

PROJECT PROFILE / **SUBSTATION DESIGN**

POWERING UP HS2

With the U.K. government launching the largest public transit improvement project in a generation, a critical substation was needed for a tunnel boring project near Long Itchington.



POWER INFRASTRUCTURE NEEDED TO DELIVER SUCCESS FOR HS2

New substation for tunnel boring project completely designed within the U.K.

HS2, the new high-speed railway now being constructed in the U.K., depends on a reliable power supply. As one of the largest public infrastructure projects in the history of the U.K., HS2 will link up London, the Midlands and the North, serving eight of Britain's 10 largest cities when complete.

Burns & McDonnell has contributed to this groundbreaking endeavour with detailed engineering of the new Long Itchington 33/11kV (kilovolt) substation, which will supply 10MVA (megavolt-amperes) of power for a tunnel boring machine being brought on-site.

The project was the first comprehensive substation engineering project Burns & McDonnell has completed fully within the U.K. under its NERS (National Electricity Registration Scheme) accreditation.

The project included all phases from civil and electrical studies to preliminary and detailed engineering design. Beyond this scope, the team was engaged in

April 2020 to provide additional design support during construction phases.

The project was designed with building information modelling (BIM) engineering software, compliant to BIM Level 3 maturity, incorporating embedded asset data that will enable operational data management throughout the project life cycle. In addition, the U.K. team provided significant added value by including custom-produced 3D videos of the substation as a supplemental visual aid.

Sustainable design features were key elements as well, including an on-site rainwater harvesting solution designed to avoid an expensive water supply line that would otherwise have been needed for the remote and rural project location.

Despite a challenging schedule and other demands, the project proved to be a significant success as one of the first full-service substations placed in service for HS2.

PROJECT STATS

CLIENT

Murphy Land and Marine

LOCATION

West Midlands, U.K.

PROJECT START

September 2019

COMPLETION DATE

December 2019
Additional scope completed, December 2020

140

MILES FOR PHASE ONE ROUTE

33/11kV

SUBSTATION

10MVA

FOR CONSTRUCTION TUNNEL BORING OPERATION

SERVICES PROVIDED

- Substation layout design, including 3D BIM models compliant to PAS 1192 and ISO 19650
- Full substation electrical, mechanical, civil, structural, and architectural design, produced in 3D BIM
- Protection and control scheme design, including SCADA, settings production, and battery sizing
- Detailed Bill of Quantities (BoQ) production
- Full power system compliance studies (G5/4, P28, and P29 compliance)
- Earthing study and detailed design, using CDEGS
- Site specific Arc Flash Study, using ETAP
- Planning permission support, including production of 3D visualization videos
- Construction phase technical support and production of Inspection & Test Plans