**MARKET SECTOR:**
Environmental

**LOCATION:**
Pen-Y-Bryn
Bleddfa
LD7 1PA

**MERCHANT:**
Burdens

**CONTRACTOR:**
BNM Alliance

**CONSULTANT:**
GHD Livigunn

## Case

# STUDY

**TENAX HM4, STRATAGRID SGI 120, LANDLOK 450,DUODRAIN GMG412**

Elan Valley Aqueduct
Temporary Working Platform &
Geogrid Reinforced Soil Wall

## The

# BACKGROUND

**Elan Valley Aqueduct (EVA) was built over 100 years ago to bring water from mid-Wales to Birmingham and the surrounding area.**

At approximately 120 km long, it discharges 300 million litres of water every day into Frankley reservoir.

The section at Bleddfa was the first to be replaced, and required construction of a new 1.8km long, 3.0m diameter bypass conduit.

## Our Client's

# REQUIREMENTS

A temporary sustainable solution for a reinforced working platform.

**In order to extract the 150ton Tunnel Boring Machine (TBM) boring the new conduit, a 1,000ton crane was required. To support these loads we were required to design a working platform.**

The local topography and level of the conduit meant that the working platform needed to be built into a sloping farmers field, so a 14m high and 160m long wall was also required to support the 1,000ton crane, the 150ton TBM and the associated construction traffic.

Furthermore, to comply with the schemes stringent environmental and sustainability requirements, re-use of very marginal, weather susceptible, site won material was required.

**47%**
**REDUCTION IN CARBON FOOTPRINT**

**335**
**TONNES APPROX OF CO2 SAVED**

**68%**
**COST REDUCTION VS PRELIMINARY SOLUTION**

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## Our Value Engineered

# SOLUTION

**Due to the location of the EVA, the reinforced soil wall and working platform needed to be built into the side of the hillside.**

To minimise the footprint of the structure, and reduce the amount of fill material required, the structure was designed to stand at a near vertical slope angle of 85 degrees.

Site won soils were tested, and it was determined that the properties were suitable for use within the reinforced soil structure, provided that a specific and strict testing regime was adhered to during construction.

The final solution consisted of 43 layers of primary reinforcement using Stratagrid SGi120 and SGi60 with 10m long tails at 300mm vertical centres. This was 'wrapped-around' at the face with Landlok TRM450 included to contain the materials. A heavy-duty steel 'Rivel Mesh' was used to ensure the 85 degree face geometry was achieved. The design of the reinforced soil wall was carried out in accordance with BS8006:2010 and Eurocode 7 (BS EN 1997-1).

One of the main objectives was to achieve a cut-and-fill balance. The reinforced soil solution achieved this by ensuring the wall could be built using site won soils, thus (with the exception of the working platform in the top 970mm) avoiding the import of granular material.

Despite being subject to some particularly inclement weather conditions, the structure was completed in an 8-week period. Once the new conduit was complete, the wall and working platform were dismantled and the land returned back to being a farmer's field. The fill and geosynthetics were used in the reprofiling, with the steel 'Rivel Mesh' facing units taken to a local site for recycling.

When compared with the original proposal for a Contiguous pile wall with Kingposts and precast concrete units, our solution provided an impressive 68% cost saving and a 47% reduction in the carbon footprint.

Throughout the construction phase Geosynthetics were available for on-site support to ensure the site won fill materials were within the required tolerance.

**"The reinforced earth solution enabled the project to make savings by utilising site won soils and provide a working platform for our tunnelling operations inline with the programme. This would not have been possible without the asistance from Geosynthetics Limited."**

**CHRIS O'CONNER**
**Site Agent**