

Compensation for Property Improvements in the ACT: A Temporal Perspective

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ABSTRACT

The compulsory acquisition of rural land involves compensation for improvements such as buildings, fencing and pasture improvements. Should that also include timber removal completed perhaps a hundred years prior? How do you determine the number of trees that were removed and how do you calculate the value of tree removal? This paper looks at some aspects of such a case in the Australian Capital Territory from 2007. After the 2003 bushfires in the Australian Capital Territory (ACT), the ACT Government took the opportunity to start urban development in the Molonglo Valley. In addition to developing former forestry land, a number of rural properties were acquired and their leases terminated. Three of the affected rural lessees challenged the Government's combined valuation of \$4 million and lodged their own claim which was about \$28 million. Their claim was overwhelmingly based on the removal of trees from the three properties up to 100 years previous. A report addressing the lessees' tree removal claim was commissioned by the ACT Government in preparation for an arbitration hearing. The report looked at the historical state of trees on the three affected properties from pre-settlement to the current day. While the report covered many issues, this paper focuses on three aspects of the report. These include the effect of cold air drainage on the establishment of trees, the use of old portion plans to estimate historical tree densities and the use of mapping and aerial photography over the last 100 years. In summary, the ACT Government report known as the Ingwersen Report demonstrated the tree densities across the three properties were probably 17 to 30 trees per hectare and would probably not have exceeded 34 trees per hectare. This was well short of the 200 to 300 trees per hectare claimed by the lessees. An arbitration hearing, in November 2007, rejected the lessees' claim for extra compensation and ruled in favour of the ACT Government with costs.

KEYWORDS: *Cold air drainage, tree densities, compensation, portion plans, aerial photography.*

1 INTRODUCTION

Three property holders being Coonan, Tanner and Tully held leases over a number of rural blocks in the Molonglo Valley, in the Australian Capital Territory (ACT). The three leases over the properties expired in 2005 (Figure 1):

- Coonan: Block 181 (north), District of Belconnen and Block 181 (south), District of Weston Creek as shown in DP 5132 and DP 5133 respectively.
- Tanner: Block 428, District of Stromlo as shown in DP 8114.
- Tully: Blocks 1171 & 1187, District of Weston Creek as shown in DP 9458.

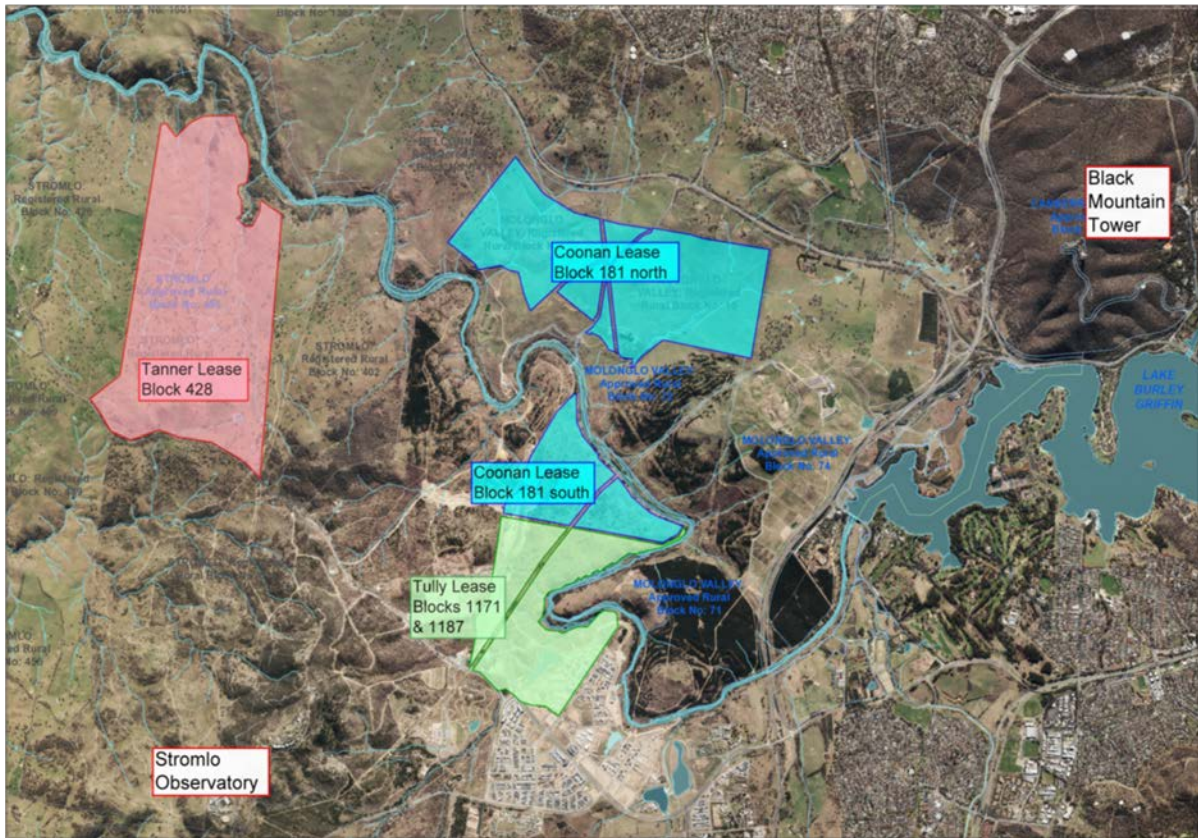


Figure 1: The location of the three properties with 2015 aerial imagery.

It should be noted that all ACT land is divided pursuant to the Districts Act 2002. All parcels are uniquely identified as follows:

- Rural parcels by Block Number and District Name.
- Urban parcels by Block Number, Section Number, Division Name and District Name.

Each of the leases included Clause 2(c) which stated the Commonwealth (or Territory Government) covenants with the lessee

“to pay to the lessee at the expiration of or sooner determination of said term the value at such expiration or determination, as the case maybe, of all fixtures and erections on, and of all improvements on or affected by the lessee or by a prior lessee under this lease or under a prior lease of the land comprised in the lease at such expiration or determination, except such fixtures, erections and improvements, if any, as are expressly excepted from the purchase by the lessee..., such value to be ascertained by agreement or in default of agreement by arbitration...”

The ACT Government had valuations prepared for all lands included in the three leases totalling \$4 million. The lessee’s combined valuation was \$28 million. The lessees claimed they were entitled to compensation for the historical timber removal improvement affected by previous lessees under Clause 2(c) of their respective leases. In order to support the claim, a vegetation report was prepared by Cumberland Ecology Pty Ltd to establish the state of the forestation of the properties in its virgin condition. The report became known as the Cumberland Report.

2 THE CUMBERLAND REPORT

The Cumberland Report (Cumberland Ecology, 2007) estimated there were trees between 20 to 30 metres high across the three properties, at the time of European settlement and at a likely density between 200 to 300 trees per hectare. Together with an independent cost analysis, the resultant timber removal value of about \$24 million was determined. The Cumberland Report determined Open Forest, Grassy Woodlands and Dry Scelrophill Forest covered almost all subject properties. Grassy Woodlands was the dominant vegetation classification and the density was in excess of 200 trees per hectare (Table 1).

Table 1: Summary of the results for the three subject properties from the Cumberland Report and an estimate of the total number of trees removed assuming the remnant trees represent 10% of the original number.

Property	Area (ha)	Pre-European Vegetation Communities	%	Area (ha)	Tree Height	Tree Density (Stems/ha)	No. of Trees (Min)	No. of Trees (Max)
Coonan	437.6	Open Forest	5	21.88	> 30 m	250 - 300	5,470	6,564
		Grassy Woodlands	95	415.72	> 25 m	200 - 250	83,144	103,930
		Dry Sclerophyll Forest						
Tanner	451	Open Forest	5	22.55	> 30 m	200 - 250	4,510	5,637
		Grassy Woodlands	65	293.15	> 25 m	200 - 250	58,630	73,287
		Dry Sclerophyll Forest	30	135.30	> 20 m	250 - 300	33,825	33,825
Tully	192.3	Open Forest	5	9.62	> 30 m	200 - 250	1,924	2,405
		Grassy Woodlands	95	182.69	> 25 m	200 - 250	36,538	45,672
		Dry Sclerophyll Forest						
					90%	Clearance	198,036	244,188

3 THE INGWERSEN REPORT

In response to the lessees' claim, the ACT Government engaged Dr F. Ingwersen to prepare a report on the historical tree cover and densities across the three properties (Ingwersen, 2007). The two main aims of the Ingwersen Report were to:

1. Determine the likely vegetation classification which would have existed prior to European settlement.
2. Estimate the tree density which would have existed pre-settlement, at the time the Commonwealth Territory was established (1912) and at different years relevant to the commencement of leases over the subject properties.

The Ingwersen Report determined the most appropriate vegetation classification for the subject properties was either Woodland or Grassland. Furthermore, it claimed the subject properties had a likely tree density of about 30 trees per hectare. The Ingwersen Report claimed there were a number of reasons for the huge difference in tree densities estimated for the pre-settlement or early-settlement era. One of the main reasons being the incorrect misinterpretation of the relevant vegetation category derived from the Australian Survey and Land Information Group (AUSLIG) Atlas of Australian Resources Vegetation Map (AUSLIG, 1974).

The difference in tree densities estimated also resulted from a number of other arguments presented in the report. This paper will examine three of the main arguments presented by Ingwersen. These are:

1. The effects of cold air drainage to restrict tree growth across most of the subject properties. Within these areas Grassland was the dominant vegetation type.
2. The use of relevant New South Wales (NSW) portion plans from the period of early European settlement in the 19th century, which provide indicative notations about vegetation types and the estimation of the maximum tree density based on distance from reference trees to portion corners.
3. The use of 20th century mapping and aerial photography to identify a distinct tree line consistent with the exclusion, from pre-settlement times, of trees in the lowest parts of the subject properties and to confirm the state of the tree cover at crucial years relevant to the leases from the 1920s to 2004.

3.1 Effects of Cold Air Drainage

Ingwersen describes Cold Air Drainage (CAD) as a night-time, winter phenomenon in the highlands of south-east Australia which results in the pooling of very cold air on valley floors and hollows. The resultant frosts on low ground are enough to suppress tree establishment and significantly influence vegetation patterns.

Ingwersen cites reliable scientific studies that have noted the phenomenon in the highlands and, in particular, the ACT:

1. Taylor (1910) states “the timberline is a fairly well marked feature and roughly corresponds to the 2000 foot or 610 m contours in the neighbourhood of the capital site. Below this line the country is open and indeed almost treeless – partly natural and partly artificial”.
2. Pryor (1939) made reference to the effects of severe cold on the Canberra plains as the main factor in excluding natural timber cover.
3. The Bureau of Meteorology (1968) noted an annual mean of 77 days of frost temperatures in Canberra. The number of days is variable dependent on local topography.
4. Moore and Williams (1976) noted “treeless plains occur at as low as 400 to 600 metres at Canberra” and “grasslands occupy the floors of shallow saucer-shaped valleys, the lower slopes of which are covered by sub-alpine woodlands”.

Ingwersen generally adopts, as the upper limit of CAD effects, the lower margin of the mature standing surviving tree line. This local tree line is observable on modern maps and aerial photos and corresponds approximately with the 560 m contour line. Consistent with Moore and Williams (1976), there are very few trees below the 560 m limit (Figure 2).

Ingwersen pointed out the CAD limit may vary across some of the subject properties south of the Molonglo River where the north-eastern aspect of the land may lower the 560 m limit to 550 m or even 540 m. Some stands of trees below the 560 m limit on Block 428 in the District of Stromlo are Snow Gums which are suited to the lower winter temperatures.

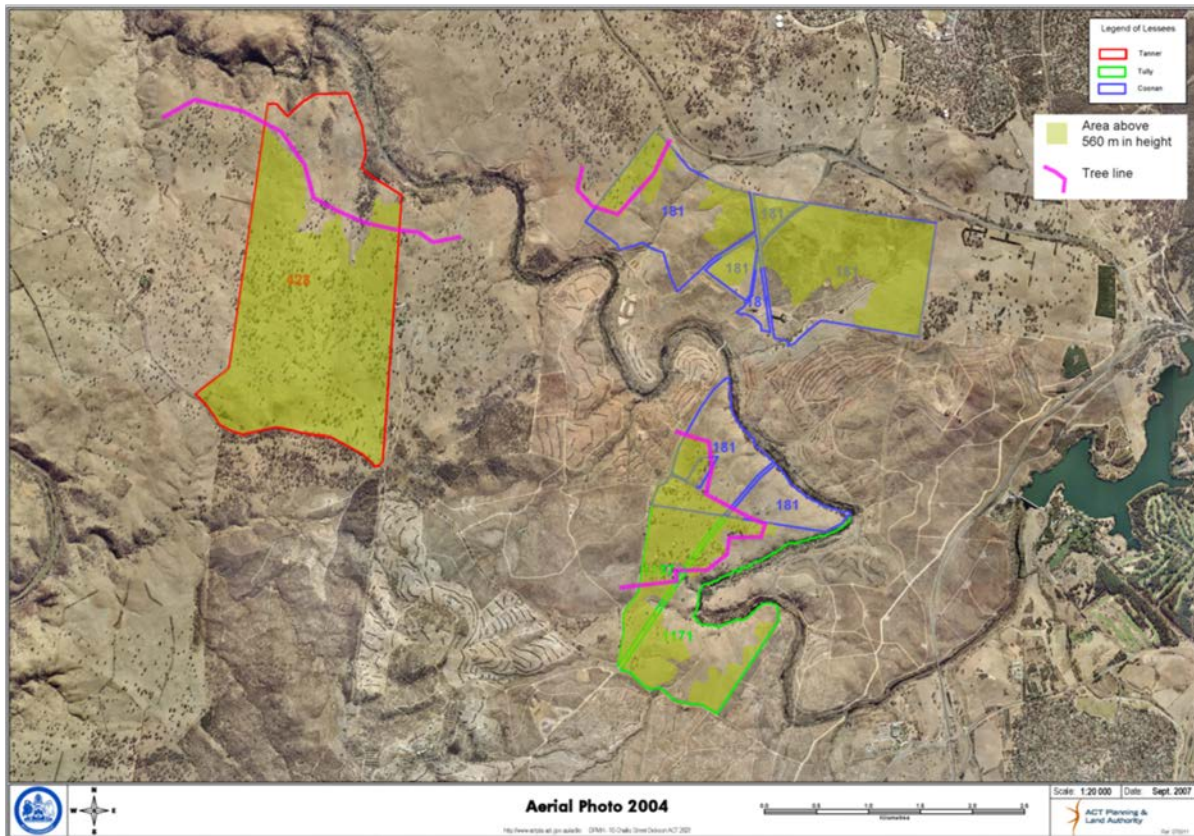


Figure 2: The 2004 aerial imagery showing the areas above 560 m in elevation and related tree line (courtesy of ACT Government Survey Office).

3.2 The 1830s to the 1910s and the Use of NSW Portion Plans

The NSW portion plans provided effective supporting evidence for Ingwersen's tree density estimation. When the Commonwealth Territory was created, the NSW portions were maintained as the basis for the Territory's rural cadastre. As time went on, Territory deposited plans gradually replaced the portion plans and leasehold title replaced freehold title. Freehold title was not completely extinguished in the Territory until the 1970s.

All the original NSW portion plans, within the Territory, were reproduced on behalf of the Commonwealth and certified as shown in Figure 3. The original as well as certified copies are currently held by the ACT Office of the Surveyor-General.

3.2.1 The Use of Portion Plan Annotations

The annotations on the portion plans gave some insight as to the vegetation cover from the original surveyor involved. Not all plans included such annotations but those that did generally described the vegetation as open forest and sometimes well grassed (Figures 3 & 4). Some notations indicated a value for the clearing and therefore indicating some clearing occurred post European settlement, but prior to survey in the 1870s and 1880s (see Figure 3).

It should be noted that Portions 10, 94 and 97 in the Parish of Weetangera were surveyed in the 1830s and do not include any such notations (Table 2).

Table 2: The portion plan annotations for the original NSW portions in the Parishes of Yarrolumla and Weetangera (Ingwersen, 2007).

Portion No.	Current Block	Survey Year	Relevant Improvements	Annotations	Remarks
Parish of Yarrolumla					
104	1171,1187	1880		Open Forest	
105	1171,1187	1880		Open Forest	
107	1171,1187	1880	Clearing \$30	Good Open Forest	See Fig. 5 above
106	West 1187	1880		Open Forest	
11	1171	1855		Dry brow	Dry topographic situation
34	1171	1874	Clearing, hut and yard \$45	Nil	
23	1171	1871		Well grassed open forest	See Fig. 4 above
28	1171	1871		Well grassed open forest Granite formation	See Fig. 4 above
7	428 181 South	1837		Description 18/4/1837	
Parish of Weetangera					
10,94,97	181 North	1835		Nil	

3.2.2 Estimating the Maximum Tree Density using Portion Plans

Ingwersen, to support his estimate of 17 to 30 trees per hectare based on Cold Air Drainage limitations and a vegetation type of Woodland, used an accepted formula to estimate the maximum tree density for woodland areas. The formula was first used to calculate tree densities in North America and later use by Lunt (1997) to estimate tree densities in the Gippsland of Victoria in the 1970s:

$$TD = 10000/4d^2 \text{ trees per hectare} \quad (1)$$

where TD is the tree density and d is the average reference distance from the reference tree in metres.

Ingwersen quotes Lunt (1997) to state “these are magnitude estimates rather than precise figures”. Given a number of portion corners did not show a tree as a reference mark, this is consistent with Lunt’s methodology. Lunt’s estimates may vary between 2 and 59 trees per hectare across a range of environmental conditions.

From Table 3, the maximum tree density computed using the relevant portion plans is 36 trees per hectare. This differs slightly from the figure of 34 trees per hectare given by Ingwersen in the table at Appendix 2 of his report. Ingwersen, in his calculations, did not include one tree and a reference bearing was used in place of a reference distance, thereby distorting the result slightly. Nonetheless, the result shown here strongly supports Ingwersen’s estimate of 17 to 30 trees per hectare.

Table 3: Tree density calculation from portion plans in the vicinity of the lessees blocks as revised (Appendix 2 from Ingwersen, 2007).

Parish of Yarrolumla								
Portion (Por)	Corner	Defined at corner	Reference Distance	Tree Type	Included	Why Excluded (same as)	Reference Distance Metres	Distance Used Metres
7	A	At corner	0	Oak Sapling			0.0	
	B		30	Gum	Yes		6.0	6.0
	C	At corner	0	Stringy bark	Yes		0.0	
	D	At corner	0	Large oak			0.0	
11	A	At corner		Peg			0.0	
	B	At corner	0	Gum	Yes		0.0	0.0
	C		26	Gum	Yes		5.2	5.2
	D			Large Oak			0.0	
23 & 28	M		48	Gum	Yes		9.7	9.7
	N			No tree	Yes			
	O	At corner		Apple	Yes		0.0	0.0
	P		41	Gum	Yes		8.2	8.2
	Q		16	Gum	Yes		3.2	3.2
	R		41	Gum	Yes		8.2	8.2
	S		31	Gum	Yes		6.2	6.2
	T		65	Apple	Yes		13.1	13.1
34	A		31	Gum	No	Por 28 S	6.2	6.2
	B		16	Gum	Yes		3.2	3.2
	C		30	Gum	Yes		6.0	6.0
	D		31	Apple	Yes		6.2	6.2
104 & 105	A		65	Apple		Por 23 T	13.1	
	B		41	Gum		Por 23 P	8.2	
	C		31	Apple		Por 34 D	6.2	
	D		56	Apple	Yes		11.3	11.3
	E		35.5	Stringy bark	Yes		7.1	7.1
	F		52	Dead	Yes		10.5	10.5
	G		131.5	Gum	Yes		26.5	26.5
	H		57	Gum	Yes		11.5	11.5
	J		48.5	Stringy bark	Yes		9.8	9.8
106	A		57	Apple	Yes		11.5	11.5
	B		10	Stringy bark	Yes		2.0	2.0
	C		84.5	Gum	Yes		17.0	17.0
	D		55.5	Dead	Yes		11.2	11.2
	E		15.5	Gum	Yes		3.1	3.1
	F		33.5	Gum	Yes		6.7	6.7
107	A		52	Dead	No	Por 104 F	10.5	
	B		47	Oak Sapling	No		9.5	
	C		55.5	Dead	No	Por 106 D	11.2	
	D		84.5	Gum	No	Por 106 C	17.0	
	E		10	Stringy bark	No	Por 106 B	2.0	
	F		75	Gum	Yes		15.1	15.1
	G		57	Gum	No	Por 105 H	11.5	
	H		131.5	Gum	No	Por 105 G	26.5	
Parish of Weetangera								
97				No marked trees				
10				No marked trees				
94				No marked trees				
					Average Distance			8.3
					Estimated Maximum Tree Density			36.062404

Lunt (1997) notes three qualifications to this methodology:

1. It assumes there was no large-scale clearing of trees between the time of settlement and the survey for the relevant portion. Lunt notes there is a 20-year gap between settlement in the 1840s and the survey in his area of interest being the Gippsland. However, the Molonglo Valley was settled some 40 to 50 years prior to the relevant portion surveys.

2. It assumes trees are randomly dispersed rather than clumped. Some clumping may occur due to competition between tree species and local climate variations.
3. It assumes surveyors always go for the closest suitable tree. Some evidence indicates surveyors favoured certain sized and species of tree.

In addition, survey reference trees need to be of a size adequate to cut a shield into it. This may distort the calculations somewhat.

3.2.3 Tree Cover from the 1910s to 2005 and Usage of Early Mapping & Aerial Imagery

In order to determine the extent of tree cover from the time of the Commonwealth Territory's establishment to when relevant leases commenced and later expired, Ingwersen relied upon mapping and aerial photography of the Molonglo Valley supplied by the ACT Government Survey Office.

In 1914, at the establishment of the Commonwealth Territory, the Federal Capital Feature Map of holdings was produced. The map included many annotations about the state of the vegetation and showed the observed tree line (Figure 5).

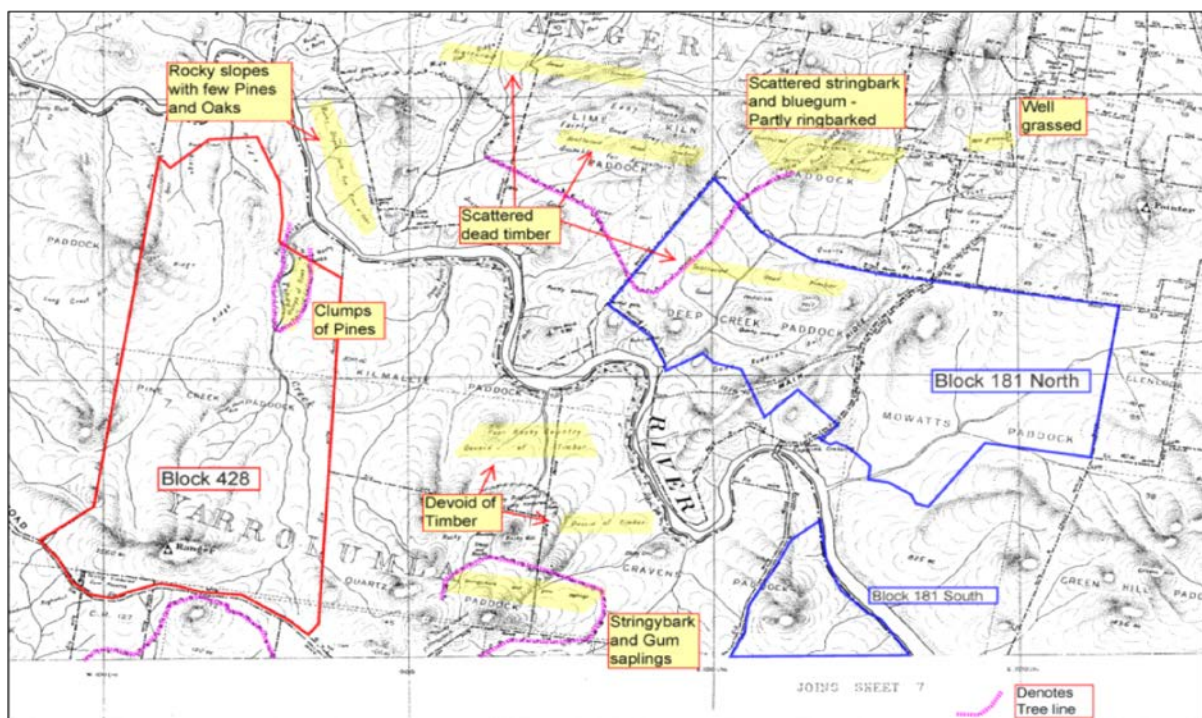


Figure 5: Part of the Federal Capital Feature Map, Sheet 3 (1914) (ACT Government Survey Office). The vegetation annotations have been reproduced and enlarged in text boxes for clarity.

Ingwersen relied on the Feature Map annotations to contend that the subject blocks had undergone extensive clearing prior to 1914. The annotations described the vegetation as scattered, dead, ringbarked or in small clumps. Interestingly, the tree line across Block 181 North is in much the same position as shown in the 1959 and 2004 aerial photography. The Feature Map, Sheet 7 to the south did not contain the same level of annotations.

Most original leases commenced in the 1920s and 1930s, which is less than 20 years after establishment of the Commonwealth Territory. Ingwersen argued that further clearing prior to the commencement of the first leases was unlikely in part due to the efforts of the Federal Capital Commission and the Timber Protection Ordinance (Commonwealth of Australia Gazette, 1919).

Table 4 shows the lease commencement dates, which were important with respect to Clause 2(c) of each lease, referred to previously. The most recent leases commenced in 1956 and expired at the end of 2005.

Table 4: Lease commencement dates for all three properties.

Lease	Leased Commenced	Lease term (Years)	Block/s	District	Deposited Plan Number	Notes
Coonan	1 Dec 1938	0.25	47	Belconnen		Lease
	1 Jul 1933	25	39	Belconnen	136	Lease
			43	Stromlo		
	1 Jan 1956	50	39 & 47	Belconnen	673	Lease
Tanner			43	Stromlo		
	1 Feb 1926	11	10	Stromlo	10	Lease
	1 Jul 1933	25	10	Stromlo		Lease
	1 Jan 1956	50	10	Stromlo		Lease
Tully	15 Jul 1992	N/A	428	Stromlo	8114	Balance Crown Lease
	1 Mar 1927	5	15	Woden		Lease
	1 Jul 1933	5				Lease
	6 Sep 1938	5				Lease
	1 Jan 1956	50	15	Woden	712	Lease
			65	Belconnen		
	15 Nov 1999	N/A	1171	Weston	9456	Balance Crown Lease
			1187	Creek		

Aerial imagery was made over the subject blocks in 1952, 1953, 1955, 1959 and 2004, which covers the period of the most recent leases. The 1952, 1953 and 1955 aerial imagery, though only partially covering the subject blocks, shows the same tree cover as the 1959 imagery. Furthermore, the 1959 and 2004 aerial imagery was consistent in showing virtually no loss of tree cover over nearly 50 years. In fact, Block 428 appears to show some regrowth. All the aerial imagery shows a similar tree line, which approximates the limit of CAD effects determined by Ingwersen (Figures 6 & 7).

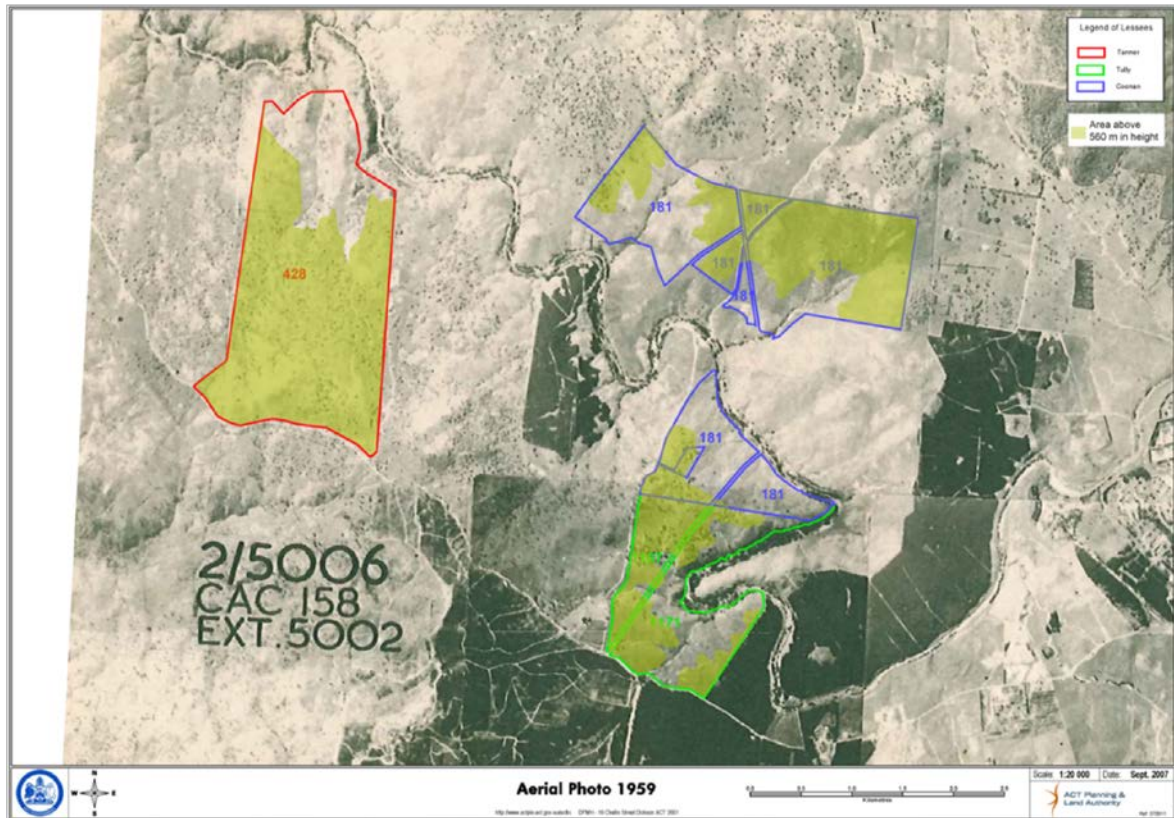


Figure 6: The 1959 aerial image with the subject blocks (ACT Planning and Land Authority, 2007).

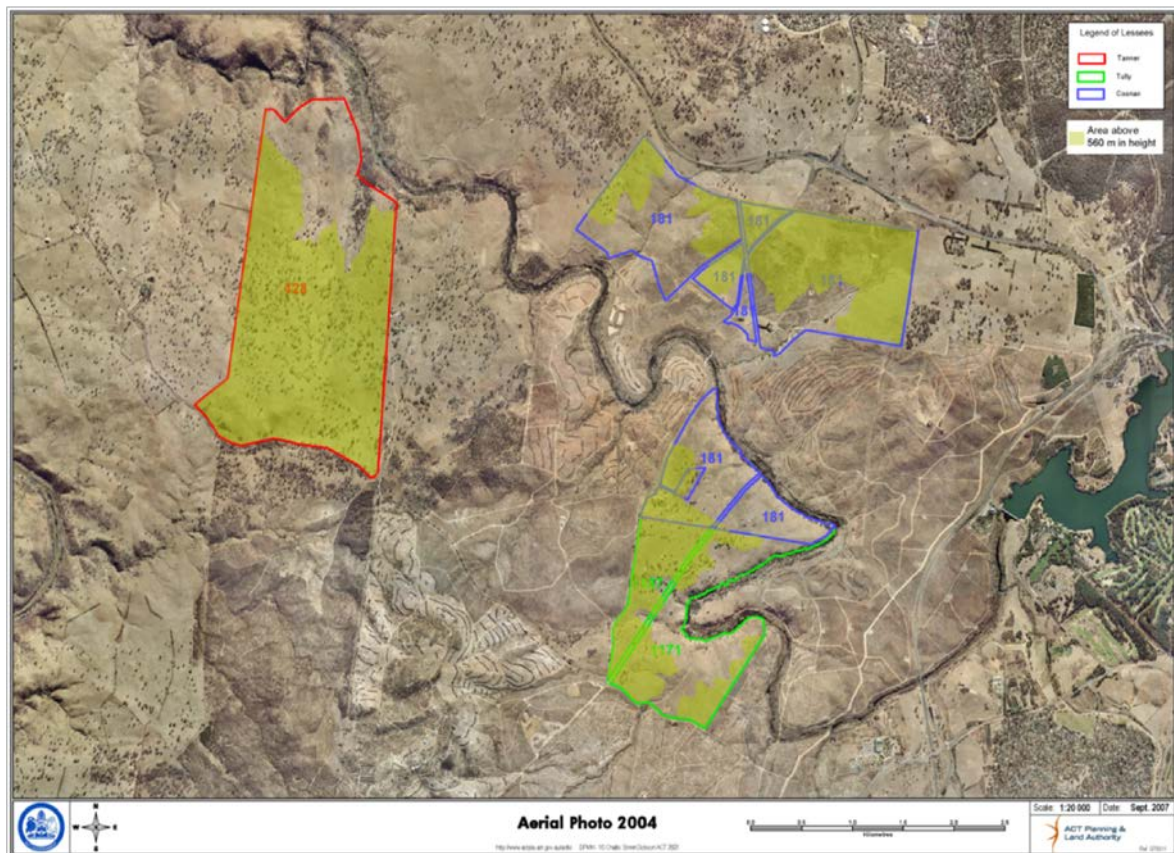


Figure 7: The 2004 aerial image with the subject blocks (ACT Planning and Land Authority, 2007).

4 CONCLUDING REMARKS

The Cumberland Report argued for tree densities of 200 to 300 trees per hectare. While claiming to be based on historical evidence and the adopted appropriate tree classifications, the figures did not appear to take account of the best scientific or historical evidence available.

In his response, Ingwersen (2007) addressed the temporal nature of the tree cover question by drawing on scientific evidence, scientific accounts written as early as 1910, NSW portion plans, mapping terrestrial imagery and aerial imagery.

Ingwersen's report demonstrated:

1. Cold Air Drainage had a long-term effect in suppressing the establishment of trees below the 540 to 560 m elevation limit. Only a small number of cold-tolerant trees had established themselves below these limits.
2. The original vegetation cover in areas above the 560 m elevation limit would, consequently, be best described as Woodland or Open Forest with a tree density of 17 to 30 trees per hectare based on the appropriate vegetation classification from the Atlas of Australian Resources, Vegetation Map (AUSLIG, 1974).
3. The early European settlement period was characterised by tree clearing as evidenced by portion plan notations from the 1880s, contemporary accounts and painting, and the Federal Capital Feature Plan of 1914.
4. Maximum tree densities on the subject properties were about 34 to 36 trees per hectare based on the method which used the reference distances shown on portion plans. The maximum density is consistent with the 17 to 30 trees per hectare estimate made.
5. Further clearing was unlikely through the period of early leases from the 1920s to the 1950s, due to a strong mitigating influence by the Federal Capital Commission and the Timber Protection Ordinance of 1919 to 1940.
6. The 1950s aerial imagery was consistent with the Federal Capital Feature Plan of 1914.
7. Little or no tree clearing occurred during the period of the most recent leases from 1956 to 2005 as evidenced by the aerial imagery produced in 1952, 1953, 1955, 1959 and 2004.

Ingwersen effectively argued the tree densities, on the leased properties, were only about 15% of what had been claimed by in the Cumberland Report and little tree clearing had been effected pursuant to Clause 2(c) of the leases, by either a lessee or a previous lessee from the 1920s to 2005. As a result, the arbitration decision was in favour of the ACT Government.

ACKNOWLEDGEMENTS

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