

## Niddrie Burn Restoration—Mine Consolidation Treatment

**Client:** Edinburgh City Council

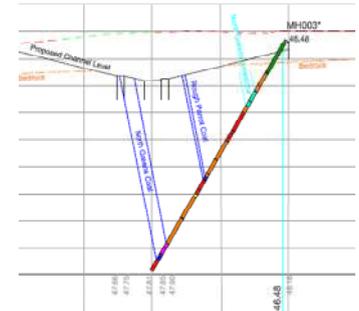
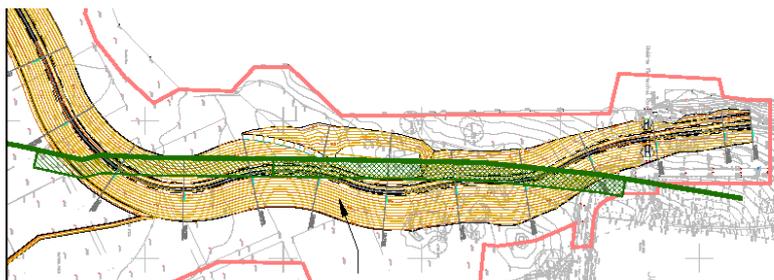
**Designer:** Jacobs

**Value:** £495k

**Date:** April—July 2011

An advance of works contract to stabilise outcropping mine workings along the proposed route of the Niddrie Burn realignment, currently culverted beneath the adjacent Niddrie Marischal housing estate in South East Edinburgh.

The preliminary site investigation work and old mine plans suggested that the steeply dipping ( 80°) 1.7m thick North Greens coal seam lay beneath part of the proposed realignment route and may have been extensively worked but the full extent of these workings was unclear. Therefore the initial phase of the contract involved further investigation by probe drilling on a series of grid lines perpendicular to the seam, spaced 45m apart, to establish the exact position of the seam as well as the extent and condition of the workings. 85 probe holes were drilled to approximately 50m depth along the 500m section of the site thought to be affected by the workings. Two Casagrande C6 drill rigs were employed during this phase of the work using rotary percussive drilling techniques with water flush. Results from these probe holes allowed Jacobs to complete the stabilisation design.



The seam dip, treatment depth of up to 50m and the nature of collapse migration meant that treatment could not be carried out with conventional grout tremmie insertion. Our proposed methodology was to drill and case the grout injection holes to full depth at the 80° angle of the seam using 88.9mm dia rotary percussive casing. The drilled casing was then used as the grout injection tube and the seam grouted in 2m ascending stages. 4 Casagrande C6 drill rigs were used during the treatment phase with each rig supported by a grout injection team.

Over 300 grout holes of between 40 and 50m depth were drilled along the seam in a primary, secondary and test hole sequence and 2000t of 12:1 pfa/cement grout used in the consolidation works.



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The site compound establishment included a container surrounded pfa storage area and grout mixing area. The containers, set 2 high, provided PFA bunkering but also worksite screening and noise & dust attenuation to the adjacent residential property. Cement was stored in a 30tonne silo.



During the probing works a team of Archaeologists was present on the site carrying out a comprehensive soil strip and site survey. Careful programming and interaction between the two disciplines on site allowed the archaeologists to complete their works prior to the main treatment phase without any disturbance to the historical information they wished to record.

