

# Remediation of polluted site

## Derwenthaugh Cokeworks

Derelict Cokeworks—Gateshead, Tyne & Wear, UK



### Containment by vibwall cut-off

The site lies between the River Derwent and the A694 Rowlands Gill to Blaydon Road and was occupied for over 50 years by a cokeworks which produced benzole, naphthalene, ammonia, coal tar, sulphur and as a byproduct, cyanide and heavy metals.

The groundwater at the site was contaminated by a floating layer of benzenes and free oils, and also contained oil emulsions deeper within the groundwater.

Due to the health hazard posed by the benzene, it was necessary to reduce the concentrations to safe levels prior to any site excavation taking place. However, before any decontamination works were carried out, it was necessary to provide barriers to groundwater movement such that the groundwater regime beyond the site was not disturbed. It was also important that increased volumes of water were prevented, as far as possible, from entering the contaminated area thus reducing treatment costs.



*Vibwall installation*

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CLIENT: Gateshead Metropolitan Borough Council Planning Department

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MAIN CONTRACTOR: Hall Construction Services Limited

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DURATION OF WORKS: 7 Weeks

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#### WORKS QUANTITIES:

Elevational area	11,600m <sup>2</sup>
Maximum depth	12m
Minimum depth	8m



Profile of completed vibwall

As a result of the highly contaminated nature of the ground it was not possible to construct a conventional slurry trench and so a Vibwall barrier, which has the advantage of not requiring spoil disposal, was used to form a cut-off around the site together with cells within the site to facilitate better control over the subsequent treatment process.

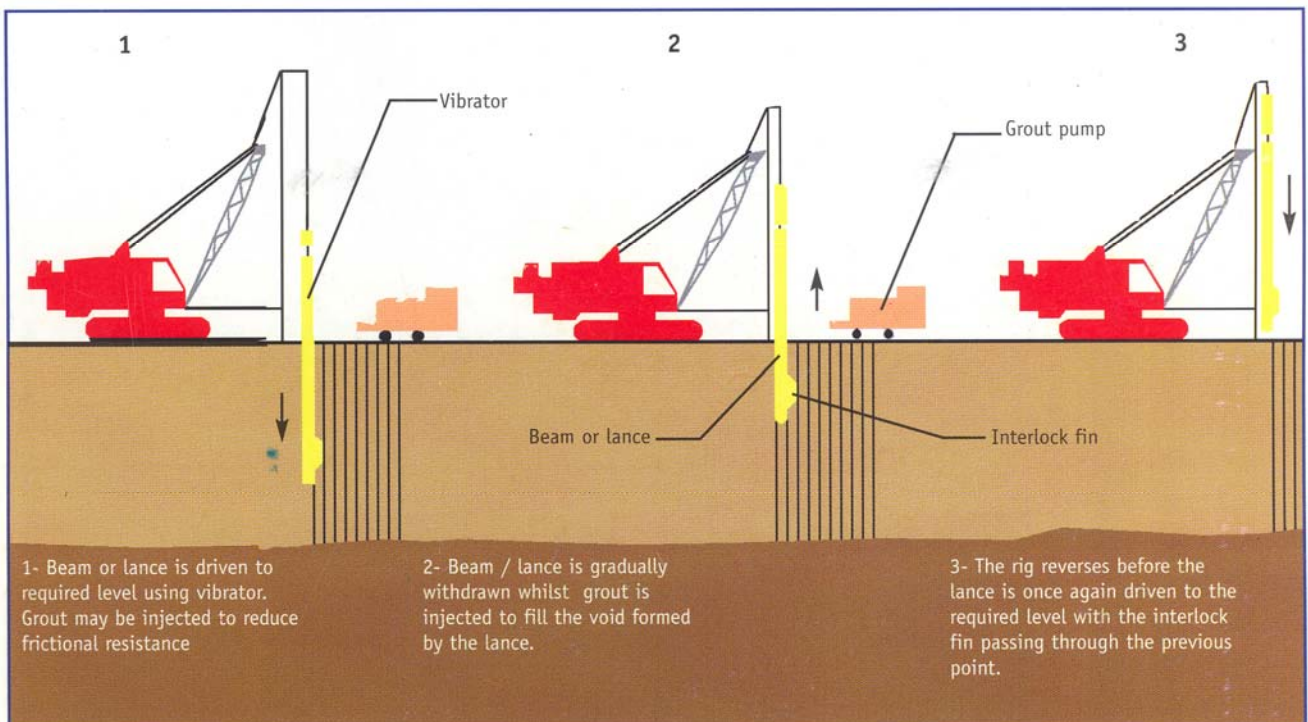
### Vibwall Construction

A total of 11,600m<sup>2</sup> of cut-off wall was installed to depths between 8m and 12m to seal onto bedrock, of where this was not possible because of the depth of the bedrock, as a "hanging wall" to provide partial containment. The specification required that the Vibwall barrier had a compressive strength greater than 200kN/m<sup>2</sup> and a permeability less than 1 x 10<sup>-8</sup>m/sec.

Vibwalls are constructed by driving into the ground a heavy H-shaped lance equipped with grout pipes. As the lance is withdrawn grout is placed under pressure to leave an H-shaped grout column. The lance is successively re-driven to give a continuous cut-off.

The barrier was constructed over a period of seven weeks and included two trial boxes constructed in advance of the main works in order to establish criteria for lance driving and slurry mix design in relation to the local ground conditions. A further two boxes were then constructed and dewatering was carried out under controlled conditions to determine the in-site permeability of the wall, which was shown to be of the order of 4 x 10<sup>-9</sup>m/sec, assuming an effective average wall thickness of 130mm.

Excavation carried out after construction along the line of the Vibwall in a number of locations clearly showed the intersecting panels.



Installation Sequence