



Australian Government

Department of Education, Employment and Workplace Relations

RTF3503A Sample soils and analyse results

Release: 1

RTF3503A Sample soils and analyse results

Modification History

Not applicable.

Unit Descriptor

This competency standard covers the process of carrying out soil sampling and interpreting the results as a foundation for further horticultural operations such as nutrition programs and irrigation scheduling.

Carrying out soil sampling is likely to be under limited supervision from others and with checking only related to overall progress. Soil sampling at this level requires the application of horticultural knowledge and a range of horticultural skills. The work is usually done within routines, methods and procedures where some discretion and judgement is required in the selection of sites, equipment and materials, organisation of work, services, actions and the achievement of outcomes within time and budgetary constraints.

Application of the Unit

Not applicable.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

Not applicable.

Elements and Performance Criteria Pre-Content

Not applicable.

Elements and Performance Criteria

Elements and Performance Criteria

Element	Performance Criteria
1 Prepare for soil sampling	1.1 The soils to be surveyed, surveying activity and contractors are identified according to site plans and enterprise work procedures 1.2 Tools, equipment and machinery are selected according to site conditions, testing agency requirements and enterprise work procedures 1.3 If required, pre-operational and safety checks are carried out on tools, equipment and machinery according to manufacturers specifications and enterprise work procedures 1.4 Areas of homogeneous soil types are identified for sampling 1.5 Services are located using site plans and in consultation with the supervisor 1.6 OHS hazards are identified, risks assessed, controls implemented and reported to the supervisor 1.7 Suitable safety equipment and personal protective equipment (PPE) are selected, used and maintained 1.8 A clean and safe work area is maintained throughout and on completion of work
2 Determine soil characteristics by performing soil sampling	2.1 The density and depth for a representative sampling of the area are determined according to enterprise work procedures 2.2 Holes are excavated at identified sampling sites according to enterprise work procedures, OHS requirements and with due consideration of the environmental implications 2.3 Samples for off-site testing are collected and prepared, packaged, accurately labelled and dispatched according to testing agency requirements and enterprise work procedures

- 2.4 The **physical and chemical characteristics** of the soil are determined according to investigative requirements and best practice guidelines
 - 2.5 Sampling and testing tools and equipment are cleaned of all **residues** and returned to storage according to manufacturers specifications and enterprise work procedures
 - 2.6 Results are recorded in an established format according to enterprise work procedures
- 3 Interpret results of soil analysis
 - 3.1 The soil types of the sample area are classified according to standards for soil classification
 - 3.2 The acceptable soil physical and chemical parameters for a specified plant are determined from published data and historical records
 - 3.3 Collected analytical results are compared with acceptable physical and chemical parameters for a specified plant
 - 3.4 Soil characteristics are evaluated to determine whether they can be altered to meet plant needs
 - 3.5 The Readily Available Water (RAW) values for irrigation sites are determined according to industry standards and enterprise work procedures

Required Skills and Knowledge

Not applicable.

Evidence Guide

What evidence is required to demonstrate competence for this standard as a whole?

Competence in surveying soil characteristics requires evidence that a person is able to prepare for surveying activities, coordinate work activities with others, survey, test and report in the required format on the soil characteristics identified.

The skills and knowledge required to survey soil characteristics must be **transferable** to a different work environment. For example, this could include different soil types, environments, testing methods and enterprises.

What specific knowledge is needed to achieve the performance criteria?

Knowledge and understanding are essential to apply this standard in the workplace, to transfer the skills to other contexts and to deal with unplanned events. The knowledge requirements for this competency standard are listed below:

Practical understanding of the range of sample collection, testing and analytical methods that may be used to perform soil surveys, and the association of surveying methods with site conditions, environmental implications and intended horticultural use of the surveyed site.

The physical and chemical properties of soils in relation to their ability to support specified horticultural production.

The capacity of soils to provide water to plants.

The importance of organic matter in soil in relation to the intended horticultural use.

Awareness of ameliorants and soil improvement techniques for addressing site limitations identified through surveying.

Awareness of the comparative environmental implications associated with soil surveying activities and the application of analytical results.

What specific skills are needed to achieve the performance criteria?

To achieve the performance criteria, appropriate literacy and numeracy levels as well as some complementary skills are required. These include the ability to:

Communicate with work team members, supervisors and contractors, interpret and apply soil surveying specifications, utilise proforma reporting, analysis and work procedure documents, and understand soil surveying data.

Measure distance, depth and spacing, calculate area, volume and Readily Available Water values, calibrate tools and equipment, and interpret analytical results.

Coordinate own activities with the requirements and schedules of contractors and other work teams to sequentially and effectively complete surveying activities in a timely and cost effective manner.

What processes should be applied to this competency standard?

There are a number of processes that are learnt throughout work and life which are required in all jobs. They are fundamental processes and generally transferable to other work functions. Some of these are covered by the **key competencies**, although others may be added. The questions below highlight how these processes are applied in this competency standard. Following each question a number in brackets indicates the level to which the key competency needs to be demonstrated where 0 = not required, 1 = perform the process, 2 = perform and administer the process and 3 = perform, administer and design the process.

- | | |
|--|--|
| 1. How can communication of ideas and information (2) be applied? | Written, oral and telecommunication of ideas and information relating to soil surveying activities and problems encountered will be required with the work group, supervisor and contractors. |
| 2. How can information be collected, analysed and organised (2)? | Enterprise work procedures, testing agency specifications and site plans should be consulted, interpreted and applied to coordinate surveying activities with further clarification sought from the supervisor when necessary. |
| 3. How are activities planned and organised (2)? | Work activities for the work group, contractors and self will be planned prior to and adjusted during the soil surveying program. |
| 4. How can team work (2) be applied? | The soil surveying program may involve facilitating and leading members of a team to complete the soil survey on time and budget. |
| 5. How can the use of mathematical ideas and techniques (2) be applied? | Mathematical application will be required to calculate and apply the spatial and logistical requirements of the soil surveying program. |
| 6. How can problem solving skills (2) be applied? | Site contingencies, personnel difficulties and timeline failures may require problem-solving techniques. |
| 7. How can the use of technology (2) be applied? | Technological understanding will be required to access and apply survey specifications, undertake surveying activities, communicate, report and keep records. |

Are there other competency standards that could be assessed with this one?

This competency standard **could** be assessed on its own or in combination with other competencies relevant to the job function.

There is essential information about **assessing this competency standard for consistent performance** and **where and how it may be assessed**, in the Assessment Guidelines for this Training Package. All users of these competency standards must have **access** to the **Assessment Guidelines**. Further advice may also be sought from the relevant **sector booklet**.

Range Statement

Range of Variables

The Range of Variables explains the contexts within which the performance and knowledge requirements of this standard may be assessed. The scope of variables chosen in particular training and assessment requirements may depend on the work situations available

What soils may be surveyed?	Soils may include field soil sites and specialist growing media.
What surveying activity may be involved?	Surveying activities may include collecting, preparing, packaging and labelling soil samples for off-site testing and/or on-site testing and analysis.
What contractors may be identified?	Contractors may include off-site testing agencies such as government, commercial or private consultants, and contractors engaged for the mechanical extraction of soil samples by the use of machinery such as an auger or backhoe.
What enterprise work procedures may apply to this standard?	Work procedures will be based on sound horticultural principles and practices and may include supervisors oral or written instructions, soil surveying program, enterprise standard operating procedures (SOP), specifications, routine maintenance schedules, work notes; product labels and Material Safety Data Sheets (MSDS); manufacturers service specifications and operators manuals; waste disposal, recycling and re-use guidelines; and OHS procedures.
What tools, equipment and machinery may be required to perform a soil survey?	Tools, equipment and machinery may include a hand or powered auger, backhoe, pH test kit or electronic pH testing device, hand held salinity or EC meter, tape measure, sample bags, plastic overlays, aerial photographs, charts and tables of soil characteristics and plant soil parameters.
What services may need to be located?	Services may include water supply, gas, power (electricity), telecommunications, irrigation, stormwater and drainage.
What OHS hazards may be associated with performing a soil survey?	Hazards may include disturbance or interruption of services, solar radiation, dust, noise, soil- and water-borne

	micro-organisms, chemicals and hazardous substances, sharp hand tools and equipment, manual handling, moving machinery and machinery parts, falling objects and uneven surfaces.
What safety equipment may be required?	Safety equipment may include signage and barriers.
What PPE may be required to perform a soil survey?	PPE may include hat, boots, overalls, gloves, goggles, respirator or face mask, face guard, hearing protection, sunscreen lotion and hard hat.
How may a clean and safe work area be maintained?	Tasks may include disabling unused tools, equipment and machinery and storing neatly out of the way of surveying activities; safely storing materials on site; using signage and safety barriers during and removing after surveying activities are completed; backfilling soil survey holes and pits; and swiftly and efficiently removing and processing debris and waste from the work area.
What OHS requirements may be relevant to this standard?	OHS requirements may include identifying hazards; assessing risks and implementing controls; cleaning, maintaining and storing tools, equipment and machinery; appropriate use of PPE including sun protection; safe operation of tools, equipment and machinery; safe handling, use and storage of chemicals and hazardous substances; correct manual handling; basic first aid; personal hygiene and reporting problems to supervisors.
What environmental implications may be associated with surveying soil characteristics?	Soil surveying activities may have beneficial environmental impacts where the analysis is applied to improve the soil structure and reduce excess water, nutrient and chemical flow into the external environment, including natural waterways, through better targetting of plants water needs and reduction of water applied, thus minimising the draw on water resources. Beneficial impacts may also result from the construction of a soil profile with more efficient water and nutrient utilisation than the original soil profile of the

site.

Detrimental environmental impacts may arise where mechanised sampling activities produce excess noise, dust or water run-off.

What **physical characteristics** of soil may be determined?

Physical characteristics may include colour, texture, structure, depth of root zone and depth of water table.

What **chemical characteristics** of soil may be determined?

Chemical characteristics may include pH, salinity, nutrient content such as N, K, P and carbonate content.

What **residues** may affect sampling and analytical accuracy?

Plant and soil-based residues, and any detergents or other cleaning chemicals may pollute the soil samples taken for analysis.

For more information on contexts, environmental implications and variables for training and assessment, refer to the Sector Booklet.

Unit Sector(s)

Not applicable.