FIELD PROCEDURE: DRILLING OF BOREHOLES

This is not a health and safety risk assessment

1. APPLICABILITY

This document details the standard field procedures used for drilling boreholes in soil or rock.

2. GENERAL PROCEDURES FOR ALL DRILLING METHODS

Selection of Bore Location

Prior to commencing intrusive works, proposed bore locations must be agreed with the Client and appropriate actions must be taken to check for and avoid underground services in accordance with the project HSEP.

Concrete (or tarmac) Coring

Where there is surface concrete or tarmac, this should be cut and removed using a water-flush, diamond-tip, rotary coring device fixed at an appropriate diameter to facilitate subsequent drilling operations (typically 10 to 25 cm diameter).

The water used to aid coring helps prevent sparking and dust creation. The water must be contained and disposed of appropriately.

Starter Hole

A starter hole will generally be required to at least 2 m depth as a precaution against the possible presence of undetected underground utilities. The starter bore is generally advanced using a hand auger or a non-destructive digging technique.

AECOM Supervision and Soil or Rock Core Logging

All borehole drilling should be observed and directed by a AECOM field scientist/engineer, who should log drill and collect soil samples or rock cores as required for on-site and/or off-site testing. Logging should generally be done on site as drilling progresses (if time allows), but may need to be followed up by more detailed logging carried out later in a controlled environment such as a laboratory or sample store.

In situ analysis of VOCs by headspace technique are carried out every meter (see specific procedure “Headspace screening of Soil samples”).

Groundwater observations

Observations of groundwater conditions are essential throughout the progress of drilling, whether or not monitoring wells are planned, as they give corroborating information on strata sequence and groundwater pressures, and can influence decisions on the need for and the design of monitoring wells. Observations to be made include:

- Depth of strike of water and comparative strength of seepage or inflow

- Depth that the strike or inflow has been sealed or staunched by drill casing
- Depth of standing water at the end of the borehole.

The drilling foreman or operator should make these records by direct measurement. The field engineer/scientist should ensure that the records are being made including confirmation that the hole remains dry at any stage as appropriate.

Photographs

The AECOM field engineer should take photographs of the following (unless cameras are not permitted on site):

- Bore location prior to drilling
- Cores, samples and drilling spoil recovered during drilling, with reference labels [borehole number, sample type and depth] clearly displayed.
- Bore location on completion of the work

Lubricants

No petroleum hydrocarbon oils, greases or similar type lubricants are to be used on equipment that enters the borehole. If drilling lubricants are required, they must be biodegradable, non-petroleum products. The AECOM field engineer must keep records of the substances used.

Backfilling

On completion, bores that are not required for well installation should be backfilled as soon as practicable, using bentonite, bentonite-cement or drilling spoil, with surface hard-standing reinstated if necessary.

Disposal of Excess Soil

Excess soil that is not returned to the bore or collected as samples must be disposed of in an environmentally responsible manner. If it is known or suspected to be contaminated, then unless another appropriate disposal method is available on site, it should be placed into drums or skips for temporary storage at an agreed location on site, pending receipt of laboratory results with which to classify the soil for waste disposal purposes. Drums or skips of waste soil should be capped or covered and must be appropriately labelled.

Decontamination of Equipment

All down-hole drilling equipment should be carefully washed prior to its first use on a site and after use at each location.

3. ADDITIONAL GUIDANCE

Rotary Drilling

Rotary drilling is generally carried out using a truck-mounted rotary rig powered by a diesel engine fitted with spark arrestors (and Chelwyn valve if required). The rotary drill head is hydraulically-powered.

Rotary drilling requires a flushing medium both for cooling and for removing soil and rock chippings from the borehole. The flushing medium may be compressed air, mains supply potable quality water, water mist, foam or mud. If air is used, a compressor blows the air through the drilling rods to the downhole hammer bit and the force of air pushes chippings of drilled material to the surface. At the surface, the chippings are collected via a dust extraction system into bags, which enable logging of material prior to collection in a skip or for bulk sampling.

The rotary drilling technique may comprise either rotary coring or rotary open-hole. Rotary coring involves the use of a triple-tube steel core barrel of typically 100 mm internal diameter (although the core diameter can be varied at the planning stage and can be chosen to suit the formation). The core barrel often has mylar sheeting or more likely a “Coreline” plastic liner forming the third component of the tube system inside the inner steel barrel, to support the rock core and to aid its removal from the core barrel. The core barrel should be withdrawn from the hole and the core removed as often as necessary to maximise core recovery and quality. If the driller suspects blocking of the bit or grinding of the core, the core barrel should be immediately withdrawn from the borehole and the core removed.

Where necessary, temporary casing can be advanced to prevent the caving-in of the formation.