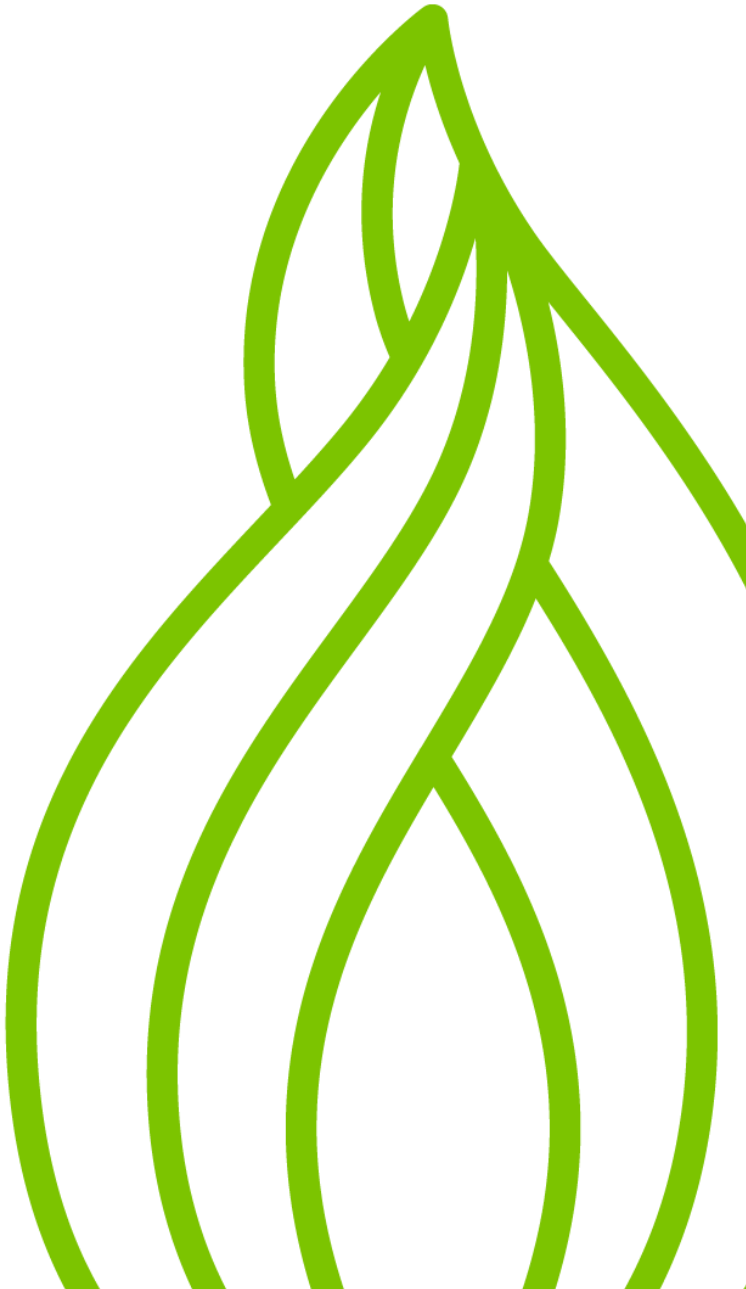
national gas transmission

Cathodic Protection for Pipelines Within a Tunnel

Value Tracking Case Study



Cathodic Protection for Pipeline Within a Tunnel

Background

National Grid Gas Transmission (NGGT) has a large number of tunnels and pipe crossings on the National Transmission System (NTS), which are found mostly where gas pipes need to cross a road, river, railway or challenging geography.
In these tunnels, Cathodic Protection (CP) is used to protect the pipeline. This technique allows an electrical current to flow through the pipeline – and to and from the ground bed or sacrificial nodes (easily eroded sacrificial metal) – which prevents the pipe from corroding.

Project teams have come across several CP challenges during recent tunnel projects, in particular where a flooded tunnel is proposed. Most tunnels on the NTS are filled with grout or another solid material. However, where the length and size of a tunnel makes it too complex to fill with a solid material, a water-filled tunnel is preferred. When this happens, specific marine CP design standards are needed, which were not previously developed for a flooded tunnel environment.

What's new?

The project investigated options for CP of pipelines within a tunnel. It pinpointed anumber of design solutions that would cut the cost of procurement and construction, provide better protection for the pipeline during its lifecycle, and potentially reduce design requirements.

As the CP design solutions combined existing onshore and offshore techniques, a new specification was developed for the Design, Construction, Commissioning and Decommissioning of Cathodic Protection Systems for Carrier Pipelines within Tunnels (ECP/9). This provides all the information for the design, materials, construction, installation, maintenance and decommissioning of CP systems for gas pipes installed in tunnels and sleeves.

The benefits

This specification was used for the design and construction of a new CP system within a concrete-lined tunnel under the Humber Estuary on Feeder 9. Initial designs, based on conventional solutions, had been shelved as they could not ensure the CP system's effectiveness in the long-term.

The new design was included in the project plan for the build, but during construction a more robust pipe insertion method was selected than originally planned. This had knock-on effects on the CP design, which meant the cost savings expected from the new solution were not realised.

However, the new design will improve employee safety, as fewer entries will be made into tunnels during construction, installation and operation. It also provides a more robust solution that brings added confidence in the long-term performance of the CP system. This is crucial on tunnels where no permanent access is provided, as the cost of temporary works to re-enter are significant should complications arise.

Use of the specification on Feeder 9 has led to new learnings in a specialist and complex work area. These will be central to future tunnel projects, allowing us to make sure the best solutions are achieved at a reduced cost to the consumer.