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## A REGIONAL WOODFLOW PLAN FOR CENTRAL VICTORIA DESIRABLE REQUIREMENTS, CONTENT AND DEVELOPMENT PROCESS

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PREPARED BY:

HAMISH CRAWFORD  
DIRECTOR AND PRINCIPAL CONSULTANT, CAILUM PTY LTD

FOR:

CENTRAL VICTORIAN FARM PLANTATIONS COMMITTEE

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## **Preface**

An Action Plan for Private Forestry Development in the Central Victorian Farm Plantations region was released in September 2006. The plan identified a number of Actions; development of a Regional Woodflow Plan was identified as a high priority need.

The Central Victorian Farm Plantations Committee has engaged Cailum Pty Ltd to undertake a scoping study and prepare a report on the desirable requirements and content of, and process to develop a Regional Woodflow Plan to best meet the needs of the various stakeholder groups within the region.

This report describes the findings of the study.

Hamish Crawford

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# 1. Background

## 1.1. Context

The need for a Regional Woodflow Plan was identified during the development of the Action Plan for Private Forestry Development in the Central Victorian Farm Plantations region, released in September 2006

The Action Plan highlights the importance of effective strategic planning to maintain the growth of the sector within the region, particularly to sustain investor confidence and ensure that key infrastructure is in place for the future. Under *Focus Area 1.1.1 – Cooperative strategic planning for private forestry (2020 Actions 1 & 2)*, four actions were identified, including:

### ***1.1.1 – Develop a wood flow plan for the region (including wood sourced externally to the region)***

*A sound understanding of the region’s wood flow is necessary for planning key infrastructure (rail and road transport, processing capability) investments. A wood flow plan, developed in consultation with existing timber providers, local government, infrastructure utilities and users will help identify critical infrastructure planning and maintenance requirements. Five yearly reviews of CVFP wood flow plan and associated infrastructure requirements should be conducted.*

Production of a Woodflow Plan was listed as a high priority Action.

## 1.2. Status of regional woodflow planning

At the individual enterprise level, woodflow planning occurs routinely as forest growers plan their operations to maximise returns from managed forest resources, given known or anticipated market constraints and opportunities.

At a regional level, woodflow planning can provide vital information to a range of stakeholders, both within and outside the forest industries. At this level, however, woodflow planning becomes more difficult and necessarily less detailed, as:

- ◆ the enterprise-specific information necessary to support woodflow planning is more difficult to obtain, and
- ◆ co-ordination of management decisions that impact woodflow is problematic when it involves multiple autonomous organisations.

The importance of regional woodflow planning to support industry and infrastructure development, however, has seen a number of woodflow planning studies carried out.

At the national level, this includes a study undertaken in 2002 for the National Forest Inventory that looked at projected woodflows from existing and potential new plantations

in each of the 15 NFI regions over the period 2001 to 2044.<sup>1</sup> The study incorporated three scenarios (high, medium and low) for new plantings.

Regional woodflow planning within south eastern Australia has been fairly limited to date, but a number of planning initiatives provide important background information to help guide the development of a plan for the Central Victorian Farm Plantations region.

### ***Green Triangle***

Green Triangle has undertaken probably the most detailed woodflow planning in this part of the country. This project originated from the regional plantation area GIS datasets collected and collated by SERIC to develop regional fire management maps. Companies (6-7 principle growers) were then asked to supply woodflow projections for the two periods 2004-08 and 2009-15. The project also collected (from companies) projections on woodflow movements (from strategic collection points, rather than the forest gate). Average loadings were then developed for key road systems. A primary objective of this project was to provide sufficient information to local government authorities to assist in the planning for infrastructure construction and maintenance. Regional woodflow data was presented in the LCRDB publication *Limestone Coast: Plantation Timber 2005 and Beyond*.

It is understood that when it is known whether and where the proposed pulp mill(s) will be built, there will be a need to re-visit this woodflow plan. As this process has developed in the Green Triangle, forest growers have become more comfortable with making information available to support regional woodflow plans.

The Green Triangle RPC also participates in an annual process driven by local government authorities to identify and prioritise regional road infrastructure capital works needs, for submission to VicRoads for allocation under their \$5million funding program for regional timber impacted roads. Identification and prioritisation of needs is driven by woodflow estimates and haulage route information prepared by forest grower companies.

### ***Gippsland***

No formal woodflow planning has been done for the Gippsland region. However, the regional socio-economic study carried out in 2004<sup>2</sup> included some broad wood supply estimates to Gippsland mills.

At a more micro level, the Gippsland RPDC is involved in coordinating the annual process of forest growers identifying and prioritising short-term (<5 years) timber related road infrastructure needs, based on woodflow planning conducted by each of the growers. These recommendations are then reviewed by local government, where preferences and rough costings are added, and then submitted to VicRoads for potential funding under the \$5 million funding program to assist local timber impacted roads.

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<sup>1</sup> Ferguson, I.S., Fox, J., Baker, T., Stackpole, D., and Wild, I., 2002. Plantations of Australia – Wood Availability 2001-2044, Consultant’s Report for the National Forest Inventory, Bureau of Rural Sciences, Canberra.

<sup>2</sup> Cameron, J., Gibbs, D., Meynink, R., 2004. A Socio-economic Assessment of the Timber Industry in Gippsland, Victoria, report prepared by MBAC Consulting to Gippsland Private Forestry, Inc.

## 2. Requirements of a woodflow plan

### 2.1. *Scope – start with the end in mind*

In scoping the regional woodflow plan, it is important to address the following questions:

- ◆ Who are the stakeholders with an interest in woodflow plans?
- ◆ Why are they interested?
- ◆ What information (type, scope, degree of detail) would these stakeholders like to see from a woodflow plan?

#### ***Regional woodflow plan – areas of interest***

The key areas of stakeholder interest, in terms of the regional woodflow plan, are summarised in Table 1.

**Table 1: Regional woodflow plan – stakeholder interest**

<b>Sector</b>	<b>Primary area of interest in regional woodflow plans</b>	<b>Desired information (type, scope and detail)</b>
Forest growers	Forest growers are the key data providers for development of woodflow plans (provision of data is covered later in the report). However, growers also see regional woodflow plans as important information resources, providing: <ul style="list-style-type: none"> <li>• knowledge of total regional resource,</li> <li>• an information base to support identification of infrastructure needs, and advocacy for prioritisation of needs,</li> <li>• identification of potential market supply opportunities.</li> </ul>	Forest growers only require fairly broad data from (aggregated) woodflow plans. Some growers suggested that consistency between internal (yield and) woodflow expectations and those presented in regional plans was an important issue consideration. Main data of interest to forest growers were seen as plantation area, species and age-class groupings (not necessarily individual P-years), and transparency in the assumptions used to create woodflow profiles.
Forest management service providers	Silvicultural and plantation maintenance activities are routinely carried out under contract by external service providers. The area of plantation within a region is an indicator of potential demand for forest management services.	Data requirements are not so much from woodflows as the area, species and broad age-class information used to derive woodflows.
Harvesting contractors	Harvesting contractors have a strong interest in regional woodflow plans as volumes of wood harvested are a direct measure for the demand for harvesting services. Harvesting contractors need to make investment decisions about the type of harvesting machinery that might be required in a region as well as the overall level of demand.	Data from regional woodflow plans that can assist harvesting contractors in their business and investment planning include: <ul style="list-style-type: none"> <li>• projected harvest profiles (areas by volume over time – i.e. how much and how long will it last?)</li> <li>• likely harvest ages (as an indicator of average piece size)</li> <li>• some indication of likely harvest terrain (e.g. areas of steep country).</li> </ul>
Transport contractors	Investment in transport equipment; selection of correct truck configurations to match log volumes, log types and	Relevant data from woodflow plans includes projections of log volumes by type by timeframe, identified for different access

Sector	Primary area of interest in regional woodflow plans	Desired information (type, scope and detail)
	suitability for existing and/or planned forest access and haul-road infrastructure.	types and haul road conditions.
Processing industries	Identification of product flows within the region to assist in planning for future processing capacity and market opportunities.	Key data requirements from regional woodflow plans are projections of log volumes by species and type over time, but also transparency in the assumptions and methodology used to derive the woodflows.
Local and state government agencies – infrastructure.	<p>Local governments have a range of interests stemming from regional woodflow expectations, including:</p> <ul style="list-style-type: none"> <li>• identifying and prioritising needs for new and upgraded transport infrastructure along local roads</li> <li>• identifying and prioritising needs for maintenance of existing transport infrastructure along local roads,</li> <li>• management of log haulage routes that impact on local communities (e.g. through increase heavy vehicle traffic through towns).</li> <li>• identifying potential conflicts between school bus routes and log haulage routes.</li> </ul> <p>State government agencies such as:</p> <ul style="list-style-type: none"> <li>• VicRoads (which has management responsibility for Victoria’s major road transport network) and allocation of funding to local governments for timber impacted roads.</li> <li>• Department of Infrastructure (which is responsible for planning of Victoria’s transport system and projects such as Rural school bus safety program).</li> </ul>	<p>Funding for timber industry related infrastructure development and maintenance is predominantly through grant programs and is invariably a competitive process, as different regions bid against each other for access to funding. The competitiveness of the bid is enhanced when it is supported by strong and credible data.</p> <p>The ideal information base to support timber industry transport planning should enable planners to identify the total tonnages over what roads, how often and in what season. However, data at a more aggregated level is also very useful, providing:</p> <ul style="list-style-type: none"> <li>• information is up-to-date. Woodflow plans can become obsolete without a process</li> <li>• woodflows are representative of whole timber industry</li> <li>• there is transparency of methodology and assumptions to give credence to published woodflows.</li> </ul> <p>Tie-ins with specific transport routes identified in TIRES reports have been useful in the past.</p> <p>Timeframes of interest vary depending on the task:</p> <ul style="list-style-type: none"> <li>• for new/upgraded infrastructure, planning lead times (to enable design, funding and construction) can be as much as 5-10 years</li> <li>• for maintenance of existing infrastructure, planning horizons are 1-2+ years.</li> </ul>
Victoria Police	Traffic flows, demands on infrastructure that might impact on road conditions (potentially causing safety hazards), identification of potential new areas of population development (e.g. to service expansions in forestry activity) and employment (there are direct correlations between employment levels and crime).	Key information requirements include the number of truck movements along designated routes and through population centres and the proximity of new plantation areas to population centres.
Other	Other interests include those looking to identify potential business opportunities either as suppliers to the forest industry or	Information types and level of detail can be variable. Key factors include currency of information and transparency and credibility

Sector	Primary area of interest in regional woodflow plans	Desired information (type, scope and detail)
	<p>as markets for forest products, including by-products. An example given includes the regional availability of wood wastes as a potential source of renewable energy.</p> <p>Fire management authorities have a direct interest not so much in woodflows but in the location and extent of plantation assets across the region.</p>	of woodflow profiles.

Source: Discussions with stakeholder interests.

### 3. Woodflow plan development process

#### Woodflow planning techniques

There are a number of approaches to woodflow planning currently being used in the industry. These range from simple simulation models that project woodflows from stands assuming a fixed management regime (e.g. thinning & harvest ages) to optimisation models of varying sophistication.

At the simplest end of the optimisation spectrum, linear programming is used to maximise a particular management objective (most commonly the net present value of future cashflows) subject to a range of management constraints such as even woodflows, maximum and minimum clearfell ages, and ongoing sustainable yield. This process seeks to identify optimal woodflow profiles essentially up to the point of the forest gate.

At the more sophisticated end of the spectrum, new software<sup>3</sup> allows optimisation models to incorporate spatial variables such as haul distance and cost, different product outturn alternatives to satisfy individual mill requirements, location of mills and differentials in mill-gate prices to extend the optimisation beyond the forest gate and incorporate log and mill allocation decisions.

These sophisticated models have their greatest strength at the individual enterprise level, where individual corporate and management objectives can be readily included.

#### Data sources

At whatever level, woodflow planning requires access to a range of forest and industry data. Generally speaking, the more sophisticated the modelling framework, the more detailed the data requirements.

However, all woodflow models involve either data or assumptions on the same specific suite of parameters. These are described in Table 2.

<sup>3</sup> The current industry standards in state of the art woodflow modeling software are Remsoft's Woodstock and Allocation Optimizer products. Other products such as FOLPI and internally developed optimisation or scheduling systems are gradually being displaced by Woodstock-based products.

**Table 2: Key data influencing woodflow planning**

<b>Parameter</b>	<b>Description of information relevant to woodflow planning</b>	<b>Potential sources and comments on availability and relevance to regional woodflow planning</b>
Plantation areas	Geographic location and net planted area. The fundamental parameter guiding woodflow planning.	Original data from forest growers in GIS format. Has been collected previously within the Central Victorian region but requires regular updating as new areas are planted and mature areas are harvested (some of which might not be replanted). Can be validated externally through remote sensing imagery (photo, satellite). Companies generally supportive of providing base area files. Process to ensure currency requires consideration.
Species	Tree species influences a range of factors important to woodflow planning, including management regimes (type and timing of harvest events), log product outturns, volume production.	Original data from forest growers (GIS format, with area data). Can also be validated externally. Again, companies generally supportive of providing data.
Age-class	Age-class is the key indicator of timing of woodflows	Original data from forest growers (GIS format, with area data). More difficult to validate externally at the detailed level. Companies generally prefer to ‘blur’ age-class data by providing age-class groups rather than specific age classes. 5-yearly age class groups probably offer sufficient resolution for regional planning purposes.
Condition	Condition can refer to a number of factors that have the potential to influence log volume production and/or product outturns: <ul style="list-style-type: none"> <li>• health, vigour &amp; nutritional status all influence a given stand’s capacity to meet the growth potential of the site – predominantly influences log volumes.</li> <li>• pruning &amp; thinning status (stand condition and timing of management interventions) – can influence both volumes and the type of log products likely to be produced from a given site (and therefore the location of respective market destinations).</li> </ul>	Although this information would routinely be collected and maintained by forest growers, it is less likely to be available to a regional planning project. Convention to assume all stands in healthy condition and receiving on-time management probably a reasonable basis for regional planning project. Impacts could be tested using sensitivity analysis.
Productivity	Site productivity can vary markedly even within a locality as subtle changes in site characteristics can significantly impact volume production and therefore woodflows from a given site.	Again, this information would routinely be collected and maintained by forest growers, it is less likely to be available to a regional planning project. External datasets and other regional planning exercises could be used to support regional woodflow planning project. Impacts of productivity variation could also

<b>Parameter</b>	<b>Description of information relevant to woodflow planning</b>	<b>Potential sources and comments on availability and relevance to regional woodflow planning</b>
		be tested through sensitivity analysis.
Slope	Slope influences management regimes (see below). Fewer thinning events are scheduled on steeper sites, therefore influencing woodflows. Slope can also influence access and haulage configurations (which in turn influences truck loads and numbers of truck movements).	Once location of plantations is known, digital elevation models can be used to identify locally steep areas. Information may be available from growers, but can be developed with sufficient accuracy for the purposes of a regional woodflow plan through external datasets.
Silvicultural regime	Plantation forests can be managed on a range of rotation ages, depending on the species, market opportunities and management objectives. Regimes that focus on sawlog production will also entail thinning at specific age intervals. Log flows from a particular plantation are therefore sensitive to the number and timing of thinning events and the timing of final clearfell (the management regime).	For short rotation hardwood plantations, silvicultural regimes are straightforward, with timing of clearfell being the key determinant. Although each forest grower will optimise clearfell timing around a range of management objectives and constraints, this occurs within a fairly narrow band that is well understood within the industry. For sawlog plantations and native forests, regimes are likely to be more variable. While detailed regimes are unlikely to be available from individual growers, generic and sub-regional standardised regimes will probably provide sufficient resolution for regional planning purposes.
Product outturns	Product outturns for short rotation hardwood plantations are simple – everything goes as pulpwood. But for softwood plantations and native forest, thinning or harvesting events produce a variety of log products, each of which could have a different market destination.	This is mostly an issue for softwood plantations and native forests. At an individual grower level, product outturns (volumes and proportions of particular log types) from specific thinning or harvesting events are routinely estimated though pre-harvest inventories. Even then actual production can vary considerably from pre-harvest estimates. For the purposes of regional woodflow planning, a more generic approach will be needed, but it needs to be transparent and supportable.
Market destinations	Location of processing centres for different log types; influences selection of haulage routes.	Location of processing centres is well known, and mill capacity and log-type specifications are fairly readily available.
Haulage routes	Specific routes including suitability for different truck configurations (e.g. B-double or semi trailer; each has different carrying capacity, therefore influencing number of truck movements on specific routes).	Forest growers or mills (depending on the point of sale) will generally nominate preferred haulage routes in consultation with haulage contractors and local authorities. There should be little difficulty in identifying relevant haulage routes for the purposes of a regional woodflow plan.
Future planting scenarios.	This incorporates re-planting of harvested sites and projected new plantings. Includes	New plantings will impact on woodflows in the medium to long term. It is unlikely that

Parameter	Description of information relevant to woodflow planning	Potential sources and comments on availability and relevance to regional woodflow planning
	species, planting rate (area by period), locations (cells).	individual growers will be able to provide anything more than broad intentions for new planting. In the context of a regional woodflow plan, this is probably best dealt with through sensitivity testing around continuation of historical planting levels.
Native forest woodflows	Site specific data (such as harvestable area, species, age-class, productivity) is unlikely to be available with any great accuracy.	Probably the best guide for native forest woodflows will come from analysis of historical data and stated harvest intentions of growers (particularly DSE).

### Scoping of woodflows to be considered

Woodflows relevant to a regional plan comprise three basic types:

- ◆ Woodflows within the CVFP region – from existing and proposed plantations, and from native forest (public and private) to processing industries located within the region. Also, movement of outputs from wood processing industries within the region.
- ◆ Woodflows into the region - from plantations and native forests outside the region
- ◆ Woodflows out of the region - from forests within the region to processing industries in other regions.

### Issues with further data acquisition

Acquisition of data to support the development of regional woodflow projections will require the support of the key data providers (i.e. the forest growers).

All growers contacted during this scoping study were supportive of providing electronic area files, but with forest stand data generalised to a degree to protect commercially sensitive information. For example, companies would prefer to provide age-class information in the form of age-class bands rather than specific P-years.

Some forest growers were unable to be contacted, preventing their level of support to be gauged. However, as indicated in Table 2 above, there are potentially a number of sources of data that the developers of the woodflow plan may access. So, even if support from forest growers in terms of data provision is less than 100%, this should not be an impediment to development of a robust regional woodflow plan.

### Ongoing maintenance and relevance of a woodflow plan

The level of detail required from a regional woodflow plan that meets stakeholder needs is not as great as would normally be required of individual enterprise plans. However, a number of stakeholders mentioned the importance of keeping woodflow plans up to date to ensure currency and reliability, and for transparency in the methodology and assumptions

used to produce woodflow profiles. Emphasis, therefore, should be placed more on transparency and simplicity to keep the plan updated.

### **Level of sophistication for a regional woodflow plan**

Sophisticated optimisation approaches used at the enterprise level may not be warranted for a regional plan for two key reasons:

1. The data available to a regional planning project are unlikely to be detailed enough to support sophisticated optimisation models. For example, optimisation models are often used to test the impact of small changes in thinning or harvest age on wood flows and profitability – if age-class data is limited to 5-yr bands, this type of analysis cannot be performed.
2. Optimisation modelling is used primarily to identify the management decisions that lead to optimal resource management. In the context of a multi-enterprise plan, this is essentially a redundant exercise – individual organisations will make management decisions that optimise their own objectives, rather than those of a regional collective.

Instead, a more suitable approach to regional woodflow planning would likely involve simulation modelling based on pre-determined and justifiable management scenarios. This would provide a number of benefits:

- ◆ Woodflow profiles which are based on clearly defined and documented management assumptions, where sensitivity testing can be used on key management or resource factors.
- ◆ A framework that allows stakeholders to further develop the woodflow plan results to suit their own specific needs.
- ◆ Modelling can be based on a ‘spreadsheet’ type of analysis, allowing for simple replication and updating and obviating the need for expensive software that might hinder ongoing maintenance of the woodflow plan.

Inevitably, data collation and analysis will require use of GIS software. While this will involve a degree of sophistication (and indeed provides some major opportunities in terms of visual presentation of results), there are industry standard formats that can be used to record spatial data in order to simplify periodic updating, such as ESRI shapefiles or MapInfo tables.

### **Development process for a regional woodflow plan**

Development of the regional woodflow plan will involve a number of steps:

- ◆ Acquisition of data – this involves resource data (physical and spatial data relating to the forest resources) and management data (regimes, products, markets, future planting assumptions).
- ◆ Verification and integration of data – verifying the accuracy of data obtained (this could involve some field verification) and developing protocols and assumptions for integrating data from various sources (e.g. matching spatial resource data sourced from different growers).

- ◆ Development of a modelling framework that facilitates rigorous analysis of data, transparency in process and assumptions, clear and meaningful presentation of results and the capacity for simple updating and ongoing maintenance.
- ◆ Data analysis and development of woodflows, as well as sensitivity testing of key parameters.
- ◆ Discussion of preliminary results with forest growers to “ground-truth” the woodflow outcomes and identify (and document) any areas of contention.
- ◆ Presentation of results (maps, tables, data summaries) that facilitate stakeholder understanding and use, ideally in a way that provides some continuity with earlier work (e.g. haulage routes/roads previously identified in the TIRES work).
- ◆ Full documentation of data, assumptions and methodology – data files and models, as well as text reports - including (ideally) a step-by-step process for periodic updating of the woodflow plan.

## **Appendix 1 - Consultancy Brief**

### ***Central Victorian Regional Woodflow Plan - Project Scoping Study***

The Central Victorian Farm Plantations Committee has engaged Cailum Pty Ltd to prepare a report on the desirable requirements and content of, and process to develop a Regional Woodflow Plan which will best meet the needs of the various stakeholder groups within the region.

The need for a Regional Woodflow Plan was identified during the development of the Action Plan for Private Forestry Development in the Central Victorian Farm Plantations region. Production of a Woodflow Plan is a high priority Action.

The study is expected to examine or refer to:

- ◆ woodflow plans developed or in development in other regions;
- ◆ the adequacy of existing data and issues associated with deriving or acquiring further required data and information;
- ◆ the needs of local government and State agencies responsible for the provision and maintenance of transport infrastructure;
- ◆ the needs of industry in planning the siting, establishment, management, harvesting, transport and processing of the wood resource;
- ◆ the degree of sophistication required of the Plan to meet these needs;
- ◆ the best way to ensure the Plan can be maintained, and kept relevant in response to changing circumstances; and
- ◆ any other matters that arise in the course of your investigations and consultations.

The scoping study and ultimately the Plan will consider transport of wood from both plantation and native forest, and wood sourced outside the region. It is expected however that the issue of most relevance will be the movement of wood from existing and proposed plantations within the region.

The report of the scoping study is likely to form the basis of the consultant's brief for the Regional Woodflow Plan Project.

Completion of the study and submission of the final report should occur by 15 December 2006.