

Development of the plantation forest threshold in the Lower Limestone Coast Prescribed Wells Area

DEWNR Technical note 2013/08



Government of South Australia
Department of Environment,
Water and Natural Resources

Development of the plantation forest threshold in the Lower Limestone Coast Prescribed Wells Area

Darryl Harvey
Science, Monitoring and Knowledge Branch
Department of Environment, Water and Natural Resources
ADELAIDE

October 2013

DEWNR Technical Note 2013/08
ISBN 978-1-922174-29-1

CONTENTS

INTRODUCTION

EXECUTIVE SUMMARY

GLOSSARY

BACKGROUND

- Select Committee on Water Allocations in the South East: 1999
- Select Committee on Groundwater Resources in the South East: 2001
- Prescription of Lacepede Kongorong Wells Area
- Pro-rata rollout of water allocations in the South East
- Reservation of unallocated water

FOREST WATER ACCOUNTING

- South East plantation forest estate
- Announcement of the need to manage forest impacts on water resources
- Accounting for plantation forest impacts on groundwater resources
- Accounting for plantation forest expansion
- Exclusion of the plantation forest industry in the pro-rata rollout
- Optimisation of the plantation forest expansion potential
- Stakeholder meetings of 2003
- Plantation forest become a water affecting activity
- Plantation forest threshold area
- Direct extraction of groundwater by plantation forest
- Quarantining of 6000 ha of threshold area
- Current status of the plantation forest threshold area
- Monitoring of plantation forest expansion

TABLES and FIGURES

- Table 1: Plantation estate at August 2002 and related recharge benefit
- Table 2: Plantation forest threshold area surrender and substitution
- Table 3: South East Plantation Forest Threshold and sources of the 59 000 ha of expansion opportunity
- Table 4a: Plantation Forest Expansion Opportunities, Hardwood, 2004
- Table 4b: Plantation Forest Expansion Opportunities, Softwood, 2004
- Table 5: Temporary reduction of 6000 ha in forest threshold area: 2007
- Table 6: Plantation Forest Threshold Areas 2013

Figure 1: Groundwater Management Areas and Cadastral Hundreds

APPENDICES

- Appendix 1: *Impact of plantation forestry on water resources management in the South East of South Australia: a summary of outcomes from key stakeholder representative meetings*
- Appendix 2: Extract from the *Intergovernmental Agreement on a National Water Initiative* (paragraph 57)

INTRODUCTION

This paper provides a summary of the development of the plantation forest threshold and the associated accounting related to water management in the lower South East of South Australia. The development of the forest expansion component in the forest threshold area occurred over several years in the progress towards forest water accounting and management in the South East.

The tables included in this report are provided to assist in explaining the outcome of the processes in arriving at what has become known as the 59 000 ha expansion component of the plantation forest threshold.

At the time of writing, the proposed Lower Limestone Coast Water Allocation Plan has been consulted on, but the policy relevant at this time is that new commercial plantation forest establishment in the lower South East remains a water affecting activity under the 2004 regulation. This regulation requires that the impacts of new plantations on the local groundwater resource are fully accounted for. The plantation forest threshold, and in particular the remainder of the 59 000 ha expansion component, is an essential accounting item in the assessment of recharge impacts of new plantation proposals.

All terms and expressions used in this paper are those applying during the forest water accounting foundation phase, which is generally considered to be from 1999 to 2004, when new commercial plantation forests were recognised as a water affecting activity, and later to 2007, when groundwater extraction by plantations was included in the accounting and assessment process associated with the 2004 regulation.

While not policy at the time of writing, a policy of the proposed Lower Limestone Coast Water Allocation Plan is for the dissolution of the Plantation Forest Threshold area. This is being offset with an initial allowance to existing forests, for the purpose of allocation, of 100 per cent of management area recharge rate.

EXECUTIVE SUMMARY

The Parliamentary *Select Committee on Water Allocations in the South East* (Select Committee) recommended in 1999 a move to a market-based approach for managing the South East's groundwater resources; this was based on the assumption that when water is transferable and fully allocated it will be traded among water users and new entrants seeking access to licensed water allocations. To achieve such a market environment the Select Committee recommended all unallocated water be allocated on a pro-rata basis to qualifying landholders. This led to the creation of licensed water *holding* allocations.

Pro-rata allocations were not available to plantation forest land owners and landholders with irrigation water licenses in excess of the pro-rata entitlement rating for their respective properties. A significant portion of the remaining unallocated water was subsequently reserved by the Minister, effectively meaning that all groundwater could be considered fully allocated and consequently, creating a commercial environment for water trading.

In developing the groundwater budgets for the 2001 water allocation plans for the Comaum-Caroline, Lacepede Kongorong and Naracoorte Ranges prescribed wells areas, a precautionary approach was taken in assuming no groundwater recharge occurred under plantation forests. During 2002 it was proposed that the groundwater recharge that occurred prior to forest canopy closure, and following thinning operations, would become available to the plantation forest industry for its exclusive use for future expansion of the plantation forest estate. While not intended as 'compensation' to the forest industry for exclusion from the pro-rata allocation process, the plantation forest industry was provided with a further expansion opportunity of approximately 16 000 ha; this being offset against some of the water reserved by the then Minister. This was a recommendation of a second Parliamentary Select Committee.

The recharge benefit attributed to the existing and planned (but undeveloped) 2002 forest estate and the 16 000 ha offset against the reserved water was welcomed by the plantation forest industry. In total, the aggregate of benefits provided for 59 420 ha of potential plantation forest expansion where the recharge impacts were taken into account. However, the industry believed that the proposed distribution could not be fully utilised by the plantation forest industry in a number of groundwater management areas because the industry had already utilised much of the land considered suitable for plantation forest expansion. To overcome this issue, it was proposed that the plantation forest industry consider some substitution of the expansion opportunity 'right'¹ into groundwater management areas where there was a water resource accounting capability to accept the impacts of a forested landscape on groundwater recharge.

In total, 22 956 ha of potential forest expansion right was surrendered and substituted into management areas where there was an accounting capability to offset forest expansion. The relocation action also relieved some potential sustainability risks in specific groundwater management areas, mainly in the Border Designated Area. These border regions contributed about a quarter of the surrendered area. When the regulation making plantation forestry in the lower South East a water affecting activity was made in June 2004, the so called 59 000 ha of aggregated expansion potential available to the plantation forest industry became part of the forest threshold area.

The 59 000 ha expansion potential was distributed between the hardwood and softwood industries and was constructed from three sources, and they were:

- the recharge benefit identified against the forest estate existing and that planned, but not developed, at August 2002, 31 239 ha
- new plantation forest development allowed for in the 2000 technical assessment but not developed at August 2002, 11 965 ha
- potential plantation forest development offset against some of the reserved water, 16 216 ha.

¹ There were no legal 'rights' to the recharge benefit, but it was an agreed 'moral' right with the then Minister for Water Resources. This also had the support from irrigation stakeholder representatives.

During February 2007, about 6000 ha of unassigned plantation expansion potential was 'quarantined' from use in groundwater management areas where it was considered there was an emerging threat to the resource. To preserve the integrity of the plantation forest industry's 59 000 ha expansion potential, this 6000 ha is still to be relocated. The Border Designated Area accounts for approximately 5000 ha of this quarantined threshold area.

Including the 6000 ha expansion component to be relocated, at 15 August 2013 the total plantation forest expansion component of the plantation forest threshold was 42 412 ha. From a monitoring sample of approved developments, it was found that 1851 ha of approved forest was not developed within the statutory period of three years (under the *Development Act 1993*). It should be noted that the plantation forest threshold only takes into account the impacts of plantations on groundwater recharge and does not take account of any extraction impacts of plantations.

GLOSSARY

To minimise misinterpretation of this paper a number of terms used during the evolution of the plantation forest threshold and plantation forest water discussions at the time are clarified below.

Accounted, accounting or accountable is the arithmetic impact of a plantation forest on the water budget of a groundwater management area, or catchment. It does not intend to imply any assignment of responsibility.

Commercial forest is the term used in development plans (under the *Development Act 1993*) for the commercial or industrial scale plantation forest land-use. Some members of the plantation forest industry prefer the term 'industrial scale'. See *Plantation forest*.

Forest authorisation: A right, proposed by the then Minister for Water Resources, entitling the owner to the planting of a defined area of commercial forest plantation of a certain species, while accounting for the impact of that plantation on groundwater recharge

Groundwater management area: An administrative area described in a water allocation plan for a prescribed wells area in the South East, usually a Hundred which are defined by cadastre. In the case of the Border Designated Area, the management unit is called a zone and other than the State border, is not necessarily bounded by cadastral lines.

Hardwood plantation forest: for the purpose of South East management, this term refers to Tasmanian blue gum (*Eucalyptus globulus*) plantations grown expressly for wood chip production. South East stakeholders consider this forest type has a planting to harvest period of ten years and second rotation plantations are established with new seedling stock. It is noted that the life cycle can be up to 12 years, but ten years is a weighted mean value recommended by the plantation industry.

The hardwood forest industry does not consider coppice regeneration to be a common or preferred approach in the management of the hardwood plantation estate in the lower South East.

Interception is a term used in the *Intergovernmental Agreement on a National Water Initiative (NWI)*, paragraphs 55-57. This is interpreted as meaning any interruption to the natural water cycle, resulting in a diversion of natural water movement, or a reduction in the consumptive pool by a particular activity. The NWI use of the term *interception* refers to the impact of plantation forest in:

- reducing surface water catchment yield
- reducing groundwater recharge
- extraction of groundwater from shallow water tables.

Whilst the NWI definition of *interception* includes groundwater extraction by plantation forest, the South Australian approach is to generally distinguish between recharge and extraction impacts.

A **licence system** would record plantation forest impacts as offsets through the water **allocation** system. Under a licensed allocation system a transferable property right is assigned to the plantation owner/manager/landowner for the deemed impact on the water resource.

Minister's reserve: For the purpose of this document, any reference to the *Minister's reserve* will only relate to that water that has been referred to as reserved by the Minister and noted in *The South Australian Government Gazette* of 6 September 2001, 15 February 2007, and 7 February 2008 in the groundwater management areas subject to the plantation forest water affecting activity regulation.

The volumes of water are expressed in megalitres (ML) and the first reservation was made on 3 September 2001 by the then Minister for Water Resources, pursuant to Section 44B (2) of the *Water Resources (Reservation of Water) Amendment Act 2001*.

Plantation forest: For the purpose of this document, plantation forest will be used to describe commercial plantation forest activity carried out at an industrial scale by companies, or private individuals, recognised as commercial forest operators. It excludes small-scale commercial forest integrated into a farming operation.

Plantation forest area: For management purposes, the area of plantation forest that is considered to be relevant for water resource management is the forested area of the plantation compartment. It is based on the 'stump to stump' measurement of the outer boundary. It may include minor access tracks, but excludes firebreaks and easements for electricity transmission lines and protective buffers around native vegetation and wetlands. It is the area that a forest owner/manager reports for fire information surveys and considers to be the productive forest area.

Significant (or significance) is a term used in the NWI ². When the aggregated impact of plantation forests represents a noteworthy portion of the total water budget in the relevant water allocation plan and has considerable impact, the impacts are considered *significant*.

Softwood plantation forest: for the purpose of South East water resource management, this description refers to pine plantations (mostly *Pinus radiata*) grown mainly for sawlog production. For administrative purposes, the South East stakeholders describe this forest type as having a planting to harvest period of 35 years, with four plantation thinning operations prior to clear felling. In reality, the life cycle generally ranges between 25 and 50 years and plantation thinning operations can range from 2-6, but the plantation forest industry considers the weighted mean rotation length to be 35 years with 4 thinnings to be a reasonable representation of the South East commercial pine forest estate.

Threshold area is a term used in the NWI ³. It is the sum of the existing plantation forest estate plus any allowance for plantation expansion for which the impact on groundwater recharge has been accounted for within the water budget.

In the case of the lower South East, threshold tables were developed by summing the forest estate, as at 2002, and approximately 59 000 ha of expansion potential. Within the threshold area, the impacts of the plantation forest on groundwater recharge are fully accounted for within the relevant groundwater management areas. The total forest threshold area for hardwood and softwood forests is approximately 183 000 ha.

It should be noted that no allowance has been made for the impacts of direct extraction of groundwater by plantation forest within water budget of the threshold areas that were developed using forest 2002 data and implemented in 2004.

² NWI paragraphs 55-57

³ NWI paragraph 57

BACKGROUND

Select Committee on Water Allocations in the South East: 1999

A significant recommendation to emerge from the Parliamentary *Select Committee on Water Allocations in the South East* (Select Committee) report tabled in August 1999⁴ was encouragement for a move to a market-based approach for managing the South East's groundwater resource.⁵ This proposal was based on the assumption that when water has an associated property right and is fully allocated, it will be traded among water users and new entrants who require access to licensed water allocations. The intended outcome was for water to move to higher value uses. This market approach policy was consistent with the water reform principles later instituted by the Council of Australian Governments (COAG). To achieve this outcome it was considered that all remaining unallocated water should be allocated.

Select Committee on Groundwater Resources in the South East: 2001

The *Select Committee on Groundwater Resources in the South East* (Committee) was given the task to inquire into the impact of land use change on groundwater resources in the South East. The Committee was established in May 2001 to further discuss the management and risks to the region's groundwater resources.⁶ It published an *interim report* in December 2001.⁷ Among other things, it supported the proposed accounting system of deemed values for recharge impacts of plantation forests on the local groundwater resource. It also recommended that some reserved unallocated water be used to offset forest expansion to the order of about 16 000 ha. No subsequent reports were released by the Committee.

Prescription of Lacepede Kongorong Wells Area

Historically, the management of groundwater resources in the South East has generally been reactive and imposed as groundwater allocations moved towards the estimated sustainable yield of the resource. This was achieved through the declaration of prescribed (previously proclaimed) wells areas under the *Water Resources Act 1976* and *Water Resources Act 1997*.

At the time of the Lacepede Kongorong prescription in March 1997,⁸ there were already four prescribed wells areas in the South East; Comaum-Caroline, Naracoorte Ranges, Padthaway, and Tatiara. The prescription of the Comaum-Caroline and Naracoorte Ranges was accelerated as a result of the bilateral agreement with Victoria on the Border Groundwaters Agreement.

Contrary to the historical trend, the Lacepede Kongorong prescription was intended as a proactive management measure.⁹ At the time, there was a relatively low level of groundwater use in the Lacepede Kongorong Prescribed Wells Area and no significant signs of emerging threats to the groundwater resource. Essentially the Lacepede Kongorong prescription would bring under management all the groundwater resources of the lower and mid South East.

Soon after the prescription of the Lacepede Kongorong Prescribed Wells Area (December 1998), the House of Assembly established the Select Committee to:

- examine the method by which water allocations were granted in the South East
- investigate the development of policy in the Lacepede Kongorong Prescribed Wells Area
- develop a clear set of guidelines for the management and allocations of groundwater in the South East.

⁴ Hansard, 3 August 1999, page 1970

⁵ Ref: Report PP223

⁶ Hansard: House of Assembly, 3 May 2001, page 1468-1473

⁷ Ref: Report PP258

⁸ South Australian Government Gazette, 20 March 1997, page 1293

⁹ The Lacepede Kongorong Prescribed Wells Area was prescribed, de-prescribed and re-prescribed over a relatively short period. While being significant in the establishment of the *Select Committee on Water Allocations in the South East* and the terms of reference for its investigation, the detail of this fact is not relevant for the discussion in this paper.

Pro-rata rollout of water allocations in the South East

Following the Select Committee's recommendation to move to a market-based approach for managing the South East groundwater resource, amendments to the *Water Resources Act 1997* were made to enable pro-rata allocation of the remaining unallocated water to landowners who were considered to be eligible, and made application. The amendments also included the creation of licensed water *holding* allocations; these came into effect on 13 July 2000.

The water allocation plans for the five prescribed wells areas were amended on 27 July 2000 to enable the pro-rata rollout of unallocated water.¹⁰ The volume available for pro-rata allocation was determined taking into consideration the capacity of the water resource, a permissible annual volume (PAV) (and later defined by the 2001 water allocation plans) and deducting an environmental water provision to ensure lateral through flow of groundwater and provisions for stock and domestic water use, areas under forest, native vegetation and lakes, and existing water allocations. For accounting purposes, the areas of native vegetation, lakes and plantation forest were considered not to contribute to groundwater vertical recharge.

Pro-rata allocations were not available to plantation forest land owners and landholders with irrigation water licenses considered to be in excess of the pro-rata entitlement for their properties. The pro-rata entitlement was a function of the applicant's assessed property recharge area, relative to the area of the groundwater management area. In total, 160 600 ML of water was allocated through 1140 new licences; a volume of 288 500 ML was on offer through the pro-rata process.

Reservation of unallocated water

The report of the *Select Committee on Water Allocations in the South East*, tabled in the House of Assembly in August 1999, led to the pro-rata allocation process, but a failure of landholders to take up all the potential offerings and some statistical quirks associated with land ownership (public lands) resulted in some groundwater remaining unallocated.

The *Water Resources (Reservation of Water) Amendment Act 2001* came into force on 23 August 2001, allowing the then Minister for Water Resources to reserve the whole, or part, of the remaining unallocated water, if that were considered desirable for the proper management of a water resource. On 3 September 2001, the then Minister for Water Resources reserved specific volumes of groundwater in individual groundwater management areas in the lower South East.

The reservation criterion was up to 20% of the PAV was reserved where this was unallocated and where less than 20% of the PAV was unallocated, all of the unallocated volume was reserved. This initial reservation of unallocated groundwater was notified in the South Australian Government Gazette on 6 September 2001.

With a significant portion of the unallocated water being reserved by the Minister, it effectively meant that South East groundwater was considered fully allocated and according to the view of the Select Committee, there would be a commercial environment conducive for water trading.

¹⁰ South Australian Government Gazette, 27 July 2000, pages 329-342
9 of 29

FOREST WATER ACCOUNTING

South East plantation forest estate

In 1999, the South East plantation forest estate was estimated to total about 100 000 ha; other than for some small areas of hardwood species (*Eucalyptus*), the estate was mostly softwood (*Pinus*) and the rate of average annual expansion was generally of an order of about 2 per cent. At this time a fledgling hardwood industry sector was being energised through the expansion of the managed investment scheme companies (MIS). As a result of aggressive MIS marketing and development strategies, an expansion of about 35 000 ha of new Tasmanian blue gum plantations was expected to occur during the following two years. This rapid hardwood expansion was against a minimal commercial hardwood base; in general, up until that time only small trial plantings had previously occurred in the lower South East.

At the time, most South East forest estate expansion data and related information were sourced through the Green Triangle Region Plantation Committee, which represented both the hardwood and softwood industry sectors.

Announcement of the need to manage forest impacts on water resources

In November 2000, the then Minister for Water Resources advised Parliament he intended that there would be community consultation on the need to manage the impact of land use change to commercial plantation forestry on South East groundwater resources.¹¹ At about the same time, the CSIRO was commissioned by government to review scientific literature for knowledge about the possible impact of plantation forestry on South East groundwater resources. The CSIRO published its conclusion in a Centre for Groundwater Studies Report No 99 in May 2001.¹² In brief, while acknowledging the importance of the plantation forest industry in the South East, the report concluded that there was strong evidence that recharge beneath all types of plantation forests was negligible, in comparison to recharge below land with the more shallow rooted pasture and crops. Furthermore, plantations could be net users of groundwater wherever the roots can reach near the water table.

Early in 2001 the plantation forest industry developed a strategy paper, *South East Forest Industry Development Strategy*,¹³ outlining its prospects for future expansion of the forest estate. The industry was concerned that any attempt to account for and manage the impacts of plantation forests on water resources would be an impediment to its expansion plans. The plantation forest industry document was intended to assist in a representation to Government and to be part of its submission to the *Select Committee on Groundwater Resources in the South East*.

Accounting for plantation forest impacts on groundwater resources

During the groundwater technical assessment to estimate the sustainable yield of groundwater resources in 2000, it was assumed that no groundwater recharged occurred under plantation forests. At the time this was considered to be a precautionary approach. More correctly, the general acceptance is there is no notable recharge under closed canopy forests. For water accounting and management purposes, an assumption of no groundwater vertical recharge under land covered by native vegetation and lakes was similarly applied in the 2000 assessment.

As a result of recognising that recharge occurred during plantation forest establishment and up to canopy closure, a recharge benefit (or credit) connected to the existing plantation forest estate was identified. It was proposed by the then Minister for Water Resources that this recharge credit would become a benefit exclusively available to the plantation forest industry for its expansion in the groundwater management areas

¹¹ Hansard; House of Assembly, 30 November 2000, page 764-765

¹² *Review of Research on Plantation Forest Water Requirement in Relation to Groundwater Resources in the Southeast of South Australia*, Dillon P, R Benyon, P Cook, T Hatton, S Marvanek and J Gillooly (ISBN 0 643 06093 6)

¹³ Prepared by the Industry Strategy Steering Committee of the South East Forest Industry, which was associated with the Green Triangle Regional Plantation Committee: July 2001, ISBN: 0-9578475-1-3

where the recharge was considered to occur, under the existing plantation forests and under proposed forest areas that were planned but not established at that time. The recharge benefits to the plantation forest industry were expressed as areas of potential plantation expansion, but for water accounting purposes were expressions of groundwater recharge in the relevant groundwater management area, using deemed annualised values. This accounting approach is described in the Department of Water, Land and Biodiversity Conservation (DWLBC) report, *Accounting for plantation forest groundwater impacts in the lower South East of South Australia* (DWLBC 2009/13). It should be noted that the original 2001 deemed forest water models were reviewed and revised in 2006.¹⁴

The 2001 deemed forest water models were based on recommendations that came from a 2001 meeting of representatives from CSIRO Land and Water, CSIRO Forest Division, South East forest industry, South East Catchment Water Management Board and the Department for Water Resources. The meeting agreed that based on biophysical principles it could be considered that groundwater vertical recharged occurred between planting and canopy closure at a diminishing rate, with recharge ceasing at canopy closure. It was also considered likely that some recharge occurred immediately following any thinning operation that reduced the number of trees per hectare.

Accounting for plantation forest expansion

In addition to the recharge impacts of existing plantations, proposed forest was accounted for and included as if it was forest existing at the time of the technical assessments for the 2001 water allocation plans. This was necessary to ensure that the water budget being developed for the water allocation plans included the best assessment of allocated water and forest assigned water before the call was made for unallocated water through the pro-rata allocation applications. Some of the unplanted forest area was in the development approval 'pipeline' while other development proposals were still being finalised, but all were included in 35 000 ha of planned forest expansion previously discussed.

The plantation forest threshold area is accounted for and administered by groundwater management areas. Forest estate areas existing at 2002 and the associated consequential recharge benefits reserved for forest expansion are presented in **Table 1**. This table presents data for each of the groundwater management areas that constitute the lower South East in the now Lower Limestone Coast Prescribed Wells Area.¹⁵ Foundation data, mostly sourced from the forest industry were based on the cadastral Hundreds and as the management of forest water accountability evolved, data were reviewed with the industry and adjusted to align with the groundwater management areas presented in Table 1.¹⁶ Table 1 provides some detail on the source Hundreds. Figure 1 provides a map of the South East with groundwater management areas and cadastral Hundreds.

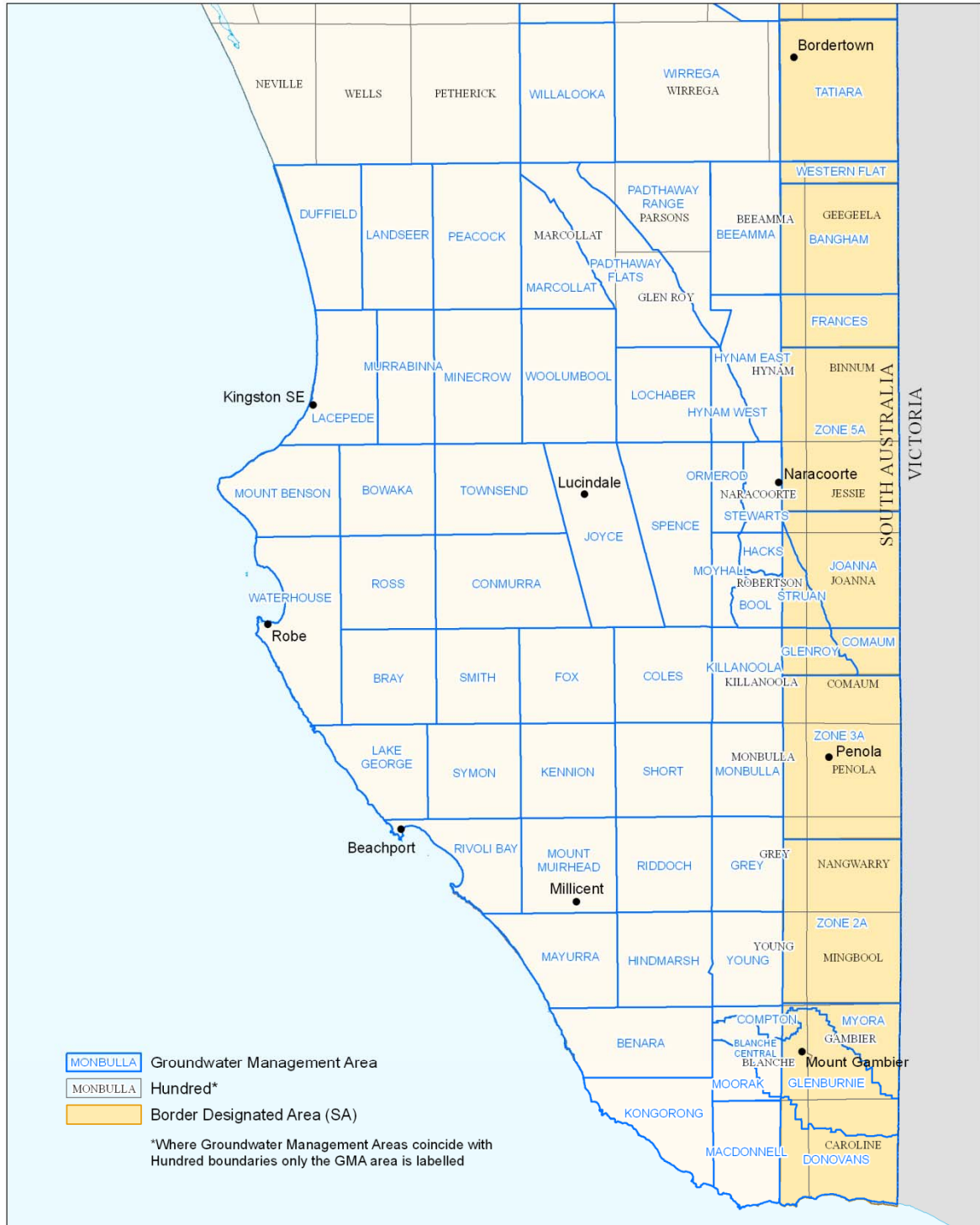
The expansion component of the forest threshold area was an area commitment to the plantation industry. Volumes of water associated with the threshold expansion generally only relate to holding allocations offsetting developments that are in excess of the threshold area or offsetting any groundwater extraction impacts. Holding allocations offsetting areas in excess to the threshold area (recharge impacts only) are based on the groundwater management area recharge rates prevailing at the time of the assessment and apply for the life of the offsetting agreement with the forest manager on the specific plantation proposal.

¹⁴ The 2006 revision was undertaken by a technical committee established by the South East Natural Resources Management Board and included representation from the forest industry and other stakeholder industries. The revised models took full account of the forestry industry's revised characterisation of the 'average' plantation forest in the South East.

¹⁵ The previous prescribed wells areas of Comaum-Caroline, Lacepede Kongorong and Naracoorte Ranges were combined to form the Lower Limestone Coast Prescribed Wells Area on 2 December 2004. South Australian Government Gazette, 2 December 2004, pages 4462-4464

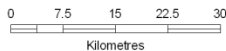
¹⁶ When plantation forestry became a water affecting activity in 2004, all forest accounting was transposed into the groundwater management areas. This transposition work was also carried out in consultation with a sub committee of the Green Triangle Regional Plantation Committee.

Groundwater Management Areas and Hundreds MID AND LOWER SOUTH EAST



- MONBULLA Groundwater Management Area
- MONBULLA Hundred*
- MONBULLA Border Designated Area (SA)

*Where Groundwater Management Areas coincide with Hundred boundaries only the GMA area is labelled



DISCLAIMER: The Department of Environment, Water and Natural Resources, its employees and servants do not warrant or make any representation regarding the use, or results of use of the information contained herein as to its correctness, accuracy, currency or otherwise. The Department of Environment, Water and Natural Resources, its employees and servants expressly disclaim all liability or responsibility to any person using the information or advice contained herein.

© Government of South Australia, through the Department of Environment, Water and Natural Resources 2013. This work is copyright. Apart from any use permitted under the Copyright Act 1968 (Cwth), no part may be reproduced by any process without prior written permission obtained from the Department of Environment, Water and Natural Resources. Requests and enquiries concerning reproduction and rights should be directed to the Chief Executive, Department of Environment, Water and Natural Resources, GPO Box 2834, Adelaide SA 5001.

Produced by: Science, Monitoring and Knowledge Branch
 Map Projection: MGA Zone 54
 Map Datum: Geocentric Datum of Australia 1994
 Date: September 2013



Government of South Australia
 Department of Environment,
 Water and Natural Resources

H513mxdw/BorderZones_hundred_GWMA5.mxd @brian

Figure 1: Groundwater Management Areas and Cadastral Hundreds

Exclusion of the plantation forest industry in the pro-rata rollout

Although there were indications that plantation forest impacts on water resources may at some future time be accountable with a form of water allocation, or allowance, the plantation forest industry was not invited to participate in the pro-rata allocation of unallocated groundwater to land holders. This was because the offered allocations were to be water *holding* allocations that could only be converted, subject to hydrogeological criteria, to water *taking* allocations where the use could be irrigation, industrial or recreational. Furthermore, plantation forestry was not an activity requiring a formal water allocation under the then Water Resources Act.

While not promoted as 'compensation' for the exclusion of the forest industry from the pro-rata allocation offer, the plantation forest industry was provided with a further expansion opportunity of approximately 16 000 ha. This expansion was offset against some of the unallocated water reserved by the Minister. This was shared on a 50:50 volume basis between the hardwood and softwood industries. These volumes were then converted to areas in the relevant management areas using the relevant management area recharge rates current at that time and the impact values derived from the 2001 plantation forest deemed models.

The notion of some forest expansion being supported by reserved water was made in the interim report of the *Select Committee on Groundwater Resources in the South East* where a specific distribution of 16 209 ha in various management areas was recommended.¹⁷ The geographic distribution of the 16 209 ha of plantation expansion was made in groundwater management areas where the plantation industry expressed a desire for forest expansion and where it was considered there was adequate suitable commercial areas of land. The forest industry document, *South East Forest Industry Development Strategy* provided guidance in the distribution of the 16 000 ha proposal.¹⁸

It should be noted that at the time, the forest industry did not believe it should be accountable for its impact on groundwater resources. However, it was believed the industry considered it was only a matter of time before forest water accountability and management would become part of its operating environment and therefore it was necessary to maintain some level of discussion with the then Department for Water Resources.

Optimisation of the plantation forest expansion potential

While the forest recharge benefit was welcomed by the plantation forest industry, the industry believed that a benefit based on recharge credits attributed to the existing plantation estate could not be fully utilised in a number of management areas because the industry had already utilised significant areas of land considered suitable for plantation forests. This also included perceived market constraints by the industry, such as high land values in some management areas (particularly the softwood sector).

To overcome this issue, it was proposed that the forest industry should consider the substitution of some of the newly recognised recharge benefits, as an expansion opportunity 'right',¹⁹ into groundwater management areas where the water resource had an accounting capability to accommodate additional forest recharge interception and where there were opportunities for land purchases for conversion to plantation forests. The plantation industry sought a 'surrendering' of some of these new forest expansion 'rights' in management areas with a low potential for increased plantation areas for an equivalent area of forest expansion right in management areas where the recharge impacts of the new forest development could be offset against unallocated water. In total, 22 956 ha of potential forest expansion right was surrendered and substituted into management areas where there was an accounting capability to offset forest expansion.

The responsible Minister agreed to this proposal as it also had a benefit in relieving potential stress in some groundwater management areas, mainly in the Border Designated Zones of 1A to 4A. Between the hardwood

¹⁷ Table 1, in the interim report of the *Select Committee on Groundwater Resources in the South East*, reference PP258

¹⁸ Prepared by the Industry Strategy Steering Committee of the South East Forest Industry (Green Triangle Regional Plantation Committee); Hanson Print, July 2001. ISBN: 0-9578475-1-3

¹⁹ There were no legal 'rights' to the recharge benefit, but it was an agreed 'moral' right with the then Minister for Water Resources. This also had the support from irrigation stakeholder representatives.

and softwood forest industry sectors of the Green Triangle Regional Plantation Committee and the former Department of Water Resources, various 'surrenders' and 'substitutions' were discussed and agreed in late 2002, ensuring that the forest expansion potential, by area, remained constant. The areas of potential expansion surrendered and substituted are presented in **Table 2**. Table 2 identifies the locations by cadastral Hundreds as forest data were only identified by the forest industry by Hundreds.

Stakeholder meetings of 2003

During the later half of 2003, there was a round of five meetings of key stakeholders. The meetings were convened by the then Department of Water, Land and Biodiversity Conservation (DWLBC), at the request of the then Minister. The meetings were to gain an understanding of various stakeholder views regarding the accounting and management of forest water impacts. One outcome was the recognition and acknowledgement of the forest expansion opportunity of 59 416 ha (subsequently referred to as 59 000 ha) by a majority of stakeholder representatives.

The summary of the five stakeholder meetings is provided as **Appendix 1**. The summary of stakeholder meetings includes a table, '*Plantation forest expansion potential*' (marked as *Attachment (b)* in the summary of meetings paper). This table is the foundation of the adopted plantation forest threshold area tables. The table based on cadastre Hundreds, indicates the actual forest areas at August 2002 and the distribution of the 59 000 ha expansion area after the surrender and substitution processes discussed above. Minor adjustments were necessary to the table to enable the adaptation of data by Hundreds to groundwater management areas.

Plantation forest become a water affecting activity

When the then Minister for Environment and Conservation made a regulation on 3 June 2004 making plantation forestry in the lower South East a water affecting activity, the so called 59 000 ha expansion potential became part of the forest threshold area.²⁰ **Table 3** provides a summary of the sources of the 59 000 ha expansion potential and the forest area at 2002.

Under the adopted management approach, new commercial forestry required a permit under the then *Water Resources Act 1997*. This was managed concurrently with development approvals for land use change, requiring all such development applications under the *Development Act 1993* to be referred to the Minister for Environment and Conservation for direction. Applications for land use change to commercial forestry were allowed if the development did not exceed the plantation forest threshold in the relevant groundwater management area. If the development exceeded the threshold, the development was allowed if the hydrological impact of the proposed plantation forest was offset with an appropriate licensed water allocation, with a signed agreement with the forest manager, for the life of the plantation and whilst the land was zoned as commercial forest.

Plantation forest threshold area

The forest threshold area is the area of existing plantation forest at August 2002, plus the area allowed for forest expansion (the 59 000 ha). The full distribution of the threshold area by management area and forest type is presented in **Table 4A** (hardwood) and **Table 4B** (softwood). These tables, while dated 30 November 2004 (and signed by then Minister) were effective from 3 June 2004 when the Minister announced that new plantation forests in the lower South East were to be considered as a water affecting activity and subject to regulation. About three weeks later, on the 25 June 2004, the South Australian Premier signed the *Intergovernmental Agreement on a National Water Initiative* (NWI). With respect to the definition of the 'forest threshold area' for the South East, the term and its meaning align with that used in the NWI in paragraph 57. The full text of paragraph 57 is presented as **Appendix 2**.

It should be noted that the threshold area, including the allowances for forest expansion, takes full account of recharge impacts of plantation forest on groundwater recharge, but no account, or consideration, is given to

²⁰ House of Assembly: Hansard, 3 June 2004, page 2468 -2469
14 of 29

the impacts of direct extraction by plantation forest from shallow water tables. The threshold area remains a constant, with the 'existing' plantation area increasing by same value as the reduction to the 'expansion potential', as new forest developments are approved through the planning process.

Direct extraction of groundwater by plantation forest

Using data provided by the CSIRO Technical Report No 148, *Water Use by Tree Plantations in South East South Australia* (Benyon; September 2004), a deemed model for groundwater extraction impacts was developed late in 2006 for both hardwood and softwood plantations. In July 2007,²¹ the water affecting activity regulation then took into account the extraction impacts of new forest developments using the values developed by the deemed plantation forest extraction models. This involved a policy decision to apply an assessment, under the water affecting activity regulation, for proposed new plantations where the water table was 6 metres, or less, below ground level.

Assessment of extraction impacts is in addition to recharge impacts and these additional impacts are required to be offset with an equivalent water holding allocation for the life of the plantation forest.

Quarantining of 6 000 ha of threshold area

On 7 February 2007, 5999 ha of unassigned plantation expansion potential was 'quarantined' by the Minister from activation in a number of groundwater management areas.²² These management areas were considered to be threatened and allowing new forest development in those specific areas was considered inappropriate. About 5000 ha of the quarantined area is in the Border Designated Area.

To preserve the integrity of the 59 000 ha expansion potential, the 5999 ha is to be relocated to groundwater management areas that are not threatened and have an accounting capability to absorb the recharge impact. It was advised that any redistribution of the 5999 ha would be in consultation with the forest industry. The 5999 ha of 'quarantined' threshold area is identified by forest type and the 'home' groundwater management area in **Table 5**.

Current status of the plantation forest threshold area

With the introduction of the water affecting activity regulation on 3 June 2004, the forest threshold area took on a formal meaning for the lower South East. The forest threshold area table is updated from time to time, as applications from forest developers are received, processed and approved. All threshold tables are notated with the disclaimer that these data are indicative only and is subject to change (as development applications for plantation forest land use are assessed and approved).

The most recent table of threshold areas, with the expansion potential of 36 413 ha being identified is presented in **Table 6**, noting that this excludes the 5999 ha quarantined from development in specific areas in 2007 (as per Table 5). In summary, at 15 August 2013 and including the 5999 ha of deferred expansion, the full forest expansion available to the forest industry from this current policy is 42 412 ha, representing about 23 per cent of the total threshold area.

Monitoring of plantation forest expansion

Should an approved forest development not result in the proposed area being fully planted, the threshold table is not adjusted, but remains at the approved area. Under the current regulation regime of referrals under the Development Act, local government is the relevant authority and responsible for compliance. From a monitoring sample undertaken by DWLBC, 1851 ha of approved forest was not developed within the statutory period of three years (under the Development Act).

²¹ Legislative Council: Hansard 31 July 2007 page 546

²² South Australian Government Gazette, 15 February 2007, page 495

Table 1: Plantation estate at August 2002 and related recharge benefit

groundwater management area	Derived from data by 'Hundreds'. Is indicative only as Border zones do not align with cadastre	hardwood		softwood	
		net area of hardwood at August 2002.	recharge benefit based on existing estate	net area of softwood at August 2002.	recharge benefit based on existing estate
		ha	ha	ha	ha
forest recharge multiplier			*23/77		*17/83
BENARA	Benara	32	10	3368	690
BLANCHE CENTRAL	Blanche - part	16	5	2341	479
BOOL	Robertson - part	0	0		0
BOWAKA	Bowaka	0	0		0
BRAY	Bray	0	0	685	140
COLES	Coles	11 754	3511	110	23
COMAUM	Comaum - part	3	1	2056	421
COMPTON	Blanche - part	0	0	654	134
CONMURRA	Conmurra	88	26	0	0
DONOVANS	Caroline - part	33	10	3502	717
FOX	Fox	713	213	556	114
GLENBURNIE	Gambier - part	77	23	7953	1629
GLENROY	Comaum - part	0	0		0
GREY	Grey - part	6	2	78	16
HACKS	Robertson - part	0	0		0
HINDMARSH	Hindmarsh	98	29	10 240	2097
JOANNA	Joanna	0	0	1353	277
JOYCE	Joyce	263	79		0
KENNION	Kennion	353	105	1987	407
KILLANOOLA	Killanoola - part	395	118		0
KONGORONG	Kongorong	0	0	5161	1057
LAKE GEORGE	Lake George	0	0	134	27
MACDONNELL	Maddonell - part	0	0	2	0
MAYURRA	Mayurra	0	0	15	3
MONBULLA	Monbulla - part	1430	427	48	10
MOORAK	Blanche - part	1	0	116	24
MOUNT BENSON	Mount Benson	0	0	4747	972
MOUNT MUIRHEAD	Mount Muirhead	23	7	1991	408
MOYHALL	Robertson - part	0	0		0
MYORA	Gambier - part	15	4	7585	1554
RIDDOCH	Riddoch	202	60	6610	1354
RIVOLI BAY	Rivoli Bay	0	0	195	40
ROSS	Ross	0	0	0	0
SHORT	Short	6859	2049	429	88
SMITH	Smith	0	0	549	112
SPENCE	Spence	1998	597		0
STEWARTS	Naracoorte - part	0	0	60	12
STRUAN	Joanna and Robertson - pt	0	0		0
SYMON	Symon	36	11	1531	314
TOWNSEND	Townsend	0	0		0
WATERHOUSE	Waterhouse	0	0	423	87
YOUNG	Young - part	130	39	3818	782
ZONE 2A	Nangwarry/Mingbool	78	23	19 816	4059
ZONE 3A	Penola/Nangwarry	117	35	10 904	2233
ZONE 5A (JESSIE)	Jessie - part	0	0	15	3
Total		24 720	7384	99 033	20 284

total area of forest recharge benefit based on existing plantation: 27 664 ha

Table 2: Plantation forest threshold area surrender and substitution

Cadastral Hundreds * signifies that groundwater management areas do not fully align	hardwood		softwood	
	industry proposed surrender	industry proposed substitute	industry proposed surrender	industry proposed substitute
	ha	ha	ha	ha
Benara	35			1208
Blanche * (Compton)		351		
Bool				
Bowaka	151			178
Bray		270		550
Caroline *		134	1291	
Coles	2873			370
Comaum *	595			
Conmurra	3793			1016
Fox		1967		630
Gambier *		491	1392	
Grey *		286	286	
Hacks				
Hindmarsh		210	1188	
Jessie *			2	
Joanna *				
Joyce	828			445
Kennion		2709		100
Killanoola *	664			
Kongorong	31			326
L George	174			300
Macdonnell				
Mayurra	769			
Mingbool * (2A)		2038		
Monbulla *		974		600
Moyhall				
Mt Benson	114		578	
Mt Muirhead		13		
Nangwarry *		483	1989	
Naracoorte *			41	
Penola *	313			
Riddoch		2727	554	286
Rivoli Bay	240			300
Robertson * (Bool)				
Ross		316		200
Short	1788			100
Smith		26		
Spence	2123		188	
Symon		1122		800
Townsend	703		100	
Waterhouse	153			200
Young		1230		
totals	15 347	15 347	7609	7609

total surrender and substitute: 22 956 ha

Table 3: South East Plantation Forest Threshold and sources of the 59 000 ha of expansion opportunity

	Hardwood ha	Softwood ha
Existing plantation forest estate at August 2002	24 720	99 033
Expansion benefit (recharge only)		
Planning approved or proposed, but undeveloped	11 965	nil
Recharge benefit for existing forest and proposed forest to be developed	10 958	20 281
Offset by reserved water	8402	7814
Total available expansion	31 325	28 095
Plantation Forest Threshold Area	56 045	127 128

Total expansion component: 59 420 ha

Note: accounting only provides for impacts of groundwater recharge

Table 4A: Plantation forest expansion opportunities: hardwood, 2004

Hardwood

Plantation forest expansion opportunities

All areas should be considered as indicative only. Confirmation of area can only be given by the Minister for Environment and Conservation, and with development approval by the relevant district council.

source	(a)	(b)	1	2	3	4	5	6	7
	estimated forest area at 2002	expansion based on 2002 data	(a) + (b)	aerial survey, industry	councils	2 + 3	1 - 4	hectare of hardwood offset against water allocation	
groundwater management area	ha	ha	ha	ha	ha	ha	ha	per ML	per IE
BENARA	32	153	185	32		32	153	1.73	7.00
BLANCHE CENTRAL	16	291	307	21		21	286	2.60	10.50
BOOL	0	299	299	3		3	296	1.73	9.03
BOWAKA	0	0	0	21		21	0	2.60	12.82
BRAY	0	600	600	0		0	600	2.60	11.44
COLES	11754	2180	13934	12198	104	12302	1632	1.30	6.41
COMAUM	3	0	3	5		5	0	1.30	6.77
COMPTON	0	0	0	0		0	0	1.73	7.00
CONMURRA	88	262	350	1419		1419	0	1.73	8.55
DONOVANS	33	72	106	39		39	67	1.73	7.00
FOX	713	3299	4012	1352		1352	2660	1.30	6.41
GLENBURNIE	77	435	512	89		89	423	2.60	10.50
GLENROY	0	0	0	0		0	0	1.30	6.77
GREY	6	123	129	11		11	118	1.73	7.63
HACKS	0	63	63	0		0	63	1.73	9.03
HINDMARSH	98	338	436	147		147	289	1.73	7.00
JOANNA	0	0	0	4		4	0	1.73	9.03
JOYCE	263	0	263	402	2760	3162	0	2.60	13.55
KENNION	353	3370	3723	117		117	3606	1.30	5.72
KILLANOOLA	395	1000	1395	536		536	859	1.30	6.41
KONGORONG	0	0	0	0		0	0	1.73	7.00
LAKE GEORGE	0	0	0	0		0	0	1.73	7.00
MACDONNELL	0	0	0	0		0	0	1.73	7.00
MAYURRA	0	52	52	6		6	46	1.73	7.00
MONBULLA	1430	3138	4568	1929		1929	2639	1.30	5.72
MOORAK	1	14	15	1		1	14	2.60	10.50
MOUNT BENSON	0	0	0	0		0	0	2.60	12.82
MOUNT MUIRHEAD	23	610	633	30		30	603	1.30	5.25
MOYHALL	0	0	0	1		1	0	1.73	9.03
MYORA	15	254	269	24		24	245	1.73	7.00
RIDDOCH	202	3343	3545	286		286	3259	1.73	7.00
RIVOLI BAY	0	0	0	0		0	0	1.73	7.00
ROSS	0	600	600	0		0	600	2.60	11.44
SHORT	6859	4620	11479	9238	407	9645	1834	1.30	5.72
SMITH	0	0	0	0		0	0	1.73	7.63
SPENCE	1998	0	1998	2054	94	2148	0	2.60	14.22
STEWARTS	0	0	0	0		0	0	1.73	9.48
STRUAN	0	0	0	0		0	0	1.73	9.03
SYMON	36	1683	1719	56		56	1663	1.73	7.00
TOWNSEND	0	275	275	0		0	275	2.60	12.82
WATERHOUSE	0	0	0	2		2	0	2.60	11.44
YOUNG	130	1188	1318	226		226	1092	1.73	7.00
ZONE 2A	78	2996	3074	989		989	2085	1.73	7.63
ZONE 3A	117	67	184	187		187	0	1.30	6.41
ZONE 5A (JESSIE)	0	0	0	8		8	0	1.73	9.48
Total	24720	31325	56045	31434	3365	34799	25406		

all calculations based on current prevailing technical values; as at 30 November 2004
recharge factors : hardwood = 23/77 (0.30)

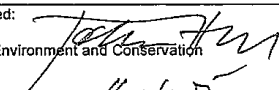
Data approved: 
Minister for Environment and Conservation
Date: 13.1.05

Table 3A

Hardwood
30 November 2004

Table 4B: Plantation forest expansion opportunities: softwood, 2004

Softwood

Plantation forest expansion opportunities

All areas should be considered as indicative only. Confirmation of area can only be given by the Minister for Environment and Conservation, and with development approval by the relevant district council.

source	(a)	(b)	1 (a) + (b)	2	3	4	5	6	7
groundwater management area	estimated forest area at 2002 ha	expansion based on 2002 data ha	forest threshold area, 3 June 2004 ha	reported forest area at Dec 2003 ha	development approvals to be planted as at 30 Nov 2004 ha	actual estate plus planning approved ha	potential expansion areas as at 30 Nov 2004 ha	hectare of softwood offset against water allocation per ML per IE	
BENARA	3368	2062	5430	3558		3558	4872	1.60	6.46
BLANCHE CENTRAL	2341	501	2842	2413		2413	429	2.40	9.70
BOOL	0	0	0	0		0	0	1.60	8.34
BOWAKA	0	318	318	0		0	318	2.40	11.83
BRAY	685	996	1681	699		699	982	2.40	10.56
COLES	110	500	610	0		0	610	1.20	5.92
COMAUM	2056	421	2477	2231		2231	246	1.20	6.25
COMPTON	654	140	794	672		672	122	1.60	6.46
CONMURRA	0	1730	1730	0		0	1730	1.60	7.89
DONOVANS	3502	254	3756	3520	40	3580	196	1.60	6.46
FOX	556	1184	1740	556		556	1184	1.20	5.92
GLENBURNIE	7953	545	8497	7912		7912	585	2.40	9.70
GLENROY	0	0	0	0		0	0	1.20	6.25
GREY	78	8	86	77		77	10	1.60	7.04
HACKS	0	0	0	0		0	0	1.60	8.34
HINDMARSH	10240	1001	11241	10204		10204	1037	1.60	6.46
JOANNA	1353	258	1611	1417		1417	194	1.60	8.34
JOYCE	0	533	533	0		0	533	2.40	12.50
KENNION	1987	1022	3009	1984		1984	1025	1.20	5.28
KILLANCOOLA	0	366	366	0		0	366	1.20	5.92
KONGORONG	5161	1412	6573	5630		5630	943	1.60	6.46
LAKE GEORGE	134	489	623	177		177	446	1.60	6.46
MACDONNELL	2	1	3	0		0	3	1.60	6.46
MAYURRA	15	765	780	15		15	765	1.60	6.46
MONBULLA	48	780	828	0		0	828	1.20	5.28
MOORAK	116	25	141	52		52	89	2.40	9.70
MOUNT BENSON	4747	500	5247	4746		4746	501	2.40	11.83
MOUNT MUIRHEAD	1991	955	2946	1978		1978	968	1.20	4.85
MOYHALL	0	0	0	0		0	0	1.60	8.34
MYORA	7585	420	8005	7633		7633	372	1.60	6.46
RIDDOCH	6610	1285	7895	6551		6551	1344	1.60	6.46
RIVOLI BAY	195	562	757	207		207	550	1.60	6.46
ROSS	0	464	464	0		0	464	2.40	10.56
SHORT	429	198	627	683		683	0	1.20	5.28
SMITH	549	116	664	548		548	116	1.60	7.04
SPENCE	0	548	548	0		0	548	2.40	13.13
STEWARTS	60	0	60	0		0	60	1.60	8.75
STRUAN	0	59	59	0		0	59	1.60	8.34
SYMON	1531	1624	3155	1722		1722	1433	1.60	6.46
TOWNSEND	0	552	552	0		0	552	2.40	11.83
WATERHOUSE	423	429	852	423		423	429	2.40	10.56
YOUNG	3818	852	4670	3810		3810	860	1.60	6.46
ZONE 2A	19816	2287	22103	20105		20105	1988	1.60	7.04
ZONE 3A	10904	1934	12839	11696		11696	1143	1.20	5.92
ZONE 5A (JESSIE)	15	0	15	0		0	15	1.60	8.75
Total	99033	28095	127128	101219	40	101259	25925		

all calculations based on current prevailing technical values; as at 30 November 2004
recharge factors : softwood = 17/83 (0.20)

Data approved:
Minister for Environment and Conservation
Date: 13.1.04

Table 3B

Softwood
30 November 2004

Table 5: Temporary reduction of 6000 ha in forest threshold area: 2007

groundwater management area	hardwood threshold removed ha	softwood threshold removed ha
BENARA		
BLANCHE CENTRAL		
BOOL		
BOWAKA		
BRAY		
COLES		420
COMAUM		
COMPTON		
CONMURRA		
DONOVANS		
FOX		
GLENBURNIE	423	549
GLENROY		
GREY		
HACKS		
HINDMARSH		
JOANNA		194
JOYCE		
KENNION		
KILLANOOLA		
KONGORONG		
LAKE GEORGE		
MACDONNELL		
MAYURRA		
MONBULLA		
MOORAK		
MOUNT BENSON		
MOUNT MUIRHEAD		
MOYHALL		
MYORA	3	177
RIDDOCH		
RIVOLI BAY		
ROSS		
SHORT	640	
SMITH		
SPENCE		
STEWARTS		
STRUAN		
SYMON		
TOWNSEND		
WATERHOUSE		
YOUNG		
ZONE 2A	2069	526
ZONE 3A		983
ZONE 5A (JESSIE)		15
Total	3135	2864

total area quarantined and to be relocated: 5999 ha

Table 6: Plantation forest thresholds and expansion opportunities, August 2013

Plantation forest thresholds and expansion opportunities

All areas should be considered as indicative only. Confirmation of area can only be given by the Minister for Environment and Conservation with development approval by the relevant district council.

groundwater management area	Hardwood					Softwood					total recharge interception of existing forest for both hardwood and softwood 8 Feb 2011
	hardwood forest threshold area, 3 June 2004	hardwood potential expansion areas as at 15 Aug 2013	hectare of hardwood offset against water allocation		recharge interception of existing forest 8 Feb 2011	softwood forest threshold area, 3 June 2004	softwood potential expansion areas as at 15 Aug 2013	hectare of softwood offset against water allocation		recharge interception of existing forest 8 Feb 2011	
	ha	ha	per ML	per IE	ML	ha	ha	per ML	per IE	ML	
BENARA	185	0	1.73	7.00	245	5430	1627	1.60	6.46	5366	5611
BLANCHE CENTRAL	307	286	2.60	10.50	29	2842	429	2.40	9.70	3505	3534
BOOL	299	296	1.73	9.03	2	0	0	1.60	8.34	0	2
BOWAKA	0	0	2.60	12.82	0	318	243	2.40	11.83	53	53
BRAY	600	600	2.60	11.44	0	1681	982	2.40	10.56	522	522
COLES	13934	0	1.30	6.41	13042	610	0	1.20	5.92	189	13231
COMAUM	3	0	1.30	6.77	1	2477	246	1.20	6.25	1111	1112
COMPTON	0	0	1.73	7.00	0	794	122	1.60	6.46	976	976
CONMURRA	350	0	1.73	8.55	259	1730	1605	1.60	7.89	99	358
DONOVANS	106	67	1.73	7.00	53	3756	196	1.60	6.46	5171	5224
FOX	4012	2407	1.30	6.41	1251	1740	1184	1.20	5.92	461	1712
GLENBURNIE	512	0	2.60	10.50	104	8497	0	2.40	9.70	9895	9999
GLENROY	0	0	1.30	6.77	0	0	0	1.20	6.25	0	0
GREY	129	0	1.73	7.63	150	86	10	1.60	7.04	95	245
HACKS	63	63	1.73	9.03	0	0	0	1.60	8.34	0	0
HINDMARSH	436	289	1.73	7.00	172	11241	890	1.60	6.46	12887	13059
JOANNA	0	0	1.73	9.03	0	1611	0	1.60	8.34	588	588
JOYCE	263	0	2.60	13.55	246	533	533	2.40	12.50	0	246
KENNION	3723	3235	1.30	5.72	457	3009	1025	1.20	5.28	1976	2433
KILLANOOLA	1395	0	1.30	6.41	1578	366	366	1.20	5.92	0	1578
KONGORONG	0	0	1.73	7.00	0	6573	943	1.60	6.46	7943	7943
LAKE GEORGE	0	0	1.73	7.00	0	623	446	1.60	6.46	110	110
MACDONNELL	0	0	1.73	7.00	0	3	3	1.60	6.46	0	0
MAYURRA	52	46	1.73	7.00	5	780	765	1.60	6.46	14	19
MONBULLA	4568	2151	1.30	5.72	3393	828	828	1.20	5.28	0	3393
MOORAK	15	14	2.60	10.50	1	141	89	2.40	9.70	76	77
MOUNT BENSON	0	0	2.60	12.82	0	5247	184	2.40	11.83	2521	2521
MOUNT MUIRHEAD	633	603	1.30	5.25	26	2946	968	1.20	4.85	1808	1832
MOYHALL	0	0	1.73	9.03	0	0	0	1.60	8.34	0	0
MYORA	269	0	1.73	7.00	332	8005	0	1.60	6.46	10396	10728
RIDDOCH	3545	2930	1.73	7.00	624	7895	1344	1.60	6.46	7069	7693
RIVOLI BAY	0	0	1.73	7.00	0	757	550	1.60	6.46	172	172
ROSS	600	600	2.60	11.44	0	464	464	2.40	10.56	0	0
SHORT	11479	0	1.30	5.72	12682	627	0	1.20	5.28	781	13463
SMITH	0	0	1.73	7.63	0	664	116	1.60	7.04	455	455
SPENCE	1998	0	2.60	14.22	1792	548	548	2.40	13.13	0	1792
STEWARTS	0	0	1.73	9.48	0	60	60	1.60	8.75	0	0
STRUAN	0	0	1.73	9.03	0	59	59	1.60	8.34	0	0
SYMON	1719	1663	1.73	7.00	48	3155	1433	1.60	6.46	1572	1620
TOWNSEND	275	275	2.60	12.82	0	552	552	2.40	11.83	0	0
WATERHOUSE	0	0	2.60	11.44	0	852	429	2.40	10.56	281	281
YOUNG	1318	1092	1.73	7.00	353	4670	558	1.60	6.46	6325	6678
ZONE 2A	3074	0	1.73	7.63	1097	22103	0	1.60	7.04	25072	26169
ZONE 3A	184	0	1.30	6.41	172	12839	0	1.20	5.92	11808	11980
ZONE 5A (JESSIE)	0	0	1.73	9.48	0	15	0	1.60	8.75	0	0
Total	56045	16616			38114	127128	19797			119295	157409

Information current as of 15 August 2013. * Areas subject to change without notice

APPENDIX 1

Impact of plantation forestry on water resources management in the South East of South Australia: a summary of outcomes from key stakeholder representative meetings

Background

The Department of Water, Land and Biodiversity Conservation, at the request of the Minister for Environment and Conservation, convened a series of stakeholder meetings to clarify stakeholder views on managing the water resources impacts of plantation forestry expansion in the lower South East.

The stakeholder groups participating were:

- Green Triangle Regional Plantation Committee (GTRPC) (withdrew at meeting 4)
- Softwood plantation industry
- Hardwood plantation industry
- Forest and timber product industry union, CFMEU
- State forest policy, Forestry SA
- South Australian Farmers Federation (SAFF)
- Limestone Coast Wine Industry
- SE potato growers
- SE dairy industry
- Mid SE Irrigators
- SE Catchment Water Management Board
- Department of Water, Land and Biodiversity Conservation (DWLBC)
- Limestone Coast Regional Development Board (observer and Chairman)

An attendance table is appended as **Attachment (a)**.

The meeting series at Mt Gambier commenced on 5 August 2003, with the final of five meetings being held on 28 November 2003. During the course of the meetings, delegates presented their industry and sector views, and opinions on the nature of a management system to ensure accountability for the impacts of plantation forestry on local groundwater resources in the South East.

The meetings resulted in majority agreement on a number of principles. Differences of views could not be resolved on a small number of issues; however, while small in number they remain significant in the context of resource management. The majority agreed that aspects of detail would need to be developed in any operational management system, with some sectors stressing the importance of this future phase of work.

Stakeholder positions

The purpose of this paper is to summarise the agreed outcomes, but not the detail of how the outcomes were achieved. In some instances outcomes are conditional, and therefore some qualifying comments have been included. Whilst every attempt has been made to convey the hardwood industry minority position, the hardwood industry does not believe that its position has been adequately reported and has subsequently sought that specific papers²³ be forwarded to the Minister to support its position.

There is unanimous or majority agreement on a number of principles and issues addressed by the five-meeting process.

While stakeholder representatives presented opinions best reflecting their industry or organisation positions, some indicated that the opinions expressed could not be considered as formal endorsement by their industry or organisation unless first referred back to their constituency for ratification.

This is particularly applicable to SAFF. Whilst their Natural Resources (NR) Committee is empowered to address matters that have state-wide implications, SAFF NR Committee requires issues that have local implications to be referred to the relevant regional SAFF branches for final endorsement. It is to be noted that whilst Nick McBride attended the meetings, the views he presented were his own and not necessarily those of SAFF.

²³ e-mail to DWLBC on 19 December, letter to the Minister on 30 October from John Vaughan, Executive Director Timbercorp Limited, and item 9.1 from the meeting notes for 28 November 2003.

Representatives of the SECWMB stated support for many of the key principles based on Board decisions, but indicated the need to seek formal Board comment on the final position emerging from the stakeholder meetings.

The hardwood industry representative indicated that whilst the hardwood sector accepts the need for water resources to be managed sustainably, and that accountability is desirable, it does not endorse the outcomes from the stakeholder meetings. During the final meeting, the hardwood representative sought to have discussions abandoned until the recommendations from the current *National Water Initiative* were adopted by COAG, with an expectation they will underpin a framework to address water use;

'where water is intercepted before entering ground or surface water systems due to changes in landuse'.

The motion to abandon discussions was supported by the representative from the CFMEU and Nick McBride, but opposed by all other representatives.

Principles and issues given unanimous support by stakeholder representatives

1. Water resources should be managed to ensure resource sustainability.
2. Impacts of plantation forestry upon water resources should be acknowledged and accounted for within water cycle budgets.
3. Management policies and accounting processes should be transparent.
4. There should be equity of opportunity for all regional industries to develop and expand within resource constraints.
5. Farm forestry on an agricultural land title be allowed and encouraged to provide a mixed landuse environment. It is proposed that the allowable extent be 10 percent of the land title, but subject to resource condition and other aspects in the management zones, it could be varied, up or down, from the 10 percent base.

This landuse category requires additional work in defining and developing management criteria. It is considered that the SECWMB could further the general agreement achieved, in consultation with DWLBC and the community.

6. There is a need to further identify and quantify the impacts of plantation forestry upon regional water resources through ongoing technical investigations and monitoring.
7. The proposed area south of a line running approximately between Kingston and Naracoorte is currently considered adequate for forest impact management. However, as further technical information comes to hand, there may be a progressive need to include other areas, or relax management in parts of the proposed management area.
8. A system to account for the impacts of plantation forestry on water resources should provide some certainty for plantation forest industry expansion.

Principles and issues that were given majority support

It should be noted that the hardwood industry representative was not part of any majority position on the following points.

9. Softwood and hardwood plantation impacts should be managed separately.

This principle had unanimous support until the final meeting.

10. Current groundwater management areas become the management areas for plantation forest impact. A review of groundwater management area boundaries is proposed as part of developing the second generation water allocation plans, and will consider the optimum boundaries for managing water resources, including the impacts of plantation forestry.

However, until then, unallocated forest expansion potential may be surrendered in one groundwater management area and substituted by the equivalent expansion allowance in an adjacent groundwater management area. This would be subject to hydrogeological assessment and plantation forest impacts being fully accounted for by offsets against unallocated water.

A forest impacts hydrogeological assessment methodology needs to be developed, as forest impacts will differ from those of irrigation and industry.

The hardwood representative opposes the use of the current water management area boundaries, but supports a four-zone approach for the lower South East.

11. Direct extraction of groundwater (discharge) should be managed separately from the recharge impacts of plantation forestry upon water groundwater resources. The direct extraction of groundwater should be handled in accordance with point 12 below (precautionary principle) and management mechanisms investigated as a matter of priority.

The SECWMB, SAFF and DWLBC believe that both groundwater use by plantations and interception of recharge by plantations must be managed concurrently, where appropriate, to ensure the full net impact of forestry is taken into account.

12. Reasonable use of the precautionary principle (as defined by SECWMB paper²⁴) in developing a risk management approach to water resource management using the best available science.
13. The principle of prior rights be accepted and priority given to protecting existing water users, legal property rights, existing industry and forestry investment and infrastructure.

A minority view is to expand the principle of prior rights to include 'protecting' current management practices and the 'rights' of landholders to have unregulated use of rain falling on their land.

14. That inequity within the current water licence system is contributing to the conflicting views within the plantation water use debate. There is a view that an equitable NRM levy needs to be developed in the future, and all stakeholders should participate in the discussion.

This issue is not central to the accountability management discussion and can be addressed in the future through annual reviews (eg, SECWMB) and or the NRM Bill.

15. The impacts on water resources by plantation forests is an issue that should be accountable and managed under the *Water Resources Act 1997*, as a water affecting activity (permit system). This system is to be managed in harmony with planning approvals under the *Development Act 1993*, with the initialising process being a forest proponent's application for development approval for landuse change to plantation forestry.

The SECWMB and SAFF have concerns that the permit approach is less robust and does not offer the necessary management flexibility compared with alternative proposal of establishing forest authorisations.

16. Where plantation expansion opportunities are not available from the allowances made in each groundwater management area for forest expansion via a permit, water allocations may be used to offset authorised forest developments. Where this policy option is activated it will be managed separately from the permit system.

While not considered an immediate problem, it was agreed more policy work was required to refine this principle.

17. The table *Plantation forest expansion potential* presented in **Attachment (b)** was adopted by a majority of stakeholders as the basis on which the management system would be implemented. The table sets out the areas and distribution of potential expansion of hardwood and softwood plantations, taking account of recharge impacts only. The table was developed with input from both the hardwood and softwood industries (March/April 2003) and it provides for 28,083 ha of softwood and 31,333 ha of hardwood expansion potential.

²⁴ The precautionary principle is defined as follows:

Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

- (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and
- (ii) an assessment of the risk-weighted consequences of various options.

(Intergovernmental Agreement on the Environment, May 1992, p 13)

The table does not consider how the impacts of direct extraction could be managed, or accounted for in the water budgets. Before the direct extraction impacts can be incorporated into a transparent management system, policy decisions need to be made with respect to the available off setting options²⁵ to meet situations discussed under point 11 above.

The hardwood representative is opposed to the table because he believes it does not fully provide for access to suitable land, this being a foundation issue for the hardwood sector.

12 January 2004

²⁵ Options for accounting for direct extraction from plantations includes offsetting against unallocated water, the strategic reserve, or a reduction of forest recharge benefits and, or, existing water allocations. It is anticipated before any reductions were implemented, PAVs and supporting technical data would be reviewed. This would also include assessment of any benefit options to emerge from realigned management area boundaries.

Participants in the stakeholder meetings;**Impact of plantation forestry on water resources management in the South East of South Australia.**

Participant	Organisation/sector	Meeting number				
		1	2	3	4	5
Jon Drohan	Green Triangle Regional Plantation Committee (see note)	R	R	R	A	
Jean McCallum	Green Triangle Regional Plantation Committee			O	O	O
Phil Lloyd	Auspine; softwood	R	R	R	R	R
George Bray	Timbercorp; hardwood	R	R	R	R	R
Carl Richardson	ITC; hardwood		O			
Brad Coates	CFMEU	R	R	A	A	A
Max Adlam	CFMEU					R
Gary Spain	Dairy industry	R	R	R	R	R
Chris Brodie	Limestone Coast Wine Industry	R	R	R	R	A
Allen Jenkins	Limestone Coast Wine Industry			O		R
Tim Heysen	Potato industry	R	R	A	R	R
Andrew Widdison	Potato industry			R		
Jamie Cooke	Mid SE Irrigators	A	R	R	A	A
Kent Martin	SAFF - NRC	R	R	R	R	R
Greg Ingham	SAFF - NRC	A	Replaced by Nick McBride ²⁶			
Nick McBride	SAFF – attended as replacement for G Ingham		R	R	R	R
Maureen Andrews	SECWMB	R	R	R	R	R
Hugo Hopton	SECWMB	R	R	R	R	R
Jenny Peterson	SECWMB project officer	O	O	O	O	O
Leith Davis	Forestry SA		O	R	R	R
Peter Johnston	Forestry SA	R	R	O	A	O
Claus Schonfeldt	DWLBC	C	C	R	A	R
Darryl Harvey	DWLBC	R	R	R	R	R
Grant King	Limestone Coast Regional Development Board		O	C	C	C

Note; the GTRPC withdrew from the process at the fourth meeting, believing that the respective forest sectors should continue to represent their own interests, however the Chairman of the GTRPC continued attendance as an observer.

R = representative

A = apology

O = observer

C = chairman

Meeting 1	5 August 2003
Meeting 2	4 September 2003
Meeting 3	17 October 2003
Meeting 4	14 November 2003
Meeting 5	28 November 2003

²⁶ Nick McBride was not a representative of SAFF NRC

Plantation forest expansion potential

It should be noted that this table considers recharge benefits only and does not take account of the impacts of direct extraction, as discussed under point 17 in the 'summary of outcomes'.

1	11	18	B12	B20
Management Area (see note)	net area of softwood plantations as at August 2002. Source RPC ha	softwood expansion allocations after surrender and substitute ha	hardwood plantation forest estate as at August 2002. Source RPC (note) ha	hardwood expansion allocations after surrender and substitute ha
Benara	3,368	2,062	32	152
Blanche * Comp	3,129	670	21	388
Bool				299
Bowaka		318		
Bray	685	996		600
Caroline *	9,721	700	90	161
Coles	110	500	11,754	2,180
Comaum *	4,367	894	54	
Conmurra		1,730	88	612
Fox	556	1,184	713	3,299
Gambier *	9,238	500	31	500
Grey *	2,903	309	15	290
Hacks				
Hindmarsh	10,240	1,001	98	338
Jessie *	11			
Joanna *	1,208	247		
Joyce		533	263	
Kennion	1,987	1,022	353	3,370
Killanoola *		366	395	1,000
Kongorong	5,161	1,412		
L George	134	489		
Macdonnell	12	3		
Mayurra	15	765		53
Mingbool *	2,999	781		2,218
Monbulla *	48	780	1,430	3,138
Moyhall				
Mt Benson	4,747	500		
Mt Muirhead	1,991	955	23	609
Nangwarry *	14,593	1,000	56	500
Naracoorte *	198			
Penola *	6,399	1,311	58	
Riddoch	6,610	1,285	202	3,002
Rivoli Bay	195	562		
Robertson *		59		63
Ross		464		600
Short	429	198	6,858	4,588
Smith	549	115		29
Spence		548	1,998	
Symon	1,531	1,624	36	1,683
Townsend		552		275
Waterhouse	423	429		
Young	5,465	1,220	151	1,383
TOTALs	99,019	28,083	24,719	31,333
Note: All plantation areas are based on best industry data available at the time of assembling the management proposal, therefore areas are provisional. Industry data relates to subdivision Hundreds and these may not necessarily align with water management areas.				

APPENDIX 2

From the *Intergovernmental Agreement on a National Water Initiative*
(paragraph 57)

57. Accordingly, the Parties agree to implement the following measures in relation to water interception on a priority basis in accordance with the timetable contained in their implementation plans, and no later than 2011:

- i) in water systems that are fully allocated, *overallocated*, or approaching full allocation:-
 - a) interception activities that are assessed as being significant should be recorded (for example, through a licensing system);
 - b) any proposals for additional interception activities above an agreed threshold size, will require a *water access entitlement*.
 - the threshold size will be determined for the entire water system covered by a *water plan*, having regard to regional circumstances and taking account of both the positive and negative impacts of water interception on regional (including cross-border) natural resource management outcomes (for example, the control of rising water tables by plantations); and
 - the threshold may not apply to activities for restricted purposes, such as contaminated water from intensive livestock operations;
 - c) a robust compliance monitoring regime will be implemented; and
- ii) in water systems that are not yet fully allocated, or approaching full allocation:
 - a) significant interception activities should be identified and estimates made of the amount of water likely to be intercepted by those activities over the life of the relevant water plan;
 - b) an appropriate threshold level will be calculated of water interception by the significant interception activities that is allowable without a *water access entitlement* across the entire water system covered by the plan:
 - this threshold level should be determined as per paragraph 57(i)b) above; and
 - c) progress of the catchment or aquifer towards either full allocation or the threshold level of interception should be regularly monitored and publicly reported:
 - once the threshold level of interception is reached, or the system is approaching full allocation, all additional proposals for significant interception activities will require a *water access entitlement* unless for activities for restricted purposes, such as contaminated water from intensive livestock operations.

