MINERAL EXPLORATION CODE OF PRACTICE

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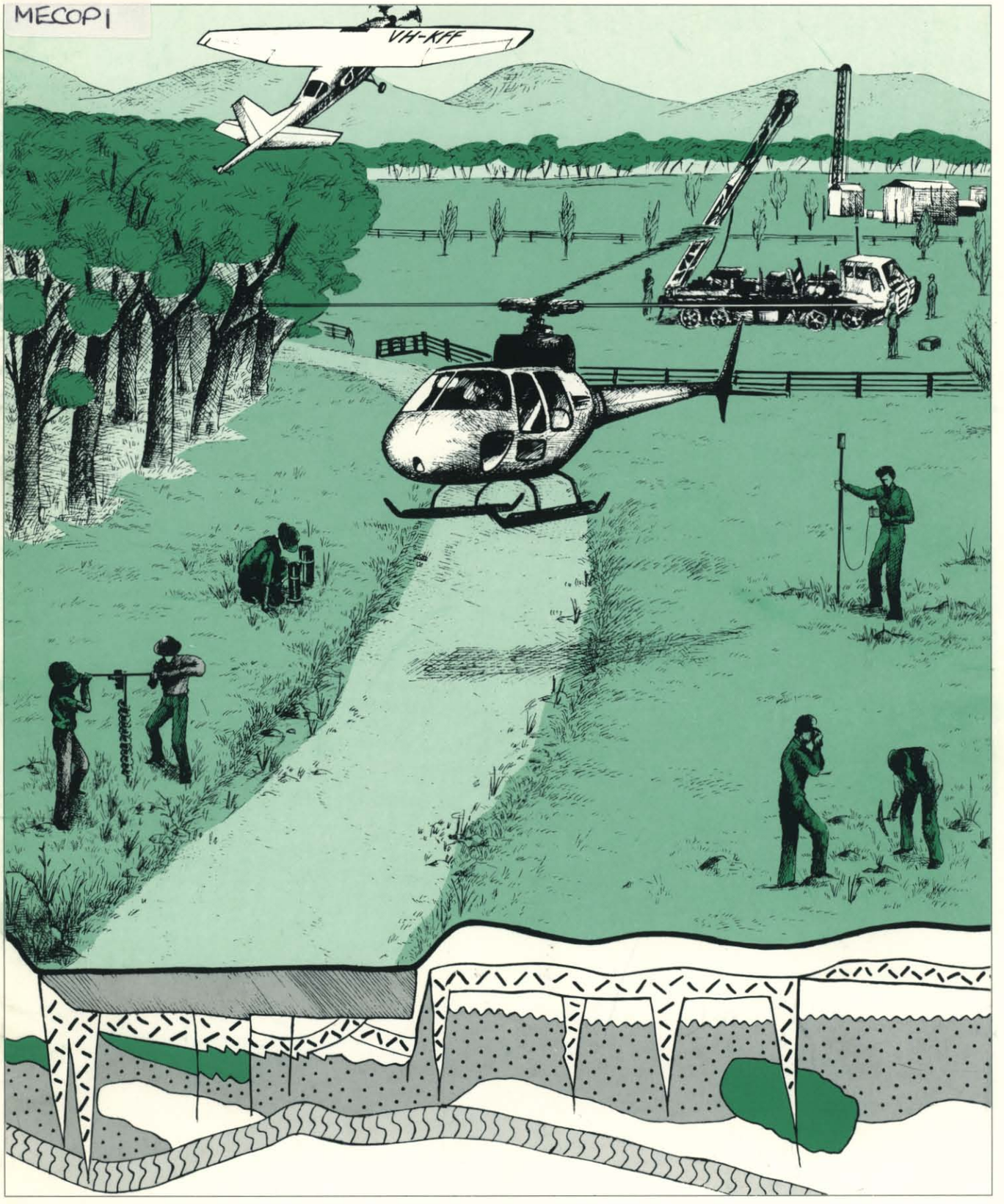

DIVISION OF MINES & MINERAL RESOURCES

TASMANIA

TASMANIA DEPARTMENT OF RESOURCES & ENERGY
DIVISION OF MINES AND MINERAL RESOURCES

1991

Mineral Exploration Code of Practice

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ENDORSED BY THE TASMANIAN CHAMBER OF MINES

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INTRODUCTION

The Division of Mines and Mineral Resources 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 the State 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 twenty 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 the Forestry Commission and the Department of Parks, Wildlife and Heritage.

Earthworks must be rehabilitated on the completion of the exploration programme 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 these 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.

ACKNOWLEDGEMENTS

In compiling this Code of Practice helpful discussions have been held with a number of people, all of whom have made valuable contributions with their comments and ideas. I would especially like to thank Pavel Ruzicka, Andrew Reeves, John Pemberton and Rod Hargreaves (Department of Resources and Energy); Ron Neve (Forestry Commission); Tim Duckett (Consultant); Jeff Randell and Ray Duraj (Billiton, Australia); Brad Cartwright and Bill Bourke (Department of Environment and Planning); Phil Uttley (RGC); Phil Jones (Consultant); Ken Morrison (Consultant); and Lindsay Newnham (Consultant).

The final version of the Code (and several drafts) was produced by Michael Dix of the Division's Publications Section, using our Desktop Publishing facility. Most of the diagrams were drafted by Andrew McGuinness and John Ladaniswkyj of the Division's Cartographic Drawing Office, using Computer Assisted Drawing machines. The text was typed by Anne Taylor. The cover was designed by Autoplot Pty Ltd.

The Forestry Commission graciously allowed the use of a number of diagrams from their *Forest Code of Practice*, diagrams of Huon Pine, Celery Top Pine and King Billy Pine from their pamphlets on native trees, and the map on the distribution of *Phytophthora* from *Tasforests* (Vol. 2, No. 1). Sue Backhouse and J. B. Kirkpatrick kindly permitted reproduction of line drawings and descriptions of Cheshunt Pine and Deciduous Beech from their book *Native Trees of Tasmania.*

Information on ABF-42 was taken from the Safety Data Sheet supplied by the manufacturer (Chemsearch Australia), and from a handout supplied by the Department of Parks, Wildlife and Heritage.The information on sodium hypochlorite comes from the Safety Data Sheet for that chemical, from data supplied by the Health Department, and from the *Dieback Hygiene Manual* of the West Australian Department of Conservation and Land Management.

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, Wildlife and Heritage) and Tony Mount (Forestry Commission). Text and diagrams from this book are used with permission, and are gratefully acknowledged.

The text of this Code has been widely circulated among Government departments (Department of Environment and Planning; Department of Parks, Wildlife and Heritage; Forestry Commission) and other organisations (Tasmanian Chamber of Mines; Combined Environment Groups). Useful suggestions made by individuals during this process have been incorporated in the Code.

EXPLORATION LICENCES — GENERAL INFORMATION

EXPLORATION LICENCES

The Exploration Licence is the principal title for exploration in Tasmania.

APPLICATIONS

An application for an exploration licence may be made by:

- one or more persons over the age of 18 years;
- a recognised company;
- 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 programme 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 Resources and Energy that a licence be issued, the applicant will be required to advertise details of the application in a Saturday edition of the major newspaper circulating in the district of the application (i.e. either *The Mercury*, *The Advocate* or *The Examiner*). The text for the advertisement and a map of the application area will be provided by the Department of Resources and Energy.

OBJECTIONS

Objection to an application may be made by any person who claims "an estate or interest" in the land over which the application falls.

Objections are heard by a Mining Warden in a Warden's Court. The objection must be made on the correct form, available from the Department of Resources and Energy, and accompanied by the prescribed fee (presently $20 per objection) and must be received by the Director of Mines no later than 30 days after the advertisement of the application.

As the Mining Act currently stands, having an "estate or interest" in the land means a monetary interest. The Warden can hear objections from landowners, tenants, lessees or holders of existing exploration licences. (More than one licence can be held over the same piece of ground provided they are for different commodities).

Individuals who object to exploration on philosophical grounds, or who simply do not like the thought of a licence being granted, have no standing in the Warden's Court, and their objections will be dismissed.

In recognition of the fact that many individuals would sometimes like to object, but have no standing to do so, the Department of Resources and Energy frequently hosts meetings with "would be" objectors and the explorer, where the issues can be discussed. In many cases this has successfully resolved the problem, and the objectors' concerns have been allayed. Objectors should be aware that the Mining Warden has the power to award costs of the proceedings to either party.

FEES

Fees for Issue of an Exploration Licence are:

(a) Oil	$1200.00
(b) Any other Mineral/Stone	$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.

During the moratorium period an application may be made for an exploration licence or mining lease for the area and mining products that were subject to the former exploration licence.

Applications received during this period will have equal priority, and will take priority over subsequent applications.

ETA (Exploration Tender Area) SYSTEM

The Department offers a service to subscribers advising them of areas available for application during a moratorium period. For an annual subscription of $100.00, subscribers receive details of land surrendered or relinquished from exploration licences, together with maps and advice of the closing date 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 usually do not exceed 250 km^2. Coal, oil and shale licences usually do not exceed 500 km^2.

TERM OF LICENCE

An exploration licence is issued for 12 months, and is renewable.

PERIOD OF TENURE

The major licence tenure is limited to a maximum of ten years. During the first five years of tenure the size of the licence must be reduced to no more than 50% of the original area. Renewals will not be granted after the ten year term except in the following circumstances:

Where a discovery is made in the final years of the tenure of a licence, 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 2 years	$2.00
(iii)	for each subsequent year	$5.00

(b) Other Mining Products — for each square kilometre per year–

(i)	for each of the first 5 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 holder of the exploration licence.

CONDITIONS AND BONDS

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 programme to be carried out, and the environmental sensitivity of the area.

The performance deposit will be returned only after any disturbances have been rehabilitated to the satisfaction of the Director of Mines. Bonds are not returned after licences have been relinquished until a field inspection has been made, and the rehabilitation is seen to be successful.

WORK PROGRAMMES

A work programme must be submitted and approved prior to any fieldwork being done. Written approval is required for any activity which involves any cutting of vegetation or any earthworks. Approval for earthworks will not usually be given without a field inspection of the proposed site of disturbance. Exceptions are made where the earthworks are proposed in an area of existing disturbance, such as a gravel pit, or where the work may require the minor extension or widening of an existing track.

When planning exploration activities remember to give as much notice as possible so that site visits may be arranged well in advance.

MONITORING AND PENALTIES

Regular field inspections are made by officers of the Division of Mines and Mineral Resources, and on occasions joint inspections are made with officers from other agencies to ensure that the conditions placed on the work programme 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 Protected and Conservation Areas, and other areas considered to be "sensitive", must be approved by The Mineral Exploration Working Group, which consists of representatives from the Departments of Resources and Energy; Environment and Planning; Parks, Wildlife and Heritage; and the Forestry Commission. Other Departments and interested bodies are consulted on individual projects where required.

Work programmes involving work in the following areas are sent to the Mineral Exploration Working Group for consideration:

- Conservation areas under the National Parks and Wildlife Service Act 1970.
- Protected areas and other reserves under the Crown Lands Act 1976 (where brought back under the Mining Act 1929).
- Proposed reserves [such as proposed protected areas, Forest Reserves, Recommended Areas for Protection (RAPS)] and other areas considered sensitive, such as unreserved alpine country, coastal areas, and areas where special natural or cultural features are recorded.
- Forest Reserves (where brought back under the Mining Act 1929).

The function of the Working Group is to examine the exploration proposal, investigate the impact that any works may have on the historical, archaeological, botanical, zoological or ecological significance of the place, and if need be, impose conditions on the activities so that these values are not permanently adversely affected.

The Working Group 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, rare species etc.

Some activities may only be permitted in a modified form; e.g. access may be allowed by helicopter, but not by construction of a track.

Bonds are generally higher in areas deemed "sensitive"; this reflects the increased cost of rehabilitation in such places.

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 programme commencement date. The Mining Act requires that the owner or occupier of land be given three days notice in writing, stating that the 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.

A bond (called Private Land Bond) must be lodged with the Department of Resources and Energy as security against any damage done on private land. This deposit is held for three months after the expiry of a licence, or until the rehabilitation (if required) is seen to be successful.

EXPENDITURE COMMITMENT

(1) Unless otherwise specified as a condition of the licence, the following minimum expenditure applies:
   (a) First two years at \$200 per km^2 per annum
   (b) Next two years at \$500 per km^2 per annum
   (c) Next two years at \$1 000 per km^2 per annum
   (d) Next two years at \$2 000 per km^2 per annum
   (e) Last two years at \$5 000 per km^2 per annum

However 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. The expenditure commitment on a licence is binding, and forms part of the conditions of the licence. The sum must not be thought of as a "guide" to possible expenditure.

(5) A licence holder may apply to the Director of Mines to waive or reduce expenditure commitments, although this will only be allowed in exceptional circumstances.

(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.

REPORTING REQUIREMENTS

Full details of reporting requirements are given in the brochure *Guidelines for Reports on Exploration Licences* available from the Division of Mines and Mineral Resources.

BIANNUAL REPORTS

Biannual reports must include a declaration of expenditure, an itemised breakdown of expenses, and a brief resumé of work in progress and completed.

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 previously been 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 a part only of a licence area is relinquished and no final report is submitted for the relinquished part, all reports relevant to the relinquished area will be released for public examination.

Failure to lodge a final report by the expiry date will 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.

STANDARD CONDITIONS

All exploration licences are subject to Standard Conditions, as outlined below. Explorers should note that **ALL** exploration activities must be approved in writing by the Department, and invariably conditions are placed on activities pertinent to each site and each activity. All exploration is carefully monitored, and regular inspections are made before activities start, whilst work is in progress, and after exploration has finished.

The "Standard Conditions" are given in Schedules A and B, which are affixed to every exploration licence on issue. Schedule A is an outline of general conditions, while Schedule B contains Cut Line Specifications and Fire Precaution Regulations

SCHEDULE "A"
(Revised December 1990)

Conditions of Exploration Licences under the Mining Act, 1929

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 programme of exploration required by this licence.

   Specific written approval is required 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 either by hand or machine.
- All cutting of grids.
- 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. 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, unless otherwise instructed.
3. The licensee shall observe the provisions of Section 35 of the Mines Inspection Act, 1968, with regard to notification of bore holes, preservation of cores and disposal thereof.
4. 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 400 millimetres wide to the Division of Mines and Mineral Resources' Core Store at Hobart 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 Division.
5. 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.
6. The licensee shall not light any fires without the approval of the State Fire Commission or the relevant District Forester in the case of State Forest. In the case of land reserved under the National Parks and Wildlife Act 1970 and the Crown Lands Act 1976, the approval of the Secretary of the Department of Parks, Wildlife and Heritage is required. Precautions are to be taken with fuel storage to minimise the risk of fire.
7. The licensee shall notify the relevant District Forester of the Forestry Commission before entering on a State Forest and shall comply with the reasonable requirements of such officer in operations on any such State Forest.
8. The licensee shall notify the relevant PWH Warden or Property Officer before work commences in land reserved under either the NP & WS Act 1970 or the Crown Land Act 1976 (where such lands have been brought back under the Mining Act 1929).
9. 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 Director of Land Management and shall otherwise observe the provisions of the Aboriginal Relics Act, 1975.
10. The licensee shall not interfere in any way with native fauna or bird life.
11. Where investigations are undertaken in sensitive areas (such as coastal areas, Conservation or Protected areas) all exploration activities must first be approved by the Mineral Exploration Working Group. All conditions imposed on such exploration are to be strictly followed.
12. 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.
13. 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 the Division of Mines and Mineral Resources for this purpose.

Reporting:

1. An interim report must be lodged biannually with the Director of Mines, Hobart (i.e. 31 March and 30 September).
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. These 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 Mining Act, 1929;

   whichever shall occur first.

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 December 1990)

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 the sites equipped with the following fire-fighting tools:

- a serviceable knapsack pump filled with not less than 10 litres of water or a powder-type fire extiguisher of not less than one kilogram capacity
- a slash hook
- a fire rake or grubbing-hoe
- a receptacle containing not less than 180 litres of water

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 a serviceable knapsack pump filled with not less than 10 litres of water, or a powder-type fire extinguisher of not less than one kilogram capacity

All premises used as kitchens or as sites for storing fuel or storing, servicing or refuelling engines will be:

- cleared to bare earth
- surrounded by a firebreak sufficient to isolate the premises from the surrounding vegetation.

LAND AVAILABLE FOR EXPLORATION

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

Land which is **EXCLUDED** from the licences includes:

- All forms of mining tenements and water licence, including leases, water licences, easement licences, special and exploration licences, prospectors licences, miners rights, permits to enter, owners consents and owners rights which were in lawful possession or marked out prior to the date of application.
- Land reserved under the National Parks and Wildlife Act, 1970, not subject to the Mining Act, such as:
  - National Parks
  - State Reserves
  - Historic Sites
  - Nature Reserves
  - Aboriginal Sites
  - Game Reserves
- Land reserved under the Aboriginal Relics Act 1975, such as Protected Archaeological Sites.
- Public and municipal reserves under the Crown Lands Act 1976, such as:
  - 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 ballast pits, quarry reserves etc. (if proclaimed).

Any of these public and municipal reserves can be brought back under the Mining Act to allow for exploration if a sufficiently good case can be made. This is generally relatively straightforward when explorationists 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 any of these areas would have to be first approved by the Mineral Exploration Working Group.

- Land exempt from the provisions of the Mining Act 1929, such as 'Exempt Areas', which are declared usually to allow for geological assessment of an area by the Department of Resources and Energy.
- Forest Reserves: these can be brought back under the Mining Act to allow for exploration if a good case for this can be made. Any exploration which was permitted would need to be first approved by the Mineral Exploration Working Group.
- HEC vested lands which cover lakes, dam sites and work areas.

The following land categories are **INCLUDED** in an Exploration Licence:

- Crown Land (if uncommitted).
- Crown Reserves (if not proclaimed. Technically speaking these are still uncommitted Crown Land).
- State Forest (if brought back under the Mining Act after dedication of forest).
- Timber Reserves.
- HEC vested lands (except lakes, dam sites, work areas).
- Private Property.
- Conservation Areas.
- Protected Areas (if brought back under the Mining Act after being proclaimed).
- Forest Reserves (if brought back under the Mining Act after being proclaimed).
- 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.
- Muttonbird Reserve: approval for exploration not likely to be given; usually excluded from the licence application by agreement with the applicant.

NATIONAL ESTATE — AN EXPLANATION

As there appears to be a fair amount of 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 presently 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 **only** in relation to actions proposed by the **Commonwealth** which might adversely affect the National Estate.

There are no direct legal constraints on owners of private property, or on State or local governments, caused by the entry of that property in the Register of the National Estate. Thus the Commission has no power to direct private owners or State or local governments with respect to their actions that might affect a place in the Register, and 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.

Whilst works by private owners, and State and local governments may not be directly controlled by the Australian Heritage Commission, there are still some activities which would be affected. Works which require Commonwealth approval, for example, may not be approved. 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."

Further, 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 reasonable opportunity to consider 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.

This means that activities in National Estate areas which do not require any input from the Commonwealth are not affected by the National Estate status. For example, a patch of forest may be cleared and used within the State as firewood or fenceposts; but should the clearing be for woodchips for export, then the Commonwealth must be approached for an export permit, which, if not granted, would have an effect on the proposed activity.

In relation to exploration and mining, activities which could result in the Commonwealth becoming involved include:

- issue of an export licence for ore or product.
- issue of an import permit for specialised machinery which may be required and which is not available locally.
- issue of visas/work permits for specialised staff, if any needed from overseas for a project.
- investment or partnership from overseas company which would require approval from Foreign Investment Review Board.

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.

Decisions on whether Commonwealth actions which might adversely affect a place in the Register proceed, are modified, or do not proceed, remain with the Commonwealth proponent. The Commission's role is to ensure, as far as it is able, that such decisions are taken in the light of the National Estate significance of the place involved.

GAINING APPROVALS FOR EXPLORATION

When submitting an application, or a renewal for an exploration licence, the applicant is asked to supply Environmental Impact Information (on the EII forms provided) and a work programme.

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

When the details are known, and plans of where grids are required, which access is to be used, which targets are to be drilled, etc, the explorer should send in a letter outlining the proposed programme, including a (legible) piece of chart showing the location of the proposed activity.

These days virtually all earthworks (unless they are upgrading of existing tracks or minor extensions of a currently used track) are not 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 such as Forestry, approval will be 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. Conditions of individual exploration activities are made available to persons having a bona fide interest in the work.

On occasions, where there are many people involved, a "duplicate book" may be used. The terms under which the work is approved are written in this book during the field inspection; these conditions are subsequently sent as a formal letter but in the meantime there can be no misunderstanding between the field visit verbal agreement and receipt of the formal written approval. This is useful where the field inspection is made with one person, who must subsequently relay the instructions to several others.

Frequent field inspections are made during the programme, and on completion to ascertain any rehabilitation requirements.

SENSITIVE AREAS

Work programmes in areas deemed to be "sensitive" are referred to the Mineral Exploration Working Group. These include work programmes in (see also page 5):

- Conservation areas under the National Parks and Wildlife Service Act 1970.
- Protected areas and other reserves under the Crown Lands Act 1976 (where brought back under the Mining Act 1929).
- Proposed reserves [such as proposed protected areas, Forest Reserves, Recommended Areas for Protection (RAPS)] and other areas considered sensitive, such as unreserved alpine country, coastal areas, and areas where special natural or cultural features are recorded.
- Forest Reserves (where brought back under the Mining Act 1929).

Proposed activities involving earthworks always require a field inspection of the site by members of the Working Group or their field representatives. The conditions which will apply to the work are agreed upon by the members, and given in writing to the explorer.

The Group meets as often as need be. There are no set meeting dates, but as a general rule the Group meets about every six weeks.

The function of the Working Group is to examine the exploration proposal, investigate the impact that any works may have on the historical, archaeological, botanical, zoological or ecological significance of the place, and if need be, impose conditions on the activities so that these values are not permanently adversely affected.

Bonds are generally higher in areas deemed "sensitive"; this reflects the increased cost of rehabilitation in such places.

Exploration activities are monitored by the Division of Mines and Mineral Resources in liason with the relevant Managing Authority.

ARCHAEOLOGICAL STUDY GUIDELINES

Consideration should be given to having an archaeological 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".

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 macheté, fern hook, axe and chainsaw only.

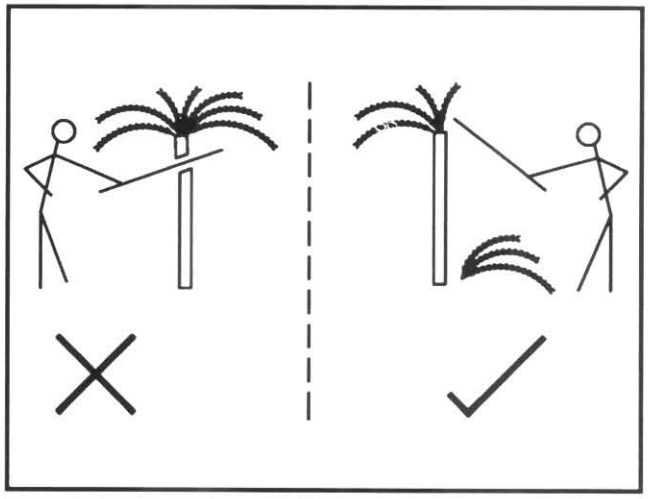
CUTTING VEGETATION

- 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 hazard of protruding branches.
- Unless imperative, no live saplings of any species over 15 cm 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*

♣ 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 is preferable 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 programme, especially from the beginning of grid lines.
- 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 programme.

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, usually declared by the Tasmanian Fire Service over the summer months (when anyone wishing to have a fire outdoors must obtain a permit), there are sometimes days declared as "Total Fire Ban" days. The ban on such days 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.

  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 programmes 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

(Athrotaxis selaginoides)

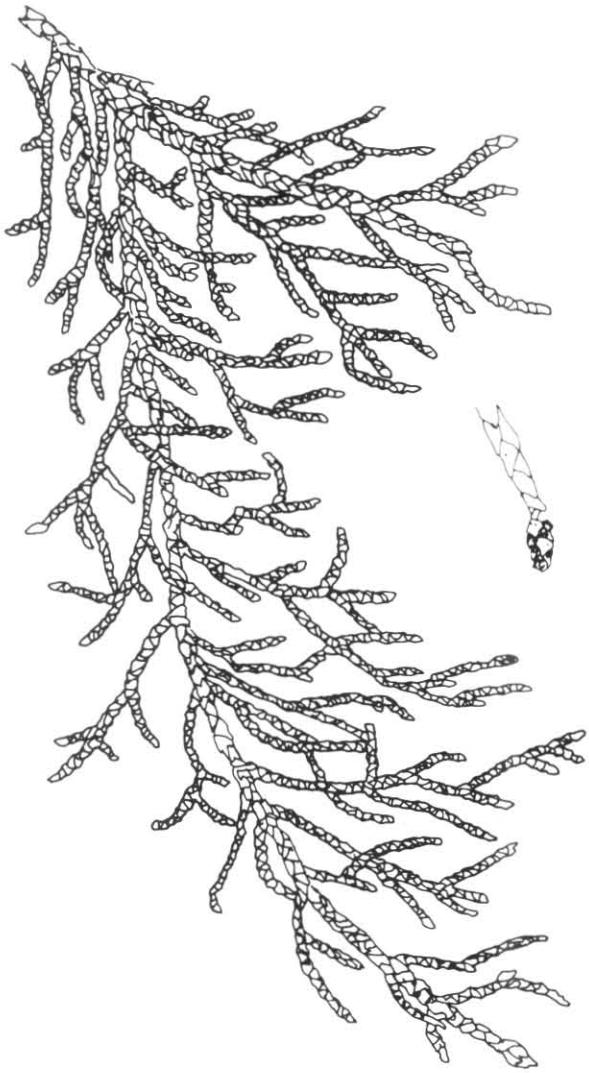
King Billy pine is a majestic and ageless tree growing in the western, south-west and central plateau rainforests of Tasmania, at medium to high altitudes. It is no longer logged, except for salvage. The timber is easily worked and valued for its durability and light weight.

FORESTRY COMMISSION, TASMANIA

FOREST TREE SERIES

HUON PINE

(Lagarostrobos franklinii)



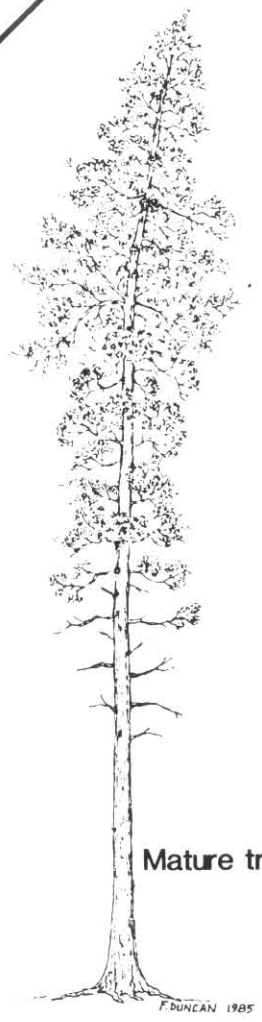
Art work by Jo Eberhard

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.

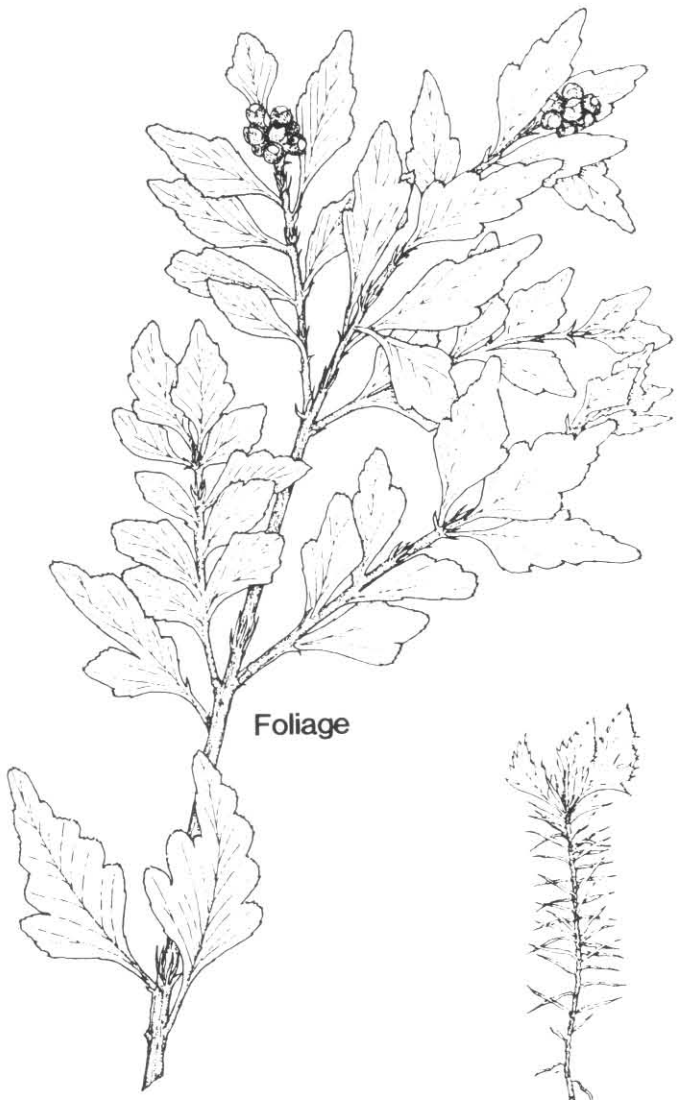
FORESTRY COMMISSION, TASMANIA

FOREST TREE SERIES

CELERY TOP PINE



Mature tree

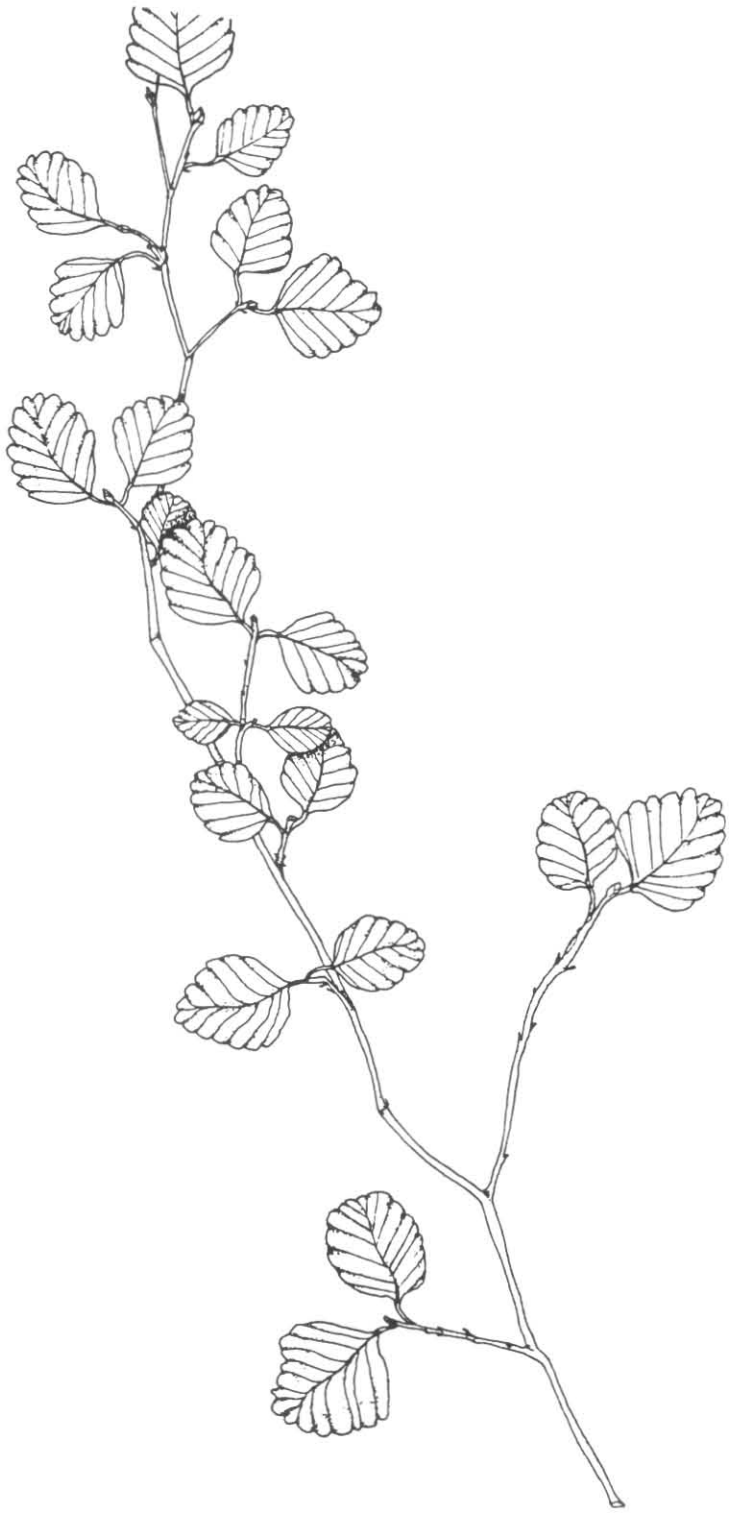


Foliage

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.

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



DISELMA ARCHERI
Cheshunt Pine

Throughout most of its range in the alpine and subalpine zones of Tasmania *Diselma archeri* dominates heath. However, in the wettest part of the State the species is found dominating high altitude rainforest. Cheshunt Pine has a leaf arrangement similar to that of Creeping Pine (*Microcachrys tetragona*). Fortunately, Creeping Pine lives down 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.

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 real eyesores. Properly made and carefully sited tracks will allow the explorer access, while remaining visually obscure and environmentally acceptable. The single most important feature of track construction is good planning. A well planned road or track will cost less than a badly placed one requiring 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.

The Department of Resources and Energy encourages companies to use helicopters for access wherever this is practicable. If a very long track, or one in difficult terrain, is proposed, the Department 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 fair-sized 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 of 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 Commission 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 of in extreme weather conditions.
- Do not use tracked vehicles on unsuitable surfaces (such as bitumen).

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 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

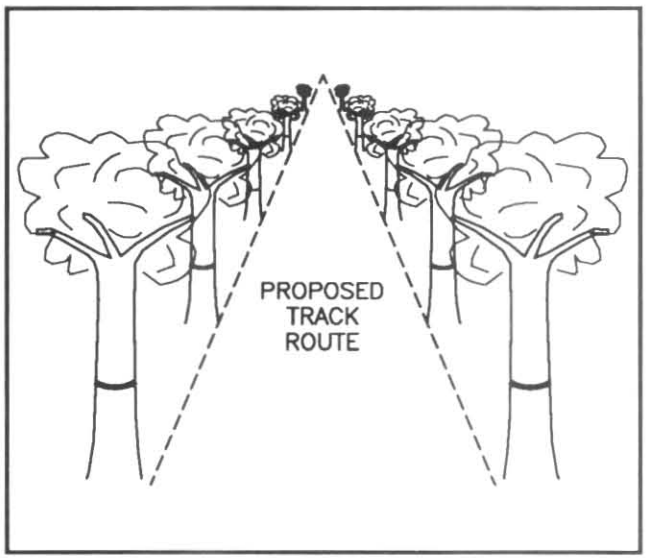
The costs involved in track construction vary enormously according to the site. Tracks in near level, lightly timbered country may cost only $500–$600/km; while a comparable track in heavily timbered country with high rainfall and many creek crossings can cost $10,000/km or more.

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.

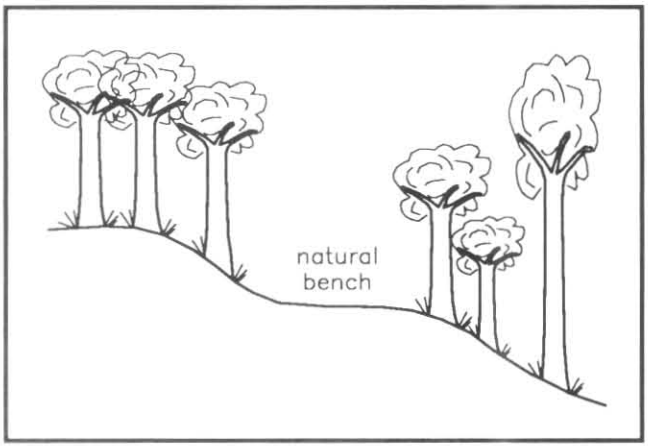
LOCATION

- 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 sitings of 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.

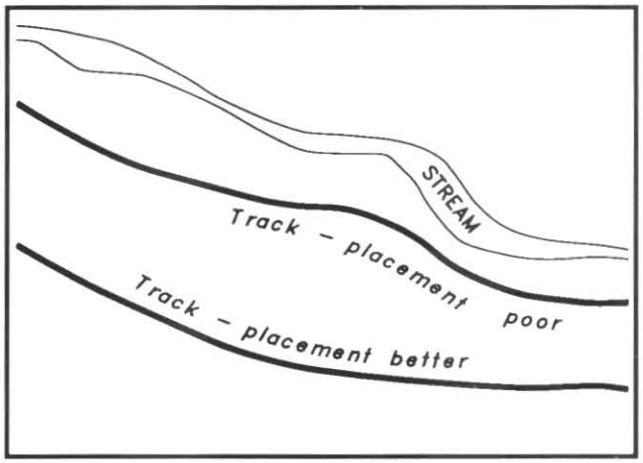


- To assist in the location of the track, first establish **control points** for the track — such as creek crossings, saddles and so on, then decide on the required gradient between the control points.
- Avoid poor or difficult ground such as rock outcrops, soaks and swamps. Generally the best track 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. On the other hand, avoid also 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.



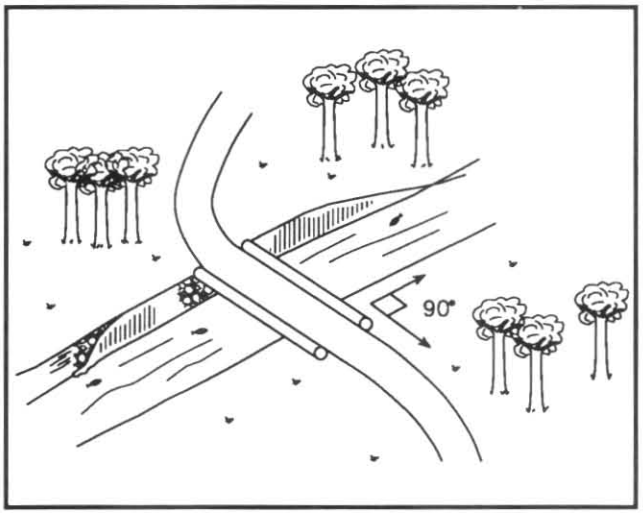
- Ideally tracks should be built to a grade not less than 1% (so water will run off) but not more than 5% — especially if constructed in erodable soils or clayey areas where traction may be a problem in the wet.
- Peg or flag the track route clearly prior to construction. A "corridor" of tapes can be tied on trees and scrub on each side of the proposed route. This will greatly assist the earthmoving contractors in putting the track in neatly.
- When developing a new track off an existing roadway ensure 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. All watercourses in Tasmania are protected by streamside reserves, as defined by the Forestry Commission. These are:

Watercourse Type	Protection Zone (per bank)	Total Streamside Reserve
Class 1. Rivers and lakes (as named on Lands Dept. 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.

- Stream crossings should be at right angles to the stream.



- Interference with the natural drainage should be kept to a minimum.

CONSTRUCTION

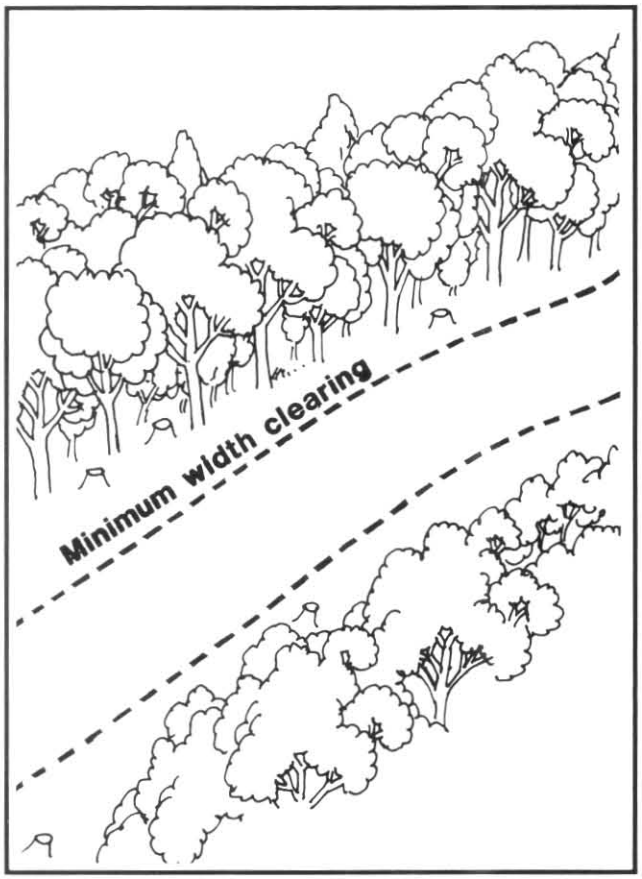
- Precut all fallen logs and saplings greater than 15 cm in diameter before pushing aside with dozer or excavator. Any commercial timber should be set aside for salvage.

- 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!

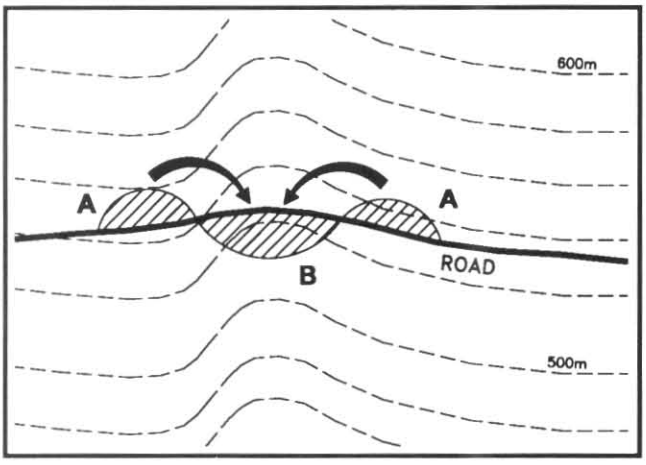
- If a second cut is made with a 'dozer and subsoil is removed to make a firm road base, store subsoil in a windrow alongside the track, but **do not** pile this on top of the topsoil.

- Do not make the track any wider than necessary. Choose the smallest 'dozer 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 roadway.
- Ensure service areas are limited in size and in numbers, and where possible ensure construction service areas, fuel, equipment, and vehicle-depots, and camp-sites 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 Commission, 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

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

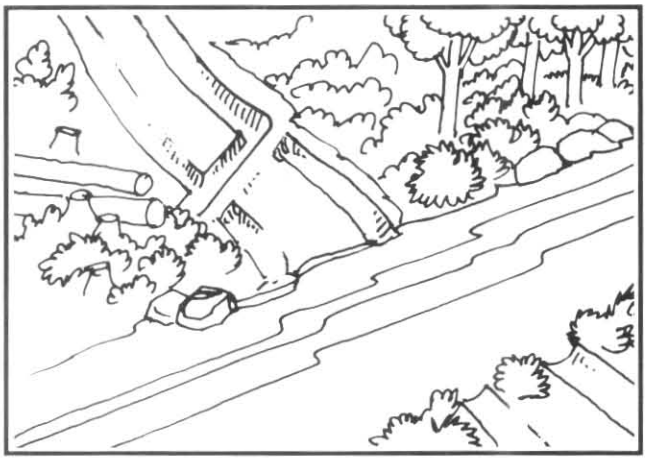
LOW: dolerite or basalt rock/soils.

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

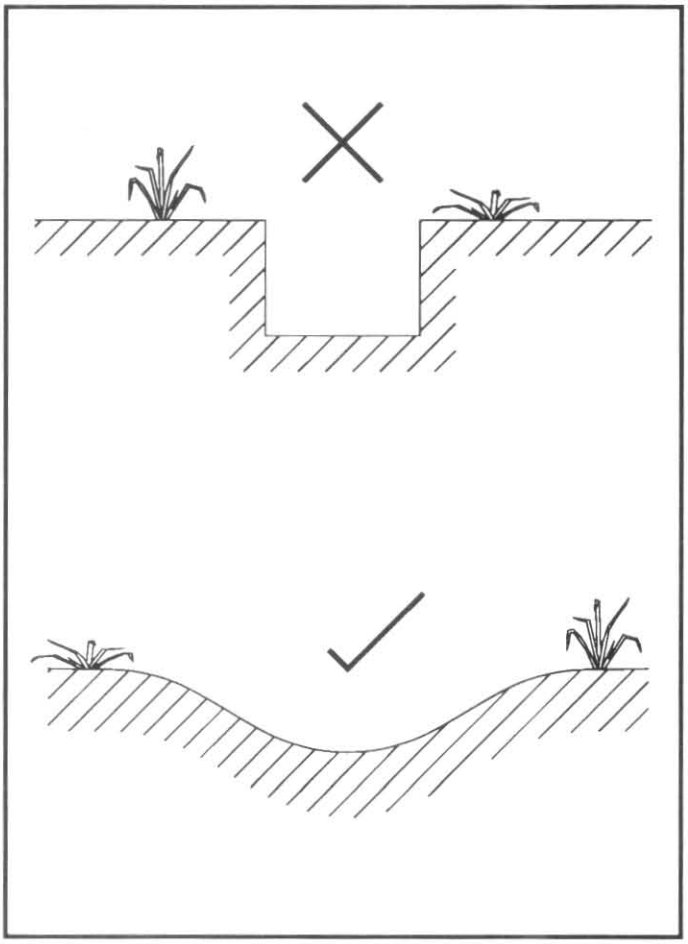
HIGH: Quartzite; coarse sandstone, thin residual soils derived from limestone and granite in wetter areas.

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

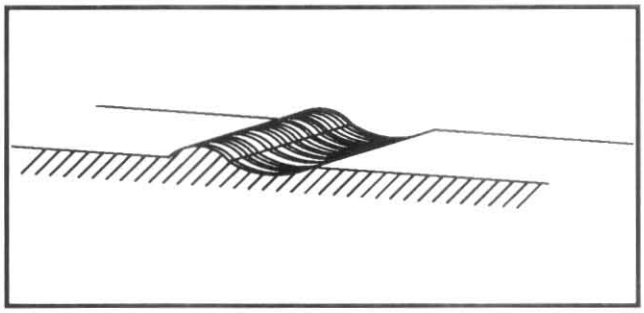
- Cross drains are constructed at an angle across the track. They should be dish-shaped, about 0.6 m wide and 0.3 m deep. These drains are often damaged by the regular passage of traffic and should be kept in a good state of repair. The drain should be at an angle to best intercept water, and should 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.

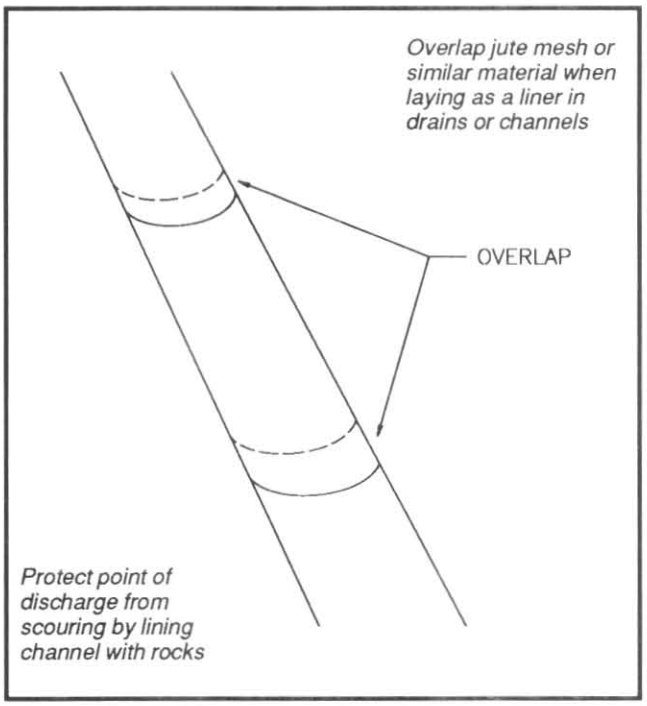


- "Mounds" can also be used to divert water off a track. These are made during track construction by piling up any available material — gravel, crushed rock, even soil into a long 'hump' across the track — rather like a 'speed hump' used to force cars to slow down. The hump works by directing water flowing 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 1 to 2 m in front of the mound during construction of the track.



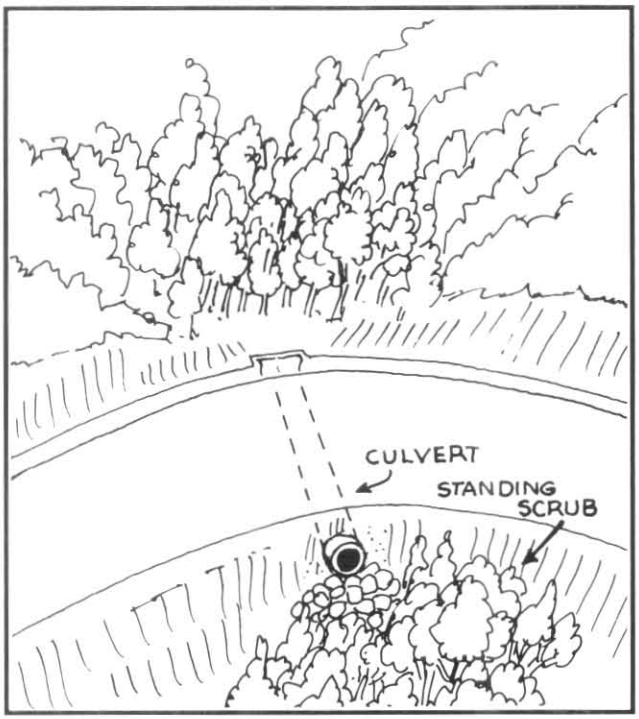
- The dimensions of cross drains and table drains must be adequate to cope with the volume of runoff. In easily eroded soils water velocity in these drains should not exceed 0.5 m/sec. In more resistant soils, the velocity should not exceed 1.0 m/sec. When constructing drains try and stick to the same 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.



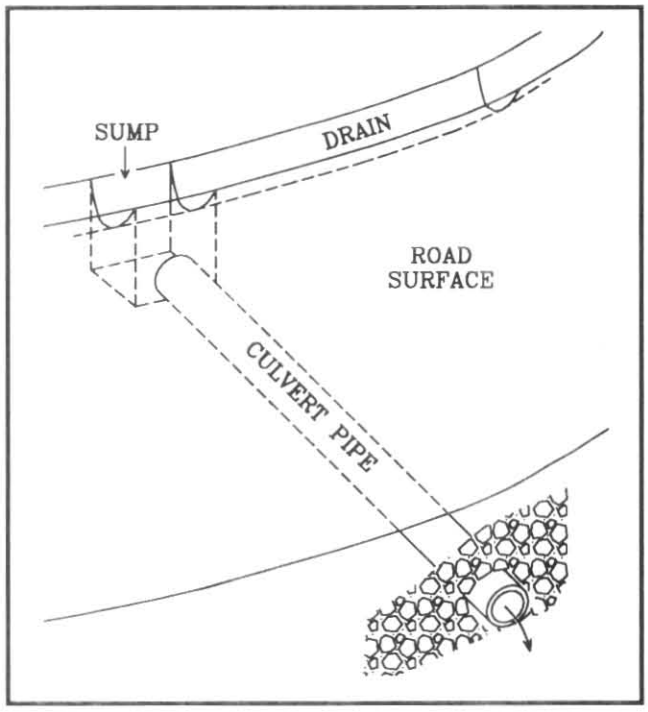
- Where excessive silt loads are anticipated, or where water quality is an issue, large cross drains and culverts should be constructed in conjunction with a sediment trap — a pond into which the drainage water can collect, and sediment can settle out before flowing on, following the natural drainage 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.

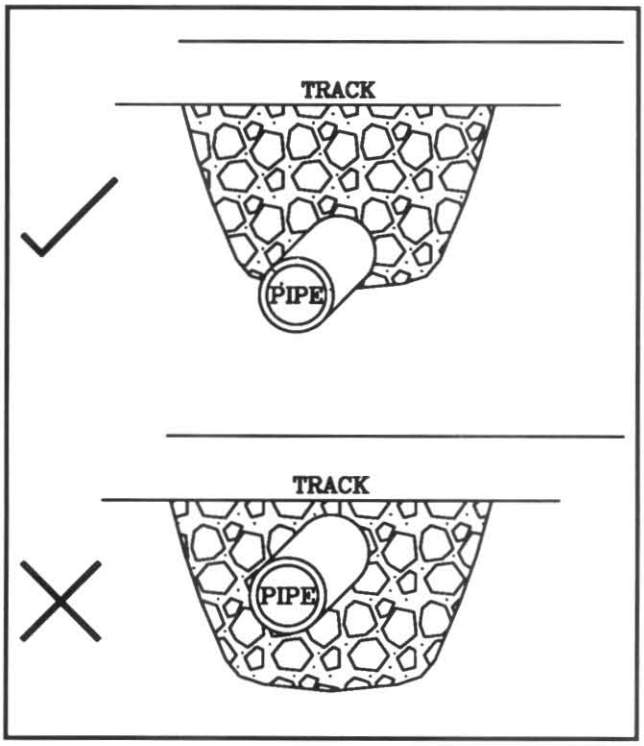


- Remember to check drains and culverts frequently and **UNBLOCK** where necessary. A blocked culvert can cause massive washouts.

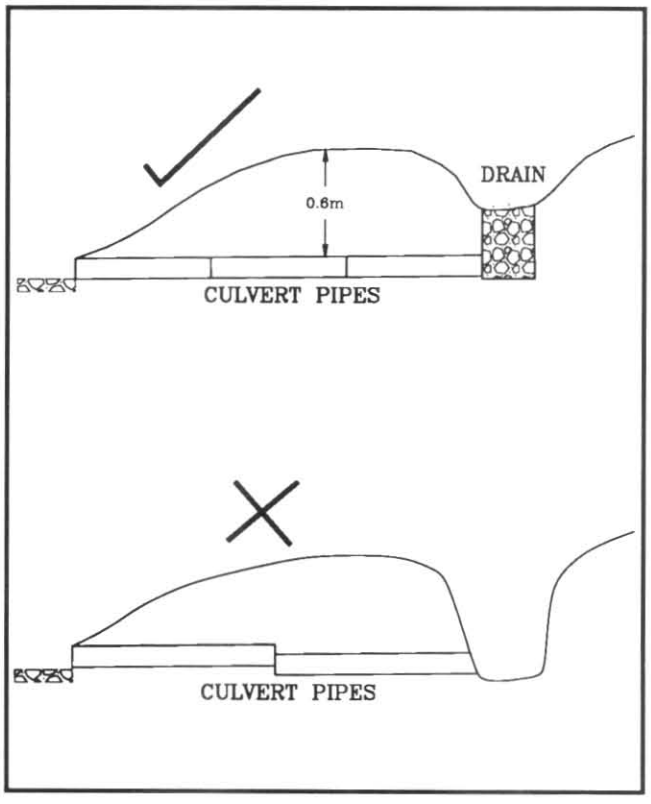
- Culvert pipes should be laid on a very slight grade, not too flat or too steep. This is to minimise silting up of the pipes, which will occur if the pipes are too flat, and to control 'scouring' of the culvert outlet, which will happen if the water flow is concentrated by a pipe. Rip rap (broken rock) 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.

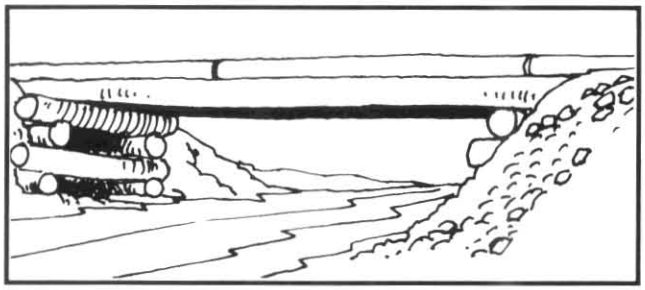


- Culvert pipes must be laid straight, on a good foundation, to prevent movement of pipes after laying. Where pipes are joined, care must be taken to have them laid straight. Rubber ring joints or external bands can be used where movement is anticipated.
- The minimum recommended cover over pipes is 0.6 m.



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.

- 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 creek bed to form a firm bottom to a ford.
- Direct road drainage off road into vegetation, not into creek.
- Minimise disturbance in 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 due to a lack of gradient and thick peat. 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 gravels which produce 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, in which 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 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 duplicated unnecessarily. 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 none the less, 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.

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 usually done with a dozer, small patches can be dug up with the excavator bucket.
- 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 m.

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 EZ off-the-shelf 6:5:5 + Mg, which should usually be spread at the rate of 250 kg/ha. At this rate 1 kg will cover 40 m^2.
- Other fertilisers may also be suitable in some situations, such as the organic fertiliser OR-90, which is made from waste bark and orange roughy fish waste. The N:K:P ratio is 1.6:0.9:0.2 with 0.3 Mg, and as a fertiliser OR-90 can be spread at a rate of 750 kg/ha. At this rate 3 kg will cover 40m^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** 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 (1990 figures)

- Topsoil stockpiled next to track.
- Earthworks done by 20 t excavator, cost $65 per hour (plus transport to site).
- Excavator operator can restore one kilometre of track every 7 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.
- D6 bulldozer will rip 1 km in 2.5 hrs, cost of $70 per hour (plus transport to site).
- Track fertilised with EZ 6:5:5 + Mg mix at rate of 100 kg/km of track, or organic fertiliser such as OR-90 at a rate of 300 kg/km of track.

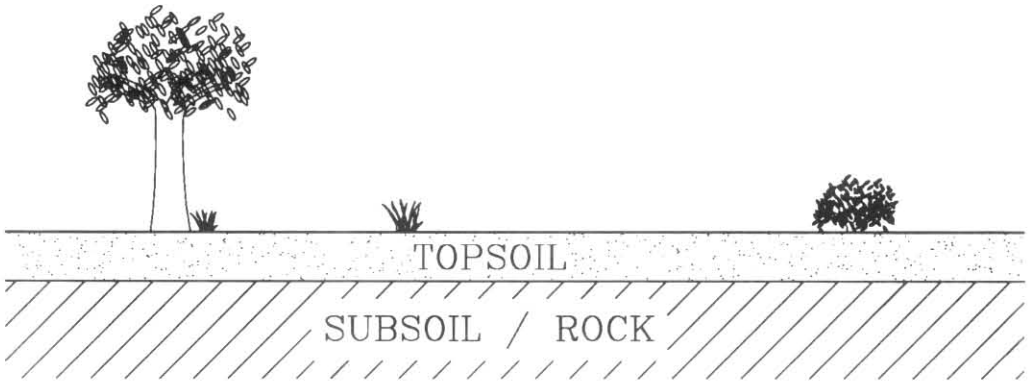
Costs per kilometre of track

Drainage	2 hrs of excavator time at $65/hour	$130
Soil replacement	7 hrs of excavator time at $65/hour	$455
Ripping	2.5 hrs of 'dozer time at $70/hour	$175
Fertilising		$30
Total cost	With ripping	$790/km
	Without ripping	$615/km

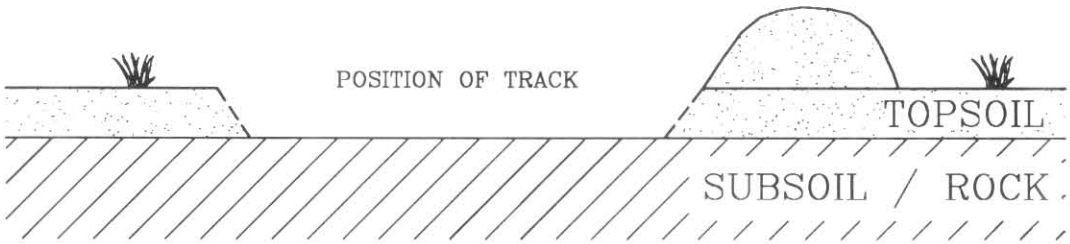
- To this must be added the cost of the machinery transport to the site, and the planning and supervision time required of the field staff.

TRACK CONSTRUCTION AND REHABILITATION

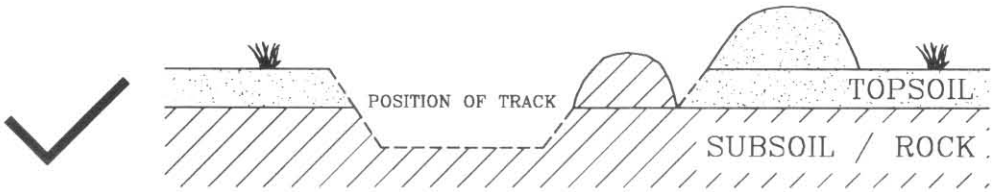
1. UNDISTURBED SURFACE — BEFORE WORK BEGINS



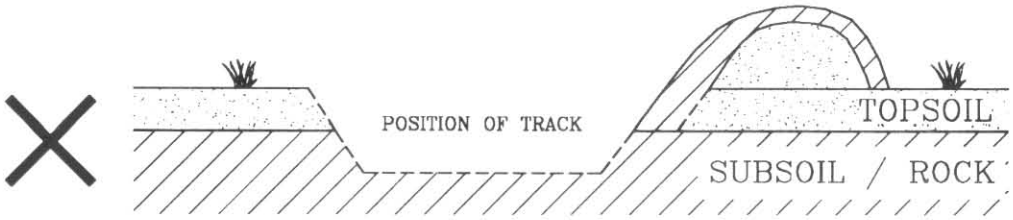
2. REMOVAL OF TOPSOIL



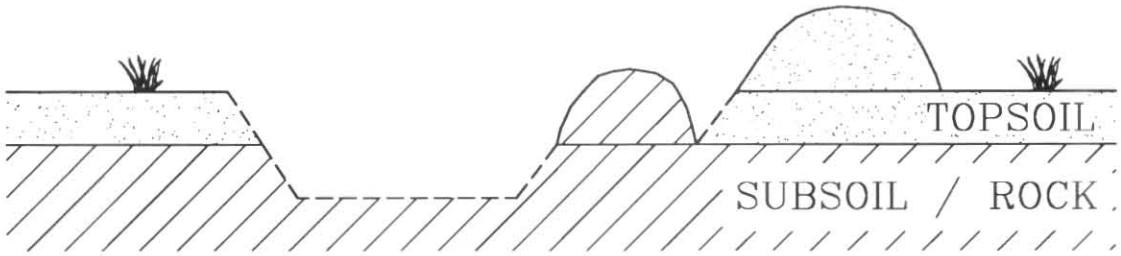
3. REMOVAL OF SUBSOIL



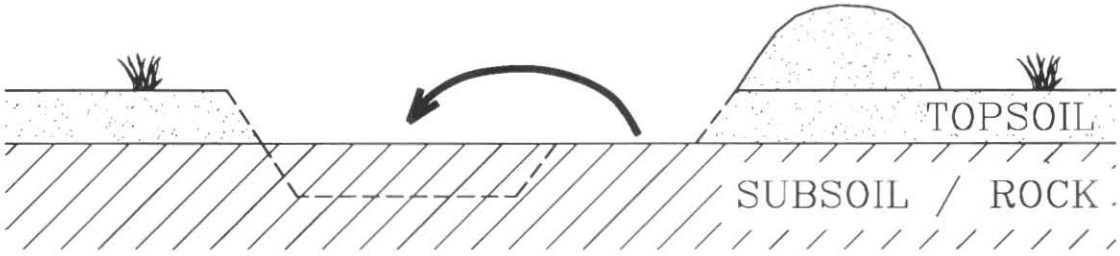
Subsoil removed if needed to complete track. The subsoil must not be stockpiled or mixed with the topsoil.



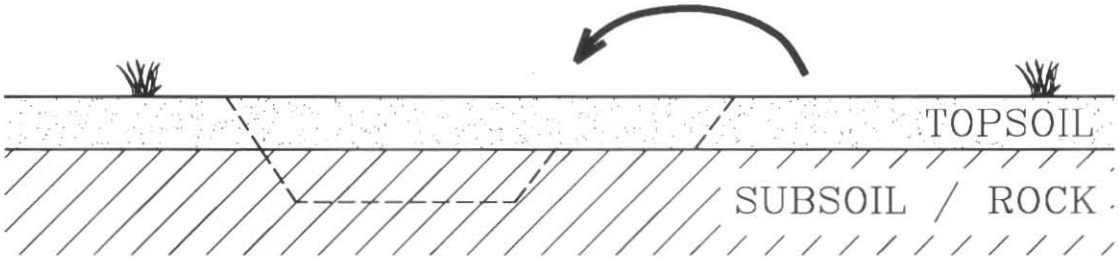
4. REHABILITATION — RIP WHERE COMPACTED IF NECESSARY



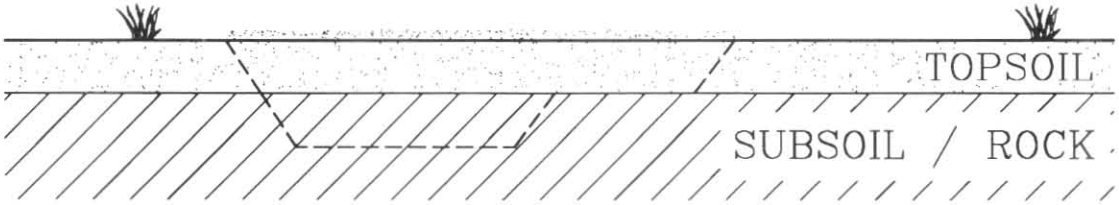
5. REPLACE SUBSOIL



6. REPLACE TOPSOIL



7. ADD SEED AND FERTILISER AS APPROPRIATE TO CONDITIONS

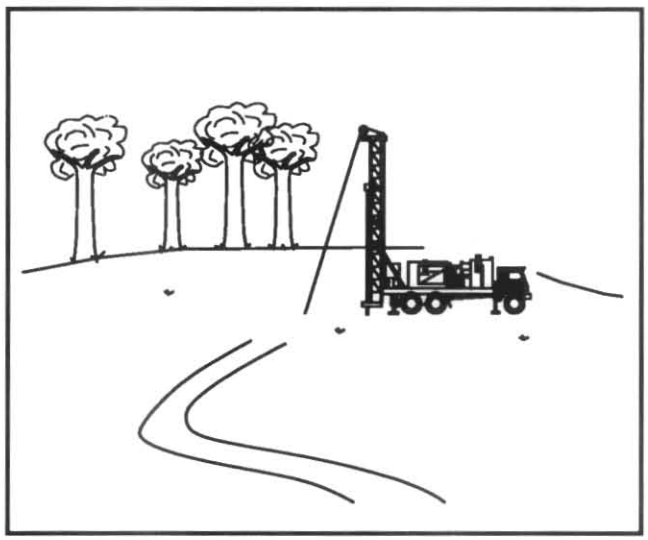


DRILL PADS

- Frequently a small clearing must be made at the site at which a hole is to be drilled, to enable the drilling rig to be manoeuvred into place, and to 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. Often a small sump must 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 programme. 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 for and what sort of pad will be required. In dry country, tea-tree scrub and the like, removal of the vegetation cover (leaving rootstock in ground) may suffice to give you a clear working area. The type of rig is also a consideration. Air tracks and small trailer-mounted rigs may be able to manage with just the vegetation removed, although in wetter areas, or where large heavy rigs are needed, then a drill pad proper must be constructed.

CONSTRUCTION

- Precut any timber greater than 15 cm in diameter in the area to be cleared.

- Earthworks, if any are needed, should be done with an excavator.

- Push topsoil and vegetation to one side of drill pad area. If drill pad is to remain in place for a long time, and pad is on a slope, provide drainage along the top side of drill pad (the same as for a costean) so drill pad and topsoil do not wash away. On a slope, topsoil should be stored on uphill side of drill pad.

- Remember that the drill will need a firm base to drill on. 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 DRILL SITE

- When drilling, place absorbent matting such as hessian under/around the rig to catch any grease or oil. If the oil in the drill rig is changed on site, take used oil away for proper disposal. Do not pour oil on to the ground near the drill rig.

- Should hessian or other matting not be available, then any spots of oily soil under or near the rig on completion of drilling should be taken away for proper disposal. We are talking here of a few buckets of earth, no more. If hessian is used no oil should be spilt on to the ground at all.

- Remove all rubbish and equipment from drill site on completion of work.

- Cap or cover drill hole. Do not leave an open hole in ground.

SUMPS

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.

- Avoid having muddy water from the drill site directly enter any nearby water course by directing water through straw bales or absorbent matting. Hay should not be used as it contains seeds which may then be introduced as weeds into the exploration area. Straw does not (or should not) contain any seeds.

- Pump water away from water courses and allow to drain through vegetation where possible.

REHABILITATION

- If ground is compacted by the use by heavy machinery or prolonged use, then 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. These can be avoided by being sure to rip along the contour.

- Stockpiled soil and vegetation should be respread 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"**.
- 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 EZ off-the-shelf 6:5:5 + Mg mix, which should be applied at the rate of 250 kg/ha. At this rate 1 kg will cover 40 m^2. The average drill pad, perhaps 15 m × 15 m (225 m^2) will require 5 kg of this fertiliser. Organic fertilisers, such as OR-90, may also be suitable. OR-90 should be spread at the rate of 50 kg/ha. At this rate 15 kg will cover an average drill pad. OR-90 is sold in 20 L bags (current cost $8) which weigh approximately 15 kg.
- If drainage works were put in around perimeter of drill site then leave them intact. This will prevent erosion of the newly established revegetation.
- 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 (1990 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 20 t excavator, cost $65 / hour and D6 bulldozer (cost $70 / hour).
- Soil to be respread by excavator (which can respread soil over 1 ha in 8.3 hours); appropriate drainage works to be installed.
- If pad compacted, ripping must be done with bulldozer. A D6 bulldozer can rip 1 ha in 4 hours.
- Disturbance to be spread with fertiliser EZ 6:5:5 + Mg at rate of 250 kg/ha; i.e. 1 kg will cover 40 m^2. A 225 m^2 drillpad will require 5 kg. Fertiliser costs about $18 per 50 kg bag.

Costs for an average drill pad

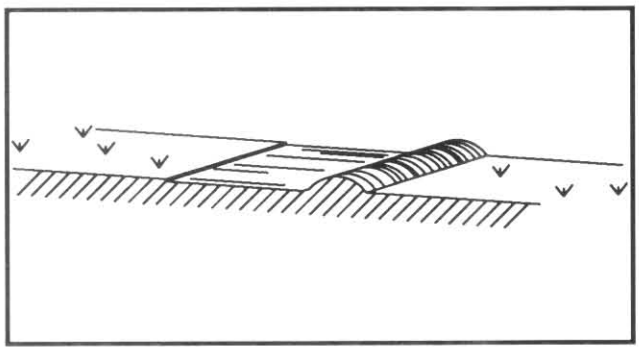
Ripping if needed:	½ hour dozer time	$30
Soil replacement:	½–1 hour excavator time	$35–$65
Seed (0.05 kg):	should be collected locally	
Fertiliser:	5 kg	$2–$8

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

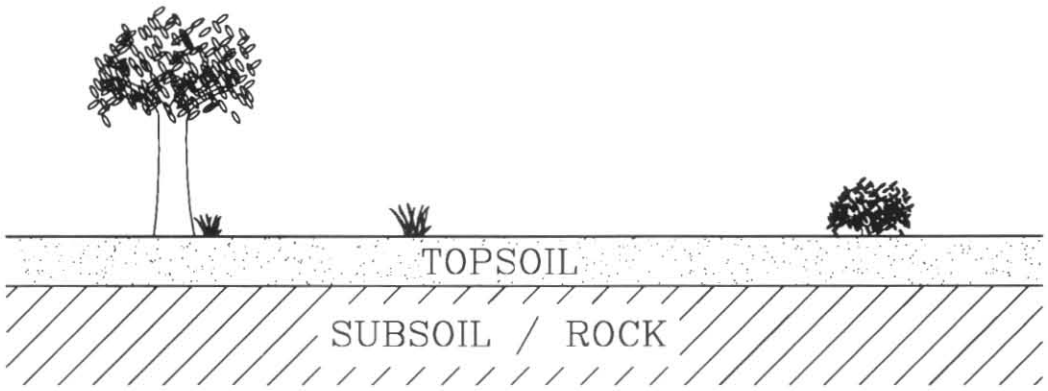
- Costeans (meaning trenches) and pits should ideally be located to avoid large trees, but where this is not possible large trees (greater than 15 cm diameter) should be pre-cut and moved to one side for salvage.
- Topsoil (including scrubby vegetation) should be stripped and moved to one side of the 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 erodable 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 shallow "scrape" costean is no longer required.
- Fill in costeans as soon as possible after programme 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"** for seeding rates and details on fertiliser types.

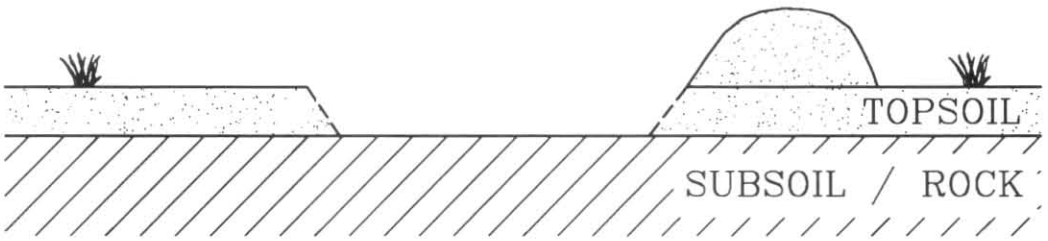
CONSTRUCTION OF COSTEANS

UNDISTURBED SURFACE

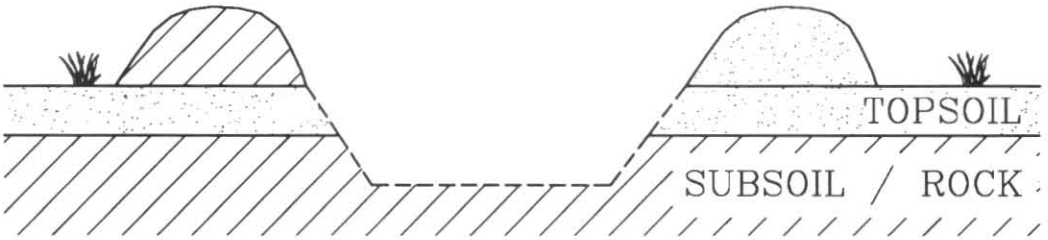


SMALL COSTEAN

1. Strip topsoil and vegetation, stockpile on one side of costean.

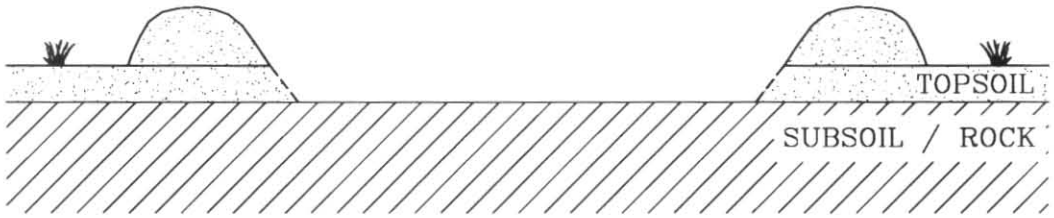


2. Stockpile subsoil (spoil) on other side of costean.

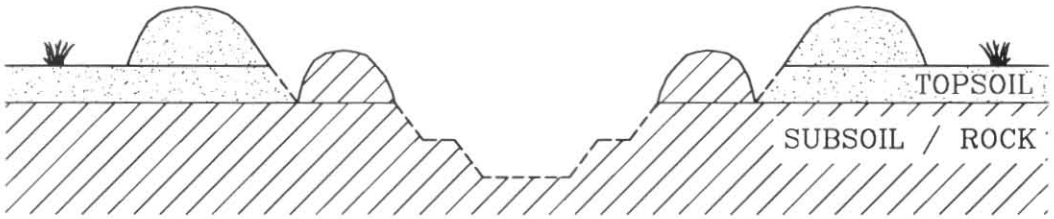


LARGE COSTEAN

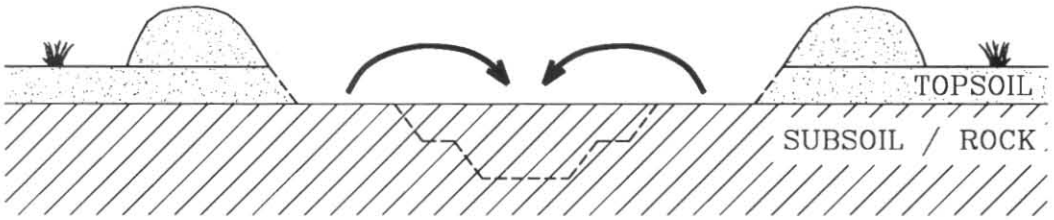
1. Strip off topsoil and vegetation and store on sides of costean. Remember to leave room for subsoil storage.



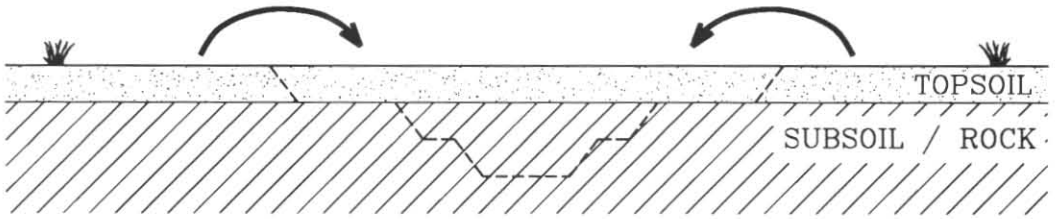
2. Remove subsoil, stockpile next to, but not on top of, topsoil. Stockpiles may be on one, or both sides of costean, depending on space required.



3. Filling in costean: subsoil replaced first.

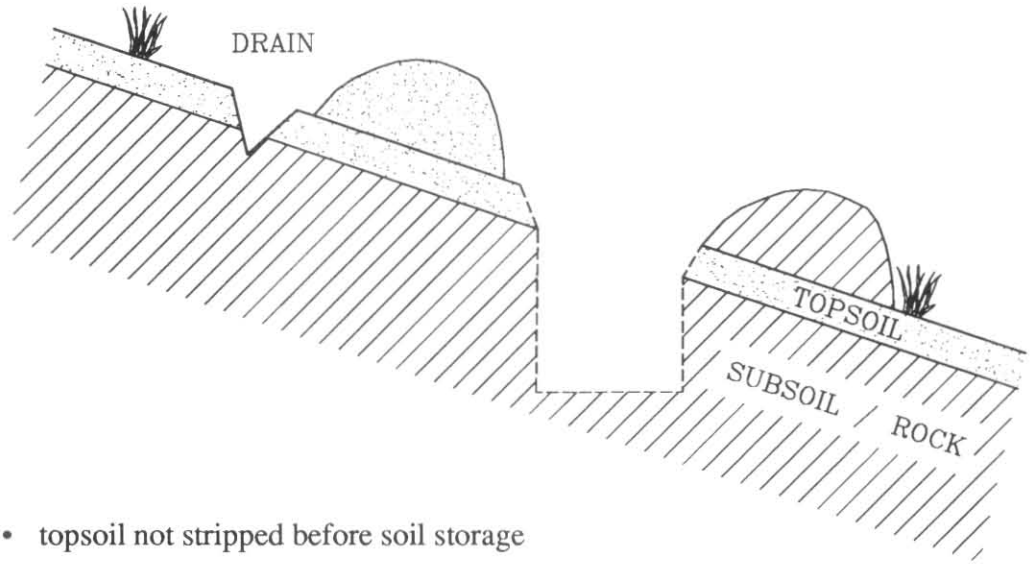


4. Topsoil replaced over filled-in costean. Fertiliser and seeds added if needed.

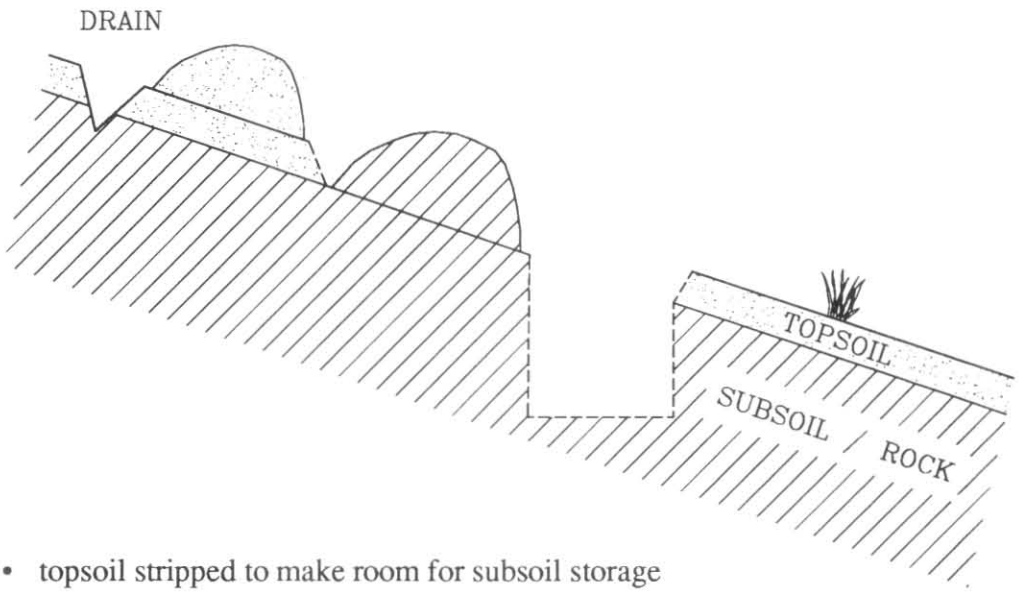


SLOPING SITES

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).

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 3–6 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 (*Cereale secale*) can be beneficial. This is a crops 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 stabilization 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 2–4 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 1–2 metres.

POTTED SEEDLINGS

Potted seedlings may be used where 'instant' growth is needed, although these are quite expensive, costing from $1.00–$2.50 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 ones 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 firms who now 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 and form a mulch, and the twigs left act as sun and wind 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.

On the whole, the use of fertiliser, especially in small amounts, is preferred to non-use. Use one such as the EZ off-the-shelf 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 40m^2.

Organic fertilisers such as OR-90, which is made from chopped eucalypt bark and orange roughy fish waste milled to a powder, may also have application in some situations.

USE OF HELICOPTERS AND HELIPADS

In some areas of inaccessible terrain, the easiest option will sometimes be to mount a helicopter-assisted drilling programme. 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 programme by helicopter, and removed when the work is finished.

The exact costs of helicopter services and the safety requirements, such as size of 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.

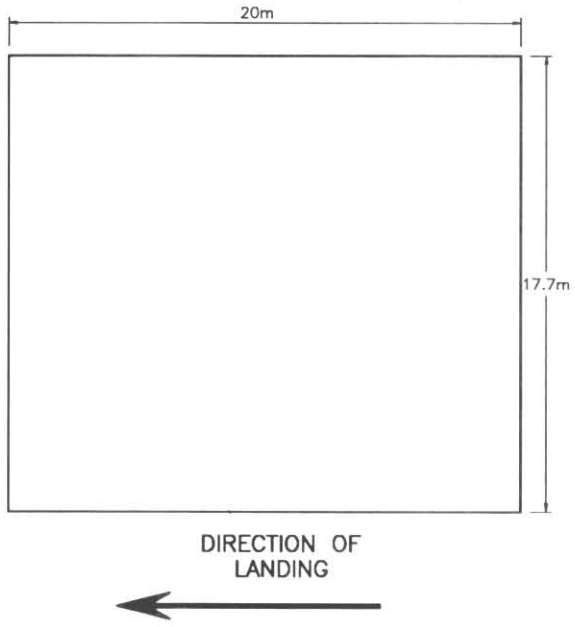
EXPLORERS SHOULD ASCERTAIN FROM THEIR HELICOPTER CONTRACTORS THE EXACT REQUIREMENT FOR EACH PROGRAMME.

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 m × 14 m.

Pads subject to frequent use, or where any sling work is required, must be at least 20 m × 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 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: 90 cm from ground level

MAIN ROTOR: 230 cm 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.

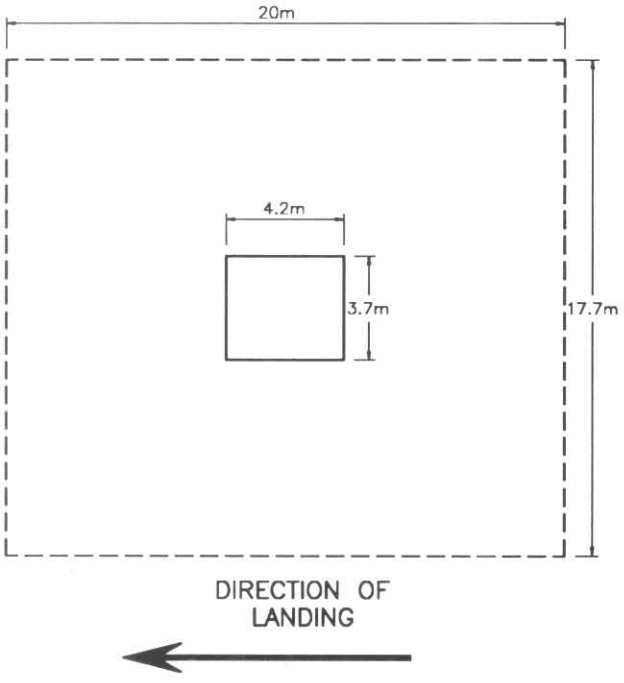
Remember that a helicopter produces strong draughts on both takeoff and landing, and all loose items — small branches, tarpaulins, empty sample bags, buckets, clothing etc. may be swept up into the rotor system or engine intake. Ensure that the helipad is clear of any loose items prior to arrival and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

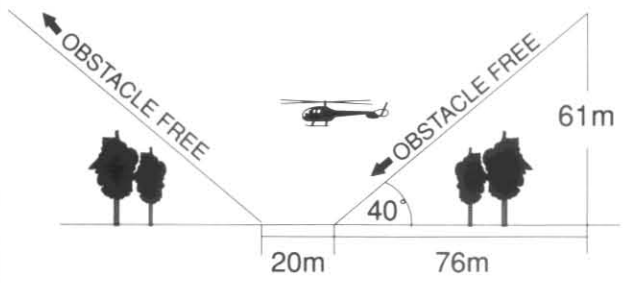
FLIGHT TERMINATION AREA

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.

RECOMMENDED MINIMUM HELIPAD DIMENSIONS



ELEVATION

Essential Requirements:

i) Sufficient tail rotor clearance all round – vegetation < 90cm height.
ii) Max 40° approach and departure angles.
iii) Touchdown area minimum 4.2x3.7m and slope < 5°
iv) All loose or light objects removed from ground effect area.
(v) Relatively free of dust.

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

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

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

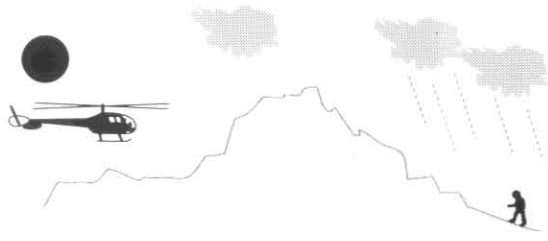
Briefings

- 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:
  - Hydro, Telecom 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.

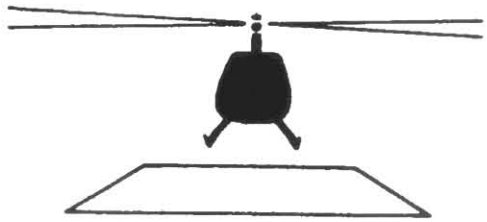
WEATHER



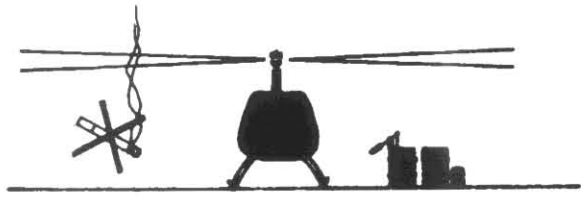
If dropped off in a remote area carry emergency clothing and food.

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 (50') 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 O.I.C. This means stay at least 16 metres (50') away.

Stay away from 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 (100') from the helicopter.

EMBARKING, DISEMBARKING

Always approach and leave a helicopter from the front — keep in the pilot's line of vision at all times and avoid the tail rotor area.

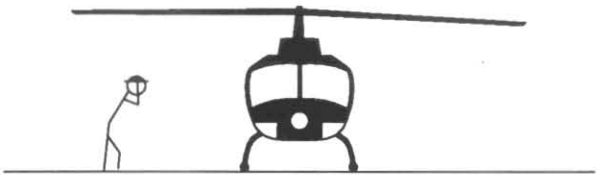
EMBARKING, DISEMBARKING

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

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

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

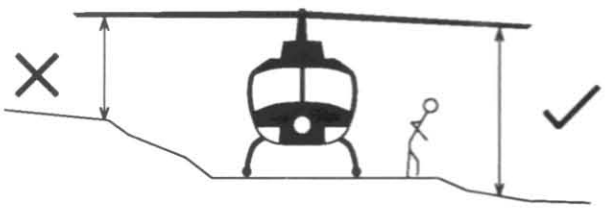
In gusty conditions the main rotor blades will sail closer to the ground as they slow down, wait untill rotor blade has stopped before approaching.



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

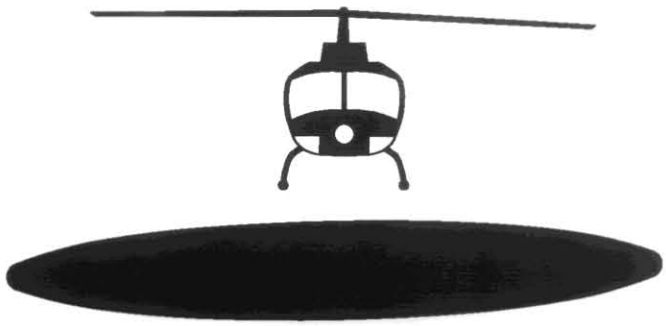
When boarding a hovering helicopter be sure to transfer your weight very gradually onto the skid and then the steps. DO NOT LEAP at the skid or cause your weight to shift suddenly to the machine.

When leaving a helicopter disembark quickly and quietly. Do not jump out. 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 main rotor.

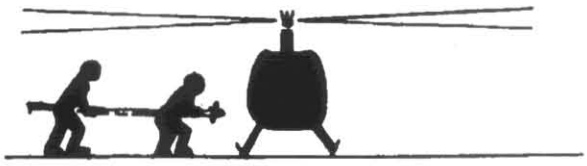
LOADING AND UNLOADING



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.

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.

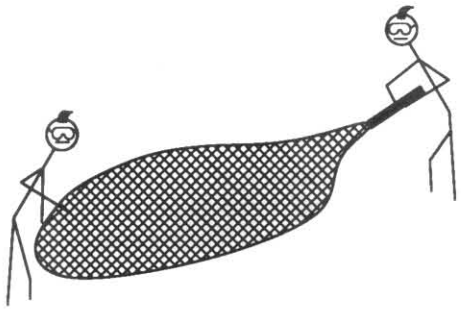


All long tools and equipment must be carried by two people (one at each end).

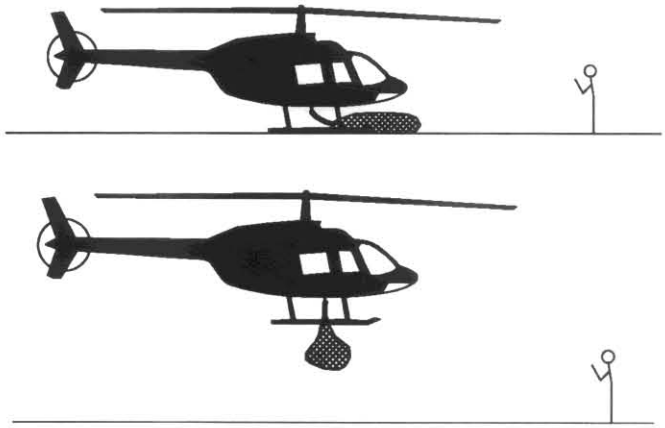
Always check goods to be loaded with pilot, especially batteries, fuel containers, pressurised vessels etc. These may need special containers.

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

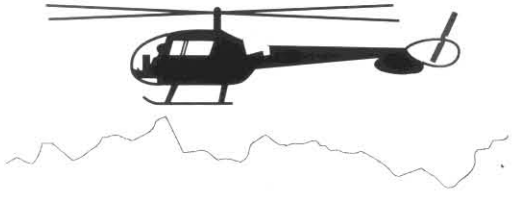


After a sling has been hooked up (either to a stationary or to a hovering helicopter) move to a position in front of the helicopter in full view of the pilot, so as to avoid being hit by the loaded sling. If using a radio to give instructions to the pilot during sling work, do not give any order which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

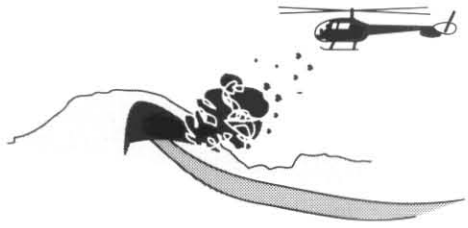
Use aircraft rated strops, shackles etc. only, check with pilot. Check all knots or retie, lockwire all shackles with s/steel wire.

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



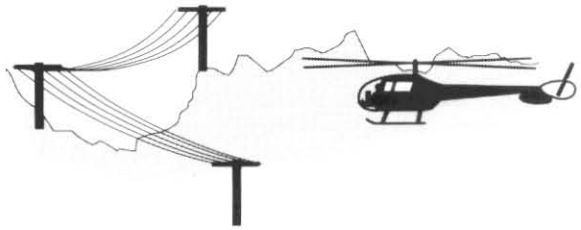
Check gear is stowed securely and lockers are closed.

FLYING



Check with quarries in vicinity (2km) 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 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 Authority and the Tasmanian Police force.
- Make the symbols at least 2m long with as great a contrast in colour as possible against the back-ground. Use the same colour throughout if possible.
- The aircraft will indicate the symbols have been seen and understood by rocking from side to side.
- The aircraft will indicate 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	⌋⌊
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. The following major centres have aviation fuel, normally located at the aerodrome: Hobart, Launceston, Devonport, Wynyard and Queenstown. Additionally, the operator normally has fuel stocks at Smithton, Tullah, Crotty, 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 S.A.R. 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.

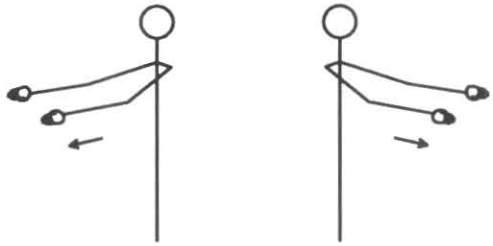
CONCLUSION

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:

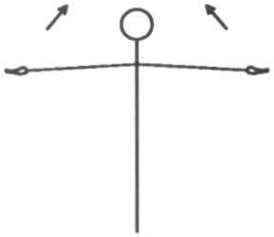
- Ensure that the condition of the injured persons is established. That is, the person must have a regular pulse, good breathing and acceptable blood pressure.
- Ensure that any bleeding has been stopped before transporting the person. NEVER transport a person who is haemorrhaging internally or externally.

HAND SIGNALS

The following are universally accepted hand signals to helicopter pilots:

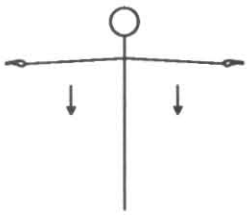


MOVE HORIZONTALLY: Appropriate arm extended horizontally sideways in direction of movement, and other arm swung in front of body in same direction, repeating movement.

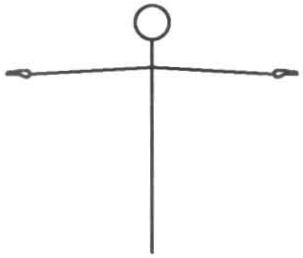


MOVE UPWARDS: Arms extended horizontally, palms facing upwards; move palms upwards; speed of movement indicates rate of ascent.

LAND: Arms crossed and extended in front of body.

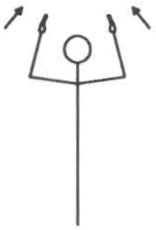


MOVE DOWNWARDS: Arms extended horizontally, palms facing downwards; arms move downwards; speed of movement indicates rate of descent.



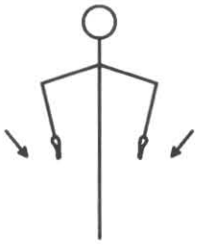
HOVER: Arms extended horizontally from shoulder.

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

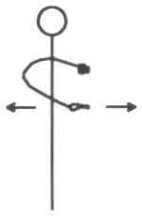


COME FORWARD: Arms in front with palms facing body, beckoning helicopter forward.

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

Frequently fieldwork must be carried out from base camps. Large programmes may be conducted from hutted camps, whilst smaller programmes 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 arrestors 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 storing of fuel, or servicing or refuelling machinery will be:

  - cleared to bare earth;

  - surrounded by a firebreak, three metres or more wide, 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 to be removed from campsites. Rubbish 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.

- 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.

In boggy areas, provision of cording or duck boarding around hut/s 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 15 cm 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.

Distribution of records of isolation of *Phytopthora cinnamomi* in native vegetation in Tasmania
(From *Tasforests*, Volume 2 No.1, Forestry Commission, Hobart)

PLANT DISEASES AND WEEDS

- 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 explorationists 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 the State is the fungus *Phytophthora cinnamomi*, and whilst this disease is incurable, strict hygiene measures may reduce the spread of this menace.

PHYTOPHTHORA

- *Phytophthora cinnamomi*, commonly known as Cinnamon Fungus, is an introduced plant fungus which causes dieback and death in a good 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.

- Recent studies (PODGER, F. D.; PALZER, C.; BROWN, M. J. 1990. Bioclimatic analysis of the distribution of damage to native plants caused by *Phytopthora cinnamomi* in Tasmania. *Aust. J. Ecol.* In press.) have shown that, unfortunately, the fungus is present over much of the State already, 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 shown on page 46.

- 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*), Christmas Bell (*Blanfordia punicea*) 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.

- Following an area becoming 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. The Division of Mines and Mineral Resources, in consultation with other Government agencies, will advise what precautions are required.

HYGIENE MEASURES

Before going into these *Phytophthora*-free zones, anything which will have, or has had, contact with the earth should be washed clean and sprayed with an appropriate fungicide, such as ABF-42 or a dilute solution of sodium hypochlorite (household bleach).

As well as large items, such as vehicles and earth-moving machinery, smaller items such as boots, tent pegs, tent floors or groundsheets, hand augers, geological hammers, spades, shovels etc. must be properly cleaned. Helicopter skids should also be cleaned if flying into uninfected areas.

The most important point to remember is that the soil must be washed from these items. Simply dipping or washing a dirty, soil-covered item with fungicide is not enough.

The soil must be removed by washing or, if dry, soil can be scraped off an item with a wire brush.

INFORMATION ON ABF-42

ABF-42 is a poly quaternary microbiocide commonly used in Australia to control the bacteria which occur in air conditioning systems and which are responsible for Legionnaires Disease.

The active ingredient in ABF-42 is poly [oxyethylene (dimethyliminio) ethylene (dimethyliminio) ethylene dichloride at a concentration of 1%.

The distributors of this product are:

Chemsearch Australia
5–9 Ralph Street
Alexandria
NSW 2015

Telephone (02) 693 5077
Emergency (02) 44 5265

- ABF-42 is a transparent, light amber, non-viscous liquid with little or no odour.

- ABF-42 has an 'indefinite' shelf life.

Health Hazard Information (on ABF-42 Concentrate)

- Skin contact: may cause redness or irritation
- Eye contact: may cause burning sensation
- Ingestion: may cause nausea

Emergency First Aid

- Skin contact: flush with water and soap; use emollient cream, see a doctor
- Eyes: flush with water for 15 minutes; see a doctor
- Ingestion: promptly drink large quantity of milk or egg white, or if unavailable drink water. Avoid alcohol. See a doctor.

Spill Or Leak Procedures

If ABF-42 concentrate is released or spilled, quickly trap spill in one area by surrounding with absorbing clay, sawdust or paper. Add enough absorbing material to absorb spill completely, shovel into bags or barrels and dispose of in an approved landfill area for chemical wastes. Avoid contact with spill.

Waste Disposal

Dump used drums in an approved landfill area. Do not re-use empty containers. Puncture drums before disposing of in an approved solids waste dump. This product is toxic to fish.

Special Protection

Wear goggles and rubber gloves when handling concentrate.

Special Precautions

- Keep out of reach of children.
- Read label directions thoroughly before opening.
- This product is toxic to fish. Treated effluent should not be discharged where it will drain into lakes, streams, ponds or public water. Do not contaminate water by cleaning of equipment or disposal of wastes.
- Avoid contact with skin and eyes. Wash concentrate from skin and eyes immediately.

How To Use ABF-42 Concentrate

The concentrate is diluted 400:1 for application to items to be disinfected. The diluted solution is unlikely to have any adverse effects, however as a matter of common sense persons handling ABF-42 should wear a full set of wet weather gear (gumboots, overtrousers, raincoat, gloves) and safety glasses or a visor to protect the eyes.

Disinfection Procedure

The equipment to be disinfected is to be treated before entering a sensitive area and after treatment should not contact soil during transit to the sensitive area.

1. Wash thoroughly with a high pressure hose to remove clods of earth. Pay particular attention to the underside of machinery, inside sump guards and 'dozer belly plates, inside tractor wheels and all track gear.

   Use spade or crowbar to remove compacted soil where needed.

   After washing, leave standing for 10 minutes to drain water.

2. Dilute ABF-42 concentrate to working strength by mixing one part of ABF-42 concentrate with 500 parts of clean water.

   Use the diluted solution to thoroughly wash down all surfaces likely to have been in contact with soil. Don't forget cabin floors and footplates.

3. Don't drive cleaned vehicle through washdown effluent.

4. In the field, washdowns should be done on a hard, rocky surface. When using ABF-42 do not washdown effluent flow into any creek — dig a sump and allow effluent to soak into ground.

5. Knapsack sprays: to assist in compliance with these hygiene measures the Division of Mines and Mineral Resources has on hand a number of backpack sprays and a supply of ABF-42 which can be used as required.

INFORMATION ON SODIUM HYPOCHLORITE

This is the active ingredient in "White King" bleach and products like "Milton", sold by chemists and used to sterilise babies bottles. The 'strength' of these bleach solutions is measured in 'available chlorine'. Both "White King" and "Milton" have around 4% 'available chlorine'.

Sodium hypochlorite is a clear to pale yellow or greenish liquid with a chlorine odour, completely miscible with water, mildly corrosive and a powerful oxidising agent.

Health Hazard Information

- Skin: irritating to skin and may cause burns.
- Eyes: corrosive to eyes; capable of causing severe damage and loss of sight.
- Ingested: can cause severe burns to the gastro-intestinal tract.
- Inhaled: vapours are irritating to respiratory tract.

Emergency First Aid

- Skin: flush body and clothes with large amounts of water.
- Eyes: flush for at least 15 minutes with running water; ensure irrigation under lids by occasionally lifting upper and lower lids; transport patient to doctor or hospital without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
- Ingested: do not induce vomiting. Give water or milk to rinse out mouth and drink. Provide liquid slowly, but as much as patient will drink. Transport patient to doctor or hospital without delay.
- Inhaled: remove patient to fresh air; lay patient down, keep warm and rested. If available, administer medical oxygen by trained personnel. Transport to hospital without delay.

Special Precautions

Follow instructions on label of bleach being used. The use of rubber gloves is advisable. Care should be taken when using bleach. Mix only enough for the job in hand; dispose of any excess. Do not store mixed solution; bleach is mildly corrosive and oxidising.

Do not use excessive quantities of bleach and do not use water so treated for drinking.

Use of Sodium Hypochlorite

The "White King" bleach (or "Milton" or similar) is diluted significantly before use. When used for washing vehicles and heavy machinery mix 50 ml of bleach with every 100 litres of washing water. Use treated water to wash vehicle.

Remember one pint = 600 ml, so 50 ml is 1/12 of one pint or 1/6 of a cup.

For small items such as boots, tent pegs, spades, hammers, etc. wash each item in water then dip into solution made up of 50 ml bleach per two litres of water.

DISINFECTION PROCEDURE

1. Wash machinery with high pressure hose as described previously. Remove all dirt. Pay attention to underside of machinery. Some dirt may be removed using wire brushes, spades and crowbars. Continue washing with bleach-treated water until item is clean.

2. Small items: tent pegs, boots and so on should be washed clean and then dipped into a bowl of treated water. Remember the aim is to remove all mud and dirt.

NOTE: there is no need to use bleach-treated water and ABF-42. Use one or the other:

either:

- wash, disinfect with ABF-42 solution
- wash with bleach-treated water (or for small items wash and dip into bleach and water solution)

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 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 south west, 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. Seedpods, if present, should be removed from the area.

Some exotic species which are not classified as a noxious weed are nevertheless environmentally undesireable plants. Always check that species to be used in revegetation projects are quite acceptable before planting.

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
* Chondrilla juncea	Skeleton Weed
* Cynara cardunculus	Artichoke Thistle
* Emex australis	Spiny Emex (Double Gee, Three Cornered Jack)
* 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
Cirsium arvense	Californian Thistle (Creeping Thistle)
Cirsium vulgare	Spear Thistle
Conium maculatum	Hemlock
Cortaderia spp.	Pampas Grasses
* Cuscuta spp. (excluding Cuscuta tasmanica)	Dodder
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
* Heliotropium europaeum	Common Heliotrope
* Hypericum perforatum	St John's Wort
Lycium ferocissimum	African Boxthorn
Marrubium vulgare	Horehound
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
* 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

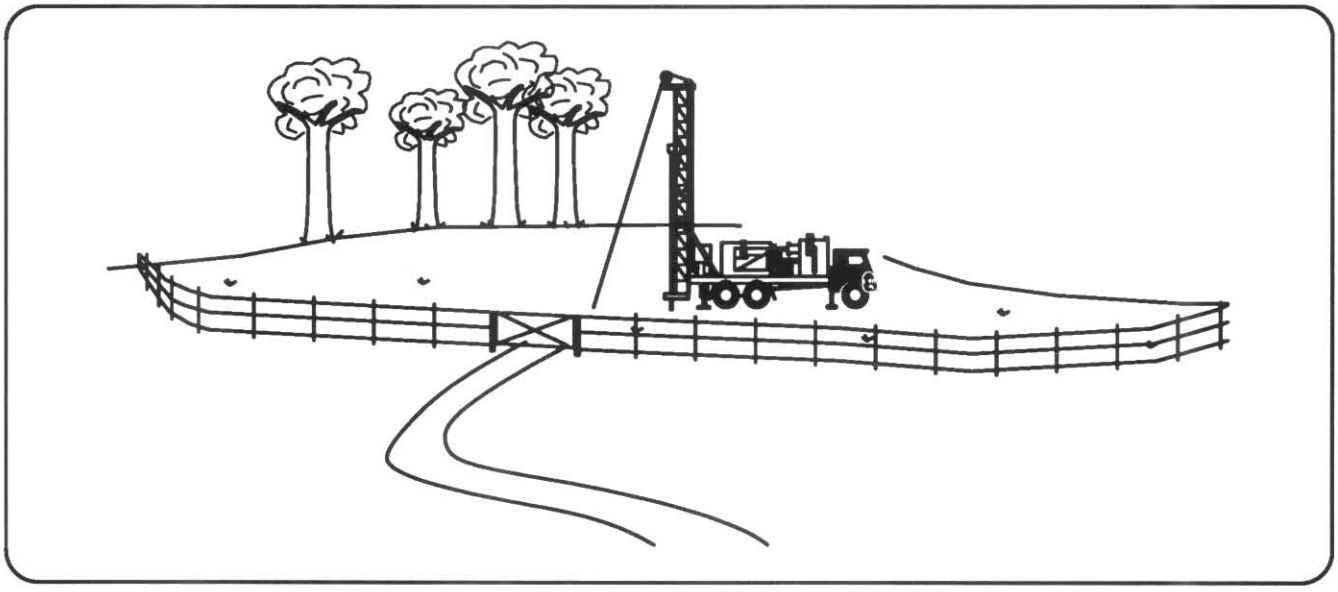
PROTOCOL WITH PRIVATE LANDOWNERS

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 text.

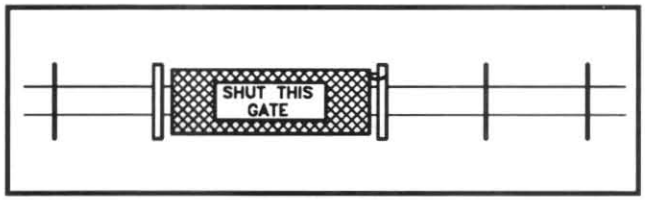
A pamphlet entitled *Exploration and Mining — the Landholder's Position* is available from the Department of Resources and Energy, and this clearly outlines the rights of the landowner and responsibilities of the explorer. Distribution of these pamphlets to landowners whose land is to be explored, and 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 programme.
- The Field Supervisor should make direct contact with the landholder well in advance of entering the property, and discuss the exploration programme 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 landholder solely to the contractor. The holder of the EL 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 programme — 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 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 proposed area of activity with the Council Clerk, and discuss with him/her your intended programme.
- 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 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 gridlines 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 cutting 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.

OWNERSHIP OF MINERALS

Whilst the Crown retains the ownership of minerals found on private land in 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 reviewed by the Crown in 1962.

M. C. Reed, Government Printer, Tasmania D 1288