



**Australian Government**

# **AHCARB803 Analyse edaphic interactions of trees and structures**

**Release: 2**

## AHCARB803 Analyse edaphic interactions of trees and structures

### Modification History

| Release   | Comments                                                                                                                 |
|-----------|--------------------------------------------------------------------------------------------------------------------------|
| Release 2 | This version released with AHC Agriculture, Horticulture, Conservation and Land Management Training Package Version 2.0. |
| Release 1 | This version released with AHC Agriculture, Horticulture, Conservation and Land Management Training Package Version 1.0. |

### Application

This unit of competency describes the skills and knowledge required to analyse the edaphic interactions of trees and structures.

This unit applies to individuals with advanced theoretical and technical knowledge and skills for professional or highly skilled work and/or further learning in one or more disciplines or areas of practice. This unit applies to individuals with advanced cognitive, technical and communication skills to provide specialist advice, analyse, generate and transmit solutions to complex problems, and to demonstrate autonomy, well-developed judgement, adaptability and responsibility as a practitioner or learner.

The role involves the self-directed application of knowledge in tree anatomy, physiology and the edaphic environment with substantial depth in areas such as tree failures and biomechanics in the built environment.

No occupational licensing, legislative or certification requirements are known to apply to this unit at the time of publication.

### Pre-requisite Unit

AHCARB701 Analyse tree biomechanics

### Unit Sector

Arboriculture (ARB)

### Elements and Performance Criteria

| Element                                          | Performance criteria                                                                                   |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i> | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i> |

| Element                                          | Performance criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i> | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>                                                                                                                                                                                                                                                                                                                                                                                          |
| 1. Determine soil attributes                     | 1.1 Research repose angle of soil materials<br>1.2 Research soil plasticity<br>1.3 Measure soil moisture content and field capacity of soil<br>1.4 Research the effects of soil moisture on soil cohesion and plasticity<br>1.5 Research modes of soil liquefaction<br>1.6 Determine soil texture<br>1.7 Assess level of soil cohesion<br>1.8 Determine shear strength of the soil of concern<br>1.9 Research load bearing capacity of soil of concern<br>1.10 Determine mass of the soil plate |
| 2. Determine root attributes                     | 2.1 Determine root morphology, division and distribution<br>2.2 Determine amount of buttressing of tree<br>2.3 Determine species development of tap root system<br>2.4 Research identifying anatomical features of tree roots<br>2.5 Identify tree roots based on anatomical features                                                                                                                                                                                                           |
| 3. Calculate forces from roots                   | 3.1 Research, experimentally model or demonstrate forces and pressures exerted into or through the soil, directly and indirectly by trees<br>3.2 Estimate and measure dimensions of roots exerting a force on a structure of concern<br>3.3 Calculate total surface area of the roots exerting a force on a structure of concern<br>3.4 Calculate force exerted by roots per unit of surface area of structure<br>3.5 Calculate total force exerted by roots of a given surface area            |
| 4. Determine structure attributes                | 4.1 Measure and determine volume of structure of concern<br>4.2 Research and calculate mass of the structure and adjacent structures<br>4.3 Consider the impact of gravity on mass                                                                                                                                                                                                                                                                                                              |

| <b>Element</b>                                                | <b>Performance criteria</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i>              | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                               | 4.4 Determine effect of leverage on the forces exerted by tree roots onto structure of concern                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 5. Define the root-soil matrix factors for root/soil breakage | 5.1 Determine factors of root–soil matrix interactions<br>5.2 Consider area of contact between root and soil<br>5.3 Consider elasticity, tensile strength and breaking stress of roots<br>5.4 Investigate root cross-sectional morphology<br>5.5 Assess extent of root plate damage, deficiencies or defects<br>5.6 Estimate impact of static and dynamic testing for root plate stability<br>5.7 Evaluate the likelihood of root failure by root breakage<br>5.8 Evaluate the likelihood of anchorage failure by soil breakage or slippage                                                                |
| 6. Research structural engineering solutions                  | 6.1 Research and consider effects of increasing mass<br>6.2 Research and consider methods for, and effects of, increasing the modulus of rupture<br>6.3 Research and consider effects of use of curved structures<br>6.4 Research and consider effects of soil mass and friction<br>6.5 Research and consider effects of use of anchors, braces and props<br>6.6 Compile a portfolio of above research including personal annotations and calculations                                                                                                                                                     |
| 7. Prepare stability and expert witness reports               | 7.1 Prepare report on likelihood of tree causing damage to structure of concern including all test results, assumptions and calculations<br>7.2 Provide design suggestions to mitigate likelihood of damage to a similar replacement structure<br>7.3 Prepare report on relative stability of tree as a result of a defective or damaged root plate<br>7.4 Provide design suggestions to mitigate likelihood of whole tree failure as a result of defective or damaged root plate<br>7.5 Prepare expert witness report on harm by roots on structures; or on stability of tree with a defective or damaged |

| Element                                          | Performance criteria                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i> | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>                                                                                                                                                                                                                                                                 |
|                                                  | root plate, as required                                                                                                                                                                                                                                                                                                                                                |
| 8. Facilitate teamwork                           | 8.1 Review construction and engineering language terminology<br>8.2 Discuss installation and protection measures to non-arboricultural project personnel<br>8.3 Resolve issues in construction and engineering terminology<br>8.4 Communicate in the language, concepts, basic science and technology of construction, architecture and engineering allied professions |

## Foundation Skills

*This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.*

Foundation Skills essential to performance are explicit in the performance criteria of this unit of competency.

## Unit Mapping Information

| Code and title current version                                           | Code and title previous version                                          | Comments                             | Equivalence status |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------|--------------------|
| AHCARB803 Analyse edaphic interactions of trees and structures Release 2 | AHCARB803 Analyse edaphic interactions of trees and structures Release 1 | Minor typographical errors corrected | Equivalent unit    |

## Links

Companion Volumes, including Implementation Guides, are available at VETNet: - <https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72>