Rayonier matariki Forests

Workplace Notification

Notification Number	AUCK 006

Safety Alert	Health Alert	Best Practice Advice
Innovation Advice	Environmental Alert	Environmental Focus

Date: 4th April 2023	**Focus Group:** Mechanical felling, Manual Felling, Silviculture and road clearing operations
Region: All	**Topic:** Tree felling – Storm damaged stands

Background

- Cyclone Gabrielle struck the North Island in Mid-February 2023. Two of our hardest hit regions, Hawkes Bay and Northland, have taken several weeks to re-establish access, recover contractor machinery and perform damage assessments.
- Some harvesting contractors have been relocated to previously unplanned stands, with new site hazards, and in many cases, these stands also contain storm damaged areas. Essentially this means our harvesting contractors and staff are actively dealing with a massive upset condition.
- At the time of writing this alert, it has been 6 weeks since the storm damage occurred. Opportunities of fine weather has been largely taken up by access repairs to forest infrastructure and accessing and relocating harvesting and roading machinery. We are now entering autumn and soon the winter weather will set in. Saturated soils will further complicate machine access to some of these sites and may make it necessary to fell hazardous trees motor-manually.
- The manual falling of hazardous storm damaged trees should only occur as a last resort option. **NO MANUAL TREE FALLING** should occur in stands that are accessible to mechanised felling options, be that assisted or non-assisted mechanised falling. If the stand is not accessible to mechanised felling options, consider providing access tracks for mechanised tree felling. If that is not an option, consider cable systems to uproot the hazardous trees. If all these options are not viable and a manual faller is required to fell hazardous trees, they must understand that they **always have the option of walking away and leaving the trees standing or undisturbed if they consider that it will be too dangerous to fell or crosscut windthrown or wind wrenched trees. The same applies to mechanised felling operations.**
- **Only experienced certified fallers** with windthrow experience should be allowed to perform clear fell in weather damaged stands.
- **Tree felling (manual or mechanical) in damaged stands is considered an elevated risk situation and as such more robust controls must be used to manage the associated risks.**
- With trees being wind affected and saturated soils it is not safe to be working in windy conditions near windthrow. These trees have been wrenched in different directions as the cyclone passed. The root plates could be very unstable.
- Check the weather forecast daily and pay attention to wind speed and wind direction forecasts expected for the day. Stop work if you see the tops start to move.
- **Start only when you are certain that the work can be completed safely.**
- **Stop when you are unsure that it's safe to continue or if the circumstances change.**

Here are some of the most important things to consider when working in windthrow or with wind wrenched trees.

HAZARDOUS TREE FEATURES

1. Overhead hazards

- Broken tops and broken branches
- Spar trees
- Hung-up trees
- Suspended debris
- Dead top
- Dead branches

Management Options

1. Seek machine assistance where possible.
2. Seek additional skilled assistance when unsure.
3. Consider two person felling teams in manual tree felling operations.
4. Fell only if you are confident that it can be done safely.

If deemed too dangerous leave it standing or undisturbed and notify RMF of the hazard

Guidance

1. Look for overhead hazards like dead crowns, hang-ups, and limbs.	2. Call for machine assistance if it's possible.
3. Anticipate the fall direction of the overhead hazard.	4. Make sure that the escape route is clear of the danger area.
5. Consider tree driving as an option to eliminate the hazard.	6. Always make sure that you can safely retreat before felling any tree. Check your escape route, make sure it's clear. If you can't get an escape route – don't cut the tree!
7. Call in your tree drives. Notify your observer if a drive failed. Do not more than one on to two.	8. Every tree set up for a drive must have a holding wedge in the back cut.
9. Increase you call up frequency when working in storm damaged stands.	10. When performing your site assessment start with overhead hazards first, this includes anything that may fall or roll into your work area – from above and from behind.

Use correct felling cuts

Tension release cuts:	**Bore and release cuts:**	**Fast release cuts:**
Tension release cuts: Plan where to cut, which cuts to use, make sure that you have enough room to finish from a safe place. For big trees you can reduce the diameter by cutting the far side first and finish from the safe side.	For slow-release felling to allow time for you get away before the tree falls, fell to the direction of lean, make cuts higher so you can look up	Use these to punch through a gap or to knock down a hazard

The FOA tree felling best practice guide provides the following guidance when dealing with hung-up and cut-up trees is illustrated below:

HUNG-UP AND CUT-UP TREES

A **hung-up** tree has been cut, windthrown or pushed and is caught in or lodged against another tree, preventing it from falling to the ground. In most cases, the direction a hung-up tree will fall in has been determined. In this situation, the danger zone may not be out in front of the tree. At any stage, the tree could dislodge and fall or it could twist sideways and pivot to either side, or twist and pivot to the rear of the stump. So in this case, the danger zone is all around the tree.

Many fallers have been fatally or seriously injured by working under a hung-up tree. Under no circumstances should the tree in which the hang-up is lodged be felled manually while the other tree is still hung-up in it.

A **cut-up tree** has been scarfed and backcut and but has not fallen to the ground. Cut-up trees are often caused by poor tree assessment, and poor tree felling or wedging techniques.

Depending on the quality of the cuts, the tree could fall in any direction.

There are two types of cut up tree:

1. Trees with a wedge or wedges in the back cut, (safest situation)
2. Trees with no wedges in the back cut, (most hazardous situation)

If the faller is not sure how to deal with a hung-up or cut- up tree, they must seek advice from a competent person.

PROCEDURES FOR FELLING HUNG-UP TREES

Hung-up trees must be brought to the ground immediately or isolated from the forest harvesting operation. No-one should work or be standing within two tree-lengths of the likely direction of fall.

With a hung-up tree the felling direction has basically been decided.

The faller must not leave the area before the tree has been brought to the ground, unless the situation has been notified to the contact person and a plan is in place to manage the hazard.

Fallers must assess hung-up trees carefully before taking any further action.

Issues to consider are:

- how long the hang-up has been lodged in the tree
- which side of the standing tree the hang-up is on
- the stability of the root plate if the tree is windblown
- the size of the branches on the standing tree that appear to be supporting the hung-up tree
- which part of the hung-up tree is in contact with the standing tree, i.e. how far up the stem

Where practical, a machine should be used to pull the hung-up tree away from the stump and bring it down safely. This machine may work within two tree-lengths, providing it is to the rear of the tree and the operator does not leave the cab. No other person or machine should be within two tree-lengths of the intended or likely direction of fall.

If machine access is not possible, the faller can attempt to drive the hung- up down with another tree. Extreme caution must be exercised when using this method.

APPROVED CODE OF PRACTICE

» **RULE 11.6.1**

A hung-up or cut-up tree shall be brought to the ground immediately or the hazard managed until such time as it can be brought to the ground.

If the cut-up tree is to be brought down, refer to section 11.7: Tree driving.

» **RULE 11.4.2**

Mobile plant with the appropriate protective structures may work closer than two tree lengths but not closer than one tree length of felling operations unless they are directly assisting in the tree felling operation.

» **RULE 11.4.3**

No person shall be closer than two tree lengths to a tree being felled, unless that person is assisting the faller.

Any person within two tree lengths of a tree being felled shall be under direct control of the faller.

The procedure is:

1. Notify the contact person of the proposed drive.
2. If there is any doubt in the faller's mind, an observer must be called in.
3. The driver tree must be selected and the area around it cleared so the top of the tree can be seen.
4. If there is any possibility that the first driver won't take the hung-up down, a back-up driver must be selected and cleared around
5. Clear a longer than usual escape route. It must be well away from the anticipated movement of the butt of the driver, which might pivot on the hung-up tree.
6. The escape route should be created to reach the protection of other standing trees, if practical.
7. Where more than one driver tree might be used, escape routes must be cleared away from each tree in the drive.
8. Depending on the location of the driver, it should be aimed so it strikes the hung-up tree immediately below the point where it is lodged in the standing tree.
9. If the driver is to the side of the hung-up tree and can bypass the standing tree, the driver should be aimed so it strikes the hung-up tree above the point where it's lodged in the standing tree.
10. Care should be taken to avoid breaking the hung-up tree off above the point where it is lodged in the standing tree.
11. As soon as the driver tree starts to move, the faller must immediately retreat immediately along the prepared escape route, leaving the chainsaw and felling aids behind.
12. Once the drive is completed, the faller informs their contact person of the successful outcome.

APPROVED CODE OF PRACTICE

» **RULE 11.6.2**

Where a cut-up tree has sat back and needs to be recut, the scarf and backcut shall be a minimum of the tree diameter above the initial backcut.

If the hang-up can't be brought safely to the ground, fallers must:

- call up the contact person and advise that the hazard cannot be eliminated
- ask the contact person to warn everyone else in the operation about the hang-up
- ensure that the hazard is reported to the crew manager as soon as it is practical to do so
- if the area has public access, the hazard must be cordoned off with warning tape to restrict access to the site
- the cordoned off area must extend at least two tree-lengths away from the hung-up tree

On larger trees, make a bore cut into the closed up backcut and drive in a wedge to re-open it.

PROCEDURES FOR FELLING CUT-UP TREES

A cut-up tree might fail to fall or might sit back if the faller has not assessed the tree correctly and has misjudged the lean, or the wind has come up unexpectedly.

Cut-up trees must be thoroughly assessed to determine the safest way to deal with them. If the tree is sitting back on a wedge, it's safer than if there is no wedge in it. There are several options for bringing a cut-up tree down.

If the felling cuts are completed and the tree is not sitting back too far, the faller can use wedges to lift it back in the intended direction of fall. The correct method is to drive a wedge into the backcut immediately behind the hinge and tap in until there's enough of a gap to get a second wedge in the backcut. Take care to ensure that the hinge doesn't fail with this technique.

If the tree is sitting back heavily, or all the wedges have been used, the options are:

- use a machine to push the tree down (this should be the first choice wherever possible)
- drive the cut-up tree down (refer to the section on tree driving)
- fell the tree with the lean (which is now in the opposite direction to the original cuts)

Use this sequence to fell the tree in the opposite direction:

1. Re-assess the path the tree is going to fall in for obstacles that it could hit on its way down.
2. Check the ground where the tree is going to land to make sure it won't kick back or rebound.
3. Check whether the escape route taken to move away from the revised fall path is likely to place the faller in amongst already felled trees that could move if struck by the falling tree.
4. Call-in to the contact person advising them that a hazardous tree is being felled.
5. Lift the new felling cuts up at least one diameter of the tree above the original felling cuts.
6. Aim the new scarf so the tree will fall directly opposite to the intended direction of the original scarf.
7. Watch for the hingewood in the first felling cuts in case it fails and allows the falling tree to kick back off the stump.
8. Move clear along the escape route as soon as the tree starts to fall.
9. Advise the contact person when the tree has been successfully felled.

2. Difficult felling direction and damaged trees

- Heavy leaners
- Wind wrenched (partially blown over) leaners.
- Intertwined branches.
- Spreading crown
- Heavy crown

Management Options

1. Seek machine assistance where possible.
2. Seek additional skilled assistance when unsure.
3. Consider two person felling teams in manual tree felling operations.
4. Fell only if you are confident that it can be done safely.

If deemed too dangerous leave it standing or undisturbed and notify RMF of the hazard

Guidance

1. Where possible use mechanical falling or machines to remove hazard in the first instance	2. Ensure that escape routes are carefully planned.
3. Use two man falling teams or an observer if required.	4. Use bore and release cut where practical.
5. Predict stem movement and read tension/compression before releasing.	6. Never stand below stems, root balls or broken material.
7. Eliminate dead spars from work area.	8. Never work directly under wind wrenched trees (trees blown partly over)
9. Fell trees in the direction of the predominate lean	10. Increase the height of the felling cuts
11. Consider tree driving to eliminate the hazard.	12. Make sure that the tree has green needles and live crown before starting felling cuts, if tree seems dead treat it as a dead spar.
13. Use recommended tree felling techniques to slow down the release when the back cut is made	14. Use tree jacks where available and appropriate
15. In hauler operations, if all else fails, consider using working ropes to bring trees down	16. Call in your tree drives. Notify your observer if a drive failed. Do not more than one on to two.
17. Every tree set up for a drive must have a holding wedge in the back cut	18. Never walk in front of a tree set up for a tree drive

The FOA tree felling best practice guide provides the following guidance when dealing with windthrow is illustrated below:

WINDTHROW

Windthrow is a result of high winds blowing down an exposed stand of trees.

Areas prone to windthrow include stands that have been:

- exposed to extreme wind conditions, often from a different direction to the predominant wind
- opened up through other harvesting operations
- subjected to wet weather conditions prior to strong winds
- planted on exposed ridge lines
- located in naturally wet areas
- planted in poor ground conditions resulting in trees with shallow root plates

Manually felling windthrown trees is very hazardous and should only be attempted by competent fallers or those under close supervision. Where possible, a machine should be used to complete or assist the tree felling operation.

ADDITIONAL HAZARDS CAUSED BY WINDTHROW

Windthrown trees cause additional hazards during tree felling and extraction and can have extreme and complex tension and compression forces within them. This makes the job of identifying safe positions and correct cutting techniques more difficult and more important.

Some of the common hazards associated with windthrown areas are:

- unstable trees
- spars
- heavy leaners
- overhead hazards: shattered tops, sailors, loose debris
- uprooted trees under tension
- multiple hang-ups
- extreme and complex tension and forces
- confined work areas
- changing weather conditions – (further rain and wind can affect the stability of the standing trees)

To minimise these hazards, the following precautions should be taken:

- only competent fallers (or those under close supervision) should work in windthrown areas
- use machines to isolate the tension in stems before they are cut
- work from the butt end of the windthrown trees wherever possible
- carefully assess each stem to be cut, and always finish on the safe side of the tree
- if cutting a stem in the middle, the final cut should be made from the compression side so it springs away from the faller
- if cutting next to a rootball, the cuts should be moved up the stem so it can't roll onto the faller.
- off-set the final cut towards the rootball with the faller standing on the rootball side in case the stem splits as it is being cut
- angle the final cut if necessary to enable the faller to stand in a safe position

These are just a few of the techniques used to handle the hazards created by windthrow events. There are many more techniques that can be applied. Any faller needing to fell windthrown trees must be professionally trained and assessed as competent before attempting to work in these conditions.

APPROVED CODE OF PRACTICE

» **RULE 11.1.1**

In areas of windthrown salvage, machine assisted felling shall be the first choice of felling mechanism.

Machines must be used if practicable to breakout windthrown trees to a safe positon where tension is released and the tree can be safely worked on

» **RULE 11.11.3**

No person must work directly under wind wrenched trees.

No person must work within two tree lengths forward of wind wrenched or damaged trees.

» **RULE 11.11.2**

Any manual faller required to work in wind throw must have their competency assessed against NZQA Unit Standard 1270

The FOA tree felling best practice guide provides the following guidance when dealing with individual windthrown trees is illustrated below:

INDIVIDUAL WINDTHROWN TREES

Individual windthrown trees are often tangled in amongst other standing trees and as such, they can temporarily increase the hazards a faller may face when dealing with them manually.

The following basic procedures should be used when felling individually windthrown trees:

1. Thoroughly assess the site.
2. Develop a felling plan and ask the contact person to document significant hazards.
3. Assess the individual tree to identify the amount of tension and the direction of any anticipated movement.
4. Prepare an adequate work area and escape route.
5. Use appropriate cutting techniques for the situation (i.e. uproots, heavy leaner, spar).
6. Finish on the safe side, away from any likely stem or root plate movement.
7. Move well clear up the escape route and observe from the safe position.
8. Do not work below unstable root plates that have been cut.

If in any doubt, the faller must seek assistance from a machine or another competent faller.

Windthrown trees

HAZARDOUS SITE FEATURES

3. Landslides in felling area as result of the cyclone

Management Options

1. Seek machine assistance where possible.
2. Seek additional skilled assistance when unsure.
3. Consider two person felling teams in manual tree felling operations.
4. Fell only if you are confident that it can be done safely.

If deemed too dangerous leave it standing or undisturbed and notify RMF of the hazard

Guidance

Look for any sign of landslides.

If you discover an area where a landslide occurred and it's part of your working area:

1. Call your observer or foreman for assistance.	2. Assess the area and determine if it's safe to enter!
3. Assess the trees and identify potential hazards.	4. If it appears difficult or dangerous stop and move away. Notify RMF of the hazard.

RMF and the contractor should develop a safe strategy for this area

4. Debris Movement – slash, slovens, logs migrated into felling area as result of the cyclone

Management Options

1. Seek machine assistance where possible.
2. Seek additional skilled assistance when unsure.
3. Consider two person felling teams in manual tree felling operations.
4. Fell only if you are confident that it can be done safely.

If deemed too dangerous leave it standing or undisturbed and notify RMF of the hazard

Guidance

1. Never work directly below loose stumps and suspended slash piles.	2. If possible, get machine assistance to remove the hazard.
3. Never work in an area that makes it difficult to retreat.	4. Never work under suspended material (boulders, stumps, root balls, trees)

Leave the area if you cannot establish a safe position to work from

5. Steep Slopes not accessible by a machine

Management Options
1. Seek additional skilled assistance when unsure. 2. Consider two person felling teams in manual tree felling operations. 3. Fell only if you are confident that it can be done safely. If deemed too dangerous leave it standing or undisturbed and notify RMF of the hazard

Guidance	
1. Ensure that escape routes are practical and clear of all obstructions	2. Accurately assess your trees and plan your felling cuts to avoid sliding hazards
3. Never work in an area that makes it difficult to retreat.	4. Always work on the high side of the tree when falling
5. In hauler blocks, consider the possibility of using working ropes to push trees over. If this method is selected ensure that the extraction phase is done mechanically. This option should be avoided for manual breaking out blocks.	
Ensure good footing, notch roots for footholds if necessary	

6. Soil type, soil strength and soil depth affecting machine stability and traction. ***These factors also affect tree stability and compromise tree root systems for both manual and mechanical tree falling.***

Management Options

1. Manual fallers should seek mechanical assistance where possible.
2. Seek additional skilled assistance when unsure.
3. Consider two person felling teams in manual tree felling operations.
4. Fell only if you are confident that it can be done safely.

If deemed too dangerous leave it standing or undisturbed and notify RMF of the hazard

Guidance

1. Look for damage around base of tree before starting felling cuts	2. Look for indications of saturated soils or soil disturbance and unusual depressions.
3. Look for any ground cracks around the tree that indicates it's unstable.	4. Look for machine tracks around the base of the tree if working in an area where machine movement occurred.
5. Look for trees leaning in a different direction to the predominant lean.	6. Look for excessive tree lean.
7. In winch-assisted felling operations, inspect stumps selected as anchors for deflection with caution. Ensure that they are stable and have sufficient holding capacity for the system.	

7. Saturated soils - too wet for machine access

Management Options

1. Seek additional skilled assistance when unsure.
2. Fell only if you are confident that it can be done safely.

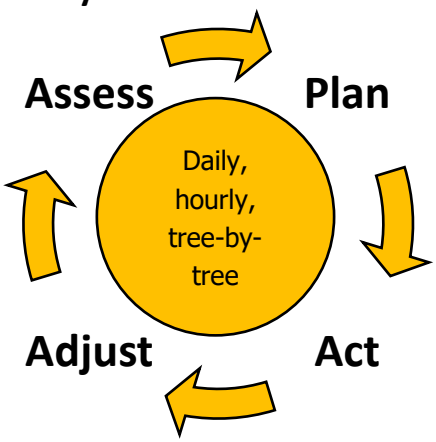
If deemed too dangerous leave it standing or undisturbed and notify RMF of the hazard

Guidance

1. If soil saturation affects machine stability, stop working.	2. Do not push the limits of the machine or system capabilities.
3. Wait for conditions to dry out.	4. Do not put manual tree fallers at risk by asking them to enter a hazardous felling area because it's too wet for a machine

REMEMBER:

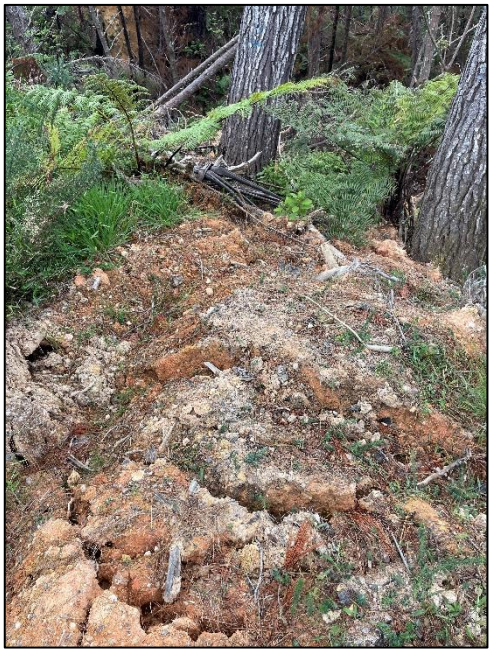
1. **Start only when you are certain that the work can be completed safely.**
2. **Stop when you are unsure that it's safe to continue or if the circumstances change.**
3. **Effective operational planning is crucial for tree felling** operations in storm damaged stands. The situation is dynamic and requires frequent daily planning interactions and at the worker level requires tree-by-tree planning.



4. **Monitoring is incredibly important.**
   - Informal safe behavioural observations should be increased.
   - Ongoing refresher training needs to be provided while working in storm damaged stands.
   - Strict fatigue monitoring is required for both manual and mech fallers.
   - Ongoing wellness check-ins is incredibly valuable.
5. **Strictly enforced call up procedures are required, this includes.**
   - Faller check-in
   - Calling in tree-drives before and after completion
   - Calling in failed tree-drives
   - Stopping work if the call in process fails

Manage your people and equipment, this will be a marathon, not a race!

Cracks due to high winds



Wind damage exposing roots

Cut one and both will fall

Wind wrenched – under tension

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For access from a desktop computer, follow the link below:

Disclaimer: Information in this notification is based on initial observations or conclusions. Because some events may be subject to ongoing investigation, details may be subject to change.