

# Bradley Lane Park & Ride, Treatment of Mine Workings and Mineshafts.

## Project Profile

**Client:** West Midlands Combined Authority

**Designer:** Aecom

**Date:** Phase 1—Oct 18 to Jan 19  
Phase 2—Apr 19 to May 19

**Value:** £790k



This contract was part of the enabling works for a new Park & Ride facility for West Midlands Combined Authority to service the West Midlands Metro Tram Stop at Bradley Lane, Bilston which currently has no parking. The new facility will have an access road off Belmont Street, 196 car parking spaces and cycle shelters and is part of substantial ongoing investment in the Metro system and the local rail network.

The site is in the South Staffordshire Coalfield area and was known to be underlain by shallow workings in the 'Staffordshire Thick' and 'Heathen' coal seams. Due to the thickness of the workings, particularly those associated with the 'Thick' Coal Seam it was recommended to fully treat the workings by drilling and grouting to a maximum depth of 35m BGL to prevent any future instability risks to the proposed development caused by void migration.

Mine workings stabilisation was carried out by completing a 4.25m centred treatment grid over the proposed development site, with the grid extending beyond the car park and access road footprints into adjacent playing fields to mitigate any subsidence that may occur from workings immediately adjacent to the site. Treatment was required under the rail embankment to ensure treatment of workings beneath the proposed access steps and ramp structure from the car park.

10 untreated mine shafts were also recorded as being present on the site and an extensive probe drilling exercise was undertaken to locate and prove these shafts. 9 other ground anomalies (unrecorded shafts or crown holes) were also located and treated during the work.

During peak activity up to 8 rotatory percussive and rotary drilling rigs were on site as well as a substantial grout mixing set up in order to complete the work in the short programme period. Up to 25 personnel and site supervisors were on site during the work.

All drilling and grouting plant and equipment used on the site was resourced from our specialist in-house plant fleet.



# Bradley Lane Park & Ride, Treatment of Mine Workings and Mineshafts (Cont'd).

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### Summary of the work completed :

- Mine Workings Treatment
  - ◇ 1,637 no. perimeter, primary & secondary boreholes drilled & grouted (55,392m drilled)
  - ◇ 4,540 Tonnes 5:5:1 (PFA:Sand:OPC) grout Injected.
- Mine Shaft Location and Treatment
  - ◇ 3,179 no. probeholes (17,078m drilled).
  - ◇ 19 Mineshafts/Anomalies located, drilled & treated, depths of between 12m to 34m BGL
  - ◇ Installation of 19 Grout Caps over the located mineshafts and anomalies.
- Working area preparation included installation of drill flush and surface water collection trenches & sumps and the creation of drilling platforms.
- Treatment grids were serviced with water feed from 2 x 12,000 gallon and 2 x 6,000 gallon water storage tanks
- Holes were drilled using 101mm OD rotary percussive steel casing drilled and sealed into rock head up to 35m BGL and followed by drilling a 75mm open hole allowing insertion of a 50mm MDPE grout tremmie pipe.
- Water flush was used with water piped to drilling rigs via a delivery main along the treatment areas. The rigs are also equipped with on board water pumps to ensure optimum hole flushing.
- Drilling & grouting was carried out in an agreed sequence with down-dip perimeter holes generally being completed first.
- A significant amount of inclined drilling was required to treat under existing Metro Line embankment with angles of up to 20° being accommodated by the versatile drilling resources on the site. These works were undertaken under nightshift closures of the Metro Line.
- Due to the depth of fills and superficial deposits overlying the shafts, grout caps were completed over each shaft by drilling a close grid of grout holes to stabilise the materials above the shaft column
- High levels of environmental monitoring of noise and dust were undertaken throughout the project.
- Grout was mixed in an 60m<sup>3</sup>/hr Bellmix continuous grout mixer, pumped to an agitation tank and then distributed by 3 screed pumps to grout holes. The grout mix used was 5:5:1 PFA / Sand / OPC.
- Mine shaft treatment was carried out by drilling a 90mm hole to prove natural strata below the base of the shaft and grouting through the drill rods in 3m ascending stages. A second treatment hole with staged grout injection was completed to each shaft to ensure full validation of treatment.
- Shaft treatment was carried out from robust fully designed drilling safety platforms.
- Continuous monitoring and recording of injected grout quantity and pressure was carried out together with extensive quality control and testing of mixed grout.

