

# Geopolymer Injection for Ground Stabilisation and the Re-Levelling of Buried Assets

Value Tracking Case Study



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## Background

Ground settlement and subsidence are common issues occurring across many of our National Transmission System (NTS) sites. This can lead to stress on our pipework, resulting in potential structural damage.

The aim of the project is to demonstrate the applicability of the geo-polymer injection technique as an innovative solution for stabilising ground under assets. Ground stabilisation (or soil stabilisation) is the process of making changes to the soil to improve its ability to bear weight and to increase its properties. This creates a more reliable basis for building and construction works and can remedy existing issues with earth and subsoils that are causing problems and to adjust asset levels to eliminate differential stress situations. This will demonstrate the ability of the technology to remediate settlement of ground hence resolving and removing the potential for further stress exceptions with the ultimate risk of pipework failure.

## What's new?

Through initial work carried out on the Geopolymer project in 2019/20, a cost-effective and minimally disruptive solution was identified. Geopolymer resin, a cement like material which expands, can be injected into the ground to fill spaces and compact the soil.



Following initial tests, a comprehensive desktop technology review was undertaken, before the team conducted an on-site trial using decommissioned pipework at Kings Lynn Compressor Station. The trial successfully demonstrated that the resin was effective at stabilising and releveling the pipework.

Utilising this technique could increase the load bearing capacity of the surrounding ground, without the need for large excavations or more expensive solutions such as concrete underpinning.



Figure 12 – Injection & Live Monitoring

Throughout the project, the sustainability of the solution was also assessed, to identify the potential environmental impact of injecting the resin. This was done via a desktop study which looked at case studies and environmental impact records, as well as assessments of the potential for groundwater contamination and the carbon footprint associated with the Geopolymer solution. This study found that the approach is more favourable than many other typical ground stabilisation techniques.



The trial conducted and the findings from the Geopolymer project provide a basis for future use of the technology on gas transmission assets and at other sites

## The benefits

Finding a more cost-effective solution not only increases the reliability of our network but has the potential for significant cost savings. The solution minimises the need to use concrete to stabilise the ground, which results in a carbon saving as well.

## Financial savings

Based on using the Geopolymer solution at just one site, there is a potential cost saving of around £664,500 over a 10-year period. Actual savings to be logged following usage onsite.

## Implementation

The project's successfully assessed the suitability of geopolymer injection technology for ground improvement and ground stabilisation on and around high-pressure gas pipework within National Grid operational sites.

Initially, the project was targeted at a completion TRL level of 8, however as the trial was conducted on decommissioned pipework, the TRL of geopolymer injection is now at TRL 6.

The project has shown the new techniques effectiveness in moving pipework, other uses such as releveling slabs are less novel although new to this industry. Use of the technique for these more routine tasks did not need trialling as part of this project and can be progressed to business as usual together with its adoption as a pipeline movement technique.

