STRATERRA™
NATURAL RESOURCES OF NEW ZEALAND

# Minerals Briefing Paper 2014

## Policies for increasing New Zealand's attractiveness for investment in responsible minerals exploration and mining.

*We borrow the land, mine it, and return it*

**mining4nz.org.nz**

# Contact us



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Cover photo: © Stewart Nimmo Gallery, Greymouth.
Working face, and rehabilitated mine workings.
Macraes gold mine, East Otago.

We borrow the land, mine it, and return it.

# About Straterra

## Straterra is the voice for the New Zealand minerals sector

Our members comprise minerals producers and explorers, research providers, equipment suppliers, engineering and geotechnical firms, mining professionals, and firms providing legal, accounting, environmental and other ancillary services.

Our goal, as a sector, is increased investment and growth in minerals exploration and mining in New Zealand. With favourable conditions, we believe the NZ minerals sector could treble in output and on-the-ground investment over coming years.

This goal is based on the observation that mining today is a hi-tech industry, employing skilled people, and producing essential materials, safely and responsibly.

We believe that to achieve our goal: the public, media and political understanding of resource sector activity must improve; and the regulations that govern our activities, including the implementation of those regulations, must be transparent, industry logical, and effective. We achieve our goal by participating in public policy processes; engaging with officials, politicians, stakeholders, Maori, industry, and the public; and advocating for the sector, at events and forums, and via the media.

Equally important is our encouragement of high standards across the industry in health & safety, and in environmental management.

These principles are set out in our Charter. Straterra places importance on a collaborative, reasonable, informed and responsible approach to engagement with government and the public on resource sector issues.

Many outcomes or decisions we seek are societal outcomes. Straterra does not presume to capture or usurp the relevant processes. We do wish to ensure that all relevant information is considered, so that good decisions are made. Straterra has a key role in making that information available.

## About The Minerals Briefing Paper

Straterra has prepared this paper to explain the nature of the New Zealand minerals sector and the challenges we face, and to provide recommendations for action.

We believe that a set of policies is required to improve New Zealand's attractiveness for investment in minerals exploration and mining. We as a sector are poorly suited to a piecemeal, incremental approach. We believe that the most effective way of developing policy is for government to work in partnership with industry.

The basis for seeking improvements in policy is set out in section 1A (1) of the Crown Minerals Act 1991: "The purpose of this Act is to promote prospecting for, exploration for, and mining of Crown owned minerals for the benefit of New Zealand."

## Actions for Government

### To improve NZ's attractiveness for investment in minerals exploration and mining:

1. A plan for promoting minerals exploration and mining in NZ
2. Integrated and effective regulation, and cost-effective and transparent processes
3. Aerial geophysical survey coverage for all of NZ - $70m over 5 yrs
4. Tailored approach to mining and exploration approval processes
5. Informed debate – mining is hi-tech and environmentally responsible
6. Health and safety regulations that are effective and fit for purpose
7. Coal's importance to NZ recognised in the transition to a lower-carbon economy
8. Tax and royalties regimes kept internationally competitive
9. Efficient allocation of research funding, via the NZ Minerals Research Strategy

# A Word From Our CEO

*NZ ironsands and coal are used to make steel at Glenbrook*

*Meridian Energy's West Wind facility at Makara, with components made at Glenbrook*

## Minerals lie at the heart of modern society, and the New Zealand economy and society is no exception. As the saying goes – you either grow it, or you dig it.

Fortunately, New Zealand has good minerals prospectivity for precious, base and strategic metals, industrial minerals, aggregates, and coal. Against that, mining is difficult, specialised and capital-intensive.

New Zealand attracts less investment in minerals than ought to be the case, despite recent reforms. Further changes are needed to government policy and administration of regulation. As a society, we would benefit greatly from a more mature debate about business and investment, including in minerals. Government needs to work in partnership with industry when developing and implementing regulatory regimes.

Without these changes, New Zealand will not make good use of our resource endowment and, in fact, risk a decline in minerals output, long term, with decreased export revenue, and in a world hungry for resources.

When the minerals industry resolved to set up Straterra, we did so because we recognised these challenges, and the need to build a well-resourced, professional organisation to work with a supportive government to meet those challenges. We are in that space now, better information is available, and we can raise the level of the debate.

Straterra has prepared this Minerals Briefing Paper to present the case that it is in New Zealand's national interest to promote and manage our minerals well. This paper sets out our industry's views on the range of issues and initiatives that, if acted upon, would contribute to more investment in the minerals sector.

I commend this paper to your attention, and I trust that the information herein, and the industry's recommendations, positively inform the consideration of policies that affect the minerals sector.

With favourable conditions, I believe New Zealand could treble output and investment in minerals exploration and mining over time, and thus gain the benefits from increased economic activity in our highly-productive, regionally-based and export-focused industry.

Chris Baker

CEO

Straterra Inc.

# Executive Summary

## With a plan for promotion, and better policies and regulation, minerals investment and output could treble in coming years.

Minerals exploration and mining is a global business that makes an integral contribution to the New Zealand economy. The sector is highly productive, provides high-reward jobs for New Zealanders, produces vital inputs for industry, and adds significantly to our exports.

Coal is a case in point, as an important input in New Zealand into: steel and cement-making; dairy, meat, fish and other food processing; breweries; horticulture; wood, timber, and wool processing; heating of schools, hospitals and other large facilities; manufacture of smart materials; and generating electricity.

New Zealand has significant potential on land in gold, coal, ironsands and other metals, and industrial minerals; and offshore in rock phosphate, ironsands, and precious and base metals, methane hydrates and other resources. While industry currently faces a commodity price downturn, in the medium and long term, global and domestic demand for minerals, driven significantly by China and other Asian countries, is expected to continue.

Industry's challenge is to position itself in this market. It is a growing challenge because the easy-to-find resources have been mined, and society's expectations have risen. As a consequence, technologies continue to advance, to discover and unlock resources that were previously not accessible or amenable to processing,

> New Zealand must compete globally for minerals investment – that is the policy challenge for government.

and to manage costs. Exploration and mining today is a hi-tech industry, employing skilled people across many disciplines.

Exploration is the life blood of mining – we must have an active exploration sector if we are to realise the contribution mining can make to the New Zealand economy. Regulation on land needs to reflect the low environmental impact of exploration drilling, as is the case in the oceans.

Overall, the minerals industry is capital intensive, with long lead-in times, and, sometimes, high returns. It is a high-financial risk, high-reward business, and investment in the sector is specialised and global in reach. New Zealand must compete globally for minerals investment – that is the policy challenge for government.

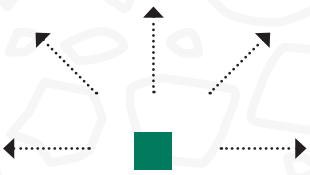
As matters stand, New Zealand is relatively attractive as a place to invest on political, policy, rule of law, and lifestyle indicators. But we do less well on certainty of environmental regulation. We could also improve on pre-competitive knowledge of resources, on access to resources, and the administration of the regulatory regimes.

### MINING BOOSTS REGIONAL INCOMES


**40%**

*of West Coast regional GDP is earned directly and indirectly from mining – mainly gold and coal*

### HIGH WEALTH FROM SMALL LAND FOOTPRINT



**0.05%**

*of NZ's land area is mined: 134km² of 268,000km²*

*If the A4 page you're viewing is the land area of NZ, this small square represents the area that is actually mined*

# Executive Summary

## HUNDREDS OF MINERALS USED IN THE HOME EVERY DAY

- CONSTRUCTION
- WIRING, PLUMBING
- FURNISHINGS
- APPLIANCES
- ELECTRONICS

**The purpose of the Crown minerals regime is to promote the minerals sector for the benefit of New Zealand - a plan or strategy, with government and industry collaboration are needed for this promotion to be effective.**

With favourable conditions, including implementation of the recommendations herein, Straterra believes the minerals sector could treble in investment and output in coming years. Improvement is needed in New Zealand's investment environment to achieve this goal.

It is accepted there is a level of opposition to some or all types of mining in New Zealand. The concerns include: climate change; effects on the environment, human health, and on special places; and extinction of native species. Events such as the Pike River tragedy have affected the industry's reputation.

That said, public opinion surveys conducted in 2012 and 2013 reveal more than 80% support for minerals development in New Zealand, provided: the environment is managed, locals are employed and most of the money stays in New Zealand. We say all of that is the case today.

New Zealand's resource management system – unnecessary and burdensome red tape aside – provides environmental safeguards for society that is the envy of many nations. This regime provides a forum that requires robust and effective stakeholder consultation on mining proposals, and consideration of the range of interests, often competing, in reaching a decision on the granting of consents, and associated conditions. What the regime does not provide is certainty of process.

We face and require high standards as an industry. The health and safety, and the RMA reforms in which we are engaging with government are examples of that.

Minerals wealth comes off a very small footprint – no other land-use earns nearly as much per hectare. Even if New Zealand's total mining and quarrying footprint on land were to treble, that area would still be less than the area of exotic forest felled every year in New Zealand, or individual South Island high country stations. Consider that 40% of regional GDP on the West Coast comes directly or indirectly from mining, off a footprint of 14km$^2$, compared to the total area of the region of 23,000km$^2$.

Straterra has a role in making information about the minerals industry more widely known, as does government. This is occurring, with sector reports, web site information, investment summits and more. Our aim is to change public understanding and the discourse around mining in New Zealand, to enable a mature and pragmatic discussion and sensible, effective policies that encourage responsible exploration and mining, for the benefit of New Zealand.

# Actions For Government

## Straterra's 24 recommendations for improving New Zealand's attractiveness for investment in the sector confer responsibilities on both government and industry.

Straterra has been established to be a credible and effective partner with government. Industry must earn, and maintain, the right to work in partnership with government. We believe we have done that, and we ask government to recognise this status and work with industry when developing policies, legislation and regulation, when improving the administration of regulation, and when promoting the sector – this is essential to improving attractiveness for investment.

### 1. A plan for promoting minerals exploration and mining in NZ

Introduced in 2013, section 1A (1) of the Crown Minerals Act 1991 says: "The purpose of this Act is to promote prospecting for, exploration for, and mining of Crown owned minerals for the benefit of New Zealand".

The Minerals Programme for Minerals (Excluding Petroleum) 2013 explains this statement: (1) minerals interests are able to carry out their activities "as readily as possible within the mandate and provisions of the Act"; (2) government is to "publicise and encourage interest and investment" in our sector, and (3) government minimises "sovereign risk for investors by providing for a stable and coherent regulatory regime".

The new regime clarifies that the Crown's purpose as an owner of minerals is for its minerals to be effectively and efficiently explored and developed. What is needed now is an action plan to put these good intentions into effect - there is much to be done. Straterra welcomes the opportunity to work with officials to that end. This briefing paper, and our other recommendations for action help inform that work.

### 2. Integrated and effective regulation, and cost-effective and transparent processes

#### Simplifying And Streamlining Of Regulation

The Government has sought to simplify and streamline regulation, however, there is more to do:

a) Alignment of resource consent, concession, and access arrangement processes for exploration and mining on public conservation land, at least for significant proposals, is necessary to avoid regulatory duplication and overlap.

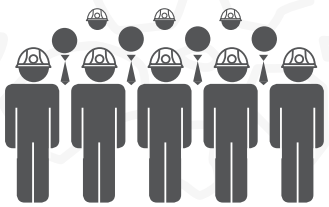
b) The proposed reforms of the Resource Management Act 1991 need to continue: to speed up planning and consenting processes; reduce costs to applicants; and provide an effective and workable regime for freshwater governance and management. The seemingly endless ability to appeal decisions must be stopped. We look forward to the next RMA reform Bill.

**$1.1bn**

*EXPORT EARNINGS PER ANNUM*

**8000**

*DIRECT AND INDIRECT JOBS IN NZ*



# Actions For Government

## NZ Mining: Global Rankings

Every year the Fraser Institute, a Canada-based think tank, conducts a survey of global mining company perceptions of doing business in jurisdictions around the world. NZ 's rankings against selected indicators in 2013-2014 are listed below (cf. 2012-2013):

### The Good

11th - legal system (13th)

### The Middling

28th – infrastructure (19th)

33rd - geological data (12th)

34th - political stability (18th)

41st - minerals prospectivity under current practices (29th)

44th - tax system (23rd)

### The Unacceptable

44th – regulatory certainty (36th)

79th - certainty of environmental regulation (75th)

The negative perceptions of New Zealand environmental regulation may reflect the "legislative labyrinth" – the five laws covering environment and heritage on conservation land affecting exploration and mining companies – and poor administration of regulation compared to Australia.

www.fraserinstitute.org

c) Minerals exploration drilling on land should be classified in RMA plans as a permitted activity, as is the case in the oceans, subject to standard conditions, e.g., management of freshwater, occupation of space, remediation of disturbed ground. The effects of a drilling programme, as a rule, are no more than minor, wherever it occurs. This matter should be given priority in work towards greater national direction under the RMA.

d) The Conservation Act 1987 is overdue for review to improve business-related provisions. Mining access to conservation land is regulated under the Crown Minerals Act 1991 (subject to conservation and economic criteria), and the Conservation Act; however, there is no provision in that Act for businesses in the definition of conservation or in the Department of Conservation's functions. While the General Policies 2005 and Conservation Management Strategies provide some alleviation, these statutory instruments cannot derogate from the Act.

e) The replacement of the Historic Places Act 1993 with new legislation will deliver improvements on processes for authorities for modifying archaeological sites and heritage.

### Effective Administration Of Regulation

New Zealand scores the lowest among Australasian jurisdictions for administration of natural resources and rights to minerals regulation, despite scoring the highest for policy design. This is unacceptable and unnecessary, and is a deterrent to investment. We recommend the following actions for government:

f) Regulators and industry to work in "partnership", and in good faith, to enable a transparent interpretation and administration of regulation, that is efficient and effective when assessed against the purpose of the CMA, and those of other relevant legislation;

g) Clear and transparent criteria for administration of the Crown minerals regime, for consistency with the purpose of the Act, and to remove unnecessary or unwarranted constraints on business activities while continuing to face high environmental and safety standards (refer to Action 1);

h) Effective inter-agency co-ordination, to deliver on government policies for the minerals sector;

i) Reasonable compliance costs for industry;

j) Statutory time frames (with leeway as appropriate) for all relevant regulatory processes.

# Actions For Government

## 3. Aerial Geophysical Survey Coverage For All Of NZ – $70M Over 5 Yrs

Public investment in basic research, which investors find difficult to justify, leads to increased exploration interest where this work is done, e.g., South Australia. A Budget bid would be required to fund this work to provide comprehensive aerial geophysical survey coverage of New Zealand, and complement existing data sets. This work could cost circa $70 million in total, but would be staged over a number of years, and prioritised, as has been the case for this work done to date.

## 4. Tailored Approach To Mining And Exploration Approval Processes

Mining on land and in the oceans is best suited to a case-by-case approach, recognising the small footprint of mining, the very high value earned off that footprint, and the unique nature of every mining proposal. This allows an assessment at proposed mine sites of the potential economic benefits, the environmental values, and how they could be managed in the context of any development.

The Resource Management Act 1991 provides the appropriate framework for effects-based consideration of mining proposals on land and in the oceans out to the 12 nautical mile limit, as does the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 over New Zealand's broader marine jurisdiction. On conservation land, conservation-related legal tests apply. All of that is as it should be, noting the need to remove bureaucratic red tape (Action 2).

In general, zoning restrictions are unnecessary and unsuitable for regulating exploration and mining.

Any moves towards marine reserves legislation in the EEZ will need to take into account the very small footprint of mining activities, especially when compared with the area of the oceans, or marine habitats. We would support a regime that provides for effects-based consideration of activities where the environmental effects are manageable in a way that is consistent with the purpose of marine protected areas or reserves.

In the case of most exploration activities, e.g., drilling of rock core, the environmental effects are no more than minor, and should be permitted everywhere on land, subject to standard conditions, as is the case in the EEZ (refer to Action 2 (c)).

## NZ v Australia Regulatory Scorecard

In 2012 the Minerals Council of Australia and Straterra commissioned URS Australia to prepare a "Scorecard of mining project approval processes" for Australian States and New Zealand, for 2012.

Minerals exploration and mining approval processes were considered under four headings: environment; mining; land access; and other, e.g., freshwater, cultural heritage.

NZ scored *highest* in Australasia for policy and regulatory design, and *lowest* for policy and regulatory administration.

NZ scored *highest* for the design of: institutional frameworks, clear processes, and stakeholder input and appeal rights.

NZ scored *lowest* for the administration of: timeliness, and compliance costs.

NZ scored *highest* overall for freshwater management, and engagement with indigenous peoples.

New Zealand's poor administration of regulation is unnecessary and unacceptable. Examples:

- Crown minerals regime;
- Commercial activities on public conservation land;
- RMA planning and consenting regimes;
- Interaction of these regimes

# Actions For Government

## 5. Informed Debate – Mining Is Hi-Tech And Environmentally Responsible

Political debate on minerals exploration and mining should be based on facts and evidence, and this does not always occur.

a) The Government's efforts to communicate the facts and evidence are supported, for example, the recent reports in which the New Zealand minerals sector is showcased or discussed.

b) Straterra aims to influence the public discourse on mining in New Zealand, and this briefing paper has a part to play in achieving that aim, as well as improved web site content and other information resources and activities, on minerals and mining.

## 6. Completed Health And Safety Reforms

Work is well progressed towards completing the Government's health and safety reforms following the Pike River Coal tragedy. Government has pursued an exemplary process of engagement with industry, to bring industry technical expertise to bear in amending legislation, and developing regulations, codes and guidelines. We look forward to this work, and model of engagement, continuing.

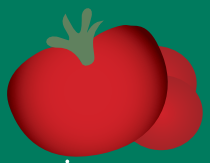
Industry, via its health and safety council, MinEx, has a mandate to deliver better health and safety practices at workplaces, and to drive continuous improvement in the industry's performance on health and safety. We ask the regulator, Worksafe NZ, to continue working with MinEx, in the settling in of the new regime, and in its administration generally.


*Photo: Kit Wilson. Hazardous chemicals management, Martha mine*

## NZ Food Production Needs Coal

### Think about the next meal you eat….

Coal and gas in the form of heat are important in food growing and processing because coal in the South Island, and coal and natural gas in the North Island, are approximately one-third the price of electricity. Other energy sources – e.g., LPG, light fuel oil, wood chips or pellets – could narrow the price gap but that would depend on availability and scale, and further research.



TOMATOES
*and other hothouse horticulture produce*

CHEESE
*and other dairy products*

MEAT
*and fish*

# Actions For Government

*Photo: Kit Wilson. Underground geologist Shannon Richards' office is 340 metres below the surface*

## 7. Coal's Importance To NZ Recognised In The Transition To A Lower-Carbon Economy

Coal is a very cost-effective source of heat, and in some cases mineral carbon, for many industrial processes in NZ – including dairy, meat, wool, timber, and steel. It is also an emissions-intensive fossil fuel. The challenge for New Zealand is how to resolve these tensions when developing or reviewing energy strategy on: affordability, security and efficiency; and environmental impact including climate change policy. Calls for a ban on all new coal mines are unrealistic, and potentially damaging economically – particularly for major users in the South Island, and for our exports.

## 8. Tax And Royalties Regimes Kept Internationally Competitive

a) Draft income tax amendment legislation is looking to be largely fit for purpose, in respect of "listed industrial minerals", following a largely favourable Select Committee report-back to Parliament in late 2013. That is broadly supported.

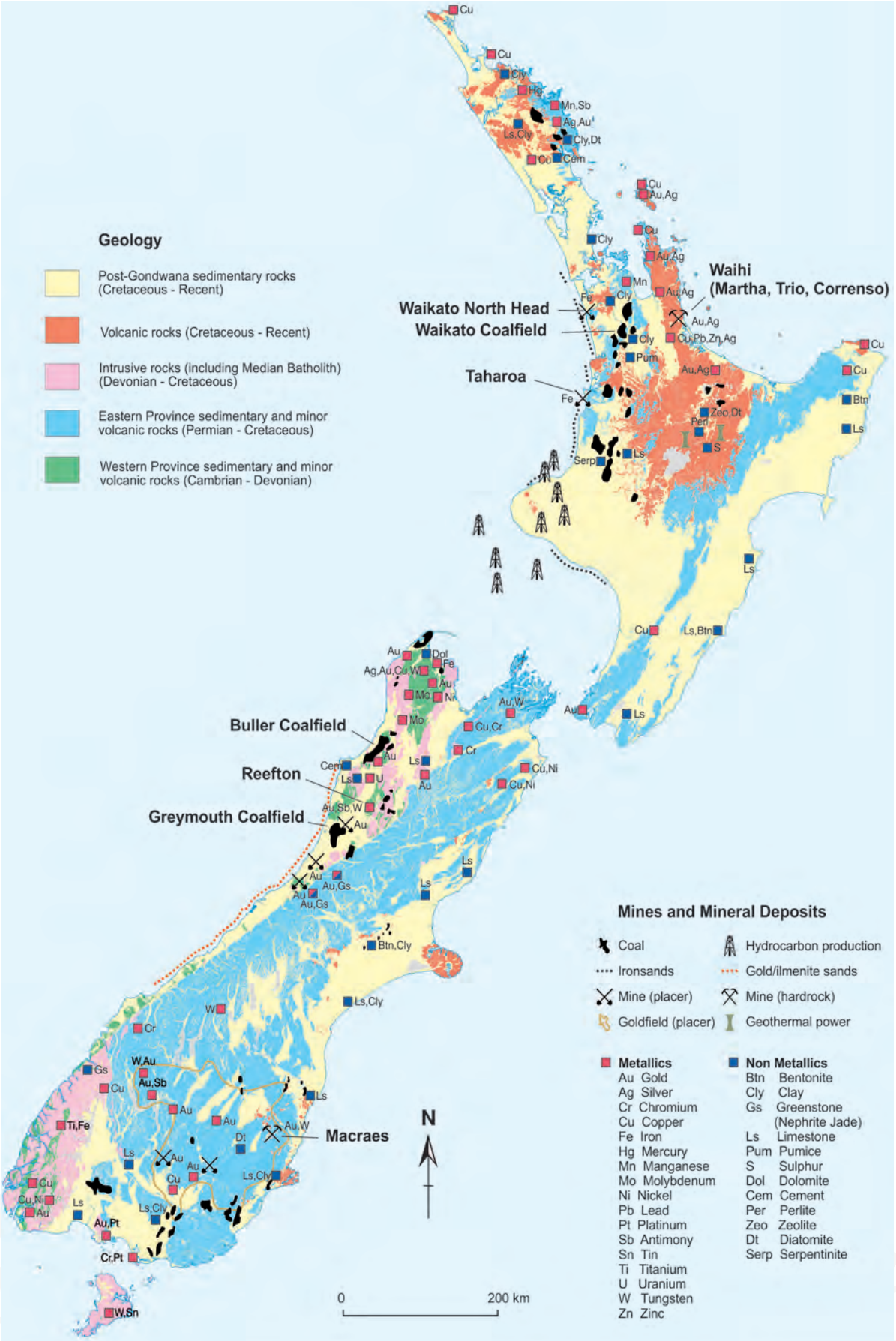
b) The new royalties regime is acceptable as it now stands, as providing revenue to the Crown while remaining internationally competitive.

c) From time to time the question arises of whether or not a portion of Crown royalty revenue should be allocated to the regions where mining occurs. Provided that such a proposal did not affect overall royalty rates, there is merit in this suggestion.

## 9. Efficient Allocation Of Research Funding, Via The NZ Minerals Research Strategy

a) New Zealand universities and other earth sciences research providers are developing a proposal for a Centre of Research Excellence in "earth deformation, resources, and geophysical exploration". This initiative, and initiatives like it, deserve to be supported, to pool scarce research capability and capacity, and funding in New Zealand.

b) The minerals industry; the Ministry of Business, Innovation and Employment; and the science providers are to finalise the New Zealand Minerals Research Strategy. A tripartite liaison group needs to be established to give effect to the MRS.




*Geology, mines and mineral deposits of New Zealand. Figure 1 in: Christie, A.B.; Barker, R.G. 2013: Mineral, coal and petroleum resources: production, exploration and potential. Chapter 2.3, pp. 300-329 in: Dymond, J.R. ed., Ecosystem services in New Zealand: conditions and trends. Landcare Research, Lincoln, Manaaki Whenua Press.*

## Mining is difficult and specialised, technically and financially.

This is largely because mineral deposits occur in very few places, and are becoming increasingly difficult to find and extract, a reality that imposes particular business models on the minerals sector.

The business of mining can be described as two related, but separate business models: prospecting and exploration; and development and mining.

The objective of prospecting and exploration is to find an ore deposit that can be economically mined.

Companies prospect and explore over large areas, mostly using techniques that carry zero to low environmental footprints, and with a very low chance of success.

But they mine over very small areas – this is almost by definition; for a resource to be economic, the valuable component sought must be highly concentrated by geological processes. The OceanaGold Macraes mine in East Otago, for example, is the largest mine in New Zealand and the area disturbed at any one time is in the hundreds of hectares.

Some exploration companies aspire to find that ore deposit, develop it and become a mining company themselves, while others retain an exploration business model. Exploration activities are not funded by way of debt - explorers typically have no (regular) income, and they are financial risk takers. In contrast, mining companies have many characteristics common to most other businesses.

Effective regulations, and the interpretation of these regulations, would recognise these distinct business models. Common to many other jurisdictions, for a company to explore or mine in New Zealand, there are three sets of regimes to navigate:

i) Title for the mineral rights if the mineral is Crown owned. These are the mining (or prospecting, or exploration) permits;

ii) Land access: the landowner can veto the proposal – in reality, this seldom happens because the value of the mine is so much greater than other land uses; and

iii) Consents for activities under the RMA, and other relevant legislation.

These regimes should, individually and collectively, ensure that mineral sector activities are carried out safely and responsibly, that the Crown's mineral endowment is developed efficiently and effectively, and that competing interests are appropriately considered and managed and, where appropriate, compensated.

Fundamental to every responsible mining company is to build, and maintain their social licence to operate.

*Photo: Kit Wilson. Martha Mine. Waihi township (pop. 4500) has grown around the open pit.*

## Prospecting

Prospecting is the first stage of looking for an economic ore deposit. This always occurs over large areas, often over 1000s of square kilometres or more. Prospecting activities include: aerial surveying; studying existing maps and data; retrieving and analysing historic mining records; field mapping; and soil and/or rock chip sampling.

The level of environmental impact for these activities is non-existent or negligible.

The approach to prospecting differs for coal and many industrial minerals, because these occur as strata or seams rather than minerals within a host rock.

*Photo: Antipodes Gold. Prospecting using airborne remote sensing*

## Exploration

Exploration is more intensive, with a smaller footprint, typically over 100s of square kilometres, or less.

Exploration is carried out in areas identified as prospective during the prospecting phase, and typically the success rate is low – on average, one economic ore deposit will be found for every 1000 prospects.

A key success factor for exploration is testing and understanding the geological setting, that is, the geological factors that caused the resource to be where it is, and the extent and grade of the resource itself. For almost all minerals, drilling of rock core is necessary to the activities required to understand these factors.

The level of environmental impact is low. Drill sites are rehabilitated. Drilling is expensive and is, therefore, not carried out over large areas, or unnecessarily. Where a drilling programme is established to define a potentially mineable-resource, around 3% of habitat may be disturbed.

Where road access is not possible, drill rigs will be carried in by helicopter, with the area of disturbance for each drilling "platform" being up to 10m x 20m. Often, a number of holes are drilled from one platform.

*Photo: Kit Wilson. Helicopter-flown exploration drill rig in native forest*

## Development

When a potentially economic ore resource is identified a company will carry out feasibility studies. Typically, these will go through a number of stages: scoping, pre-feasibility, feasibility, and full feasibility, often referred to as "bankable". Each stage involves more detailed engineering, financial, social and environmental studies covering all aspects of the project (including stakeholder and iwi consultation), and progressively de-risking the project from a financial and social perspective.

The culmination of these studies has three components: consents, so that all activities proposed can be carried out legally and responsibly; bankability, so that funds (debt and equity) can be raised; and Board approval.

## The broad approaches to mining are:

Every mine is different and there are many approaches to mining depending on a myriad of factors. It is not normally possible to choose in advance between surface or underground mining, although option analyses may be carried out in some cases. The geological setting of the ore deposit will dictate the mining method, and the primary consideration of mine design is safety.

### Opencast Mining:

This is the method adopted at Macraes in East Otago, and at the Stockton and Cascade coal mines, as examples. Essentially, overburden is removed, the exposed ore is recovered, and the pit is filled, progressively, by the next tranche of overburden. The ratio of overburden to ore may be 10:1, but can vary widely. The working footprint of an o/c mine like Macraes would typically be up to 300 ha, although the total area mined over time would be much greater than that.

### Opencut Mining:

This is the method adopted at the Martha gold mine at Waihi. A pit is dug, progressively deeper as the ore, technical considerations, consents and economics allow. When complete, the pit is left as a lake for community use, or modified as agreed in the consent conditions (refer to Golden Cross, p. 16). The footprint of an o/cut mine is similar to an o/cast mine.

*Cascade opencast coal mine, Denniston plateau*

### Underground Mining:

An underground mine will normally have a surface footprint of 5-10 ha. There are a multitude of u/g mining techniques, each designed to mine safely and extract the maximum amount of ore in a safe manner, given the geological and geotechnical setting of the mine. Some u/g mines extract less than 20% of the resource (low recovery would be dictated by safety considerations), while others might recover 100%.


*Favona underground gold mine, Waihi*

### Seabed Mining:

The technologies for extracting resources off the seafloor, e.g., ironsands, rock phosphate, precious and base metal sulphides, are very different to that deployed on land, with the added challenges of working at depth, and often by remote control. In broad terms, material has to be scooped off the seafloor and pumped via a pipe to the surface to a purpose-built vessel. Separation of ore from waste rock is carried out on board, and the waste rock is then returned to the seafloor, via a pipe, in such a way as to minimise sediment dispersion. This is targeted, precision work, and any project proposal will be subjected to independent scrutiny that establishes the environmental impacts, and remediation requirements specific to that proposal.

## Processing:

In all metal mines, and many coal mines, there will be a processing facility to upgrade/refine the ore into a saleable product. At the Macraes mine, for example, the processing plant crushes, grinds and chemically treats the ore to recover the gold. Chemicals used include cyanide, caustic soda, lime, and hydrogen peroxide. All cyanide used in the process is neutralised before discharge into the tailings impoundment. All water (including from rainfall) in the process plant area is collected and treated, and recycled where possible. Any discharge is monitored and controlled to meet volume and quality standards required in RMA consent conditions.

## Tailings Impoundments:

The best examples of tailings impoundments, or dams, in New Zealand are at the Macraes and Waihi gold mines. These dams are engineered, managed and monitored to the conditions and standards required under the relevant consents. Monitoring typically includes regular sampling, testing and reporting of adjacent groundwater quality and other measures to confirm the integrity of the impoundment.

Cyanide is often cited as "deadly" poison, and a reason not to mine. The reality is cyanide, like all hazardous chemicals, must be handled and treated with care, but that can be done relatively easily. As a solid or in solution, cyanide is safe unless ingested. The cyanide molecule is biodegradable, a rapid process aided by sunlight, and it does not persist in water in the tailings impoundment. As a testament, cyanide is used in every hard rock gold operation in the world.

## Rehabilitation:

Requirements for rehabilitation are set out in consent conditions. An opencast mine will rehabilitate land progressively as mining advances. This is what occurs at the Macraes mine, where such land is returned to grazing, and is typically more productive than pre-mining.

## Bonds:

Mining companies are required to put in place bonds, as insurance for the regulator, in the event the company fails. The bond amount is typically based on an engineer's peer-reviewed assessment of the cost of closure, or the cost of remediating the particular issue the bond is intended to cover.

## Golden Cross Mine Case Study

*Between 1991 and 1998, 660,000 oz of gold, and 1.7m oz of silver were produced*

*2001: Three years after mine closure, rehabilitation is well under way*

*2011: All mining infrastructure has been removed and the area returned to farmland*

# Straterra's Position On Key Issues

Investment in minerals exploration and mining is sensitive to many factors, principally: minerals prospectivity, the regulatory environment, and access to resources.

All of these factors in New Zealand can be improved, respectively, by improving the geological database, with further regulatory reforms, and by taking a case-by-case approach to mining proposals.

In this section, we outline Straterra's position on a wide range of issues affecting the minerals sector. This material supports Straterra's 24 recommended actions for government, to improve New Zealand's attractiveness for minerals investment.

## Simplifying And Streamlining of Regulation

### Working With Government

Straterra understands fully that government regulators feel compelled to keep at arm's length the sectors they regulate. We agree that "regulatory capture" is to be strenuously avoided. Industry, like government, needs a robust, principled and transparent regulatory process. Straterra was formed as an advocacy body with a mandate to promote the industry, consistent with what is good for New Zealand as a whole. We do not advocate on company-specific issues. These policies are central to our being credible as an industry body. We have worked hard to build that credibility, to the extent that Straterra is and has been represented on a number of government-led stakeholder forums or advisory groups, whose purpose is to help government develop fair, reasonable and workable policies and regulation for industry and the benefit of New Zealand. Where technical expertise is required to inform this work, Straterra is able to co-ordinate that from among our membership. This approach to policy development is becoming increasingly the norm because it is successful.

A comparative study of regulatory regimes commissioned by the Minerals Council of Australia and Straterra, reported in 2013 that New Zealand scored highest among Australasian State jurisdictions for design of the institutional framework, clarity of processes and stakeholder input and appeals. We scored lowest for administration of regulation, timeliness and compliance costs. This result is unacceptable.

We believe strongly that government working in "partnership" with Straterra is the appropriate mechanism to achieve effective regulatory outcomes for industry, and for New Zealand. The reference group or advisory group model, with appropriate terms of reference, is an essential element of the partnership concept.

## Public Opinion

Public opinion surveys conducted by Pauline Colmar in 2012 and 2013 reveal that more than 80% of New Zealanders are supportive of minerals exploration and mining, provided: locals are employed, most of the money stays in New Zealand, and that the environment is managed responsibly. All of that is presently the case.

Nonetheless, a vocal and persistent minority has a heavy influence in the media debate on minerals, leading to an erroneous perception that most Kiwis are opposed to mining.

Our view is that much of the opposition - to fracking, deep sea drilling, new coal mines – is driven by climate change concerns. These concerns are valid, but tend to drive an ideologically-based debate, rather than one based on facts and evidence. Straterra's objective is to encourage informed and responsible debate so that policy decisions are driven by science, knowledge and pragmatic outcomes. We want to positively influence the public discourse on mining. Good information is a prerequisite for this to occur. Industry and government, separately, are working towards this objective.

# Straterra's Position On Key Issues

## Crown Minerals Act 1991

The recent review of the CMA was an opportunity lost. Neither government nor industry framed the objectives of the review appropriately, and officials and industry were often at loggerheads on issues that should have been resolved in the context of the Government's Business Growth Agenda.

A positive outcome of the CMA review was the inclusion of an explicit purpose in the Act. A negative has been interpretation of the Act that requires a high level of industry commercial and technical knowledge – a level that will always be challenging for government officials. Having identified the problem, the solution is straightforward – for the regulator to engage actively and transparently with subject matter expertise from industry, and this is occurring.

For the CMA, we recommend the primary mechanism for such engagement is a governance group, guided by suitable Terms of Reference, comprising senior government and industry participants. Additional operations and policy level forums, such as the existing Minerals Relationship Group convened by Straterra and NZP&M, perform an additional and valuable function.

## Legislative Labyrinth

On public conservation land, mining companies face compliance with up to five different pieces of legislation covering environment and heritage: Resource Management Act 1991, Crown Minerals Act 1991, Conservation Act 1987, Wildlife Act 1953, and the Historic Places Act 1993. This imposes millions of dollars of unnecessary regulatory costs on applicants with no benefit for society. We have proposed aligning processes for approvals under the RMA, CMA and CA for big projects on conservation land (Operation Minotaur). Government suggestions of aligning resource consent and concessions processes are welcome but do not go far enough to be useful. New Zealand ranks 44th in the world for certainty of regulation generally, but only 79th for certainty of environmental regulation (Fraser Institute, 2013-2014). That is not good enough. The forthcoming RMA Bill on RMA processes and freshwater management is an opportunity for change.

## Conservation Act 1987

This is a dated law, poorly suited to the 4000 businesses on conservation land, and wanting review. DOC's functions include fostering recreation and allowing tourism but do not extend to businesses. The concessions provisions were bolted on in 1996 with little integration into the Act, noting that the General Policies 2005 provide some relief.

The latest draft Conservation Management Strategies provide for conservation partnerships with businesses, with some attention to enabling businesses. While that is supported, a residual issue is the lack of alignment between the helicopter access provisions, and the reality of minerals exploration, at places. It is unclear to what extent biodiversity offsets, as a way of managing the effects of development, are compatible with the concessions regime.

The New Zealand Conservation Authority and Boards are an anachronism from 1990 when DOC was thought to focus on operations rather than policy, and at a time predating the Internet and email. Today DOC has the policy capability and capacity and, arguably, the Boards do not. It is difficult for DOC to be accountable to the Executive if it or the Minister cannot approve CMSs and national park management plans.

## Resource Management Act 1991

Many of the proposed reforms of the RMA are supported – greater national direction, unitary plans, templates for plans, speedier planning and consenting processes, and more rigorous analysis of the benefits and costs of plans and policy statements. An opportunity arises to encourage classification of most minerals exploration, e.g., drilling of rock core, as permitted activities everywhere, subject to standard conditions. The likely shape of the freshwater framework is supported, noting there are many details to resolve, and that the proposed collaborative planning process may not work as well as intended. The proposed revamp of sections 6 and 7 (RMA principles) has positives but may be outweighed by the negatives – we foresee litigation to interpret the new provisions, noting that the current provisions, while less than ideal, do have workable case law. The Bathurst Resources experience argues convincingly for heavily-restricted, truncated or streamlined appeal processes.

# Straterra's Position On Key Issues

## Tax Treatment Of "Listed Industrial Minerals"

The Taxation (Annual Rates, Foreign Superannuation and Remedial Matters) Bill, as originally drafted, risked providing harsher tax treatment of minerals (noting coal is excluded) than any other business in New Zealand. It is understood officials are working on removing the distortions to enable operators to claim deductions for various types of expenditure in a way that is consistent with general tax principles. The Finance and Expenditure Select Committee's report-back to Parliament in late 2013 endorsed this approach, and that is generally supported.

## Economic Contribution

Mining is a good job to have because miners earn on average double the national average wage. Based on studies by NZIER 2010 and Berl 2010, around 8000 people are employed directly, and indirectly, in the minerals sector. Regionally, this can be significant. Forty percent of regional GDP on the West Coast is earned from mining off a footprint of 14km$^2$ compared to the total area of the region of 23,000 km$^2$ No other land-use earns close to what mining does on a per hectare basis. At the Macraes mine in East Otago, for example, it is assessed that it would take 767 years to earn from farming the amount earned from mining, off the mine footprint. In addition, the opencast mining method used at Macraes means that as mining progresses, land is returned to productive grazing use. Indeed, the rehabilitated land at Macraes is more productive than pre-mining. This is a common outcome when land is mined and later returned to agricultural use.

The Ministry of Business, Innovation and Employment sector report 2013 provided the following information on the economic contribution of the minerals and oil & gas sector:

- GDP contribution: 2.5%
- Exports: 6.2%
- Average wage: $105,000 a year
- Labour productivity: $333 per hour worked (cf. NZ average of $48)

Newmont Waihi Gold reported in 2012 that 86% of income earned from mining stayed in New Zealand as salaries, taxes, rates, royalties, levies, and payments to suppliers and contractors.

New Zealand coal, ironsands, aggregates and industrial minerals are important inputs into a wide range of industries in New Zealand, including food, wood and timber processing, breweries, cement and steel-making, heating of schools and hospitals, and roading and construction.

For these reasons, we believe mining should be actively promoted as a sector of the economy.

## Health And Safety

### Pike River Coal Tragedy

This tragedy should never have happened but it did. Industry, and the Government, had argued previously for "light-handed" regulation. This was clearly a mistake. We need a health and safety regime, including appropriate regulations, that ensures as far as possible that such an event does not occur again. Industry submitted and presented to the Pike River Royal Commission in this vein. Straterra restructured the industry H & S body, MinEx, to maximise expert input into the Government's development of the new H & S regime. Industry must improve its own performance and MinEx has, and will provide leadership on this.

### Health And Safety In Employment Reforms

Industry supports all 16 Pike River Royal Commission recommendations, the amendments to the Health and Safety in Employment Act 1992, and the Health and Safety in Employment (Mining Operations and Quarrying Operations) Regulations 2013. Government, and industry, through MinEx and industry expert and operator contributions, worked together in good faith and within a very tight time frame to deliver fit-for-purpose regulations. The next priority is to finalise codes and guidelines, and MinEx is continuing to provide technical and policy support.

# Straterra's Position On Key Issues

## Information

### Minerals research

Minerals prospectivity is determined by nature. Economic mineral deposits occur in few places and are becoming harder to find – because the easy ones have already been found. New and innovative technologies are coming more to the fore because:

- We search for ore deposits in places, and in geological settings that to date have not been accessible;
- The mineralogy of deposits we mine tends to be more complex – again, because the easy ones have been mined – and require technologically more advanced processes to recover the values (e.g., gold, platinum, copper); and because of
- Rising costs of resource discovery, measurement, extraction and processing, potentially affecting profitability and return on investment.

That said, New Zealand can do a number of things to enhance prospectivity. On a local and permit area scale, records of activity are important – permit history, work programmes and reports all must be, and generally are, in the public domain.

At a regional scale, the information that might enhance prospectivity is expensive to obtain compared to the likelihood of returns, and is difficult to fund privately. Many jurisdictions fund this work publicly, and in New Zealand the Northland and Westland aerial geophysical surveys are good examples. The information gained from these surveys encourages private exploration interest. South Australia is the leader in this area, and subsequent private spending in this State has greatly exceeded the level of public investment. New Zealand should do the same; it is a clear path to improving attractiveness for investment.

Other areas of research can be important, particularly where we have New Zealand-specific issues to address such as complex mining conditions, complex processing requirements, coal quality and specific safety issues, environmental issues – but these tend to be company specific, and therefore funded at a company level.

### Science funding

At present three universities, a private provider, and two Crown research institutes are competing for around $1-4 million a year of economic minerals and energy research funding. In this model, there is duplication of effort and resourcing, and no clear or shared strategy, which is wasteful. A virtual centre of research excellence on minerals is preferred, and to this end the research providers are exploring the creation of a "Centre of Research Excellence". The institutions would still exist; however, the allocation of funding should be matched to a single minerals research strategy. This strategy has been completed, with industry, science and government input, and remains to be implemented via the creation of a tripartite liaison group.

## Access To Minerals

### Ownership Of Minerals

In New Zealand, the Crown owns all gold, silver, uranium, and petroleum wherever they occur, and all minerals on Crown land and lands alienated from the Crown, including the marine and coastal area (with the exception of pounamu). In most countries, there is State ownership of some, most, or all minerals. We believe there is a strong case for Crown ownership of all minerals – they are a strategic and valuable resource. We accept there are contrary views on that, and on any suggestion that arbitration be provided for access to privately-held minerals or Crown-owned minerals on private land (cf. petroleum).

As matters stand, rights to privately-held minerals either lie with the land owner, or some other person as a result of historic title changes, and a lengthy land title search is usually required to find that out. Land Information New Zealand is developing a cadastral strategy, in which that issue would be addressed, however, we are advised action will be dependent on resourcing. Our view is that LINZ needs to consider carefully its priorities for attention within this work programme.

### Crown Minerals Regime

In 2013 the review of the Crown Minerals Act 1991 and accompanying regulatory regime was completed. A key improvement is the purpose of the regime, which is to promote minerals exploration and development

for the benefit of New Zealand. Other expected benefits include speedier administration of the regime, and greater flexibility in managing permits, both for the regulator and the permit holder. It is early days, but industry is concerned that the regime places government too close to the business of mining, rather than establishing a framework for responsible investment.

Interpretation of the Act and regulations will be important, particularly as that interpretation seeks to give effect to the purpose of the Act, which, therefore, must be tested against the factors that encourage investment. Our recommendations under Actions 1, and 2 (f) and (g), refer.

## Case-By-Case Approach To Mining Projects

Every mine is different, as is each site, in terms of the methods of extraction, and environmental management. On that basis, mining proposals should be considered on their merits, and on the values present in the land. That is the rational approach, and, in fact, is how the RMA was designed originally to work. As an additional point in favour of the case-by-case approach, the footprint of mining is relatively very small, around 0.05% of New Zealand's land area, and the footprint of any mine in the future will always be relatively small. In some places, zoning in RMA plans may be used to constrain the type of mining, or to manage rare instances of cumulative effects.

# Environment and Conservation

## Environmental Responsibility

The Straterra Charter or code of ethics includes a principle for our members of environmental responsibility. This needs to be demonstrated, and many businesses do that, e.g., via membership of the Sustainable Business Council or the Global Mining Initiative, participating in DOC-led biodiversity offsets pilot studies, entering in industry environmental awards, adhering to company policy statements on sustainability or biodiversity. Straterra is building case studies of environmental management as core business as part of its outreach. Overseas methods and metrics, e.g., the Corporate Ecosystem Services Review methodology being championed by the SBC, are relevant. We strongly support the forthcoming Environmental Reporting Bill.

## Biodiversity Offsets

This tool provides for development damage to biodiversity at one site to be offset by creating or enhancing or reducing the rate of loss in biodiversity at another site, with an aspirational aim of no net loss to biodiversity. DOC has produced a draft of "good practice", non-statutory guidance with the aim of helping DOC staff, developers and other stakeholders in approvals processes. To be useful, these guidelines need to be produced by stakeholders in a collaborative process.

## Emission Controls

The draft Auckland Unitary Plan proposes the adoption of a new World Health Organisation guideline for sulphur dioxide emissions to air. There is a risk of a precedent for other RMA plans around the country, where users of coal-fired boilers could find it prohibitive to meet the WHO standard. In our view, the WHO standard is not fit for purpose in New Zealand (or anywhere else). A more sophisticated approach to $SO_2$ emissions is required, to allow businesses to operate cost-effectively while safeguarding air quality. The existing guidelines in National Environmental Standards for air quality are adequate.

The same consideration applies to emissions of trace mercury from coal-fired boilers. New Zealand needs to be careful to avoid unnecessary costs on businesses with no commensurate environmental benefit when amending legislation to enable ratification of the United Nations Convention on mercury. As well, mercury is an input into some alluvial gold mining operations. Handled safely and responsibly, this use of mercury should be able to continue, and ongoing supply of mercury for such use needs to be secured.

# Oceans

## EEZ Environmental Effects Regime

As matters stand, the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 looks workable, following extensive engagement with industry during policy development. Straterra

has submitted on proposals for moving regulations covering discharges and dumping from the Maritime Transport Act 1994 into the EEZ regime. Of principal concern is that applicants may have to apply twice for approval to return sediment to the seafloor under "non-notified marine consents", and standard "marine consents" (which are open to public input). As well, exploration for some types of minerals may fail to qualify as a permitted activity. Straterra has been engaging with officials during the development of draft regulations, and amendments to the Act, and we look forward to reasonable and workable outcomes on the issues raised.

## Marine Reserves Bill

Straterra accepts that provision should be made for partial or full protection of important marine habitats in the EEZ. With a Bill to promote this outcome, the Benthic Protection Areas should be reviewed. A new process is needed that brings the diverse stakeholder interests to bear. Consideration should be given to the possibility that the effect of mining on the seafloor may be limited in extent and in duration compared to natural disturbance and other activities in the EEZ.

## Maui's Dolphin

The Maui's dolphin is likely limited in range between Kawhia and Kaipara harbours. The western coastlines and seabed of Te Ika-a-Maui hold significant ironsands potential, with work underway to assess the environmental effects and how they would be managed. We advocate an evidence-based approach to Maui's dolphin, which the Government has announced it intends to follow. It is noted that the issue would be addressed in any event in the resource consent process under the RMA.

# Future Proofing

## Mine Closure

Sooner or later every mine must close. The "when" can be difficult to predict. The Macraes opencast gold mine in East Otago started with a mine life of seven years, and more than 20 years later, it is still operating, with a mine plan still looking a few years out. Where mining infrastructure is in place, the marginal cost of brownfields development reduces. All of New Zealand's large producing mines have satellite operations, greatly extending the life of mining in their region. Even so, every mining company and community must plan for a future post-mining.

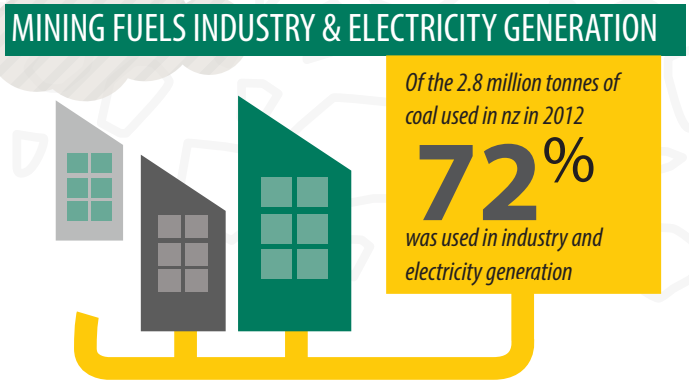
Mined land is rehabilitated, progressively where possible and otherwise on closure. The large open cast mine at Macraes has been progressively rehabilitated as mining proceeds. Land is returned to its former use – farming in this case – as per the conditions of the mining permit, and resource consents. Often, land productivity post-rehabilitation is enhanced. An open pit, such as at the Waihi operation, may form a lake, or be partially contoured as per the Golden Cross closure plan. Tailings dams can be filled in or turned into ponds or wetlands. Community support is usually provided for by mining companies during mining, which can be invested in useful community facilities or projects post-mining.

## The Future Of Mining

At face value, all of New Zealand's resources will run out, if we continue to extract them, noting that it would take decades or centuries to discover them, and to develop the projects that are viable at any one time. Logically, however, resources will never run out. Once the price of any diminishing resource increases to the point where a substitute becomes competitive, demand will shift to the substitute.

For now, New Zealand has promising minerals potential in gold, silver, ironsands, tungsten and rock phosphate, industrial minerals, with a longer view to be taken on precious and base metals in the Kermadecs, methane hydrates, and manganese nodules, in the oceans. There are other resources we have little knowledge of, e.g., platinum, rare earths, and others again that we don't know about yet!

We believe mining investment and output could treble over time, under favourable conditions.



# Straterra's Position On Key Issues

## Fossil Fuels

### Climate Change

The science of climate change is clear – burning fossil fuels is leading to increased atmospheric $CO_2$, which has a warming impact on the atmosphere. Quantitative estimates of this impact, over time, are wide ranging and mitigation is justified.

This is a global issue, demanding a global response, and New Zealand should do its fair share. We have an advantage over most other countries in our endowment of renewable resources – hydro, wind and geothermal. The Emissions Trading Scheme provides a framework that can be adjusted to the level of international effort. At higher carbon prices, we will need to safeguard emissions-intensive, trade-exposed industries from competition against countries that have little or no price on carbon. The calculation of emissions intensity should include liquid fossil fuels where used as a process input when classifying businesses as EITE. Whatever international efforts New Zealand encourages, there is no rationale for our country leading the response (with the obvious exception of agriculture research) – or more specifically, taking on an unfair economic burden to reduce emissions. We are a small player with an export-dependent economy, and our businesses are predominantly price-takers.

To address climate change, we need to de-carbonise the economy. Encouraging renewables is an important option to achieve that outcome; while carbon capture and storage, other "clean coal" technologies, nuclear energy, and energy efficiency also have an important role in the global response. None of these options are mutually exclusive. To date, global efforts to address climate change have been spectacularly unsuccessful. An acknowledgement of this, and an analysis of the causes, would greatly assist future strategies.

### Coal

Coal is the most emissions-intensive fossil fuel. Arguably, coal is a "transition fuel" – at some point in time coal will not have the vital role it has currently in supplying, globally, low-cost energy and an essential input for the making of steel. Some make the case to phase out coal in New Zealand.

In New Zealand, 72% of the 2.8 million tonnes of coal consumed domestically in 2012 was in industrial processes, and to a lesser extent in electricity generation. In many cases, there are no proven, cost-effective alternatives. That is also the case for the use of coal in steel and cement manufacture. A transition away from coal will require a plan with significant technology advances and cost changes over time.

Globally, coal provides 40% of electricity generation capacity, and that is predicted by the International Energy Agency to drop to one-third by 2035, noting that electricity generation will continue to grow in absolute terms. Coal has a vital role to play in alleviating poverty and allowing poorer countries to improve their economic conditions. That is a simple reality, and will remain so until appropriate alternative technologies become mainstream.

## Technology

### Green Economy

Minerals are essential to the "green economy" because all technologies are made with them. Either we must import minerals, or produce them locally. Because of cost, local production is usually necessary for aggregates and many industrial minerals, exports will also be part of whatever economic path New Zealand takes, of which mineral exports form a part. Mining today is a knowledge-based, high-technology industry, employing skilled people, producing essential materials, in an environmentally responsible way.

### Technology Exports

As the easier resources become extracted, the world is entering the "technology age" of mining. New Zealand is no stranger to this development, being both a taker and a creator of technology. The latter includes a smart material (a high-strength material made chiefly out of lignite), geological modelling software, minerals laboratory equipment, and new approaches to engineering and geotechnical problems. To facilitate in this area, Straterra initiated AustmineNZ, the New Zealand branch of a successful Australian association that promotes domestic activity and exports of mining technology and services. Straterra maintains links with New Zealand Trade and Enterprise.

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