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Geotechnical engineering

The geotechnical engineering staff contingent has grown considerably over the past eight years and consists of Professor Chris Rogers (CR), Professor Andrew Chan (AC), Dr David Chapman (DC), Dr Gurmel Ghataora (GG), Dr Ian Jefferson (IJ), Dr Colin Thornton (CT) and Dr David Boardman (DB).

They are covering a broad range of topics that have been grouped into five categories below for convenience, though more truly span across the discipline.

The projects are at different stages and are being addressed at different levels of sophistication.
Links are provided to those that have matured or recently been completed.

Open all sections

Soil stabilisation, contamination and waste

- **The Response of Stone Column under Cyclic Loading - PDF 289 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/stone-columns.pdf)** (GG) (IJ)
- **Influence of Iron on Soil properties - PDF 56 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/influence-of-iron-on-soil-properties.pdf)** (CR, CD)
- **Stiffness of Lime and Lime-Cement Stabilised Capping Layers - PDF 108 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/lime-cement-stabilised-capping-layers.pdf)** (CR, DB – Highways Agency funding)
- **Soil Stabilization Using Basic Oxygen (BOS) Steel Slag - PDF 45 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/soil-stabilization-using-steel-slag.pdf)** (GG)
- **Chemical Improvement of Clay Soils in situ Using Electrokinetic Processes - PDF 59 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/chemical-improvement-clay-soils.pdf)** (CR, DB – Industrial funding)
- Solidification of Contaminated Soils using Accelerated Carbon Technology (CR, DB – Industrial funding)
- Electro-kinetic Treatment of Liquid Wastes (CR, DB – EPSRC funding)
- Dewatering of Silt Lagoons (GG)
- **Hydraulic and Diffusive Properties of Cement-Bentonite Low Permeability Barriers - PDF 52 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/hydraulic-diffusive-properties-cement.pdf)** (CR, DB)
- Using Waste to Counteract Acidity of Colliery Spoil (GG – Industrial funding)
- Reuse of Quarry Fines (GG)
- Reuse of Gypsum Waste in Construction (GG – EPSRC funding)
- Novel Trench Backfills (GG – EPSRC funding)
- **Loess Soil Stabilisation - PDF 33 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/electrokinetic-stabilisation.pdf)** (IJ, CR)

Tunnels and trenchless technology

- **Exploring appropriateness of underground space utilisation for sustainability improvement (pdf 133 KB) (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/underground-space-utilisation-sustainability.pdf)** (CR)
- Ground Displacements around Twin Tunnels (DC, AC, CR – EPSRC funding)
- Ground Displacements around Triple Tunnels (DC)
- **Stress Paths and Associated Deformations Induced by Twin Tunnelling in Clay and the Applicability of Current Constitutive Models - PDF 83 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/deformations-twin-tunnelling-in-clay.pdf)** (DC, GG)
- **Optical Fibre Sensors For Remote Tunnel Displacement Monitoring - PDF 84 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/optical-fibre-sensors-remote-tunnel.pdf)** (DC, CR – EPSRC funding)
- Trenchless Technology Network – NETTWORK (CR,DC – EPSRC funding)
- Installation of High Voltage Cables Over Long Distances Using Trenchless Techniques (DC, CR – EPSRC funding)
- Mapping the Underworld – Multi-Sensor Device for Buried Utility Services Location (CR, DC – EPSRC funding)
- Mapping the Underworld – **Multi-Sensor Device for Buried Utility Services Location (Phase II) - PDF 47 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/geophysical-methods-or-utility-location.pdf)** (CR, DC, NM – EPSRC funding)
- **Mapping the Underworld Network (http://www.mappingtheunderworld.ac.uk/)** (CR – EPSRC funding)
- GG-TOP – Development of a very sensitive gravity gradient sensor for detecting buried objects, such as deeply buried water or gas pipelines (NM, DC, CR – EPSRC funding)

Pipelines, utility services and 'towards sustainability'

- **Asset Information Management - PDF 91 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/asset-information-management.pdf)** (AIM)
- **A Geotechnical Model for the Prediction of Buried Cast Iron Pipe Performance and Failure - PDF 59 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/geotechnical-model-cast-iron-pipe-performance.pdf)** (DC, CR – Industrial funding)
- Leakage Development Mechanisms in Clay Soils (DC, CR – Industrial funding)
- Flexible Pipes buried in Landfills (CR)
- **'Smart Pipes' containing Micro- and Nano-Scale Sensors - PDF 94 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/smart-pipes.pdf)** (DC – Industrial funding)

- **Sustainable Urban Redevelopment – Eastside Case Study (http://www.esr.bham.ac.uk/)** (CR, IJ – EPSRC funding)
- Sustainability of Geotechnical Processes (IJ, CR)
- Sustainable Provision of Utility Services (CR, IJ – EPSRC funding)
- Use of Underground Space to deliver Sustainability Benefits (IJ, CR – EU funding)
- Critical Local Transport and Utility Infrastructure (CR, IJ, DC – EPSRC funding)
- Industrial Symbiosis (CR, DB – Industrial funding)
- Waste Minimisation (DB, CR – Industrial funding)

Railway foundations, ground improvement and unusual soils

- **Behaviour of compaction piles made from sand, quarry fines and granular blast furnace slag PDF 223 KB (/Documents/college-eps/civil/research/compaction-piles-sand-quarry-fines-blast-furnace-slag.pdf)**
- Railway Trackbed Stabilisation (GG, AC, DC, CR – EPSRC funding)
- Rail Track Design … from a geotechnical perspective (GG – EPSRC funding)
- Novel Materials for Anti-Pumping in Trackbeds (GG)
- FE Modelling of Rail Track / Rail Systems (AC)
- Modelling to Optimise Railway Maintenance Operations (AC)
- Shear Strength of Glacial Tills for Linear Features (IJ)
- **Internal Erosion in Clay Embankments - PDF 50 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/internal-erosion-clay-embankments.pdf)** (GG – Industrial funding)
- Geohazards associated with Rising Groundwater (IJ)
- Ground Improvement using Stone Columns (IJ, DC)
- **Factors Affecting Bonding in Loess Soils - PDF 116 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/bonding-in-loess-soils.pdf)** (IJ, CR – NERC funding)
- **Geophysics in Ground Improvement - PDF 44 KB (/research/activity/civil-engineering/long-term/sustainability/geotechnical/pdfs/geophysics-in-ground-improvement.pdf)** (IJ, DC)

Modelling of continua and discrete particles

- FE Modelling of Tunnels (AC, DC)

  FE Modelling of Off-Shore Foundations (/research/activity/civil-engineering/short-term/computation/finite-mod/index.aspx) (AC – Industrial funding)

  Discrete Element Modelling of Shear Experiments (CT – EPSRC funding)

  Discrete Element Modelling of Fluidised Beds (/research/activity/civil-engineering/short-term/computation/discrete-mod/index.aspx) (CT – EPSRC funding)

  Discrete Element Modelling of HDD Bore Stability (CT, DC, CR)

A new major thrust in **'smart' infrastructure monitoring (/research/activity/civil-engineering/long-term/sustainability/geotechnical/smart-infras.aspx)** has been developed from several of the above projects and is being led by Dr Chapman.

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