## DEROGATION APPLICATION: HEXAZINONE

### A. GENERAL REQUIREMENTS

<table>
<thead>
<tr>
<th>Application Submission Date</th>
<th>19/07/2013</th>
</tr>
</thead>
</table>
| Name and contact details of certification body requesting a temporary derogation | SCS Global Services  
2000 Powell Street, Suite 600, Emeryville, CA 94608 USA |
| Active ingredient for which derogation requested | 3-cyclohexyl-6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4 (1H,3H)-dione, known as Hexazinone |
| Trade Name and formulation type of the Pesticide | Velmac Controlled Release (CR)  
- Controlled release granules  
- Manufactured by Macspred  
  Velmac Granules (G)  
- Controlled release granules  
- Manufactured by Macspred  
  Grunt 750 WDG  
- Water dispersible granule  
- Manufactured by Nufarm  
  HexMac  
- Water soluble powder  
- Manufactured by Macspred |
| Method of application and application equipment | Velmac CR and G are primarily applied manually as a spot over each tree using a calibrated Weed-a-Meter applicator. Both are also used for broadcast release where releasing by helicopter at times when target weeds are widespread and a spot application will not give adequate control. Spot application is the preferred method. Both Grunt and HexMac are applied aerially by fixed wing or helicopter. When water volumes are less than 75 litres/hectare, CP or DR nozzles are used. For water volumes greater than 75 litres/hectare, Accuflow nozzles are used. |
| Common or scientific names of the pest species | Tasmania  
Native and introduced grasses and woody weeds including: Garnia grandis (cutting grass); Lomandra longifolia (saggs); Acacia delbata (silver wattle); Acacia mearnsii (native willow); Muehlenbeckia gunnii (Macquarie vine); Jacobaea vulgaris (ragwort); Pteridium esculentum (bracken); Rubus fruticosus (blackberry); Ulex europaeus (gorse); and Cortaderia species (pampas grass).  
Green Triangle (Victoria and South Australia)  
Agricultural weeds including: Ehrharta calycina (Veldt grass); wild oats; Holcus lanatus (Yorkshire Fog grass); Phalaris aquatica (phalaris); flatweed; Oxalis spp. (sorrel); Conyza sumatrensis (fleabane); Pteridium spp. (bracken); and Rubus fruticosus (blackberry). |
| Name and FSC certification codes of certificate holders requesting a temporary derogation | Timberlands Pacific Pty. Ltd. (applicant FME) |
| Scope for which a temporary derogation is being requested | Tasmania  
The Taswood Estate consists of approximately 46,000 hectares of *Pinus radiata* plantation located across the north of the state. |
Excluded from the derogation scope are streamside reserves and other buffer areas. As these areas can be small and are highly localised they are only shown on compartment level maps. (refer to supplied examples)

Green Triangle
The Green Triangle Forest Trust (GTFT) Estate consists of approximately 42,000 hectares of *Pinus radiata* plantation located in the Green Triangle border region of South West Victoria and South East South Australia.

1. **Demonstrated need and geographical scope**

Explain how the proposed use complies with the criteria for need, including the consideration of non highly hazardous alternatives and preventative silvicultural measures.

- The pesticide is used for protecting native species and forests against damage caused by introduced species or for protecting human health against dangerous diseases, OR
- Use of the pesticide is obligatory under national laws or regulations, OR
- **Use of the pesticide is the only economically, environmentally, socially and technically feasible way of controlling specific organisms which are causing severe damage**

as indicated by documented evidence of current feasibility study reports: field-trials of alternative non-chemical or less toxic pest-management methods, cost-benefit analysis, social and environmental impact assessment.

Please indicate briefly the usual practices for harvesting and re-planting/ regeneration practices, in particular the method of harvesting (e.g. clear-cut, using a mechanized harvester, etc), which tree species are grown, the average time between successive rotations and harvest, and methods for site preparation.

a) Statement of the pest problem: in not more and 500 words, state the nature of the pest problem for which you are seeking a derogation including information on whether the pest species are native, endemic, exotic, common etc. Include in your statement an estimate of the damage by area (%ha) and or the dollar value of the potential damage to your operation from the pest problem, justifying your estimate with supporting evidence

**Statement of the problem**

Timberlands Pacific Pty Ltd (TPPL) use Hexazinone for post plant control of a variety of common native and introduced agricultural and woody weed species as listed above.

Within the Taswood and the Green Triangle Forest Trust (GTFT) Estates, the dominant weed species compete with the crop trees for light and water. Nutrient competition is a secondary issue. Both these regions have winter/ spring rainfall patterns. Over the dry summer months, prolific growth of herbaceous and woody species, rapidly swamp newly planted trees causing severe growth retardation and in some years extensive mortality. High levels of summer weed growth can also cause significant access impediments to the following silvicultural operations, with the associated unacceptable health and safety implications, and unnecessarily increase the fire hazard.

Hexazinone is a residual, broad spectrum herbicide. *Pinus radiata* will tolerate a direct application of Hexazinone, even as a newly planted tree, making this chemical a very effective tool for reducing competition from a wide range of weed species.

The Taswood Estate is located on state owned land known as State Forest. Forestry Tasmania, the government run forestry organisation and landowner, has prohibited the use of many residual chemicals on State Forest as well as restricting the application methods of others. Prohibited chemicals include potential ‘alternatives’ to Hexazinone such as Terbuthylazine, and chemicals such as Sulfometuron methyl, Triclopyr and Picloram which are restricted to ground application only; this is not logistically possible on many Taswood coupes.
Of the 84,000 hectares (Taswood Estate 46,000 ha and GTFT Estate 42,000 ha) under management by TPPL, approximately 400 ha in Tasmania and 600 ha in the Green Triangle are treated with Hexazinone annually. This equates to approximately 40% and 60% of each estate’s annual establishment program being treated.

b) Comparative cost/ benefit analysis (including the social, environmental and economic aspects or costs) of using the requested pesticide versus at least five non-highly hazardous control alternatives, justifying the analysis and conclusions with supporting evidence such as field trial reports, IPM reports, EIAs, SIAs etc. (If the costs cannot be quantified compare the disadvantages and advantages of different methods.)

The TPPL Social Impact Assessment indicates that due to the rural location of the two Estates, they are mostly surrounded by farming and forests. In Tasmania, the farming is a combination of cropping and grazing and the forests are mostly native available for wood production with some Eucalyptus nitens plantations. In the Green Triangle, the farming is predominately grazing. However, Pinus radiata and Eucalyptus globulus plantations are the predominant surrounding land use. Both of these land uses are sensitive to weed invasion and as ‘good neighbours’, TPPL has a legal, social and ethical obligation to restrict weed loads to minimise negative impacts on our neighbours. This becomes a legal requirement when the weeds are declared species¹.

Alternatives to Hexazinone treatment

To date the use of Hexazinone remains TPPL’s most cost effective and reliable treatment for controlling post plant weed growth. TPPL have developed alternatives to Hexazinone that are effective under specific circumstances; all are limited in their application by health and safety considerations. TPPL uses a highly site specific approach to all weed control; each site is assessed for weed type, coverage and height as part of the planning process. Hexazinone is only used when the options below have been reviewed and found to be inappropriate or likely to be ineffective.

Manual brush cutting

Effective on tall (greater than 2m) single stemmed woody weeds that do not coppice such as silver wattle. It is currently used on sites where any type of chemical application is inappropriate such as isolated coupes where it is uneconomic or where there are restrictions on chemical use. Manual brush cutting is cost prohibitive for multi stemmed species and/ or there are unacceptable health and safety risks from thick vegetation. Macquarie vine or blackberry if present, poses a significant tripping hazard. It is however comparable in cost to aerially applied Hexazinone for isolated blocks or blocks where aerial access is difficult at $550- $650/ ha.

Mechanical slashing

Undertaken using a purpose built mulching head attached to a small bobcat type machine. It is very effective on coupes with thick cutting grass; where weed growth is restricted to the interrow gap. This method has been used in the past by TPPL for older sites where weeds were well established and too thick for chemical control or other control means, or there were chemical restrictions. A single slashing operation will generally limit weed growth for one growing season. Due to ground clearance, machine stability and fire risks, this method cannot be used on steep or rocky terrain. Operational costs are higher than early chemical control at between $480- $700/ ha.

¹ Declared by the various state based legislation as ‘noxious’ weeds that must be controlled or eradicated.
Photograph 1: Mulched inter rows. All weeds within the 3m wide row are removed at ground level. No control of weeds within the rows.

Photograph 2: Bobcat sized Mulcher in action

Clopyralid

Available for forestry use under the commercial trade names of Clomac or Archer. It is not on the FSC Highly Hazardous list of Pesticides. It is effective where the weed spectrum is dominated by woody weeds such as wattle or broad leaf weeds such as Fleabane; it is not effective for grass control. Clopyralid application costs on average are $440/ ha.

It must be noted however, that Clopyralid is not suitable or effective for use on native and introduced grasses such as Garnia grandis (cutting grass) Lomandra spp, Macquarie Vine, Nassella trichotoma (Serrated Tussock), Pteridium spp (Bracken species), or Rubus fruticosus (Blackberry).

Photograph 3: Severe native willow infestation. There is 100% weed cover at similar heights to the planted Pinus radiata. Aerial treatment with Hexazinone was the preferred option, but was reconsidered due to the presence of surface water and the running streams feed into a downstream town water supply.

Photograph 4: Photograph taken 8 weeks post treatment with 3 ltr/ ha Clopyralid. Results are less than optimal, growth of target weeds has been retarded but they have not been completely killed.

Haloxypof

Available for forestry use under the commercial tradename of Verdict. Haloxypof is used as an alternative to Hexazinone where the weed spectrum is dominated by grasses to provide for knockdown control of specific grasses and broadleaf weeds. Verdict has limited aquatic mobility. Haloxypof application costs on average are $320/ ha.
Haloxyfop has limited residual properties and is not suitable or effective for use on *Oxalis spp.* (Sorrel) or *Holcus lanatus* (Yorkshire Fog Grass) which are controlled by Hexazinone.

**Hand pulling**

Only possible when weeds are very small and isolated, i.e. isolated Ragwort plants found within a newly established plantation. It is very labour intensive and difficult to monitor and maintain productivity within the crew due to the nature of the work. This method has been used within the Estates but there have been health and safety ramifications from strained backs, hands and shoulders. Costs vary considerably but average over $500/ha.

**Strip spraying**

Hand spraying in strips between rows of trees is only economically feasible within 150m of a formed road, due to equipment limitations. Results and costs can be highly variable and operator related. There are also environmental and operational risks, as onsite supervision is intermittent (it is uneconomic to have a staff supervisor on site throughout all the operation, usually and hour or so per day or every 2 days at most). Chemical application includes mixes of Glyphosate and Triclopyr and so operators must be very careful not to contact the crop trees; as it will scorch or cause mortality.

2. **Stakeholder consultation**

All applications for derogations shall present the responses of the consulted stakeholders, including opinions and original comments on the need to use the ‘highly hazardous’ pesticide in the region concerned and on adequacy of control mechanisms to prevent, minimise and mitigate negative impacts on human health (of forest workers and the public) and the environment. The application shall also demonstrate how stakeholder comments were taken into account in its derogation application.

A written letter of support by the Board of Directors of the FSC National Initiative for the territory concerned shall normally be considered sufficient evidence of national stakeholder support for the application.

a) **Description of the nature of the information provided and consultation undertaken with potentially affected groups, and local communities (e.g. neighbours on directly adjoining land) who use managed forests for various purposes (as a source of groundwater, for hunting, fishing or gathering medicinal or edible plants) and those stakeholders with the more general interest regarding the use of pesticides**

Information outlining TPPL’s use of Hexazinone, the selection criteria for when it’s used description of management and buffers, etc is detailed in the TPPL Forest Management Plan. This document has been available for public comment since 1\textsuperscript{st} May, see [http://www.tppl.com.au/vdb/document/193](http://www.tppl.com.au/vdb/document/193). TPPL has regular and meaningful contact with affected neighbours prior to any operation taking place. Neighbour or downstream water users concerns are always addressed prior to the operation commencing, as per TPPL standard operating procedures.

b) **Description of the consultation mechanism (i.e. public notices in local newspapers or on local radio stations, letters sent to potentially affected persons, meetings, field observations etc) used to inform, consult and receive significant feedback from the majority of the potentially affected persons.**

A full copy of the derogation with supporting material will be made available on the FSC Australia and TPPL website with a call for comments followed by a 45 day comments period.

Direct stakeholder contact via email, as per the TPPL Stakeholder Register, will also be undertaken.
c) Evidence of balanced stakeholder consultation with potentially (directly or indirectly) affected persons or groups of individuals, local/ regional environmental organisations (non-governmental organizations), local/ regional government (environmental authorities), representatives of the local community (e.g. contacted at community meetings), representatives of the forest industry

After consultation period the derogation and the comments submitted will be referred to the pesticides Policy Advisory Group who will make recommendations to the Board of FSC Australia who may choose to endorse the application.

d) Where FSC National Initiatives exist, there is evidence that the NIs were given the option of carrying out the consultation process including a written offer of covering the costs associated with the consultation process). Evidence must be provided that the NI formally declined this option.

A derogation for Hexazinone is already in place for Australia, however no stakeholder consultation has been conducted by FSC Australia. TPPL will advertise its derogation application through the FSC Australia website.

e) A summary of the comments received and any responses made is presented for each stakeholders category (refer to (c) above. Explanations should be given of how stakeholder concerns were addressed. Where necessary, the original stakeholder comments may be requested.

A summary of the comments received and any responses made by stakeholders will be summaries for each stakeholder category. Any concerns or raised will be addressed and the outcomes will be included in the summaries.

The original stakeholder comments will be kept and filed within the existing TPPL Environmental Management System. These can be made available to the certifier and FSC as requested.

B. FOREST MANAGEMENT ENTERPRISE SPECIFIC REQUIREMENTS

<table>
<thead>
<tr>
<th>Forest Management Enterprise</th>
<th>Timberlands Pacific Pty. Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSC Certificate Registration Code:</td>
<td>Pending</td>
</tr>
<tr>
<td>Location/ Region:</td>
<td>Northern Tasmania and Green Triangle region of South Australia and Victoria</td>
</tr>
</tbody>
</table>

1. Specific controls, to prevent minimise and mitigate hazards

The derogation shall specify the controls that have been implemented to prevent, minimise and mitigate the hazards associated with the use of the pesticide, for example restrictions related to sensitive areas (e.g. groundwater zones or wildlife habitats), weather conditions, soil types, application method, water courses, etc. If the specified formulation is considered to reduce the level of hazard then the information on which this claim is based shall be presented, and the applicant shall provide credible independent, third party support for the claimed reduction of hazard. The applicant shall indicate all pesticides in the formulation, including other active ingredients in mixtures.

a) Description of the nature of the controls that will be implemented for the use of the derogated pesticide to mitigate and minimise any deleterious effects on ecological, social and economic values within and beyond the management unit. References to national laws/ regulations on safety measures should be made and any additional safety measures to supplement these laws/ regulations should be stated. Include information
Herbicide quantity and annual treatment area

A thorough IPM process is used as the starting point for all weed control. If alternatives to chemical application are found to be inappropriate or ineffective, then the use of chemicals is assessed for the least toxic option. Factors considered include proximity to surrounding water tables and stream flows, proximity of downstream intakes and the lowest rate/ha applicable (spot vs. broadscale application) for the weed species present. Site specific Spray Plans and Maps are developed for each coupe that highlight: the treatment area; environmental features including surface water and nearby streams; site hazards such as powerlines, roads, mines shafts; chemical control measures including no spray buffer widths (highlighted clearly on Spray Maps); surrounding vegetation including native vegetation and private property land use; location of nearby buildings and houses; location of traffic control signage; and water sampling locations.

All chemical applications require the surrounding neighbour to be notified prior to operation commencing. In Tasmania a state government administered database, TheList, is consulted for the address and ownership details of all properties within 200m (or within line of sight) of the treatment area. Ideally a written letter is sent to the neighbour, outlining details of the types and quantities of herbicide to be used as well as any withholding periods. Neighbours are also encouraged inform us about any water intakes (whether registered or not) that may be impacted upon. In the Green Triangle no such databases are available, local knowledge and door knocking is used to identify affected properties within 200m of the treatment area. Neighbour contact details and addresses are then entered onto the TPPL Stakeholder Register for future reference.

In general within the TPPL managed Estate, Hexazinone is applied either as a granular controlled spot release using a Weed A Meter (WAM) applicator, as a controlled release granular or granular application using a helicopter or as a liquid applied with fixed wing aircraft or helicopter. All aerial herbicide operations are strictly monitored by TPPL staff, which remain on site throughout the program. Weather readings are taken hourly, or ½ hourly if conditions are approaching maximum allowable limits and the site records are kept on the compartment file as evidence. In all districts all spray plans and maps are peer reviewed by other TPPL staff and the application contractor prior to the operation commencing and signed off by the local Tree Crop Manager.

TPPL plantations rotations are between 25-35 years. Hexazinone application generally occurs once or occasionally twice in the first few years post establishment; any long term residual or cumulative contaminants in the soil organic matter will be negligible.

Tasmania

All herbicide application is governed by the legally binding Forest Practices Code (2000), the Code of Practice for Aerial Spraying (2000) and the Code of Practice Ground Spraying (2001). Both spraying Codes of Practice (COP) are implemented and enforced by the Department of Primary Industries, Parks, Water and Environment Spray Referral Unit. The requirements of the Tasmanian Aerial Spraying COP are among the most stringent in Australia and are used as the minimum standards in TPPL’s internal standard operating procedures.

WAM application is the preferred method and is used when there is either significant weed germination that will, in all likelihood, overtop (causing light and water competition) the crop
trees. WAM application of 2.5 grams/ tree (between 2 to 2.75 kg/ ha) will control weeds within a circle of approximately 1m to 1.2m diameter around individual trees. Spot releasing with controlled release Hexazinone may also be used if there are no competing weeds present on a site at time of assessment but the immediate surrounding areas have a history of significant weed growth (i.e. all coupes surrounding a re established area have had weed issues). If this is the case, a lower rate of 1.7 grams/ tree (1.36 to 1.87 kg/ ha) is used thus reducing chemical quantities and also reducing the risk of chemical movement. Weed a meter programs are undertaken over the summer months, when in Tasmania, the occurrence of large rainfall events which might wash the product overland is low as are local ground water/ water tables. Typically WAM programs are between 200- 350 hectares each year.

Broadscale aerial application of Velmac (150g/ kg active hexazinone) is only required when Macquarie Vine is present among the weed species or competing weed coverage exceeds 75% of the site. As a first preference, controlled release granular formulations applied at between 18 to 25 kg/ ha (depending on weed species and coverage levels) are used. Visual evidence of chemical activity will be seen approximately 6 months post application. If weed competition has increased to an extent where more immediate control is required, (this has occurred on only 1 coupe since 2008) liquid Hexazinone products at maximum label rates are necessary. The activation period is much shorter at between 1 and 3 months. On all aerial applications, boundary buffer widths are at least doubled to that recommended in the COP for aerial spraying and increased to 50m either side of flowing streams. Where there are known water intakes within 1 km down stream of a proposed aerial hexazinone treatment, neighbour approval must be obtained. Aerial herbicide programs are conducted either in autumn, March or April, in conjunction with the preplant spraying programs or in spring, September October. Since 2008 approximately 60 hectares has been released with granular and 30 hectares with liquid hexazinone products.

Green Triangle

In the Green Triangle, the timing of weed control is closely correlated to its effectiveness. Many herbaceous species (such a Phalaris grasses) germinate in spring and by mid summer have reached heights greater than 500 mm. These prolific species have high water demands and compete with newly planted seedlings for both soil moisture and light; poor weed control over this time results in significantly retarded seedling growth which will persist through the subsequent growing seasons.

To maximise moisture and light availability to the seedlings, control is required across the whole site, making a broadscale release the preferred method. TPPL internal operating procedures stipulate that the highest legislative requirements or best management practices between South Australia, Tasmania and Victoria will be adopted across all managed areas; to this end the prescriptions in the Tasmanian Code of Practice for Aerial Spraying (2000), including neighbour notification obligations and expanded buffers are used far exceeding local legislative requirements.

As the dominant soil profiles are characterised by sandy loams, strict adherence to labelling instructions for the different state requirements must be ensured. Aerial application of Grunt or Hexmac (750g/ kg active hexazinone) on sandy loam soils is applied at 2 to 3 kg/ ha (label limit is 3.5 kg/ ha). Application occurs in September or October depending on local spring rainfall and germination rates. It should be noted TPPL only began management of the GTFT Estate in November 2012. Historical data on program sizes are unavailable; however it is anticipated, that approximately 40- 60% of the annual establishment program will required post plant releasing with hexazinone.
The topography and underlying geology of the GTFT Estate make it a low risk environment for chemical application. The terrain is categorised by low to rolling hills with sandy loam soils overlying clay layers. Streams and surface water is isolated to a handful of compartments where there is a geology change from limestone to basalt. Wetlands and soaks are found throughout the Estate; however rarely contain moisture during the late spring to early summer months when treatment generally occurs. To ensure no runoff or overspray occurs, large boundary buffers of several tree lengths are left untreated.

Quality Control and Monitoring

As previously stated, the Tasmanian Code of Practice for Aerial Spraying (2000) used as the minimum standard for all spraying operations. Buffer widths are expanded when there is moderate or greater risk of overspray or chemical trespass. This risk is identified through field validation, affected stakeholder engagement particularly the immediate neighbours and consultation with chemical suppliers and agronomists. In particular areas such as heads of catchments (ephemeral streams and drainage depressions regardless of where they contain water at time of operation) are buffered out of the treatment area as these small catchments feed into large ones that may impact on water intakes.

TPPL also considers the form, liquid, granular or controlled release, of Hexazinone as part of its planning process. Typically liquid hexazinone is only used on sites where the trees require rapid release, where weed species have dominated a site quicker than anticipated. Granular or controlled release forms are used in preference as they significantly minimise the risk of spray drift, especially if surface water is present at time of spraying. In line with all label restrictions in Australia, Hexazinone is not used on areas that have been broadcast burnt, as high charcoal levels is likely to render Hexazinone ineffective.

All TPPL chemical application operations only occur under strict weather conditions, which must be measured and recorded hourly. The allowable operating conditions are explicit on all Spray Plan documentation and the weather reading records are kept with the compartment files. If weather conditions approach the maximum allowable range readings are increased to ½ hourly.

Only contractors with the appropriate training and qualifications are used to apply chemicals. Conformance with this requirement is audited by an external Health and Safety specialist as part of the annual TPPL Contractor Health and Safety Systems audit program.

Every treatment area with water flowing from it is sampled for the most mobile chemical in the brew, i.e. Hexazinone. Water samples are taken by an independent contractor using the Forestry Tasmania Water Sampling Techniques Guidelines. This ensures that TPPL cannot bias the sampling technique and sampling techniques are of a consistent standard. Samples are taken within approximately 1 hour of an operation being completed (if surface water is present) and post significant rainfall. Samples can be made available to affected neighbours on request.

If a detect is found down stream water users and other affected stakeholders are contacted as soon as possible. TPPL makes both during and post operation samples available to them and propose any remedial action if required.
2. Outline the program to identify alternatives to a ‘highly hazardous’ pesticide including preventative silvicultural measures. Describe the programs that are in place to identify alternatives, include a timetable and indicate research partners and targets

The forest management enterprise shall describe the programs which will be put in place during the proposed derogation period, designed to identify and develop alternative pest control methods which do not use ‘highly hazardous’ pesticides. Forest management enterprises shall describe in detail what kind of alternatives or silvicultural measures will be investigated on what area and what research partners may be involved (e.g. university, enterprise, government agency, or other certificate holders). A timetable and documentation (on ongoing activities, targets, resources) has to be provided regarding the program for alternatives. The applicant should include information on the authorities for pesticide registration and which other non ‘highly hazardous’ pesticides are registered in their country for controlling the pest organism.

a) Nature of research and development (R&D) on alternative pest management regimes in the short, medium and longer-term research plan covering the 5-year derogation period and including the resources devoted to the R&D, expected timelines, results from ongoing field trials with alternatives (outcomes) relevant supporting studies.

Long term planning

Over the length of the derogation period TPPL’s goal is to reduce its total hexazinone use by 10%. This will be achieved by more targeted use of the chemical, as it is considered a last resort option rather than standard procedure.

Fallow periods (eliminate pre plant hexazinone use)

TPPL does not use Hexazinone as a preplant herbicide. Instead a site specific fallow period is used in both the Taswood and GTFT Estates to ensure there is adequate weed germination prior to preplant spraying operations. Effective fallow management allows a broad spectrum of species to germinate, so the effectiveness of knockdown herbicide mixes such as glyphosate and metsulfuron methyl are maximised. This regime has been refined in Tasmania since 2005 and was introduced in GTFT in 2012 when TPPL commenced forest management activities. It gives adequate weed control throughout winter and into the first summer following planting.

Medium term planning

Mulching trials

TPPL has been trailing different types of mulching and slashing technology, within the Taswood Estate, since the late 1990’s. Initially the idea was to mechanically manage wildling regeneration (as typically chemical control was ineffective); trials were conducted in the early 2000’s, using large excavators with slashing heads to slash in between rows. This method proved effective, however the large machinery and cumbersome heads made it expensive and difficult to use in many situations. It also tended to cause damage to the remaining stems.

The next trials were conducted in 2006 using a purpose built “mulcher”. This was similar in size to a Bobcat with a spinning drum on the front. The drum has large blades attached to it which slash down the vegetation. This machine was highly manoeuvrable, fitted easily between the existing planted rows and could effectively sever wildlings at ground level. Unfortunately the machine was not built for ‘forestry’ conditions and was plagued with breakdowns and other logistical issues.
In 2008 a new type of mulching machine became available. It was designed for slashing under power lines and the like, and was much more suited to the difficult and uneven terrain encountered in plantations. This new machine proved highly effective in controlling wilding regeneration in flat to undulating terrain at an economical viable cost.

Standard ‘mulching’ operations were expanded to include sites with a broad range of woody weeds and cutting grass in 2010. The first site was chosen for a trial as a significant water intake was located immediately downstream and residual chemical use was deemed ‘high risk’. Anecdotal field evidence suggests that while mulching did not kill the woody weeds it has suppressed weeds in this stand for 2 growing seasons, allowing the crop trees enough time to out compete the weeds. As state previously this type of weed control is not possible on all sites but can offer an alternative to chemical control.

Short term planning

Chemical suppliers

TPPL have regular meetings with local chemical supply company, Serve Ag, and regularly consult with them on any potential new herbicides and mixes that may provide alternatives to Hexazinone. Due to some ambiguity about conducting trials with chemicals within the managed Estate, that are either commercial in confidence or contain known highly hazardous pesticides, TPPL has postponed the Peracto alternatives to Hexazinone 2013 chemical trials until it understands its FSC obligations.

Chemical substitutes

Currently there are no chemicals on the market that are a complete alternative for Hexazinone. There are several alternatives that are effective, however, multiple applications maybe required to achieve an acceptable result. Specifically, Haloxyfop used for grass control will be operationally trialled in Tasmania; this is currently part of the standard suite of chemicals used in the Green Triangle.

Serve Ag has recently completed a trial using Clopyralid with a spike of Triclopyr to control wood weeds (gorse) in young pine. The results have been highly encouraging; with no checking or damage to the seedlings and nearly 100% control of the wood weed infestation. TPPL will be trialling this combination of chemicals on small areas of wattle infestation in the Taswood Estate and bracken infestation in the GTFT Estate in Spring 2013.

b) With respect to (a) above, a clear distinction of the research and development programmes that are run by the forest enterprises themselves and research conducted
in collaboration with other research agencies/institutions (e.g. Universities) or commercial enterprises.

The Australian Forest Industry Herbicide Research Consortium (AFIHRC) is funded by the Forest and Wood Products Australia and the Australian Plantation Forestry Industry. The AFIHRC have been focusing much of their trial work on alternative to many chemicals in the triazine family. This research is targeted at increasing the efficacy of herbicide timing and application methods to maximise weed control. The AFIHRC have also investigated mechanical techniques such as different site preparation techniques to reduce the amount of chemical used. Unfortunately to date, only small gains have been made, and there has not been either a silver bullet or a combination of non chemical alternatives effective and economic.

c) A list of all registered pesticides available for the control of the targeted pest species

Note: State based restrictions on the use of triazines on State Forest in Tasmania, and restricted application methods of other chemicals will exclude some alternatives from being used in Tasmania.

**Evolus (Azifeniden):** proven to bind tightly with soil particles, reducing likelihood of leaching, broad spectrum control of perennial woody weeds with no phytotoxic symptoms shown in young seedlings at rates up to 800g/ha. Not currently registered for use in Australia, and product not available under trial permits.

**Brodal (Diflufenican):** Label application rates are based on agricultural requirements. Trials in forestry in Australia at much higher rates have been effective. Time is required to test this product at lower rates.

**Balance (Isoxaflutol):** Variable efficacy, Australian trials show 2x maximum label rates required for adequate control of weeds such as fleabane. Currently only labelled for agricultural use in Australia.

**Callisto (Mesotrione):** Not currently registered in Australia. Trials conducted in TPPL’s sister company, Timberlands Limited, on the North Island New Zealand showed this chemical has shown a synergy with the triazines, which allows a reduced rate of Hexazinone.

**Goal (Oxyfluorfen):** Currently has a forestry label for both fallow and emerged establishment phases. Binds strongly to clay particles so should not be used on sandy soils with low organic matter contents. This chemical was among included in the most recent Peracto trials run in conjunction with Serve Ag, where both its preplant and post plant weed control potential is to be assessed. It is also on the FSC prohibited list due to its chronic toxicity and biomagnification properties.

**Authority (Sulfentrazone):** Possible alternative to Hexazinone in preplant situations. TPPL manages preplant weed germination through fallow periods, this product is not appropriate as a post plant application. It is also not currently registered in Australia by the APVMA.

**Terbuthylazine:** This triazine is widely used in NZ in conjunction with Hexazinone. The resulting synergy has reduced rates of both chemicals substantially. Unfortunately Terbuthylazine registration for forestry use has been abandoned in Australia and is unlikely to be reinitiated.
d) The proportion of pest control intended to be achieved during the derogation period via the use of chemical methods requested ‘highly hazardous’ pesticide and other non ‘highly hazardous’ pesticides, non chemical method

Approximately 300-400 hectares in Tasmania and 600 hectares in the Green Triangle are treated with Hexazinone annually. This equates to approximately 17% of Taswood’s total weed control program in F13 and 31% of GTFT’s total weed control program.

<table>
<thead>
<tr>
<th></th>
<th>Taswood F13</th>
<th>Taswood F14 Budget</th>
<th>GTFT F13</th>
<th>GTFT F14 Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preplant Ha</td>
<td>786</td>
<td>851</td>
<td>673</td>
<td>1752</td>
</tr>
<tr>
<td>Weed a Meter (Hexazinone) Ha</td>
<td>278.8</td>
<td>81</td>
<td>0</td>
<td>71.5</td>
</tr>
<tr>
<td>Aerial release (Hexazinone) Ha</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>709.1</td>
</tr>
<tr>
<td>Aerial release (non HH) Ha</td>
<td>336</td>
<td>246</td>
<td>2242</td>
<td>0</td>
</tr>
<tr>
<td>Manual brushcutting Ha</td>
<td>386.5</td>
<td>508</td>
<td>709.9</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,812.3</td>
<td>754</td>
<td>3624.9</td>
<td>2532.7</td>
</tr>
</tbody>
</table>

\(^2\) TPPL only began management of the GTFT Estate 1\(^{st}\) November 2012
3. References:

Ganapathy, C., 1996, Environmental Fate of Hexazinone. Environmental Monitoring & Pest Management Branch, Department of Pesticide Regulation, Sacramento, Ca


