



A framework for preventing water quality impacts on streams from mining

Key points of this fact sheet

- The framework is intended to enable informed decision-making on proposed mining operations, specifically around minimising impacts on streams.
- The framework has been developed in conjunction with stakeholders and end-users to ensure that practical aspects for decision-making are addressed.
- The framework is based on scientific research on rock geochemistry, aquatic chemistry, freshwater ecology, aquatic toxicity, and management and remediation techniques for mining.
- The framework is intended for all parties involved in decision-making for mining operations ranging from the mine operator to regional councils and the Department of Conservation.

Mining in New Zealand is an important part of the economy being valued at \$1.5B/year, excluding petroleum (Crown Minerals 2007). Mining has been part of New Zealand's history since the 1800's and produces gold, coal, aggregates, industrial minerals, limestone and iron sands. However, mining can have significant impacts on the environment; therefore mining must be managed in a way to minimise those impacts and ensure environmental sustainability.

A framework to assist with planning of future mine developments on the West Coast and in Southland has been developed as part of a collaborative research programme. This framework draws together research on rock geochemistry, aquatic chemistry, freshwater ecology, aquatic toxicity, and management and remediation techniques for mining.

It was developed in conjunction with stakeholders/end-users including Department of Conservation, West Coast Regional Council, Environment Southland, Solid Energy NZ Ltd, Oceania Gold, Francis Mining and consultants. This framework is intended to enable informed decision making for proposed mining operations, specifically around minimising impacts on streams.



What is the framework?

The framework, on the following page, is a flow chart outlining a series of steps to determine the likelihood and extent of impacts on aquatic systems from mining, and underlying detailed information. In the framework, water quality is the key parameter enabling prediction of the likely ecological impact and selection of management or remediation options.

While the focus of the framework is for new mining operations, the information provided is also relevant for existing mining operations, or selection of remediation options for historic mining operations.

The framework does not establish explicit 'acceptable' water quality criteria because these are likely to be different at different sites and because there are social, economic and cultural factors that may also influence decision-making.

Instead the framework provides a robust scientific basis for this decision to be made by end-users, either for internal purposes (e.g. mining company) or during regulatory decision-making processes.



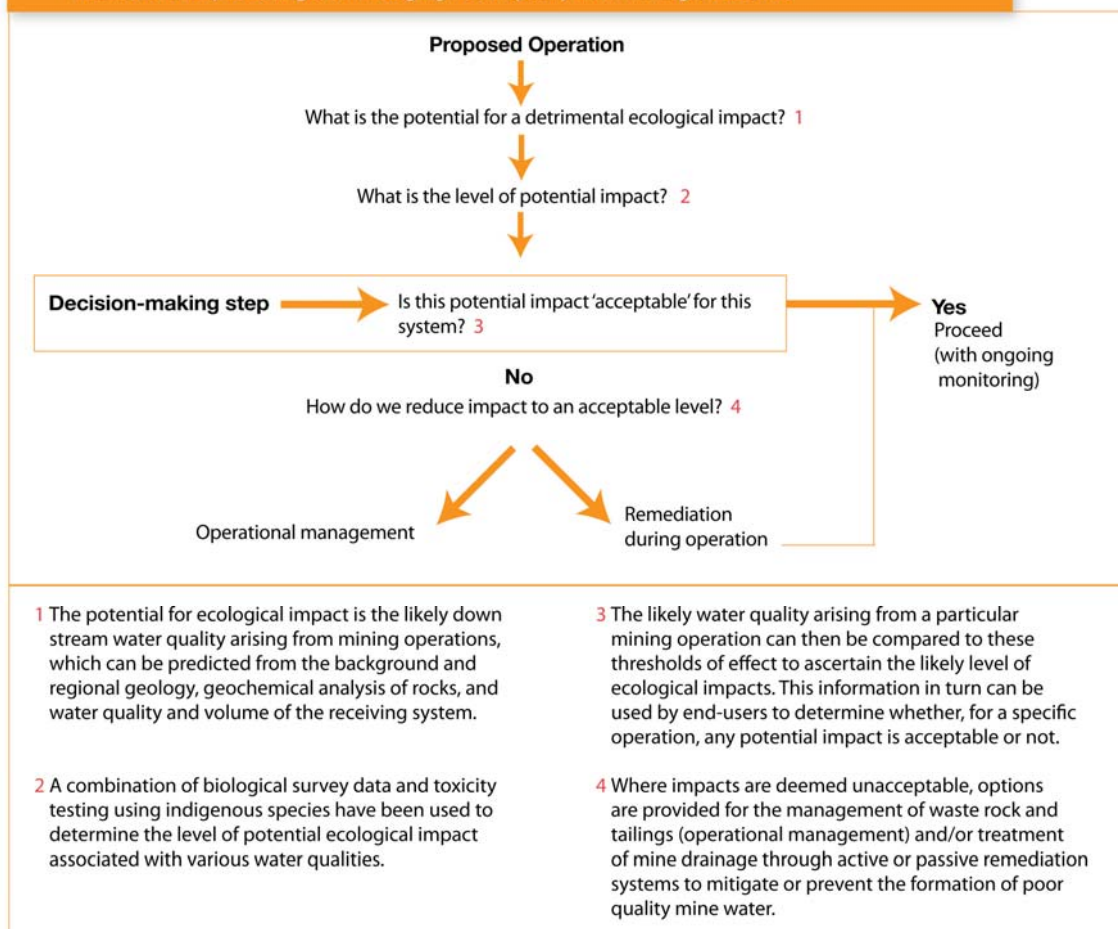
The consequences of poor management of acid mine discharge. Left, upstream of acid mine discharge. Right, iron oxide coating present on rocks downstream of acid mine discharge.

This fact sheet is part of series relating to a framework for predicting and managing the water quality impacts of mining on streams.

The framework was developed as part of a collaborative research programme aimed at helping mining companies, councils and other end-users make more informed decisions about the possible environmental effects of mining on streams and how to reduce those effects. Stakeholders and end-users assisted in the development of the framework which explains:

- how you can assess the likely water quality coming from a mine,
- the impacts that mine water will have on stream life,
- options for management or treatment of mine drainage and
- guidance on how best to monitor mine discharges.

Framework for predicting and managing water quality from mining on streams



The framework includes details on predicting downstream water quality for mine operations on the West Coast and in Southland and specific information on four mine groupings: coal – potentially acid-forming (PAF), coal – non-acid-forming (NAF), gold – alluvial, and gold – hard rock. For each of these groupings the framework provides a more detailed discussion of the likely water quality, potential ecological impact and options for management and remediation to reduce aquatic impacts.

The framework also provides information on water quality and biological monitoring that should be undertaken as part of ongoing monitoring of mining operations. This includes substances to be monitored, frequency of sampling and techniques for biological monitoring. An overview of the potential impacts of extreme events such as high rainfall events and tailings dam failures on streams, and how these events

may need to be considered during planning of mining operations, is also included. Finally, a set of appendices provides detailed technical information that underpins the suggested processes.

Who can/should use the framework?

The framework is intended for all parties involved in decision-making for mining operations ranging from the mine operator to regional councils and the Department of Conservation. It can be used by mine operators to assist with internal decision-making, as well as for regulatory decision-making.

More information on the framework and underlying research is available from other fact sheets in this series and at: http://www.crl.co.nz/research/mine_drainage.asp.

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