

NSW MINERALS INDUSTRY EXPLORATION HANDBOOK

**Leading practice
for NSW explorers**

2013 EDITION



The NSW Minerals Council gratefully acknowledges the assistance from members and government agencies in the preparation of this Handbook.

Prepared with the assistance of



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A Message from the Minister



Historically, mining has often been associated with luck. We think of pioneers in the early days, working day and night in the hope of striking that one big find.

It has also been said in recent times Australia is lucky we had our booming mining exports, to carry us through when the rest of the world was facing economic crisis.

The pioneers may have left it to chance, but these days, luck has nothing to do with it. First-rate exploration makes the difference between a successful mining sector and just wasted potential.

We have to know where we're headed before we get there.

This guide combines industry-leading exploration advice with an emphasis on the growing importance of social and environmental responsibility.

Good exploration and planning is also essential to protecting our most important resource – people.

That's why I am committed to supporting those doing the hard yards in exploration through initiatives like the New Frontiers program.

This way we can help ensure the entrepreneurial spirit of our explorers stays as strong as it was for the pioneers of yesteryear – with a responsible approach that is thoroughly modern.

With an industry as strong as ours, the prospects for major new discoveries are very exciting. I hope to see a battered copy of this Handbook on sites all across NSW.



Chris Hartcher
Minister for Resources and Energy

The pioneers may have left it to chance, but these days, luck has nothing to do with it. First-rate exploration makes the difference between a successful mining sector and just wasted potential.

Foreword

The NSW Minerals Council is committed to providing strong leadership for the exploration sector, including the promotion of leading practice.

We are therefore pleased to provide you with a revised edition of this benchmark reference *NSW Minerals Industry Exploration Handbook – Leading practice for NSW explorers*.

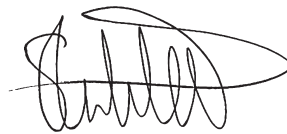
This guide provides a valuable reference as well as a practical guide for explorers who must find the minerals needed to sustain the jobs, investment and economic strength of this great State.

This updated and expanded edition provides the most up-to-date information on compliance and leading practice, as well as more case studies so explorers in NSW can 'get it right from the beginning'.

Exploration doesn't always result in mining, for a range of geological, environmental or economic factors, but without exploration there would be no mining. Explorers not only find minerals but also have an important role in laying the foundation for the mining industry's reputation.

Exploration can also be challenging due to proximity of mineral resources to existing populations and alternative land uses. Environmental excellence and social responsibility is therefore critical for the industry's social licence to operate in the community. It is also good business sense.

We commend this Handbook to you and trust it will make a valuable contribution to best-practice in your exploration activities.



Stephen Galilee
Chief Executive Officer
NSW Minerals Council

Environmental excellence and social responsibility is critical for the industry's social licence to operate in the community.

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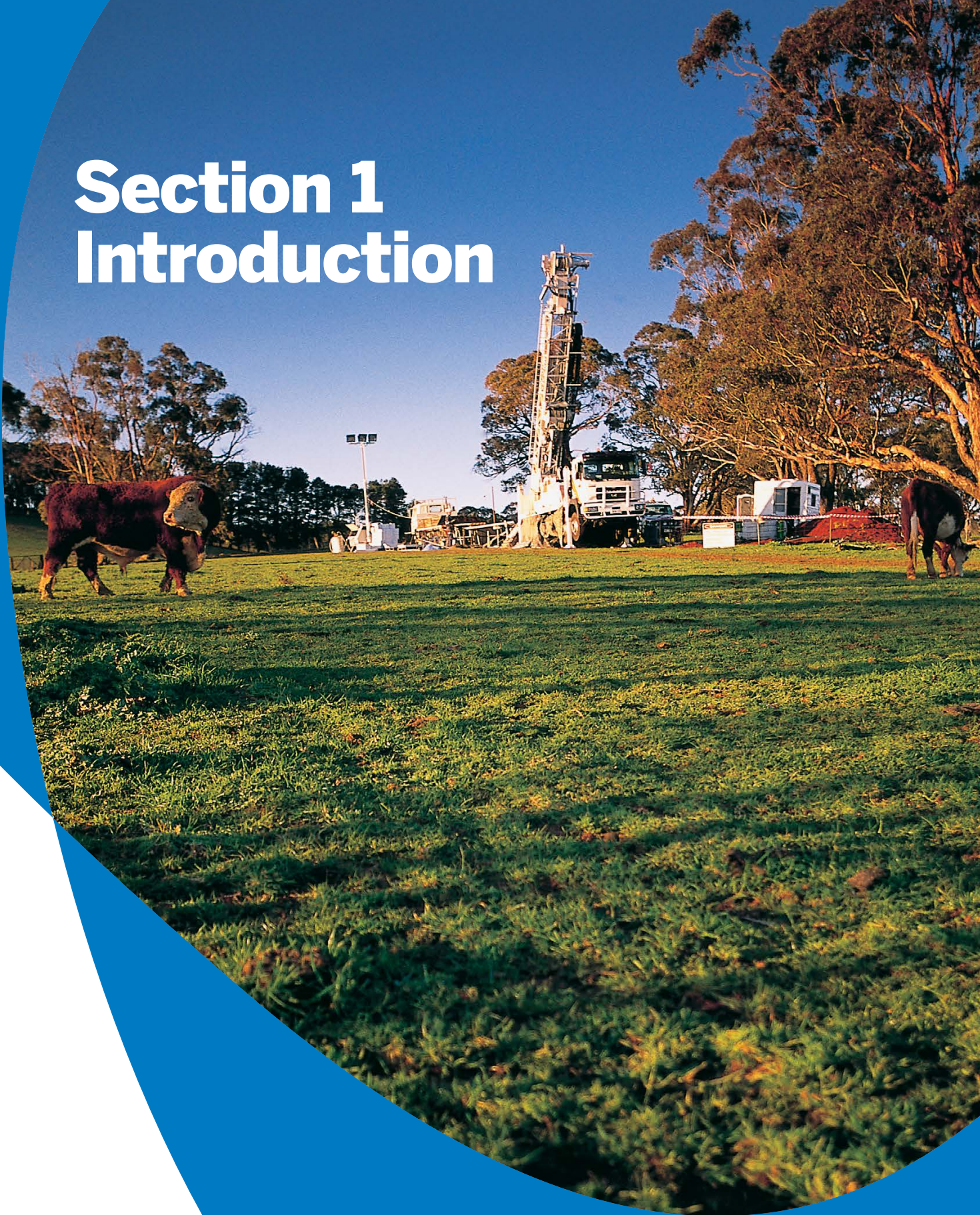
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Section 1 Introduction



Exploration and farming
in coexistence

1.1 What Is Mineral Exploration?

Exploration is the process of searching for deposits of minerals in the ground. The information gathered during exploration is used to assess the size and quality of a mineral deposit and to determine if it can be economically recovered. Minerals in NSW are owned by the Crown and are excluded from property deeds. The NSW Government encourages mineral explorers to find and develop mineral resources, which deliver significant economic benefits to regional areas and the State.

All exploration and mining activity in NSW must be conducted under an authority from NSW Trade & Investment – Division of Resources and Energy (DRE), the NSW State Government department responsible for mineral resources. Exploration licences are granted under the *Mining Act 1992* and allow licence holders to explore for certain minerals on limited areas of land.

Exploration licences are typically granted and renewed for periods of between two and five years and can cover up to hundreds of square kilometres. A substantial security deposit must also be lodged by the explorer with the NSW Government to ensure explorers satisfy licence requirements and complete rehabilitation of areas disturbed during exploration. Activities other than low impact activities require additional assessment and approval by DRE. In some cases, further permits and approvals from other Government agencies may also be required.

Exploration licences do not permit mining, nor do they guarantee that a mining lease will be granted. If there is the potential for a mine to be developed, any mine proposal must undergo a rigorous assessment under the *Environmental Planning and Assessment Act 1979*. This assessment involves a series of stages that normally take several years. Each proposal must be considered on its merits and there is no guarantee that approval will be granted.

Exploration is initially conducted over wide areas and becomes more focused and intense where potential mineral resources are identified. Exploration can involve a range of techniques and is generally carried out in stages. This can include:

- **Reconnaissance:** This initial work usually involves a visit by a geologist to look at rock outcrops and to map the geology. It may involve vehicle access to a property, taking and recording measurements and walking across the area. It may also involve gathering small samples from rock outcrops, soils or streams for chemical analysis. Reconnaissance exploration can also include airborne surveys involving low flying helicopters or light aircraft fitted with instruments flying in a grid pattern.

- **Follow-up Investigations:** The reconnaissance stage may identify areas requiring further investigation. This could involve surveying the area, taking additional small soil or rock samples for analysis, geophysics surveys using electronic instruments and more detailed airborne surveys. Generally these techniques have a low impact and only involve small areas of ground disturbance.
- **Detailed Investigations:** If an area of a potential mineral resource is discovered, the next stage of exploration would usually involve drilling. Drilling to collect rock samples is expensive, so the number of holes drilled to test an area of interest is kept to a minimum. Explorers normally use truck-mounted drill rigs. This stage may also involve digging trenches or test pits to take a bulk sample. However, bulk sampling is very rare and is generally only required as part of feasibility investigations for a mining proposal.

Before any exploration can commence, exploration licence holders must reach a land access agreement with the landholder. Landholders may not veto exploration, but access arrangements must be negotiated and in place before exploration may commence. The negotiations regarding access arrangements are part of the important consultative process undertaken by the explorer. All access arrangements should be based on the understanding that explorers are 'guests' on private land and an appreciation by landholders of the needs and rights of mineral explorers.

The NSW Minerals Council provides a united voice for mineral explorers, producers, operators and associated service providers in NSW. The NSW Minerals Council has prepared and updated the *NSW Minerals Industry Exploration Handbook – Leading practice for NSW explorers* to help mineral exploration companies understand their environmental and community responsibilities, and to provide an overview of the factors that need to be considered when planning, conducting, monitoring, rehabilitating and reporting on their activities.

Exploration licences are granted under the *Mining Act 1992* and allow licence holders to explore for minerals on limited areas of land.

Section 1 Introduction



1.2 Our Environmental and Social Responsibility

The success of the mining industry of tomorrow is largely dependent on the work of the mineral explorers of today. Just as explorers play a pivotal role in creating the stream of projects necessary for an economically sustainable mining industry, so too their environmental performance lays the foundations for the industry's reputation for environmental sustainability and as a responsible community citizen. Environmental issues and the responsible management of environmental resources are becoming increasingly important in the eyes of the community, who provide the industry's social licence to operate.

Environmentally and socially responsible mineral exploration is simply good business. Money and time are saved in the long term when exploration is undertaken in an environmentally sound manner.

Environmentally and socially responsible mineral exploration is simply good business.

The community is increasingly focused on the performance of the minerals industry, with perceptions often shaped by interest groups and the media. As a result, failure to uphold the highest environmental standards during exploration can make obtaining approvals difficult and reflect poorly on the industry as a whole.

1.3 Your Handbook

This Handbook has been designed to be a reference document for all mineral explorers operating in NSW. The Handbook does not constitute legal advice but provides a practical guide for all companies working in exploration and has been written to promote and encourage leading practice. It will be especially useful for:

- Mineral explorers in NSW
- Newcomers to the mineral exploration industry or those exploring in NSW
- Contractors and consultants working with mineral explorers.

This Handbook does not cover statutory requirements or exploration management for:

- Petroleum including coal seam gas
- Geothermal energy.

Extensive consultation with industry members, government and other stakeholders was undertaken during the preparation of this Handbook. The information and recommendations provided represent, to the knowledge of the NSW Minerals Council, examples of leading practice in the mineral exploration industry in NSW. However, different practices may be more appropriate in different environmental settings and locations, depending on the level of risk that may be relevant where the exploration activities are conducted.

Section 1 Introduction

This Handbook is presented in a number of sections identifying planning, risk assessment and leading practice for exploration activities. A range of resources that may be useful to mineral explorers is also provided in the appendices.

Exploration practices and the regulatory environment change with time. As a result, this Handbook has been published digitally on the NSW Minerals Council website to allow for ease of updating as required. It is recommended that mineral explorers check for updates regularly.

The NSW Minerals Council welcomes comments and recommendations on this document for inclusion in subsequent editions.

1.4 What is New in this Edition?

This is the third edition of the NSW Exploration Handbook. Previous editions were published by the NSW Minerals Council in 1998 and 2010. This edition was prepared with the assistance of DRE.

The following has been updated:

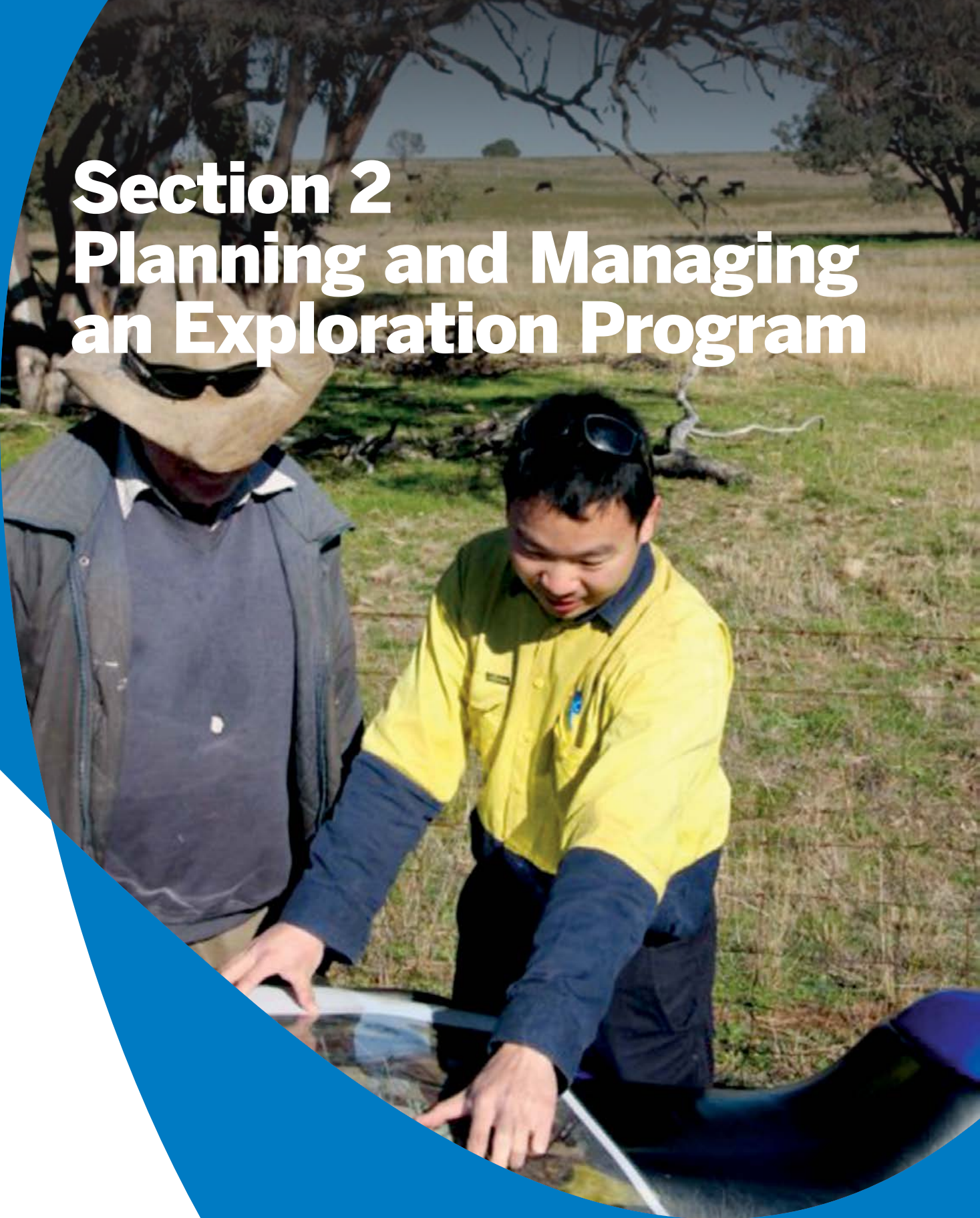
- Regulatory requirements following legislative or policy change
- Approval requirements, including additional information to assist in the preparation of Reviews of Environmental Factors (REFs) and Agricultural Impact Statements (AIS)
- Information sources and weblinks to relevant legislation, regulations, guidelines and policies, as well as background information on the environment surrounding individual mineral authorities
- Leading mineral exploration practice to reflect improved practices and technological change, including a range of new and updated case studies.



This Handbook has been designed to be a reference document for all mineral explorers operating in NSW. The Handbook does not constitute legal advice but provides a practical guide for all companies working in exploration and has been written to promote and encourage leading practice.

Section 2

Planning and Managing an Exploration Program



Careful planning is critical
to successful exploration

Section 2 Planning and Managing an Exploration Program

2.1 Introduction

Planning and managing an exploration program requires a risk management approach. Standard risk management processes need to be applied to all components of an exploration program including the planning, management and implementation of field activities. Risk management can help:

- Avoid, minimise or mitigate environmental impacts
- Comply with regulatory requirements
- Meet landholder and community expectations
- Ensure that the potential for damage or expensive remedial action is minimised.

The level of risk management and documentation should match the nature and intensity of the exploration program. All explorers need to be able to demonstrate to landholders, the community and other stakeholders that:

- Regulatory requirements are understood
- The social and environmental context is understood
- Risks have been identified, assessed and appropriate controls have been designed
- Sufficient documentation is in place to guide and record all activities
- A monitoring and review process is in place.

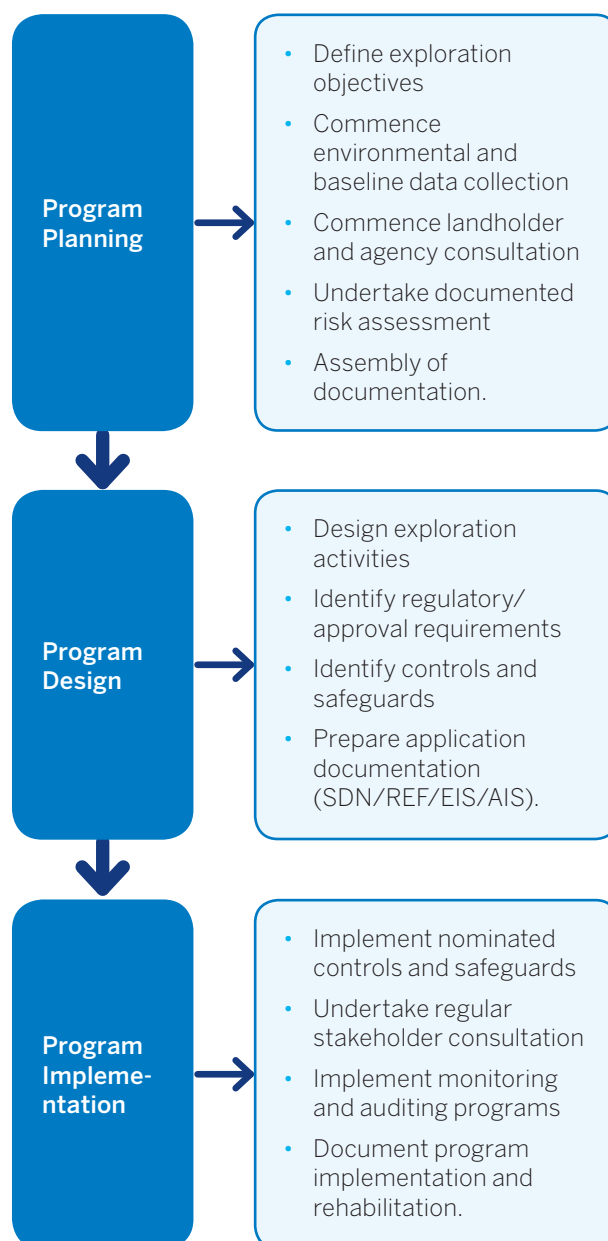
The principal components in planning and managing an exploration program are displayed below and discussed throughout this section.

2.2 Environmental Data Collection

Mineral explorers must have a sufficient understanding of the environment within and surrounding the exploration area before undertaking the risk assessment described in [Section 2.4](#). This needs to include collection and analysis of all publicly available environmental data. [Section 4](#) and [5](#) provide an overview of potential risks and accompanying leading practice. [Appendix 1](#) – Directory of Websites and Information Sources identifies a range of websites from which information may be sourced.

Where publicly available information is insufficient, additional information should be collected on site. Any on site work requires consultation and a land access agreement with the landholder. The information that needs to be collected will depend on the environmental setting of the exploration area and the nature of the proposed activities, but may include:

- Landholder information
- Native title and Aboriginal places, culture and heritage



- Potential for items of non-Aboriginal heritage significance
- Type and density of vegetation
- Presence or likely presence of any threatened species, populations or ecological communities
- Type of land use (such as grazing, cropping, forestry) and associated productivity
- Nature of surrounding agricultural operations

Section 2 Planning and Managing an Exploration Program

- Nature of the ground surface and, in particular, whether the soils are dispersive or non-dispersive
- Nature of any water courses surrounding the exploration area. This may include a description of the bed and banks, identification of any erosion or sedimentation, vegetation within and surrounding the water course, nature of the flow regime (ie. perennial or ephemeral) and water quality (pH and electrical conductivity) both upstream and downstream of the exploration area.
- Standing water levels and quality (pH and electrical conductivity) of groundwater in bores surrounding the exploration area.
- Any other environmentally relevant matter such as slope of the land, climate, geology, land ownership, etc.
- Photography of the site and wider area to provide context.

2.3 Landholder and Community Consultation

Landholder and community consultation is critical from the very beginning. Mineral explorers must consult widely and document the concerns and expectations of landholders and the surrounding community. Before any on site exploration can commence, a written access agreement is needed with the landholder. [Section 3](#) provides further information on the requirements and leading practice in this critical aspect of exploration.

2.4 Planning an Exploration Program

The planning of every exploration program must include a review of all relevant regulatory requirements for exploration activities and a risk assessment. If environmental risks are properly considered at this point, potential problems and costs can be avoided or minimised. The risk assessment needs to consider both the operating environment and regulatory requirements.

Regulatory Requirements

Government regulations reflect public expectations. Regulatory requirements are usually framed around the licensing or approval of exploration activities and setting of minimum standards. Early identification of regulatory requirements is essential to ensure compliance. Non-compliance can have serious consequences including environmental damage and damage to the explorer's record and reputation and the reputation of the mining industry as a whole. Non-compliance can also lead to increased scrutiny

of the explorer's activities, prosecution and loss of exploration rights. Engagement with regulators, landholders and the community can minimise problems and provide an early warning of potential issues.

[Appendix 4 – Legislative Overview](#) presents an overview of the legislative framework for mineral exploration in NSW. A clear understanding of the requirements of the *Mining Act 1992*, mineral authority conditions and relevant policies and guidelines is needed.

Risks Identified and Assessed

The following information outlines the steps in risk management that should be undertaken for all exploration programs. *ISO 31000:2009 Risk Management – Principles and Guidelines* is a useful reference on risk management implementation.

Establish the Context

- Identify what environmental sensitivities are likely to exist within the exploration area using available information.
- Identify landholder and community expectations and concerns.
- Review relevant legislation and exploration licence conditions and determine the obligations in relation to the exploration program and whether the proposed exploration activities require further approval.

Identify, Analyse and Evaluate Risks

- Identify the proposed exploration activities and what environmental risks are likely to result from the proposed activities. Overlaying proposed exploration activities on a map showing landholders and areas of environmental sensitivity can help identify, analyse and evaluate environmental risks.
- Undertake an analysis of the identified risks the likelihood of occurrence and potential consequence.
- Rank the identified risks and determine what level of risk is acceptable and which risks require management.

Avoid, Minimise or Mitigate the Risks

- Identify whether those risks deemed to require management can be avoided, minimised or mitigated and identify the controls required to achieve the required outcomes including relocation or avoidance of the proposed activities.
- Re-assess the risk to determine whether the proposed controls can reduce the risk to an acceptable level. If not, apply further controls.
- Ensure proposed activities comply with the relevant legislation and exploration licence

Section 2 Planning and Managing an Exploration Program

conditions and ensure the activities do not require further regulatory approval.

- Where the proposed activities cannot be designed to comply with relevant legislation and exploration licence conditions, contact DRE to identify what further approvals will be required. DRE publishes *Guidelines for Review of Environmental Factors* and other guidance information on its website.

Allocate Responsibilities and Resources

- Allocate responsibilities for managing all identified risks early on during the planning phase of an exploration program.
- Allocate resources (including personnel, equipment, consumables, capital and time) and infrastructure (including services, access, communication, water and power) during the planning phase of the exploration.
- Ensure that personnel are provided with adequate training.

Document and Communicate the Risk Assessment

- The outcomes of the risk assessment need to be documented and communicated to appropriate personnel throughout the organisation so that resources can be effectively allocated to the management of the risk identified.
- Ensure that appropriate communication between exploration personnel, contractors, regulators, landholders and the wider community is identified, implemented and documented.
- Ensure that the induction of employees and contractors addresses environmental (and other) risks, management procedures and requirements.

Following collection of the relevant publicly available environmental data, site specific information (if required), and completion of the risk assessment, the exploration program should be designed to achieve the following objectives:

- Undertake activities in a cost effective and safe manner
- Comply with all relevant regulatory requirements
- Minimise the potential for adverse environmental impacts.

For further information see the following:

- [Section 2.9](#) details documentation requirements for exploration.
- [Section 4](#) identifies common environmental risks.
- [Section 5](#) – Exploration Operations details leading practice for typical exploration operations.

- [Appendix 5](#) – Proforma Documentation identifies leading practice for documentation.
- [Appendix 6](#) – Forms and Checklists provides examples of relevant forms and checklists.

2.5 Approval for Exploration Program

Essentially any exploration activity requiring more than hand-held equipment requires assessment and specific approval.

Standard exploration licence conditions identify three categories of exploration:

- Category 1 – reconnaissance and low intensity prospecting operations that may not require further approval.
- Category 2 – prospecting operations that have potential for moderate disturbance to the land surface, native vegetation or other environmental value and require further approval.
- Category 3 – prospecting operations that have potential to cause significant environmental impact involving, for example, considerable land surface disturbance or native vegetation clearing and require further approval.
- Any exploration activity not identified under Categories 1, 2 or 3 requires further approval.

A surface disturbance notice (SDN) must be submitted for any exploration activities that requires further approval. In preparing the SDN, explorers should refer to DRE's guideline *EDG10 – Surface Disturbance Notice for exploration activities*.

The Director-General, through DRE, will determine, based on the SDN, whether a *Review of Environmental Factors* (REF) is required to be prepared to provide more detailed information. In preparing the REF, explorers should refer to the DRE guideline, *ESG2: Environmental Impact Assessment Guidelines*.

In addition, the *Strategic Regional Land Use Policy* requires an *Agricultural Impact Statement* (AIS) to accompany any application for activities for which a REF is required. In preparing an AIS, explorers should refer to the *Guideline for Agricultural Impact Statements (Exploration Stage)*. [Appendix 7](#) identifies a range of information to assist in REF and AIS preparation.

Section 2 Planning and Managing an Exploration Program



2.6 Preparing for an Exploration Program

Contractor Selection

The required resources (including people, equipment, consumables, capital and time) and infrastructure (including services, access, communication, water and power) should be identified and allocated before the exploration program begins. Contractor selection is especially important as contractors will often undertake field activities on behalf of explorers. Explorers can have their authority cancelled and face fines if contractors do not follow conditional requirements and appropriate procedures.

When choosing contractors:

- Ensure that appropriate contractors or operators are selected for the proposed tasks. Inappropriate equipment choice may damage infrastructure and unreliable contractors or poor operators may unduly consume resources that could be better used by the company or community.
- Identify the capabilities of the contractors. Consider the contractor's previous environmental performance, appropriate licensing, safety management systems, reputation and experience. Reputable operators will usually have better maintained equipment and better trained staff, requiring less supervision and are less likely to be involved in incidents.
- Ensure operators are appropriately qualified, trained and aware of all relevant regulatory requirements and company procedures for the exploration being undertaken.

- Select equipment of the appropriate type and size that is well maintained and has the required controls and safeguards. Consider the age and condition of the equipment to be used. Well maintained equipment will be less likely to break down and cause environmental problems than poorly maintained equipment. A contractor with well maintained equipment will also be more likely to complete the proposed program on time and in an efficient manner, resulting in lower cost exploration.
- Give preference to local contractors and suppliers, especially those recommended by the landholder, where appropriate.

Work Health and Safety (WHS) Management

The purpose of this Handbook is to focus on environmental management of exploration operations. However, given explorers need to satisfy the provisions of safety legislation, [Appendix 4 – Legislative Overview](#) provides a brief overview of the requirements of the *Work Health and Safety Act 2011*, *Mines Health and Safety Act 2004*, *Coal Mine Health and Safety Act 2002* and associated regulations. It is imperative that all mineral explorers are familiar with their WHS obligations.

PLEASE NOTE: On the 25 June 2013 a new health and safety Bill passed the NSW Parliament, but had not been enacted at the time of publication of this Handbook. The WHS (Mines) Act will replace the Coal Mine Health and Safety Act and the Mine Health and Safety Act.

At the time of publication, the Act and its Regulation have not been finalised. However, there will be significant changes that will be relevant for mineral explorers. Users of this Handbook are encouraged to visit the DRE Mine Safety Website (<http://www.resources.nsw.gov.au/safety>) for further updates.

Under the *Mines Health and Safety Act 2004* operators of all 'mines', including exploration operations, must notify the Chief Inspector of Mines before operations begin. The Act identifies that the registered operator must be the person or entity who has day-to-day control of the exploration activities. The registered operator may be a company. Note the statutory reporting requirements for all 'mines' (see [Appendix 4](#)).

In addition, all 'mines' are required to have a registered operator and must prepare and implement a *Mine Safety Management Plan*. The DRE website (<http://www.resources.nsw.gov.au/safety>) has useful

Section 2 Planning and Managing an Exploration Program

tools including guidance on a *Mine Safety Management Plan* and *Safety Management Systems*. The documents *Small Mines Safety Management Kit*, *Field Safety Manual* and *Exploration Drilling Hazard Checklist* provide clear information for explorers. Further information may be obtained by contacting the Mines Safety Operations officer in the nearest DRE office.

The *Mine Safety Management Plan* should include a means to:

- Identify all hazards in the workplace, including travel and fatigue
- Assess the risks from these hazards or dangers
- Implement ways to remove or control risks
- Deal with incidents or emergencies
- Consult and communicate with people working at the site on health and safety matters.

In addition, the Safety Management System should include:

- *Contractor Management Plan* – stating how the risks arising from the use of contractors at the mine will be managed
- *Fitness for Work Plan* – including fatigue management
- *Health Management Plan* – including procedures for monitoring health.

The NSW Minerals Council has produced a range of fact sheets on work health and safety which are available at www.nswmining.com.au.

2.7 Implementation of the Program

On the ground activities need to be carried out and managed to minimise potential environmental and social impacts. Implementation of the management measures identified during the risk assessment and planning and approvals phase of the program will help to fulfil this objective.

Regulatory requirements vary according to the type, location, and potential impacts of an activity. All activities must comply with the relevant legislation and exploration licence conditions and all appropriate approvals must be in place. Further detail may be obtained directly from DRE regarding additional approvals.

Section 4 – Identifying the Existing Environment and Associated Risks and Section 5 – Exploration Operations provide an overview of leading practice for a range of environmental aspects and exploration activities. Appendix 8 presents a range of case studies related to particular aspects of exploration operations.

2.8 Monitoring and Auditing Exploration Activities

Mineral explorers must be able to demonstrate that they adequately understand the environment in which they operate and that their activities will not have an unacceptable impact on the environment. This requires implementation of an appropriate monitoring and auditing program to determine whether the management controls are effective and verify that any impacts are within acceptable limits.

The level of environmental monitoring and auditing should be appropriate to the level of environmental risk associated with the exploration operations. As with the management of all aspects of exploration operations, regular inspections or audits are critical to determine whether the measures identified in the various management plans are being implemented.

The following should be considered when monitoring and auditing exploration activities:

- Establish an *Environmental Monitoring Plan* to be implemented during and following the exploration program. The details of the Plan (including what is to be monitored, monitoring methods and the frequency of monitoring) will depend on the nature of the exploration program and the environmental sensitivity of the exploration area. It would be appropriate for the environmental monitoring to be undertaken in conjunction with safety or other related monitoring. Monitoring may be designed to verify the effectiveness of measures intended to:
 - Protect environmental sensitivities such as flora and fauna, areas of cultural significance and drainage lines
 - Prevent pollution, such as noise and dust controls and appropriate storage of hydrocarbons.
- Ensure that relevant exploration personnel have the appropriate equipment to undertake environmental monitoring.
- Photographic evidence of environmental conditions, including before and after photographs, may be sufficient to demonstrate appropriate environmental management. A fixed photo point should be established at each site with photos taken at the same time of day and in the same direction to ensure consistency.

Section 2 Planning and Managing an Exploration Program

2.9 Documentation and Reporting

Pre-Program Documentation

Documentation of exploration operations and management is critical. Exploration operations are typically undertaken by a small team of mineral explorers, often supported by a range of specialist contractors such as geophysical, drilling and earthmoving contractors. Personnel on site can vary over the course of each operation. As a result, a well documented risk assessment and associated management plans or operational procedures will be essential to ensure that relevant information and expectations are conveyed to contractors and other personnel and that environmental risks are appropriately managed.

These documents need to be developed in conjunction with other company technical information. Components of the documents may be standard for a particular mineral explorer and so should be used consistently on all exploration projects. This ensures that practices which improve the efficiency of exploration operations, or minimise the environmental impacts, are used on future exploration programs. In addition, documentation may be useful in the event of addressing a complaint or defending an accusation of environmental harm.

The planning phase risk assessment needs to be documented and communicated to appropriate personnel throughout the organisation, so that resources can be effectively allocated to the management of those risks. A **Risk Register** may be an appropriate way to document and communicate risk information. Once established, a risk register should be reviewed and updated on a regular basis. The Risk Register can be used by management to check that strategic and operational management plans are appropriately addressing the key risks for the business. Risk Registers can be very simple documents, highlighting key risks and priorities. A Risk Register may include the outcomes from a risk assessment in terms of consequence, likelihood and risk ratings, action plans and an assessment of residual risk once planned controls have been implemented. The format of this assessment will vary between mineral explorers. However, a pro-forma risk assessment is provided in [Appendix 5 – Proforma Documentation](#).

Explorers should also consider developing an **Environmental Management Plan or System** or relevant environmental procedures as part of a company procedure manual. Apart from recording the relevant risks, these plans or procedures need to record the necessary management procedures and allocate management responsibilities. The documents

do not need to be unnecessarily long or complex and should incorporate figures or maps as appropriate. For a small exploration company, these plans could simply be written as a single Environmental Plan/Policy/Procedure and sit beside WHS material.

Some exploration companies have a **Business Procedure Manual** which can be a complete guide on all company administrative, WHS, and environmental procedures. Each procedure may be a one or two page document that details company procedures and becomes a key company document.

The Plans identified in this Handbook may only represent a couple of paragraphs of the Environmental Plan/Policy/Procedure and mineral explorers may wish to develop additional plans or procedures to address operational, safety, administrative or other components of the proposed exploration operation.

[Appendix 5 – Proforma Documentation](#) provides more information on documentation including examples of a risk assessment framework and management plan. [Appendix 6 – Forms and Checklists](#) provides examples of relevant forms and checklists.

These documents need to be provided to all relevant personnel, including contractors and, where appropriate, landholders or other stakeholders. Training in documentation and regular updating of all documentation is essential.

Other documentation that should be prepared, retained and made available to relevant personnel includes:

- Exploration licence and additional approvals documentation (including conditions, further assessments and pre-drilling information)
- Public liability insurance certificate of currency
- Approved work plans
- Emergency response plans
- Landholder maps and information
- Landholder access and compensation agreements
- Records of consultation and correspondence with stakeholders, including government agencies, the community and landholders
- Records of induction and training of personnel
- Monitoring and auditing records
- Exploration program reports identifying activities undertaken and results achieved
- Photographic information including the site pre-activity, during activity and following activity.

Section 2 Planning and Managing an Exploration Program

Post-Program Documentation and Reporting

Following completion of an exploration program, a range of documentation should be completed. This should include a report that details the activities completed, including:

- An overview of the planning and exploration targets
- Tables of co-ordinates
- Drill hole information
- Environmental monitoring and auditing results, including before and after photographs
- Results of consultation with landholders and the surrounding community
- Plans and maps showing relevant aspects of the program
- Results of the program
- Rehabilitation reporting including details of work, rehabilitation and maintenance
- Prioritised recommendations for further work.

The format of any report should be consistent with the following.

- *EDG13 – Exploration licence: Rehabilitation and Relinquishment Report*
- *Exploration reporting: a guide for reporting on exploration and prospecting in New South Wales.*

As digital lodgement of exploration reports is a requirement of DRE, explorers should ensure that internal database structures are consistent with the required reporting structure.

Incident Reporting

Mineral explorers are required to prepare and submit an Environmental Incident Report to DRE (and the EPA in some circumstances) if an environmental incident occurs. An initial verbal report must be made to DRE within 24 hours (EPA-reportable incidents require 'immediate' notification) and a fully investigated report must be submitted within 7 days. An environmental incident includes:

- Any incident causing or threatening material harm to the environment. Harm to the environment is defined as material if:
 - It involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or
 - It results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding \$10,000.

- Any breach of identified conditions of the exploration licence
- Any breach of the conditions of environment protection legislation or
- A serious complaint from landholders or the public.

The format of any report will vary depending on the incident. However, the report should include the following information:

- Introduction – briefly outlining the incident, actions to date and purpose of the report.
- Description of the incident – providing a detailed description of the steps leading to the incident, the incident itself and actions implemented following the incident to protect the environment.
- Results of incident investigation – describing the investigation undertaken since the incident, the immediate and root causes of the incident, failures of the approved management measures and safeguards and residual environmental impacts taking into account the immediate remedial actions implemented following the incident.
- Follow up actions – describing the proposed actions that will be implemented to complete remediation of any residual environmental harm, prevent a recurrence of the incident or similar incidents and long-term monitoring, if required, to ensure further remediation is not required.

Some exploration companies have a Business Procedure Manual which can be a complete guide on all company administrative, WHS, and environmental procedures.

Section 3

Landholders, Community and Stakeholder Engagement



Landholders often appreciate the opportunity to discuss the proposed exploration activity in detail

Section 3 Landholders, Community and Stakeholder Engagement

3.1 Introduction

There are several groups of people who have an interest in exploration activities and who need to be engaged throughout an exploration program:

- **Landholders** – People whose properties lie within the exploration area
- **Surrounding community** – People who live in the vicinity of the exploration area
- **Other stakeholders** – People who may have an interest in the exploration area including Aboriginal groups, local councils, road authorities and infrastructure providers.

The introduction of exploration into an area can raise questions for people who are unfamiliar with the process or who have concerns about the potential impacts of exploration or future mining operations that may eventuate.

Successful exploration programs require open and transparent dialogue with stakeholders from start to finish, along with goodwill by all stakeholders. The NSW Minerals Council is committed to these principles and works closely with its member companies, the community and government to achieve positive outcomes.

Effective engagement also makes good business sense. Poor community consultation adversely impacts on the reputation of the explorer and the perception of the mining industry, making future exploration operations more difficult. Direct benefits of proactive community consultation include:

- Mineral explorers are typically the first representatives of the mining industry to come into contact with landholders and local communities. There is only one chance to make a good first impression. If the exploration program is successful and the project moves to a feasibility stage or into development, good community relations from the outset will improve negotiations for the mining project.
- Good relationships with stakeholders in the community allow them to voice concerns early, so the explorer can quickly identify any issues and respond accordingly.
- Assistance from the landholder is more likely when a good relationship has been established at the outset. Landholders can give important assistance with an exploration program, including permission to use on-farm facilities such as water from dams. Landholders can also be valuable sources of information in relation to the existence and location of previous workings that may not be recorded elsewhere.

3.2 Legislative Requirements

- *Mining Act 1992* – Part 8, Division 2 (Sections 138 to 158)

This Division deals with access arrangements generally. In summary, mineral exploration is to be carried out in accordance with a written access agreement between the holder of a mineral authority and each landholder on whose land exploration activities are to be undertaken. The agreement should cover matters such as:

- The term of the agreement
- Activities permitted, areas of access, times of day, days of the week and months of the year in which access is permitted
- Rehabilitation and compensation.

3.3 Leading Practice

Consultation

Courtesy and honesty go a long way in landholder consultation. Landholders should always be treated with respect by all exploration personnel. Landholders should be given contact details for the on-site Technical or Field Operations Manager as well as the overall Project Manager, including afterhours contact details, so they can get an immediate response if they have any issues or queries.

Landholders often appreciate being kept up-to-date with the exploration program, for example they may appreciate a copy of the company's public information and releases. Some mineral explorers include landholders (with their agreement) on their email list for Australian Securities Exchange (ASX) announcements to ensure complete transparency between the information the mineral explorers disseminate to their shareholders and landholders.

Finally, prompt payment of compensation and a strict policy of implementing commitments made are essential to maintain landholder trust.

Successful exploration programs require open and transparent dialogue with stakeholders from start to finish.

Section 3 Landholders, Community and Stakeholder Engagement



The *Guideline for Community Consultation Requirements for the Exploration of Coal and Petroleum, including Coal Seam Gas* was published by DRE in March 2012. This Guideline details the requirements for consultation in coal and petroleum exploration and should be considered by metalliferous explorers when planning their consultation program. The guideline recommends preparation of a *Community Consultation Plan*, including the following steps:

- Step 1 – Identification of the community
- Step 2 – Providing information to the community
- Step 3 – Receiving and considering feedback from the community
- Step 4 – Responding to complaints and other communication from members of the community.

The *NSW Minerals Council: Community Engagement Handbook* identifies the following seven steps for community engagement.

- **Step 1 – Setting the Objectives**

It is important to identify the aims and objectives of engagement at the earliest possible stage. These may include establishing and maintaining good relationships with the community and negotiating access to land.

- **Step 2 – Identify Stakeholders**

It is important to identify the various stakeholders who may be impacted by, or interested in, the exploration activities. These may include landholders, neighbours, the wider community, special interest groups, Aboriginal groups and government agencies.

- **Step 3 – Identify the Issues**

It is important to identify the likely issues of concern for each identified stakeholder and review the proposed exploration activities to determine likely areas of conflict.

- **Step 4 – Identify Appropriate Engagement Techniques**

These may include telephone contact, individual meetings, small community information sessions or less formal consultation processes. Where appropriate, exploration personnel should be encouraged to participate in community activities and events including social groups, sporting teams and school fairs. Sponsorship of community events or activities may also be appropriate. Supporting the local community is an opportunity to build relationships, show the direct benefits of the mining industry at a local level and to communicate with centres of influence within the community.

- **Step 5 – Apply Identified Engagement Techniques**

The identified engagement techniques should be implemented prior to commencement of exploration activities. In particular, consultation with landholders in key exploration areas should be undertaken as early as possible.

Consultation with appropriate government agencies must be undertaken prior to commencement of exploration activities to ensure that all required approvals are obtained.

Early consultation with Aboriginal stakeholders is also important to achieve a positive relationship, which is critical should the exploration program be successful.

- **Step 6 – Evaluate the Consultation Program**

An appropriate evaluation of the consultation program should be undertaken to identify what was done well and where improvements could be made. It may be helpful to involve a person not directly involved with the exploration program to provide a more independent evaluation.

- **Step 7 – Documentation**

The results of all consultation should be documented, including the date and time of each consultation event, who was consulted, what issues were discussed and any outcomes or commitments given during the consultation. Such detailed notes will be invaluable in confirming commitments made or defending the mineral explorer against allegations of failing to adhere to an agreement. [Appendix 5](#) includes proforma for landholder consultation.

Section 3 Landholders, Community and Stakeholder Engagement

Mineral explorers should, based on the above documents, prepare and implement a consultation program that reflects the scope of the proposed program, stage of the exploration program (ie reconnaissance or resource definition) and sensitivity of the environment and surrounding community.

Finally, mineral explorers should undertake end-of-program consultation with landholders to ensure that landholder expectations have been met and to inform them of the anticipated results of the program and proposed future programs. In addition, the statutory landholder sign-off indicating acceptance of the rehabilitation undertaken should be obtained.

Negotiating Access Agreements

When negotiating an access agreement with a landholder, the following should be discussed, agreed and documented:

- Proposed activities
- Hours of operation
- Period of agreement
- Vehicular access
- Access to water
- Expectations regarding preventing the transfer of diseases, weeds and pests
- Compensation
- Dispute resolution
- Rehabilitation standards, including completion criteria (which must also be acceptable to DRE).

DRE has published a template **Land Access Agreement for Mineral Exploration**. The template and the accompanying guide *Land Access Arrangement Information for Mineral Exploration – A guide to negotiating land access arrangements for mineral exploration in NSW* were developed to help explorers and landholders negotiate a land access arrangement. The template is written in plain English and outlines practical conditions, with options, to allow the agreement to reflect the individual needs of the landholder and explorer. Use of the template is not mandatory but if the template is used, it is a requirement that the landholder is provided with a copy of the *Land Access Arrangement Information*. Any changes made to the template should be made clear to the landholder. The NSW Minerals Council has also drafted a *Guideline* to provide further background information on the Template, as well as

guidance on compensation rates and an optional confidentiality clause.

3.4 Useful Resources

- The NSW Minerals Council has produced a series of fact sheets to assist mineral explorers in community consultation. These include *Exploration and You* which is specifically written for mineral explorers to give to landholders and a series of fact sheets on exploration methods. All NSW Minerals Council fact sheets may be downloaded from <http://www.nswmining.com.au>.
- DRE information for landholders and explorers, the template *Land Access Agreement for Mineral Exploration* and accompanying guide *Land Access Arrangement Information* are available at <http://www.resources.nsw.gov.au/landholder-informationland-access>.
- The NSW Minerals Council *Guideline* to provide further background information on the Template, as well as guidance on compensation rates and an optional confidentiality clause. This Guideline may be downloaded from <http://www.nswmining.com.au>.
- [Appendix 8](#) presents case studies of leading practice in landholder and community engagement.

The template *Land Access Agreement for Mineral Exploration* is written in plain English and outlines practical conditions, with options, to allow the agreement to reflect the needs of the landholder and explorer.

Section 4 Identifying and Managing the Existing Environment

Exploration drilling in an organic vineyard was achieved after identifying and managing the existing environment in consultation with the landholder

Section 4 Identifying and Managing the Existing Environment

4.1 Introduction

A range of environmental aspects need to be identified and assessed during the risk assessment undertaken in the planning phase of exploration (see [Section 2](#)). This section details these environmental aspects and provides information on the regulatory requirements and conditions as well as information on leading practice. The information presented in this section will also be useful in the preparation of Reviews of Environmental Factors (REFs) needed for approval of some exploration programs.

A risk based approach will identify appropriate actions and management measures that should be implemented. The leading practice described in this Handbook may not be practical for all exploration programs or all parts of NSW.

4.2 Culture and Heritage

An understanding of the cultural and heritage values of a proposed exploration area, both Aboriginal and non-Aboriginal, is required to ensure that an exploration program does not inadvertently interfere with or damage a site or object of significance. An awareness of identified (or potential) heritage items in the vicinity of the exploration operation should allow the activity to be designed to either avoid or minimise adverse impacts.

The NSW Minerals Council has produced fact sheets on Aboriginal culture and heritage and native title which are available at <http://www.nswmining.com.au>.

Requirements and Conditions

National Parks and Wildlife Act 1974 (as amended)

- Under Section 86(1) of the Act it is an offence for a person to 'harm or desecrate an object that the person knows is an Aboriginal object'. Similarly, under Section 86(2) or 86(4) of the Act, it is an offence to 'harm an Aboriginal object' or 'harm or desecrate an Aboriginal place' whether or not the person knows that the object is an Aboriginal object. The latter is a 'strict liability offence'.
- 'Harm' is defined as any act or omission that destroys, defaces or damages and object, moves and object or causes an object to be harmed.



Carved trees are important in Aboriginal heritage

- Under Section 87 of the Act, defences to these offences include:
 - If the mineral explorer holds an Aboriginal heritage impact permit
 - If the mineral explorer exercised due diligence in determining whether an activity would result in harm to an Aboriginal object (see below)
 - If the activity is 'low impact' as defined by Clause 80B of the *National Parks and Wildlife Regulation 2009* which includes a range of exploration related activities.
- Breaches of the requirements of the Act may result in very significant fines and/or imprisonment.

Heritage Act 1977 – Section 57

- A person may not demolish, damage, move, destroy any object, place or building that is the subject of an interim heritage order or is listed on the State Heritage Register without an appropriate approval or permit.

Mining Act 1992

- Mineral Authorities may include conditions relating to heritage, both Aboriginal and non-Aboriginal.

The leading practice described in this Handbook may not be practical for all exploration programs or all parts of NSW.

Section 4 Identifying and Managing the Existing Environment

Native Title Act 1993 (Commonwealth)

- The Act identifies that native title may exist on some land. Generally, some past acts such as granting of freehold title or some classes of leases over land may extinguish native title over that land. Where native title may exist, mineral authorities will typically be issued with a requirement to negotiate a suitable agreement with relevant native title claimants prior to the commencement of exploration activities. Alternatively, areas potentially subject to native title may be excluded from the mineral authority.

Leading Practice

- Review and follow the **NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects**. This Code of Practice details the due diligence process and when it applies. This Code of Practice is based on the then Department of Environment, Climate Change and Water (now Office of Environment and Heritage (OEH)) *Code of Practice* but has specific guidance and examples for the minerals industry. All records of due diligence activities must be retained. A summary of the requirements for most exploration programs is as follows.
- Undertake an initial assessment of the potential for items of Aboriginal or non-Aboriginal heritage significance to occur in the vicinity of the proposed area of disturbance. This should include:
 - Undertake a search of the *Aboriginal Heritage Information Management System (AHIMS) Database* (<http://www.environment.nsw.gov.au/licences/HeritageRegisters.htm>), OEH listing of Aboriginal places and the various publicly available heritage databases (see [Appendix 1](#)). Note AHIMS data has a limited validity.
 - During access negotiations, ask the landholder if they know of items of heritage or any available studies, reports or surveys.
 - Undertake a landscape assessment. Items of heritage significance are most likely to occur in rock shelters, ridge tops, flat areas near creeks, sand dunes or near sources of water.
 - If there are landscape features which indicate there may be Aboriginal objects, have an appropriately trained or experienced employee or other qualified person undertake a desktop assessment and visual inspection of the area, including ground surface (artefacts, fireplaces, building foundations) and trees (scars and carvings).
- If there is potential for items of heritage significance to occur or if such items are found, consider relocating exploration activities.
- If items of heritage significance are identified and exploration activities cannot be relocated, seek appropriate advice from the local Aboriginal community and OEH. Approvals such as an Aboriginal Heritage Impact Permit may be required. An alternative may be the negotiation of a *Cultural Heritage Management Plan* in consultation with the local Aboriginal community. Relevant management measures negotiated in a *Cultural Heritage Management Plan* may include:
 - Identification and marking of 'no go areas' for exploration
 - Employment of observers during ground disturbing activities
 - Relocation/salvage of identified object/s, with the appropriate permits/approvals.

All personnel must be advised of the requirements of the Plan.

- Ensure that a procedure exists for ceasing or relocating work if a suspected item/s of heritage significance is discovered until an assessment of the item/s can be completed and that staff are trained in cultural heritage.
- Ensure, where appropriate, that the Aboriginal stakeholders are notified at the start and finish of the exploration operation.
- Document and photograph (permission may be required) potential items of cultural heritage significance before, during and after exploration operations.

Review and follow the *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects*.

Section 4 Identifying and Managing the Existing Environment

4.3 Ecology and Vegetation Clearing

Well planned and managed exploration should have minimal impact on flora, fauna, threatened species and endangered ecological communities and their habitats. The principal mechanism for avoiding ecological impacts is to avoid clearing native vegetation, recognising that native vegetation may include native grasslands. In most situations, mineral exploration programs should be undertaken with minimal, if any, vegetation clearing. Where vegetation clearing is required, relatively simple procedures should ensure that the proposed exploration activities have a minimal impact on vegetation surrounding the proposed exploration area/s.

Requirements and Conditions

National Parks and Wildlife Act 1974 – Part 8A

- Section 118A – a person must not harm any animal or pick [or harm] any plant that is of, or is part of, a threatened species, an endangered population or an endangered ecological community.
- Section 118C – a person must not, by an act or an omission, do anything that causes damage to any critical habitat.
- Section 188D – a person must not, by an act or an omission, do anything that causes damage to any habitat of a threatened species, an endangered population or an endangered ecological community if the person knows that the land concerned is habitat of that kind.

Threatened Species Conservation Act 1995

- The schedules of this Act identify endangered species, populations and ecological communities; critically endangered species and ecological communities; vulnerable species and ecological communities and key threatening processes. These schedules are updated from time to time based on the recommendations of the Scientific Committee.

Fisheries Management Act 1994

- Similar to the *Threatened Species Conservation Act 1995*, this Act identifies threatened fish species, populations and communities as well as key threatening processes, including for inland waters.

Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth) (EPBC Act)

- Division 1 – a person must not take an action that will have a significant impact on matters of national environmental significance, including:
 - wetlands of international importance;
 - listed threatened or migratory species; or
 - endangered communities.

Note: Species or communities listed under NSW and Commonwealth legislation may be different or may be classified differently to those listed under the EPBC Act.

Mining Act 1992

- A mineral authority may include conditions relating to ecology and vegetation clearing.

Leading Practice

- Undertake searches of the following databases to determine those threatened species and populations, endangered ecological communities, critical habitat or matters of national environmental significance (referred to hereafter simply as 'threatened species') that may occur within the proposed area/s of disturbance within the exploration area (see [Appendix 1](#)). Typically, a radius of 10km around the proposed disturbance area would be appropriate.

OEI Threatened Species Database –

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_species.aspx

Bionet Database –

http://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_AtlasSearch.aspx

DPI Fisheries Record Viewer –

<http://www.dpi.nsw.gov.au/fisheries/species-protection/records/viewer>

Commonwealth Protected Matters Database –

<http://www.environment.gov.au/erin/ert/epbc/index.html>

Note: these databases show only known locations and should not be relied upon as evidence that a full site inspection has been undertaken.

Section 4 Identifying and Managing the Existing Environment

- Determine the habitat preference for each of the identified threatened species and the likelihood of occurrence (based on the habitat within the disturbance area) of each within the proposed areas of disturbance. The OEH *Threatened Species Database* provides further information on habitat.
 - If threatened species are likely to exist or do exist within the proposed areas to be disturbed, consider whether the activity could be relocated. If not, consult with DRE in relation to further approvals required.
 - Identify where ground disturbing activities will be undertaken, the habitat that would be disturbed, and procedures that would be implemented to avoid or minimise potential impacts.
 - Determine from aerial photography or satellite imagery the type of vegetation that would be disturbed. Where high value vegetation (such as remnant native vegetation or improved pasture) would be disturbed, consider relocating the proposed exploration area/s or changing the timing of the activity to avoid sensitive times of the year, including breeding periods for relevant species or bushfire danger periods.
 - Locate exploration activities in areas that have been previously disturbed or cleared. Where possible, use existing access tracks.
 - Determine from topographic plans areas of slopes of 18° (1:3 (V:H)) or greater and try to avoid disturbance in those areas.
 - Consult with the landholder in relation to proposed areas of vegetation clearing and obtain agreement for all areas to be disturbed.
 - Physically inspect all areas of proposed disturbance. Identify and mark areas of approved disturbance to ensure no inadvertent disturbance of surrounding areas.
 - Prepare a *Flora and Fauna Management Plan*, if required. This *Plan* should include a map identifying areas of important vegetation that are not to be disturbed. These should also be marked on the ground. In addition, the *Plan* needs to include detailed procedures for clearing of vegetation. Consideration should be given to:
 - The time of year should be taken into account when vegetation clearing is undertaken to minimise the impact on threatened or other species. In particular avoid breeding seasons or other periods of heightened sensitivity.
 - Trimming of large trees rather than removal, provided that trimming does not place the trees at risk of death or disease that may result in death.
 - Cutting off vegetation just above the ground level to allow regrowth rather than removal of the root stock.
 - Identifying of vegetation stockpile area/s for cleared vegetation. All cleared vegetation should be stockpiled and used during rehabilitation operations. Burning of vegetation should not be undertaken unless to destroy weeds and in agreement with the landholder.
 - Retaining as much whole vegetation as possible, taking particular care to preserve hollows and other features that may have habitat value.
 - Ensure that all exploration personnel, including contractors, are aware of the procedures and requirements of the *Flora and Fauna Management Plan* prior to the exploration program commencing.
 - Use the smallest equipment suitable for the task.
 - Install, where possible, access ramps for fauna in drill sumps and/or fence as appropriate.
 - Backfill or cover all drill holes to prevent fauna or livestock access.
 - Remove all exploration equipment and consumables as soon as possible after exploration activities are completed.
 - If sample bags are to be left in place temporarily, ensure that temporary fencing is constructed, where appropriate to minimise interference for or from livestock or other fauna.
 - Undertake rehabilitation operations as soon as possible after completion of the exploration activities. If areas are not rehabilitated immediately, deep excavations should be made safe and fenced to prevent fauna access or allow fauna to escape. Erosion control measures, such as diversion drains, may need to be put in place to protect the rehabilitated areas.
- Undertake rehabilitation operations as soon as possible after completion of the exploration activities.

Section 4 Identifying and Managing the Existing Environment

- Develop a Disturbed Land Register for each licence or mineral authority, identifying the area of cleared land within each. This will assist in managing compliance with the regulatory requirements.
- Ensure, through documented inspections and photographs, that the requirements of the *Flora and Fauna Management Plan* are being complied with.
- Obtain written confirmation from the landholder and DRE that areas of completed rehabilitation are satisfactory. Remove such areas from the Disturbed Land Register.

4.4 Existing Land Uses and Agriculture

Ensuring that exploration activities minimise disruption to other land uses or activities, including agriculture, is important to ensure continued social licence to operate. In NSW this is critical due to the close proximity of exploration with other land uses which may include agriculture, forestry, nature conservation and residential land.

Requirements and Conditions

Noxious Weeds Act 1993 – Section 30

- A person must not knowingly scatter or cause to be scattered on any land or water any notifiable or other noxious weed material, knowing it to be such weed material.

Plant Diseases Act 1924 – Section 26

- A person commits an offence if they sell, or bring onto or remove from a premises any plant, fruit, covering or thing of any nature whatever with the knowledge that it is infected or likely to convey infection.

Mining Act 1992

- A mineral authority may include conditions relating to land uses, diseases or weeds.

Leading Practice

Consultation

- Implement the measures identified in [Section 3](#) to ensure that:
 - All relevant stakeholders are identified and effectively consulted
 - Relevant issues are identified and addressed
 - Effective management and mitigation measures are identified and implemented
 - Stakeholders are provided with information in relation to the proposed activities, management plans and mitigation
 - Stakeholders are advised on the way to contact relevant company personnel.
- Consult with the landholder/s on whose land the exploration activities are proposed well before the proposed commencement of the program. Consultation should include:
 - Identification of potentially impacted landholders or enterprise operators.
 - Preferred times of the year/season to undertake mineral exploration.
 - Activities that may have an adverse impact on agricultural operations and mitigation measures to be implemented. This may include avoidance of certain paddocks during lambing, calving, sowing or harvesting or avoidance of certain activities during particular weather conditions such as following rain or on hot, windy days.
 - Infrastructures requirements, including the need and source of water to ensure that sufficient capacity remains for the agricultural operations.
 - Sensitive surrounding agricultural operations or enterprises, including neighbours.
- In all cases, ensure that appropriate compensation is paid promptly to affected landholders.

Minimising disruptions to other land uses or activities, including agriculture, is important to help maintain your social licence to operate.

Section 4 Identifying and Managing the Existing Environment

Agricultural Impacts

- Avoid, where possible, areas of particular sensitivity, including cropping areas, areas of improved pasture, feed lots, orchards, vineyards and areas surrounding dams and creeks.
- Where avoidance is not practicable, ensure appropriate mitigation measures are in place, including limiting the days/times particular activities are undertaken, using smaller (or larger) equipment that would otherwise be the case, limit vehicle speeds, etc.
- Prepare an *Agricultural Impact Statement* (AIS) in accordance with the *Guideline for Agricultural Impact Statements at the Exploration Stage*,
 - Undertake an agricultural risk assessment, ideally in conjunction with the landholder and any other relevant stakeholders, to identify any exploration activities that may have a high risk or potential impact on agricultural activities.
 - If high-risk activities are identified complete Section B of the AIS (see [Appendix 7](#) for further information on completing an AIS and REF).

Weed and Pest Management

- Consult with all relevant landholders to determine their expectations to prevent transfer of diseases, weeds or pests. Agreed outcomes need to be documented in the access agreements.
- Prepare relevant procedures for the avoidance of problems relating to diseases, weeds and pests. Matters to be considered and included, in consultation with the landholder may include requirements for the cleaning or disinfecting of all equipment and other materials, including boots, prior to arrival on site.
- Ensure any fill or pad construction materials to be used on site are free from diseases or weeds.
- Inspect all equipment to ensure it has been adequately cleaned before it enters the exploration area.
- Ensure that food waste is removed from site daily to prevent attraction of pests.

- Ensure that the measures identified during the risk assessment are appropriately implemented.
- Consult with all relevant landholders during exploration activities to ensure their satisfaction with the manner in which the exploration activities are being undertaken.
- Ensure that all equipment is washed and/or disinfected on departure from site.

4.5 Surface Disturbance and Soil Management

Most exploration activities are able to be undertaken with minimal surface disturbance. However, where surface disturbance is required, procedures should ensure that the impact of the disturbance is minimised and that the soil removed remains viable for rehabilitation operations.

Management of soil resources is closely related to management of sedimentation and erosion. As a result, this section addresses issues associated with soil removal, stockpiling and re-spreading while [Section 4.6](#) addresses issues associated with management of sedimentation and erosion. It is also noted that further approvals and increased security will typically be required for exploration operations that propose to disturb significant areas of land (see [Section 4.3](#)).

Requirements and Conditions

Mining Act 1992

- Authorisations may include conditions relating to surface disturbance and soil management.

Procedures should ensure that the impact of the disturbance is minimised and that the soil removed remains viable for rehabilitation operations.

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Leading Practice

- Determine whether soil removal would be required for the proposed exploration program. Consideration should be given to minimising the amount of soil to be removed. For example, when constructing drill pads, the drill sumps will typically be the only area requiring stripping of topsoil.
- Consider using above ground drill sumps wherever practical.
- Establish an appropriate *Soil Management Plan* describing soil stripping, stockpiling and re-spreading procedures. The *Plan* needs to:
 - Identify the thickness and properties of the topsoil and subsoil. A simple hand dug test pit should provide the required thicknesses and the landholder should be able to indicate whether any special soil management measures are required.
 - Determine whether acid sulphate soils are present and, if so, develop an appropriate management strategy. The Commonwealth Department of Resources, Energy and Tourism has produced a Handbook, *Leading Practice Sustainable Development Program for the Mining Industry: Managing Acid and Metalliferous Drainage* (available at http://www.ret.gov.au/resources/resources_programs/lpsdpmining/handbooks/Pages/default.aspx) that has further information and a section on exploration procedures.
- Identify soil stockpile locations and design. Note that soil stockpiles should be less than 2m in height, and topsoil and subsoil must be stockpiled separately and measures should be implemented to avoid compaction of the stockpile. The biodiversity of topsoil can be destroyed by higher stockpiling and/or compaction.
- Locate stockpiles more than 40m away from drainage lines or watercourses.
- Consider using the subsoil stockpile, in conjunction with appropriate silt-stop fencing, as a bund around the lower side of exploration sites to contain all potentially sediment-laden water within the area of disturbance.
- Establish a cover equivalent to 70% vegetative cover within 10 days of establishment of the stockpile in accordance with guideline *Managing Urban Stormwater* (available at <http://www.environment.nsw.gov.au/stormwater/publications.htm>). This may be achieved through establishment of a non-persistent cover crop, spraying with a binding agent or covering with geotextile.
- Develop a procedure for respreading subsoil then topsoil during rehabilitation operations.
- Ensure that all exploration personnel, including contractors, are aware of the procedures and requirements of the *Soil Management Plan* prior to the exploration program commencing.
- Ensure that the requirements of the *Plan* are being complied with and that the proposed management measures are performing adequately. Evidence should be recorded through documented inspections and photographs.
- Re-spread subsoil then topsoil and revegetate as soon as practicable once exploration activities have been completed.
- Ensure that appropriate sediment and erosion control measures (see Section 4.6) remain in place until an adequate vegetative cover has been established.

Management of soil resources is closely related to management of sedimentation and erosion.

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4.6 Sediment and Erosion Control

Appropriate sediment and erosion management is essential to ensure that areas of disturbance do not develop into areas with long-term erosion issues and that down slope and/or downstream environments do not become subject to higher volumes of sediment than would normally be received. An awareness of the characteristics of the soil material to be disturbed should result in identification and appropriate management of potential sediment and erosion control risks. Leading practice erosion and sediment control should be managed in accordance with the guideline *Managing Urban Stormwater*, Volumes 1, 2C and 2E (see below).

Requirements and Conditions

Protection of the Environment Operations Act 1997

- Additional requirements may exist in drinking water catchment areas or other sensitive areas. Mineral explorers should contact DRE to identify relevant requirements.

Mining Act 1992

- Authorisations may include conditions relating to sediment and erosion control.

Leading Practice

- Prepare an appropriate *Sediment and Erosion Control Plan*, including the design and location of sedimentation and erosion control structures. In preparing the plan, reference should be made to the following useful documents (available at <http://environment.nsw.gov.au/stormwater/publications.htm>).

Managing Urban Stormwater: Soils and Construction – Volume 1

Managing Urban Stormwater: Soils and Construction – Volume 2C – Unsealed Roads

Managing Urban Stormwater: Soils and Construction – Volume 2E – Mines and Quarries.

- The *Sediment and Erosion Control Plan* may include:
 - Upslope clean water diversions to divert clean water away from proposed areas of disturbance including existing and newly prepared tracks and roads.

- Down slope containment bunds to contain all potentially sediment-laden water.
- Sediment retention basins to retain sediment-laden water until suspended sediment has settled. In-ground drilling sumps may be effective as sediment retention basins, providing they are adequately designed and constructed for the purpose.
- Sediment fences constructed using geotextile cloth, straw bales or similar. These should be constructed down slope of all areas of disturbance including existing and newly prepared tracks and roads.
- Appropriate road-side drainage where required, including mitre drains.
- Sediment and erosion control plans should be based on the average climate conditions for the exploration area and in response to the risk level of the maximum probable rainfall event for the area. Long term forecasts for variations from the average climate conditions should be consulted for the exploration period.
- Ensure that all exploration personnel, including contractors, are aware of the procedures and requirements of the *Plan* prior to the exploration program commencing.
- Ensure that the requirements of the *Sediment and Erosion Control Plan* are being complied with and that the proposed management measures are performing adequately. In particular, attention should be paid to evidence of erosion or sedimentation developing. Evidence should be recorded through documented inspections and photographs.
- Remove accumulated sediment within sediment control structures to ensure the continued performance of the structures.
- Retain or construct new erosion and sediment control structures following initial rehabilitation operations and maintain those structures until an adequate vegetative cover has been established.

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4.7 Surface Water

Understanding surface water is important for determining the location and design of access tracks, surface water diversions and water catchment structures, as well as potential sources of water for exploration activities. Some exploration activities have the potential to pollute surface waters with sediment, dissolved salt or chemicals such as hydrocarbons or drilling fluids. An awareness of the potential for surface water impacts associated with the proposed exploration activities should result in either avoiding or minimising adverse impacts.

Requirements and Conditions

Protection of the Environment Operations Act 1997 – Section 120

- A person who pollutes any waters is guilty of an offence.

Water Act 1912

This Act is being progressively phased out and replaced by the *Water Management Act 2000*, but some provisions are still in force where a *Water Sharing Plan* has not commenced. Unlike the *Water Management Act 2000*, no exemptions from approval requirements are available for exploration.

Contact the office of Water to find out which Act applies to a proposed exploration activity.

Water Management Act 2000

This Act only applies in areas where a *Water Sharing Plan* has been implemented.

- Section 60A – a person who takes water from a water source to which this Part applies, and who does not hold an access licence for that water source is guilty of an offence.
 - *Clause 18 of the Water Management (General Regulation) 2004 provides an exemption from section 60A for any person lawfully engaged in prospecting or fossicking for minerals under the Mining Act 1992, in relation to water required for that purpose.*
- Section 91A – a person who uses water from a water source without a water use approval for that use is guilty of an offence.
 - *Clause 38 of the Water Management (General Regulation) 2004 provides an exemption from section 91A for the use of water for the purpose of prospecting or fossicking for minerals under the Mining Act 1992.*
- Section 91B – a person who constructs or uses a water supply work, and who does not hold a water supply work approval for that work, is guilty of an offence.
 - *An exemption from section 91B (1) for the construction of a water supply work to be used solely for the purpose of prospecting or fossicking for minerals under the Mining Act 1992.*
- Section 91C – a person who constructs or uses a drainage work, and who does not hold a drainage work approval for that work, is guilty of an offence.
- Section 91D – a person who constructs or uses a flood work, and who does not hold a flood work approval for that work, is guilty of an offence.
- Section 91E – a person who carries out a controlled activity in, on or under waterfront land, and who does not hold a controlled activity approval for that activity, is guilty of an offence.
 - *Clause 39A of the Water Management (General Regulation) 2004 provides an exemption from section 91E for activities carried out in accordance with any lease, licence permit or other right in force under the Mining Act 1992.*
- Section 342 – a person must not destroy, damage or interfere with:
 - a. Any work that is owned by, or is under the control and management of, the Minister, the Ministerial Corporation, a water supply authority, an irrigation corporation, a private irrigation board, a private drainage board or a private water trust, or

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b. Any mark, peg, stake or level fixed for the purposes of this Act.

- Section 345 – a person who harms waterfront land is guilty of an offence.

Mining Act 1992

- Section 165 (1) – If land subject to an authority includes the surface of any land, a landholder who is entitled to use the land for stock watering or water drainage purposes is entitled to free and uninterrupted access, for those purposes, to the water in any stream (whether perennial or intermittent) or any lagoon or swamp (whether permanent or temporary) on or adjacent to the land.
- Section 165 (2) – If a dispute arises between the holder of the authority and any such landholder concerning the right of access, the holder or the landholder may apply to the Land and Environment Court for a determination on the matter.
- Section 166 (1) – a mineral explorer must not use water stored in farm dams or similar without the consent of the landholder.
- *Mining Act 1992* authorisations may include conditions relating to surface water.

Leading Practice

- If the risk assessment determines the proposed exploration operations could result in sediment, salt or chemical-laden water entering a watercourse, implement appropriate management measures to prevent this occurring. Management measures may include:
 - Construction of sumps of sufficient capacity to retain all anticipated sediment, salt or chemical-laden water, with a sufficient margin of safety, until such time as the water can be treated and discharged, evaporated or disposed of in some other appropriate manner.
 - Identification of appropriate methods to remove potentially contaminated water for treatment, evaporation or disposal elsewhere. Note that further approvals may be required for disposal of potentially contaminated water.
 - Construction of appropriate sediment and erosion control structures, including diversions required to prevent 'clean' water from flowing into disturbed areas and becoming potentially contaminated.

- Determine whether any activities, including access tracks, are proposed within 40 m of a watercourse and, if so, either move the activities further away from the watercourse or contact NOW or DP&I to identify approval requirements under the *Water Management Act 2000* or the *Fisheries Management Act 1994*.
- Negotiate appropriate water access arrangements from a suitably licensed source such as a farm bore or dam or local town water supply.
- Determine whether water will be required to be drawn from a watercourse and, if so, contact NOW to identify approval requirements, if any (see above description of Section 60A/Clause 18 of the Act and Regulations).
- Identify and mark 'no go areas' to avoid inadvertent disturbance.
- Ensure that all water from disturbed section of the exploration site is retained and, where practicable, and reused for exploration operations.
- Ensure that water quality is monitored at an appropriate interval during exploration operations and ensure water is not discharged to local watercourses unless the quality is compliant with EPA requirements and/or subject to an approval issued by DRE.
- Record volumes of water used, produced, stored and discharged during the exploration activities. In-line meters can be installed in poly pipes.
- Regularly inspect all water treatment and evaporation areas and rehabilitate when no longer required.

4.8 Groundwater

An understanding of the local groundwater is important to ensure that surrounding groundwater resources and groundwater quality are not adversely affected. Groundwater users, including surrounding bore owners, and the environment should not be adversely impacted by the exploration operation. In addition, it is important that groundwater intersected during drilling does not adversely impact on surface water resources. Potential groundwater impacts associated with exploration operations have been a matter of significant concern for the community. Mineral explorers should be understanding of community concern when designing exploration programs and consult broadly.

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Requirements and Conditions

Protection of the Environment Operations Act 1997
– Section 120

- A person who pollutes any waters is guilty of an offence.

The Water Act 1912 is being progressively phased out and replaced by the *Water Management Act 2000*, but some provisions are still in force where a *Water Sharing Plan* has not been commenced. Contact the NOW to find out which Act applies to a proposed exploration activity.

Water Management Act 2000

This Act only applies in areas where a *Water Sharing Plan* has been implemented.

- Section 60A – a person who takes water from a water source to which this Part applies, and who does not hold an *access licence* for that water source is guilty of an offence.
 - *Clause 18 of the Water Management (General Regulation) 2004* provides an exemption from section 60A for any person lawfully engaged in prospecting or fossicking for minerals under the *Mining Act 1992*, in relation to water required for that purpose, to a maximum of 3ML per year.
- Section 91A – a person who uses water from a water source without a *water use approval* for that use is guilty of an offence.
 - *Clause 38 of the Water Management (General Regulation) 2004* provides an exemption from s.91A for the use of water for the purpose of prospecting or fossicking for minerals under the *Mining Act 1992*.
- Section 91B – a person who constructs or uses a water supply work, and who does not hold a *water supply work approval* for that work, is guilty of an offence.
 - *Clause 39 of the Water Management (General Regulation) 2004* provides an exemption from section 91B (1) for the construction of a water supply work to be used solely for the purpose of prospecting or fossicking for minerals under the *Mining Act 1992*.
- Section 91C – a person who constructs or uses a drainage work, and who does not hold a *drainage work approval* for that work, is guilty of an offence.
 - *Drainage work means a work (such as a pump, pipe or channel) that is constructed or used for the purpose of draining water from land, including a reticulated system of such works, and includes all associated pipes, sluices, sluiceways, valves, metering equipment and other equipment, but does not include:*
 - c. *Any sewage work (within the meaning of Part 2 of Chapter 6), or*
 - d. *Any work declared by the regulations not to be a drainage work.*
- Section 91E – a person who carries out a *controlled activity* in, on or under waterfront land, and who does not hold a *controlled activity approval* for that activity, is guilty of an offence.
 - *Clause 39A of the Water Management (General Regulation) 2004* provides an exemption from section 91E for activities carried out in accordance with any lease, licence permit or other right in force under the *Mining Act 1992*.
- Section 91F – a person who carries out an *aquifer interference activity*, and who does not hold an *aquifer interference approval* for that activity, is guilty of an offence.
 - *Aquifer interference activity means an activity involving any of the following:*
 - a. *The penetration of an aquifer*
 - b. *The interference with water in an aquifer*
 - c. *The obstruction of the flow of water in an aquifer*
 - d. *The taking of water from an aquifer in the course of carrying out mining, or any other activity prescribed by the regulations*
 - e. *The disposal of water taken from an aquifer as referred to in paragraph (d).*
- Section 345 – a person who harms an aquifer is guilty of an offence.
 - *Aquifer means a geological structure or formation, or an artificial landfill, that is permeated with water or is capable of being permeated with water.*

Mining Act 1992

- Authorisations may include conditions relating to groundwater.

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Aquifer Interference Policy

- The Aquifer Interference Policy was released in September 2012. The policy provides a framework for assessing and licencing activities that may interfere with an aquifer. The policy seeks to ensure that impacts to groundwater resources are minimal. A range of activities are defined as 'minimal impact aquifer interference activities', including:

Core holes, stratigraphic (chip) holes, geo-environmental and geotechnical bores, ... intersecting the water table if they are decommissioned in such a way as to restore aquifer isolation to that which existed prior to the construction of the bore, work or activity and that the decommissioning is conducted within a period of 28 days following completion of the bore, work or activity.

An assessment of potential aquifer impacts is required to be included in any REF prepared for an exploration program.

Leading Practice

- Identify potential groundwater resources in the vicinity of the exploration activities, including the anticipated groundwater quality and quantity. Based on this information, determine risks and appropriate trigger levels for intervention. These trigger levels would be used to determine when further investigation of groundwater-related impacts would be required. Groundwater quality triggers will be dependent on the quality of the groundwater.
 - Identify potential groundwater users in the vicinity of the exploration activities (NSW Natural Resources Atlas is a useful initial resource – see [Appendix 1](#)). Landholders should also be consulted.
 - Determine the groundwater setting. In particular, does more than one aquifer exist and if so is the water of different qualities? For example, assess whether there is an alluvial aquifer with high quality water and a fractured rock aquifer with poor quality water. If so, these need to be taken into account when rehabilitating drill holes.
 - Identify potential groundwater-dependent ecosystems in the vicinity of the exploration activities. Any native vegetation in the vicinity of a spring or soak should be considered a potential groundwater-dependent ecosystem.
 - Contact NOW to determine licensing requirements.
 - Identify groundwater-related risks in consultation with the landholder and document these in the REF. These risks may include:
 - The anticipated flow rates, volume and quality of groundwater
 - Potential impacts of additives that may be added to water to produce a suitable drilling fluid
 - Potential for discharge to the surface
 - Potential and risk of aquifer mixing.
- Minimum Construction Requirements for Water Bores In Australia* provides useful guidance (National Uniform Drillers Licensing Committee 2012, available at <http://adia.com.au/resources/waterwell-sector/water-bore-construction>).
- Develop appropriate management plans and procedures to manage:
 - Casing requirements to isolate aquifers
 - Monitoring and recording groundwater quality and volumes produced during drilling operations
 - Monitoring and recording in drill logs groundwater levels, quality and volumes, as appropriate, in surrounding bores, springs and soaks before, during and following exploration activities
 - Management of produced groundwater
 - Triggers and response actions for initiating further investigations and contingency measures
 - Hole abandonment requirements, including establishing whether aquifer protection measures are likely to be required.
 - Determine whether drill holes will be required to be grouted on completion, and if so, whether the entire length of the holes will require grouting or only certain sections. If only certain sections require grouting, determine how plugs will be inserted and confirm placement of the grouting. Ensure sufficient supplies are available on site if grouting is likely to be required.
 - Ensure that the identified procedures are implemented and appropriate corrective actions are undertaken, if required.
 - Record the volume and quantity of groundwater intersected in drillholes, together with the depth at which it was intersected and the associated rock types or aquifer class. This information needs to be recorded in drilling logs and reported with other required information to NOW.

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- Inspect all drill holes following completion of drilling operations to determine if they are making water and, if so, rework the hole to effectively seal it to the satisfaction of DRE.
- Ensure that groundwater piezometers are fully protected with a solid enclosure/monument and appropriately licenced and recorded on a monitoring plan.
- Document all groundwater treatment and discharge.
- Record the results of all monitoring of surrounding bores, springs and soaks.

4.9 Air Quality and Dust Management

Excessive dust may result in environmental or health-related impacts. Typically, procedures implemented to manage the health-related impacts of dust for exploration personnel will also adequately manage environmental impacts. This section provides a brief overview of leading dust management practice from an environmental perspective. Individual mineral explorers may wish to implement additional management measures to manage health-related impacts.

Requirements and Conditions

Protection of the Environment Operations Act 1997

- Section 124 – the occupier of any premises who operates any plant in or on those premises in such a manner as to cause air pollution from those premises is guilty of an offence if the air pollution so caused, or any part of the air pollution so caused, is caused by the occupier's failure:
 - a. To maintain the plant in an efficient condition, or
 - b. To operate the plant in a proper and efficient manner.

Mining Act 1992

- Authorisations may include conditions relating to air quality and dust management.

Leading Practice

- Determine whether the proposed exploration activities would be likely to result in generation of dust. If so, prepare an appropriate *Air Quality or Dust Management Plan*. The *Plan* needs to be developed taking into consideration occupational health requirements, proximity of the exploration area to surrounding residences, prevailing wind directions, other environmentally sensitive areas as well as the nature and extent of the dust that would be likely to be generated.
- Incorporate the following in the *Air Quality or Dust Management Plan*:
 - The composition of the parent material, in particular the anticipated free crystalline silica, heavy metals or asbestos content, for example.
 - Appropriate control measures to manage dust emissions, including dust suppression units on percussion drill rigs, watering of roads, minimising the number of vehicle movements, reduced speed limits on unsealed roads in the vicinity of residences and prevailing weather conditions.
- Maximise buffer areas around sensitive receptors through careful siting of activities, where practicable.
- Preferentially select equipment with comprehensive dust-suppression capacity.
- Ensure that the area disturbed is the minimum required for the exploration operation.
- Install temporary soil stockpile covers as appropriate, including non-persistent cover crops.
- Ensure that all exploration personnel are aware of the procedures and requirements of the *Air Quality or Dust Management Plan* prior to the exploration program commencing.
- Ensure that the requirements of the *Air Quality or Dust Management Plan* are being complied with and that the proposed management measures are performing adequately. Evidence should be recorded through documented inspections and photographs.
- Consult regularly with surrounding residents, where appropriate, to determine whether there are any perceived adverse dust-related impacts associated with the exploration operation and implement additional management measures, as required.
- Ensure that areas of disturbance are rehabilitated as soon as practicable at each site once exploration activities are complete.

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4.10 Noise Management

Environmental noise-related impacts typically relate to disturbance of the amenity of residents surrounding the exploration area. Such impacts may occur despite implementation of appropriate measures to manage noise-related occupational health issues.

Environmental conditions that can enhance noise propagation and potentially increase noise-related impacts to surrounding residences include:

- Temperature inversions which typically occur on calm, cool to cold evenings, nights and early mornings.
- Gentle winds of less than approximately 10km per hour. Winds greater than this tend to generate their own noise through wind in trees and other causes.
- The nature of the noise. A regular tonal variation or short bursts of noise can be more annoying than regular, uniform noise.
- Time of the noise. Noise in the evening or on weekends may have a greater impact on residents than noise during daylight hours on weekdays. In addition, noise may have a greater impact during hot or mild weather when residents are more likely to be outside or have open windows than during cold weather when they are more likely to be inside or have the windows shut.

This section provides a brief overview of leading noise-management practice from an environmental perspective. Individual mineral explorers may wish to implement additional management measures to manage health-related impacts.

Requirements and Conditions

Protection of the Environment Operations Act 1997

- Section 139 – the occupier of any premises who operates any plant (other than control equipment) at those premises in such a manner as to cause the emission of noise from those premises is guilty of an offence if the noise so caused, or any part of it, is caused by the occupier's failure:
 - a. To maintain the plant in an efficient condition, or
 - b. To operate the plant in a proper and efficient manner.

Mining Act 1992

- Authorisations may include conditions relating to noise.

Leading Practice

- Preferentially select less noisy equipment and ensure sufficient safeguards are on equipment to minimise noise impacts.
- Determine, in consultation with surrounding residents, whether the proposed exploration activities would be likely to generate noise that would be considered unacceptable or would be in excess of the relevant criteria identified under the *Interim Construction Noise Guideline* (DECC 2009, <http://epa.nsw.gov.au/noise/constructnoise.htm>). If so, prepare a *Noise Management Plan*. The *Plan* needs to:
 - Identify the time of day and days of the week when particular exploration activities may be undertaken. For example, it may be appropriate to undertake diamond drilling operations 24 hours per day but percussion drilling operation may only be undertaken between 7am and 6pm Monday to Saturday.
 - Maximise buffer areas around sensitive receptors through careful siting of activities and use of natural barriers, where practicable.
 - Consider meteorological considerations that could enhance noise impacts on sensitive receptors such as temperature inversions and prevailing winds.
 - Identify noise controls that could be implemented. These may include:
 - Use of rubber mats, rags or wood to muffle rod noise
 - Construction/placement of temporary noise barriers
 - Identification of weather conditions (cool still evenings, nights and mornings) or time periods (night-time, weekends) during which particular activities will be avoided.
 - Identify a procedure where residents may contact the project manager in the event that noise levels become unacceptable. In such circumstances, the project manager should then implement appropriate additional management measures, including temporarily ceasing exploration activities or noise-generating activities.
 - Develop a procedure of regular consultation with surrounding residents.
- Ensure that all exploration personnel, including contractors, are aware of the procedures and requirements of the *Noise Management Plan* prior to the exploration program commencing.

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- Ensure that the requirements of the *Noise Management Plan* are being complied with. Evidence should be recorded through documented inspections.
- Consult regularly with surrounding residents, where appropriate, to determine whether there are any perceived significant adverse noise-related impacts associated with the proposed exploration operation and, if required, implement additional management measures and noise monitoring.

4.11 Waste Management

Exploration activities have the potential to generate a range of waste materials including:

- Production wastes, such as percussion drill chips and residue
- Potentially contaminated wastes, including waste oils, drilling fluids and sewage
- Recyclable waste, including metal, cardboard and paper
- General wastes, including rags and food scraps.

Any material that may be classified as a 'waste' under the NSW Waste Classification Guidelines (OEH, <http://www.epa.nsw.gov.au/waste/envguidlns/index.htm>) should be disposed of at an appropriately licenced facility. Typically, drill cuttings that have not had anything added to them such as percussion drill chips would not be classified as a waste, while cuttings that have had anything added such as hydrocarbons or non-biodegradable additives will be classified as a waste material.

Usually, exploration activities will not be of a size to justify the regular engagement of a waste contractor. However, waste is a very visible product of exploration and can become an important community concern. As a result, it is the responsibility of the mineral explorer to develop appropriate waste management measures for each class of waste material.

Requirements and Conditions

Protection of the Environment Operations Act 1997

- Section 115 – If a person wilfully or negligently disposes of waste in a manner that harms or is likely to harm the environment:
 - a. The person, and
 - b. If the person is not the owner of the waste, the owner,are each guilty of an offence.

- Section 142A – a person who pollutes land is guilty of an offence.
- Section 143 – If a person transports waste to a place that cannot lawfully be used as a waste facility for that waste, or causes or permits waste to be so transported:
 - a. The person, and
 - b. If the person is not the owner of the waste, the owner,are each guilty of an offence.
- Section 144 – a person who is the owner or occupier of any land and who uses the land, or causes or permits the land to be used, as a waste facility without lawful authority is guilty of an offence.
- Section 145 – a person who deposits litter [including general waste] in or on a public place or an open private place is guilty of an offence.

Mining Act 1992

- Authorisations may include conditions relating to the management of waste.

In addition, in certain sensitive areas, such as drinking water catchment areas, additional waste management requirements may exist. Mineral explorers should contact DRE to identify relevant requirements.

Leading Practice

- Identify the anticipated types and volume of waste that may be generated during the proposed exploration operation.
- Identify appropriately licensed waste disposal or recycling sites. These may include local council resource recovery centres or transfer stations.
- Develop a *Waste Management Plan* to identify procedures and measures to manage each of the classes of waste identified above, where sufficient volumes of such material would be likely to be generated. The *Plan* needs to include:
 - Identification of the classes and anticipated volumes of waste that would be generated. Reference needs to be made to the *NSW Waste Classification Guidelines* (OEH <http://www.environment.nsw.gov.au/waste/envguidlns/index.htm>).

Consult regularly with surrounding residents.

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- Consideration of modifications to exploration practices to minimise waste produced.
- Management measures for production or percussion drilling wastes. These may include:
 - Use as backfilling material or for spreading on areas of pasture, assuming the material can be classified as Virgin Excavated Natural Material and with written landholder consent
 - Transportation to an appropriately licensed waste disposal facility.
- Management measures for potentially contaminated wastes. These may include:
 - Waste hydrocarbons (see [Section 4.12](#)) – should be transported to, and disposed of, at an appropriately licensed facility as soon as possible after they are created.
 - Drill cuttings – should be characterised in accordance with the waste classification guidelines and if not classified as a waste, be allowed to dry out and covered during rehabilitation. If the cuttings may be classified as a waste, such as diamond drilling cuttings with non-biodegradable additives, they should be removed using a vacuum truck or similar and transported to a waste disposal facility licenced to receive the wastes. Disposal in an approved tailings dam, with approval, may also be an appropriate disposal method.
 - Drill fluids – the liquid component of the drilling muds should also be classified in accordance with waste classification guidelines. Drill fluids typically comprise water mixed with a range of additives to lubricate the drill rods, increase the fluid viscosity or limit fluid losses. The classification of the fluid is likely to depend on the composition of the additives used.
 - Sewage – portable chemical toilet facilities should be provided for extended exploration operations and must be serviced regularly by a suitably licensed contractor. Temporary camps must be with the approval of the landholder and may also require local council approval.
 - Other contaminated wastes – more stringent management measures may be required for other wastes or in sensitive environments.
- Management measures for recyclable and general wastes. These may include:
 - Separated into recyclable waste (including metal, cardboard, plastic) and non-recyclable waste (including rags, food scraps).
 - Storage in covered animal-proof receptacles.
 - Regular (preferably daily) removal to an appropriate off-site recycling or disposal facility.
 - Ensure that a fully stocked spill response kit is positioned at or near each location where hydrocarbons and hazardous materials are stored or used.
 - Ensure that all exploration personnel, including contractors, are aware of the procedures and requirements of the *Waste Management Plan* prior to the exploration program commencing.
 - Ensure that the requirements of the *Waste Management Plan* are being complied with. Evidence should be recorded through documented inspections.
 - Ensure that all waste materials generated by the exploration program are removed from site in accordance with the *Waste Management Plan* as soon as practicable following completion of each stage of exploration operations.

4.12 Hydrocarbon and Hazardous Materials Management

Hydrocarbons and hazardous materials can have a significant long-term impact on the environment. A set of management procedures and minimising the amount of such materials present on site should result in the risks associated with transportation, use and disposal of this material being reduced.

Limited amounts of hazardous materials are used during exploration activities. Therefore, this section primarily addresses risks associated with the transportation, storage, use and disposal of hydrocarbons.

Requirements and Conditions

Protection of the Environment Operations Act 1997

- Section 120 – a person who pollutes any waters is guilty of an offence
- Section 142A – a person who pollutes land is guilty of an offence.

Dangerous Goods (Road and Rail Transport) Act 2008

- Section 9 – a person involved in the transport of dangerous goods by road or rail who fails to ensure that the goods are transported in a safe manner is guilty of an offence.

Mining Act 1992

- Authorisations may include conditions relating to hydrocarbon and hazardous material management.

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Additional requirements may exist in areas of environmental sensitivity such as drinking water catchments. Mineral explorers should contact DRE to identify relevant requirements.

Leading Practice

- Identify the likely types and volumes of hydrocarbons and hazardous materials that are likely to be required, stored and used. As a general principle, the volume of such materials stored on site should be minimised and a sufficient quantity be brought to site either daily or every few days, as required.
 - Develop a *Hydrocarbon (and Hazardous Materials) Management Plan* to appropriately manage the transportation, storage, use, disposal and spills of all hydrocarbon and hazardous materials. This *Plan* needs to include:
 - Transportation procedures: Where appropriate, a fuel delivery contractor should be engaged to deliver hydrocarbons to site every few days. Where this is not practicable, hydrocarbons should be transported to site daily using appropriately designed and constructed containers. A range of tray-mounted tanks with pumps and cut-off nozzles are available and are ideally suited for transporting diesel. Where daily transportation of diesel is not practical, then an appropriate, double skinned, diesel storage tank should be established and bulk hydrocarbons should be delivered, as required.
 - Storage procedures:
 - Bulk storage – On-site bulk storage of hydrocarbons should be avoided, where practicable. Where such storage cannot be avoided, hydrocarbons should be stored in accordance with *Australian Standard: the Storage and Handling of Flammable and Combustible Liquids* (AS 1940–2004). This Standard requires that all hydrocarbon storage containers should be bunded or double skinned, with the volume of the bund equal to 110% of the volume of the largest tank.
 - Storage in small containers – a range of bunded pallets suitable for drums up to 205L capacity are available and these should be considered a minimum for exploration operations. All hydrocarbons, no matter how small the container, should only be stored on such a bunded pallet.
 - All storage – All storage areas should be covered to prevent them filling with incidental rainfall and any water that does accumulate should be treated as contaminated.
- Hydrocarbons should always be stored in a flat area away from drainage lines.
- Transfer and usage procedures: All hydrocarbons should be transferred and used in a manner that minimises the potential for spillage or contamination.
 - Disposal procedures: Waste hydrocarbons should be stored as described previously and transferred to an appropriate recycling or disposal facility, as soon as practicable.
 - Spill management procedures: Procedures need to be developed to appropriately manage all hydrocarbon spills, including procedures for ensuring that the appropriate equipment is available for managing potential spills. A fully stocked spill response kit should be positioned at each location where hydrocarbons and hazardous materials are stored or used, and all site personnel must have the appropriate training.
 - Appropriate contamination management procedures: Identify appropriate procedures to manage and remediate land contaminated as a result of a hydrocarbon spill. This may include procedures for on-site remediation or excavation and transportation to an off-site contaminated waste facility.
- Ensure that all equipment is regularly inspected and maintained, including scheduled replacement of hydraulic hoses, to minimise the risk of hydrocarbon spills.
 - Place appropriate plastic liners or other absorbent materials in all areas of potential hydrocarbon leaks or spills, including under drill rigs, compressors, lighting towers and pumps.
 - Ensure that all exploration personnel, including contractors, are aware of the procedures and requirements of the *Hydrocarbon (and Hazardous Materials) Management Plan* prior to the exploration program commencing.
 - Ensure that the requirements of the *Hydrocarbon (and Hazardous Materials) Management Plan* are being complied with and are performing adequately. This should include a detailed inspection of all hydrocarbon storage areas and all areas under significant pieces of equipment for evidence of hydrocarbon spills. The spill response kit should also be checked regularly and replenished as required. Evidence should be recorded through documented inspections.
 - Thoroughly inspect all work areas for evidence of hydrocarbon contamination and remediate any areas identified.

Section 4 Identifying and Managing the Existing Environment

4.13 Infrastructure and Resources Management

Electricity-related infrastructure, particularly overhead power lines, poses significant work health and safety issues for mineral explorers. Buried infrastructure also poses a significant work health and safety and financial risk. Interruption of services to a community damages the reputation of the mineral explorer in particular, and the mineral exploration industry in general. Some infrastructure items will have buffer zones that may impact on proposed exploration activities.

Requirements and Conditions

Damage to items of infrastructure caused by exploration activities would generally be repaired at the cost of the mineral explorer, often with a penalty for disruption to services.

Mining Act 1992

- Authorisations may include conditions relating to infrastructure and resource management.

Leading Practice

- Determine and mark on a plan, and on the ground, the location of sensitive items of infrastructure. This may include overhead and underground services, load-limited bridges or roads, dry-weather only roads, railway lines, water storages and transmission towers. Note that information on buried services in NSW may be obtained from the 'Dial Before You Dig' service (telephone 1100 or www.1100.com.au). Where present, an accurate survey of the location of underground services may be required.
- Identify any items of critical infrastructure or infrastructure buffer zones, and consult with the relevant authority in relation to the proposed exploration program.
- Develop, where appropriate, an *Infrastructure Management Plan* including:
 - The location of all items of sensitive infrastructure
 - Measures to protect all identified items, including signposting and exclusion or limited activity areas
 - Identify services that could be damaged by the exploration operations including roads, buried services (pipelines, communication cables) or overhead services
 - Information in relation to roads and bridges may be obtained from the local council or Roads and Maritime Service (formerly the Roads and Traffic Authority)

- Identify whether the exploration operations adversely impact on the community's ability to utilise services or resources. For example, will the exploration operations place a landholder's water security at risk or will a community struggle to obtain other services because the mineral explorer is utilising all available services?
- Ensure that all exploration personnel, including contractors, are aware of the procedures and requirements of the *Infrastructure Management Plan* prior to the exploration program commencing.
- Ensure that the requirements of the *Infrastructure Management Plan* are being complied with. Evidence should be recorded through documented inspections and photographs.

4.14 Bushfire Management

Bushfires result in significant economic and personal losses for the community. By contrast, community support for exploration will be engendered through responsible management of fire risks and provision of appropriate fire-fighting equipment.

Requirements and Conditions

Rural Fires Act 1997

- Section 63(2) – It is the duty of the owner or occupier of land to take the notified steps (if any) and any other practical steps to prevent the occurrence of or to minimise the danger of the spread of bush fires.
- Section 64(1) – If a fire is burning on any land at any time during a bush fire danger period applicable to the land, the occupier of the land must:
 - a. Immediately on becoming aware of the fire and whether the occupier has lit or caused the fire to be lit or not, take all possible steps to extinguish the fire, and
 - b. If means of communication are available, inform or cause to be informed an appropriate officer of the existence and locality of the fire (if it is practicable to do so without leaving the fire unattended.)
- Section 88 – a person who lights a fire on land within a fire district or rural fire district that would be likely to be dangerous to any building is guilty of an offence.

Mining Act 1992

- Authorisations may include conditions relating to bushfire management.

Section 4 Identifying and Managing the Existing Environment

Leading Practice

- Identify the bushfire risks associated with the proposed exploration program. The exploration program needs to be designed to minimise the risk of starting or being impacted by bushfire. To this end, consideration should be given to:
 - The time of year and expected weather conditions
 - Existing fuel loads
 - The proposed location and nature of exploration activities
 - Surrounding agricultural activities such as cropping cycles.
- Identify whether landholders or relevant regulatory authorities such as Catchment Management Authorities, National Parks and Wildlife Service or NSW Forests have bushfire management procedures and ensure that the proposed exploration program is consistent with those procedures.
- Prepare an appropriate *Bushfire Management Plan*. This *Plan* needs to include two components: prevention of bushfires; and the emergency management of bushfires in the event that a fire approaches or occurs within the exploration area. The *Bushfire Management Plan* needs to be supported with appropriate equipment and training.

The bushfire prevention component of the *Plan* needs to include:

- Identification of high-risk activities including electrical geophysical surveys, vehicle operations in long grass, operations likely to generate sparks and management of cigarette butts.
- Identification of threats to life, property and high risk vegetation communities both at and in the vicinity of the exploration site.
- Identification of high-risk weather conditions and procedures for suspending work under certain conditions or in certain areas. Typically an assessment for each day based on predicted weather conditions should be undertaken prior to the commencement of work each morning.

- Management measures for identified high-risk activities, including daily inspection of all active current lines used during electrical geophysical surveys, vehicle operations in long grass, operations likely to cause sparks and appropriate management of cigarette butts.

The bushfire emergency response component of the *Plan* needs to include:

- Identification of fire detection and communication procedures, including positioning of an observer during electrical geophysical surveys, provision of radio communication to all personnel and provision of emergency contact telephone numbers (including government authorities and local landholders) and satellite phones or UHF radio if required.
- Provision of appropriate fire-fighting equipment, including fire extinguishers and fire-fighting tankers/trailers, and training in the use of that equipment.
- Identification of evacuation routes and/or points in the event of bushfire, including identification of appropriate circumstances when equipment should (or should not) be evacuated.
- Undertake inspection for fire risks daily during periods of elevated bushfire danger.
- Where appropriate, allocate resources to undertake a bushfire emergency response exercise. This may be as simple as running through a bushfire scenario at a toolbox meeting.
- Ensure that all exploration personnel, including contractors, are aware of the procedures and requirements of the *Bushfire Management Plan* prior to the exploration program commencing.
- Ensure that the requirements of the *Bushfire Management Plan* are being complied with. Evidence should be recorded through documented inspections and photographs.

Community support for exploration will be engendered through responsible management of fire risks and provision of appropriate fire-fighting equipment.

Section 5

Exploration Operations



Geological mapping is
one of the most common
exploration activities

Section 5 Exploration Operations

5.1 Introduction

Careful planning, including a risk assessment, will ensure exploration operations progress in the most environmentally sound and economically practical manner. Successful management of each stage of exploration operations helps minimise potential adverse impacts. Mineral explorers must always be mindful of regulatory requirements and community expectations.

Appendix 3 – Description of Exploration Activities gives a full description of each exploration as fact sheets that may be given to landholders. These fact sheets are also available at <http://www.nswmining.com.au>.

5.2 Surface Sampling and Geological Mapping Operations

Surface sampling is often the first work on the ground, and the first chance to meet the landholders and community. Geological mapping typically requires a geologist, often assisted by one or more field hands, to traverse the area to be mapped on foot, noting the rock types occurring at surface and collecting samples for analysis.

Surface sampling surveys include activities such as soil sampling, rock chip sampling, stream sediment sampling, biogeochemical and channel sampling. With limited exceptions, including costeaning and trenching, surface sampling surveys are undertaken using hand-held equipment such as geological hammers, sledge hammers, shovels, hand augers or power augers. Section 5.4 has detail on surface sampling using equipment such as backhoes, bobcats and excavators.

With the exception of areas of undulating, open topography with limited vegetation, geochemical sampling will generally be undertaken on foot or using four-wheel motorbikes or similar. In areas of undulating, open topography with limited vegetation, larger vehicles such as a 4WD utility may be suitable.

Geochemical sampling, when undertaken on foot or supported by a 4WD utility, will usually be classified as low-impact or Category 1 exploration for which a Surface Disturbance Notice may be required. While the potential environmental impact associated with such surveys is likely to be limited, the adoption of a range of procedures will ensure that risks that may exist are appropriately managed and that sampling sites have minimal impact.

Leading Practice

- Identify all areas of proposed sampling activities, including access tracks, and determine whether any ground-disturbing activities, other than those required for the actual collection of the sample, will be required.
- Determine the equipment to be used. Preference should be given to using the smallest equipment practicable.
- Use biodegradable flagging tape and remove all markers as soon as possible after the completion of the program.
- Discuss the sampling program with the relevant landholder/s to determine the most appropriate sampling methodology, access routes, time of year for the program, compensation and rehabilitation procedures.
- Identify the degree of vegetation disturbance required and the proposed rehabilitation procedures, including return of oversize/undersize or excess material to the sample hole and replacement of topsoil and ground vegetation (if present) or reseeded requirements.
- Promptly undertake rehabilitation of all disturbance and pay compensation to the landholder, as appropriate.
- Review licence conditions to determine requirements to provide samples to DRE prior to disposal.
- Ensure that all samples are classified according to the NSW Waste Classification Guidelines (OEHL, <http://www.environment.nsw.gov.au/waste/envguidlms/index.htm>) and disposed of appropriately in accordance with those guidelines.
- Ensure that sampling locations are inspected and photographed before and after completion of the sampling program to demonstrate appropriate rehabilitation and for inclusion as evidence in the EDG13 Form for submission to the DRE.

5.3 Access Track Construction, Use and Decommissioning

Typically, access to most exploration sites can be achieved using either existing access tracks or, in the case of relatively short programs or in areas of flat topography, without the use of access tracks. Construction of access tracks may be required where heavy machinery such as drill rigs will require access, where the ground is likely to be soft during the exploration program, where access will be required over a long period or in areas of steeper slopes.

Section 5 Exploration Operations



It is important when constructing access tracks to ensure that the tracks are constructed to a standard suitable for the proposed traffic. A range of procedures should ensure that the construction, use and removal (if required) of any constructed tracks has a negligible impact on the environment within the exploration area/s.

Leading Practice

- Consult with the relevant landholder/s and/or regulatory authorities, including inspection of all access routes and determine:
 - Whether construction of an access track will be required. Investigate alternative access routes including helicopters in mountainous areas.
 - Whether any access track, if required, will be retained following completion of exploration activities. If so, this should form part of a written agreement between the landholder/s and mineral explorer.
 - Whether there are any areas where cut and fill will be required and, if so, how deep will the cut sections need to be and whether cut and fill material will balance out.
- Construct all access tracks in accordance with the guideline *Managing Urban Stormwater – Soils and Construction – Volume 2C Unsealed roads*
- Whether any creek crossings are required and if so, what is the nature of the creek in the vicinity of the crossing and what works would be required. Further approvals may be required for such crossings. The mineral explorer should consult DRE, DPI Fisheries or NOW. Consideration should be given to the guideline *Why do fish need to cross the road? – Fish passage requirements for waterway crossings*.

- Develop an *Access Track Management Plan* that includes the following:

Design

- Determine and mark the most appropriate route for the access track to avoid, as far as practicable, areas of native vegetation, steep slopes, dispersive soils, creek lines and any environmentally sensitive areas.
- Where access tracks join public roads, they should discourage access by the public through dog-leg bends, bunds, fences, gates or similar.
- Tracks should be designed with the following in mind:
 - The size of the largest piece of equipment that is likely to use the track.
 - The nature of the material the track will be constructed on, including its load-bearing capability and dispensability of the soils.
 - The period during which the track will remain in operation.
 - The requirements for road-side and under-road drainage, including the location, size and spacing of under-road drainage, table drains and mitre drains. In addition, an estimate should be made of upslope run-on. In general, access tracks should be designed to the requirements of *Managing Urban Stormwater: Soils and Construction – Volume 2C – Unsealed Roads*.
 - The quality of materials available for construction.

Construction

- Construction should only be undertaken by experienced contractors during appropriate weather conditions.
- Construction should be undertaken with the appropriate equipment and WHS procedures.
- Temporary and permanent sediment control measures should be constructed at points where surface water runs off the track to retain particulate matter from the water and minimise erosion or sedimentation below the run-off points.

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Operation

- Procedures for ensuring that only appropriate equipment use the access track should be in place. Maximum load signs may be appropriate.
- Procedures for regular inspection of all access tracks, drainage structures and maintenance, where required.

Rehabilitation

- The final use of the track needs to be determined in consultation with the landholder; namely whether the track will remain in place following completion of the exploration program or will be removed. Provided the track is to be used for agricultural purposes and the land is zoned for agriculture under the relevant Local Environment Plan, no further approvals should be required.
- If the track is to remain in place, a review procedure should be considered to ensure that the track is stable in the long term and will not result in significant environmental impacts.
- If the track is to be removed, a procedure should be considered to remove and rehabilitate the track. Consideration needs to be given to:
 - Excavation and removal to an appropriate location of imported road construction material
 - Re-profiling of areas of cut and fill to re-establish the pre-existing landform
 - Deep ripping of the footprint of the access track, preferably parallel to contour
 - Installation of appropriate temporary or permanent surface water management structures
 - Re-spreading of subsoil and topsoil, and revegetation with an appropriate mix of species.
- Ensure that the requirements of the *Access Track Management Plan* are being complied with and amend the *Plan* as required. Evidence should be recorded through documented inspections and photographs.
- Promptly undertake rehabilitation of all disturbance and pay compensation to the landholder, as appropriate.
- Ensure that tracks are inspected and photographed before and after completion of the sampling program to demonstrate appropriate rehabilitation and for inclusion as evidence in the EDG13 Form for submission to the DRE.

5.4 Excavation and Related Operations

Excavation of material for exploration purposes may include use of hand held or mobile equipment to sample, costean or cut channel samples. Excavation may also be required during construction of drill sites and in-ground sumps. All excavation activities, other than those constructed with hand held equipment, must be approved by DRE and some excavation operations may require preparation of a REF.

Excavation operations have the potential to result in long-term environmental impacts such as scarring of the landscape and erosion. However, with forward planning and a range of procedures, excavation operations should have a negligible impact on the environment within the exploration area.

there is an important safety risk due to 'cave in' during sampling in costeans, and safety considerations must be taken into account during their construction.

Leading Practice

- Identify and inspect the location of all proposed sample sites. In selecting each, consideration needs to be given to:
 - Access for excavation equipment.
 - Slope of the land. Sites should ideally be located in areas of least slope and slopes should be less than 10° (1:5 (V:H)). Where land to be disturbed is sloped at greater than 18°, DRE should be contacted for advice and expert advice should also be sought in relation to the design of the excavation.
 - Minimise the amount of native vegetation that would be disturbed, remembering that often root systems may extend laterally to the drip line of the trees or beyond. In addition trimming of overhead branches is preferable to removal of the whole tree.
 - Avoid sensitive areas such as within 40m of creek lines or near Aboriginal objects.
 - Surface water flows and sediment and erosion control.
- Identify the style of excavation required, namely a narrow excavation for sampling only (ie. 'Ditch Witch') or a wider excavation to basement to allow access for mapping and detailed sampling.
- Select the smallest equipment for the task. If a deep excavation is required, a step or bench may be required.
- Identify whether further approvals are required. Advice from DRE should be obtained.

Section 5 Exploration Operations

- Ensure that one or both ends of the excavation are sloped to allow fauna that fall into the excavation to escape, and fence where appropriate.
- Steep sides greater than 1m high should be fenced to prevent falls.
- Liaise with the landholder/s in relation to the program. Matters to be discussed and agreed upon include:
 - Location and timing of the excavation.
 - Management of the open excavation ie. should the excavation be backfilled immediately or could it stay open until assay results are received and reviewed? If the excavation is to stay open, does it need to be fenced? Generally, a fence should be installed for safety of animals and people, and rehabilitation should be undertaken as soon as possible.
 - Presence or otherwise of livestock and appropriate management measures.
 - Rehabilitation.
- Prepare an *Excavation Management Plan*. Matters to be addressed include:
 - The location, dimensions, cross-sectional profile, livestock, fauna management and procedures as agreed with the landholder/s.
 - Procedures for soil and vegetation removal and the period for which the excavation is to be open, taking into account leading practice identified in [Section 4.3](#) and [Section 4.7](#) of this Handbook.
 - Procedures for management of surface water flows and erosion and sediment control, both during excavation operations and following rehabilitation.
 - Safety considerations (limits on depth, width, benching).
 - Fencing of excavations which are left open, as agreed with the landholder/s.
 - Equipment (such as wheel-mounted or track-mounted equipment) to be used to minimise soil disturbance.
 - Rehabilitation and revegetation of operations. Leading practice rehabilitation is to re-establish the original soil profile as far as practical. Rehabilitation should include replacement of spoil material, followed by subsoil then topsoil. Excavations should be backfilled above the natural ground to allow for settlement. If required, the excavation should be revegetated with the appropriate species and fenced to minimise grazing pressure until the vegetation is sufficiently established.
- Ensure that the requirements of the *Excavation Management Plan* are being complied with. Evidence should be established through documented inspections, photographs and GPS survey pick-ups. Such evidence should be provided to DRE in annual reports or with the EDG13 Relinquishment Report.
- Rehabilitate the excavations and any disturbed area as soon as possible after they are no longer required.
- Pay compensation promptly to the landholder, as appropriate.

5.5 Ground-Based Geophysical Survey Operations

Ground-based geophysical surveys include gravity, magnetic, electrical or seismic surveys. Gravity and magnetic surveys typically involve a survey on foot, by four wheeled motor bike, or in a vehicle, and generally do not require surface disturbance. As a result, these survey methods have limited potential to adversely impact the environment and should be managed as for surface sampling and mapping surveys operations (see [Section 5.2](#)). Seismic and aerial surveys are addressed separately in [Section 5.6](#) of this Handbook.

Electrical geophysical surveys may include a variety of different techniques. In summary, many of these techniques require the placement of active current lines, often carrying very high voltages and receiver lines. These lines are progressively relocated during the survey.

Principal risks associated with electrical surveys include: four wheeled motor bike incidents (in steep terrain); starting a fire as a result of damage to the insulation of the transmission line; and the electrocution of animals through treading or biting the transmission line. In addition, non-environmental risks include safety risks associated with the electrocution of humans. Management of the safety aspects of ground-based electrical geophysical operations is beyond the scope of this Handbook and mineral explorers should ensure that they have an adequate Safety Management System in place to address safety-related risks. Leading practice identified below would complement any safety-related systems that may be implemented.

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Leading Practice

- Determine the area to be surveyed and the level of environmental risk associated with the proposed survey methodology.
 - Discuss the proposed survey with the landholder/s and surrounding residents. Issues that should be discussed include:
 - The risks associated with the proposed survey including risk of fire and electrocution and measures to be implemented to manage those risks
 - The most appropriate time of year and days of the week to undertake the survey
 - Whether stock can be removed from the active area (plus setback distance) for the survey period
 - Appropriate access routes and access between paddocks and across property boundaries
 - Training for operators of quad bikes
 - Compensation.
 - Prepare an *Electrical Geophysical Survey Management Plan*. This Plan needs to incorporate:
 - A procedure to ensure that all personnel have appropriate inductions and are aware of the risks associated with high voltage electrical currents.
 - A procedure to ensure that the relevant landholder, their neighbours and other interested parties, including the local Rural Fire Service and Regional Mines Safety officer, are notified of the survey program before it commences and made aware of the associated risks.
 - Exclude stock from the survey area, where possible. It may be appropriate to compensate the landholder for the time taken to move stock from the relevant area.
 - Ensure that a robust communication procedure is developed and that appropriate communications equipment is provided to all personnel in the survey area, including landholders, where appropriate.
 - A procedure is developed whereby signage is erected to warn visitors of the electrical geophysical survey and the risks of high voltage electrical currents.
 - A procedure for keeping watch for fire and ensuring that fire-fighting equipment is available in a suitable location within the survey area. This may require more than one fire-fighting unit if fences and other features prevent easy access to the entire survey line. Leading practice for bushfire management is discussed further in [Section 4.14](#) of this Handbook.
- 
- Geophysical survey running wires
- A procedure for bringing in and checking all wires each night. This should detect any damage to the insulation of the wires and will prevent overnight damage to wires from small animals such as stock, rabbits, foxes and native fauna.
 - If two or four-wheel motorbikes are used, ensure that personnel have been appropriately trained, the terrain is suitable, and identify areas where they are not to be used.
 - A procedure for ensuring that electrode and detector pits, if required, are appropriately rehabilitated and revisited as required to ensure any slumping is identified and rectified.
 - Use biodegradable flagging tape and remove all markers as soon as the exploration program is completed.
 - An Emergency Response Plan.
- Ensure that the requirements of the *Electrical Geophysical Survey Management Plan* are being followed. Evidence should be recorded through documented inspections and photographs.
 - Maintain regular communication with the geophysical crew, landholder/s and other relevant stakeholders and address any concerns as soon as they arise.
 - Ensure that a representative selection of survey lines are inspected once complete to ensure that electrode and detector pits have been appropriately rehabilitated and that sections of damaged wire have not been left on the ground.
 - Promptly undertake rehabilitation of all disturbance and pay compensation to the landholder, as appropriate.

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5.6 Seismic Geophysical Survey Operations

Seismic geophysical surveys involve the use of induced vibration to identify geological units and structures below the land surface. The vibrations used during the survey may be generated through the use of explosives or, more commonly, trucks with vibrating weights. These vibrations are detected using a range of specialist receivers called geophones which are arrayed in either a linear or grid pattern. Typically, environmental risks associated with seismic surveys are limited and principally relate to operation of equipment on public roads.

Leading Practice

- Identify the proposed survey area and proposed seismic survey technique.
- Consult with the relevant landholder/s and other stakeholders in relation to the proposed program and ensure the access agreement and compensation covers this activity. Stakeholders may include:
 - Local councils, the appropriate road authority or other agency if activities are proposed within road reserves, travelling stock routes, forestry tracks or on Crown land.
 - Local Mines Safety Operations officer (Mines Inspector) with DRE.
 - Local police.
- Prepare a *Seismic Survey Management Plan* that includes:
 - Determination of the location of items of sensitive infrastructure, including buried cables, pipelines, bridges, culverts, rail lines and residences, and an assessment of whether the proposed activities would have an adverse impact on the identified infrastructure.
 - Management of transportation, storage, use and documentation of explosive materials and appropriate certification for all personnel associated with the program in accordance with the relevant legislation.
 - A procedure to determine in advance the anticipated ground vibration and airblast overpressure at relevant surrounding residences and on services and other items of infrastructure.
 - A procedure for progressive rehabilitation of shot holes and other areas of disturbance where they occur.
- Ensure that the requirements of the *Seismic Survey Management Plan* are being followed, including the rehabilitation of all drill-hole sites. Evidence should be recorded through documented inspections and photographs.
- Inspect selected sections of survey lines once complete to ensure that areas of disturbance have been appropriately rehabilitated.

5.7 Airborne Geophysical Survey Operations

Airborne geophysical surveys are typically undertaken using helicopters or fixed-wing light aircraft. The height of such surveys may be as low as 25m above the ground. In addition, the use of unmanned aerial vehicles (UAVs or 'drones') is rapidly evolving, with potential uses for mineral explorers. The principal environmental impacts associated with these surveys are usually impacts to stock and the amenity or privacy of surrounding residents. As a result, wide consultation with the community will be required before such operations are undertaken.

Leading Practice

- Identify the area to be surveyed, survey methodology, aircraft to be used (UAV, helicopter or fixed-wing aircraft) and survey height.
- Undertake wide consultation with the community and interested stakeholders. This needs to include:
 - Prepare a plan showing land ownership of all land within and immediately surrounding the survey area. Local councils or Land and Property Information may be able to assist with landownership information.
 - Develop a flyer showing the area of the proposed survey, including a clear map, a brief summary of the proposed activities, photograph of the type of aircraft and the geophysical sensor if possible. Provide all landholders within the survey area and other stakeholders with a copy of the flyer. In addition, place copies of the flyer in appropriate locations such as the local supermarket, general store or hotel.
 - Undertake individual consultation with all landholders and residents within and immediately surrounding the survey area. Contact should initially be via telephone, with follow-up correspondence and face-to-face meetings offered where required, or where concerns are raised.

Section 5 Exploration Operations



Samples of rocks from drilling are bagged and sent for laboratory analysis of the minerals

Note: Properties with horses can be very sensitive to aerial vehicles. Each consultation, including the names of the participants, date, time and outcome of the consultation, should be documented.

- Negotiate appropriate management and mitigation measures. These may include providing assistance to relocate sensitive stock, principally horses, to areas that either will not be, or have already been, surveyed.
- Provide contact information to enable concerned residents to contact the mineral explorer, if required.
- Inform other relevant stakeholders of the survey, including local council, the police and relevant air traffic authorities (the contractor should be able to advise on this aspect).
- Place a public notice describing the survey and identifying the survey area in the local print media and provide contact details to enable members of the public to obtain further information.
- Prepare an *Airborne Geophysical Survey Management Plan*. This Plan needs to include:
 - A plan showing the proposed survey area, flight lines and land ownership
 - A list of contact numbers for each of the identified landholders and residents
 - A summary of the negotiated management and mitigation measures to be implemented and time frames for doing so

- Measures to be implemented to ensure that explorer personnel are aware of the proposed survey areas on a day-by-day basis that that commitments made to landholders are complied with, particularly in relation to notice.

Ensure compliance with the relevant civil aviation requirements and that the Plan adequately addresses the operational and safety-related aspects of the proposed survey.

- Ensure, through documented inspections and photographs, that the requirements of the *Airborne Geophysical Survey Management Plan* are being followed.

5.8 Drilling Operations

Drilling operations are typically the culmination of a long period of preparatory exploration and are often the most visible and high profile exploration activity undertaken. Drilling operations may include air core, percussion or diamond drilling methods (which are described in [Appendix 3 – Description of Exploration Activities](#)) and comprise a significant expenditure for mineral explorers. Good environmental and community management of drilling operations is critical to sound management and minimisation of financial risk. Copies of all relevant approvals of the drilling activity should be held at the drilling site.

Leading Practice

- For each drilling program, identify all drill targets and associated drill site locations. Inspect all drill site locations and, where practicable, adjust the location for the drill site taking into account:
 - Ecological sensitivities
 - Heritage items. See [Section 4.2](#) – in particular, explorers should ensure that the requirements of the document *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* are complied with.

Drilling operations are typically the culmination of a long period of preparatory exploration.

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- Native vegetation
- Agricultural activities
- Underground or overhead services
- Site access
- Slope of the land. Where practicable, drill sites should be located on flat to gently sloped land. This will permit the use of above-ground sumps. In cases where excavations are required, sites should be located on land with a slope of 10° (1:5 (V:H)) or less. Where land to be disturbed is sloped at greater than 18° , DRE should be contacted for advice and expert advice should also be sought in relation to the design of the excavation.
- Identify the requirements for the drilling program including:
 - The type of drilling (air core, percussion, diamond) and design of the drill hole (dip, azimuth, proposed depth) and the type and number of drill rigs and support vehicles.
 - Whether an excavated drill site or in-ground sumps will be required. If at all possible, these should be avoided.
 - Whether water will be required and where that water will be sourced.
- Whether groundwater is likely to be intersected, the volume and quality of that water and how that water is to be managed (temporally retained and discharged: collected and taken off site or, where appropriate, re-injected).
- The proposed hours of operation and days per week.
- Site access route, times, speeds, types and numbers of vehicles to be using the route.
- Discuss the proposed drilling program with landholders and other surrounding residents. Appropriate management measures to minimise the impact of the program on agricultural activities and the amenity of residents should be agreed upon and documented within the access agreement. In particular:
 - Ensure the access agreement and compensation covers the proposed activity.
 - Provide the landholder with information which describes the proposed activity, anticipated impacts and rehabilitation.
 - Provide contact details for site and overall project managers, including after hours contact details.
- Select appropriate drilling contractors (refer to [Section 2.4](#)). Note that drillers need a licence to drill holes that will be used as piezometers or will be retained by the landholder as production bores.
- When preparing drill sites, consideration needs to be given to:
 - The degree of vegetation clearing and/or excavation that is required. Where practicable, both clearing of vegetation and excavation of drill sites should be avoided. Where excavation is required, it should be undertaken in accordance with the leading practice requirements identified in [Section 5.4](#) of this Handbook.
 - Portable, above-ground, self-contained sumps should be used if possible, including for diamond drilling.
 - If in-ground sumps are required, they should be the minimum size likely to be required. Where practicable, long, thin sumps typically provide superior settling properties than more equi-dimensional sumps. In-ground sumps should be lined with an impermeable membrane such as

Portable, above-ground, self-contained sumps should be used if possible.

Section 5 Exploration Operations

plastic which should be removed at the end of the program. Failure to line the sumps or remove the plastic liner results in establishment of an impermeable zone in the walls and floor of the sump and a permanent area with poor drainage. This is generally contrary to licence conditions.

- In-ground sumps should be fenced with temporary fencing.
- Safe access for light and heavy vehicles, including high vehicles.
- Surface water flows and sediment and erosion control.
- Sufficient area should be provided for all operations and storage/parking of equipment, and supplies, processing of samples and parking of light vehicles.
- Ensure that where drill-holes are expected to intersect or make significant groundwater, the hole is constructed in accordance with *Minimum Construction Requirements for Water Bores in Australia* (National Uniform Drillers Licensing Committee, 2012 available at <http://adia.com.au/resources/waterwell-sector/water-bore-construction>) and consideration is given to whether the hole needs to be grouted in full or in part in accordance with the *Aquifer Interference Policy*
- Prepare a *Drilling Management Plan* that would typically be provided to all relevant personnel, including drillers, drill supervisors and field assistants, to ensure that critical information is available to all parties. A copy should be kept on site at all times. The *Drilling Management Plan* would include:
 - The proposed drill-hole location, design and style of drilling.
 - Access instructions including routes, times and speed limits.
 - Drilling instructions including hole size, planned hole deviation, survey intervals, etc.
 - Whether in-ground or above-ground sumps will be used.
 - Anticipated geology and groundwater, together with any required management measures.
 - Reporting structure, including mobile and after-hours contact details for primary and backup contacts.
 - Landholder information and contacts.
 - Hours of operation.
 - Collaring instructions: Appropriate permanent collars need to be installed in all drill holes to prevent collar collapse during or following completion of drilling operations.

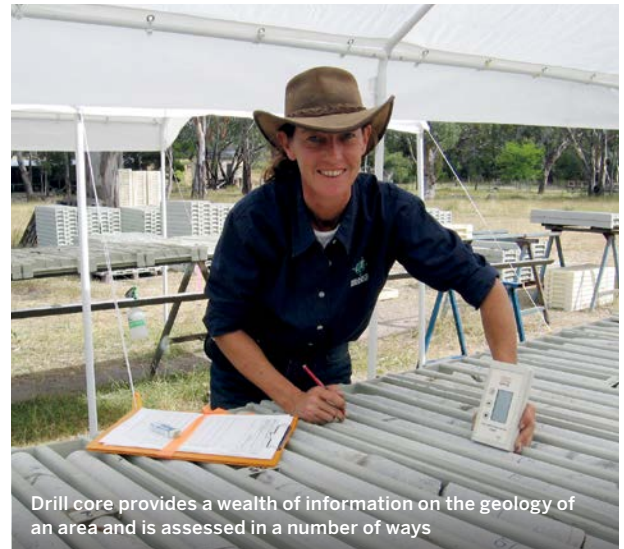


Careful analysis is undertaken by drill core

- Hole closure instructions: Where significant groundwater is intersected or groundwater is flowing from the drill-hole collar, this should include placement of a plug below the aquifer and sealing of the drill hole for the entire length of the aquifer. Where two aquifers are intersected, the drill hole needs to be sealed between the aquifers to prevent cross contamination of the aquifers. Sealing may be undertaken using cement grout or other suitable material such as bentonite. Where such plugs or grouting are placed, successful placement should be confirmed once sufficiently hardened by gently tapping the plug with the drill rods. Reference should be made to *Minimum Construction Requirements for Water Bores in Australia* (National Uniform Drillers Licensing Committee, 2012, available at <http://adia.com.au/resources/waterwell-sector/water-bore-construction>) when designing and implementing hole sealing operations.
- Hole capping instructions: All holes need to be temporarily capped prior to the drill rig leaving site. During rehabilitation, all collars need to be permanently capped as described below.
- Demobilisation instructions: All drilling and other equipment needs to be removed from site as soon as practicable once drilling activities are complete. If sample bags are to remain in place until assay results are available, they should be fenced, where necessary, and removed as soon as practicable, once those results have been received and reviewed. All in-ground drill sumps should be fenced pending rehabilitation.

Section 5 Exploration Operations

- Prepare a *Rehabilitation Plan* that would typically include:
 - Permanent capping and marking of all drill hole collars. This may be achieved through the use of PVC caps of the appropriate size or concrete plugs. Where re-entry of the drill hole may potentially occur, the collar should be marked with a metal plate or similar object that can be detected using a metal detector. The depth of the cap needs to be a minimum of 300mm below ground surface and will depend on the land use of the area. There should be no surface expression of the collar following completion of rehabilitation.
 - Accurate surveying of the collar location.
 - Backfilling of in-ground sumps. While leading practice is to use above ground sumps, with suitable management and disposal of drilling fluids and cuttings, in ground sumps are still commonly used. Where in-ground sumps are to be rehabilitated, drill cuttings and associated drilling fluid should be removed from site using a vacuum truck and transported to an appropriate disposal location. Alternatively, drill cuttings may, with landholder approval, be allowed to dry out and be encapsulated within the drill sumps. If this management method is used, mineral explorers need to satisfy themselves that the drill cuttings are not classified as 'waste' under the NSW *Waste Classification Guidelines* (OEH <http://www.environment.nsw.gov.au/waste/envguidlns/index.htm>). Where encapsulation is proposed, the drill cuttings should spread evenly across the base of the drill sump and should not be too thick. Where the cuttings are too thick, there is the potential for them to be remobilised to the surface under pressure as a paste following completion of rehabilitation operations. Cuttings must be buried below root depth.
 - Backfilling operations should be undertaken in accordance with leading practice identified in [Section 5.4](#) of this Handbook.
 - The entire drill site should be revegetated, if required, in accordance with the requirements of the landholder. Where appropriate, the drill site should be fenced until the vegetation is established.
- Ensure that the requirements of the *Drilling Management Plan* are being followed. Evidence should be recorded through documented inspections and photographs. [Appendix 6 – Forms and Checklists](#) presents a proforma drilling inspection sheet that may be used and modified to suit the needs of individual mineral explorers. Inspections should be undertaken by the drilling



Drill core provides a wealth of information on the geology of an area and is assessed in a number of ways

contractor and by the mineral explorer daily, with more detailed inspections undertaken weekly.

- Maintain regular and appropriate communication with the drill crew, drill supervisor, landholder/s and surrounding stakeholders to address any issues as they arise.
- Implement the rehabilitation procedures in the *Rehabilitation and Monitoring Plan* and record activities for all holes drilled.
- Following completion of rehabilitation and re-establishment of vegetation, obtain landholder/s sign-off that they are satisfied with the rehabilitation of all drill sites.
- Promptly pay compensation to the landholder/s, as appropriate.

5.9 Camp Construction, Use and Decommissioning

In remote areas or in areas with limited facilities, temporary camps may be required to support the exploration activities. These may vary from a simple swag or tent camp for a few people for a few days during reconnaissance exploration to a fixed camp supporting a 24-hour drilling operation with a larger number of residents and increased infrastructure.

Section 5 Exploration Operations



Leading Practice

- Determine whether suitable accommodation or other facilities exist within the vicinity of the proposed exploration area. These may include motels or similar in local towns, shearing sheds or empty houses on surrounding properties. Where practicable, these facilities should be used rather than establishing a camp.
- If suitable facilities are not available, determine the style of camp and facilities required and the likely number of people to be accommodated. Facilities may include:
 - Accommodation (tents or demountable buildings/caravans).
 - Communal or other structures (kitchens, dining/recreational areas, office area).
 - Camp support facilities (water and food storage, showers and toilet facilities, waste water management, power generation and entertainment).
 - Exploration support facilities (fuel, consumables and spares storage, and core logging and cutting facilities).
 - Equipment parking and storage.
 - Emergency response procedures and facilities (medical supplies and patient transport facilities).
 - Communications (landline, mobile or satellite phones), both verbal and data. Care should be taken that community needs are not adversely impacted.
- Based on the above, determine the area required for the camp and in consultation with the landholder/s identify a suitable location. In determining an appropriate location, the following needs to be taken into account:
 - The regulatory requirements.
 - Proximity to existing access tracks and ease of location of the camp for emergency services or people not familiar with the exploration area.
 - Surrounding vegetation.
 - Distance to surrounding residences.
- Prepare and implement a *Camp Management Plan*. The contents of such a *Plan* will vary depending on the location, number of people to be accommodated and style of camp. However, such a *Plan* may include:
 - Plan showing access to the camp from the closest main road or town.
 - Plan showing the layout of the camp.
 - Procedures for managing hygiene within the camp including waste management (food, solid waste and waste water), pest control and fauna savaging.
 - Procedures for minimising the risk of fire and other emergencies and managing such emergencies should they arise.
 - Procedures for ensuring communication with emergency services and others, individuals who may be working away from the camp and personal communications.
 - Procedures for the collection of firewood and lighting of fires, including the requirement for landholder consent for such activities.
 - Procedures for ensuring the security of the camp and its occupants.

Evidence should be recorded through documented inspections and photographs.

Section 5 Exploration Operations

- Regularly review the *Camp Management Plan* to ensure that it adequately addresses the relevant WHS and environmental issues.
- Ensure that the requirements of the *Camp Management Plan* are being followed. Evidence should be recorded through documented inspections and photographs. Ensure that any departures from the Plan are either rectified or that the Plan is amended to reflect the new circumstances.
- Remove all equipment, rubbish and other materials once no longer required.
- Rehabilitate the camp site once no longer required. This may include scarifying the areas of disturbance and revegetating the site.
- Undertake and document inspections and photographs to ensure compliance with the above plans.
- Promptly pay compensation to the landholder/s, as required.

5.10 Rehabilitation

Appropriate rehabilitation of all areas disturbed during exploration is a conditional requirement of every exploration licence and is critical to ensure ongoing access to land. Rehabilitation operations need to be undertaken progressively and carried out as soon as practicable on completion of the exploration activity. The objective of rehabilitation is to return the disturbed area to the agreed land use capability that is safe, stable and non-polluting. Rehabilitation represents an opportunity to exceed landholders' expectations and all rehabilitation must also be to the satisfaction of DRE.

Leading Practice

- Identify, in consultation with the landholder, relevant final land use, rehabilitation objectives and completion criteria, including the required final landform, taking into account the regulatory requirements.
- Prepare and progressively implement an appropriate *Rehabilitation Management Plan*. This plan needs to be consistent with the *Vegetation Management Plan*, *Soil Management Plan* and the *Sediment and Erosion Control Plan* described previously. *Mine Rehabilitation: Leading Practice Sustainable Development Program for the Mining Industry* (Commonwealth Department of Industry, Tourism and Resources, October 2006) available at http://www.ret.gov.au/resources/resources_programs/lpsdpmine/handbooks/Pages/default.aspx is an excellent reference when preparing this Plan. Matters that may be appropriate to include in the *Rehabilitation Management Plan* are:
 - For the rehabilitation objectives and outcomes, determine the appropriate success criteria that will need to be achieved prior to rehabilitation being considered successful and complete.
 - Consult with the landholder/s on proposed rehabilitation objectives and outcomes including revegetation preferences.
 - Remove all equipment, samples, rubbish and any other exploration-related items as soon as exploration activities are completed. If sample bags are to remain in place until assay results are available, they should be fenced where appropriate, and removed as soon as practicable, once those results have been received and reviewed. Rehabilitation is not considered complete until sample bags are removed and the disturbed area rehabilitated.

Rehabilitation operations need to be undertaken progressively and carried out as soon as practicable on completion of the exploration activity.

Section 5 Exploration Operations

- Undertake rehabilitation operations as soon as practicable once the disturbed area is no longer required for exploration activities and climatic conditions are suitable. During an extended exploration program, rehabilitation operations should be undertaken progressively.
- Unless requested by the landholder and approved by DRE, remove any imported gravel or sheeting material for re-use during subsequent exploration activities or for use elsewhere.
- Backfill any excavations using spoil material, followed by subsoil then topsoil. The final landform should mimic the pre-exploration landform and should be safe, stable and non-polluting.
- Install or maintain, where appropriate, surface water control structures to minimise the potential for erosion and sedimentation. These structures may either be permanent or temporary.
- Where the final landform is to be rehabilitated to native vegetation, determine the appropriate species mix and revegetation procedures. Species should be endemic to the exploration site and should not be invasive.
- Revegetation procedures may include:
 - Natural revegetation (allowing an area to revegetate from seed and propagules within the soil)
 - Direct seeding (spreading of seed of the appropriate species mix, generally mixed with sand)
 - Brush matting (selective removal of seed-bearing limbs from vegetation adjacent to the disturbed sites and placement of the limbs over the disturbance) and/or
 - Planting of tube stock.

Where direct seeding or tube stock are to be employed, ensure that the seed used during revegetation operations has been sourced locally to maximise the potential for successful revegetation. Fertilizers and soil conditioners may be required, however, advice should be sought prior to their use.

- Where the final landform is to be rehabilitated to agricultural or a specific land use, determine the most appropriate revegetation procedures with the landholder/s.
- Typically, temporary fencing topped with barbed wire may be required until the vegetation is successfully established. Alternatively, electrical fencing may be appropriate.
- Unless requested by the landholder, deep rip tracks and revegetate as described above.
- Undertake regular monitoring of rehabilitated areas until the rehabilitation success criteria are achieved. This monitoring should include a photographic record taken from a fixed photo location and similar time of day and in the same direction each day.
- Where rehabilitation success appears to be limited, implement additional rehabilitation. This may include application of additional topsoil, repeating of revegetation operations, remediation of surface water control structures or implementation of a weed control program.
- Once the rehabilitation criteria have been achieved, remove the fence and obtain written agreement from the landholder/s that the rehabilitation is of an acceptable standard.
- Undertake an assessment of the success of the rehabilitation operations against the rehabilitation objectives and criteria that were identified prior to exploration. Where required, implement ameliorative actions to ensure that the relevant criteria are achieved.
- Prepare a report for DRE on the rehabilitation undertaken during the reporting period. The report will be required for annual reporting to DRE and for the final relinquishment report.

Appendices

Appendix 1 Directory of Websites and Information Sources

Relevant Government Agencies

NSW Trade & Investment – Division of Resources and Energy (DRE)

<http://www.resources.nsw.gov.au>

- Safety
 - Advice in relation to management of safety aspects of exploration operations, appointment of operators, contractor management and Mines Health and Safety Plans
- Environment
 - Policies, guidelines and forms
 - Advice re approvals, permissible activities and contacts within other agencies
- Geological survey – including
 - DIGS (online exploration report database)
 - EROL (Exploration-Environmental Reports Online Lodgement)
 - Minview (online interactive database including historic and current exploration data)
 - GDW – Geoscientific Data Warehouse (Pilot)
 - GPC – Geoscience Product Catalogue
- Land consultation information including the template Land Access Agreement.

NSW Office of Water (NOW)

<http://www.water.nsw.gov.au>

- Water Licencing
- Application forms.

Office of Environment and Heritage (OEH)

<http://www.environment.nsw.gov.au>

- Threatened species information and searches
- Management and information in relation to Aboriginal heritage
- Aboriginal Heritage Information Management System (AHIMS)
- Waste classification
- Noise.

Roads and Maritime Service (RMS)

<http://www.rms.nsw.gov.au>

- Road conditions and traffic safety information
- Approval to work in road corridors
- Contact information.

Local Councils

http://www.dlg.nsw.gov.au/dlg/dlghome/dlg_regions.asp

- Searchable map with contact details for all NSW Councils
- Individual Council Web pages
- Community contacts
- Road conditions.

Department of Planning and Infrastructure (DP&I)

<http://www.planning.nsw.gov.au>

- Description of the NSW development assessment system
- Register of approvals for Major Projects and State Significant Development
- Information on the Strategic Regional land use Policy.

Department of Primary Industries

- Agriculture – <http://www.dpi.nsw.gov.au/agriculture>
 - Advice re agricultural operations and information
 - Local Land Services – incorporating
 - Livestock Pest and Health Authorities (manage travelling stock reserves)
 - Agronomists
 - Provide advice on Agricultural Impact Statements and assessments
- Catchments and Lands – <http://www.dpi.nsw.gov.au/lands>
 - Catchment Management Authorities (manage native vegetation on non-reserve land)
 - Soil conservation service (Advice re soil management and rehabilitation)
- Fisheries – <http://www.dpi.nsw.gov.au/fisheries>
 - Advice in relation to threatened fish species, including freshwater species

Appendix 1 Directory of Websites and Information Sources

Forestry Corporation NSW

<http://www.forestrycorporation.com.au>

- Management of State Forests, including access agreements.

Land and Property Information

www.lpi.nsw.gov.au

- Land titles and land ownership searches
- Maps and imagery.

Crown Lands

<http://www.crownland.nsw.gov.au>

- Management of Crown land, including landholder access agreements for crown land and crown roads.

NSW Rural Fire Service

<http://www.bushfire.nsw.gov.au>

- Fire danger maps and bushfire updates.

Commonwealth Department of Sustainability, Environment, Water, Population and Communities

<http://www.environment.gov.au>

- Matters of National Environmental Significance
- Commonwealth protected matters database.

Environmental Information and Background

Legislation, Regulations and Environmental and Planning Policies

<http://www.legislation.nsw.gov.au/maintop/scanact/inforce/NONE/0>

<http://www.comlaw.gov.au/Browse/ByTitle/LegislativeInstruments/Current>

Land Titles Information

http://www.lpi.nsw.gov.au/land_titles

Aerial Photography, Satellite Imagery and Other Maps

http://www.lpi.nsw.gov.au/mapping_and_imagery

<http://maps.six.nsw.gov.au>

Google Earth and Google Maps

<http://www.nearmap.com> (particularly for urban and semi-urban areas and for historical images).

Meteorology and Climate

<http://www.bom.gov.au>

- Weather predictions, radar and satellite images, monthly average climate data.

<http://www.weatherzone.com.au>

<http://www.eldersweather.com.au>

Buried Infrastructure

<http://www.1100.com.au>

- Dial before you dig.

Aboriginal Culture and Heritage

<http://www.environment.nsw.gov.au/licences/AboriginalHeritageInformationManagementSystem.htm>

- Online database of recorded Aboriginal heritage items within a specified area.

<http://www.environment.nsw.gov.au/conservation/AboriginalPlacesNSW.htm>

- List of declared Aboriginal places in NSW.

<http://www.nntt.gov.au/Pages/default.aspx>

- National Native Title Tribunal website, includes a comprehensive range of Native Title-related information.

Non-Aboriginal (Historic) Heritage

http://www.heritage.nsw.gov.au/07_subnav_01.cfm

- List of identified non-Aboriginal heritage items from the NSW heritage database from within a specified area

<http://www.legislation.nsw.gov.au/maintop/scanact/inforce/NONE/0>

- Provides access to Local Environment Plans which (depending on the local government area) may list local heritage items

<http://www.environment.gov.au/heritage/ahdb/>

- List of identified heritage items from the Commonwealth heritage database from within a specified area.

Appendix 1 Directory of Websites and Information Sources

Threatened Species

<http://www.bionet.nsw.gov.au>

- List of identified *Threatened Species Conservation Act 1995* threatened species likely to occur or observed within a specified area

<http://www.dpi.nsw.gov.au/fisheries/species-protection/records/viewer>

- Location of identified *Fisheries Management Act 1994* threatened species likely to occur or observed within a specified area

<http://www.environment.nsw.gov.au/threatenedspecies>

- Information in relation to listed threatened species
<http://www.environment.gov.au/erin/ert/epbc/index.html>
- List of matters of national environmental significance within a pre-determined or user defined search area.

Existing Land Uses and Agriculture

<http://www.dpi.nsw.gov.au/agriculture>

- General information on agriculture in NSW

http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/189697/ag-land-classification.pdf

- Agricultural land classification

<http://www.abs.gov.au/websitedbs/c311215.nsf/web/Agriculture>

- Agricultural statistics and general information

<http://www.planning.nsw.gov.au/LinkClick.aspx?fileticket=-kV1I07NkDY%3d&tabid=495&language=en-US>

<http://www.planning.nsw.gov.au/LinkClick.aspx?fileticket=6Bqi-scXZJk%3d&tabid=495&language=en-US>

- Strategic Regional Land Use Plans for the Upper Hunter and New England Regions. Contains significant background information on agriculture within those regions.

Soil and Water

<http://www.nratlas.nsw.gov.au/wmc/custom/homepage/home.html>

- Online soil, vegetation, surface water, groundwater and basic geology database

<http://www.water.nsw.gov.au/Water-management/Water-sharing-plans/Water-sharing>

- Information on water sharing plans.

Air Quality

<http://www.epa.nsw.gov.au/air/aqt.htm>

- Information on management of air quality prepared by the EPA

<http://www.environment.nsw.gov.au/aqms/sitesrural.htm>

- EPA-operated air quality monitoring stations.

Guidelines, Policies and Other Information

General

Commonwealth Department of Resources, Energy and Tourism. *Leading Practice in the Australian Mining Industry* (15 handbooks on various topics, including exploration).

NSW Minerals Council (NSWMC)

<http://www.nswmining.com.au>

<http://www.worldclassminers.com.au>

<http://landusefacts.com.au>

NSW Farmers

<http://www.nswfarmers.org.au>

Aboriginal Consultation, Culture and Heritage

Department of Environment and Climate Change (2010) *Aboriginal Cultural Heritage Community Consultation Requirements for Proponents (April 2010)*

National Parks and Wildlife Service (1997) *Aboriginal Cultural Heritage Standards and Guidelines Kit*

NSW Minerals Council (2010) *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects*

National Native Title Tribunal *ILUA or the right to negotiate process? a comparison for mineral tenement applications* – the National Native Title Tribunal web site also includes a comprehensive range of information brochures and guidelines on a range of native title-related matters.

Flora, Fauna, Threatened Species and Endangered Ecological Communities

Department of the Environment, Water, Heritage and the Arts (2006) *EPBC Act Policy Statement 1.1 Significant Impact Guidelines – Matters of National Environmental Significance*

Appendix 1 Directory of Websites and Information Sources

Department of Environment and Climate Change (2007) [Threatened species assessment guidelines: the assessment of significance](#)

Department of Environment and Conservation (2004) [Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft](#)

Department of Water and Energy (2008) [Guidelines for controlled activities: Riparian corridors](#)

Department of Water and Energy (2008) [Guidelines for controlled activities: Watercourse crossings](#)

Department of Primary Industries (2004) [Policy and Guidelines for Fish Friendly Waterway Crossings](#)

Department of Primary Industries (2003) [Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterways Crossings](#)

Existing Land Uses and Agriculture

Division of Resources and Energy (2012) [Strategic Regional Land Use Policy Guideline for Agricultural Impact Statements at the Exploration Stage](#)

Air Quality

Office of Environment and Heritage (2011) [NSW Coal Mining Benchmarking Study: International Best Practice Measures to Prevent and/or Minimise Emissions of Particulate Matter from Coal Mining](#)

Department of Energy Resources and Tourism (2009) [Leading Practice Sustainable Development Program for the Mining Industry: Airborne Contaminants, Noise and Vibration](#)

Department of Environment and Conservation (2007) [Approved Methods for the Sampling and Analysis of Air Pollutants in NSW](#)

Department of Environment and Conservation (2005) [Approved Methods for the Modelling and Assessment of Air Pollutants in NSW](#)

Department of Environment and Climate Change (2007) [Local government air quality toolkit](#)

Soil and Water

Department of Environment and Conservation (2006) [a resource guide for local councils: Erosion and Sediment Control](#)

Landcom (2004) [the Blue Book – Managing Urban Stormwater: Soils and Construction – Volume 1 – available for purchase from EPA](#)

Department of Environment and Climate Change (2008) [Managing Urban Storm Water – Volume 2C – Unsealed Roads](#)

Department of Environment and Climate Change (2008) [Managing Urban Storm Water – Volume 2E – Mines and Quarries](#)

Hulme T., Grosskopf T. & Hindle J. (2002) [Agfact AC25: Agricultural Land Classification](#)

Department of Environment and Conservation (2004) [Approved Methods for the Sampling and Analysis of Water Pollutants in NSW](#)

Geoscience Australia (2009) [Groundwater Sampling and Analysis – a Field Guide](#)

National Uniform Drillers Licensing Committee (2011) [Minimum Construction Requirements for Water Bores In Australia](#)

Australia and New Zealand Environment and Conservation Council (ANZECC) (2000). [ANZECC Fresh and Marine Water Quality Guidelines](#).

Bushfire Management

NSW Rural Fire Service (2006) Planning for Bush Fire Protection

Community Consultation

NSW Minerals Council (2006) [Community Engagement Handbook](#)

Department of Planning (2007) [Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects](#)

Department of Energy Resources and Tourism (2009) [Leading Practice Sustainable Development Program for the Mining Industry: Community Engagement and Development](#)

Noise Management

Department of Energy Resources and Tourism (2009) [Leading Practice Sustainable Development Program for the Mining Industry: Airborne Contaminants, Noise and Vibration](#)

Department of Environment and Climate Change (2007) [Noise Guide for Local Government](#)

Department of Environment, Climate Change and Water (2009) [Interim Construction Noise Guideline](#)

Environment Protection Authority (2000) [NSW Industrial Noise Policy](#)

Waste Management

Department of Environment and Climate Change (2008) [Waste classification guidelines](#) Appendix 2 – Glossary of Terms, Abbreviations and Acronyms

Appendix 2 Glossary of Terms, Abbreviations and Acronyms

Glossary of Terms

Aboriginal Heritage Impact Permit – a permit issued by the Director-General of office of Environment and Heritage (or their delegate) allowing a person to desecrate or harm an Aboriginal place or objects.

Aboriginal object – deposit, object or material evidence relating to the Aboriginal habitation of an area, including Aboriginal remains.

Aboriginal place – a place declared under Section 84 of the NPW Act that, in the opinion of the Minister, is or was of special significance with respect to Aboriginal culture.

aerial photograph – a photograph of the landscape taken from an aeroplane (typically covering several kilometres across) used for the surveying and interpretation of vegetation type, geology and land use.

aerial survey – survey of a landscape from an aeroplane or helicopter to determine specific parameters, particularly geophysical parameters.

air pollutant – a substance in ambient atmosphere, resulting from the activity of humans or from natural processes causing adverse effects to humans and/or the environment (also called 'air contaminant').

alluvial – pertaining to material, such as sand or silt, deposited by running water (eg. A creek or river).

amphibian – animals (such as frogs) adapted to live both on land and in water.

aquifer – rock or sediment capable of holding and transmitting groundwater; a layer of water-bearing material that is permeable and can transmit significant quantities of water.

archaeology – the scientific study of human history, particularly the relics and cultural remains of the distant past.

artefact – anything made by human workmanship, particularly by previous cultures (such as chipped and modified stones used as tools).

background noise level – the level of the ambient sound recorded on a sound level meter in the absence of the sound under investigation (eg. sound levels in the absence of drill rig operations).

baseline monitoring – monitoring performed prior to site development.

bentonite – clay mineral that swells when it absorbs water and becomes impermeable. Used in drilling applications.

bund – embankment of clay or weathered rock emplaced for visual or acoustic screening.

carved tree – a culturally significant tree that has been carved by Aboriginal people, usually denoting a burial or ceremonial ground.

catch drain – drain used to intercept and redirect runoff.

catchment area – the area determined by topographic features within which rainfall will contribute to run-off at a particular point.

concentration – the amount of a substance, expressed as mass or volume, in a unit volume of air, water or rock.

conductivity – the measurement of the ability of a substance (either a measure of solid, liquid or gas) to transmit electricity; a measure of the salt content.

conservation – the management of resources in a way that will benefit both present and future generations.

contour bank – an earth bank constructed across a slope parallel to contours.

contractor – specialist brought in to perform a specific task, such as drilling operations or geophysical surveys.

costean – trench dug with a backhoe, 'Ditch Witch' or similar equipment and used in geochemical surveys.

cross-section – a two-dimensional representation of an area presented as if the area had been cut perpendicular to its length.

decibel – unit expressing difference in power between acoustic signals.

density – the mass of a substance (eg. sediment) divided by its volume (water has a density of exactly 1kg/L); the coverage of vegetation (eg. trees) per unit of distance (along a linear transect) or unit of area (in an area transect).

dispersibility – a characteristic of soils relating to their structural breakdown in water into individual particles.

Ditch Witch – proprietary trench excavation equipment; motorised equipment using a continuous chain/blades to excavate a narrow trench.

diversion bank – an earth bank constructed to divert water away from disturbed areas.

drainage line – a passage along which water concentrates and flows towards a stream, drainage plain or swamp intermittently during or following rain.

Appendix 2 Glossary of Terms, Abbreviations and Acronyms

drilling – the action of boring holes (usually less than 30cm in diameter and typically between 50m and several hundred metres deep) into the ground, typically to investigate the geology found at depth ([Appendix 3](#)).

drill rig – equipment used for drilling bore holes ([Appendix 3](#)).

dust – particles generated by erosion of surfaces and the disturbance and handling of materials.

dust concentration – the amount of dust, expressed as mass or volume, in a unit volume of air.

electrical conductivity (EC) – the ability of a substance (either solid, liquid or gas) to transmit electricity, often used as a measure of salinity.

ecology – the relationship between living things and their environment.

ecologically sustainable development (ESD) – using, conserving and enhancing the community's resources so that ecological processes on which life depends are maintained and the total quality of life, now and in the future, can be increased.

ecosystem – the totality of biological processes and interactions within a specified physical environment.

emission – a discharge of a substance (eg. dust) into the environment.

endemic – belonging to, or found naturally in, a particular environment (see also exotic).

environment – a general term for all the conditions (physical, chemical, biological and social) in which an organism or group of organisms (including human beings) exists.

environmental constraint – limitation on a project by components of the existing environment.

environmental policy – statement by an organisation of its intentions and principles in relation to the overall environmental performance, that provides a framework for action and for the setting of its environmental objectives and targets.

ephemeral – not permanent, eg. A stream that flows only seasonally or after rainfall or a lake that periodically dries out.

erodibility – the tendency of soil, earth or rock to erode.

erosion – the wearing away of the land surface (whether natural or artificial) by the action of water, wind and ice.

erosion potential – the susceptibility of a parcel of land to the prevailing agents of erosion. It is dependent on a combination of climate, landform, soil, land use and land management factors.

excavate – to dig into natural material or fill using an excavator or other machinery.

existing air quality – the quality of the ambient air near ground level, expressed as concentrations or deposition rates or air pollutants (also expressed as 'ambient air quality').

exotic – introduced or foreign; not native.

exploration licence – mineral authority that allows exploration or prospecting over a defined area.

fauna – a general term for animals (including birds, reptiles, marsupials, fish).

fill – material imported (either from elsewhere on-site or off-site) and emplaced to raise the general surface level of a site.

geochemistry – the study of the chemical properties of rocks. In the mineral exploration determination of the chemistry of the rocks may assist to identify mineralisation.

geology – the science comprising the study of the earth and the solid materials from which it is composed.

geophysics – the study of the physical properties of a mass of rock through direct (ie magnetic surveys measuring magnetic susceptibility) or indirect (ie an induced polarisation survey using an electric current to induce a magnetic field in the rocks) methods.

geotechnical – technical or engineering aspects relating to soil, rock and other materials.

gradient – rate of change of a given variable (such as temperature or elevation).

grassland – an extensive area of largely treeless land covered mainly by natural grasses.

ground vibration – oscillatory motion of the ground caused by the passage of seismic waves originating from a blast.

groundcover – vegetation that grows close to the ground (such as grasses and herbs) providing protection from erosion.

groundwater – all waters occurring below the land surface. The upper surface of the soils saturated by groundwater in any particular area is called the water table.

habitat – the place where an organism normally lives. Habitats can be described by their floristic and physical characteristics.

Appendix 2 Glossary of Terms, Abbreviations and Acronyms

hazard – any source of potential damage, harm or adverse health effects on something or someone under certain conditions at work.

heavy metal – elements such as lead, mercury, cadmium and chromium that typically originate from mined ore. These elements are toxic to animals and are environmentally hazardous.

heritage – the collective environment, traditions and assets that we inherit from the past and preserve for the use and inspiration of future generations.

heritage significance – of aesthetic, historic, scientific, cultural, social, archaeological, natural or aesthetic value for past, present or future generations.

hydrogeology (geohydrology) – the study of groundwater and the related geologic aspects of surface waters.

igneous – a rock or mineral that solidified from molten or partly molten material.

impact – the effect of human induced action on the environment.

in-situ – a term used to distinguish material (such as rocks, minerals and fossils) found in its original position of formation, deposition or growth, as opposed to transported material.

infiltration – the process of surface water soaking into the soil.

inflow – flow directed into a particular feature, such as a lake, mine or pit.

infrastructure – the supporting installations and services that supply the needs of a project or community (eg. road or rail).

Inversion – the boundary between two layers of air of different temperatures; generally used in meteorology with respect to an increase of temperature with height in contrast with the usual decrease of temperature with height in the troposphere. An inversion layer is distinguished by its large stability, which limits the turbulence and therefore the dispersion of pollutants and enhances the prorogation of noise over long distances.

invertebrate – commonly animals without a backbone (such as jellyfish, worms and molluscs).

jointing – planes of discontinuity in a rockmass that exhibit no evidence of relative movement.

landform – a specific feature of a landscape (such as a hill) or the general shape of the land.

landholder – the owner of freehold land or lessee of such land; the holder of a lease under the *Crown Lands Act 1989* or the *Western Lands Act 1901* or controlling body of the land (note extended definition in the *Mining Act 1992*).

loam – loose soil composed of clay and sand, especially a kind containing organic matter and of great fertility.

long-term – a period of time often associated with annual air quality standards. Long-term models usually address pollutant concentrations over several seasons to one year.

mammal – animal of the class mammalia, distinguished by the presence of hair and mammary glands.

management strategy – a policy or direction that assists in actions required to address issues.

material harm to the environment – harm or potential harm to the environment is not trivial or results in actual or potential loss or property damage of more than \$10,000.

migratory animal – an animal that passes, usually predictably, from one region or climate to another, for purposes of feeding, breeding, or other biological purposes.

mobile equipment – wheeled or tracked self-propelled equipment such as trucks and front-end loaders.

monitoring – systematic sampling and, if appropriate, sample analysis to record changes in particular aspects of the environment over time caused by impacts such as mining or exploration; the regular measurement of components of the environment to understand a feature of the environment and/or establish that environmental standards are being met.

native – an organism or group of organisms that originate from a particular region or environment; a local inhabitant of a place.

natural – existing in, or formed by, nature (generally excludes anything obviously modified by humans).

noxious weed – introduced species considered to be harmful to endemic species or to the habitat of endemic species.

nutrient – generally refers to nitrogen and phosphorus, which are essential for biological growth.

particulate matter – small particles suspended in or falling through the atmosphere (also expressed as 'particulates').

perennial – stream that has flow throughout the year; plant that lives for more than two growing seasons.

Appendix 2 Glossary of Terms, Abbreviations and Acronyms

porosity – a material property relating to the ability of the material to store water.

permeability – a material property relating to the ability of the material to transmit water.

pervious – permeability.

pH – a measure of the degree of acidity or alkalinity of a solution, expressed numerically (logarithmically) on a scale of 1 to 14, on which 1 is most acidic, 7 is neutral acid, and 14 is most basic (alkaline).

piezometer – a bore drilled specifically for the monitoring of groundwater levels and water quality.

pollution – the introduction into the environment of any matter, whether solid, liquid or gaseous, so that the physical, chemical or biological condition of the environment is changed.

population – a group of organisms all of the same species occupying a particular area.

potable water – water suitable for human consumption.

progressive rehabilitation – rehabilitation of mine or disturbed areas as soon as practicable after they are released during the life of the mine or after the final landform is achieved.

quantify – to determine the quantity or amount of a component in a substance.

recharge – the addition of water to an aquifer, which may be directly from the surface, indirectly from the unsaturated zone, or by discharge from overlying or underlying aquifer systems.

rehabilitation – the preparation of a final landform after mining and its stabilisation with grasses, trees and shrubs. In exploration, rehabilitation means restoring disturbed land so that it can be used for the same or some other purpose after exploration has finished.

relief – the variation in landscape elevation over a region.

remnant woodland – native woodland remaining after widespread clearing has taken place.

revegetation – replacement of vegetation, often grasses and legumes, on areas disturbed by mining activities.

riparian – pertaining to a river or stream bank.

ripping – Use of tynes attached to a piece of mobile plant equipment to break up hard or crusted land surfaces.

risk – the chance or probability of an event with adverse impacts occurring.

run-off – that portion of the rainfall falling on a catchment area that flows from the catchment past a specified point.

saline – water or soil with high salt concentration.

salinity – the dissolved content of water expressed in terms of milligrams per litre.

scarred tree – tree with cuts in its bark or wood made by Aboriginal people.

sediment – material such as silt or sand that has been moved and deposited by water, ice or wind.

sediment basin – a small excavation designed to trap the coarse material washed from disturbed areas.

sediment fencing – fine mesh fencing normally installed downslope of a sediment source, designed to trap silt and sediment and allow the water to pass through.

sequence (geological) – layers of (predominantly) sedimentary rocks sourced from a common geological environment or period.

soil erosion hazard – the susceptibility of an area of land to erosion and includes rainfall erosivity, slope, soil erodibility and cover.

solubility – the ability of a substance (such as copper) to dissolve in a solvent (such as water). Solubility depends on such factors as temperature and pH.

species – a taxonomic grouping of organisms that are able to interbreed with each other but not with members of other species.

species diversity – a measure of the number of different species in a given area.

stakeholder – person, group, organisation or company with an interest in an activity or outcome.

storage capacity – the maximum volume of liquid able to be retained in a container (eg. A reservoir or lake).

stormwater – surface water run-off immediately after rainfall.

stratigraphy – the succession and age of strata of rock and unconsolidated material. Also concerns the form, distribution and lithologic composition of the strata.

stripping – removal of vegetation and topsoil.

structure (soil) – the physical texture of the soil arising from the interrelationship between the grain size, composition and organic nature of a soil.

subsoil – the layer of soil lying below the topsoil – usually contains less organic matter and is less fertile.

Appendix 2 Glossary of Terms, Abbreviations and Acronyms

sump – storage location for fluids commonly required in drilling. Usually in a hole dug for the purpose but may be an above ground device in sensitive area.

surface water – all water flowing over or contained on a landscape (eg. run-off, streams, lakes).

suspended solids – analytical term applicable to water samples referring to material recoverable from the sample by filtration.

sustainable development – development that meets the needs of the present without compromising the ability of future generations to meet their needs (*World Commission on Environment and Development* (1990)).

temperature inversion – an atmospheric state where there is an increase in air temperature with height.

terrestrial – of or relating to the land, as distinct from air or water.

texture (of soil) – variations in composition, grain size distribution and structure.

threatened species – a species of plant or animal that is listed by State or Commonwealth government as threatened with extinction.

topography – the physical relief and contour of a region.

topsoil – the surface or upper layer of soil, usually containing more organic material, viable life forms, seeds and nutrients than the subsoil beneath it.

total suspended particulates – the mass of all particulate matter (dust) suspended in air.

total suspended solids – a common measure used to determine suspended solids concentrations in a waterbody and expressed in terms of mass per unit of volume (eg. milligrams per litre).

tributary – a stream or river that flows into a larger river or lake.

vegetation community – a combination of plants that are dependant on their environment and that influence one another and modify their own environment. They form, together with their common habitat and other associated organisms, an ecosystem, which is also related to neighbouring ecosystems and to the macroclimate of the region.

waterland – has the same meaning as in s198A of the *Fisheries Management Act 1994*.

waste – has the same meaning as in the *Protection of the Environment Operations Act 1997*.

weathered rock – rock affected to any degree by the processes of chemical or physical weathering.

weed – any plant (in particular an herbaceous one) that survives in an area where it is harmful or troublesome to the desired land use.

wildlife – non-domesticated fauna.

wildlife corridor – a strip of vegetation that has a design purpose of allowing animals to pass from one area to another and acting as an undisturbed area for wildlife preservation.

wind direction – the direction from which the wind, averaged over a certain period of time, is blowing.

wind erosion – wearing away of exposed soil, earth, or rock surfaces by the abrasive action of wind-blown particles (eg. grains of sand).

wind rose – diagrammatic representation of wind direction, strength, and frequency of occurrence over a specified period.

woodland – plant communities dominated by trees whose crowns shade less than 30% of the ground.

yield – (of a water bore) the capacity of the bore to produce water; the amount of water actually withdrawn.

Appendix 2 Glossary of Terms, Abbreviations and Acronyms

Glossary of Abbreviations and acronyms

AC	Aircore drilling (Appendix 3)	NT Act	<i>Native Title Act (1993) (Cth)</i>
AHIMS	Australian Heritage Information Management System	OEH	office of Environment and Heritage
AIS	Agricultural Impact Statement	OHS	Occupational health and safety (now termed 'work health and safety')
AS(/NZS)	Australian Standard (and New Zealand Standard)	POEO Act	<i>Protection of the Environment Operations Act 1997</i>
ASX	Australian Securities Exchange	RAB	Rotary Air Blast (Appendix 3)
cm	Centimetres	RC	Reverse Circulation Drilling (Appendix 3)
Cth	Commonwealth	REF	<i>Review of Environmental Factors</i>
CMA	Catchment Management Authority	RMS	Roads and Maritime Service
dB(A)	decibels, A-weighted scale	RTA	Former Roads and Traffic Authority
DECCW	Former Department of Environment, Climate Change and Water (NSW)	SDN	Surface Disturbance Notice
DEWHA	Former Department of the Environment, Water, Heritage and the Arts (Cth)	SEPP	State Environmental Planning Policy
DP&I	Department of Planning and Infrastructure	SRLUP	Strategic Regional Land Use Plan/s
DoP	Former Department of Planning (NSW)	SCA	State Conservation Area
DPI	Department of Primary Industries	SIS	Species Impact Statement
DRE	NSW Trade & Investment – Division of Resources and Energy (DRE)	TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>
EA	<i>Environmental Assessment</i>	WHS	Work health and safety
EIS	<i>Environmental Impact Statement</i>		
EL	Exploration Licence		
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>		
EPA	Environment Protection Agency		
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>		
EPL	Environmental Protection Licence		
mg/L	Milligrams per litre		
ML	Mining Lease or Megalitre		
NOW	NSW office of Water		
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>		
NSW	New South Wales		
NSWMC	NSW Minerals Council		

Appendix 3 Description of Exploration Activities



The following fact sheets provide a description of a range of typical exploration activities. These descriptions are primarily provided for those who may not be familiar with exploration operations and are intended to be provided to landholders and stakeholders during consultation.

As a result, the descriptions are, by their nature, general. These fact sheets are available at www.nswmining.com.au.

The decision on which exploration activities form part of any exploration program will be dependent on a number of factors, including the mineral under investigation, the geology of the area and previous exploration.

1. Overview of Exploration Methods
2. Exploration Methods Explained: Geological Mapping and Geochemical Sampling
3. Exploration Methods Explained: Geophysical Surveys
4. Exploration Methods Explained: Drilling
5. Exploration Methods Explained: Costeaning
6. Exploration Methods Explained: Bulk sampling

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Overview of Exploration Methods

Mineral exploration is undertaken in stages, with each step dependent on the results of the previous stage. Drilling is undertaken only in advanced mineral exploration and the most common drilling method is very similar to water bore drilling. This fact sheet explains the different exploration methods and equipment, how exploration is regulated, the potential impacts and how these can be managed.

What is exploration?

Exploration is the process of searching for deposits of minerals in the ground. The information gathered during exploration is used to assess the size and quality of a mineral deposit and to determine whether there is the potential for it to be mined.

All exploration and mining activity in NSW must be conducted under an authority from the NSW Government. Exploration licences contain detailed conditions to protect the environment. A substantial security deposit must also be lodged with the Government to ensure explorers satisfy licence requirements and complete rehabilitation of areas disturbed during exploration.

Can an exploration licence holder undertake mining?

Exploration licences do not permit mining, nor do they guarantee that a mining lease will be granted. Exploration does not always lead to mining. Exploration licences simply allow the licence holder to explore for minerals. Even if a licence holder discovers a mineral deposit, it may not be economic to mine at that time.

If there is the potential for a mine to be developed, any mine proposal must undergo a rigorous assessment under the *Environmental Planning and Assessment Act 1979*. This assessment process involves a series of stages that normally takes several years. Each proposal must be considered on its merits and there is no guarantee that approval will be granted.

What does exploration involve?

Exploration is initially conducted over wide areas and becomes more focused where potential mineral resources are identified. Exploration can involve a range of techniques and is generally carried out in stages. Exploration can include:

- **Collation of geological information:** Before any activities are undertaken on the ground, previous geological data is collated and analysed. This includes data from annual reports which are submitted by prior explorers to the Government, data collected by the Government, and information from surrounding areas and areas with similar geology.
- **Negotiation of access:** Before exploring on private land, exploration licence holders must reach a land access agreement with the landholder. Landholders may not veto exploration on their land, but access arrangements must be negotiated and in place before exploration may commence. The negotiations regarding access arrangements and compensation are an important part of the consultative process undertaken by the explorer.

Further information for landholders at www.resources.nsw.gov.au/landholder-information

- **Reconnaissance investigations:** Initial work on the ground usually involves a visit by a geologist to look at rock outcrops and to map the geology. It may involve vehicle access to a property, taking and recording measurements and walking across the area. It may also involve gathering small samples from rock outcrops, soils or streams for chemical analysis. Reconnaissance exploration can also include airborne surveys by low flying helicopters or light aircraft fitted with instruments flying in a grid pattern.

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- **Follow-up Investigations:** The reconnaissance stage may identify areas requiring further investigation. This could involve surveying the area, taking additional small soil or rock samples for analysis, geophysics surveys using electronic instruments and more detailed airborne surveys. Generally these techniques have a low impact on the surface and only involve small areas of ground disturbance.
- **Detailed Investigations:** If an area of a potential mineral resource is discovered, the next stage of exploration usually involves drilling. Drilling is expensive, so the number of holes drilled to test an area of interest is kept to a minimum. The most common form of drilling is similar to water bore drilling. Explorers normally use truck-mounted drill rigs. This stage may also involve digging trenches or test pits to take a bulk sample. However, bulk sampling is not a regular occurrence (only two bulk samples were approved in NSW in 2011) and is generally only required as part of feasibility investigations for a mining proposal.



Regulation of Exploration

Exploration is regulated by the NSW Government. Every exploration licence has strict conditions including a range of environmental conditions. Additional Government approvals are required for surface disturbing activities. These approvals often need a full *Review of Environmental Factors* (REF) and *Agricultural Impact Statement* (AIS) which requires the applicant to assess the current environment in detail, justify the proposed activity and detail environmental mitigation and management methods. Bulk sampling usually requires an assessment process similar to that required for a proposed mine.



Rehabilitation of Exploration

Rehabilitation is a condition of every exploration licence and undertaken as soon as practical following surface disturbance. Planning for rehabilitation is undertaken prior to surface disturbance and in consultation with the landholder.

Further information

NSW Trade & Investment – Division of Resources and Energy www.resources.nsw.gov.au

NSW Minerals Industry Exploration Handbook www.nswmining.com.au/menu/media/publications

For additional Exploration Fact Sheets, see www.nswmining.com.au/menu/media/fact-sheets

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Exploration Methods Explained: Geological Mapping and Geochemical Surveys

Geological mapping and geochemical surveys are commonly undertaken early in an exploration program. Mineral exploration is undertaken in stages, with each step dependent on the results of the previous stage. This fact sheet explains these exploration methods and equipment, how exploration is regulated, the potential impacts and how these can be managed.

Geological Mapping

Geological mapping is commonly the first mineral exploration method undertaken on the ground. This involves a visit by a geologist to look at rock outcrops and to observe the location, orientation and characteristics of the rocks or sediments exposed at the surface. It may involve vehicle access to a property, taking and recording measurements and walking across the area. It may also involve gathering small samples from rock outcrops, soils or streams for chemical analysis. This information can then be used to prepare a geological map of the exploration area, recording the rock types and structures.



Geochemical Surveys

Geochemical surveys are undertaken to target areas for further exploration. The surveys usually involve the collection of soil, rock and/or sediment samples. These samples are sent for laboratory analysis to identify areas of potential mineralisation. The surveys may comprise:

Soil sampling – Hand-held tools such as shovels, picks and hand augers are used to collect samples of soil and subsoil. Samples are typically collected on a regular grid pattern and involve collection of small (approximately one kilogram) samples of soil. Power augers, either hand operated or vehicle-mounted, may be used. Sampling programs undertaken using hand tools are supported by a four-wheel motorbike or vehicle. Holes excavated during the program are typically back-filled and vegetation replaced immediately following sampling.



Stream sediment sampling – Approximately two kilogram samples of sediment are collected within drainage lines. Three samples are usually taken at the junction of two creeks: one downstream of the junction and two upstream of the junction (in each of the merging drainage lines). Samples are typically extracted using hand tools and may be sieved during collection.

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Rock chip sampling – Up to a few kilograms of rock material from outcrops are collected using hand-held tools. Rock chip samples will usually be collected during geological mapping programs.

Channel sampling – A series of samples of soil or rock are collected along the face of the excavation. This may be a road cutting, the face of an open-cut or underground mine, a trench or similar.

Regulation of Geochemical Surveys

Geological mapping and geochemical surveys are strictly regulated in the conditions of all exploration licences. As most geological mapping and geochemical survey work has minimal, if any, surface disturbance, further approvals for this work are only required in sensitive areas. On private land, this work must be covered in an access agreement with the landholder before work begins.

Rehabilitation of Geochemical Surveys

Rehabilitation is a condition of every exploration licence and is undertaken as soon as practical following surface disturbance. Planning for rehabilitation is undertaken before surface disturbance and occurs in consultation with the landholder.

Surface disturbance from most geochemical surveys is minimal and rehabilitation is usually undertaken straight after the survey. Any disturbed soil is replaced and is reseeded and fertilised as appropriate to the surrounding area.

Further information

NSW Trade & Investment - Division of Resources and Energy
www.resources.nsw.gov.au

NSW Minerals Industry Exploration Handbook
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Stream sampling involves collecting approximately 2kg samples using hand tools



A geologist's tool is the g-pick (geological pick similar to a hammer with a pointed tip)



Rock chip sampling uses a g-pick to collect a few kilograms of rock for analysis



Channel sampling in a trench or costean

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Exploration Methods Explained: Geophysical Surveys

Geophysical surveys can help identify resources without the need for sampling and are usually undertaken with minimal surface disturbance. Different geophysical surveys measure various physical properties of the Earth and have different applications and equipment. Geophysical surveys can be conducted from the air, on the ground or down drill holes.

Airborne geophysical surveys

Airborne geophysical surveys may comprise magnetic, radiometric, gravity or electromagnetic surveys. These surveys provide general geological information for an area and are often used in the initial stages of exploration. These surveys are typically undertaken using low flying helicopters or light aircraft which fly in a grid pattern. The instruments may be either mounted on the aircraft or towed underneath. Depending on the type of survey, the aircraft may fly between 25 and 60 metres above the ground, with flight lines spaced between 25 and 200 metres apart. Companies planning airborne surveys are required to notify landholders before the survey begins.

Ground based surveys

There are a number of types of geophysical surveys which are undertaken on the ground. These include:

- **Seismic surveys** – Seismic surveys measure vibration as it passes through the Earth. This is done using a series of geophones (sensors connected to wires) placed using hand-held tools and arranged in an array or specific pattern. This gives information about the properties of the rocks, often down to depths of several kilometres. The vibrations may be induced using truck-mounted vibrating weights or small explosives. Seismic surveys are particularly suited to specific geological forms including flat-lying sedimentary basins.



Geophysical surveys are usually undertaken using hand held equipment



Seismic survey lines have minimal impact

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- **Magnetic surveys** – Magnetic surveys measure the variations of the Earth's magnetic field due to the presence of magnetic minerals. Subtle variations in the abundance of magnetic minerals are used to interpret rock types and can assist in identifying resources. These surveys are typically undertaken by a geophysical technician on foot carrying a magnetometer and a sensor on a pole. They are most often used in metallic mineral exploration.
- **Radiometric surveys** – Radiometric surveys measure gamma rays which are continuously being emitted from the Earth by natural decomposition of some common radiogenic minerals. Most gamma rays emanate from the top 30 centimetres of rock or soil which can be detected by airborne surveys or on surface rocks using a hand-held spectrometer. These surveys are most often used in metallic and industrial mineral exploration.
- **Gravity surveys** – A gravimeter measures the gravity field to determine variations in rock density in the Earth's crust. Ground gravity surveys require a geophysical technician to take gravity measurements at set intervals of distance and record the precise height at each location. Access to the recording sites can be by vehicle or helicopter, depending upon remoteness. These surveys are used in mineral and energy exploration.
- **Induced Polarisation (IP) surveys** – IP surveys induce an electric field in the ground and measure the chargeability and resistivity of the subsurface. The technique can identify changes in the electric currents caused by different rocks and minerals. Readings are taken by a small crew who shift a ground array or pattern of transmission and receiver cables. These surveys are most often used in metallic mineral exploration.
- **Electromagnetic (EM) surveys** – EM surveys induce an electromagnetic field and measure the three dimensional variations in conductivity within the near-surface soil and rock. Conductive units can be studied to locate metallic minerals, and to understand groundwater and salinity. Ground readings are taken by a small crew who shift a ground array or pattern of transmission and receiver cables.



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Down hole surveys

These geophysical surveys involve putting geophysical equipment down exploration drill holes to gather magnetic, radiometric or electrical information from the rocks adjacent to the hole. The surveys may also be used to determine the exact path of the drill hole. They require a small truck or simply a winder on a tripod and a range of down hole tools. Occasionally tools with a small radiometric source may be used and a detailed risk assessment is required to ensure the tool is not lost down hole.

Regulation of Geophysical Surveys

Geophysical surveys are strictly regulated in the conditions of all exploration licences. As most survey work has minimal, if any, surface disturbance, further approvals for this work are only required in sensitive areas. On private land, this work must be included in an access agreement prior to commencement.

Rehabilitation of Geophysical Surveys

Rehabilitation is a condition of every exploration licence and undertaken as soon as practical following surface disturbance. Planning for rehabilitation is undertaken prior to surface disturbance and occurs in consultation with the landholder.

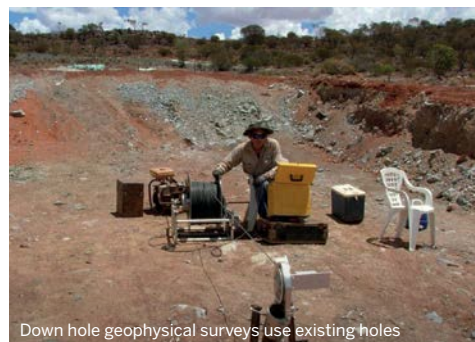
Surface disturbance from most geophysical surveys is minimal and rehabilitation is usually undertaken straight after the survey. Any disturbed soil is replaced, reseeded and fertilised as appropriate to the surrounding area.

Further information:

NSW Trade & Investment – Division of Resources and Energy www.resources.nsw.gov.au

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Down hole geophysical surveys use existing holes

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Exploration Methods Explained: Drilling

Drilling is often conducted as part of an advanced exploration program to obtain detailed information about the rocks below the ground surface. The drilling method and size of the drilling rig used depends on the type of rock and information sought. The most common drilling method is very similar to water bore drilling and is usually completed in a day. The degree of disturbance around the hole varies with each method. Strict environmental safeguards ensure all drill sites are rehabilitated after the completion of drilling.

Shallow drilling

There are two main types of shallow drilling:

Auger Drilling – Auger drilling uses either a hand-held power auger or one mounted on a small vehicle. Auger drilling is very similar to a post hole digger used by farmers when fencing and could also be compared to a jackhammer.

Air Drilling – There are two main shallow air drilling methods, **aircore** and **rotary air blast (RAB)**. These methods usually involve a utility or small truck-mounted drill rig with an air compressor carried onboard or towed separately. This type of drilling creates rock fragments or 'rock chips'. Compressed air is forced down the hole which lifts the rock chips to the surface. This type of drilling requires minimal site preparation and is usually completed in well under a day.

Deep Drilling

There are three main types of deep drilling:

Air Drilling – There are two main types of air drilling used to drill deeper holes, namely **open hole percussion and reverse circulation (RC)**. These drilling techniques are very similar in equipment to water bore drilling.

Air drilling uses compressed air to drive a slowly rotating percussion drill bit, which operates in a similar manner to a jack hammer. The drill bit is typically fitted with numerous hardened protrusions that crush the rock at the bottom of the hole. It produces rock chips that are lifted to the surface by compressed air.

This drilling method is relatively fast, can penetrate hard rock and is capable of drilling holes up to 300 metres deep. These methods do not usually require significant site preparation. Truck-mounted rigs with one or two support vehicles, to carry drill rods and an air compressor, are typically required. Most drill holes can be completed in a single day. The rock chips brought to the surface are logged by a geologist and samples are sent for laboratory analysis.



Auger drilling is similar to post hole digging



Rotary Air Blast (RAB) drilling uses compressed air to bring up rock chips and is usually completed in under a day

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RC drilling is similar to water bore drilling and the latest rigs are mounted on a 4WD vehicle



RC drilling may also be undertaken using a larger rig



Diamond drilling produces core of rock which is logged by a geologist with samples sent to a laboratory for analysis



RC drilling produces rock chips which are logged by a geologist with samples sent to laboratory for analysis

Diamond Drilling – Diamond drilling uses a truck-mounted rig with support vehicles to extract a continuous cylinder of rock. This method uses a rapidly rotating drill bit that uses water and drilling fluids, contained in either an in-ground sump or above ground tanks, to cool and lubricate the drill bit. As the drill rods advance, the cylinder of remaining rock gradually becomes enveloped by the drill rods. The core of rock is logged by a geologist and samples are sent for laboratory analysis.

Ground up rock material is transported to the surface by the returning drilling fluids and is separated from the fluids, typically in drill sumps or small ponds. Above ground sumps may be used in sensitive environments.

Diamond drilling is the most costly form of drilling and is capable of drilling holes many kilometres in depth. Each drill hole can take a number of days to complete and some programs drill over 24 hours a day if practical.

Depending on the duration of the drilling program, additional equipment such as portable shelters, storage containers and portable lighting plants may be required. This method requires significant site preparation and rehabilitation. Most advanced exploration for coal and minerals uses a combination of diamond and reverse circulation drilling.

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Rotary Mud Drilling – Rotary mud drilling is most often used for deep stratigraphic drilling in coal exploration. This method produces fine rock fragments and uses water and drilling fluids to lubricate the drill bit and bring the rock fragments to the surface. Typically a down-hole motor is located behind the drill bit. This means that the drilling can be steered so this form of drilling is used for directional drilling of specific targets.

The drilling fluids are contained in either in-ground sumps or above ground tanks. The drilling rigs are usually larger than for other methods and require more support vehicles and site preparation. Each drill hole can take up to several weeks to several months to complete, dependent on the depth of the hole. Drilling is often undertaken 24 hours a day if practical.

Regulation of Exploration Drilling

Exploration drilling is strictly regulated in the conditions of all exploration licences. Most drilling requires additional Government approval which must describe the current environment, proposed activity and environmental mitigation and management procedures. On private land, this work must be included in an access agreement prior to commencement.

Rehabilitation of Exploration Drilling

Rehabilitation is a condition of every exploration licence and undertaken as soon as practical following surface disturbance. Planning for rehabilitation is undertaken before surface disturbance and in consultation with the landholder.

Rehabilitation of drill holes includes casing, sealing and capping the hole. Usually the hole is given a temporary cap prior to the results of the laboratory analyses. The hole is then plugged below ground with a concrete and metal plug so it can be found with a metal detector. The surface is backfilled and left slightly mounded, to allow for subsidence, then reseeded and fertilised as appropriate for the surrounding area.

Further information

NSW Trade and Investment – Division of Resources and Energy
www.resources.nsw.gov.au

NSW Minerals Industry Exploration Handbook
www.nswmining.com.au/menu/media/publications

For additional Exploration Fact Sheets,
see www.nswmining.com.au/menu/media/fact-sheets



Above ground sumps are used in sensitive areas



Diamond drilling is used in advanced exploration



Rotary mud drilling is used in coal exploration



Rehabilitation is undertaken as soon as practical

These descriptions are primarily provided for those who may not be familiar with exploration operations. As a result they are, by their nature, general. The descriptions have been written in consultation with the NSW Trade & Investment - Division of Resources and Energy. Our thanks to Malachite Resources Limited, Oakland Resources Limited, Golden Cross Resources Ltd, Shenhua Watermark Coal Pty Limited, Silver Mines Limited and Alkane Resources Ltd for contributing photos to this fact sheet.

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Exploration Methods Explained: Costeaning

Costeaning is a form of geochemical sampling where a shallow trench is dug then the exposed rock mapped, analysed and sampled. Costeaning is only used in exploration for some minerals, including gold and lead, and rarely used in NSW. Strict regulations apply to costeaning and environmental safeguards ensure all sites are rehabilitated.

Costeaning or Trench Sampling

Costeaning (also called trench sampling) involves digging a costean or trench using a backhoe or similar equipment. The costean or trench may range from 20cm wide to more than a metre wide and from a few centimetres deep (where hard rock is near the surface) to metres deep. The edges of the trench are typically geologically mapped and channel samples collected for laboratory analysis.

Regulation of Costeaning

Costeaning in NSW is strictly regulated by Government and environmental safeguards ensure that all costeaning is fully rehabilitated. Costeaning requires additional Government approval. The application for approval requires a description of the local environment, proposed activity and environmental mitigation and management procedures. On private land, this work must be included in an access agreement before it is undertaken.



Costeaning or trenching requires additional government approvals

Rehabilitation of Costeaning

Rehabilitation is a condition of every exploration licence and undertaken as soon as practical following surface disturbance. Planning for rehabilitation is undertaken before surface disturbance and in consultation with the landholder.

The soil and rock is returned to the hole before the topsoil is replaced. The surface is left slightly mounded to allow for subsidence, then reseeded and fertilised as appropriate to the surrounding area.

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Measures are taken to minimise interference with the land surface and rehabilitation is undertaken as soon as practical



Reseeding is an important part of rehabilitation

Further information:

NSW Trade & Investment – Division of Resources and Energy www.resources.nsw.gov.au

NSW Minerals Industry Exploration Handbook www.nswmining.com.au/menu/media/publications

NSW Minerals Council Fact Sheets on mineral exploration methods and guideline on the template *Land Access Arrangement for Mineral Exploration* www.nswmining.com.au/menu/media/fact-sheets

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Exploration Methods Explained: Bulk Sampling

Bulk sampling is undertaken only in very advanced exploration when making the decision to mine. Additional Government approvals are required for bulk sampling and strict environmental safeguards ensure all sites are rehabilitated.

Bulk Sampling

Bulk sampling is undertaken only in very advanced exploration programs. In 2011, there were only two bulk sampling approvals in NSW (one of which involved the removal of only 6m³ of material). Before making a decision to apply to develop a mine, an explorer may extract a bulk sample of the material to be mined to allow further metallurgical or chemical testing and refinement of the proposed mining procedures.

Extraction of a bulk sample typically involves excavation of a small open cut or development of a small underground operation. The nature of disturbance associated with a bulk sample depends on the nature and location of the mineral deposit to be sampled.

Regulation of Bulk Sampling

Extraction of a bulk sample in NSW requires approval from Government. Applications for such approvals are typically supported by a detailed *Review of Environmental Factors* (REF) and *Agricultural Impact Statement* (AIS) or similar document. Large samples may require further approval from the Department of Planning & Infrastructure in a process similar to a new mine approval where a full environmental impact statement is required. These approvals require detailed assessment of the current environment, justification of the proposal, mitigation and management strategies.

Rehabilitation of Bulk Sampling

Rehabilitation is a condition of every exploration licence and is undertaken as soon as practical following surface disturbance. Planning for rehabilitation is undertaken before surface disturbance and in consultation with the landholder. The soil and rock is returned to the hole before the topsoil. The surface is left slightly mounded to allow for subsidence then reseeded and fertilised as appropriate to the surrounding area.



Bulk sampling is only undertaken in very advanced exploration when the decision to mine is being made

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Further information

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NSW Minerals Industry Exploration Handbook www.nswmining.com.au/menu/media/publications

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Appendix 4 Legislative Overview

This overview does not constitute legal advice. It is intended strictly as a guide only. Every company should review all relevant legislation, regulations, policies and guidelines for their proposed activities.

Introduction

Exploration in NSW is governed by NSW and Commonwealth legislation, regulations, policies, guidelines and codes. Table A4-1 presents a summary of those items of particular importance to mineral explorers in NSW, while the subsequent sections of this Appendix discuss some of these in more detail.

Table A4-1 – Summary of Relevant Legislation and Environmental Policies

Legislation and Regulation	Comment
<i>Mining Act 1992</i> <i>Mining Regulation 2010</i>	This Act governs the exploration for and extraction of publicly owned minerals and is of primary importance to mineral explorers.
<i>Work Health and Safety Act 2011</i>	The main object of this Act is to provide for a balanced and nationally consistent framework to secure the health and safety of workers and workplaces.
<i>Mine Health and Safety Act 2004</i> <i>Mine Health and Safety Regulation 2007</i>	The legislation is intended to protect the health, safety and welfare of people working in the NSW metalliferous, extractive and opal mining industries and applies to most mineral exploration activities.
<i>Coal Mine Health and Safety Act 2002</i> <i>Coal Mine Health and Safety Regulation 2006</i>	The legislation is intended to protect the health, safety and welfare of people working in the NSW coal industry and applies to most coal exploration activities.
<i>Environmental Planning and Assessment Act 1979</i> <i>Environmental Planning and Assessment Regulation 2000</i>	This Act regulates development in NSW including exploration and mining-related developments. Some low impact exploration activities are exempt from development consent. Mineral exploration is development permissible without development consent. Non-exempt exploration activities are assessed under Part 5 of this Act and mining developments under Part 4.
<i>Protection of the Environment Operations Act 1997</i> <i>Protection of the Environment Operations (Clean Air) Regulation 2002</i> <i>Protection of the Environment Operations (General) Regulation 2009</i> <i>Protection of the Environment Operations (Noise Control) Regulation 2008</i>	This legislation aims to protect, restore and enhance the quality of the environment in NSW, in particular through the management of pollution and environmental discharges. Mineral explorers are covered by general prohibitions against polluting land, air or water. The appropriate regulatory authority for exploration activities is the local Council however, by arrangement the NSW Trade and Investment – Division of Resources and Energy (DRE) takes the lead for environmental protection regulation of exploration activities in NSW and imposes environmental protection conditions on authorisations.

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Legislation and Regulation	Comment
<i>National Parks and Wildlife Act 1974</i> <i>National Parks and Wildlife Regulation 2010</i>	This Act provides for the conservation of habitat, ecosystem processes, biological diversity, Aboriginal objects and places, landforms and objects of significance to the people of NSW, as well as providing for the management of land reserved under the Act. In particular, it includes strict liability offences for disturbance of Aboriginal objects.
<i>Threatened Species Conservation Act 1995</i> <i>Threatened Species Conservation Regulation 2002</i>	This Act aims to conserve biological diversity, promote ecologically sustainable development, protect critical habitat of threatened species, populations and ecological communities and ensure proper assessment of those activities that may impact on such species, populations or communities.
<i>Water Act 1912</i> <i>Water Management Act 2000</i> <i>Water (Part 2 – General) Regulation 1997</i> <i>Water (Part 5 – Bore Licences) Regulation 1995</i> <i>Water (Part 5 – Drillers' Licences) Regulation 1995</i> <i>Water (Part 8 – General) Regulation 1995</i> <i>Water Management (General) Regulation 2004</i>	These Acts regulate the management of surface water and groundwater within NSW, including the extraction and use of water and interference with water courses or aquifers.
<i>Roads Act 1993</i> <i>Roads Regulation 2008</i>	Section 138 of this Act requires that a permit from the roads authority (local council or Roads and Traffic Authority) be obtained for any activities within a road reserve.
<i>Soil Conservation Act 1938</i>	This Act provides for the conservation of soil resources and prevention and mitigation of soil erosion.
<i>Heritage Act 1977</i> <i>Heritage Regulation 2005</i>	This Act provides for the protection of items of non-Aboriginal heritage significance and the regulation of activities that may impact on those items. Issues related to Aboriginal heritage are governed by the <i>National Parks and Wildlife Act 1974</i> .
<i>Crown Lands Act 1989, Crown Lands (Continued Tenures) Act 1989</i>	These Acts regulate the management procedures related to Crown land, in particular the conditions under which Crown land may be occupied or used.
<i>Native Title Act 1993 (Cth)</i>	This Commonwealth Act recognises and protects native title and defines conditions under which native title has been extinguished. In particular the Act provides native title claimants with a 'Right to Negotiate' with mineral explorers prior to determination of their native title claim.
<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>	This Commonwealth Act provides for the protection of the environment, and in particular those aspects of the environment that are of national and international significance, as well as promoting the principals of Ecologically Sustainable Development, conservation of biodiversity and wide co-operation in matters related to environmental management.

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Policy	Comment
<i>SEPP (State and Regional Development) 2011</i>	<p>This Policy applies to:</p> <ul style="list-style-type: none"> • Coal or mineral sand mining projects • Metalliferous mining projects with a capital cost of more than \$30 million • Projects involving extraction of a bulk sample in excess of 20,000 tonnes. <p>Applications for development consent for projects to which this Policy applies are assessed under Part 4, Division 4.1 of the <i>EP&A Act</i>.</p>
<i>SEPP (Mining, Petroleum Production and Extractive Industries) 2007</i>	The Policy defines how some mineral exploration activities and exploration related activities are either exempt or permissible without development consent under the <i>EP&A Act</i>
<i>SEPP (Infrastructure) 2007</i>	This Policy governs development of and activities within the vicinity of certain classes of infrastructure, including schools, power stations and transmission lines, gas pipelines, railways and roads.
<i>Local Environment Plans</i>	A Local Environment Plan exists for all Local Government Areas and identifies permitted land uses in particular areas.
<i>Strategic Regional Land Use Policy</i>	The Strategic Regional Land Use Policy aims to identify and protect strategic agricultural land, water resources and provide greater certainty for companies wanting to invest in mining and coal seam gas projects in regional NSW.

Note: SEPP = State Environmental Planning Policy

In addition to the above legislation and environmental policies, DRE, OEH and NOW have a number of relevant guidelines and codes. Copies of these are available on the respective web sites (see [Appendix 1](#)).

Mining Act 1992

Objectives

Section 5 of the *Mining Act 1992* states that a person must not prospect for or mine any publicly owned mineral on any land otherwise than in accordance with an authority. The maximum penalty for prospecting for a publicly owned mineral without authority is \$550,000 for a corporation and \$110,000 for a natural person. The maximum penalty for mining a publicly owned mineral without an authority is up to \$1,110,000 fine for a corporation and for a natural person, \$220,000 or five years imprisonment or both.

Relevant Components

Exploration Licences (EL)

Part 3 of the Act regulates mineral exploration within NSW. The Act specifies procedures for applying for an EL and where such licences may or may not be granted. The Act also states that the Minister may grant an exploration licence, subject to conditions, over specific land for a specified period and relating to particular minerals only. Different ELs may be granted over the same area for different groups of minerals. All ELs include the provision of a rehabilitation bond.

Exploration licences detail conditions for exploration and allow some exploration activities without further approvals. Other exploration activities will require further approvals from DRE prior to the planned activities commencing. This includes activities classified as Category 2 or 3 Exploration Activities, or those occurring within or adjacent to Sensitive Areas or State Conservation Areas.

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Low Impact Exploration Licence

A low-impact exploration licence is excluded from the 'Right to Negotiate' provisions of the *Commonwealth Native Title Act 1993* but authorises only a limited range of prospecting operations. Refer to the DRE website for further details regarding low-impact exploration licences.

Standard Exploration Licence

Standard exploration licence conditions define three categories of exploration activities, which are detailed below. Information on further approvals, forms and guidance documentation may be downloaded from the DRE website at <http://www.dpi.nsw.gov.au/minerals/environment/exploration>.

- **Category 1** – Exempt activities in accordance with Mining SEPP clause 10 and 10A including:
 - a. Geological mapping
 - b. Airborne surveys
 - c. Sampling and coring using hand held equipment
 - d. Geophysical surveys and downhole logging, but not seismic surveys
 - e. Vehicle access that does not require construction of new track
- **Category 2** – prospecting operations which have potential for moderate disturbance to the land surface, native vegetation or other environmental value, including:
 - a. Operations under Category 1 (c) to (e) within or adjacent to Sensitive Areas*
 - b. Operations under Category 1 (c) to (e) of a concentrated or cumulative nature
 - c. Shallow reconnaissance drilling involving no more than minimal site preparation
 - d. Minor clearing or cutting of native vegetation
 - e. Seismic surveys
 - f. Excavating or bulk sampling not exceeding 60 cubic metres
 - g. Non-intensive drilling involving no more than moderate site preparation, excluding drilling holes exceeding 400 millimetre diameter
 - h. Camp construction and usage (See Mining SEPP clause 10A for exemptions)
 - i. Access tracks, drill pads or line clearing involving no more than moderate native vegetation disturbance
- **Category 3** – prospecting operations which have potential to cause extensive and/or cumulative environmental impact involving, for example, considerable land surface disturbance or native vegetation clearing including:
 - a. Operations under Category 2 (c) to (i) within or adjacent to Sensitive Areas*
 - b. Operations under Category 2 (c) to (i) of a concentrated or cumulative nature
 - c. Excavations or bulk sampling in excess of 60 and less than 20,000 cubic metres
 - d. Exploratory shaft sinking or tunnelling
 - e. Drilling holes in excess of 400 millimetre diameter
 - f. Intensive drilling, such as for resource definition purposes
 - g. Access tracks involving formed construction and waterland crossings

Sensitive Areas are defined to include the following:

- a. Land reserved as a State Conservation Area under the *National Parks and Wildlife Act 1974*
- b. Land declared as an Aboriginal place under the *National Parks and Wildlife Act 1974*
- c. Land identified as wilderness under the *Wilderness Act 1987*

Exploration licences detail conditions for exploration and allow some exploration activities without further approvals. Other exploration activities will require further approvals from DRE prior to the planned activities commencing.

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- d. Land subject to a 'conservation agreement' under the *National Parks and Wildlife Act 1974*
- e. Land acquired by the Minister for Climate Change and the Environment under Part 11 of the *National Parks and Wildlife Act 1974*
- f. Land proposed to be reserved under the *National Parks and Wildlife Act 1974*
- g. Land within State forests identified as Forestry Management Zone 1, 2 or 3
- h. Wetlands subject to SEPP 14 – Coastal Wetlands
- i. Wetlands listed under the Ramsar Wetlands Convention
- j. Lands subject to SEPP 26 – Littoral Rainforests
- k. Areas listed on the Register of National Estate
- l. Areas listed under the *Heritage Act 1977* for which a plan of management has been prepared
- m. Land declared as critical habitat under the *Threatened Species Conservation Act 1995*
- n. Land within a restricted area prescribed by a controlling water authority
- o. waterfront land, meaning the following
 - i. The bed of any river, together with any land lying between the bed of the river and a line drawn parallel to, and 40 metres inland of, the highest bank of the river, or
 - ii. The bed of any lake, together with any land lying between the bed of the lake and a line drawn parallel to, and 40 metres inland of, the shore of the lake, or
 - iii. The bed of any estuary, together with any land lying between the bed of the estuary and a line drawn parallel to, and 40 metres inland of, the mean high water mark of the estuary, or
- p. Land reserved or dedicated under the *Crown Lands Act 1989* for the preservation of flora, fauna, geological formations or other environmental protection purpose and
- q. Any other land identified as additional Sensitive Land by the Director-General.

Category 1 exploration operations may be conducted without further approval, as they are exempt from environmental assessment in accordance with the Mining SEPP.

Category 2 or 3 exploration activities, require further approval. Where the activity is not in or adjacent to a sensitive area, requires only minimal site preparation or vegetation clearing, the approval should be sought using the appropriate application form (Surface

Disturbing Notice (SDN)) accompanied by adequate information describing the activity and likely impacts and justification as to why the activity is classed as 'low impact'. DRE will assess the SDN and advise the applicant as to whether further information is required and a Review of Environmental Factors (REF) is required to more fully assess the impacts of the activity on the environment.

Applications for which a REF is required will also need an Agricultural Impact Statement (AIS) (see [Appendix 8](#)). In rare cases where environmental impacts are determined by DRE as likely to be significant, the preparation of an Environmental Impact Statement (EIS) will be required. An EIS must be undertaken and dealt with in accordance with the prescribed stages in the EPA&A Regulation.

Exploration licence conditions may require preparation of a security estimate and lodgment of an additional security, as well as a range of other requirements. Explorers should be aware of all conditions of their exploration licenses and ensure compliance.

Mining Leases (ML)

Part 5 of the Act regulates extraction of minerals within NSW, including the procedures for applying for a ML. The Minister may not grant a ML without the applicant first obtaining the relevant Development Consent under the EP&A Act. A granted ML gives the holder exclusive rights to extract publicly owned minerals from land covered by the ML for a specified period. The Minister may grant an ML subject to conditions, including preparation and acceptance of a Mining Operations Plan and the provision of a rehabilitation bond.

Work Health and Safety Legislation

PLEASE NOTE: On the 25 June 2013 a new health and safety Bill passed the NSW Parliament, but had not been enacted at the time of publication of this Handbook. The WHS (Mines) Act will replace the Coal Mine Health and Safety Act and the Mine Health and Safety Act.

At the time of publication, the Act and its Regulation have not been finalised. However, there will be significant changes that will be relevant for mineral explorers. Users of this Handbook are encouraged to visit the DRE Mine Safety Website (<http://www.resources.nsw.gov.au/safety>) for further updates.

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Objectives

Under the *Mines Health and Safety Act 2004* and *Coal Mine Health and Safety Act 2002*, operators of all 'mines', including exploration operations, must notify the Chief Inspector of Mines prior to commencing operations. In addition, all 'mines' are required to have a registered operator and must prepare and implement a Mine Safety Management Plan. The Act identifies that the registered operator must be the person or entity who has day-to-day control of the exploration activities. The registered operator may be a company. Mineral explorers are encouraged to contact a Mines Safety Operations Officer in the nearest office of DRE for additional information.

Relevant Components

Mine Health and Safety Act 2004

This Act applies to all mines, which includes exploration sites. The key obligations include (but are not limited to):

- Section 22 – The operator must nominate a mine holder
- Section 26 – The operator must:
 - i. Ensure that all persons working at the mine (including managers and supervisors) have the necessary skills, competence and resources to undertake their work safely and to ensure the safety of others
 - ii. Prepare a Mine Safety Management Plan stating how the health and safety of the persons who work at the mine or who are directly affected by the mine, will be protected and
 - iii. Inform employees and contractors that they have requirements they must follow under the Act.
- Section 68 – A person must not commence drilling operations unless the person has given the Chief Inspector at least 7 days written notice of the operations. (See Regulation 143)
- Section 88 – An exploration licence holder must give the Chief Inspector and an Industry Check Inspector notice in accordance with this section of any of the following incidents (notifiable incidents) within seven days:
 - i. Any incident at the mine that has resulted in a person being killed
 - ii. Any other incident at the site of a kind prescribed by the regulations.
- Section 89 – The operator of a mine must take measures to ensure that plant at the exploration

site is not used, moved or interfered with after it has been involved in a notifiable incident, and the area and environment at that site is not disturbed.

Mine Health and Safety Regulation 2007

- Regulation 145 – Notification of certain incidents. Under Section 88 of the Act, you must report an injury to a person that results (at any time after the injury) in any of the following:
 - i. The amputation of one or more fingers or toes or any other part of a hand or foot
 - ii. Any fracture other than a fracture of a finger, toe, hand or foot
 - iii. Loss of sight of an eye
 - iv. An internal haemorrhage receiving hospital treatment
 - v. The injection of fluid (including hydraulic fluid, oil, air or water) under pressure
 - vi. Asphyxia
 - vii. The loss of consciousness of the person caused by impact of physical force, exposure to hazardous substances, electric shock or lack of oxygen
 - viii. The admission (at any time after the event) of a person to hospital as an in-patient
 - ix. The unintended activation or movement of machinery (other than a vehicle), and
 - x. A wider range of other incidents including machinery damage, electrical incidents entrapment.
- Regulation 155 – within 30 days of the end of the quarter, mineral explorers must report on the number of people, injuries and time worked. An exemption to make this an annual requirement has been sought from the Chief Inspector.

Coal Mine Health and Safety Act 2002

The *Coal Mine Health and Safety Act 2002* applies to all coal exploration sites. Its aim is to put in place special provisions necessary for the control of particular risks arising from the exploration for coal. The Act has a number of key obligations an exploration holder must be aware of. These include (but are not limited to):

- Section 78 – Drilling operations must not commence unless the exploration holder has given the Chief Inspector at least seven days written notice of the operations.
- Section 110 – An exploration license holder must give the Chief Inspector and an Industry Check Inspector notice in accordance with this section of

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any of the following incidents (notifiable incidents) within seven days:

- i. Any incident at the exploration site that has resulted in a person being killed
- ii. Any other incident at the exploration site of a kind prescribed by the Regulations.
- Section 111 – The operator of a coal operation and an exploration holder must take measures to ensure that plant at the exploration site is not used, moved or interfered with after it has been involved in a notifiable incident, and the area and environment at that coal operation or exploration site that is connected with the notifiable incident is not disturbed.

Coal Mine Health and Safety Regulation 2006

- Section 57 – An exploration licence holder must report an injury to a person that results (at any time after the injury) in any of the following:
 - i. The amputation of one or more fingers or toes or any other part of a hand or foot
 - ii. Any fracture other than a fracture of a finger, toe, hand or foot
 - iii. Loss of sight of an eye
 - iv. An internal haemorrhage receiving hospital treatment
 - v. The injection of fluid (including hydraulic fluid, oil, air or water) under pressure
 - vi. Asphyxia
 - vii. the loss of consciousness of the person caused by impact of physical force, exposure to hazardous substances, electric shock or lack of oxygen
 - viii. The admission of a person to hospital as an in-patient and
 - ix. The unintended activation or movement of machinery (other than a vehicle).

Environmental Planning and Assessment Act 1979

Objectives

The Environmental Planning and Assessment Act 1979 (EP&A Act) regulates environment assessment of activities and development within NSW, including exploration and mining-related activities and development. This Act is currently under review and is likely to be replaced with a new Act during 2014/5.

The following Parts of the EP&A Act are relevant:

- Part 5 of the Act relates to the environmental assessment of exploration activities that require approval in accordance with the *Mining Act 1992* and the conditions of the mineral authority.
- Part 4 relates to mining development that is not classified as State Significant Development.
- Part 4, Division 4.1 relates to mining development that may be classified as State Significant Development.

Most exploration activities are development that is permissible without development consent. Some activities may still be subject to environmental assessment by DRE under Part 5 of the Act.

The following sub-sections provide a necessarily brief overview of each of these Parts.

Relevant Components

1. Part 5 – Assessment of Activities

An 'activity' under the Act is defined as the use of land or carrying out of a work, except for:

- Development to which Part 4 of the Act applies or
- Development defined under a Local Environment Plan of State Environmental Planning Policy as 'exempt development'.

Relevant examples of an activity under this Part include most exploration activities.

For exploration-related activities, the Minister for Resources and Energy, through DRE, is the determining authority. The Minister must consider the environmental impacts of a proposed activity and may request a *Review of Environmental Factors* (REF) be prepared by the mineral explorer. Under the *Strategic Regional Land Use Policy*, and REF is required to be accompanied by an Agricultural Impact Statement. [Appendix 8](#) provides further information on the preparation of these documents. If the environmental operations are likely to significantly impact on the environment, the Minister may alternatively request an *Environmental Impact Statement* (EIS) be prepared.

2. Part 4 – Assessment of Development

Part 4 of the Act applies to development where development consent is required under the terms of a Local Environmental Plan or is declared 'designated development' by the *Environmental Planning and Assessment Regulation 2000*. Schedule 3 of those regulations classifies the following developments as designated development:

Appendix 4 Legislative Overview

- Crushing, grinding, and separating works with a capacity of more than 30,000 tonnes per year
- Mineral processing facilities that process more than 30,000 tonnes per year
- Mines that require a Mining Lease under the *Mining Act 1992* and will disturb more than four hectares.

Development consent under Part 4 of the Act requires the preparation of an EIS and wide consultation with a number of stakeholders and Government agencies. Assessment of the development application is undertaken by the local council. Determination of the application will be by either the local councillors (for projects with a capital cost of less than \$20 million), or by the Joint Regional Planning Panel for projects with a capital cost of between \$20 million and \$30 million.

3. Part 4, Division 4.1 – Assessment of State Significant Projects

Part 4, Division 4.1 of the Act came into force on 1 October 2011 and replaces the now repealed Part 3A of the Act. The Division applies to State Significant Development and applies to the following classes of proposed development:

- All coal or mineral sands development
- Other mining-related development with a capital investment greater than \$30 million or any proposal to extract a bulk sample of more than 20,000 tonnes of ore material as part of a resource appraisal.

As a result, most medium to large mining-related development would fall under Part 4, Division 4.1 of the Act.

Part 4, Division 4.1 requires the applicant to prepare an *Environmental Impact Statement* (EIS). The application is assessed by the NSW Department of Planning and Infrastructure, with the Minister for Planning the determining authority. The Minister has, however, delegated approval authority to senior officers of the Department of Planning and Infrastructure (for projects that receive less than 25 unique objections) or the Planning and Assessment Commission (for projects that receive more than 25 unique objections).

Once development consent has been granted under Part 4, Division 4.1, other approvals such as Mining Leases and Environment Protection Licences (EPL) may not be refused, nor be inconsistent with the conditions of the development consent.

A detailed description of Part 4 of the EP&A Act is beyond the scope of this Handbook. Mineral explorers whose exploration prospects may fall under this Part are strongly encouraged to seek appropriate professional advice.

Protection of the Environment Operations Act 1997

Objectives

The *Protection of Environment Operations Act 1997* (POEO Act) regulates for pollution generally and licences environmental discharges and pollution. An Environment Protection Licence (EPL) may be required for specified activities that may result in discharges to surface waters, groundwater or the air, or the emission of noise. Schedule 1 of the Act defines coal mines, mineral processing or metallurgical works or other mines with an area of disturbance of more than four hectares as activities requiring an EPL. In addition, the Act prohibits the emission of water, air, noise or land pollution from any activity without a licence. Mineral exploration generally does not require an EPL, however DRE may require an approved management plan for the exploration activity and there may be some relevant circumstances where an EPL is required during exploration.

Relevant Components

The following provides a brief overview of when an EPL may be required. Note that the relevant regional office of the EPA may be able to advise whether a licence will be required for a particular activity.

- Water – Waters discharged to local streams or creeks during exploration activities should, in general, meet the following criteria:
 - pH – 6.5 to 8.5 or a maximum deviation of 0.5 from the receiving waters
 - Suspended Solids – 30mg/L or 50mg/L for classified and unclassified streams respectively
 - Salinity – salinity standards will vary depending on the receiving environment. *ANZECC (2000)* provides a range of water quality 'trigger levels' depending on the setting of the waterway. In general, water discharged to the waterway should have a salinity similar to or lower than water that naturally flows through the waterway. Note that an arrangement may be made with the landholder and with the prior approval of the DRE to allow water with elevated salinity to be released to the surface of the land or to on-farm storages
 - No hydrocarbon contamination.

Any potentially contaminated waters, including waters contaminated with hydrocarbons, drilling fluids or other chemicals should not be released and must be disposed in accordance with NSW waste disposal regulations.

Appendix 4 Legislative Overview

- Air Quality – Air quality guidelines require that all practicable measures to reduce dust should be taken. This may include dust suppression units on drill rigs and regular watering of disturbed areas (see [Section 4.9](#)).
- Noise – Noise impacts associated with mineral exploration are, according to DRE, covered by the Construction Noise Guidelines. In summary, however, local residents, including those on neighbouring properties should be consulted to determine what they deem to be acceptable.

National Parks and Wildlife Act 1974

Objectives

The *National Parks and Wildlife Act 1974* regulates the protection and preservation of Aboriginal culture and heritage, flora and fauna within NSW. The Act makes it unlawful to explore or mine for minerals within specified areas, including National Parks.

Relevant Components

1. Part 6 – Aboriginal Objects and Places

Aboriginal culture and heritage is currently regulated under the *National Parks and Wildlife Act 1974*. This is under review. It is an offence under Section 86 of the Act to 'harm' an Aboriginal object. Harm is defined as any act or omission that destroys, defaces or damages and object, moves an object or causes an object to be harmed.

Amendment to the Act in 2010 introduced two types of offence for harming an Aboriginal object

- A 'knowing offence' (where the person knows that the object/s disturbed is an Aboriginal object)
- A 'strict liability offence' (where the person does not know that the object/s disturbed is an Aboriginal object).

This 'strict liability offence' necessitates due diligence for many of the activities which are undertaken in exploration. There are exemptions for the strict liability offence including:

- that the activity was a 'Low Impact Activity' as prescribed in National Parks and Wildlife Amendment Regulation 2010 (which includes some exploration activities)
- that the harm is 'trivial or negligible' or
- that there was an 'honest and reasonable mistake'.

This 'strict liability offence' also relates to Aboriginal places.

Section 90 of the Act prohibits a person from knowingly destroying, defacing or damaging Aboriginal objects or places without a permit under Section 87 of the Act.

OEH maintains a register of Aboriginal objects (referred to as the AHIMS database – see [Appendix 1](#)) and Aboriginal places. The NSW Minerals Council has prepared the *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* as a guide for the industry.

2. Part 8A Threatened Species, Populations and Ecological Communities

Part 8A of this Act makes it an offence to:

- Harm any threatened animal species
- Pick any threatened plant species or endangered population or ecological community
- Damage any habitat critical to an endangered species, population or ecological community.

The above applies unless the act alleged was essential for carrying out an activity or development authorised under the EP&A Act.

Mineral exploration activities that are likely to have more than a minimal impact will require further assessment under Part 5 of the EP&A Act (see previous description of the *Mining Act 1992*).

Threatened Species Conservation Act 1995

This Act and associated Regulations list threatened species, populations and ecological communities. The Act requires that mineral explorers, government agencies and others must not make decisions or act in a manner that negatively impacts such species, populations or ecological communities. In addition, such decisions and activities must not be inconsistent with a Threat Abatement or Recovery Plan. Bionet and the NSW Threatened Species Database provide a database of scheduled species and communities likely to occur within user defined areas (see [Appendix 1](#))

Where an exploration activity is likely to have more than a minimal impact, an environmental assessment under Part 5 of the EP&A Act (Section 7.3.2 of the Act) will be required.

Appendix 4 Legislative Overview

Native Vegetation Act 2003

This Act prohibits clearing of Native Vegetation except:

- With development consent under Part 4 of the EP&A Act
- In accordance with a property vegetation plan or
- For the purpose of routine agricultural management activities.

Clearing of native vegetation in accordance with an approval granted under the *Mining Act 1992* is exempt from this Act.

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) regulates the environmental assessment of activities and development that may impact on matters of National Environmental Significance or matters which are the subject of international agreements. Examples of relevant activities or development that may be regulated under this Act include activities or development that may impact on:

- Ramsar declared wetlands
- World Heritage declared properties
- National Heritage declared properties
- Listed threatened or migratory species or
- Commonwealth land or heritage places.

Where a proposed activity such as mineral exploration may impact on one of the aspects listed above, an assessment of the environmental impacts must be undertaken in accordance with the EPBC Act. The Commonwealth Department of Sustainability, Environment, Water, Population and Communities will advise on assessment requirements for specific activities.

Native Title Act 1993

The *Native Title Act 1993* (NT Act) recognises and protects native title in Australia. Under the Act and subsequent decisions of the Federal Court and High Court, native title has generally been extinguished on freehold land, allocated Crown Land such as road reserves and National Parks and Western Land Leases.

Subdivision P of the Act also allows Native Title claimants 'Right to Negotiate' with regards mining and exploration-related activities, other than 'low impact' exploration as defined under the *NSW Mining Act 1992*. Low impact exploration activities are defined as:

- Aerial surveys
- Field surveys, including ground based geophysical surveys, that do not include clearing
- Sampling by hand methods
- Drilling and related activities that do not involve clearing or site excavation other than the minimum necessary.

Where exploration is deemed not to be 'low impact' exploration and native title may not have been extinguished, an agreement must be negotiated or arbitrated between relevant native title claimants and other interested parties, the explorer and the Commonwealth prior to granting of the exploration licence.

A detailed description of the operation of this Act is beyond the scope of this Handbook. It is recommended that mineral explorers who may be impacted by the application of this Act seek specialist legal advice.

Appendix 5 Proforma Documentation

Throughout this Handbook, reference has been made to the importance of undertaking an appropriate risk assessment during the planning stages of all exploration programs. A risk assessment should be used to identify those aspects of the proposed program that have the highest environmental (or other) risk. For those risks deemed to be unacceptable, mitigation measures should be identified and the risk assessment repeated to determine the mitigated risk level.

In light of the results of the risk assessment, a range of appropriate plans and documentation should be developed to describe and communicate the identified mitigation measures. These documents may take a number of forms, depending on the preference of the explorer, and may include management plans, operational procedures or risk registers. Maps should be attached to Exploration Plans and include the detail of identifying sensitive areas, sampling sites, access routes, water sources, 'no-go' areas and landholders. Checklist or forms are also a key way of ensuring that all exploration personnel are following the requirements of the Plans. More information on forms and checklists, together with some example forms, are detailed in [Appendix 6 – Forms and Checklists](#).

The DRE, when assessing the significance of the environmental impacts, and thus when an EIS might be required, must assess the application on the basis of the information contained in the SDN or REF and cannot assume or presume that the explorer has the appropriate mitigation measures in place or will adopt best practice management methods in conducting activities. The management plans, operational procedures or risk controls must be described within the REF. An approval of the activity will usually be given on condition the activities are conducted in accordance with the plans, procedures and risk controls described in the REF.

Each procedure or plan can be a short document detailing company practice that would become a key company document.

For a small exploration company, these plans could simply be written as a single Environmental Plan/Policy/Procedure and sit beside WHS material. The plans identified in this Handbook may only represent a couple of paragraphs of the Environmental Plan/Procedure. Some exploration companies have a Business Procedure Manual, which can be a complete guide on all company administrative, WHS, and environmental procedures. Each procedure or plan can be a short document detailing company practice that would become a key company document.

Different approaches will suit different mineral explorers. Whatever the format, risk assessment and management plans (or similar) should meet the following criteria:

- Documentation needs only to be sufficiently comprehensive to address the risks that are likely to be encountered during an exploration program.
- Risk assessment and management documents should be 'living' documents. They should be updated and referred to regularly to maintain relevance. Good management plans are stained and dog eared!
- Management documentation should be brief, focus on actual procedures used onsite, be prepared in a manner that all users can understand them and should only include information that is relevant to the particular exploration program. Environmental documentation should be linked with WHS and quality management documentation so personnel have a single reference source.
- Documentation should be developed and updated with the full support of company management.
- All staff must be trained and regularly updated on these systems. They must be practical for all exploration personnel including project managers, geologists, field assistants and contractors.
- Document control (author, date of issue, approved by, date for review) should be attached to all documentation to ensure all personnel have the most up to date information.

The following presents a list of management plans or similar documents that may be required for exploration programs:

- Cultural Heritage Management Plan
- Flora and Fauna Management Plan
- Soil Management Plan
- Sediment and Erosion Control Plan
- Surface and Groundwater Management Plan
- Air Quality and Dust Management Plan

Appendix 5 Proforma Documentation

- Noise Management Plan
- Waste Management Plan
- Hydrocarbon (and Hazardous Materials) Management Plan
- Infrastructure Management Plan
- Bushfire Management Plan
- Emergency Response Plan
- Mine Safety Management Plan
- Access Track Management Plan
- Excavation Management Plan
- Electrical Geophysical Survey Management Plan
- Seismic Survey Management Plan
- Airborne Geophysical Survey Management Plan
- Drilling Management Plan
- Camp Management Plan
- Rehabilitation Plan
- Environmental Monitoring Plan.

On the following pages is an example of a risk assessment format, followed by an example of a Management Plan that could be incorporated into a REF. These may be used as guides for companies developing their own version of this documentation.

For completeness, and to demonstrate to DRE that all relevant risks have been listed, where a risk is not relevant, a brief statement as to why the risk is not relevant to the particular activity should be included. This may then avoid any necessity for DRE to ask for further information about the risk/s.

Example Risk Assessment – XYZ Exploration Program, ABC Resources Limited

Identified Risk	Unmitigated Risk Rating			Management Measure(s)	Mitigated Risk Rating		
	Likelihood	Severity	Rating		Likelihood	Severity	Rating
Adverse impact on threatened species	C	4	E	<ul style="list-style-type: none"> • Identify and avoid areas of high habitat value • Avoid disturbance to native vegetation • Identify no-go areas on maps and on the ground with flagging tape and signs • Complete rehabilitation as soon as possible once program complete 	E	3	M

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A (Almost Certain)	H	H	E	E	E
B (Likely)	M	H	H	E	E
C (Possible)	L	M	H	E	E
D (Unlikely)	L	L	M	H	E
E (Rare)	L	L	M	H	H

Risk Ratings: E=Extreme H=High M=Moderate L=Low

Note: Rating after Standards Australia – Environmental Risk Management – Principles and Process – Table 4(C)

Appendix 5 Proforma Documentation

XYZ Exploration Program – ABC Resources Limited Flora and Fauna Management Plan

Legislative and Other Requirements

National Parks and Wildlife Act 1974 (NSW)

- A person must not harm any threatened species, endangered population or an endangered ecological community, or their habitat.

Environment Protection and Biodiversity Conservation Act 1999 (Cth)

- A person must not take an action that will have a significant impact on matters of national environmental significance.

Flora and Fauna Management Procedures

- Ensure that a search the appropriate databases has been undertaken to identify threatened species, populations or ecological communities that may occur in the vicinity of the exploration area. Where such threatened species, populations or ecological communities may occur, the areas should be avoided where possible or further assessment should be undertaken. The results of these searches should be mapped as an overlay to the exploration program for ease of reference in the field.
- Ensure that all equipment is washed and/or disinfected before arrival and departure from site.
- Ensure that all areas to be cleared are clearly marked on the ground.
- Where possible, trim vegetation rather than removing it or remove vegetation above ground only, leaving the root structure intact. Where possible avoid removing native vegetation. Do not remove native vegetation more than 3m high.
- Ensure that all excavations that will be left open have a ramp to allow fauna to escape.
- Backfill or cover all drill holes to prevent fauna access.
- Remove all exploration equipment, consumables and sample bags as soon as possible after exploration operations are completed.
- Undertake rehabilitation as soon as possible after completion of the exploration operations. If areas are not rehabilitated, make safe and fence deep excavations to prevent fauna access and ensure fauna are able to escape from deep excavations.

Monitoring and Auditing

- Inspect all exploration areas during operations weekly to ensure that there has been no disturbance of areas identified as 'no go' areas.
- Inspect all equipment entering or leaving the exploration site to ensure that there is no potential for transmission of weeds or disease into or from the exploration area.
- Inspect and photograph from a set point all exploration activities initially weekly during rehabilitation, gradually increasing to six-monthly as vegetation becomes established.

In developing forms and checklists, individual mineral explorers should take a risk-based approach based on the environment within and surrounding the exploration area, the activities proposed and the environmental and other risks that must be addressed.

Appendix 6 Forms and Checklists

Introduction

Forms and checklists are crucial to:

- Ensure that company procedures are followed and checked.
- Ensure that there is consistency between different exploration programs and personnel.
- Provide documentary evidence that procedures were followed in the event of an accident or incident.

In developing forms and checklists, individual mineral explorers should take a risk-based approach based on the environment within and surrounding the exploration area, the activities proposed and the environmental and other risks that must be addressed.

This appendix provides a range of forms and checklists for use and adaption by mineral explorers. These forms and checklists focus primarily on environmental management of exploration operations. To allow the content of these documents to be directly incorporated into company documentation, an editable version of the checklists provided in this appendix may be downloaded at <http://www.nswmining.com.au>.

Landholder Consultation

Project: _____ Location: _____ Date: _____

	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/ Action	Complete	Date/ Initial
Have the relevant landholders been identified?					
Has a plan showing the distribution of land holdings been prepared?					
Has initial telephone contact been made with the relevant landholders and written records retained?					
Has the proposed exploration program been explained to the landholder and a plan showing the program left with them to review following the meeting?					
Has information in relation to the landholders use of the land been sought and documented, i.e. what is the nature of the farming operations, what non-farming activities are undertaken?					
Have the relevant landholders been identified?					
Has a plan showing the distribution of land holdings been prepared?					

Appendix 6 Forms and Checklists

	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/ Action	Complete	Date/ Initial
Has initial telephone contact been made with the relevant landholders and written records retained?					
Has the proposed exploration program been explained to the landholder and a plan showing the program left with them to review following the meeting?					
Has information in relation to the landholders use of the land been sought and documented, i.e. what is the nature of the farming operations, what non-farming activities are undertaken?					
Have key issues from the landholder's perspective been identified and documented?					
Have rehabilitation completion criteria been discussed, agreed upon and documented?					
Does the landholder know of any matters that may be relevant to the program. i.e. previous environmental studies, reports or surveys, areas of old workings, location of springs or sensitive vegetation?					
Has a written access agreement, including compensation, been negotiated and agreed upon?					
Has a procedure for ongoing consultation been agreed and implemented?					
Have the relevant contact details for the Technical or Project Manager been provided?					
Has the landholder been encouraged to inspect the exploration operations and provide feedback?					
Has rehabilitation been commenced as soon as practicable following completion of the program?					
Has compensation been paid as soon as practicable following completion of the program?					

Appendix 6 Forms and Checklists

	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/ Action	Complete	Date/ Initial
Have rehabilitation operations been completed and the rehabilitated area protected from grazing pressure?					
Has the rehabilitated area been inspected regularly until the agreed rehabilitation criteria have been achieved and has remedial action been implemented if required?					
Has the landholder signed off on the completed rehabilitation?					

General Comments

Completed by:

Name: _____ Position: _____ Signature: _____

Approved by:

Name: _____ Position: _____ Signature: _____

Appendix 6 Forms and Checklists

Landholder Correspondence Register

Landholder: _____ Telephone numbers: _____

Address: _____ Email: _____

Project: _____ Location: _____

[illegible]

Appendix 6 Forms and Checklists

Planning a Field Trip

Project: _____ Location: _____ Date: _____

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Has the objectives of the field trip been identified?					
Have the relevant landholders been notified and permission to enter land provided?					
Has a risk assessment been undertaken and appropriate management plans developed, if required?					
Has an Emergency Response Plan, including communication protocols, been developed?					
Has the required safety and exploration equipment been identified and collected?					

General Comments

Completed by:

Name: _____ Position: _____ Signature: _____

Approved by:

Name: _____ Position: _____ Signature: _____

Appendix 6 Forms and Checklists

Planning an Exploration Program

Project: _____ Location: _____ Date: _____

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Have the conceptual targets been identified?					
Have the objectives of the program been identified and documented?					
Have the proposed exploration areas been inspected?					
Has a risk assessment been undertaken and appropriate mitigation measures identified?					
Have appropriate management plans been prepared and incorporated into a REF and distributed to the appropriate personnel?					
Have the appropriate approvals been obtained if required?					
Has the landholder been consulted and provided their consent for the program?					
Have contractors been identified and have their management plans or operational procedures been inspected and determined to be adequate?					

General Comments

Completed by:

Name: _____ Position: _____ Signature: _____

Approved by:

Name: _____ Position: _____ Signature: _____

Appendix 6 Forms and Checklists

Access Tracks

Project: _____ Location: _____ Date: _____

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Does the track appear to be safe for light and heavy vehicles?					
Is the track appropriately signposted?					
Is there evidence of degradation of the track (potholes, depressions, boggy/soft areas)?					
Have any side tracks developed?					
Is there evidence of erosion along or adjacent to the track?					
Does the road-side drainage appear to be working effectively?					
Is there evidence of erosion or sedimentation adjacent to the track or at the drainage discharge points?					
Do other surface water control measures appear to be operating effectively?					
Is there evidence of sediment tracking onto public roads?					
Is there evidence of unauthorised access?					
Do all gates appear to have been left as they were found?					

General Comments

Completed by:

Name: _____ Position: _____ Signature: _____

Approved by:

Name: _____ Position: _____ Signature: _____

Appendix 6 Forms and Checklists

Field Mapping and Sampling

Project: _____ Location: _____ Date: _____

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Have identified access tracks and points been used?					
Have all pegs and flagging tape been removed?					
Have all gates been left as they were found?					
Have all sampling locations been adequately backfilled?					
Have all sampling locations been revegetated, where appropriate?					
Have all sample bags been removed from site?					

General Comments

Completed by:

Name: _____ Position: _____ Signature: _____

Approved by:

Name: _____ Position: _____ Signature: _____

Appendix 6 Forms and Checklists

Costeans/Excavations

Project: _____ Location: _____ Date: _____

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Has vegetation been appropriately stockpiled for later use during rehabilitation?					
Has topsoil and subsoil been separately stockpiled?					
Are surface water controls installed and do they appear to be adequate?					
Is there any evidence of erosion or sedimentation?					
Do the walls of the excavation appear to be stable?					
If the excavation is more than 1.5m deep, are the walls stepped or is there some mechanism to prevent human or animal access?					
Are there ramps or similar to allow fauna to escape the excavation?					
Are livestock present and, if so, are appropriate control measures in place?					
Is the excavation appropriately signposted?					

General Comments

Completed by:

Name: _____ Position: _____ Signature: _____

Approved by:

Name: _____ Position: _____ Signature: _____

Appendix 6 Forms and Checklists

Electrical Geophysical Surveys

Project: _____ Location: _____ Date: _____

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Is appropriate signage warning of the survey in place at all potential access points?					
Do all personnel appear to be complying with identified procedures?					
Do all personnel have access to an appropriate method of communication at all relevant times?					
Is there any evidence of damage to transmission or receiver wires?					
Is there stock in the vicinity of the survey and if so, do the risks associated with their presence appear to be appropriately managed?					
Is there an appropriate procedure to identify fires should they occur and respond appropriately?					
Is the appropriate fire fighting equipment present in an appropriate location/s, is it operational and have personnel been trained in its use?					

General Comments

Completed by:

Name: _____ Position: _____ Signature: _____

Approved by:

Name: _____ Position: _____ Signature: _____

Appendix 6 Forms and Checklists

Drilling Operations – Air

Project: _____ Location: _____ Date: _____

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Drill site set up					
Has cleared vegetation been appropriately stockpiled for later use during rehabilitation?					
Has topsoil and subsoil been separately stockpiled?					
Are surface water controls installed and do they appear to be adequate?					
Is there any evidence of erosion or sedimentation?					
Are livestock present and if so, are appropriate control measures in place to prevent access?					
Is there sufficient area for safe operation of the site?					
Is there safe access for light and heavy vehicles?					
Groundwater management					
Are above-ground or in-ground sumps in place to manage groundwater, should it be intersected?					
Are the cyclone underflow and outside return hoses directed to the sumps?					
Does the overflow from the sumps appear to be appropriately managed?					

Appendix 6 Forms and Checklists

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Are site personnel aware of relevant discharge criteria and are contingency measures in place should water not be able to be discharged?					
Are equipment and consumables available to plug the hole if required?					
General environmental management					
Does the dust management system appear to be operating appropriately?					
Are hydrocarbons stored and used appropriately (bundled pallets, covered to prevent rainwater accumulating, sealed containers)?					
Do hydrocarbon spill controls appear to be adequate (rig nappies, trays)?					
Is hydrocarbon spill management equipment available and easily accessible?					
Is appropriate fire fighting equipment available, operational and easily accessible?					
Does noise, light, dust and other emissions appear to be appropriately managed to minimise the impact on surrounding residents?					

Appendix 6 Forms and Checklists

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Drill site rehabilitation (see also Rehabilitation Operations Checklist)					
Has all equipment and rubbish been removed from site?					
Are drill samples present and if so, are appropriate measures in place to prevent stock access?					
Has the drill hole been appropriately capped and buried?					
Has the site been appropriately reprofiled, subsoil then topsoil spread and revegetated in accordance with the landholder's instructions?					
If grazing pressure may impact on rehabilitation, have stock and other fauna been appropriately excluded from the site?					
General Comments					
Completed by:					
Name: _____ Position: _____ Signature: _____					
Approved by:					
Name: _____ Position: _____ Signature: _____					

Appendix 6 Forms and Checklists

Drilling Operations – Diamond

Project: _____ Location: _____ Date: _____

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Drill site set up					
Has vegetation been appropriately stockpiled for later use during rehabilitation?					
Has topsoil and subsoil been separately stockpiled?					
If required, has the site been sheeted with hay or gravel and does the sheeting appear adequate?					
Have clean water diversions been established and do they appear to be adequate?					
Have dirty water containment structures been established and do they appear to be adequate?					
Does the drill site generally drain towards the sumps?					
Is there any evidence of erosion or sedimentation?					
Are livestock present and if so, are appropriate control measures in place to prevent access?					
Is there sufficient area for safe operation of the site?					
Is there safe access for light and heavy vehicles?					
Drilling fluid management					
Are above-ground or in-ground sumps in place to manage drilling fluids?					

Appendix 6 Forms and Checklists

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/Initial
Do the sumps appear to be appropriately constructed?					
Are the sumps lined with an impervious liner?					
Do the sumps appear to be of sufficient size to ensure nil discharge from site?					
Are there appropriate controls to prevent human or animal access to the sumps?					
If the sumps are to be left unattended, are there ramps to allow animals that fall in to escape?					
General environmental management					
Are hydrocarbons stored and used appropriately (bundled pallets, covered to prevent rainwater accumulating, sealed containers)?					
Do hydrocarbon spill controls appear to be adequate (rig nappies, trays)?					
Is hydrocarbon spill equipment available and easily accessible?					
Is appropriate fire fighting equipment available, operational and easily accessible?					
Are equipment and consumables available to plug the hole, if required?					
Does noise, light, dust and other emissions appear to be appropriately managed to minimise the impact on surrounding residents?					
Drill site rehabilitation (see also Rehabilitation Operations Checklist)					

Appendix 6 Forms and Checklists

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Has all equipment and rubbish been removed from site?					
Has the drill hole been appropriately capped/sealed, marked and buried?					
Have drill cuttings been removed from the sumps or is the volume of cuttings sufficiently thin to ensure that they will not 'toothpaste' to the surface following backfilling?					
Have in-ground sumps been appropriately backfilled (subsoil then topsoil) and mounded to allow for subsidence?					
Has the remainder of the site been appropriately reprofiled, subsoil then topsoil spread and revegetated in accordance with the landholder's instructions.					
If grazing pressure may impact on rehabilitation, have stock and other fauna been appropriately excluded from the site?					

General Comments

Completed by:

Name: _____ Position: _____ Signature: _____

Approved by:

Name: _____ Position: _____ Signature: _____

Appendix 6 Forms and Checklists

Rehabilitation Operations – All Activities

Project: _____ Location: _____ Date: _____

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Site decommissioning					
Has all equipment and rubbish been removed from site? Have all markers and flagging tape been removed?					
Have the drill holes been appropriately capped and buried?					
Are drill samples present and if so, are appropriate measures in place to prevent stock access?					
Have drill cuttings been removed from the sumps or is the volume of cuttings remaining sufficiently thin to ensure that they will not 'toothpaste' to the surface following backfilling?					
Have all sites been made safe for both humans and animals prior to rehabilitation?					
Do all excavations include fauna escape measures such as ramps?					
Have photographs of the site prior to rehabilitation been taken?					

Appendix 6 Forms and Checklists

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Site rehabilitation					
Have in-ground sumps been appropriately backfilled (subsoil then topsoil) and mounded to allow for subsidence?					
Has sheeting material used for tracks or drill sites been removed or has written approval to leave in place been received?					
Has the remainder of the site been appropriately re-profiled and subsoil then topsoil spread?					
Where areas of compaction exist, have they been ripped?					
Have surface water controls that will no longer be required been removed?					
Have surface water controls that will be still required been retained or constructed?					
Have all areas of disturbance been revegetated in accordance with the landholder's instructions?					
If grazing pressure may impact on rehabilitation, have stock and other fauna been appropriately excluded from the site?					
Have photographs of the site immediately following rehabilitation been taken?					

Appendix 6 Forms and Checklists

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/Initial
Post rehabilitation monitoring (e.g. 3 months, 6 months, 12 months, ongoing)					
Time since rehabilitation: _____					
Is there evidence of subsidence or uneven settling of in-ground sumps?					
Is there evidence of erosion or sedimentation?					
Do the surface water control measures appear to be operating appropriately?					
Does the vegetation appear to have become established?					
Have weeds become established?					
Is there evidence of grazing adversely impacting on rehabilitation?					
Are fences in appropriate condition?					
Is remedial action required to ensure adequate rehabilitation?					
Have photographs of the rehabilitation in progress been taken?					

Appendix 6 Forms and Checklists

Environmental Issue	Performance ✓ Acceptable ✗ Not Acceptable – Not applicable ? Unknown	Action Req'd (Y/N)	Comment/Action	Complete	Date/ Initial
Site handover					
Does the site appear to be self -sustaining?					
Has infrastructure that will no longer be required (fences, surface water controls) been removed?					
Is the landholder satisfied with the status of the rehabilitation?					
Has written confirmation of the above been received?					
Have post rehabilitation photographs been taken?					

General Comments

Completed by:

Name: _____ Position: _____ Signature: _____

Approved by:

Name: _____ Position: _____ Signature: _____

Appendix 7 REF and AIS Preparation Tips and Strategies

Introduction

Conditions of exploration licences identify those activities requiring further approval, as detailed in [Section 2.5](#). Typically Category 1 activities do not require further approval. Category 2 and 3 activities, however, will require further approval. In determining whether to grant approval, DRE must assess the environmental impacts of the activities in accordance with Part 5 of the *Environmental Planning and Assessment Act 1979*.

An application for approval of Category 2 activities must contain information that describes the exploration activities, the risks of the impacts of the activities on the environment and the mitigation measures and practices that will minimise the risks. For exploration activities that are likely to have low impacts and risks and are not in or adjacent to sensitive areas, the application for approval should be in the form of a Surface Disturbance Notice (SDN). The SDN, in most cases where the environmental impacts are minimal, should contain sufficient information for the DRE to determine if further information is required about the likely environmental impacts. If no further information is required, DRE can approve the exploration activities. If the DRE determines that not all impacts have been addressed in the SDN, or the information is inadequate, the DRE will request the additional information be provided in a Review of Environmental Factors (REF).

For Category 3 exploration activities, the application for an activity approval must be accompanied by a REF.

In addition, the *Strategic Regional Land Use Policy* requires that potential agricultural impacts are considered when an approval is required for exploration activities and a REF is required. This is achieved through preparation of an *Agricultural Impact Statement* (AIS). This document may be incorporated into the REF.

Where, in the opinion of the DRE, the activities are likely to have a significant impact on the environment, an *Environmental Impact Statement* will be required.

This appendix provides a suggested Table of Contents for a REF, including an AIS, as well as a range of suggestions where relevant information may be sourced. The suggested Table of Contents closely follows the requirements of the Government guidelines, which mineral explorers should refer to during preparation of the REF/AIS.

- *ESG2: Environmental Impact Assessment Guidelines – For exploration, mining and petroleum production activities subject to Part 5 of the Environmental Planning and Assessment Act 1979* (REF Guidelines)

prepared by the Division of Resources and Energy and dated March 2012. A copy of this guideline may be downloaded from http://www.resources.nsw.gov.au/_data/assets/pdf_file/0007/427444/2012-03-05-ESG2-Environmental-Impact-Assessment-Guidelines-FINAL.pdf.

- *Guideline for Agricultural Impact Statements at the Exploration Stage* (AIS Guidelines) prepared by the Department of Primary Industries and dated (October 2012). A copy of this guideline may be downloaded from http://www.resources.nsw.gov.au/_data/assets/pdf_file/0007/448315/Strategic-Regional-Land-Use-Policy-Guideline-for-Agricultural-Impact-Statements-at-the-Exploration-Stage.pdf.

Preparing to Draft the REF/AIS

The REF/AIS should be prepared by an experienced person suitably qualified in the field of environmental sciences, natural resources or rehabilitation management or similar. Generally a REF/AIS may be prepared by the Project Geologist/Geophysist, Exploration Manager or other technically qualified personnel familiar with the proposed program.

In preparing to draft the REF/AIS, the following should be considered before drafting commences:

- **Scope the REF/AIS** – The first decision a mineral explorer needs to make is to determine the scope of the application. Should the application cover a single exploration program or multiple phases of exploration at a single prospect or a long-term program over multiple prospects within a larger area? That decision should be made in consultation with DRE and will depend on the ability of the explorer to describe the proposed activities and risks or impacts to sites in sufficient detail to allow DRE to assess the anticipated environmental and other impacts for all sites where the activities are to be conducted.
- **Risk assessment** – As identified in [Section 2.4](#), mineral explorers should implement a risk assessment during the initial planning phase for a mineral exploration program. That assessment will not only assist the explorer determine the appropriate aspects of the proposed program with the highest potential to result in environmental harm, it will also identify the relative emphasis that will be required for each issue in the REF/AIS. For example, if traffic-related risks are considered to be less significant than say noise related risks, then the REF/AIS should focus on the latter, with less emphasis placed on the former.

Appendix 7 REF and AIS Preparation Tips and Strategies

- **Consultation** – Once the scope of the application has been determined, the mineral explorer should consult widely in relation to the proposed program to identify particular issues that should be covered in the document. The consultation should be well documented (see [Appendix 6](#) for a pro forma consultation record form) and should include the agencies, organisations and individuals identified in the REF Guideline. Where possible, written requirements should be obtained.
- **Baseline data** – In parallel with the consultation program, the mineral explorer should commence gathering data for inclusion in the REF/AIS. This data may include information in relation to the setting of the exploration area, including its climate, topography and drainage, ecological, surface water, groundwater and Aboriginal heritage, agricultural productivity and particular sensitivities of the surrounding area. This data should be collated in a manner that simplifies its inclusion in the REF/AIS and should be collected at a level of detail that is commensurate with the risk determined previously. For example, if flora and fauna-related risks are considered to be low, relatively basic baseline data collection may be appropriate. However, if such risks are determined to be high, a more detailed assessment, possibly with the assistance of a specialist ecologist, may be required.
- **Table of Contents and Figure** – Finally, a draft table of contents and the figures for the REF/AIS should be prepared. Invariably, this process will identify gaps in available information and will significantly assist the efficient preparation of the document.

Drafting of the REF/AIS should only commence once these steps have been completed.

Drafting the REF/AIS

The REF Guidelines provide a suggested Table of Contents for a REF. This suggested table of contents should be followed as closely as possible, with modifications to take into account peculiarities of the proposed program and the requirements of the AIS Guidelines. The following provides a range of matters for consideration during drafting of the REF/AIS and should be read in conjunction with both sets of guidelines.

In preparing the REF/AIS, the results of the risk assessment should be kept in mind and the level of detail and discussion should be commensurate with the risk associated with the particular issue.

In preparing the required REF and AIS documents, mineral explorers may elect to:

- Prepare and submit separate documents
- Prepare separate documents and include the AIS as an appendix to the REF or
- Combine the documents, with the relevant AIS component included in Sections 2, 3 and 4 of the REF (the approach assumed in this document).

In drafting the REF/AIS, consideration should be given to tabulating or including as much information as possible on figures and plans. This will reduce the amount of text that needs to be written (and reviewed) and will facilitate both the preparation and review of the document.

Finally, the REF/AIS should be an operational document. To that end, the structure should be kept simple and operational procedures should be suitable for field and contract staff to implement without further instruction, briefing or explanation required.

Suggested Table of Contents

1. The Proposed Activity

1.1 Introduction and Summary of the Activity

- This section should introduce the document, the applicant, define the terminology that will be used throughout the document and provide a regional location plan. A [brief](#) description of the proposed program should be included.

1.2 Stakeholder Consultation

- This section should provide a brief overview of all consultation undertaken, followed by a series of subsections providing a detailed description of the consultation, including outcomes and commitments made. Record sheets maintained during the consultation process (examples in [Appendix 6](#)), should be included as an appendix to the REF/AIS.

1.3 Justification of the Activity

- The emphasis on 'Ecologically Sustainable Development' (ESD) required in this section reflects the objects of the *Environmental Planning and Assessment Act 1997* (see Section 5(a)(vii) of the Act). ESD is defined by Section 6(2) of the *Protection of the Environment Administration Act 1991*. Extensive information in relation to ESD and its four component principles is available online.

Appendix 7 REF and AIS Preparation Tips and Strategies

1.4 Analysis of Alternatives

- A brief analysis of alternative exploration methods and why these methods have not been selected is critical for justifying the proposed program. Such a discussion should, however, be brief. Tabulating relevant information or providing a list of bullet points may be of assistance.

1.5 Description of the Activity

- This section is likely to be the most critical section of the REF and should include a series of subsections describing particular aspects of the program. Extensive use of figures, plans and photographs will assist preparation of this section, as well as assist readers develop a clear understanding of the proposed activities.
- The level of detail to be provided in this section will depend on the results of the risk analysis, nature of the proposed activities and sensitivity of the surrounding environment.
- Consideration should be given to providing tabulated co-ordinates for activities for which approval is sought and locations on a figure or, where that information is not available, identification of an area in which all activities will be undertaken.
- This section can be drafted separately from the REF/AIS and used during consultation with the landholder. Indeed, drafting the rehabilitation and other relevant components of this section, together with aspects of the AIS, with the landholder will ensure that they are satisfied with the proposed activities and both parties have a clear understanding of the expectation in relation to the program.
- Avoid providing private information as the REF will become a public document. It is the responsibility of the titleholder to ensure private information is not published.
- Explorers should take care to ensure that the description of the proposed activities meet the requirements of both the REF Guidelines and the AIS Guidelines.

1.6 Mitigation Strategy

- This section requires relevant mitigation strategies to be identified and described. Mineral explorers may wish to include such mitigation strategies in Sections 3 or 4 of the REF/AIS. In that case, a cross reference to the relevant section/s should be included in this section.
- If mitigation measures are presented in this section they should be cross referenced to the relevant description of the existing environment ([Section 3](#)) and assessment of residual impacts ([Section 4](#)).

- Mitigation measures should be presented as a list of bullet points or tabulated in a manner that may be easily understood and implemented by field and contract staff.
- Mitigation measures and commitments should be presented in a consistent manner so that they can easily be transferred to the Statement of Commitments required at the end of the REF.

1.7 Access Arrangements

- Note access agreements in place and ensure that privacy concerns are considered, particularly in relation to personal contact information and compensation agreements.

1.8 Other Approval Requirements

- With the exception of the requirements associated with the AIS, further approvals are typically not required for exploration activities. However, the Division of Resources and Energy may be able to assist identify if further approvals are required.

2. The Site Description and Site Plan

- Typically this section would comprise one or more figures and tables showing the area for which approval is sought, as well as the matters identified in the REF Guideline. The former is critical because that will define the land over which any subsequent approval will apply.
- Mineral explorers may wish to include this information in Section 1.5 (or alternatively include Section 1.5 in this section). If this is done, a cross reference should be included.

3. Existing Environment

Mineral explorers may combine Sections 1.6, 3 and 4 into a single section to allow a description of the existing environment, mitigation strategies and impact assessment for each environmental aspect to be presented in a single location. If explorers elect to do so, it should be clearly stated that this has been done and cross references should be provided where relevant.

The purpose of this section is to provide a description of the environment within the exploration area against which, taking into account the proposed mitigation measures, the residual impacts can be assessed in Section 4. The level of detail required for each environmental component will vary depending on the results of the risk analysis, the nature of the proposed program and the sensitivity of the surrounding environment. In some cases where risks are determined to be high, specialist advice may be required. However, explorers may wish to consider specialist input in relation to ecology, Aboriginal heritage, noise or air quality if these issues are determined to be high risk.

Appendix 7 REF and AIS Preparation Tips and Strategies

Where a judgement is made as to whether the risk is potentially high or low, the rationale for making that judgement should be briefly explained.

Finally, extensive use should be made of figures and plans to present information in relation to the existing environment. In particular, a series of base maps and plans at a range of standard scales may assist with the presentation of relevant information in a simple, easily understood manner.

Information sources for relevant aspects of the existing environment are presented in [Appendix 1](#). In addition, the following sources of information may be of assistance:

- Landholders in the vicinity of the exploration area
- Local Council
- Local agronomists, surveyors, stock and station agents and other local service providers
- Historical societies.

In relation to specific environmental aspects, explorers should consider:

- Surface water and groundwater
 - Identify both registered users and those exercising their basic landholder right to extract up to 3ML per year without the need for a licence.
 - Consider taking samples of both surface water and groundwater for analysis and present that data in the REF. This will assist determining criteria for discharge of water, if required, or if the proposed program has resulted in adverse water-related impacts.
- Threatened species, populations and ecological communities
 - It will be important to identify and classify the vegetation community that occurs with the exploration area, as well as available habitat for threatened species. Where the vegetation community has been heavily modified, such as in cropping areas or areas of improved pasture, this will be less critical. In areas where remnant vegetation remains, consideration should be given to seeking specialist advice.
- Aboriginal heritage and culture
 - The strict liability provisions of Section 86 of the National Parks and Wildlife Act 1974 mean that mineral explorers should undertake due diligence investigation for all areas of potential disturbance. The document *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* identifies procedures for undertaking such an assessment. A documented

program based on the requirements of the Code of Practice will assist prevent inadvertent disturbance of Aboriginal objects and will provide a defence if disturbance does occur.

- Agricultural setting
 - A description of the agricultural setting should be provided in sufficient detail to allow the assumptions made during the Agricultural Impact Risk analysis (see below) to be documented. This may include a description of cropping or grazing practices and productivity within and surrounding the exploration area.
 - In the event that the Agricultural Impact Risk analysis identifies any medium or high risks associated with the proposed activities, the information requirements identified in Section B of the AIS Guidelines should be provided.
 - Surrounding landholders are likely to be the best source of the required information.

4. Risk Analysis

This section is not identified in the REF Guidelines, however mineral explorers should consider documenting the risk analysis undertaken for the proposed program to demonstrate to both DRE and the public how the emphasis on each environmental aspect has been determined.

In addition, mineral explorers may wish to consider including the Agricultural Impact Risk analysis required under Section A of the AIS Guidelines in this section.

5. Impact Assessment

In the event that the mineral explorer elects to present the management and mitigation measures in this section, these should be presented before the impact assessment. This will ensure that only residual impacts are assessed rather than unmitigated impacts. Unless the mitigation measures are included in the REF, the activity will be assessed as being unmitigated.

The REF Guidelines provide extensive guidance in relation to the impact assessment requirements. As previously identified, mineral explorers should present impact assessment information commensurate with the level of risk associated with the particular environmental aspect. If for example, an exploration program is planned in an area of previous disturbance, only limited information in relation to ecological impacts need be provided. If by contrast, the proposed program would be undertaken in an area of Endangered Ecological Community with known threatened species in the vicinity, considerably more information should be provided.

Appendix 7 REF and AIS Preparation Tips and Strategies

In the event that the Agricultural Impact Risk analysis identifies any medium or high risks associated with the proposed activities, the impact assessment information outlined in Section B of the AIS Guidelines should be presented in this section.

Finally, this section should conclude with an overview of the cumulative impacts associated with the proposed program, namely is the proposed program the latest in a long line of exploration programs within or in the vicinity of the exploration area, or is it the first program to be undertaken.

6. Summary of Impacts

This section should present an overview of the impact assessment presented in the previous section. Mineral explorers may wish to include this section as a concluding subsection to the previous Impact Assessment section.

7. Conclusion

The REF Guidelines include a detailed description of what should be included in the concluding section.

8. Statement of Commitments

Assuming that the mitigation measures have been drafted appropriately in the previous sections, these should be able to be copied across to a summary of the statements of commitments, preferably in a table format. The statement will provide field and contract staff with a useful consolidated list of requirements and expectations.

Appendices

A range of appendices will typically be required, which may include:

- A copy of the exploration licence
- A copy of any formal risk analysis undertaken for the proposed activities, including the Agricultural Impact Risk analysis required by the AIS Guidelines, if that information is not presented in Section 4
- A copy of the results of any information searches undertaken, including for threatened species or searches of the AHIMS or Natural Resources databases
- Copies of any specialist reports prepared for the proposed program
- Copies of consultation records.

Following Completion of the REF/AIS

Following completion of the REF/AIS, mineral explorers should carefully review the document, including undertaking an internal peer review, to ensure that the information presented in the document is clear, unambiguous and contains all relevant information. Consideration should also be given to providing a copy of the document to the relevant landholder/s to ensure that their acceptance of the proposed program and the mitigation measures proposed.

Generally a REF/AIS may be prepared by the Project Geologist/Geophysist, Exploration Manager or other technically qualified personnel familiar with the proposed program.

Appendix 8 Case Studies



The following case studies provide examples of NSW companies demonstrating leading practice. The practices described in these case studies represent leading practice in certain circumstances and a variety of environments. Recognising the myriad of variables involved in exploration activities, these practices will not be practical or possible for all exploration programs or in all areas of NSW.

These case studies are available at www.nswmining.com.au.

1. **Community Engagement – Exploration to Development**
2. **Working with Landholders – Keeping the Gate Open**
3. **Mineral Exploration and Agriculture Working Together**
4. **Construction and Management of Drill Sites**
5. **Drill Site Management**
6. **Use of Above-Ground Sumps for Drilling**
7. **Management of Percussion Drill Samples**
8. **Successful Rehabilitation in State Forests**
9. **Exploration Rehabilitation in Native Woodland**
10. **Successful Rehabilitation on Steep, High Rainfall Terrain**



CASE STUDY
September 2013

Community Engagement – Exploration to Development

Community engagement by mineral explorers and miners is vital to protecting the mining industry's social licence to operate. Alkane Resources Ltd has gained social acceptance of its operations through engaging, communicating with and supporting local communities.



Background

Alkane Resources Ltd (Alkane) has been actively exploring and mining in Central West NSW since the 1980s. The Peak Hill Gold Mine began as an exploration project in 1993, progressing through development to its closure in 2005. Alkane's strong record and experience of community engagement helped in the next mine development at Tomingley and is continuing to facilitate acceptance of the much larger development proposed for the Dubbo Zirconia Project.

Community Engagement Protocol

Alkane developed a number of specific strategies for community engagement and acceptance of the company at the local level. Clear and honest communication is a foundation for these strategies.

Alkane developed a community engagement protocol to ensure they were engaging with the appropriate community representatives, and communicated this protocol to all staff and contractors.

Alkane identified key stakeholders early on, and met with these stakeholders regularly to ensure they were able to freely raise their concerns and have confidence that Alkane would address them. Stakeholders received regular project updates through direct email communication, ASX announcements and media releases.



Alkane has been a sponsor of the Peak Hill Show for fifteen years

Appendix 8 Case Studies



CASE STUDY



The local Aboriginal community operates tours of the tourist mine and rehabilitated surrounds at Peak Hill. This provides the public with an insight into mining and its impacts and benefits. The tourist mine is a positive legacy left by the mine operator to boost visitor numbers to the town and provide ongoing training and employment for the Aboriginal community



Supporting a Red Cross street stall – Alkane personnel were part of the local community while the mine was operating from 1996–2005

As the Peak Hill project moved towards development, a group of key community members was identified. Regular, formal consultation was undertaken with this group. Alkane has a policy of listening to the community's expectations, of being responsive and maintaining careful documentation of all complaints. Prompt follow-up, including personal meetings and remedial actions where necessary, ensured that complaints were dealt with early and effectively.

During operations, the community consultation included six-monthly public meetings and mine tours, which was an excellent opportunity for the community to see and understand the operations first hand. The wider community was also updated with information in local newspapers.

Corporate Social Responsibility

Mining companies have the capacity to generate significant economic activity in the communities in which they operate. Alkane worked closely with the community to build trust and social acceptance, supported by its environmental performance record.

Alkane is a strong advocate for corporate social responsibility. Its corporate social responsibility policies include:

- Employ and purchase locally where possible
- Provide equal opportunity in employment
- Encourage staff and contractors to maintain involvement in community organisations and projects.

Sponsoring projects that provide immediate and/or long term benefits is an important and practical way for Alkane to demonstrate sound corporate social responsibility.

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CASE STUDY

Alkane supported the local community in an extensive program including:

- Individual sponsorships for local athletes
- Team sport uniforms for school and sporting groups
- Sporting clubs including the junior ruby league team, Peak Hill Harness Racing Club, Tomingley Picnic Races, Peak Hill Golf Club and Tennis Club
- School equipment including computers, shade for playground and school excursions
- Infrastructure improvements (doctor's residence, mining museum, community radio station and helipad)
- Restoring community assets (complete refurbishment of hall, which was purchased then donated back to the community)
- Events (local shows, sporting events and street carnivals)
- Work experience at the mine for school students.

Through strong community engagement and support, Alkane earned community trust and acceptance for its next mines to be developed at Tomingley and Toongi.



Disclaimer: This case study is intended to provide general information only. It does not intend to be comprehensive or to provide specific legal advice. Given the changing nature of legislation, regulations, program rules and guidelines, there is a potential for inherent inaccuracies and potential omissions in information contained in this case study. All information in this case study is provided 'as is' with no guarantee of completeness or accuracy and without warranty of any kind, express or implied. In no event will New South Wales Minerals Council Limited, any related members, consultants or employees thereof be liable to anyone for any decision made or action taken in reliance on the information in this paper or for any consequential damages.

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Appendix 8 Case Studies



CASE STUDY
September 2013

Working with Landholders – Keeping the Gate Open

With competing land use pressures, land access is increasingly challenging for explorers, and can rapidly halt the exploration program if not implemented with adequate thought and commitment. A culture of respect for landholders and the community is paramount in establishing and maintaining good relationships.



Background

Malachite Resources Limited has been exploring in Eastern Australia since 1997. During this time, the exploration team has built up expertise in land access and community engagement matters, based on a corporate culture of understanding and respect of the landholders and the local community. This strategy is based on initial one-on-one meetings with landholders (and sometimes their families), providing an opportunity for both parties to discuss the proposed exploration program and any impacts it will have on the farmer's land and agricultural business. Listening and responding to farmers' views and concerns is an important aspect of building a sustainable relationship with landholders. Explorers must recognise that fostering good relations with farmers is fundamental to the success of an exploration program.

Establishing Positive Relations with Landholders

Good landholder relations can take months or years to build, but only seconds to destroy, so they must be carefully handled with an ingrained culture of respect from the Board right down to the field technicians. Without this culture in place, there is a high risk that at some point in the exploration program the gate will be locked and access will be denied. Some key concepts for successfully dealing with landholders are:

- Recognise that farming is a business, and in most circumstances our exploration activities will disrupt that business to varying degrees
- The explorer's employees and those of its contractors must recognise that they are essentially 'guests' on the farmer's property, and should behave accordingly.

Before the first contact with a landholder:

- Read the local newspaper, 'The Land' newspaper and visit the NSW Farmers' website to become aware of local and national farming issues
- Familiarise yourself with local issues, particularly those that might affect the relevant farmer.

When making the first contact (usually a telephone call), be aware that:

- The main purpose of the call is to introduce yourself and your company, and to arrange a time and place to meet to discuss the exploration program and its potential impact on the farmer's land and business
- Remember the Golden Rule: You only get one chance to make a first impression, so make sure in your first phone call and first meeting that you do give a good impression of yourself and your company (e.g. "Have I called you at a bad time?")
- Farms are commonly run as partnerships and family businesses, so anyone who answers the phone at the farmer's property may be an owner in the business, so treat them with due respect
- By explaining any connection you personally have with farming, the farmer may be more relaxed about talking with you
- By listening to the farmer's views and concerns, you will place yourself in a better position to discuss these in an informed manner when you meet the farmer.

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CASE STUDY

The first meeting with a farmer is critical to building a good and sustainable relationship, so keep in mind:

- The importance of arriving for the meeting on time – like you, most farmers are busy people and do not like to be kept waiting. First impressions continue, so dress neatly and behave with understanding and respect.
- Put yourself in his/her position – how would you respond if a stranger telephoned you and asked for access to your land to conduct activities which may impact on your family and business?
- Listen carefully to all that the farmer says, particularly any concerns he/she raises with you.
- A good way to start building an enduring one-on-one relationship with the farmer is to endeavour to find a common personal interest with the farmer (e.g. interest in a particular football team, cricket player etc.)
- It is important to establish how much (or how little) the farmer understands about the actual exploration process, and the physical impact it may have on his land. Use our Fact Sheets and an album of photographs of the different exploration techniques to inform the farmer.
- Explain the proposed exploration program and the need for a land access agreement and explain their rights.
- Leave the farmer with a letter of introduction from the company (including all relevant names and contact numbers), a copy of the draft *Land Access Arrangement for Mineral Exploration* and related documents. Ensure you explain the agreement and their rights.
- Learn as much as possible about the farmer's business plan in the area you wish to explore (e.g. timing of cropping activities, stock grazing and stock movements, lambing and shearing times etc.), and as far as possible try to schedule your exploration activities to cause the least disruption to farming activities.
- Find out how frequently that farmer wants to be contacted about your activities – should you call him/her before every time you enter the property or just at the start of each work program?

Maintaining Positive Relations with Landholders

- Most important is to continue to build on the level of trust and respect already established.
- Achieve this by always doing what you say you are going to do, and immediately advise the farmer if there are any changes to what you have already told him or her.
- Ensure that every employee and contractor who enters the property behaves and operates responsibly and is aware of all relevant components in the access agreement. Aim to have the person who makes the first contact with the farmer as the one to liaise with the farmer as the exploration program proceeds. This will greatly strengthen the working relationship between the company and the farmer for the future.
- Starting staged rehabilitation works as soon as possible is a visual demonstration of your company's commitment to putting the farmer's land back in good order.
- Paying compensation ahead of the due date (if possible) is another way to demonstrate your bona fides to the farmer.
- If practical, any form of 'in kind' assistance will be appreciated by the farmer (e.g. replace an old gate or grade a track).
- You, your employees and contractors should work to build a reputation with local landholders as a good neighbour in the district.
- Consider holding a community event (e.g. a BBQ or an open day) to meet your neighbours and listen to their comments and any concerns they may have.
- Exceeding the farmer's expectations is a good way to build trust, respect and understanding.

A positive and sustainable relationship with landholders can only be built on trust and respect. It is critical to get it right from the beginning.

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Appendix 8 Case Studies



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Mineral Exploration and Agriculture Working Together

Exploration drilling to define a mineable resource can take several years but that does not mean that farmers and explorers cannot work together. Alkane Resources Ltd successfully undertakes exploration activities on productive agricultural land.



Background

The vast majority of exploration targets tested do not identify mineralisation and often no further work is required. However, where mineralisation is identified, it can take several years to finally determine whether the identified mineralisation is an economically recoverable ore body. In addition, the mining industry, like farming, suffers from fluctuating commodity prices and cashflows that may further delay and extend exploration activities. Understanding complex geology beneath deep soil cover and defining a mineable ore body can take a decade or more.

Getting off on the right foot

In light of the possible long-term relationship between explorer and landholder, the explorer needs to establish a cooperative working relationship with the landholder.

The explorer needs to understand what the farmer's business is (grazing or cropping), how the property works and changes with the seasons.

The explorer needs to explain to landholders such matters as who the people behind the company are who will be working on the property what equipment and methods they will be using, when access to the property is required and for how long and what measures the company will employ to ensure that contractors comply with all instructions and commitments.

Prior to accessing any property the explorer and landholder must negotiate a land access agreement which will clearly set out both parties' wants and needs, including how, when and where the explorer can access the property, and if and when particular activities can be undertaken. Several land access agreements may be negotiated during the life of an exploration project depending on what the explorer seeks to do. The explorer should be as flexible as possible to meet the landholder expectations.

Exploration and farming can co-exist

With a robust relationship between an explorer and landholder based on trust and respect, exploration and farming operations can co-exist.

Drilling can be undertaken with livestock in paddocks provided that the livestock are safe from machinery and earthworks associated with the program. Suitable barrier fencing may be required.

Drilling in cultivation and growing crops requires prior agreement with the farmer around compensation for loss of production and contingencies. Access tracks through cultivation paddocks can become compacted and these need to be rehabilitated. The farmer may be willing to provide a fee for service in the rehabilitation works and may have the necessary equipment on hand.



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Two drill rigs operating in a growing wheat crop at Tomingley



Drilling during harvest season at Tomingley

Drilling in crops nearing harvest is also feasible, however, explorers should be aware of heightened risks of loss for landholders, particularly in relation to fire as crops brown off. Contingencies and compensation agreements should be in place before the program begins. Consideration should be given to avoiding particular times of year if possible.

Drilling in high value and speciality cropping areas is also feasible, provided that the explorer has a sound understanding of the particular issues associated with the landholder's activities and these are taken into account to the landholder's satisfaction.

Alkane identified three ore bodies in wheat cropping land at Tomingley, and drilled them for 12 years, resulting in over 3,000 reverse circulation and diamond holes. These programs operated during droughts and floods and average seasons.

During those 12 years of resource definition drilling and feasibility study work, there was only very minor loss of production as the drilling footprint was minimised.

The landholders were compensated to a level where more drilling was not seen as a financial burden.

Alkane has also undertaken drilling operations in organic vineyards and high rainfall, steep terrain.

Each of these operations has been successfully implemented, with the landholders satisfied in each case that their particular concerns and issues were addressed and that they received appropriate compensation.



Exploration in a grazing paddock near Wellington

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Constructing and Managing Drill Sites

Drill sites are often the most visible aspect of an exploration program, and in hilly terrain, earthworks are often required. These must be carefully planned, implemented and managed so as to minimise environmental impacts and landholder concerns. Malachite Resources Limited has developed expertise in the construction and management of drill sites, especially in difficult terrain.



Background

Malachite Resources Limited has been exploring in the hilly terrain of the New England region of northern NSW since 1997. This terrain has presented a number of challenges with respect to constructing and managing drill sites to minimise environmental impacts.

Drill sites must be large enough for safe operations, but small enough to minimise their environmental impact. In addition, they need to be designed, constructed and managed so that rehabilitation can be undertaken as soon as possible following drilling and in an effective and timely manner. This aspect of exploration is the one to which landholders pay the closest attention, and the one that gives explorers the best opportunity to exceed the landholders' expectations.

The following construction and management strategies have been used with success and form the basis of all Malachite's drilling procedures.

Strategies for Drill Site Construction

- Relevant approvals are obtained from NSW Trade and Investment – Division of Resources and Energy (and other relevant government agencies) prior to the commencement of work.
- Aboriginal cultural heritage clearances are conducted as required.
- Drill sites are located in the most 'open' areas to minimise impacts on vegetation, pastures and crops.
- Liaison with the landholder regarding the location of each drill site is undertaken prior to the drilling program. Landholders are given a clear understanding of the program and their comments are noted. The parties discuss and agree upon a rehabilitation program before exploration begins. Liaison with the drilling contractor is undertaken to ensure the drill site will be of adequate size and to determine the preferred locations for drill trucks and sumps.
- Dead timber is removed and stacked nearby for re-use in rehabilitation. Overhanging branches may also be removed as they may fall during drilling operations.
- Only trees that are allowed by permit and agreed by the landholder are removed.
- Grass and topsoil are stripped and stacked separately, adjacent to the drill site, for replacement in the rehabilitation phase. These stacks are covered to avoid erosion during heavy rainfall.
- Trip hazards (such as rocks and tree roots) are cleared from the drill site.
- Above-ground sumps are used wherever possible, and are positioned so that they can be pumped out during the drilling program if required.
- In-ground sumps, if needed, are constructed on the down-slope side of the drill rig and are lined with plastic sheeting. Excavated materials are placed on the down slope side of the sumps in a manner that would direct any flows of surface water into the sumps.
- Multiple in-ground sumps are positioned and constructed so that excess drilling fluids can safely flow from one sump to the adjoining sump.

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Sediment fence on down-slope side of plastic-lined and fenced sumps



Multiple sediment fences lined with hay bales below drill site (to right of photo) in environmentally sensitive location

- Sediment fences are constructed of silt-stop geotextile fabric and/or hay bales along the down-slope perimeter of the drill site to contain any run-off of surface water and any spills from sumps. When using silt-stop cloth, Ringlock (or Hinge Joint) fencing is attached to 3m spaced star pickets. The cloth is then attached to the up-slope side of the fencing with cable ties, digging the bottom of the cloth into the ground to prevent losses. When hay bales are used, these can be secured on the up-slope side of the sediment fence with wooden grid pegs.
- Safety fencing of the drill site (or just the sumps) is undertaken as needed, and safety signs are positioned at the entry point to the drill site.
- A bunded area is established to contain the drilling contractor's fuel, oils, muds and drilling additives.

Strategies for Drill Site Management

- A spill response kit is positioned at the drill site before the drill rig arrives.
- Black plastic sheeting (with a sheet of oil absorbent matting above it) is placed under the length of the drill rig to contain any oil or diesel leaks.
- The geologist liaises with the senior driller on each visit to the drill site. A walk around the perimeter of the drill site is undertaken to ensure that there are no leaks from sumps, the drill rig, compressor or support vehicles.
- Enlargement or construction of additional sumps is discussed with the driller during the drilling program, along with any requirement to have the above-ground or in-ground sumps pumped out before the hole is completed.
- Damage to sediment fences is promptly repaired as required.
- If during the drilling operations the ground becomes slippery, a thin layer of loose hay is spread to give the drillers a better surface on which to work.
- Drilling is stopped immediately if a diesel or oil leak is detected. The leak is then contained and the spill cleaned up. The source of the leak is repaired before drilling is recommenced.

Together with effective rehabilitation, these strategies minimise surface disturbance and facilitate future access for exploration.

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Drill Site Management

Drilling is considered a high impact and visible part of a minerals exploration program. From open pastures on flat ground to more challenging woodlands and State Forest terrain, the exploration program operator must carefully plan and manage drilling operations to the satisfaction of landholders, regulatory authorities and the environment. White Rock Minerals Ltd undertakes successful drilling site management on its exploration and mining leases in northern NSW.



Background

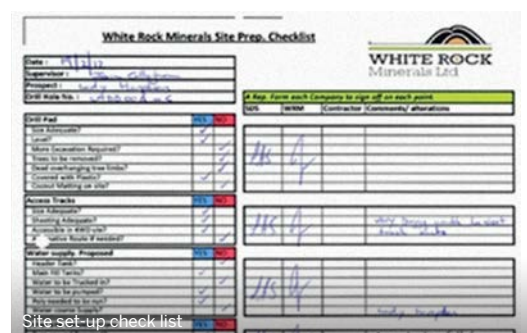
White Rock Minerals explores for silver and gold mineralisation in grazing areas comprising pastures to woodland terrain and associated State Forest in the Northern Tablelands of NSW.

Drilling exploration targets to define mineral discoveries, and ultimately mineral deposits, is every exploration company's aim. The key aspects of drilling campaigns include careful site specific planning, drill operator selection, early communication with landholders including compensation discussions, operations monitoring and constant contractor communication, and successful rehabilitation and restoration of sites.

Over a period of four years White Rock Minerals have developed and refined drill management practices to the satisfaction of authorities and stakeholders.

Drilling Preparation

- Exploration geologists, field technical employees and company management initially discuss how to best test the exploration target/s.
- Considerations include the program's social and environmental impact, heritage clearance, landholder discussion, regulatory requirements, access, site ecology, pad dimensions, earthmoving and rehabilitation requirements, safe work area, water source for diamond core drilling, containment and disposal of waste water and cuttings, and selecting the drill rig with best operating capacity but smallest footprint.
- Meet with landholders to discuss drill planning and compensation agreement.
- Alert authorities by submitting Surface Disturbance Notice EDG10 (SDN) and/or Review of Environmental Factors (REF) documentation. Carry out and document site heritage and ecological assessments.
- Allow 1 to 2 months processing time for regulatory approvals before commencing drill site preparation.
- Undertake drilling contractor selection process to ascertain the safest and smallest drill equipment footprint for drill site set-up.



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- Engage earthmoving contractors familiar with local guidelines for surface disturbance and access track construction.

Drill site construction

- Upon approvals, construct small footprint tracks and drill pads. Avoid clearing habitat trees. Stockpile vegetation and topsoil, covering the latter with coconut fibre matting to prevent wind and water erosion.
- Erect sediment fences downslope of drill pads and access tracks to contain any sediment load dispersion from rainfall.
- Underlay pads with thick plastic sheeting and bund perimeter. Overlay with coconut fibre matting for operators footing grip in wet conditions and absorption of potential drill fluid spills.
- Use above ground plastic portable drilling tanks and vessels to negate need for in-ground sumps.
- Once drilling equipment is transported to site, conduct site audit and risk assessment using checklist with contractor and senior geologist before operations commence.
- Induct operational personnel into the sensitivities required of operating on landholder property.



Drilling operation

- For each drillhole during initial shift operation, conduct a walk-around safety audit with drill supervisor using drill safety checklist. Remedy issues immediately.
- Communicate with drill operations staff at start/end of every shift and monitor drill mechanical safety and production daily reports.
- Conduct regular toolbox meetings involving all client and contractor staff to focus on operational safety and environmental compliance.

Drilling rehabilitation

- Monitor drill operator orderly egress from drill site.
- Arrange drill site and access track rehabilitation by articulated earthmoving vehicle to carefully distribute stored topsoil and re-contour area to original state.
- Document rehabilitation and clean-up using a detailed checklist.
- Stockpiled vegetation matter is replaced to promote early re-establishment of natural species grasses and tree seedlings by stabilising soil and adding natural nutrients.
- Arrange compensation to be paid as per agreement.
- Ensure rehabilitation maintenance of drill site is documented by photography and monitoring of its recovery at 3, 6, 12 and 24 month intervals.

White Rock Minerals has shown that by careful site specific planning, drill operator selection and early communication with landholders including compensation discussions, operations monitoring and constant contractor communication, successful rehabilitation and restoration of sites can be successfully achieved.

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Using Above-Ground Sumps for Air Drilling

Capturing and managing the water and mud discharged from cyclones and outside return hoses during air drilling is particularly important given current environmental conditions on Exploration Licences. Capturing the water and mud greatly reduces the visual impact of drilling, wetting of the ground around the rig (and subsequent disturbance), and rehabilitation time and cost. These measures can make drilling safer, cause less surface disturbance and are more acceptable to landholders.



Background

One of the prospects where Dargues Gold Mine (DGM) conducted reverse circulation (RC) drilling was on prime grazing land. The landholder had invested considerable time and money to grow high quality pasture for his stock and the last thing he wanted was damage caused by exploration. The drilling program plan also anticipated intersecting water in the holes. The program had to be managed to minimise the impact of the water, contained rock fragments and mud on the pasture, as well as generation of muddy conditions around the rig. DGM therefore had to undertake the drilling program with minimal disturbance in this difficult and sensitive area.

The Solution

One of the measures to minimise surface disturbance was to capture the water discharged from the cyclone and outside return hoses in an above-ground sump. As well as minimising disturbance, by containing the water the drill site stayed drier, more comfortable and safer.

The other integral measure was the use of a dust suppression system to capture both the sample and outside return material. The dust suppressor had two cyclones, one for the sample and the other for the outside return. The unit had a bin beneath the cyclones to capture the water and drain it into the above ground sumps.

Above-Ground Sumps

Above ground sumps can be made by forming a dam of hay bales or using a collapsible frame of 'form ply' and lining the structure with plastic. DGM uses form-ply sumps that can be used over and over again. This frame was affordable and easy to make, easily handled by one person, portable and allowed for quick clean-up upon completion of the hole. The above-ground drill sump system had the following components:

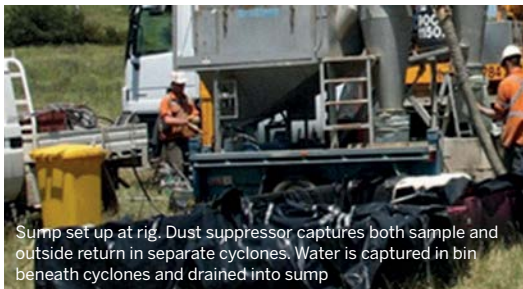
- Four 20mm thick plywood side panels approximately 600mm high (sheet of 'form-ply' cut in half lengthwise)
- The side panels joined at each corner with detachable fittings or hinges. Two methods of joining the panels are:
 - Each panel can be fitted with four steel rings at the end of sufficient diameter to allow a star picket to be passed through or
 - Heavy duty gate hinges, which can come apart on 2 corners and lever over latches on the other 2 corners DGM has used both systems, and both work equally well.
- Notches of sufficient size to accommodate a 150mm PVC pipe were cut into the top edge of the end panels
- Rolls of plastic of sufficient width to allow the sump to be lined
- A cable drive pump or syphon.

The sumps were assembled by joining the edges of two panels, passing a star picket through all four steel rings and driving it into the ground or inserting pins in hinges and securing the latches. This process was repeated to form a rectangular sump. The sump was then lined using plastic and the edges of the plastic held in place with clamps as required. The overflow pipe from the

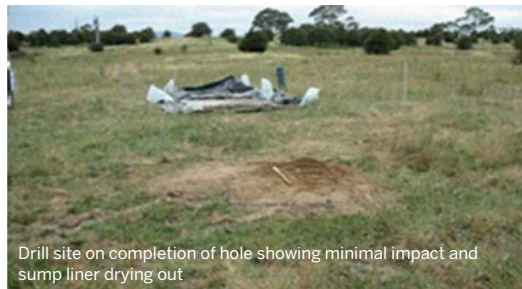
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Sump set up at rig. Dust suppressor captures both sample and outside return in separate cyclones. Water is captured in bin beneath cyclones and drained into sump



Drill site on completion of hole showing minimal impact and sump liner drying out



Form-ply sump showing hinges



Form-ply sump showing latches

dust suppression unit or cyclone and outside return hose were then directed into the sump. The outside return hose had to be restrained to prevent injury in the event of sudden movement.

Once the sump was full or near capacity and the water was sufficiently clear, it could be pumped or syphoned away from the work area if of suitable quality. If the water is not of suitable quality it should be retained until the sediment has settled or, if saline, should be disposed of at a suitable location. Criteria for releasing water, suitable disposal locations and the availability of required equipment (extra sump-building material and access to vacuum truck or similar) should be determined well in advance of the drill program and included in the Review of Environmental Factors prepared for the program. If in doubt about water quality, do not discharge until it has been tested.

In DGM's case, the water could be syphoned away down slope of the drill site. Every situation is different, but only clean water may be discharged onto the ground. If the volume of water intersected required greater settling time than could be achieved using a single sump, a second (or more) sump(s) could be setup in series.

Once the drill hole was complete, the sump was emptied of water and the sides removed. The remaining sediment was then left to dry, bagged and removed from site. The plastic liner could have been reused if undamaged, otherwise disposed of appropriately. The plastic liner was only left on the ground for a couple of days to reduce damage to the grass underneath. If the sediment was not dry it was bagged up wet or disposed of down the drill hole.

Containing the water in the sumps greatly reduced the wetting of the ground around the rig, disturbance to the ground by drillers walking in mud, visual scarring from rock fragment laden water flowing over the ground and overall drill pad rehabilitation times.

Once the program was complete, the landholder was happy with the minimal amount of disturbance to his pasture, a positive outcome for both parties.

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Managing Percussion Drill Samples

Good management of percussion drill samples is particularly important when operating in areas of high value agricultural land to minimise the impact of the collection, storage and disposal of samples on the agricultural operations and reduce the cost of rehabilitation.



Background

Unity Mining Limited (previously Cortona Resources Limited) has been conducting drilling campaigns on high value pasture paddocks in recent years. For these drilling campaigns to meet landholder expectations, the drilling activities must have minimal impact on the pasture. The landholders had invested a great deal of time and money to develop their pasture and stock and required minimal interference.

The Solution

Managing the collection, storage and disposal of drill samples is key to minimising the impact of percussion drilling operations.

Although samples are collected in plastic bags and laid in rows on the ground, percussion drilling involves several processes where chips and dust may be deposited on the ground due to spillage and venting of cyclone and outside return hoses.

Minimising disturbance and damage to the ground cover reduces the amount of rehabilitation and makes the drilling process more acceptable to the landholder.

Sample Management

To minimise the impact of the collection, storage and disposal of percussion samples on pasture, Unity incorporated the following steps into its drilling procedures:

- Using dust suppression to reduce dust and rock fragments blowing over the pasture
- Using above ground sumps to collect and manage water from the drill hole (see Case Study 3)
- Removing sample bags to a dedicated bag farm as soon as practical.

Dust Suppression

A dust suppression system greatly reduces the amount of dust and chips spilled from a conventional cyclone and the amount of airborne dust vented from the cyclone and outside return. An ideal dust suppression unit should have the ability to capture and filter both the sample and outside return material. It should also have a bin to catch dust and chip spillage and any water, which can then be drained into an above ground sump.

A dust suppression unit also reduces the amount of material to be cleaned up after drilling has finished and minimises the grey dust 'scar' from the cyclone and outside return hose.



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The handling of dust and spillages will depend on the particular dust suppression system used. Using black plastic beneath cyclones to catch spillage makes clean-up easier. Eliminating material falling on the ground significantly reduces the clean-up time and impact of the drilling.

Sample Bags

The short-term impact of storing the plastic sample bags on pasture is sweating and killing of the grass. The long-term impact on pasture is that the bags deteriorate over time, can be disturbed by stock and the clean-up process takes more time and money. Removing the sample bags to a suitable bag farm once the hole was complete minimised the impact of the bags on the pasture, reduced the rehabilitation time and cost and met landholder expectations.

The bag farm needs to be readily accessible and in a location that will not cause additional management and rehabilitation issues if bags are stored long term. Removing sample bags involves manual handling, and correct lifting techniques must be used. It is important to place the bags in ordered rows, with each labelled with hole number, in case further sampling is required. Bag farms are usually fenced to prevent interference from stock.

When the plastic sample bags are no longer required the bags may be recycled or disposed of in an appropriate landfill site.

Disposal of Reverse Circulation (RC) Chips

Disposing of RC chips can be difficult, especially if they contain sulphides or deleterious elements like arsenic or heavy metals. Under the Office of Environment and Heritage (OEH) Waste Classification Guidelines, material deemed to be contaminated has to be disposed of in a licenced facility. To determine the Waste Classification of the RC chips and whether they are 'contaminated' or pose a risk to the environment from leaching of elements or acid generation, the RC chips need to be analysed according to Australian Standard AS4439.3-1997. The analysis should be tailored to reflect the type of contamination risk.

The analyses are Specific Contaminant Concentration (SCC) for total metals and a TCLP leach at final pH 5 followed by ICP analysis of the leachate for metals. The results need to be analysed by an Environmental Consultant and a certificate provided as to the Waste Classification of the material. The OEH Waste Classification Guideline contains contamination tables with metal threshold levels.

The final Waste Classification will determine the disposal method.

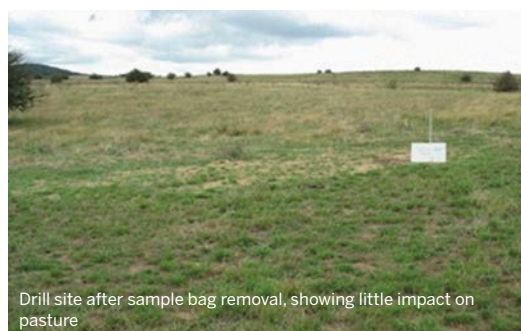
If the RC chips are to be stored at the project site, the waste classification will determine the appropriate measure, which will include storage in a bunded area and may include impermeable (plastic) liners and covers.

RC chip disposal needs to be planned for in the drilling program as it is very easy to accumulate many tons of material.

Conclusion

Good management of percussion samples is key to minimising the short- and long-term impacts of the sampling process and storage on the land, and to reducing the amount of clean up and disruption to landholder activities.

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Exploration Rehabilitation in Native Woodland

Close-spaced drilling in heavily timbered environments can cause significant disturbance to soil, shrub and tree habitat layers. Alkane Resources Ltd has demonstrated successful woodland rehabilitation on its mining lease at Peak Hill.



Background

Exploration activities should always aim to minimise impacts on biodiversity. However, removing whole trees can be unavoidable when close-spaced drilling is required.

Rehabilitation of disturbed areas can be rapid, provided care is taken with handling and stockpiling of woody material and topsoil when vegetation is cleared. Note that major disturbance of woodlands does occur naturally, usually as a result of fire or wind storms.

Preparation in Woodland Area

Alkane consulted landholders from the planning stage right through to rehabilitation and provided clear information regarding the anticipated level of disturbance. Alkane also consulted with relevant government agencies and obtained all approvals necessary before commencing work.

Alkane's drill lines were planned and clearing of the minimum area needed for safe access and working area was undertaken. The equipment was matched to the task and the smallest and least surface disturbing equipment was used in the native woodland. The timber and topsoil were stockpiled separately. A bobcat or traxcavator effectively stacked timber when clear working space was scarce.

Alkane installed erosion control structures on steep land. Contour banks diverted storm waters into the more stable undisturbed woodland.

Rehabilitation in Woodland Area

Once drilling was complete, the land surface was restored as soon as possible. Subsoil and topsoil were returned and the trunks and crowns that had been stockpiled were spread over the disturbed area. Again, the equipment was matched to the task.



Drilling in this woodland required completely removing trees. Trunks and crowns were spread over the disturbed area

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As for any native woodland rehabilitation project, introduced pasture species were avoided. Adequate native species were naturally contained within the topsoil, which had been stockpiled correctly for the minimum period necessary. Roughing the surface created microhabitats for native plants and animals to re-establish.

Regular monitoring was carried out. Where introduced pest, plant and animal species occurred in the area, control measures were implemented to improve biodiversity outcomes.

Thanks to effective fencing and rehabilitation strategies across the whole mine site, two additional species of macropods were recorded in the area following the operation.



Grasses, trees and shrubs naturally regenerate through the tree trunks and crowns

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Successful Drilling Rehabilitation in State Forests

Drilling in State Forests requires negotiation with Forestry Corporation of NSW district officers and lessees for regulatory approvals. Special attention is paid to flora and fauna in construction of drill pads and best practice rehabilitation is undertaken after drilling cessation. White Rock Minerals Ltd undertakes successful drilling rehabilitation on its exploration and mining leases in northern NSW.



Background

White Rock Minerals explores in State Forest and woodland terrain of the Northern Tablelands of NSW. Successful rehabilitation of drilling sites is a combination of initial communication with Forestry Corporation officers, Forest lessees, drilling contractors, and ecologists followed by best practice management of planning, site construction, operation, and final restoration.

Local Forestry Corporation officers know their terrain and offer key guidance to minimise potential impacts on flora and fauna. Compensation for track construction and unavoidable tree removal is negotiated in an agreement that spans from months to several years depending on the life of the exploration drilling program.

Preparation in State Forests

- Meet Forestry Corporation Officers and/or forest lessees, such as graziers and beekeepers, on site to discuss drill planning and compensation payable prior to drafting an agreement.
- Submit Surface Disturbance Notice EDG10 (SDN) and/or Review of Environmental Factors (REF) documentation depending on Category 2/3 (drilling) activities in Forest Management Zones.
- Carry out a site ecological assessment to submit with the REF. Heightened awareness of flora and fauna sensitivities are vital before operations can begin.
- Allow 1 to 2 months for regulatory approvals before starting drill site preparation works.
- Consult with the drilling contractor to ascertain safest and smallest drill equipment footprint site set-up.
- Engage earthmoving contractors familiar with Forestry Corporation guidelines for surface disturbance and access track construction.
- Upon approvals from agencies cited, construct small footprint tracks and drill pads. Avoid clearing habitat trees. Stockpile vegetation and topsoil, covering the latter with coconut fibre matting to prevent washaway and sediment runoff in wet conditions.
- Prudent sediment fencing downslope of drill pads and access tracks is essential to prevent and contain any sediment load dispersion from rainfall runoff.
- Perimeter bunded pads to be underlain by thick plastic sheeting and overlain by coconut fibre matting for grip in wet conditions and absorption of potential drill fluid spills.
- Above ground plastic portable drilling tanks and vessels negate need for in-ground sumps.
- Induct operational personnel into the sensitivities required of operating in State Forests.



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Rehabilitation

- Once drilling has finished and equipment removed, all plastic sheeting, liquid drill contaminants and stored drill cuttings are collected and disposed of at the nearest waste facility. Coconut fibre matting is collected and can be recycled up to 3 times.
- Drillhole PVC collars are trimmed, plugged with cement, impregnated with pieces of iron and buried up to 400mm below the re-contoured surface. The iron helps to detect buried collars by metal detectors if required in future.
- Each drill site and access track is rehabilitated by an articulated earthmoving vehicle such as a backhoe to carefully distribute stored topsoil by re-contouring to original state. Stockpiled vegetation matter can be replaced to promote early re-establishment of natural grasses and seedlings by stabilising soil and adding natural nutrients.
- Post rehabilitation photography and monitoring of site recovery and associated downslope sediment fencing can be maintained at 3, 6, 12 and 24 month intervals.
- Compensation is agreed upon between the explorer and Forestry Corporation. Post drilling inspection by Forestry Corporation officers is encouraged.

White Rock Minerals has shown that by co-operative discussions with Forestry Corporation operatives, State Forest lessees, drilling contractors, earthmoving contractors and company field staff, successful rehabilitation and restoration of sites disturbed by drilling can be successfully achieved and documented.

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Appendix 8 Case Studies



CASE STUDY
September 2013

Successful Rehabilitation on Steep, High Rainfall Terrain

Drilling on steep but highly productive farmland requires careful negotiation with the landholder, as well as extra attention to establish stable and permanent rehabilitation of access tracks and drill pads. Alkane Resources Ltd successfully undertakes exploration activities in sensitive landscapes.



Background

Drilling in steep, high rainfall terrain (particularly in winter months) can require significant disturbance to established pastures to create safe access tracks and level work areas.

Preparation for Drilling

Alkane's top priority in planning a drilling program in difficult terrain was to discuss the issues honestly with the landholder. The anticipated level of disturbance was clarified and the timing for the drilling program and rehabilitation plans were communicated clearly from the outset to ensure the landholder's expectations would be met.

The landholder's local knowledge was critical when planning access and rehabilitation. Farmers know their land intimately and understand which pasture species establish in their district under specific seasonal conditions and usually have clear preferences.

Finally, all relevant approvals were obtained for each program prior to site preparation commencing.

The Drilling Program

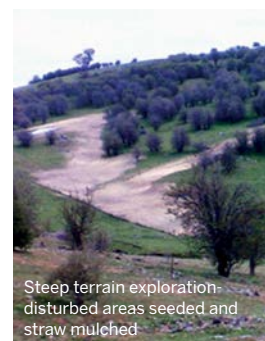
Safe access was created by stripping pasture and topsoil to one side of the access track. Alkane established erosion and sediment control structures, which were appropriate to conditions and terrain.

Rehabilitation

Prompt site clean-up and re-establishment of final landform was essential to minimise disturbance and meet the landholder expectations.

In consultation with the landholder, the preferred pasture seed and fertiliser were spread as required. Inoculants and seed protection coatings were used, as recommended, to minimise insect attack.

Alkane has worked on other projects on certified organic farms, which have very stringent standards controlling what chemicals can be used on their land. When operating in these environments careful discussion between the company, the landholder and the contractor ensures all products brought onto the property comply with their certification. These standards must be carefully explained to all personnel.



Steep terrain exploration disturbed areas seeded and straw mulched



RC drill rig on steep, high rainfall terrain

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CASE STUDY

Straw mulch and hydro-seeding of steeper areas were carefully considered. Although there was a higher initial cost, these methods proved to be the lowest risk method of pasture establishment. Temporary fencing was established around rehabilitation to prevent livestock damaging the pasture regrowth. Solar powered electric tape fences were quick to erect and highly portable and so were used repeatedly.

The landholder was promptly compensated following completion of the exploration activities, including lost production of disturbed areas until the rehabilitation was mature enough to take stock. Compensation payable for the period of lost production was equated to the rate for agistment of livestock at \$/head/Ha/day.

Good practices in initial drilling programs built the trust necessary to ensure access to farming and grazing properties for later operations.



Temporary electric fencing protects the rehabilitating areas from grazing animals



Rehabilitation progress on access track two years after disturbance

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