

Garriongill Embankment Stabilisation and Mine working Remediation Overtown – Wishaw, North Lanarkshire, Scotland Network Rail / QTS / COWI UK

BIG Biodiversity Challenge Award category: Medium Scale Permanent Award

Project overview

The Garriongill project was a combined slope stabilisation and mine working remediation civil engineering project, located in a rural setting. Following a significant embankment slip on the West Coast Mainline railway corridor in 2013 and subsequent monitoring regimes at the site, it became necessary to carry out positive intervention to the railway supporting soil embankment.

Planning approval was applied for in September 2015, with formal planning granted in September 2016. The works commenced in September 2016 with a combined project team of approximately 25 staff. The slope stabilisation works consisted of a compacted engineering fill re-grade, with associated mine working remedial works carried out by a sub-contractor consisting of gravity fed grouting techniques. The cost of the project is £3.7M and works commenced in September 2016 and were completed in June 2017.

Were there any specific reasons that led to this project?

The project was a direct result of a safety risk to the existing operational railway by failure indicators present in the embankment. Following full planning approval through the Local Authority, there was an acceptance from all stakeholders that there would be a 'permanent' loss of qualified habitat as a result of the works.

One of the planning conditions was to provide an acceptable compensatory habitat to offset the intrusive nature of the works at this location. A site was nominated by the Local Authority at a nearby location called Cambusnethan.

What were the biodiversity conditions on site, prior to the enhancement?

The site is located in the designated Garriongill Site of Special Scientific Interest (SSSI) and within the Clyde Valley Woodland Special Area of



Slope prior to intervention works, West Coast Mainline running left to right through photo:

Conservation (SAC); designated for its Mixed woodland on base-rich soils associated with rocky slopes (a priority habitat). The total SSSI comprises an area of approximately 40 hectares.

What were the biodiversity measures taken?

This embankment is located within an SAC (Special Area of Conservation) which is a European designated habitat. The works affected approximately 0.46 hectares of habitat. However as part of the planning approval a compensatory area of 10 hectares of SAC qualified habitat will be provided at an alternative site. In this sense the project is not likely to be replicable, especially considering it is the first railway project in Britain to seek planning permission and land purchase within an SAC qualified habitat. The planning process concluded that a compensatory area of approximately 10 hectares should be provided to North Lanarkshire Council at a site recommended by the local authority at Cambusnethan. This will require a long term commitment (15 years) from Network Rail to deliver this planning condition.

A Habitats Management Plan will be agreed between key stakeholders (Network Rail, North Lanarkshire Council and Scottish Natural Heritage) and delivered over the course of 15 years to take a previously unclassified area of local woodland and upgrade it to an SAC qualified area.

With respect to recycling materials during the construction phase, there was approximately 1 million litres of water recycled and re-used during the drilling and grouting process. This was significant as it reduced the amount of water required from the mains supply and mitigated the risk of polluting the nearby watercourse.

There was also approximately 100 tonnes of topsoil which was excavated at the start of the project, stored and redistributed on the final embankment in the hope of encouraging local fauna to re-establish and soften the aesthetic impact of the engineering fill.



Works progressing on site, with approx. 75% of the new embankment complete:

How would you best describe the project?

Mitigation

Further information

Stage 1 comprised of grout infill of the redundant mine workings beneath the embankment. Drill holes were taken to bedrock and a cement based grout was then mixed in the appropriate quantity and gravity fed to avoid risk of polluting the nearby watercourse. A water recovery procedure was implemented to ensure any waste water from the grouting process was captured and re-used. This consisted of capturing water at the toe of the slope, pumping it back to the crest and into settlement tanks in order to re-use it in the grouting process again. It is estimated that circa 1 million litres of water was recycled in this fashion.

Stages 2, 3 and 4 comprised of ground stabilisation anchors installed into the embankment and placing / compacting the engineering fill. Working platforms were formed for each of the stages using excavators to level and grade engineered fill. Holes were mechanically driven and water flushed to allow for the insertion of hollow bar ground anchors which assist with the stabilisation of the embankment. As each section was completed with respect to the ground anchor installation the embankment slope was then graded with stone and compacted to ensure stability.

During stage 5 there was no requirement for drilling, anchors or grouting. Excavators working from the previously formed platforms profiled the slope in 500mm x 500mm steps. Once the steps had been excavated then a non-permeable geotextile membrane was placed to the excavated profile and the final layer of stone was placed and profiled to the crest of the new embankment.



Completed works showing new embankment profile:

What was your personal motivation for carrying out the enhancement?

To be a part of a project this complex was a significant personal challenge. This was the first railway project in Britain to seek planning consent within an SAC, and I feel the team certainly rose to the challenge to ensure all the planning conditions and stakeholder aspirations were met.