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Clients to ensure rig-guarding under new CDM Regulations

The new CDM Regulations will place a responsibility on clients requiring ground investigations to ensure appropriate sub-contractor health & safety standards eg adequate guarding of drilling rigs.

Under current UK legislation employers' legal duties include the following:

To provide effective measures to prevent access to any dangerous part of machinery.

To ensure that, where appropriate, work equipment is fitted with one or more readily accessible controls to bring the machine to a complete stop where necessary for health & safety reasons (an emergency stop).

To ensure that, except where necessary, no control for work equipment is positioned where it would cause a risk to the health & safety of the operator.

Recent investigation by HSE has shown that people may be being placed at risk due to one or more of the following reasons:

1. A risk assessment has not been done & acted upon.
2. A risk assessment has been done but is neither suitable & sufficient.
3. Access to the dangerous rotating parts of the drilling machinery is not effectively prevented in line with the hierarchy of protective measures given in the Provision & Use of Work Equipment Regulations 1998 (PUWER) & backed up in the BDA guidance.
4. Insufficient or inadequate emergency stops are provided.
5. The operator position places them in close proximity to the rotating part of machinery.
6. The nature of the work undertaken requires close approach to a rotating part of machinery.
7. Operators are not adequately trained or supervised.

It is the HSE's opinion that a fixed or moveable, interlocked guard would be a practicable method of preventing access to the rotating drill string in all but a very few cases.

Clients and those commissioning drilling work will need to have systems in place to ensure they appoint contractors who are complying with the legal requirements.

New CDM co-ordinators—much more than a change of name

For clients and main contractors that currently follow best practice, the new CDM Regulations should reduce bureaucracy and costs through better planning processes. There will be less inappropriate cost-cutting, less flexibility when it comes to the late appointment of contractors, and a greater legal onus on clients.

Pre-construction Information Pack

For contractors, such as site investigation companies, the early Information Pack will bring great benefits. It should not only result in fewer Friday evening calls for a Monday morning start, but should also make the requirements clearer resulting in less misinterpretation and cost-cutting. Competitors will be applying the same H&S standards when bidding for tenders. With greater time to respond, the SI contractor can be expected to give the client a more considered site specific response; with attention to the detail required.

Co-ordinators

A key element of the new CDM Regulations, due out next Spring, is to change the earlier role of the Planning Supervisor, who according to the Health and Safety Executive (HSE) website often neither planned nor supervised. The new Co-ordinator role will broadly replace that of the Planning Supervisor but the HSE intends it to be much more than a change of name.

An immediate effect will be the need for close cooperation between co-ordinator and client to produce the Pre-construction Information Pack. An important and specific Co-ordinator task is to support and educate the client in this task. The information pack provides background information for those bidding for, or planning work; and for the development of the construction phase plan, which sets out how health & safety is to be managed during the construction phase.

HSE is signalling not merely a change of name for the supervisor but a shift in responsibility to the client - a whole new way of looking at H&S issues with greater onus on the clients. There will be a focus on fundamentals, more precise planning and less opportunity for last-minute decisions.

We believe that the new regulations will have a beneficial effect on quality as well as safety. They will help to evolve new and more efficient ways of working, heralding an era of better communication and a safer environment.

Ray Wood—Managing Director

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“Drilling rigs are required by HSE to have adequate guarding. Under new CDM regulations it becomes the clients' responsibility to ensure their drilling sub-contractors comply”

Geotechnical site investigations at Edinburgh Airport Rail Link

An extensive investigation of soil and rock geotechnical properties has been completed at the site of the proposed Edinburgh Airport Rail Link (EARL). The project, being carried out by Fugro Engineering Services Ltd (FES) for tie limited includes penetration testing, sampling, dynamic probing and geophysical surveys.

The technical complexity of the project is made more challenging by the nature of the work environments. Not only does much of the work need to take place during night-time possessions on the railways but also within Edinburgh airport and the surrounding farmland. Co-ordination of the trackside, airside and landside aspects of the large contract would be a daunting challenge for many site investigation companies but Fugro Engineering Services say they were well prepared.

"Ninety-five per cent of the plant, engineers and operators used on the project are from Fugro's specialist in-

house resources. This has allowed FES to manage the difficult 22 week field programme efficiently despite the specialist nature of the work and the wide-ranging environments. Health and safety have been paramount considerations. Our Consett office in County Durham is well-placed to provide the support we need for major projects in Scotland. We have a highly experienced Project Manager in Neale Davies. He is well-supported by our site agent Andy Horspool who, like many of our staff, has been involved in major transport infrastructure projects such as Hong Kong airport" said Fugro's Project Director, Christian Grundy.

Airport runway

A significant part of the investigation has centred on gathering soil and rock information for the tunnelling route. Geophysical surveys on the airport runway section of the route used a combination of electrical resistivity and electromagnetic methods including ground penetrating radar. Cone penetration testing

through the runway provided a range of geotechnical measurements and a limited number of boreholes were drilled adjacent to the runway. Some services such as concrete-coring were provided by nominated sub-contractor Raynesway.

Railway

Trackside investigations include cable percussion (up to six rigs) and rotary drilling to obtain high quality soil and rock samples for subsequent testing at Fugro's laboratories in Consett and Wallingford. Specialist cone penetration tests such as cone pressuremeter and Mostap sampling were also carried out. Fugro is one of very few companies offering this capability. In total the project included numerous cable percussion boreholes, rotary boreholes, and specialist cone-tests, as well as Mostap sampling, dynamic probing and geophysics at many separate locations near railway track, the airport and embankments - all completed on time and within budget.



Cone penetration testing is fast and effective for airport investigations”

www.fes.co.uk



Geo-environmental cones are pushed into the ground by 20 tonne CPT vehicles to measure in situ contaminants and soil properties

The use of in situ testing supports MCERTS, states Environment Agency

The Environment Agency has stated that "the use of in situ testing to complement MCERTS can significantly improve the quality of site investigation and can reduce the cost of both site investigation and remediation" (Environment Agency management system document, 08/08/06). The policy statement goes on to explain that in situ testing (such as cone penetration testing with environmental cones) can improve targeting of conventional sampling, better delineate contaminated areas and help with the development of conceptual site models. Although only MCERTS accredited data can be used to support regulatory decisions the Environment Agency recognises that in situ testing has an important supporting role to play.

One example of in situ testing of contaminated soils is laser induced fluorescence (LIF) and cone penetration testing to detect and speciate hydrocarbon contamination. This is a well-established technique and many

successful projects have been completed over the last decade. LIF is a specialist tool in frequent use by the major contaminated land consultants. It is often used in conjunction with other environmental cones and geotechnical cones such as the membrane interface probe, MIP piezocone and standard friction cone. Its main features are: -

1. US EPA tested and approved
2. Benefit of combination of accurate soil lithology & contaminant profiles
3. Designed to detect oil derived hydrocarbons
4. Precise profiling of hydrocarbon distribution
5. Low levels of detection
6. Contaminant identity via spectroscopy
7. Real time data acquisition

For anybody interested in finding out more, the Field Analytical Suppliers Association (FASA) is a good source of information and has provided a number of workshops at various

venues around the country. The FASA workshops - included the subject of in situ screening tools presented by Fugro's geo-environmental manager, Darren Cook. The workshops, which are titled "A practical introduction to field analytical tools" have been very well received. Further information on FASA is available on www.ipm-ktn.com. Direct enquiries can also be made to Darren Cook at 0870 402 1400.



Consultants call for higher standards of site investigation

Many of the geotechnical and geo-environmental consultancies are calling for higher standards of site investigation information. This was one of the main findings of a recent poll conducted by Ground Engineering published in their Geotechnical Services File 2006. The importance of quality site investigation is increasingly appreciated by clients and was emphasised by many consultants included in the survey of opinion on current trends.

This indicates that tender evaluations based solely on lowest price should become less common as consultants and clients seek better

standards of information from their contractors. Consultants who select their contractors on lowest cost will undoubtedly find their expectations are not met and their clients will be disappointed with the outcome.

Site investigation contractors who are in the business for the long-term strive to provide good quality data but they are undercut on price by less experienced new entrants to the industry and companies with poor quality control procedures.

Clients and consultants can ensure higher quality site investigations by providing

clear tender documents prepared by staff with geotechnical experience. The scope of work should fully meet the needs for the standards required. The survey indicated that some clients are still reluctant to spend sufficient money on geotechnical work.

Several of Fugro's blue-chip clients commented that there is a large gap in data quality between the best in our field and the rest of the pack. Fugro is the only company in Britain with UKAS accreditation for Cone Penetration Testing.



The magnetometer cone used for detecting unexploded bombs. A friction cone can also be added



Cable percussion drilling to investigate the 15m wide crater caused by a burst water pipe (2.5m diameter, 27m b.gl)

CIRIA to produce "A clients' guide for assessing risk on UXO sites"

Many major regeneration projects taking place in the near future, including London preparing for the 2012 Olympics, will encounter Unexploded Ordnance (UXO) hazards, a legacy from World War I and II bombing. There is currently no guidance available to assist professionals in assessing the construction risks associated with the discovery of UXO. Many developers have limited knowledge of the subject and this has caused delays whilst mitigation measures are put in place at the eleventh hour. CIRIA's new research project *A clients' guide for assessing risk on UXO sites* will produce

the first UK good practice guidance to help developers and clients deal with UXO. The guide will enable these professionals to understand the different approaches and how to appoint specialist contractors. As an integrated part of the project, CIRIA will be carrying out a survey of how UXO sites are dealt with in the UK, with case studies and examples used to highlight the problems facing developers and clients. This will allow good practice to be developed and improvements made to create a level playing field for all professionals

involved in the assessment and management of sites with potential UXO hazards. The project funders include prominent organisations in the construction industry such as Crossrail, HSE, Fugro Engineering Services, Peter Brett Associates, Keller Ground Engineering, RPS Consultants and Transport for London. The research project has been led by consultants Worley Parsons Komex and is currently under way. Further information can be obtained from Joanne Kwan of CIRIA or Steve Poulter at Fugro (0870 402 1423).

Queen Mother Reservoir – Inlet Failure

Inlet Pipe Failure
In April 2006, a 2.5m diameter raw water tunnel (sitting at a depth of ~27.00m b.g.l.) dramatically burst, creating a fifteen metre wide crater and ejected Terrace Gravel and London Clay deposits to a distance of up to twenty five metres. Fugro Engineering Services were invited to create a programme of works to determine the causative factors and to assist the Thames Water Project Team with the remediation using a wide range of specialist in-house techniques, including cable percussive boring, rotary drilling, pushed thin wall sampling, CPT, geophysical surveys and geotechnical testing. The project was high profile and time critical.

Phase 1: Initial Geophysical Survey
The initial works were geophysical surveys using GPR, microgravity and resistivity techniques to ascertain where any voids had been created.

Phase 2: Cable Percussion – Determining ground conditions
FESL determined a safe working distance from the

edge of the crater using slope stability calculations. Cable percussive boring techniques were employed to establish the limit of disturbed ground and to provide data for the design of the proposed remediation. Piezometers and standpipes were installed in boreholes to monitor groundwater conditions.

Phase 3: Cable Percussion and Rotary – Cross Hole Geophysical Investigation
Cable percussive boring and rotary drilling continued for further geologic and geophysical investigations (using the Geobore-S wireline system to obtain high quality continuous core samples). The core was logged in detail and sub sampled immediately on site for geotechnical and chemical testing. A cross-hole geophysical survey was designed and implemented using the boreholes installed to show a clearer picture of the subsurface conditions around the tunnel.

Phase 4: CPT - Increasing lateral resolution
In order to pinpoint the location of pipe failure and areas of disturbance an intensive regime of sixty Cone

Penetration Tests (CPTs) using sleeve friction, tip pressure and excess pore water pressure data was conducted. This successfully located a ~2.5m diameter 'chimney' through which the water had burst.

Phase 5: Cable Percussion – Shaft design and safety
Two shafts were designed to rescue and reline the tunnel and FESL conducted further cable percussive boreholes to aid with design and also to install inclinometer and extensometer monitoring points. These were monitored daily throughout shaft excavation to ascertain whether slope stability was at risk on the reservoir wall. A standpipe was installed in one borehole for use as a dewatering well to relieve pressure from the base of the shaft.

Forensic Phase – Rotary with Cable Percussion
A variety of in situ testing was employed including pushed thin wall sampling, self-boring pressuremeter and permeameter testing, downhole geophysical logging and an additional crosshole geophysical survey.