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Appendices

1998
October

Phase 2 Gorgon Offsets Study

Department of Conservation
and Land Management



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APPENDIX 1

SUMMARY OF RESEARCH AND DEVELOPMENT PROJECTS ON MARITIME PINE

PART A: THE CURRENT RESEARCH AND DEVELOPMENT PROGRAM

1. Introduction

The objectives of the maritime pine research and development projects are to develop a system that allows the insertion of trees into farmland in the <600 mm rainfall zone. This will be achieved by:

- optimising the growth performance of trees by determining the best establishment techniques and best management practices;
- determining the best distribution of trees to maximise their water use and thus salinity control;
- devising practical management strategies which optimise the profitability and sustainability of trees established on farmland;
- devising strategies which take into account present and future risks to farm forestry from pests and diseases;
- developing a vigorous, drought tolerant maritime pine tree by selection and breeding;
- developing a co-operative Western Australian approach to farm forestry research and development, developing joint funding proposals to prospective sources with partners from other institutions (e.g. universities, Agriculture Western Australia).

These projects are specifically related to maritime pine and topics such as pests, diseases and fire control are currently being studied in the native forest and hardwood plantation programs.

2. Tree breeding and genetic deployment

2.1 Tree breeding

CALM has a long and successful history with the breeding of *P. pinaster* that has achieved substantial gains in tree growth rate and stem and branching form. The new variety available for deployment to tree farms is 80 per cent more productive than the original maritime pine tree from Portugal, as well as being straighter and smaller limbed. Research is currently concentrated on improving drought tolerance through breeding within the Western Australian population and by selection and introduction of new genotypes from low rainfall areas in Portugal and Morocco.

2.2 Development of *Pinus pinaster* genetic deployment

Project objectives:

- to develop reliable vegetative propagation methods for *P. pinaster*;
- to develop an accelerated control pollination orchard for the production of high genetic value seed;
- to establish field trials comparing seedlings with various vegetative propagation methods developed;
- to monitor the growth and survival of these trials after planting and after one and two years of growth;
- to monitor the water relations of seedlings for early signs of physiological stress created by the propagation method;
- to observe the root structure of plants produced from the different propagation methods.

3. Site evaluation

3.1 Maritime pine yield study

The objective is to develop models to predict site quality, growth and yield of maritime pine on farmland in south-west Australia. Input variables (mostly obtained from field measurements on 180 study plots) are site conditions (climate, soils, landform) and management factors (planting layout, genetics, silviculture). (National Heritage Trust/CALM funding)

3.2 Site evaluation standards

Provision of objective physical resource (soil, geomorphological and hydrological) information to CALM's Maritime Pine Project. This project has resulted in site selection methodology and standards for maritime pine plantations. These are reviewed as necessary.

Assess value of remote sensing and geophysical techniques in predicting development of salinity and optimising tree placement. Small research projects that have taken place in this program include an evaluation of gamma-radiometrics to survey soils (with CSIRO Land and Water) and an evaluation of EM38 meters for salinity prediction (with Curtin University).

3.3 Regional evaluations

Estimates of areas of land suitable for maritime pine using regional data sets and Geographic Information Systems have been made with CALM Information Management Branch.

4. Establishment techniques for *Pinus pinaster*

4.1 Weed control

Project objectives:

- to develop a system to control broadleaved and grass weeds among trees that are newly planted on farmland;
- to develop a system to control weeds among trees in the season after planting.

4.2 One-pass planting system

The main objective is to develop a system (or systems) to establish deep-rooted perennial vegetation on cleared farmland at the lowest possible cost. A system is likely to be a machine where options for different soil preparation methods, weed control methods, fertilising methods and planting capabilities are integrated such that only one visit to a site will be necessary to establish vegetation on cleared farmland. The project aims to provide the incentive to individuals or organisations to develop a one-pass planting system within stipulated environmental and silvicultural specifications.

5. Silvicultural systems

5.1 Plant nutrition and water use

Nutrient requirements and stand densities are being researched to optimise growth and survival. Develop an understanding of the interaction between stand density, fertiliser inputs and tree performance.

CALM has a range of fertiliser trials that are assessing the nutrient requirements of maritime pine across the range of soils in the 400 to 600 mm rainfall zone. Experiments include:

- 7 rates of nitrogen x phosphorus x potassium
- 2 rates of nitrogen
- 1 rate of phosphorus
- 1 trace element rates

Four trials are assessing the interaction between fertiliser inputs, thinning regimes and water use. These have been established in a joint project with The University of Western Australia, funded by CALM and the Australian Research Council.

One trial is assessing the use of heat pulse methodology to measure sap flow in pine species to assess water use.

5.2 Ultra-short-rotation agroforestry (USRA) system, for low rainfall areas

Evaluation of an ultra-short-rotation agroforestry system for low rainfall areas, which de-waters landscapes at risk from salinity while producing commercial wood fibre. Outcomes will include a scoping study and a feasibility demonstration to landholders. The system will result in the use of a resource that is currently contributing to environmental problems and more sustainable agricultural systems. (Rural Industries Research and Development Corporation/CALM/CSIRO Land and Water/The University of WA).

5.3 Optimising tree placement for tree performance and salinity control

Development of a system for integrating trees into farming systems in the <600 mm rainfall zone including that optimizes water use and profitability, via determination of the best planting locations and layouts. (National Heritage Trust/CALM/CSIRO Land and Water/The University of Western Australia/Agriculture Western Australia).

6. Carbon sequestration studies

6.1 Maritime pine biomass and carbon study

Involves extensive destructive-sampling of plots of maritime pine trees (tops, roots and litter) to measure stand biomass and stemwood volumes. Objectives are:

- to develop allometric equations to predict tree carbon content reliably and from easily measured independent variables such as stem diameter and tree height;
- to develop stand level empirical model of carbon sequestration by maritime pine on farmland.

PART B: DEPARTMENTAL PUBLISHED RESEARCH AND OTHER PUBLICATIONS

1. Tree breeding and genetic deployment

Barbour, L (1996). *Maritime pine: Pinus pinaster Ait. Reprinted from: Trees and natural resources.* – Vol. 38, no. 2 Natural Resources Conservation League of Victoria.

Butcher, T B (1993). *Realised gains from breeding Pinus pinaster.* Reprinted from: *Forest ecology and management.* – Vol. 58.

Gough, G (1992). In search of the perfect pine. In: *Landscape.* – Vol. 7, no. 3 Department of Conservation and Land Management.

Hopkins, E R, Butcher, T B (1993). *Provenance comparisons of Pinus pinaster Ait. in Western Australia* In: *CALM Science.* – Vol. 1, no. 1 Department of Conservation and Land Management.

Kusnander, D, Butcher, T B (1997). *Age trends in variances and heritabilities for height and diameter in maritime pine (Pinus pinaster Ait.)* Reprinted from: Conference abstracts: proceedings of the 44th Annual Conference of the Genetics Society of Australia Inc. Genetics Society of Australia 1997.

Perry, D H (1967). *Importation of breeding material of Pinus pinaster Ait. from Portugal.* Forests Department.

2. Site evaluation

Clifton, A L (1966). *Pinus pinaster on gravel.* In: Forest notes – Vol. 4, no. 3 Forests Department.

Clifton, A L (1966). *Pinus pinaster in the hills.* In: Forest notes – Vol. 4, no. 4 Forests Department.

Harper, R J (1995). *Preliminary site selection guidelines for new Pinus pinaster plantations.* Department of Conservation and Land Management. Unpublished report.

Havel, J J (1967). *Site assessment for Pinus pinaster (Ait.) plantations in Western Australia* Reprinted from: Ninth Commonwealth Forestry Conference, 1968 Forests Department.

Havel, J J (1968). *The potential of the northern Swan Coastal Plain for Pinus pinaster Ait. plantations.* Forests Department Bulletin

Hopkins, E R (1994). *Improvement of Pinus pinaster Ait. in Western Australia.* In CALM **Science** – Vol. 1, no. 2 Department of Conservation and Land Management.

3. Establishment techniques for *Pinus pinaster*

Butcher, T B (1982). *Use of fertiliser in the establishment of Pinus pinaster on the Swan Coastal Plain, Western Australia.* Paper presented at workshop on establishment of pines in Western Australia.

de Braganca, L F S (1986). *Survival of Pinus pinaster Ait. seedlings on second rotation (2R) sites in Gnangara plantation north of Perth, Western Australia.* Department of Conservation and Land Management.

Havel, J J (1969). *Research into problems of Pinus pinaster plantation establishment.* In: Forest notes. Special issue Forests Department.

Hopkins, E R-T (1960). *The fertiliser factor in Pinus pinaster Ait. plantations on sandy soils of the Swan Coastal Plain, Western Australia.* Forests Department.

Hopkins, E R (1960). *Germination stimulation in Pinus pinaster Ait.* Forests Department.

Hopkins, E R (1971). *Germination in Pinus pinaster Ait.* Forests Department

Lejeune, D (1968). *The establishment of P. pinaster in the Banksia bush coastal sands*. In: Forest notes. – Vol. 6, no. 3 Forests Department.

Stoate, T N (1938). *Pine establishment experimentation : an account of experiments in connection with the initial survival of cluster pine (Pinus pinaster) in Western Australian coastal plantations*. Forests Department report.

Stoate, T N (1938). *Pine establishment experimentation in Western Australia, 1932-37*. Forests Department Report.

Stoate, T N (1939). *Pine establishment: an account of experiments in connection with the initial survival of cluster pine (Pinus pinaster) in Western Australian coastal plantations*. Forests Department Report.

Stoate, T N (1946). *Pine establishment: a further report on a study from 1932 to 1945 of initial survival in plantations of cluster pine (Pinus pinaster) in Western Australian coastal plantations*. Forests Department Report.

4. Silvicultural systems

Butcher, T B (1976). *Impact of moisture relationships on the management of Pinus pinaster Ait. plantations in Western Australia*. From Project Group 202, proceedings IUFRO World Congress (1976) University of Stellenbosch, Faculty of Forestry.

Butcher, T B (1977). *Impact of moisture relationships on the management of Pinus pinaster Ait. plantations in Western Australia*. Reprinted from: Forest ecology and management – Vol. 1

Butcher, T B (1979). *Growing sawlogs on the Gnangara Mound*. Reprinted from: Hydrology and Water Resources Symposium, Perth Institution of Engineers, Australia.

Butcher, T B (1979). *Management of Pinus pinaster plantations on the Swan Coastal Plain for timber and water yield*. Australian Govt. Pub. Service.

de Braganca, L (1987). *A report on second rotation (2R) studies in Western Australia*. Department of Conservation and Land Management.

Harris, A C (1966). *Introduction of Pinus pinaster into Western Australia*. Forests Department.

Jenkins, E A (1974). *Pine plantations of Western Australia*. Forests Department. Reprinted 1983

Moore, R (1987). *Pine trees for timber under W.A. conditions*. Department of Conservation and Land Management.

Stoate, T N (1937). *Further studies in pine nutrition in Western Australia*. Forests Department Report.

Stoate, T N (1950). *Nutrition of the pine*. Forestry and Timber Bureau.

5. Pests and diseases

Batini, F E (1978). *Screenings of Pinus pinaster Ait. seedlings for resistance to Phytophthora cinnamomi Rands in pot trials*. Forests Department.

de Braganca, L and Havel, J J (1987). *Potential of Pinus pinaster, P. radiata and P. elliottii to rehabilitate dieback sites*. Department of Conservation and Land Management.

6. Plantation management

Annels, A R (1974). *Observations on the effect of re-fertilisation of Pinus pinaster planted on grey peaty sands*. In: Forest notes – Vol. 12, no. 2 Forests Department.

Ashcroft, A (1971). *Burning under P. pinaster*. In: Forest notes – Special issue Forests Department.

Burrows, N B, Ward, D, Robinson, A (1988). *Aspects of fire behaviour and fire suppression in a Pinus pinaster plantation*. Department of Conservation and Land Management.

Harmon, L M (1971). *Cambium damage in P. pinaster burns*. In: Forest notes – (Special issue) Forests Department.

Harman, L H (1972). *Bark burning on P. pinaster*. In: Forest notes – Vol. 10, no. 3 Forests Department.

Hopkins, E R (1960). *Variation in the growth rate and quality of Pinus pinaster Ait. in Western Australia*. Forests Department.

Hopkins, E R (1971). *Early responses to thinning in stands of Pinus pinaster*. Forests Department.

Kitt, R J (1971). *The effect of crown scorch on growth in P. pinaster*. In: Forest notes – (Special issue) Forests Department.

Lejeune, D R (1969). *Study of double leaders: P. pinaster at Gnangara*. In: Forest notes – Vol. 7, no. 3 Forests Department.

McCormick, J (1971). *Birds in Pinus pinaster plantations : a frequency count*. In: Forest notes – Vol. 9, no. 3 Forests Department.

McCormick, J (1971). *Fuel quantity assessment in Pinus pinaster*. In: Forest notes – (Special issue)

McCormick, J (1971). *Edge burning in Pinus pinaster*. In: Forest notes – (Special issue) Forests Department.

McCormick, J (1972). *Birds in Pinus pinaster plantations: a frequency count II*. In: Forest notes – Vol. 10, no. 2 Forests Department.

McCormick, J (1973). *Assessing maritime pine fuel quantity*. Forests Department.

McCormick, J (1976). *Recovery of maritime pine (Pinus pinaster) after severe crown scorch*. Forests Department.

Peet, G B, McCormick, J, Sneeuwjagt, R (1971). *A controlled burning guide for maritime pine plantations*. In: Forest notes – Special issue Forests Department.

Springett, J A (1972). *A soil zoological study of Pinus pinaster plantations at Gnangara, Western Australia, 1968-1971*. Forests Department.

Underwood, R J (1965). *A supering effect on Pinus pinaster*. In: Forest notes – Vol. 3, no. 1 Forests Department.

Ward, D (1971). *A controlled experiment to study factors influencing fire rate of spread in P. pinaster litter*. In: Forest notes – Vol. 9, no. 3 Forests Department.

7. Timber utilisation

Brennan, G K, Baggetta, C E (1997). *Dimensional changes of pine timber exposed to different environmental conditions*. In: CALM**Science** – Vol. 2, no. 3 Department of Conservation and Land Management.

Donnelly, D, Siemon, G (1986). *Sawmilling study of Pinus pinaster Ait. (Landes Provenance) in Western Australia*. Department of Conservation and Land Management Report.

Nicholls, J W P (1967). *Assessment of wood qualities for tree breeding. IV, Pinus pinaster Ait. grown in Western Australia*. Sauerlander Bibliography: p. 28

Phillips, F, Bain R, Watson, A (1967). *An assessment of the pulping potential of various Western Australian wood species*. CSIRO Report Bibliography: p. 30

Siemon, G R (1983). *Strength properties of Pinus pinaster Ait. in Western Australia*. Forests Department Report.

Siemon, G R (1995). *Wood density and spiral grain of radiata pine and maritime pine grown in Donnybrook Sunkland trial plots*. In: CALM**Science** – Vol. 1, no. 3 Department of Conservation and Land Management.

Siemon, G, Donnelly, D (1984). *The effects of exposure on the stability of heart-in studs of Pinus pinaster*. Forests Department.

White, K J (1990). *Debarking small diameter logs using a mobile flail chain debarker*. Wood Utilisation Research Centre, Department of Conservation and Land Management.

APPENDIX 2

TIMBER SHAREFARMING AGREEMENT

Date:

Parties:

("Owner")

The Executive Director of the Department of Conservation and Land Management a body corporate constituted by the Conservation and Land Management Act 1984 of Corner Hackett Drive and Australia II Drive ("**Grantee**")

Recitals:

- A. Section 34B of the Act provides that the Grantee has power to enter into, or enter into and carry out, whether as a principal or an agent, a timber sharefarming agreement (being an agreement by which, among other things, a right which is a profit a prendre and an interest in land is acquired).
- B. The Owner is registered as the proprietor of the estate and interest specified on page one of this deed in the Land and wishes to establish trees on the Land for the purpose of timber production, land improvement and the sequestration of Greenhouse Gases.
- C. The Grantee and the Owner have agreed that the Grantee may establish, maintain and harvest Trees on the Tree Crop Area for the Term on and subject to the terms and conditions contained in this deed.
- D. The parties intend this deed to be a timber sharefarming agreement, as defined in the Act.

Operative provisions:

1. Interpretation

Definitions

1.1 In this deed unless the contrary intention appears:

Act means the Conservation and Land Management Act 1984.

Available Credit means a Credit on account of the Greenhouse Gases which are sequestered by or in the Greenhouse Property prior to the expiry or termination of this deed.

Available Debit means a Debit which is attributable to the emission or possible emission of the Greenhouse Gases sequestered by or in the Greenhouse Property or to the harvesting or destruction of Greenhouse Property.

Commencement Date means the date of commencement of the Term which date is specified on page 1 of this deed.

Commercial Product means a part of the Forest Product which the Grantee determines is technically, logistically and economically possible for the Grantee to sell and which the Grantee is actually able to sell.

Credit means any emission reduction unit, credit, permit, licence, authority or other form of right (by whatever name called and whether proprietary or otherwise) in connection with the sequestration of Greenhouse Gases.

Debit means any debit or other form of obligation (by whatever name called) arising out of the emission or possible emission of Greenhouse Gases or on the harvesting or destruction of trees or Forest Product.

Encumbrance means any:

- (a) profit a prendre or other similar right, easement, public right of way or restrictive or positive covenant; or
- (b) lease, licence to use or occupy, possession adverse to the Owner, permit or authority; or
- (c) Security Interest, assignment of income or monetary claim; or
- (d) interest, equity, garnishee order or writ of execution,

or any agreement to create any of them or allow them to exist.

Execution Date means the date upon which the last of the parties to do so executes this deed.

Final Harvest means:

- (a) if the Grantee elects to carry out only one Harvest, that Harvest; and
- (b) if the Grantee carries out more than one Harvest, the last of those Harvests.

Forest Product includes trees, roots and other parts of trees, timber, sawdust, chips, firewood, charcoal, gum, kino, resin, sap and seed, and if any Forest Product is of more than one grade or class of use, each grade or class of use shall be a separate Forest Product for the purposes of this deed.

[Greenhouse Expenses means those amounts which are either:

- (a) costs, charges or expenses which are incurred by the Grantee (otherwise than in respect of services provided by an employee of the Grantee) to the extent to which they are attributable to:
 - (i) developing or acquiring a system by the Grantee for claiming Credits;
 - (ii) establishing an entitlement to Credits in connection with the Greenhouse Property or any supporting investigation or due diligence;
 - (iii) applying for and obtaining the Available Credits or any supporting investigation or due diligence; and
 - (iv) book keeping, accounting and other administration in relation to Credits and Debits; and
 - (v) exercising rights and powers under clauses 12.10 and 12.11; and
- (b) charges for work performed by employees of the Grantee for the matters referred to in paragraph (a) above at commercial rates determined by the Grantee.

Greenhouse Gases means:

- (a) carbon dioxide, methane, nitrogen oxides (including nitrous oxide), hydrofluorocarbons, hydrochlorofluorocarbons, perfluorocarbons (including perfluoromethane and perfluoroethane), sulphur hexafluoride and any other substance which contributes to or is thought by a reasonable body of scientific opinion to contribute to the greenhouse effect and any combination of them; and
- (b) any element comprised in the substances referred to in paragraph (a) and any substance (in whatever state) formed from any of the constituent elements comprised in the substances referred to in paragraph (a) or in which any of the constituent elements comprised in the substances referred to in paragraph (a) form part.

Greenhouse Property means:

- (a) the Tree Crop (including roots) and any resultant Commercial Product;
- (b) the trees established or to be established on the Land Care Area (including roots);
- (c) all branches, twigs, nuts, bark, leaf litter and other Forest Product on and in the Tree Crop Area and the Land Care Area; and
- (d) the soil and organic matter on and under the Tree Crop Area and the Land Care Area.

Harvest means the taking of any Forest Product from the Tree Crop Area and includes:

- (a) any intentional felling and, at the discretion of the Grantee, removal of Trees by the Grantee; and
- (b) Thinning,

and "to Harvest" has a corresponding meaning.

Harvest Plan means the plan relating to each Harvest of the Tree Crop prepared by the Grantee pursuant to clause 10.2.

Harvest Revenue means an amount determined in accordance with schedule 2.

Land means the land described on page one of this deed.

Land Care Area means that part of the Land (if any) as described in item 3 of schedule 1 planted or to be planted with trees by the Grantee for the main purpose of land rehabilitation.

Mining Tenement includes a permit to enter on private land, prospecting licence, special prospecting licence, exploration licence, mining lease, general purpose lease or miscellaneous licence or other tenement available for grant under the Mining Act 1978 and any other right or licence to prospect, explore or mine for minerals.

Petroleum Tenement includes a drilling reservation, exploration permit, production licence, pipeline licence, access authority or other tenement available for grant under the Petroleum Act 1967 or the Petroleum Pipelines Act 1969 and any other right or licence to prospect, explore for, recover, or convey petroleum.

Plan means the sketch plan annexed to and forming part of this deed.

Schedule of Royalties and Other Charges means the "Schedule of Hardwood and Softwood Royalties and other Charges", as published from time to time by the Executive Director of the Department of Conservation and Land Management.

Security Interest means any bill of sale (as defined in any statute), mortgage, charge, lien, pledge, hypothecation, title retention arrangement, trust or power, as or in effect as security for the payment of a monetary obligation or the observance of any other obligation.

Term means the term specified on page 1 of this deed.

Thinning means the felling and, at the option of the Grantee, removal of a portion of the Trees within the Tree Crop Area.

Trees means the trees established or to be established by the Grantee under this deed but does not include the trees planted on the Land Care Area.

Tree Crop means the Trees in aggregate.

Tree Crop Area means that part of the Land described in item 1 of schedule 1. A reference to Tree Crop Area includes any part of it.

Interpretation

- 1.2 In this deed unless the contrary intention appears:
- (a) a reference to a statute, ordinance, code, or other law includes regulations and other instruments under it, and consolidations, amendments, re-enactments, or replacements of any of them;
 - (b) a reference to this agreement or another instrument includes any variation or replacement of either of them;
 - (c) an agreement, representation or warranty on the part of or in favour of two or more persons binds or is for the benefit of them jointly and severally;
 - (d) an obligation of 2 or more parties binds them jointly and separately, and an obligation incurred in favour of 2 or more parties is enforceable by them jointly and separately;
 - (e) if a word or phrase is defined, other parts of speech and grammatical forms of that word or phrase have corresponding meanings; and
 - (f) references to this deed include its schedules and annexures (if any).
 - (g) the singular includes the plural and vice versa;
 - (h) the word person includes a firm, a body corporate, an unincorporated association or an authority;
 - (i) a reference to a person includes a reference to the person's executors, administrators, successors, substitutes (including, but not limited to, persons taking by novation) and assigns;
 - (j) a reference to any thing (including, without limitation, any amount) is a reference to the whole and each part of it and a reference to a group of persons is a reference to all of them collectively, to any two or more of them collectively and to each of them individually.

Headings

- 1.3 Headings and the table of contents are inserted for convenience and do not affect the interpretation of this deed.

2. Grant of rights

- 2.1 Subject to clause 12 and the other terms and conditions of this deed, and on and from the Commencement Date, the Owner (in consideration of the sharing of Harvest Revenue in accordance with clause 11.1 and for the further consideration, if any, specified in item 2 of schedule 1):
- (a) transfers and grants to the Grantee for the Term the right:
 - (i) to enter and otherwise have access to the Land; and
 - (ii) to establish, grow and maintain Trees on the Tree Crop Area from time to time; and
 - (iii) to Harvest and sell those Trees and any other Commercial Product; and
 - (iv) to undertake work and provide facilities on the Land for the purposes specified in paragraphs (i), (ii) and (iii);

- (b) assigns and transfers to the Grantee all of the Owner's right, title and interest, present and future, to:
 - (i) any entitlement to apply for or claim any Credit in respect of Greenhouse Gases sequestered by or in the Greenhouse Property during the Term and any right of action against the Commonwealth of Australia or other person (whether in Australia or elsewhere) in connection with any application or claim for any Credit in respect of Greenhouse Gases sequestered by or in the Greenhouse Property during the Term;
 - (ii) each Available Credit; and
 - (iii) any claim, award, compensation, judgment or other money to which the Owner is entitled in connection with the sequestration of Greenhouse Gases by or in the Greenhouse Property during the Term, any right of action referred to in clause 2.1(b)(i) or any Available Credit.

and the Owner declares for valuable consideration that it will hold the above right, title and property (to the extent not already assigned or transferred) on trust for the Grantee.

Property

- 2.2 The Owner and the Grantee acknowledge and agree:
 - (a) the Tree Crop (including roots);
 - (b) the trees established or to be established by the Grantee on the Land Care Area (including roots);
 - (c) all branches, twigs, nuts, bark, leaf litter and other Forest Product on and in the Tree Crop Area and the Land Care Area at any time during the Term; and
 - (d) all organic matter in or on the Tree Crop Area and the Land Care Area which is derived from the establishment of the Tree Crop and the trees established or to be established on the Land Care Area, are and remain the property of the Grantee notwithstanding that the trees are or may be affixed to the Land and, in the case of the trees, whether or not the trees have been felled.

3. Land Care trees

- 3.1 The Grantee agrees to plant trees of the species referred to in item 3 of Schedule 1 on the Land Care Area at a stocking rate as provided in item 3 of schedule 1 for the purposes of land rehabilitation.
- 3.2 The Grantee is not responsible for maintaining the trees planted pursuant to clause 3.1.
- 3.3 The Owner may not destroy, cut down or dispose of any trees planted on the Land Care Area without the Grantee's consent.

4. General manner of operations

The Grantee agrees to:

- (a) **(Council approval)** obtain the approval of the local council to the planting of the Trees, subject to receiving the assistance of the Owner;
- (b) **(Planting)** use reasonable endeavours to plant the seedlings on the Tree Crop Area and in accordance with good silvicultural practice; and
- (c) **(General manner of operations)** establish, grow, maintain and Harvest the Trees in a manner that, in the opinion of the Grantee, causes minimal disruption to the Owner's other farming activities on the Land and having regard to sound land conservation practice.

5. Seedlings

The Owner must provide the Grantee with an area to safely store seedlings prior to planting. The area must be reasonably close to the Tree Crop Area. Prior to the Grantee planting the seedlings, the Owner must (if requested) make available enough good quality water to water the seedlings twice per day until planting is complete. The Owner must allow the Grantee access to the area used to store the seedlings to water the seedlings as required by the Grantee until planting is complete.

6. Growing the Trees

Grantee's rights

- 6.1 Without limiting the generality of clause 2 and for the removal of doubt, the Grantee may, to the extent and in the manner the Grantee considers necessary, desirable or convenient, do any of the following on or in relation to the Tree Crop Area:
- (a) **(Drainage)** construct drainage works to combat waterlogging;
 - (b) **(Site preparation and associated works)** undertake ripping to relieve compaction, mounding, and ploughing and undertake any other associated works to prepare the Tree Crop Area for planting;
 - (c) **(Rabbits and vermin)** do any act or thing to control rabbits and other vermin;
 - (d) **(Insects)** do any act or thing to control insects which may adversely affect the Tree Crop;
 - (e) **(Weed control)** apply herbicides to kill weeds and to inhibit new weed germination and growth;
 - (f) **(Fertiliser application)** apply fertiliser containing the nutrients determined by the Grantee and applied in a regime over the Term to be determined by the Grantee;
 - (g) **(Pruning)** remove limbs from the Trees;
 - (h) **(Thinning operations)** carry out Thinning from time to time;
 - (i) **(Monitoring)** monitor the Tree Crop Area and the Tree Crop;
 - (j) **(Soil samples)** take samples of the soil on the Tree Crop Area and the area surrounding the Tree Crop Area;

- (k) **(Tree samples)** take samples from Trees and in its discretion cut down or uproot and remove an entire Tree or Trees as a sample; and
- (l) **(Other acts)** do any other act that the Grantee considers necessary, desirable or convenient to establish, maintain and grow the Trees.

Owner as contractor

- 6.2 The Grantee may in its discretion engage the Owner as a contractor on the terms and conditions it sees fit to perform any of the acts the Grantee may perform under clause 6.1.

7. Owner's obligations

General Obligation

- 7.1 Without prejudice to any specific obligation, the Owner must facilitate the use by the Grantee of its rights under this deed, the performance by the Grantee of its rights and obligations under this deed and foster the success of the Tree Crop throughout the Term.

Specific Obligations

- 7.2 The Owner agrees to:
- (a) **(Livestock and Fences)** exclude livestock from the Tree Crop Area including without limitation:
 - (i) adapt existing fences and gates; and
 - (ii) erect new fences and gates, (to the standard and within the time specified in writing by the Grantee along all the boundaries of the Tree Crop Area in order to exclude stock from the Tree Crop Area and:
 - (iii) maintain those fences and gates; and
 - (iv) at times specified by the Grantee, remove or alter fences and gates to allow access for any act permitted under this deed;
 - (b) **(Fire Prevention)** conduct all necessary or prudent practices for fire prevention and control on the Land including without limitation:
 - (i) to comply with the Bush Fires Act 1954 and the Bush Fires Regulations 1954;
 - (ii) to construct and maintain fire breaks on the Land as required by the local government pursuant to any power including, without limitation, its powers under section 33 the Bush Fires Act 1954 or as otherwise directed by the Grantee;
 - (c) **(Advise Grantee of fire on Land)** advise the Grantee at least 24 hours prior to the lighting of any fires on the Land during restricted burning seasons; and
 - (d) **(Advise the Grantee of fire on adjoining properties)** immediately advise the Grantee if the Owner is aware that a fire will be lit during a restricted burning season on any of the properties adjoining the Land;

- (e) **(Monitoring)** monitor the Tree Crop Area or as otherwise directed by the Grantee for anything that has harmed or may harm the Tree Crop (including without limitation insects, pests and vermin) and to advise the Grantee without delay if the Tree Crop has been harmed or something may harm the Tree Crop;
- (f) **(Access)** at all times allow the Grantee and the Grantee's agents, employees and contractors full and free access to the Land and the Tree Crop Area with or without plant, machinery and equipment;
- (g) **(Cutting and Damage)** not cut, remove, or damage any of the Trees or knowingly allow any other person to do so; and
- (h) **(Rates, Taxes and Other Charges)** subject to the terms of this deed, comply with the provisions of all mortgages, leases, licences and charges relating to the Land and to punctually pay all rates, taxes and other charges levied by any competent authority in respect of the Land.

Performance of Owner's obligations on default

7.3 If the Owner fails to perform any obligation of the Owner under this deed then the Grantee may give the Owner notice requiring that the default be rectified within 30 days. If the default is not rectified within 30 days of receipt of the notice then the Grantee at its option may perform that obligation at the cost of the Owner. The Owner must pay the costs incurred by the Grantee within 30 days of receiving written notification of the costs. The written notification provided by the Grantee of the costs incurred will be sufficient evidence of that fact.

8. Grazing rights

Consent to grazing

8.1 The Owner may, with the prior written consent of the Grantee, graze livestock on the Tree Crop Area. The consent of the Grantee may be revoked at any time by the Grantee. Without limiting the Grantee's right to revoke a consent at any time, the Grantee may make its consent subject to any terms and conditions it sees fit and if any of those terms and conditions are not complied with the consent is automatically revoked without the need for notice or any further act.

Damage caused by grazing

8.2 If the Owner grazes livestock on the Tree Crop Area (whether or not pursuant to a consent granted under clause 8.1), the Owner must repair and rectify any damage to the Tree Crop or the Tree Crop Area caused by the grazing of livestock to the satisfaction of the Grantee. If the damage to the Tree Crop or the Tree Crop Area is in the reasonable opinion of the Grantee beyond repair or rectification, the Owner must pay to the Grantee damages in respect of damage to the Tree Crop or the Tree Crop Area.

Obligation to fence not affected

- 8.3 This clause 8 or a consent provided pursuant to it does not limit the obligations of the Owner under clause 7.2(a).

9. Access

Owner's Roads

- 9.1 The Grantee may use, upgrade and maintain existing roads, tracks, culverts and bridges on the Land as at the Commencement Date and any roads, tracks, culverts and bridges constructed by the Owner after that date (each an "**Owner's Road**") in order to carry out any of its rights under this deed including without limitation to carry out a Harvest. The Grantee will, at the end of the Final Harvest, repair any Owner's Road on the Land to a condition which is as good or better than the condition in which it was generally maintained by the Owner, although only to the extent necessary to repair any damage caused by the Grantee.

Grantee's Roads

- 9.2 The Grantee may construct and maintain new roads, tracks, culverts and bridges on the Land in order to carry out any of its rights under this deed including, without limitation, to carry out a Harvest. The Owner must not do anything to damage the new roads, tracks, culverts or bridges until completion of the Final Harvest. The Owner may, however, use those roads, tracks, culverts and bridges to the extent that use does not interfere with a Harvest or the exercise by the Grantee of any of its rights under this deed.

10. Harvest

General

- 10.1 The Grantee agrees to organise and supervise the Harvest (or if more than one, the Harvests) and to undertake the sale of the Commercial Product.

Harvest Plan

- 10.2 The Grantee must commence preparation of a Harvest Plan in consultation with the Owner a reasonable time (but not less than 12 months) before each Harvest is proposed to be commenced by the Grantee and complete the Harvest Plan prior to each Harvest. The Harvest Plan will specify in particular the access route across the Land and onto the Tree Crop Area and the use, upgrading, maintenance or construction of roads, tracks, culverts, and bridges pursuant to clause 9.

Harvest Date Variation

- 10.3 The Owner may propose during preparation of each Harvest Plan that the Harvest date be varied by up to 12 months and the Grantee must attempt to accommodate this proposal in the Harvest Plan, although the date of a Harvest is at the discretion of the Grantee.

Multiple Harvest Operations

10.4 The Grantee may conduct more than one Harvest.

Stacking

10.5 The Owner must provide the Grantee with an area acceptable to the Grantee to stack the Commercial Product obtained from any Harvest for a reasonable period after it is Harvested.

11. Harvest revenue

Sharing of Harvest Revenue

11.1 The Owner and the Grantee are entitled to and will share each of the Harvest Revenues from the sale of Commercial Product in the proportions specified in item 4 of schedule 1.

Harvest Payments

11.2 Subject to receipt by the Grantee of the sale proceeds of the relevant Commercial Product, the Grantee must within 90 days of the completion of each Harvest, pay the Owner's share of the Harvest Revenue relating to that Commercial Product to the Owner or the Owner's nominee after deducting all amounts owing (whether or not then due) to the Grantee by the Owner.

Supporting Information

11.3 When paying to the Owner the Owner's proportion of any Harvest Revenue, the Grantee must provide a supporting statement of account showing:

- (a) the Harvest Revenue and how it was calculated; and
- (b) the distribution of that Harvest Revenue; and
- (c) a breakdown of all deductions from the Owner's proportion of any Harvest Revenue which identifies the amount of and reason for those deductions.

12. Credits

Intention

12.1 The Grantee and the Owner agree that unless it is stated in item 5 of schedule 1 that the Owner will have no entitlement to Available Credits:

- (a) the Grantee will be responsible for making the application for the Credits in respect of the Greenhouse Property on behalf of both the Owner and the Grantee; and
- (b) subject to clause 12.4, the benefit of all Available Credits and the money referred to in clause 2.1(b)(iii) and the burden of all Available Debits will be distributed and shared between the Owner and the Grantee in the proportions or as otherwise specified in item 5 of schedule 1 regardless of who is the person who would otherwise actually be entitled to those Available Credits, money or Available Debits.

Acknowledgments

12.2 The Owner and the Grantee acknowledge and agree:

- (a) there may be no system established in Australia or internationally for the creation of Credits and that, even if any system is established, the terms and conditions of any system cannot yet be predicted;
- (b) it may be that Credits will not be available in respect of Greenhouse Gases sequestered in plantation timber or the Greenhouse Property;
- (c) the price, if any, which can be obtained from the sale of Available Credits generally is unknown and will be subject to fluctuation in accordance with market factors;
- (d) it is not yet known whether it will be technically, logistically or economically feasible for the Grantee to undertake the work required to make a claim for Credits for the whole or any part of the Greenhouse Gases sequestered in the Greenhouse Property; and
- (e) any release of Greenhouse Gases from the Greenhouse Property, for example, if the Tree Crop or Land Care Trees are felled, could create a Debit which may create an obligation to:
 - (i) pay money or provide compensating Credits on account of those Debits; and
 - (ii) provide security for the obligations referred to in clause 12.2(e)(i) for future Available Debits.

Applications for Credits

12.3 The Owner and the Grantee agree that:

- (a) if from time to time, but not less than once in each period of ten years commencing on the date of this deed, the Grantee considers that there is an entitlement to claim Credits in respect of the Greenhouse Gases sequestered in or by the Greenhouse Property and that it is technically, logistically and economically viable to do so, then the Grantee will apply for those Credits which the Grantee considers may be applied for in connection with the Greenhouse Property or so many of them as the Grantee considers appropriate; and
- (b) the Owner will not, except as directed by the Grantee, apply for any Credits in respect of Greenhouse Gases sequestered in or by the Greenhouse Property; and
- (c) unless it is stated in item 5 of schedule 1 that the Owner will have no entitlement to Available Credits:
 - (i) the Grantee will, at the Grantee's option, either apply for those Credits in its own name or make separate applications in the names of the Owner and the Grantee respectively in the proportions specified in item 5 of schedule 1; and
 - (ii) if the Grantee applies for Credits in its own name it will, once it is allocated Available Credits, divide those Available Credits between it and the Owner in proportions specified in item 5 of schedule 1.

Division of Credits and Debits

12.4 If an application for Credits or Available Credits are required to be apportioned in proportions specified in item 5 of schedule 1 the Grantee shall divide the application or the Available Credits as nearly as possible in the specified proportions. Any excess entitlement may at the Grantee's option be taken by the Grantee for its own use, subject to the Grantee paying to the Owner cash compensation (after set-off of any amounts payable under clauses 12.6 and 12.7) of an amount equal to the Grantee's estimate of the open market sale value of the excess entitlement at the time of allocation by the relevant authority of the relevant Available Credits less an amount determined by the Grantee as the present value of the Grantee's estimate of any future Debit which may be incurred by the Grantee in respect of the sequestered Greenhouse Gases the subject of the excess entitlement.

Indemnity by Owner

12.5 Unless it is stated in item 5 of schedule 1 that the Owner will have no entitlement to Available Credits) the Owner indemnifies the Grantee against any liability or loss arising from, and any costs, charges and expenses incurred in connection with the Grantee being liable for:

- (a) in the case where it is stated in item 5 of schedule 1 that the Owner will have no entitlement to Available Credits, Available Debits to the extent those Available Debits are in respect of Greenhouse Gases which are sequestered by or in the Greenhouse Property after the expiry or termination of this deed; and
- (b) in all other cases, Available Debits to the extent that those Available Debits arise in respect of:
 - (i) that proportion of the Greenhouses Gases sequestered by or in the Greenhouse Property which are sequestered prior to the expiry or termination of this deed as is specified as the Owner's proportion in item 5 of schedule 1; and
 - (ii) the Greenhouse Gases which are sequestered by or in the Greenhouse Property after the expiry or termination of this deed.

Indemnity to Owner

12.6 The Grantee indemnifies the Owner against any liability or loss arising from, and any costs, charges and expenses incurred in connection with the Owner being liable for:

- (a) in the case where it is stated in item 5 of schedule 1, that the Owner will have no entitlement to Available Credits, all Available Debits, other than Available Debits to the extent to which those Available Debits arise in respect of the Greenhouse Gases which are sequestered by or in the Greenhouse Property after the expiry or termination of this deed; and
- (b) in all other cases, Available Debits to the extent that those Available Debits arise in respect of that proportion of the Greenhouses Gases sequestered by or in the Greenhouse Property which are sequestered prior to the expiry or termination of this deed as is specified as the Grantee's proportion in item 5 of schedule 1.

Greenhouse Expenses

12.7 Following the issue of Available Credits to which the Owner has a proportionate entitlement in accordance with item 5 of schedule 1, the Owner must from time to time pay to the Grantee a charge on account of Greenhouse Expenses in connection with those Available Credits. Each charge will be calculated in the manner and be payable at the times determined by the appropriate part of the section headed "greenhouse expenses" in the Schedule of Royalties and Other Charges. For the avoidance of doubt it is acknowledged that if it is stated in item 5 of schedule 1 that the Owner will have no entitlement to Available Credits, then the Owner will have no responsibility for Greenhouse Expenses.

Third Party Interests

12.8 The Owner agrees with the Grantee that, without prejudice to its other obligations under this deed, the Owner will ensure that each person who has or claims a Security Interest or other Encumbrance in the Land (other than through the Grantee) or the Owner's right to claim Credits in respect of the Greenhouse Gases sequestered in or by Greenhouse Property or the Available Credits does all such things and signs all such documents as may reasonably be required by the Grantee to ensure that that person:

- (a) has no greater right or claim to Credits in respect of Greenhouse Gases sequestered in the Greenhouse Property or Available Credits than those of the Owner under this deed; and
- (b) does all such things (at the cost of the Owner) as may reasonably be required by the Grantee to enable the Grantee to enjoy its rights under this deed.

Mensuration

12.9 In making any determination in connection with this clause 12, the Grantee may use such methods of measuring, estimating, modelling, averaging or attribution as the Grantee determines is reasonable.

Assistance by Owner

12.10 The Owner agrees with the Grantee that whenever required it will do whatever may be reasonably required by the Grantee:

- (a) to vest in the Grantee (or any nominee of the Grantee) the Greenhouse Property and the Available Credits assigned and transferred by clause 2.1;
- (b) to enable the Grantee to apply for the Credits which may be applied for in connection with the Greenhouse Property;
- (c) in connection with a Debit in respect of Greenhouse Gases sequestered in the Greenhouse Property; and
- (d) to enable the Grantee either in the name of the Grantee or the names of the Grantee and the Owner to institute, conduct or defend legal proceedings in connection with any:
 - (i) entitlement of the Owner to claim Credits; and
 - (ii) obligation of the Owner in respect of Debits in respect of the Greenhouse Gases sequestered in the Greenhouse Property.

Power of Attorney

12.11 For the purposes set out in this clause 12, the Owner irrevocably appoints the Grantee and each officer of the Grantee with the word "director" or "manager" in her or his title severally its attorney to do the things contemplated by this clause 12 or which are ancillary to those things, notwithstanding any conflict of interest or duty of the attorney or that the attorney has a personal interest in the means or result of an exercise of power and the Owner agrees to ratify anything done by its attorney under this clause 12.11. An attorney appointed under this clause 12.11 may delegate its powers to any other person on such terms and conditions as the attorney sees fit.

13. Warranties

The Owner warrants to the Grantee as of the Execution Date and as of the Commencement Date that:

- (a) the Tree Crop Area is free from Encumbrances, other than the Encumbrances described on page 1 of this deed;
- (b) there are not within the knowledge of the Owner:
 - (i) any outstanding or impending demands, orders or requisitions of any competent authority relating to the Land;
 - (ii) any proposals for the re-alignment, widening or alteration of the level of any road adjoining the Tree Crop Area by any competent authority that would materially affect the Tree Crop Area or its use;
 - (iii) any sewers, drains, pipes, cables or other installations passing through the Tree Crop Area, other than as shown on the Plan;
 - (iv) any proposals by any competent authority to resume any part of the Land;
 - (v) any proposals by any competent authority to change the zoning or permitted use of the Land;
 - (vi) any use to which the Land has in the past been put which would materially affect the growth or use of the Trees; or
 - (vii) any native title claims over the Tree Crop Area.
- (c) the Owner has not received any notice of resumption or intended resumption of the Land or any part of it by any competent authority; and
- (d) all information given to the Grantee by the Owner relating to the Land is true and correct, and that the Owner has not failed to disclose to the Grantee any material information relating to the Land which the Owner ought reasonably to have provided to the Grantee.

14. Tree crop damaged or destroyed

Salvaged Commercial Product

14.1 If the Tree Crop or any part of it is damaged the Grantee may cut down and dispose of all Commercial Product salvageable from the damaged area and the parties will share any proceeds from the sale of the salvaged Commercial Product as if those proceeds were Harvest Revenue.

Destruction – Replanting

14.2 If the Tree Crop or any part of it is destroyed, the Grantee may in its absolute discretion replant the destroyed area within 2 years of that destruction. Any trees planted pursuant to this clause 14.2 will be Trees for the purposes of this deed.

Negligence and destruction by fire

14.3 If the Tree Crop is damaged or destroyed by fire as a result of the negligence of the Owner, the Owner will not be liable to the Grantee in negligence in respect of the damage or destruction if the Owner has not breached subclauses 7.2(b), (c) and (d) of this deed and has not been reckless. The Owner must however, pay the Owner's Proportion specified in item 4 of schedule 1 of the costs incurred in replanting the destroyed area pursuant to clause 14.2. A certificate signed by the Grantee as to the costs of replanting shall be sufficient evidence of that fact.

15. Termination

Grantee's Right of Termination

15.1 If at any time during the Term all or substantially all of the Tree Crop is destroyed or rendered unsaleable, or the Grantee considers it to be uneconomical for any reason for the Grantee to establish or continue to maintain the Tree Crop or to Harvest, the Grantee may (without liability to compensate the Owner) terminate this deed by giving a written notice of termination to the Owner.

Early Termination by Agreement

15.2 The parties may agree in writing at any time prior to the expiration of the Term by effluxion of time to terminate this deed.

Termination after Final Harvest

15.3 Upon completion of the Final Harvest by the Grantee either party may (without liability to compensate the other) terminate this deed by written notice of termination to the other which will take effect from the date specified in that notice.

Default by the Grantee

15.4 The Owner may terminate this deed by giving the Grantee written notice of termination if:

- (a) the Grantee is in default of any obligation under this deed; and
- (b) that default continues for 2 months after receipt by the Grantee of written notice from the Owner specifying the default and requesting that the default be remedied.

Termination under this clause 15.4 takes effect from the day 12 months after the day on which the notice of termination was served.

Default by Owner

15.5 The Grantee may terminate this deed by giving the Owner written notice of termination if:

- (a) the Owner is in default of any obligation under this deed; and
- (b) that default continues for 2 months after receipt by the Owner of written notice from the Grantee specifying the default and requesting that the default be remedied.

Antecedent Breaches

15.6 Termination of this deed under any clause of this deed, at law, in equity or pursuant to statute, does not prejudice any rights or remedies that may have arisen out of any breach of this deed prior to the date of termination.

Rights and Obligations on Expiration

15.7 The Owner and the Grantee agree that:

- (a) upon the termination of this deed (other than because of the default of the Owner) or its expiration the Trees and other property referred to in clause 2.2 and all Credits which relate to Greenhouse Gases sequestered in or by the Greenhouse Property prior to the termination or expiry after the date of termination will cease to be the property of the Grantee and belong to the Owner as the Owner's absolute property freed from any rights of the Grantee under this deed and that, at the cost of the Owner, the Grantee will, if requested, do all things necessary to vest in the Owner property in the Trees, the other property referred to in clause 2.2 and any Credits which relate to Greenhouse Gases sequestered in or by the Greenhouse Property prior to the termination or expiry;
- (b) upon the termination or expiry of this deed for any reason:
 - (i) the Grantee must leave the Tree Crop Area in a tidy condition, but is not obliged to re-establish pastures or crops, or to remove mounds or any trees (including the Trees), stumps, bark, branches, access roads, rocks or fencing; and
 - (ii) the parties will execute a formal document of surrender of this deed, for registration under the Transfer of Land Act 1893 (the costs of which the parties must bear in equal shares),

and it is expressly agreed that this clause 15.7 is to survive such termination.

Essential Terms

15.8 Clauses 5, 6, 7, 8 and 9 are essential terms of this deed. This clause does not prevent any other clause being an essential term.

16. Force majeure

- 16.1 This deed is made subject to any delays in the performance of the obligations under this deed and to the temporary suspension of continuing obligations under this deed that are caused by or arise from any of the following circumstances beyond the power and control of the party responsible for the performance of those obligations, namely, act of God, force majeure, earthquakes, floods, storms, tempest, washaways, fire (unless caused by the actual fault or privity of the party responsible for such performance), act of war, act of public enemies, riots, civil commotions, strikes, lockouts, stoppages, restraint of labour or other similar acts (whether partial or general), acts or omissions of the Commonwealth Government, shortages of labour or essential materials, reasonable failure to secure contractors or delays of contractors.
- 16.2 The party whose performance of obligations is affected by any of the causes referred to in clause 16.1 must promptly give notice to the other party of the event or events and must use best endeavours to minimise the effects of such causes as soon as possible after their occurrence.

17. Special Terms

The special terms (if any) set out in item 8 of schedule 1 are deemed to be incorporated in this deed as if fully set out in this deed and if there is any inconsistency between the terms contained in this deed and the special terms in item 8 of schedule 1 then the special terms in item 8 of schedule 1 are to prevail.

18. Dealings with Land and Credits

Owner not to transfer etc. without consent

- 18.1 The Owner must not transfer, assign, surrender, lease, dispose of, mortgage, charge or encumber the Owner's interest in the Land or in this deed or part with possession of the Land (or agree to do any of those things) without the prior written consent of the Grantee which the Grantee must not refuse if the Owner procures:
- (a) in the case of a proposed transfer, assignment, surrender, lease, disposal or licence ("disposal") the execution by the proposed transferee, assignee, grantee, lessee, disponee or licensee (as the case may be) ("the acquirer") of a deed of covenant in the form of the Transferee's Deed of Covenant in schedule 3 (with the appropriate modifications) in favour of the Grantee which binds the acquirer to perform and observe the terms of this deed to be performed by the Owner from the date of the proposed disposal; and
 - (b) in the case of a mortgage, charge or encumbrance the execution by the proposed mortgagee, chargee or encumbrancer of a deed of covenant in a form approved by the Grantee, but, in the case of a security interest, substantially in the form of the deed of consent and covenant in schedule 4 in favour of the Grantee.

Notification

- 18.2 The Owner must promptly notify the Grantee in writing as soon as the Owner becomes aware of any application by any person for a Mining Tenement or Petroleum Tenement over any part of the Tree Crop Area, or of any notice of intention to mine or conduct petroleum operations on any part of the Tree Crop Area.

19. Assignment by the Grantee

- 19.1 The Grantee must not assign its interest or any part of its interest in this deed to any other person without the prior written consent of the Owner which the Owner must not refuse if:
- (a) the proposed assignee is solvent;
 - (b) the proposed assignee is competent and experienced in the management of tree crops or at the time of assignment it has appointed as its agent to manage the Tree Crop either the Executive Director of the Department of Conservation and Land Management or someone who is a competent manager of tree crops; and
 - (c) the proposed assignee agrees to execute a deed of covenant between the proposed assignee, the Grantee, and the Owner which binds the proposed assignee to perform and observe the terms of this deed to be performed by the Grantee from the date of the proposed assignment, and which contains a release of the Grantee by the Owner from the date of the proposed assignment from any obligation to be performed by the Grantee following that date.
- 19.2 For the removal of doubt, clause 19.1 does not place any limitation on the Grantee assigning the Available Credits or any other right, title or interest referred to in clause 2.1(b).
- 19.3 If the proposed assignee satisfies the criteria in clause 19.1, then the Owner must execute the deed of covenant referred to in clause 19.1(c).

20. Binding effect of deed

Deed to continue

- 20.1 This deed is to be binding upon and be available for the benefit of each party and their respective executors, administrators, successors, substitutes (including, but not limited to, persons taking by novation) and assigns.

Section 34B of the Act

- 20.2 The parties acknowledge that under section 34B(4) of the Act the obligations in this deed which bind the Grantee cease to do so on the Grantee assigning its rights under this deed and under section 34B(5) of the Act the obligations and restrictions in this deed which bind the Owner are also binding on the heirs, executors, administrators and successors in the title of the Owner.

Owner means registered proprietor only

- 20.3 Subject to clause 20.4, if the Owner's interest in the Land and this deed is transferred or assigned in any way (other than by way of security only) the Owner named in this deed (and in the case of any subsequent transfers or assignments other than by way of security only, then the transferor or assignor) will be automatically released and discharged from and after the date of such transfer or assignment of all personal liability for the performance of any obligation on the part of the Owner contained in this deed and under this deed to be performed after the date of such transfer or assignment.

Limitation on release of Owner

20.4 The release and discharge of an Owner or any transferor or assignee of an Owner in clause 20.3 is always subject to the condition of that person procuring the proposed transferee or assignee to execute the deed of covenant referred to in clause 18.1(a).

21. Registration of deed

Caveat pending registration

21.1 Pending registration of this deed under the Transfer of Land Act 1893 as a profit a prendre, the Grantee may lodge a subject to claim caveat against the Land protecting its estate and interest in the Land under this deed. The Grantee shall pay all the costs of and incidental to the preparation and lodging of the caveat and any withdrawal or replacement caveat and all registration fees.

Parties to register deed

21.2 Each party must do all things necessary or, in the opinion of the Grantee, desirable, to have this deed registered as a profit a prendre under the Transfer of Land Act 1893 as soon as practicable following the Execution Date.

Consent of encumbrances

21.3 If the consent of an Encumbrancer (including those specified in item 6 of schedule 1) is required then the Owner must use its best endeavours to obtain the consent of that Encumbrancer to this deed and the interest in and rights over the Land and to Available Credits granted by this deed in the form required by the Grantee. In the case of a Security Interest, the consent shall be obtained in the form of deed of consent and covenant in schedule 4 with such amendments as the Grantee may reasonably require.

Termination for non-registration

21.4 If this deed has not been registered within 90 days following the Execution Date then within 120 days following the Execution Date the Grantee may terminate this deed by giving the Owner written notice of termination, in which case clauses 15.6 and 15.7 will apply.

22. Notices

To Grantee

22.1 Any notice required to be given under this deed to the Grantee is to be in writing and delivered personally or sent by pre-paid post addressed to the Grantee at the Department of Conservation and Land Management, at the address specified in item 7 of schedule 1.

To Owner

22.2 Any notice required to be given under this deed to the Owner is to be in writing and delivered personally or sent by pre-paid post to the Owner at the Owner's address appearing on page 1.

Deemed Receipt

22.3 Any notice so delivered or mailed is deemed to have been duly given and, in the case of posting, received on the 7th day after posting.

Change of Address

22.4 Any party may change its address for receipt of notices at any time by giving notice of the change to the other party as provided in this clause.

Signature of Notices

22.5 Any notice may be signed by that party, or on behalf of the party giving it by any director of that party or employee of that party whose title includes the word "manager" or that party's solicitors.

23. Proper law and forum

This deed is to be interpreted and to take effect according to the law for the time being in force in Western Australia. The parties irrevocably submit to the exclusive jurisdiction of the courts of Western Australia and courts hearing appeals from those courts.

24. General

Relationship of parties

24.1 Nothing in this deed is to be construed as constituting the Owner and the Grantee as partners, or as creating between the Owner and the Grantee:

- (a) a fiduciary relationship of any kind whatsoever;
- (b) the relationship of:
 - (i) employer and employee;
 - (ii) master and servant; or
 - (iii) principal and agent,

and neither the Owner nor the Grantee has (and must not represent that it has) any power right or authority to bind the other.

Entire agreement

24.2 This deed embodies the entire agreement between the parties relating to the subject matter of this deed, and this deed supersedes and replaces prior and contemporaneous agreements and understandings between the parties relating to the subject matter of this deed.

Further assurance

24.3 Each party must do all things and execute all documents reasonably required by the other party to give effect to any of the matters contemplated by this deed.

Severability of provisions

24.4 If any part of this deed is or becomes unenforceable for any reason whatever then in an appropriate case a Court may sever that part from this deed and all those parts not so severed will remain in full force and effect and be unaffected by such severance.

EXECUTED as a deed

SCHEDULE 1

Information

1. Description of Tree Crop Area (clause 1.1)

The Tree Crop area is located as shown on the Plan. The area to be planted determined by aerial photographic interpretation or ground survey, or both, and after exclusion of major unplatable parts, is approximately [] ha.

2. Further consideration (if any) (clause 2.1)

3. Land Care Area and trees and stocking rate

The Land Care Area is located as shown on the Plan. The area to be planted determined by aerial photographic interpretation or ground survey, or both, and after exclusion of major unplatable parts, is approximately [] ha.

The trees to be planted are [].

The stocking rate is to be [].

4. Harvest Revenue (clause 11)

Grantee's Proportion []%

Owner's Proportion []%

5. Benefit of Available Credits (clause 12)

[Grantee's Proportion []%

Owner's Proportion []%]

[The Owner will have no entitlement to Available Credits]

6. Encumbrances for which Consent is necessary (clause 21.3)

7. Address for service of Grantee (clause 22.1)

[]

8. Special Terms (if any) (clause 17)

Nil or:

Fencing

The Executive Director agrees to contribute to the cost of fencing materials at the rate of \$50/ha for the Tree Crop Area within 30 days of the Execution Date.

SCHEDULE 2

Harvest Revenue

1. The Grantee must determine the Harvest Revenue for Commercial Product which is harvested and sold by applying the relevant stumpage component of the "Schedule of Royalties and Other Charges" to the Grantee's estimate of the weight, volume, number or other form of measurement (as the case may require) of Timber Product sold as at the date of sale of the Timber Product which is harvested and sold and making any adjustment for any matters which are contemplated by the Schedule of Royalties and Other Charges.
2. In making the determination in paragraph 1:
 - (a) the Grantee may use such methods of measuring, estimating, modelling, averaging or attribution as the Grantee determines is reasonable; and
 - (b) the Grantee shall, where the Schedule of Base Softwood Stumpages contains alternative stumpage methods, use the method which the Grantee considers most appropriate.

SCHEDULE 3

Clause 18.1(a)

TRANSFEEE'S DEED OF COVENANT

Date:

Parties:

[
("the Grantee")]

[
("the Transferor")]

[
("the Transferee")]

Recitals:

- A. The Grantee and the Transferor are parties to the timber sharefarming agreement ("Timber Sharefarming Agreement") described in item 1 of the Schedule in respect of the Transferor's land described in item 2 of the Schedule ("the Land") and registered at the Titles Office, Perth, as a profit a prendre ("the profit a prendre") and allocated the number contained in item 3 of the Schedule.
- B. By clause 18.1 of the Timber Sharefarming Agreement, the Transferor may not transfer the Land without the consent of the Grantee and by clause 20.4 the Transferor is not discharged from its obligations under the Timber Sharefarming Agreement unless this deed is executed and delivered by the proposed Transferee.
- C. The Transferor wishes to transfer the Land in favour of the Transferee and the Grantee consents to the transfer on the condition that the Transferee executes and delivers this deed.

Operative Part:

1. Interpretation

The rules of interpretation and the definitions contained in the Timber Sharefarming Agreement apply to this deed.

2. Consent

The Grantee consents to the Owner transferring the Land to the Transferee.

3. Covenants

The Transferor, the Transferee and the Grantee covenant and agree that as from the time that the Transferee becomes the registered proprietor of the Land:

- (a) the obligations of the Transferor under the Timber Sharefarming Agreement will bind the Transferee as if the Transferee:
 - (i) were the Owner named in the Timber Sharefarming Agreement; and
 - (ii) had executed and delivered the Timber Sharefarming Agreement, and the Transferee will carry out and comply with those obligations;
- (b) the obligations of the Grantee under the Timber Sharefarming Agreement will bind the Grantee for the benefit of the Transferee;
- (c) the Transferee is released from any obligations it has under the Timber Sharefarming Agreement other than those obligations which were required to be met prior to the date the Transferee becomes the registered proprietor of the Land; and
- (d) The Transferee assigns and transfers to the Grantee all of its right, title and interest, present and future, to:
 - (i) any entitlement to apply for or claim any Credit in respect of Greenhouse Gases sequestered by or in the Greenhouse Property during the Term and any right of action against the Commonwealth of Australia or other person (whether in Australia or elsewhere) in connection with any application or claim for any Credit in respect of Greenhouse Gases sequestered by or in the Greenhouse Property during the Term;
 - (ii) each Available Credit; and
 - (iii) any claim, award, compensation, judgment or other money to which the Owner is entitled in connection with the sequestration of Greenhouse Gases by or in the Greenhouse Property during the Term, any right of action referred to in clause 3(d)(i) and any Available Credit.

and the Transferee declares for valuable consideration that it will hold the above rights and property (to the extent not already assigned or transferred) on trust for the Grantee.

4. Deed supplemental

This deed is supplemental to the Timber Sharefarming Agreement within the meaning of section 16 of the Property Law Act 1969.

5. Costs, charges and expenses

24.5 The Transferee and the Owner agree to pay or reimburse the Grantee and the Transferee on demand for the Grantee's costs, charges and expenses in negotiating, executing and enforcing this deed including, without limitation, legal costs and expenses on a full indemnity basis.

24.6 The Transferee must pay all stamp duties, fees, taxes and charges which are payable in connection with this deed or a payment, receipt or other transaction contemplated by it.

EXECUTED as a deed

Schedule to Transferee's Deed of Covenant

- 1. Timber Sharefarming Agreement**
- 2. Land**
- 3. Registered profit a prendre number**

SCHEDULE 4

Clause 18.1(b)

DEED OF CONSENT AND COVENANT: SECURITY INTEREST

Date:

Parties:

[
("the Grantee")]

[
("the Owner")]

[
("the Mortgagee")]

Recitals:

- A. The Grantee and the Owner are parties to the timber sharefarming agreement ("Timber Sharefarming Agreement") described in item 1 of the Schedule in respect of the Owner's land described in item 2 of the Schedule ("the Land") and [registered] [to be registered] at the Titles Office, Perth, as a profit a prendre ("the profit a prendre") [and allocated the number contained in item 3 of the Schedule].
- B. Clause 18.1 of the Timber Sharefarming Agreement prohibits the Owner from mortgaging, charging or encumbering the Land without the consent of the Grantee.
- C. The Owner wishes the Grantee to give its consent to the Security Interest specified in the schedule ("Specified Security Interest") and the Grantee has agreed to give its consent on the condition that the Owner and the Mortgagee execute and deliver this deed.

Operative part:

1. Interpretation

The rules of interpretation and the definitions contained in the Timber Sharefarming Agreement shall apply to this deed.

2. Consent

- 24.1 The Grantee consents to the Specified Security Interest.
- 24.2 The Mortgagee consents to the Owner [entering into] [having entered into] the Timber Sharefarming Agreement with the Grantee.

3. Covenants

Possession by Mortgagee

- 24.3 The Mortgagee must observe the obligations of the Owner under the Timber Sharefarming Agreement:
- (a) while the Mortgagee is in possession of the Land; or
 - (b) while the Mortgagee is in receipt of the rents and profits derived from the Land; or
 - (c) if the Mortgagee has appointed a person receiver or receiver and manager of the Land, while that person is the receiver or receiver and manager of the Land,
- as though it were a party to and had executed the Timber Sharefarming Agreement.
- 24.4 For the avoidance of doubt the Mortgagee is not liable to the Grantee in respect of any breach or default by the Owner under the Timber Sharefarming Agreement other than during the periods referred to in clause 1.3.

Power of Sale

- 24.5 The Mortgagee agrees with the Grantee that the Mortgagee and any receiver or receiver and manager appointed by the Mortgagee will comply with the Owner's obligation not to transfer, dispose of, deal with or part with possession of any estate or interest in the Land, other than with the consent of the Grantee.

Transfer of Security Interest

- 24.6 The Mortgagee may not transfer the Specified Security Interest unless it causes the proposed transferee to enter into a deed of covenant in a form approved by the Grantee which binds the proposed transferee to the obligations of the Mortgagee under this deed.

4. Costs, charges and expenses

- 24.7 The Owner agrees to pay or reimburse the Grantee and the Mortgagee on demand for their costs, charges and expenses in negotiating and executing this deed including, without limitation, legal costs and expenses on a full indemnity basis.
- 24.8 The Owner must pay all stamp duties, fees, taxes and charges which are payable in connection with this deed or a payment, receipt or other transaction contemplated by it.

EXECUTED as a deed

Schedule to Deed of Consent and Covenant: Security Interest

- 1. Timber Sharefarming Agreement**
- 2. Land**
- 3. Registered profit a prendre number**
- 4. Security Interest**

Execution pages

THE COMMON SEAL of the Executive)
Director of **THE DEPARTMENT OF**)
CONSERVATION AND LAND)
MANAGEMENT was affixed to this)
deed by Sydney Ronald Shea, the)
Executive Director of the Department of)
Conservation and Land Management for)
the time being in the presence of:)

.....
Signature of authorised person

.....
Signature of authorised person

.....
Office held

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Office held

.....
Name of authorised person (block letters)

.....
Name of authorised person (block letters)

SIGNED by [] in)
the presence of:

.....
Signature of witness

.....
Name of witness (block letters)

.....
Address of witness

.....
Occupation of witness

.....
Signature of []

SIGNED by [] in)
the presence of:

.....
Signature of witness

.....
Name of witness (block letters)

.....
Address of witness

.....
Occupation of witness

.....
Signature of []

(Include appropriate execution clauses for both the Transferor and the Transferee)

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APPENDIX 3

CORPORATE SERVICES SUPPORTING THE GORGON PLANTATION PROJECT

1. CALM's Corporate Executive

CALM's Corporate Executive is responsible for all major decisions made by the Department in relation to its business, including CALM's involvement with overseas investor plantation projects. The majority of support for the Gorgon project would come from the Executive Director and the Director of Forests in the area of political lobbying. Corporate Executive also controls many other important functions and tasks as follows:

- drafting a State Agreement Act, if required, and overseeing its passage through State Parliament;
- amending the State Agreement Act in the future, as required;
- drafting the Deed of Agency and Indemnity and subsequent approval for execution;
- approving advertising and awarding contracts above a total value of \$50,000;
- responding to Parliamentary questions and correspondence to Ministers relating to the project and associated plantation projects;
- approving annual budgets, staffing arrangements and other logistical requirements such as vehicles and large equipment, buildings and accommodation, purchase of assets;
- providing representatives on the Farm Forestry Task Force and the newly formed Farm Forestry Development Group;
- providing direct input into the National Carbon Accounting Committee;
- lobbying on the opportunities for tree crops and timber products to contribute to carbon sinks.

2. Plantations Group

The Plantations Group includes four units and is responsible for a range of matters including the following:

Staff support

- General management of the Plantations Group and the units within the Group.
- Staff structure support, proposals for additional and replacement staff, accommodation and transport.
- Staff appraisals and staff development.

Budget formulation and approvals

- Annual budget collation for the Plantations Group.
- Negotiating with Corporate Executive for annual budget approvals.

Co-ordination and participation in missions

- General support for visitors from parties related to the Project, preparation of information and special projects.

Co-operative research

- Promotion and support of co-operative research.

Plantation code of practice

- Development of a plantation code of practice for Western Australia, one of the assessment criteria for lifting export restrictions on plantation grown woodchips. A code of practice also simplifies and allows a consistent approach to the granting of permits to establish plantations under Town Planning Schemes.
- A code of practice has been prepared and released by CALM and the Australian Forest Growers Association.

Plantation manuals

- The development of the hierarchy of plantation manuals has begun which will develop plantation strategy and policy in a principal document, supported by satellite documents that provide the prescriptions and greater detail.
- A Field Manual for Maritime Pine has been prepared and is available for the project. This manual will be regularly reviewed in light of research findings and operational experience.

3. CALMfire

The services that CALMfire provides to the plantation projects in Western Australia are summarised under the following headings.

Fire fighting personnel

- About 200 trained fire officers and 300 firefighters are available in the south-west land division to combat major fires threatening plantations and other high value estates within and adjoining CALM-managed lands. These personnel are placed on call throughout the fire season to respond immediately to fire emergencies throughout the south-west. Fires threatening Gorgon plantations would be treated with the same priority as fires threatening CALM plantations – private plantations on the other hand would only be attended by CALM if convenient.

Fire fighting equipment

- More than 120 large fire tankers and 100 light patrol units are available for use at fires threatening plantations. Many of CALM's fire trucks are made available to local brigades that cover the plantation areas but again, priority would be given to Gorgon plantations in a similar way to CALM-owned plantations, subject to finalisation of Gorgon's fire strategy.

Inter-agency agreements

- Development of inter-agency fire control agreements with Bushfires Board, local government authorities and Bushfire Brigades, which enable these volunteer forces and their equipment to be made available at fires which are threatening plantations.

Plantation fire protection guidelines

- Development and application of Plantation Fire Protection Guidelines which ensure that all relevant planning authorities, local government, plantation owners and fire control agencies properly plan for and apply suitable fire prevention measures at all stages of plantation establishment and management.

Fire control working plans

- Development and application of Fire Response Plans (known as Fire Control Working Plans) by all CALM Districts and Regions which provide the basis for appropriate fire pre-suppression and fire response plans in areas containing plantations. All of Gorgon's plantations would be identified in the Fire Control Working Plans for the target area with appropriate responses to plantations fires as if the plantations were CALM assets.

Training

- Training CALM offices and crews, contractors and machinery operators in the various fire control functions, activities and related actions.

Liaison

- Liaison role at State, regional and local levels to ensure effective co-operation and co-ordination on fire prevention, pre-suppression and suppression operations needed to protect plantations.

Technology

- Access to the latest national and international technologies including the application of these in the following operational areas:
 - fire equipment;
 - fire suppressants;
 - suppression systems;
 - real time mapping systems.

Research

- Access to research findings and expertise in fire behaviour and fire ecology research and monitoring projects.

4. CALMScience

The corporate cost of research is allocated directly to the Plantations Group based on the actual research projects being undertaken. This means that the cost of all research into maritime pine is allocated to the Unit – costs which are subsequently internally allocated to individual projects. Current projects are listed in Appendix 1.

5. Corporate Relations

CALM's Corporate Relations would undertake a range of activities to promote the Gorgon Project. Corporate Relations staff include a range of professionals who are available at short notice to work with CALM's operational staff. They are well-informed about the Gorgon project, having been involved since its inception, making them much more effective than outside agencies without this experience.

6. Information Management Branch

Information Management Branch provides services to work centres within CALM according to the following sections within the Branch:

Information technology section

- Provides mainframe computers and software for business units financial and human resources management systems.
- Provides the Department's wide area network and supports local area networks and desktop personal computers.
- Provides a "Help Desk" for use by all CALM computer users.

Corporate interpretation section

- Manages the filing and distribution of all departmental and business unit correspondence and corporate documents.

Geospatial information section

- Obtains, checks and enhances all topographic digital map information (roading, hydrography, contours, water points etc.) within and surrounding all plantations and plantation properties.
- Maps and revises boundaries of planted areas including plantation sharefarms, following the completion of on-ground operations.
- Produces accurate maps of planting years, and plantation plans, for plantations throughout the State.
- Produces broad-scale strategic maps of the total plantation resource (hardwood and softwood, private and CALM) for overall planning purposes. Produces area statements for individual plantations, and gross plantation area statements for annual reporting purposes.
- Develops a comprehensive plantation inquiry system (PMap), encompassing all types of plantations, and including a full data-base relating to establishment data. The spatial and attribute data assembly process for this system is nearly complete and ready for use by work centres.
- In partnership with Department of Land Administration, is developing a system for mapping plantation areas (to a spatial accuracy of around 10 metres) of all types of plantations by the use of remote sensing technology.
- Organises all aerial photography used in plantation mapping: planning the annual aerial photography program, preparing the submission to Western Australian LIS, ordering photographs.
- Processes GPS data captured by Forest Management Branch, to produce high quality plantation maps and area statements. Responsible for the long-term storage of such data.
- Prepares plantation information for depiction on CALM operational maps, as needed for fire protection of plantations. Preparation of plantation information to appear on published CALM maps.
- Prepares flight line indexes in order to facilitate aerial photography of plantations, for mapping services.

Forest Resources Services

Forest Resources Services provide specialised services for all units in the Forest Resources Division. These were developed from the need to achieve auditable standards in relation to the sales of timber produce. There are sections servicing:

- the drafting, tendering, letting and management of contracts;
- the system for log delivery and payment;
- the records of log deliveries, customers;
- indexation and adjustment of stumpages and contract prices;
- manuals related to the timber industry;
- timber inspection.

These services will become more relevant when the first timber products are harvested from Gorgon plantations.

Forest Management Branch

Outlined below are some of the programs running in Forest Management Branch and the services provided which support CALM Sharefarms:

Plantation boundary capture and data storage

- Plantation boundary capture for preparation of contract maps and operations maps. Although this service is charged directly to the Project there is no additional or overhead charge for equipment, expertise and information base used for the development and maintenance of the mapping and data storage systems.

Early growth monitoring

- Early Growth Monitoring (EGM) will be carried out on Gorgon plantations at age three. This project will involve acquisition of aerial photographs, stratification of plantations, aerial and ground-based assessment.
- EGM reports and analysis.
- EGM system maintenance and data management.
- Upgrade database system to Access for easier use and enhanced operation, validate, backup and training in use and field measurement.

Maritime pine growth simulation

- FMB is the custodian of growth models within CALM and is responsible for continual upgrading of the model and testing against actual plantation performance.

GIS and planning systems

- Storage and maintenance of plantation data, records and systems for future strategic planning and harvest planning.
- Incorporation of databases to link into plantation graphics for development of geographical information system (GIS).
- Forecast requirements for successful planning and modify systems accordingly.

9. Human Resources Branch

The following details show the services provided by CALM's Human Resources Branch to organisation units within CALM. Human Resources Branch also provides strategic human asset management planning services to CALM Corporate Executive, and develops, formulates, implements and evaluates human resources policies at the corporate level.

The key results areas or primary functions of the branch can be summarised as follows:

- personnel services;
- payroll services;
- industrial services;
- risk management services;
- staff training and development services.

10. Financial Services Branch

Finance Branch provides services to internal and external users of CALM's finance function, while maintaining efficient and effective financial control and steadily improving productivity. Services provided by the Branch may be summarised as follows:

- accounts section;
- management accounting sections;
- financial systems sections;
- fleet management/engineering/supply section;
- accrual accounting project team;
- special projects, such as cost centre business planning and formulation of business plans and fee and cost reviews for branches and other work centres within CALM.

11. Management Audit Branch

CALM has a strategic objective to optimise the efficiency, effectiveness and responsiveness of the Department in the achievement of conservation and other management objectives.

Management Audit Branch is one of the controls the Department has to effect that objective. As such its goal is "To assist CALM management and staff to implement effective, efficient and best practice management of the wildlife, lands, waters and resources entrusted to them" and the specific functions of the Branch are to:

- provide ad hoc advice on appropriate system controls and their effective implementation;
- conduct a systematic review of all CALM's management systems, at least once every three years, to advise managers on their compliance, effectiveness and efficiency;
- undertake special audits as requested by directors.

Management Audit Branch is also a service provider. The services it supplies are:

- advice to staff on how to conduct operations to meet set procedural requirements;
- advice to system developers on required and appropriate control procedures;
- certification, prior to implementation, of new systems developed by CALM staff that they meet Government control requirements;
- an independent assessment of the compliance of a management system, part of a system or a individual transaction with legislation, policies and procedures;
- an independent assessment of the efficiency and effectiveness of a systems internal control environment;
- an independent assessment of the effectiveness of a management system in achieving its objectives;
- an independent assessment of where the efficiency of a system could be improved.

The activities of Management Audit Branch would be of direct benefit to Gorgon because the Branch exercises control over the Plantations Group to:

- ensure that financial and operational activities comply with all laws;
- ensure there is no fraud in the financial management of the project;
- ensure operations are conducted in an efficient and effective manner in accordance with all relevant Government legislation, policies and guidelines.

APPENDIX 4

WESTERN NODES: A FARM FORESTRY CASE STUDY

Introduction

In 1993, Western Nodes, a mixed farming property near Dandaragan, Western Australia, was selected for the development of a plan to integrate farm forestry with traditional farming. Property owners, Richard and Kaye Notley, wanted to develop a whole farm plan that would combat land degradation and also meet their economic and social objectives.

The planning process and some implementation work was funded with a grant secured by CALM from the Federal Farm Forestry Program. This appendix describes the four steps followed in the planning process:

- description of the property (inventory);
- interpretation, planning and design;
- evaluation (plan testing); and
- implementation.

Property description

A team of specialists was brought together to assess and describe the property. They included a soil scientist, hydrologist, agronomist, forester, landscape architect, ecologist, economist and most importantly, the landowner. Each had responsibility for describing Western Nodes in terms of their particular area of expertise.

The regional context

Western Nodes is in the West Midland Region, an area with 1,172 farms supporting 630,000 hectares of crop, 3.6 million sheep and 100,000 cattle. Gross value of agricultural production from the area in 1991-92 was \$300 million, comprised of 66 per cent crop and pasture, 21 per cent wool and 13 per cent livestock slaughterings.

The region is dominated by sandplain soil types – some are highly suitable for cropping and other, poorer sands are more suited to grazing. The poorer sands occur predominately in higher rainfall parts of the region, i.e. above 550mm annual rainfall. Rainfall ranges from approximately 750mm/year in the region's south-west to 400mm/year in the east.

Since 1990 the cropped area has risen by around seven per cent. Over the same period, the number of dry sheep equivalents run has decreased by three per cent, while the proportion of these run as cattle has increased from 12 per cent to 23 per cent of the total. The main issues confronting farmers in the region are worsening returns from agriculture, particularly from grazing, and increasing levels of land-degradation, particularly salinity and soil erosion.

Western Nodes – general features

Western Nodes lies approximately 10 kilometres south of Dandaragan on Stockyard Road, off Brand Highway to Dandaragan Road. The property covers 1,600 hectares of which 1,280 hectares or 80 per cent has been cleared. The climate is Mediterranean, with cool wet winters and hot dry summers. The average rainfall is 600mm/year, most of which falls between June and September. Strong north-west to south-west winds are common during winter and spring.

Farming system and land use

The main farming enterprises on Western Nodes are sheep grazing and wheat and lupin cropping. Most pastures for sheep grazing are comprised of subterranean clovers and ryegrass. Lupin and wheat stubble provides additional fodder for sheep. Pastures and crops require applications of fertiliser to boost production.

Land use problems

Farming at Western Nodes has three main land use problems:

- low productivity of infertile sands;
- erosion of soil by wind and water; and
- rising water-tables.

Low productivity of infertile sands – 12 per cent of the farm has deep infertile sands. These sands are unproductive under conventional agriculture; i.e. annual pastures and wheat and lupin crops. Such land is commonly described as "negative income country" – livestock and crop production being so low that the cost of production is generally not recovered.

Soil erosion – Light soils, strong winds and over clearing frequently combine to cause significant soil erosion. For example, strong north-west winds in early winter when the ground is bare commonly cause damage. Heavy rainfall can also cause serious erosion. The landowners consider current levels of soil erosion are unacceptable and will lead to pressing problems in the medium to long term if not addressed.

Rising water tables – Perched water tables on Western Nodes are rising and will lower production in the medium to long term through waterlogging and possibly through increased salinity. Five bores established on the property at the outset of the project show that water tables are rising at the rate of about 35cm/year.

Existing farm infrastructure

Existing farm infrastructure on the property (fences, race-ways, remnant vegetation, drainage lines, troughs, sheds and other buildings) were plotted and mapped (Figure 4.1)

Land management units

Seven land management units, based on land capability, were identified and mapped. Levels of production for lupins, wheat and sheep were estimated (see Table 4.1).

"WESTERN NODES" DANDARAGAN

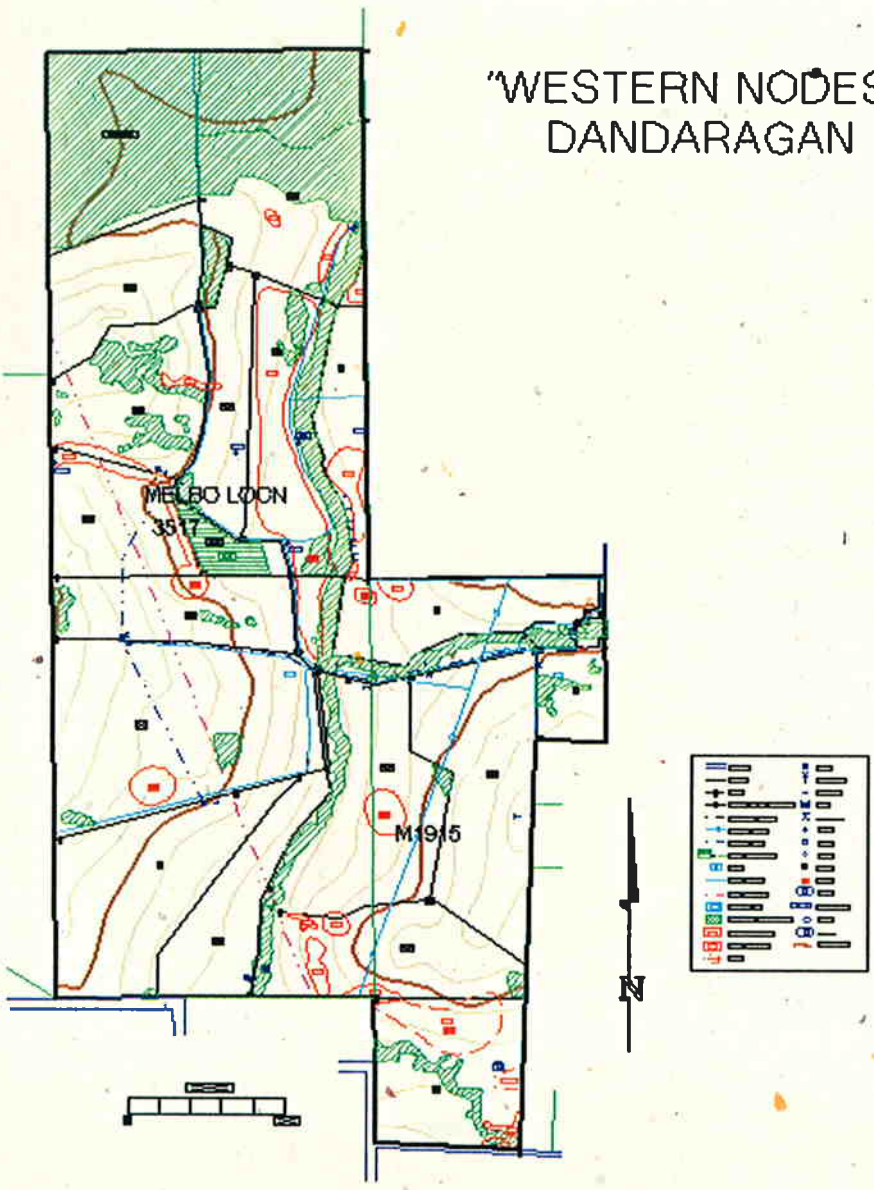


Table 4.1: Land management units and estimated levels of production for lupins, wheat and sheep

Land management unit	Area (ha)	Lupin yield (t/ha)	Wheat yield (t/ha)	Sheep carrying capacity (DSE/ha)
Brown loamy soil	329	0.8 – 1.6	1.8 – 2.8	4 – 6
Gravel	259	0.4 – 0.6	1.2 – 2.8	7 – 9
Yellow sand	202	0.8 – 1.4	1.6 – 2.5	4 – 6
Heavy loam and gravel	60	0.4	1.8 – 3.0	7 – 9
Poor deep sand	174	<0.2 – 0.8	<0.2	1 – 2
Poor duplex soil	57	0.2 – 1.5	<0.2 – 0.6	1 – 3
Wet duplex sand	39			
Remnant vegetation	322			
Total	1442			

(Jerome Gumley, Agriculture Western Australia)

Soils

Information on soil structure, depth and texture was collected to determine the suitability of soils for maritime pine and to enable appropriate species to be selected for non-pine areas. The initial mapping of soils was plotted from aerial photographs. These boundaries and soil descriptions were verified by undertaking an intensive field survey on 400 hectares of the farm using a hand auger to sample soils to a depth of three metres. The use of a back-hoe to dig six pits to three metres provided additional information, which added further confidence to the soil map (Figure 4.2).

Water table depth and quality

Five bores were established across the property to determine water table depth and quality. All bores intercepted perched water tables at depths of between two and 20 metres. Water quality in all but one of the bores was fresh (<60 mS/m), but the fifth bore recorded a salinity level of 240 mS/m.

Geophysics

A 400-hectare section of the property was surveyed with "Geoliner" equipment. This equipment measured soil conductivity, radiometrics and magnetics. Soil conductivity readings give an indication of current levels of salinity in the soil profile. The survey found the area to have generally low salinity, although one "hot spot" was located.

Radiometric surveys provide information about the clay content of soils. The survey results helped to locate changes in soil type.

Magnetometers measure variations in the earth's magnetic flux and provide information on the structure of the basement rock. The magnetic survey of Western Nodes provided little useful information.

Landscape and cultural values

Consideration of landscape character and cultural and heritage values identifies potentially negative impacts that revegetation might have on the appearance of the farm. Grant Revell, from the School of Architecture and Fine Arts at The University of Western Australia, described Western Nodes from the landscape and cultural values point of view.

"The Western Nodes agrarian landscape is broad-acre rangeland in character. Scale is open, wide and horizontal, with layers created by expansive ridges/skylines, midslope spurs and valley bottoms. The landscape is dominated by rolling hills, remnant paddock trees, riparian vegetation and uncleared banksia heathlands. Vegetation patterns are irregular and predominantly free-flowing".

Figure 4.2: Soils map

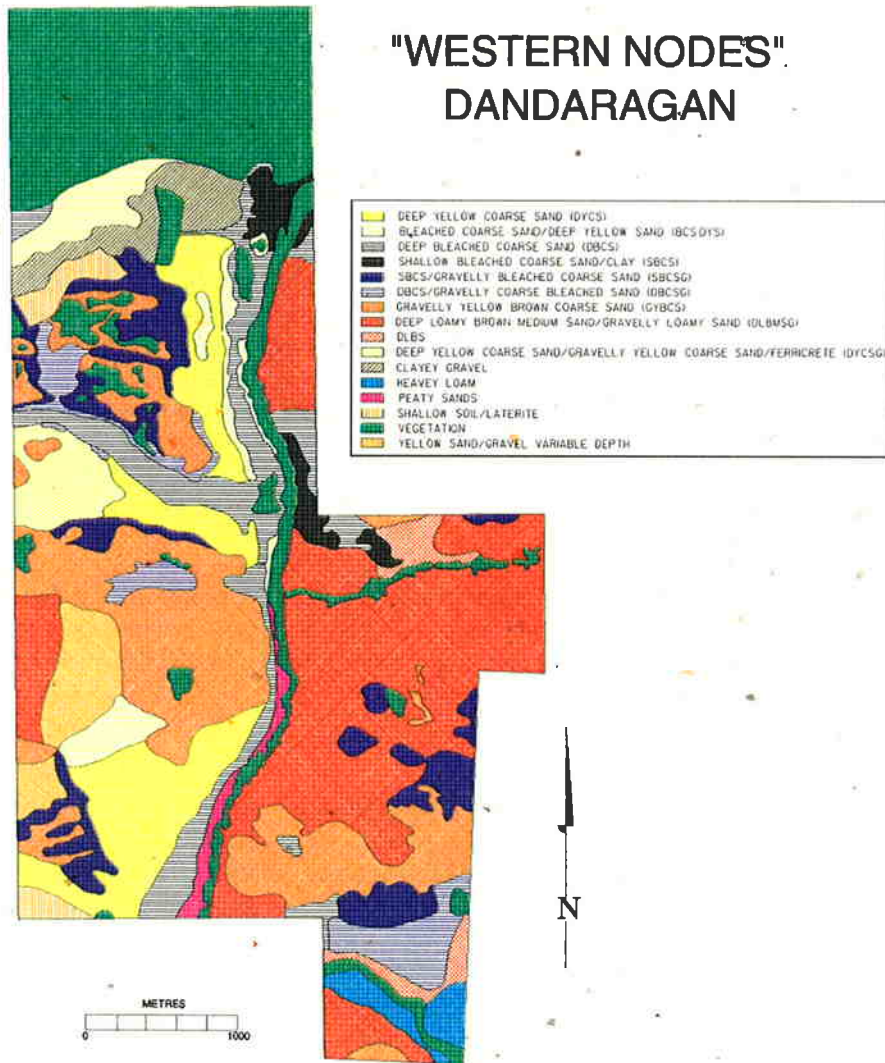
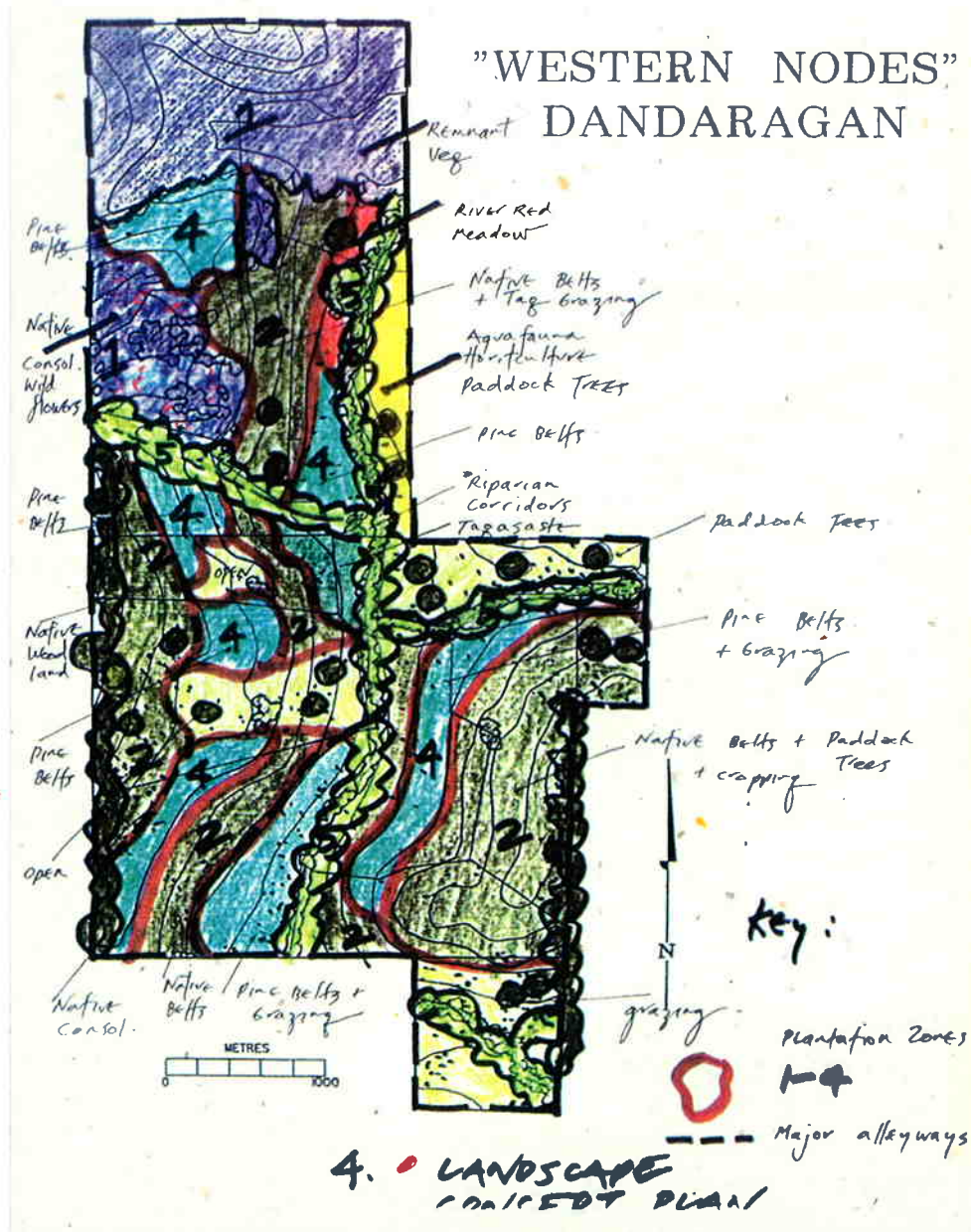


Figure 4.3 is a landscape concept plan developed for the property.

Figure 4.3: Landscape concept plan



Ecological values

Remnant vegetation provides clues on the original ecology and a framework for revegetation. An ecological description of Western Nodes was provided by Grant Revell.

"The remnant vegetation within the property is largely unfenced, with small isolated pockets of low scrub associated with laterite crests and breakaways. The Caren Caren Brook is well vegetated with Eucalyptus camaldulensis on its immediate banks, with the secondary flood plain largely cleared. The persisting vegetation between creek and crests is remnant paddock trees of redgum (E. calophylla) and coastal blackbutt (E. decipiens)."

Interpretation, planning and design

Developing a sound plan depended on being able to make use of all sets of data. Specialist interpretation was required on some, e.g. the electromagnetic information, to put it into a useable form. Specialists translated their information into practical design criteria. The most important design criteria are listed below for each set of data.

- land management units – *fence to soil types;*
- soil types – *maritime pine requires soils that are penetrable to at least two metres;*
- water table depth and quality – *place commercial trees where they can use excess water;*
- geophysics – *maritime pine can be planted where penetrable depth is at least two metres, except where electromagnentic measurements show high levels of conductivity;*
- landscape and cultural values – *soften "unnaturally" straight plantation edges with local species; modify layouts to enhance landform patterns; avoid planting trees where they will obstruct commonly used vantage points; assess what plantings will look like in the medium to long term;*
- ecology – *fence off remnant vegetation, riparian areas, paddock trees and plantings of native species; enhance fenced off areas by planting native species where necessary and grazing sensitively.*

Development of a plan

A workshop, involving the landowner and specialists, was held to present, discuss and synthesise information about the property into a long-term plan. The design process involved:

- keeping the landowners in the "driving seat" – whatever was decided had to meet their objectives and resources;
- exploring various design options;
- accepting that some compromise would be necessary to meet multiple objectives;
- referring to specialists to clarify technical aspects.

The outcome was a proposed works plan (Figure 4.4) the main features of which were:

- fencing to soil types;
- positioning laneways to allow easy movement of stock and machinery between paddocks and sheds;
- widening laneways, fencing and lining with trees;
- planting maritime pine on soils that are unproductive under agricultural crops;
- planting belts of maritime pine and other species on the contour to protect agricultural land from wind and water erosion;
- positioning belts of trees so that the alleys of agricultural land in between are a practical width for farming;
- fencing off remnant vegetation, especially along creek lines;
- linking significant patches of remnant vegetation by fencing and revegetation.

In total, 172 hectares (about 11 per cent) of the property were to be revegetated; 150 hectares of maritime pine and 22 hectares of native species.

Evaluation (plan testing)

Economic

Assumptions used in the economic analysis of the proposed tree planting plan included:

- cost of establishment = \$410/ha;
- superphosphate applied at 120kg/ha in years seven, 13 and 20;
- pine grown on a 40-year rotation with thinnings at years 15, 25 and 32;
- timber yields based on growth rates of nine and 12 m³/ha/year;
- returns from timber based on stumpages of \$12.34/m³ for medium density fibreboard, \$26.05/m³ for small sawlogs, \$49.21/m³ for second-grade sawlogs and \$73.35/m³ for first-grade sawlogs;
- discount rate of seven per cent.

Table 4.2 presents results from the analysis for two growth rates of pine.

Table 4.2: Results of economic analysis for Western Nodes tree planting plan

Parameter	Growth rate – 9 m ³ /ha/yr	Growth rate – 12 m ³ /ha/yr
Net present value	\$94,686	\$187,570
Equivalent annual value (E.A.V.)	\$6,984	\$13,830
E.A.V./ha/year	\$47	\$92
Cumulative peak debt	\$98,685 (year 14)	\$98,685 (year 14)
Cumulative peak surplus	\$1,669,000	\$2,800,000
First surplus	\$25,950 (year 15)	\$32,670 (year 15)
Benefit/cost ratio	17:17	28:13

(S. Butts, AgWA)

Social (landscape and cultural values)

The impact of proposed tree plantings on the appearance of the landscape was evaluated using computer software. Simulated views from Stockyard Road looking west, before and after trees, provided an effective way of evaluating the likely visual impact. The shape and orientation of tree plantings were considered to be in harmony with the existing character of the landscape.

Environmental – on-going monitoring

The impact of proposed works on environmental aspects, such as water-table level and rates of soil erosion, will take some years to determine. Bores are being monitored to determine impact of tree planting on water table levels. The farm offers opportunities for post-graduate and other research projects to be carried out on a range of topics including:

- assessing the impact of tree belts on rates of soil erosion;
- assessing the impact of tree belts on agricultural production; and
- examining in more detail the impact of farm forestry on the farm cash-flow.

Implementation

A program to implement the tree planting over five years was developed (Table 4.3).

Table 4.3: Proposed tree planting plan for Western Nodes, 1994 to 1998.

Tree type	Area to be planted by year (hectares)					Total
	1994	1995	1996	1997	1998	
Maritime pine	35	45	10	45	15	150
Native species	4	5	10	1	2	22
Total	39	50	20	46	17	172

Implementation of the plan began in 1994. By the end of 1995, stage 1 had been completed with 35 hectares of pine and four hectares of native species established, using a combination of landowner and Federal Farm Forestry Program funds. In 1997, Richard Notley entered into a sharefarming agreement with CALM. This enabled a significant part of stage 2 to be implemented – 20 hectares of maritime pine. Further works are being planned.

References

Notley, R and K, Winchcombe, J and Speed, R (1997). The West Coast Pine Timberbelt Project – The Western Nodes Experience. State Landcare Conference, Geraldton, 1-4 September 1997.



APPENDIX 5

SHIRE OF DANDARAGAN – A CASE STUDY

Background

The main objective of examining the social and economic characteristics of rural regions is to obtain an overall understanding of how land use has evolved, to help plan future developments. A major future development considered for the Shire of Dandaragan and neighbouring Shires is the expansion of privately-owned maritime pine plantations on cleared agriculture land which is capable of significant carbon sequestration.

The Shire of Dandaragan was selected for this study as the agricultural land within the Shire is identified as being suitable for the establishment of tree crops for carbon sequestration (see Map 1).

The Shire of Dandaragan is very dependent on the agricultural sector for employment, with this sector employing about 40 per cent of the workforce in 1996. In effect the Shire may be economically vulnerable if there is further downturn in the agricultural sector. The effect of the phenomenon "rural decline" within the Shire led to a real decrease in population between 1986 and 1991. The development of tree crop industries has the potential to reverse rural decline and provide substantial benefits to regional communities. Tree crops will also help alleviate one of Western Australia's most important environmental problems; salinisation of farmland in the Wheatbelt.

The Shire of Dandaragan has five townsites; Dandaragan, Jurien, Badgingarra, Cervantes and Regan's Ford. Jurien and Cervantes are the largest towns, situated on the coast, 260 and 230 kilometres north of Perth, respectively. Both towns developed as a result of the growth of the fishing and lobster industries and both have since become popular for fishing, tourism, recreation and retirement. As these towns do not rely on agriculture as their dominant industry and because of their locality, the impact of the establishment of trees on farms for carbon sequestration is considered slight. The other three towns in the Shire are relatively small communities situated about 30 kilometres inland. Their main industry is agriculture, with a primary focus on grazing and cereal crops.

Survey methods

The social research literature reports that the most crucial elements of social change are often best represented in qualitative, rather than quantitative, terms. This study used social research methods to achieve a combination of quantitative and qualitative data:

- basic Shire of Dandaragan profile – census of housing and population for the years 1976, 1981, 1986, 1991 and 1996 (Australian Bureau of Statistics);
- questionnaire of members of the Shire of Dandaragan – 50 households were phone surveyed;
- records from newspapers.

A common approach to evaluating social impacts is to begin by recognising the various functional subsystems of society, usually defined as economic, political, socio-cultural and environmental. Obviously these criteria import a level of subjectivity into the interpretation and analysis. However, this is a characteristic of descriptive research, which cannot be avoided. In this respect it is important for descriptive research projects to show results and define decision-making criteria clearly.

Shire of Dandaragan profile

Population change

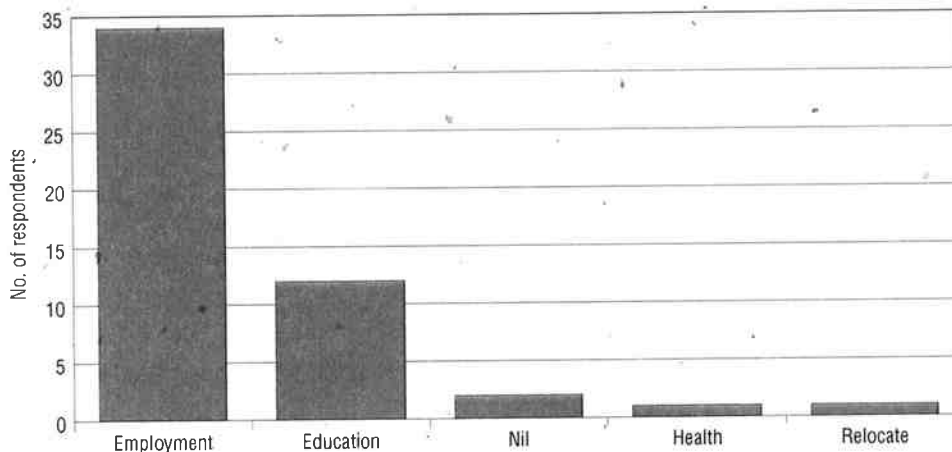
Of particular interest to this study was the population change between 1976 and 1991. The Shire had a population increase of 37 per cent over this period, but the population declined by two percent between 1986 and 1991. This trend in population growth was significantly different from the State's growth rate (Table 5.1). Most respondents to the questionnaire surveying rural families believed people leave the Shire to find alternative employment and to seek education (Figure 5.1). Most respondents also believe people leaving the Shire of Dandaragan were from the age group 15 to 20 years. This survey does not present data on the type of people leaving the Shire. However, the trend of young people leaving suggests there may be adverse implications for sporting organisations and the general social fabric of the community. The Shire recorded a population of 2,364 at the 1991 census, with 1,292 males and 1,072 females.

Table 5.1: Percentage change in population (census periods 1976 to 1991) and unemployment (census periods 1991 to 1996, data for unemployment taken at August) for the Shire of Dandaragan and Western Australia

Period	Population growth		Unemployment rate	
	Dandaragan	Western Australia	Dandaragan	Western Australia
1976-1986	39%	23%		
1986-1991	-2%	12%		
Year				
1991			15.6%	10.5%
1996			11.3%	7.7%

The results of the questionnaire surveying rural families show that only a few people believe plantation development within the Shire will lead to farming families leaving the community.

Figure 5.1: Reason for people leaving the Shire (questionnaire results)

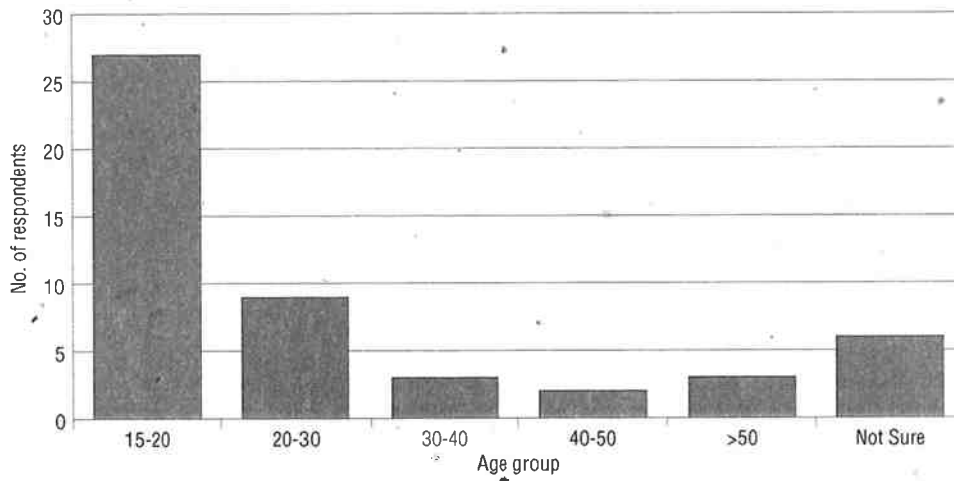


Age

The largest portion of the population between 1991 and 1996 were in the newborn to nine and 30 to 39 age groups, at 18.4 per cent and 18.3, respectively. There was a decline in the proportion of 10 to 19 age group, which is consistent with findings from results of the questionnaire surveying rural families (Figure 5.2).

Findings from these figures suggest that there is a good population base for employment in the future. The challenge will be to provide adequate employment in the area to prevent the drift into larger regional centres and cities, by those seeking employment.

Figure 5.2: Dominant age group leaving (questionnaire results)



Employment levels

The total labour force in 1991 was 1,133, which was comprised of 956 employed and 177 unemployed, indicating an unemployment rate of 15.6 per cent. This rate was significantly higher than the State unemployment rate (Table 5.1). The greatest proportion of people in the workforce was in the 35 to 54 age group (431 persons) and the major employment category was Agriculture, Forestry and Fishing (40.5 per cent) (Table 5.2). This suggests that a large proportion of the workforce would be currently engaged in work that is closely related to activities identified for tree crop establishment and maintenance.

In 1996 the total labour force was 1,280, which was comprised of 1,135 employed and 145 unemployed, indicating an unemployment rate of 11.3 per cent. This rate was significantly higher than that of the State unemployment rate. Between 1991 and 1996, employment rose by 15.7 per cent and unemployment fell by 27.5 per cent.

Table 5.2: Employed persons by industry type for the Shire of Dandaragan in 1991 and 1996

Industry	1991		1996	
	Persons	Proportion (%)	Persons	Proportion (%)
Agriculture, forestry and fishing	487	40.5	444	38.6
Mining	39	4.1	65	5.6
Manufacturing	36	3.8	56	4.8
Electricity, gas and water	0	0	12	1.0
Construction	66	6.9	62	5.3
Wholesale and retail trade	81	8.5	113	9.9
Accommodation and restaurants	—	—	56	4.8
Transport and storage	33	3.5	30	2.6
Communication	9	0.9	13	1.1
Finance, property and business services	24	2.5	45	3.9
Public administration and defence	50	5.2	60	5.2
Community service	93	9.7	104	9.0
Recreation, personal and other services	63	6.6	39	3.4
Not stated	75	7.8	55	4.8
Total	956	100	1154	100

The results of the questionnaire surveying rural families showed that most people believed unemployment had increased in the Shire over the past five years, which is contrary to census data on employment in 1991 and 1996. The perception of increased unemployment rates may be attributed to the unemployment rate in the Shire of Dandaragan being higher than that of the State unemployment rate (Table 5.1).

Occupational opportunities

The Shire of Dandaragan is very dependent on the agricultural sector for employment, with this sector employing about 40 per cent of the workforce in 1991 and 1996 (Table 5.2). The agricultural workforce was predominantly male, ranging from 71 to 74 per cent of the workforce between 1991 and 1996. The breakdown of employed persons in different industries did not change significantly between 1991 and 1996 (Table 5.2), suggesting a relatively stable workforce in the Shire. This data suggests the Shire may be economically vulnerable if there is further downturn in the agricultural sector.

Development indicators: property ownership, financial position and agricultural practices

The number of rural holdings has decreased significantly between 1981 and 1994; from 205 to 177, suggesting that a relatively high level of farm consolidation has occurred (Table 5.3). Further evidence of this trend is provided by data on the gross area of farmland in the Shire of Dandaragan, which decreased slightly from 407,000 hectares in 1981 to 397,000 hectares in 1991. This data indicated the average size of a farming property was about 2,220 hectares in 1991.

Land under cereal crops, other crops and pasture decreased between 1986 and 1991. The number of cattle have declined (36,300 in 1981 to 20,500 in 1991), whereas the number of sheep has increased continually (731,000 in 1981 to 864,900 in 1991).

Table 5.3: Growth and development indicators for the Shire of Dandaragan in 1981 and 1991

Indicators	Year of Census		
	1981	1986	1991
Number of rural holdings	205	186	177
Gross area of farmland (ha)	407,000	391,000	397,000
Land under crops (ha)	50,787	56,100	41,700
Land under pasture (ha)	209,600	214,000	212,100
Land under cereal crops (ha)	42,340	37,900	36,800

The Shire's economy is based strongly on primary industries, in particular agriculture. Manufacturing is limited to small industries, which service the agricultural sector.

Transport

The primary road within the Shire is Brand Highway, which runs north-south with secondary roads linking the towns. Westrail provides a daily bus service along Brand Highway, with stops at Badgingarra and Cataby, and the turnoffs to Cervantes and Jurien.

A coastal road link between Lancelin in the south to Leeman in the north is proposed. This road will provide links to the coastal localities of Wedge Island, Grey, Cervantes and Jurien. The construction of the coast road will have a dramatic overall long-term effect on the coastal area of the Shire through tourism and will lead to a reduction in traffic on Brand Highway within the Shire.

Community Services

In general, the Shire has a wide variety of community associations, interest groups and service clubs such as the CWA, Ratepayers and Progress Association, St John's Ambulance, Red Cross and Volunteer Fire Brigades. The town of Dandaragan has a modern community centre catering for indoor sports. Badgingarra, similarly is well supplied with good quality community facilities, including a community centre.

While pre-primary and primary education facilities exist at Badgingarra and Dandaragan, the closest town with secondary schooling is Jurien. The results of the questionnaire surveying rural families show that most people believe young people leave the Shire to seek education in larger regional towns or cities which have better educational facilities.

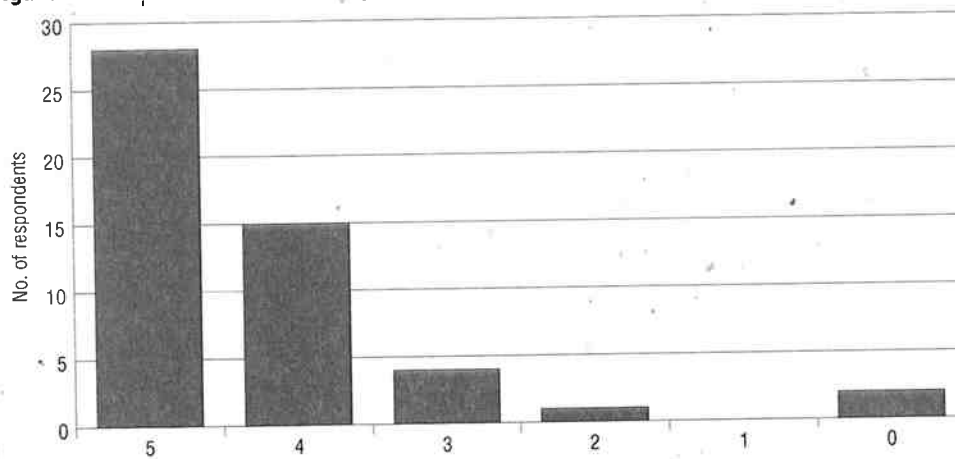
Results from questionnaire

Background

The most striking finding from this survey was that 86 per cent of respondents had an emphatic or very positive attitude towards the establishment of tree crops on farms within the Shire (Figure 5.3). Responses are given from five to one where five is very high importance or emphatically, one is very low importance or not significant and zero is no response.

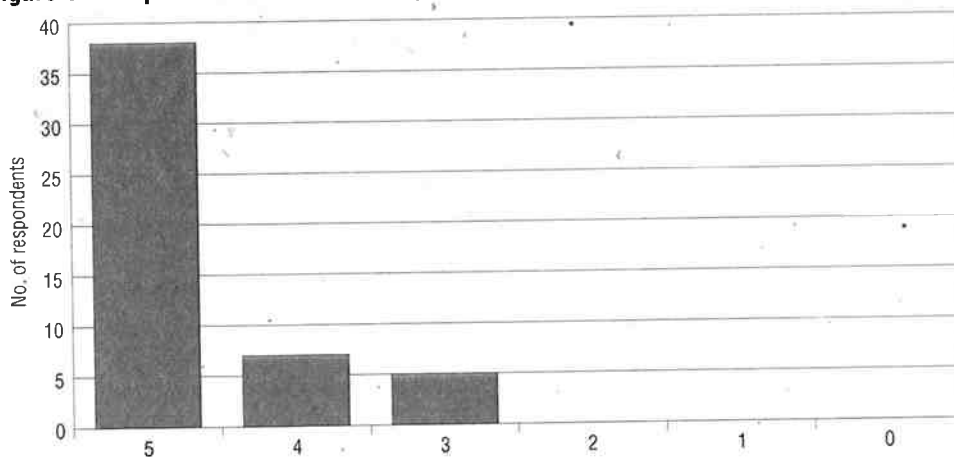
Thirty four respondents to the questionnaire were female and 16 were male. Overall the responses to the various questions in the questionnaire did not indicate any significant difference between genders, but generally, female respondents were more supportive of the establishment of tree crops on farms than the male respondents.

Figure 5.3: Attitude of establishing tree crops on farms (questionnaire results)



Sixty four per cent of respondents were involved in farming. The closest town to 42 per cent of respondents was Moora (west), 36 per cent lived in or were closest to Dandaragan, 18 per cent were from Badgingarra and four per cent were from Wathero. Ninety two per cent of respondents considered agriculture as the dominant industry within the Shire.

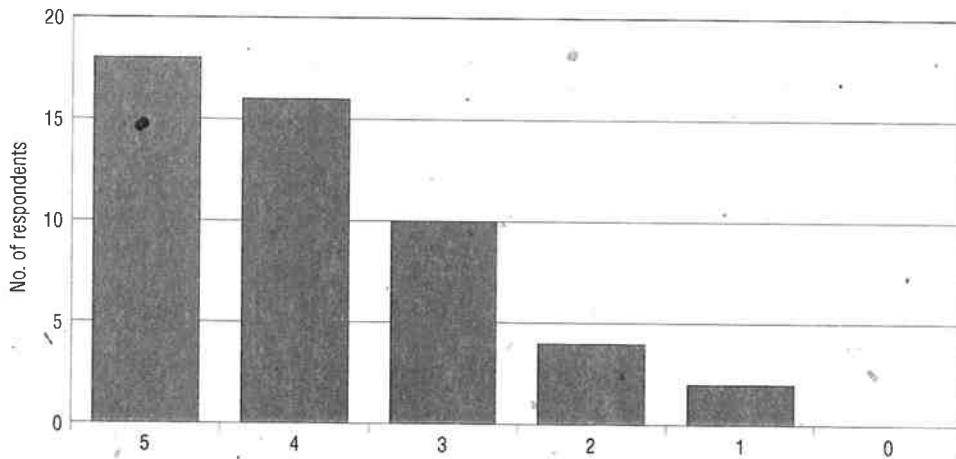
Figure 5.4: Importance of farm diversity



Farm diversity

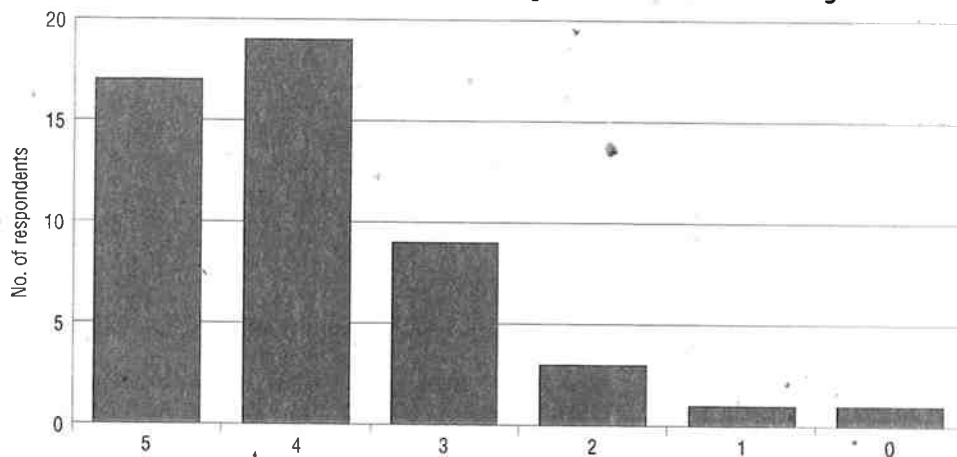
Ninety per cent of respondents believed it was of very high importance or high importance for farms to diversify operations and income (Figure 5.4) and 68 per cent of respondents believed tree crops on farms would emphatically or very significantly assist in diversifying farm incomes (Figure 5.5).

Figure 5.5: Importance of tree crops to diversify farm incomes



Seventy six per cent of respondents believed establishing tree crops on farms would emphatically or very significantly increase the financial status of farmers through payment of annuities and/or sale of timber (Figure 5.6).

Figure 5.6: Importance of tree crops in increasing financial status of farming families



Environmental implications

Seventy eight per cent of respondents believed rising groundwater levels and dry-land salinity were of very high importance or high importance as threats to agricultural production within the Shire (Figure 5.7). Ninety four per cent of respondents believed tree crops on farms would emphatically or very significantly help control rising groundwater (Figure 5.8).

Figure 5.7: Rising groundwater and salinity to farm production

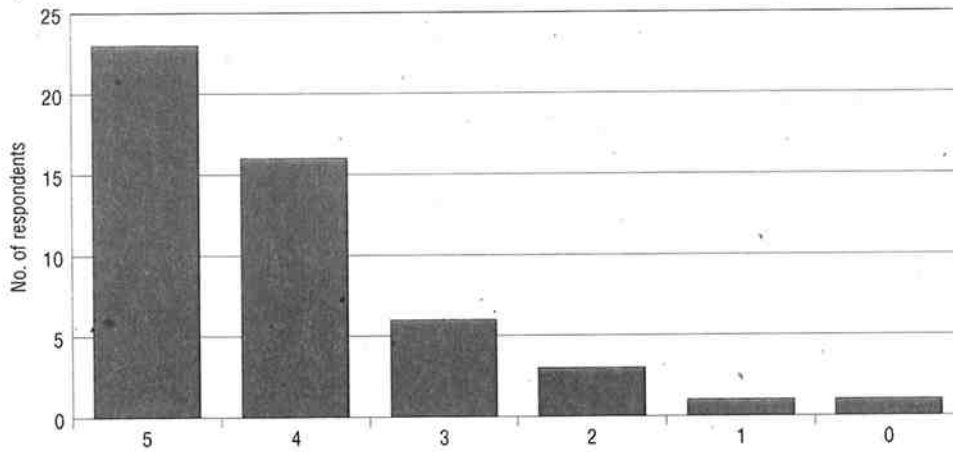
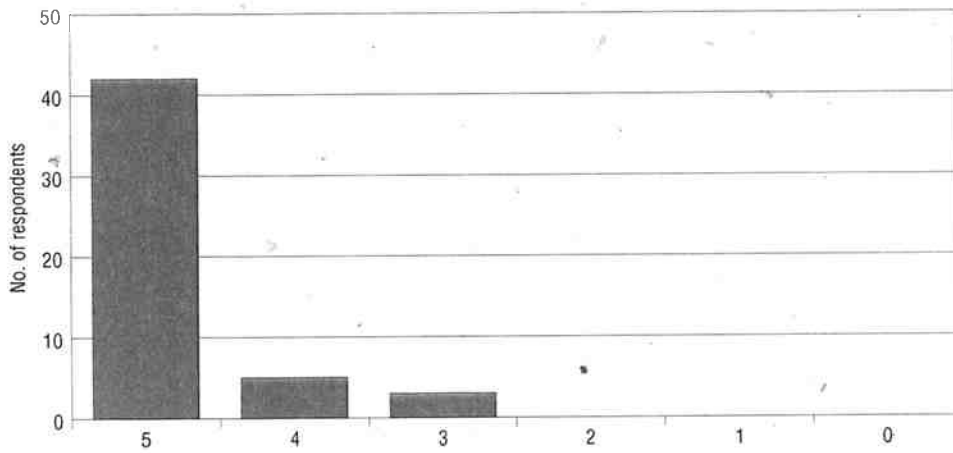
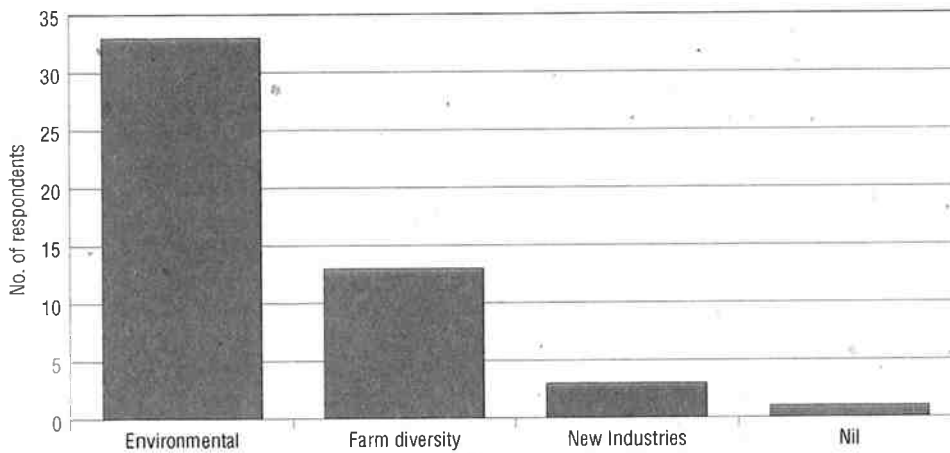


Figure 5.8: Benefit of tree crops to assist the control of rising groundwater



Sixty six per cent of respondents thought the main benefit of establishing tree crops within the Shire was environmental (control rising groundwater levels, salinity control, soil erosion control), whereas 26 per cent of respondents thought the main benefit would stem from increased farm diversity (Figure 5.9).

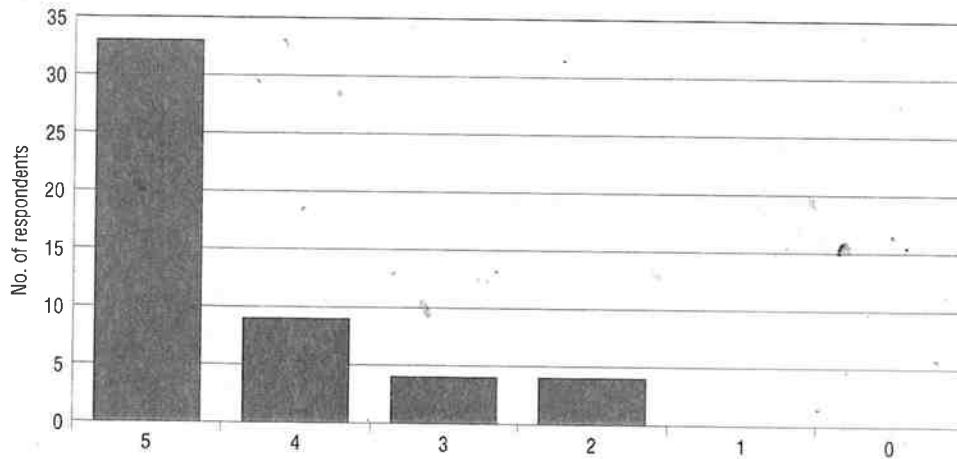
Figure 5.9: Benefit of tree crops on farms



Rural decline

Fifty per cent of respondents believed unemployment had increased in the Shire over the past five years, whereas 30 per cent thought unemployment had declined and 20 per cent did not know. Eighty four per cent of respondents believed the phenomenon of rural and population decline was of very high importance or high importance to be redressed (Figure 5.10).

Figure 5.10: Significance of rural and population decline

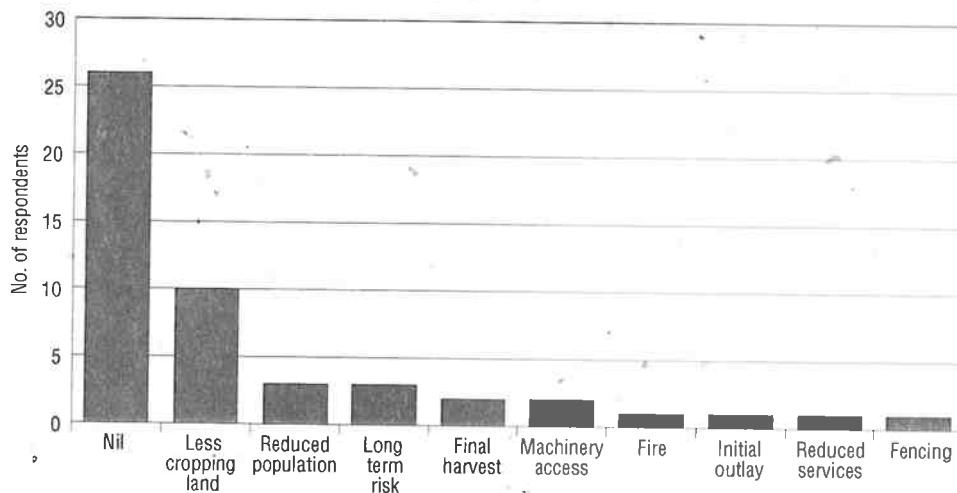


Fifty four percent of respondents believed that the dominant age group leaving the Shire was 15 to 20 years. Sixty eight per cent of respondents thought people left the Shire to seek employment, whereas 24 per cent thought people left the Shire to undertake alternative forms of education (Figure 5.1).

Development of tree crops as a new industry

Fifty two percent of respondents considered establishing tree crops within the Shire would have no negative impact within the Shire, whereas 20 per cent of respondents thought tree crops on farms would reduce land available for traditional agriculture as the main negative aspect of tree crops (Figure 5.11).

Figure 5.11: Negative aspect of tree crops on farms



Seventy four per cent of respondents believed it was of very high importance or high importance to develop new industries (such as timber processing plants) within the Shire (Figure 5.12). Sixty two per cent of respondents believed tree crops on farms and the associated services required for tree crops would emphatically or very significantly increase employment opportunities within the Shire (Figure 5.13).

Figure 5.12: Importance of developing new industries

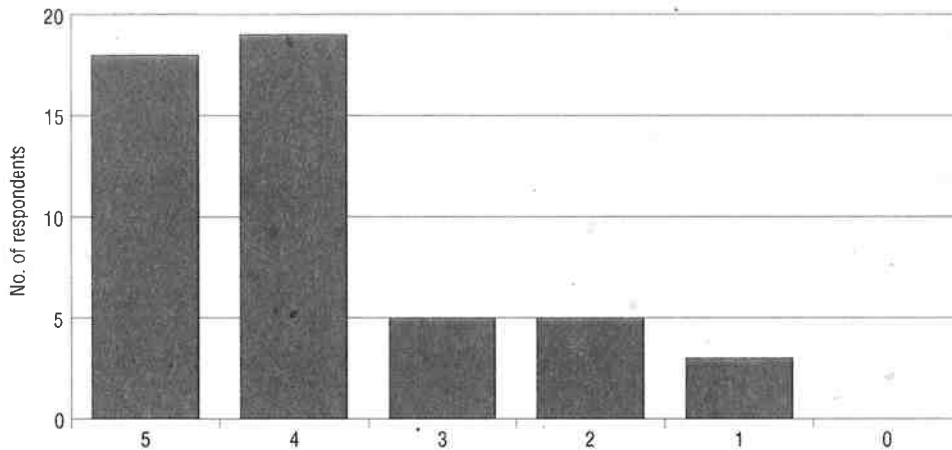
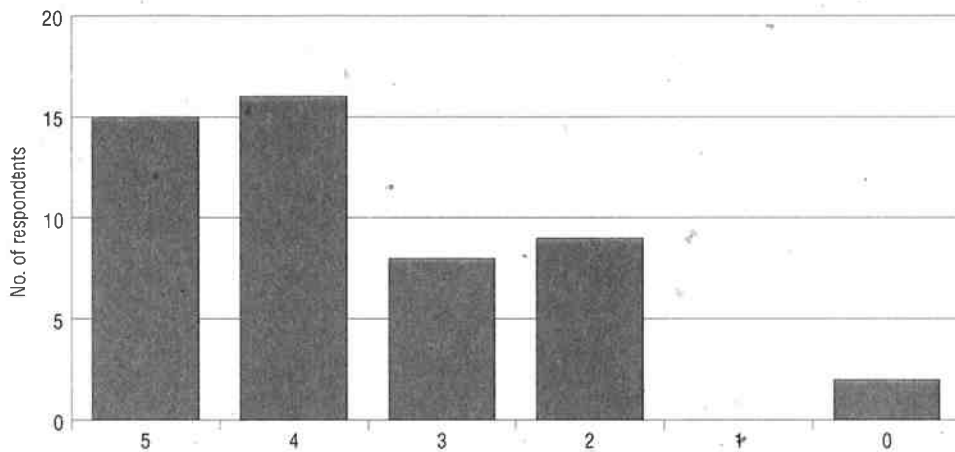
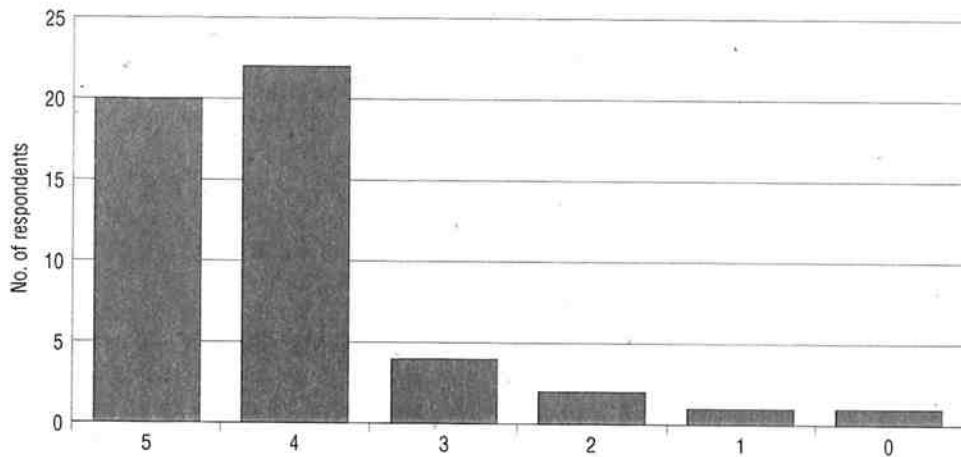


Figure 5.13: Influence of tree crops and associated services in increasing employment



Eighty four per cent of respondents believed the development of new industries within the Shire would have an emphatic or very significant beneficial impact on social and sporting organisations (Figure 5.14).

Figure 5.14: Influence of new industries on social and sporting organisations



Economic benefits of tree crops

The development of tree crop industries, particularly when they are integrated into existing farming systems, has the potential to reverse rural decline and provide substantial benefits to regional communities. For example, a study commissioned by Albany Port estimated that in 1997, 216 people were employed directly and indirectly on bluegum plantations in the Great Southern region and that these plantations provided \$46 million directly and indirectly in wages and other income. CALM employs 80 private sector contractors across the south-west of the State to implement the current tree crops on farms program.

The forest products industry is "job-rich" and the impact of the tree crop program on unemployment in regional centres will be magnified significantly if forest product processing industries based on the tree crop resource, can be established in regional centres. Tree crops have better potential for local value adding than annual plant products. Many wood products are comparatively low in value and it is not viable to transport them out of rural areas without first being processed into higher value products. For example, the proposed 85,500 hectares of pine plantings would be sufficient to establish a medium density fibreboard factory and laminated veneer lumber factory that would support 200 to 300 new jobs. It is estimated that the proposed planting program would generate more than 1,300 direct and indirect jobs primarily in towns within the areas targeted for planting.

Discussion

Local governments in rural areas, including the Shire of Dandaragan, face adverse issues due to the general and periodic difficulties of rural industries. What has been described as "the crisis of Australian agriculture" has reduced the number of farms, increased their debt, reduced the real value of their land and increased rural unemployment and poverty. The population in many rural areas not only needs extra help but is also in no position to pay higher rates to obtain it. One of the consequences of the decline of the agricultural sector in regional Western Australia, is that employment levels in many country towns are falling below the thresholds necessary to sustain basic infrastructure services, such as banks and shops.

Clearly, there is a positive perception concerning the establishment of tree crops on farms in the Shire of Dandaragan. The basis for this perception stems from the adverse implication of rural decline within the Shire caused by the shrinkage of traditional agricultural industries. Tree crops offer a new and substantial industry within the Shire, which would in effect provide an area of non-traditional knowledge that younger people could develop, giving them social standing and bonding them to the community.

In general terms, the literature presents a number of adverse implications stemming from a large-scale government-owned pine plantation programs. Traditionally, there was concern about fundamental change in the socio-economic character of districts, attributed to the disappearance of family farms. Pine plantations employ fewer man-years per hectare than farming and forest workers tend to live in towns. The big employment boom will eventually arrive at the harvesting and processing stage, but in the meantime the farming population has decreased resulting in the cessation of the school-bus run, the Shire loses much of its rating base and community groups lose membership.

Joint venture tree crops (agroforestry) between the investor and farmers would minimise the adverse socio-economic impact of tree crops and still create a valuable industrial resource base. The establishment of maritime pine tree crops for carbon sequestration proposed for this Project would use an estimated 20 per cent of cleared agricultural land within each rural holding. In effect, this will allow the farming family to stay on the land. In addition the risk of the tree crop venture is greatly reduced or negligible, because the return to the tree-grower is virtually guaranteed by the nature of the joint venture.

Aesthetically, pine plantations are not favoured as a tree crop by property owners. However, the establishment of maritime pine tree crops for carbon sequestration for this Project would not necessarily be on a broad-acre, monotonous pine monoculture, as not all soil types on a farm will be suited to growing maritime pine. In any case a far greater diversity of tree species (such as oil mallees and landcare plantings) is proposed for this Project.

Establishing trees on farms under an agroforestry regime introduces trees back into the landscape while maintaining the core-agricultural practices. In this respect, agroforestry has already being undertaken by many landowners on a small scale within the Shire.

In conclusion, farmers will generally want agriculture to remain their main land use and the predominant activity their labour. For tree crops to be accepted by the greater rural community, there needs to be an appreciation by the community that timber is a valuable agricultural crop which can be integrated efficiently, effectively and economically into farming enterprises.