

The Mineral Potential of Northland

Summary

Introduction

Mining in Northland began with the discovery of coal at Kawakawa in the 1860s, followed by cement-making trials at Portland near Whangarei in the 1870s. Since then, antimony, copper, diatomite, kaolinite clay, kauri gum, manganese, mercury, peat, serpentine, silica sand and silver have been mined in Northland, along with aggregate and sand for building, and limestone.

Today Northland has a significant mining industry, dominated by:

- Cement – the Golden Bay Cement plant at Whangarei is New Zealand's largest, and makes more than half of the cement being used throughout New Zealand.
- High quality china clay for export from Matauri Bay
- Aggregate, being produced at more than 50 quarries throughout the region
- Limestone, mainly used as fertiliser in farming from more than 20 quarries
- Sand, both onshore and offshore, for building and industrial use

The value of Northland's mineral output is the fifth largest of the 15 regions of New Zealand, and the mining sector is a significant source of employment in the region at present. In February 2006 it employed nearly 600 people, more than half of them in the Whangarei District.

New Studies

Two new studies on Northland's mineral potential and its value are the latest result of a mining industry strategy that was developed nearly 10 years ago. It first looked at Government investment in research and development and was later extended to cover other aspects of the minerals sector. Among the conclusions of the strategy development were;

- Aggregate resources were not being well-managed
- Available information on resources (the resource database) is not being used effectively
- Information technology could add value to the resource database
- New information is an effective spur to exploration investment
- Regional and District Councils manage mineral resources under the Resource Management Act, but lack information on sub-surface resources in a form they can use.

The joint GNS Science¹, industry, Crown Minerals programme to encourage regional development agencies to include mineral resources in their initiatives began in Otago where the Regional Council is contributing to the cost of a regional airborne geophysical programme. As well as assisting mineral exploration it will provide new information on sub-surface resources (water and geology particularly) beneath most of the region.

In Northland, the regional programme that began in 2006 has been coordinated by Enterprise Northland and GNS Science.

¹ GNS Science is a Crown Research Institute – the Institute of Geological and Nuclear Sciences

The new mineral resource and economic studies demonstrate that there is potential to expand the minerals industry in Northland and its contribution to Northland's economy. The mineral potential across a wide range of minerals has been investigated by GNS Science within their FRST² funded minerals research programme. The potential economic benefits of discovering and developing Northland's mineral resources have been quantified in a study by the NZ Institute of Economic Research (NZIER). The economic study has been funded by Crown Minerals (Ministry of Economic Development) and the Far North and Whangarei District Councils. The results are presented in two reports.

The Resource Assessment

The Northland region contains a wide range of mineral commodities and currently produces cement, high quality ceramic clays, limestone for agriculture, and rock and sand aggregates. In addition there are prospects for aluminium, bentonite, coal, copper, diatomite, feldspar sand, gold, kauri gum, lead, mercury, nickel, peat, phosphate, serpentinite, silica sand, zeolite and zinc.

Potential mineral resources have been estimated using a three step process involving mineral deposit models, a geographic information system (GIS) of spatial data sets, and a counting method of assessment. The total potential value of Northland's resources (excluding aggregate, limestone and sand) are estimated at \$47 billion. Estimates of value for 14 non-metallic mineral deposit types total NZ\$28,019 million, and for 16 metallic mineral deposit types total NZ\$5,235 million.

Assessed Gross Value Of The Potential Mineral Resources Of Northland (\$million)

	Far North	Kaipara	Whangarei	Northland
Non metals	18,058	2,476	7,485	28,019
Metals	3,772	5	1,458	5,235
Coal (including lignite) ³	240	380	1,150	1,770
Peat ³	12,000			12,000
Total	34,070	2,861	10,093	47,024

While resources of rock aggregate, sand and limestone have not been quantified, they are estimated to be large and sufficient to meet foreseeable local demand. Previous estimates have been used for sub-bituminous and bituminous coal (23 Mt valued at \$1,150 M), lignite (31 Mt valued at \$620 M) and peat (300 Mt valued at \$12,000 M).

The study includes a scenario where the value of Northland's mineral production could increase from the current approximate NZ\$100 million to NZ\$352 million annually by:

- An increase in production of aggregate and limestone to past maximum annual levels
- Development of a gold-silver mine
- A second metalliferous mine (e.g. aluminium, copper or gold-silver),
- Silica sand mining,
- Small mining operations in one or more commodities such as bentonite, coal, feldspar, kaolinite, kauri gum, peat and zeolite

² FRST: Foundation of Research, Science and Technology, a Wellington-based Government agency

³ Previous estimates

We suggest that this scenario would be possible over a 15 year time-frame, provided that:

1. There is a sufficient level of exploration to define the new resources and
2. New discoveries can be developed.

Although the assessed potential value of non-metal resources is about 5 times higher than the value of metals, it is the metals that contribute most to the potential increase in the value of production. Markets for the metals are highly developed and are not a barrier to new production. The development of non-metals is constrained by the size of the market within the region (and New Zealand). Developing markets for high value, specialised industrial minerals such as china clay requires substantial investment and a long term commitment.

Attracting explorers to work in the region will require marketing Northland's mineral potential to the international exploration community along with identifying and overcoming barriers to exploration and mineral development.

The Economic Study

NZIER have taken the mineral development scenario based on the resource assessment and investigated the potential economic impact of the mineral resources of the Northland region. For the region as a whole, and for each of its districts (Far North, Whangarei and Kaipara) the purpose of the analysis is to determine what additional economic benefits accrue, in terms of output, value added and employment, from the scenario of increased mineral production. *Output* is the value of production, while *value added* is the difference between the value of production (i.e. output) and the value of goods and services that are needed in the production process. GDP is the total of the values added by all firms in the economy.

	Far North	Kaipara	Whangarei	Northland
Increase in annual mining production (\$million)	181	12	103	296
Increase in annual output of all sectors (\$million)	372	24	236	683
Increase in annual GDP (\$million)	151	10	98	279
Increase in employment	1,566	95	891	2,720

For Northland the interpretation is that if mining output increases from \$56 million to \$352 million per year, the total value of output of the Northland economy will increase by nearly \$683 million. This total impact includes the initial impact within the mining sector. Thus, a scenario in which mining output is increased by \$296 million will lead to increases in the output of the other sectors of the Northland economy of about \$387 million per year. These increases are with respect to the "business as usual" (BAU) case in which the economy remains static. Therefore, we can say that if the mining production scenario were to eventuate, the annual output of the Northland economy would be nearly \$683 million higher than it would otherwise have been.

The analysis also shows that if mining production increases by \$296 million, mining value added will increase by around \$136 million, and the value added of the other sectors will increase by around \$143 million (above what it would otherwise be in the BAU case).

The additional mining production proposed in the scenario will generate an additional 1,127 full-time equivalent jobs in Northland's mining sector, and the employment of other sectors in Northland will increase by a further 1,596 jobs, a total of 2,720 additional jobs.

Because of the way that mineral potential is distributed across the region, the economic benefits would be concentrated in the Far North District, which accounts for more than half of the area of the region. Whangarei District would benefit mainly through Whangarei city being the largest commercial and industrial centre in Northland.

The Way Forward

The results of the studies indicate a range of possibilities for making more effective use of Northland's mineral potential in the future and these are now being investigated. They include an assessment of aggregate supply and demand, and the location of potential aggregate resources to allow for more effective management of these essential local resources. Other possibilities are obtaining new data to assist exploration, using the data compiled in this study for managing resources and supporting exploration, and developing more consistent policies and rules for mineral exploration throughout the region.

Reports:

Christie AB, Barker R G, 2007. Mineral resource assessment of the Northland Region, New Zealand. *GNS Science* science report 2007/06, May 2007

Walton, M, 2007. Northland's mineral resources – potential economic impact. Report by NZ Institute of Economic Research to Crown Minerals, Northland Regional Council and Far North and Whangarei District Councils. May 2007