



GEOQUEST

# Rivers & waterways

REINFORCED EARTH® APPLICATIONS FOR HYDRAULIC WORKS

Rivers and waterways are essential assets to be maintained and preserved. The valleys opened by rivers frequently provide way for roads and railways which have to be built to allow a safe traffic of people and freight whatever the condition of the rivers might be. Waterways constitute vital links between communities and they allow sustainable transportation means to be used. Rivers, waterways and lakes can play a key role in land development.

**Geoquest brings tailor-made solutions and provide support at all stages of the projects, fulfilling the demanding requirements of rivers and waterways hydraulic applications.**

Pont Gwynfynydd



## River walls

Roads, motorways and railways are often constructed along river valleys just above the high water or normal flood stage elevation. When the riverbank is so narrow that new construction or widening of existing communication links encroach on the river, retaining structures are required which will be permanently or temporarily in contact with water.

**The Reinforced Earth® technique has been extensively used for around 60 years to build such structures** supporting highways and railways along rivers, lakes and waterways. **It is easily adapted to these complex situations** and has performance characteristics that have made it universally accepted in more traditional civil engineering applications.

The wide choice of the soil reinforcement materials associated with Reinforced Earth® system allows this technique to be used for all types of water conditions, fresh, brackish or saline.

Although vertical concrete facings are generally used, vegetalized steel mesh provides a good solution to restore natural river banks.

Reinforced Earth® river structures are designed and built to resist the combined forces of water and water borne debris which can be highly destructive during and after storms or floods. Reinforced Earth® structures also resist other environmental stresses such as strong currents.

Reinforced Earth® panels combined with proper backfill materials ensure adequate drainage, especially if the structure may be subjected to sudden rapid draw down and other variations in water level.



Banbury Lane Bridge

## Bridges

Crossing rivers and waterways, bridges are essential civil engineering structures. The combination of Geoquest's precast arches and Reinforced Earth® technique allows the **design and construction of arch bridges** that blend into the environment.

## Canals

The Reinforced Earth® technique provides an interesting solution for canals due to its **ease and speed of construction**. When watertightness is necessary, the GeoMega® system which associates concrete facing panels and GeoStrap® or EcoStrap™ soil reinforcements **can be combined with a waterproofing membrane on the back face of the panels** (patent pending). This allows the use of the Reinforced Earth® technique **for complex structures** such as locks and water saving basins.

## Quays, breakwaters and marinas

Its intrinsic characteristics also make the Reinforced Earth® technique **well adapted to hydraulic structures associated with water transportation** such as quays, breakwaters or marinas constructed alongside rivers, waterways or lakes.

For commercial freight transportation, Reinforced Earth® structures **can be designed to withstand the heavy loads imposed by railroad locomotives and freight cars as well as by traveling cranes, and the stresses generated by bollards or other docking systems**.

While concrete panels are the most common facing used for these structures, steel mesh facing is also an option in the case of freshwater or for structures with a short design life. **The GeoTrel® system** which associates this type of facing with synthetic soil reinforcements **provides a good solution when access to site is a constraint**.

## Land development

The Reinforced Earth® method is well known to **combine strong technical and operational benefits with aesthetic properties while providing speed of construction and substantial cost savings**. Thus it is a logical solution when land development or urban planning schemes require the rearrangement of existing rivers or lakes, or the creation of new ones. Geoquest can provide **the right answer to the requirements of planners and local communities**.

# Reinforced Earth® applications for rivers and waterways

- Lower land use and site impact during construction
- Suitability of soil reinforcing and facing materials to environmental and site conditions
- Rapid construction
- Structural flexibility on moderately compact or heterogeneous foundation soils
- Compatibility with internal waterproofing geomembranes
- Exceptional response to seismic events
- Lower CO2 impact than conventional techniques
- Use of natural or recycled materials
- Durability
- Ease of inspection, maintenance and upgrading



## Reinforced Earth®, the value of experience

Choosing a Reinforced Earth® solution allows owners and engineers to benefit from:

The longest experience in the field of mechanically stabilised earth structures

Tailored engineered solutions adapted to complex situations

The widest range of reliable and sustainable materials

As global specialist we operate as **designer** and **supplier** of civil engineering solutions that **retain, cross, protect and strengthen**. As the **inventor of the Reinforced Earth® solution**, our strength is the result of an **unrivalled combination of expertise with over 60 years of experience** in the fields of **soil-structure interaction** and **engineered backfills**.

Geoquest delivers **its leading technologies** to serve clients' projects, from the simplest to the most extraordinary. Guided by our focus on **innovation** and our **culture of excellence in client care**, we offer **durable solutions**. We build on our **global expertise**, which is applied by our **local companies** to develop new applications to address challenges and ensure sustainability of our solutions.

Watch our Retain, Cross, Protect, Strengthen video.



Shrub Hill

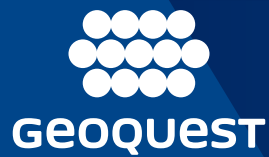


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 Geoquest UK

 Geoquest Group

**Engineering expertise, innovation and  
excellence in client care  
to deliver sustainable solutions.**



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