Tasmania
MINERAL RESOURCES TASMANIA

Mineral Exploration Code of Practice

Edition 4 — March 1999

MINERAL RESOURCES TASMANIA, PO BOX 56, ROSNY PARK, TASMANIA 7018 ISBN 0 7246 4013 4

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Introduction

Mineral Resources Tasmania rigorously enforces a policy of responsible and careful exploration, requiring all proposed exploration activities to be approved, in writing, before work commences. Conditions under which the exploration work may proceed are decided on a site-by-site basis, usually after consultation with other Government departments.

The purpose of this Code is to provide an outline of the current procedures which must be followed to obtain exploration approvals, and at the same time to give useful, practical information on the expected standards of exploration activities. The Code also details the controls and monitoring procedures which are currently in place.

Most mineral exploration activity in Tasmania is low impact; reconnaissance mapping, stream sediment and soil sampling, grid cutting, and geophysical surveys all have a minimal disturbance on the environment, but are the necessary precursors to more detailed work.

Once an anomaly has been found by these low-impact methods, drilling or costeaning, sometimes involving the construction of access tracks, follows. This is the part of exploration which is the most visible. In the past, some access tracks have been pushed into areas nowadays considered to be sensitive. Community standards and expectations have changed greatly over the past thirty years, and past activities should not be judged using the standards of today. Exploration, especially in the first phases, is now expected to be of low impact, leaving little trace of activity.

Extensive liaison networks are in place, and there is regular consultation with land managers such as staff from Forestry Tasmania and the Department of Primary Industries, Water and Environment.

Earthworks must be rehabilitated on the completion of the exploration program unless the works are specifically required by an incoming explorer. In this case, the new explorer must accept responsibility for the tracks and drill pads left open for their use.

This Code gives detailed information on various earthmoving activities to allow this work to be done in the best possible way. Other issues of importance to the explorer, such as protocol with private landowners and the need to prevent the spread of weeds and fungal diseases, is also documented. We envisage that the Code will provide explorers with a useful 'ready reference' guide to questions relating to all aspects of exploration.

The first edition of the *Mineral Exploration Code of Practice* was issued in December 1990. Since then, the code has been updated, and will continue to be revised so as to remain a current and useful guide for explorers.

NOTE TO EXPLORERS

Whilst substantially the same as Edition 3, this new edition has been arranged in three parts:

- Exploration procedures — information for explorers
- Mineral Exploration Code of Practice — standard schedules
- Mineral Exploration Code of Practice — exploration guidelines

Exploration Procedures — Information for Explorers

The following pages contain general information relating to the issue of Exploration Licences and the approval of exploration works. This section also contains explanations of land classifications, National Estate, biodiversity and wilderness as they relate to exploration.

Exploration Licences

The Exploration Licence is the principal title for mineral exploration in Tasmania. The following procedures are taken from the *Mineral Resources Development Act 1995* which prescribes procedures generally the same as the preceding *Mining Act 1929*.

APPLICATIONS

An application for an exploration licence may be made by:

- one or more persons over the age of 18 years;
- one or more bodies corporate;
- or a combination of these.

An application form is available to assist applicants. Should the form not be used, it is essential that an application include the following information:

- details of current holdings;
- names and qualifications of staff;
- estimated expenditure for the first two years of the licence;
- an outline of the exploration program to be carried out.

It is not necessary for the applicant to mark out the proposed area of the exploration licence.

When the Director proposes to recommend to the Minister for Mines that a licence be issued, the Registrar of Mines will advertise details of the application in a newspaper circulating in the district of the application. The advertisement will be in a standard format, which includes a map showing the location of the area. The cost of the advertisement is included in the application fee.

An objection to an application may be lodged by any person who claims an estate or interest in the land. This includes a landowner, tenant, lessee or holder of an exploration licence for other mining products. Objections must be on the prescribed form available from Mineral Resources Tasmania, must be accompanied by the prescribed fee, and must be received by the Director of Mines no later than 30 days after the advertisement of the application.

Application fees for exploration licences are:

(a) Oil $1200.00

(b) Any other mining product $300.00

PRIORITY OF APPLICATIONS

A moratorium period of two months applies when ground is released from an Exploration Licence by surrender, revocation, or reduction in area, or when a licence ceases to apply to mining products that had been the subject of the licence.

At the end of the moratorium period applications will be received 'over the counter'. Priority will be by date of lodgement. Applications received on the same day will be treated as simultaneous and will be judged on merit. Applications cannot be accepted during the two month moratorium period.

ETA (Exploration Tender Area) SYSTEM

Mineral Resources Tasmania offers a service to subscribers advising them of areas available for application after a moratorium period. Whilst every effort is made to be as accurate as possible, there may be areas within the ETA diagram which are unavailable for exploration.

Exploration Licence applications (tenders) can no longer be accepted during the two month moratorium. Applications can only be accepted after the expiry of the moratorium period.

TRANSFER OF APPLICATIONS

An application may be transferred by completing the prescribed form and payment of a fee of $50.00.

AREA OF LICENCES

Exploration licences for minerals or stone are not to exceed 250 km^2. Coal, oil and oil shale licences are not to exceed 500 km^2.

TERM OF LICENCE

An exploration licence is issued for five years.

PERIOD OF TENURE

Licence tenure is limited to a maximum of five years. During the tenure the size of the licence need not be reduced.

Renewals will not be granted after the five year term except in exceptional circumstances, such as where a discovery is made in the final years of the tenure of a licence, when an extension may be granted for sufficient time to allow the discovery to be evaluated. The area of the extended licence will be limited to that necessary to give security of title to the discovery.

ANNUAL RENTAL

Rents for Exploration Licences are:

(a) Oil — for each square kilometre per year:
  (i) for each of the first 2 years $1.00
  (ii) for each subsequent year $1.50

(b) Other mining products — for each square kilometre per year:
  (i) for each of the first 2 years $15.00
  (ii) for each subsequent year $30.00

RIGHTS OF A LICENCE HOLDER

Only one Exploration Licence may be issued for the same mineral products on the same land. Within the area of the licence, the holder has an exclusive right to

a Mining Lease in respect of the mining products specified in the licence.

The holder has the right to object to the issue of an Exploration Licence or a Mining Lease for other mining products in the area of the licence.

A Miner's Right or Prospector's Licence may only be used within the area of an Exploration Licence with the consent of the Exploration Licence holder.

CONDITIONS

A licence is issued subject to such conditions as the Minister may apply. A performance deposit is required to ensure compliance with all conditions of the licence. The amount of the deposit is determined by the size of the area, the program to be carried out, and the environmental sensitivity of the area.

EXPENDITURE COMMITMENT

(1) Unless otherwise specified as a condition of the licence, the following minimum expenditure applies:
   (a) First year at $200 per km^2 per annum
   (b) Second year at $500 per km^2 per annum
   (c) Third year at $1000 per km^2 per annum
   (d) Fourth year at $2000 per km^2 per annum
   (e) Last year at $5000 per km^2 per annum

   The minimum expenditure commitment is $5000 per annum.

(2) Over-expenditure in one year may be carried forward for one year only to offset under-expenditure.

(3) Under-expenditure in one year is to be made up the next year, together with that year's commitment.

(4) Licence holders not satisfying expenditure commitments in successive years will be required to show cause why all or part of a licence should not be revoked.

(5) A licence holder may apply to the Director of Mines to waive or reduce expenditure commitments.

(6) (a) Reported expenditure must be itemised.
   (b) Only actual costs incurred in exploration work are to be included.
   (c) Administration costs, including licence fees, should not exceed 10 per cent of annual expenditure.

EXPLORATION ON PRIVATE LAND

Explorers wishing to explore on, or use access through private land, should contact the landowner and discuss their exploration plans well in advance of the program commencement date. The *Mineral Resources Development Act 1995* requires that the owner or occupier of the land be given 14 days notice, in writing, stating that work is to commence. However, explorers should take special pains to contact the landowner and discuss plans on a personal basis before sending, or delivering, the formal notice.

REPORTING REQUIREMENTS

Full details of reporting requirements are given in the brochure *Guidelines for Reporting on Exploration Licences* available from Mineral Resources Tasmania. This information is also included in this code (see page 9).

Interim Reports

Interim reports must include a statement of expenditure, an itemised breakdown of expenses, and a brief résumé of work in progress and completed.

Quarterly interim reports should be submitted on the form *Interim Report of Exploration* (for the quarters ending 30 March, 30 June, 30 September and 31 December).

Annual Reports

An annual report should be a full technical report detailing all exploration undertaken and results obtained during the year.

Final Reports

The final report should be a complete summary of exploration carried out on the area of the licence to be relinquished, plus details of work on that area which has not been previously reported. It should include a list of previous reports and their contents, and details of rehabilitation carried out on the area.

The final report must be lodged prior to the expiry date of the licence. Where only part of a licence area is relinquished and no final report is submitted for that part, all reports relevant to the relinquished area will be released for public examination.

Failure to lodge a final report by the expiry date may result in the forfeiture of a portion of the performance deposit.

RESEARCH

A complete record must be submitted where research is undertaken on a licence area and is attributed to exploration activity and expenditure.

DISCOVERY

The Director of Mines is to be notified immediately on discovery of significant mineralisation.

CONFIDENTIALITY

All reports submitted to Mineral Resources Tasmania remain confidential until:

(1) a period of five years has elapsed from the date when the report was due to be submitted; or

(2) a licence expires, is relinquished, or is cancelled; or

(3) the area to which a report relates is no longer held by the licensee,

whichever occurs first, unless otherwise negotiated with Mineral Resources Tasmania.

ANNUAL REVIEW OF LICENCE

Mineral Resources Tasmania will carry out an annual review of performance on exploration licences. Failure to perform may result in termination of the licence.

The licence holder is required to supply, 30 days prior to the anniversary date:

- the annual rent;
- an annual report of exploration activity;
- a proposed work program for the forthcoming year;
- where a licence is to be voluntarily reduced, a plan showing the area to be relinquished.

If the area of the licence is to be reduced, the licence holder should give Mineral Resources Tasmania at least two months notice, and must submit a final report on the relinquished area. **If a final report is not provided prior to the renewal date, MRT may release all reports pertinent to the relinquished area for public examination**.

TRANSFER

A licence may be transferred with the approval of the Minister. An application must be made on the prescribed form and must be accompanied by a fee of $100.00.

SURRENDER

A licence may be surrendered at any time with the approval of the Minister. An application for surrender must be made on the prescribed form and be accompanied by a $50.00 fee. A surrender takes effect when approved by the Minister.

An application for surrender will not be approved until all reports, including the final report, have been lodged and disturbed areas have been rehabilitated to a satisfactory standard.

CHANGES TO THE LICENCE

The area of the licence, or the number of mining products for which the holder is authorised to explore, may be reduced with the consent of the Minister.

The area of the licence may be increased, and additional commodities included in the licence, either by:

(1) the consent of the Minister; or

(2) application for an Exploration Licence in respect of the additional area or commodities.

REGISTRATION OF LICENCES

All applications, grants, transfers of applications, changes in area, changes in mining products, approvals of transfers, approvals of surrenders, and revocations will be registered.

Where a moratorium period applies, there will be no registration of applications for exploration licences during that period.

APPROVAL AND REGISTRATION OF DEALINGS

All dealings in Exploration Licences must be approved by the Minister and registered.

A dealing, in this context, is an agreement 'by which a legal or equitable interest in or affecting an existing or future exploration licence or retention licence is or may be created, assigned, affected or dealt with directly or indirectly.'

This includes joint venture agreements, farm-in and farm-out agreements, options, compensation agreements, over-ride royalty agreements and the like.

An application for approval may be made by a party to the agreement and must be:

- made on the prescribed form;
- accompanied by a copy of the instrument;
- accompanied by the prescribed fee of $100.00.

EXPLORATION LICENCE SCHEDULES

All Exploration Licences are issued subject to schedules which contain the standard licence conditions. These schedules are:

- **Schedule A**: Standard conditions outlining operational and reporting requirements.
- **Schedule B**: Cut line specifications and fire precaution regulations.
- **Schedule C**: Contains conditions relating to the drilling for petroleum onshore, and is not applied to every licence.
- **Schedule D**: Non-exclusive licence — exploration reports, which enables Mineral Resources Tasmania to reproduce and copy exploration reports once they are placed on open file.
- **Schedule E**: Inclusion of Fossicking Areas in exploration licence.

MONITORING AND PENALTIES

Regular field inspections are made by officers of Mineral Resources Tasmania, and on occasions joint inspections are made with officers from other agencies to ensure that conditions placed on the work program are being observed. Penalties imposed for breaches of conditions can include the forfeit of bond monies and/or the licence.

SENSITIVE AREAS

Exploration activities proposed in existing reserves, such as Conservation Areas, State Recreation Areas, Forest Reserves, CAR Reserves and other areas considered to be 'sensitive', must be approved by the Mineral Exploration Working Group, which consists of representatives from Mineral Resources Tasmania,

the Department of Primary Industries, Water and Environment, and Forestry Tasmania. Other departments and interested bodies are consulted on individual projects where required.

When various proclamations are made under Section 2 of the *Regional Forest Agreement (Land Classification) Act 1998* State Recreation Areas will become Nature Recreation Areas and most of the CAR Reserves will become either Forest Reserves or Conservation Areas.

FOSSICKING AREAS

There are many localities within Tasmania where interesting lapidary and mineralogical material can be found. In recognition of the recreational activity of fossicking, some of the best areas have been set aside for the use of fossickers (see page 21).

Guidelines for Reporting

INTRODUCTION

Mineral Resources Tasmania has compiled guidelines for reporting to assist the holders of mineral exploration tenements in Tasmania with the preparation and submission of reports on exploration activities. These guidelines are primarily concerned with requirements under the conditions of Exploration and Retention Licences, but specific requirements for reporting of exploration on Mining Leases are also listed.

TASXPLOR database

All mineral exploration reports are catalogued upon receipt and are indexed, keyworded and abstracted for input into TASXPLOR, a computerised index of exploration reports.

TASXPLOR contains **textual** information on author, title, company, licence/lease, location by geographic features and map sheets, subject (e.g. geological mapping, geophysics, geochemistry, drilling, etc.), minerals and commodities, mines and deposits, and stratigraphic units. A **spatial** index of reports described in TASXPLOR is being developed. The spatial index will allow the user to search for reported exploration activities within a designated area.

The open file information on TASXPLOR is available for public enquiry and is also made available as a flat text file.

GENERAL INFORMATION

Exploration Licences

Holders of Exploration Licences are required to submit *quarterly* and *annual reports* during tenure of a licence, and a *final report* upon expiry, relinquishment or cancellation of a licence or any part thereof.

It is the responsibility of the licensee to ensure that full details of all work carried out as part of the exploration program are submitted, irrespective of whether the exploration is undertaken by the licensee, by consultants, or by joint venture partners.

Combined reporting

Where the licensee holds adjoining licences and is carrying out an integrated exploration program, combined annual reports are acceptable if the terms of the licences are similar and if approval has been obtained for combined reporting.

If regional surveys, such as airborne geophysical surveys and regional stream-sediment geochemistry, have been carried out over a number of adjoining licences, a single report on such surveys should be submitted. In this case, the licences covered must be clearly indicated and reference must be made to that report in subsequent annual reports submitted for each of the individual licences.

Licence holders are advised that if combined annual reports are provided and a licence is relinquished, then the combined reports may be placed on open file, irrespective of the status of the adjoining licence(s).

Retention Licences and Mining Leases

Holders of Retention Licences are required to submit *quarterly* and *annual reports* during tenure of the licence covering exploration and feasibility studies. Holders of Mining Leases may also be required to report quarterly and annually. The reporting format for annual reports should be similar to that required for annual reports on Exploration Licences.

Research reports

If research is sponsored by the licensee and/or joint-venturer and is attributed to exploration activity and expenditure, a complete record must be presented to Mineral Resources Tasmania either under the same cover as the annual report, or provided directly from the author. This may be in the form of a University thesis or confidential report from a research organisation. Research reports will be subject to the same confidentiality restrictions as the covering annual reports, unless agreed otherwise with the licensee.

Copyright

With the submission of annual and quarterly reports to MRT, a non-exclusive licence, copyright included, is given to MRT to publish, print, adapt and reproduce the work in any form, subject to

confidentiality as prescribed by the *Mineral Resources Development Act 1995*.

Microfilming reports

All annual and final reports are microfilmed for security of the exploration database. The reports therefore must be of sufficient quality of presentation for microfilming, particularly maps, plans and sections. Reports (or sections of reports) lacking clarity will be returned to the tenement holder for amendment.

Microfiche copies of open file reports are available for purchase from Mineral Resources Tasmania.

QUARTERLY REPORTS

Quarterly reports must be lodged for the quarters ending 31 March, 30 June, 30 September and 31 December.

The quarterly reports shall be lodged within 31 days of the above dates.

The reports should be made on the appropriate form, available from Mineral Resources Tasmania, and must contain an expenditure statement, a brief progress report on exploration and full details of any activities completed, in progress or planned that have an environmental impact. A report form will be posted to each tenement holder before the end of each quarter.

The quarterly progress report on exploration should be a brief statement of work carried out and major results obtained, and the progress of long-term surveys. The progress report should be no more than one page. Detailed accounts and results of specific surveys are not required in quarterly reports. Any detailed data given in a quarterly report must be resubmitted in the annual report.

ANNUAL REPORTS

An annual report is required for all investigations undertaken during the term of the licence or lease. This report should be submitted to the Director of Mines one month before the annual review date.

The first annual report for an Exploration Licence should also contain a statement of the exploration philosophy and objectives (in particular, the type of mineral deposits sought and the reasons for considering the licence area prospective for these deposits).

When long-term surveys, such as regional geochemical surveys, are in progress at the time of submission of an annual report, it is acceptable to indicate the progress of such surveys, and to submit the full results in a subsequent report when the survey has been completed.

FINAL REPORTS ON EXPLORATION LICENCES

A final report is required to be submitted upon expiry, relinquishment or cancellation of all or part of an Exploration Licence, and must be submitted to the Director of Mines no less than 30 days prior to the expiry or surrender date.

The report must accompany a surrender application or an application for renewal of the reduced area of the licence, but be separate from the annual report supporting the area to be retained.

Final reports generally follow the content and format of annual reports, and are required to contain the following information:

(1) A résumé of the exploration philosophy.

(2) A summary of all exploration undertaken on the relinquished area during tenure of the licence. Detailed information, such as results of geochemical and geophysical surveys, drill logs, etc., which have been included in previously submitted annual reports, need only be referred to in the final report but must be provided in partial relinquishment reports unless the licensee opts for the relevant reports to be released from confidential files as detailed below.

(3) Full details of work undertaken during the final reporting period, and any data not previously reported.

(4) Conclusions as to the nature and distribution of any mineralisation in the relinquished area.

(5) A complete bibliography of all reports on the relinquished area.

(6) All transparencies of plans within the relinquished area, cross-referenced with the relevant annual report where applicable.

(7) Details of tracks constructed, costeaning, drill sites cleared, etc. and details of rehabilitation undertaken.

(8) Complete digital datasets covering the life of the tenement should be lodged (and will be stored on MRT's 'Digital Bookshelf'). This effectively provides subsequent explorers with easy access to all digital data pertaining to the tenement.

As an alternative to providing full details of all exploration within partial relinquishment areas (as required in item (2) above), the licensee may opt for previously submitted annual reports to be released from confidential files. This would alleviate the necessity to duplicate previously submitted data, provided such reports cover all work done on the relinquished area. This would also apply to reports on specific contracted surveys and regional surveys. This option does not release the licensee from providing a relinquishment report containing the other information listed above.

CONFIDENTIALITY

Exploration Licences and Retention Licences

Reports submitted under the terms of Exploration Licences are held for official purposes and remain confidential until:

(1) a period of five years has elapsed from the date on which a report was due to be submitted to the Director of Mines, and a period of five years from the date of acquisition of geophysical data;

or

(2) a Licence expires, is relinquished, or is cancelled,

whichever occurs first.

Reports submitted under the terms of Retention Licences remain confidential until the licence is either extended or surrendered.

Mining Leases

Reports on exploration on Mining Leases remain confidential whilst the lease is operated. Reports on current leases may be periodically released from confidential files, but only after permission has been sought from the lessee.

SUBMITTING REPORTS

All reports and correspondence must be submitted to The Director of Mines, Mineral Resources Tasmania, PO Box 56, Rosny Park, Tasmania, 7018.

FORMAT OF ANNUAL AND FINAL REPORTS

To ensure that information in annual and final reports is submitted in an easily accessible and usable form, and to obtain good quality microfilm, it is desirable for some standardisation of data presentation to be achieved. Reports are commonly submitted in more than one medium, i.e. text, diagrams and maps on paper, transparencies on film, and digital data on computer disc or tape.

Hard copy

The binding of reports must be robust but easily dismantled and reassembled so that pages can be individually removed from a volume for microfilming. The preferred bindings are GBC-type plastic coil binders, ring binders or screw-pin binders. Companies are asked to avoid wire spiral binders and Velo plastic binders because of the difficulty in dismantling and reassembly. Pages must be A4 size (i.e. 210 mm 297 mm) and paginated. Reports containing large quantities of data should be divided into several small volumes rather than one or two bulky volumes.

As far as practicable, all data should be submitted in original, processed, and interpretative forms. This enables original data to be subjected to alternative methods of processing and interpretation, and at the same time allows an insight into the conclusions reached by the licensee from the results obtained.

General comments on maps and plans

All plans should be on A-series paper with an upper limit of A0 (i.e. 1190 mm 840 mm), and be at a scale related to that of the standard map series (e.g. 1:250 000, 1:100 000, 1:50 000, 1:25 000, 1:10 000, 1:5000, 1:2500, 1:2000, 1:1000).

Maps and plans should show the following:

- The Australian Map Grid (AMG), based on either AGD66 or GDA94 (specify which). Maps should show sufficient base information (i.e. geographic features) for the maps to be related to standard topographic maps.
- A graphic bar scale in metric units.
- A north point or arrow (Grid/True and/or Magnetic north); or orientation of sections.
- A clear and comprehensive legend [*Symbols used on geological maps*, AGSO (BMR); and the *Field Geologists' Manual*, Aus.IMM, are recommended references].

Shaded or coloured features should be designed so that black and white reproduction is possible, e.g. geological units should be bounded by closed polygons and include a code or mnemonic.

All lettering and line work should be large enough for adequate definition when microfilmed.

Standard specifications for drafting of plans are also provided in the Australian Geological Survey Organisation publication *Symbols used on geological maps* (1988).

Metric measurements are to be used throughout.

Transparencies

In addition to paper copies of plans, it is required that existing copies from which reproductions can be made, such as clear plastics or microfilms (aperture cards or microfiche), be submitted with reports. This requirement is not strictly enforced, as many plans are continually updated as new data are added, but explorers should be prepared to provide transparencies as required. As a general guide, transparencies are required for plans detailing those parts of a survey that are 'complete' (e.g. flight lines, line profiles, contour plots of an airborne geophysical survey; complete results of a regional stream sediment sampling survey). Digital versions of transparencies, from which printouts can be made, are acceptable *in lieu* of hard copy (see below for format). All available transparencies should accompany **final** reports.

Digital data

Digital data supplied by companies will be stored on the MRT 'Digital Bookshelf'. The Digital Bookshelf contains data exactly as supplied by companies. This should include all data that are available in digital format, including text, tabular data, geophysical data, and images.

All unique diagrams, if available in digital form, should be submitted. The submission of progressive diagrams that are continually updated should be discussed with Mineral Resources Tasmania.

To enable easy transfer of digital data, the table below outlines the file formats currently preferred by MRT. If these formats cannot be supplied, please contact MRT to discuss a suitable transfer format.

Data type	*Preferred formats*
Text	ASCII text file, RTF, Microsoft Word
Tabular data e.g. analyses	Delimited text file, Microsoft Excel, Microsoft Access
Plans, maps, diagrams	ARC/INFO formats, generate or export (.e00); Mapinfo; Autocad (.dwg, .dxf); Corel Draw (.cdr)
Geophysical data	Located data files in fixed column ASCII format
Raster data, e.g. geophysical images	ERMapper format, include hard copy of header file

Datasets should be in separate files that have comprehensive header information or an accompanying metadata/header file, including the associated report identification and a description of the dataset. A metadata file may simply be a portion of the relevant text document. It is essential that delimited ASCII files have a unique delimiter that does not occur in the text. Tabular data should have a title for each column in the main data file or defined in the header.

Data files may be compressed with PKZIP (WINZIP), Unix compress or Unix tar. The transfer media currently accepted are 3.5 inch diskettes, 60 or 150 Mb cartridge tape, 2 Gb or 5 Gb exabyte tape, DAT tape, or ISO 9660 CDROM.

Where lodgement of a dataset would breach licence conditions alternatives are acceptable. For example a Landsat image cannot be lodged in ERMapper format, but can be lodged in TIF format.

LAYOUT OF ANNUAL REPORTS

Title page

- ☐ Report title;
- ☐ Licence number, nature of report (i.e. annual, final, relinquishment), period covered, name and address of licensee (and/or operator/ manager);
- ☐ Author(s) of the report;
- ☐ Date of report.

Abstract

- ☐ Objective, methodology, results, recommendations.

Contents

Include lists of figures and plates, loose plans, non-paper media (transparencies, computer discs and types, etc), and appendices.

1. Introduction

- ☐ Exploration rationale (objective) and geological setting;
- ☐ Licence, tenement number, tenement name, tenement location, reporting period, tenement holder;
- ☐ Location;
- ☐ Tenure, including joint venture details and title transfers.

2. Review of previous work

- ☐ Prior to current tenement;
- ☐ During current tenement.

3. Exploration completed during the report period

- ☐ Literature review (if first annual report);
- ☐ Regional exploration activities;
- ☐ Prospect-based exploration activities.

4. Discussion of results

5. Conclusions

- ☐ Including recommendations and proposed future exploration.

6. Environment

- ☐ Including surface-disturbing operations, surveys (e.g. archaeological, botanical) and rehabilitation.

Expenditure

References

Keywords

NOTES ON REPORTING OF EXPLORATION ACTIVITIES

Prospect-based exploration activities

Reports are normally ordered by work site or prospect, with work programs and results described for each. Topics considered for each area should normally include gridding, geology, geophysics, geochemistry, drilling, remote sensing, ore reserves and resources, environment, other work, discussion and future work. Most of the actual data should be included as appendices, rather than in the main part of the report. While spatial data is commonly presented in large format plans (in the map supplement folder at the rear of the report), readers usually appreciate A4 summaries in this section.

Exploration activity map

Exploration activity is captured from exploration reports, including consultants reports, for input into a digital spatial index for the TASXPLOR database. Reports should include a summary map of the licence area showing the particular area(s) covered by the

report with the location and type of surveys conducted to allow digital capture of boundaries to an accuracy of 500 metres. The map should also show topographic features and the Australian Map Grid.

The types of activities conducted should be categorised under the following themes:

- ☐ geological mapping
- ☐ soil geochemistry
- ☐ rock chip and whole-rock geochemistry
- ☐ stream-sediment geochemistry
- ☐ drilling
- ☐ gridding
- ☐ track/road construction
- ☐ site investigations (for development or rehabilitation)
- ☐ remote sensing investigations
- ☐ airborne radiometric surveys
- ☐ airborne magnetic surveys
- ☐ airborne electromagnetic surveys
- ☐ ground magnetic surveys
- ☐ gravity surveys
- ☐ IP/SP surveys
- ☐ ground electromagnetic surveys
- ☐ ground radiometric surveys
- ☐ seismic refraction surveys
- ☐ seismic reflection surveys
- ☐ other activities

Geology

- ☐ All geological maps must be line drawings with graphical and/or alphabetical symbols for rock units, and should show geographic features, local grid lines and the AMG.
- ☐ Results of geological mapping should be presented as geological 'fact' maps and as interpretative geological maps.
- ☐ Where a complicated system of abbreviations is used on geological 'fact' maps, an index should be included in the report, but not necessarily listed on each map. All interpretative maps should have a legend.
- ☐ Geological information used on maps and in the text which is not the result of original work should be acknowledged.
- ☐ Petrological descriptions should be appended to the report, and sample locations shown on appropriate plans (or listed in drilling logs) and/or indicated by AMG or local grid co-ordinates.

Geochemistry

- ☐ Geochemistry data should be submitted in table format with AMG location and analyses for all labelled samples. Digital geochemical databases under continuous development should also be submitted. Sample numbers and locations must be presented on base maps showing relevant geographic features (including drainage) and the AMG.
- ☐ Full analytical results should be supplied by presentation either on maps or in tables, with sample numbers.
- ☐ Sampling procedures, such as sample depth, sample weight, method of collection, and sample type, e.g.:
  - water (surface or underground);
  - stream sediment;
  - soil (hand or power auger; horizon sampled);
  - rock (surface or underground);
  - gossan or mineralisation;
  - drill sample (core, chips, sludge);
  - others, such as air, vegetation, etc.
- ☐ Description of sample preparation, such as sieving and size fraction analysed, any concentration of sample (e.g. heavy mineral separation, magnetic or non-magnetic fraction, panned concentrate).
- ☐ Description of analytical procedures, which should include the name of analytical laboratory, analytical method, limits of detection and precision, and method of extraction/digestion, if applicable.
- ☐ Methods used for processing and interpretation of data should be described, particularly if advanced data-processing methods have been employed.

Geophysics

The principal requirements for reporting of geophysical investigations are:

- ☐ Specifications of geophysical surveys (e.g. for airborne geophysical surveys: altitude, line spacing, station spacing, type of aircraft).
- ☐ Specifications of instruments (notably type, design, power, accuracy, precision), units of measurement (preferably SI units) and mode of recording data (i.e. analog or digital).
- ☐ Traverse lines, and station intervals on lines, should be presented on maps showing geographic features and the AMG, together with significant cultural features which may affect results (e.g. power lines).
- ☐ All data should be presented both as original basic data (tabulated, line profiles) and as processed data (e.g. contoured interpretative maps). Gravity surveys should include details of position (AMG co-ordinates), elevation and observed gravity for each station.

- Geophysical survey data must be presented digitally for lodgment on the Digital Bookshelf and be accompanied by a detailed description of the data on the medium. The format should allow easy duplication.
- Data on each medium should be free from error, that is all useless records edited out and all spurious data removed. All drift/diurnal/tie corrections should have been made and location and geophysical data merged. Field tapes are not required.
- Examples — gravity survey: station number, AMG co-ordinates, AHD elevation, absolute observed gravity (specify which datum), terrain correction;

  Aerial survey: AMG or latitude/longitude co-ordinates, parameters after correction in located data tape format.

Remote sensing

- A description of the type of scan.
- Image location, description, presentation and interpretation.

Drilling

- A plan showing the precise location of the drill holes. This plan should include geographic features and the AMG.
- Type of drilling (e.g. diamond, percussion, auger) and drill rig and drilling company.
- Grid reference and collar elevation for each drill hole, both in terms of the AMG and any local grid (drill hole collars should be surveyed in accurately, wherever possible).
- Orientation of the drill hole (declination and direction at collar, and the results of, and instruments used in, any down-the-hole surveys).
- Detailed geological log of the core, cuttings, etc. in metric units; and name of the geologist who logged the core.
- Full results of any down-hole geophysical logging.
- Details of any samples taken and full results of testing of the samples (geochemical, petrological, geophysical, metallurgical, etc.).
- Graphic cross sections.
- The location of drill core, cuttings, etc.

Ore reserves and resources

- Ore reserves and/or resource estimations are to be reported in full (including the method(s) used for calculating ore reserves) and should be in accordance with the classification and terminology defined in the *Australasian Code for Reporting of Identified Mineral Resources and Ore Reserves* (The JORC Code), Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists, and the Australian Mining Industry Council (1996). Reporting of coal reserves should follow the guidelines in AS2519–1986.

Duty of Care

RESPONSIBILITY OF EMPLOYERS

Employers have a duty of care to provide a safe workplace for their employees. An employer must provide such information, instruction, training and supervision as may be necessary to ensure the health and safety of employees whilst at work.

RESPONSIBILITY OF MANAGERS

Managers have a duty of care to all their employees and support staff including contractors. This includes:

- Ensuring plant and equipment are in good working order and are safe to operate;
- Making arrangements to ensure that where persons operate, the workplace is safe;
- Ensuring that persons are adequately trained to perform their duties in a safe manner;
- Providing adequate supervision, instruction and information to ensure operations are carried out safely;
- Providing adequate warning of any hazard (such as old, unprotected shafts) on the Exploration Licence which may come to his/her notice for the protection of the public as well as the workers.

RESPONSIBILITY OF EMPLOYEES

- Every person employed on an Exploration Licence must take reasonable steps to ensure that the machinery used and the place of work are safe.
- Every person employed on an Exploration Licence has a duty of care to prevent other persons from being exposed to any danger of which they may be aware.

Responsible Officers For Exploration Activities

The *Workplace Health and Safety Act 1995* sets out, in respect to employees, contractors and their employees, visitors and other persons who may be affected by operations at the workplace, the duties of employers with regard to health and safety matters. This means that holders of Exploration Licences will need to appoint a 'responsible officer' to perform the duties of the employer under the Act, for each workplace at which he or she carries on business. The responsible officer must therefore have sufficient authority to be able to perform these duties effectively.

The licence holder must notify the Director of Mines, in an approved form, of the name of the appointed responsible officer (forms for this purpose are available from MRT).

Land Available for Exploration

Exploration Licences are marked out in 1 km^2 blocks according to the Australian Map Grid. There are a number of land categories which are not available for exploration and so are not included in the licence.

CURRENT SITUATION — FEBRUARY 1999

Land Categories EXCLUDED from Exploration Licences

This will include:

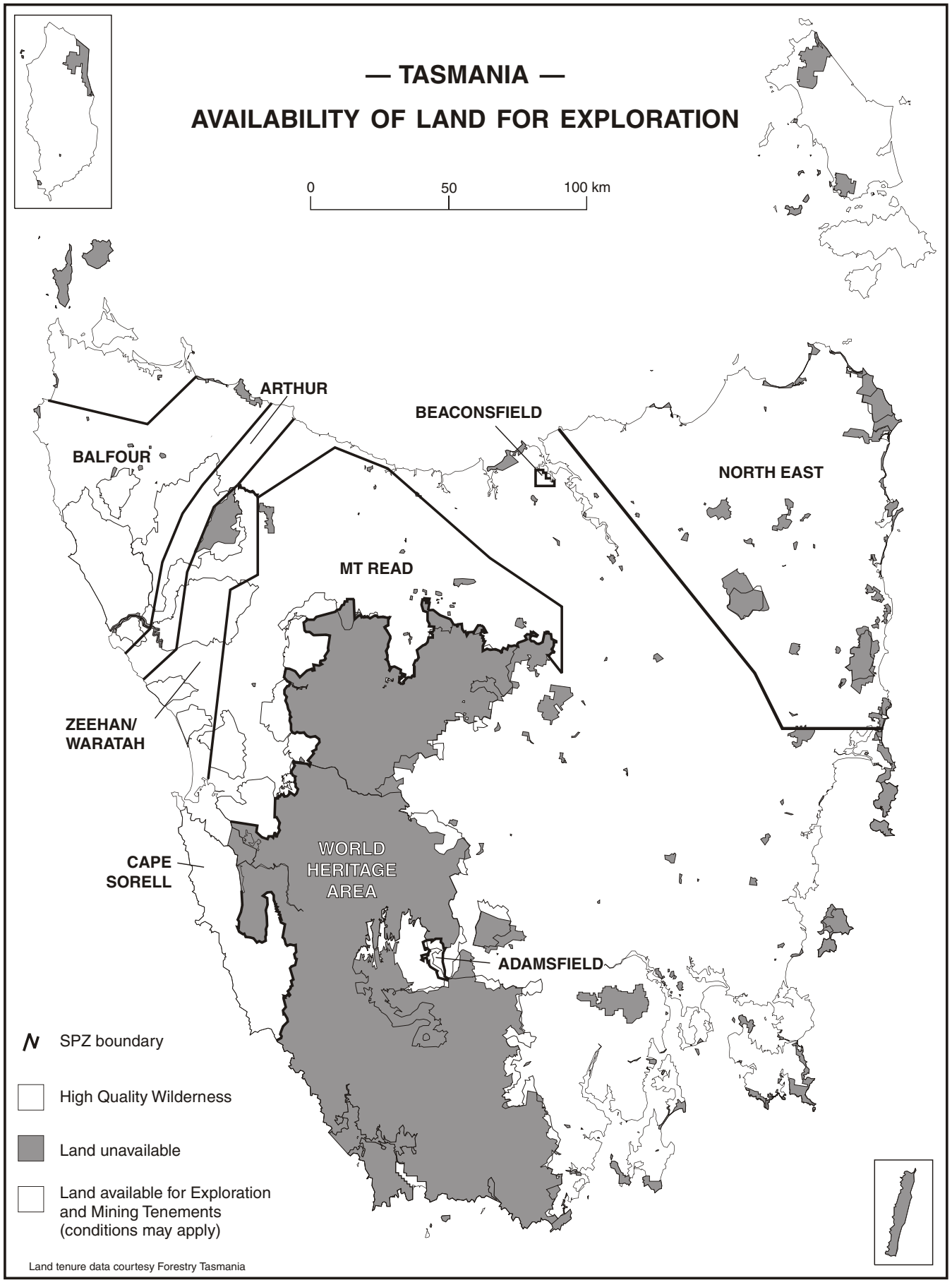
- Some mining tenements, including Mining Leases, Special Exploration Licences, Exploration Licences, and Retention Licences which were in lawful possession or marked out prior to the date of application.
- Land exempt from the provisions of the *Mineral Resources Development Act 1995*, such as 'Exempt Areas', which are usually declared to allow for geological assessment of a particular area by Mineral Resources Tasmania.
- Fossicking areas: the top two metres of land which is set aside as a Fossicking Area may be excluded. Land beneath this depth will be included.
- Land reserved under the *National Parks and Wildlife Act 1970*, having the status of State Reserve and in practical terms not being subject to the *Mineral Resources Development Act 1995*:
  - State Reserves;
  - National Parks;
  - Historic Sites;
  - Nature Reserves;
  - Aboriginal Sites;
  - Game Reserves.
- Land reserved under the *Aboriginal Relics Act 1975*, such as Protected Archaeological Sites, and lands listed in the *Aboriginal Lands Act 1995*.
- Public and municipal reserves under the *Crown Lands Act 1976*, such as:
  - Protected Areas;
  - State Recreation Areas;
  - Coastal Reserves;
  - River Reserves;
  - Lakeside Reserves;
  - Some roadways (such as highways);
  - Crown Reserves for conservation purposes, e.g. Mt Nelson Signal Station Reserve;
  - Crown Reserves such as cemeteries;
  - Crown Reserves for construction materials and water (Crown ballast pits, quarry reserves, water reserves etc.).

Any of these public and municipal reserves can be brought back under the *Mineral Resources Development Act 1995* to allow for exploration if a sufficiently good case can be made. This is generally relatively straightforward when explorers require access to Crown gravel and quarry reserves and ballast pits, but is not common in any of the other categories which have usually been set aside for conservation purposes. Any exploration which was permitted in these areas would have to be first approved by the Mineral Exploration Working Group.

- Commonwealth land, Telstra installations and land leased to the Commonwealth for military purposes such as the Buckland Military Training Area.
- Land formerly held by the Commonwealth around lighthouses. While most of this land and the lighthouses have been given back to the State, these areas are likely to be given reserve status which precludes mining.
- Wildlife Sanctuaries: some have management plans which specifically prohibit exploration; in others approval for exploration is not likely to be given. Usually excluded from licences by agreement with the applicant.
- Ramsar sites (significant waterbird habitats) are usually excluded from licences.
- Muttonbird Reserves: approval for exploration not likely to be given; usually excluded from the licence application by agreement with the applicant.

Land categories INCLUDED in an Exploration Licence

- Crown Land (if uncommitted).
- Crown Reserves if not proclaimed. Technically speaking these are still uncommitted Crown Land, and are known as 'notary' reserves.
- State Forest (if brought back under the *Mineral Resources Development Act 1995* after dedication of forest).
- Deferred Forest Land
- Land vested in electricity authorities. Access and work around lakes, dam sites and work areas must be agreed with the HEC and Transend.
- Private property.
- Conservation Areas (except the Central Plateau and Marble Hill Conservation Areas and any other conservation area not brought back under the MRDA after being proclaimed).


— TASMANIA —
AVAILABILITY OF LAND FOR EXPLORATION
0
50
100 km
ARTHUR
BEACONSFIELD
BALFOUR
NORTH EAST
MT READ
ZEEHAN/
WARATAH
CAPE
SORELL
WORLD
HERITAGE
AREA
ADAMSFIELD
SPZ boundary
High Quality Wilderness
Land unavailable
Land available for Exploration
and Mining Tenements
(conditions may apply)
Land tenure data courtesy Forestry Tasmania

- Protected Areas (if brought back under the *Mineral Resources Development Act 1995* after being proclaimed). Protected Areas will soon all become Conservation Areas.
- Forest Reserves (most Forest Reserves have been brought back under the *Mineral Resources Development Act 1995*).

LAND AVAILABLE FOR EXPLORATION — POST RFA

Proclamations which will be made in accordance with Section 2 of the *Regional Forest Agreement (Land Classification) Act 1998* will amend the *Forestry Act 1920*, the *Crown Lands Act 1976* and the *National Parks and Wildlife Act 1970*. Once these proclamations have been made the following will apply:

Land which will be EXCLUDED from Exploration licences

This will include:

- Some mining tenements, including mining leases, special exploration licences, exploration licences, and retention licences which were in lawful possession or marked out prior to the date of application.
- Land exempt from the provisions of the *Mineral Resources Development Act 1995,* such as 'Exempt Areas', which are declared usually to allow for geological assessment of a particular area by Mineral Resources Tasmania.
- Fossicking areas: the top two metres of land which is set aside as a Fossicking Area may be excluded. Land beneath this depth will be included.
- Land reserved under the *National Parks and Wildlife Act 1970,* such as;
  - State Reserves
  - National Parks
  - Historic Sites
  - Nature Reserves
  - Nature Recreation Areas
  - Game Reserves (includes former Muttonbird Reserves)
  - Conservation Areas (includes former wildlife sanctuaries; most Conservation Areas will be brought back under the *Mineral Resources Development Act 1995)*
- Land reserved under the *Aboriginal Relics Act 1975,* such as Protected Archaeological Sites, and lands listed in the *Aboriginal Lands Act 1995.*
- Public reserves under the *Crown Lands Act 1975,* such as cemeteries, Water Reserves, ballast pits, Quarry Reserves and Road Reserves.

Any of these public reserves may be brought back under the *Mineral Resources Development Act 1995* to allow for exploration if a sufficiently good case can be made. This is generally relatively straightforward when explorers require access to Crown gravel and quarry reserves and ballast pits, but is not common where the land has been set aside for conservation purposes. Any exploration which was permitted in any of these areas would have to be first approved by the Mineral Exploration Working Group.

- Commonwealth land, Telstra installations and land leased to the Commonwealth for military purposes such as the Buckland Military Training Area.
- Land formerly held around the lighthouses. While most of this land has been given back to the State, these areas are likely to be given reserve status which precludes mining.
- Ramsar sites (significant waterbird habitats) are usually excluded from licences.

Land categories which will be INCLUDED in an Exploration Licence:

- Crown Land (if uncommitted).
- Public Reserves if not proclaimed. Technically speaking these are still uncommitted Crown Land, and are known as 'notary' reserves.
- Public Reserves if brought back under the *Mineral Resources Development Act 1995.*
- State Forest (if brought back under the *Mineral Resources Development Act 1995* after dedication of forest).
- Forest Reserves (most Forest Reserves have been brought back under the *Mineral Resources Development Act 1995).*
- Land vested in electricity authorities. Access and work around lakes, dam sites and work areas must be agreed with relevant electricity authority.
- Private property.
- Conservation Areas (except the Central Plateau and Marble Hill Conservation Areas and any other conservation area not brought back under the *Mineral Resources Development Act* after being proclaimed).
- Regional Reserves.
- Nature Recreation Area (if brought back under the *Mineral Resources Development Act)*).
- Informal Reserve.

Regional Forest Agreement

A Regional Forest Agreement (RFA) is an agreement between the Commonwealth Government and a State or Territory Government concerning forest use and management. The Tasmanian and Commonwealth governments agreed to develop an RFA for Tasmania and worked towards achieving this during 1997.

The development of Regional Forest Agreements is a key element of the *National Forest Policy Statement* (NFPS) which, together with the policy framework presented in the *Wood and Paper Industry Strategy*, is a primary mechanism for implementing the National Forest Policy Statement.

The NFPS, agreed by the Commonwealth and all States and Territories, outlines forest management objectives and policies for Australia's public and private forests. It is the Governments' response to many years of divisive community debate about forest use and management and calls for a national approach to forest policy and decision making. In particular, the NFPS is a response to, and contains many elements from, recent work on forest issues in Australia including:

- the Ecologically Sustainable Development Working Group on Forest Use;
- the National Plantation Advisory Committee; and
- the Resource Assessment Commission Forest and Timber Inquiry.

The National Forest Policy Statement sets out broad goals for the ecologically sustainable management of Australia's forests and measures to ensure that the community will benefit from the full range of forest uses. The goals of the NFPS are to:

- establish a comprehensive, adequate and representative (CAR) forest reserve system which will protect biodiversity, old growth forest and wilderness values;
- provide for complementary management outside reserves in public native forests;
- promote the management of private forests in sympathy with nature conservation goals;
- develop an efficient, value adding, internationally competitive and ecologically sustainable wood products industry;
- provide for a range of other forest values including water supply, tourism and recreation in an ecologically sustainable management framework;
- co-ordinate decision making between the Commonwealth and the States and Territories;
- expand hardwood and softwood plantations; and
- provide assistance to communities faced with structural adjustments as a result of the implementation of these measures.

Tasmania signed the National Forest Policy Statement in April 1995 and following this the Tasmanian and Commonwealth governments signed a Statement of Intent on Forest Management. This included agreement to:

- sign a Scoping Agreement for the development of an RFA for Tasmania;
- undertake a study of old growth and wilderness values in forests;
- suspend harvesting in specified forest areas in the Picton, Huon and Weld areas of the Southern Forests until the old growth and wilderness assessment and all agreed actions arising from the study were implemented;
- undertake feasibility studies for domestic value-added processing opportunities and develop strategic options for increasing value adding in Tasmania as part of the economic and social assessment for an RFA;
- undertake feasibility studies for domestic value-added processing opportunities for existing forest resource export operations, and develop strategic options for increasing value adding; and
- subject to achievement of significant progress towards an RFA, the pulpwood volumes identified in the 1986 Memorandum of Understanding and the 1988 Heads of Agreement as surplus to domestic requirements and surplus to existing export licences being available for new value-added projects in Tasmania.

CAR RESERVES

In 1997 the Commonwealth and Tasmanian governments signed a Regional Forest Agreement (RFA), which agreed on the land to be available for sustainable wood production, access for other industry use and areas to be set aside for conservation purposes. The RFA is to last for twenty years.

The objectives of the RFA were to:

- protect environmental values in a world-class system of National Parks and other reserves;
- to expand the industries that rely on Tasmania's forests including wood products, tourism and minerals; and
- to manage the native forests in a sustainable way.

The conservation aims of the RFA were to protect:

- 15% of each forest ecosystem which existed in 1750;
- 60% of existing old-growth forest; and
- at least 90% of high quality wilderness.

Over 130 CAR areas were chosen for protection as a result of the studies associated with the RFA. Some of these areas were formerly identified as

Recommended Area for Protection (RAPs). Most of the CAR areas will remain open for mineral exploration. The CAR areas will be given a land status in accordance with State legislation. Some CAR areas will not be available for exploration.

Work programs involving work proposed in CAR reserves will be reviewed by the Mineral Exploration Working Group and conditions may be placed on various activities to ensure that the National Estate values of CAR reserves are protected.

NATIONAL ESTATE VALUES

The State has agreed to protect all National Estate values. These will be taken into consideration in setting appropriate conditions for work programs. The means by which the State intends to protect National Estate values can be found in Table 1 of the Regional Forest Agreement.

RFA CLAUSES RELEVANT TO EXPLORATION

79. The Parties recognise subject to clauses 80, 81 and 82 that mineral exploration and mining can occur in those specified parts of the CAR Reserve System which are identified in Attachment 6.

80. The State confirms that mineral exploration in areas covered by the CAR Reserve System will be subject to the Tasmanian Mineral Exploration Code of Practice and that all exploration proposals will be referred to the Mineral Exploration Working Group who will investigate the potential impact on CAR values and recommend appropriate conditions to protect those values.

81. The State will ensure that all proposed mining activities in areas covered by the CAR Reserve System will be subject to environmental impact assessment and environmental management conditions as required by the *Environment Management and Pollution Control Act* 1994 (Tas.), the *State Policies and Projects Act* 1993 (Tas.), and/or the *Mineral Resources Development Act* 1995 (Tas.).

82. The Parties agree that in relation to those parts of the CAR Reserve System with high quality wilderness values, as identified through the CRA, measures will be taken under State processes to minimise the effects of mineral exploration and mining activities on wilderness values. Rehabilitation of any exploration activity impacts and rehabilitation of any mine site will be in accordance with the provisions of the *Mineral Resources Development Act* 1995 (Tas.), and the *Environmental Management and Pollution Control Act* 1994 (Tas.) in so far as any permit conditions are relevant, and will aim both to achieve world's best practice and to return the site to its wilderness condition.

REGIONAL FOREST AGREEMENT (LAND CLASSIFICATION) ACT 1998

This Act will implement the Regional Forest Agreement between the Tasmanian and Commonwealth governments. The Act amends the *National Parks and Wildlife Act 1970*, the *Crown Lands Act 1976*, and the *Forestry Act 1920*. The Act provides for:

- Some CAR reserves to become Forest Reserves (which will still be subject to the *Mineral Resources Development Act* 1995);
- Some CAR reserves to become Conservation Areas (most of which will be subject to the MRDA);
- The establishment of a 'Regional Reserve' land classification, which will be subject to the MRDA. Three parcels of land will become Regional Reserves;
- All remaining Protected Areas to become Conservation Areas. The classification Protected Area will then be abolished.
- Management plans may be drawn up for any class of reserve, and management objectives have been set for each class of land. Mineral exploration will be permitted in Regional Reserves, Conservation Areas and Nature Recreation Areas, and in some Public Reserves.

The Minister for Mines will be consulted during the drafting of management plans for any parcel of reserved land (Conservation Area or Regional Reserve) which is subject to the *Mineral Resources Development Act 1995*.

Land classification in Tasmania — A guide for explorers

INTRODUCTION

The major Acts under which Crown Land may be reserved in Tasmania are:

- *National Parks and Wildlife Act 1970*
- *Aboriginal Relics Act 1975*
- *Aboriginal Lands Act 1995*
- *Crown Lands Act 1976*
- *Forestry Act 1920*
- *Mineral Resources Development Act 1995*
- *Regional Forest Agreement (Land Classification) Act* 1998

Under each of these Acts land may be excluded from the auspices of the *Mineral Resources Development Act 1995* (MRDA). In practical terms this means land excluded from the operation of the MRDA is not available for mining or exploration. In addition, Mineral Resources Tasmania (MRT) may enter into agreement with an Agency to exclude certain lands from mining tenements without this land being excluded formally from the MRDA. An example of this is the agreement between MRT and the Hydro-Electric Corporation whereby land vested in the HEC remains subject to the MRDA but certain parts (around dams etc.) are excluded from mining tenements.

Other examples are the agreement with the National Trust to exclude a National Trust Classified Historical Site at Derby from any mining tenement application and a similar arrangement with Forestry Tasmania relating to the Toolumbunner ochre mine near Mole Creek.

There are additional categories of land not covered by these Acts, such as private property and Commonwealth land.

Private Property

This is available for exploration, provided certain protocols are followed. Landowners may object to the issue of an Exploration Licence over their land and the objection will be heard by the Mining Tribunal. Having ownership of the land does not, in itself, constitute a reason for the Exploration Licence to be disallowed.

A private property bond is held by Mineral Resources Tasmania to ensure landowners are compensated for any damage not made good by the explorer.

Explorers must give landowners notice, in writing, fourteen days prior to entry on to the property.

Commonwealth Land

This is excluded from Exploration Licences. This includes, for example, Telstra installations and the Buckland Military Training Area.

SHAPE OF EXPLORATION LICENCES

One of the most confusing features relating to exploration licences is the fact that a licence, in plan, may **appear** to cover a certain patch of land. Exploration licences must be marked out on the AMG metric grid in square kilometres for ease of drafting. The plan may cover some 'excluded' ground which will be specified as such in the written licence document. Explorers are now provided with a small piece of chart showing exclusions, but these are not routinely charted on the MRT licence charts, as most charts are of a scale not suited to showing many small exclusions and these are best noted by description.

MINERAL RESOURCES DEVELOPMENT ACT 1995

Administered by: Mineral Resources Tasmania

On-ground Manager: Various

Existing Mining Tenements

Existing Mining Leases, Exploration Licences and Retention Licences are EXCLUDED from Exploration Licence applications where the existing tenements have been issued for the same minerals as the new application.

Exempt Areas

Areas may be declared 'Exempt' from the MRDA to allow MRT to carry out geological investigations. These are not generally available for exploration, but access for some work will be considered by MRT.

Licences over same area

Two Exploration Licences can be held over the same piece of ground for different minerals.

The applicant is provided with a piece of chart showing any exclusions, or areas of overlap with another licence.

Fossicking Areas

Fossicking Areas can be declared under the *Mineral Resources Development Act 1995*. These areas, which extend from the land surface to two metres depth, have been set aside for use by amateur fossickers. These areas are usually excluded from Exploration Licence applications. The explorer will be permitted to examine the area in the same way as are the fossickers. Surface access for drilling may be considered on a case-by-case basis. No mechanical excavation (trenching, costeaning) will be permitted.

Current fossicking areas are located at:

- Lune River;
- Coal Hill;
- Tunnel Marsh;
- Penguin:

- Colebrook Hill;
- Lord Brassey mine;
- Magnet mine;
- Weld River;
- Killiecrankie Bay;
- Weymouth;
- Gladstone.

A booklet is available from MRT describing these areas in detail.

NATIONAL PARKS & WILDLIFE ACT 1970 — Current situation (February 1999)

[Note that there will be changes to this act when various proclamations are made in accordance with the *Regional Forest Agreement (Land Classification) Act 1998*.]

Administered by: Department of Primary Industries, Water and Environment

On-ground Manager: Parks and Wildlife Service

Land may be reserved as either a State Reserve, a Conservation Area, or a Game Reserve.

State Reserves (SR)

Land having the status of State Reserve is exempt from the *Mineral Resources Development Act 1995* for all intents and purposes. Exploration and mining can only occur in a State Reserve if the activity is authorised in a management plan which has passed both Houses of Parliament. The exception to this is where a State Reserve is declared over an existing mining tenement.

State Reserves include land known as:

- State Reserve
- National Park
- Historic Site
- Nature Reserve
- Aboriginal Site

Where a State Reserve is declared over an existing tenement

There are a number of examples where a State Reserve has been declared over an existing mining tenement. In these cases the tenement holder retains a 'private right' under the *National Parks and Wildlife Act 1970*, which allows for the continuance of such rights and privileges as were in existence before the Reserve was declared. Examples of this are:

EL45/86 King Island

An extension to the Lavinia Nature Reserve was declared over part of this tenement in 1988. The licence holder was entitled to continue exploration under the same terms and conditions as were in force prior to the declaration of the Nature Reserve extension. However, mining could only proceed if this activity was provided for in a management plan. This licence has now expired.

RL8709, 8710, 8711 Douglas–Apsley

These retention licences pre-date the Douglas–Apsley National Park and are held for coal. The tenement holder retains the right to explore on these licences, and a procedure for the approval of exploration programs has been included in the management plan for this area.

Game Reserve (GR)

These are exempt from the provisions of the *Mineral Resources Development Act 1995*.

Conservation Areas (CA)

These are usually subject to the *Mineral Resources Development Act 1995*, although some are not. For example, the Central Plateau Conservation Area (CPCA) was declared over part of the Central Plateau Protected Area and the area of overlap is unavailable for exploration. The CPCA is included in the World Heritage Area.

In most cases exploration can proceed, under strict environmental guidelines. Proposed work programs for work in conservation areas (and other areas deemed to be sensitive) are sent to the Mineral Exploration Working Group for comment.

Conservation Areas include land known as:

- Conservation Area;
- Wildlife Sanctuary (WS): these are usually excluded from licences by agreement with the applicant. The Portland WS has a management plan which specifically prohibits exploration;
- Mutton Bird Reserve: also usually excluded from Exploration Licence applications by agreement with the applicant.

Post RFA Changes to the *National Parks and Wildlife Act 1970*

The *National Parks and Wildlife Act 1970* will be amended when proclamations are made in accordance with the *Regional Forest Agreement (Land Classification) Act 1998*.

The changes will result in the Governor, by proclamation, declaring land to be reserved as:

- National Park
- State Reserve
- Nature Reserve
- Game Reserve
- Conservation Area
- Nature Recreation Area
- Regional Reserve
- Historic Site

Aboriginal sites will be known as Aboriginal Reserves.

Private land may be reserved as:

- Private Sanctuary
- Private Nature Reserve

Land reserved as Regional Reserve, Conservation Area or Nature Recreation Area will be available for mineral exploration and mining.

ABORIGINAL RELICS ACT 1976

Administered by: Department of Primary Industries, Water and Environment

On-ground Manager: Parks and Wildlife Service

Land reserved under this Act as Protected Archaeological Sites is removed from the auspices of the *Mineral Resources Development Act 1995* and is not included in mining tenements.

ABORIGINAL LANDS ACT 1995

Under this Act parcels of land may be given to the Aboriginal community. An Aboriginal Council manages such lands. Mining leases, exploration and retention licences cannot be granted over such lands without the agreement of the Council.

CROWN LANDS ACT 1976 — Current situation (February 1999)

[Note that there will be changes to this act when proclamations are made in accordance with the *Regional Forest Agreement (Land Classification) Act 1998*.]

Administered by: Department of Primary Industries, Water and Environment

On-ground Manager: Parks and Wildlife Service

Land is reserved under this Act for a multitude of purposes; some categories are exempt from the MRDA whilst others are not.

Public and municipal reserves declared under this Act are **exempt** from the *Mineral Resources Development Act 1995* unless they are specifically 'brought back' under the auspices of the Act, either at the time of reservation or later on. For any of these reserves to be 'brought back' under the *Mineral Resources Development Act 1995* the explorer will have to present a convincing case as to why the ground is required.

The Act is **administered** by the Department of Primary Industries, Water and Environment with all on-ground management being done by the staff of the Parks and Wildlife Service. Land reserved under the Crown Lands Act and **EXCLUDED** from exploration licences is as follows:

- State Recreation Areas
- Coastal Reserves
- River Reserves
- Lakeside Reserves
- Some roadways (such as highways)
- Crown Reserves for conservation purposes, e.g. Mt Nelson Signal Station and Truganinni Reserve, etc.
- Crown Reserves such as cemeteries
- Crown Reserves for construction materials and water (e.g. Crown ballast pits, quarry reserves, water reserves, etc.)
- Protected Area. Protected areas are exempt when first declared; if not brought back under the Act the land remains excluded from an Exploration Licence.

In many areas strips of land along the margins of rivers and lakes and on coastlines have been reserved by the Crown, so as to retain access to the foreshore, beach, lake or river. On old charts these strips of land, commonly one chain (20.1 m) or one hundred feet (30.5 m) wide, are shown as 'Crown Reservations'. These are subject to the auspices of the *Mineral Resources Development Act 1995*.

On modern maps some of these areas are shown as 'Coastal Reserves' and in some cases (e.g. Ocean Beach) signs have been erected stating 'Coastal Reserve', although the land does not, in all cases, have any formal reserve status. Reserves can only exist officially if gazetted or established under existing legislation or regulations; otherwise these are known as 'notary' reserves, and are included in land available for exploration.

Coastal reserves can be established by proclamation or by Crown Land Order under the *Crown Lands Act 1976* and also by S473A of the *Local Government Act 1962*, which requires land to be set aside for public use when subdivisions are created.

Formal public reserves created by these means are exempt from the provisions of the *Mineral Resources Development Act* 1995 for a depth of 15 metres. Where coastal areas are included in Exploration Licence applications Mineral Resources Tasmania has an informal agreement with the Department of Primary Industries, Water and Environment that access to these areas will be subject to that Department's approval. This is noted on licence documentation. In addition, where coastal land is being managed for conservation purposes (e.g. bird nesting sites, penguin habitats, etc.) but there is no formal reserve, parts may still be excluded from applications.

Land generally **INCLUDED** in Exploration Licences under the *Crown Lands Act 1976* comprises:

- unallocated Crown Land;
- Protected Area (provided it has been brought back under the Act) e.g. the Arthur Pieman Protected Area, Waterhouse Protected Area, part of Central Plateau Protected Area not overlapped by Central Plateau Conservation Area.

Post RFA Changes to Crown Lands Act 1976

- All existing Protected Areas will become Conservation Areas.
- All existing State Recreation Areas will become Nature Recreation Areas. Those State Recreation Areas which were subject to the *Mineral Resources Development Act 1995* will remain so.
- Most Coastal Reserves will become Conservation Areas.
- Crown Reserves set aside for various purposes will become Public Reserves.

PUBLIC LAND (ADMINISTRATION AND FORESTS) ACT 1991;

This act was made redundant by the *Regional Forest Agreement (Land Classification) Act 1998*.

FORESTRY ACT 1920

Administered by: Forestry Tasmania

On-ground Manager: Forestry Tasmania

Most land managed by Forestry Tasmania is available for exploration.

State Forest

This is included in Exploration Licences. Most State Forest is Crown Land dedicated as State Forest, but Forestry Tasmania does purchase land and has this dedicated as State Forest. These are, in effect, private property blocks owned by Forestry Tasmania.

Timber Reserves

This land classification has been abolished.

Forest Reserves

These are set aside for conservation or recreational purposes and when declared are exempt from the *Mineral Resources Development Act 1995*. Most Forest Reserves have now been brought back under the Act.

Multiple Use Forest Land

This is land available for exploration.

Deferred Forest Land

All land which was previously on the Register of Deferred Forest has either been classed as a CAR Reserve or removed from the register. This category of land no longer exists.

Management Decision Classification System

Forestry Tasmania employs a Management Decision Classification System (MDCS) as a management tool. Areas requiring careful management (such as river banks, scarps, patches of particular habitat, vegetation and so on) may be flagged by this system.

RAPs (Recommended Areas for Protection)

These were areas of either State Forest or unallocated Crown Land chosen as representative areas of different forest communities. Some RAPs were within existing Conservation Areas. The majority of the RAPs have been classed as either Conservation Area or Forest Reserve and are available for exploration.

A small number of RAPs became State Reserves, and are off limits to exploration.

HYDRO-ELECTRIC CORPORATION ACT 1995

Administered by: Hydro-Electric Corporation

On-ground Manager: Hydro-Electric Corporation, Aurora and Transend

The former Hydro-Electric Corporation has now been split into three organisations; Aurora, Transend and the HEC.

Aurora is responsible for electricity distribution, and mainly owns small depots, shops, small substations and some corridors of land beneath distribution lines. Land owned by Aurora is mainly in urban areas and generally would not be affected by mineral exploration.

Transend is responsible for transmission line easements and large substations. Exploration would not be permitted on land adjacent to substations but on occasions access will be needed beneath transmission lines. This will be done in consultation with the HEC and Transend.

The HEC is responsible for all other land including lakes, dams, power station sites, and land alongside canals and some waterways.

Most land vested in the HEC is subject to the *Mineral Resources Development Act 1995*. However, exploration works proposed for areas around dams and transmission lines will require approval from the HEC, Aurora or Transend. Exploration activities which will not affect dam structures, etc. will be permitted.

MINING (STRATEGIC PROSPECTIVITY ZONES) ACT 1992

Administered by: Mineral Resources Tasmania

Under this act the status of large parcels of Crown Land within designated Strategic Prospectivity Zones may not be changed without the approval of both houses of Parliament. Should a change in land status made by the State have the effect of revoking a Mining Lease or an Exploration Licence, the tenement holder is entitled to compensation. The State is, however, not responsible for actions of the Federal Government which may result in changes in land status, such as the nomination of World Heritage Areas.

The status of parcels of land less than 500 ha in area can be changed with the agreement of Mineral Resources Tasmania. Some land, such as residential land around towns, is exempt from this Act.

Changes in status of land can also be made in extreme circumstances, for example if a species of flora or fauna was to become rare, vulnerable or endangered as a result of mining activity, or where an area having cultural or natural heritage value could suffer

substantial effects as a result of mining operations. In these cases the Crown may, after a recommendation from the Resource Planning and Development Commission and some Ministers, change the status of that piece of land, and compensation is payable for this action.

WORLD HERITAGE

Land classed as 'World Heritage' is done so by the Commonwealth Government using the *World Heritage Properties Conservation Act 1975*. This is not a land use, as such. Most of the land classed as World Heritage in Tasmania is also National Park, and so is not open for exploration.

The World Heritage area also covers three Forest Reserves and three Conservation Areas.

The Forest Reserves are:

- Liffey Forest Reserve
- Drys Bluff Forest Reserve
- Meander Forest Reserve

These Forest Reserves have Management Plans which confirm that these areas are not available for exploration and mining and will not be brought back under the *Mineral Resources Development Act 1995*.

The three Conservation Areas are:

- *Marble Hill Conservation Area:* over the former Bender's limestone quarry at Lune River. Operations at this quarry were terminated by the Commonwealth Government.
- *Adamsfield Conservation Area*: Exploration is allowed. Exploration works are assessed by the Parks and Wildlife Service and Mineral Resources Tasmania, and if the planned work is extensive the proposal will be referred by Parks and Wildlife to the WHA Standing Committee and possibly to the WHA Ministerial Council.
- *Central Plateau Conservation Area*: this covers part of the Central Plateau Protected Area, and is not available for exploration.

The Commonwealth Government has a significant input into the management of the WHA and provides funds for this purpose. Any area can, theoretically, be proclaimed a 'property' to which Section 9 of the *World Heritage Properties Conservation Act 1975* applies. The application of 'Section 9' would require that "except with the consent in writing of the (Federal) Minister it is unlawful ... to carry out operations for, or for exploratory drilling in connection with the recovery of minerals on any property to which this section applies". If this happens, the Commonwealth is not legally obliged to compensate the explorer/developer. However, compensation was eventually paid to the lessee of Benders Quarry which was closed by the Commonwealth using these powers.

National Estate — An Explanation

As there continues to be confusion between the terms 'National Estate', 'World Heritage' and 'National Park', an explanation of what National Estate actually means is given below. The Australian Heritage Commission maintains a 'Register of the National Estate'. There are three classes of entries in the Register: nominations, interim listings and registered entries. 'Nominations' are entries of areas nominated for the Register, as outlined by the person nominating the entry. 'Interim Listings' are nominations which are currently being considered, and 'Registered Entries' are those nominations which have been assessed and accepted onto the Register.

HOW PLACES ARE REGISTERED

Anyone can nominate a place or item to be considered for registration. Each nomination is assessed by Commission staff, who may refer the nomination for comment to expert panels, government agencies, or voluntary expert bodies. The final decision on what is placed on the Register is made by the Commission. In deciding whether or not a nomination will be accepted, the Commission examines only the significance of the place in National Estate terms. Issues such as current or planned use, management, or ownership of the place are not considered.

Once the Commission has accepted a nomination, this is advertised by notices in the press and in the *Commonwealth Gazette*. Anyone may lodge an objection to that proposal within three months of publication of the notice.

The Heritage Commission is required to give 'due consideration' to any objections received. If the significance of the place is brought into question, an independent expert or body will be engaged to assess the information. Objectors are given an opportunity to state their case to these experts, and to examine and comment upon the assessor's report. The Commission considers all this information before making a final decision.

EFFECTS OF REGISTRATION

The Register has a direct protective role in relation to actions proposed by the **Commonwealth** which might adversely affect the National Estate. In the light of the State–Commonwealth Regional Forest Agreement, Tasmania has agreed to protect National Estate values throughout the State by the establishment of a CAR (Comprehensive Adequate and Representative)

Reserve system and other legislated protection mechanisms, and within State Forest by statutory management plans and active management.

There are no direct legal constraints on owners of private property caused by the entry of that property in the Register of the National Estate. Thus the Commission has limited power to direct private owners with respect to their actions that might affect a place in the Register. The Commission may not acquire property entered in the Register.

The entry of a place on the Register does not automatically entitle the public access to that place.

The Act requires that Commonwealth Ministers, and Commonwealth Authorities must "ensure that their own actions and those of their departments and authorities do not adversely affect the National Estate values of places in the Register unless there are no feasible and prudent alternatives and, if there are no such alternatives, unless all reasonable measures are taken to minimise the effect. The Minister's actions to achieve these ends must be consistent with any relevant laws."

Before a Minister, department or authority takes any action that might significantly affect the national estate value of a place in the Register, they must inform the Commission and give a reasonable opportunity for consideration of the proposed action. The statement of significance for each place in the Register provides the basis for the Commission's conservation advice to Commonwealth Ministers and bodies.

The State must also protect National Estate values and these values must be considered before approving any activity in these reserves. Table 1 of the Regional Forest Agreement lists the various measures by which National Estate values on public land are to be protected.

PURPOSE OF THE REGISTER

- To provide a comprehensive list of all places in Australia which have heritage value.
- To educate Australians, by means of this list, about the natural and cultural history of their country.
- To give all decision-makers, inside and outside government, objective information to help them make better decisions.
- To ensure as far as possible that Commonwealth decisions and actions related to listed places are taken as thoughtfully and carefully as possible.

The Commission's functions as listed in the Act, and the provisions of Section 30 of the Act, make it quite clear that the Commission's only decisive powers relate to the entry of places in the Register of the National Estate. Other functions of the Commission are advisory, educational or research oriented.

Effect on Exploration

Mineral Resources Tasmania keeps an up-to-date record of all National Estate nominations, interim listings and registered entries. Overlap with any interim listings or registered entries is recorded on each Exploration Licence application. In approving exploration works MRT is mindful of the reasons given for any listing, and conditions placed on work may reflect the need for care in/on a particular site. Exploration proposed in CAR areas will be carefully assessed and the likely impact (if any) on National Estate values will be taken into account in the approval process. The fact that a place is listed does not in any way delay the assessment of exploration proposals.

Gaining Approvals for Exploration

APPLICATIONS

When submitting an application, or a renewal for an Exploration Licence, the applicant is asked to supply Environmental Impact Information (on the green EII forms provided) and an outline of the proposed work program.

All Exploration Licence applications are circulated to the Department of Primary Industries, Water and Environment and the relevant land management agency for information and comment. Agencies can flag areas likely to be of interest should activities involving ground disturbance be proposed.

Quite often, the applicant will only have a conceptual plan of the exploration proposed, with actual details of the programs still to be worked out.

WORK PROGRAM

When the details are known, and plans are available of where grids are required, which access is to be used, which targets are to be drilled, etc., the explorer should send in either a completed EII work program (pink) form or a letter outlining the proposed program. A legible piece of chart at a suitable scale showing the location of the proposed activity must be included. The following details are required:

- Project supervisor and contact details;
- Land status of area of proposed works;
- Description of proposed works (attach a legible map). Location of works should be related to AMG, not arbitrary datum. Preferably use plans at 1:25 000 scale.
- Present land use of area of proposed works;
- **Soils**: Describe types (e.g. organic, mineral, sandy, clayey) of soils to be disturbed by any proposed earthmoving operations (such as tracks, pits, costeans, drill sites, etc.);
- **Flora**: Describe vegetation which will be affected by proposed operation (rainforest, wet eucalypt, dry eucalypt, light scrub, coastal heath, coastal scrub, wetlands, buttongrass plains, alpine vegetation);
- **Fauna**: Any known rare or threatened species or significant populations or wildlife within area of proposed works;
- **Historical**: Any sites of historic or archaeological significance in area of proposed works;
- **Equipment**: List of all mechanical equipment/ vehicles to be taken on site, and their proposed use.
- **Accommodation and staff numbers**: Number in team, period of project, accommodation type (hotel, hut, tents);
- **Hazardous materials:** Quantities of flammable liquids, explosives and noxious chemicals on site;
- **Environmental impacts:** program features likely to affect the environment, timing of the work and precautions taken to limit impact (noise, erosion, waste disposal, water pollution, fire, etc.). Include significant visual impacts, pollution of water courses from tracks, earthworks or drilling, and disposal of waste, litter, toilet refuse, etc.;
- **Rehabilitation:** proposed methods and extent of land rehabilitation to be completed progressively and prior to abandonment.

On receipt of a work program MRT checks the following:

- Land status (to ensure activity is on land included within the Exploration Licence and is not on a Mining Lease, or a reserve category which is excluded from the licence);
- Reserve proposals (CAR reserves, any other proposed reserves);
- National Estate listings;
- Wilderness Index;
- Geoconservation site register;
- Vegetation type (rainforest/Huon Pine/King Billy/ Heath);
- Ramsar sites (protected by the Convention on Wetlands of International Importance, especially Wildfowls Habitat as agreed at Ramsar, Iran in 1971, to which Australia is a signatory);
- Archaeologically interesting areas or sites, including mining heritage sites;
- Any other significant features which have been flagged at the application stage:
  - populations of rare plants or animals;
  - forestry plantations, grazing leases, forest licences;
  - licences from the Department of Primary Industries, Water and Environment for any purpose.
- The land manager (FT/PWS) may provide advice on:
  - threatened species;
  - Aboriginal archaeological sites and any other archaeological sites;
  - geoconservation matters; and
  - any other relevant management issues.

Mineral Resources Tasmania frequently produces maps showing the areas of environmental concern in relation to the proposed works. These maps are given to the explorer to enable compliance with conditions relating to the work.

INSPECTIONS

Virtually no earthworks (except repairs or minor extensions to a currently used track) are approved until a site inspection has been made of the location. Inspections are difficult to arrange at short notice. Please submit your plans which may require field inspections at least three weeks prior to your planned starting date, whenever possible.

Following the field inspection, which is often made jointly with field officers from other departments, approval is given in writing stating the conditions under which the work is to be done. A copy of these conditions is provided to the relevant District Forester, if the area is in State Forest, or other relevant land manager. Conditions of individual exploration activities are made available to persons having a bona fide interest in the work.

CONDITIONS

Conditions on all Exploration Licence activities are imposed in effect by the Minister for Mines. The paperwork is done by Mineral Resources Tasmania as an administrative arrangement.

VARIATIONS TO THE PROGRAM

The requirements of the explorer may vary as the exploration program progresses and results come to hand, and as variations to the initial program are desired. The very nature of exploration means that an entire program usually cannot be planned in detail, later work being dependent upon the results of the first phase of exploration activity.

Variations to the approved exploration program which are likely to have environmental impact, such as re-siting of drill holes or test pits, should be submitted to the Director of Mines, who will obtain approval for the variations from the appropriate land management authority.

FIELD STAFF

All licence holders must ensure that field officers are fully cognisant with the approved program and any variations, together with all conditions and schedules applying to the licence. However, the licence holder remains responsible and liable for any rehabilitation and other works required to restore areas.

REHABILITATION

Bonds are held on Exploration Licences and Mining Leases to ensure compliance with environmental and rehabilitation obligations. Bonds are not returned until rehabilitation is satisfactory. Bonds will be at least commensurate with the cost of any restoration work which is likely to be necessary.

CODE OF PRACTICE

All exploration activities will abide by the *Mineral Exploration Code of Practice*, and to any additional conditions imposed on the work.

APPEAL

Explorers can appeal against any work condition considered unreasonable by submitting an appeal, in writing, to the Minister within 14 days of receipt of the approval. Mineral Resources Tasmania is not a land management agency and the concerns of the relevant land managers must be accommodated in the formulation of appropriate conditions.

Frequent field inspections are made during the program, and on completion, to ascertain any rehabilitation requirements. Bonds are held until any rehabilitation required is completed to the satisfaction of Mineral Resources Tasmania and the relevant land manager.

ACCESS TO PRIVATE LAND

Explorers wishing to explore on, or use access through private land, should contact the landowner and discuss their exploration plans well in advance of the program commencement date. The *Mineral Resources Development Act 1995* requires that the owner or occupier of the land be given 14 days notice in writing, stating that work is to commence. Explorers should take special pains to contact the landowner and discuss plans on a personal basis before sending, or delivering, the formal notice.

Mineral Exploration Working Group

PURPOSE

Matters relating to mining and exploration in other sensitive areas will be referred to an interdepartmental committee, the Mineral Exploration Working Group (MEWG), for consideration.

The function of the committee is to investigate the impact that any works may have on the historical, archaeological, botanical, zoological, ecological or geoheritage significance of the place, and if need be advise Mineral Resources Tasmania of conditions to be placed on the activities so that these values are not permanently adversely affected.

MEMBERSHIP

Membership comprises representatives from Mineral Resources Tasmania, the Department of Primary Industries, Water and Environment (Parks and Wildlife Service, and Environment and Planning Division), and Forestry Tasmania.

AIM OF MEWG

The MEWG may request that studies (archaeological, historical, botanical, etc.) be carried out prior to the work to properly assess the impact of the proposed activities.

Explorers working in such areas may be required to engage a specialist to advise the field crews on field techniques, such as recognition of artefacts and rare species.

Some activities may only be permitted in a modified form; for example access during the early stages of a project may be allowed by helicopter, but not by construction of a track, or other earthworks.

The fundamental purpose of the MEWG is to allow the aims of the explorer to be met without compromising the conservation, historical, cultural or other natural values of the area.

APPLICATIONS AND WORK PROGRAMS

Exploration Licence applications are to be accompanied by a brief outline of the type of work expected to be done if the licence is granted. However explorers are not required, at the application stage, to have a detailed plan of works. Work programs are therefore independent from applications.

As soon as the exact locations of any proposed grids, drill holes, tracks, costeans or any other works liable to result in environmental disturbance have been decided, the applicant must forward to Mineral Resources Tasmania a detailed work program, with locations marked on a legible map of suitable scale, for approval.

Exploration work programs involving work in sensitive areas will be referred to the MEWG for comment. In Conservation and Protected Areas, Coastal Areas and some reserves brought back under the *Mineral Resources Development Act 1995*, all proposed programs, including those involving only low impact reconnaissance work, will be sent for comment. In other areas only those proposals involving significant ground disturbance or earthworks (such as extensive gridding, drill pad or track construction) will be circulated. Work is not to commence until the program has been approved in writing.

Mining lease applications in conservation and other sensitive areas will be sent to the MEWG for comment.

AREAS TO WHICH THESE GUIDELINES APPLY

Conservation Area	*All work*
Protected Area (will soon become Conservation Area)	*All work*
Reserves brought back under the *Mineral Resources Development Act 1995* e.g. Forest Reserves	*All work*
Coastal Area (most but not all will soon become Conservation Area)	*All work*
Rehabilitation areas (e.g. Greening Australia Project Area, South Mt Cameron)	*Ground disturbance*
CAR (Comprehensive, Adequate, Representative) areas arising from the Regional Forest Agreement	*All work*
Any other area* for which significant, natural or cultural features are recorded	*Ground disturbance*

* These areas include:

- ☐ wilderness values;
- ☐ wild rivers and undisturbed catchments;
- ☐ scenic landscapes;
- ☐ remnant vegetation;
- ☐ rare or threatened habitats/communities;
- ☐ areas of highly endemic flora/fauna;
- ☐ wetlands;
- ☐ Ramsar (wildfowl habitat) sites;
- ☐ teaching or research sites, type localities, fossil sites etc.

Protection of Historic Cultural Heritage

Consideration should be given to having a study made of an area where earthworks are planned:

- within one kilometre of high water mark;
- within 50 m of streams, waterways, marshes or lakes;
- within 250 m of historic industrial sites, such as old mine workings or timber mills and associated housing and infrastructure sites;
- along old tramways;
- in regions known to be 'archaeologically rich'.

In some circumstances an explorer may be asked to undertake an archaeological survey prior to work being approved.

Abandoned machinery and equipment

Under the provisions of the *Mineral Resources Development Act 1995*, abandoned mining machinery belongs to the Crown. When working around an old mine every effort should be made to leave such machinery as it is, where it is. Under no circumstances should such items be bulldozed 'out of the way'.

Pieces of old 'machinery' should not be 'souvenired' by workers or visitors to the site. The remains of old machinery can give a valuable insight into the history of working a deposit, and every effort should be made to have such relics left as they are found. The inclination to 'rebuild' or 'reconstruct' machinery by cannibalising parts from a number of sites should be resisted. Machinery should not be moved simply to be in a place which is more convenient for visitors to view.

In re-opening an old site, the explorer should not gather into a central heap pieces of equipment such as skips, pulley wheels, stamper shafts, chains and so on. Leave items where they are — undisturbed.

Similarly, such items must not be 'tidied up' and buried just to improve the aesthetic appearance of a site.

Protection of Aboriginal Heritage

All Tasmanians are bound by the provisions of the *Aboriginal Relics Act 1975*, which is currently being reviewed. Sections from this Act which are of particular note to explorers are listed below.

2—(3) For the purposes of this Act, but subject to the following provisions of this section, a relic is —

(a) any artefact, painting, carving, engraving, arrangement of stones, midden or other object made or created by any of the original inhabitants of Australia or the descendants of any such inhabitants;

(b) any object, site, or place that bears signs of the activities of any such original inhabitants or their descendants; or

(c) the remains of the body of such an original inhabitant or of a descendant of such an inhabitant who died before the year 1876 that are not interred in—

(i) any land that is or has been, set aside, reserved, or used for the purposes of a burial-ground or cemetery pursuant to any Act, deed, or other instrument; or

(ii) a marked grave in any other land.

14—(1) Except as otherwise provided in this Act, no person shall, otherwise than in accordance with the terms of a permit granted by the Minister on the recommendation of the Director—

(a) destroy, damage, deface, conceal, or otherwise interfere with a relic;

(b) make a copy or replica of a carving or engraving that is a relic by rubbing, tracing, casting, or other means that involve direct contact with the carving or engraving;

(c) remove a relic from the place where it is found or abandoned;

(d) sell or offer or expose for sale, exchange, or otherwise dispose of a relic or any other object that so nearly resembles a relic as to be likely to deceive or be capable of being mistaken for a relic;

(e) take a relic, or cause or permit a relic to be taken, out of this State; or

(f) cause an excavation to be made or any other work to be carried out on Crown land for the purpose of searching for a relic.

20 A person who is guilty of an offence against this Act for which no other penalty is expressly provided elsewhere in this Act is liable to a penalty of $500 or 6 months imprisonment, or to both such fine and imprisonment.

ADMINISTRATION OF ACT

The Director of the National Parks and Wildlife Service is responsible for administering the *Aboriginal Relics Act 1975* and a contact for Aboriginal heritage matters is:

Manager
Aboriginal Heritage Unit
Parks and Wildlife Service
Telephone: 6233 3927

ARCHEOLOGICAL POTENTIAL ZONING SYSTEM

A map-based system which indicates the likelihood of finding Aboriginal sites is used by Forestry Tasmania for State Forest. Forestry Tasmania can advise Mineral Resources Tasmania of the potential sensitivity of an area and assists in formulating appropriate work conditions.

Biodiversity

In 1993 the Commonwealth and State Governments signed a National Strategy for the Conservation of Australia's Biological Diversity. The National Strategy is meant to be a blueprint for the ecologically sustainable management and use of Australia's natural resources. Since 1993, governments have progressively implemented the actions outlined in the National Strategy, some funded by the $13 million Commonwealth Biodiversity Conservation Plan. Tasmania has enacted the *Threatened Species Protection Act 1995* which outlines measures to protect the State's rare, vulnerable and endangered species.

MRT liaises with the relevant land manager on receipt of a work program. If the proposed work is near any population of rare or endangered species then site-specific conditions are formulated in conjunction with the land manager. On occasions the explorer may be required to employ a specialist to assist in siting works.

Wilderness

The distribution of wilderness values as used in the Regional Forest Agreement is shown in the accompanying map (see page 17). Values of 12+ represent 'high wilderness quality'. Exploration proposals in such areas will be referred to the Mineral Exploration Working Group and conditions may be placed on activities to ensure that values in such areas are not permanently adversely affected by such work.

In wilderness areas MRT will aim to ensure that:

- The disturbance is kept to a minimum;
- The disturbance can be reversed by rehabilitation.

Geological Heritage

The range of earth features, including bedrock, soil and landforms, together with earth processes, make up our geological heritage. Sites of special significance have been called 'geological monuments'. In recent times the term 'geodiversity' has been used to describe the complete range of earth features and processes.

Mineral Resources Tasmania has contributed to the Tasmanian database which lists sites of geoheritage significance. The database will be used to identify sites of significance during the Exploration Licence approval process. This will result in the implementation of appropriate management strategies. In most cases the identified values are robust and large scale, with minimum intervention required. Where vulnerable small-scale features (such as mound springs) are present management prescriptions could involve protection by avoiding ground disturbance in close proximity to the site.

Details on the potential impact of various activities (such as specimen collection, fire, earth disturbance and so on) can be found in the *Conservation and Management Guidelines for Geodiversity* by Dixon, Sharples, Household, Pemberton and Eberhard (Report to the Tasmanian RFA Environment and Heritage Technical Committee, April 1997).

Ownership of Minerals

Whilst the Crown retains the ownership of minerals found on most of the private land in Tasmania, there are, nevertheless, some exceptions to this. Prior to 1890 the rights to coal and metallic minerals, excluding gold and silver, were usually given with the land being granted, and subsequent sales of the original land grant have not altered these rights. From 1893 the rights to various ores and metals were reserved to the Crown, but as the wording of grants varied from grant to grant until around 1910, the only real way of ascertaining mineral ownership is to search for the original terms of the land grant. Some landowners have rights to all minerals in the top 50 feet of the land surface, others have rights to all minerals excepting gold and silver, and others have only rights to soil and stone. The terms of the original grant may also be altered by subsequent legislation; in Tasmania the rights to petroleum and atomic substances were resumed by the Crown in 1962.

Community Consultation

Exploration Licence applications are advertised in major the Tasmanian newspapers. Explorers are requested to provide a summary of their proposed exploration program which can be given to anyone interested in their application and proposed work program.

If objections are received the Registrar of Mines will convene a meeting between the applicant and objector in an effort to resolve the matters of concern. If the matter cannot be resolved the objection is determined by the Mining Tribunal.

Explorers are obliged to observe statutory provisions relating to exploration on private land. In addition to these provisions, explorers are encouraged to enter into open dialogue with landowners and relevant community groups.

Mineral Exploration Code of Practice — Statutory Requirements

The following schedules outline the statutory requirements of the holders of exploration licences. Schedules A, B and D are automatically attached to every exploration licence issued under the *Mineral Resources Development Act 1995*.

SCHEDULE 'A' (Revised February 1999)

Conditions of Exploration Licences under the *Mineral Resources Development Act 1995*

Operational:

1. The licensee shall conduct operations so as not to disturb the environment except in so far as this may be necessary to undertake the program of exploration required by this licence.

   Specific written approval is required from Mineral Resources Tasmania for any of the following activities:

   - All track construction, repair or restoration whether or not the activity includes moving earth and cutting vegetation, including 'one pass' traverses off formed roads by either tracked or wheeled vehicles.
   - All drilling activity, whether or not drill pad construction, involving stripping to bare earth, clearing or flattening of vegetation, is required.
   - Helipad construction.
   - All costeaning and pitting.
   - Augering by either hand or machine.
   - All cutting of grids.
   - Any stream-sediment sampling.
   - Any movement of heavy machinery, either wheeled (cranes, rigs and trucks etc.) or tracked (dozers, excavators, backhoes, traxcavators, rigs, bombardiers etc.) on to a licence. This may include access through other licences.

   Conditions imposed on such works must be strictly observed.

2. Proposed programs should be submitted at least two weeks before work is planned to commence to allow time for field inspections to be arranged if required.

   Mineral Resources Tasmania will contact other Government agencies and/or electricity authorities as required to seek their advice in order to set conditions on a site-specific basis.

   Work programs must not be sent to other agencies other than via Mineral Resources Tasmania.

3. Work is to be planned to avoid, insofar as practicable, the need to construct tracks and drill pads in wet weather.

4. On the completion of exploration, all works (tracks, helipads, drill pads, costeans etc.) are to be rehabilitated to the satisfaction of the Director of Mines.

5. The licensee shall observe the provisions of Sections 117–122 of the *Mineral Resources Development Act 1995*, with regard to notification of bore holes, preservation of core and disposal thereof.

6. At the termination of the licence, or at any time at the option of the licensee, all drill core and samples required by the Director of Mines shall be delivered in core boxes 1000 millimetres long and either 400 or 200 millimetres wide to the Department's Core Store at Mornington at the cost of the licensee, unless the Director of Mines notifies the licensee in writing that such core or samples are not required. Where companies are still using stocks of old core boxes (1050 470 mm for example) these will be accepted by the Department.

7. The licensee shall observe any instructions which may be given by the Director of Mines with a view of minimising or preventing damage to public or private property, and conform to the provisions of the *Mineral Exploration Code of Practice*, as revised from time to time, for all operations.

8. The licensee shall not light any fires without the approval of the State Fire Commission or the relevant District Forester when in State Forest. When on land reserved under the *National Parks and Wildlife Act 1970* or the *Crown Lands Act 1976*, the approval of the Secretary of Parks and Wildlife Service is required. Precautions are to be taken with fuel storage to minimise the risk of fire. The licensee, agent and/or employees during exploration activities shall be responsible for the immediate suppression of non-permit fires arising from those activities.

9. The licensee shall notify the relevant District Forester of Forestry Tasmania before entering on a State Forest and shall comply with the reasonable requirements of such officer in operations in any such State Forest. Any commercial forest produce which is cut down (with approval) during exploration must either be paid for at current rates or removed for salvage, and any such activities must be done in accordance with the *Forest Practice Code*.

   The licensee shall allow unhindered access for forestry operations and Forestry Tasmania officers during work in State Forest.

10. The licensee shall notify the relevant Parks and Wildlife Service Ranger or Property Officer before work commences in land reserved under either the *National Parks & Wildlife Service Act 1970* or the *Crown Land Act 1976* (where such lands have been brought back under the *Mineral Resources Development Act 1995*).

Schedule A (continued)

11. Where any Aboriginal artefacts or objects of historic interest are discovered, operations shall be conducted so as not to damage or interfere with such site or object, and the licensee shall report details of such discovery to the Secretary, Parks and Wildlife Service and shall otherwise observe the provisions of the *Aboriginal Relics Act 1975*.

    There may be a requirement for archaeological inspections to be conducted prior to approval for works being granted in some areas.

12. The licensee shall not interfere in any way with native fauna or bird life.

13. Where investigations are to be undertaken in sensitive areas (such as coastal areas, Conservation or Protected areas) all exploration proposals must first be assessed by the Mineral Exploration Working Group.

14. All waste, rubbish and other materials produced or used during the exploration and related works are to be removed from the licence area or, if approval is so granted, buried on site.

15. All licence holders must ensure that field officers are fully aware of all conditions and schedules applying to the licence. A copy of the licence is provided by Mineral Resources Tasmania for this purpose.

16. The Minister reserves the right to suspend operations immediately if weather conditions and/or the operation are causing unnecessary damage to roadways and tracks.

Reporting:

1. An interim report must be lodged quarterly with the Director of Mines, Hobart (i.e. 31 March, 30 June, 30 September and 31 December).

2. This statement shall include a statement of expenditure and a brief progress report of operations. The interim report shall be lodged within 14 days of the above due dates.

3. The licensee shall furnish the Director of Mines, Hobart, with an Annual Report detailing all investigations undertaken during the term of the licence **one month** prior to the licence renewal date. This shall include detailed reports, plans, sections, analyses, metallurgical investigations and feasibility and other studies. All plans must include transparencies unless the Director of Mines advises in writing that such are not required.

4. All information furnished to the Director of Mines under this licence will be held in confidence for official purposes:

    (a) during a period of five years from the date on which such information was furnished to the Director of Mines; or

    (b) until the areas to which the reports relate are no longer lawfully held under the *Mineral Resources Development Act 1995*;

    whichever shall occur first.

    - The Department may publish, print, adapt or reproduce records once the report has been transferred to the MRT Open File library (see Schedule D).

5. **One month** prior to relinquishment of any part of the area described in the schedule hereto the licensee shall furnish a report containing all information relating to such unless the Director of Mines advises, in writing, that such report is not required.

SCHEDULE 'B' (Revised August 1998)

Cut Line Specifications and Fire Precaution Regulations

CUT LINE SPECIFICATIONS

1. Access to cut lines from established tracks will be discreet, to reduce the possibility of subsequent misuse.
2. Markers to indicate commencement of access tracks will be minimal, and will be removed when activities are suspended.
3. Cut lines will not exceed one metre in width.
4. Clearing will be kept to a minimum; trees will not be blazed.
5. Unless imperative, no live saplings over 15 cm in diameter will be felled.
6. Track-cutters must recognise and avoid cutting the following native species: Huon Pine, King William Pine, Cheshunt Pine, Celery Top Pine and Deciduous Beech.
7. Fire must not be used for track making.
8. Non-biodegradable track markers will be removed when work is completed.
9. On completion, all introduced debris will be removed including cans, bottles, paper, fabric etc.

FIRE PRECAUTION REGULATIONS

Exploration managers will ensure that **during a fire permit period**, persons occupying permanent and semi-permanent camp sites, drilling sites, or work sites using, servicing or refuelling earth-moving equipment shall have equipment which is sufficient for the suppression of any fires which may reasonably be anticipated.

Track cutting teams using chainsaws, and persons on work sites where chainsaws, power augers, generators or other petrol engines are frequently used, will maintain within sensible reach equipment which is sufficient for the suppression of any fires which may reasonably be anticipated.

All premises used as kitchens or as sites for storing fuel or storing, servicing or refuelling engines will be cleared to bare earth and surrounded by a firebreak sufficient to isolate the premises from the surrounding vegetation.

SCHEDULE 'C'

Schedule of Onshore Petroleum Exploration and Production Requirements

Copies are available on request.

SCHEDULE 'D' (October 1996)

Non-exclusive Licence — Exploration Reports

1. Licence to use reports

(a) In respect of reports prepared by or on behalf of the holder and submitted to the Director pursuant to Schedule A of this licence or otherwise, the holder hereby grants to the Minister, by way of a non-exclusive licence, copyright therein, to publish, print, adapt and reproduce the work in any form and for the full duration of the copyright, subject to a period of confidentiality as outlined in sub-clause (2).

(b) The non-exclusive licence to do acts comprised in the copyright granted hereunder is a consent to disclosure of the information contained in the copyright material.

2. Confidentiality

(a) All exploration reports submitted in accordance with the conditions of this title will be kept confidential for a period of five years from the due date of the report, or while the title is in force, whichever is of the shorter duration, except in cases where:

(i) The holder has agreed that specific reports may be made non-confidential.

(ii) Reports deal exclusively with exploration conducted on areas that have ceased to be part of the title.

(b) Confidentiality of reports will be continued beyond the termination of a title in cases where an application for renewal of that title was lodged during the currency of the title, provided that a period of no more than five years has elapsed since the due date of a report concerned. An application for an amalgamated exploration licence would be treated in the same way as an application for renewal for the purpose of this sub-section.

(c) The maintenance and continuation of the period of confidentiality under sub-clauses (a) and (b) above is subject to the holder submitting a report on all exploration conducted in the parts of the tenement that have been relinquished. Such reports will be made public.

(d) The Director may extend the period of confidentiality in respect of reports beyond the time(s) stipulated in sub-clauses (a) and (b) hereof.

3. Terms of the non-exclusive licence

The terms of the non-exclusive copyright licence granted under sub-clause (1)(a) are:

(a) The Director may sub-licence others to publish, print, adapt and reproduce but not on-licence the copyright in a report.

(b) The Director and any sub-licensee will acknowledge the holder's and any identifiable consultant's ownership of copyright in reports in any reproduction of reports, including storage of reports onto an electronic database.

(c) The holder does not warrant ownership of all copyright works contained in any report and the holder will use best endeavours to identify those parts of the report for which the holder owns the copyright.

(d) There is no royalty payable by the Minister for the licence.

SCHEDULE 'E' (February 1999)

Inclusion of Fossicking Areas in Exploration Licence

Fossicking areas are primarily established to enable the general public access to areas for the purposes of fossicking.

Fossicking areas are declared by the Minister for Mines by way of an order and are restricted to a depth of two metres.

Any person may fossick in a fossicking area without a licence, subject to conditions approved by the Minister from time to time.

Where a fossicking area is included in an Exploration Licence:

(a) The explorer must not restrict access to the collecting site/s;

(b) The explorer must not hinder the recreational activities of genuine fossickers;

(c) The explorer may only carry out the same level of activity on these areas as approved for fossickers; and

(d) Any higher level of activity may only take place with the written approval of the Director of Mines and will be subject to conditions which shall protect the integrity of the fossicking area.

Mineral Exploration Code of Practice — Exploration guidelines

The following pages outline the general standard expected of exploration works in Tasmania.

Cutting and use of grid lines

ESTABLISHING CUT LINES

- Cut lines or walking tracks must not exceed one metre in width.
- Access to cut lines must be discreet, to reduce the possibility of subsequent misuse by unauthorised users.
- Cut lines are to be established using hand tools such as machete, fern hook, axe and chainsaw only.

CUTTING VEGETATION

- For safety reasons, vegetation should be cut close to ground level to avoid dangerous 'spikes' of stumps protruding. Overhanging vegetation should be trimmed to reduce the hazard of protruding branches.
- Unless imperative, no live saplings of any species over 150 mm diameter will be felled.
- Track cutters should recognise and avoid cutting the following native species:

Common Name	Scientific Name
King Billy Pine	*Athrotaxis selaginoides*
Huon Pine	*Lagarostrobos franklinii*
Celery Top Pine	*Phyllocladus aspleniifolius*
Cheshunt Pine	*Diselma archeri*
Creeping Pine	*Microcachrys tetragona*
Deciduous Beech	*Nothofagus gunnii*
Pandani	*Richea pandanifolia*

These species are usually confined to alpine areas

- Where plants such as manferns (*Dicksonia antarctica*, *Cyathea spp.*) are encountered, individual specimens are not to be decapitated. Fronds may be shaved off one side of the plant to allow access next to the plant.

USE OF PEGS AND TAPE

- Biodegradable tape should be used in preference to the ordinary plastic type. This tape will last at least two years, but will eventually disintegrate.
- Use only small lengths of tape. 'Streamer' type markers using several metres of tape are not necessary.
- Conspicuous markers such as pegs and tape should be removed wherever possible on completion of the program, especially from the beginning of grid lines.
- Hipchain cotton should be removed from grid lines. Birds can, and do, become entangled in this line.
- In some sensitive areas — such as alpine areas — cutting should be kept to a minimum. Grids should be pegged and flagged with tape wherever possible. In these areas a special effort should be made to recover pegs and tape on completion of the program.

USE OF GRID

- Whilst cutting and later using grid, all introduced debris (bottles, cans, paper) is to be removed. DO NOT LITTER.
- If changing oil in small, hand-carried machinery, waste oil is to be collected and taken to an appropriate disposal area. Used oil must not be dumped in bush while cutting grid.

FIRE PREVENTION

- On all work sites where chainsaws, power augers, and other petrol-driven machinery are used there must be, within sensible reach, a serviceable knapsack filled with not less than 10 litres of water, or a powder-type extinguisher of not less than one kilogram capacity, during a Fire Permit Period.
- In addition to Fire Permit Periods, declared by the Tasmania Fire Service over the summer months (when anyone wishing to have a fire outdoors must obtain a permit), there are occasionally days declared as 'Total Fire Ban' days. The ban on such days usually lasts for 24 hours, from midnight to midnight. On occasions such bans may be declared on several subsequent days, depending on weather conditions. On days of Total Fire Ban forest workers are not permitted to use machinery of any kind in State Forest — including chainsaws — due to the risk of starting fires by friction by dragging logs, or from sparks off engines and motors.

  Daily checks should be made to ensure that exploration staff are made aware of total fire ban days when they are declared.

  Grid cutters should not use chainsaws in the bush on such days. Work should be confined to activities which do not require the use of machinery.

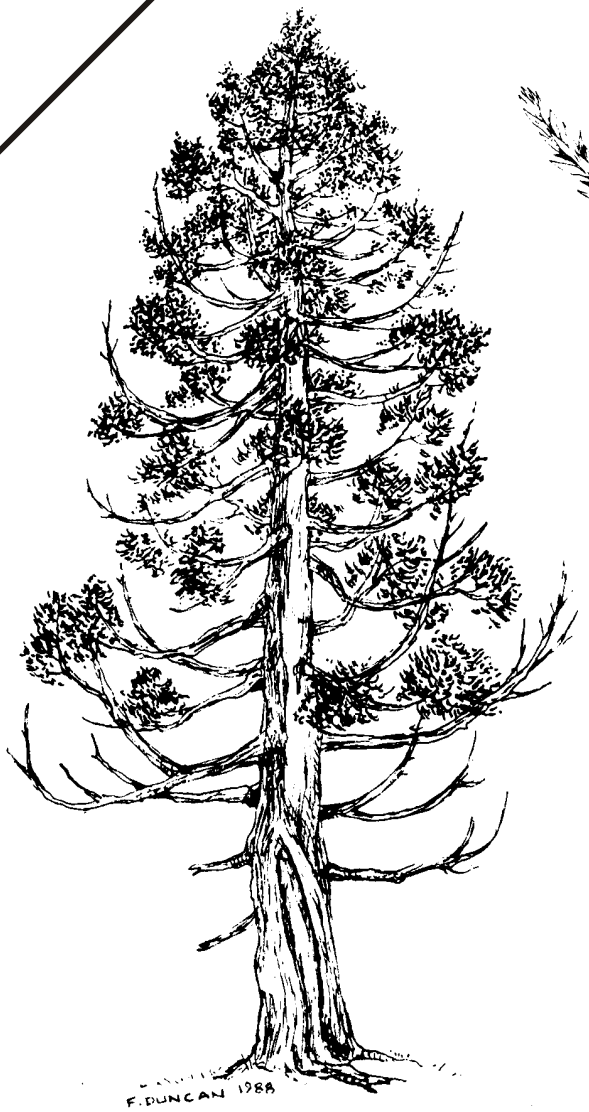
  Typically there are only a few days of total fire ban each summer, but should there be so many days of declared total fire ban in any one summer that exploration programs are seriously disrupted, the explorer should report this in the Annual Report, and if necessary request an extension of time for the delayed fieldwork.
- When using a portable generator, such as for UTEM surveys, be sure to keep the exhaust area clear of leaves and twigs. On the completion of the survey, remove all wires from the grid.

FORESTRY COMMISSION, TASMANIA

FOREST TREE SERIES

KING BILLY PINE

(Athrotaxus selaginoides)



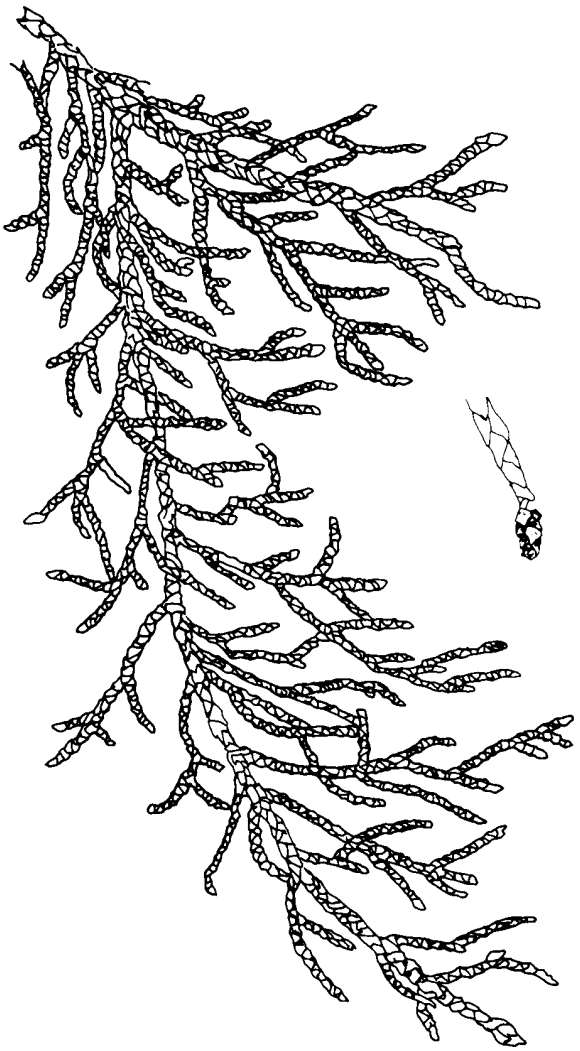
King Billy pine is a majestic and ageless tree growing in the western, south-west and central plateau rainforests of Tasmania, at medium to high altitudes. It is no longer logged, except for salvage. The timber is easily worked and valued for its durability and light weight.

FORESTRY COMMISSION, TASMANIA

FOREST TREE SERIES

HUON PINE

(Lagarostrobus franklinii)



Art work by Jo Eberhard

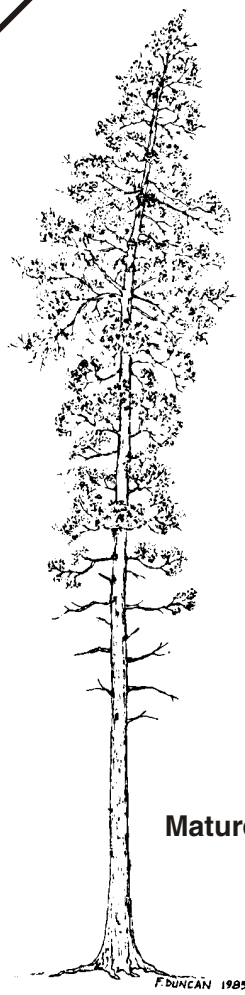
This most famous Tasmanian timber has been used for furniture and boatbuilding since the 1820s. A mellow, fine textured timber with a characteristic fragrance, it attains phenomenal age, some trees dating from before the birth of Christ.

FORESTRY COMMISSION, TASMANIA

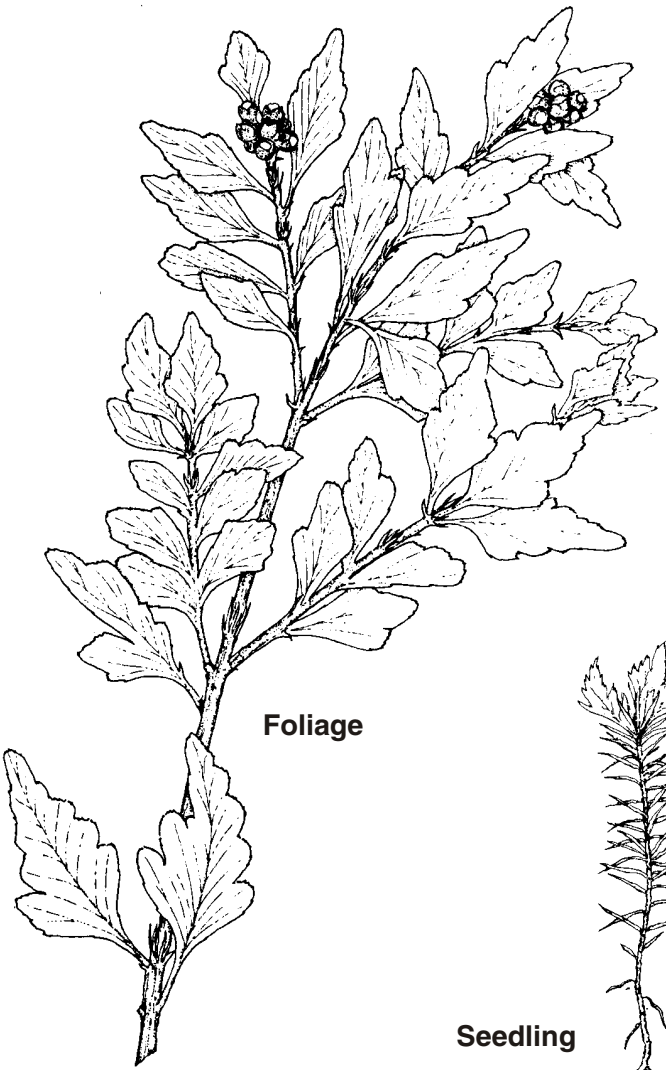
FOREST TREE SERIES

CELERY TOP PINE

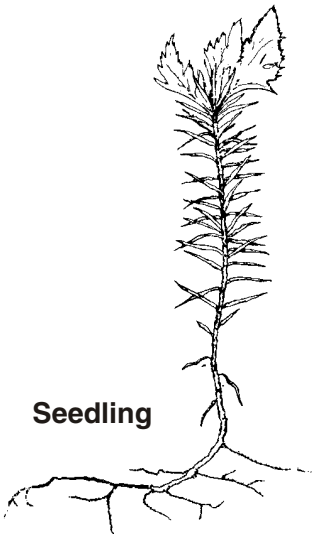
(Phyllocladus aspleniifolius)



Mature tree

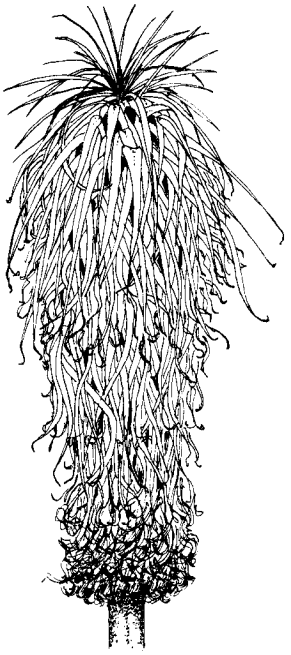


Foliage



Seedling

Celery-top pine is one of the best known of Tasmania's native coniferous species. The tree, which occurs only in Tasmania, is common in the west of the State and also occurs in isolated patches in the east. It can be easily identified by its distinctive celery-like foliage. The timber is valued for its durability, hard wearing surface, dimensional stability and attractive fine-grained appearance.

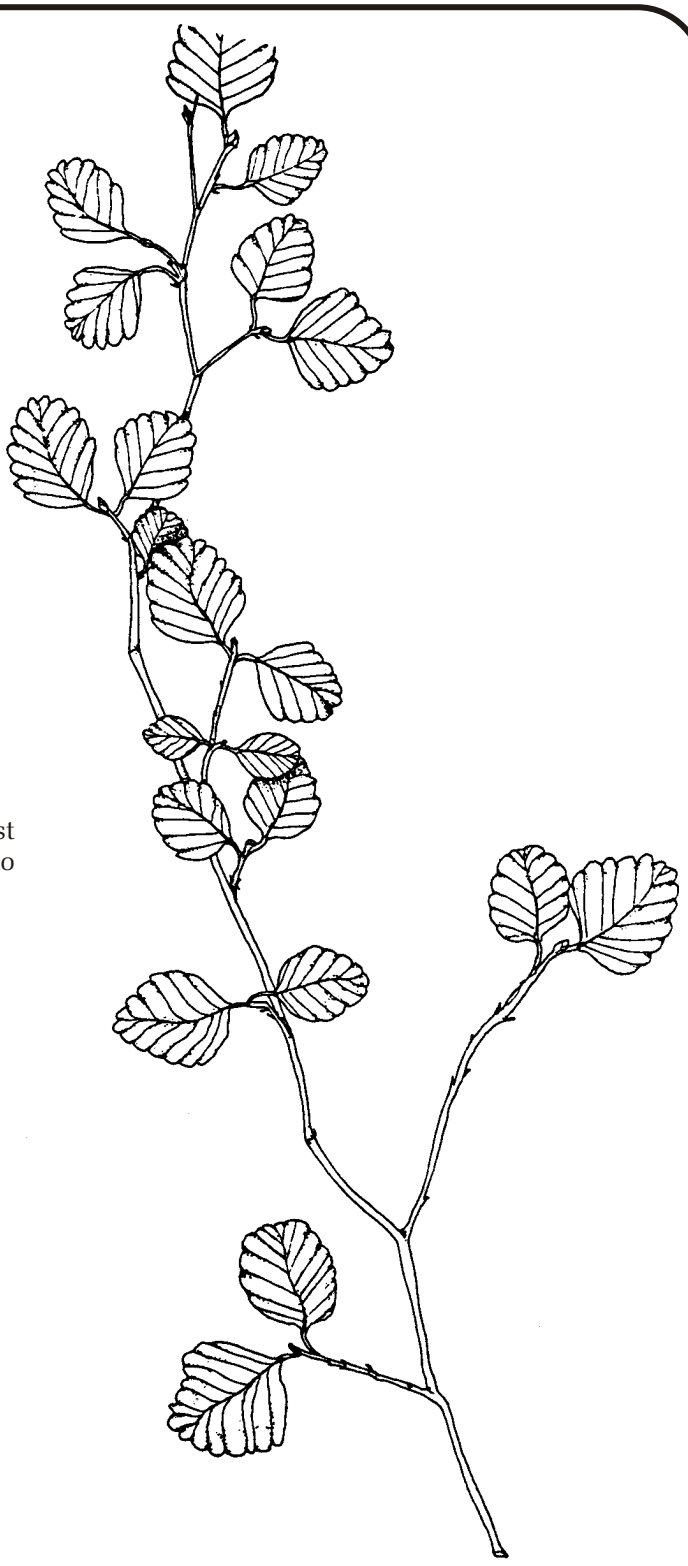


RICHEA PANDANIFOLIA
Paandani

This palm-like tree is common in rainforest, most commonly in the understorey. It also extends into the alpine zone, where it forms a squat shrub.

DISELMA ARCHERI
Cheshunt Pine

Throughout most of its range in the alpine and subalpine zones of Tasmania *Diselma archeri* dominates heath. In the wettest parts of the State the species dominates high altitude rainforest. Cheshunt Pine has a leaf arrangement similar to that of creeping pine (*Microcachrys tetragona*). Fortunately Creeping Pine lives up to its name.



NOTHOFAGUS GUNNII
Tanglefoot, Deciduous Beech

This highly fire-susceptible endemic species is found in subalpine rainforest and alpine heath on the wettest mountains in the State. It rarely exceeds 8 m in height.

These diagrams and descriptions are reproduced with permission from the authors of the book 'Native trees of Tasmania' by J. B. Kirkpatrick and Sue Backhouse.

Tracks

The most visible evidence of exploration activities would have to be the building of tracks, which if put in the wrong place or not constructed properly can be eyesores. Properly made and carefully sited tracks will remain visually obscure and environmentally acceptable, while still allowing the explorer access. The single most important feature of track construction is good planning. A well planned road or track will cost less than one which is badly placed and requires frequent maintenance. When planning a track, the maintenance and rehabilitation requirements must also be considered, and included in the cost estimates.

COST-BENEFIT ANALYSIS

Helicopters

Track construction and rehabilitation is very expensive, as well as being environmentally disturbing. The explorer would be wise to always do a brief cost-benefit analysis to compare the costs of helicopter access versus ground access. The results are sometimes quite surprising — especially where access is through steep, heavily-timbered country, or where a long access track is being contemplated.

Mineral Resources Tasmania encourages companies to use helicopters for access wherever this is practicable. If a very long track, or one in difficult terrain, is proposed, MRT will ask if a cost-benefit analysis has been done, and what the results were, before consideration will be given to the proposed earthworks.

Four-wheel drive ag (quad) bikes

Consideration could be given to the possibility of using four-wheel drive ag (quad) bikes in some situations. These can carry reasonable loads of gear, and have the advantage of requiring only a well-made walking track to drive on. Operators should be trained in the use of these bikes, and in the safety requirements involved in using bikes on rough bush tracks.

PLANNING

The first step in planning access is to ascertain whether or not the track is really essential. What are the alternatives?

PUBLIC AND OTHER PRE-EXISTING ROADS

- Always use an existing road or track in preference to constructing a new one. This will prevent duplication, avoid unnecessary environmental interference, and reduce costs to those required for maintenance of the track.
- Establish the ownership and/or the controlling authority of roads before use, and where appropriate obtain permission (e.g. from HEC, Forestry Tasmania or from private landholder) before use.
- Respect existing roads/tracks; do not aggravate deterioration by use of excessive speed, oversize or overloaded vehicles, or use in extreme weather conditions.
- Do not use tracked vehicles on unsuitable surfaces (such as bitumen).
- Drainage on existing roads should be repaired.

CONSTRUCTING TRACKS

If no suitable access exists, and the planner determines that a track must be constructed (as opposed to using helicopters for access), then the following points should be considered:

- The volume of traffic, and type of traffic to use the track. How often will the track be used? Once or twice a day? Once a month? Will a drill rig be sledded in? Will heavy, wheeled trucks need access?
- For how long is the access required? For the duration of one drill hole? Many drill holes? For several field seasons?
- Will access be required only in summer? Or is some winter work planned?
- How will future developments affect the track use? Is there any likelihood that at some time in the future the volume of traffic or type of equipment to use the track will change? Will you drill another ten holes if the first one is any good? Bear in mind possible future events which may cause the track to be upgraded or extended.

Once the planner has determined the standard to which the track must be constructed, some estimate should be made of costs, and consideration given to funding. Track building is very expensive, and there are many hidden costs not immediately obvious. A costing must include:

- planning time;
- allowance for proper drainage;
- cost of pipes and culverts;
- cost of maintenance;
- cost of rehabilitation.

The costs involved in track construction vary enormously according to the site. Tracks in near level, lightly timbered country may cost only $500–$600/km; a comparable track in heavily timbered country with high rainfall and many creek crossings could cost $10,000/km or more.

Ask people who have had local experience in track construction. District Foresters will usually be able to give a rough guide as to the cost of roads in their own district.

Road Design — Basic Approach

A guide to road design for permanent roads based on average tonnes per week carted (Forestry Tasmania)

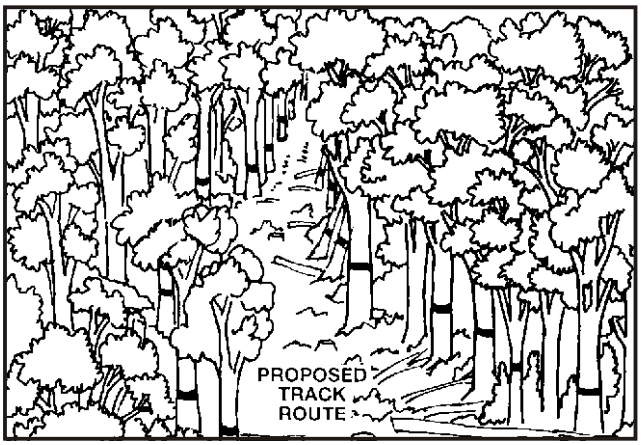
Characteristics	Road Class			
	Class 1 (Main)	**Class 2** (Semi-main)	**Class 3** (Spur)	**Class 4** (Track)
Function	Primary road in large network (two lane)	Significant feed road (slower two lane)	Terminal road (fast or slow single lane)	Special purpose access road, single lane — low cost
Log Traffic Volume	2500 t/week	1000–2500 t/week	<1000 t/week	very low
Pavement Type	Heavy duty, all weather	Heavy duty, all weather	Can be all or summer only	Usually not metalled
Pavement Width	5.5–6.0 m	5.5 m	3.7–4.0 m	3.7 m
Shoulder Width	0.6–1.0 m	0.6 m	0.5–1.0 m	0.6 m
Desired Maximum Gradients	+5, -8%	+8, -10%	+12, -15%	+15, -15%

CLASS OF TRACK

Forestry Tasmania has designed a classification system for the construction of permanent roads; this is reproduced above. Most exploration tracks will never be subject to the heavy use many forestry roads experience, and the 'most permanent' type of exploration track ever required is not likely to be greater than a Class 4 road. Frequently, small temporary tracks of a few hundred metres length and required for limited use — drilling one hole for example — may not need to be of this standard.

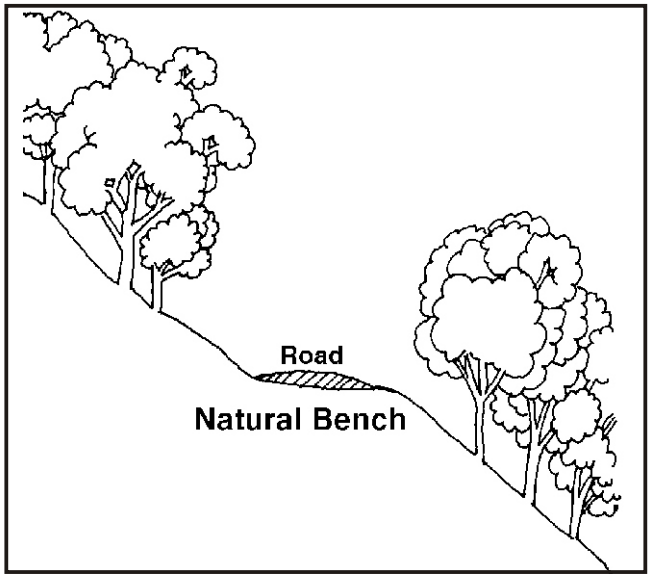
LOCATION

- Possible routes for the track or road should be found, firstly using available maps and air photos, then by field inspection. Do not hesitate to investigate the various possibilities or alternative sites for different parts of the proposed track. Walk the whole length of the proposed route, not just the beginning.
- An assessment should be made of the potential visible impact of different routes, not only from roadways but from local residential sites and vantage points in the neighbourhood.
- Colour contrasts between soil and the underlying material can produce a high visual impact, which is not evident when the soil and underlying material are of the same colour. This visual impact must be taken into account in the planning.
- Learn to recognise and avoid rare or valued tree species.
- Where removal of trees is unavoidable consider routes which minimise tree clearing. Try and mark both sides of the track by tying a 'corridor' of tapes along the proposed route. This will greatly assist the earthmoving contractors in putting the track in neatly.



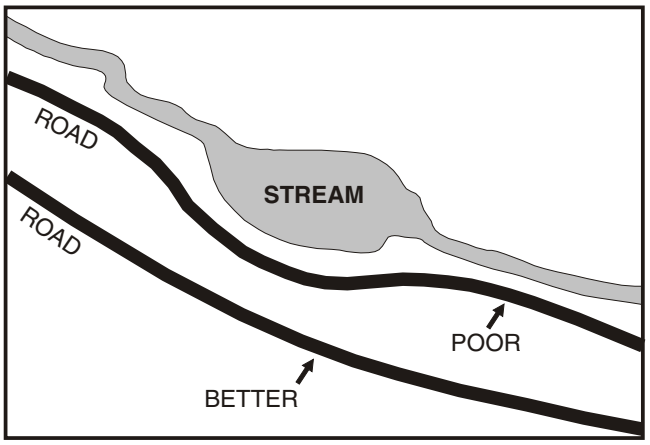
- To assist in the location of the track, first establish control points — such as creek crossings and saddles — then decide on the required gradient between the control points.
- Avoid poor or difficult ground such as rock outcrops, soaks and swamps. Generally the best track locations will be found on ridge tops or on bottom slopes just above the valley floor. Keep off valley floors, as drainage is generally a problem in these locations. Wet areas, which may not be wet at the time of inspection, can be recognised by the vegetation — tea tree, Ghania (cutting grass) and button grass, and so on.
- Minimise the number of stream crossings.
- Fit the track to the topography so that the earthworks disturbance will be kept to a minimum.
- Try and position tracks along the contour, and avoid sudden changes in gradient. Steep sections of tracks are prone to severe erosion and generally incur high maintenance costs, and must have drainage grips or cross drains put in during construction. Also avoid building dead-level tracks, as water will pool on these flat sections and not run off. Where topography permits, locate roads on old benches (provided they are not

backslopes of old landslides), ridge tops and flatter slopes.

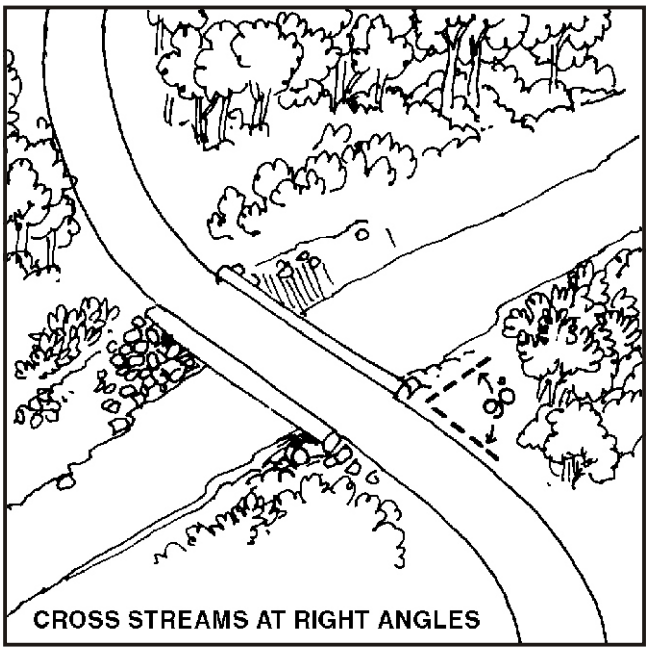


- Ideally tracks should be built to a grade of not less than 1% (so water will run off) but not more than 5% — especially if constructed in erodible soils or clayey areas where traction may be a problem in the wet.
- When developing a new track off an existing roadway ensure that the junction is discreet, but is also safe. Traffic must have a clear view at junctions. Junctions located just over the brow of a hill, or round a sharp bend on a main road, should be avoided.
- Where possible, the angle between track and road should be large and the track should include a 'dog leg' in the bush, close to the road, to reduce visibility.
- Tracks constructed parallel to a major watercourse should be some distance from the watercourse, the general rule being the larger the watercourse, the larger the margin of undisturbed vegetation to be left on the banks. Watercourses should be protected in a manner consistent with the guidelines provided in the *Forest Practices Code* (Forestry Tasmania, 1993).

Protection Watercourse Type	Total Zone (per bank)	Streamside Reserve
Class 1. Rivers and lakes (as named on DIPWE 1:100 000 topographic series)	40 m	80 m
Class 2. Creeks and streams (carrying permanent running water; catchment exceeds 100 ha)	30 m	60 m
Class 3. Permanent watercourses (catchment 50–100 ha)	20 m	40 m
Class 4. Semi-permanent or ephemeral streams carrying water intermittently	10 m	20 m



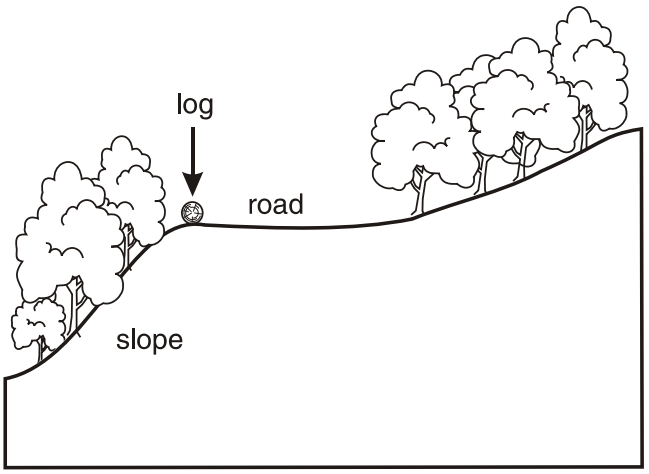
- These streamside reserves are recognised as necessary for the protection of water quality. Heavy machinery should not enter these streamside reserves except to cross the streams at defined crossing points.
- Interference with the natural drainage should be kept to a minimum.
- Stream crossings should be at right angles to the stream.



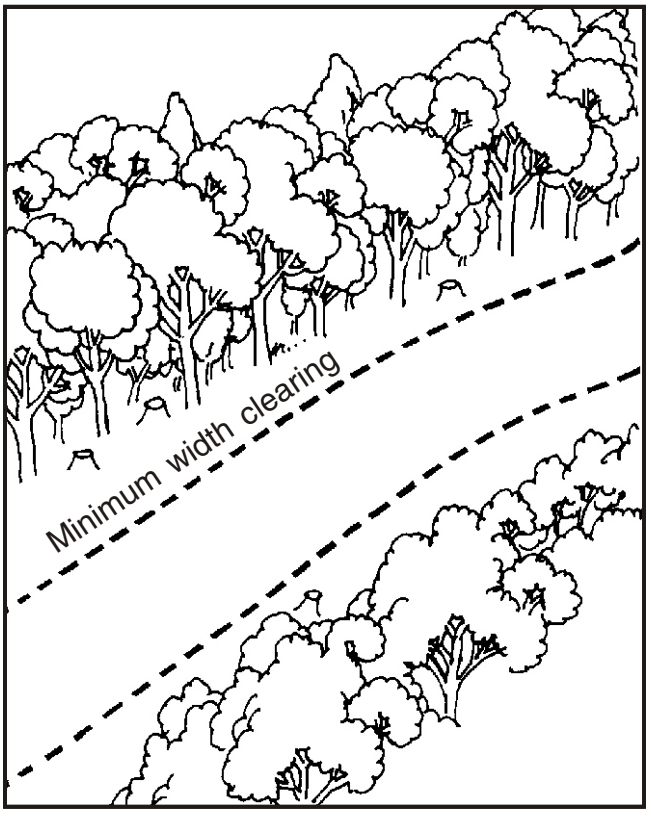
CONSTRUCTION

- As a general rule, precut all fallen logs and saplings greater than 150 mm in diameter before pushing aside with dozer or excavator. Any commercial timber should be set aside for salvage.
- Remove topsoil and vegetation and store in a long windrow, no higher than 0.5 m alongside track. Make sure topsoil stockpile is out of the way of traffic. Ensure that drains are constructed through the stockpiled soil to allow runoff to escape. If this is not done, the valuable topsoil may be eroded away!
- If a second cut is made with a machine and subsoil is removed to make a firm road base, store subsoil in a windrow alongside the track, but do not pile this on top of the topsoil.

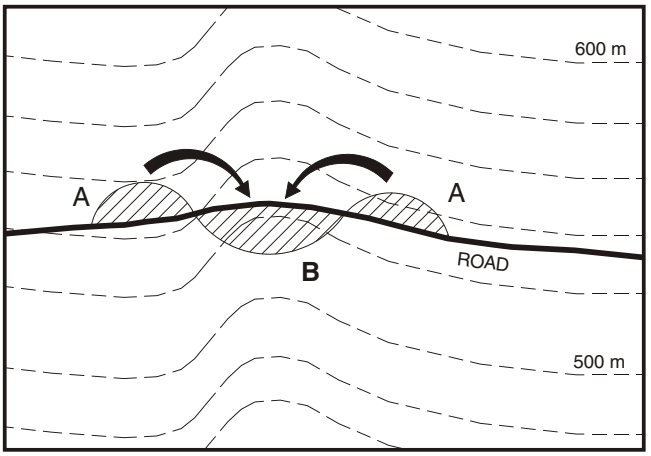
- On some occasions, pushing over trees in line with the proposed track may be preferable to cutting. Revegetation on roadsides, where the fallen log, with roots partly intact, forms the roadside verge, is frequently assisted by re-sprouting from the tree trunk. The reason for pre-cutting is to avoid damage to peripheral vegetation from uncontrolled falling of large trees. However, on occasions, careful felling of trees can assist in stabilising the road verge. This is mostly used in the construction of narrow tracks on moderate slopes.



- Do not make the track any wider than necessary. Choose the smallest machine suitable for the job to restrict the width, or use an excavator.



- Tracks made with excavators are frequently more neatly done and require less rehabilitation work, although there are situations where a bulldozer is the more appropriate machine to use. Use excavators wherever possible, in conjunction with a bulldozer if necessary.
- On steep slopes (>30°) some benching will probably be necessary. Use fill from cuts wisely — do not push over bank and waste. Compact fill as much as possible to minimise water penetration and to prevent fill washing away.



- When a demand for road building material is anticipated, locate a few good source sites, and develop these systematically. Do not poach fill and surfacing from along the road verges.
- Material can also be obtained by slightly widening the track, and on some occasions this may be preferable to opening up a borrow pit next to the track.
- Design road material pits to be compact, and inconspicuous from the roadway and from neighbouring vantage points, by judicious siting, utilising local landforms, leaving natural screens of vegetation, constructing mounds capped with top soil, and revegetating.
- Limit vegetation clearance to the extraction site, and remove trees with the same reservations as for the track.
- Do not needlessly remove vegetation from either side of a roadway.
- Ensure service areas are limited in size and number, and where possible ensure construction service areas, fuel, equipment, vehicle depots and campsites are confined to the future road alignment.
- Do not use creek floors as tracks.

DRAINAGE

- Install proper drainage systems on all tracks. This one point cannot be emphasised enough. A few dollars spent on adequate drainage in the beginning will save much time and money later on in repairing water damage.
- All tracks require cross drains or grips at frequent intervals. On moderately steep slopes, grips every 30 m or even closer will be required. Cross drains function most effectively with a table drain built to channel water into the cross drain. Of all the faults seen in poorly constructed tracks, the lack of cross drains is the most common.

- While the actual spacing of cross drains and table drains is largely determined on a site-specific basis, the following table (adapted from the *Forest Practices Code*, Forestry Tasmania, Hobart) is a guide for drain spacings on a track which would be required for more than one season.

ERODIBILITY FACTOR

Grade of track	Low–Medium	High	Very High
1–5%	150 m	120 m	70 m
6–10%	120 m	90 m	40 m
11–15%	95 m	70 m	30 m
16–20%	50 m	35 m	30 m

The erodibility factor is governed by the soil type and/or parent rock over which the track is constructed. These are:

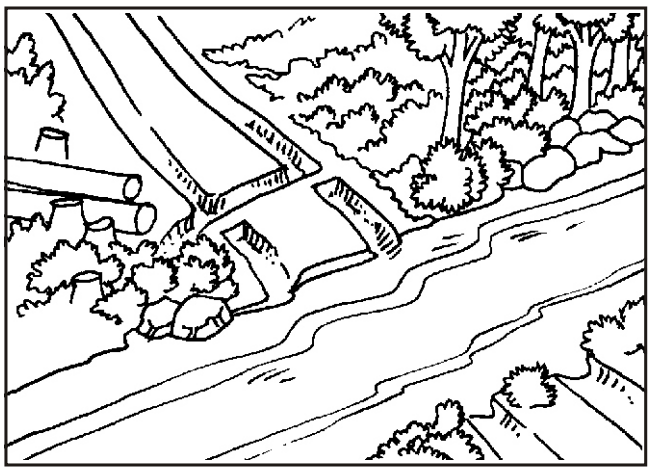
LOW: Dolerite or basalt rock/soils.

MEDIUM: Mathinna Beds and equivalents rock/soils; sandstone, mudstone; non-limestone soils overlying karst.

HIGH: Quartzite; coarse sandstone, thin residual soils derived from limestone and granite in wetter areas.

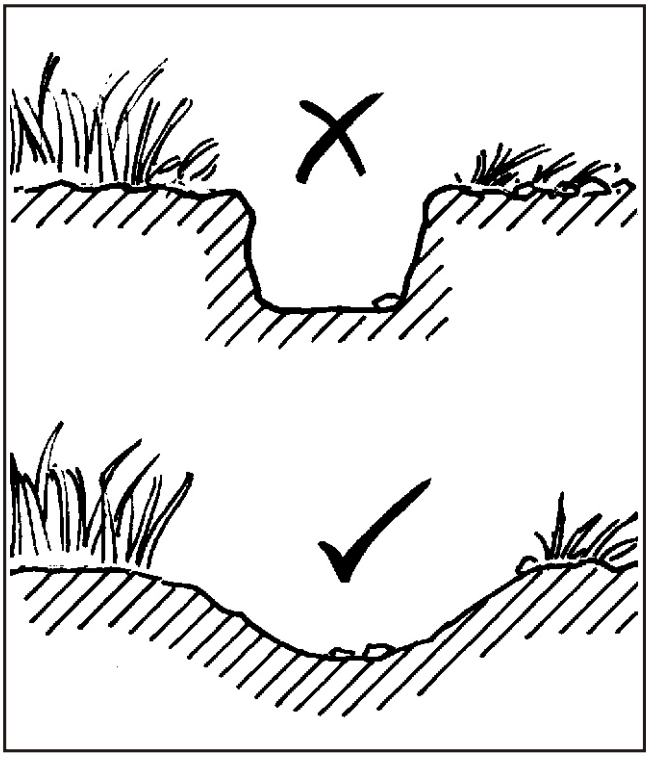
VERY HIGH: Granite rock/soil in dry areas; fine sandy soils.

- Cross drains are constructed at approximately right angles to the water flow across the track. They should be dish-shaped, about 0.6 m wide and 0.3 m deep. These drains are often damaged by the regular passage of traffic and should be kept in a good state of repair. The drain should be at an angle to best intercept water, and should be on a slight grade (1–3%) to pass the water from one side of the track to the other.

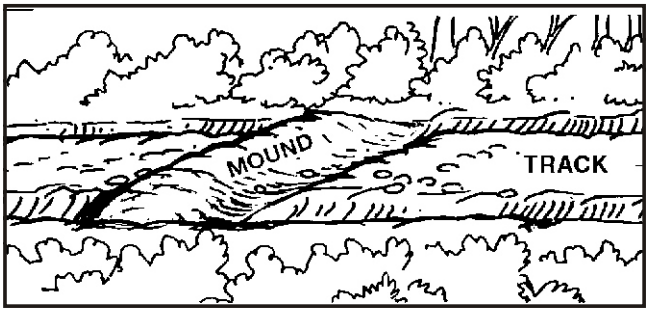


- Table drains should be dish-shaped, at least 300 mm (0.3 m) deep and at least 600 mm (0.6 m) wide. They should be dug on the inside edge (i.e. on the uphill side) of a track and should connect to a properly constructed cross drain.

- Table drains and cross drains should not be 'square in cross section' as can easily happen when drains are constructed with a backhoe or excavator. The preferred shape is that of a shallow dish, as this is less easily eroded.

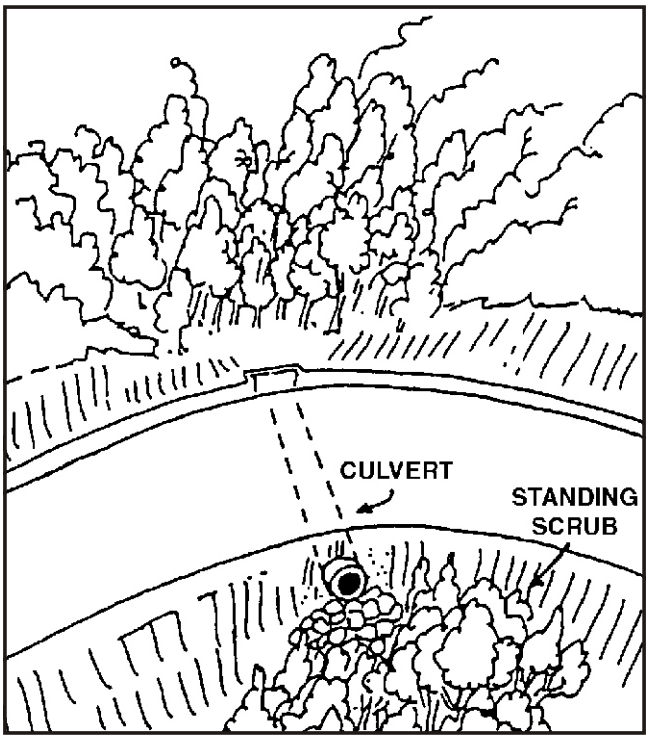


- 'Mounds' can also be used to divert water off a track. These are made during track construction by piling up any available material — gravel, crushed rock, even soil into a long 'hump' across the track — rather like a 'speed hump' used to force cars to slow down. The hump works by directing water flowing down the track off to one side, into a table drain. These mounds must be carefully maintained. The material to make the mound is obtained by making a long spoon-shaped scrape one to two metres in front of the mound during construction of the track.

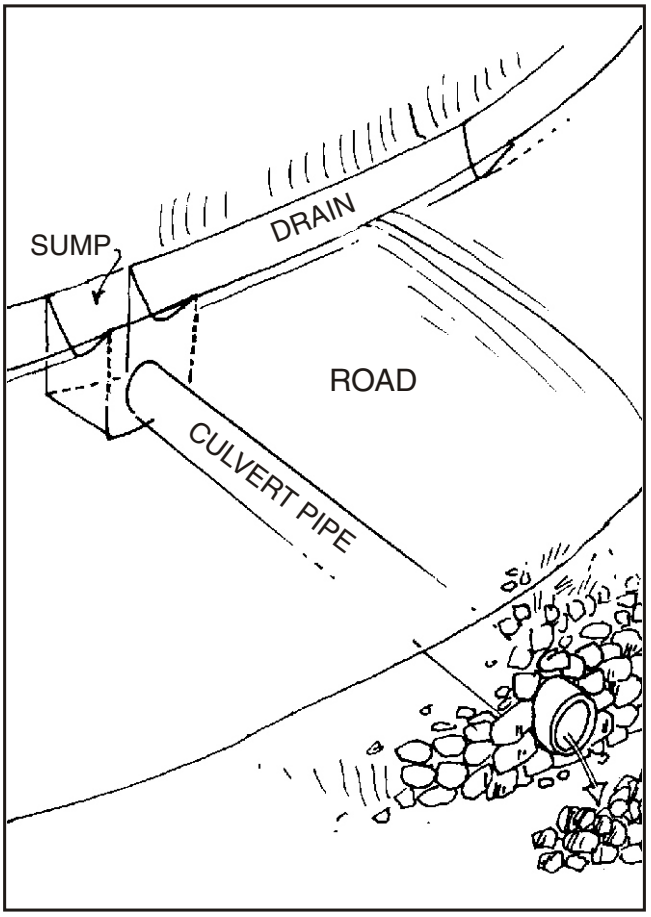


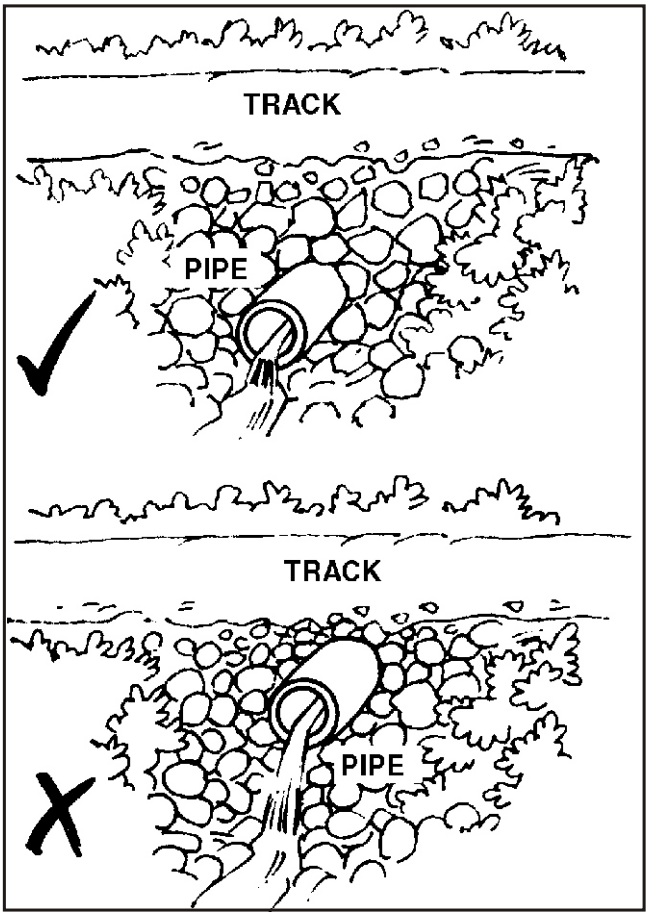
- The dimensions of cross drains and table drains must be adequate to cope with the volume of runoff. In easily eroded soils water velocity in these drains should not exceed 0.5 m/sec. In more resistant soils, the velocity should not exceed 1.0 m/sec. When constructing drains try and stick to the same gradients as used in track construction — between 1 and 5% slope wherever possible.

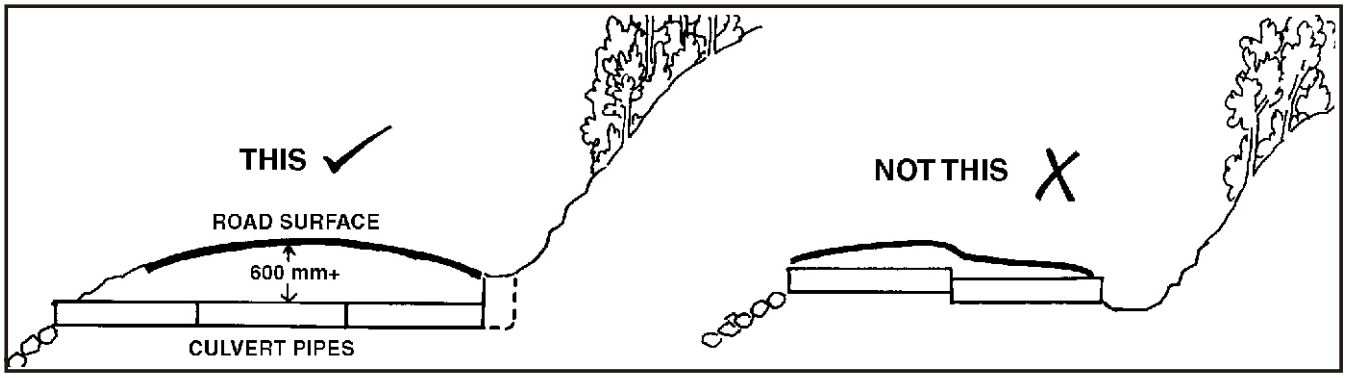
- Where drains cannot cope with the volume of water, they can be lined with rip rap (broken rock), half pipes or concrete interlocking channels.



- Where excessive silt loads are anticipated, or where water quality is an issue, large cross drains and culverts should be constructed in conjunction with a sediment trap — a pond into which the drainage water can collect, and sediment can settle out before flowing on, following the natural drainage channels.
- Culverts and cross drains should be located where the run-off either filters through undisturbed forest soil or into natural drainage channels. If this is not possible the discharge should be directed onto solid ground, not fill.
- Remember to check drains and culverts frequently and UNBLOCK where necessary. A blocked culvert can cause massive washouts.
- Culvert pipes should be laid on a very slight grade, not too flat or too steep. This is to minimise silting up of the pipes, which will occur if the pipes are too flat, and to control 'scouring' of the culvert outlet, which will happen if the water flow is concentrated by a pipe. Rip rap (broken rock) should be placed in the discharge area to prevent erosion.
- DO NOT fill gully or creek up with rock, and put in pipe near the top and cover with a few centimetres of soil. Pipe must be laid on a solid base. Often the most convenient spot is on the side of a gully. The most important factor in choosing where the pipe is to go is to ensure that the pipes will not move.
- Culvert pipes must be laid straight and on a good foundation, to prevent movement of pipes after laying. Where pipes are joined, care must be taken to have them laid straight. Rubber ring joints or external bands can be used where movement is anticipated.



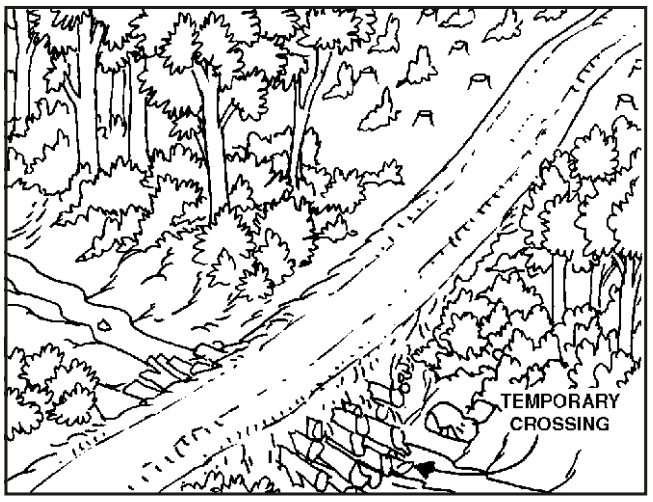




- The minimum recommended cover over pipes is 600 millimetres.

CREEK CROSSINGS

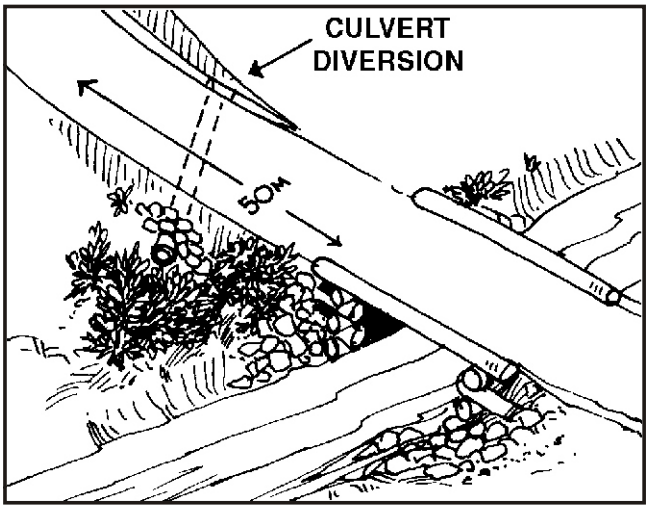
- Some creeks may be crossed by fording. This is generally only suitable when crossings are infrequent. The ford may be made more permanent by concreting the width of the roadway across the creek. This can only be done where creeks have a low summer flow, and where few crossings are envisaged.



- Creek crossings will usually require a culvert to allow the water to run under the road. Small crossings can be made by using a 'nest' of logs, where logs are laid in the creek, parallel to each other, so that the water can flow between the logs. Gravel and fill are usually placed over the collection of logs to complete the road surface.
- Larger creeks will require something more substantial, such as a piped culvert or a log culvert. The size of the pipe will depend on the size of the creek to be crossed. Anticipate winter water flows and install culvert pipes which will cope with the maximum expected water flow. Evaluate the size of the catchment. DO NOT put in a pipe only just capable of taking the summer flow — these will almost certainly wash out.
- Log culverts are made by placing two 'abutment' logs on each bank of the creek, parallel with the creek direction, then putting logs (stringers) across the creek, with their ends resting on the abutment logs. The logs are then covered with gravel or soil. These are much more substantial structures than 'nests' of logs or piped culverts, and are only required in exploration where rivers have to be crossed.
- During the last 50 metres before a road crosses a Class 1, 2 or 3 watercourse (see page 48), road drainage will be diverted into the surrounding vegetation or sediment traps, and not allowed to continue to the stream unchecked. Where necessary a culvert should be installed to pass drainage from the top side of the road to the lower side, and then diverted into the surrounding vegetation.
- If access is only required for a summer season or so, a temporary bridge which can be lifted into place and taken away again after use could be considered.
- On major creek crossings or minor creeks important for use by spawning fish, use a log culvert or a temporary bridge.

SUMMARY

- Major creek crossings are usually made by either fording or construction of a log bridge. In these cases, steep approaches to the creek crossing must be avoided. Rocks may be placed in the creek bed to form a firm bottom to a ford.
- Direct road drainage off road into vegetation, not into the creek.
- Minimise disturbance in the creek bed.
- Select logs (stringers) strong enough to do the job.



DIFFICULT AREAS

Some terrains are much more prone to scarring than others. Constructing tracks in dunes, alpine areas and buttongrass plains should be avoided if practicable. Tracks in buttongrass country are frequently poorly drained because of thick peat and a lack of gradient. Skirt buttongrass plains wherever possible. When obliged to cross them do so at their narrowest point. The foundation of buttongrass plains is frequently quartz-based gravel, which produces a conspicuous colour contrast with the vegetation when exposed.

Dunes are prone to erosion by wind; tracks which are well built can soon become the domain of unauthorised 4WD and trail bike users, whose abuse of some areas is only too evident. Stabilisation of sand dunes is often dependent upon their precise shape and a fragile vegetation cover. Minor cuttings or limited alteration of dune form can provoke blow-outs in time. When working in dune country, the major requirement is to retain the full vegetation cover. Tracks should not be made unless absolutely essential; grids should be pegged, not cut, wherever possible.

Roading should be avoided in alpine country, where tracks are difficult to construct and near impossible to restore. Helicopter-assisted drilling should be used in alpine areas wherever possible.

USE OF TRACKS

- ☐ Try, wherever possible, to confine the use of temporary tracks to the summer months.
- ☐ Carry a spade in your vehicle and unblock cross drains as required. Keeping water off the surface of tracks will greatly reduce the expenditure required for maintenance.
- ☐ Do not wait until tracks fail before doing any maintenance work. Cover patches which may become boggy with tea tree or geotextiles covered with gravel.
- ☐ Plan the daily and weekly workloads / crew changes / gear shifts so that these are accomplished with the fewest number of journeys. Trips are frequently unnecessarily duplicated. Plan your time well, choose a suitable vehicle, and this will minimise both expense and environmental impact on the track.
- ☐ Tracks which are required for a number of years should be built to withstand some flooding. Traditional road building incorporates a 'flood interval' component in the design, taking into account that there will be a 'bigger than annual' flood every ten years, a fairly big flood every fifty years, and a huge flood every hundred years. This planning is far in excess of what is required for a humble exploration track but you should consider that your track may be subject to some flooding and plan accordingly.

RE-OPENING OF OLD TRACKS

- ☐ Overhanging vegetation should be cut, not pushed out of the way with either excavator or 'dozer.
- ☐ Logs across the track must be cut, not simply pushed out of the way.
- ☐ Re-open old drainage and be sure to install additional drainage wherever necessary.

Utilise existing access wherever possible.

Any suitable methods available which do not require a track to be constructed?

Actual construction of a track may not always be necessary.

Photographic summary of main points — see text for more detailed information

Plan the route thoughtfully — investigate thoroughly.

Consider the visual impact.

Do not cross boggy areas.

Photographic summary of main points — see text for more detailed information

Pre-flag the corridor of the planned route.

Thoroughly clean earthmoving machinery.

Supervise the work.

Photographic summary of main points — see text for more detailed information

Pre-cut any trees fallen across the track route.

Stockpile vegetation and topsoil separate from subsoils — keep peripheral disturbance to a minimum.

Avoid steep gradients and disturbing larger trees.

Photographic summary of main points — see text for more detailed information

Avoid excessive earthworks, such as in this example.

Install adequate drainage and watercourse crossings. The crossing shown is adequate.

Provide ongoing drainage maintenance.

Photographic summary of main points — see text for more detailed information

Rehabilitation of tracks

PREPARATION OF GROUND

- The use of an excavator with a rock, not a mud bucket, is preferred to a bulldozer in most situations, as an excavator can usually do a neater job.
- Some ripping may be required if the track has been heavily used, or is badly rutted in spots. However most exploration tracks should not need ripping. (Ripping is not needed prior to the replacement of peaty soils).
- Should ripping be required, remember to always:
  - Rip along the contour;
  - Spacing of rip lines should normally be approximately equal to ripping depth;
  - Do not rip when soil conditions are too wet to allow the soil to shatter;
  - A 'winged' ripper type may be more effective in moist soil conditions;
  - If ripping brings large amounts of rock to the surface, discontinue.
- Whilst ripping is commonly done with a bulldozer, excavators are also capable of ripping.
- Pull out culverts (pipes, logs etc.) and re-establish natural drainage pathways.
- Using an excavator replace stockpiled topsoil over the track (after ripping if this was needed) to a depth of 0.3–0.4 metres.

TIMING OF WORK

Successful rehabilitation is dependent on the works being done at the correct time of year. Earthworks should be done when the soil is dry enough to move — usually between November and March. Under no circumstances should earthworks be attempted when the soil is wet and waterlogged.

Seeding and fertilising should be done after the replaced soil has been softened by rains. Autumn is the ideal time to seed and fertilise replaced soils (i.e. February to April).

Peat can be replaced at any time.

ESTABLISHING A VEGETATION COVER

- If topsoil has been stockpiled for more than three months consideration should be given to using seeds and fertiliser to encourage vegetation regrowth.
- Seeds collected locally should be used in preference to seeds from elsewhere.
- A suitable fertiliser in most situations is the off-the-shelf 8:4:10, which should usually be spread at the rate of 250 kg/ha. At this rate one kilogram will cover 40 m^2.
- The timing of rehabilitation is important; such work is best done in spring or autumn. Whilst earthworks can be done in summer if necessary, seeding and fertilising should be done the following spring or autumn. Rehabilitation should not be attempted in winter.
- Refer to the chapter on *Rehabilitation and Revegetation* (page 76) for further details.

OLD TRACKS

Where tracks are quite old, and there is little soil to be respread, the track can be ripped, and if cut into the side of a hill, the sharp edge can be recontoured. Seeding and fertilising will assist in establishing a vegetation cover.

COSTS OF TRACK REHABILITATION

The actual cost of rehabilitation is dependent on the condition of the site. However, as a very approximate guide, the following figures can be used to give a rough estimate of expected costs.

Assumptions (approximate 1998 figures)

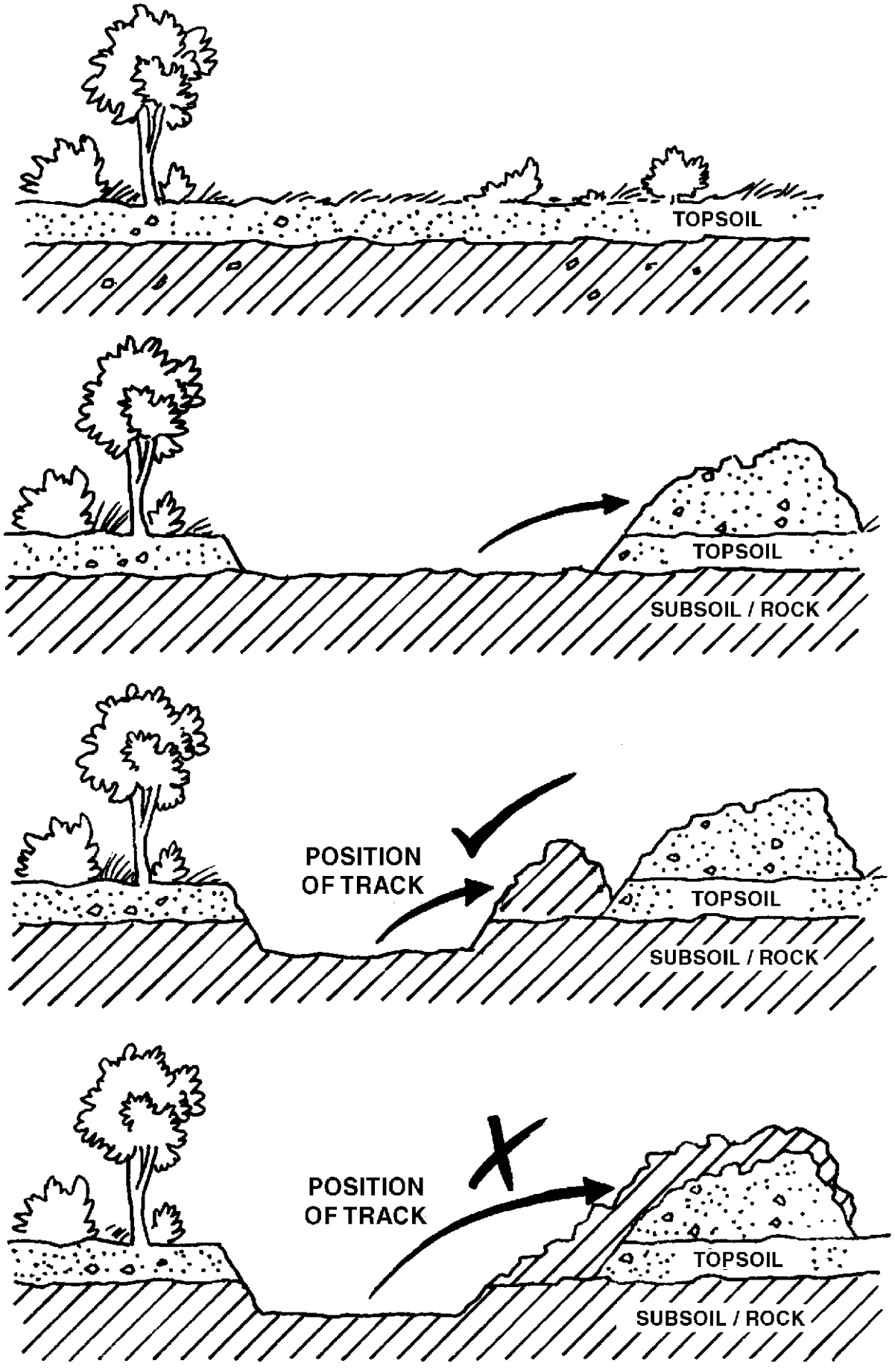
- Topsoil stockpiled next to track.
- Earthworks done by 22 tonne excavator, cost $80 per hour (plus transport to site).
- Excavator operator can restore one kilometre of track every 6 hours; total width of track disturbance 4 metres.
- Only 2 hours/km needed to install drainage.
- If track is compacted, ripping will be required, to a depth of 0.3–0.4 metres.
- D7 bulldozer will rip 1 km in 2 hours, cost of $90 per hour (plus transport to site).
- Track fertilised with 8:4:10 mix at rate of 100 kg/km of track.

Costs per kilometre of track

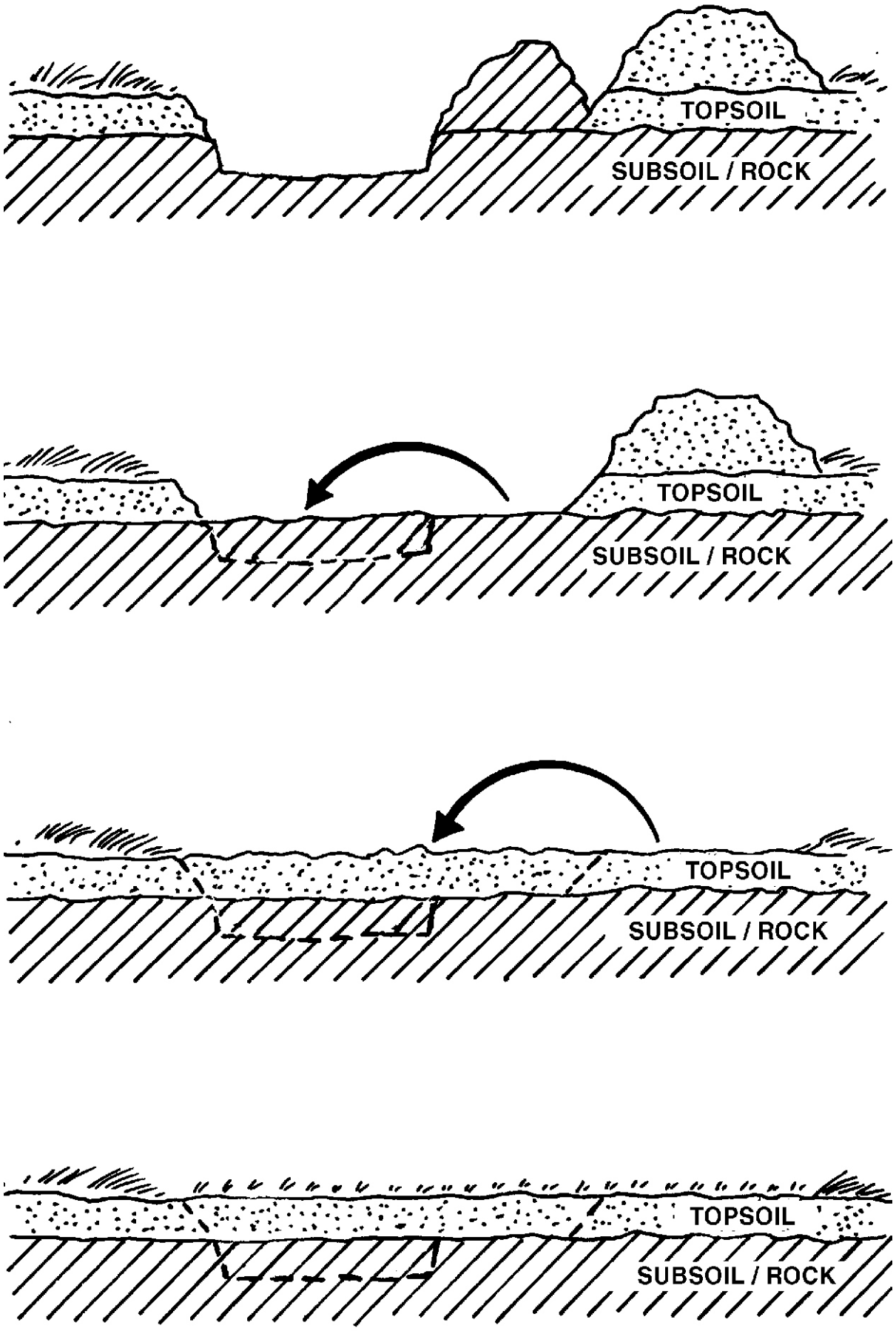
Drainage	2 hours of excavator time at $80/hour	$160
Soil replacement	6 hours of excavator time at $80/hour	$480
Ripping	2 hours of 'dozer time at $90/hour	$180
Fertilising		$40
Total cost	With ripping	$860/km
	Without ripping	$680/km

- To this must be added the cost of the machinery transport to the site, the planning and supervision time required of the field staff, and the costs of any seeds used.

TRACK CONSTRUCTION



TRACK REHABILITATION



Thoroughly clean down earthmoving machinery. Where practicable undertake earthworks during drier times of the year.

Rip compacted areas, pull out culverts and re-establish natural drainage patterns.

Replace stockpiled subsoils, followed by topsoil and vegetation.

Photographic summary of main points — see text for more detailed information

Recontour the site, returning to natural profile.

Leave surface irregular, construct spur drains on sloping sites.

Spread fertiliser over site if required.

Photographic summary of main points — see text for more detailed information

Vegetation cover may be restored quickly by using a tea-tree slash cover.

Locally collected seed bulked with sawdust can be applied as another method of revegetation.

On some sites planted seedlings may be appropriate. Follow-up inspection should be undertaken to ensure that the work has been successful.

Photographic summary of main points — see text for more detailed information

Drill Pads: Environmental considerations

- A small clearing must often be made at the site at which a hole is to be drilled. This will enable the drilling rig to be manoeuvred into place and will provide a safe working area around the drilling equipment.
- The drill pad must be large enough to accommodate the drilling rig, compressor, pumps, drilling rods and rack, and often a small shelter for the drillers. A small sump must often be dug to collect the muddy water produced during drilling. Whilst the drill pad must be of safe working size, do not make the pad any larger than necessary.
- As a general rule, try and locate drill sites in areas which require little or no clearing. When drilling on a grid pattern, for example, the planned location of one hole can be moved without greatly affecting the overall program. However, if a specific target has been chosen, then the location of the drill site is more limited, and is largely predetermined by the position of the target. If there are no clear spots near the target zone which is to be drilled, then clearing is inevitable.
- Try to avoid locating a drill site directly beneath large, dead trees to avoid the danger of falling limbs. Should this not be possible, the work site must be made safe by cutting dangerous limbs or felling the whole tree.
- When an area must be cleared to make room for a drill pad, there are a number of points to remember which will make rehabilitation easier. Ask yourself how long the site is to be used and what sort of pad will be required. In dry country, with tea-tree scrub or similar, removal of the vegetation cover (leaving rootstock in the ground) may suffice to give you a clear working area. The type of rig is also a consideration. Track-mounted and small trailer-mounted rigs may be able to manage with just the vegetation trampled or removed. In wetter areas, or on sloping sites, construction of a drill pad will normally be required.
- Upon completion of a drill hole most of the drill pad can be rehabilitated at the time the rig is moved, leaving vehicle access to the drill collar for later down-hole logging. This minimises the time for which the soil is stockpiled and saves on rehabilitation costs for an excavator at some later date.

CONSTRUCTION

- Pre-cut any timber greater than 150 mm in diameter in the area to be cleared.
- Earthworks, if any are needed, should be done with an excavator.
- Place topsoil and vegetation to one side of the drill pad area. If the drill pad is to remain in place for a long time, and the pad is on a slope, provide drainage along the top side of the pad (the same as for a costean) so that the drill pad and topsoil do not wash away. On a slope, topsoil should be stored on the uphill side of the drill pad.
- Remember that the drill will need a firm base on which to drill. If the ground is not hard enough, construct a small pad with gravel or logs. The base must be firm to prevent the drill moving (by sinking of one of the legs etc.) during drilling.

USE OF A DRILL SITE

- When drilling, place oil absorbent matting or hessian under/around the rig to catch any grease or oil.
- Should hessian or other matting not be available, any areas of contaminated soil under or near the rig should be taken away for proper disposal on completion of drilling. If oil absorbent material is used no oil should be spilt on to the ground at all.
- Care should be taken when refuelling not to spill any of the contents. Fuel pumps, pouring spouts and funnels should always be used.
- If emergency repairs or some form of on site maintenance is unavoidable, care should be taken to ensure that any fuel, oils, etc. are contained and are not able to spill on the ground.
- Remove all rubbish and equipment from the drill site on completion of work. Provide rubbish drums for drillers.
- Cap or cover the drill hole. Do not leave an open hole in the ground.
- Drill holes making water should be plugged and sealed off following the completion of any down-hole geophysics.
- The site should be monitored periodically and any invasion of weed species eradicated.

WATER PUMPS

Water pumps should be placed on oil-absorbent material and regularly checked for oil and fuel leaks because of their close proximity to water courses.

SUMPS

Coring a 1000 metre deep NQ drill hole will produce 2.5 m^3 of rock dust and sediment. Adequate sumps should be used adjacent to all drilling sites in order to minimise the quantity and optimise the quality of water leaving the site, and to trap the drilling sediment.

- Drill pads should be designed with the sump on the downhill side. Drains should be dug to direct any accidental spills into the sump.
- Avoid having muddy water from the drill site directly entering any nearby watercourse.

- Pump water away from watercourses and allow to drain through vegetation where possible.
- Redirect excess water from the supply pump away from the sump.
- In a properly-designed drill pad all material spilt would ideally be caught in an excavated sump. Drains should be constructed so that runoff is always into, and not past, the sump.
- In sensitive areas, where discharge of water should be kept to a minimum, an effort should be made to recycle water. If a sump cannot be dug a tank should be taken onto the site and the water and drilling sediment contained in this. The drilling sediment can be removed at periodic intervals.
- There are many circumstances where an above-ground sump system should be adopted, for example:
  - helicopter-supported drilling programs;
  - where an excavator is not required on programs utilising track-mounted rigs;
  - where no site preparation is required;
  - where an effective sump cannot be excavated due to difficult ground conditions;
  - where the visual disturbance from earthworks is undesirable.
- It is recommended that a pre-fabricated, portable tank system be used. This should be of a sufficient size to allow the drillhole return water enough time to settle. This will allow a percentage of the sediment to drop out and give the oil absorbent material enough opportunity to pick up any hydrocarbons that may be present. On deeper holes, or where there is adequate room and slope, a system using at least two tanks should be set up.
- To avoid the possibility of an unchecked spread of weed species, the practice of using straw bales should be avoided.

STORAGE OF FUELS

- All fuel drums and other containers should be in a sound condition.
- Oil and diesel stored on site should be contained in a bund away from any watercourses.
- A supply of oil absorbent material should be kept on hand to clean up any minor spills.

ACCIDENTAL SPILLS

- Spills of significant quantities of oil or diesel (i.e. more than half a 200 litre drum) require notification to Mineral Resources Tasmania and also to the Oil Pollution Control Officer at the Department of Primary Industries, Water and Environment (telephone 1800-005 171). Each large mine has a designated contact officer in liaison with the Department of Primary Industries, Water and Environment, and notification may also be made using this network.
- Actions which may help clean up such spills include:
  - digging a trench (by hand) just below the spill and filling with oil-absorbent material, which is replaced at frequent intervals;
  - constructing a small dam/s with straw bales in any affected watercourse and placing in a 'sock' of oil-absorbent material to trap oil/diesel; replace the 'sock' at regular intervals

DRILLING ADDITIVES

- The effect on the environment of drilling additives commonly used under Tasmanian drilling conditions is unknown. Additives should be used sparingly and, where available, alternative biodegradable products should be trialed.
- The use of diesel as a mixing agent, and down-hole as a lubricant, should no longer be practised.
- Used containers should be stored appropriately or taken off site.
- Material Safety Data Sheets on these products are available from the manufacturer or distributor. Their recommendations on the safe handling and storage of these substances should be observed.

CAPPING DRILL HOLES

- It is the explorer's responsibility as outlined in Schedule A (see page 34) to ensure that all flowing drill holes are permanently sealed to prevent surface discharge of groundwater. Publications by Minerals and Petroleum Victoria and the New South Wales Department of Mineral Resources give detailed advice on the various procedures available to stop water flow. It is recommended that explorers consult with MRT staff who can supply the information in the above publications or recommend possible remedial action.
- All cored holes must be accurately surveyed and permanently marked so that their location can be readily ascertained.
- All holes, whether cored or otherwise, must be sealed so as to prevent collapse of the surrounding surface.
- Where any drill hole or borehole encounters natural or noxious gases, it must be plugged or sealed so as to prevent their escape.
- Where any drill hole or borehole encounters an artesian or sub-artesian water flow the hole must be sealed discretely to prevent contamination of aquifers.
- Most exploration holes in Tasmania are cored, and are usually left open after drilling for later access for geophysical logging. When a hole is no longer required, it must be backfilled or permanently capped.

Any suitable methods which do not require pad construction?

Earthworks may not always be necessary — or possible.

Utilise existing disturbances wherever possible.

Photographic summary of main points — see text for more detailed information

Thoroughly clean down all machinery and equipment.

Stockpile vegetation and topsoil separately from subsoils.

Keep pad size and peripheral disturbance to a minimum.

Photographic summary of main points — see text for more detailed information

Excavate a sump in a suitable location.

Fuel and oil drums etc. are to be in a sound condition and stored appropriately.

Ensure the water pump has no fuel or oil leaks.

Photographic summary of main points — see text for more detailed information

Place oil absorbent products in sump and under rig — replace as required.

Keep the site tidy — maintain drains to the sump in working order.

Remove rubbish from site on completion of work. Cap or cover drill holes, and plug if making water.

Photographic summary of main points — see text for more detailed information

REHABILITATION

- If the ground has been compacted by the use of heavy machinery or prolonged use, the drill pad should be ripped to loosen the soil. An excavator bucket can usually loosen the compacted areas quite sufficiently. Take care when ripping or loosening not to create large furrows which may become erosion gullies. This can be avoided by being sure to rip along the contour.
- Stockpiled soil and vegetation should be spread over the site. An excavator will be able to do this more neatly than a bulldozer.
- If the soil has been stockpiled for more than three months, consideration should be given to reseeding. This will depend on the location of the site — see chapter on *Rehabilitation and Revegetation* (page 76).
- Consideration should be given to fertilising respread topsoil which has been stockpiled, whether seeding is done or not. A suitable fertiliser for most situations is the off-the-shelf 8:4:10 mix, which should be applied at the rate of 250 kg/ha. At this rate one kilogram will cover 40 m^2. The average drill pad, perhaps 15 m 15 m (225 m^2), will require 5 kg of this fertiliser.
- Any drainage works put in around the perimeter of a drill site should be left intact. This will prevent erosion of the newly established vegetation.
- The site should be monitored periodically and further work carried out, if required, to ensure success of the rehabilitation.
- Refer to the chapter on *Rehabilitation and Revegetation* for further details.

COSTS — DRILL PAD REHABILITATION

Restoration of drill pads is largely dependent on the location and size of the pad, and the amount of restoration work needed. However, as a very rough guide, the following figures are given as a generalised approximation of costs where a reasonably large drill pad has been constructed. There will be many cases, of course, where such clearing has not been needed, or a much smaller area has been used.

Assumptions (approximate 1998 figures)

- No allowance has been made for the transport of machinery to the site. This is dependent on distance, and must not be forgotten.
- Drill pad 225 m^2 (0.0225 ha) (15 m 15 m).
- Repairs to be made by 22 tonne excavator, cost $80 / hour and D7 bulldozer (cost $95 / hour). Having all work done by an excavator will be cheaper than mobilising two machines.
- Soil to be spread by excavator (which can spread soil over one hectare in 8 hours); appropriate drainage works to be installed.
- If the pad is compacted, the area must be ripped with a bulldozer or an excavator. A D7 bulldozer can rip one hectare in 3.5 hours, an excavator will take slightly longer.
- Disturbed area to be spread with fertiliser 8:4:10 at rate of 250 kg/ha; i.e. one kilogram will cover 40 m^2. A 225 m^2 drill pad will require five kilograms. Fertiliser costs about $22 per 50 kg bag. For easier handling, 25 kg bags can be ordered by request.

Costs for an average drill pad

Ripping if needed:	½ hour dozer or excavator time (minimum hourly rate)	$95
Soil replacement:	½–1 hour excavator time	$80
Seed (0.05 kg):	should be collected locally	
Fertiliser:	5 kg	$2–$8

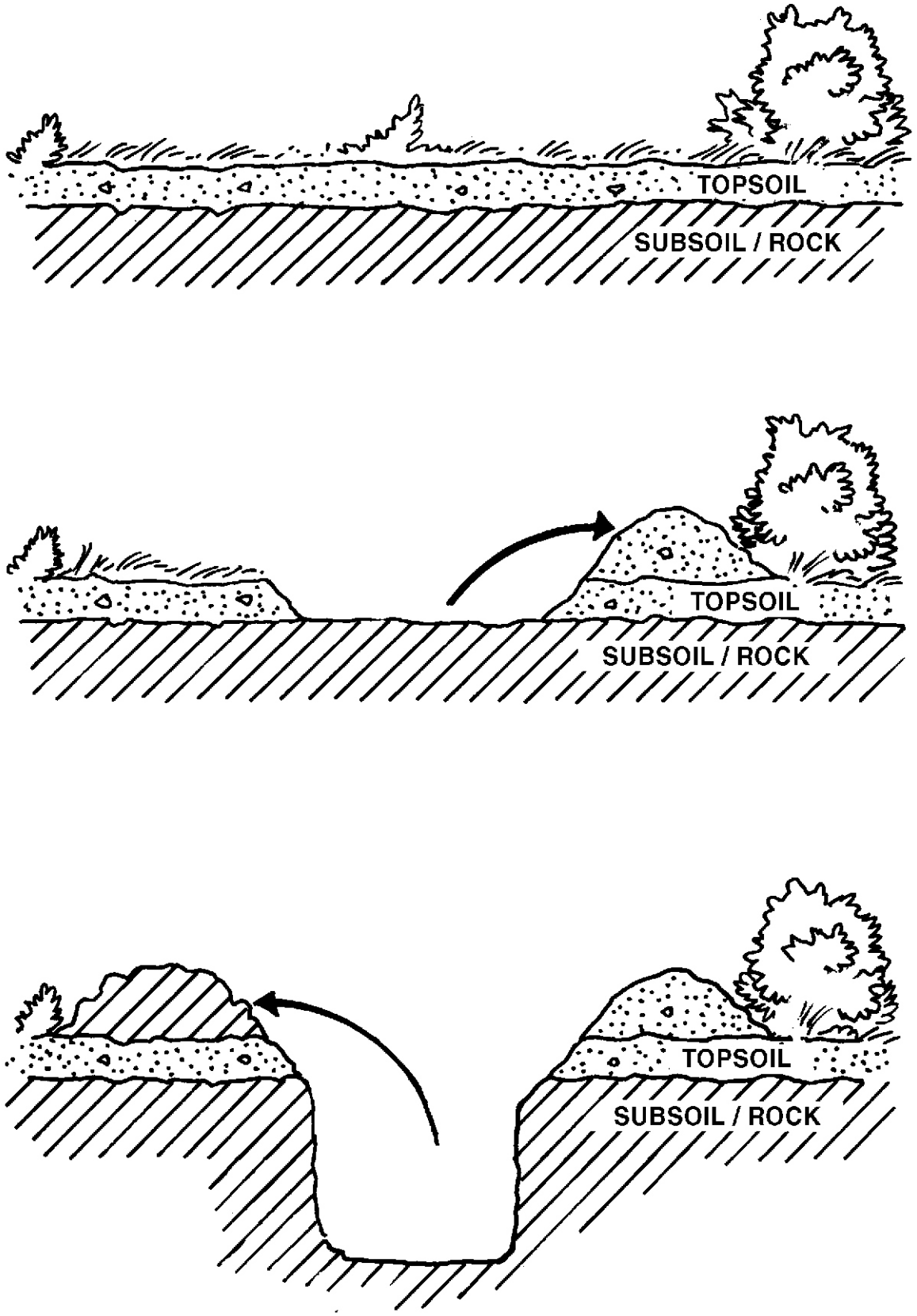
Placement of seed and fertiliser by hand.

The time of the person supervising the work must also be considered, as should the cost of floating the excavator to the site and between sites.

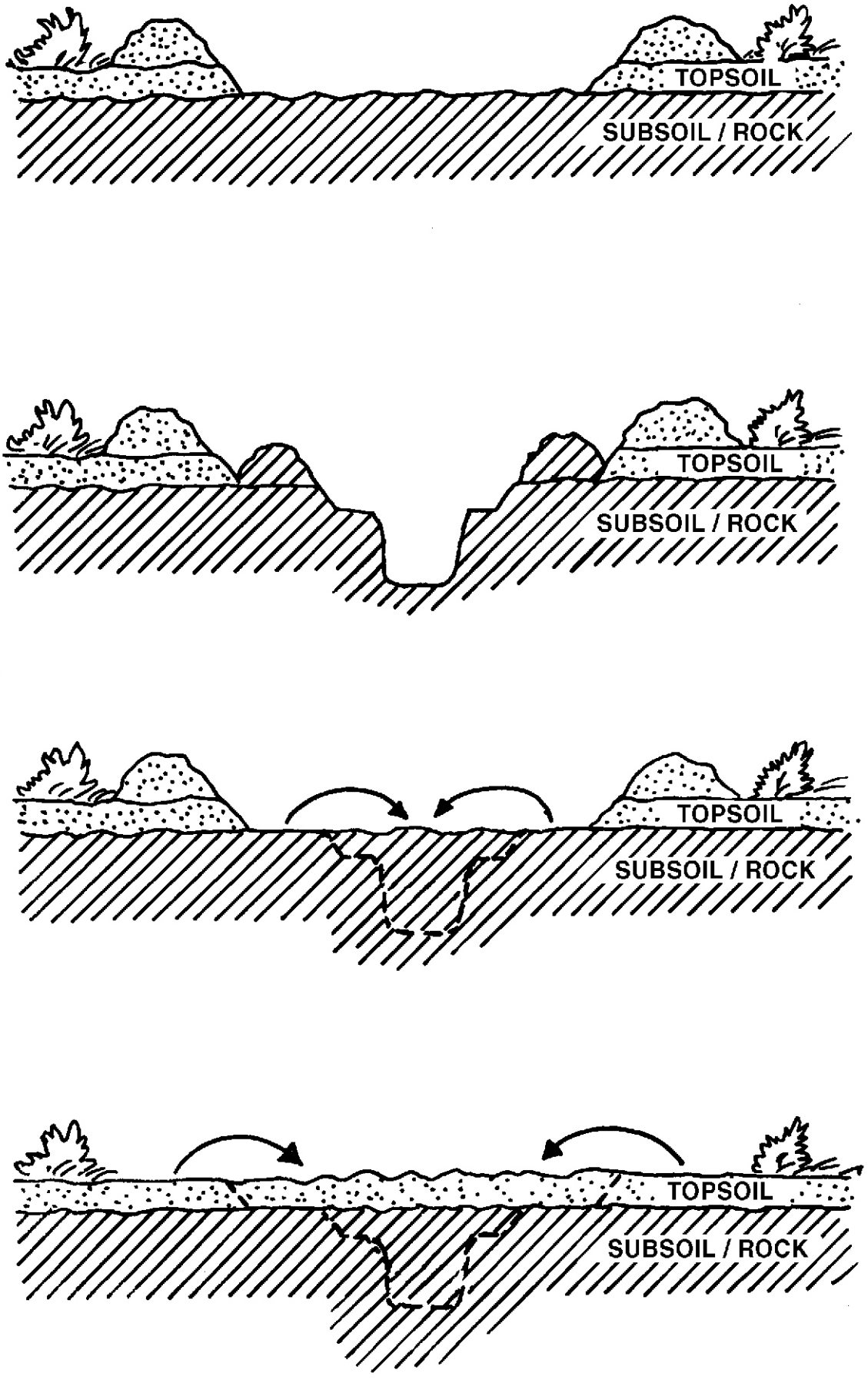
Costeans and Pits

- Costeans (meaning trenches) and pits should ideally be located to avoid large trees, but where this is not possible large trees (greater than 150 mm diameter) should be pre-cut and moved to one side for salvage.
- Topsoil (including scrubby vegetation) should be stripped and moved to one side of the costean.
- Topsoil should be stored in a long, narrow pile, no more than 0.6 m high. Piling topsoil into larger heaps does not allow oxygen to reach the centre of the pile, and useful soil organisms die. The soil becomes sterile and loses nutrients. Proper storage of soil is preferable wherever possible.
- Provide proper drainage through windrowed topsoil, which may have to lay for several months before rehabilitation works commence. Topsoil is easily erodible and must be protected from needless erosional loss by installing drainage if required. On a slope, a table drain uphill from the costean will be needed. This will also prevent the costean from filling up with water.
- Subsoil ('spoil') should be placed in a separate pile, not placed on top of the topsoil. One easy method for small costeans is to place the topsoil on one side of the costean and subsoil on the other. When the time comes to refill the costean, the subsoil is replaced first, then covered with the topsoil/vegetation mixture.
- With small costeans, which are filled in on the same day or within a few days of being dug, the storage of topsoil on one side and subsoil on the other is recommended. There is no need in these cases to strip topsoil to provide room for subsoil storage. However if the costean is large and will be left open for weeks or months, the topsoil should be stripped to make room for subsoil storage.
- Large costeans should be benched for the safety of workers. There may not be room on one side for the whole of the subsoil, in which case both soil and subsoil can be piled each side of the costean, but in separate piles.
- Bulldozers should never be used to dig trench-type costeans. Excavators and backhoes can do a far neater job. However when a shallow scrape is needed to expose rock for examination (also called a costean) then a bulldozer is the most suitable machine for this job.
- Replace scraped-off soil (if any) when a shallow 'scrape' costean is no longer required.
- Fill in costeans as soon as possible after the program has finished. Replace subsoil, then spread out topsoil and vegetation.
- Encourage new growth by application of fertiliser and seeds if the site requires such treatment. If soil has been stored for longer than three months, the nutrients will have been depleted and fertilising will certainly be an aid to revegetation. If stored longer than six months, seeding will also be beneficial.
- Refer to the chapter on *Rehabilitation and Revegetation* (page 76) for seeding rates and details on fertiliser types.

CONSTRUCTION OF COSTEANS

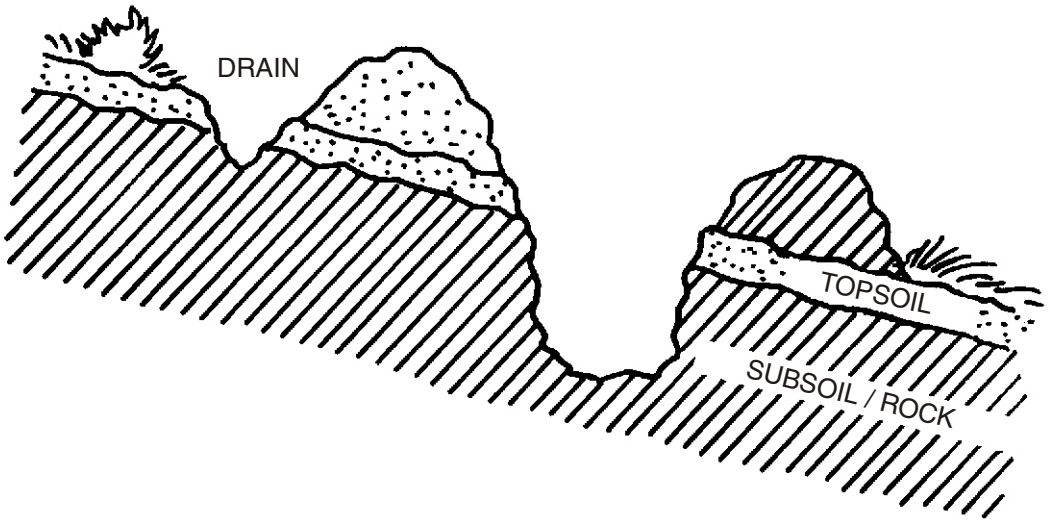


REHABILITATION OF COSTEANS

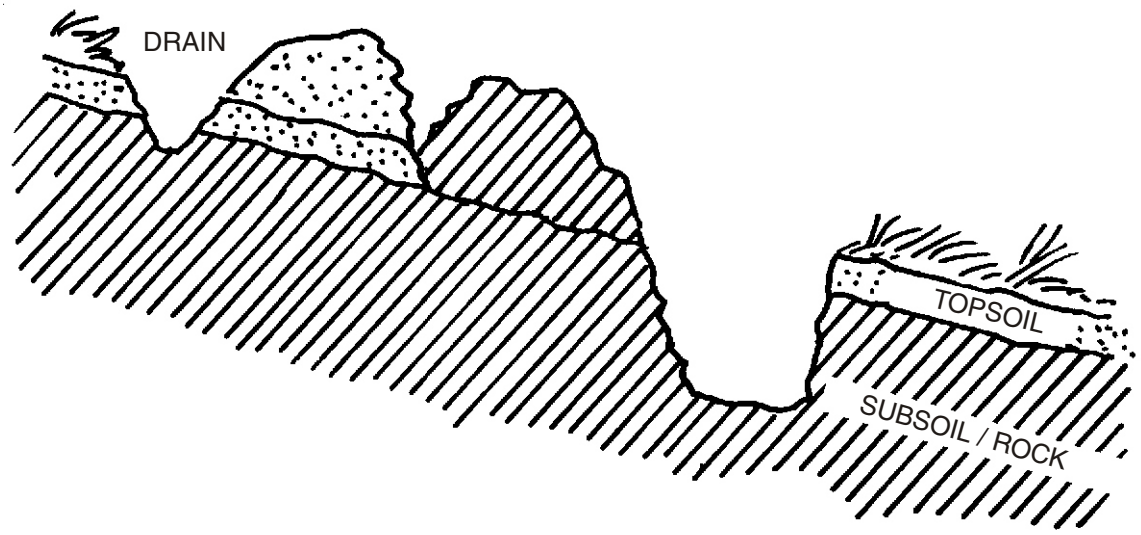


SLOPING SITES

On sloping sites provide drain above costean and soil storage



- ❑ Topsoil not stripped before soil storage
- ❑ Topsoil on one side of costean, spoil on other



- ❑ Topsoil stripped to make room for subsoil storage

Rehabilitation and Revegetation

Rehabilitation is defined as "those activities which seek to improve damaged or degraded lands or to re-establish land that has been destroyed and to bring it back to a form where its biological potential is reinstated" (BRADSHAW, A. D.; CHADWICK, M. J. 1980. *The Restoration of Land*. University of California Press).

TIMING OF WORK

Successful rehabilitation is dependent on the works being done at the correct time of year. Earthworks should be done when the soil is dry enough to move — usually between November and March. Under no circumstances should earthworks be attempted when the soil is wet and waterlogged.

Seeding and fertilising should be done after the replaced soil has been softened by rains. Autumn is the ideal time to seed and fertilise replaced soils (i.e. March to May).

Peat can be replaced at any time.

ESTABLISHING A VEGETATION COVER

Once topsoil has been respread over a prepared disturbed area, a vegetation cover must be established. The viability of the seed and vegetative matter contained in the stockpiled topsoil degenerates dramatically with time. After 3 to 6 months stockpiled soil will have lost much of the regenerative material, and seeding may be needed.

Seeds should ideally be collected from plant populations growing locally, to preserve the integrity of the local gene pool. Seeds, when hand sown, should be bulked with sand or sawdust for ease of sowing.

NURSE CROPS

On large patches of bare ground, the sowing of a 'nurse crop' such as cereal rye (*Secale cereale*) can be beneficial. This is a crop species which will not persist to invade surrounding bush.

Cereal rye can be sown at 15–25 kg/ha as a cover crop, but as a stabilisation crop the seed should be sown at 70–100 kg/ha. The grass protects the soil from erosion, gives shelter to smaller sprouting seeds, and as it dies off a useful mulch is produced. Sowing a mix of native seeds and an annual nurse grass crop can assist in the establishment of a vegetation cover faster than if native seeds are sown alone.

MULCHING

Mulching also aids revegetation on very exposed sites by providing protection from extremes of heat and cold and drying winds to the newly germinated seedlings. Mulches must be chosen carefully and must not contain any weed seeds which may be thereby introduced into the area. Products such as straw, woodchips, shredded bark or OR-90 (when coarsely ground) can all be used as mulches. Straw is commonly spread at 2 to 4 tonnes/hectare. Do not use hay, as this contains seeds, which may become weeds in the area in which the bales are used.

Where erosion is a particular problem, such as on steep slopes, straw or mulch can be held in place by using non-galvanised 0.9 mm wire netting with a 50 mm mesh, stapled down at intervals of 1 to 2 metres.

POTTED SEEDLINGS

Potted seedlings may be used where 'instant' growth is needed, although these are quite expensive, costing from $2.00 to $2.75 each. Seedlings usually have to be bagged properly to prevent excessive losses through grazing damage. Field trials have shown that seedlings from sown seed often overtake planted out seedlings after two years or so, as the potted plants suffer some setback on planting out.

Nonetheless potted seedlings are very useful in areas where there may be fierce competition with opportunistic grasses, which prevent seedlings grown from seed from making reasonable progress.

HYDROMULCHING

There is a technique known as 'hydromulching' which is most useful in covering large bare areas. This consists of spraying the bare area with a mix of water, appropriate seeds, fertiliser and mulch, such as paper pulp mixed with indicator dye in a water and glue solution. The mix literally 'sticks' wherever sprayed, and the dye enables the sprayer to see what ground has been covered. The fertiliser and mulch enable the seedlings to get off to a good start. There are a number of companies who specialise in this field, and will make up seed mixes to suit the site being treated.

TEA-TREE SLASH

One of the cheapest and easiest methods of revegetation, which is appropriate for use over small areas in many parts of Tasmania, is tea-tree slash. Pieces of seed-bearing tea-tree are collected — being careful to trim bushes selectively and not cut all the slash in one small spot — and these are laid over the newly spread topsoil. About one piece of slash per square metre is sufficient. The seeds drop out of the tea-tree, the leaves dry and fall off to form a mulch, and the twigs left act as sun, wind and grazing protection to the small tea-tree seedlings.

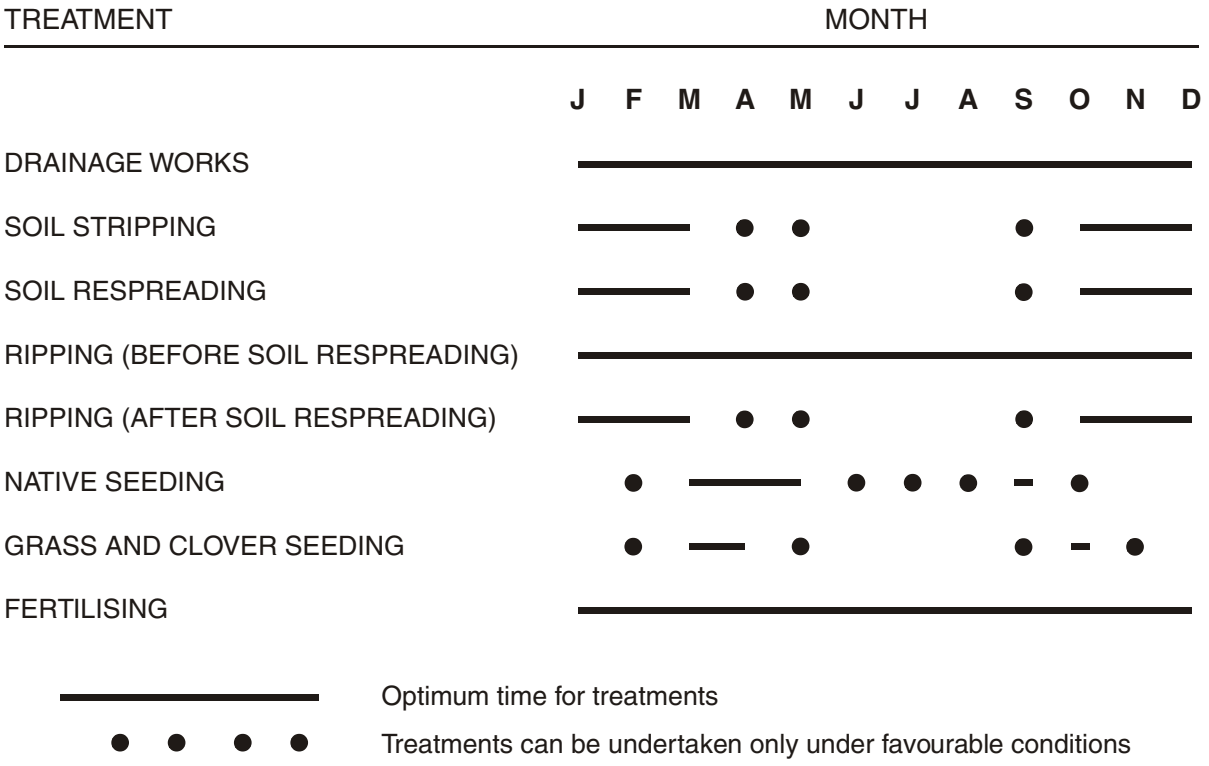
This is of course not suitable in absolutely every exploration site, but is, nonetheless a good solution to economical revegetation of sites in many cases. Additional seeds and/or fertiliser can be added over the slash.

FERTILISERS

Field trials have shown that native plants do, in fact, respond well to small doses of fertilisers; this is especially evident in the establishment phase. There is some field evidence that the Myrtaceae family do especially well with the addition of small amounts of fertiliser; the Proteaceae do not do so well, and may in fact be hindered. Insect damage has been noted in some trials to be more severe in fertilised plots, due no doubt to the increase in lush new growth which can sustain greater numbers of insects. Grazing damage can also be greater on fertilised plots than on similar, non-fertilised plots.

On the whole, the use of fertiliser, especially in small amounts, is preferred to non-use. Use a fertiliser such as the off-the-shelf 8:4:10 or 6:5:5 plus magnesium mix, at a rate of no more than 250 kg/ha. At a rate of 250 kg/ha, one kilogram of fertiliser will cover 40 m^2. One handful (approximately 100 g) will cover four square metres.

Optimum Timing for Rehabilitation Works



(from DUCKETT , T. A. P. *Rehabilitation guidelines for forest construction*. Forestry Commission, Tasmania)

Use of Helicopters and Helipads

The information in this chapter has mainly been provided by Helicopter Resources. Some information is from a pocketbook on helicopter safety procedures by Tim Rudman (Parks and Wildlife Service) and Tony Mount (Forestry Tasmania).

In some areas of inaccessible terrain, the easiest option will sometimes be to mount a helicopter-assisted drilling program. Ground parties using chainsaws, machetes and axes cut 'pads' large enough for the helicopter to land safely. All large items of equipment are then brought in for the program by helicopter, and removed when the work is finished.

The costs of helicopter services and the safety requirements, such as size of the helipad and the size and direction of the flight path corridor, will vary according to the type of craft used, the nature of the terrain, and the loads which must be carried. The size of the helicopter landing pads will also vary according to the site and the work envisaged.

Explorers should ascertain from their helicopter contractors the exact requirement for each program.

However, as a rough guide, the following details relate to the minimum requirements for the use of an AS-350 model helicopter (the Squirrel).

HELIPAD CONSTRUCTION — MINIMUM REQUIREMENTS

The minimum size of a helipad for 'once only' landings, where no sling work is required, is around 14 14 metres.

Pads subject to frequent use, or where any sling work is required, must be at least 20 17.7 metres.

Whilst this size is generally sufficient on LEVEL GROUND, larger clearings may be required in sloping country. The direction of landing is variable in bush situations because changes in weather conditions cause variations in landing direction.

The pad size may also be dependent on the height of the surrounding vegetation. The taller the trees, the longer the opening required in the direction of takeoff and landing.

The area must be cleared so that the tail rotor does not come into the proximity of overhanging branches, standing tree trunks, or rocks sticking up out of the ground. The clearances required are:

TAIL ROTOR:	900 mm from ground level
MAIN ROTOR:	2.3 m from ground level

There must be good 'all round' clearance to allow sufficient room for manoeuvring of helicopters and loads.

Ideally the helipad area should be flat, level, and clear of any foliage or rocks which rise above ground level.

Remember that a helicopter produces strong draughts on both takeoff and landing, and all loose items — small branches, tarpaulins, empty sample bags, buckets, clothing etc. may be swept up into the rotor system or engine intake. Ensure that the helipad is clear of any loose items prior to arrival and departure of the craft.

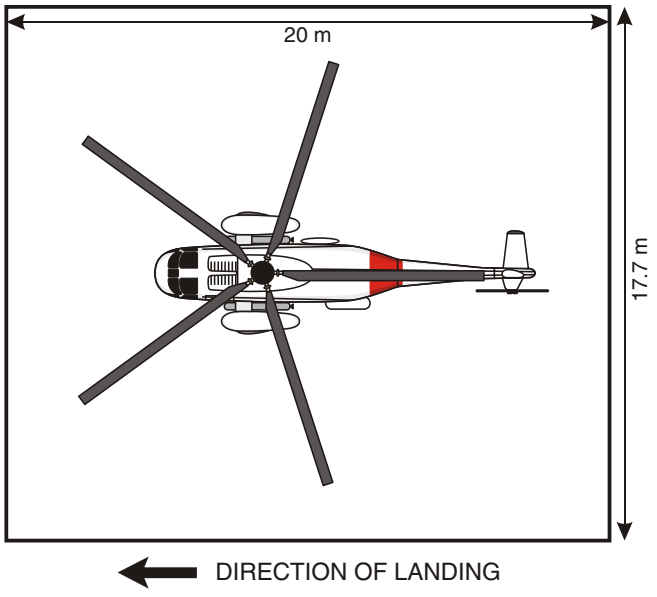
The helipad must have a clearly marked 'TOUCHDOWN ZONE' which must be at least

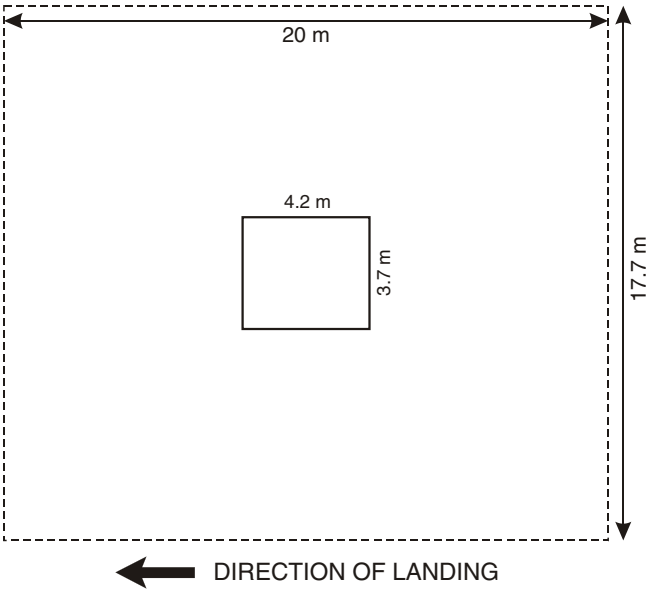
4.2 m in LENGTH

3.7 m in WIDTH

with a maximum slope of 7° (grade of 1 in 8) and be able to support a load of 4000 kg (4 tonne).

The TOUCHDOWN AREA must be clearly defined. This area may be level with the ground, or on a raised platform.





RAISED TOUCHDOWN AREAS such as 'LOG HELIPADS' are good in that better clearance can be provided, especially for the tail rotor. Logs must be placed on the pad so that there are no spaces between them. They must be aligned PERPENDICULAR to the line of flight, so that on landing the helicopter's skids rest across a number of logs, not along one log.

IDEALLY THE TOUCHDOWN AREA
SHOULD BE DEAD LEVEL.

FLIGHT TERMINATION AREA

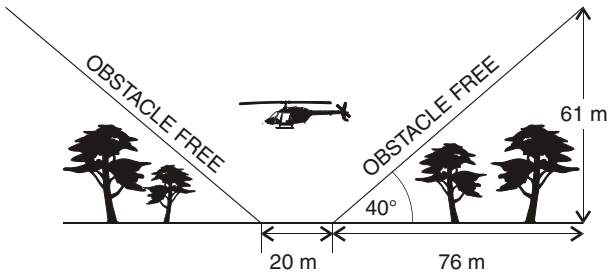
At the centre of the helipad there should be a CIRCULAR AREA of 10.7 m DIAMETER which has a maximum slope of 7° (1 in 8) which the pilot can use as a flight termination area.

FLIGHT ACCESS CORRIDOR

In timbered country, there may be a need to clear an access corridor to allow the helicopter to fly into and out of the helipad. The actual dimensions of such a corridor will depend on the site, and on the type of loads which must be carried.

Discuss the program with you helicopter contractor and ascertain the precise requirements for the job.

RECOMMENDED MINIMUM HELIPAD DIMENSIONS



ELEVATION

Essential requirements:

(1) Sufficient tail rotor clearance all round — vegetation less than 900 mm height.

(2) Maximum 40° approach and departure angles.

(3) Touchdown area minimum 4.2 ´ 3.7 m and slope <5°.

(4) All loose or light objects removed from ground effect area.

(5) Relatively free of dust.

USING HELICOPTERS

Responsibility — Air Safety

- ☐ The pilot is the sole arbiter of any matter affecting the safety of the aircraft, air crew or sling load.

Responsibility — Helipad Safety

- ☐ The officer in charge shall be responsible for all ground operations around the landing site or helipad.

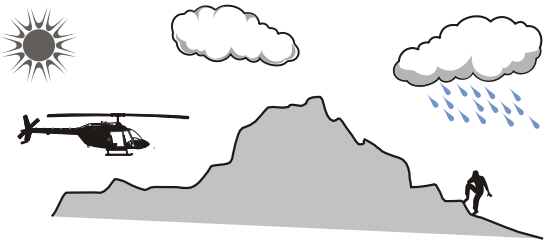
Briefings

- ☐ All personnel involved in an operation are to be thoroughly briefed in procedure and safety.
- ☐ The officer in charge shall inform the pilot, where necessary, of the following hazards:
  - Power or telephone poles and lines, towers, blasting operations, dangerous goods on board.
- ☐ The pilot will require briefing on the number of passengers, type and weights of any loads (internal and external), distances, topography, helipads, fuel dumps, etc.

Remote areas

If you are dropped in a remote locality for a day, ensure that you take gear and provisions adequate for at least a one night stay in the bush. Bad weather can prevent your pilot from returning to pick you up. Survival gear such as a tent, food, strobe light, heliograph, flare, first aid kit, matches and warm clothes should be stashed in a waterproof plastic drum, which is clearly marked. This should be checked before fieldwork, and should be off-loaded with you every time you are dropped in a remote area. The minimum party size should be at least two. Individuals should not be dropped into remote locations alone.

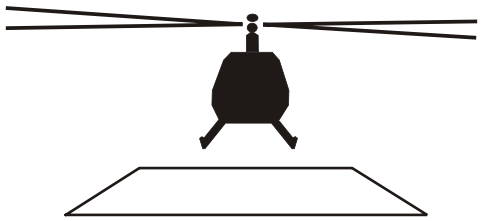
WEATHER



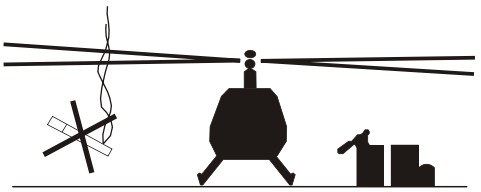
If dropped off in a remote area carry emergency clothing and food.

Watch the weather for signs of closing in and maintain radio contact for evacuation if necessary.

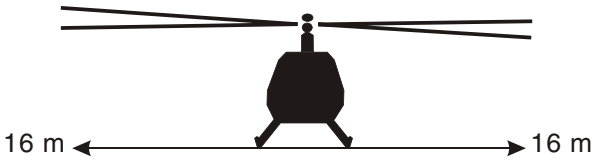
HELIPAD SAFETY



Keep heliports clear of unauthorised personnel, equipment and loose or light objects.



Do not smoke in flight or within 16 metres of helicopter on the ground, fuel dumps or refuelling equipment.



Stay away from helicopter when rotor blades are in motion, unless authorised by the pilot or OIC. This means stay at least 16 metres away.

Stay away from the tail rotor at all times, and see that others do likewise.

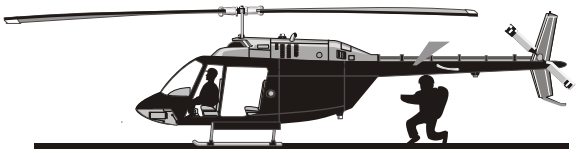
Unless equipped with safety goggles or glasses, do not watch landings, take-offs or hovering closer than 32 metres from the helicopter.

EMBARKING, DISEMBARKING

Always approach the helicopter from the side — forward of the pilot's line of sight.

EMBARKING, DISEMBARKING

Wait until the pilot gives OK before approaching. On soft or uneven ground helicopters often need to reposition.



Never walk behind or under the tail of a helicopter, even when the rotors are not in motion.

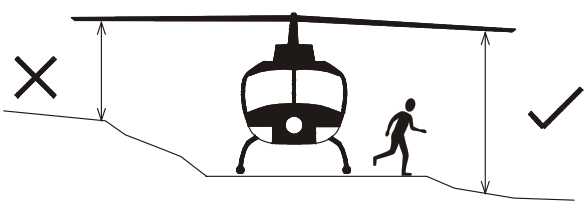
If blinded by swirling dust and grit, stop, sit down and await assistance.

In gusty conditions the main rotor blades will sail closer to the ground as they slow down. Wait until the rotor blade has stopped before approaching.

Approach helicopter in a crouched position. Hold on to any loose articles of clothing and hats. If possible use a hat with a chin strap when working around helicopters.

When boarding a hovering helicopter be sure to transfer your weight very gradually onto the skid and then the steps. DO NOT LEAP at the skid or cause your weight to shift suddenly to the machine.

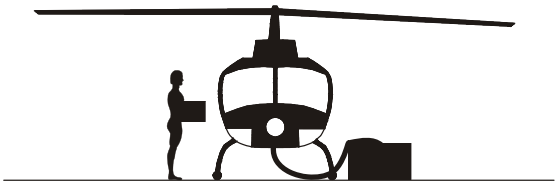
When leaving a helicopter disembark quickly and quietly. Do not cause a sudden shift in weight, even if the helicopter is on the ground.



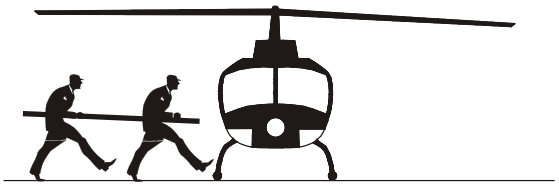
On sloping ground approach and leave the helicopter ON THE DOWNHILL SIDE of the machine, to avoid the main rotor.

LOADING AND UNLOADING

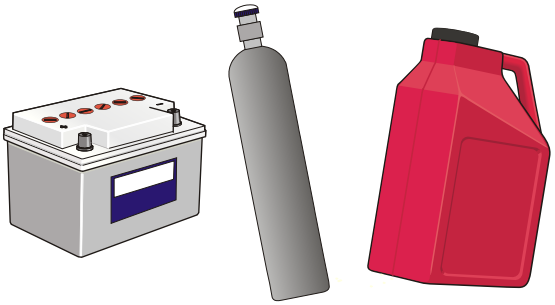
Carry any tools, such as picks and spades, at waist height. DO NOT carry anything on your shoulders. DO NOT throw anything out of the craft on landing — especially shovels and the like — as these may hit the rotor.



Never stand directly beneath moving helicopter rotors, unless trained in and performing sling load hookup operations.



All long tools and equipment must be carried by two people, one at each end.

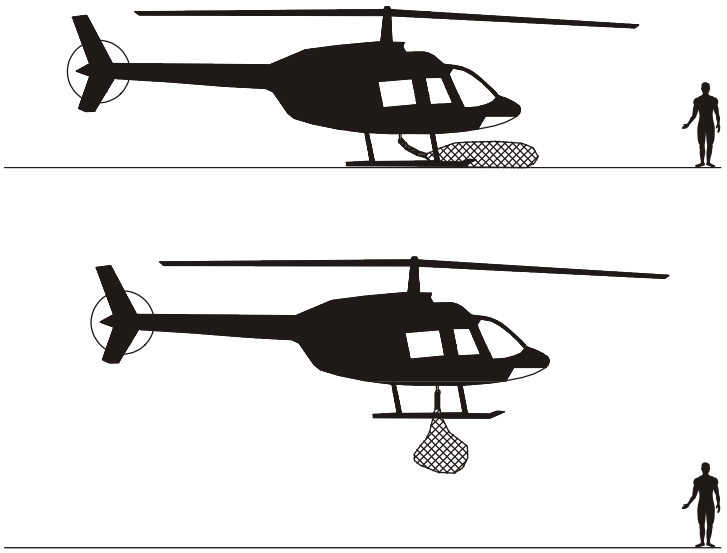


Always check goods to be loaded with pilot, especially batteries, fuel containers, pressurised vessels, etc. These may need special containers.

Keep helicopter landing site clear of any loose articles which could fly around in the draught caused by the take off and landing. Such articles include groundsheets, tarpaulins, clothing, Eski lids and so on. Keep all gear at least 5–10 m away from edge of landing area.

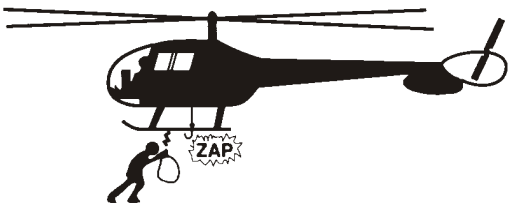
If moving a crew, ensure that all members are familiar with safety rules and keep them back from the landing zone. Have them face away from the helicopter as it lands and takes off. Ensure that the crew files into the helicopter in an orderly fashion as soon as pilot gives the signal to board. Do not have any tents in the immediate flight path or they may be blown flat.

LOADING AND UNLOADING

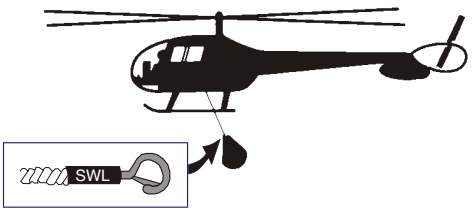


Workers loading slings must always be provided with eye or face shields to protect their eyes from flying debris.

After a sling has been hooked up (either to a stationary or to a hovering helicopter) move to a position in front of the helicopter in full view of the pilot, so as to avoid being hit by the loaded sling. If using a radio to give instructions to the pilot during sling work, do not give any order which requires manual acknowledgement, as the pilot will be busy with both hands on the controls.

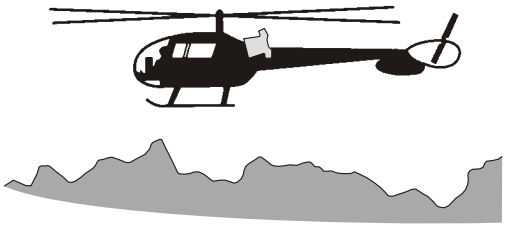


Be aware of static electricity build up on the aircraft when hooking up in the hover position.
The discharge is unlikely to cause injury.



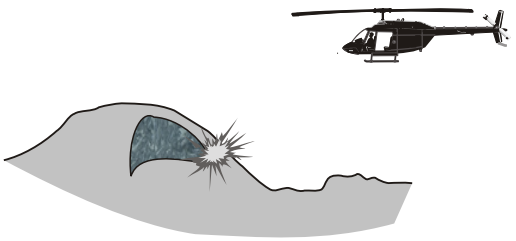
Use only aircraft-rated strops, shackles, etc. Check with the pilot. Check all knots or retie, lockwire all shackles with stainless steel wire.

When winching stand clear until load reaches the ground, then move in to disconnect.
When hooking up always take the bag to the hook, don't swing the hook.



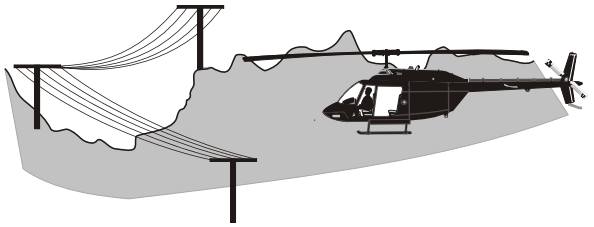
Check that gear is stowed securely and that lockers are closed.

FLYING



Check with quarries in the vicinity (2 km) of low flying operations to ensure that no blasting will be occurring during planned flights.

Keep all loose objects secured in flight and never throw or let any object fall from the helicopter. Even a plastic bag around a rotor may bring down a helicopter.



Keep alert for hazards — inform the pilot. Don't assume that the pilot has seen any hazard.

Do not talk to the pilot during take off and landing or when air traffic control are calling.

NO SMOKING

IN FLIGHT

SEARCH AND RESCUE GROUND SIGNALS

- Do not make any signals to aircraft unless in distress or searching.
- If assistance is required, attract the attention of an aircraft by using smoke signals, flares, mirrors or movement of brightly coloured objects. The accepted distress signal is three signals together, regularly spaced.
- Use only the ground to air signals listed below for passing on messages. These symbols are recognised by the Civil Aviation Safety Authority and Tasmania Police.
- Make the symbols at least two metres long with as great a contrast in colour against the background as possible. Use the same colour throughout if possible.
- The aircraft will indicate that the symbols have been seen and understood by rocking from side to side.
- The aircraft will indicate that the symbols have been seen but not understood by making complete right hand circuits, when viewed in direction of flight.

SYMBOLS

REQUIRE DOCTOR SERIOUS INJURIES	I	ALL WELL	LL
REQUIRE MEDICAL SUPPLIES	II	NO	N
REQUIRE FOOD AND WATER	F	YES	Y
INDICATE DIRECTION TO PROCEED	K	NOT UNDERSTOOD	⅃ L
AM PROCEEDING IN THIS DIRECTION	↑	NOTHING FOUND CONTINUING SEARCH	NN

FACTORS AFFECTING THE CAPABILITY OF HELICOPTERS

Even though, as previously stated, the helicopter is a versatile aircraft, there are certain factors which limit its capability, and it is important that users are aware of these.

The major factors are dealt with below.

POOR WEATHER AND TURBULENCE

Poor weather conditions, apart from reducing visibility, may produce air turbulence which can affect the handling of helicopters, thus limiting their capability.

TEMPERATURE AND ALTITUDE

High temperatures and altitudes lessen the helicopter's lift capacity thereby reducing the maximum load which can be carried.

FUEL REQUIREMENTS

Compared with fixed wing aircraft, the helicopter has a very short endurance. Support helicopters normally leave Hobart with a full fuel load which will last from 2 to 3 hours. If the area of operation is remote from a major centre, thought must be given to either establishing a fuel depot in the field or ensuring that the helicopter brings sufficient fuel with it in the form of 20 litre cans or slung 200 litre drums. Liaison with the pilot, prior to his departure, is essential in order to establish the fuel requirements. Stocks of aviation fuel are normally located at the Hobart, Launceston, Devonport, Wynyard and Queenstown airports. Additionally, the operator normally has fuel stocks at Smithton, Tullah, Strathgordon, St Helens, Catamaran and Lake St Clair.

Prior notice will be required to obtain and shift drumstock (200 litre drums) from these centres to remote areas.

GROUND/AIR/GROUND COMMUNICATIONS

Most helicopters are equipped with 99 channel VHF radios for communications on the State Disaster Plan frequencies.

Note — Channelisation of these radios may differ from the State Disaster Plan channelisation.

The Pilot also has additional VHF and HF radio communications.

Normal flight practice is to maintain a ½ hourly SAR schedule with air traffic control. In mountainous areas the helicopter may need to gain height in order to report.

MEDICAL EVACUATION BY HELICOPTER

GENERAL

There are a number of factors which must be considered before transporting an injured person in a helicopter. The major factors are:

- Pressure changes.
- Turbulence and vibration.
- Noise.

These factors are dealt with below.

PRESSURE CHANGES

Any increase in height will produce a corresponding decrease in pressure. In a non-pressurised helicopter this can seriously affect an injured person. The parts of the body affected by pressure changes are the ears, sinus, lungs, gut and teeth. Severe pain will be experienced by persons suffering with ear and nasal problems; for example, persons with a heavy cold or with blocked sinus will experience severe pain, particularly when the aircraft is descending.

Another problem associated with reduced barometric pressure is that of decompression sickness or 'bends'. This may occur when there is a rapid ascent and is caused by gases, mainly nitrogen, escaping from the blood and tissue fluids into the cells of the body.

TURBULENCE AND VIBRATION

Turbulence and vibration are major factors to consider in relation to the transportation of an injured person in a helicopter. This is particularly so if the person is suffering from fractured limbs. Before transporting a person with a fracture, the following actions should be taken:

- Better than average splinting must be placed around the fracture;
- Layers of foam should be placed under both the fractured limbs and the person;
- If necessary sandbags should be placed around the fractured limb to completely immobilise it.

NOISE

Noise is another factor to consider, as irritability can occur with a distressed person or a person suffering from head injuries.

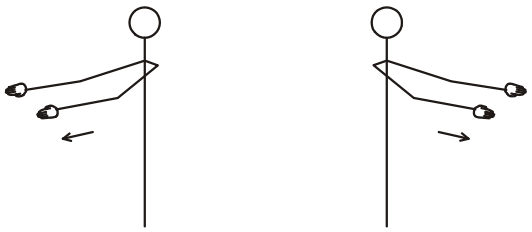
CONCLUSION

Prior to transporting an injured person in a helicopter the factors dealt with above must be considered. In addition the following rules must be observed:

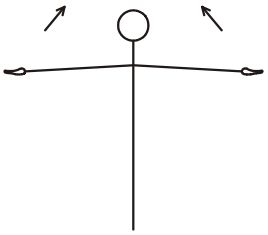
- Ensure that the condition of the injured persons is established. That is, the person must have a regular pulse, good breathing and acceptable blood pressure.
- Ensure that any bleeding has been stopped before transporting the person. NEVER transport a person who is haemorrhaging internally or externally.

HAND SIGNALS

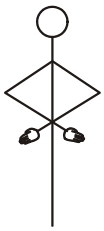
The following are universally accepted hand signals to helicopter pilots:



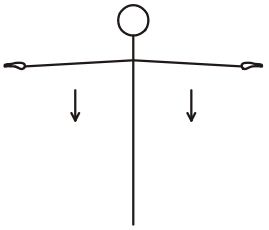
MOVE HORIZONTALLY: Appropriate arm extended horizontally sideways in direction of movement, and other arm swung in front of body in same direction, repeating movement.



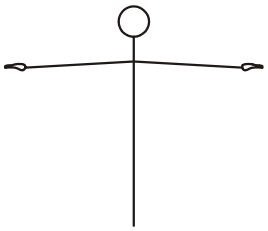
MOVE UPWARDS: Arms extended horizontally, palms facing upwards; move palms upwards; speed of movement indicates rate of ascent.



LAND: Arms crossed and extended in front of body.

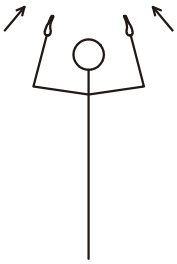


MOVE DOWNWARDS: Arms extended horizontally, palms facing downwards; arms move downwards; speed of movement indicates rate of descent.



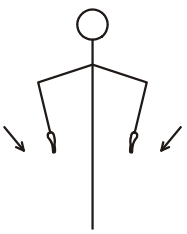
HOVER: Arms extended horizontally from shoulder.

WINCH DOWN: Left arm horizontal in front of body, with fist clenched. Right hand with palm turned down, making a downwards motion.

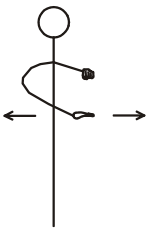


COME FORWARD: Arms in front with palms facing body, beckoning helicopter forward.

LOAD HAS NOT RELEASED: Right arm held across chest, bent at elbow; palm facing downwards; left hand held under arm and pointing upwards to make a 'T' shape.



MOVE BACK: Arms in front with palms facing away from body pushing helicopter away. Pushing movement.



RELEASE SLING OR WINCH LOAD: Left arm extended in front of body, fist clenched; right hand making slicing movements below left fist; palm downward.

NOTE

Important hand signals to remember are the 'thumbs up' and 'thumbs down' signals.

THUMBS UP indicates to the pilot any of the following:

YES, ALL IS WELL, UNDERSTOOD

THUMBS DOWN indicates to the pilot any of the following:

NO, ALL IS NOT WELL

Camping

Fieldwork must frequently be carried out from base camps. Large programs may be conducted from hutted camps, whilst smaller programs often involve tented camps for brief periods of time. The general rule of camping, either at hutted camps or in tents, is to leave an area in the same, if not better, condition than found.

FIRE PRECAUTIONS — ALL CAMPS

- *The Fire Services Act 1979* (Section 69) forbids the lighting of any fire for cooking or warmth in or on peat, humus or marram grass, or within three metres of any stump, log or standing tree. Fires shall not be left unattended unless completely extinguished. As a general rule open fires are not encouraged and all cooking should be done on fuel stoves wherever possible.
- Should an open fire be needed, then only dead wood is to be used as fuel. The fire should only be lit in a cleared area, and must be kept as small as possible. A cut-down 44 gallon drum makes a good container in which a fire may be confined. The fire must be extinguished prior to the campsite being vacated.
- Most huts have fireplaces installed. Spark arresters on the flue or chimney are recommended in all areas. Only fallen or dead wood should be collected for use in the fireplace.
- Many huts have generators installed for electric power. As with all machines, these must be well maintained. Leaves and debris should not be allowed to collect near the exhaust of these machines as this could represent a fire hazard in some conditions.
- On all work sites where chainsaws, power augers, generators or other petrol-driven machinery are either used or serviced, there must be a serviceable knapsack filled with not less than 10 litres of water, or a powder-type fire extinguisher of not less than one kilogram capacity, for fire fighting purposes.
- All premises used as kitchens, or used as sites for the storing of fuel, or servicing or refuelling machinery, will be:
  - cleared to bare earth;
  - surrounded by a firebreak sufficient to isolate the premises from the surrounding vegetation.
- All hutted camps are to be fitted with serviceable fire extinguishers.
- During a FIRE PERMIT PERIOD persons occupying permanent (i.e. hutted) and temporary (hutted or tented) camp sites, drilling sites and work sites either using, refuelling or servicing any earthmoving equipment shall have the sites equipped with the following fire fighting tools:
  - a serviceable knapsack pump filled with not less than 10 litres of water;
  - a slash hook;
  - a fire rake or grubbing-hoe, or beaters;
  - a receptacle containing not less than 180 litres of water.

ALL CAMPS — GENERAL GUIDELINES

- All rubbish is to be removed from campsites and shall not be burnt or buried. Tins, especially, shall not be discarded as wildlife are prone to getting their heads stuck in such items, causing injury and/or death to the animal, in addition to the visual problem of the litter. Rubbish containers (e.g. 200 L drum) should be provided at campsites.
- Ensure washing (of people, dishes, clothes) is done at least 50 m from any watercourse. Scatter soapy water into ground, so some filtering is done before water percolates back to nearest stream. DO NOT wash dishes in creeks, streams or lakes, as this will introduce food scraps into clean water. Use biodegradable soaps and detergents.
- Pets (dogs and cats) should be left at home.

HUTTED CAMPS

Permanent or large semi-permanent camps must be equipped with either a long drop toilet pit or a chemical toilet. The contents of the latter should be flown out for proper disposal.

The provision of cording or duck boarding around huts in boggy areas will be both more comfortable for camp users and environmentally responsible. Such materials should be ferried in to the camp, not cut from local vegetation.

TENTED CAMPS

- Unless completely unavoidable, no vegetation should be cut to provide a campsite. Suitable campsites can often be found without resorting to the cutting of standing vegetation. Use existing campsites wherever possible.
- Camp at least 50 m away from watercourses of any size — freshwater lakes, creeks and rivers.
- Toilet waste should be buried at least 100 m from any campsite or watercourse. A hand trowel should be carried for this purpose. Dig a hole at least 150 mm deep in soil to bury waste. In snow bury refuse in soil beneath snow wherever possible. The snow will melt leaving refuse if this is not done!!!
- Camping parties are expected to be equipped with modern camping gear including bedding, air mattresses, foam mats or stretchers for bedding, and tents including tent poles, to avoid the old fashioned practice of cutting ferns for bedding and saplings for tent poles.
- The construction of campsite ‘furniture’ is to be avoided. Lightweight chairs and tables are to be ferried in (and out again) if required.

Plant Diseases

Some plant and stock diseases and weed species can easily be transported by people and vehicles, and especially by heavy earth-moving machinery, if hygiene measures are not observed between jobs. Whilst mineral explorers are not the sole users of heavy machinery in isolated areas, or the sole users of many West Coast tracks, there remains an obligation on all users of all tracks to try and prevent the spread of weeds, and of pathological fungal diseases. One of the worst plant diseases in Tasmania is the fungus *Phytophthora cinnamomi*, and whilst this disease is incurable, strict hygiene measures may reduce the spread of this menace.

PHYTOPHTHORA

Five species of *Phytophthora* (commonly known as 'water moulds') have been found in native vegetation in Tasmania (Rudman and Whinam, 1995). Of these only *Phytophthora cinnamomi* is a significant threat to the biodiversity in Tasmania.

Phytophthora cinnamomi (known as Cinnamon Fungus) is an introduced plant fungus which causes dieback and death in many of our native plant species. The fungus can be water borne, and lives in soil. One of the prime methods by which this disease is spread is by the carriage of particles of soil from infected to uninfected zones.

The quantity of soil which must be moved to infect an area is staggeringly small. The fungus is known to have been spread by the passage of walkers; both wombats and sulphur-crested cockatoos are suspected vectors. The spread of this fungus by earth-moving machinery is a real possibility.

Studies (Podger *et al.*, 1990) have shown that, unfortunately, the fungus is already present over much of Tasmania, but the fungus is unlikely to survive on sites where the mean annual temperature does not exceed 7.5°C, or the annual mean rainfall is less than 600 mm; i.e. the fungus will not live in cold, dry areas such as on parts of the Central Plateau.

A map showing the location of known sites of infection is included in this Code.

Whilst strict hygiene measures must obviously be observed in the *Phytophthora*-free zones, there are also good arguments for continuing some hygiene procedures in areas known to be already infected with the fungus. In an infected area, the species most susceptible to the fungus will brown off and die completely. Susceptible species include Blackboys (*Xanthorrhea australis*), Christmas Bells (*Blanfordia punicea*), Springelia (*Sprengelia incarnata*), white Waratah or whitey-wood (*Agastachys odorata*), Melaleuca (*Melaleuca squarrosa*), Pandani (*Richea pandanifolia*), Mountain Berry (*Gaultheria hispida*) to name just a few. In fact, most of the heath family (Epacridaceae), the pea family (Fabaceae), and the Proteaceae (Banksias, Hakeas and the like) are all very susceptible. Even rainforest tree species and many eucalypts are not immune from this disease.

Special care should be taken in coastal heathlands, buttongrass, sedgeland plains, and in dry eucalypt forest areas.

After an area becomes infected the more susceptible plants die, and these are replaced by other, more hardy types. Thus the core area of an infected zone may well seem to be of healthy scrub — but a number of key species will be missing. Out from this now-revegetated core will be a zone where the susceptible species will be dead and dying, then beyond this, healthy plants in the uninfected zone. When moving from an infected to an uninfected area, always clean boots and tools, and wash machinery and vehicles. Plan routes to avoid entering infected regions then passing into uninfected country. Visit infected areas last on a journey.

Before undertaking certain activities in areas known to be *Phytophthora*-free, explorers may be required to observe hygiene regulations. Mineral Resources Tasmania, in consultation with other government agencies, will advise what precautions are required.

HYGIENE MEASURES

Bleach (sodium hypochlorite) is no longer considered to be useful as an effective fungicide. Whilst bleach-treated water readily kills the fungal spores, it is not effective in killing mycelium unless used in very high concentrations with the item being soaked for at least 24 hours. Consequently the use of bleach as a fungicide is no longer recommended.

The use of fungicides is only recommended where the machinery can be washed at a purpose-built wash down site, where the effluent is transferred to appropriate treatment facilities.

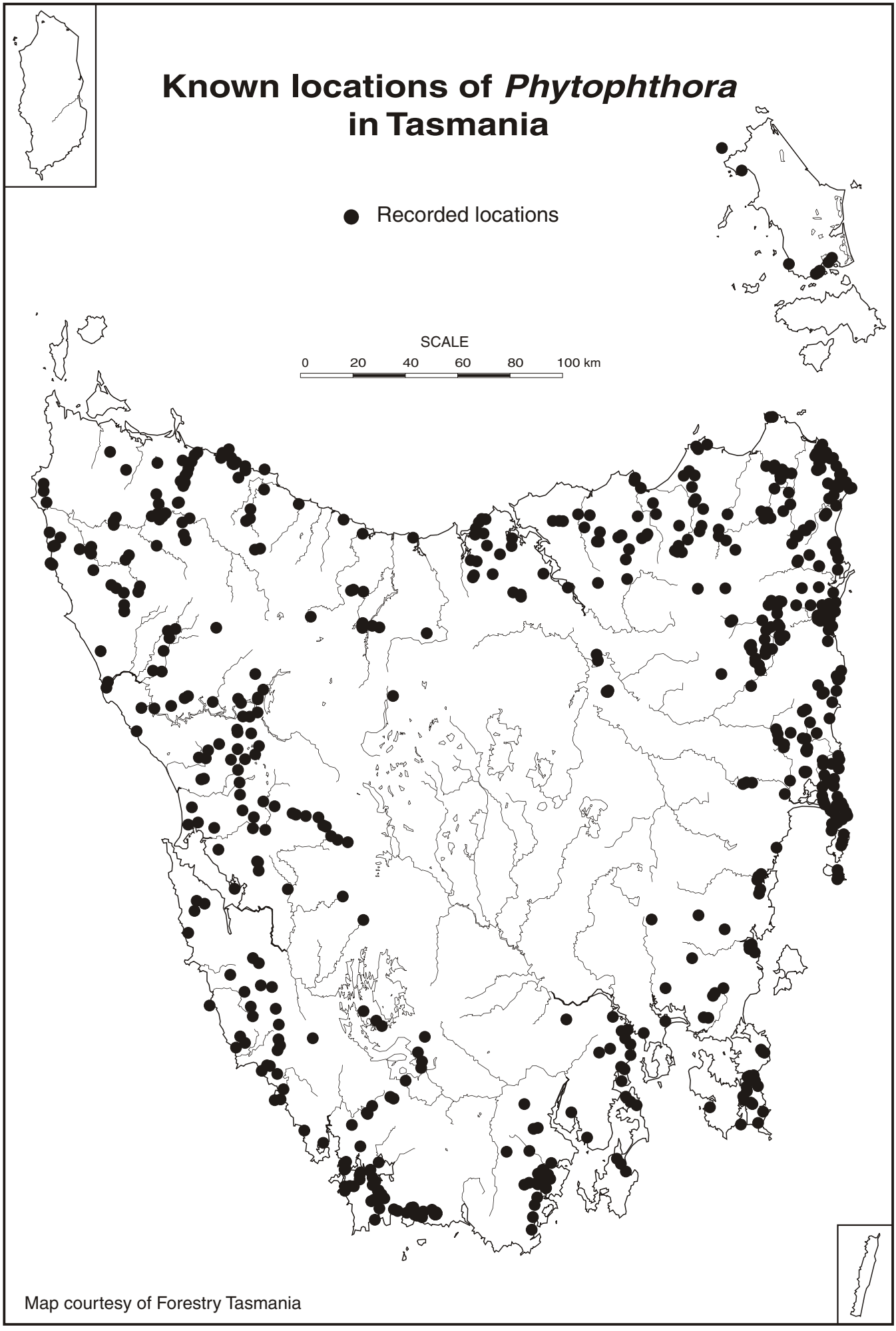
Note: The off-label permit for the use of ABF-42 has expired. A new product called *Phytoclean* is available and is registered for machinery washdown. Explorers may sometimes be required to use fungicide but only at an approved washdown station.

Small Items

In some areas explorers may be asked to clean all items which will have been in contact with the soil; boots, shoes, tent pegs, spades, shovels and so on. Washing items in water will suffice. Ensure that the item is washed free of soil.

General hygiene procedures

- ☐ Wash all machinery, vehicles, implements (spades, augers etc.) and footwear that has been soiled before relocating to a new site (e.g. changing farm/river catchment). Wash at point of soiling using high-pressure low-volume pumps and clean water.


Known locations of *Phytophthora* in Tasmania
Recorded locations
SCALE
0 20 40 60 80 100 km
Map courtesy of Forestry Tasmania

- Timetable works for when the soil is dry to minimise soil movement.
- Avoid or minimise introducing soil or gravel to sites. If doing so, ensure the source material is free of weed seeds and plant pathogens, by obtaining the material from a disease and weed-free area or quarry. Freshly crushed rock is considered *P. cinnamomi* and weed free. Potted plants should be used with caution if rehabilitating *P. cinnamomi* susceptible plant communities.
- Recognise the potential for spread of weeds and disease through the observation of symptoms (weed infestations, dying plants) in the field and take steps to control the weeds or wash vehicles etc. to minimise spread.
- Plan to undertake work in healthy (disease-free areas) and weed-free areas first to minimise the potential for spread of weeds or disease. Aircraft should visit *P. cinnamomi*-free areas before areas infected with *P. Cinnamomi*.

Washdown procedure for machinery

1. Choose a site for washdown. This should be where effluent from the washdown will not infect surrounding areas.

   Suitable sites are:

   - at the point of soiling;
   - any town or city where effluent is directed to a reticulated drainage system;
   - any hard-standing site which drains to a sump occurring within grassland, mature wet forest or rainforest; or
   - any hard-standing site where the effluent will flow directly back into an infected area (*P. cinnamomi* etc.) as advised by an environmental officer).

   Position machinery so that it may be moved forward out of the effluent during the washdown process.

2. Thoroughly inspect machinery for adhering soil (caked on mud and dirt) paying particular attention to the undercarriage, tyres or tracks, suspension, bumpers, guards, skid plates, etc.
3. Clean using a high pressure/low volume washdown unit using water and a detergent (in specific circumstances a fungicide may also be recommended and provided by Mineral Resources Tasmania in consultation with the Parks and Wildlife Service).
   - Use a spade, bar or wire brush to assist removal of caked on mud.
   - Raise tracked vehicles on the blade or bucket to assist clean down, rotate tracks while cleaning if possible.
   - Move machinery forward during clean down to clear tracks of muddy effluent and avoid accumulation of mud around the machine.
4. Avoid driving through the effluent when leaving the washdown area.
5. Transport to next area of operation. Machinery has an extremely low risk of picking up weeds and plant pathogens if it is:
   - floated to a site;
   - driven on bitumen.

   The risk of reinfection on gravel roads is least when road surfaces are dry.

References

PODGER, F. D.; PALZER, C.; BROWN, M. J. 1990. Bioclimatic analysis of the distribution of damage to native plants in Tasmania caused by *Phytophthora cinnamomi*. *Australian Journal of Ecology* 15:281.

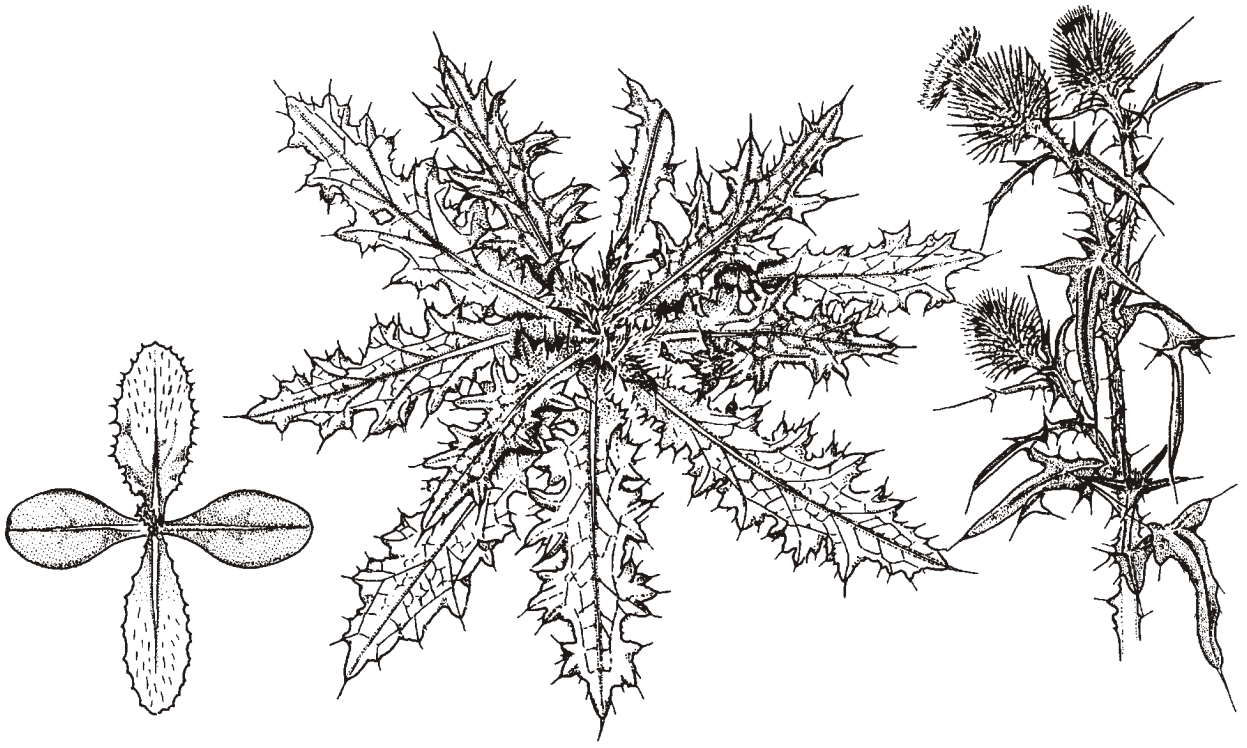
RUDMAN, T.; WHINAM, J. 1995. *Interim Pine Lake Dieback Management Plan*. Parks and Wildlife Service Tasmania.

Weeds

- There are a number of plant species in Tasmania which are regarded as weeds. Whilst weeds are opportunistic and can quickly cover a barren area, they will also spread into the surrounding vegetation and compete with the existing flora. For this reason, weeds should NEVER be used in revegetation projects, and steps should be taken to prevent weed seed being spread by people and machinery.
- In Tasmania, weeds are generally classed as such due to the potentially devastating effect they could have on our agricultural industry. The weed gorse is of concern to farmers in the Midlands, for example. However some weeds are already causing concern as they are spreading into bushland. Weeds in this category include canary broom on Maria Island, a variety of pampas grass which is spreading into parts of the southwest, blackberry, gorse and broom which are very evident on the West Coast, and ragwort along the North West Coast.
- Tasmanian weeds are classed into three categories:
  - Noxious
  - Secondary
  - Prohibited
- All noxious and some secondary weeds are classed as 'prohibited'. This means that these plants may not be propagated, sold or transported within Tasmania.

PREVENTION OF SPREAD

- All earthmoving machinery should be routinely washed to remove all clods of earth when moving from one location to another. Vehicles should also be washed, and mud knocked off boots and shoes.
- Any weeds found growing in newly revegetated zones should be removed by digging, or poisoning with an appropriate herbicide. Weeds encountered during track building should similarly be eradicated. Seed pods, if present, should be removed from the area.
- Some exotic species which are not classified as a noxious weed are nevertheless environmentally undesirable plants. Always check that species to be used in revegetation projects are quite acceptable before planting.



Cirsium vulgare (Spear Thistle)
(Former Department of Primary Industry and Fisheries)

LIST OF WEEDS

Noxious Weeds

	Botanical name	*Common name*
*	Acroptilon repens (= Centaurea repens)	Creeping Knapweed (Hardheads)
*	Asphodelus fistulosus	Onion Weed
*	Berkheya rigida	African Thistle
*	Carduus nutans	Nodding Thistle
*	Carthamus lanatus	Saffron Thistle
*	Cenchrus incertus	Spiny Burgrass (= Cenchrus pauciflorus)
*	Cenchrus longispinus	Spiny Burgrass
*	Chondrilla juncea	Skeleton Weed
*	Cynara cardunculus	Artichoke Thistle
*	Emex australis	Spiny Emex (Double Gee, Three Cornered Jack)
*	Equisetum spp.	Horsetail
*	Homeria spp.	Cape Tulips
*	Nassella trichotoma	Serrated Tussock
*	Onopordum spp.	Onopordum Thistles
*	Opuntia aurantiaca	Tiger Pear
*	Parthenium hysterophorus	Parthenium Weed
*	Pennisetum macrourum	African Feathergrass
*	Solanum elaeagnifolium	Silver-leaf Nightshade (Whitehorse Nettle)
*	Stipa brachychaeta	Espartillo
*	Stipa caudata	Espartillo
*	Xanthium spp.	Burrs

Secondary Weeds – Terrestrial plants

	Allium triquetrum	Three-corner Garlic
*	Allium vineale	Crow Garlic
	Anthemis cotula	Stinking Mayweed
*	Asparagus asparagoides	Bridal Creeper (Smilax)
	Cardaria draba	White Weed (Hoary Cress)
	Carduus pycnocephalus	Slender Thistle
	Carduus tenuiflorus	Slender Thistle
*	Carex buchanii	Sedge
*	Carex comans (C. albula)	Sedge
*	Carex flagellifera	Sedge
*	Carex testaceae	Sedge
	Cirsium arvense	Californian Thistle (Creeping Thistle)
	Cirsium vulgare	Spear Thistle
	Conium maculatum	Hemlock
	Cortaderia spp.	Pampas Grasses
*	Cuscuta spp. (excluding Cuscuta tasmanica)	Dodder
	Datura spp.	Datura
	Ecballium elaterium	Squirting Cucumber
	Echium plantagineum	Paterson's Curse
	Echium vulgare	Paterson's Curse (Viper's Bugloss)
*	Eragrostis curvula	African Lovegrass
*	Euphorbia lathyrus	Caper Spurge
	Foeniculum vulgare	Fennel
*	Galium tricornutum	Three-horned Bedstraw
*	Heliotropium europaeum	Common Heliotrope*
	Hypericum perforatum	St John's Wort
	Lycium ferocissimum	African Boxthorn
	Marrubium vulgare	Horehound
*	Myrsiphyllum asparagoides	Bridal Creeper (Smilax)
	Oxalis spp.	Oxalis
*	Pennisetum villosum	Feathertop
	Reseda lutea	Cut-leaf Mignonette
	Reseda luteola	Wild Mignonette
	Rosa rubiginosa	Sweetbriar
	Rubus spp. (excluding Rubus idaeus and Rubus parvifolius)	Brambles
	Rubus fruticosus agg.	Blackberry
	Rumex crispus	Curled Dock
	Rumex obtusifolius	Broad-leaf Dock
*	Salpichroa origanifolia	Pampas Lily-of-the-Valley
	Senecio jacobaea	Ragwort
	Silybum marianum	Variegated Thistle
*	Solanum marginatum	White-edged Nightshade
*	Solanum sodomaeum	Apple-of-Sodom
*	Tribulus terrestris	Caltrop
	Ulex europaeus	Gorse
+	Genista monspessulana	Canary Broom
+	Sarothamnus scoparius	Broom

Secondary Weeds – Aquatic plants

*	Alternanthera philoxeroides	Alligator Weed
*	Cabomba caroliniana	Fanwort
*	Ceratophyllum demersum	Hornwort
*	Egeria densa (Elodea densa)	Egeria (Dense Water Weed)
*	Eichhornia crassipes	Water Hyacinth
*	Elodea canadensis	Canadian Pondweed (Elodea)
	Glyceria maxima	Glyceria (Reed Sweet Grass)
*	Gymnocoronis spilanthoides	Temple Plant
*	Hydrilla verticillata	Hydrilla (Water Thyme)
*	Lagarosiphon major	Lagarosiphon
*	Myriophyllum aquaticum (= M. brasiliense)	Parrot's Feather (Brazilian Water Milfoil)
*	Pistia stratiotes	Water Lettuce
*	Sagittaria graminea	Sagittaria
*	Sagittaria montevidensis	Sagittaria
*	Salvinia auriculata	Salvinia
*	Salvinia molesta	Salvinia
	Typha spp.	Cumbungi

* Denotes **prohibited** weed

\+ Secondary weed in the Waratah Municipality

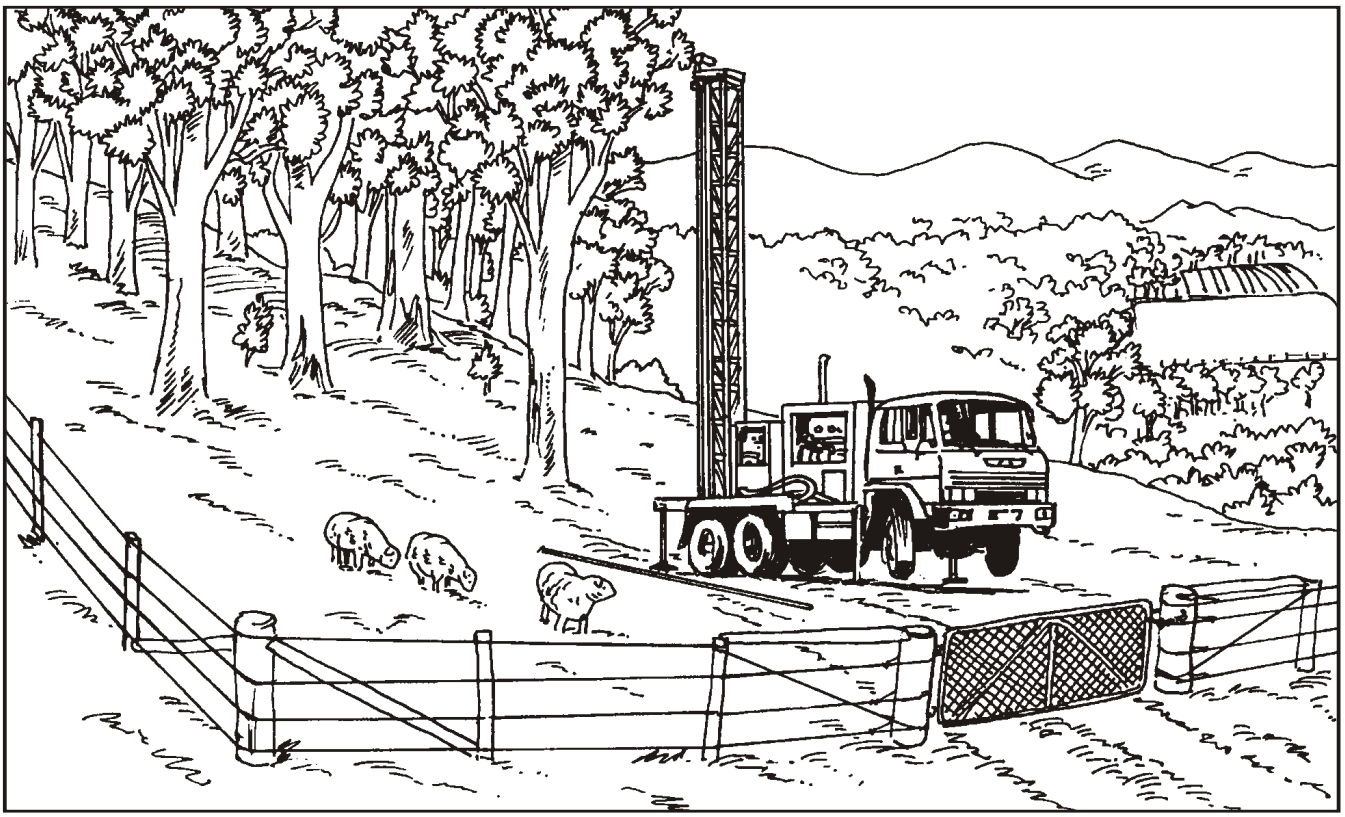
Protocol with private landowners

On occasions, the explorer may wish to enter upon private property to enable exploration to proceed according to plan. A balance must be maintained between the interests of the landholders, who have surface rights, and the explorer who has rights to explore for minerals, which are usually the property of the Crown. The question of ownership of minerals is quite complex in Tasmania and is addressed elsewhere in this book.

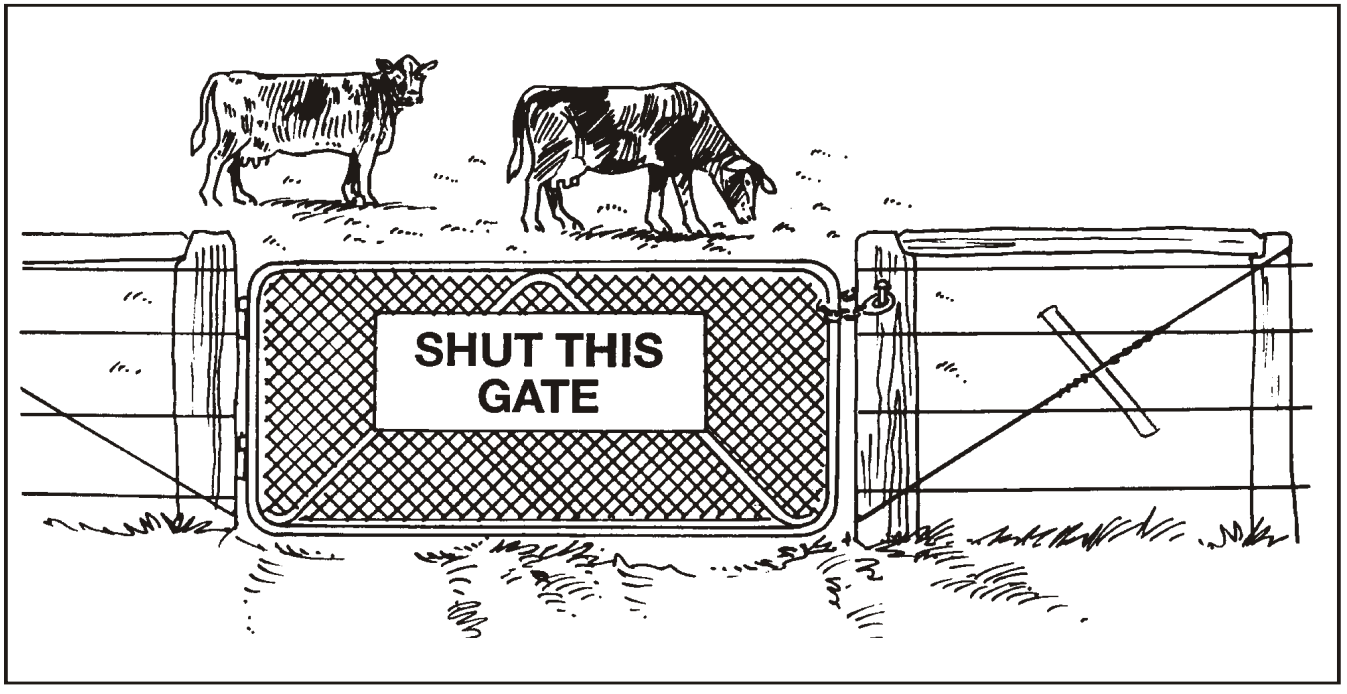
A pamphlet entitled *Land Owner's Questions* is available from Mineral Resources Tasmania, and this clearly outlines the rights of the landowner and responsibilities of the explorer. Distribution of these pamphlets to landowners whose land is to be explored, and discussion with them of your proposed activities, is a good idea. Another pamphlet entitled *Explorer–Landholder procedures — A commonsense guide to good relations between miners and farmers* has been produced for the use of explorers by the Australian Mines and Metals Association and the Tasmanian Farmers and Graziers Association.

Harmonious working relationships with landowners can be achieved by adherence to simple guidelines.

- Liaise closely with landowners. Select a Field Supervisor who has, if possible, some knowledge of farming and grazing practice. The Field Supervisor must be familiar with all aspects of the field program.
- The Field Supervisor should make direct contact with the landholder well in advance of entering the property, and discuss the exploration program and how any procedures may affect the land or improvements (fences, gates and so on).
- Give the landowner the names of the senior field staff, and leave a telephone number where the Field Supervisor can be contacted should any problems arise.
- Leave with the landowner a location map showing position of any proposed grids or drill holes. Discuss with the landowner and be advised of any particular areas which require special care — such as buried water pipes, contour banks, shade clumps, erosion-prone land and the position of gates and fences.
- Make all contractors and subcontractors aware of company policy in the field and ensure that this is adhered to. Do not leave liaison with the landholder solely to the contractor. The holder of the Exploration Licence must bear the responsibility for establishing good working relationships with the landowner.
- Ensure that the operation of heavy machinery is supervised at all times and ensure that the contractor understands what is required.
- Where practicable the explorer should contact the landholder before each operational phase of activity. Keep the landowner informed of the progress of your work, be sure to discuss any changes to the program — such as moving a proposed drill site, and so on.



- If heavy machinery is required (i.e. for drilling) let the landowner know when the machinery will be entering the property so he/she may be present if he/she so desires.
- No fishing, hunting or carrying of firearms without the express permission of the landowner.
- In country areas, contact the local Council Clerk if the use of narrow, winding, unsealed, country roads by heavy machinery is envisaged. Discuss the use of the roads by your vehicles, particularly during wet weather, when roads may be subject to damage. If drilling on roadside verges, leave a map showing the proposed area of activity with the Council Clerk, and discuss with him/her your intended program.
- When ground is wet, limit or curtail entirely machine movements which would damage tracks/roads and/or paddock surfaces. If machinery must be moved, and damage occurs, then be sure to repair the damage as soon as possible, and to the satisfaction of the landowner.
- Keep the number of vehicles on a property to a minimum, and where possible keep to the same track.
- Use existing gates wherever possible. Go out of your way to use these.
- Leave gates as you found them. Do not shut an open gate and do not leave open a gate which was shut.
- Ensure any tracks put in for exploration are properly made and drained, and will not degenerate into an erosion hazard.
- Prevent the spread of noxious weeds by frequently hosing down heavy machinery and vehicles. Enquiries should be made at the local Department of Primary Industry, Water and Environment office concerning stock health campaigns. Washing of vehicles may be needed within one district or even between properties to prevent the spread of weeds and/or stock diseases.
- As little timber should be cleared as possible. Try and remain flexible on the precise positioning of drill holes and grid lines, and be prepared to move (if possible) the proposed location a few metres to avoid, for example, a clump of shade trees. Keep to an absolute minimum width when cutting through shade belts.
- If timber is cleared be sure to do so in a manner acceptable to the landowner.
- On completion of exploration, tracks and rehabilitation requirements should be discussed with the landowner. The tracks may or may not be wanted; drill pads may or may not have to be ripped; or the farmer may prefer to have the company pay him to do the work.
- When the project is finished invite the landowner to inspect the work area so any problems can be discussed and seen to promptly.
- Remove all rubbish from drill sites — including piles of cuttings if holes are chip drilled — unless you have agreed with the farmer that these can be left and spread over the drill site on completion of work. Make sure drill holes are either filled in completely, or capped and made safe for stock.



Acknowledgements

FIRST AND SECOND EDITIONS

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Information on ABF-42 was taken from the Safety Data Sheet supplied by the manufacturer (Chemsearch Australia), and from a handout supplied by the Parks and Wildlife Service. Additional information on the use of ABF-42, from the Registrar of Pesticides and the Parks and Wildlife Service draft *Phytophthora hygiene manual for the World Heritage Area* has been included in Editions 2 and 3.

The information and diagrams in the chapter on helicopters comes from material supplied by Helicopter Resources, and from a pocketbook on helicopter safety procedures prepared by Tim Rudman (Parks and Wildlife Service) and Tony Mount (Forestry Tasmania). Text and diagrams from this book are used with permission, and are gratefully acknowledged.

The text of the first edition of this Code was widely circulated amongst government departments and other organisations (Tasmanian Chamber of Mines; Combined Environment Groups). Useful suggestions made by individuals during this process were incorporated in the Code.

THIRD EDITION

In compiling the Third Edition I would like to acknowledge the assistance given by David Gatehouse, who contributed greatly to this revision. Photographs have been provided by David Gatehouse and Hans Rae (Pasminco Exploration).

FOURTH EDITION

The main change is organisational, with the Code now being split into three distinct parts:

- Information for explorers;
- Code of Practice (i.e. Statutory requirements); and
- Mineral exploration guidelines.

Various comments made by government agency staff and explorers have been incorporated in this edition. The draft was also circulated to various non-government organisations and interested individuals for comment. Useful comments made during this review have been incorporated.

Information on *Phytophthora* hygiene procedures in this edition was provided by the Parks and Wildlife Service.