

Nippon Paper Industries and the Wood Pulp Agreement



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Executive Summary

This report reviews the origin and history of successive legislative agreements under which pulp logs are supplied to Nippon Paper Industries Co. Ltd's Maryvale pulp and paper processing mills in Gippsland. It provides an analysis and review of the forests impacted by the current Legislative Supply Agreement (LSA), otherwise referred to as the Forests (Wood Pulp Agreement) Act 1996. This report focuses on the Mountain Forests covering large areas of Gippsland and its state forests. A spatial analysis of disturbance in the Mountain Forests has been carried out and the report also reviews academic and government literature concerning the forests' capacity to supply wood to Maryvale.

The report covers the following points:

- The Maryvale Mills were originally established in 1938 on the premise that they had a 50-year legislated supply of pulp logs from Victorian state forests, where most of the supply comes from the 'Mountain Forests', consisting of Mountain Ash and Alpine Ash;
- The present LSA was passed in 1996 on the premise that the Maryvale Mills, then owned by AMCOR Ltd, reduce their dependence on sourcing pulplogs from native forests and substitute these with pulplogs from plantations;
- In 2008, then owner PaperlinX Ltd announced its intention to exit native forests completely by 2017, having completed an upgrade of the Maryvale facilities and secured an additional supply of native forest pulp logs under a Timber Sales Agreement with VicForests;
- In 2009, Nippon Paper Industries Co. Ltd acquired PaperlinX Ltd together with the LSA. It has made no move to reduce dependence on native forest wood. However, declining supply from within the LSA area is being compensated by additional supplies from elsewhere in Victoria at an unknown cost to the taxpayer;
- No other company in the logging industry has been afforded the privilege of a legislative supply agreement, which will have endured for 94 years, if it survives as legislated, until 2030;
- More than half of the forest allocated to logging within the LSA area has been burnt since the passing of the LSA in 1996;
- The Mountain Ash Ecosystem within the LSA is now red listed by the IUCN as Critically Endangered, with logging as the primary driver compounded by bushfire (Burns, et al., 2014);

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- The LSA provides for the company and the government to share information and plan jointly for the supply of pulp logs. The Act has flexibility for the government to respond to major disturbance events, such as fire.

The report concludes that this is crunch time – the Mountain Forest ecosystem faces collapse and the LSA is unsustainable. It proposes urgent consideration of the following:

1. that all reviews carried out under Clause 12 of the Forests (Wood Pulp Agreement) Act 1996 be published;
2. that the annual Plan of Utilization agreed between Paper Australia Pty Ltd and the government be published for each year from 2013 when VicForests announced reductions in Ash sawlog supply;
3. that the proposed Plan of Utilization for 2018, due to be prepared by 30 April, be published; and
4. that the Victorian Government invoke the provisions of Clause 32 of the Act and potentially suspend the legislated supply of pulp logs, given that more than half of the state forest allocated to logging under the LSA has been impacted by recent fires.

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1. Introduction

The native forest logging industry in Victoria has experienced a dramatic decline in resource availability over recent years (DEPI, 2013). This came to a crunch in 2017 when the previous owners of Australia's largest native forest sawmill, Australian Sustainable Hardwoods (ASH) in Heyfield, claimed that their business would not be commercially viable if sawlog supply was reduced to 80,000 m³ per annum, as planned by VicForests. In an unprecedented move, the Victorian Government purchased the ASH sawmill and presently owns the business (Willingham, 2017). While much media attention was focused on the ASH sawmill, very little was given to the largest consumer of native forest hardwood logs in Victoria, the Maryvale Mills, owned by Nippon Paper Industries and operated by its subsidiary, Paper Australia Pty Ltd.

The Maryvale Mills, near Morwell, consume on average around 500,000 m³ per annum of pulp logs from native forests across Victoria. The State of Victoria is legally bound to supply at least 350,000 m³ under a long term Legislated Supply Agreement (LSA), the *Forest (Wood Pulp Agreement) Act 1996*. The company also has a Timber Sales Agreement with the Victorian Government's logging business, VicForests (VicForests, 2008). The intention of the original long term LSA, legislated in 1936, was to provide investment certainty for the initial developers of the Maryvale Mills, Australian Paper Manufacturers Ltd, to construct a major domestic pulp and paper processing facility at the Maryvale site in the Gippsland region of Victoria (Sinclair, 1991). No other business purchasing logs from the Victorian Government and/or VicForests has been granted the privilege of such a guaranteed long-term supply.

Under normal circumstances, the obligated volumes under the LSA can only be altered with the consent of the company. This has restricted flexibility with regards to allocating pulp logs to any other potential market (URS, 2010) and prevented forest management adequately adapting to changing conditions across the forest ecosystem (e.g. (Lindenmayer & Franklin, 2002)). The Victorian Government can alter or terminate the LSA if damage beyond its control makes it impractical to supply the legislated pulp log volumes (State of Victoria, 1996). The LSA requires the state to carry out a review of pulp wood in the area covered by the Agreement at least once every five years and to advise the company of the results of the review. Major fires have burnt across the LSA since the passing of the *Forests (Wood Pulp Agreement) Act 1996*, impacting large areas of state forest providing pulp logs to the Maryvale Mills. It is not clear whether the five-year reviews have taken place on time or at all and whether the recent fires have been taken into account in forecasting the supply of pulp logs under the LSA.

The Maryvale Mills have been under continuing pressure to cease consuming pulp logs from native forests and source fibre solely from plantations and

recycling. Previous owners of the Maryvale Mills committed to downsizing their intake from native forests and, in 2005, proposed to obtain all of their pulp log supply from plantations by 2017 (PaperlinX Ltd, 2006). However, these commitments were never implemented. The Maryvale Mills continue to source part of their supply from Victoria's native forests, despite the increased capacity of the state's plantation estate (ABARES, 2017) and the perilous state of the native forests from which the pulp logs are drawn.

Paper Australia Pty Ltd is considering major changes in its Maryvale operations. In 2017, it began a \$7.5 million feasibility study for a Waste to Energy project using waste from Melbourne. The Commonwealth and Victorian governments have each contributed \$2.5 million to the study (Nash, et al., 2017). The company has floated the possibility of diverting lignin, a by-product of pulp-making currently burnt for energy, into a feedstock for manufacturing 'bio products' such as bioplastics. Paper Australia Pty Ltd states that "a long term non-contentious supply of economic wood is essential" for its plans (Paper Australia Pty Ltd, 2018).

The purpose of this report is to describe the current operation of the Maryvale Mills and to review the LSA that has bound the Victorian Government to supply pulp logs to them. It spatially analyses the condition of the forests within the LSA and reviews their capacity to supply pulp logs. The report provides suggestions for pathways forward, including the enacting the specific clauses of the *Forests (Wood Pulp Agreement) Act 1996* that allow for legislated pulp log volumes to be amended or even suspended in response to major disturbance events.

2. The Nippon Paper Group and Paper Australia Pty Ltd

Paper Australia Pty Ltd (trading as Australian Paper) is a subsidiary of Nippon Paper Industries based in Japan. It is the product of a long line of mergers and acquisitions, dating back to 1868, when Ramsden's Melbourne Mill was built on the banks of the Yarra River opposite the site now occupied by Flinders Street Station (Sinclair, 1991). The business merged with other mills in Victoria at Broadford and Geelong, as well as mills in New South Wales. In 1920, it became the Australasian Paper and Pulp Co. and then Australian Paper Manufacturers Ltd in 1926. In 1937, following passage of the first legislated wood supply agreement by the Victorian government, it began constructing the first of a series of pulp mills at Maryvale (Sinclair, 1991).

Australian Paper Manufacturers Ltd diversified its operations to cover not only pulp and paper production, but also sawmilling, manufacturing of particle board, packaging and even minerals extraction and transport (Sinclair, 1991). It formed partnerships with several major companies, including Colonial Sugar Refining Co Ltd (CSR) under the subsidiary Pyneboard Pty Ltd. With the acquisition of Containers Ltd between 1980 and 1983, Australian Paper

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Manufacturers Ltd greatly expanded its capacity to become one of Australia's largest packaging companies with factories in all the mainland states (Sinclair, 1991).

Over much of this time, Australian Paper Manufacturers Ltd undertook logging and forest management and, in 1951, formed APM Forests Pty Ltd. This subsidiary acquired a total of 34,065 hectares of freehold land to plant pines, of which 18,772 hectares were converted from eucalypt forest (Sinclair, 1991). It began establishing pine and eucalypt ash plantations in the Strzelecki Ranges, south of Maryvale, in 1960 (Noble, 1986). The Victorian Government also leased a part of the Strzelecki Ranges to APM Forests Ltd under a special Act of Parliament to support further establishment of plantations (Carron, 1985).

In the mid-1980s, Australian Paper Manufacturers Ltd sought to identify itself under a 'common' name to reflect the diversity of its investments and interests. The name 'AMCOR Ltd' was selected in 1986 with the approval of the company's shareholders. The acronym APM was maintained for AMCOR Ltd's pulp and paper division and related corrugated fibre box making operations (Sinclair, 1991). AMCOR Ltd created a wholly owned subsidiary, PaperlinX Ltd, to manufacture and distribute its fine papers and virgin-fibre based packaging papers across Australian and New Zealand markets. The manufacturing arm of PaperlinX Ltd was Paper Australia Pty Ltd, which was known in the market as *Australian Paper*. Paper Australia Pty Ltd manufactured pulp, communication papers and packaging papers from 11 paper machines, one coating machine, six pulp mills and two recycling plants across four locations in Australia (AMCOR Ltd, 2000). Paper Australia Pty Ltd's pulp mills and paper machines were integrated, with all of PaperlinX's pulp production used by its subsidiary's paper machines. The Maryvale Mills were the largest.

In 1993, the Australian Competition and Consumer Commission (ACCC) permitted AMCOR Ltd to acquire Associated Pulp and Paper Mills (APPM) from North Broken Hill Peko Ltd, including paper mills at Burnie and Wesley Vale in Tasmania and at Shoalhaven in NSW (Fels, 1996). PaperlinX Ltd became the sole Australian producer of fine communication papers (AMCOR Ltd, 2000). Through its REFLEX™ brand, PaperlinX also became the largest supplier of office papers in Australia and New Zealand, with market shares of approximately 60% and 45%, respectively (AMCOR Ltd, 2000).

In the late 1980s and 1990s, AMCOR Ltd expanded its packaging operations across Australia and internationally, following considerable growth in the sector. Packaging became the largest contributor to its sales which, in 1999, accounted for 76% of AMCOR Ltd's group earnings before interest, abnormal items and income tax (EBIT) (AMCOR Ltd, 2000). AMCOR Ltd's packaging businesses included specialty printed cartons, high value-added flexible plastic packaging, polyethylene terephthalate (PET) containers for the food and beverage industry, specialty plastic packaging, corrugated and other packaging products. AMCOR Ltd had established itself as Australia's leading

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paper and packaging company. It became one of the country's top 35 companies, as ranked by market capitalisation (AMCOR Ltd, 2000).

In February 2000, the AMCOR Ltd Board of Directors announced a proposal to demerge its Paper Operations under a separate company, PaperlinX Ltd, and AMCOR Ltd would focus on its Packaging Operations:

The Demerger Proposal recognises the gradual divergence which has taken place over time of the respective objectives and strategies of Amcor and PaperlinX. While the production ties between the businesses once formed an integral part of Amcor, the development of highly successful businesses in offshore packaging and domestic fine paper manufacturing has lessened the strategic value of retaining the businesses under common ownership (AMCOR Ltd, 2000, p. 12).

It is the Board's considered opinion that the Demerger Proposal will provide the focus and structure to enable both the Packaging Operations and the Paper Operations to pursue independently the opportunities and strategic direction that will best equip them to thrive in a dynamic competitive environment. Furthermore, the Demerger Proposal is viewed as the most advantageous of a number of considered alternatives to achieve both these strategic objectives and the key corporate objective of maximising shareholder value (AMCOR Ltd, 2000, p. 12).

In the demerger, PaperlinX Ltd was listed as a separate company on the ASX. Paper production and direct sales were conducted through its subsidiary, Paper Australia Pty Ltd, trading as 'Australian Paper'. Ownership of the Maryvale Mills was transferred to PaperlinX Ltd (AMCOR Ltd, 2000).

PaperlinX Ltd also continued to manage the APM Forests Ltd estate under the name Australian Paper Plantations (APP); the total area comprising 52,200 planted hectares of pine and eucalypt (AMCOR Ltd, 2000). However, in the following year, PaperlinX Ltd sold Australian Paper Plantations for \$152 million to Hancock Victorian Plantations. The company saw no need to retain the plantations because it had already secured fibre supplies for the Maryvale Mills through long term supply agreements for plantation hardwood and softwood, as well as from a longer term legislative supply agreement for pulp logs sourced from state forests. The divestment saw PaperlinX Ltd focusing solely on paper manufacturing and merchanting (PaperlinX Ltd, 2001).

In 2005, PaperlinX Ltd approved the installation of a new elemental chlorine free (ECF) bleaching plant and upgrade of its existing kraft pulp mill at the Maryvale Mills with the aim of becoming self-sufficient in pulp at a substantially lower cost (Australian Paper, 2005). The installation and upgrade were completed in 2008. However, PaperlinX Ltd (2009) encountered adverse conditions in the paper market around this time, which had a substantial negative impact on the company's operating earnings:

The 2009 year saw an unprecedented fall in demand for paper in all key markets as a result of the global economic slowdown. Paper volumes fell sharply from October 2008 off an already depressed base, and remained weak through the balance of financial year 2009 (PaperlinX Ltd, 2009, p. 2).

To address increasing debts, PaperlinX Ltd (2009) sold its subsidiary, Paper Australia Pty Ltd, along with its assets in the Maryvale and Shoalhaven Mills, to Nippon Paper Industries Co. Ltd for \$600 million, plus net asset adjustments and a potential earn-out over three years. This was the first time that sole ownership of the Maryvale Mills moved offshore. The acquisition expanded Nippon Paper Industries Co. Ltd's presence in the Australian market (Nippon Paper Group Inc, 2009).

Nippon Paper Industries Co. Ltd describes itself as a comprehensive biomass company that covers businesses manufacturing paper cartons, healthcare products and a variety of new materials, including cellulose nanofiber (Nippon Paper Industries Co Ltd, 2017). It comprises an extensive network of 175 Group companies in Japan and in 15 other countries (Nippon Paper Industries Co Ltd, 2014). It was ranked 10th in the top 100 global forest, paper and packaging companies in 2015, with sales of US \$8.3 billion (Price Waterhouse Coopers, 2016).

In 2016, Nippon Paper Industries Co. Ltd (2017) consumed nearly 4.5 million bone dry tonnes (BDt) of woodchips, its main raw material for paper manufacturing. It produced 4.12 million tonnes of paper and 1.67 million tonnes of paperboard. In 2013, Nippon Paper Industries Co. Ltd imported 2.6 million BDt of wood chips and other wood products, comprising 63% of its total procurement of wood (Nippon Paper Industries Co. Ltd, 2013). The company has positioned Australia, South Africa and Chile as procurement bases, which were established under long-term purchasing contracts with major local suppliers. The company also engaged in afforestation projects across Victoria, including the Green Triangle, Portland Treefarm and Victoria Treefarm Projects (Nippon Paper Group Inc, 2005). Victorian plantation management enterprise and woodchip exporter, Midway Limited, has a long established standing commercial relationship with Nippon Paper Industries Co. Ltd, being its first customer in 1986 (Midway Limited, 2016).

3. The Maryvale Mills

The Maryvale Mills (Figure 1) are the largest pulp and paper manufacturing facilities in Australia. In total, the facilities consist of three pulp mills, five papermaking machines, an ECF Lite bleach plant, a pulp lapping machine, a finishing facility, a waste paper processing plant, waste water treatment ponds and chemical recycling facilities. The primary paper outputs at Maryvale are office and packaging papers (Australian Paper, 2010). The first mill was operational in 1938, with major expansions occurring in subsequent decades (AMCOR Ltd, 2000).

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The primary wood fibre inputs for the Maryvale Mills are pulp logs from native forests, hardwood and softwood plantations, offcuts from sawmills processing sawlogs from native forests and waste paper sourced from industrial recyclers and kerbside collections (Figure 2) (Australian Paper, 2005). The native forest component is divided into two categories: Mountain Forests and Mixed Species Forest (Poyry, 2011), all sourced from VicForests, the state owned enterprise responsible for the logging and sale of logs from state forests under the *Sustainable Forests (Timber) Act 2004*. The sawmill offcuts are sourced from sawmills processing sawlogs procured from VicForests. For example, nearly 30% of the annual 155,000 m³ of Ash sawlogs that Heyfield Sawmill previously processed was delivered to Paper Australia in the form of woodchips (Hurley, 2017). The majority of the plantation pulp log supply is sourced from hardwood and softwood plantations managed by Hancock Victorian Plantations (HVP) (Australian Paper, 2005).



Figure 1. Maryvale Mills, Gippsland

The three pulp mills operating at Maryvale are:

- A Pine Kraft Mill producing pulp for liner board and sack kraft;
- A Bleached Hardwood Kraft Pulp (BHKP) mill producing bleached pulp for printing and writing paper grades; and
- A Neutral Sulphite Chemical (NSSC) mill producing a lower cost unbleached pulp, to provide stiffness for packaging boards.

The BHKP and NSSC pulp mills use hardwood woodchips sourced from VicForests and offcuts from sawmills processing native forest hardwood. These consume a total of 630,000 m³ per annum (Poyry, 2011). Of this, around 500,000 m³ is directly sourced from VicForests logging operations in native forest (Williams & Green, 2014).

The pine kraft pulp mill sources solely from pine plantations. The NSSC pulp mill sources solely from mixed species native forests. The BHKP pulp mill sources from both native forests and plantations, with a greater reliance on native forests, specifically, Mountain Forests (Table 1).

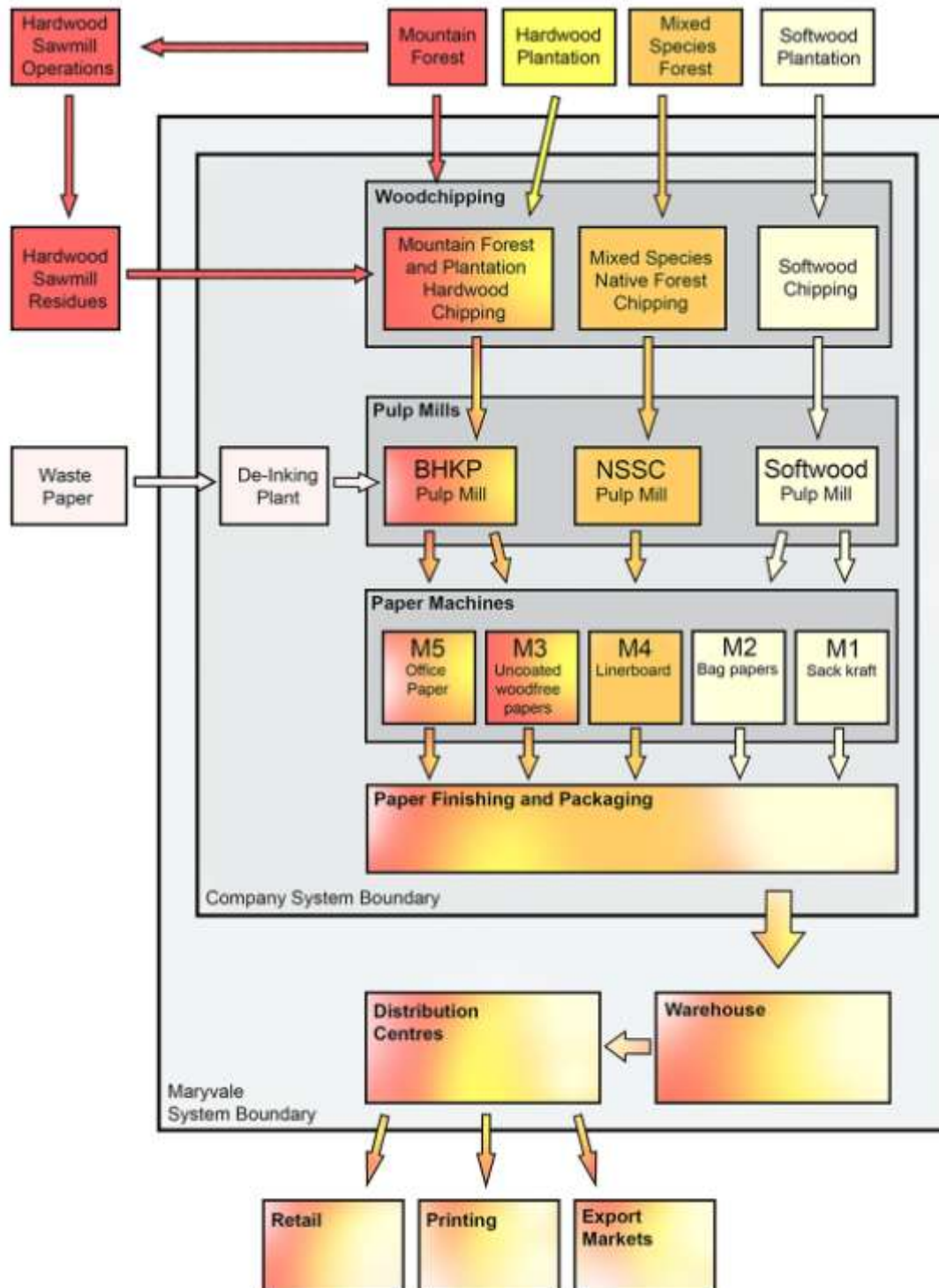


Figure 2. Wood fibre flow through the Maryvale Mills

Table 1. Maryvale Mills hardwood intake in 2011 (Source: (Poyry, 2011))

	BHKP Mill	Waste Paper	NSSC Mill	Pine Mill	
Mountain Forests (m ³ /annum)	456,000*	-	-	-	
Mixed Species Forest (m ³ /annum)	-	-	174,000	-	
Hardwood Plantation (m ³ /annum)	300,000	-	-	-	
Softwood Plantations (m ³ /annum)	-	-	-	N/A	
Waste Paper (t/annum)	-	10,000	-	-	
Key Products	Bleached Eucalypt Pulp	De-inked Pulp	Semi-chemical eucalypt pulp	Unbleached pine kraft pulp	
Paper Machine	M5	M3	M4	M2	M1
Key Products	Office Papers	Uncoated woodfree papers	Linerboard	Bag Papers	Sack Kraft
Capacity (t/yr)	180,000	80,000	240,000	30,000	70,000

*Note – Mountain Forest intake includes 80,000m³ of sawmill waste

Woodchips are processed into pulp through a chemical pulping process, involving a cooking process where lignin is removed from chips of wood. It is dissolved in white liquor, which is a mixture of caustic soda and sodium sulphate. Some of the woodchips are also processed into bleached pulp, producing a white pulp suitable for printing and writing papers. Oxygen is then used to dissolve and remove lignin. Chlorine dioxide, ozone and oxygen are used to break down and remove the colour from nearly all of the remaining lignin (Australian Paper, 2010).

Pulp from pine woodchips is predominantly used in the manufacture of packaging papers and mechanical communications papers. Bleached eucalypt pulp from Mountain Forests and hardwood plantations is predominantly used in the manufacture of fine communications papers. Unbleached eucalypt pulp from mixed native forests is predominantly used in the manufacture of packaging grades (AMCOR Ltd, 2000).

The processed pulp is moved to a series of paper machines (numbered M1 to M5) that further process the pulp into the specific paper products. In the machines, pulp and additives are mixed to form paper. This is a three stage process that encompasses forming, pressing and drying. A continuous paper sheet is produced, which moves onto a series of drying rollers. For fine paper, a film of starch is then applied to increase the surface strength (Australian Paper, 2010). The combined capacity of the paper machines is 620,000 t/yr.

The Maryvale Mills were expanded several times over the past several decades. In 1984, the pine kraft pulp mill was constructed along with M4, which facilitated a large increase in production of kraft linerboard for high performance corrugated containers (AMCOR Ltd, 2000). In the 1990s, the construction of the M5 Paper Machine was possibly the most significant investment, which formed the focus of a \$400 million expansion program to manufacture office paper:

Historically, PaperlinX's sales of communication papers have been hampered by a lack of capacity, which allowed overseas producers to increase their share of the Australian market. However, the start-up of the M5 office papers machine has added 180,000 tonnes per annum of new capacity, allowing the demand for products such as office papers to be filled and new products to be developed and marketed from PaperlinX's other paper machines, including coated papers at Wesley Vale (AMCOR Ltd, 2000, p. 47).

PaperlinX's new M5 office papers machine at Maryvale mill was completed ahead of schedule and within budget in July 1998. The machine produces high quality office papers, including the REFLEX™ brand. Overall M5's performance has exceeded expectations, including its capability to perform in excess of the design output of 160,000 tonnes a year. During the year ended 30 June 1999, production of 220,000 tonnes of paper was repositioned between Australian Paper's machines to achieve optimal use of capacity. The new machine is now producing almost all of PaperlinX's office papers and has the potential for further increases in capacity as the office papers segment grows (AMCOR Ltd, 2000, p. 47).

The M5 Paper Machine began production in July 1998 with a capacity of 180,000 tonnes of office papers per annum. The increased production from M5 assisted Amcor's subsidiary PaperlinX Ltd to meet demand for office papers and maintain its market share (AMCOR Ltd, 2000). This expansion coincided with the passing of the *Forests (Wood Pulp Agreement) Act 1996*, a Legislative Supply Agreement that bound the State of Victoria to provide specified volumes of pulp logs to the Maryvale Mills from state forests over a 34 year period. This agreement is part of a legacy of legislative supply agreements that began with the construction of the first Maryvale pulp mill.

4. The Legislative Supply Agreement (LSA)

4.1 History

The construction of the mills at Maryvale, commencing in 1936, was contingent on guaranteed access to large areas of state forest, as well as water from the Latrobe River and electricity by direct transmission from the State Electricity Commission (SEC) (Sinclair, 1991). Access to state forest was initially granted in 1936 through the Wood Pulp Agreement Bill. This agreement was part of an exclusive concession regime afforded to a number of pulp and paper production facilities, starting with Tasmania in the 1920s (Dargavel, 1995). Although Australian Paper Manufacturers Ltd itself was established in the 1920s, it was not until the mid 1930s that it looked towards Gippsland to establish a major processing facility. Introducing the Bill, Minister for Forests, Albert Lind, stated that the Wood Pulp Agreement would:

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..... enable the initiation and development of the wood-pulp and papermaking industry in Victoria from Victorian timbers, side by side with the development of our native forest areas (Lind, 1936, p. 3672).

This LSA gave Australian Paper Manufacturers Ltd exclusive rights to draw from designated public land a minimum quantity of pulpwood and bound the State of Victoria to make available the required quantity (Lind, 1936). This was stated in Clause 14 of the Act:

.....the Company without obtaining any lease licence permit or authority under the Forests Act 1928 shall have the exclusive right to obtain pulpwood timber— (i) from the Forest Area until the expiration of twenty years from the commencement of commercial production; and (ii) from the Mill Area during the remainder of the term of this Agreement (Victorian Parliament, 1936, p. 434).

The area of forest for which pulp wood cutting rights were granted was divided into two categories:

- the 'Mill area' comprising 245,600 acres of reserved forest and 172,000 acres of unoccupied Crown lands to which the company had rights immediately when it commenced operations; and
- the 'Forest area', which included the Mill area and an area of 135,000 acres held in reserve, to which the company could gain access only after extension of its mills and satisfactory operation on the Mill Area.

This provided Australian Paper Manufacturers Ltd access to 550,600 acres or 222,820 hectares of state forest for a period of 50 years (Lind, 1936). This agreement was introduced because the then Forest Commission had no power to grant a supply of logs exceeding 20 years and the company was not prepared to commit to developing its mills at Maryvale unless the agreement was for 50 years (Sinclair, 1991).

In view of the large expenditure involved in establishing the industry, and the necessity for assured supplies of raw material, it is necessary that the company be granted a long period of agreement and a period of 50 years has been decided upon (Lind, 1936, p. 3674).

The then Forest Commission insisted that pulp wood be obtained from forest and sawmill waste, where the supply of pulp wood would follow logging operations carried out by sawmills and other timber getters (Lind, 1936). The establishment of a pulp mill provided a means for the Forests Commission to utilise the biomass left behind following sawmill logging operations. There were to be five sources of supply:

- 1) Current cutting areas being operated by sawmilling licensees;
- 2) Unlogged forests containing trees unsuitable for sawmilling and requiring regeneration;
- 3) Areas previously logged for sawmilling timber;

- 4) Thinnings from regrowth forests; and
- 5) Mill waste offcuts from sawmill logs.

In 1961, the Agreement was amended, enlarging the area to approximately 2,350,000 acres or over 950,000 hectares (Thompson, 1961). This was on the grounds that the original Mill and Forest areas were insufficient to guarantee the required supply, because they supplied only 16 per cent of the total quantity. Under this new agreement, the then Minister for Forests, L.H.S Thompson, stated:

A larger supply of pulpwood is to be guaranteed. The new agreement provides for the supply of 75,000 cunits [212,376 m³] per annum for nine years, to be raised to 110,000 cunits [311,485 m³] per annum thereafter. The company will take not less than 50 per cent of the minimum supply of pulpwood. Originally this was 90 per cent of the annual quantity of 40,000 cunits [113,267 m³], but that was found too harsh a total provision (Thompson, 1961, p. 1120).

The Wood Pulp Agreement was further amended in 1966, 1974 and 1984. It also included access to pulp logs sourced from state-owned softwood plantations. The amended Wood Pulp Agreement Bill was scheduled to expire in 2004, 68 years after its original introduction (Land Conservation Council, 1994). However, a new agreement was reached between the State of Victoria and the successor of Australian Paper Manufacturers Ltd, AMCOR Ltd, who, at the time, announced the construction of its M5 Paper Machine (AMCOR Ltd, 2000). The Victorian Government provided resource security for this investment in passing the current *Forests (Wood Pulp Agreement) Act 1996*:

The agreement before the house is part of the larger package of measures agreed between Amcor and the government. The agreement provides resource security for Amcor to support its major capital investment. The agreement therefore extends the term of the existing agreement from 2004 to 2030 (Birrell, 1996, pp. 537-538).

4.2 Forests (Wood Pulp Agreement) Act 1996

This current LSA replaced and consolidated the 1961 agreement. It bound the state to provide fixed volumes of pulp logs to AMCOR Ltd over specified time periods, as outlined in Clause 14(2):

The Secretary shall be bound in each year to make available to the Company or to have the Department deliver to the Company as the Plan of Utilization may require from areas of forest as provided in this clause and in accordance with a Plan of Utilization a minimum annual supply of pulpwood which shall be -

- (a) *in each of the years 1996 - 1997 to 2003 – 2004 inclusive - 500,000 cubic metres;*

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(b) in each of the years 2004 - 2005 to 2006 – 2007 inclusive - 450,000 cubic metres;

(c) in each of the years 2007 - 2008 to 2009 – 2010 inclusive - 400,000 cubic metres;

(d) in each of the years 2010 - 2011 to 2029 – 2030 inclusive - 350,000 cubic metres,

of which at least 300,000 cubic metres shall be made available to the Company or delivered by the Department to the Company as the Plan of Utilization may require from mountain forests inside the Forest Area (State of Victoria, 1996, pp. 12-13).

This agreement allocated to AMCOR Ltd the rights to pulp logs sourced from over 300,000 hectares of state forest (Figure 3) (Table 2). The area covered a total of 558,654 hectares of public land, with around 309,000 hectares available for logging. Inversely, Clause 16(1) bound the company each year to accept delivery of not less than 85% of the quantity of pulp logs specified under Clause 14(2). If the company did procure less than this percentage, it would be required to pay the equivalent royalty to the Victorian government at the average royalty rate that the company would otherwise pay for pulp logs in that year.

Table 2. Land tenure allocation of forest on public land in the Legislated Supply Agreement (LSA) Area

Land Tenure	Area (ha)	% of Total
Conservation Reserves	132,245	24%
Special Protection Zones	117,286	21%
Special Management Zones	16,361	3%
General Management Zones	292,762	52%
Total	558,654	100%

Clause 5(1) of the LSA provided liberty to AMCOR Ltd, with written consent of the relevant minister, to transfer the rights of the LSA to a subsidiary company or any other company of its choosing. The LSA gave AMCOR Ltd the right to:

- a) procure the incorporation of a subsidiary company to exercise as the nominee of the Company all or any of its rights under this Agreement and the Act; and
- b) assign all or any of its rights under this Agreement and the Act to such subsidiary company or to any other company.

In 1998, the LSA was re-assigned to AMCOR Ltd's subsidiary, Paper Australia Pty Ltd (AMCOR Ltd, 2000). Subsequently, when ownership of Paper Australia Pty Ltd was transferred from AMCOR Ltd to PaperlinX Ltd, then to Nippon Paper Industries Co. Ltd, the LSA remained between the Victorian Government and Paper Australia Pty Ltd.

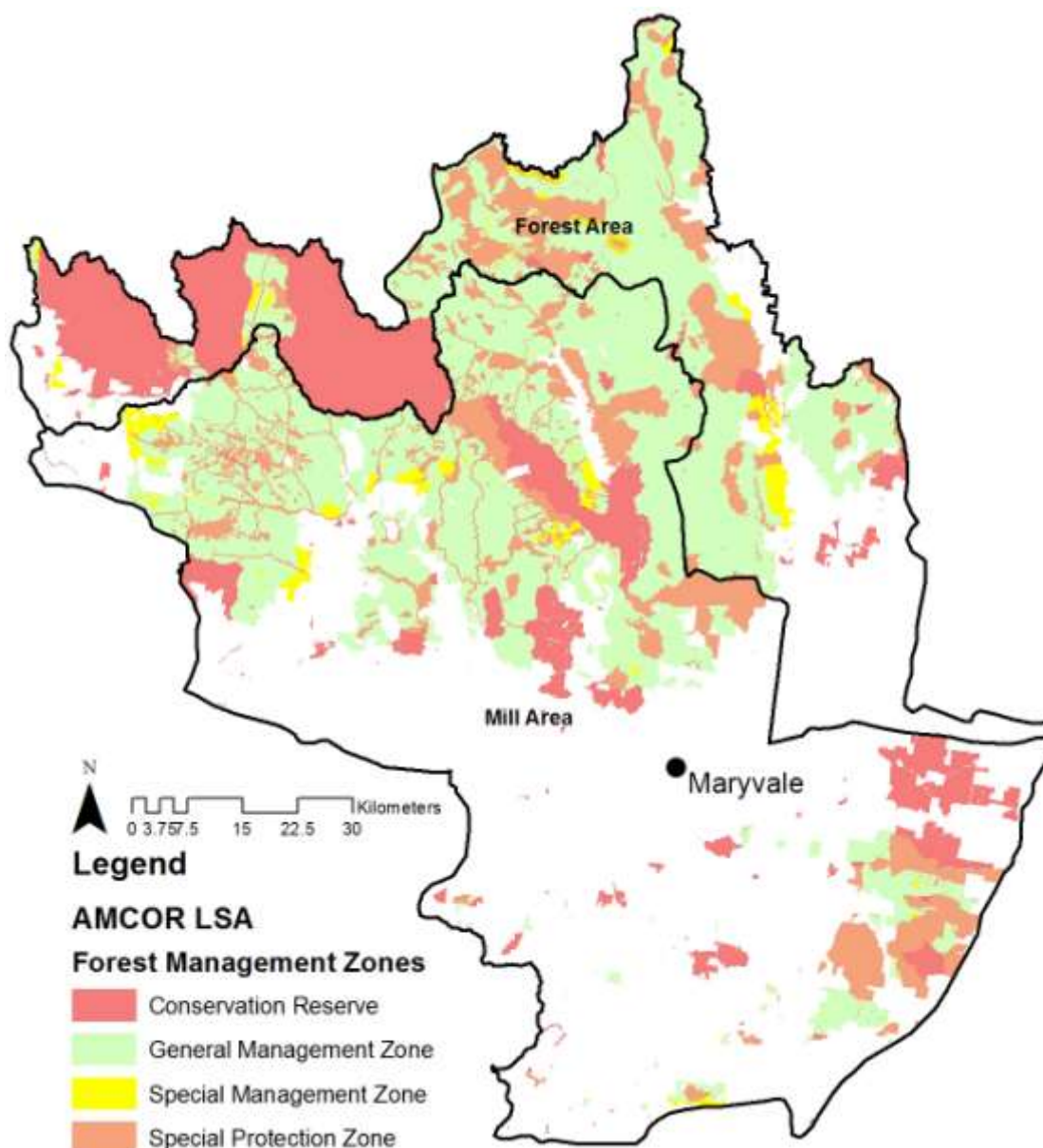


Figure 3. Legislated Supply Agreement Area under the Forests (Wood Pulp Agreement) Act 1996 and forest management zones

4.3 An Exclusive Agreement

The exclusive context of the Wood Pulp Agreements did raise concern in parliament at the time that they were initiated. The original 1936 Wood Pulp Agreement drew the concern of former Premier John Cain Snr, where he argued that exclusive concession awarded to Australian Paper Manufacturers Ltd would give the company a complete monopoly in the logging industry (Sinclair 1990). Later, former Minister for Forests, L.H.S Thompson, stated in his second reading of the Wood Pulp Agreement 1961 Bill that:

It may seem strange that an agreement should be made with a particular branch of private enterprise for exclusive rights over Victorian grown pulpwood, but in 1937 there was no company in the world manufacturing paper from hardwood and there was no company in

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Australia manufacturing paper at all. Certain concessions were granted to Australian Paper Manufacturers Limited, mainly that exclusive rights would be granted in an area of 650,000 acres in central Gippsland for the supply of quantities of pulp (Thompson, 1961, p. 1120).

In the 1990s, the Victorian Government prioritised the LSA over the Regional Forest Agreements (RFA), which were then being negotiated between the Victorian and Federal Governments. In a letter addressed to the General Manager of AMCOR Ltd, the then Premier of Victoria, Jeff Kennett, stated:

In relation to the proposals of the Commonwealth for the Victorian Government to sign the Deferred Forest Agreement, the Scoping agreement for a Regional Forest Agreement (and the subsequent Regional Forest Agreements), let me also assure you that the State of Victoria does not intend to enter into any of these agreements if they are inconsistent with or in any way affect the rights of the Amcor group of companies or any other companies under legislated wood supply agreements enacted under Victorian Law. As I have already assured you, the Victorian Government has no intention of signing any Agreement with the Commonwealth which I consider disadvantages the industry or compromises new developments (Kennett, 1995).

At the time of writing (2018), the exclusive concession regime afforded to Paper Australia Pty Ltd, under the LSA, has been in place for 82 years. The first Wood Pulp Agreement was viewed as a means of initiating a new industry. However, whilst the first wood pulp agreement was to expire after 50 years (1986), renewals of the agreement have made legislative supply agreements the norm for the mills at Maryvale. This exclusive concession regime has not been adaptive to changing conditions and lacks flexibility:

The longest timber contract is the government's 34-year legislated agreement with Australian Paper. This agreement was established as the Forests (Wood Pulp Agreement) Act 1996. Since then there have been significant changes to timber resource availability—more conservation reserves, several fires—and to the industry—changes in plantation pulpwood predictions, forest certification issues. As these have resulted in additional costs to government, DEPI will need to consider costs against the socio-economic benefits that Australian Paper brings to Gippsland communities (VAGO, 2013).

These commitments, especially the Australian Paper commitment, are very long term and reduce VicForests flexibility with regard to the allocation of low grade logs to potential new markets, and in addition locking VicForests into particular contract terms and conditions (URS, 2010, p. 36).

If the LSA were to last until 2030, the successive owners of the Maryvale Mills will have enjoyed 94 years of guaranteed wood supply from Victoria's public native forests. The legislative allocation of a public asset to a private enterprise has had serious consequences for the forest ecosystems

concerned (see section 5) and continues to block opportunities for new regional jobs and businesses that depend on forests, as opposed to pulp logs.

5 The *Mountain Forests*

5.1 *Why the Preference?*

Clause 14(2) of the *Forests (Wood Pulp Agreement) Act 1996* obligates the Victorian Government to provide at least 300,000 m³ per annum of pulp logs sourced from 'Mountain Forests' within the LSA area or 'Forest Area'. 'Mountain forest' is defined as:

.....any eucalypt forest in which the predominating species is Eucalyptus regnans or Eucalyptus delegatensis or both of them (State of Victoria, 1996, p. 7).

The 'Mountain Forests' are referred to in scientific literature as 'montane ash' forests (Lindenmayer, et al., 2015). These cover only 92,551 hectares or 22% of the state forest allocated to Paper Australia Pty Ltd (Figure 4) (Table 3). Yet this small area provides over 70% of Paper Australia Pty Ltd's pulp log intake from state forests (Poyry, 2011). Pulp logs sourced from 'Mountain Forests' are preferred because Mountain Ash and Alpine Ash trees exhibit qualities of formation, brightness, strength, opacity and resilience for paper manufacture. Furthermore, Mountain Ash and Alpine Ash pulp logs require less bleaching to remove lignin and colour (Land Conservation Council, 1994).

Table 3. Forest type within state forest across the Legislative Supply Agreement area

Forest Type	Forest allocated to logging (ha)	Total State Forest Area (ha)
Mountain Forest	69,217	92,551
Mixed Species Forest	219,722	325,730
Total	288,939	418,281

The preference for 'Mountain Forests' dates from the first Wood Pulp Agreement in 1936, where the state was bound to provide:

(i) not less than three-fourths shall be from Eucalyptus regnans or (where economically necessary) from Eucalyptus gigantea; and (ii) pulpwood equal in quantity to one-third (or such other proportion as the Commission and the Company agree upon) of the pulpwood from those species shall be from timber of Eucalyptus regnans obtained under paragraph (d) of this clause from mountain forest of regrowth (Victorian Parliament, 1936, p. 435).

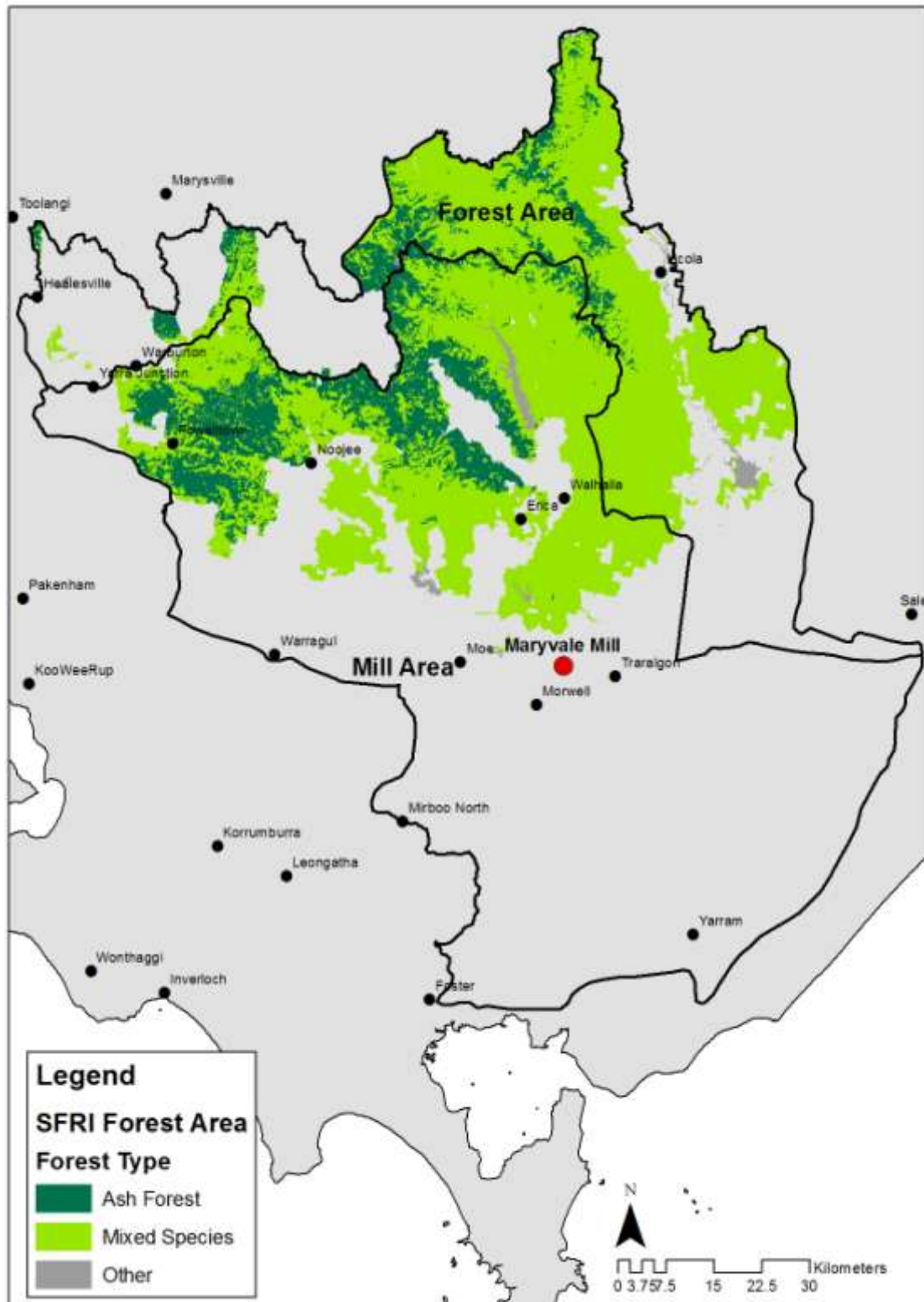


Figure 4. Ash Forest and Mixed Species Forest across the LSA area providing the majority of pulp logs (Source: State Forest Resource Inventory (SFRI), DSE 2003)

5.2 Mountain Forests

The 'Mountain Forests' are defined by their iconic and visually spectacular stands of tall trees, particularly Mountain Ash (*E.regnans*) (Figure 5) and Alpine Ash (*E.delegatensis*) (Figure 6). These forests are restricted to the mountainous and highest rainfall areas of the state, occupying only 547,000 hectares or less than 7% of Victoria's total forest cover of 8.2 million hectares (DEPI, 2013). Mountain Ash forests are located only in Victoria and Tasmania. They are the tallest of the Mountain Forests, exceeding more than 100 metres in height (Ashton, 1976). The structure of Mountain Ash forests can be either even-aged or multi-aged, depending on the disturbance history (Mackey, et al., 2002). Previous fires of extreme severity can result in even-aged stands. However, fires can be highly variable in their severity and fires of lower severity result in Mountain Ash forests consisting of multiple age cohorts (Lindenmayer & McCarthy, 1998). These forests contain old growth trees interspersed with younger trees (Figure 5). Mountain Ash forests are typically monotypic (Lindenmayer, et al., 2015) but feature a diverse understorey (Mueck, 1990).

Alpine Ash forests are also monotypic, but occur at higher elevations than Mountain Ash forests (Figure 6). They are also more geographically widespread, dominating the slopes of the Australian Alps throughout Victoria, New South Wales and the Australian Capital Territory, along with higher elevations in East Gippsland and Tasmania. Alpine Ash trees often form pure stands under optimum conditions, but can be mixed with other species at sub-optimal sites (Turnbull & Pryor, 1984).

The Mountain and Alpine Ash forests provide habitat for numerous rare and threatened fauna, including the endemic and critically endangered Leadbeater's Possum (*Gymnobelideus leadbeateri* McCoy) (Lindenmayer, et al., 2013) and the Baw Baw Frog (*Philoria frosti* Spencer) (Hollis, 2004), as well as the vulnerable Greater Glider (*Petauroides volans*) (Lindenmayer, et al., 2015). The Mountain Forests across the LSA area contain nationally significant landscapes, including a site of global zoological significance located around Mount Baw Baw (Mansergh & Norris, 1982). These forests include water catchments critical for supplying water to the city of Melbourne and surrounding rural communities (Viggers, et al., 2013). They also support the largest known stores of terrestrial ecosystem carbon, with some sites containing over 1,800 t/C/ha (Keith, et al., 2009).



Figure 5. Mountain Ash forest on the south face of the Baw Baw Plateau (Photo: Chris Taylor)



Figure 6. Alpine Ash forests along the northern escarpment of the Baw Baw Plateau (Photo: Chris Taylor)

The Mountain Ash forest ecosystem itself has been red listed as ‘critically endangered’ by the International Union for the Conservation of Nature (IUCN) (IUCN, 2015). The primary driver behind this threat listing is extensive clearfell logging, compounded by the effects of bushfire (Burns, et al., 2014). The Alpine Ash forests are closely associated with the Mountain Ash forest ecosystem and they have also experienced similar and rapid decline (Lindenmayer, et al., 2015).

The Mountain and Alpine Ash forests are some of the least protected forest types in Victoria. Around 286,000 hectares or 52% are located within state forest. Of this, 241,000 hectares have been allocated to VicForests for the purposes of logging and other activities (DEDJTR, 2014). Mountain Forests cover 92,551 hectares in state forests in the LSA Area. This is approximately 32% of the 286,000 hectares of Mountain Forests (otherwise called ‘Ash’ Forests) in all Victorian state forests.

5.3 Clearfell Logging

Clearfell logging is the main form of logging in the Mountain Forests (Lutze, et al., 1999) and remains one of the country’s most contentious and long-standing environmental issues (Lindenmayer & Franklin, 2003). It is the most intensive of all silvicultural practices, where all the merchantable logs are removed from a defined area of forest or coupe and the remaining debris or slash is consumed in an applied high intensity fire (Flint & Fagg, 2007). This creates an ash bed, upon which the commercially valued eucalyptus species are replanted. Replanting is either through direct reseeding or through a

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'seed tree' method, which involves scorching the crowns of remaining seed trees dispersed throughout the coupe (Figure 7) (Florence, 1996).



Figure 7. Clearfell logging in Ash forest near Mt Matlock (Photo: Chris Taylor)

A strong scientific criticism of clearfell logging is that it ignores the natural disturbance history of a specific forest and type (Mackey et al. 2002). Clearfell logging removes biological legacies, such as hollow bearing old trees (Lindenmayer & Franklin, 2002) and long-lived understorey species (Mueck, et al., 1996). The stand of trees replacing the previously unlogged forest is often even aged and homogenous. Previous biological legacies are lost and may take up to 2,000 years to recover following logging (Norton, 1996).

Clearfell logging was first implemented because of the need to develop 'regeneration' techniques in Mountain Forests. During the late 1950s, research work into the 'seed tree' system saw the development of clearfelling in Mountain Ash forests and clearfell, burn and sow in Alpine Ash forests around Mt Stirling (Grose, 1960). This led to the widespread implementation of the clearfelling system involving intensive slash fires across all wet forest types (Squire, et al., 1991) (Figure 8).

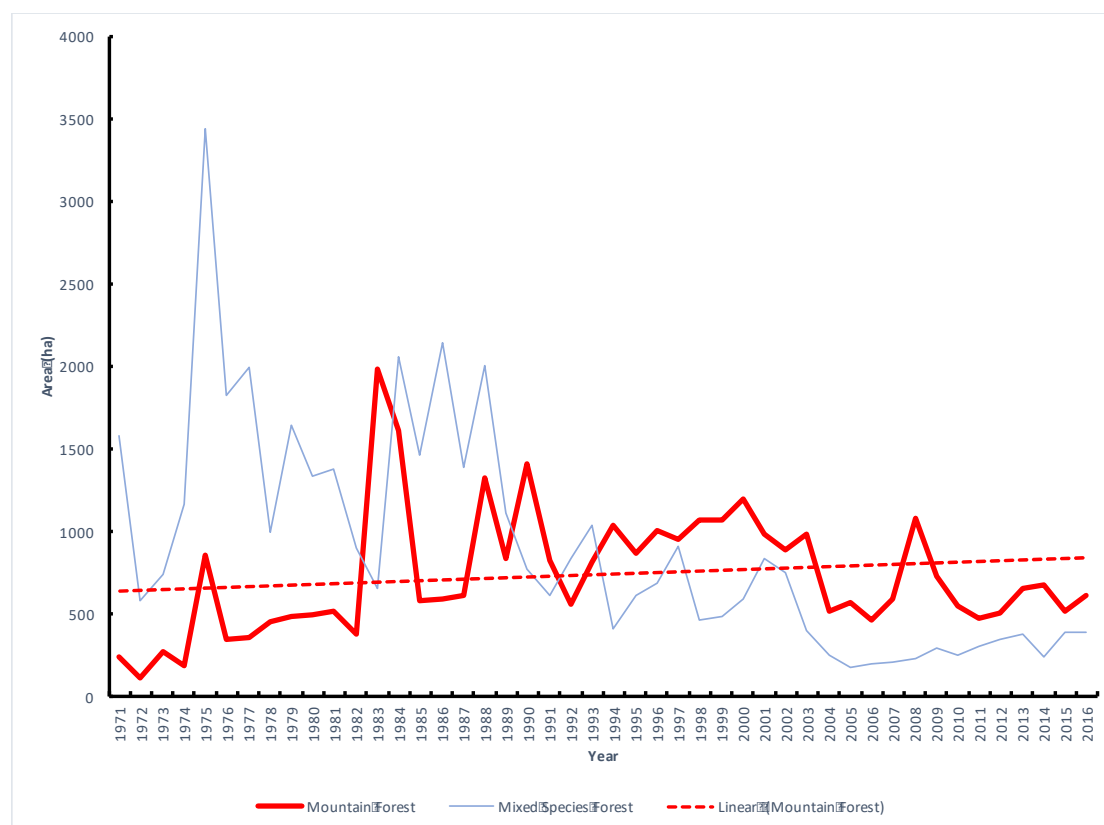


Figure 8. Trends in the logging of forest types in the Legislative Supply Agreement area, showing the long-term trend (dashed line) (Derived from DELWP 2017).

Across the LSA area, most logging takes place in Mountain Forests. On average, the Mountain Forests account for 66% of the total area logged annually in the LSA area since the passing of the *Forests (Wood Pulp Agreement) Act* in 1996. Since 1970, approximately 93% of logging in Mountain forests across the LSA area has been clearfelling (DELWP, 2017). The largest area of Mountain Forest logged in a single year was 1,983 hectares in 1983. The next highest peak was in 1990, with around 1,400 hectares of Mountain Forest logged. The highest average area logged occurred between the years 1994 to 2003, with an average of around 1,000 hectares logged per annum. While there has been a decrease in the area of mixed species being logged, the area of Ash forest logged has increased over the long term.

5.4 Spatial Analysis of Disturbance Across Mountain Forests

Major fires have impacted the LSA area since the passing of the *Forests (Wood Pulp Agreement) Act 1996* (Figure 9). More than half of the forest area allocated for logging in the General Management Zone (GMZ) has been impacted by fire since 1996; similarly nearly half of the smaller Special Management Zone category has burnt (Table 4). The largest fires burnt through Victoria's Alpine Bioregion in 2007, followed by the February 2009 fires.

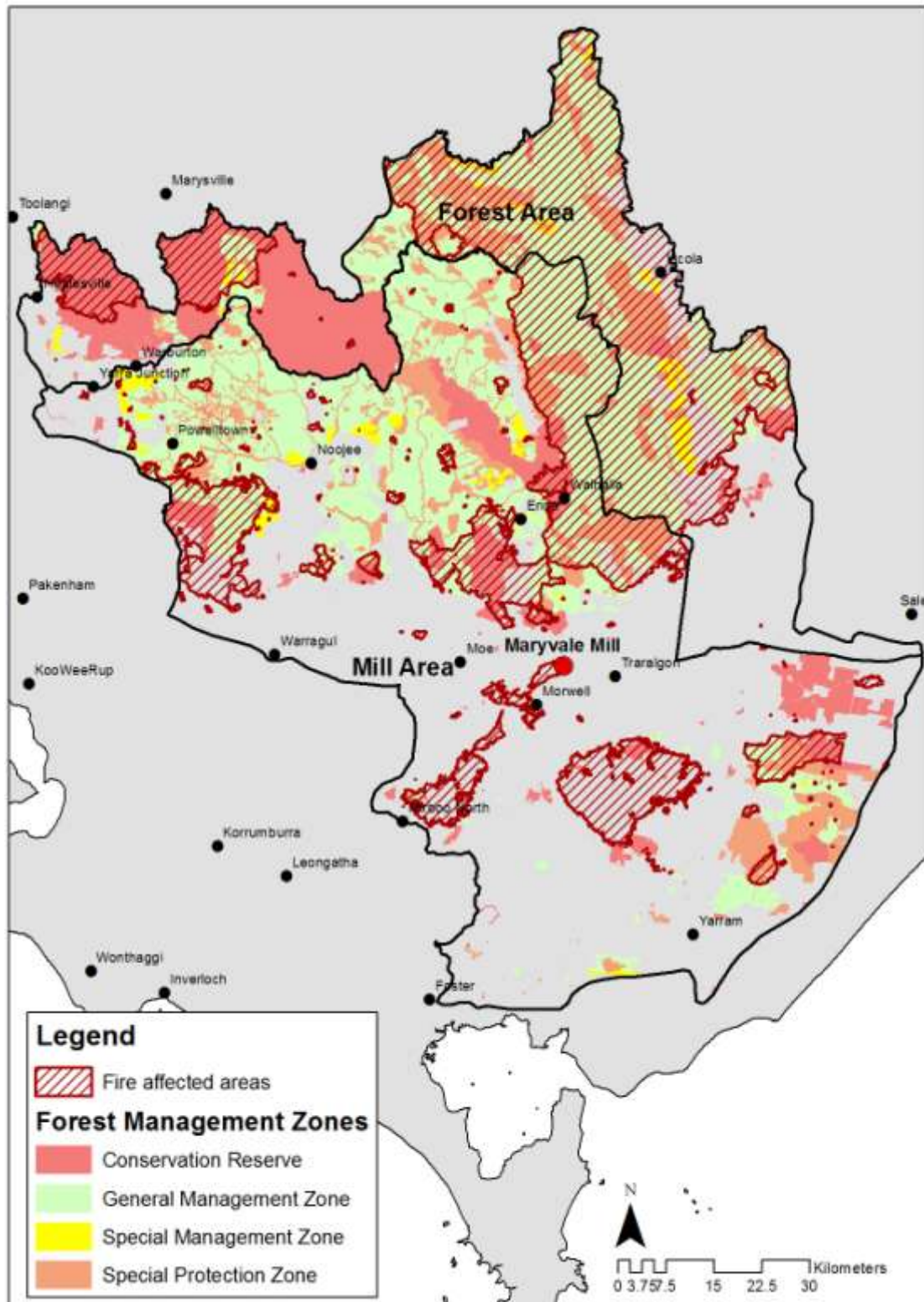


Figure 9. Extent of fires across the LSA since the passing of the Forests (Wood Pulp Agreement) Act 1996 (Derived from DELWP 2017).

Table 4. Forest type within state forest across the Legislative Supply Agreement area

Forest Management Zone	Burnt	Unburnt	Total	% Burnt of Total
General Management Zone	150,551	142,210	292,762	51%
Special Management Zone	7,200	9,161	16,361	44%
Special Protection Zone	59,702	57,584	117,286	51%
Conservation Reserve	50,446	81,799	132,245	38%
Total Public Forests	267,899	290,755	558,654	48%

These fires impacted the Mountain Forests throughout the LSA area (Figure 10). An analysis was conducted for this review, calculating the areas that were disturbed by these fires in conjunction with clearfell logging. This analysis was based on the State Forest Resource Inventory (SFRI) (DNRE, 1997), which only covers state forests, along with fire severity data (DELWP, 2018) and logging history (DELWP, 2017).

Mountain Forests in state forest across the LSA area have suffered widespread disturbance: inclusive of recent wildfires, 54,170 hectares or 59% has been disturbed. Around 36,737 hectares (40%) of Mountain Forest has been clearfell logged. Of this area, 9,304 hectares have been burnt in the 2007 and 2009 fires (Table 5). The remaining least disturbed forests cover 38,381 hectares, with only two core areas remaining.

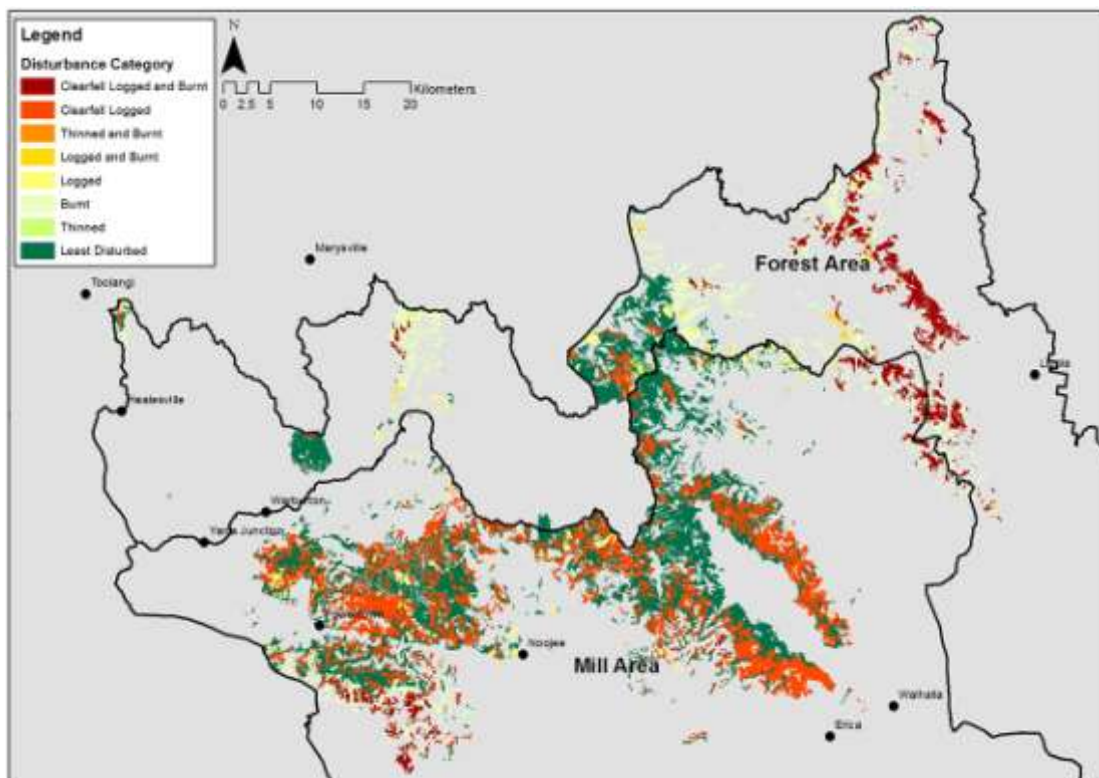


Figure 10. Degree of disturbance across Mountain Forests in state forests

Table 5. Disturbance in Ash forests in State Forests across the LSA area

Disturbance	Area (ha)	% of Total
Clearfell Logged and Burnt	9,304	10%
Clearfell Logged	27,433	30%
Thinned and Burnt	0	0%
Logged and Burnt	700	1%
Logged	3,030	3%
Burnt	13,352	14%
Thinned	351	0%
Least Disturbed	38,381	41%
Total	92,551	100%

The spatial analysis for this report updated the age classes in the SFRI dataset (DNRE, 1997) to reflect the current conditions of the Mountain Forest following the February 2009 and 2007 bushfires and more recent logging. Age classes were defined using those presented in Ashton (1975), describing growth stage in Mountain Ash forest from seedling to over-mature (Table 6). These stages are also applied to Alpine Ash and Shining Gum forests.

Table 6. Growth stages of Ash forest (based on Ashton 1975)

Growth Stage	Age (years)
Seedling	0-4
Sapling	5-6
Thicket	7-10
Pole	13-34
Spar	35-89
Mature	90-300
Over-mature	300-400

The spatial analysis shows that Mountain Forest in its seedling stage (0-4 years) is predominantly surrounded by forest in its late spar growth stage (79-89 years old), much of which emanated from the 1939 wildfires and is now 79 years old (Figure 11). This indicates that recent clearfell logging is specifically targeting the remaining intact areas of least disturbed Ash forest. The areas disturbed by the February 2009 and the 2007 fires are now in their sapling growth stages aged 9 years and 11 years, respectively. Over 43,000 hectares or 47% of state Mountain Forest consists of young stands less than 75 years old (Table 7).

Mountain Forest under General Management (GMZ) and Special Management Zones (SMZ), where logging is permitted, covers 69,219 hectares or 77% of the Mountain Forest area in state forest. The majority of this area has sustained a severe disturbance (Figure 11), with 45,104 hectares or 65% of total Mountain Forest allocated to logging being clearfell logged and/or sustaining recent fires (Table 8). The least disturbed Mountain Forests cover only 24,114 hectares or 35% of the area.

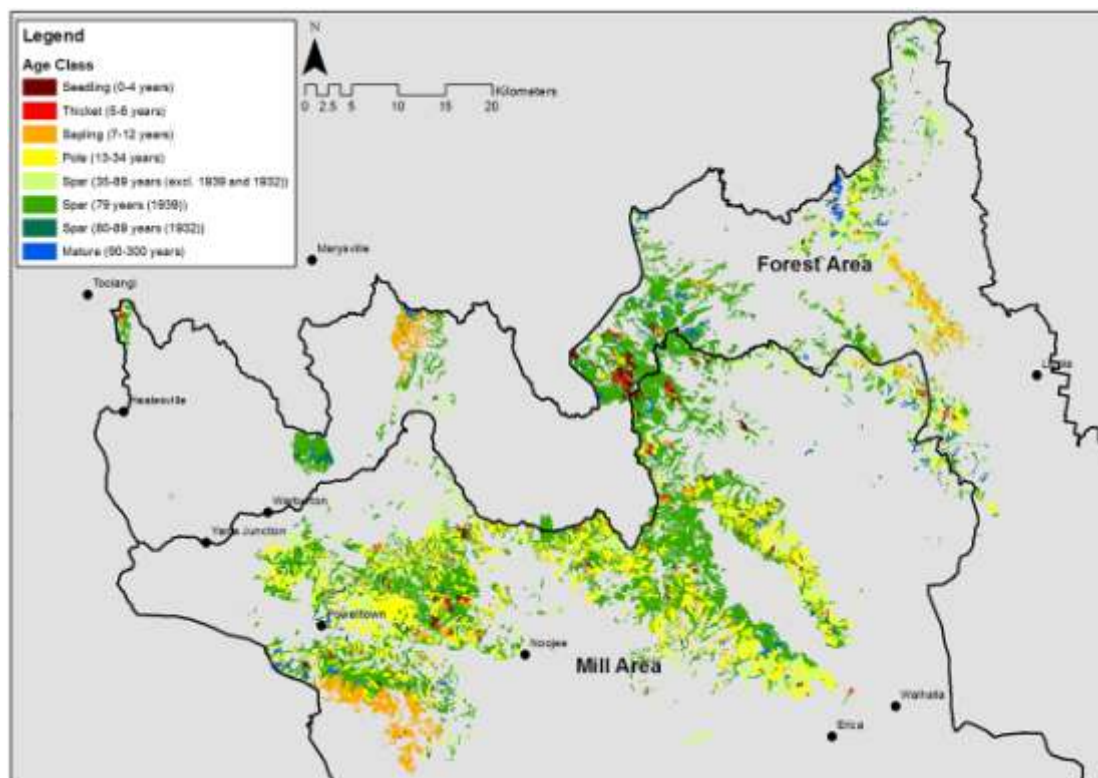


Figure 11. Age class distribution of Ash forests across state forests (age classes based on Ashton 1975)

Table 7. Areas of age classes in Ash forests across state forests

Age class	Area (ha)	% of Total
Seedling (0-4 years)	1,616	2%
Thicket (5-6 years)	1,047	1%
Sapling (7-12 years)	7,585	8%
Pole (13-34 years)	18,631	20%
Spar (35-89 years (excl. 1939 and 1932))	14,539	16%
Spar (1939) (79 years)	45,215	49%
Spar (1932) (86 years)	1,155	1%
Mature (90-300 years)	2,763	3%
Total	92,551	100%

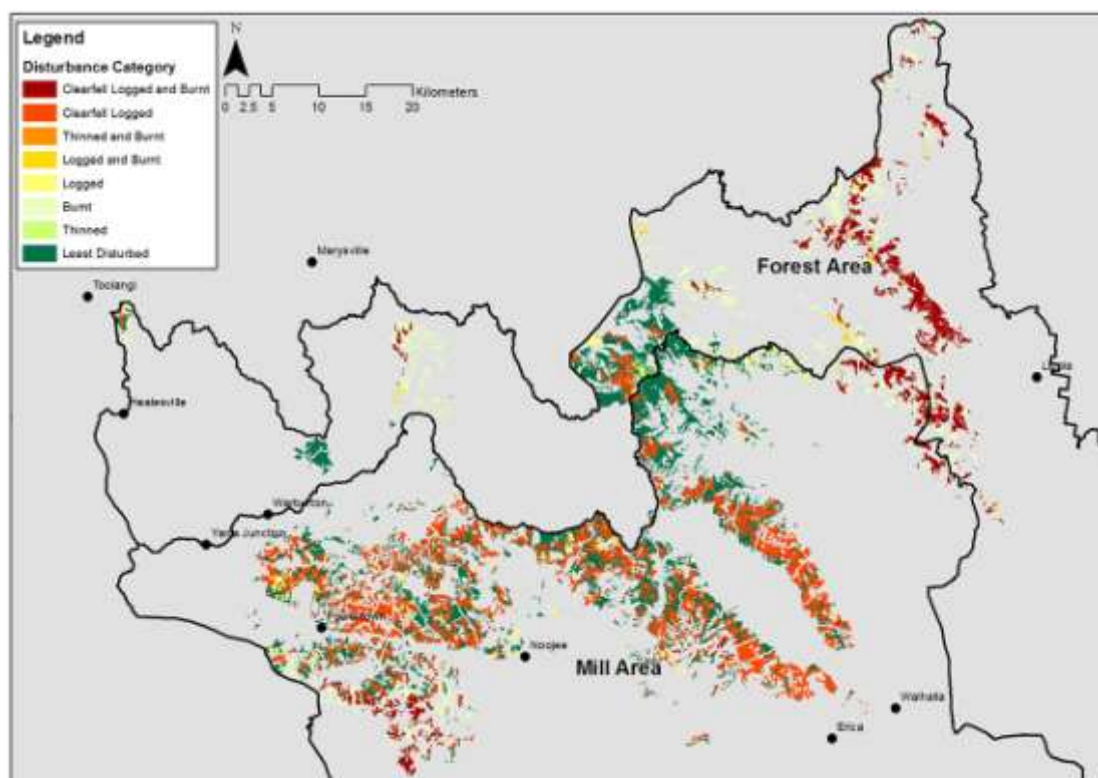


Figure 12. Degree of disturbance across the Ash forests in General Management Zones and Special Management Zones (where logging is permitted)

Table 8. Disturbance areas across the Ash forests in General Management Zones and Special Management Zones (where logging is permitted)

Disturbance	Area (ha)	% of Total
Clearfell Logged and Burnt	8,987	13%
Clearfell Logged	23,031	33%
Logged and Burnt	601	1%
Logged	2,349	3%
Burnt	9,794	14%
Thinned	342	0%
Least Disturbed	24,114	35%
Total	69,218	100%

Mountain Forest in the younger age classes between pole and seedling (less than 35 years old) cover 37,455 hectares or 54% of Mountain Forests allocated to logging (Table 9) (Figure 13). Remaining stands of late spar growth stages originating from the 1939 wildfires have suffered extensive recent clearfell logging, as indicated by forest in the seedling growth stage. Only 31,762 hectares or 46% of the 1939 regrowth forest area remains unlogged. However, much of this resides in fragments in between previous clearfell logging coupes and previous fires.

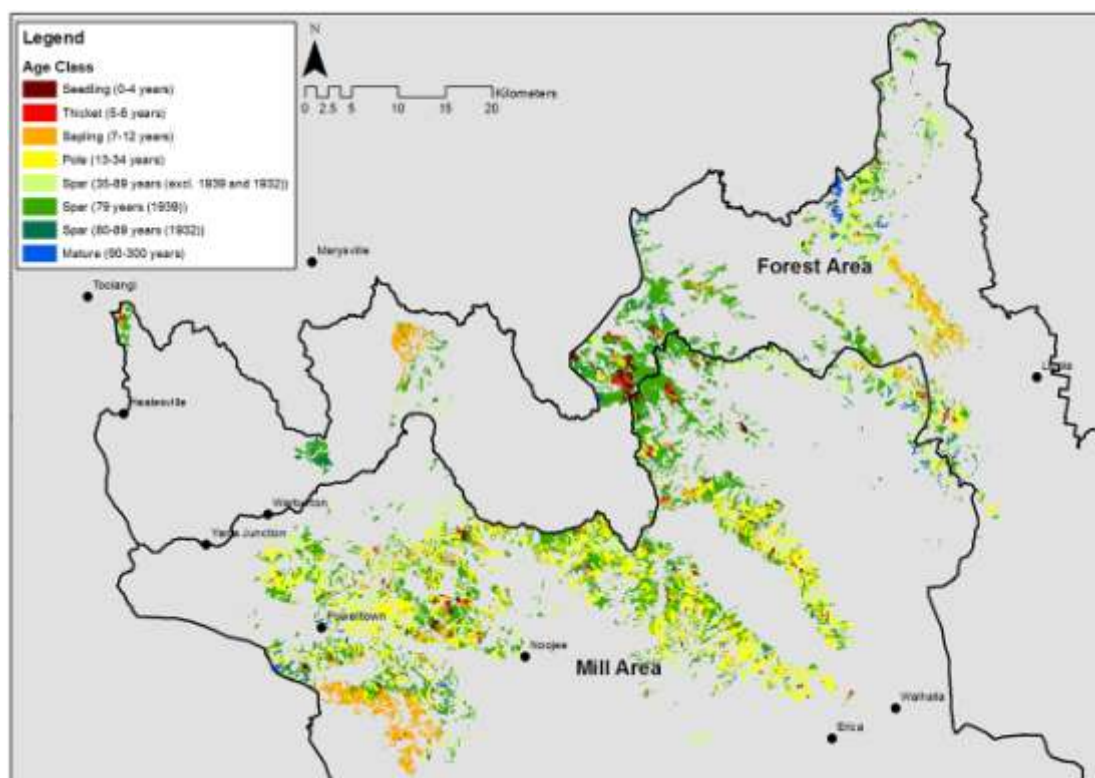


Figure 13. Age class distribution of Mountain Forests in General Management Zones and Special Management Zones (where logging is permitted) (age classes based on Ashton 1976)

Table 9. Areas of age classes in Mountain Forests in General Management Zones and Special Management Zones (where logging is permitted) (age classes based on Ashton 1976)

Age Class	Area (ha)	% of Total
Seedling (0-4 years)	1,539	2%
Thicket (5-6 years)	957	1%
Sapling (7-12 years)	6,759	10%
Pole (13-34 years)	14,665	21%
Spar (35-89 years (excl. 1939 and 1932))	11,742	17%
Spar (1939) (79 years)	30,457	44%
Spar (1932) (86 years)	763	1%
Mature (90-300 years)	2,335	3%
Total	69,218	100%

The compounded impacts of clearfell logging and fire are pushing the Mountain Forests into an altered compromised state. The close succession of recent fires and widespread clearfell logging present a serious problem, because large areas of Mountain Ash and Alpine Ash trees in juvenile stages of growth are not yet producing seed. Mountain Ash trees begin producing seed at around 20-25 years of age (Florence, 1996). If a high severity fire burns through a young stand of Ash trees previously clearfell logged or burnt, the capacity of the ecosystem to recover following the disturbance is compromised. This has been documented on the Toorongo Plateau, where fires in close succession have eliminated the Ash forest over large areas and required artificial replanting (McKimm & Flinn, 1979). The process by which

the Ash forest moves into this compromised state has been described as a 'Landscape Trap', where

.....the entire landscape is shifted into, and then maintained (trapped) in, a highly compromised structural and functional state as the result of multiple temporal and spatial feedbacks between human and natural disturbance regimes (Lindenmayer, et al., 2011, p. 15887).

This process creates an irreversible change in disturbance dynamics, forest cover, landscape patterns and vegetation structure. It leads to collapse or a major regime shift to an alternative state (Burns, et al., 2014). This process has resulted in the Mountain Ash forest ecosystem being formally listed as 'critically endangered' under the International Union for the Conservation of Nature (IUCN) (IUCN, 2015). According the IUCN (2016), an ecosystem is threatened when the best available evidence indicates that it meets any of the following criteria for Critically Endangered:

- a) Reduction in distribution;
- b) Restricted distribution;
- c) Environmental degradation;
- d) Disruption of biotic processes; and/or
- e) Quantitative analysis.

If a threatened category is triggered for one of more of the criteria, the ecosystem will qualify to be listed as threatened in one of three categories: 'vulnerable', 'endangered' or 'critically endangered'. In their study, Burns *et al.* (2014) assessed the Ash forest ecosystem against these criteria and quantified key aspects of the forest's historical, current and future decline in spatial distribution, extent of occurrence, area of occupancy for the ash forest ecosystem and the decline in key abiotic and biotic processes, along with features for historical, current and future time periods. Declines in biotic and abiotic processes were noted, along with the quantitative assessment of the probability of ecosystem collapsing, therefore triggering the critically endangered status of the ecosystem (Table 10). The IUCN defines a 'critically endangered' ecosystem to be at an extremely high risk of collapse (IUCN, 2016).

There has been a significant reduction in the amount of old-growth. Burns *et al.* (2014) estimated that the area of Mountain Ash forest unlogged and unburnt by wildfire in 1964 was 6,300 hectares (4% of the estate). By 2011, this area was reduced to 1,700 ha or only 1% of the total Mountain Ash area). Accordingly, modelling has shown that there will be a severe decline in the average number of large old hollow-bearing trees across the Mountain Ash forest from approximately 3.77 per hectare in 2011 to approximately 0.29–0.82 per hectare by 2067. Burns *et al.* (2014) defined ecosystem collapse as occurring when the average abundance of hollow-bearing trees declined to <1 hollow-bearing tree per hectare. The quantitative assessment modelling by Burns *et al.* (2014) indicates a ≥92% chance of the Mountain Ash ecosystem reaching a collapsed state by 2067; hence its critically endangered listing.

Table 10. Criteria for the critically endangered listing of Ash forest (derived from Burns et al. 2014)

Category	Sub-category	Classification
A. Decline in Distribution	A1. Current Decline	Least Concern
	A2. Future Decline	Least Concern
	A3. Historical Decline	Least Concern
B. Distribution Size	B1. Extent of Occurrence	Endangered
	B2. Area of Occupancy	Least Concern
	B3. Number of Locations	Critically Endangered
C. Decline in abiotic processes	C1. Current decline	Data Deficient
	C2. Future decline	Least Concern - Critically Endangered
	C3. Historical decline	Data Deficient
D. Decline in biotic processes and interactions	D1. Current decline	Critically Endangered
	D2. Future decline	Critically Endangered
	D3. Historical decline	Critically Endangered
E. Quantitative assessment of the probability of ecosystem collapse		Critically Endangered

6. Wood Supply

6.1 State Forests

The original intent of the *Forests (Wood Supply Agreement) Act 1996* was to commence the transition of the Maryvale Mills from native forests to plantations. Introducing the *Forests (Wood Pulp Agreement) Bill*, the then Minister for Conservation and Land Management Marie Tehan, announced that the new LSA would begin the transition towards the Maryvale Mills sourcing the majority of pulp logs from plantations over time:

While the government is mindful of the economic benefits of the agreement, it is firmly committed to the principle that sustainable economic growth must go hand in hand with sound environmental practices. The expanded mill will increasingly rely on plantation wood rather than native forest and by 2010 Amcor plans to reduce its reliance on native forest from 90 per cent of its intake to 35 per cent. It will also make increased use of recycled paper (Tehan, 1996, p. 450).

When the Agreement was legislated in 1996, the Maryvale Mills were sourcing around 500,000m³ per annum of pulp logs from native forests (Brumby, 1996). By 2010, this was to be reduced to 350,000m³ per annum. However, the opposite happened (Figure 14). Pulp log intake from native forests did decline

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from 533,528 m³ in 2002 to 353,806 m³ in 2006, but increased to 597,463 m³ in 2011 (Williams & Green, 2014). The pulp logs are coming not only from the LSA area, but from other state forests as well. Around one-third of the supply is obtained through a separate Timber Supply Agreement with VicForests made in 2008 (VicForests, 2008) (Figure 15).

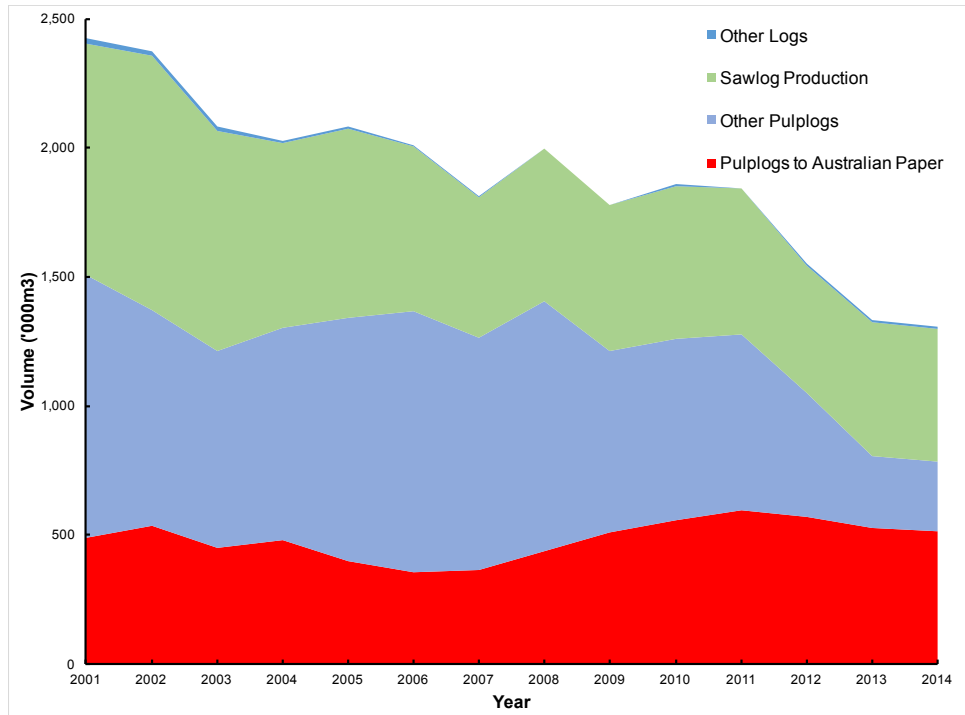


Figure 14. Victorian pulp log deliveries to Maryvale in context with other markets (Sources: Williams and Green 2014, VicForests 2015)

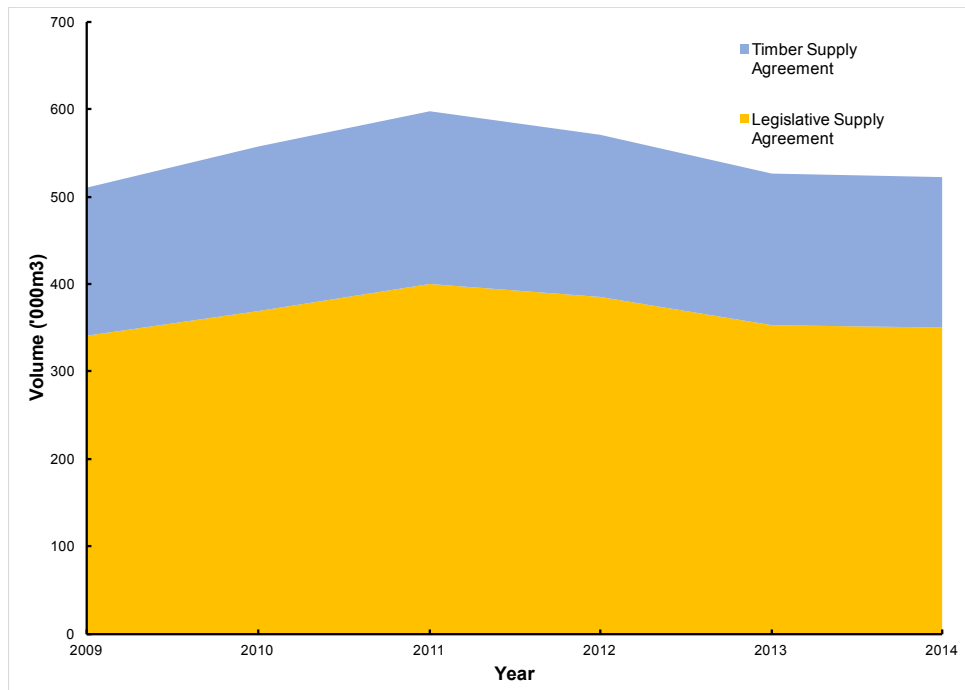


Figure 15. Breakdown of the Legislative Supply Agreement and Timber Sales Agreement (VicForests, 2014)

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The overall supply of native forest hardwood logs in Victoria has been in decline since the creation of VicForests as a State-Owned Enterprise in 2004. From a peak of nearly 2 million m³ in 2007-08, log production declined to around 1.3 million m³ in 2015-16 (Figure 14). Much of this decline has been a result of past overcutting (Vanclay & Turner, 2001), shifts away from traditional hardwood timber products in the market (BIS Shrapnel, 2015) and the impacts of the 2003, 2007 and 2009 bushfires. The 2009 bushfires alone burnt around 10 million m³ of standing Mountain Forest logs, with a mill door value of approximately \$600 million (VAFI, 2009). This has had a profound impact on the availability of D+ Grade sawlogs from the LSA and surrounding Central Highlands Regional Forest Agreement (RFA) area.

In its 2013 and 2014 Resource Outlooks, VicForests announced that it would implement reductions in Ash saw log supply:

The 2013 Resource Outlook was made available to the industry and the public more generally on 16 May. The outlook shows that ash D+ sawlog harvest levels will significantly decline in 2017-18, from about 300,000 m³ p.a. to about 215,000 m³ p.a. (VicForests, 2013, p. 26).

In its 2015 *Sustainability Report*, VicForests explained that the impacts of the 2009 February fires were responsible for these reductions:

In response to the impact of these fires on the ash timber resource available for harvesting, VicForests has decreased harvest levels, from about 320,000 m³ of D grade or better ash saw log per annum in 2002 to about 215,000 m³ of D grade or better ash saw log per annum in 2013. Ash harvest levels will decrease further in 2017 following the expiry of a number of timber sale agreements (VicForests, 2015, p. 19).

In 2014, VicForests planned further reductions in Ash saw logs, based on the policy of implementing 'Timber Harvesting Exclusion Zones' (THEZ) around known and newly detected sites containing the critically endangered Leadbeater's Possum (Leadbeater's Possum Advisory Group, 2014). This involved the creation of 200 metre buffers around each detection site from which logging is excluded. VicForests (2014) initially reported a volume reduction of about 10,000 m³ per annum. However, in February 2017, VicForests (2017) revised its reduction to 43,000 m³ in D+ Grade sawlogs, with the new D+ sawlog yield being 132,000 m³ (VicForests, 2017). Areas excluded from logging, as a result of Leadbeater's Possum detections in state forest, only equate to 3,134 hectares of state forest previously available to logging (DELWP, 2017). The Ash forest component of these exclusion zones equates to only 2,848 hectares or 1.8% of the 158,000 hectares of Ash forest available for logging across the state.

Owners of the ASH Heyfield Sawmill, the largest consumer of these saw logs, alleged that the reduced D+ supply would render the mill unviable (The Hermal Group, 2017). Initially, the Heyfield Mill was consuming around 155,000 m³ of D+ Grade Ash sawlog per annum. The reduction imposed has seen this intake

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reduced to 80,000 m³ per annum over a revised three-year contract under state government ownership. This had been rejected by the previous mill owners, who demanded that the original intake be maintained (Driscoll, 2017). However, the Premier of Victoria, Daniel Andrews, alleged that maintaining 155,000 m³ to the Heyfield sawmill would put at risk the supply of pulp logs to Maryvale. In an interview with Neil Mitchell on 3AW, the Premier stated:

I met with the head of Nippon Paper, yesterday. He travelled out from Tokyo. We have reached a long-term agreement with them, but I can't announce the details of that today, I will soon. That's the third meeting I have had with him, he is the CEO and there are a thousand jobs at Australian Paper that are at risk. And if you provide unsustainably high levels of resource – timber – to one mill, this mill [Heyfield], then we will not be able to meet our legislated obligations and we will directly put at risk a thousand jobs at Australian Paper in 5, 10, 15 years. I'm just not prepared to do that (Andrews, 2017).

The Premier was referring to Victoria's legislated obligation to supply an annual volume of pulp logs to Maryvale under the *Forests (Wood Pulp Agreement) Act 1996*. The Heyfield Sawmill, along with other native hardwood sawmills, purchases sawlogs from VicForests through a range of sales processes, including auctions, expressions of interest (EOI) and requests for proposals (RFP) (VicForests, n.d.). Contracts have been awarded to sawmills with periods between three and four years (VicForests, 2015). As per the change in supply offered to the Heyfield Mill, these contracts are renewed and supply commitments can be reviewed. This is not the case with the Maryvale Mills whose successive legislative supply agreements extend over decades. Where D+ Ash sawlog contracts expire by 2022, Ash pulp log contracts extend out to 2030, the timeframe of the LSA (Figure 16). This has been identified by the Victorian Environment Assessment Council (VEAC) as a problem in its *Fibre and Wood Supply Assessment*, where, if Ash sawlog commitment falls below 130,000m³, then corresponding volumes of Ash pulplogs may fall short of meeting the legislative commitments for Paper Australia Pty Ltd:

The longer term component of the pulplog commitment is contingent on there being sufficient sawlog supply for new TSAs [Timber Sales Agreements] to be issued as current contracts expire and maintain supply of D+ ash logs around the 130,000 cubic metres of 2017/18. VicForests advises that any overall sawlog commitment significantly lower than this will not provide enough 'residual' pulplogs to meet the commitments to Australian Paper. This problem is most acute for the ash sawlogs from which Australian Paper produces high quality paper. (VEAC, 2017, p. 39).

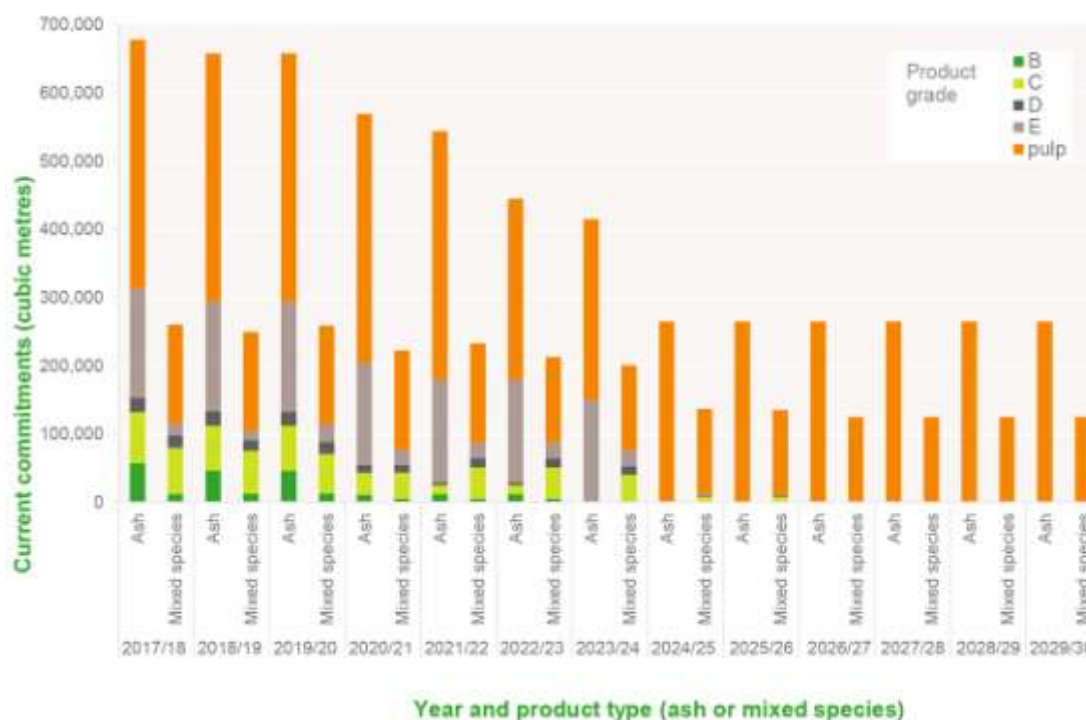


Figure 16. Current sawlog and pullog commitments by product type and grade (VEAC, 2017)

The *Fibre and Wood Supply Assessment* noted that forecast decline in ash sawlog supply would result in additional alternative sources of pullogs being required to meet the current legislative commitments of ash pullogs from state forests until 2030 (VEAC, 2017). This would include areas of forest outside the LSA area. This has already occurred, as indicated by statements presented to the *Parliamentary Inquiry into VicForests Operations*. The Secretary of the Department of Economic Development, Jobs, Transport and Resources, Richard Bolt, advised the *Inquiry* of the need for additional alternative pulp log sources outside of the LSA area, because the current LSA area could not supply the legislated volume of pulp logs to the Maryvale Mills. Mr Bolt said that the company was receiving payment to cover the additional costs of sourcing from beyond the LSA area:

The reason there is provision for some payment to Australian Paper arising from its entitlements to timber under the legislated agreement, the forests wood pulp agreement, which is enshrined, as you know, in legislation, is that there is a requirement that they be supplied with timber from a designated forest area. As you know, the forest area has become increasingly incapable of supplying the full quantum to which they are entitled, and if there is any timber supplied from outside that area that raises costs due to transport, there is an obligation, in a sense, to make Australian Paper good in relation to those increased costs (Bolt, 2017, pp. 44-45).

Under Clause 13(5) of the *Forests (Wood Pulp Agreement) Act 1996*, the Victorian government is bound to substitute pulp logs from another area at an economic cost if pulp logs cannot be obtained from within the LSA area. This includes taking into account any increased cost of delivery, particularly where

these substituted areas are more distant from the Maryvale Mills. Alternatively, the LSA can be suspended if forests within the LSA area are damaged by fire, disease or other any other cause that prevents the state from providing the pulp logs to the Maryvale Mills.

6.2 Obligations to Review and Provisions to Suspend the LSA

The LSA has been viewed by both the Victorian Government and Paper Australia Pty Ltd as binding, where the obligation to provide legislated pulp log volumes as well as procuring them must be met. However, there are provisions in the *Forests (Wood Pulp Agreement) Act 1996* that may allow flexibility to amend or even suspend the obligation to supply the quantity of pulp logs specified in the LSA. Importantly, the LSA requires the company and the government to plan wood supply jointly.

First, the Act requires that the Victorian Government and the Company jointly prepare a Plan of Utilization for the supply of pulpwood based on the Company's estimates of its pulpwood requirements. The Plan of Utilization is to prescribe the areas to be made available under the Act for the obtaining of pulpwood, estimate the yield for each class of pulp log and provide organisation of and obligations with respect to the felling and extraction of pulpwood. These plans are to be prepared no later than the 30th of April in each year. The Victorian Government and Paper Australia Pty Ltd can agree to a modification of the Plan of Utilization (State of Victoria, 1996).

Second, the Act requires that the Victorian Government carry out five-yearly reviews of the LSA area and its supply of pulp logs. In Clause 12, the Act states:

In order to ensure the effective management and utilization of the forests within the Forest Area the Secretary shall carry out a review of pulpwood within the Forest Area at least once in each period of five years while this Agreement remains in force and shall make the results available to the Company (State of Victoria, 1996, p. 10).

It is not clear whether the five-yearly reviews have been conducted, but if so, they have not been published. Since Nippon Paper Industries acquired Paper Australia Pty Ltd in 2009, at least two five-yearly reviews should have been completed in 2011 and 2016. At any event, both the company and the government must be fully aware of the state of the LSA forests, projected supply of pulp logs out to 2030 and the impacts of successive fires over that period, both to the forests themselves and to pulp log supply.

Lastly, the *Forests (Wood Pulp Agreement) Act 1996* features provisions for the Victorian Government to suspend its legal obligations to provide Paper Australia Pty Ltd with the specified quantities of pulp logs from state forests should they sustain damage beyond the control of the Victorian Government. Clause 32 of the Act states:

If any of the forests in the Forest Area or any of the forests identified in any Plan of Utilization which are outside the Forest Area are damaged or destroyed by fire disease or other cause to such an extent that it is impracticable for the Secretary to comply with the provisions of clause 14 [to provide the specified volumes of pulplogs] hereof or that having regard to the situation of those forests and of the Company's mills and other circumstances relevant to such damage or destruction it is impracticable for the Company to obtain under this Agreement supplies of pulpwood of sufficient quantity at reasonable cost whether by extraction by the Company or delivery from the Department to enable production of wood pulp to be carried on in an economic manner then so long as that state of affairs continues –

- a) the Company shall have no claim against the Secretary for the non-fulfilment of its obligations under clause 14 hereof so far as non-fulfilment is due to any such cause;*
- b) the Company's obligations under this Agreement shall be suspended provided that such suspension shall not affect any liability of the Company to make payments due before such suspension occurs;*
- c) any questions or disputes arising in relation to the operation of this clause 32 and the suspension of the Company's obligations shall be referred for determination in accordance with clause 37. (State of Victoria, 1996, pp. 29-30).*

Clause 37 states that, if these matters were to arise, they should be referred to two arbitrators: one appointed by the Company and the other by the Victorian Government. The provisions of the Commercial Arbitration Act are to be applied and the arbitrators are to decide what is fair and reasonable, having regard to the terms of this Agreement and the circumstances existing at the time of the reference.

Since the passing of the Act in 1996, more than half of the state forests allocated for logging within the LSA have been burnt. If the five-yearly reviews were conducted, it can be assumed that the impacts of these fires on pulp log capacity would be quantified. However, the provisions of Clause 32 under the Act appear not to have been activated by the Victorian Government.

6.3 Maryvale Expansion 2008

In 2005, PaperlinX Ltd announced the installation of a new Elemental Chlorine Free (ECF) bleaching plant and an upgrade of its kraft pulpmill at Maryvale (PaperlinX Ltd, 2005). The intent was to improve long term returns, increase the profitability of Paper Australia Pty Ltd and underpin the strategic value of the Maryvale Mills. The company sought to improve the quality of all paper and packaging products produced at Maryvale, while moving the mills into a position of pulp self sufficiency and enhancing environmental performance. They proposed to increase the bleached pulp manufacturing capacity at the Maryvale Mills to around 210,000 tonnes per annum at start-up

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and required a further 200,000 m³ of eucalypt pulp logs per annum (Australian Paper, 2005). PaperlinX Ltd planned that:

All of the additional wood required would be supplied from sustainably-managed plantations as soon as practicable and from existing harvesting activities managed by Vic Forests in the transition phase (Australian Paper, 2005, p. 4).

For existing bleached pulp production to move to 100% plantation supply, PaperlinX Ltd claimed that a further 150,000 m³ per annum of eucalypt plantation pulp wood would be required (Australian Paper, 2005). At the time, the company considered that it was not economically feasible to procure these volumes from plantations and that the additional pulp log supply would be procured from native forests via VicForests until such time as plantation pulp logs were considered feasible.

PaperlinX Ltd referred to a 'transition' period, during which it would move from sourcing its pulp logs from native forests to newly established plantations:

A transitional wood supply would be required between the proposed development start date and availability of new plantation wood. Any transitional pulp wood sourced for this purpose from State Forests would be residual wood resulting from Vic Forests' sustainable saw log harvesting regime. This would be harvested in accordance with the agreed Regional Forest Agreements (RFAs). Hence any transitional wood supply volumes made available by Vic Forests would be met by diversion of woodchips that would otherwise have been exported (Australian Paper, 2005, p. 5).

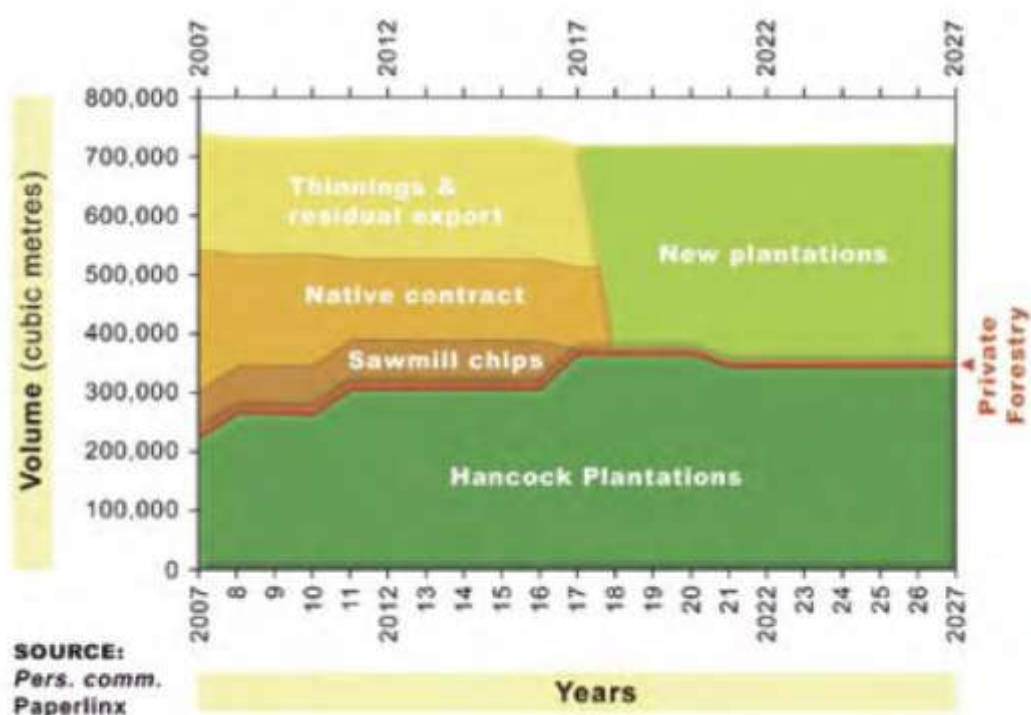
In 2008, PaperlinX Ltd publicly announced that it would phase out its procurement of native forest pulp logs by 2017. Then CEO and managing director of PaperlinX Ltd, David Park, stated:

Through this investment we are reducing our use of pulp logs and other residue from Victorian State managed forests and moving to use 100 per cent plantation sourced fibre for printing and communication papers produced at Maryvale by 2017 (PaperlinX Ltd, 2006, p. 31).

This commitment was reaffirmed in the PaperlinX Ltd 2008 annual report:

This upgrade means that we will move to phase out the use of fibre from state-managed forests for communication papers by 2017 (PaperlinX Ltd, 2008, p. 16).

This strategy was proactively communicated to a number of environment groups at the time, including WWF, The Wilderness Society and the Australian Conservation Foundation (Victorian Forest Alliance, 2006). A collective of environment groups under the Victorian Forest Alliance published a report 'Choosing a Future for Victoria's Forests', in which the strategy of the native forest pulp log phase out was detailed (Figure 17).



Wood Supply to Maryvale (PaperlinX 2006)*

Figure 17. Timeframe for native forest pulp log phase out by 2017 (Source: Victorian Forest Alliance 2006)

The transition detailed the volume of wood being procured by the Maryvale Mills in 2006 from Victoria's native forests. It was proposed that this volume would have decreased from 450,000 m³ to 350,000 m³ by 2009. The mill also sourced volumes of native forest sawmill offcuts estimated to be around 100,000 m³. As the amount of wood available from public native forests decreased, it was estimated that there would be a corresponding increase in the amount of wood supplied by Hancock plantations (Victorian Forest Alliance, 2006). PaperlinX Ltd reached an agreement with VicForests for a 'transitional wood supply' from native forests, between the proposed pulp mill upgrade start date and the availability of new plantation wood. The company argued that additional volumes, made available by VicForests, would be met by diversion of woodchips that would otherwise have been exported (Australian Paper, 2005).

In 2008, Paper Australia Pty Ltd and VicForests commenced their new Timber Sales Agreement to support the Maryvale Mills' expansion:

During May, VicForests commenced delivery of timber under Paper Australia's new Timber Sales Agreement. This forms the first tranche of pulplogs to be supplied by VicForests to support the expansion of paper making at Maryvale. Next financial year an additional supply of at least 80,000m³ of pulplog will be delivered to the Maryvale site. This will redirect log supply from export woodchip markets to domestic processing by Paper Australia, increasing the domestic employment generated through this sale (VicForests, 2008, p. 28).

As the kraft mill and bleaching processing expansion was completed in 2008, the transition plan to sourcing all of its pulp logs from plantations was abandoned and volumes of pulp logs from native forests increased.

7. The Future of the Legislative Supply Agreement

The *Forests (Wood Pulp Agreement) Act 1996* was passed on the premise that the Maryvale Mills would decrease their dependence on pulp logs sourced from native forests in Victoria (Tehan, 1996). In 2006, PaperlinX Ltd committed to a complete transition from native forest to plantation pulp logs by 2017, including additional pulp logs required for the upgrade and expansion of the Maryvale Mills in 2008 (Australian Paper, 2005). The transition did not eventuate. By 2014, under Nippon Paper Industries Co. Ltd's ownership, the Maryvale Mills were sourcing even more pulp logs from native forests than in 2009.

The LSA afforded to the Maryvale Mills has established an exclusive concession regime that the mills' successive owners and managers have enjoyed for over 80 years. By the time of the expiration of the current LSA, this exclusive concession regime would be 94 years in duration. It has bound the State of Victoria to provide fixed volumes of pulp logs spanning over multiple decades, irrespective of major changes in the social and environmental context around the forest ecosystems from which the mills source their pulp logs. The LSA area is no longer able to provide the legislated volumes of pulp logs and VicForests have been required to create an additional Timber Supply Agreement that provides more pulp logs to the Maryvale Mills outside of the LSA area, at an unknown additional cost to the Victorian tax payer (Bolt, 2017).

Since the *Forests (Wood Pulp Agreement) Act in 1996* passed, successive fires have impacted more than half of the area within the LSA allocated to logging. There are provisions in the Act, requiring that the Victorian Government carry out five-yearly reviews of the LSA area and its supply of pulp logs. It is not clear whether these five-yearly reviews have been conducted nor whether they have assessed the impact of the fires. Furthermore, the impact of these fires alone may enable the Victorian Government to enact the provisions under Clause 32 of the Act, whereby it suspends supply of the legislated volumes to the Maryvale Mills. The impact of these fires in the LSA area, as well as the greater Central Highlands RFA area, has been noted by the Victorian Government in its latest review on the Leadbeater's Possum:

The impacts of subsequent fires, in particular the 2009 Black Saturday fires, have further skewed the age class distribution of ash species. A primary challenge facing VicForests and the native forest industry is the exhaustion of the 1939 ash regrowth after 2030, but before

sufficient new forest resources from subsequent regeneration events are suitable to harvest (DELWP, 2017, p. 60).

This alarming admission forecasts the exhaustion of the Ash forests or 'Mountain Forest' estate assigned for logging, whether from an ecological or an industry perspective. This is the point of no return. The native forest logging industry, which relies on the Mountain Forests, effectively has no future beyond 2030.

Paper Australia Pty Ltd appears to have rejected the plans of its previous owner PaperlinX Ltd to exit native forests altogether by 2017 and there is no indication of the company moving to secure alternative 'conflict free' sources of pulp logs for its Maryvale Mills.

The Mountain Forest ecosystem now exists in a highly compromised and fragmented state. Another fire could see the collapse of large areas of these critically endangered forest ecosystems, which will be unable to recover. Therefore, this investigation proposes urgent consideration of the following:

1. that all reviews carried out under Clause 12 of the Forests (Wood Pulp Agreement) Act 1996 should be published immediately;
2. that the annual Plan of Utilization agreed between Paper Australia Pty Ltd and the government should be published for each year starting in 2013 when VicForests announced reductions in Ash sawlog supply;
3. that the proposed Plan of Utilization for 2018, due to be prepared by 30 April, should be published; and
4. that the Victorian Government should invoke the provisions of Clause 32 of the Act and suspend the supply of legislated pulp log volumes, given that more than half of the state forest allocated to logging under the LSA has been impacted by recent fires.

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Appendix A

Maryvale Mills chronology of events from 1993

Date	Industry	Forests and wood supply	Maryvale native forest intake (m ³ /an)*
1993	Amcor acquired APPM Tasmanian operations, becoming Australia's monopoly producer of printing and writing paper with Trade Practices Commission approval		
1996	Amcor committed to expand printing and writing paper production at Maryvale (construction of M5 paper machine). Cost \$400 million	<i>Forests (Wood Pulp Agreement) Act 1996</i> (LSA) passed extending the legislated native forest wood supply from 2004 to 2030 Amcor promised less reliance on native forest wood by 2010	500,000
1998		Central Highlands Regional Forest Agreement signed	490,529
1999	M5 Paper Machine officially opened		462,560
2000	Amcor demerger. Paper Operations (plantations, production, sales, Maryvale Mills) separated into a new ASX listed company PaperlinX	LSA assigned to PaperlinX subsidiary Paper Australia Pty Ltd	443,523
2001		PaperlinX sells Australian Paper plantations to Hancock Victorian Plantations. Price \$152 million	487,774
2002			533,528
2005	PaperlinX approved Maryvale upgrade - new ECF bleaching plant and kraft mill		399,130
2006			353,806
2007		Major bushfires – Great Dividing Range	365,176
2008	Maryvale upgrade completed	Timber Sales Agreement between Paper Australia Pty Ltd and VicForests for supply of native forest pulp logs from outside the LSA area	435,070
2008		PaperlinX announced plan to phase	509,804

out use of native forest wood by
2017

Date	Industry	Forests and wood supply	Maryvale native forest intake (m³/an)*
2009	Nippon Paper Industries acquired Paper Australia Pty Ltd from PaperlinX (including Maryvale mills, LSA, Timber Sales Agreement). Cost \$600 million	Black Saturday bushfires	558,002
2013		VicForests announced reduced ash sawlog supply from 2017-18	526,860
2015	De-inking plant opened. Cost \$90 million with contributions from CEFC \$9.9 million, Commonwealth \$9.5 million, Vic government \$amount unknown	Mountain Ash ecosystem listed as critically endangered by IUCN Leadbeater's Possum listed as critically endangered under EPBC Act	
2016		Greater Glider listed as vulnerable under EPBC Act	
2017	Maryvale waste to energy feasibility study started		
2018		Central Highlands RFA due to expire; extended for two years	

Appendix B

Employment at Maryvale and the logging industry

The Maryvale Mills and the subsidiary managing it, Australian Paper, employ approximately 1,100 people in Victoria (Australian Paper 2013), which equates to around 5% of the 21,222 people employed in Victoria's forest industries in 2012 (Table A1). It is considered a mixed plantation and native forest primary processor of logs, in which, the sector employs a total 1,461 people (Schirmer *et al.* 2013).

Table A1. Total estimated employment by industry sector (FIS and ABS), 2012 (Source: Schirmer *et al.* 2013).

Activity	Hardwood Plantations	Softwood Plantations	Mixed Plantations	Native Forests	Mixed Native & Plantation	Unknown	Total
Growing Forestry Support	44	199	15	121	7	0	385
Primary Processing	110	555	761	270	176	100	1,973
Secondary Processing	32	1,571	21	710	1,461 (1,156 at Maryvale)	683	4,478
Total within Victoria	186	2,325	797	1,101	1,644	783	21,222

The largest percentage of employment in the logging, pulp and timber sector is in secondary processing, which employs 14,384 or 68% of the logging industry dependent workforce. However, Schirmer *et al.* (2013) report that much of this workforce may not be dependent on Victorian grown timber:

A further 14,384 workers were employed in secondary processing industries [...] much of this secondary processing does not depend on Victorian grown timber. It is not possible to more specifically estimate the extent to which the secondary processing sector depends on Victorian grown timber versus wood and fibre sourced from other locations (Schirmer *et al.* 2013, p15).

Examples of secondary processing includes roof truss manufacturing and engineered wood production.

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