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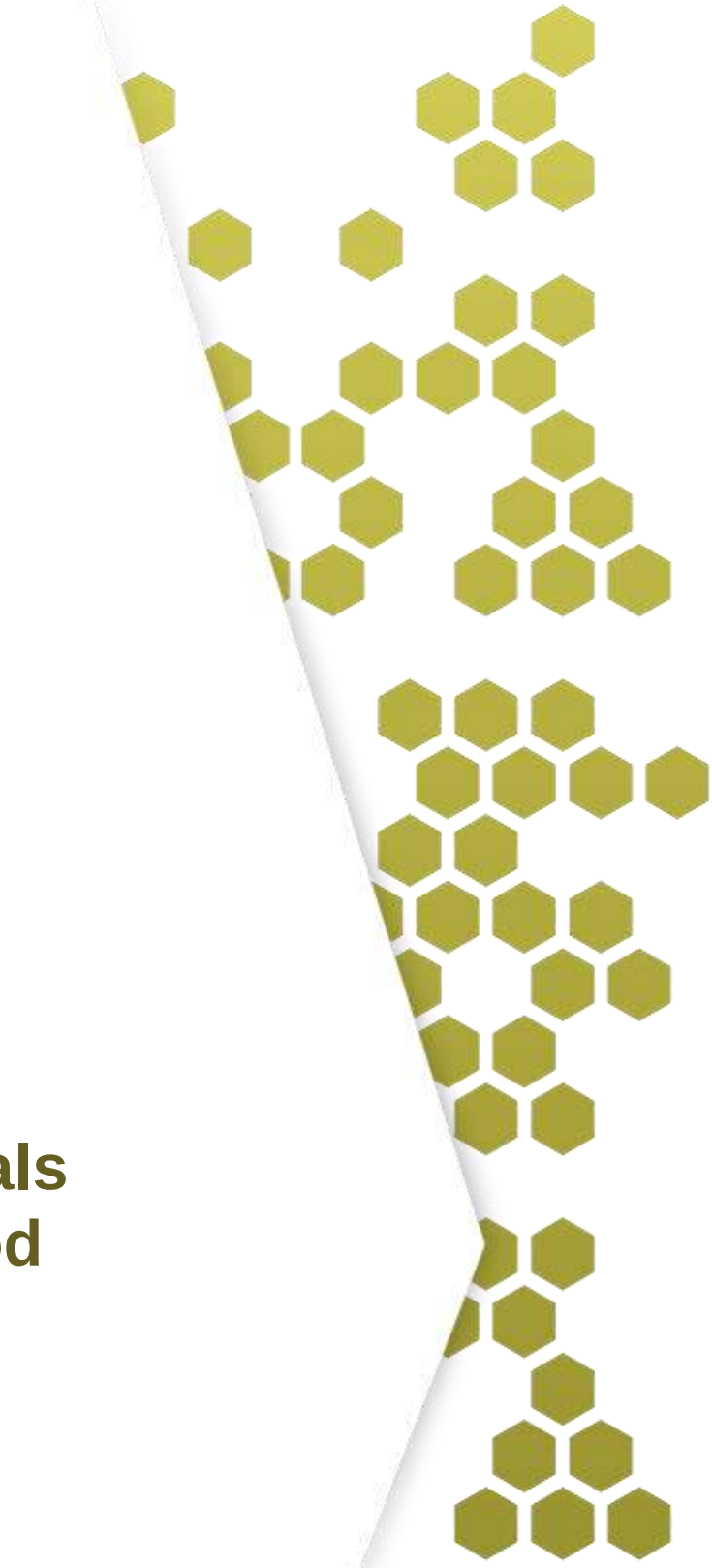

Integrated Forestry Operations Approvals Remake Trial Method

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IFOA Remake Trial Method

Summary

Background

The NSW Government has committed to remaking the four Coastal Integrated Forestry Operations Approvals (IFOAs) into a single consolidated Coastal IFOA with following objectives:

1. Reduce costs associated with implementation and compliance
2. Improve clarity and enforceability.

These objectives are to be delivered with **no net change to wood supply** and **no erosion of environmental values**.

In September 2014, the Threatened Species Licence (TSL) components proposed for the Coastal IFOA were provided to a panel of expert ecologists and botanists to review. Some members of the expert panel suggested that some of the proposed conditions and options required further testing to ensure they do not result in an erosion of environmental values.

Some of the proposed multi-scale landscape threatened species licence components also made it difficult to determine any potential wood supply changes.

On this basis the Government has decided to undertake a trial to demonstrate the environmental and wood supply outcomes of the proposed multi-scale landscape settings. The information obtained from the trial will inform negotiations around components that have not yet been finalised and help ensure the Coastal IFOA delivers against the objectives and guiding principles of the IFOA remake.

Process

An amendment has been made to the existing Lower North East IFOA to explicitly permit the trial within a limited number of sites for no more than a three month period.

The trial is not intended to be a scientific study (these studies have been utilised in developing potential conditions), but rather an opportunity to demonstrate a range of options for threatened species protection in a practical setting. The information obtained from the trial will be used to support negotiations around the TSL requirements at the landscape, stand and site scale.

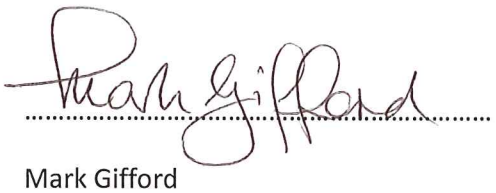
The range of options to be demonstrated through the trial will be benchmarked against current IFOA requirements.

Purpose of this document

This document, as approved by the Chief Environmental Regulator of the EPA sets the scope of the specific threatened species protection options and/or settings to be applied as part of the trial. This document also details methods for undertaking the trial, analysis of results and stakeholder engagement as agreed by the Environment Protection Authority (EPA), Forestry Corporation of NSW (FCNSW) and the Department of Primary Industries (DPI) Fisheries.

Approval

Approved by the Chief Environmental Regulator, Environment Protection Authority:



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Mark Gifford Date

Contents

Acronyms

AGS	Australian Group Selection
CAR	Comprehensive, Adequate and Representative
DBHOB	Diameter at breast height over bark
DPI	Department of Primary Industries
EPA	Environment Protection Authority
ESA	Environmentally significant area
FA	Forest Agreement
FCNSW	Forestry Corporation of NSW
FMZ	Forest Management Zone
GPS	Global Positioning System
Ha	Hectare
HCVOG	High Conservation Old Growth Forest
HQ or HQL	High quality (log)
IFOA	Integrated Forestry Operations Approval
LIC	Land Information Centre
LiDAR	Light Detection and Ranging
LLA	Local Landscape Area
LNE	Lower North East
NHA	Net Harvest Area
NSW	New South Wales
RFA	Regional Forest Agreement
STS	Single Tree Selection
TSL	Threatened Species Licence

Key Definitions

Australian Group Selection (AGS)	The Australian Group Selection silvicultural system is designed to encourage regeneration by creating canopy openings in the forest canopy that allows maximum light onto the forest floor. It is more appropriate for wetter or tablelands forest types that may have difficulty regenerating in smaller canopy openings. This practice aims to create smaller patches of even-aged regrowth distributed through the harvest area. This practice is the highest intensity silvicultural practice permitted in the current IFOAs.
Clumpable Area	This is the available harvest area calculation that is used to determine the number of wildlife habitat clumps required in each harvesting operation. It is calculate by buffering all mapped exclusion zones by 100m. The area available for harvesting outside of this buffering is the clumpable area.
Environmentally significant area	A collective term used to describe all exclusion zones and habitat/environmental features that require protection from harvesting operations
Intensive Harvesting	Intensive harvesting as referred to in the trial is comparable to the practice of “regeneration harvesting” or “heavy single tree selection” or “Australian group selection”.
Local Landscape Area (LLA)	A grouping of compartments that is a maximum of 1,500ha of harvestable area. LLAs are mapped and permanently fixed. LLAs are landscape scale zones that will be used to inform threatened species management needs.
Management Area	A group of State Forests in a local area up to 50,000 ha in gross area which are proposed to be used to assess and implement annual harvesting area limits.
Non-Intensive Harvesting	Non-intensive harvesting as referred to in the trial is the practice of light to moderate harvesting treatments comparable to “single tree selection”
Regeneration Harvesting	A harvesting system that is appropriate for achieving regeneration in forests that are dominated by obligate seeding and shade intolerant Eucalypt species such as Blackbutt, Flooded Gum and Sydney Blue Gum. These species typically do not regenerate well and will be restricted in growth where harvesting does not allow adequate access to a seedbed and sunlight.

	Regeneration harvesting typically removes a larger proportion of trees than selective harvesting , with a focus on retention of suitable trees at a spacing that will allow seed dispersal across the harvest area. Hollow bearing and Recruitment trees are also retained in regeneration harvesting areas.
Selective Harvesting	A harvesting system used in multi-aged forests typically dominated by shade tolerate species, which focuses on retaining a younger cohort of trees for future growing stock. The system typically promotes the release of lignotubers to create a new crop.
Single tree selection (STS)	A harvesting system in the current IFOA that limits stand basal area removal in any one event to 40%.

Objectives

The objectives of the trial are to:

1. demonstrate the outcomes of proposed threatened species measures at the landscape, stand and site scales
2. demonstrate the environmental and wood supply outcomes of a range of options for conditions still being negotiated to determine the most suitable option for delivering against the objectives of the IFOA remake
3. assess how the proposed threatened species measures interact across the landscape
4. assess how the proposed threatened species measures deliver against the IFOA remake objectives and guiding principles, namely:
    a. no change to wood supply
    b. no erosion of environmental values
    c. enforceable and practical conditions
    d. reduced operating and regulatory costs.
5. collect information to assist in the finalisation of a draft Coastal IFOA
6. provide the IFOA remake expert panel an opportunity to see the application of the proposed threatened species measures in a practical setting and inform further expert consultation on the suitability of conditions for the Coastal IFOA
7. provide the opportunity for targeted stakeholder consultation on the practical application of proposed threatened species measures.

Scope

Area

The desktop and field based harvesting trial will be conducted across a range of forest types and harvesting zones within the Lower North East IFOA region.

The trial will be conducted in no more than six of the following State Forest Operations:

1. **Ingalba State Forest; Compartments 35, 36, 37, 38, 39**
2. **Queens Lake State Forest; Compartment 10**
3. Mount Boss State Forest; Compartments 62, 184, 185, 186, 193, 205, 206
4. Bulga State Forest, 11, 16, 17, 20, 21, 25, 26, 27, 158, 159
5. **Lansdowne State Forest; Compartments 193, 194, 195, 199, 200, 201, 202**
6. **Kiwarrik State Forest; Compartments 17, 18, 19, 20**
7. Bulahdelah State Forest; Compartments 129, 130, 131, 132, 140, 141, 143
8. Burrawan State Forest; Compartments 21, 22, 23
9. Styx River State Forest; Compartments 512, 515, 516, 523, 524, 525, 526, 527

10. Chichester State Forest; Compartment 22
11. Riamukka State Forest; Compartments 95, 98, 99, 155, 156, 157, 341
12. Middle Brother State Forest; Compartment 232
13. Bulls Ground State Forest; Compartments 54, 58, 60, 61, 62

*Note: the final approved trial sites will be placed on the EPAs website prior to any field harvesting exercises commencing. Those displayed in **bold** have been identified as the priority trial sites.*

The trial sites were selected from amongst the existing planned compartments to cover a range of forest types and silvicultural treatments that were practical to supervise and manage from the Lower North East (LNE) area. The trial compartments are typical of the ongoing forest harvesting operations in the area.

Timeframes

The Coastal IFOA timelines are:

Develop draft method	11 June 2015
Field inspection of Queens lake State Forest – SOG inspection (pre-harvest)	12 June 2015
Provision of draft method to expert panel for review	Week of 23 June 2015
Approval of method by EPA Chief Environmental Regulator	Week of 29June 2015
Commence pre-harvest field assessments	22 June 2015
Pre-harvest site inspection and briefing with key stakeholders – Queens Lake State Forest	30 June 2015
Commence desktop planning assessment	22 June 2015
FCNSW engagement of suitable harvesting contractors	Before 6 June 2015
FCNSW and EPA joint briefing of all FCNSW and EPA staff that will conduct and collate information	6-7 July 2015
Commencement of harvesting and field components	Week commencing 6 July 2015
Expert Panel – field orientation	After 15 July 2015
Finalisation of harvesting and field components	Prior to the week ending 21 August 2015

Field inspection with Department of Premier and Cabinet	Late August
Completion of analysis and reporting	Late August / Early September 2015
Expert panel field inspection and panel sessions	Late August / Early September 2015
Finalisation of Coastal IFOA Trial Report	October 2015
Stakeholder field inspection	October 2015

Agency Responsibilities

The trial will be jointly conducted by the EPA and FCNSW and will look to utilise the skills and experience of the Coastal IFOA remake expert panel and relevant independent experts – in the development and assessment of the process.

FCNSW will be responsible for:

1. Preparing harvest plan amendments for trial compartments
2. Undertaking pre and post-harvest assessment plots
3. Undertaking mark-up for the trial treatments
4. Engaging and managing the harvesting of the trial areas, including provision and support of GPS mapping in harvesting equipment
5. Support of post-harvest compliance inspections
6. Undertaking the GIS analysis of the desktop component of the trial
7. Data management and analysis of operational and desktop trial components
8. Ongoing logistical support for all elements of the field trial
9. Reporting.

EPA will be responsible for:

1. Stakeholder consultation and field inspections
2. Overview of desktop planning exercise
3. Assistance in mark-up of EPA positions and overview of mark-up of FCNSW positions and current requirements
4. Overseeing field based exercise – including consultation with FCNSW field staff and contractors
5. Post harvesting compliance inspections / audits
6. Data collection, recording and analysis
7. Media and public liaison
8. Reporting.

DPI-fisheries will be responsible for:

1. Overseeing field based exercise relevant to riparian protection – including consultation with FCNSW field staff and contractors

2. Post harvesting compliance inspections / audits
3. Data collection, recording and analysis
4. Reporting.

Coastal IFOA Expert Panel Engagement

A copy of the IFOA Trial methods will be provided to each member of the Coastal IFOA expert panel for comment. The purpose of this preliminary review is to ensure all the concerns and matters that the panel have previously raised are adequately considered during the trial. Advice will be sought on any matters that the experts consider are not adequately addressed.

The expert panel will be convened midway through the field-based exercise (around mid July). This will provide panel members a preliminary understanding of the range of threatened species measures being demonstrated.

The expert panel will be convened following the completion of the desktop and field exercises (around early September). This will include a field inspection of the trial sites followed by an expert panel workshop. The expert panel will be engaged to provide advice to the Government that will inform the finalisation and/or negotiation of all outstanding threatened species matters.

Stakeholder Engagement

The EPA will invite peak conservation and industry stakeholders to attend field inspections of the trial sites. This will include an inspection of a trial site prior to the commencement of harvesting operations to discuss the method and other practical considerations. A second field inspection will be arranged at the finalisation of the trial.

The second field inspection will occur in conjunction with the release of a draft Coastal IFOA. Stakeholders will be able to see the outcome of the practical application of the threatened species settings, the challenges that were faced in the development of the conditions and the Government's decision making around the settings that will be presented within the draft coastal IFOA.

Method

The trial will be conducted in two parts:

1. **A desktop planning exercise** – to demonstrate a range of options for distributing the impacts of harvesting operations across the landscape over time.

   It will include setting minimum thresholds for landscape exclusion zones, distribution of harvesting operations across the landscape, minimum periods of time within which subsequent harvesting operations may not be carried out in a discrete landscape unit and triggers for threatened species survey requirements and protections. It will also consider improvements to the effectiveness and efficiency of harvest planning and identify mapping, data management and reporting needs.

Harvest plans and operational maps will be prepared for all field trial sites and published on the FCNSW website.

2. **A pre- and post-harvest field-based exercise** – to demonstrate a range of options for mitigating the impacts of harvesting operations on threatened species and their habitats. It will include the demonstration of landscape, stand and site based threatened species settings by applying:
    a. existing measures such as rainforest and HCVOG protection
    b. new wildlife clump provisions and
    c. new koala, riparian and tree retention requirements.

    The field-based exercise will also apply new boundary protection and field marking rules that have been developed to improve the effectiveness and efficiency of harvesting operations and regulatory activities. New mapping and information recording requirements will also be applied.

The trial is not intended to be a scientific study but rather an opportunity to apply a range of options in a practical setting to help clarify and finalise negotiations around the TSL requirements at the landscape, stand and site scale.

The range of options to be demonstrated through the trial will be benchmarked against the current IFOA requirements, including current:

- silvicultural settings including Australian Group Selection (AGS) and Single Tree Selection (STS)
- landscape exclusion zones
- threatened species exclusion zones[1]
- exclusion zone management
- tree retention
- stream classification and protection zones
- survey and mark- up requirements [1]
- exclusion zone boundary protection requirements.

The EPA, FCNSW and DPI will establish an agreed interpretation, intent or application of all current IFOA settings that will be applied.

The adequacy of each proposed new condition or setting demonstrated through the desktop planning and field-based exercises will be considered against assessment criteria to determine how well it meets the objectives underpinning the remake of the Coastal IFOAs.

[1] *note: all existing pre-harvest threatened species survey requirements have been undertaken in each of the trial sites to enable this benchmarking*

Desktop Component

Overarching Assessment Criteria (OAC)

1. Do the proposed conditions reduce FCNSW's ability to meet high quality wood supply commitments established in the forest agreements (FA)s?
2. Do the conditions lead to an erosion of environmental (habitat) values compared to the current conditions?
3. Are the proposed conditions practical and less costly to implement?
4. Are the conditions clear and enforceable?
5. Are the conditions outcomes focused and based on a risk management approach?
6. Do the conditions affect commitments made under the Regional Forest Agreements (RFA)s and Forest Agreements (FA)s?
7. Do the conditions change the Comprehensive and Adequate Reserve (CAR) reserve system?
8. Do the conditions better protect threatened species and their habitat using landscape measures?

Desktop Planning Measures

1. Local Landscape Areas (LLA) and biodiversity exclusion zones (minimum threshold of 20%)

Assessment criteria

1. Is the net harvest area within each LLA equivalent to that under the current settings (*OAC 1 and 2*)?
    a. If not, what is the difference (as averaged over the areas that are within the current FCNSW plan of operations) (*OAC 1 and 2*)?
    b. If there is a change in area protected, how does it compare to the existing area impact (FRAMES strike rate) of the current site based threatened species protection measures (*OAC 1*)?
2. Is the placement of additional biodiversity exclusion zones providing:
    a. Improved landscape connectivity; and
    b. Long-term protection of mature forest elements; and
    c. Habitat protection that benefits the needs of a range of regionally specific species? (*OAC 2, 5, 6, 7 and 8*)
3. Are the conditions, protocols and guidance providing FCNSW planning staff enough clarity to implement the outcomes effectively and efficiently? (*OAC 4*)
4. Are the conditions, protocols and guidance providing EPA and DPI operational staff enough clarity to:
    a. Assess and regulate the conditions and outcomes effectively and efficiently? (*OAC 3)*
    b. Enforce the conditions and outcomes? (*OAC 4*)

Desktop Planning Steps

1. Prepare a LLA map for each operational area identified within FCNSW's current Lower North East Region Annual Plan of Operations (as per the approved drafting instructions for LLAs)
2. Develop a map that identifies the available net harvest area under:

A - Current	B - Proposed
FMZ 3b, 4 and 8	FMZ 3b, 4 and 8
Less:	Less:
Strahler ordered LPI mapped riparian protection	GeoNet classified LiDAR mapped riparian protection
Landscape exclusion zones: • HCVOG • rainforest • ridge and head water habitat • other existing mapped exclusion zones as triggered.	Landscape exclusion zones: • HCVOG • rainforest • ridge and head water habitat • other existing mapped exclusion zones as triggered. *Note: this will include all existing mapped landscape protections plus requirements to identify and map additional landscape features that have not previously been mapped.*
Species exclusion zones: • owl landscape • record triggered protection (as identified in pre harvest planning and surveys)	Species exclusion zones: • Carried-over exclusion zones for: • large forest owls • brush tailed phascogale • squirrel glider exclusion • spotted-tailed quoll • Philoria spp. • Any likely record or habitat triggered protection (following draft conditions based on expert panel advice to date – as identified in pre harvest planning and surveys)

3. For option 2(B) – identify the percentage of each LLA within exclusion zone and
   a. Where a LLA has less than 20 per cent within existing exclusion zones:
      i. Make up the difference with new permanent biodiversity exclusion zones (ie. a minimum of 20 per cent of every LLA must be permanently excluded from forestry operations)
      ii. Develop biodiversity exclusions must be developed in accordance with the draft biodiversity and clump protocol.
4. Identify the net harvest area (in hectares) for options 2(A) and 2(B) above – (including additional areas set out in 3):
   a. By individual LLAs
   b. For each pricing area/management area
   c. For each harvesting zone (Non Regrowth, Regrowth Intensive and Regrowth non-intensive)
5. Conduct a subjective assessment of:
   a. The connectivity to protected areas (including flora reserves, National Park, FMZ 2 and 3a); and

b. Habitat value (based on the habitat criteria listed in the biodiversity and clump guidance material).

c. Assess each against established criteria:
    i. Size
    ii. Shape (is it linear or circular?)
    iii. Proximity (distance categories to unharvested areas – is it connected or island?)
    iv. Connectivity to comparable habitat (what are the closest forest types?)

2. Landscape and stand scale exclusion zones (mapped exclusions, species exclusions, wildlife clumps, riparian exclusions)

Assessment criteria

1. Is the net protected area under the proposed new landscape settings equivalent to the current IFOA settings for: (*OAC 1 and 2*)
    a. Landscape exclusion zones (including but not limited to mapped areas of rainforest, HCVOG, ridge and headwater habitat, rare forest, heath and scrub)?
    b. Riparian protection?
    c. Wildlife clumps?
    d. Additional exclusion zones requirement to meet the 20 per cent LLA threshold?
    e. Owl Landscape exclusion zone?
    f. Species exclusion zones (by species)?
    g. Broad forest types?
2. If not, what is the difference (as averaged over the areas that are within the current FCNSW plan of operations) (*OAC 1 and 2*)?
    a. If there is a change in area protected, how does it compare to the existing area impact (FRAMES strike rate) of current site based threatened species protection measures (*OAC 1*)?
    b. If there is a loss in area protected, is the area lost being offset by changes to other threatened species protection (i.e. gains in tree retention and wildlife clumps) (*OAC 2*)?
3. Are previously protected threatened species exclusion zones (species specific measures) protected under new measures (*OAC 2*)?
    a. If not:
        i. What species protections?
        ii. What area (ha) is not within proposed new protection measures
        iii. Is there ability to prioritise protection of these features in wildlife clumps or in biodiversity exclusion zones?
        iv. Is the species protection for a threatened species that is sensitive or at threat to disturbance?
        v. What additional measures may be required to afford equivalent levels of protection for this species and its habitat?

Desktop Planning Steps

1. Undertake pre-harvest surveys for each trial site in accordance with current IFOA survey requirements.
2. Using the maps prepared in part 1 (above) - add the required number and placement of wildlife clumps (in accordance with draft wildlife clump conditions and protocol).

3. Then:
    a. Model species exclusions for:

A – Current	B - Proposed
species recorded in pre-harvest surveys	species recorded in pre-harvest surveys
any species protections that would be afforded under the existing LNE TSL.	any proposed species protections that would be afforded exclusion zones under the coastal IFOA – as per the preliminary species conditions drafted (based on the initial expert panel advice and pending final negotiation of overarching settings)

    b. Prepare a map layer
    c. Undertake an area calculation for each exclusion zone
    d. Prepare a map layer
    e. Undertake an area calculation for each exclusion zone
4. Compare the area (in hectares) of exclusion zone protection under both scenarios (2A and 2B – part 1) and species protections (2A and 2B – part 2) for:
    a. Landscape exclusion zones (including but not limited to mapped areas of rainforest, HCVOG, ridge and headwater habitat, rare forest, heath and scrub)
    b. Riparian protection
    c. Additional exclusion zones requirement to meet the 20 per cent LLA threshold
    d. Owl Landscape exclusion zone
    e. Species exclusion zones
5. Conduct an assessment of wildlife clumps, including:
    a. Total area protected within each operational area and each LLA
    b. Review the number and area of clumps
    c. Improved connectivity to protected areas (including flora reserves, National Park, FMZ 2 and 3a) at the:
        i. Compartment scale
        ii. LLA scale
    d. Specific habitat values, placement, distribution and number (as identified by the wildlife clump protocol)
    e. Located as habitat islands or exclusion zone extensions.

3. Time and Space Settings

Assessment criteria

Intensive Operations

1. Is the annual area available for intensive harvesting equivalent to that of AGS at the (*OAC 1 and 2*):
    a. Operation scale
    b. LLA scale

    c. Pricing zone/management zone scale
    d. FA Region scale
    e. By broad forest types
2. Are the timeframes for returning to a intensive treatment area (including temporary offset areas, treated areas or adjacent areas) equivalent to that of AGS at the (*OAC 1 and 2*):
    a. Operation scale
    b. LLA scale
    c. Pricing zone/management zone scale
    d. FA Region scale
3. Does the Operational area available for intensive harvesting provide for:
    a. Equivalent or improved landscape connectivity?; and
    b. Equivalent or improved long term protection of mature forest elements?; and
    c. Habitat protection that benefits the needs of a range of regionally specific species? (*OAC 2, 5, 6, 7 and 8*)
4. Are the conditions, protocols and guidance providing FCNSW planning staff enough clarity to implement the outcomes effectively and efficiently? (*OAC 4*)
5. Are the conditions, protocols and guidance providing EPA and DPI operational staff enough clarity to:
    a. Assess and regulate the conditions and outcomes effectively and efficiently? (*OAC 3)*
    b. Enforce the conditions and outcomes? (*OAC 4*)

Non - Intensive Operations (Regrowth Zone and Non-Regrowth Zone)

6. Is the annual area available for harvesting equivalent to that of STS at (*OAC 1 and 2*):
    a. Operation scale
    b. LLA scale
    c. Pricing zone/management zone scale
    d. Forest Agreement Region scale
7. Does the area available for harvesting provide for:
    a. Equivalent or improved landscape connectivity; and
    b. Long term protection of mature forest elements; and
    c. Habitat protection that benefits the needs of a range of regionally specific species? (*OAC 2, 5, 6, 7 and 8*)
8. Are the conditions, protocols and guidance providing FCNSW planning staff enough clarity to implement the outcomes effectively and efficiently? (*OAC 4*)
9. Are the conditions, protocols and guidance providing EPA and DPI operational staff enough clarity to:
    a. Assess and regulate the conditions and outcomes effectively and efficiently? (*OAC 3)*
    b. Enforce the conditions and outcomes? (*OAC 4*)

Desktop Planning Steps

Harvesting Zones

1. Describe the silvicultural treatments to be applied for each harvesting operation listed on the current FCNSW Annual Plan of Operations (AGS, STS, thinning, regeneration harvesting, mixed treatments) within the LNE IFOA region.
2. Using the map of proposed harvesting treatment zones, identify the operations listed on the current FCNSW Annual Plan of Operations that occur within:

A – Current	B - Proposed
Regrowth Zone	Regrowth Zone - Intensive Regrowth Zone – Non- Intensive
Non Regrowth Zone	Non Regrowth Zone

3. For each zone, identify the area of proposed:
    a. STS operations within Regrowth (intensive)
    b. Regeneration harvesting operations within Regrowth (non-intensive) or Non – regrowth
    c. Mixed treatment operations within Regrowth (non-intensive) or Non – regrowth
4. If any harvesting treatments are identified by parts 3 (a), (b) or (c), identify:
    a. What is the area (ha) affected?
    b. Forest types
    c. Potential timber volume affected (gains or losses) by applying the maximum limit thresholds available for the zone.
    d. Extent (ha) of mixed intensity treatments required (if within the Regrowth-intensive zone).

<u>Intensive Operations</u>

5. Prepare a map that details the location and extent of all existing basal area offsets that have been applied since 2007 in the LNE IFOA region by:
    a. Each compartment
    b. Each LLA
6. The areas identified in part 5 must include documentation of:
    a. The date the associated harvesting took place (time period since it was retained)
    b. The location and date of the associated intensive harvesting.
7. Using the operations listed on the current FCNSW Annual Plan of Operations within the Regrowth (intensive) zone:
    a. Prepare a map that models the following options:

	Limit	**Options**			
		Current – AGS	**Option A**	**Option B**	**Option C**
a	Percentage of each Management Area available for intensive harvesting (per financial year)	All	5%	5%	5%
b	Percentage of each Management Area available for forestry operations (total per financial year)[2]	All	10%	10%	10%

[2] The amount of area treated with regeneration harvesting must be removed from this total. For example, if the maximum 5% is intensively logged, then only and additional 5% can then be harvested using lower intensity selective harvesting practices.

c	Total annual harvesting cap for each Management Area	N/A	2,200 ha / year (with a rolling 5 year average)	2,200 ha / year (with a rolling 5 year average)	2,200 ha / year (with a rolling 5 year average)
d	Maximum available area per treatment	22.5% of a compartment	33.3% of a LLA	33.3% of a LLA	33.3% of a LLA
e	Maximum area of contiguous intensive harvesting	0.13ha to 0.79ha	60 ha	60 ha	50ha
f	Minimum return time to treatment area	Average of 7 years (North) to 20 years (South)	10 years	7 years	10 years (noting limit (g) requirement)
g	Minimum retention of mature forest (NHA un-harvested)	N/A	N/A	N/A	At any time - 33% of net harvest area of each LLA must not have been subject to harvesting for at least 30 years
h	Adjacency management	10% of net harvest area to be remain un-harvested following the completion of all the AGS events.	To be developed during the trial – based on natural features and operational and planning practicalities.	To be developed during the trial – based on natural features and operational and planning practicalities.	To be developed during the trial – based on natural features and operational and planning practicalities.
i	Previous intensively harvested areas and offsets	N/A	Limits described in (d) to (h) will apply to any areas mapped in part 5 and 6 (above) – areas of existing basal area offsets and regeneration harvesting	Limits described in (d) to (h) will apply to any areas mapped in part 5 and 6 (above) – areas of existing basal area offsets and regeneration harvesting	Limits described in (d) to (h) will apply to any areas mapped in part 5 and 6 (above) – areas of existing basal area offsets and regeneration harvesting

8. Document any challenges or ease of application encountered in modelling the four approaches.
9. Identify any potential refinements to the three options that would improve the practical implementation and effectiveness of the measures at distributing the impacts of harvesting over time and space.
10. For each associated LLA - <u>using current AGS limits as the baseline</u>, compare the following for each option described in part 7:
    a. Available area (ha) for harvesting for the current planned operation

b. The area (ha) and number of previous AGS cuts applied in the LLA to date
c. At what point in the proposed harvesting cycle would the LLA be at (ie first 33 per cent, 2nd 33 per cent or last 33 per cent) to date
d. Area within each associated LLA that would be available in the next harvesting cycle
    i. Including a break down by broad forest type
e. Minimum time period before the next harvesting cycle would be permitted
f. The potential timber gains or losses under each option.
g. The spatial distribution of harvesting events (dispersed or consolidated) – additional criteria will be developed by the EPA during the trial to assess this
h. The long term maintenance of mature forest – additional criteria will be developed by the EPA during the trial to assess this:
    i. Amount (ha)
    ii. Age
    iii. How (minimum retention requirements, temporal limits, other)
i. Other associated disturbance factors (amount of roading requirements, log dump requirements, burning).

Non- Intensive Operations

11. Using the operations listed on the current FCNSW Annual Plan of Operations within the Regrowth (non-intensive) and non-regrowth zones:
    a. Prepare a map that models the following options:

	Limit	**Options**		
		Current – STS	**Option A**	**Option B**
a	Percentage of each Management Area available for intensive logging (per financial year)	All	5%	5%
b	Percentage of each Management Area available for forestry operations (total per financial year)[3]	All	10%	10%
c	Maximum available area per treatment	100% of a LLA	100% of a LLA	100% of a LLA
d	Minimum return time to treatment area	N/A	N/A	7 years
e	Adjacency management	N/A	N/A	To be developed during the trial – based on natural features and operational and

[3] The amount of area treated with regeneration harvesting must be removed from this total. For example, if the maximum 5% is intensively logged, then only and additional 5% can then be harvested using lower intensity selective harvesting practices.

				planning practicalities.
f	Previous regeneration harvesting and offsets	N/A	Limits described in (d) to (h) will apply to any areas mapped in part 5 and 6 (above) – areas of existing basal area offsets and regeneration harvesting	Limits described in (d) to (h) will apply to any areas mapped in part 5 and 6 (above) – areas of existing basal area offsets and regeneration harvesting

12. Document any challenges or ease of application encountered in modelling the three approaches.
13. Identify any potential refinements to the two options that would improve the practical implementation and effectiveness of the measures at distributing the impacts of harvesting over time and space.
14. For each associated LLA - <u>using current STS limits as the baseline</u>, compare the following for each option described in part 7:
    a. Available area (ha) for harvesting for the current planned operation
    b. Minimum time period before the next harvesting cycle would be permitted
    c. The potential timber gains or losses under each option.
    d. The spatial distribution of harvesting events (dispersed or consolidated) – additional criteria will be developed by the EPA during the trial to assess this.
    e. The long term maintenance of mature forest:
        i. Amount (ha)
        ii. Age
        iii. How (minimum retention requirements, temporal limits, other)
    f. Other associated disturbance factors (amount of roading requirements, log dump requirements, burning).

<u>Mixed Intensity Operations (Regrowth –intensive zone only)</u>

15. For each LLA - using the operations listed on the current FCNSW Annual Plan of Operations within the Regrowth (intensive) zone:
    a. Map the areas that would ideally be harvested under:
        i. Regeneration harvesting
        ii. STS
    b. Calculate the area (ha) of each harvesting treatment
    c. Identify the forest types within each harvesting treatment.
16. Identify possible approaches for setting limits on mixed intensity operations, that address:
    a. Maximum limits on the area available for each harvesting treatment
    b. Minimum return times to a LLA between harvesting operations
    c. Adjacency management for intense harvesting treatments
    d. Previously applied regeneration harvesting treatments and basal area offsets.

17. This should include:
    a. the options described under intensive operations (part 7)
    b. the options described under non-intensive operations (part (11)
    c. new options that provide a sliding scale based on the proportion of harvesting – by harvesting treatment (intensive or non-intensive).
18. Document any challenges or ease of application encountered in modelling all potential approaches.
19. Identify options that are practical to implement and distribute the impacts of harvesting over time and space.
20. For each associated LLA - using current AGS and STS as the baseline, compare the following for each option using the steps outlined at point 10.

4. Koala habitat protection

Assessment criteria

1. Using current koala protection requirements as the baseline, are the triggers for koala protections proposed:
    a. Equivalent or improved in area (ha)?
    b. Comparative in respect to forest types?
    c. Correlate to known records and existing high use areas?
    (*OAC 1, 2, 8*)

2. Using current koala protection requirements as the baseline, are the proposed options for map based triggers koala protection equivalent or improved in terms of:
    a. Planning efficiency? (*OAC 3*)
    b. Clarity? (*OAC 4, 5*)
    c. Enforceability? (*OAC 4, 5*)
    d. Delivering greater koala habitat identification? (*OAC 8*)

Desktop Planning Steps

The desktop assessment will compare current IFOA requirements including intermediate habitat protection (tree retention and survey triggers) and koala high use areas (if identified) to:

(1) Habitat and record driven koala measures

Assessment:

1. Using the current IFOA requirements, prepare a map that identifies intermediate and high use koala area applied in each compartment relative to the net harvest area within a minimum of 50 compartments sampled across the LNE region form the last 12 months.
2. Prepare a map that identifies areas of preferred and secondary koala habitat that would trigger exclusion zone and/or different tree retention levels for each sample compartment used in point 1.
3. Koala habitat categories described in point 2 will developed using two different options based on RN17 Forest Type mapping.

Note: the EPA and FCNSW are currently preparing these lists pending findings from the EPAs koala mapping projects, current IFOA requirements, and other factors.

4. For the current IFOA approach (point 1) and the options being assessed under point 2 – determine:
    a. The forest types that correlate
    b. The area of state forest that triggers koala protections:
        i. By compartment
        ii. By LLA
        iii. By management Area / Pricing Zone
        iv. By region
    c. The percentage of high use areas within areas identified as:
        i. intermediate habitat under the current IFOA
        ii. koala habitat (by each class) under forest type list 1
        iii. koala habitat (by each class) under forest type list 2
    d. The percentage of koala records within areas identified as:
        i. intermediate habitat under the current IFOA
        ii. koala habitat (by each class) under forest type list 1
        iii. koala habitat (by each class) under forest type list 2
    e. Assess if koala habitat is being adequately captured by the current IFOA requirements and the option being proposed.
5. Document any challenges or ease of application encountered in all potential approaches.
6. Identify options are practical to implement and enforce.

Field Component

Overarching Assessment Criteria (OAC)

1. Do the proposed conditions reduce FCNSW's ability to meet high quality wood supply commitments established in the forest agreements (FAs)?
2. Do the conditions lead to an erosion of environmental (habitat) values compared to the current conditions?
3. Are the proposed conditions practical and less costly to implement?
4. Are the conditions clear and enforceable?
5. Are the conditions outcomes focused and based on a risk management approach?
6. Do the conditions affect commitments made under the Regional Forest Agreements (RFAs) and FAs?
7. Do the conditions change the Comprehensive and Adequate Reserve (CAR) reserve system?
8. Do the conditions better protect threatened species and their habitat?

Field Harvesting Trial – Demonstration of Options

Each harvesting site will have three treatments applied:

(1) The current IFOA requirements (status quo)
(2) Option A – the more flexible protection approach
(3) Option B - the most conservative protection approach.

The following tables describe the conditions that will be applied for tree retention, silviculture, exclusion zone management, riparian protection, koala protection and wildlife habitat clumps and species-specific conditions.

Riparian, species specific, exclusion zone management and clump protection conditions are the same for Options A and B.

Tree retention and harvesting rules vary between options A and B.

1. Tree retention (Hollow- bearing, Recruitment, Stag, Giant and General feed trees)

Assessment criteria

1. Is there a difference in high quality timber availability (by species and quality) between the two proposed options (A and B) and the current conditions? (*OAC 1*).
    a. If so, what are the drivers of those differences:
        i. Habitat trees?
            1. Selection criteria (size, age, other)
            2. Retention rates
        ii. Recruitment trees?
            1. Selection criteria (size, age, other)
            2. Retention rates

iii. Feed trees?
    1. Selection criteria (size, age, other)
    2. Retention rates
iv. Giant trees?
    1. Selection criteria (size, age, other)
    2. Retention rates.

Measured by assessing the high quality volume in pre and post-harvest plots

2. Is there a difference in environmental values protected between the two proposed options and the current conditions? (*OAC 2, 8*)
    a. If so, what are the drivers of those differences for habitat trees, recruitment trees, feed trees and giant trees?
        i. Selection criteria (size, age, other)
        ii. Retention rates
    b. Do the location and spacing of retained trees under options A and B provide comparable:
        i. Connectivity to retained habitat?
        ii. Isolation of individual trees?
        iii. Increased risks of damage over time (ie wind damage?)

    Measured by assessing the size, species, dispersion, form, longevity, suitability of retained trees in pre and post-harvest plots

3. Are the proposed conditions practical to implement and enforceable? (*OAC 3, 4, 5*).
    a. If not, what components of the conditions are impractical?
    b. If not, what components are unenforceable?

    Measured by time to complete mark-up, post-harvest audits and interviews with forest technicians, harvesting crews, harvest coordinators and EPA compliance team

Measures to apply

1. Current Conditions

Retained Tree	***Regrowth Zone***	***Non-Regrowth Zone***
Habitat Tree A live tree where the base, trunk or limbs contain hollows, holes and cavities that have formed as a result of decay, injury or other damage. Such hollows may not be visible from the ground; but may be apparent from the presence of deformities such as burls, protuberances or broken limbs,	Five (5) trees per hectare of net harvest area (NHA) **where available** Eight (8) trees per hectare where greater glider density is greater than 1 in every hectare.	Five (5) trees per hectare of NHA. Eight (8) trees per hectare where greater glider density is greater than 1 in every hectare. Where insufficient habitat trees are available, additional

or where it is apparent the head of the tree has been lost or broken off. Priority must be given to trees with evidence of occupancy or with multiple hollows. Trees must then be selected based on a range of features including largest cohort, crown development and range of species.		*recruitment trees* must be retained to meet this retention rate.
Recruitment Tree Live mature or late-mature tree with good potential for hollow development and long-term survival. Select trees based on having a range of features including largest cohort, crown development, range of species, scattered.	One (1) for each habitat tree retained.	Five (5) trees per hectare of NHA.
Feed Tree (mature or late mature from a list of winter flowering eucalypt species)	Six (6) trees per two (2) hectares of NHA, **where available**. Habitat and Recruitment trees can count towards this rate of retention.	
Giant Tree	N/A	
Dead Standing Tree A dead tree greater than 300mm diameter at breast height and greater than 3 metres in height.	Minimum of five (5) per hectare of NHA, **where safe to do so**.	

2. Option A

<table>
<tr><th>Retained Tree</th><th>Regrowth Zone (Intensive)</th><th>Regrowth Zone (Non-intensive)</th><th>Non-Regrowth Zone</th></tr>
<tr><td rowspan="3">Habitat Tree

Live tree with apparent Hollows.

Select the largest available habitat trees first.</td><td rowspan="3">Five (5) trees in every hectare on NHA where available</td><td>Five (5) trees in every hectare of NHA</td><td>Eight (8) trees in every hectare of NHA</td></tr>
<tr><td colspan="2">Where insufficient habitat trees are available, additional recruitment tree(s) must be permanently retained to meet the rates specified</td></tr>
<tr><td colspan="2">Any recruitment trees retained as habitat trees are in addition to recruitment trees rates</td></tr>
<tr><td>Recruitment Tree

Live mature or late-mature tree with good potential for long-term survival.

Must be a minimum of 50 cm DBHOB</td><td>Five (5) trees in every hectare</td><td>Five (5) trees in every hectare</td><td>Five (5) trees in every hectare</td></tr>
<tr><td>Feed Tree

Winter flowering eucalypt species greater than 30 cm DBHOB

Non-eucalyptus species that are greater than 15 cm DBHOB (including Allocasurina or Banksia spp.)</td><td colspan="3">Five (5) trees in every hectare of NHA

Feed trees are additional to those retained as Habitat or Recruitment trees.</td></tr>
<tr><td>Giant Tree

Any tree that is greater than 160 cm DBHOB.</td><td colspan="3">Retain all.</td></tr>
<tr><td>Dead Standing Tree</td><td colspan="3">Retain all (unless compiled with work safe health and safety conditions).</td></tr>
</table>

A dead tree greater than 300mm diameter at breast height and greater than 3 metres in height.	

1. ***Habitat trees*** and ***recruitment trees*** must be permanently retained.
2. Habitat, recruitment, feed trees and giant trees must be protected from forestry activities.
3. Hollow bearing trees can be retained as a recruitment tree where the habitat tree retention rates are exceeded.
4. The location of each retained habitat, recruitment trees feed trees and giant trees must be recorded on GPS.
5. Retention rates must be calculated and implemented for logical mark-up areas up to 25 ha in size. A logical mark-up area is a contiguous area (normally an area of net harvest area that is a ridge isolated from other tracts of NHA by drainage lines or other exclusion zones and bounded on at least 1 side by aa road or track). This defined area can be used to calculate the number of retained trees required to be marked.
6. Retained trees should be a combination of scattered and aggregated within these logical mark-up areas.
7. Trees retained within wildlife habitat clumps can count towards trees retained under these tree retention conditions.

3. Option B

<table>
<tr><th>Retained Tree</th><th>Regrowth Zone (Intensive)</th><th>Regrowth Zone (Non-intensive)</th><th>Non-Regrowth Zone</th></tr>
<tr><td rowspan="3">Habitat Tree

Live tree with apparent Hollows.

Select the largest available habitat trees first.</td><td rowspan="3">Five (5) trees in every hectare on NHA where available</td><td>Five (5) trees in every hectare of NHA</td><td>Eight (8) trees in every hectare of NHA</td></tr>
<tr><td colspan="2">Where insufficient habitat trees are available, additional recruitment tree(s) must be permanently retained to meet the rates specified</td></tr>
<tr><td colspan="2">Any recruitment trees retained as habitat trees are in addition to recruitment trees rates</td></tr>
<tr><td>Recruitment Tree

Live mature or late-mature tree with good potential for long-term survival.</td><td>Five (5) trees in every hectare</td><td>Five (5) trees in every hectare</td><td>Five (5) trees in every hectare</td></tr>
</table>

Must be selected from one (1) of the (2) largest trees in any 0.2ha area			
Feed Tree Winter flowering eucalypt species greater than 30 cm DBHOB Non-eucalyptus species that are greater than 15 cm DBHOB (including Allocasurina or Banksia spp.)	Five (5) trees in every hectare of NHA Feed trees are additional to those retained as Habitat or Recruitment trees.		
Giant Tree Any tree that is greater than 150 cm DBHOB.	Retain all.		
Dead Standing Tree A dead tree greater than 300mm diameter at breast height and greater than 3 metres in height.	Retain all (unless compiled with work safe health and safety conditions).		

1. ***Habitat trees*** and ***recruitment trees*** must be permanently retained.
2. Habitat, recruitment, feed trees and giant trees must be protected from forestry activities.
3. Hollow bearing trees can be retained as a recruitment tree where the habitat tree retention rates are exceeded.
4. The location of each retained habitat, recruitment trees feed trees and giant trees must be recorded on GPS.
5. Retention rates must be calculated and implemented in 0.2ha plots. This would involve walking every 50m and within a person's line of sight (around 20m) a pro-rata rate of trees be selected.
6. Retained trees should be a combination of scattered and aggregated within these 0.2ha areas.
7. Trees retained within wildlife habitat clumps can count towards trees retained under these tree retention conditions.

2. Forest structure and diversity (basal area and regeneration harvesting limits)

Assessment criteria

1. Is there a change in timber availability associated with each option for proposed basal area and regeneration harvesting limits conditions compared to the current silviculture conditions? If so: (*OAC 1*)
    a. Is there a timber gain or loss?
    b. What are the drivers of those differences?
        i. Silviculture?
        ii. Basal area limits (per option)?
        iii. Regeneration harvesting limits?

    Measured by plot assessment (pre and post-harvest) of standing high quality (HQ) timber (by species) retained under different treatments (including identification of what is projected to be available in future cuts).

2. Is there any change in the environmental values associated with each option for proposed basal area and regeneration harvesting limits conditions compared to the current silviculture conditions? If so: (*OAC 2, 8*)
    a. Is there a gain or loss of environmental values?
    b. What are the drivers of those differences?
        i. Silviculture?
        ii. Basal area limits (per option)?
        iii. Regeneration harvesting limits?

    Measured through tree and habitat metrics (metrics would include the frequency, size, species, growth stage, hollow status) from pre and post-harvest plots

3. Using AGS as the baseline, is the area of contiguous area of regeneration harvesting: (*OAC 2, 8*)
    a. Changing the connectivity of unharvested areas (does it provide a barrier to species movement)?
    b. Changing the potential structure of the forest (does it promote multi-aged stands)?
    c. Maintain or promote the retention of mature forest elements?

    Measured through tree and habitat metrics (metrics would include the frequency, size, species, growth stage, hollow status) from pre and post-harvest plots

    Measured by assessing the spacing's between unharvested areas in all treatments

4. Is there any change in regeneration potential under the proposed silvicultural conditions compared with the existing conditions? (*OAC 1*)

    Assess through comparing retained basal area and canopy metrics from aerial imagery analysis between treatments to assess for relative light availability.

5. Using current silviculture conditions as the baseline, are the proposed conditions practical and cost effective to implement? Including costs associated with: *(OAC 3, 4, 5)*
    a. Roading?
    b. Harvesting?
    c. Mark-up?

d. Regeneration?
e. Compliance and enforcement?

Assess by completing post-harvest interviews with harvest coordinators and crews and EPA compliance officers

6. Is the document *Silvicultural Guidelines for the Code of Practice for Private Native Forestry* - practical for implementing and measuring compliance with retained Basal Area conditions? (OAC 3, 4, 5)
    a. What refinements need to be made to deliver the intended basal area outcomes?
    b. Is it clear and practical?
    c. Is it enforceable?

    Measured through post-harvest BA plot results and interviews with EPA compliance team and harvest coordinators

7. Are the proposed conditions practical to implement and enforceable? If not: (*OAC 3, 4, 5*)
    c. What components of the conditions are impractical?
    d. What components are unenforceable?

    Measured by time to complete mark-up, post-harvest audits and interviews with forest technicians, harvesting crews, harvest coordinators and EPA compliance team

Measures to apply

<table>
<tr><th>Element</th><th>Current</th><th>Option A</th><th>Option B</th></tr>
<tr><td rowspan="2">Silviculture</td><td rowspan="2">Single Tree Selection (STS)

40% Basal Area removal limit across the NHA of a tract.

No specific spatial distribution limits.

Regrowth Zone and Non Regrowth Zone</td><td>Non-Intensive harvesting:

Average minimum retained Basal Area of 12m^2/ha (regrowth non-intensive harvesting zone) within the NHA

Average minimum retained Basal Area of 16m^2/ha (non-regrowth harvesting zone) within the NHA</td><td>Non-Intensive harvesting:

Stand Basal Area must not be reduced below the limit of 16m^2/ha within the NHA

(Applicable to the regrowth non-intensive and non-regrowth harvesting zones)</td></tr>
<tr><td colspan="2">The document Silvicultural Guidelines for the Code of Practice for Private Native Forestry will be used to implement and assess the Basal Area retention.

FCNSW and EPA will use the trial to set criteria on sample size and the percentage of plots that must be above the basal area limits.</td></tr>
</table>

	Group Selection (AGS) Maximum of 22.5% of NHA in any one event, maximum gap size of 0.25 ha Regrowth Zone and Non Regrowth Zone	**Regeneration harvesting: Regrowth zone – Intensive.** Maximum contiguous area of 60 ha.[4] Apply minimum **tree retention** requirements described in option A above.	**Regeneration harvesting: Regrowth zone – Intensive.** Maximum contiguous area of 50 ha.[5] Apply minimum **tree retention** requirements described in option B above.

Note: at least one field trial site will be harvested to the maximum limits described above under:

- Current IFOA conditions
- Option A
- Option B

This will enable assessment against the maximum permitted harvesting intensity and extent that the proposed conditions would allow.

3. Environmentally Significant Areas (ESAs) (rainforest, high conservation value old growth, ridge and headwater habitat and all other exclusion zones)

Assessment criteria

1. Is there a change in the outcomes delivered by the proposed ESA boundary conditions and the current conditions? If so: (*OAC 1, 2*)
    a. Was there a negative or positive wood supply consequence?
    b. Was there a negative or positive environmental consequence?
    c. What are the drivers of those differences?
        i. By exclusion zone type
        ii. By ESA category
        iii. Extent of occurrence (was it frequent or rare)?

    Measured by comparing the frequency of incursions into ESAs located in the field using GPS in harvesters, EPA compliance assessment and timber volume that may be within additional buffering on these zones

2. Are the proposed conditions more practical, efficient, clear and enforceable? If not: (OAC 3, 4 and 5)
    a. What are the drivers of those differences?
        i. By exclusion zone type

[4] This treatment will only be applied to one (1) trial area to demonstrate its extent. This same area will be used to demonstrate the extent of contiguous regeneration harvesting in Option B.
[5] See footnote 4.

ii. By ESA category and conditions
iii. Extent of occurrence (was it frequent or rare)?

Measured by GPS track logs, post-harvest assessments and interviews with forest technicians, harvesting contractors and EPA audit staff

Measures to apply

Element	Current	Option A	Option B
Exclusion Zone Boundary Management	An inconsistent range of hard and soft buffers with different accidentally felled tree, fall into and machinery entry provisions.	Two categories (see list of exclusion types which applies to each category) **ESA 1** – hard boundaries – no falling into (except accidental), no machinery entry. Road and snig track construction and use only under approval. **ESA 2** – limited falling into or machinery access where no safe or practical alternative. Road and snig track construction only under approval.	

4. Koala habitat protection

Assessment criteria

1. Is there a change in the outcomes delivered by the proposed koala conditions and the current koala conditions? If so: (*OAC 1, 2, 5 and 8*)
    a. Was there a negative or positive wood supply consequence?
    b. Was there a negative or positive environmental consequence?
    c. What are the drivers of those differences?
        i. By broad forest type
        ii. By koala habitat category
        iii. By tree retention rate
        iv. By koala brows tree species
        v. Extent of occurrence (was it frequent or rare)?
    d. Do high use areas that are identified under the current conditions correlate with Forest Type Mapping allocated to “preferred” or “secondary”
    e. Do koala scats identified in compartment mark up surveys (current approach) align with the “preferred” or “secondary” categories of forest types?

Measured by the relative area of habitat managed under different tree retention outcomes (ha comparison) and a assessment of the environmental outcome of different tree retention levels (a full range from 5, 10, 20 /ha to all primary browse)

Measured by assessing the high quality volume in pre and post-harvest plots

Measured by assessing the size, species, dispersion, form, longevity, suitability of retained trees in pre and post-harvest plots

2. Are the proposed conditions practical to implement and enforceable? (*OAC 3, 4, 5*).
    a. If not, what components of the conditions are impractical?
    b. If not, what components are unenforceable?

Measured by time to complete mark-up, post-harvest audits and interviews with forest technicians, harvesting crews, harvest coordinators and EPA compliance team

Measures to apply

Element	Current	Option A	Option B
Koalas	Mark-up surveys and star-searches in preferred forest types High use exclusion zones Intermediate use tree retention of 10 koala browse trees per 2ha of NHA.	Retention applies to particular mapped forest types. These forest types will set differing categories of koala habitat (preferred, secondary, non-preferred) Rate of koala tree retention would include: • 5, 10, 20 primary browse trees /ha and • all primary browse trees will be protected in at least one treatment site. *Note: normal koala mark-up surveys will continue and any identified high-use area identified during the trial will be excluded under the normal conditions regardless of which treatment area it occurs in. The high use are will be included as part of a wildlife clump.*	

5. Wildlife habitat clumps

Assessment criteria

1. Are the proposed wildlife habitat clumps practical to manage and protect during harvesting operations? If not: (*OAC 3, 4, 5, 8*)
    a. What component?
        i. Location in the landscape?
        ii. Topography of the compartment?
        iii. Road networks?
        iv. Size and shape requirements?
        v. Other?

Measured by boundary compliance audits, interviews and field review of values protected

2. What is the average high quality timber loss within wildlife habitat clumps: (*OAC 1*)
    a. Per operation?

b. Per clump?
c. By tree species?

Measured by area of NHA protected and buffer on buffer volume and by assessing the high quality volume in pre and post-harvest plots

3. Do the wildlife habitat clumps provide improved environmental outcomes, including: (*OAC 2 and 8*)
    a. Connectivity to unharvested areas?
    b. Improved stand structure (does they promote a multi aged stand)?
    c. Improved useability and protection of habitat features?
    d. Improved retention and promotion of mature habitat features?
    e. Provide short-term (and therefore long term) islands of habitat refuge?

    Measured through tree and habitat metrics (metrics would include the frequency, size, species, growth stage, hollow status) from pre and post-harvest plots
    Measured by assessing the spacing's between unharvested areas in all treatments

4. Are the design rules and guidance material suitable for implementation? (*OAC 3 and 4*).
    Measure by planning and mark-up interviews with forest technicians, harvesting contractors and EPA compliance officers.

5. Are the proposed conditions practical to implement and enforceable? (*OAC 3, 4, 5*).
    a. If not, what components of the conditions are impractical?
    b. If not, what components are unenforceable?

    Measured by time to complete mark-up, post-harvest audits and interviews with forest technicians, harvesting crews, harvest coordinators and EPA compliance team

Measures to apply

Element	Current	Option A	Option B
Wildlife Habitat Clumps	Not applicable	Clumpable area is calculated as the area of NHA buffered 100m from an ESA (other than class 1 drainage lines) within the NHA. 3.2% of clumpable area must be protected in wildlife habitat clumps. Six (6) wildlife habitat clumps must be established for each 100 ha of clumpable area. The minimum size of wildlife habitat clumps is 0.1 ha	

		The average size of wildlife habitat clumps retained in a operation must me greater that 0.5 ha The location and values to be protected within each wildlife habitat clumps are based on design criteria established within a protocol. Wildlife habitat clumps must be protected from harvesting operations (a ESA category 1 boundary)

6. Species exclusion zones

Assessment criteria

Assessment criteria will be developed on a case-by-case assessment pending species-specific triggers in any trial compartments. Assessment criteria will align with the overarching assessment criteria.

This step will be prepared by the EPA within input from FCNSW once trial sites are selected and FCNSW are developing all required harvest plans and maps.

Measures to apply

Element	Current	Option A	Option B
Species Specific Conditions	Apply to relevant records based on current TSL conditions. Will be based on any threatened species records identified through pre-harvest surveys.	Apply to relevant records based on proposed conditions (on the preliminary recommendations of the expert panel) Will be based on any threatened species records identified through pre-harvest surveys that have been conducted and existing records.	

7. Riparian exclusion zones and Ground protection zones

Assessment criteria

1. Are the riparian exclusion zone and ground protection zones conditions clear and practical to implement? If not: (*OAC 3, 4*)
    a. What component?
        i. Steam class or order?
        ii. Mid stream class changes?
        iii. Topography of the compartment?
        iv. Stabilisation and rehabilitation requirements?
        v. Other?

Measured by qualitative assessment of exclusion zone and ground protection zones by soil and water team and DPI fisheries and interviews with harvesting crews, harvest coordinators

2. Are the ground protection zones conditions effective at minimising soil erosion potential around class 1 streams and drainage depressions? If not: (*OAC 2, 3, 4*)
    a. Why?
    b. What additional measures or clarification is required to improve outcomes?

    Measured by qualitative assessment of ground protection zones by soil and water team and DPI fisheries and interviews with harvesting crews, harvest coordinators

3. Is there a change in timber availability associated with the change in conditions for: (*OAC 1, 3 and 4*)
    a. Class 1 and unmapped streams?
    b. Potential buffer on buffer impacts associated with Class 1 streams (or all streams in regeneration harvesting operations)
    c. Stream order to stream classification?
    d. If so:
        i. Which components?
        ii. Is it a loss or gain?

    Measured by buffer on buffer tree assessment, area assessment, qualitative field assessment and post-harvest interviews with harvest coordinators and crew

4. Do the five metre class 1 streams maintain a suitable riparian habitat corridor? If not: (*OAC 2 and 8*).
    a. Why?
    b. What additional measures or clarification is required to improve outcomes?

    Measured by qualitative assessment of ground protection zones by threatened species team and DPI fisheries and interviews with harvesting crews, harvest coordinators and other threatened species expert

5. Is the conditions and guidance material around bank full and channel head determination clear and enforceable? If not: (*OAC 3, 4, 5*)
    a. If not, what components of the conditions are impractical?
    b. If not, what components are unenforceable?
    c. What additional measures or clarification is required to improve outcomes?

    Measured by post-harvest audits and interviews with forest technicians, harvesting crews, harvest coordinators EPA and DPI fisheries compliance team

Measures to apply

Element	Current	Option A	Option B
Riparian Protection	Based on LIC streams and Strahler stream ordering. Width measured from edge of the incised channel. Unmapped – no exclusion 1st Order – 10 m buffer	LiDAR based and using classified drainage by a catchment area in hectares Habitat network applies from the channel head and along the drainage line downstream The width of ESAs must be measured from bank-full level point. Class 1 (0-20 ha) – 5m ESA	

	2nd order – 20 m buffer 3rd Order – 30 m buffer 4th order and greater – 50 m buffer Operational Zones – 10 m outside of riparian buffers + drainage depression buffer strips. Inner 5 m hard filter strip, trees can be felled into outer area.	Class 2 (20-100 ha) – 20 m ESA Class 3 (100-400 ha) – 30 m ESA Class 4 (>400 ha) – 50 m ESA. Ground Protection Zones 10 m outside buffer on class 1 drainage lines and 5 m along drainage depressions. ESA category 1 on: • all class 1 drainage lines and • all classes where regeneration harvesting applied. ESA category 2 on: • class 2 and above • non-intensive harvesting areas.

1. In addition, the demonstration of harvesting and on-ground assessments will facilitate:
    a. Demonstration areas of changed riparian exclusion zone applications from LIC Strahler to catchment area classes
    b. The management of mid-stream class change
    c. The collection of photos for the development of suitable guidance material
    d. The development of agreed interpretations of the definitions of “stable” and “rehabilitate”.

8. Mark-up and Broad-area habitat search

Assessment criteria

1. Are the proposed conditions clear, practical and efficient to implement? If not: (*OAC 3, 4 and 5*)
    a. What component?
    b. Why?
    c. What additional measures or clarification is required to improve outcomes?

    Measured by time to complete mark-up, post-harvest audits and interviews with forest technicians, harvesting crews, harvest coordinators and EPA compliance team

2. Are the proposed conditions enforceable? (*OAC 4*).
    a. If not, what components are unenforceable?
    b. What additional measures or clarification is required to improve enforceability?

    Measured by post-harvest audits and interviews with forest technicians, harvesting crews, harvest coordinators and EPA compliance team

3. Do the marking provisions provide an equivalent level of environmental outcome? If not? (*OAC 2*)

a. What component?
b. Why?
c. What additional measures or clarification is required to improve outcomes?

Measured by compliance with ESA rules and post-harvest audits and interviews with forest technicians, harvesting crews, harvest coordinators and EPA compliance team

4. Is the broad-area habitat search effort sufficient to locate required habitat features? If not? (*OAC 2 and 8*).
    a. What component?
    b. What habitat features or species?
    c. Why?
    d. What additional measures or clarification is required to improve outcomes?

Measured by interviews with FCNSW ecology team, EPA technical experts, expert panel and and analysis of search findings

Measures to apply

Element	Current	Option A	Option B
Boundary Marking	Exclusion zones must be identified and marked in the field (100m in advance of harvesting operations)	Boundaries of ESAs will be identified and protected using GPS devices in harvesting machines. Features identified in broad area surveys must be immediately mapped and provided to harvesting contractors.	
Tree Marking	Retained tress must be marked in the field • 100m in advice of harvesting operations • 300m in known koala habitat areas	Retained trees will be identified and marked using GPS devices (iPAD devices with FCNSW app) by field technicians in advance of harvesting operations Some sites will trial operator selection (by harvesting contractors within harvesting machines) at the time of the harvesting	Retained trees will be identified and marked using GPS devices (iPAD devices with FCNSW app) by field technicians in advance of harvesting operations
Board Area Surveys	**Compartment Mark-up surveys**	**Board Area Surveys**	

	Conducted by suitably qualified FCNSW staff between 100m and 300 m in advance of harvesting operations. Looking for habitat features (as listed in the TSL) and the application of mark-up and tree retention requirements.	Conducted by suitably qualified FCNSW staff in advance of harvesting operations. Looking for unmapped habitat features (including flora, incidental fauna, unmapped landscape features), mapping of habitat features, selection of wildlife habitat clumps and tree retention requirements.

9. Additional considerations

In addition, the desktop exercise, harvesting and on-ground assessments will facilitate assessment of:

- Data management and recording forms
- Accidental/dangerous trees /non-compliance forms
- Mapping conditions and protocols.

Field Harvesting Trial – Implementation Steps

Step 1: Operational Planning:

Conduct operational planning and develop revised harvest plan and operational map for up to six selected compartments showing:

- Current IFOA requirements
- Two Proposed Options to be applied:
    - Category 1 and 2 ESA areas based on agreed classification.
    - Classified drainage network using geonet streams and agreed classification process.
    - Trial treatment areas:
        - Silviculture (including low intensity operations, regeneration harvesting, current silviculture)
        - Tree retention requirements
        - existing prescriptions
        - Wildlife habitat clumps (based on calculation of the clumpable area – aim for a range of sizes, topographic locations and values across the six sites, need not have one in each treatment area)
        - Any relevant species-specific exclusion zone.
        - Interim koala habitat mapping.
    - aim to assess and treat approximately 10 ha per treatment per compartment (noting treatment areas will use logical boundaries and may be larger than 10 ha for practicality)

Step 2: Pre-Harvest Assessment:

- Establish 10 pre-harvest plots per treatment area per site.
- Use 0.2 ha circular plots randomly located within treatment area, (excluding past gaps using LiDAR data)
- Accurately record plot location by GPS and clearly mark location in field
- Undertake three (3) Basal Area (BA) sweeps/plot – systematically placed within plots
- Measure all trees greater that 40 cm dbhob located within the in plot
- For each tree, record species, diameter, growth stage, hollow class, dominance class, canopy quality class, product volume
- Number each tree recorded in the plot and clearly paint that number on the tree in the field prior to harvest.

Step 3: Pre-harvest Mark-Up:

- Trial supervisor(s) (EPA and FCNSW nominated officers) to train forest technicians and EPA staff in the mark-up requirements for silviculture and tree retention for each proposed treatment.
- Mark-up each treatment area for the relevant condition.
- Maintain a GPS track-log of mark-up so mark-up time can be assessed.
- Record and map any relevant field identified ESAs in line with mapping protocols.
- Forest technicians to record issues/difficulties with mark-up requirements and inform the trial supervisor(s) of issues to ensure they are quickly and consistently addressed.
- Undertake boundary mark-up for selected ESAs/treatments.

Step 4: Harvesting Treatments

- The trial supervisor(s) to induct crew and harvesting coordinators into the trial, including explaining the new conditions that operate in each treatment area, purpose of trail and expectations
- Ensure crew has functioning iPad map app with external data logging GPS and are able to log waypoints.
- Conduct harvesting.
- Harvesting must cut to the maximum permitted limit for the basal area and regeneration harvesting treatments.
- Crew/Coordinators to record issues progressively and seek clarification from trial supervisor as required.
- Record buffer on buffer trees, dangerous trees removed, accidentally felled trees.
- Monitor harvesting and application of conditions to ensure treatments are delivering on expectations for retained BA, ESA and tree protection and ground protection zones.

Step 5: Post-Harvest Assessment

- Resample all pre-harvest plots and assess:
    - Trees retained for reason, volume and damage
    - Include additional trees under 40 cm dbhob if marked for retention and remeasure BA.
- Undertake post-harvest BA assessment in line with the current PNF procedure.
- Assess application of ground protection zone conditions and guidance material for meeting intent.
- Assess geonet stream network protection.
- Assess clump protection.

- Assess recorded buffer on buffer trees for volume and reason as well as dangerous trees and accidentally felled trees for enforceability and practicality of the reporting requirements.
- Undertake on-ground boundary compliance transects (500 m per site) to assess boundary compliance and enforceability.
- Undertake audits to assess enforceability of all conditions.

Step 6: Post-harvest Interviews

- Interview all forest technicians, EPA staff, harvesting contractors, experts and involved parties.
- Undertake a post trial de-brief to discuss outcomes, findings and next steps.
- Document all interviews.

Step 7: Data Integration

- Collate all data collected during the trial, including:
    - Maps
    - Area calculations and analyses
    - Information and mapping within iPad map app
    - Diary entries
    - Interview notes
    - Photos, GPS points, recordings
- Copies of all data will be provided to FCNSW, EPA and DPI
- Data and recommendations collected during the trial will be used to inform improvements and ongoing negotiations on the threatened species measures.
- Undertake assessment of all available data against the specified assessment criteria
- Prepare a report against each assessment criteria.

Documentation and Reporting

For the duration of the trial the following documentation must be prepared:

1. **Harvest plans and operational maps** – these documents will include all treatment areas, protected areas, threatened species measures and all associated rules. They will be prepared for all trial sites. These documents will be provided in hard copy (at request or on FCNSW website) and in digital format for use in GPS and mapping devices.

2. **Supporting documents** – to assist operational staff (including forest technicians, EPA officers, and harvest contractors) in the implementation of the desktop and field based exercises.

3. **Diary notes** by trial supervisor(s) that outline the application, practicality, issues and proposed solutions for each measure being applied.

4. **Weekly written update reports** that document progress, challenges, proposed solutions and general governance matters. These reports will be distributed to EPA, FCNSW and DPI management teams for their information and action where necessary.

5. **Development of a photo library** – to assist in the development of guidance material and to ensure the long term interpretation and application of the measures are being delivered

6. **Mapping and associated data** – using the FCNSW iPad map app, EPAs FULCRUM map app, GPS track logs and waypoints and other mapping sources.

7. **Forms** – pre-prepared survey sheets, non-compliance, WHS and approval forms. Forms may also be prepared to assist in consistent collection of filed data (ie interview forms, issues forms)

8. **Reporting** – as each measure is assessed – the data collected will be used to report against each assessment criteria (identified above). The findings of the assessment will be used to inform ongoing negotiations, modifications and final drafting of these measures. The EPA, FCNSW and DPI will conduct the assessment and reporting of the trial findings. This will occur progressively throughout the conduct of the trial.

9. **Development of guidance material** – the information obtained throughout the trial will be used to inform the guidance material needed to ensure the correct interpretation and application of the threatened species measures.