

# UNITED KINGDOM



**Name of Association:** British Tunnelling Society

**Type of Structure:** Charity: The Trustees of the British Tunnelling Society are the ex officio and elected members of its committee, with the Committee consisting of elected members, nominated members, co-opted members, and ex-officio members. Ten members of the Committee are elected by electronic/postal ballot, the result of which is announced at the Annual General Meeting. Members elected to the Committee serve for a term of three years and then retire from the Committee unless they are elected Chairperson or Vice-Chairperson.

**Number of Members:** 828 with 85 corporate members

## ASSOCIATION ACTIVITIES DURING 2023 AND TO DATE

The BTS published the fourth edition of the BTS Specification for Tunnelling on December 13th, 2023. This comprehensively reviewed and updated edition incorporates the lessons mega projects such as Crossrail and High Speed 2 have learned from working with the previous third edition and removes prescriptive clauses from the specification to open it for emerging sustainable products and ways of working. Specific attention was given to all areas where technology has evolved over the last decade, this includes safe and efficient use of sprayed concrete and water proofing, and an in-depth review of segmental lining technology including segment accessories and primary grout. The latest revision of British and European standards has been baselined. The industry wide multi round peer review by the British tunnelling industry together with workshops held with the supply chain has resulted in a widely accepted document which we expect to retain its highly merited role as one of the global go-to baseline specifications for tunnelling projects both large and small.

BTS SCL Best Practice guideline: This has been reviewed and contact has been made with Emerald publishing to see it published in 2024.

BTS Monitoring Underground Construction - a best practice Guide: a sub-group has been established to update this document with advances in the field since last publication. Target publication early 2025.

BTS Segmental lining production control guidance: a sub-group has been established to create a document that builds on ITA segmental guidance to address issues of QA/QC during segment

production. It will include gaskets. This will be a short pamphlet rather than full book.

BTSYM carbon calculations/how to guides: further to ITAtech sustainability sub-groups and the Pipejack Association carbon calculator, it is proposed that the BTS prepare examples to aid the industry and allow benchmarking. A BTS technical sub-committee will provide guidance to the BTSYM who will lead this activity. The BTS has begun a Tunnels Net Zero initiative that will work with ITA and other organisations to support the global target of Net Zero.

A Tunnel Industry Steering Group on Shift Fatigue Guidance Development has been established through the BTS which is focused on developing a client lead guidance on shift patterns to support health and well-being of operatives underground. This work is being supported by the wider UK infrastructure sector through the Infrastructure Industry Innovation Partnership (i3P), legacy of the Crossrail/Elizabeth Line Innovation programme.

BTSYM held a successful well attended conference in September 2023 at Arup's London Offices a rebound from the pandemic period showcasing some incredible projects and talent from within the BTSYM.

## CURRENT TUNNELLING ACTIVITIES

### ■ Tunnelling Segments Depart

**Hartlepool for HS2:** Rail deliveries from STRABAG facility in Hartlepool, which has a direct rail link, manufacturing pre-cast concrete segments for HS2's next London Tunnel drives commenced.

These segments will be part of the Northolt East twin bore 5.5km tunnel connecting to the Northolt West Tunnel totally 13.5km taking HS2 services from Old Oak Common Station to the edge

of London. Transporting the Tunnel segments by rail rather than road will cut CO<sub>2</sub> emissions by 76%.

### ■ Thames Tideway Construction

**Completion:** Construction of the Thames Tideway Super Sewer in London has been completed, with the project now moving into commissioning phases with full completion in the first half of 2025. The project faced setbacks due to the pandemic's impact on working however it has been able to minimise this disruption to be on target for delivery with less than 12-month delay.

### ■ London Power Tunnels Phase 2:

Phase 2 started in Spring 2020 and spans 32.5km from Wimbledon to Crayford in southeast London with tunnels between 3 - 3.5m in diameter around 10-63m below street level, with the majority at around 30m deep, tunnelling was completed in October 2023.

■ **HS2 Chiltern Tunnelling:** In December 2023 the HS2 Chiltern Tunnels reaching 90m deep completed 90% of their 16km journey with completion expected in early 2024.

■ **HS2 Long Itchington Wood and Bromford Tunnels:** TBM Dorothy completed 1.6km long Second Bore in March 2023. The first TBM for the 5.6km, 8.3m diameter Bromford Tunnel launched in 2023 with the second due to be launched in early 2024.

■ **HS2 Atlas Road Tunnel:** This 835m long logistics tunnel was started in Spring 2023 and completed in winter 2023/ beginning of 2024.

■ **Woodsmith Mine Material Transport Tunnel:** 37km long tunnel between Woodsmith Mine near Whitby in North Yorkshire and the Wilton International Complex on Teesside, England. This is a single bore single TBM tunnel with 25.8km bored as of December 2023.

■ **Hinkley Point C Nuclear Power Station:** Connection of the underwater tunnels to the six shafts in the seabed to complete the stations cooling water system. The station will be cooled by water being drawn in through the intake into 10km of tunnels.

## FUTURE TUNNELLING ACTIVITIES

■ **Lower Thames Crossing:** The planning and construction of the UK's longest Road tunnel beneath the Thames estuary is being pushed back by two years. The project linking Essex and Kent in southeast England was on course



Coire Glas Hydro

to begin in 2024 and be completed in 2029 but this has now been pushed back to 2026 to allow for inflationary pressure to ease and consider stakeholder views on the project with target completion date of 2032.

- **A303 Stonehenge Tunnel:** Preliminary work and archaeological field work begins in 2024. The government approved the £1.7bn tunnel in July 2023, however challenges persist around the archaeological sensitivity of the site and the wider heritage concerns that the project may jeopardise this UNESCO world Heritage site.
- **HS2 Tunnelling:** 1. The 5.6km Bromford Tunnel bore between Water Orton in Warwickshire and Washwood Heath in Birmingham due to start in early 2024. 2. Euston Tunnel twin bore 7.5km tunnel between old oak common and London Euston is expected to start construction in 2026.
- **Coire Glas Pumped Storage:** The development and planning for the 1.5GW Coire Glas Pumped Storage scheme continues. Tendering is underway by SSE. An advance contract has been let to undertake an adit as part of the investigation works for the construction of the main tunnels.
- **Cruachan 2 Pumped Storage:** Drax has plans in development for a new 600MW pumped storage plant adjacent to the existing and using the same reservoirs. The 600-megawatt (MW) power station will be located inside Ben Cruachan – Argyll’s highest mountain – and increase the site’s total capacity to 1 gigawatt (GW). The new power station would be built within a new, hollowed-out cavern which would be large enough to fit Big Ben on its side, to the east of Drax’s existing 440MW pumped storage hydro station. More



HS2 Long Itchington

than a million tonnes of rock would be excavated to create the cavern and other parts of the power station. The existing upper reservoir, which can hold 2.4 billion gallons of water, has the capacity to serve both power stations.

- **Haweswater Aqueduct Resilience Project (HARP):** The HARP project is a major scheme to maintain drinking water supplies across Cumbria, Lancashire and Manchester for future generations. The Haweswater Aqueduct is a 110km pipeline which runs from the Lake District, through Lancashire and into Greater Manchester. Completed in the 1950s, the pipeline needs essential maintenance to ensure it can continue to supply customers for generations to come. Plans include the replacement of six tunnel sections along the pipeline route. Construction is expected to begin post 2025.
- **Water for Life:** A water transfer, and recycling project to address water issues in Hampshire.
- **Teddington Direct River Abstraction:** This project is a new river abstraction on the River Thames close to Teddington Weir. Water abstracted from the river would be transferred via an existing underground tunnel to the Lee Valley reservoirs in East London. Highly treated

recycled water would be moved from Mogden sewage treatment works upstream to compensate for the additional water taken from the river to protect the environment and wildlife. The project will provide up to 75 million litres per day as a drought resilience project. It would only be used during periods of prolonged dry weather. Detailed consultations with the regulator are underway.

## STATISTICS

### List of tunnels completed:

Thames Tideway, London Power Tunnels Phase 2, HS2 Chiltern Tunnels, HS2 Long Itchington Wood, HS2 Atlas Road Tunnel

### List of tunnels under construction:

HS2 Bromford Tunnel, Woodsmith Mine Material Transport Tunnel

## EDUCATION ON TUNNELLING IN THE COUNTRY

### BTS Tunnel Design and Construction Course

The 2023 course was held from 3rd July to 7th July at the University of Warwick and was once again a successful event. A total of 80 delegates attended the course, five of whom were students sponsored by the BTS. Many thanks to all the presenters from industry that gave their time to help make the course a success. The 2024 Course will be held at Warwick University on 1st to 5th July 2024, although there are limited residential places in 2024 because of work on the accommodation at the University.

### BTS Underground Health and Safety Course

The annual BTS Underground Health and Safety Course was held at the ICE on 21st & 22nd Nov at the ICE London, with 41 delegates attending. The 2024 Course will be held at the ICE in London on 20th and 21st November 2024.

### Level 2 Tunnelling Operative Apprenticeship

Successful qualification of the Align/TG Tunnelling apprentices in February 2023. The training provider of the programme worked well due to client, contractor and subcontractor working together to ensure apprentices supported within teams and ‘rotated’ to gain full experience. Two new cohorts planned for 2024 – one to start April in London, and one later in West Midlands.