nationalgrid

Gas Transmission innovation

Building Information Modelling (BIM)

Value Case Study

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Strategic

Project: NIA_NGGT0024 BIM (Building Information Modelling)
PEA cost: £202k
Duration: 10 months
Supplier: Premtech
PEA benefits: £1m
Benefits realised: £885k

To date, BIM has delivered £4.6m in cost efficiencies.

Our asset health and compressor programme investment for the remainder of RIIO-T1 is circa £750m, presenting significant opportunities to deliver even greater value.

Background

Building Information Modelling (BIM) is the process used for pegging cost and carbon data to 3D models throughout the design, construction and maintenance of an asset. Asset owners can store the models and data for reuse on future projects. Advanced spatial survey techniques, in particular laser scanning and photogrammetry, has enhanced the work done by NGGT under BIM.

These techniques provide an accurate "as-is" visual representation of the site. This type of representative survey is crucial in removing ambiguity between conflicting historical records.

What's new?

The objectives of the BIM demonstration were to identify efficiencies and savings in cost, carbon impact, project schedule and operational expenditure. Using BIM, clash detection for both space and time can be undertaken. This is a clear advantage over traditional methods, allowing us to test various construction methods and sequences, proving the site logistics are valid and the construction timeframe is achievable.

Laser scanning was identified as an immediate solution to improve visualisation because of the high accuracy of the returned information, and the reasonable costs and fast generation of the site models. The development of a standard for laser scanning has allowed the technique to be quickly adopted for business-as-usual asset health works such as Feeder 9, Bacton and the Emissions Reduction Programme (ERP), as well as on new innovation projects.

Key advantages in using the BIM technique come through in the early stages of generating and assessing design options, which are often very different from the conventional solutions.

BIM at Feeder 9

The benefits

The BIM process was trialled as part of a constructability review for a new gas transmission installation at Goxhill, part of the ongoing works on Feeder 9. The conceptual design for a gas transmission project, which had previously been tendered but not completed, was used to benchmark costs and design deliverables.

A laser scan of the site along with the proposed construction activities and timeline were re-evaluated in real-time through the BIM tool, Navisworks. The process allowed the team to identify and eliminate construction hazards and embed construction process improvements at a very early stage of the works.

Key benefits:

Improved safety

through the elimination of construction hazards

Financial savings

from greater efficiencies achieved at the design stage

"BIM excels in its ability to help people visualise a project. Suppliers and stakeholders see our design intent more clearly – and we all see the benefit."

Paul Lee, Investment Scheme Manager
NGGT

The BIM model highlighted problems with the location of an instrument and control building on the far side of the site. This location would require site personnel to cross the site behind a pig trap door to investigate instrumentation trips, and so the building was relocated close to the site entrance. Also, the sequence of work was amended to ensure construction considered working traffic and access. The flexible nature of the model enables clash detection between the permanent and temporary works to be undertaken. During the study, a concrete lighting base was identified as being too close to a deep excavation. This led to repositioning the installation of the concrete base to avoid any conflict with the excavation.

The learning from the Goxhill constructability review was then applied to the Paull installation on the north side of the Feeder 9 crossing.

Financial savings

The laser scan and resultant 3D model for the Paull installation, when combined with the clash detection software, highlighted a concern related to the initial pig-trap location on site. Applying the BIM technique at this early stage in design allowed us to investigate a number of alternative options, meaning the final option did not require a new pig-trap or associated pipework. The use of BIM at the Paull installation generated a cost saving of £885k including material, plant and labour.

Environmental Impact

BIM also came to the fore when assessing the impact of Feeder 9 on local wildlife. The Humber Estuary is of high nature conservation value being designated a Special Protection Area (SPA), Special Area of Conservation (SAC), Site of Special Scientific Interest (SSSI) and Ramsar site. Using the technology, we created enhanced models that demonstrated the project would not affect light in the area and as a result there would be no impact on the local bird population.