

# **AUSTRALIAN FOREST AND WOOD PRODUCTS INDUSTRY SECTOR**

## **Business Case for Improvement of Units of Competency and Qualifications**

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**Forest Harvesting Optimisation**

**September 2016**

Prepared on behalf of the Forest and Wood Products Industry Reference Committee (IRC) for the Australian Industry Skill Council (AISC)

# The Business Case for Improvement of Training Package Components

## PURPOSE

This Business Case represents the Forest and Wood Products Industry Reference Committee (IRC) case for improvement of relevant Training Package components driven by identified skill gaps in the forest harvesting sector.

The report was developed, in line with the Australian Industry and Skills Committee (AISC) template, through research to identify drivers for the proposed Training Package development work, evaluation and risk analysis of Training Package solutions, significant stakeholder consultations and input from the industry sector and the VET sector.

The Business Case is designed to provide sufficient and robust evidence to enable the AISC to decide training product development work that should be undertaken.

*This Business Case for the development of new Training Package Product has been produced with the assistance of funding provided by The Commonwealth Government through the Department of Education and Training*

## EXECUTIVE SUMMARY

The Australian Industry Skills Committee (AISC) has requested that Skills Impact investigate a reported skill issue in the forest and harvesting industry sector and prepare a Business Case to support the need for a Forest and Wood Products Training Package project. The key priority skills gap for the forest and harvesting industry sector identified by the Industry Reference Committee (IRC) was forest harvesting optimisation.

The Business Case draws attention to the fact that the sector is currently facing significant skill gaps across its workforce regarding the ability to apply the latest forest harvesting optimisation principles, practices and processes. Further, the report highlights that operators of mechanical harvesters and log processors are not skilled to operate effectively optimisation technology (i.e. forest harvesting equipment fitted with on-board optimisation systems and computers); and that these skills and job roles are currently in high demand and difficult to fill in the sector.

Optimisation is a critical area in the sector and the Business Cases shows the in optimisation can assist competitiveness. Skills in optimisation enable businesses to become more agile to varying market requirements, increase productivity, and maximise forest value or minimise forest waste. Optimisation through technological and/or digital interfaces can also improve job quality and safety.

The Business Case identifies the following two work areas of Training Package work in order to address these skill needs and opportunities in forest harvesting:

1. Modifications to 13 relevant harvesting units of competency to incorporate best practice principles in forest harvest operations. These units of competency are listed below. The work will involve work functional analysis, consultation and expert input to modify/add appropriate content throughout unit and assessment requirements fields.
2. Development of a new unit of competency covering the use and application of on board optimisation systems and computers in mechanical harvesting.

Stakeholder consultation shows that the sector supports these proposed changes to the Training Package. The stakeholders agree that a lack of action could narrow the sector opportunity to improve productivity and competitiveness; to ease the skill gaps and shortage; and to replace non-formal and informal training with nationally recognised training. No action is highly likely to result in a negative perception of the VET sector and its credibility in providing solutions which respond to industry skill gaps and emerging needs.

The units of competency proposed for alignment with current forest harvesting optimisation processes and technologies are:

- FWPCOT3223 Grade and mark logs
- FWPHAR3206 Conduct forwarder operations
- FWPHAR3207 Conduct feller buncher operations
- FWPHAR3210 Conduct mechanical processor operations
- FWPHAR3214 Operate a single grip harvester

- FWPHAR3218 Conduct loader operations
- FWPCOT2223 Segregate and sort logs
- FWPHAR3217 Conduct skidder operations
- FWPHAR3208 Conduct boom delimeter operations
- FWPHAR3211 Operate yarder
- FWPHAR3219 Conduct excavator operations with grabs
- FPICOT2226 Debark logs mechanically
- FWPHAR3216 Conduct forestry operations using crawler tractor

New unit of competency:

- Use harvester optimisation technology for log making

DRAFT

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## A ADMINISTRATIVE INFORMATION

Name of Skills and Employment Industry Reference Committee (IRC): Forest and Wood Products Skills and Employment Industry Reference Committee

Name of Skills Service Organisation (SSO): Skills Impact

Proposed changes to the Forest and Wood Products Training Package:

1. Modifications to 13 relevant harvesting units of competency to incorporate best practice principles in forest harvest operations. This will involve work functional analysis, consultation and expert input to modify/add appropriate content throughout unit and assessment requirements fields. These units of competency include:
  - *FWPCOT3223 Grade and mark logs*
  - *FWPHAR3206 Conduct forwarder operations*
  - *FWPHAR3207 Conduct feller buncher operations*
  - *FWPHAR3210 Conduct mechanical processor operations*
  - *FWPHAR3214 Operate a single grip harvester*
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  - *FWPHAR3211 Operate yarder*
  - *FWPHAR3219 Conduct excavator operations with grabs*
  - *FPICOT2226 Debark logs mechanically*
  - *FWPHAR3216 Conduct forestry operations using crawler tractor*
2. Development of a new unit of competency covering the use and application of on board optimisation systems and computers in mechanical harvesting.
  - *Use harvester optimisation technology for log making*

Training Package components examined as part of this Business Case: All of the above

Additional direction given by the AISC: Nil

## B METHODOLOGY

The methodology used to prepare this Business Case was based on analytical and consultative approaches, bringing together Training Package specialists, researchers, leading industry stakeholders and the VET sector. The work involved the three overarching processes of collecting evidence, evaluating and consulting with stakeholders. Figure 1 provides an outline of how the information and evidence was generated and how this was analysed.

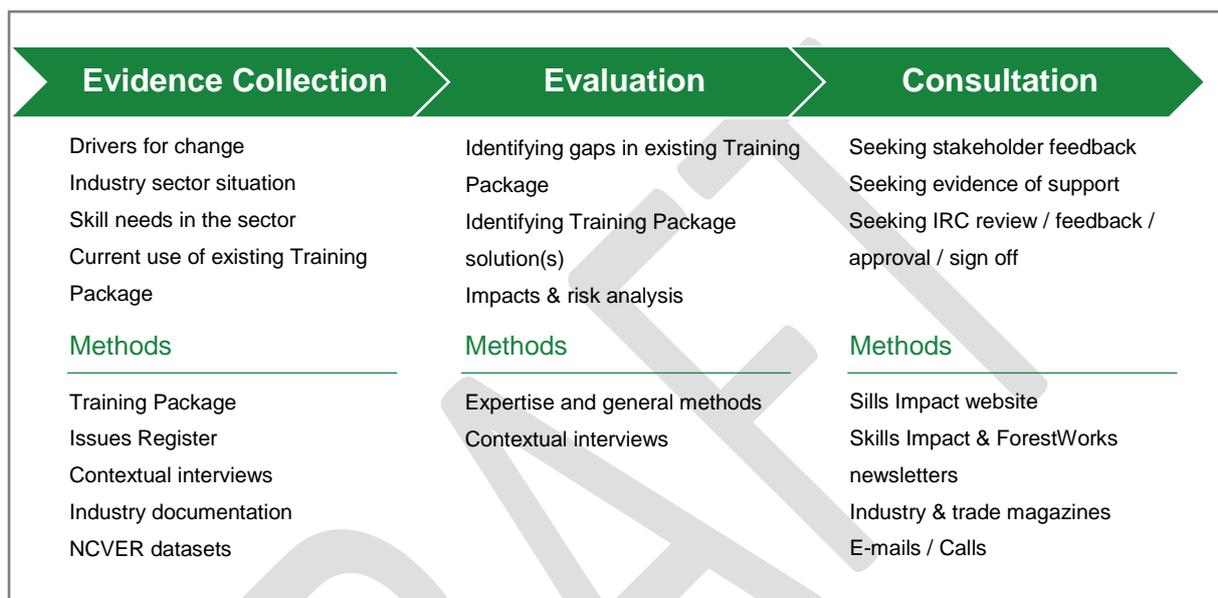


Figure 1: Methodology used to prepare this Business Case

The Business Case consultation process was guided and approved by the Forest and Wood Products Industry Reference Committee. Details of the consultation process are provided in Table 1. As shown, different and varied consultation methods were used in the process including open consultation via the Skills Impact website and targeted consultation involving key industry stakeholders (Table 2).

<sup>1</sup> Change in this report denotes both changes to existing training products and development of new training products

Table 1: Business Case consultation process

PHASE	SCOPE	OBJECTIVE	METHOD
IRC consultation to provide information and seek agreement to the proposal for stakeholder consultation process for the Business Case process	<ul style="list-style-type: none"> <li>Advise IRC about Business Case commissioned by AISC and its function in providing a feasibility study to AISC in order to get a Work Order to fund the proposed work</li> <li>Describe the IRC role in approving the Business Case and the stakeholder consultation proposed</li> <li>Describe the Business Case methodology and consultation process</li> <li>Inform about the Business Case content (i.e. Draft Executive Summary)</li> </ul>	<ul style="list-style-type: none"> <li>Advise about Activity Order for Business Case development</li> <li>Seek feedback and approval on the methodology and consultation process</li> </ul>	<ul style="list-style-type: none"> <li>Email</li> </ul>
Stakeholder consultation on the Business Case	<ul style="list-style-type: none"> <li>Inform the draft Business Case content</li> </ul>	<ul style="list-style-type: none"> <li>Seek feedback on the Business Case content and the proposed work for Training Package updates</li> </ul>	<ul style="list-style-type: none"> <li>Open consultation via Skills Impact website</li> <li>Consultation details announced via Skills Impact &amp; Forestworks newsletters, and industry &amp; trade magazines</li> </ul>
Request for feedback from targeted key stakeholders	<ul style="list-style-type: none"> <li>Prompt key stakeholders to provide feedback on the Draft Business Case</li> </ul>	<ul style="list-style-type: none"> <li>Seek feedback and evidence of industry support for the proposed Training Package updates</li> </ul>	<ul style="list-style-type: none"> <li>List of targeted key stakeholders approved by IRC</li> <li>Send request for feedback via Email</li> </ul>
Report back to IRC	<ul style="list-style-type: none"> <li>Advise IRC on the feedback received and how it was addressed and a list of companies who provided letter of support.</li> <li>Request IRC approval for Business Case</li> </ul>	<ul style="list-style-type: none"> <li>Seek IRC sign off</li> </ul>	<ul style="list-style-type: none"> <li>Email</li> <li>Teleconference (if required)</li> </ul>

Table 2: Key stakeholders involved in targeted consultation

Stakeholder type	State
<b>Major forest plantation management companies</b>	
Hancock Queensland Plantations	QLD
Hancock Victorian Plantations	VIC
Australian Bluegum Plantations	VIC/SA
Forico Pty Ltd	TAS
OneFortyOne Plantations	SA
Timberlands Pacific	TAS, VIC/SA
PF Olsen	WA, VIC/SA, TAS
<b>State forestry businesses</b>	
VicForests	VIC
NSW Forestry Corporation	NSW
Forestry Tasmania	TAS
Forest Products Commission	WA
Department of Agriculture and Fisheries Queensland	QLD
Forestry SA	SA
<b>Major harvesting enterprises</b>	
Softwood Logging Services	WA
LV Dohnt	VIC/SA
Tabeel Logging	VIC/SA
<b>Industry associations</b>	
Australian Forest Contractors Association (AFCA)	NATIONAL
Australian Forest Products Association (AFPA)	NATIONAL
Forestry Industry Advisory Council	NATIONAL
Forest Industry Council (FIC)	Southern NSW
Victorian Association of Forest Industries (VAFI)	VIC
Forestry Industry Council (Southern NSW)	VIC
Forest Industries Federation W.A. (FIFWA)	WA
<b>Training providers</b>	
Riverina Institute of TAFE	NSW
Federation TAFE	VIC
Timber Training Creswick Ltd	VIC
South Regional TAFE	WA
FITS Training Service	WA
<b>Unions</b>	
Construction, Forestry, Mining and Energy Union (CFMEU)	NATIONAL
Australian Workers Union (AWU)	NATIONAL

## C INDUSTRY IMPERATIVE

The following sections provide information to support the need for a Forest and Wood Products Training Package project focussed on updates in line with current harvesting optimisation processes and technology.

### C.1 Drivers for change

Improving capabilities for better optimisation of processes is an important step for businesses in the forest and harvest industry sector to ensure ongoing increase of productivity and efficiency. Coupled with enabling technology and best practice processes, the application of appropriate skills can support businesses to maximise the value of the forest and minimise costs.

Driven by these objectives, the sector identified skill gaps in the workforce and skill shortages in relation to the following areas:

- Optimisation of forest harvesting processes – Skills development is required for conducting optimal harvesting activities in the commercial forest harvesting sector. All harvesting processes including mechanical felling, stem extraction and forwarding, log grading, sorting and stacking, and log loading for transport are impacted by skill levels of these operators.
- Harvesting optimisation technology – Skills development of new and existing operators is required for the efficient use of harvesting optimiser technology on harvesters, processors and de-barkers. The on-board technology is now an essential requirement for many harvesters and requires operators to be fully conversant with features and functions of the technology whilst integrating its use into felling operations.

There is a gap where most production operators in the forest harvesting industry sector need to undertake skills development to implement the current harvesting optimisation practices and processes. In addition, mechanical felling and log processing operators who work in production of plantation sawlogs and veneer logs also need further skills development to operate effectively harvesters fitted with on-board optimisation systems and computers.

### C.2 The situation

#### C.2.1 Industry sector affected

Optimisation of tree value at harvest and log loading/delivering is relevant to commercial timber harvesting processes in both plantation and native forests. In Australia there are 6 state forestry business enterprises, over 20 private plantation management companies and approximately 1,300 forest harvest businesses (contractors) ranging from family-owned small businesses to a few medium and large businesses.

In 2011 the harvesting sector employed 2,134 people. About 80 per cent were harvesting equipment operators and 20 per cent forestry and logging workers.<sup>2</sup> The level of employment oscillated up and down during the following years and grew significantly in 2016 to approximately 4,000 people.<sup>3</sup>

Optimisation in this sector refers to improving harvest recovery and minimising waste, by allocating the right logs to higher value uses. Optimisation principles for commercial harvesting have been developed and continue to improve over time in the industry.

Commercial harvesting involves a chain of processes including cutting, skidding, on-site processing, and loading of trees or logs onto trucks or skeleton cars. Harvesting involves the logistics moving wood from the stump to the processing site. Mechanical harvesting machinery such as harvesters and excavators, skidders, forwarders, shovel loggers, yarders, boom delimiters, and log loaders are used in each process. Operating this equipment in line with best practices is critical for the harvest outcome and in the optimisation process.

Enabling technology, such as harvesting optimiser systems, is also important. To maximise the value of the forest at the time of harvest, most modern harvesters involved in production of sawlogs and veneer logs from plantations are now equipped with optimising systems and on-board computers. Harvester optimiser systems have become compulsory in many plantations, particularly softwood plantations, through contracts with forest managers.

### **C.2.2 Skill needs**

Changes to the Training Package is required to support the following skill needs:

- Improved skills are needed in applying best practice principles to limitation of breakage and other damage, waste minimisation, accurate log identification, safe and effective handling and efficient loading and movement.
- Improved skills are required to effectively conduct harvester optimiser operations, including the use of on-board computers. The relationship between operator and computer is symbiotic, meaning the operator is guided by the software, but can override/adjust it as conditions require. Skills include loading and editing cutting plans, generating and transferring production data, interpreting cutting data in real time, calibration, and interpreting maintenance information. Use of the software requires a detailed knowledge of tree species, specifications and characteristics, including abnormalities.

### **C.2.3 Gaps in existing Training Package**

A preliminary review of the existing Forest and Wood Products Training Package indicates that best practice harvest optimisation principles and skills for an efficient operation of harvesting optimiser systems are not currently embedded in relevant existing units of competency. All Training Package components analysed as part of the development of this business case are listed in Section A.

The following are examples of gaps in units of competency against the best practice applied by some businesses in the sector.

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<sup>2</sup> 2011 Census

<sup>3</sup> ABS Australian Industry 2016

Table 2: Examples of gaps in existing units of competency

Unit of competency	Gaps	Best Practice
<i>FWPHAR3218 - Conduct loader operations</i>	The current unit does not deal with the effects of log age in delivery or optimising recovery of partial loads	<p>Prioritise log loading so that older logs are loaded first. This minimises moisture content loss and Bluestain from occurring.</p> <p>Relocate partial loads to other landings.</p>
<i>FWPHAR3214 - Operate a single grip harvester</i>	<p>The current unit does sufficiently address the various requirements of optimising value log recovery.</p> <p>PC 2.5 states <i>Use and adjust operating techniques to achieve optimum efficiency in felling trees</i>; however, the knowledge evidence does not address the various aspects of optimal value recovery such as the effects of excessive long butting, felling breakage prevention or minimisation, breakage when falling, or optimal length combinations to maximise value recovery.</p>	<p>Making decisions to obtain maximum yield by docking out a low value sections as required by customer. This involves the operator knowing the log grade specifications and log grade values.</p> <p>Practices also include ‘forward felling’ – avoidance of ground obstacles and scarf cutting larger diameter trees to avoid LED (large end diameter) breakage.</p>

An investigation of other existing training packages, which was focussed on identifying components with provisions for optimisation processes and technologies, shows that currently no suitable units of competency exist that could cover the use of harvester optimising software.

A summary of the investigation outcomes include:

- Other training packages contain units that deal with optimising production processes. Examples include:

*FDFPPL4004A - Optimise a work process* – covers the skills and knowledge required to assess, investigate and make recommendations to optimise the performance of a work process, system or area.

*PMAOPS500 - Optimise production systems* – covers skills to analyse and optimise complex operating production systems.

- None of training packages covers the use and application of optimising software designed to enhance or complement a specific process. Harvesting computer systems are real time, in-field technologies that guide operators in maximising yields. It is a highly log harvesting specific interactive process unrelated to the subject matter that the above units deal with.

#### **C.2.4 Current use of relevant Training Package components**

The production workforce of the forest harvesting sector integrates highly-skilled operators able to conduct highly mechanised harvesting operations. Currently, the skills of logging equipment operators are in high demand and positions difficult to fill. The sector places heavy emphasis on skill currency and formal training, particularly due to the high-risk nature of the forest operations.

Training in this sector is expected to be mainly on-the-job learning with support, development and assessment by suitable training providers.

Based on NCVET database, training participation in Certificate III in Harvesting and Haulage increased by 5.5 per cent to 1,040 enrolments in 2015. This means that approximately one of two workers operating in the sector enrolled in a Certificate III in Harvesting and Haulage training program. Most of the participants were recently forestry and harvesting workers, who possibly upgraded skills or moved in harvesting equipment operator roles. Subject enrolments also increased by 53 per cent to 604 enrolments for the relevant units of competency.<sup>4</sup>

Certificate III in Harvesting and Haulage is also suitable and available as an Australian Apprenticeship across some Australian States.

## **D TRAINING PACKAGE SOLUTION**

Training Package specialists evaluated possible options for a Training Package solution able to address the skill gaps identified in forest harvesting regarding log optimisation processes and technology. Optimal solution resulting from the evaluation proposes the following changes to the Training Package components:

1. Modifications to 13 relevant harvesting units of competency to incorporate best practice principles in forest harvest operations. This will involve modifying/adding appropriate content throughout unit and assessment requirements fields. These units of competency are:
  - *FWPCOT3223 Grade and mark logs*
  - *FWPHAR3206 Conduct forwarder operations*
  - *FWPHAR3207 Conduct feller buncher operations*
  - *FWPHAR3210 Conduct mechanical processor operations*
  - *FWPHAR3214 Operate a single grip harvester*
  - *FWPHAR3218 Conduct loader operations*
  - *FWPCOT2223 Segregate and sort logs*

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<sup>4</sup> NCVET VOCSTAS Collection 2016

- *FWPHAR3217 Conduct skidder operations*
  - *FWPHAR3208 Conduct boom delimeter operations*
  - *FWPHAR3211 Operate yarder*
  - *FWPHAR3219 Conduct excavator operations with grabs*
  - *FPICOT2226 Debark logs mechanically*
  - *FWPHAR3216 Conduct forestry operations using crawler tractor*
2. Development of a unit of competency covering the use and application of on board optimisation systems and computers in mechanical harvesting. A proposed title for the new unit is *Use harvester optimisation technology for log making*.

The Forest Products IRC supports...

Support for undertaking the proposed work has been extended by the following organisations:

Refer to Appendix A for letters of support.

## E ESTIMATED IMPACTS OF PROPOSED CHANGE

### E.1 Expected benefits for the industry sector

Consultations with stakeholders indicated the following benefits as the result of the proposed changes to the Training Package components:

- **Significant improvement in existing skills and operations:** the proposed changes are expected to help improve existing skills in forest harvesting and log optimisation processes and technology as the sector's participation in training is projected to grow across every state and territory.
- **Reduction of skill shortages:** the proposed changes are expected to help ease the skill shortages created by these skill gaps. Consultation with forest managers and contractors has confirmed difficulty in sourcing skilled machine operators, particularly those skilled in the use of optimiser technologies.
- **Increased productivity and value recovery / waste minimisation of our forests:** previous studies<sup>5</sup> show that harvest optimisation systems can improve the productivity of harvesting operations by 9 per cent and increase the value of logs harvested from each tree by 3 to 6 per cent. Any change regarding skills improvement, to efficiently use the technology, can generate an estimated value of up to \$33.5 million per year for the forest industry and national economy. This would be multiplied if efficient application of broader optimisation processes across the industry sector is considered.<sup>6</sup>

<sup>5</sup> (Walsh 2012); and [https://www.scionresearch.com/\\_data/assets/pdf\\_file/0020/5519/04MOBERG.pdf](https://www.scionresearch.com/_data/assets/pdf_file/0020/5519/04MOBERG.pdf)

<sup>6</sup> ABARES and Skills Impact estimates

## E.2 Potential impacts on training providers

The proposed change to the Training Package will be anticipated to impact on training organisations by creating some work load in updating existing resources and scope as follows:

- Adding a new unit to the scope of registration
- Updating scope for reviewed units subject to the extent of the changes
- Updating or developing training resources and assessment tools which are in line with the improved and new units of competency
- Enabling high quality professional development for teachers in cooperation with the industry sector's leading businesses and technology providers

## E.3 Potential risks of not proceeding with the project

Consultations with stakeholders indicated this project has high industry support and expectations. Not proceeding and delivering this work to the level of industry expectation will impact on the VET sector credibility. The following risks and mitigation strategies related to not proceeding with the proposed Training Package project were identified:

Risk	Level of risk
Technology suppliers deliver non-standard, disjointed training	High
A growing skills shortage	High
No improvement in productivity, or waste reduction	High
Negative perception on the VET sector and its credibility	High

## E.4 Potential risks of proceeding with the project

Consultations with stakeholders indicated the following risks and mitigation strategies as the result of the proposed changes to the Training Package components:

Risk	Level of risk	Mitigation strategy
Training providers lack sufficient skills to impart best practice principles of forest harvesting	High	The sector supports processes and ensures that partnership arrangements are developed amongst the VET providers, technology providers and businesses for third party delivery of training.

Training providers lack resources to deliver harvester optimiser training	High	As above
Take-up of training is affected by technology supplier training as an alternative to training package-based training	Medium	As above
Some businesses don't support the development of proposed training package components	Low	The sector supports promotion of improved training package components and the benefits resulting from taking-up training
Public funds are invested in the Training Package development but take-up of training is lower than expected	Low	The sector is responsible for providing reasons for its level of participation in training and for finding solutions to address the issues

## F OUTSTANDING ISSUES

None

## G EXPECTED TIMEFRAMES AND PROCESS FOR TRAINING PRODUCT DEVELOPMENT WORK

Process	Timeframe
IRC and industry support	August/September 2016
Business case submission	October 2016
Development of draft components	October/November 2016
Technical expert review of drafts and feedback	November 2017
Final drafts of components	December 2017
IRC sign off	January 2018
Case for Endorsement and submission to AISC	January 2018

## H TRAINING PRODUCT CHECK STATUS

## I IRC SIGN-OFF

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