

**HIGH ENERGY IMPACT COMPACTION (HEIC) WORKS  
FOR A COMMERCIAL DEVELOPMENT  
FORT DUNLOP, BIRMINGHAM, ENGLAND**

**Job Facts**

Date of HEIC works	November- December 2004
HEIC unit deployed	3 Sided 27 kJ Unit
Site area	2 Ha
Site development	Commercial Portal framed Unit
Contract Duration	3 Weeks

**Development Description**

LANDPAC were commissioned to carry out HEIC works at Fort Dunlop in Birmingham. The proposed development occupied an area of approximately 2 Ha and included a portal framed commercial building carrying a floor slab load of 50 kN/m<sup>2</sup>.

**Ground Conditions**

Site investigation information indicated that the site was underlain by Made Ground to a depth of about 3.5 mbgl. This in turn was found to overly Terrace Gravels or Alluvium which in turn overlies Mercia Mudstone Groundwater was not encountered in the boreholes put down during the site investigation.

**Requirements of HEIC works carried out by LANDPAC**

LANDPAC were commissioned to carry out HEIC works and through the use of CIR mapping and conventional geotechnical testing carried out by a third party Geotechnical Consultant, confirm that the finished platform was capable of carrying the proposed 50 kN/m<sup>2</sup> floor load within settlement tolerances. Settlement limits were set by the structural engineering at no more than 25 mm total settlement and no more than 10 mm differential movement over a 6 m length. The works were started on 26 November 2004 and took three weeks to complete.

**HEIC Process**

The works were carried out using LANDPACs' three sided 27 kJ impact compactor with mapping carried out using LANDPACs' proprietary Continuous Impact Response (CIR) mapping system

**Plate 1 Three sided impact compactor**



The works were carried out according to the following methodology:

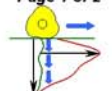
- Carry out initial ground level surveys
- Carry out initial CIR mapping (indicating pre treatment conditions)
- Carry out HEIC works in batches of 10 passes where possible
- Take ground surface levels and CIR readings after each set of ten HEIC passes
- Repeat HEIC and surveying until ground surface settlements <= 20 mm for 10 passes of the HEIC.
- Carry out analysis of CIR and settlement data and commission conventional Geotechnical testing. (This testing was carried out under the supervision of an independent Geotechnical Consultant)

**Plate 2: Dynamic Probe Testing**



**Results of HEIC treatment**

The HEIC process was successful in providing a verified finished working platform capable of carrying the proposed floor slab loadings within the prescribed tolerances. A summary of the conventional geotechnical testing which was carried out at the site is included on sheet 2.



### Verification testing

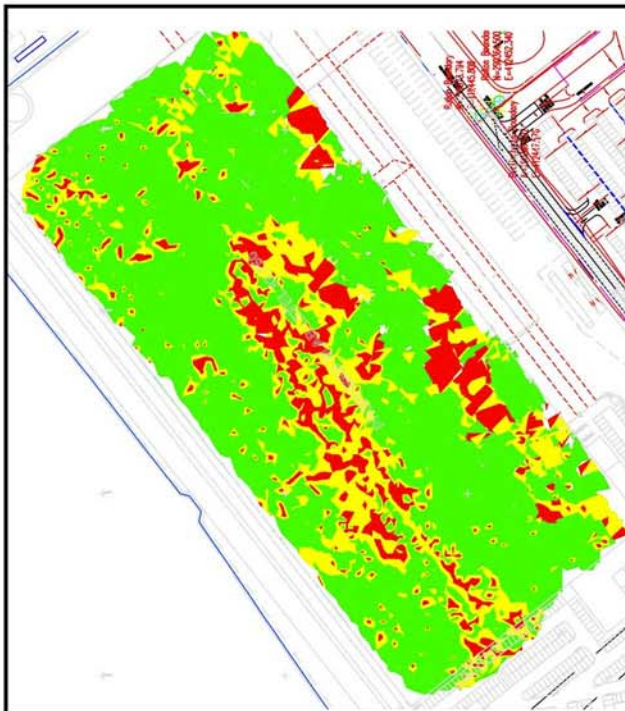
As part of the ground treatment package, LANDPAC included a suite of verification testing carried out under the supervision of an independent Geotechnical Consultant.

The verification testing for this site included a suite of dynamic probe testing and zone load testing which when used in conjunction with LANDPAC's proprietary CIR mapping system allowed the Geotechnical Consultant to write a Verification report confirming that the requirements of the Specification had been achieved.

### CIR Mapping

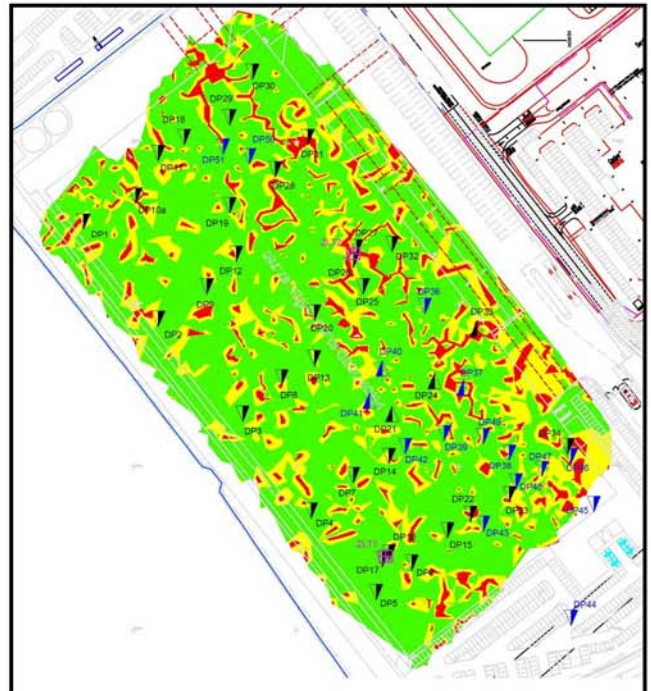
LANDPAC's CIR mapping system allows the deceleration of the impact compactor to be recorded at any point on the site and at any time and the data can be presented as a colour coded drawing.

### Drawing 1: CIR map at zero coverages



In the drawings shown the deceleration increases from red to yellow and green.

### Drawing 2 CIR map at final coverages



The CIR maps show an increase in the rate of deceleration following HEIC works particularly in the centre of the site

### Zone testing

Three zone tests were carried out on 2 m x 2 m square plates which were loaded to apply a pressure of 50 kN/m<sup>2</sup>.

The zone testing indicated Young's Moduli of between 9 and 15 MN/m<sup>2</sup> over the stress range zero to 50 kN/m<sup>2</sup>.

### Dynamic Probing

Dynamic Probing carried out across the site at 50 locations which confirmed that the strength variation across the site following HEIC treatment was sufficiently low to meet the differential settlement criteria outlined in the Specification for the works.

