THE PIPELINE INDUSTRIES GUILD
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2024 TECHNICAL AWARDS ENTRY FORM

Entry Deadline: Friday 19th April 2024

Please tick which categories you are entering (entries may be submitted in multiple categories using the same entry form)

Large Diameter Pipeline Project Award	X
Large Diameter Pipeline Technology Award	X
Utility Pipeline Project Award	
Utility Pipeline Technology Award	
Subsea Pipeline Award	
iICE Award	
Health & Safety Award	
Net Zero Carbon Award	

1. Brief title of entry: Tees and Central Strategic Transfer Mains

2. Company name: Northumbrian Water Group, Stantec & Mott MacDonald working with Farrens and FT Pipelines Systems

3. Signed: ....

4. Date: ....

5. Company contact name: Robert Chesney

6. Telephone: 0191 249 3648

7. Email: Robert.Chesney@stantec.com

8. Precis of your entry (50 words):

Large scale strategic infrastructure: how collaboration and geospatial software is utilised for effective technical delivery.

The project will replace existing ageing water mains with a new trunk main, which will serve approximately 50,000 properties and link several strategic assets serving the Barnard Castle, Darlington, and Teesside conurbations: providing significant resilience to the overall system by 2028.

9. Summary of entry:

The £160m+ pipeline project will directly improve water quality, network resilience and operability within the Northumbrian Water network. The 800/900mm pipeline stretches over 60km, from Lartington Water Treatment Works (WTW) to the existing service reservoirs (SRs) at Whorley, Shildon, Beaumont Hill and Long Newton.

The outline design of the project is being delivered by Northumbrian Water Group's (NWG) technical framework partners, Stantec, Mott MacDonald, Mott MacDonald Bentley, and Esh-Stantec, under the collaborative project team named IDeA (Integrated Delivery Alliance). The works are being phased over multiple AMP cycles with Phase 1 currently under construction, delivered by Principal Contractor Farrans, and Phase 2 nearing the end of outline design, delivered by IDeA. The schemes form part of NWG's wider Tees network strategy, with further improvements to follow in future AMPs.

Multi-disciplinary Collaboration

Throughout the lifecycle of the project, IDeA have worked closely with stakeholders including NWG's network operatives, controllers, and analysts to help enhance their network control and to aid in planning future operations. Specialist companies such as Lichfields and Bell Ingram also engage closely with IDeA to deliver the technical excellence required for the project. Multiple weekly meetings are scheduled between all stakeholders to review and challenge key design aspects and ensure continuous improvement and best practices are met.

Engaging with wider stakeholders such as affected local councils, development companies and the environment agency at the earliest opportunity has been critical to moving the project forward. As a result, it is estimated that up to £4 million has been saved through early mitigation of disruptions or disputes.

Key Design Aspects

To optimise the pipeline route, several guiding design principles were followed including keeping the route as short as possible, keeping a uniform gradient fall in the vertical alignment and favouring curvature over formed bends to reduce head loss. Extensive hydraulic modelling and scenario planning has been undertaken to ensure the network is robust and can provide resilience.

Strategic crossings and connections have all been identified, developed, and enhanced with input from stakeholders formalised through design sprints and workshops. Resilience has been considered at every strategic crossing, taking consideration of future maintenance requirements and redundancy of the wider network. There are numerous major road crossings, three river crossings and two railway crossings. Tunnels of 1.8m internal diameter have been proposed for crossing the A68 dual carriageway, the Tees Valley Railway and the East Coast Main Line. The tunnels, up to 106m in length, will be constructed by tunnel boring machine and pipe jacking.

Five strategic connections are required to deliver the project. These vary from under-pressure connections to the existing network, to direct connections into the existing SRs with new internal pipework. New flow meters, control valves and turbidity monitoring will be installed on these connections to provide further monitoring and control. This will enable more flexibility in the system and improve water quality and efficient movement of supply throughout the network, maximising operating efficiencies. These efficiencies allow for the use up to 30Ml/d of gravity fed upland impounding reservoir water from Lartington WTW over pump river water from Broken Scar WTW.

To align with the transition towards a net zero carbon economy, an assessment of predicted capital carbon emissions associated with the delivery of the project was carried out. Mott MacDonald's in-house carbon assessment software, Moata Carbon Portal (MCP), was used to generate carbon emissions for the pipeline, strategic crossings and temporary works. The assessment in turn was used to identify, prioritise, and action opportunities for carbon reduction, for example reducing the footprint of temporary works and optimising pipeline depths.

Steel was selected as the pipeline material via a material selection matrix with input from suppliers, installers, world renowned technical specialists and NWG operatives, as well as geotechnical, carbon and civil teams.

A geospatial software, ArcGIS Online, has been used as the primary Common Data Environment (CDE) between IDeA and external stakeholders. This is to ensure the project teams have a single source of up to date, relevant information that can be managed effectively. Around 900 entries of design decisions and hazards are recorded in the CDE, as shown in *figure 4*. Furthermore, geo-environmental constraints, aerial photogrammetry, utilities, local development information, and pipeline alignments have also been recorded in the CDE, allowing various data sets to be displayed across several geospatial maps. The software application was selected due its visual and interactive nature, providing a more engaging experience to stakeholders than traditional tabular data.

The outputs of the CDE have enhanced external stakeholder engagement, allowing stakeholders to appreciate the scale of the project, and the full constraints associated with the chosen alignment. The CDE has also been used to assist with the creation and management of land entry notices across the full scheme. Finally, the CDE was also used to host the data for tenderers for Phase 1 to ensure they were provided with a common platform of information, see *figure 3*.

Supply chain – key participants

- Design (pipeline and tunnels): Mott MacDonald
- Design (pipeline, strategic connections & outline hydraulic modeling): Stantec UK
- Planning consultants: Lichfields
- EIA: Mott MacDonald
- Land management consultant: Bell Ingram
- Land drainage design: Land Drainage Consultancy Ltd
- Design & Construction: Farrans Construction
- Lead designer for Farrans: Atkins
- Tunnel design & construction subcontractors: Joseph Gallagher Ltd
- Steel pipes: FT Pipeline Systems
- Pipe fittings: George Green (Keighley) Ltd
- Shaft segments: Macrete (Ireland) Ltd
- Tunnel precast pipes: FP McCann

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Ancillary Entry Information

(Entry is restricted to normal type face and font size on this form plus no more than 5 pages of A4 drawings or photographs)
Links to external videos or demonstrations are allowed.

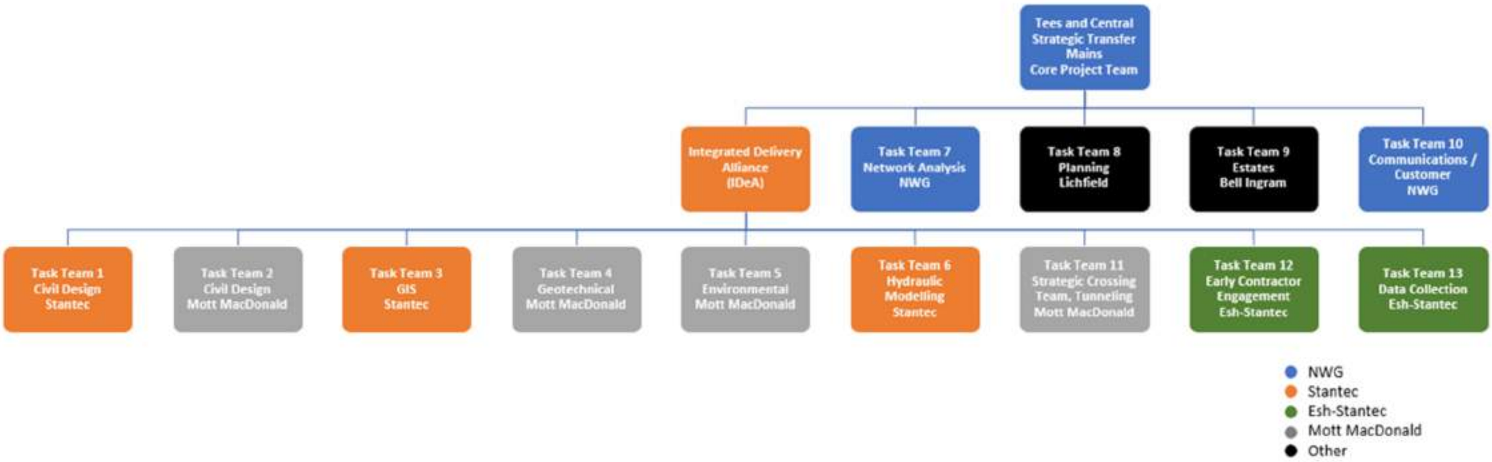

Figure 1: Project Team Organogram (courtesy of IDeA)

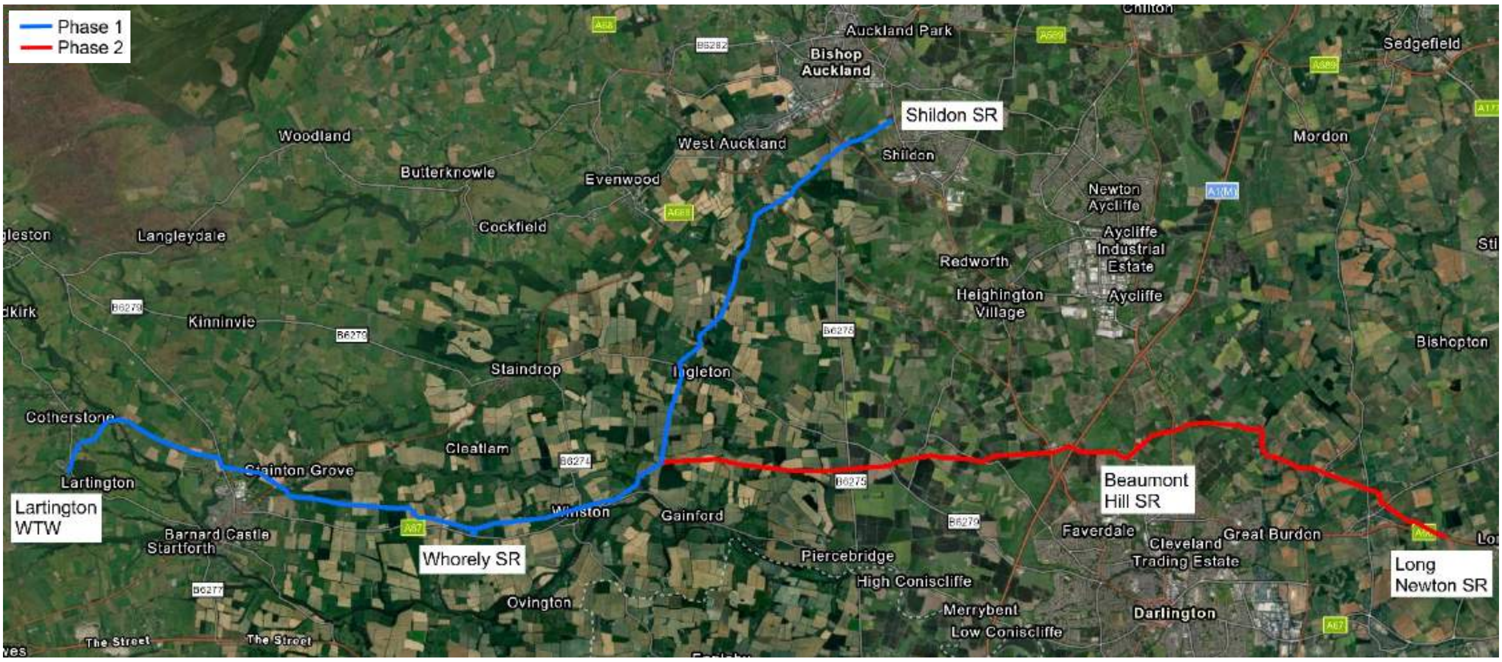

Figure 2: Overall Pipeline Schematic (courtesy of IDeA)

Figure 3: Phase 1 ArcGIS Online Tender Package (courtesy of IDeA)

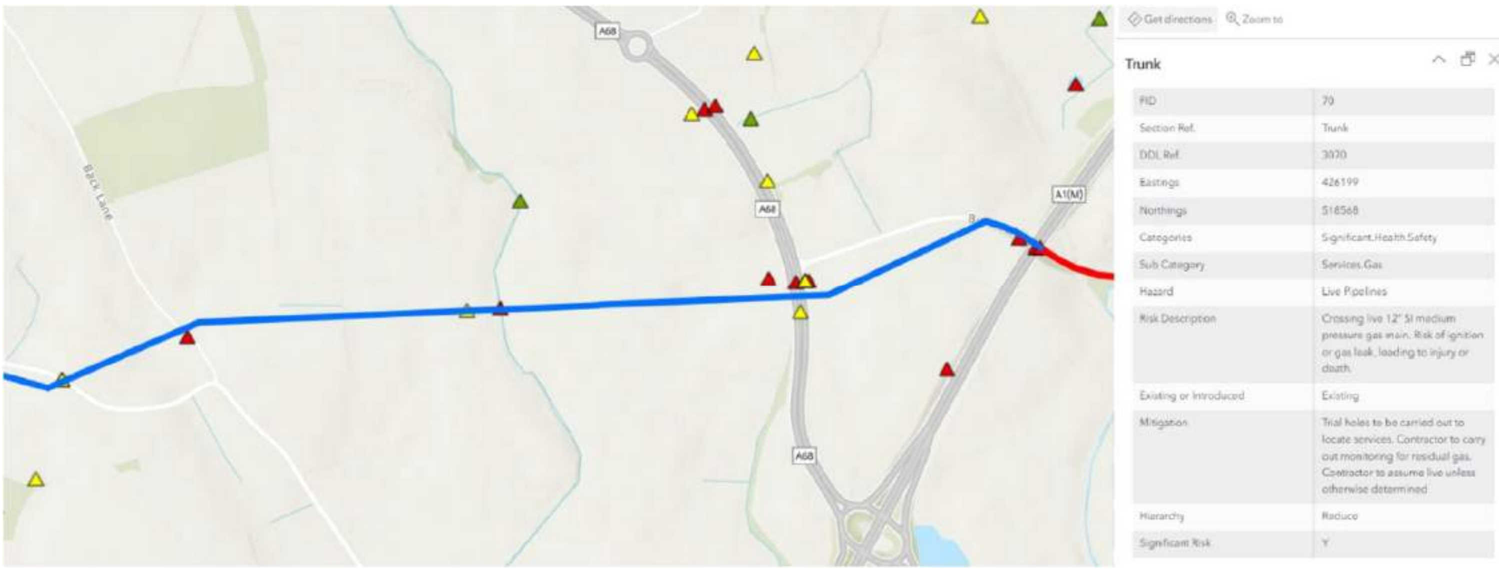

Figure 4: Hazards Recorded and Managed within a Geospatial CDE (courtesy of IDeA)

Figure 5: River Tees Crossing from East Shaft Looking West (courtesy of Farrans)

Figure 6: Pipeline Working Corridor (courtesy of Farrens)

Figure 7: DN800 Pipeline Installation Works (courtesy of IDeA)

Figure 8: River Tees East Shaft Construction (courtesy of IDeA)

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Figure 9: Delivery of steel pipes to the site and (inset) pipes arriving in the UK (courtesy of FT Pipeline Systems)