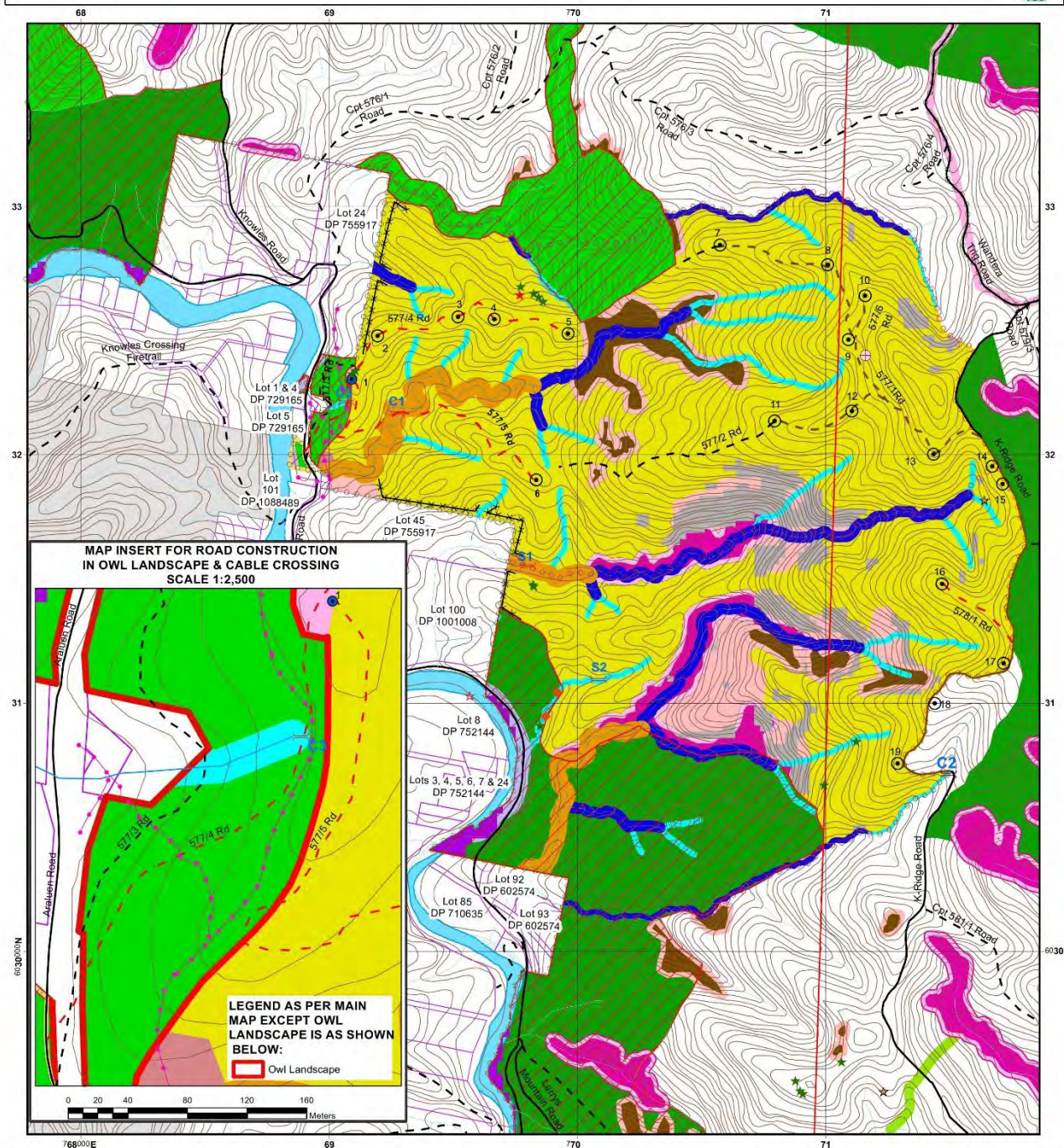


EPA AUDIT REPORT – WANDERA STATE FOREST COMPARTMENT(S) 577 and 578

Auditee:	FORESTRY CORPORATION OF NSW
Audit scope:	Wandera State Forest, compartments 577 and 578 (see Map 1 , below). The field audit took 2 day(s) to complete.
Region:	Batemans Bay Management Area
Date/Audit timing:	1-2 December 2016
Lead EPA auditor:	Toby Eastoe
Assisting EPA auditors:	Greg Abood
Justification of audit:	Report on the level of compliance with conditions and environmental performance in line with EPA compliance priorities.
Audit objectives:	<ol style="list-style-type: none"> 1. Assess compliance against audit criteria that reflect EPA compliance priorities. 2. Assess and categorise risk of identified non-compliance or appropriate further observations. 3. Request action plans against key audit findings so that auditee can use risk categorisation to inform timeliness and level of risk reduction control. 4. Promote continuous improvement of the environmental performance of forestry operations.
Audit scope:	<ul style="list-style-type: none"> • Hollow bearing and recruitment trees – Selection, Retention and Protection • Basal Area Retention • Streams – Protection • Rocky Outcrop - protection • Crossing drainage and water pollution <p>Physical scope: This audit was limited to the physical boundaries of compartments 577 and 578.</p> <p>Temporal scope: The audit period was on the days of the audit inspection (1-2 December 2016).</p>
Audit criteria	<p>Cond. 5.6 (d) (e) (h) Hollow bearing and Recruitment trees</p> <p>IFOA 5.11 – Basal area retention</p> <p>Cond. 5.1 (b) Marking of EZ and buffer zones</p> <p>Cond. 5.11 Rocky Outcrops and Cliffs</p> <p>Cond. 5.7 Riparian habitat protection</p> <p>Schedule 5 Environment Protection Licence, Clause 37</p> <p>Section 120 of <i>Protection of the Environment Operations Act 1997</i> (POEO Act)</p>
Summary of Operations	Logging and hauling contractor was Mathie and FCNSW Harvest Coordinator, Jim Potter. Finished Log dumps 1-6. Working from log dump 9 during audit.



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Map 1: Wandra State Forest Harvest Plan Operational Map

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AUDIT FINDINGS - OVERVIEW

A summary of EPAs findings are shown in the table below.

Condition	Non-compliances	Compliances	Not Determined
TSL 5.6 (b) &(c) H & R tree retention	2	0	0
TSL 5.6 (b) &(c) H & R tree selection	12	12	0
TSL 5.6 (h) - H & R tree protection	10	14	0
Part 5.11 IFOA - Basal Area	0	0	1
TSL 5.1 (b) - Marking-up of EZ boundaries	1	3	0
TSL 5.11 Rocky Outcrop Protection	0	4	0
TSL 5.7 Riparian habitat: protection	0	4	0
EPL Schedule 5: crossings	0	1	0
S120 POEO Act: crossings	0	1	0
TOTAL	25	39	1

AUDIT RECOMMENDATIONS

Action Details	Non-compliance Code*	Target/Action Date
Retention of H & R trees	Orange: Likely to occur with moderate damage	Retention rates need to be improved in new harvest areas. FCNSW mark-up and close monitoring will help to improve on operator select retention
Selection of retained trees	Red: Impact certain as hollow bearing trees cut down	An action plan must be developed and implemented to ensure all areas are marked up pre-harvest by FCNSW technicians OR if operator select retention is used it needs to be properly monitored.
Protection of retained trees	Red: Impact certain as hollow bearing trees cut down	Clear debris from around affected H and R trees and correctly assess hollow bearing trees
Mark-up of EZ boundaries	Yellow: Rocky outcrop not marked up but protected by other buffer	Ensure all exclusion zones are marked up as per the TSL. While this EZ had an overlapping riparian protection zone this zone has different criteria to EZ's.

*Please refer to [Page 11](#) for explanation of non-compliance codes

AUDIT FINDINGS - FIELD COMPONENT

NOTE: Each condition is listed and explained in **Appendix 1**, methodologies, data, photos and a survey map are in **Appendix 2**. The conditions are hyperlinked for easy access.

1. Retention of H & R trees

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non-compliance per sample (sample size)	Risk Code	Action required by licensee
TSL 5.6 (b) & (c)	Non-compliant	2/2 (8.28ha)	Orange: low rate of retention across a large area causes environmental risk	An action plan must be developed and implemented to ensure H and R trees are properly marked up with required retention rates or that operator select retention is monitored properly.

EPA conducted two meander transects in Compartment 577. Meander 1 covered 4.89ha in which EPA recorded 9 H trees and 3 R trees which translates to 1.8 H trees and 0.61 R trees per hectare of harvested area. Meander 2 covered 3.39ha in which EPA recorded 8 H trees and 4 R trees which translates to 2.4 H trees and 1.2 R trees per hectare. The overall retention rate of H trees was 2.05 trees per hectare and of R trees was 0.85 per hectare.

The requirement of the TSL is for 5 H trees and 5 R trees per hectare. Where this density is not available, the existing hollow-bearing trees must be retained plus additional trees must be retained as hollow-bearing trees to meet the required rate. Neither area surveyed met the requirements for retention so **two (2) non-compliances** are recorded, one for H and one for R trees.

The TSL also states that trees are located such that they are evenly scattered throughout the net harvest area. EPA officer's observed one area where retained trees were only marked along the edges of riparian protection zones. Care needs to be taken to ensure an even spread.

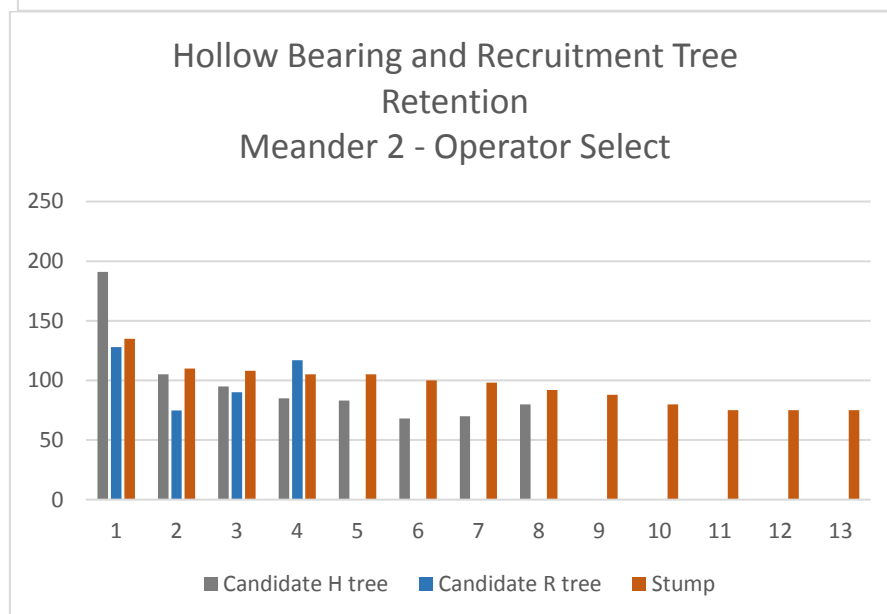
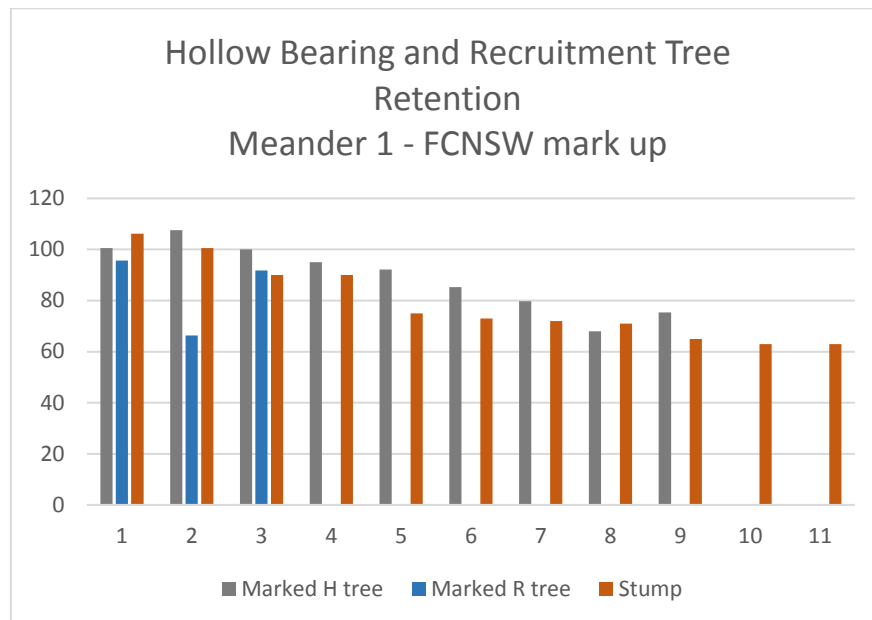
2. Selection of H & R Trees

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non-compliance per sample (sample size)	Risk Code	Action required by licensee
TSL 5.6 (b) & (c)	Non-compliant	12/24 (24 H & R trees)	Red: Impact certain as hollow bearing trees cut down	An action plan must be developed and implemented to ensure all areas are marked up pre-harvest or operator select retention is monitored properly.

EPA officers conducted two meander surveys for H & R retention in compartment 577 of the State Forest. The first meander was in an area that had been marked up by FCNSW technicians while the second was in an area that had not been marked up due to impenetrable scrub and was therefore operator select retention.

Twelve (12) candidate H & R trees were retained on meander two but as they did not fulfil the requirements of the TSL condition for selection the **twelve (12) trees are seen as non-compliant**.

Graphs comparing cohorts of retained trees versus stumps on the both the marked up area and the operator select area are below.



EPA found that trees retained in the FCNSW marked up area (meander 1) fulfilled the TSL requirement of belonging to the largest cohort with the largest dbhob. However, trees selected by operators for retention in meander 2 were not consistently in the largest cohort of trees for the area. EPA officers also observed one tree on this meander with large hollows that had been cut down (Photo 1 and 2).



Photo 1 & 2: Felled hollow bearing tree on meander 2

3. Protection of H & R Trees

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non-compliance per sample (sample size)	Risk Code	Action required by licensee
TSL 5.6 (h)	Not Compliant	10/24 (24 H & R trees)	Red: Impact certain as hollow bearing trees cut down	An action plan must be developed and implemented to ensure H&R trees are protected at all times.

When assessing trees, the EPA records a separate finding of compliance / non-compliance for each tree assessed. Accordingly, the EPA recorded **ten (10) instances of non-compliance** and fourteen (14) instances of compliance relating to the protection of retained H and R trees. EPA auditors spoke to the onsite FCNSW harvest supervisor about this at the time of the field inspection as an area that needed improvement. EPA will return to assess how the remainder of the operation complies with this condition.



Photo 3: Retained marked H tree on meander 1 with debris in its 5m buffer

4. Forest Structure - Basal Area Retention

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non-compliance per sample (sample size)	Risk Code	Action required by licensee
IFOA 5.11 (D) (a)	Not determined	0/1 (8.28ha)	Not determined	More information needed to determine combined basal area retention

The average pre harvest basal area recorded by FCNSW in compartments 577 and 578 was 29m²/ha and the average post-harvest basal area recorded by this audit in Compartment 577 was 13.5m²/ha. The harvest plan objective was to remove 35-45% of the basal area to create canopy openings with a harvest limit of 45% basal area and/or minimum of 10m² per hectare.



Photo 4: Basal sweep location at waypoint 616 with a BA of 12m²

The EPA cannot make a final determination on basal area retention without further information from FCNSW regarding pre-harvest basal area measurements and offset areas.

5. Field marking of boundaries (compartment mark-up)

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non- compliance sample (sample size)	Risk Code	Action required by licensee
TSL 5.1 E (b) (ii)	Compliant	1/4 (4 sections of rocky outcrop)	Yellow: harm is less likely	Ensure all outcrops and their exclusion zones are marked up

The EPA assessed mark-up of rocky outcrop exclusion zones in compartment 577 for this condition. Three outcrops were found to be marked up correctly but one was not identified. The unidentified rocky outcrop was small and was protected by a marked third order stream buffer but the cliffs should have been marked up as per the condition.

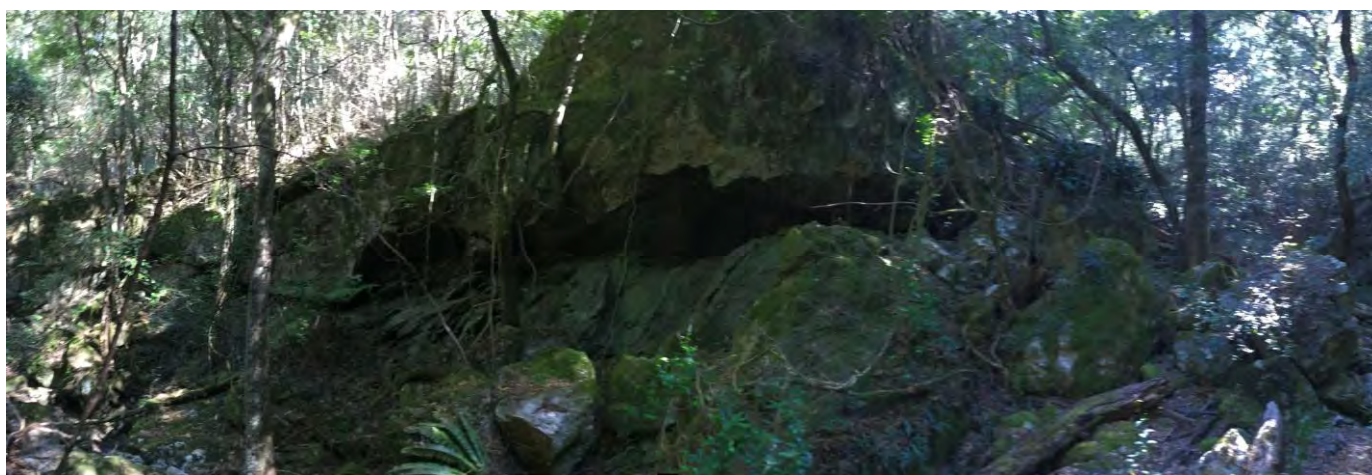


Photo 5: Cliff at waypoint 655 inside 3rd order stream buffers.

6. Rocky Outcrop and Cliff Protection

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non- compliance sample (sample size)	Risk Code	Action required by licensee
TSL 5.11	Compliant	0/4 (4 rocky outcrops)	n/a	n/a

The EPA found that FCNSW was **compliant** with the above conditions in the area assessed. This finding is based on an inspection of four (4) rocky outcrops in compartment 577. Outcrops higher on the slope were hard to define due to impenetrable scrub but were found to be well protected.



Photo 6 & 7: Rocky outcrops protected on upper slopes

7. Riparian Protection Zone

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non-compliance sample (sample size)	Risk Code	Action required by licensee
TSL 5.7	Compliant	0/4 (1400m of boundary in 4 segments)	n/a	n/a

The EPA found that FCNSW was **compliant** with the relevant conditions in the area assessed. This finding is based on the assessment of 1000m of third order, 200m of second order and 200m of first order drainage riparian protection zones in compartment 577. The riparian buffers were assessed in four (4) separate segments. EPA records a compliance or non-compliance for each segment.

At waypoint 653 and 656 trees had been felled and pushed past marked boundaries into the soft protection zone. While this is not a non-compliance to this condition it should be noted that the third order stream at those points is draining into the adjacent locally important Deua River and every care should be taken to protect the riparian zones.

8. Road crossings, drainage & water pollution risks

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non-compliance sample (sample size)	Risk Code	Action required by licensee
EPL Schedule 5 S120 POEO	Compliant	0/2 (1 crossing, 2 conditions)	n/a	n/a

The EPA make a single compliance / non-compliance finding in relation to each assessed crossing. EPA officers assessed one crossing in Compartment 577 and found it was **compliant** with both the EPL schedule 5 and S120 of the POEO act.

While drainage structures were installed at the required distances the type of drainage structure used should be re-evaluated as rubber strips were seen not to be operating in a proper and efficient manner. This issue was discussed with the FCNSW harvesting coordinator in the debriefing.



Photos 8 & 9: Problematic rubber strips used as drainage structures on crossing C1

RISK ASSESSMENT OF NON-COMPLIANCE

The significance of any non-compliances identified during the audit process are categorised. Following risk assessment of non-compliances, an escalating response relative to the seriousness of the non-compliance is determined to ensure the non-compliance is addressed by the enterprise.

The risk assessment of non-compliances involves assessment of the non-compliance against two criteria; the likelihood of environmental harm occurring and the level of environmental impact as a result of the non-compliance. After these assessments have been made, information is transferred into the risk analysis matrix below.

	Likelihood of Environmental Harm Occurring			
		Certain	Likely	Less Likely
Level of Environmental Impact	High	Code Red	Code Red	Code Orange
	Moderate	Code Red	Code Orange	Code Yellow
	Low	Code Orange	Code Yellow	Code Yellow

The assessment of the likelihood of environmental harm occurring and the level of environmental impact allows for the risk assessment of the non-compliance via a colour coding system. A red risk assessment for non-compliance denotes that the non-compliance is of considerable environmental significance and therefore must be dealt with as a matter of priority. An orange risk assessment for non-compliance is still a significant risk of harm to the environment however can be given a lower priority than a red risk assessment. A yellow risk assessment for non-compliance indicates that the non-compliance could receive a lower priority but must be addressed.

There are also a number of licence conditions that do not have a direct environmental significance, but are still important to the integrity of the regulatory system. These conditions relate to administrative, monitoring and reporting requirements. Non-compliance of these conditions is given a blue colour code.

The colour code is used as the basis for deciding on the priority of remedial action required by the licensee and the timeframe within which the non-compliance needs to be addressed. This information is presented in the action program alongside the target/action date for the noncompliance to be addressed.

While the risk assessment of non-compliances is used to prioritise actions to be taken, the EPA considers all non-compliances are important and licensees must ensure that all non-compliances are addressed as soon as possible.

APPENDIX 1: CONDITIONS IN LEGISLATION

“IFOA” refers to the Integrated Forestry Operations Approvals package incorporating amendments from 1st March 2013

“TSL” refers to the Terms of Licence under the Threatened Species Conservation Act 1995

“EPL” refers to Schedule 5 of the Environmental Protection Licence under Section 55 of the Protection of the Environment Operations Act 1997

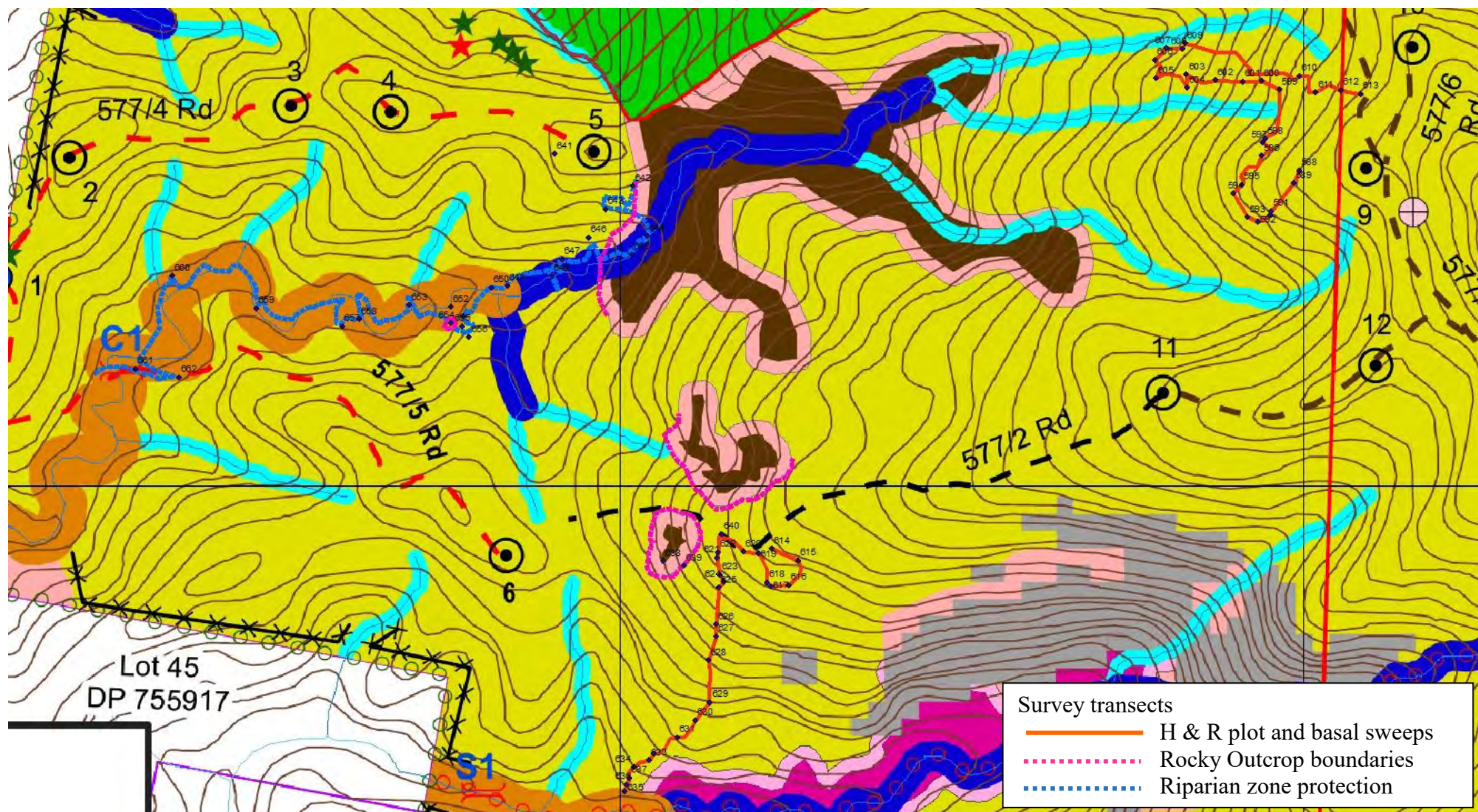
All are available on the [EPA Website](#)

Condition reference	Condition	Why is this important?
TSL 5.6 (b) & (c)	<p>A minimum of five (5) hollow-bearing trees must be retained per hectare of net logging area.</p> <p>Where this density of hollow-bearing trees is not available all hollow-bearing trees within the net logging area must be retained.</p> <p>Within the Regrowth Zone, for each hollow-bearing tree retained in (d) above a recruitment tree must be retained.</p>	Hollow bearing and recruitment trees provide valuable habitat for native fauna species
TSL 5.6 (b) & (c)	<p>Hollow-bearing trees must be selected with the objective of retaining trees having as many of the following characteristics as possible:</p> <ul style="list-style-type: none"> • belonging to a cohort of trees with the largest dbhob, • good crown development, <p>Note: this does not restrict the selection of trees with broken limbs consistent with the hollow-bearing tree definition minimal butt damage,</p> <ul style="list-style-type: none"> • represent the range of hollow-bearing species that occur in the area, • located such that they result in retained trees being evenly scattered throughout the net logging area. <p>Recruitment trees must be selected with the objective of retaining trees having as many of the following characteristics as possible:</p> <ol style="list-style-type: none"> i. belong to a cohort of trees with the largest dbhob, ii. located such that they result in retained trees being evenly scattered throughout the net logging area iii. good crown development, iv. minimal butt damage, v. represent the range of hollow-bearing species that occur in the area. 	Hollows generally form in trees as they grow larger and older. Therefore the largest trees offer the best habitat for hollow utilising species of native fauna and should be the preferred tree to be retained.
TSL 5.6 (h)	<p>During harvesting operations, the potential for damage to these trees must be minimised by utilising techniques of directional felling.</p> <p>In the course of conducting specified forestry activities, logging debris must not, to the greatest extent</p>	The EPA considers it important that hollow-bearing and recruitment trees are adequately protected from both logging operations and post-logging risks, such as hazard reduction burns and wild fires. Excessive logging debris in the immediate

	<p>practicable, be allowed to accumulate within five metres of a retained hollow bearing or recruitment tree.</p> <p>Mechanical disturbance to ground and understorey must be minimised to the greatest extent practicable within this five metres radius. Habitat and recruitment trees must not be used as bumper trees during harvesting operations.</p>	<p>proximity of hollow-bearing or recruitment trees increases the risk of damage or mortality to the retained trees in the event of a fire. This has a flow-on effect on the long-term availability of suitable hollow-bearing and recruitment resources for arboreal fauna species</p>
IFOA 5.11 (D) (b)	<p>This condition focuses on the retention of basal area and general compliance with the silvicultural prescriptions for Single Tree Selection (STS).</p> <p>The Southern Region IFOA defines STS for the south coast sub-region in Part 1, 5(11) D:</p> <p>(i) the sum of the basal areas of trees removed or destroyed comprises no more than 45% of the sum of the basal areas of all trees existing immediately prior to logging or culling within the net harvestable area of the tract, and</p> <p>(ii) the sum of the basal areas of trees remaining after logging or culling as a proportion of the net harvestable area of the tract existing immediately prior to logging or culling is at least 10m² per hectare;</p>	<p>Implementation of STS basal area requirements ensures that the spatial impacts of harvesting in forest stands can be limited. Basal area limits also ensure that sufficient timber volumes are available for sustainable harvesting in the future. One method is to ensure there is an overall level of basal area across all harvested areas.</p> <p>To assess this the EPA needs to compare pre harvest basal area data with post-harvest data</p>
TSL 5.1 E (b) (ii)	<p>This condition focuses on marking-up requirements relating to exclusion zones. Condition 5.1(b) of the South Coast Sub-Region TSL specifies that environmentally sensitive areas must be marked up if forestry activity will come within 50m of the boundary.</p> <p>The EPA records a single compliance or non-compliance finding in relation to the mark-up of a compartment.</p>	<p>Proper mark-up of environmentally sensitive area boundaries reduces the risk of harvesting occurring in and/or felling occurring across these boundaries.</p> <p>Using GPS to identify boundaries in conjunction with physical mark-up is helpful but the TSL condition requirement is for boundaries of environmentally sensitive areas to be physically marked up</p>
TSL 5.11	<p>This condition focuses on rocky outcrops and cliffs.</p> <p>The key requirements of the condition are:</p> <p>a) Specified forestry activities are prohibited within areas of rocky outcrops and cliffs.</p> <p>b) In addition, exclusion zones of at least 20 metres wide must be implemented around all rocky outcrops more than 0.1 hectare (approx. 30m x 30m), and all cliffs.</p> <p>The definition on a rocky outcrop is:</p> <p>“Rocky outcrop” means an area where rocks or exposed boulders cover more than 70% of any 0.1 hectare area (30 metres by 30 metres); OR areas with skeletal soils (areas with shallow soils where rocks are exposed), supporting heath or scrub (sometimes with occasional emergent trees); OR a combination of both.</p>	<p>Rocky outcrops provide habitat for native species. In general, rocky outcrops occur in clusters associated with a landscape element such as a hill top or ridge, can occur in a mosaic of rock and skeletal soil covering that landscape feature, and can have heath, scrub and trees growing on them. Rocky outcrops should be protected as per the definition as a landscape feature.</p>
TSL 5.7	<p>This conditions protection requirements provide for two different protection zones alongside drainage lines and streams:</p> <ul style="list-style-type: none"> a hard protection zone of 5m, to be measured from the top of the bank of the incised channel 	<p>Protection zones include riparian zones and their buffers and are required to be protected. While there are allowances for accidental falling into the protection zones operations should use an</p>

	<p>or, where there is no defined bank, from the edge of the channel;</p> <ul style="list-style-type: none"> a soft protection zone along the entire length of each hard protection zone. The width of the soft protection zone is 25m for third order streams. <p>Conditions 5.7.1 a) i)-iii) of the TSL sets out the provisions relating to hard protection zones. It provides that specified forestry activities are prohibited in a hard protection zone, no tree is to be felled into a protection zone (hard), and if a tree falls into a hard protection zone, then no part of the tree can be removed.</p> <p>Under 5.7.1 f) if a tree is accidentally felled into the protection zone it must be recorded by FCNSW</p> <p>Conditions 5.7.2 of the TSL sets out the provisions relating to soft protection zones. It provides that specified forestry activities and harvesting machinery are prohibited in a soft protection zones. Trees may be felled into and removed from a soft protection zone. Trees located in a protection zone (soft) must not be felled, except for the purpose of removing vegetation that is in the area of a proposed road crossing or snig track.</p>	<p>"operational exclusion zone" to buffer against operating close to the boundaries.</p>
EPL Schedule 5	<p>Roads must be drained using a cross bank, relief pipe, spoon drain or mitre drain between 5 metres and 30 metres from a watercourse, drainage line, wetland or swamp crossing. This distance must be measured from the top of the bank of the incised channel, or where there is no defined bank, from the edge of the channel.</p> <p>The EPA make a single compliance / non-compliance finding in relation to each assessed crossing.</p>	<p>This condition ensures that water is diverted off road surfaces on approaches to crossings. Where drainage structures are constructed correctly these structures will mitigate against potential pollution of watercourses and water bodies during and after rainfall events.</p>
S120 POEO	<p>A "person" who pollutes any waters is guilty of an offence.</p>	<p>This is a strict liability offence under the Protection of the Environment Operations Act. FCNSW must ensure that pollution of watercourses and water bodies in compartments being harvested does not occur.</p>

APPENDIX 2: SURVEY METHODOLOGY AND DATA TABLES



Map 2: Survey transects conducted for audit on 1-2 December 2016

Assessment of H & R tree retention, selection and protection

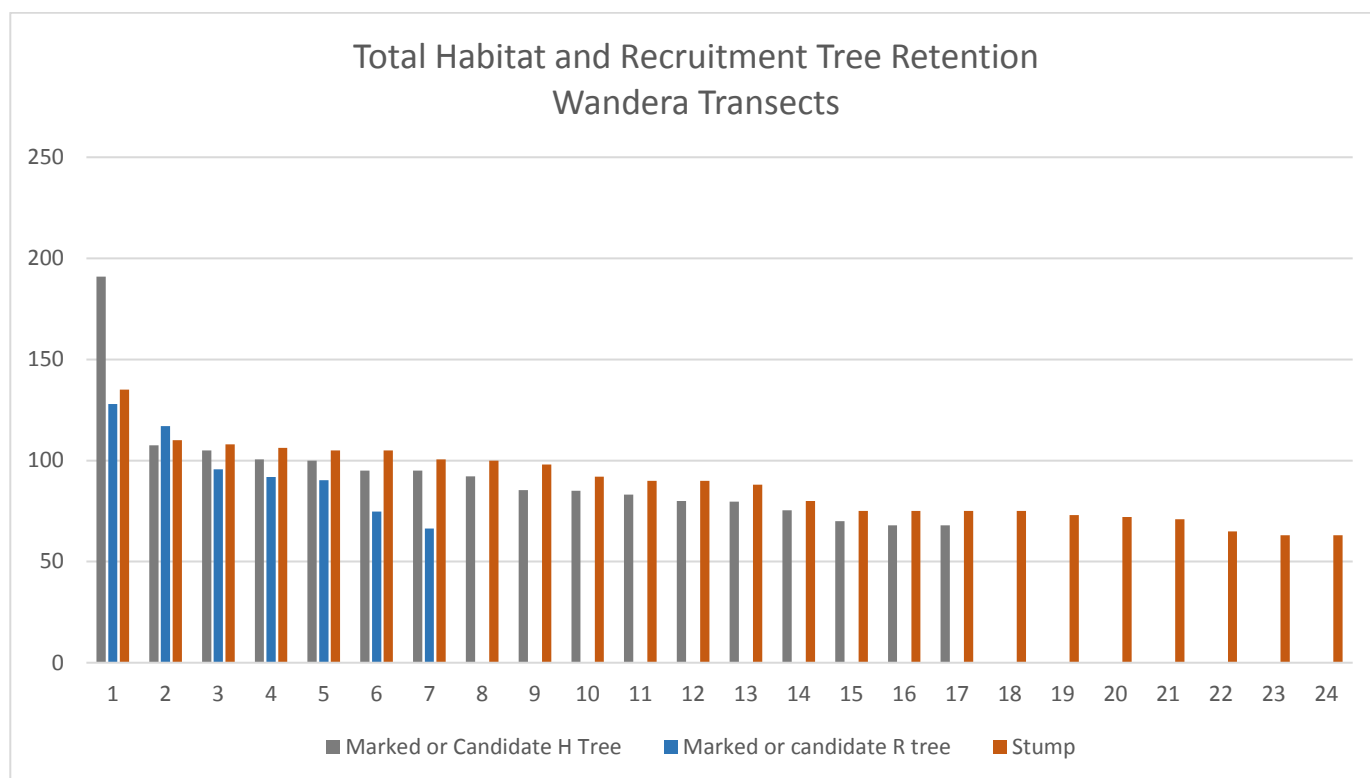
EPA officers undertook two survey meanders in compartment 577 (see Map 2) with a total survey area of 8.275 hectares (total meander length of 1655m, 25m either side of meander line). Survey results are presented in Table 1 below.

Table 1: Assessment of H & R tree selection and protection

Meander	Tree/Stump no.	EPA GPS waypoint	Accuracy	iPad GPS photo placemark	Mark-up. H, R or Stump	Live tree	Species	Tree DBHOB (cm)	Stump SDOB (cm)	St Ht (cm)	hollows present	Crown damage	Logging debris >1m within 5m	ground disturbance within 5m	Protection Compliance (C) or Non-compliance (N)	Comment
1	1	588	3m	p2	S		STA		90	95						
1	2	588	3m	p2	H	Y	STA	67.9			Y	N	Y		N	
1	3	589	3m	p3	H	Y	BW	92.1			Y	N	Y		N	
1	4	590	3m	p4	R	Y	STA	91.8				N	N	Y	C	
1	5	592	3m	p6	H	Y	WS	75.4			N	N	Y		N	
1	6		3m	p5	S		WS		65	70						
1	7	593	3m	p7	R	Y	STA	95.7				N	N	N	C	Minimal Harvest Nearby
1	8	594	3m	p8	H	Y	STA	100.5			Y	N	N	N	C	Minimal Harvest Nearby
1	9	595	3m	p9	H	Y	STA	79.7			Y	N	N	Y	N	Hollow in base
1	10	597	3m	p12	H	Y	BW	95			Y	N	N	N	C	Minimal Harvest Nearby
1	11	598	3m	p12	R	Y	BW	66.3			N	N	N	N	C	Minimal Harvest Nearby
1	12	599	3m	P14	S		BW		71	67						
1	13	601	3m	P15	S		STA		75	65						
1	14	601	3m	P15	S		STA		63	70						
1	15	602	3m	P17	S		STA		106	130						
1	16	603	3m	P18	S		STA		63	90						
1	17	603	3m	P18	H	Y	BW	100							C	
1	18	604	3m	P19	H	Y	WS	107.5			Y		N	N	C	Double leader. Main trunk 77.9 DBH

Meander	Tree/Stump no.	EPA GPS waypoint	Accuracy	iPad GPS photo place mark	Mark-up. H, R or Stump	Live tree	Species	Tree DBHOB (cm)	Stump SDOB (cm)	St Ht (cm)	hollows present	Crown damage	Logging debris >1m within 5m	ground disturbance within 5m	Protection Compliance (C) or Non-compliance (N)	Comment
1	19	605	3m	p20	S		WS		90	65						
1	20	606	3m	p21	S		WS		101	130						
1	21	609	3m	P22	H	Y	BW	85.3							C	
1	22	610	3m	P26	S		WS		72	60						
1	23	612	3m	P28	S				73	75						
2	24	615	3m	P32	S		BW		75	60						Meander 2 operator select, no marking
2	25		3m	P33	S		BW		80	75						
2	26		3m	P34	H	Y	WS	105							C	
2	27	616	3m	P35	S		WS		105	70						
2	28	617	3m	P36	S		BW		92	50						
2	29	618	3m	P37	S		WS		75	60						
2	30	620	3m	P38	H	Y		68							C	
2	31	622	3m	P40	R	Y	BW	74.8					Y		N	
2	32	622	3m	P40	H	Y	BW	80			Y		Y		N	
2	33	623	3m	P41	H	Y	BW	70							C	
2	34	624	3m	P42	S				110	60						
2	35	625	3m	P42	H		WS	85			Y		Y		N	
2	36	625	3m	P43	H		WS	83.2			Y		Y		N	
2	37	626	3m	P43	R		WS	117							C	
2	38		3m	P44	S		WS		88	60						
2	39	628	3m	P45	H		WS	95			Y		Y		N	
2	40	628	3m	P46	S		BW		75	60						
2	41	628	3m	P46	S		WS		135	140						Large hollows in felled tree
2	42		3m	P47	R		Gum	128					Y		N	
2	43	629	3m	P49	H		WS	191							C	
2	44	630	3m	P50	S				100	50						
2	45	631	3m	P51	S				105	100						

2	46	632	3m	P53	S				108	87						
2	47	633	3m	P54	S				98	45						
2	48	634	3m	P56	R		WS	90.2							C	



Basal Area Sweeps

Table 2: Basal Area Sweeps in Wandera State Forest, Cpt 577 on 1-2 December 2016

Meander	BA no.	EPA GPS waypoint	Accuracy	iPad GPS photo place mark	Basal Area	corresponding FCNSW BA sweep	Basal area Reduction
1	1	591	3m		16		
1	2	596	3m	P11	16		
1	3	600	3m		17		
1	4	603	3m		12		
1	5	605	3m		12		
1	6		3m	P25	16		
1	7	610	3m	P26	14		
2	8	614	3m	P31	8	44	81.82%
2	9	616	3m	P34	12	44	72.73%
2	10	619	3m		10		
2	11	627	3m		10		
2	12	630	3m	P50	18	32	43.75%
2	13		3m	P55	14	32	56.25%
EPA and FCNSW averages					13.46154	29	53.58%

Boundary assessment for environmentally sensitive areas and riparian protection zones

Table 3: Boundary assessments undertaken on 1st and 2nd December 2016

Boundary	EPA GPS waypoint	iPad GPS photo place mark	Accuracy	Mark-up	Details of field observations
Rocky Outcrop 1		p65	5m	Yes	Middle of outcrop
Rocky Outcrop 1	638		3m	Yes	Edge outcrop
Rocky Outcrop 1	639		3m	Yes	marked buffer 20m from outcrop
Rocky Outcrop 2		p66	5m	No	No mark-up but not close to operations as too steep
Rocky Outcrop 3		p69	5m	Yes	Buffer of rocky outcrop
Rocky Outcrop 3		p70	5m	Yes	buffer mark-up
Rocky Outcrop 3	642	p71	3m	Yes	Edge rocky outcrop or drainage as third order in same area. Edge of harvest here is 30m
Rocky Outcrop 3		p72	5m	Yes	buffer unmapped drainage line
3rd order stream		p73	5m	Yes	unmapped drainage line mark up
3rd order stream	643	p74	3m	Yes	unmapped drainage line mark up
3rd order stream		p75	5m	na	Centre of rocky outcrop
3rd order stream	644		3m	na	In rocky outcrop
3rd order stream	645		3m	na	Bottom of waterfall
3rd order stream		p76	5m	na	downstream part of unmapped outcrop but under sized
3rd order stream		p77	5m	No	Inside NHA up from rocky outcrop
3rd order stream	646	p78	3m	Yes	Edge harvest
3rd order stream		p82	5m	Yes	edge harvest
3rd order stream	648		3m	No	Edge stream
3rd order stream	650	p84	3m	No	Stream junction
3rd order stream	651		3m	Yes	harvest edge close to 3rd order
3rd order stream		p86	5m	No	3 trees pushed at edge of harvest area. Stump is 44m from stream, debris is 21m from streambank
3rd order stream	653		3m	No	Edge stream in relation to p86
3rd order stream	656	p94	3m	Yes	2 trees felled across marked boundary and 7 trees pushed across marked boundary
3rd order stream/ Rocky Outcrop	664	p95	3m	No	Unmarked rocky outcrop and cliff inside 3 rd order stream buffer
3rd order stream	658	p100	3m	No	stump in harvest area 27.5m from stream edge wp658

Road crossings, drainage & water pollution risks

Table 4: Crossing survey results

Crossing ID	GPS point	iPad GPS photo place mark	Observations	Assessment
C1	661	P106	East approach – rubber strip drains at 15m, 55m and 75m but not connected well and could fail. West approach – rubber strip drains at 5m and 80m. Bridge made of timber and covered in earth cloth. Sediment detention basins next to bridge in working order. <i>No evidence of sediment entering waterway.</i>	Compliant



Photo 10: Looking East at the crossing from 15m drainage strip on west access



Photo 11: Looking West from crossing showing earth cloth on bridge, detention basin and 15m drainage strip



Photos 12: stream bed of 3rd order stream with no pollution. Photo 13: Rubber strip drainage starting to fail.

ATTACHMENT 2:
AUDITEE SUBMISSIONS FORM

Condition / Audit finding reference / page No.	EPA draft finding / risk categorisation	Location – description, GPS	FCNSW evidence submission	EPA final finding / risk categorisation	EPA response to FCNSW submission
TSL 5.6(d)/finding 1/pg 5	Code Orange	Meander 1 & 2	<p>FCNSW reviewed the finding related to retention of H & R trees, which recorded an overall retention rate of 2.05 H trees and 0.85 R trees per ha. This finding is not consistent with FCNSW monitoring of H & R tree retention in Wandera 577 & 578, consequently FCNSW carried out a field inspection of EPA ‘meander 2’ to attempt to replicate the EPA result and identify potential root causes.</p> <p>- FCNSW traversed the same transect line as EPA (this was difficult as no GPS coordinates were provided by EPA) from ‘Point A’ to ‘Point B’ as shown in image 1 below. This transect was approx. 450m long and FCNSW measured 20m either side (FCNSW standard transect), a total of 1.8ha. Within the 1.8ha sample FCNSW recorded 47 candidate retained trees. Approximately 30 of these contained visible hollows and 17 were candidate recruitment trees. Retained trees were calculated at 16.6 H trees and 9.4 R trees per hectare. FCNSW only counted trees that met the requirements of 5.6(b)iii. FCNSW has also completed 16 individual H & R tree transects in these compartments between August 2016 and January 2017, which found an overall retention rate of 5.2 H trees and 4.7 R trees per hectare (see enclosed tree retention data sheets).</p>	The EPA findings for retention of H & R trees will be retained in the final report	<p>EPA surveyed 25m on either side of the 677m meander 2. This gives the area of meander 2 as 3.385 hectares. As retained trees had not been marked by FCNSW on meander 2 EPA assessed the selection of what had been retained against the conditions of the Southern region TSL. EPA only found 12 candidate retained trees on this meander. FCNSW data supports EPA findings.</p> <p>FCNSW’s sixteen H & R tree transects sent with submissions support EPA findings as the average number of retained trees per hectare in the transects was 10 trees which differs significantly from the 26 trees per hectare recorded by FCNSW post-harvest from point “A” to point “B”.</p>

			<ul style="list-style-type: none"> - Given FCNSW's results above, is the EPA able to provide additional information as to what methodology was used to calculate the area for meander 2 and how EPA selected candidate retained trees within that area. It appears from the map shown in appendix 2 that only trees found directly on the transect line were recorded, rather than all candidate trees within a set distance of the transect line. - Additionally there may be an editing error in the draft report. The condition referenced for this finding is TSL5.6(d), which is the condition applying to the re-growth zone. The correct condition is TSL 5.6(b) – non-regrowth zone. <p>FCNSW would like this finding reviewed. FCNSW would be available for a field debrief to further demonstrate the above submission.</p>		Correct. The final draft will be amended to the non-regrowth condition
TSL 5.6(d) & (e)/ finding 2/pg 5	Code Red	Meander 1 and 2	<p>It is FNSW understanding that this finding relates to TSL condition 5.6(b)iii – belonging to a cohort of trees with the largest dbhob. The data collected by EPA for meander 2 shows that retained trees had an avg. dbhob of 99cm and stumps of felled trees had an avg. diam of 96cm (stump diameter would need to be reduced to account for taper). This indicates that the contractor has selected trees for retention that belong to a cohort of trees with the largest dbhob. Condition 5.6(b)iii does not prohibit FCNSW from felling trees that are suitable sawlogs and have a similar diameter to retained trees. FCNSW has exceeded the retention rate and the trees retained are the most mature cohort with the largest diameter. Furthermore the statement in the audit report on</p>	The EPA findings for selection of H & R trees will be retained in the final report	<p>The risk identified is in relation to the difference between FCNSW selection and operator selection. EPA relies on its evidence to show that FCNSW is marking up correctly but operator select is not selecting the correct trees for retention or operators are not being monitored.</p> <p>Hollow bearing trees were also knocked down in meander 2 which shows they were not selected for retention.</p>

			<p>page 6 comparing trees selected by FCNSW in meander 1 with those selected by the contractor in meander 2 is not supported by the data. Meander 1 shows that retained trees had an avg. dbhob of 88cm and stumps of felled trees had an avg. diam of 79cm. The results between the 2 meanders are similar when comparing diameter of retained trees and stumps.</p> <p>Additionally, FCNSW assessment of meander 2 shows there is at least a further 35 retained trees that were not reported/assessed by the EPA.</p> <p>The data reported by EPA and FCNSW field observations suggest that FCNSW selection of retained trees is consistent with TSL condition 5.6(b)iii – in that retained trees do belong to a cohort of trees with the largest dbhob. FCNSW would like the EPA to review this finding.</p>		
TSL 5.6(h)/finding 3/pg 7	Code Orange	Meander 1 & 2	<p>Protection of retained trees is an ongoing compliance focus for FCNSW. FCNSW monitoring of retained trees and FCNSW inspection of meander 2 indicates that of 205 retained trees assessed, 34 of those did not meet requirements of condition 5.6(h), a compliance rate of 83%. This result shows improvement is required but the non-compliance level is not as high as that reported by the EPA (58%).</p> <p>Furthermore, during field inspections FCNSW made several observations along meander 2 where the contractor had pushed back or knocked down debris to ensure compliance with the condition. Considering FCNSW monitoring result, FCNSW would like EPA to review and downgrade the risk code for this finding.</p>	EPA findings have been reviewed for this condition with the final risk rating being upgraded to a code red risk.	<p>The transect data supplied by FCNSW shows 24 trees out of 119 with debris, a compliance rate of 80%.</p> <p>A hollow bearing tree was also logged by operations.</p>

TSL 5.1(b)/finding 5, pg 8	Code Yellow	Wpt 664	<p>FCNSW has reviewed this finding and is unsure as to what the non-compliance is. FCNSW markup information (shown in image 2), indicates that mark-up of the boundary was completed. Our records show that the mark-up was approximately 30m away from the location identified by the EPA as a cliff/rocky outcrop and no finding in the draft audit reports shows that mark-up or forestry activities occurred within 20m of the cliff/rocky outcrop.</p> <p>Furthermore, condition 5.1(b) referred to in the audit report was found to be compliant, additional condition 5.1(b) have been revoked from the TSL.</p> <p>FCNSW would like EPA to review this finding.</p>	The EPA finding will be retained	<p>This condition should be 5.1E (b) (ii) and the waypoint should be the edge of harvest wp 655 which was within 50 metres of the edge of the rocky outcrop and therefore should be marked as per condition 5.1E (b) (ii)</p>
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ATTACHMENT 2: KEY AUDIT FINDINGS

- **Hollow bearing (H) trees and recruitment (R) tree retention selection and protection**

The two areas assessed in Wandera State Forest for H & R trees were marked up in different ways. In one area the H & R trees were marked up by FCNSW forest technicians on the ground and using the FCMapApp and in the other FCNSW assessed the area as having impenetrable scrub which means they do not have to mark up the area physically. In the second area the operators themselves selected which trees to retain.

The key finding of this audit with retained trees is that the FCNSW marked up area fulfilled the requirements of the TSL but the operator select area did not fulfil the requirements of the TSL. Operator select did not retain the minimum required trees and did not select trees with the characteristics required for retained trees in the operator select area.

Further to this a hollow bearing tree had been logged and left in place in the operator select area which shows it was not selected, retained or protected and FCNSW did not report it as a non-compliance.

EPA meander 1 was in the FCNSW mark-up area while meander 2 was in the operator select area.

In response to EPA findings FCNSW sent results of 16 pre harvest 250m/ 1 hectare transects showing retention statistics. FCNSW also checked a 450m section of EPA meander 2 and found 47 candidate trees had been retained. FCNSW's sixteen H & R tree transects sent with submissions support EPA findings on meander 2. The average number of retained trees per hectare in the FCNSW transects was 10 trees which differs significantly from the 26 trees per hectare recorded by FCNSW post-harvest from meander 2. It is highly unlikely that FCNSW could record a maximum 13 retained trees per hectare pre-harvest and 26 per hectare after harvest unless many hollow bearing trees had not been marked up.

The likely root cause is that operators were not correctly trained in retained tree selection and were not monitored in areas FCNSW had not marked up.

Trees selected in the EPA audit conform to the TSL requirements. More details on how EPA assesses retained trees are in **Attachment 3**

- **Stream Protection**

While there were no non-compliances found in this Audit around stream protection it should be noted that third order stream in Wandera State Forest drain into the adjacent locally important Deua River and every care should be taken to protect the riparian zones in future operations.

ATTACHMENT 3: HOW THE EPA DETERMINED TSL COMPLIANCE WITH HOLLOW BEARING (H) & RECRUITMENT (R) TREE RETENTION, SELECTION & PROTECTION

Retention: The EPA assesses H & R retention and protection only in harvested areas (only post-harvest). It counts live standing tree that exhibits the characteristics of a H or R tree towards the retention rate threshold. These include live standing H & R trees marked by FCNSW staff as well as those not marked by FCNSW staff. EPA considers unmarked unselected live standing H & R trees as candidate H & R trees. Candidate H & R trees must be standing, live and have the characteristics of a H & R tree as defined in the TSL. If a retained tree does not have the TSL characteristics of a H & R tree such as damage or size, then it is not considered a candidate H & R tree and not counted towards retention. Candidate H & R trees are counted towards retention as they have actually been retained by the harvesting operation.

The EPA counts candidate H & R trees up to the TSL retention rate threshold **not beyond**. This inclusive method provides a more accurate and fairer picture of what the forest habitat resource actually looks like after a harvesting event (i.e. not just those that have paint on them).

Protection: Protection criteria controls the longevity prospects of retained H & R trees. If a tree is counted for retention, then it is assessed for protection. Again, assessing protection of candidate H & R trees is only done **up to the retention rate threshold point not beyond**.

Selection: The EPA assesses H & R tree selection in harvested and yet to be harvested areas (pre harvest and post-harvest). EPA considers marked H& R trees as well as stumps and live standing unmarked H & R trees against TSL selection criteria. EPA considers the presence or absence of **field marking (paint)** on trees as the measure for whether a tree is selected or not. If a tree is not marked in the field then it is not selected.

1. Candidate H & R trees - If a H & R tree is unmarked (candidate) and should have been selected then the EPA considers it as one non-compliance of TSL selection criteria for that tree.
2. Stumps - The EPA considers stumps when assessing selection namely the size of stumps relative to the size of retained marked H & R trees (adjusted to account for taper). Tree size is a scientifically accepted guide to habitat potential as well as a key element of the TSL condition ("belonging to the cohort of trees with the largest DBHOB" (size)). When resources are dispersed across the landscape it is a reliable measure and the EPA uses relative size to assess against TSL selection criteria.
3. Marked H & R trees - The EPA assesses marked live standing H & R trees against the H & R tree characteristics defined in the TSL.

Audit evidence

EPA uses audit evidence that satisfies "the balance of probabilities" to determine audit findings. This is important to note during the FCNSW submissions process. EPA encourages where possible FCNSW provide evidence based submissions such as FCNSW written records and field notes to support any written submission.