



Australian Government

AHCARB804 Analyse tree structure and biomechanics

Release: 1

AHCARB804 Analyse tree structure and biomechanics

Modification History

Release	Comments
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 5.0.

Application

This unit of competency describes the skills and knowledge required to identify and analyse aspects of tree biomechanics that affect the physical load and strength of trees, branches and anchorage in the ground. It requires the assessment of tree strength and the loads that occur, and the ability to assess factors that can weaken trees that increase the chance of failure.

The unit applies to individuals with highly specialised advanced theoretical and technical knowledge for professional work and research in arboriculture. They exercise advanced cognitive, technical and communication skills and demonstrate complete autonomy, judgement and adaptability in research and analysis for complex problems.

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

Pre-requisite Unit

Nil

Unit Sector

Arboriculture (ARB)

Elements and Performance Criteria

Elements	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 existing physical loads and strengths of trees, branches and anchorage	1.1 Determine existing physical loads affecting trees 1.2 Identify source and factors causing stress on trees 1.3 Assess root plate environment and history for damage 1.4 Assess history of pruning operations to above and below ground

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	components 1.5 Determine presence and extent of defects on trunk and root system 1.6 Assess strength and material properties of tree structural components
2. Determine wind load	2.1 Determine wind environment of tree 2.2 Determine surface area of structure exposed to wind 2.3 Determine crown surface area exposed to wind 2.4 Assess aerodynamic drag factor of tree crown 2.5 Estimate primary loads occurring in seasonal climatic events 2.6 Determine wind-load of prevailing stormy weather 2.7 Determine load and drag associated with saturated foliage
3. Determine structural integrity by static load testing	3.1 Determine static load on trees for structural integrity testing and estimate wind-equivalent load 3.2 Calibrate static load testing instruments according to manufacturer instructions 3.3 Conduct static tests according to instrument instructions and analysis procedures 3.4 Monitor loads and forces on trees to ensure safe limits to prevent damage 3.5 Record data from static tests according to workplace procedures 3.6 Compare data with benchmarks obtained from stable tree populations 3.7 Prepare a report on structural integrity testing of tree from the static load tests
4. Determine tree dynamic response	4.1 Investigate tree biomechanics using dynamic methods of analysis 4.2 Review complex models of tree dynamics analyses 4.3 Calculate mass of branches of tree to determine degree of open-grown 4.4 Calculate vector of force on tree 4.5 Determine tree dynamic response under defined wind loads 4.6 Prepare a report on structural integrity testing of tree from dynamic load analysis

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
5. Investigate and consolidate structural integrity data and create a structural integrity report	5.1 Investigate level of contribution of material properties in tree dynamics 5.2 Investigate dynamic effect of branches on natural oscillation frequency and damping effect 5.3 Determine level of contribution of form and morphology in tree dynamics 5.4 Review suitability of invasive and non-invasive methods of testing 5.5 Evaluate and determine likelihood of structural failure 5.6 Confirm level of anchoring potential of root system and stability of tree 5.7 Prepare a structural integrity report and provide to client

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.

Skill	Description
Writing	Create logical, succinct and accurate reports that use appropriate industry terminology and mathematical language and symbols
Numeracy	Analyse and synthesise highly complex mathematical information for tree mechanics, and perform calculations to determine structural integrity of trees

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
AHCARB804 Analyse tree structure and biomechanics	AHCARB701 Analyse tree biomechanics	Code changed to reflect AQF alignment Title changed Elements and performance	Equivalent

		criteria clarified Foundation skills added Assessment requirements updated	
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Links

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