Forestry

MOBILE PLANT ASSESSMENT TOOL

September 2018

New Zealand Government

WORKSAFE NEW ZEALAND | MAHI HAUMARU AOTEAROA

Inspector safety:

- Ensure safe entry, inspection and exit has been arranged before approaching or inspecting mobile plant, ropes, rigging or stump anchors.
- Insist a competent escort is provided.

Objective

WorkSafe Forestry Assessments are part of a workplace health and safety system to provide New Zealanders with assurance that the risks associated with forest harvesting are being effectivity eliminated or managed. Broadly, risks arise from the:

Machines	plant and equipment
People	training, qualifications, experience, competence, PCBU arrangements/ responsibilities
Site	includes topography, soil types, weather impacts, and
Plan	machinery suitable for extraction system, site, slope, man-machine interaction, separation distances etc.

This assessment tool has a focus on the machines involved in machine felling and extraction and is designed to supplement the Forestry Assessment tool which has a broader focus on the people, the site, and the plan.

UNDERTAKING THE ASSESSMENT

Assessments will focus on what measures the duty holder has implemented in the workplace to eliminate or manage risks and how effective these measures are. Documentation and policies are not substitutes for action and behaviour.

Duty holders should be able to demonstrate that:

- A functioning and effective health and safety practice (a system) is in place, covering, for example, risk assessment, incident reports and evidence of follow up, safety meetings, inspection records, training records, worker engagement (ref Forestry Assessment Tool).
- The configuration of the crew is suitable for the area being harvested (ie not a ground-base crew working in a hauler block).
- The harvest planning has been done by a competent person and is sensible for the area.
- The choice of machine is suitable for work it is used for, including the slopes that the machine is operating on.

Contractors should be able to explain:

- What they consider the critical risks with operating their mobile plant.
- How they manage these risks.
- How they know that the risks are being managed effectively.
- How the risks are reviewed – this should be included in daily tailgate meetings and workers speaking up.
- What they need to do to when plans change (eg absence of operator, extreme weather, production pressure).

During an assessment this is assessed by conversations with duty holders including workers, looking at documentation and also observing operations.

Assessments use a sampling approach looking at a sample of plant/operating practices to assess the effectiveness of health and safety management.

The mobile plant assessment tool purpose is to provide inspectors information to assist them in assessing whether the risks associated with the use of mobile plant in forestry are being adequately managed by duty holders. It should not be used as a checklist type process.

Evidence of failure to comply with an ACOP, standards or other guidance material including this inspector guidance is not in itself sufficient evidence to form reasonable belief that a duty holder is not complying with a provision of the Act or Regulations.

Refer to the Practice Framework for further guidance – Issuing Legally Enforceable Notices.

CONTENTS

1.0 Health and safety system

IN THIS SECTION:

ASSESSMENT	GUIDANCE
1.1 Health and safety management system in relation to mobile plant	
Through their enquiries and observations inspectors will assess whether the duty holder is managing the risks associated with operating mobile plant. An inspector's confidence will be guided by evidence obtained through enquires to establish the effectiveness of the health and safety system and any supporting documentation.	
Additional inquires could include but not be limited to: – Evidence of maintenance and repair (including records).	A summary maybe provided at the worksite. Complete records of maintenance and repair work will most likely to be kept off site. Some records may be kept by the maintenance/repair service provider.
– Site/task specific identification of risks to workers operating mobile plant. Including plans, tailgate meetings and lock out procedure.	Reference Forestry assessment tool 1.4. Are risks effectively managed? Lock out procedure should include an explanation of why, when, how and who.
– Where applicable a risk matrix or similar decision making aid should be used to assist with the management of variable circumstances and conditions.	For example the risk matrix used for winch-assisted steep slope harvesting.
– Conversations with machine operators should verify the effectiveness of the health and safety management system including whether effective worker engagement and participation is occurring. – A sample of mobile plant should be assessed.	The machine operator should explain any issues and how or if rectified, safety features, functions, machine capabilities and limitations, lock out procedures. Observing a sample of mobile plant operations taking place on site utilising this assessment tool will assist in determining whether the duty holder has effective systems and controls in place to manage the risks associated with the operation of mobile plant.
1.2 When health and safety failures have been established	
When evidence is obtained to support the reasonable belief that a failure to comply with HSWA legislation has or is occurring inspectors will use the EDM to determine the appropriate enforcement response.	The assessment tool will assist inspectors in determining whether the risks associated with mobile plant are being adequately/ effectively managed. However evidence of not complying with this guidance on its own will not be sufficient to establish a failure under HSWA legislation and additional enquires/evidence will need to be obtained.

2.0
Mobile plant

IN THIS SECTION:

ASSESSMENT	GUIDANCE
2.1 Operator protective structures	
Protective structure certification and expiry dates. Ergonomics (seating) entry and egress, (steps ladders) are fit for use. Seatbelt assembly working and being worn by the operators.	(ROPS) Roll Over Protective Structure, (FOPS) Fall On Protective Structure, (OPS) Operator Protective Structure. In regard to the ROPS certification the CPEng will also cover the seatbelt assembly its position and how it's attached. ACOP Operator Protective Structures on self-propelled Mobile Mechanical Plant (OPS ACOP). See OPS ACOP Section 8 for information required on certification plates. Certification of plant used on the landing may only require FOPS and OPS, as they are exempt when working on flat ground. (**Note**: Attrition should over time remove the older plant as new plant is being introduced with full ROPS FOPS OPS structure packages.) Mobile plant used in environments where there is an opportunity for material to enter the operator's cab shall be fully OPS protected, front and side intrusion. Polycarbonates and specific glass products currently in use shall be certified to OPS protection. Any alterations or additions to the protective structure shall be certified. Certification shall be undertaken by a Chartered Professional Engineer. All mechanised processors shall have as a minimum: – a windscreen of 12.5 mm polycarbonate or equivalent strength material – chain shot protection on the main saw. Log yarders – FOPS, OPS certification on cabs in addition to annual tower. Refer Forestry ACOP 14.
2.2 Safety features	
Seat belts (75 mm lap belt required). Multipoint harnesses is installed and used on machines engaged in steep slope harvesting. Reference Operator Protective Structures ACOP.	75 mm lap belt required in mobile plant fitted with Operator Protective Structure and used by the operator at all times. Multipoint harness fitted to machines using winch-assisted steep slope systems. Seat belts and multi point harness manufactured to ISO 6683:2005 may have a minimum width of 46 mm. Certification standard attached to the seat belt or harness. Exemption: Grader operators required to stand up while grading. When traveling to and from jobs seat belts shall be worn. Log yarders do not require seat belts.
Machines hydraulic lock out device is working.	When locked out the machine should not be able to slew, move forward and back or move the grapple by activating the joy stick or foot controls. Switches to activate the implements attached are also engaged to show everything is fully de-energised.
Mobile plant fitted with a quick release mechanism are fitted with a locking pin when operating near workers who are not protected by operator protective structures.	Workers engaged in tree processing on the landing or machine assisted tree felling could be struck by the sudden, unintentional release of a grapple or bucket.
Condition of machine – guarding in place and secure	Particular attention should be given to older yarders still in use for exposed winch drums and any rotating flywheel type attachments.

ASSESSMENT	GUIDANCE
Operator's cab – no loose/unsecured equipment.	No tools, objects, loose in the operator's cab. Such things must be secured and must not interfere with the operation of the machine. Forestry ACOP 6.2.6.
Doors open and close correctly from inside and outside the machine. Forestry ACOP 6.1.4.	Where there is a provision for doors, doors shall be fitted and closed while plant is in use. Forestry ACOP 6.1.4.
Fire extinguishers are the appropriate in size for the machine.	2 x 9 kg foam is preferred. Fire suppression in the engine bays could be used in felling machines as foam performs better and is more compatible with electrics.
Powerline and noise stickers are displayed.	
Lights are fitted and working on machines used for work at night. Forestry ACOP 6.1.5.	Mobile plant required to work at night shall be equipped with working lights that illuminate the work area. Forestry ACOP 6.1.5.

2.3 Functions operate correctly

– brakes are working correctly – winch functions correctly – blade and grapple function correctly – steering functions correctly when under load – machine operator maintains control of machine and load – observe that the mobile plant is operating clear of workers, ropes and logs, (man machine interaction risk).	Brakes are working (foot, park and emergency brakes) and are able to hold the machine and load on any slope which is operated. Forestry ACOP 6.1.7. Does the machine have obvious damage? (Cracked windscreens, damaged/missing guards). Consider whether any damage is compromising the safe operation of the machine and operator safety. Tree felling: Two tree length rule. Forestry ACOP 11.4. Breaking out Ground-based Extraction: Clear communication, machine operators follow breaker outs signals, Breaker outs in the clear at break out.

3.0 Maintenance

IN THIS SECTION:

ASSESSMENT	GUIDANCE
3.1 Maintenance and repair	
The contractor or machine operators should be able to explain/show: – where the operator's manuals are kept – safety devices fitted and how they function – the lock out procedures – maintenance schedules – machine faults repaired – procedure to remove plant from use if a safety critical fault is identified – how safety devices are checked.	Machines on site should have an operating manual. Machine operators can demonstrate the lock out procedures. Machine log book. Daily prestart check lists and audits.

4.0 Yarders

IN THIS SECTION:

ASSESSMENT	GUIDANCE
4.1 Yarders including harvest lines	
Log Yarders only require FOPS and OPS structures however harvest line yarders will require ROPS also.	
Tower inspection certificate: TI number and expiry dates.	At this time expiry dates are determined by specific CPEng's. Yarder towers three years from manufacture date shall be inspected annually by an approved tower inspector.
Yarder identification plate attached to or near tower.	Identification plates must be mounted on the yarder (base of the tower), and provide specific information from the manufacture in regard to rope size, serial number. See BPG Tower Maintenance page 24 for example.
Yarder installation dates for guy rope, guy rope extensions and deadman strops.	
Towers have a safety strop passing through the guy blocks and attached to the top tower to prevent block falling.	Safety strop is to prevent the blocks falling. The safety strop shall be equal to the largest working rope (Sky or Main lines). Maintenance and Inspection of Yarder Towers BPG page 23.
Guy ropes at 45 degrees or less?	
Guylines, anchors and rigging shall be checked when under load daily. Guylines, anchors and rigging checks shall be documented.	A competent person shall check daily that guylines, anchors and rigging are secure when under load Forestry ACOP 14.1.1. All yarders must have a maintenance log book. Ensure log book matches yarder. Installation dates may be recorded in the log book.
Confirmation of the pendant rope age and instalment date.	Pendant rope shall be end for ended yearly and replaced every two years.
Installation date for tower lifting ropes.	Tower lifting ropes must be replaced after two years from new.
4.2 Yarder operation	
Yarder winch rope brakes hold ropes and rigging when under load. Yarder operator follows signals from breaker outs. Yarder operator maintains control of ropes and rigging.	Yarding shall cease if the communication cannot be clearly heard. Forestry ACOP 12.2.7.
Yarder operator signals all major rope movements.	The Head Breaker Out may communicate via RT but the yarder operator must respond by signals.
Two-thirds of the logs in the drag are landed safely or stems cleared before breaker outs move into the danger triangle.	Tree felling direction and positioning of the yarder should link to landing the drag safely. Calculate the MTH and divide by 3 as a reasonable measure. Forestry ACOP 13.1.1. WorkSafe Forestry Breaking out assessment tool 3.2.
Downhill yarding: – flat chute area is adequate to land stems safely.	Where the site has been set up downhill the yarder has to be set up so any material including the drag does not hit or pose a risk to people working on the landing. Adequate room must be provided to land drags.

ASSESSMENT	GUIDANCE
4.3 Anchors	
Types, mobile tail hold, stumps, deadman. See WorkSafe Forestry Breaking Out assessment tool 3.8.	
Stumps See Forestry ACOP 14.3. **Caution** Never stand closer than 6 m from a live anchor. (Working under tension) as it may pull out or ropes may release at any time. Never underestimate the potential diameter of the stump root plate. Stumps used for anchors either on the back line or as guy anchors are of a suitable size and that they are notched correctly.	Observe that the stumps are fresh, less than six months old and there is sufficient height above the planned notch, at least 30 cm. Larger stumps are preferred. Multi stump load sharing systems can be used. Reference Cable Logging BPG: Anchors. If the stump root plate is moving while under load Yarder operation should stop!
Deadman observations Logs selected are 5 m in length and greater than 50 cm in diameter. Trench is at least 4 m in depth with vertical walls notched cut at 90 degree to limit vertical pull. Strop ends are pulled up evenly.	Deadman anchors are buried and are obviously difficult to assess. However if an inspector was to observe the process the Cable Logging BPG page 81 describes the procedure which should be used.
Exit locations painted to identify movement.	

5.0 Operation of ground-based harvesting mobile plant

IN THIS SECTION:

ASSESSMENT	GUIDANCE
5.1 Assess health and safety management systems for ground-based logging mobile plant	
Does the contractor have a comprehensive management plan/system in place for ground-based harvesting? Validate effectiveness of the system by talking with: – relevant workers – the manager or contractor – the principal.	The contractor/employer can provide evidence that the principal has sighted their safety management system for ground-based harvesting? ACOP (2.4.1).
The PCBU should follow the recommended operating and maintenance requirements of the manufacturer.	Operator's manuals defining safe operating and maintenance requirements should be available. Look for evidence of maintenance/inspection /monitoring of mobile plant.
Can the contractor/employer and operator explain how risks including: slope, ground and weather conditions and daily variations are managed?	Where the stability of mobile plant is compromised by slope, weather or ground conditions then there is evidence that a task specific plan has been is developed, implemented and is being monitored to ensure effective controls are in place to manage identified risks The contractor/employer or operator should be able to provide evidence of daily risk management including the following factors: Slope, ground conditions, topography, weather conditions. Validate by talking with crew members.
5.2 Training	
Training records detailing training for system specific winch-assisted steep slope harvesting. Completed an induction for the specific winch-assisted steep slope harvesting system in use. NZQA unit standard: – 6934 Skidder – 6935 Excavator based machine – 6936 Tracked machine (Bulldozer) – 6945 Mechanized tree felling – 24590 Self-levelling machine – 6947 Bunch trees for extraction.	Workers must be competent to operate the machine in use or under documented training and close supervision. The NZQA qualifications support the determination of competency.
5.3 Ground-based mobile plant operation including bulldozers, skidders, shovel logging, forwarders	
– Multi point harness/seat belt. – Entry/exit points. – Tracks or tyres must be suitable for the conditions and task. Fire extinguisher securely fastened in the operator's cab.	Refer to guidance assessment in 4.1 regarding operator protective structures and protective windscreens for chain shot. Mobile plant with damaged tracks or tyres affecting the ability of operator to maintain control must not be used.
Operators of mobile plant must maintain effective communication with other workers they operate near.	Radios are the most effective means of communication.
Mobile plant shall be equipped with a braking mechanism capable of holding itself and its load on any slope on which it is operating.	Reference Forestry ACOP 6.1.7. Observe the machine operator using the brakes. Operators must maintain control of mobile plant.

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Formed tracks used for access or tree extraction must be positioned and constructed so they are safe for the machines operating on them to use. Tracks must be maintained. The PCBU must ensure tracks are provided where machine stability cannot be assured.	Tracks which are too steep or have cross slope affecting the ability of operator to maintain control must not be used. Tracks which have not been maintained and have ruts or cross slope affecting the ability of operator to maintain control must not be used.
Machine operators maintaining control of the machine and trees.	Observe the machine undertaking usual task (eg bunching or extracting trees). **Note**: Mobile plant is less stable on cross slopes.

5.4 Feller buncher

– Multi point harness/seat belt. – Entry/exit points: Three exit points recommended. – Emergency stop button. Fire extinguisher securely fastened in the operator's cab.	Refer to guidance in 4.1 regarding operator protective structures and protective windscreens for chain shot.

5.5 Feller buncher operating

Observations: – machine operator uses seat belt/multi point harness – machine operator maintains control of machine – felling head functions correctly – winch rope is not damaged by felling head, tracks or felled trees – machine operator maintains control of trees.	Inspectors must ensure they are in a safe position when observing mobile plant in operation. Inspectors must follow inspector safety guidance provided.

5.6 'Upset conditions'

The machine operator can describe situations when the machine they are operating may become unstable. The machine operator can explain when the extraction machine they are operating may become unstable when winching trees for extraction. The machine operator can explain the procedures to follow in the event of: – winch rope or winch failure – machine becoming unstable – fire.	Machine operators must understand the risk mitigation systems in use for each 'upset condition'.

5.7 Worker engagement

Machine operator can explain: – periodic competency assessment (eg annual competency assessment) – auditing PPE, mobile plant, ropes/rigging – involvement in health and safety system, daily meetings, work plans, health monitoring – training and development – involvement in the development and improvement of health and safety system on site – what is their involvement in accident/incident investigation, or near miss?	

6.0 Winch-assisted steep slope harvesting system

IN THIS SECTION:

ASSESSMENT	GUIDANCE
6.1 Assess winch-assisted steep slope harvesting health and safety management systems	
Does the contractor have a comprehensive management plan /system in place for steep slope harvesting? Validate effectiveness of the system by talking with: – relevant workers – the manager or contractor – the principal.	The contractor/employer can provide evidence that the principal has sighted their documented safety management system for winch-assisted harvesting on steep slopes? ACOP (2.4.1). Has the principal PCBU signed off the steep slope harvesting policies and procedures? Engineering certification for steep slope machines and their anchor systems may come in the form of documents rather than a certification plate. ACOP 6.4.1.
The PCBU should follow the recommended set up and maintenance requirements of the CPEng. Provide documentation of annual engineering and mechanical inspection of the winch-assisted steep slope harvesting system.	Review CPEng maintenance requirements. Look for evidence of maintenance/ inspection.
Can the contractor/employer or operator explain how risks including: slope, ground and weather conditions and daily variations are managed?	The contractor/employer or operator should provide evidence of daily risk management including the following factors: Slope, ground conditions, topography, weather conditions. Validate by talking with crew members.
Is there specific winch-assist machine anchoring guidance available for reference on site? Documentation available listing all rigging components. Rigging components have a minimum SWL of 33% of the breaking load of the winch rope. The machine operator will explain daily checks including rope, rigging and anchor checks. Daily checks should be recorded. Inspect documentation supporting the safe operating system.	Blade or bucket must be dug in to resist the forces applied. Minimum half blade depth, full bucket depth. Reference Cable Harvesting BPG: Anchors. The PCBU should provide a list of rigging components. The tension on the ropes and rigging shall be restricted to 33% of its breaking load. Daily checks should include an assessment of the combined factors which effect machine stability including slope, ground conditions, and topography and weather conditions. This could be supported by a risk assessment matrix.
6.2 Training	
Training records detailing training for system specific winch-assisted steep slope harvesting. Completed an induction for the specific winch-assisted steep slope harvesting system in use. NZQA unit standard: – 6945 mechanized tree felling – 24590 self-levelling machine – 6947 bunch trees for extraction – 17771 anchor a mobile tail hold machine.	Workers must be competent to operate the winch-assisted steep slope harvesting system in use. The NZQA qualifications support the determination of competency. **Note**: Currently NZQA unit standards for winch-assisted steep slope harvesting have not been developed.

ASSESSMENT	GUIDANCE
6.3 Emergency backup system	
The machine operator can explain the emergency back-up system.	This could be a: – second winch rope – blade or other hydraulic attachment – warning device to warn the machine operator of anchor movement. Any system or combination of systems needs to be supported by appropriate training and safe operating procedures. Systems also require ongoing monitoring and review to ensure that new risks are identified and that existing controls are working effectively.
The machine operator can explain winch machine anchoring and monitoring/anchor failure systems. The machine operator can explain the procedures to follow in the event of: – rope or winch failure – anchor failure – machine tip over – fire.	Blade or bucket must be dug in to resist the forces applied. Minimum half blade depth, full bucket depth. The machine operator should be able to explain the side deflection angle. The explanation must be in accordance with the manufacturer's guidance. The operator can explain the movement detecting system. Explanation should include: – position boom to stabilise the machine – position boom to stabilise the machine, stay in the machine – assess stability and exit machine – use fire suppression system, exit machine.
Tension monitor or system is required to ensure rope tension does not exceed 33 percent of its breaking load at all times.	This could include or be a combination of instruments informing the operator of the load or a mechanical load limiting system.

7.0 Winch-assisted steep slope harvesting operation

IN THIS SECTION:

ASSESSMENT	GUIDANCE
7.1 Winch-assist machines	
– Securely anchored refer to BPG Cable Logging Anchors Mobile Plant. – Machine has a movement detection system. – Blade or bucket functions correctly. – Winch-assist ropes are not used for log extraction. – Inspect engineering certification of tow hitch/draw bar.	– Blade or bucket must be dug in to resist the forces applied. Minimum half blade depth, full bucket depth. – Electronic movement detection which signals an alarm to warn the operator. – If observed must function correctly. – Trees must not be hooked to the ropes for extraction. – Tow hitch/draw bar must have engineering certification.
7.2 Feller buncher	
– Multi point harness/seat belt. – Entry/exit points: Three exit points recommended. – Emergency stop button. – Fire extinguisher securely fastened in the operator's cab.	Refer to guidance in 4.1 regarding operator protective structures and protective windscreens for chain shot.
7.3 Feller buncher operating	
Observe: – machine operator uses seat belt/multi point harness – machine operator maintains control of machine – winch functions correctly – felling head functions correctly – winch rope is not damaged by felling head, tracks or felled trees – winch rope bights are managed.	Inspectors must ensure they are in a safe position when observing winch-assisted mobile plant in operation. Inspectors must follow inspector safety guidance provided. Do winch rope bights place machine at risk of becoming unstable?
7.4 'Upset conditions'	
The machine operator can explain the emergency back-up system. The machine operator can explain winch machine anchoring and monitoring/anchor failure systems. The machine operator can explain winch machine anchor monitoring and anchor fail to safe systems. The machine operator can explain the procedures to follow in the event of: – rope or winch failure – anchor failure – machine tip over – fire.	Machine operators must understand the risk mitigation systems in use for each 'upset condition'.
7.5 Worker engagement	
Machine operator can explain: – periodic competency assessment (eg annual competency assessment) – auditing PPE, mobile plant, ropes/rigging – involvement in health and safety system, daily meetings, work plans, health monitoring – training and development – involvement in the development and improvement of health and safety system on site – what is worker involvement in accident/incident investigation, or near miss?	

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