| SOIL | Description of Nutrient Test Methods | Turnaround (working days) | Amount of sample (kg or Litres) |
|---|---|---|---|
| *Aluminium Extractable | Based on Rayment & Lyons; 15G1 using ICP-07; extracted with 1:3 soil/1M potassium chloride solution for one hour. Extractable aluminium closely follows the pH of the soil and becomes a problem when the pH (water) is less than 5.5 (in soils which contain significant aluminium). | 5 | 0.1 |
| *Boron Extractable | Based on Rayment & Lyons; 12C2 extracted with 1:2 soil/0.01M calcium chloride solution, refluxed for 10 minutes. Measured on ICP by ICP-05. Rayment & Lyons; 12C1 extracted with 1:2 soil/0.01M calcium chloride solution, refluxed for 10 minutes. Measured manually on UV Vis PMS-14. | 5 | 0.1 |
| Calcium Carbonate % | Based on Rayment & Lyons 19A1 | 5 | 0.1 |
| *Carbon Organic | Rayment & Lyons; 6B3; based on loss-on-ignition/combustion method. The carbon present in the soil is oxidised to carbon dioxide ($CO_2$) by heating the soil to at least 900 °C in a flow of oxygen-containing gas that is free from carbon dioxide. | 5 | 0.1 |
| *Carbon Organic | Rayment & Lyons; 6A1 based on Walkley-Black Organic carbon is measured by digestion in strong acid/dichromate solution and the colour development assessed against standard sucrose. | 5 | 0.1 |
| *Carbon Total | Rayment & Lyons; 6B2b based on loss-on-ignition/combustion method. Carbon is the organic material in soil which improves moisture holding capacity, increases soil structural stability and protects soil from erosion. | 5 | 0.1 |
| Carbon/Nitrogen Ratio | Carbon to nitrogen Ratio, Carbon:nitrogen ratio is used when making compost from organic material. | 5 | 0.2 |
| *Cations Exchangeable (K, Ca, Mg, Na) & ECEC | Based on Rayment & Lyons; 15A1 and ICP-06. Of particular importance are the exchangeable cations (calcium, magnesium, sodium, potassium and aluminium) and the cation exchange capacity. 1M $NH_4Cl$ at pH 7.0 - Used for neutral soils pH ($H_2O$) between 6.5 and 8. Here, cations Ca, Mg, Na and K are measured by ICP-OES | 5 | 0.1 |
| Cations Soluble (Ca, Mg, Na) & SAR | Based on in house method ICP-11. Sodium absorption ratio (SAR) also can be used as indication of soil sodicity; it shows the relation between soluble sodium and soluble divalent cations which can be used to predict the exchangeable sodium fraction of soil equilibrated with a given solution. | 5 | 0.1 |
| *CEC Cation Exchange Capacity inc. ex Cations | Based on ECEC Rayment & Lyons; 15J1 (Extraction 15A1) using in house PMS-15A. ECEC the effective cation exchange capacity is a measure of the soils ability to hold cations. The sum of exchangeable bases plus total soil acidity at a specified pH value (usually 7 or 8). The unit is centimoles of charge per kilogram of exchanger (cmolc/kg). In surface soils the cation exchange capacity is associated with clay content, organic matter and type and retention of cations. The CEC in this procedure is calculated by adding the 5 cations and as such is the EFFECTIVE CEC. | 5 | 0.1 |
| CEC Cation Exchange Capacity with soluble salts, gypsum and lime wash inc. ex cations | Based on Rayment & Lyons; 15J1 (Rayment & Lyons extraction 15A2). Soluble salts must be removed from soils with EC 1:5 > 30 dS/m by washing with glycol-ethanol. | 5 | 0.1 |
| *Chloride soluble | Based on Rayment & Lyons; 5A1 using PMS-05. Extracted with 1:5 soil/water for one hour. Measured with ISE Probe. | 5 | 0.1 |
| *Conductivity EC | Based on Rayment & Lyons; 3A1 using PMS-03. The electricity conductivity (EC) of the 1:5 soil/water suspension is measured and the results are expressed in decisiemens/metre (dS/m). | 5 | 0.1 |
| Conductivity ECe inc. texture | By calculation using in house method PMS-32. The value for EC (1:5 soil/water) is converted to an estimated electrical conductivity of a saturation paste extract (ECe) by multiplying by a texture factor. | 5 | 0.1 |
| *ESP Exchangeable Sodium Percentage | Exchangeable Sodium Percentage (ESP) ESP is used to indicate if soils have sodic properties ie: the cation exchange complex is saturated with too much sodium. Sodic soils are often dispersive with poor structural characteristics. | 5 | 0.1 |
| Free Lime or Fizz Index | This method tests for the presence of carbonates in soil materials and is also may be known as the “fizz” test. The method is based on the reaction of HCl with soil carbonates and visual observation of gaseous loss of $CO_2$ from the sample. Soils may be categorised as slightly reactive, moderately reactive or highly reactive. The method detection limit is approximately 0.2% $CaCO_3$ equivalent (on a dry soil basis). | 5 | 0.1 |
| Heavy Metals | Total or dissolved arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, nickel, selenium and zinc. | 5 | 0.1 |
| Lime Index – Available Lime | AS4489.6.1-1997 The available lime index of quicklime and hydrated lime designates those constituents that enter into the reaction under the conditions of this specified test method, otherwise known as the “rapid sugar test method”. | 5 | 0.1 |

| SOIL | Description of Nutrient Test Methods | Turnaround (working days) | Amount of sample (kg or Litres) |
|---|---|---|---|
| *Moisture | Based on classical techniques AS1289.2.1.1 and in house PMS-17. Calculation and reporting of the results of soil analysis is done on basis of "oven-dry" soil. | 5 | 0.1 |
| Nitrogen Drawdown Index, | Is a method for determining the Nitrogen Drawdown index (NDI) from the rate at which a potting mix or landscaping soil uses (draws down) soluble nitrogen according to Australian Standards 3743, 4419 and 4454. | 5 | 0.5 |
| *Nitrogen Total | Based on Rayment & Lyons; 7A1 where total nitrogen is measured by Kjeldahl digestion of soil (copper sulphate-potassium sulphate catalyst). Provides a good estimate of total soil N in soils with little NO3: otherwise slightly lower apparent total soil N concentrations are likely. The method initially involves semi-micro Kjeldahl digestion. | 5 | 0.1 |
| *Nitrogen Total | Based on Rayment & Lyons; 7A5. LECO/dumas. The nitrogen content is determined by heating to 900 °C in the presence of oxygen gas. Mineral and organic nitrogen compounds are oxidised and/or volatilised. The combustion products are oxides of nitrogen (NOx) and molecular nitrogen (N2). After transforming all nitrogen forms into N2, the content of total N is measured using thermal conductivity. | 5 | 0.1 |
| Nitrogen-Ammonium Extractable | Based on and in-house method PMS-22; using 1:10 ratio 2MKCL extraction. | 5 | 0.1 |
| *Nitrogen-Nitrate Extractable | Based on UV-Vis using in house method PMS-08. This method uses the same 1:5 soil/water suspension described for method 3A1. The filtered or centrifuged aliquot is subjected to automated colorimetric analysis. | 5 | 0.1 |
| *pH (CaCl2) 1:5 | Based on Rayment & Lyons; 4B2 and PMS-0402; pH (calcium chloride) is measured in a 1:5 soil/0.01M calcium chloride suspension. pH (calcium chloride) is normally 0.5 - 1.2 units lower than pH (water) | 5 | 0.1 |
| *pH (H2O) 1:5 | Based on Rayment & Lyons; 4A1 and PMS-0401; pH(water) is measured on a solution of 1 part soil to 5 parts water. Soil pH is a measure of soil acidity. Most crops grow best if the soil pH is between 6.0 and 7.5. | 5 | 0.1 |
| *Phosphorus Bray No.1 | Based on Rayment & Lyons; 9E1 Bray No.1 Extractable Phosphorus using in house method PMS-11. The Bray test tends to be more suitable for the North Coast's acid soils. Because phosphorus tends to tie up with aluminium and iron and become unavailable to plants in acid soils, it is important to keep your pH at around 5 if your soil is to benefit from phosphorus. | 5 | 0.1 |
| Phosphorus BSES | Based on Rayment & Lyons; 9G1 Acid Extractable Phosphorus. The Bureau of Sugar Experiment Stations (BSES) phosphorous (P) tests have been increasingly adopted in the broad acre cropping section, and used in conjunction with Colwell P and Phosphate Buffering Index (PBI), to describe soil P status across the region. | 5 | 0.1 |
| *Phosphorus Buffer Index | Based on Rayment & Lyons; 9I2A Phosphorus Buffer Index by UV-Vis using PMS-12. This test is a measure of the soil's ability to tie up phosphorus. PBI can assist in determining fertiliser requirements. | 5 | 0.1 |
| *Phosphorus Colwell | Based on Rayment & Lyons; 9B1 Colwell Extractable phosphorus using PMS-10. A 1:100 soil/0.5M sodium bicarbonate extract is shaken for 16 hours and the phosphorus concentration determined by colourimetry. Bicarbonate P is measured by the method of Colwell (1963), viz. 1:100 soil:solution ratio, extractant is 0.5 M sodium bicarbonate (pH 8.50), 16 hours extraction at 23oC. | 5 | 0.1 |
| *Phosphorus Sorption Capacity | Based on Rayment & Lyons; 9I2A Phosphorus Sorption Capacity. This test is a measure of the soil's ability to tie up phosphorus. It can assist in determining fertiliser requirements. | 5 | 0.1 |
| *Phosphorus Total | Based on Isaac and Johnson Digest, measured on ICP-OES using in-house method ICP-03. | 5 | 0.1 |
| Potassium Colwell Available | Based on Rayment & Lyons 18A1; A 1:100 soil/0.5M sodium bicarbonate extract is shaken 16 hours & potassium is measured by ICP-OES. | 7 | 0.1 |
| *Sulphur extractable KCl-40 | Based on Rayment & Lyons 10D1 and in-house method ICP-04 or in-house UV-Vis PMS-13. Soil sulphur is extracted with 0.25M potassium chloride heated at 40oC for 3 hours. The concentration is determined using an ICP spectrometer. | 7 | 0.2 |
| Trace (Cu, Fe, Mn and Zn) EDTA | Extracted with 1:5 soil/0.02M EDTA (pH 4.9) for one hour. The analytes are determined by ICP. Measures plant-available forms of these elements. | 7 | 0.2 |
| *Trace (Cu, Fe, Mn and Zn) DPTA | Based on Rayment & Lyons 12A1 using ICP-08. Extracted using a 0.005 M DTPA, 0.01 M CaCl2 and 0.10 M triethanolamine solution. The analytes are determined by ICP. | 7 | 0.2 |

*Indicates NATA Accreditation

| SOIL | Description of Physical Test Methods | Turnaround (working days) | Amount of sample (kg or Litres) |
|---|---|---|---|
| Angle of Repose | Assess the ability of a material to be retained on a slope. The size of the sample required depends on the average aggregate size of the material. Maximum size is 200mm aggregates. | 5 | 1-40 |
| Coefficient of Uniformity | Calculation to assess particle uniformity from PSA. | 5 | 0.5 |
| Colour Munsell | Identifies soil colour on the Munsell charts | 5 | 0.1 |
| Density Bulk Re-compacted | USGA Re-compaction method used. The mass of dry soil per unit volume of soil with units of g/cm3, mg/m3 or t/m3. The bulk volume is determined before drying to constant weight at 105°C. ASTMF 1815-97 | 7 | 1.0 |
| Density Bulk Fixed Volume | Fixed volume method used. The mass of dry soil per unit volume of soil with units of g/cm3, mg/m3 or t/m3. The bulk volume is determined before drying to constant weight at 105°C.Intact core method 503.01 | 7 | 1.0 |
| Density Bulk Clod | Clod Method used. The mass of dry soil per unit volume of soil with units of g/cm3, mg/m3 or t/m3. The bulk volume is determined before drying to constant weight at 105°C. | 7 | Clods |
| Density Particle | AS1289.3.5.1 | 5 | 0.5 |
| Dispersion index | This test observes the dispersion potential of soils on wetting and remoulding – NSW soil pack. | 5 | 0.1 |
| Dispersion Percentage | This test measures the percentage at which a soil will disperse. Craze &Hamilton AS1289.c8.2 | 7 | 0.5 |
| *EAT | Emerson Aggregate Test is a measure of the stability of a soil aggregate through assessing its slaking and dispersion potential. AS1289.3.8.1 | 5 | 0.1 |
| EAT Adjusted SAR 5 | Emerson Aggregate Test with dispersion conducted in SAR 5 to assess the soils slaking and dispersion properties when exposed to effluent waters. AS1289.3.8.1 | 5 | 0.1 |
| *Linear Shrinkage | AS 1289.3.4.1 Determination of the linear shrinkage of a disturbed sample. | 7 | 0.5 |
| Porosity | Total, air-filled & capillary porosity. ASTMF 1815-97 at 30cm tension. | 7 | 0.5 |
| PSA Particle Size Analysis Hydrometer | Australian Standard for Agricultural Soils. Determinations of the distribution of particles in soil i.e. gravel, sands, silts and clay. | 4 | 60g clay 130g sand |
| PSA Particle Size Analysis Hydrometer | USGA Method ASTMD422-63 Determination of the distribution of particles in soil i.e. gravel, sands, silts and clay. | 4 | 60g clay 130g sand |
| *PSA Particle Size Analysis Sieves only | Australian Standard 1141-12 Determination of the distribution of particles in soil i.e. gravel, sands, silts and clay. | 3 | 130g sand only |
| Particle Size Distribution Hydrometer | Australian Standard AS1289.3.6.2 Determination of the distribution of particles in soil i.e. gravel, sands, silts and clay. | 5 | 55g clay |
| Saturated Hydraulic Conductivity | ASTM F 1815-97 Rate in mm/hr at 30cm tension that water passes through the saturated soil sample. | 2 | 0.4 |
| Soil Moisture Curve | Five point soil moisture retention curve necessary for providing input data to numerical modelling required in any assessment of the suitability of soils for phytocapping landfills. ASTM Designation: D 5084 – 00e1. | 15 | 2-4 |
| Texture | Soil texture is not readily subject to change, so it is considered a basic property of a soil. Soil texture refers to the size (diameter) of individual soil particles. McDonald et al. | 5 | 0.1 |
| Total Water Holding Capacity | Determination of total water holding capacity under conditions resembling a home or nursery growing environment according to Australian Standard 3743. | 5 | 1.0 |
| Toxicity | Determines whether the potting mix, landscaping soil or soil conditioner is sufficiently toxic to inhibit the growth of roots according to Australian Standards 3743, 4419 and 4454. | 10 | 1.0 |
| Wettability | Determination of the wettability of potting mix, soil or soil conditioners according to AS 3743, 4419 and 4454. | 5 | 1.0 |
| Water retention | Measures the capacity for a soil to store the maximum amount of water. ASTMF 1815-97 | 7 | 0.2 |

*Indicates NATA Accreditation

| SOIL | Description of Testing Suites | Turnaround (working days) | Amount of sample (kg or Litres) |
|---|---|---|---|
| AS4419 Soil Landscaping | pH($H_2O$), EC, NH4, Bulk Density, Organic Matter, Soluble PO4, texture, CEC, Fe, Cl, Wettability, NDI, Toxicity, Dispersibility, Permeability, Large particles, Heavy Metals(As, Cd, Cr, Cu, Ni, Hg, Pb, Se, Zn) and Residues (organo-chlorines & PCB), TRH, BTEX and total phenol. | 10 | 6 |
| AS3743 Potting Mixes | Air filled porosity, total water holding capacity, Wettability, pH, EC, Cl, ammonium-N, ammonium+nitrate-N, Nitrogen drawdown index, toxicity, soluble P, K, Ca, Mg, Na, K/Mg ratio, Ca/Mg ratio, S, Fe, Cu, Zn, Mn & B. Heavy Metals(As, Cd, Cr, Cu, Ni, Hg, Pb, Se, Zn) and Residues (organo-chlorines & PCB) | 10 | 6 |
| AS4454 Composts Mulches and Soil Conditioners | pH($H_2O$), EC, $NH_4$, $NO_3$, Total N, Bulk Density, Organic Matter/Carbon, C/N ratio, Soluble $PO_4$, Total P, B, Na %, Na, Ca, Mg, K CEC, DTPA Trace Cu, Zn, Mn, Fe & B, Wettability, Toxicity, NDI, Permeability, Particle Size Grading, Moisture Content, Visual Contaminants, Heavy Metals(As, Cd, Cr, Cu, Ni, Hg, Pb, Se, Zn) and Residues (organo-chlorines & PCB) | 10 | 6 |
| Carbon Monitoring Suite | Total Carbon, Organic Carbon, Bulk Density, Texture, Moisture. | 10 | 2 |
| A2 | Chloride, pH ($H_2O$ & $CaCl_2$), EC, Total N and Nitrate-N, Colwell P and K, Phosphorous Buffer Index (PBI), KCl-40 Available S, Ex Cations {K, Ca, Mg, Na & Al} ECEC, ESP, Ca/Mg, K/Mg, Organic Carbon | 10 | 1 |
| A3.2 | pH ($H_2O$ & $CaCl_2$), Conductivity, Available Phosphorus, Total Nitrogen, Organic Carbon, Ex Cations {K, Ca, Mg, Na & Al}, ECEC, ESP, Total Cations {K, Ca, Mg, Na} | 10 | 0.5 |
| A3.9 | pH (H2O & CaCl2), Conductivity, Total and available phosphorous, Total Nitrogen, NH4, NH3, NO2, & NO3, 9 Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, SE, Zn), Organo-chlorines & PCB's | 10 | 1 |
| Soil Test Sports Field | pH($H_2O$), EC, PSA Hydrometer, Porosity, Water Retention, Bulk Density USGA, Permeability (SHC), Particle Size Grading and Moisture Content, | 7 | 1 |
| S1 | Full Test- E.C., pH($CaCl_2$), $NO_3$-N, P, PBI, S, O, Carbon, Cu, Zn Mn, Fe, {K, Ca, Mg & Na} in ppm, Meq/100g & %, C. E. C. & Ca/Mg ratio. | 7 | 0.2 |
| S2 | NPS Macro- E. C., pH($CaCl_2$), $NO_3$-N, P, S {K, Ca, Mg & Na} in ppm, Meq/100g & %, C.E.C & Ca/Mg ratio. | 7 | 0.2 |
| S3 | NPS Trace- E.C., pH($CaCl_2$), $NO_3$-N, P, S, Cu, Zn, Mn & Fe. | 7 | 0.2 |
| S4 | NPSK- E.C., pH($CaCl_2$), $NO_3$-N, P, S & K. | 7 | 0.2 |
| S5 | Basic Test- E.g.: E.C., pH($CaCl_2$), & $NO_3$-N | 7 | 0.2 |
| VENM/ENM | VENM/ENM validation. Complete analysis and report certificate. | 10 | 6 |
| Wastewater Application | Modified wastewater: soil analysis for a single lot. | 10 | 2 |
| Wastewater Application | Modified wastewater: soil analysis for a subdivision. | 10 | 3 |
| Wastewater Application | Report for engineers on modified wastewater: soil analysis for a single lot or subdivision. | 10 | - |
| Heavy Metals | Total or dissolved arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, nickel, selenium and zinc. | 5 | 0.1 |

| GEOTECHNICAL | Description of Engineering Test Methods |
|---|---|
| *Sampling | Soil, Aggregates & Concrete AS 1141.3.1 Methods for sampling and testing aggregates - Sampling – Aggregates; RMS (NSW) Method T100 Sampling from a truck, stockpile. AS 1289.1.2.1 Methods of testing soils for engineering purposes - Sampling and preparation of soils - Disturbed samples - Standard method; RMS (NSW) Method T100 Disturbed sampling from a stockpile. AS 1012.1 Methods of testing concrete - Sampling of concrete. RMS (NSW) Method T300 Fresh Concrete. |
| *Bulk Density Aggregate | Uncompacted and compacted bulk density AS 1141.4 Methods for sampling and testing aggregates - Bulk density of aggregate. |
| *Sieving Aggregate (PSD) | Particle Size Distribution AS 1141.11.1 Methods for sampling and testing aggregates - Particle size distribution - Sieving method. RMS (NSW) T201. |
| *Sieving Aggregate(<75μm) | Material <75μm. AS 1141.12 Methods for sampling and testing aggregates - Materials finer than 75 um in aggregates (by washing). RMS (NSW) T203. |
| *Average Least Dimension Aggregate | AS 1141.20.1 Methods for sampling and testing aggregates - Average least dimension - Direct measurement (nominal size 10 mm and greater). Methods for sampling and testing aggregates - Average least dimension - Direct measurement (nominal sizes 5 mm and 7 mm). RMS (NSW) Methods T235, T275 average least dimension; crushed faces. |
| *Wet/Dry Strength Variation Aggregate | AS 1141.22 Methods for sampling and testing aggregates - Wet/dry strength variation. RMS (NSW) Method T215 Aggregate crushing value; wet/dry strength variation. |
| *Weak Particles Aggregate | AS 1141.32 Methods for sampling and testing aggregates – Weak particles (including clay lumps, soft and friable particles) in coarse aggregates. |
| Organic Impurities Aggregate | AS 1141.34Methods for sampling and testing aggregates – Organic impurities other than sugar |
| *Maximum Dry Compressive Strength Aggregate | RMS (NSW) T114. |
| *Fractured Faces Aggregate | RMS (NSW) Methods T239; crushed faces. |
| *Particle Shape Aggregate | AS 1141.14 Methods for sampling and testing aggregates - Particle shape, by proportional calliper.<br>RMS (NSW) Methods T213. Proportional calliper. |
| *Foreign Materials Content Aggregate | Recycled Aggregates RMS (NSW) Method T276 Foreign material in Crushed Concrete. |
| *Particle Density and Water Adsorption Aggregate | Fine Materials AS 1141.5 Methods for sampling and testing aggregates - Particle density and water absorption of fine aggregate. Coarse Materials AS1141.6.1 |
| Point Load Aggregate | RMS (NSW) Methods T223 |
| *Aggregate Crushing Value Aggregate | AS 1141.21 Methods for sampling and testing aggregates - Aggregate crushing value. RMS (NSW) Method T215 Aggregate crushing value. |
| External tests Aggregate | LA Value, Flakiness, Triaxial, Acid Sulphate, Electrical Resistance, Sodium Sulphate & Resistance to Wear by Wet Attrition |
| *Soil Moisture Content | Oven Dry AS 1289.2.1.1 Methods of testing soils for engineering purposes - Soil moisture content tests - Determination of the moisture content of a soil - Oven drying method (standard method). RMS (NSW) T120. |
| *Plasticity Index (1 point) | AS 1289.3.2.1 Methods of testing soils for engineering purposes - Soil classification tests - Determination of the plastic limit of a soil - Standard method. AS 1289.3.3.1 Methods of testing soils for engineering purposes - Soil classification tests - Calculation of the plasticity index of a soil. AS 1289.3.1.2 Methods of testing soils for engineering purposes - Soil classification tests - Determination of the liquid limit of a soil - One point Casagrande method (subsidiary method) |
| *Plasticity Index (4 point) | AS 1289.3.2.1 Methods of testing soils for engineering purposes - Soil classification tests - Determination of the plastic limit of a soil - Standard method. AS 1289.3.3.1 Methods of testing soils for engineering purposes - Soil classification tests - Calculation of the plasticity index of a soil. AS 1289.3.1.1 Methods of testing soils for engineering purposes - Soil classification tests - Determination of the liquid limit of a soil - Four point Casagrande method. RMS (NSW) T108, T109. |
| *Linear Shrinkage Soil | AS 1289.3.4.1 Methods of testing soils for engineering purposes - Soil classification tests - Determination of the linear shrinkage of a soil - Standard method. RMS (NSW) T113. |

| GEOTECHNICAL | Description of Engineering Test Methods |
|---|---|
| *Emerson Class Soil | AS 1289.3.8.1 Methods of testing soils for engineering purposes - Soil classification tests - Dispersion - Determination of Emerson class number of a soil. |
| PH of a soil | RMS (NSW) Methods T123 |
| *Shrink Swell Soil | AS 1289.7.1.1 Methods of testing soils for engineering purposes - Soil reactivity tests - Determination of the shrinkage index of a soil - Shrink-swell index. |
| *Standard Compaction - (Only) Soil | AS 1289.5.1.1 Methods of testing soils for engineering purposes - Soil compaction and density tests - Determination of the dry density/moisture content relation of a soil using standard compactive effort. RMS (NSW) Methods T111, T130 Standard compaction. |
| *Modified Compaction – (Only) Soil | AS 1289.5.2.1 Methods of testing soils for engineering purposes – Soil compaction and density tests – Determination of the dry density/moisture content relation of a soil using modified compactive effort. RMS (NSW) T112. |
| Max/Min Only | AS 1289.5.5.1 Methods of testing soils for engineering purposes – Soil compaction and density tests – Determination of the minimum and maximum dry density of a cohesionless material – Standard method |
| *California Bearing Ratio Soil | AS 1289.6.1.1 Methods of testing soils for engineering purposes - Soil strength and consolidation tests - Determination of the California Bearing Ratio of a soil - Standard laboratory method for a remoulded specimen. RMS (NSW) Methods T117, T132 Bearing ratio (remoulded specimens). |
| *Dynamic Cone Penetrometer (Aust Std) | AS 1289.6.3.2 Methods of testing soils for engineering purposes - Soil strength and consolidation tests - Determination of the penetration resistance of a soil - 9kg dynamic cone penetrometer test. RMS (NSW) T161. |
| *Pre-Treatment - Repeated Compaction Soil | RMS (NSW) T102. |
| *Field Density - by Nuc Gauge with Std HILF | AS 1289.5.7.1 Methods of testing soils for engineering purposes - Soil compaction and density tests - Compaction control test - Hilf density ratio and Hilf moisture variation (rapid method). AS1289.5.8.1, Methods of testing soils for engineering purposes, Soil compaction and density test – determination of field density and field moisture content of a soil using a nuclear surface moisture – density gauge – direct transmission mode, AS1289.5.4.1, Methods of testing soils for engineering purposes, Soil compaction and density test – Compaction control test- Dry density ratio, moisture variation and moisture ratio |
| *by Nuc Gauge with Max/Min | AS 1289.5.4.1 Methods of testing soils for engineering purposes - Soil compaction and density tests - Compaction control test - Dry density ratio, moisture variation and moisture ratio. AS 1289.5.6.1 Methods of testing soils for engineering purposes - Soil compaction and density tests - Compaction control test - Density index method for a cohesionless material. ). AS1289.5.8.1, Methods of testing soils for engineering purposes, Soil compaction and density test – determination of field density and field moisture content of a soil using a nuclear surface moisture – density gauge – direct transmission mode, |
| *Field Density - by Nuc Gauge with Mod HILF | AS 1289.5.7.1 Methods of testing soils for engineering purposes - Soil compaction and density tests - Compaction control test - Hilf density ratio and Hilf moisture variation (rapid method). AS1289.5.8.1, Methods of testing soils for engineering purposes, Soil compaction and density test – determination of field density and field moisture content of a soil using a nuclear surface moisture – density gauge – direct transmission mode, AS1289.5.4.1, Methods of testing soils for engineering purposes, Soil compaction and density test – Compaction control test- Dry density ratio, moisture variation and moisture ratio |
| *Unconfined Compressive Strength - RTA - Lab | RMS (NSW) Methods T131 Relative compaction; dry density ratio,; density index; compaction control- Hilf method; field density using a nuclear gauge. |
| *Unconfined Compressive Strength - RTA - Site | RMS (NSW) Methods T116. Compressive strength tests (maximum, dry and unconfined). |
| Remoulded Permeability | AS 1289.6.7.1Methods of testing soils for engineering purposes - Soil strength and consolidation tests - Determination of permeability of a soil- Constant head method for a remoulded specimen, AS 1289.6.7.2 Methods of testing soils for engineering purposes - Soil strength and consolidation tests - Determination of permeability of a soil - Falling head method for a remoulded specimen AS 1289.6.7.3 Methods of testing soils for engineering purposes - Soil strength and consolidation tests - Determination of permeability of soil - Constant head method using a flexible wall permeameter |

| GEOTECHNICAL | Description of Engineering Test Methods |
|---|---|
| *Particle Size Distribution Soil (>75μm) | AS 1289.3.6.1 Methods of testing soils for engineering purposes - Soil classification tests - Determination of the particle size distribution of a soil - Standard method of analysis by sieving. RMS (NSW) T106. |
| Particle Size Distribution Soil Decant (<2.36mm) | RMS (NSW) T107. Fine particle size distribution of road construction materials |
| *Particle Size Distribution Soil (<4.75mm) | AS 1289.3.6.3 Methods of testing soils for engineering purposes - Soil classification tests - Determination of the particle size distribution of a soil - Standard method of fine analysis using a hydrometer. |
| External Subcontract | Soil Permeability AS1289.6.7. |
| *Concrete Crush Only | AS 1012.9 Methods of testing concrete - Compressive strength tests - Concrete, mortar and grout specimens. RMS (NSW) Methods T305, T306 Compressive strength. AS1012.8, methods of test concrete – method for making and curing concrete – compression and indirect tensile test specimens |
| *Concrete Slump Only | AS 1012.3.1 Methods of testing concrete - Determination of properties related to the consistency of concrete - Slump test. RMS (NSW) Method T301 Slump Test. |
| *Cast Cure & Crush | AS 1012.8.1 Methods of testing concrete - Method for making and curing concrete - Compression and indirect tensile test specimens. RMS (NSW) Method T304, Making and curing compression specimens. AS 1012.12.1 Methods of testing concrete - Determination of mass per unit volume of hardened concrete - Rapid measuring method. RMS (NSW) Method T316 Measurement method. |
| External Subcontract | Concrete Shrinkage and/or Flex |
| Site Classifications | Residential & Industrial |
| Field logs | Soil profiling, test pits, core/bore holes and other field observations including texture and colour. |
| Benkelman Beam | This test procedure covers the determination of the rebound deflection of a pavement under a standard wheel load and tyre pressure, with or without temperature measurements. RMS (NSW) T160. |

*Indicates NATA Accreditation

| WATER | Description of Test Methods | Turnaround (working days) | Amount of sample (kg or Litres) |
|---|---|---|---|
| *Alkalinity | Based on APHA 2320 and PMW-07. Alkalinity is a measure the bicarbonates and sometimes hydroxides that make water alkaline. The alkalinity in water comes partly from carbon dioxide dissolving in the water to form bicarbonate and H+ ions. Based on method APHA 2320B and in house PMW-07 including bicarbonate, carbonate, hydroxide and total alkalinity in mg/L. | 5 | 0.1 |
| *Cations (K, Ca, Mg & Na) | Calcium ions in water originate from the weathering of minerals, sewage and many types of industrial wastewater. The calcium content of water has a marked effect of water infiltration in many soils. Magnesium is a major contributor to the hardness of water and high levels in irrigation water can lead to undesirable effects on the structure of soil. Excess magnesium can cause scouring and diarrhoea in livestock and can also result in scaling and encrustation of fittings. Sodium is a natural component of water that contributes to the salt content of waters. Sodium can have a major impact on the salinity & sodicity of waters used for agricultural & human consumption purposes. Dissolved potassium, calcium, magnesium and sodium by ICP OES using method APHA 3120 Band in house ICP-09. | 5 | 0.1 |
| *Chloride (soluble) | Based on ISE using in-house method PMW-09. Soluble chloride by ion selective electrode (ISE) using method in house PMW-09. | 5 | 0.1 |
| Chlorine Total Residual | Based on APHA-4500 and in-house method PMW-06. Chlorine is widely used as a cheap and effective sanitiser for water. Bacteriological contamination is unlikely to occur if free chlorine levels are kept around 0.4 – 0.5 mg/l. Total Chlorine is measured by UV-Vis spectrophotometer (HACH) based on APHA 4500 Cl G and in house PMW-06. | 5 | 0.1 |
| *Chlorine Free Residual | Based on APHA-4500 and in-house method PMW-06. Free Chlorine is measured by UV-Vis spectrophotometer (HACH) using APHA 4500 Cl G and in house PMW-06 | 5 | 0.1 |
| Colour Apparent | Apparent colour is measured by classical (HACH) techniques using in house method PMW-06. | 5 | 0.1 |
| Colour True | Based on in-house method PMW-08. True colour is measured by classical (HACH) techniques using in house method PMW-06 where the sample is filtered to remove suspended solids. | 5 | 0.1 |
| *Conductivity EC | Based on APHA 2510 B and in house PMW-03. Electrical conductivity (EC) is a measure of the capacity of a liquid to pass an electric current, and increases as salinity increases. EC is the most common measurement of salinity in both soil & water. Electrical conductivity is measured by classical (meter) based on APHA 2510 B and in house PMW-03. | 5 | 0.1 |
| *Dissolved Oxygen | The dissolved oxygen (DO) is oxygen that is dissolved in water. The oxygen dissolves by diffusion from the surrounding air; aeration of water that has tumbled over falls and rapids; and as a waste product of photosynthesis. DO is measured by classical (Meter) using APHA 4500 O G and in house PMW-02. | 5 | 0.1 |
| Hardness | Based on a calculation using in-house method PMW-12A. Hardness is the name for the amount of calcium and magnesium in water. Calcium is also a contributor to the hardness of water and can cause scaling and encrustation on pipes, pumps, heaters, boilers & cooking utensils. Total hardness and calcium carbonate hardness is a calculation. | | |
| Heavy Metals | Total or dissolved arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, nickel, selenium and zinc. Determined according to in house ICP-09. | 5 | 0.1 |
| Langelier Corrosion Index | Based on a calculation using in-house method PMW-12E. Sometimes called the Langelier Saturation Index. This index uses information on temperature, hardness, alkalinity, total dissolved salts and pH to calculate the tendency that the water has to be corrosive. Corrosive water will slowly dissolve some metals such as copper and iron so this could be a problem if your plumbing system includes copper pipe and iron tanks or pumps. | 5 | 0.1 |
| *Nitrate-N | The amount of nitrate in water has become an important issue because in many parts of the world nitrates are getting into groundwater and streams through losses from agricultural fertilisers or through organic pollution. High concentrations of nitrates may be a health problem for infants. Nitrogen-nitrate is measured by UV-Vis spectrophotometer using in house method PMW-10. | 5 | 0.1 |

| WATER | Description of Test Methods | Turnaround (working days) | Amount of sample (kg or Litres) |
|---|---|---|---|
| Nitrogen Total | Total Nitrogen is the measure of all Nitrogen containing compounds in the water. A high total Nitrogen result is indicative of contamination of the water supply from an outside source e.g. cattle, sewage. Determined according to in house method LEC-09. | 5 | 0.1 |
| Organic Matter or Carbon | Organic matter in water can come from natural like decomposition products or metabolic products of plants and animals or other man-made chemicals. Organic matter is measured as DOM Dissolved Organic Matter if the water is first filtered or as Total Organic Carbon if the water is unfiltered. Determined according to in house method LEC-08. | 5 | 0.1 |
| *Oxidation Reduction Potential | Oxidation Reduction Potential (ORP) or REDOX potential gives an indication of water quality. If ORP is low this can be due to organic pollution or lack of oxygen or both. ORP is measured by classical (meter) based on APHA 2580 B and in house method PMW-05. | 5 | 0.1 |
| *pH | pH is a measure of acidity and alkalinity. It is logarithmic scale between 1 & 14, with 7 being neutral, below 7 being acid & above 7 being alkaline. pH is measured by classical (meter) based on APHA 4500 H B and in house method PMW-04. | 5 | 0.1 |
| Phosphate-P | Dissolved or total phosphate-phosphorus is measured by ICP-OES using method APHA 3120 B and in house ICP-09. | 5 | 0.1 |
| Phosphorus Total | Total Phosphorus is a measure of phosphorus in all its inorganic and organic forms. Determined according to in house ICP-09. | 5 | 0.1 |
| Residual Sodium Carbonate | Based on a calculation using in-house method PMW-12C. Residual Sodium Carbonate (RSC) is another alternative measure of the sodium content in relation with Mg and Ca. This value may appear in some water quality reports although it is not frequently used. | 5 | 0.1 |
| Sodium Adsorption Ratio | Based on a calculation using in-house method PMW-12B. The index Sodium Adsorption Ratio (SAR) expresses the relative activity of sodium ions in the exchange reactions with the soil. This ratio measures the relative concentration of sodium to calcium and Magnesium. High sodium ions in water affects the permeability of soil and causes infiltration problems because sodium when present in the soil in exchangeable form replaces calcium and magnesium adsorbed on the soil clays and causes dispersion of soil particles. | 5 | 0.1 |
| Sulphate-Sulphur Soluble | Sulphate-S is measured by ICP-OES using method APHA 3120 B and in house ICP-09. | 5 | 0.1 |
| TDS Total Dissolved Solids | Based on a calculation using in-house method PMW-12D. Total Dissolved Salts (TDS) is a calculation which can aid in determining whether water is suitable for irrigating particular crops. | 5 | 0.1 |
| Trace Metals | Dissolved copper, zinc, manganese, iron & boron measured by ICP-OES using method APHA 3120 B and in house ICP-09. | 5 | 0.1 |
| TSS Total Suspended Solids | Based on a classical using in-house method PMW-11.Total suspended solids or non-filterable residue can be found in a majority of waters in Australia and even if particles can not be seen with the naked eye there will still be tiny particles contained in it. High levels of non-filterable residues can cause reduction in light transmission through water & in sitting or slow-running water the residues may sediment out, smothering life on the riverbed. Determined according to in house PMS-21. | 5 | 0.2 |
| *Turbidity | Turbidity is a measure of the way the water scatters light is also a general indicator of water quality. Turbidity may be caused by very fine colloids from clays or particulate organic matter or even caused by algal growth. It may also be caused by solids which are carried or suspended in the water. Turbidity is measured using classical (meter) based on APHA 2130 B and in house PMW-01. | 5 | 0.1 |
| Water Suite 1 | pH, Alkalinity, EC, Cl, TDS, Sodium Adsorption ratio (SAR), N-$NO_3$, $PO_4$, $SO_4$-S, Fe, Mn, B, K, Na, Ca, Mg & Hardness | 5 | 0.1 |
| Water Suite 2 | pH, EC, Cl, Na, Ca, Mg & Hardness, TDS & SAR | 5 | 0.1 |
| WFC (Microbiology) Presence/Absence | *Escherichia coli* & Faecal Coliforms Absence / Presence. E.coli bacteria belong to the coliform bacteria group. Many coliforms occur naturally in soil and water. However the presence of E.coli bacteria indicates possible sewage contamination of water because E.coli is found only in the mammalian intestinal tract including that of humans. Just a note: Coliforms found in mammals are called faecal coliforms. Most faecal coliforms are E coli so E coli tests are used as an indicator of faecal coliforms. | 3 | 0.1 |

*Indicates NATA Accreditation

| PLANT/ GRAIN | Description of Test Methods | Turnaround (working days) | Amount of sample (kg) |
|---|---|---|---|
| Germination | 10 day germination | 10-12 | 0.5 |
| Germination | 28 day germination | 28-30 | 0.5 |
| Purity Seed | Purity only graded | 5 | 0.5 |
| Purity Seed | Purity only un-graded | 5 | 0.5 |
| Grain Protein | Total nitrogen, crude protein and moisture if applicable. | 5 | 0.2 |
| Feed Testing | External sublet for NIR analysis of metabolisable energy, protein etc. | 7 | 0.5 |
| Carbon/Nitrogen Ratio | Carbon to nitrogen ratio | 5 | 0.2 |
| Petiole Nitrate | Nitrate-N test on cotton or grape petiole 1:100 water extraction with colorimetric finish. | 5 | 0.1 |
| Plant Test Suite 1 | Full Test: Total (N, P, S, K, Ca, Mg, Na, Cu, Zn, Mn, Fe, B) and soluble chloride | 5 | 0.2 |
| Plant Test Suite 2 | NPKS Macro: Total (N, P, S, K, Ca, Mg, Na) | 5 | 0.2 |
| Plant Test Suite 3 | NPKS Trace: Total (N, P, S, K, Cu, Zn, Mn, Fe, B) | 5 | 0.2 |
| Plant Test Suite 4 | NPKS: Total (N, P, S, K) | 5 | 0.2 |
| Plant Test Suite 5 | Total (N) | 2 | 0.2 |
| Cotton Leaf & Petiole | Leaf Full Test: Total (N, P, S, K, Ca, Mg, Na, Cu, Zn, Mn, Fe, B) and soluble chloride. Nitrate-N test on cotton petiole | 3 | 0.1 |

| MANURE/ COMPOST/ FERTILISER | Description of Test Methods | Turnaround (working days) | Amount of sample (kg or Litres) |
|---|---|---|---|
| Carbon/Nitrogen Ratio | Carbon to Nitrogen Ratio | 5 | 0.2 |
| Manure/Compost Suite 1 | Moisture, Soluble Cl, Total (N, P, S, K, Ca, Mg, Na, Cu, Zn, Mn, Fe, B), Organic Carbon, C/N ratio. | 7 | 0.5 |
| Manure/compost Suite 2 | Total (N, P, S, K, Ca, Mg, Na). | 5 | 0.2 |
| Manure/compost Suite 3 | Total (N, P, S, K, Cu, Zn, Mn, Fe, B). | 5 | 0.2 |
| Manure/compost Suite 4 | Total (N, P, S, K). | 5 | 0.2 |
| Manure/compost Suite 5 | Total (N). | 2 | 0.2 |
| Faecal Manure | Crude protein and phosphorus. | 5 | 0.2 |
| AS4454 Composts Mulches and Soil Conditioners | pH($H_2O$), EC, $NH_4$, $NO_3$, Total N, Bulk Density, Organic Matter/Carbon, C/N ratio, Soluble $PO_4$, Total P, B, Na %, Na, Ca, Mg, K CEC, DTPA Trace Cu, Zn, Mn, Fe & B, Wettability, Toxicity, NDI, Permeability, Particle Size Grading, Moisture Content, Visual Contaminants, Heavy Metals(As, Cd, Cr, Cu, Ni, Hg, Pb, Se, Zn) and Residues (organo-chlorines & PCB). | 10 | 6 |
| Gypsum fertiliser | Analysis of calcium and sulphate percentage. | 7 | 0.1 |
| Lime Fertiliser | Analysis of calcium carbonate percentage. | 7 | 0.1 |
| NPSK Fertiliser | Analysis of NPSK percentages. | 7 | 0.1 |
| Unknown Fertiliser | Confirmation and analysis of nutrients present.<br>Full test: Moisture, Soluble Cl, Total (N, P, S, K, Ca, Mg, Na, Cu, Zn, Mn, Fe, B). | 7 | 0.1 |
| Heavy Metals | Total or dissolved arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, nickel, selenium and zinc. | 5 | 0.1 |