

# Elan Valley Aqueduct (EVA)

**Client:** Severn Trent Water

**Location:** Mid-Wales

**Value:** £63m

**Duration:** 5 years

## In Brief...

After 5 years of construction, Barhale (as part of the BNM Alliance) have completed work on the Elan Valley Aqueduct. The EVA is a Victorian culvert which, for the past 100 years, has carried a water supply from mid-Wales into the City of Birmingham.



The 45m x 25m secant piled pit (widest point) TBM launch pit at Bleddfa.



Frydd Wood working platform, where the TBM launch shaft was constructed.

## In Brief cont'd...

The project has involved the off line replacement of the existing water conduit in three locations – Bleddfa, Nantmel and Ffrydd Wood (Knighton). The new tunnel sections are 3m in diameter and each 1km or more in length.

The project commenced in 2015, and was required due to deterioration within existing sections of the EVA. The success of this project has been crucial to secure a resilient water supply to Birmingham and the surrounding areas

## Technical Features...

At each of the three tunnel locations, two sites were required for the TBM (tunnel boring machine) launch and reception.

### Bleddfa

- Construction: September 2015 to September 2017
- Tunnel length: 1.8km (May 2016 to December 2016)

The TBM launch pit was a large 45m x 25m secant piled pit to safely excavate and connect into the EVA. The reception pit was smaller, at 30m x 25m.

### Nantmel

- Construction: November 2016 to October 2018
- Tunnel length: 1km (May 2017 to September 2017)

At the launch site, a reinforced soil wall was constructed using site won materials; 14m max height, 160m length. The wall was required to create 3,500m<sup>2</sup> low level and 3,600m<sup>2</sup> high level working platforms. These were joined by a 6m wide, two way access road and adjacent to the compound and laydown areas.

### Ffrydd Wood (Knighton)

- Construction: November 2017 to September 2020
- Tunnel length: 1.8km (August 2018 to May 2019)

The secant piled TBM launch shaft at Ffrydd Wood was approximately 33m deep and 12m diameter. To construct the 4,300m<sup>2</sup> working platform, a 2m high, 105m long soil nailed wall was installed. The A488 Shrewsbury to Pennybont road was 5m from the top of wall so monitoring points ensured that the team mitigated any impact on the road.

Each new section of tunnel required 2 no connections into the EVA. To safely undertake these connections, two shutdowns per year were granted by Severn Trent, allowing the team to partially demolishing the existing conduit (taking out the side wall) and construct a new branch connection. The existing conduit was then blocked off to send all the water flow down the new tunnel on completion. The final shutdown took place in October 2019.

Upon completion, all sites have been fully reinstated.



At Nantmel a competition was held at the local primary school to name the TBM. The winning name was Nantmel Supermole.



The team at the Nantmel tunnel breakthrough.

### Community Engagement...

From the very start of the project, the team were involved with the local communities, through:

- Engaging local subcontractors for earthworks
- The TBM naming competitions
- Customer exhibitions and presentations
- Sponsorship of the local carnival
- Partaking in the Royal Welsh Show, and so much more.

### Health, Safety & Environment...

This project has been an exemplar of Barhale's front foot approach to health and safety, achieving over two years accident free.

At Ffrydd Wood, 3 no lagoons were installed for the separation of silt from the tunnelling effluent. These lagoons had an automated package treatment plant which stabilised the pH and added flocculent to lagoons to help settlement. It was crucial that this process was effective as the lagoons discharged into a nearby river that is a SSSI (Site of Special Scientific Interest).

### Awards...

This project has been widely recognised across industry awards, and over the course of the project has achieved the following:

#### 2017:

- Specialist Tunnelling 'Project of the Year' (New Civil Engineer Tunnelling Awards)
- Project of the Year (Civil Engineering Contractors Association (CECA) Midlands Annual Awards)
- New Installation Award (UKSTT Awards)

#### 2018:

- Environmental Best Practice Award – Silver and Gold (Green Apple Awards)
- Supplier of the Year Award – Bronze (Severn Trent Awesome Awards)
- Top 10 Best Construction Project to Work On Civils (Construction Enquirer Awards)
- Accident free for 730 days/377,500 man-hours (Severn Trent H&S Award)
- SHEQ Standards of Excellence (Severn Trent Integrated Assurance Certificate of Achievement)

#### 2019:

- Environmental Best Practice Award (International Green Apple Award)