

**HIGH ENERGY IMPACT COMPACTION (HEIC) WORKS  
FOR A RESIDENTIAL DEVELOPMENT  
CASTLEGATE, CAERPHILLY, WALES****Job Facts**

Date of HEIC works	Intermittent June to Sept 2004
HEIC unit deployed	3 Sided 27 kJ Unit
Site area	6 Ha
Site development	Residential Development
Contract Duration	8 Weeks

**Development Description**

LANDPAC were commissioned to carry out HEIC works at Castlegate, Caerphilly in Wales. The proposed development occupied an area of approximately 6 Ha and included a residential development of short terraces and semi detached houses.

**HEIC Process**

The works were carried out using LANDPACs' three sided 27 kJ impact compactor

The works were carried out according to the following methodology:

- Carry out initial CIR mapping
- Carry out HEIC works in batches of 10 passes
- Take CIR readings and repeat for 80 passes. (number of passes determined through initial trial)
- Carry out analysis of CIR and settlement data and commission conventional Geotechnical testing including CPT and zone testing

**Plate 1 General View of site.**

**Ground Conditions**

Site investigation information indicated that the site was underlain by 2 types of Made Ground. To a depth of about 2.5 to 3 mbgl a sandy gravelly CLAY was found below which pulverised Fuel Ash was found to 13.3 m bgl. This in turn was found to overly Glacial Deposits. Groundwater was not encountered in the boreholes put down during the site investigation.

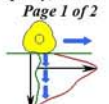
**Requirements of HEIC works**

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 loading of 20 kN/m<sup>2</sup> on 8 m wide rafts

The works were started on 13 May 2004 and took two weeks to complete.

**Results of HEIC treatment**

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

**Plate 2 CPT test rig**

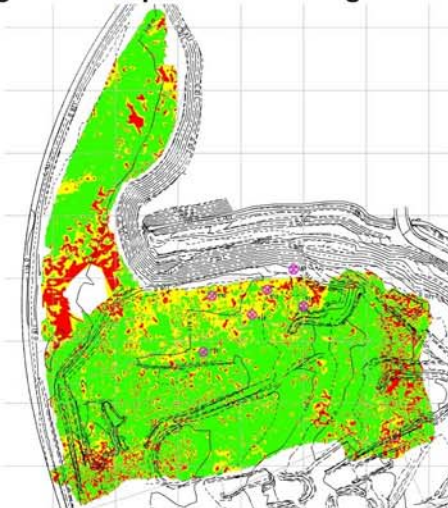
**Verification testing**

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 SCPT testing, zone load testing and a large scale embankment load test

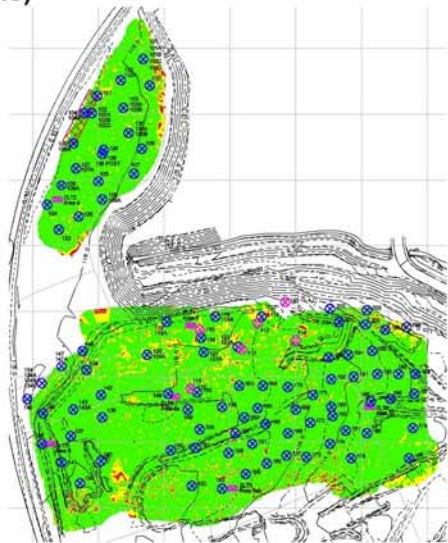
**CIR Mapping**

LANDPACs' 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. In the drawings below the deceleration increases from red to yellow and green.

**Drawing 1: CIR map at zero coverages**



**Drawing 2 CIR map at 30 coverages (including test locations)**



**Zone testing and Ebmarkment Trial**

Six zone tests were carried out on 2 m x 2 m square plates which were loaded to apply a pressure of 100 kN/m<sup>2</sup>. The testing indicated Youngs Moduli of between 14 and 18 MN/m<sup>2</sup> over the test increment zero to 100 kN/ m<sup>2</sup>.

**Plate 3: Zone testing**



A large scale load test was carried out using an embankment load and a settlement predictions for the proposed raft foundation load of 30 mm was derived by the Geotechnical consultant.

**Plate 4 Trial Embankment**



**Static Cone Penetrometer Testing (SCPT)**

127 SCPT tests were carried out at the site which confirmed uniformity of the treated PFA at the site. The testing confirmed an increase in cone resistance to around 4 m bgl. (see Chart 1)

**Chart 1 SCPT Improvement Profile**

