dissipating wave energy*



*Pre-filled Rock Rolls are easy to handle*

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