

SUB-APPENDIX A2: SOIL ANALYTICAL SUITES

NOT PROTECTIVELY MARKED

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A2.1.1 There will be three soil analytical suites – summarised in Table 3 in the text. Details of the analyses to be carried out in each suite and the methodologies to be used are provided here.

a) Soil Analytical Suite 1: Characterisation of *in situ* Soil Conditions Ahead of Site Preparation Works

A2.1.2 Soil determinations to be carried out before the start of ground preparation works, to provide a robust baseline of *in situ* soil conditions against which to compare restoration soil conditions at each AD site, are as follows:

- soil texture – % sand, silt and clay (using methodology in BSI, 1990a). (Ref. 1) as well as a crude determination of % w/w organic matter content.
- soil pH (methodology in MAFF, 1968) (Ref. 2).
- total P, K and Mg (using the methodology in MAFF, 1968) (Ref. 2).
- soil bulk density – both topsoil and subsoil – measured using both hand-held cone penetrometer and via sampled soil cores, subsequently analysed in the laboratory. The method to be used will be that described in BSI (1990a) (Ref 1).
- soil moisture content at plastic limits determined using the methodology described in BSI (1990a) (Ref. 1).
- percentage stoniness by volume. The method to be used will be that described in BSI (1990a) (Ref. 1); and
- aggregate stability testing. The method to be used will be that described in Black *et al.* (1965) (Ref. 3).

A2.1.3 The determination of soil texture will use the methodology described in BSI (1990a) BS 1377-2 Methods of test for soils for civil engineering purposes. Classification Tests (Ref. 12).

b) Soil Analytical Suite 2 – Soil testing of soils in stockpiles ahead of restoration activities

A2.1.4 The following suite of *in situ* and laboratory analyses will be carried out on soils sampled from stockpiles immediately before, but not more than four weeks ahead of, restoration activities.

A2.1.5 In situ determinations:

- compaction/density, using a hand-held penetrometer (to determine whether in-situ treatment is required (such as ripping or harrowing) to alleviate soil compaction;
- soil moisture content (%) to determine whether in-situ treatment is required to assist soil drying;
- soil structure – using simple hand excavation technique and wet sieving. Type and strength of peds will be recorded; and
- odour (qualitative) – indication of anaerobism to determine if *in situ* treatment is required to assist aeration during restoration.

A2.1.6 Laboratory analyses:

- pH (determined in both distilled water and CaCl₂);
- organic Matter content (%) determined using both LOI and Walkley Black (some soils are derived from limestone and LOI is inaccurate in such soils);
- conductivity;
- total P, K and Mg (for all soils to be reinstated/restored for agricultural purposes). This will permit calculation of fertility indices to allow calculation of required fertilizer application rates for proposed cropping end uses;
- aggregate stability (wet sieving method); and
- assessment of topsoil stoniness (%) to ensure that contamination with stony phase has not occurred

A2.1.7 Soils stockpiled appropriately for restoration purposes are considered, as a result of the pre-development Site Investigation results, to be uncontaminated and hence no further contaminant analyses will be carried out at the site restoration phase.

c) Soil Analytical Suite 3 – *in situ* soil in restoration compartments after works are completed

A2.1.8 The analyses to be carried out in all reinstated or restored areas of land will be those described as follows;

- pH (determined in both distilled water and CaCl₂);
- organic Matter content (%) determined using both LOI and Walkley Black (some soils are derived from limestone and LOI is inaccurate in such soils);
- conductivity;
- total P, K and Mg (for all soils to be reinstated/restored for agricultural purposes). This will permit calculation of fertility indices to allow calculation of required fertilizer application rates for proposed cropping end uses;
- 2M KCl-extractable inorganic N (NH₄-N and NO₃-N). These will give an indication of plant (crop)-available inorganic N;
- aggregate stability (wet sieving method);
- in situ bulk density (by taking 5cm diameter x 10cm cylindrical auger cores in the field at 10cm intervals horizontally down each excavated soil profile through the stockpile); and
- assessment of topsoil stoniness (%) to ensure that contamination with stony phase has not occurred.

References

- 1 British Standards Institute (BSI) (1990a) BS 1377-2 Methods of Test for Soils for Civil Engineering Purposes. Classification Tests.
- 2 MAFF (1968) The Analysis of Agricultural Materials by Hislop J and Cooke IJ. Booklet RB427.
- 3 Black, C.A. (Ed) et al. (1965) Methods of Soil Analysis. Part 1: Physical and Mineralogical Properties. No 9 in the series Agronomy, pp 511-519. America Society of Agronomy Inc., Madison, Wisconsin, USA.