

**BAUXITE PIT REHABILITATION**

Saddleback Timber Reserve

---

AGREED ARRANGEMENTS BETWEEN  
WORSLEY ALUMINA PTY LTD  
AND THE  
DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

---

February 1990

Note: Section 2 (Responsibilities) and 3 (Policies and Objectives) require revision, in consultation with CALM's Central Region Office, to reflect the rehabilitation objectives contained in the "Central Forest Region, Regional Management Plan, 1987-1997" (CALM Management Plan No. 10).

## CONTENTS

|  | <u>Page</u> |
|--|-------------|
| 1. PREAMBLE  | 1           |
| 2. RESPONSIBILITIES                                  | 2           |
| 3. POLICIES AND OBJECTIVES                           | 4           |
| 3.1 Land Use Plans in the Principal Mineralised Area | 4           |
| 3.2 Rehabilitation Objectives                        | 4           |
| 4. STRATEGIES AND PLANNING                           | 6           |
| 4.1 Rehabilitation Strategies                        | 6           |
| 4.2 Rehabilitation Planning                          | 6           |
| 4.3 Prescription Development                         | 7           |
| 4.4 Documentation                                    | 8           |
| 5. REVIEW MECHANISMS                                 | 9           |
| 6. PRESCRIPTIONS                                     | 10          |
| 6.1 General Prescription - Saddleback Timber Reserve | 10          |
| 6.1.1 Preparation of Areas for Planting              | 10          |
| 6.1.2 Revegetation                                   | 11          |
| 6.2 1989 Appended Prescription                       | 14          |

1. **PREAMBLE**

The aim of this document is to outline the mechanisms by which the Department of Conservation and Land Management (CALM) and Worsley Alumina will provide for progressive mine-pit rehabilitation in Timber Reserve areas (as defined in Section 6(2) of the Conservation and Land Management Act 1984), of the Worsley Alumina Principal Mineralised Area (i.e. Saddleback, Quindanning and Marradong forest blocks.)

To achieve this aim, the document sets out the responsibilities of each party and develops a set of policies, objectives, strategies and review mechanisms for rehabilitation planning. These provide a framework from which a rehabilitation prescription will be prepared annually. The framework ensures that full advantage can be taken of the resources and experiences of both organizations, and that the prescription is responsive to new information from trials, research and operational experience. It is also anticipated that the regular process of review built into the mechanism will identify aspects of rehabilitation requiring trial and experimentation.

## 2. RESPONSIBILITIES

Under the provisions of the Conservation and Land Management Act 1984 (as amended), CALM is charged with the responsibility for management of State Forest and Timber Reserves. In fulfilling this responsibility, CALM ensures that forest resources are managed to give the maximum long term social and economic benefit. To this end, CALM has adopted a multiple land use management approach which, in the case of Saddleback, Quindanning and Marradong forest blocks, recognizes recreation as the primary use, with bauxite mining as a compatible use (Forests Department General Working Plan No. 87 1982). Being a transient land use, bauxite mining, with the appropriate rehabilitation strategies, need not permanently or seriously affect the potential for recreation.

Worsley Alumina is bound by the provisions of the Alumina Refinery (Worsley) Agreement (1973-1982) [the Worsley Agreement] and the approved ERMP (October 1979). With specific reference to rehabilitation, the following obligations and undertakings are important:

(i) Clause 16(8) of The Worsley Agreement states:

"As may reasonably be required by the Executive Director, the Joint Venturers shall from time to time and at their expense take adequate measures -

- (i) for the progressive restoration and re-forestation of the forest destroyed;
- (ii) for the prevention of soil erosion;
- (iii) for the prevention of the formation of deep water pools and other dangers to persons who may use the forest areas.

PROVIDED THAT the Joint Venturers shall not be obliged to restore to its original contour land on which forest has been destroyed."

(ii) Clause 16(10) of the Worsley Agreement states:

"The Joint Venturers after consultation with the Executive Director of CALM will prepare and submit to the State not later than two years after 31st October, 1978, a plan in reasonable detail of their proposed mining operations upon areas of State Forest and Crown land during the succeeding ten years and such plan after like consultation shall be reviewed and resubmitted thereafter at yearly intervals."

(iii) The approved ERMP contains undertakings in several technical areas:

- . surface water control
- . disease management
- . topsoil/overburden handling
- . pit-floor ripping
- . revegetation
- . fertilizing
- . maintenance of rehabilitation
- . rehabilitation research (including the Trial Rehabilitation Exercise (TRE-1)).

(iv) The approved ERMP also contains a commitment to carry out biological studies, which have been and will be designed to provide data directly applicable to rehabilitation planning.

### 3. POLICIES AND OBJECTIVES

#### 3.1 Land use plans in the Principal Mineralised Area

A small area within Saddleback Block is designated as a scientific study Management Priority Area. This area encompasses an hydrology research area designed to study the hydrologic impact of mining and rehabilitation. Worsley Alumina has made a specific commitment to support this study in terms of liaison with the appropriate authorities regarding the timing of mining operations in the research area.

Other specified uses for the area include conservation of flora and fauna and protection of forest values.

Current recreational use of the area is minimal and only broadscale planning has been undertaken to develop its potential. This is outlined in the Northern Region Forest Recreation Framework Plan (Forests Department, 1982). In this plan, the area falls within the Monadnock Management Unit (grouped with other Monadnocks in the eastern forest). Since these areas are best suited to non-motorised, low-intensity recreational activities, the following management strategies are relevant:

- (i) where practical, avoid road construction within the immediate vicinity of monadnocks to discourage vehicle use and to minimize problems of erosion and disease;
- (ii) facilitate access by foot by providing facilities at the base of hills; and
- (iii) provide written guides to flora, fauna and landscape characteristics.

In the abovementioned Recreation Plan, it is proposed that a long term development plan be written for the Saddleback Block. This plan can form the basis for developing recreation guidelines for rehabilitation prescriptions.

#### 3.2 Rehabilitation Objectives

The broad objective is to regenerate a stable forest ecosystem planned to maintain recreation, conservation and other nominated forest values.

Specific goals are:

- . Recreation - where practicable, to provide or maintain recreational values in accordance with approved CALM plans.
- . Conservation - to regenerate, in the long term, floral and faunal characteristics compatible with the Eastern Jarrah Forest.

- . Landscape - to create a rehabilitated landscape compatible with the general landform and physiography.
- . Hydrology - to restore the hydrological balance through the establishment of deep-rooted vegetation in rehabilitated areas.
- . Protection - to minimise impacts on non-mined areas, to conserve the residual soils, to minimize dieback spread, and ensure that unacceptable fire hazards do not accumulate.

In seeking to meet these goals, the desired end result is a multiple-use forest in which rehabilitated and undisturbed stands are integrated to the maximum practical extent.

#### 4. STRATEGIES AND PLANNING

##### 4.1 Rehabilitation Strategies

The following measures will be adopted to achieve the objectives:

- . the development of prescriptions for rehabilitation procedures for each mined area, in accordance with the designated land use priority and land use management plans;
- . the conduct of trial and monitoring programmes into means of improving rehabilitation procedures;
- . the monitoring of regenerated areas for their capacity to sustain long-term production of the forest values listed in the objectives; and
- . the development of remedial treatments should monitoring reveal that rehabilitation objectives are not being fulfilled.

##### 4.2 Rehabilitation Planning

Rehabilitation planning occurs at two levels: the first is broad-scale regional minesite planning on a 10-year time scale. The second is the detailed operational annual planning on a pit-by-pit basis.

For broad-scale regional planning, Worsley Alumina consults with CALM to produce an annually-updated 10-year Mining Plan for submission to the State. In the preparation of these plans, the following aspects of rehabilitation are considered:

- . the sequence of mining and rehabilitation;
- . access for mining and future management;
- . location of mine facilities;
- . dieback hygiene;
- . water management systems and water-course protection;
- . land use priorities; and
- . buffer zones for fire protection.

On a broad scale, CALM will advise on perceived recreational values, so that Worsley Alumina may take these values into account in developing rehabilitation proposals.



In terms of recreation, the draft proposal will address:

- . impacts on natural and cultural (i.e. man-made) landscape attractions and recreational features - large rock outcrops, prominent view points, historical sites, and existing recreation development which are considered important to the existing or potential recreational use of the area.
- . types of vegetation to be cleared for mining: this information will also be used in selecting species mixes for re-seeding following mining, in selecting treatments to provide faunal habitats, and in determining stocking rates and selecting vegetation structures and types for particular areas of rehabilitation.
- . assessment of the mining envelope and environs in terms of its existing significance for recreation at a regional and local level. The assessment will identify the opportunities which exist for recreation activities, taking into account both the likely demand for such activities and the capability of the area to service those demands.
- . proposed action to re-establish or enhance recreation potential.
- . post-mining access requirements for recreational use of the area, for incorporation into planning the decommissioning of the mine road network.
- . the scheduling of mining and rehabilitation in areas of high visibility, so that visual impacts are minimised to the extent that is practicable.

#### 4.3 Prescription Development

Detailed operational planning will consist of two steps.

Firstly, after completion of each year's rehabilitation plantings, an updated generalized prescription for the next year's rehabilitation works will be jointly prepared. This will specify rehabilitation works common to all pits and identify where options to vary particular rehabilitation treatments exist. It will address:

- . preparation of pits for planting, including landscaping, topsoil/overburden management, treatment of "islands" of unmined ore and ripping.
- . water management options.
- . planting - species selection and layout, fertilizer application rates and success evaluation.

Secondly, Worsley Alumina will prepare a detailed rehabilitation proposal for each pit based on the generalized prescription. This will include:-

- . pit identity and location.
- . detailed drawings.
- . particular options for rehabilitation chosen to suit particular locations.
- . any proposed deviations from the general prescription.

Each proposal will be jointly assessed prior to submission seeking formal affirmation from the Executive Director. Departures from the agreed plan may sometimes be necessary, but will only take place after consultation and endorsement by both organizations.

#### 4.4 **Documentation**

Worsley Alumina will assume responsibility for the progressive graphic and descriptive documentation of rehabilitation efforts. The Department of CALM will advise of its particular requirements for its internal recording; where practical, these requirements will be incorporated into the documentation programme.

5. **REVIEW MECHANISMS**

The annual reviews of rehabilitation, foreshadowed in Section 4.3, together with regular liaison between Worsley Alumina and CALM, will demonstrate the results of continuing trials and monitoring. Findings for inclusion in operational practice will then be incorporated into planning and into the agreed prescription of operations. Priorities for experimentation will also be evaluated, and work programmes developed as appropriate.

## 6. PRESCRIPTIONS

### 6.1 General Prescription - Saddleback Timber Reserve

This prescription is considered to be a dynamic document which will evolve as more information from research into the biological and hydrological nature of the area becomes available, as future recreational planning progresses, and when the results of on-going trial rehabilitation treatments identify change requirements. The development of new or improved rehabilitation implements may also effect the methods employed to achieve the rehabilitation objective.

The following general prescription will be supplemented annually with specific and detailed pit-by-pit plans which will take into account the unique nature of each site to be rehabilitated.

#### 6.1.1 Preparation Of Areas For Planting

As part of the mining operation, and after ore removal, rehabilitation earthworks will be carried out in the following sequence:

- . The pit floor will normally be deep ripped on contour to a depth of 1.5m at 1m intervals, but areas programmed for heath development might not be ripped.
- . Pit sides will be battered down and the entire area landscaped to enhance aesthetic and recreational land use values. Where bauxite mineralization necessitates the clearing of narrow forest strips, which in turn may result in apparent long straight batter runs following mining of deep ore horizons, the slopes of the landscaped batters will be varied along strike to soften the visual impact of the final rehabilitated surface. Large boulders derived from deep ripping, or residual from the mining operation, will be buried.
- . Pit drainage and water management structures will be designed to promote retention and infiltration, and to prevent prolonged surface or sub-surface ponding. This will be achieved by:
  - (i) infiltration and silt trapping in the contoured rip lines; and
  - (ii) collection of overland flow either in a series of mid-slope contour banks and a pit bottom sump, or by a system of grade discharge banks directing flows to predetermined sump areas within the pit. Criteria for designing these drainage structures include:
    - Each sump will have the capacity to cope with the runoff from a 10-day 15-year storm event (170mm, derived by Worsley Alumina from

Marradong rainfall data, Station No.009575, 1907-1980) as calculated from meteorological records and mine-pit characteristics.

- Contour interceptor banks, where constructed, will be established at vertical intervals of up to 10m. Such banks will not exceed 1m in height or have steep sides which present an obstacle to future access.
  - Where used, contour interception banks will be provided with suitably constructed overflows and non-erodable spillways. Construction of these devices will be completed before the first autumn rains.
  - Grade discharge banks, where used, will comprise stabilised waterways which direct water to detention sumps within the pit. Sump and drain locations will be indicated on the rehabilitation plans.
  - If the design of banks conflicts with landscape considerations, alternative systems of drainage may be examined.
- . Overburden will be replaced.
  - . Topsoil, including forest litter and trash remaining after clearing, will be re-spread and the entire area lightly scarified on contour.
  - . Where pits exceed 5 hectares, temporary internal access tracks will be provided for the revegetation programme, on-going biological monitoring and general forest management operations.

#### 6.1.2 Revegetation

##### TREE SEEDLING ESTABLISHMENT

##### (i) Planting Layout and Design

- Generally, tree species are to be established as mixtures, but pure stands may be planted in localised portions of the landscape.
- Plant spacing will be varied according to the annual detailed site rehabilitation objectives. In certain situations, areas such as prominent view points and along selected roads, some areas may be left unplanted. In other instances, trees may be planted in small groups or clumps to minimise the rigid plantation effect created by row planting on a regular spacing.
- Initial stocking of about 500 planted trees/hectare.

- Planting will commence when the soil is wet to a depth exceeding 1m, generally after about mid-June. Planting will be completed by 1st August.

(ii) Species Selection

- In every mixture, species indigenous to the Saddleback area will be included. Species mixes will be determined in advance and confirmed in the agreed Annual Rehabilitation Plan with the Department of Conservation and Land Management.
- Seedling specifications: plants in jiffy pots or paper pots, approximately 12cm in height with a minimum of 2 pairs of leaves; pots and soil mix sterile.
- In addition to seedlings planted, all rehabilitated pits will be sown with *E. calophylla*, *E. marginata* and *E. wandoo* seed, at the rate of 1000 viable seeds per hectare.

(iii) Fertilizer Application

- Each tree seedling will receive one (1) 200g Di-ammonium Phosphate fertilizer tablet at planting. The tablets will be speared in below the soil surface up-slope and between 200mm and 300mm from each seedling.

(iv) Success Criteria

- 80% survival of planted species, at 9 months after planting, as determined by a 10% systematic sample.

UNDERSTOREY ESTABLISHMENT

(i) Species Selection and Establishment

- Species for understorey and groundcover seeding will be selected from those known to be "indicator" or "associated" species of the vegetation communities representative of the type of community being re-established (Worsley Alumina Pty Ltd, 1985), from experience gained on the Trial Rehabilitation Exercise One (TRE-1) site, and to facilitate erosion control and soil nutrition-building. Detailed provenance data will be recorded for all seed/seedlings used in rehabilitation.
- The base species for the seeding mix will include the major Saddleback Timber Reserve legume species, together with species identified as having high "relative importance values" in the majority of plant community types represented within the area

(Worsley Alumina Pty Ltd 1985). The base mix will comprise about 75% of the total understory seed mix and will generally include the following species:

*Acacia alata*  
*A. celastrifolia*  
*A. drummondii*  
*A. pulchella*  
*Bossiaea ornata*  
*Daviesia decurrens*  
*D. rhombifolia*  
*Dryandra nivea*  
*Hakea lissocarpha*  
*Kennedia coccinea*  
*K. prostrata*  
*Macrozamia riedlei*  
*Xanthorrhoea preissii*

- In order to promote species diversity, a large number of minor Saddleback Timber Reserve species will generally make up the balance of seed in the base mix, including other nitrogen fixing species (e.g., *Allocasuarina* spp.). Importantly, plants which are "indicator" or "associated" species for particular sites e.g. heathland etc, may be selected in advance and confirmed in the agreed annual rehabilitation plan with CALM.
- Mixed seed will be sown at the rate of 1.0kg/hectare.

(ii) Fertilizer Application

- All areas will be broadcast with Superphosphate No. 1 at a rate of 450 kg/hectare.

(iii) Success Criteria

- One plant established per square metre, 9 months after sowing, as determined by a sample quadrat survey of each pit.

**SADDLEBACK TIMBER RESERVE**

**BAUXITE PIT REHABILITATION - 1990 APPENDED PRESCRIPTION**

February 1990

This is the annual Appended Prescription to the document "Bauxite Pit Rehabilitation (Saddleback Timber Reserve) - Agreed Arrangements Between Worsley Alumina Pty Ltd and the Department of Conservation and Land Management.





## SADDLEBACK TIMBER RESERVE

### BAUXITE PIT REHABILITATION - 1990 APPENDED PRESCRIPTION

#### 1. INTRODUCTION

A total of 45.3 hectares of mined land in Saddleback Timber Reserve and 5.3 hectares of Worsley Joint Venturer-owned land are scheduled for rehabilitation by Worsley Alumina in 1990. The locations of the areas are illustrated at 1:10,000 scale on the plan "Tunnell Road Bauxite Mine - Bauxite Pit Rehabilitation 1990 - General Location Plan" and described as follows:

- . Timber Reserve sites
  - . West 1 Pit area - 9.7 ha, comprising portions of Worsley Alumina Clearing Notice areas WOR/3/87 and WOR/1/88;
  - . West 3 Pit area - 8.8 ha, comprising portions of WOR/2/88 and WOR/4/89;
  - . South Pit area - 1.7 ha, comprising a portion of WOR/7/81;
  - . South East 1 Pit area - 8 ha, comprising portions of WOR/3/86 and WOR/5/89;
  - . East 1 Pit area - 1.1 ha, comprising portions of WOR/5/87 and WOR/4/88;
  - . North East 1 Pit areas - total of 16 ha in two locations, comprising portions of WOR/4/88; and
- . Worsley JV-owned sites
  - . North East 2 Pit areas - total of 5.3 ha in two locations, comprising Worsley Alumina Joint Venturer Clearing Areas NE 2/88 and NE 2/89.

#### 2. PREPARATION OF AREAS FOR PLANTING

Rehabilitation earthworks, including provisions for pit drainage and water management, will be as described in the "General Prescription - Saddleback Timber Reserve", contained in the document "Bauxite Pit Rehabilitation, Agreed Arrangements Between Worsley Alumina Pty Ltd and the Department of Conservation and Land Management". General earthworks proposals for each pit area are illustrated on the attached seven (7) 1:2000 scale plans; detailed contour plans will be produced at 1:1000 scale and forwarded to CALM following the completion of the 1990 rehabilitation programme.

### 3. REVEGETATION TREATMENTS

#### 3.1 Site Descriptions Prior to Clearing

##### WEST 1 PIT AREA

This lower mid-slope site, below the haul road to West 3 Pit, supported an open *Eucalyptus marginata* - *E. calophylla* forest with dominant admixtures of *Allocasuarina fraseriana* and indicator species including *Lasiopetalum cardiophyllum* (Lc), *Lechenaultia biloba*, *Ptilotus drummondii* and *Pentapeltis peltigera* (Worsley Alumina vegetation code 19JLc - the dominant mid-slope Jarrah Community Type in Saddleback Timber Reserve, and an eastern variant of Site-vegetation Type P defined by Havel [1975]).

Two small heathland patches (vegetation code 23HDc, an open heath dominated by *Dryandra carduacea* [Dc], *Hakea incrassata*, *Petrophile serruriae*, *Adenanthos cygnorum* and *Stylidium repens*) are located in the fringing forest on the south-eastern edge of the area, with the extensive Tunnell Road Heathland down-slope and close to the north-eastern margin. Gravel overburden depths ranged from 0.2 - 3.4 m, with ore depths from 2.1 - 14 m.

##### WEST 3 PIT AREA

This upper-slope site supported a major component of the 19JLc vegetation community type described for West 1 Pit, with a small portion of the typical upper-slope and saddle community 19JBg on the south-eastern edge. This community consists of an open forest of *Eucalyptus marginata* - *E. calophylla* with admixtures of *Banksia grandis* (Bg) and *Allocasuarina fraseriana* in the second tree storey; *Acacia celastrifolia* and *Senecio leucoglossus* are common understorey species. Gravel overburden depths ranged from 0 - 0.76 m, with ore depths from 2.4 - 16.3 m.

##### SOUTH PIT AREA

This lower mid-slope site supported the 19JLc vegetation community type with some adjacent small patches of the 24HDc heathland community. Gravel overburden depths ranged from 0 - 1 m, with ore depths from 3.5 - 8.7 m.

##### SOUTH EAST 1 PIT AREA

This former haul road section and adjacent recently cleared and excavated mine-pit site supported the 19JLc community on the lower portions, with the 19JBg type originally growing on the higher sections of the roadway. A small patch of 24HDc heathland was cleared for the northern 50m of the haul road, and adjacent vegetation contains heathland species. Gravel overburden depths ranged from 0.1 - 1.9 m, with ore depths from 4 - 11.5 m.

### EAST 1 PIT AREA

This upper-slope to ridge site supported the 19JBg community on the low portion adjacent to the long term haul road and the 19JSd community (an open forest of *E. marginata* - *E. calophylla* with indicator species *Stylidium dichotomum* (Sd), *Clematis pubescens*, *Acacia celastrifolia*, *Senecio leucoglossus* and *Xanthosia atkinsoniana*, and *B. grandis*, *A. fraseriana* and *Dryandra sessilis* dominating the second tree storey) on the upper areas. Gravel overburden depths ranged from 0.2 - 0.6 m, with ore depths from 3.2 - 6.4 m.

### NORTH EAST 1 PIT AREAS

The major upper-slope portions of these two areas supported the 19JBg vegetation community, with a small area on the east side and one to the south-east - both typical mid-slope sites - supporting the 19JLc type. Gravel overburden depths ranged from 0.1 - 0.8 m, with ore depths from 2 - 9 m.

### NORTH EAST 2 PIT AREAS (JV-owned land)

These two mid-slope areas supported the 19JLc type for the major part, with a small south-eastern section of the 19JBg type. Gravel overburden depths ranged from 0.1 - 0.8 m, with ore depths from 2 - 9 m.

## 3.2 Revegetation

Plant species selection criteria, tree spacings, sowing rates, fertilizer treatments and establishment success assessment will be based on the afore-mentioned "General Prescription - Saddleback Timber Reserve".

As the areas involved in the 1990 programme supported similar Jarrah vegetation community types prior to mining, all areas will receive the same general revegetation treatment. Where site conditions, original vegetation anomalies and existing fringing vegetation communities warrant modifications to this treatment, these have been outlined below.

Tree species, numbers of seedlings per planting tray and percentage planting frequency for the general revegetation treatment will be as follows:

| SPECIES                     | SEEDLINGS/TRAY | % PLANTING FREQUENCY |
|-----------------------------|----------------|----------------------|
| <i>Eucalyptus marginata</i> | 18             | 60                   |
| <i>E. wandoo</i>            | 6              | 20                   |
| <i>E. accedens</i>          | 2              | 6.7                  |
| <i>E. patens</i>            | 2              | 6.7                  |
| <i>E. melliodora</i>        | 1              | 3.3                  |
| <i>E. sideroxylon</i>       | 1              | 3.3                  |
| TOTALS                      | 30/TRAY        | 100%                 |

*E. drummondii* will be planted on rocky sites exposed during earthworks treatments, where its shallow-rooted habit will be most suitable, and on sites adjacent to fringing heathland vegetation. (This species is the dominant Eucalypt in the Tunnell Road Heathland.)

The remaining Eucalypt species will be planted as mixtures, with *E. marginata* and *E. accedens* generally located up-slope and away from the water-gaining sites (as illustrated on the 1:2000 scale general earthworks plans referred to in Section 2); *E. patens* and *E. wandoo* will be concentrated on these sites.

Additionally, and <sup>if</sup> sufficient local seed can be obtained, Eucalypt seed will be spread over the rehabilitated areas at the rate of 1000 seeds of each of *E. calophylla*, *E. marginata* and *E. wandoo* per hectare.

The base understorey species seed mix listed in the General Prescription will be augmented with a large number of minor Saddleback Timber Reserve Jarrah community species to promote understorey species diversity. Seed from a range of heathland species will be over-sown on the eastern edge of the West 1 Pit area, on northern sections of the South East 1 Pit haul road area and on parts of the South Pit area, adjacent to existing undisturbed heathland vegetation. Plant species and provenance data for understorey and groundcover seed spread during the 1990 mine-pit rehabilitation programme will be provided to CALM on completion of the programme.

#### 4. REFERENCES

Havel, J.J. (1975). Site-vegetation mapping in the Northern Jarrah Forest (Darling Range). I. Definition of site-vegetation types. *Bull. For. Dept. West. Aust.* 86.

Worsley Alumina Pty Ltd (1985). "Worsley Alumina Project. Flora and Fauna Studies, Phase Two", pp. 348. Worsley Alumina Pty Ltd, Perth.

Department of Conservation and Land Management (1987). Central Forest Region Management Plan, 1987-1997. Department of Conservation and Land Management, Management Plan No. 10.

t3:na12:5