

# Minerals in the Bay of Plenty Region

Prepared by Bron Healey, Resource Planner



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5 Quay Street  
P O Box 364  
Whakatane  
NEW ZEALAND

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## Executive Summary

The Bay of Plenty Regional Policy Statement and the SmartGrowth Strategy for the western Bay of Plenty have provisions concerned with identifying and locating known or potential mineral resources and protecting access to these resources. An information scoping and review exercise was conducted as a first step towards implementing these provisions. The results of this exercise are presented in this report.

Production figures indicate that industrial minerals (particularly rock, sand and gravel for roading and building) make a significant contribution to the Bay of Plenty economy. The Bay of Plenty is also the leading pumice producing region in New Zealand.

There is ongoing prospecting and exploration interest in the Bay of Plenty for high value metallic minerals e.g. gold and silver. Areas of potential interest for gold and silver include those where historical gold production has occurred, as well as areas in the Taupo Volcanic Zone displaying high prospectivity for epithermal gold mineralisation.

The Bay of Plenty has multiple known occurrences of several minerals associated with volcanic activity. An example of current extraction is amorphous silica at Tikitere. Detailed groundwork would be required to identify and refine other areas for potential future extraction of these minerals.

In regional terms, the locations of quarries for the extraction of aggregate, pumice and sand can be grouped spatially into four areas of activity:

- (a) Te Puke/Paengaroa/Pongakawa extending west to the southern limits of Tauranga.
- (b) An area around Whakatane.
- (c) An area around Murupara.
- (d) Sites adjacent to Rotorua (to a more limited extent).

Previous mineral resource assessments have noted that there are limited sources of good quality roading and building aggregate close to Rotorua and Tauranga. Areas of andesite of the southern Coromandel Volcanic zone represent potential future extraction sites of high quality aggregate in the western Bay of Plenty.

Greywacke ranges constitute a key source of aggregate in the eastern Bay of Plenty. This resource is extracted from quarries and directly from rivers in the east of the region.

Information on potential areas of future extraction for key industrial mineral resources, particularly the hard rock resource in the western Bay of Plenty, should be factored into resource management decisions as a means of protecting access to these resources.



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## Chapter 1: Introduction

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The Regional Policy Statement Known Minerals project was initiated as a means of implementing the mineral-related provisions in the Bay of Plenty Regional Policy Statement (Appendix A). These provisions include policies and methods to promote the protection of access to known mineral resources of the region and to discourage uses of land that would compromise this access. The Regional Policy Statement encourages the regional council, as well as city and district councils, to implement these provisions.

The SmartGrowth Strategy also contains actions with implications for the Known Minerals project. These actions include: to investigate mineral demand and resource potential, to prepare maps showing the location of known or potential resources in the [sub] region, and to develop management strategies that take into account the findings of this investigation. Environment Bay of Plenty has been nominated as the lead agency for undertaking these actions.

An information scoping and review exercise was conducted as a first step in implementing Regional Policy Statement and SmartGrowth provisions. This exercise was conducted with the intention of:

- (a) Identifying information sources;
- (b) Reviewing publicly available information produced by agencies and relevant to the project;
- (c) Identifying any areas of potential future extraction.

This report presents the results of this exercise, and makes recommendations for the ongoing implementation of mineral-related provisions in the Regional Policy Statement.



## Chapter 2: Information Scoping and Review

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To develop a picture of known mineral resources in the region it was necessary to determine what information was currently publicly available. The focus of the scoping and review exercise was on mineral resource information that had already been interpreted rather than geological information or raw data requiring further analysis. The following sections describe the key information sources identified during the scoping process.

### 2.1 Environment Bay of Plenty

Environment Bay of Plenty holds a number published reports and maps on both the mineral resources and the underlying geology of the Bay of Plenty region, as well as reports produced mainly by central government agencies on mineral resources in New Zealand.

Produced in the early 1990s, *Sheet QM302 Whakatane, Geological Resource Map of New Zealand 1:250 000, Institute of Geological & Nuclear Sciences Science Report 92/17* proved to be a key information source. This map covers most of the region and is a compilation of historical data on mineral deposit occurrences, including aggregate quarries. The accompanying report provides a detailed assessment of mineral resources for the area covered by the map. Environment Bay of Plenty also has a data set from the same source (the IGNS GERM database) on its GIS system, that covers the entire region.

Environment Bay of Plenty also holds a substantial amount of quarrying, mining and gravel extraction information in resource consent files, monitoring and compliance reports and spreadsheets. While much of this information has not been systematically collated, it has proved a useful source in compiling this report.

### 2.2 External Sources of Information

The agencies and organisations identified as the main potential sources of mineral resource related information were:

- The Institute of Geological and Nuclear Sciences
- Crown Minerals, Ministry of Economic Development
- District and city councils in the Bay of Plenty region
- The New Zealand Minerals Industry Association.

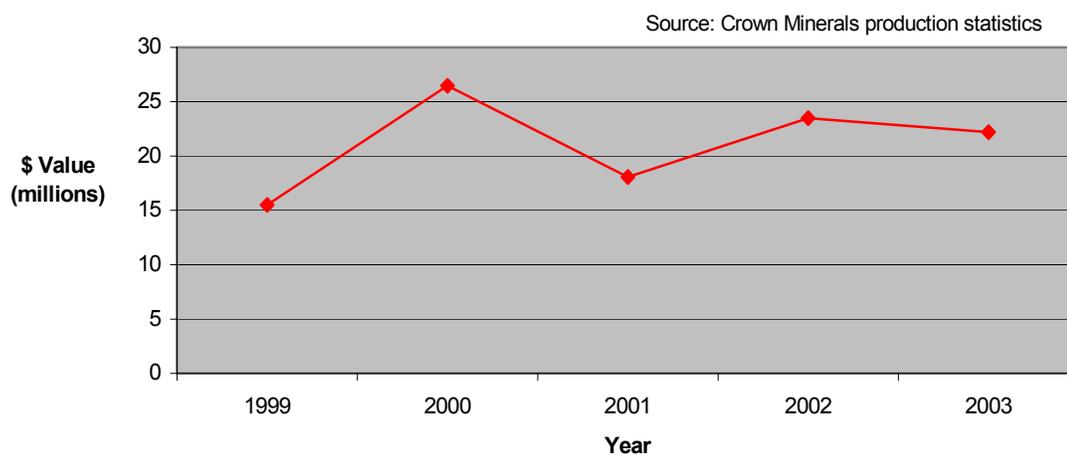
These agencies and organisations were contacted as part of the information scoping exercise, and provided information to varying degrees. In response to a request, Crown Minerals provided information of relevance to the study area, including recent figures for the total mineral production in the Bay of Plenty and information on recent quarrying activity held by the Inspector of Quarries.

Crown Minerals also undertook some analysis to identify areas in the Bay of Plenty with potential for the future extraction of gold, aggregates, and other non-metallic rocks and minerals. This has been used to supplement information from other sources in the main body of the report.

## Chapter 3: Regional Overview

### 3.1 Current Production

Industrial minerals<sup>1</sup> make an important contribution to the functioning of the Bay of Plenty economy in terms of both direct earnings and the supply of raw materials for the development and maintenance of infrastructure, particularly roading and building. Production figures for the past five years show a direct sales value averaging about \$21 million per annum (Figure 1).



*Figure 1 Sales Value of Bay of Plenty Industrial Minerals (1999-2003)*

In the national context, the 2003 sales figure places the Bay of Plenty 7<sup>th</sup> of 15 regions (Figure 2), with a sales value comparable to the Wellington region, but significantly lower than the leading producing regions. The Waikato and Northland figures can to some extent be attributed to their proximity to metropolitan Auckland and the demand generated by infrastructural growth in this city.

<sup>1</sup> Non-metallic minerals. The Bay of Plenty currently produces no metallic minerals (e.g. gold, silver, ironsand), although there has been historical gold production and there are areas of exploration interest.

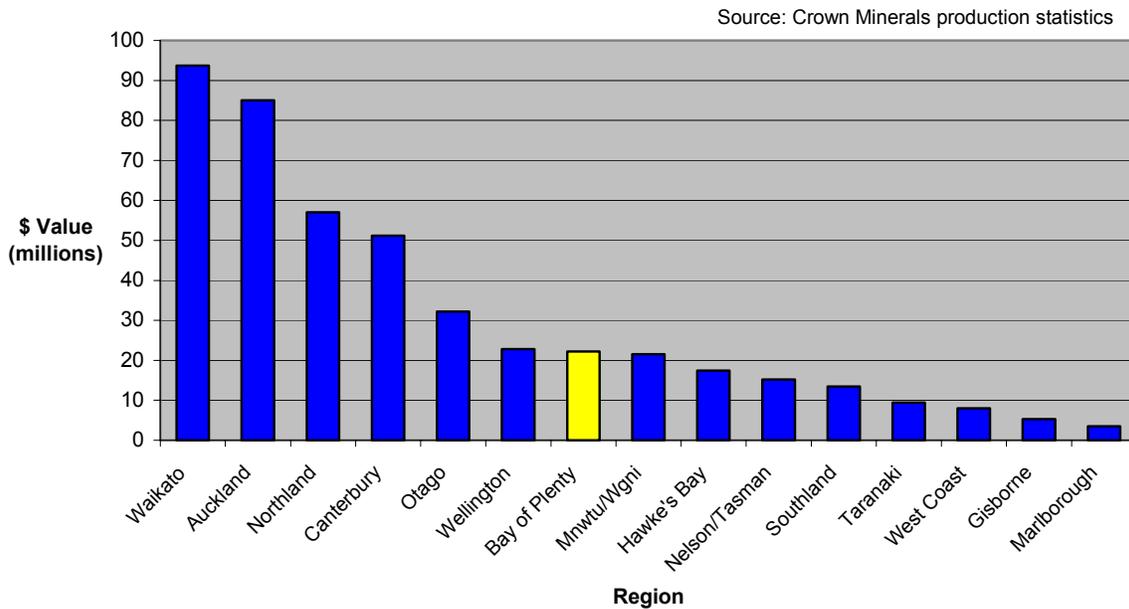


Figure 2 Industrial Mineral Sales Value by Region (2003)

In quantitative production terms, industrial minerals can be divided into two broad categories: minerals of low value per unit that are used in large quantities for basic infrastructure purposes; and minerals of higher value per unit that are generally extracted in lower quantities for more specialised purposes. Figure 3 graphs the quantities of 'high volume' industrial minerals extracted in the Bay of Plenty 1999-2003. The graph shows that the production of rock, sand and gravel for roading and building purposes are the dominant categories. There is also a steady production of pumice, which is primarily used as fill in road construction and for building purposes, with smaller quantities used in horticultural soil mixes and in textile production processes (Christie *et al*, 2000). The Bay of Plenty is the leading pumice producing region in New Zealand.

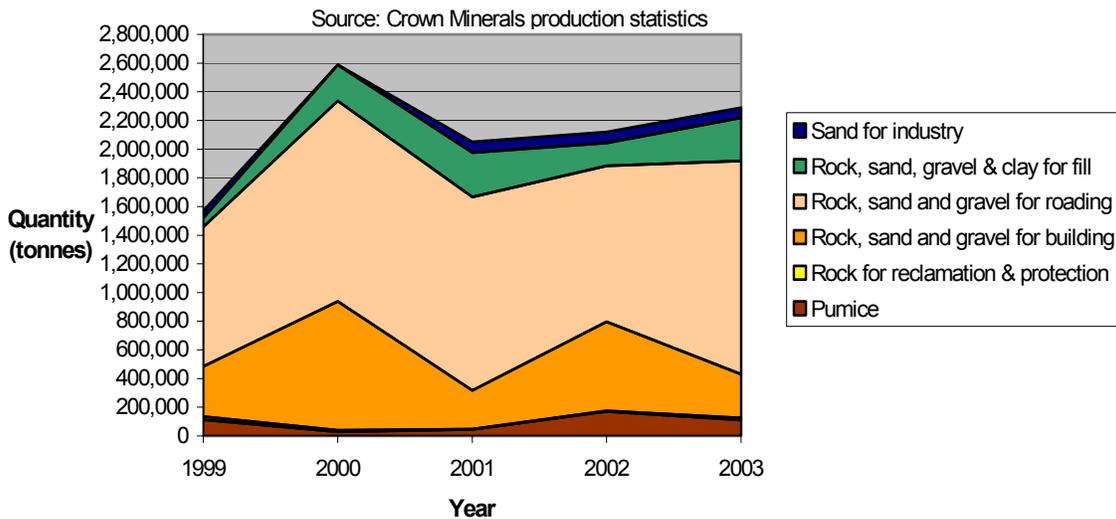


Figure 3 Bay of Plenty Industrial Mineral Production (High Volume) 1999-2003

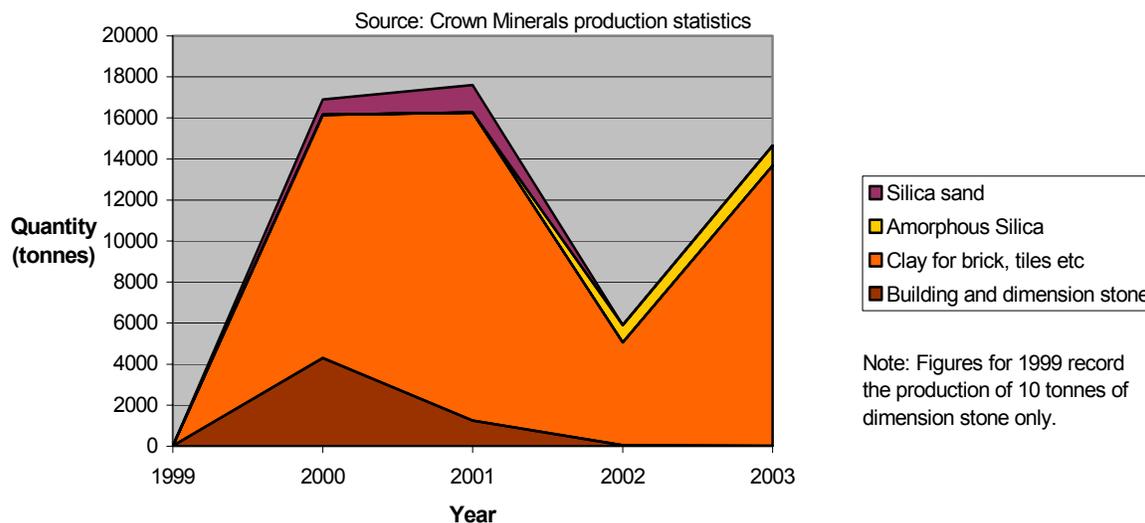


Figure 4 Bay of Plenty Industrial Mineral Production (Specialised Purpose) 1999-2003

Figure 4 maps a five year sequence for the production of industrial minerals extracted for more specialised purposes. Clay for use in bricks and tiles makes the most significant contribution in quantitative terms, although the quantities produced fluctuated significantly over the five year period. The Bay of Plenty is also the only region in New Zealand currently producing amorphous silica, which is added to cement to improve its strength and durability, as well as in tunnel linings, mortars and grouts (Ministry of Economic Development, 2001).

The information available on the sales value of each commodity is more limited, partly due to commercial considerations. However, a breakdown of Bay of Plenty figures for the 2002 production year indicates that rock and sand for roading (\$9.7 million) and rock and sand for building (\$8.1 million) dominate sales earnings. Pumice (\$2.3 million) was also a significant earner.

### 3.2 Prospecting and Exploration

The Crown Minerals Act 1991 governs the prospecting, exploration and mining of Crown owned minerals in New Zealand. Crown owned minerals include all naturally occurring gold, silver and uranium, as well as all other mineral and aggregate resources on Crown owned land or, as a general rule, all land disposed of by the Crown by way of freehold title since 1948.

Three types of permits are issued under the Crown Minerals Act 1991: prospecting, exploration and mining. Prospecting permits are issued for both Crown and privately owned minerals for activities aimed at identifying land likely to contain exploitable deposits. Prospecting permits cover very low impact activities such as geological mapping, general surveys and hand sampling. Exploration and mining permits are granted only for Crown minerals. Exploration permits cover activities designed to identify mineral deposits and evaluate the feasibility of mining, which may include

drilling and bulk sampling. Mining permits (and licences) are for mineral extraction activities.

There are currently 16 permits, licences or applications for permits in the Bay of Plenty region. Of these, 3 are prospecting permits, 2 are exploration permits and 3 are applications for prospecting or exploration (Table 1). The remaining 8 mining permits or licences are for aggregate, pumice or sand extraction and are considered separately in the section on these resources.

*Table 1 Bay of Plenty Mineral Prospecting and Exploration Permits (April, 2005)*

Permit	Holder	Mineral	Area	Date of Grant or Application	Expiry Date
<b>Prospecting</b>					
39 289	Mercator Gold (UK)	All metallic minerals	1167 km <sup>2</sup>	17/1/2005	16/1/2007
39 241	Glass Earth Ltd	All metallic and non-metallic minerals	8989.5 km <sup>2</sup>	21/10/2003	20/10/2005
39 195	Neptune Resources	All metallic and non-metallic minerals	7790 km <sup>2</sup>	15/10/2002	14/10/2006
<b>Exploration</b>					
40 667	HPD New Zealand	All metallic minerals	595 ha	4/10/2004	5/10/2009
40 365	Waihi Earthmovers	Aggregates	55 ha	15/5/1997	14/5/2007
<b>Applications</b>					
40 737	Glass Earth		4055 ha	25/1/2005	
40 736	Heritage Gold NZ		5000 ha	18/1/2005	
39 298	Waihi Gold Company		1045 km <sup>2</sup>	4/3/2005	

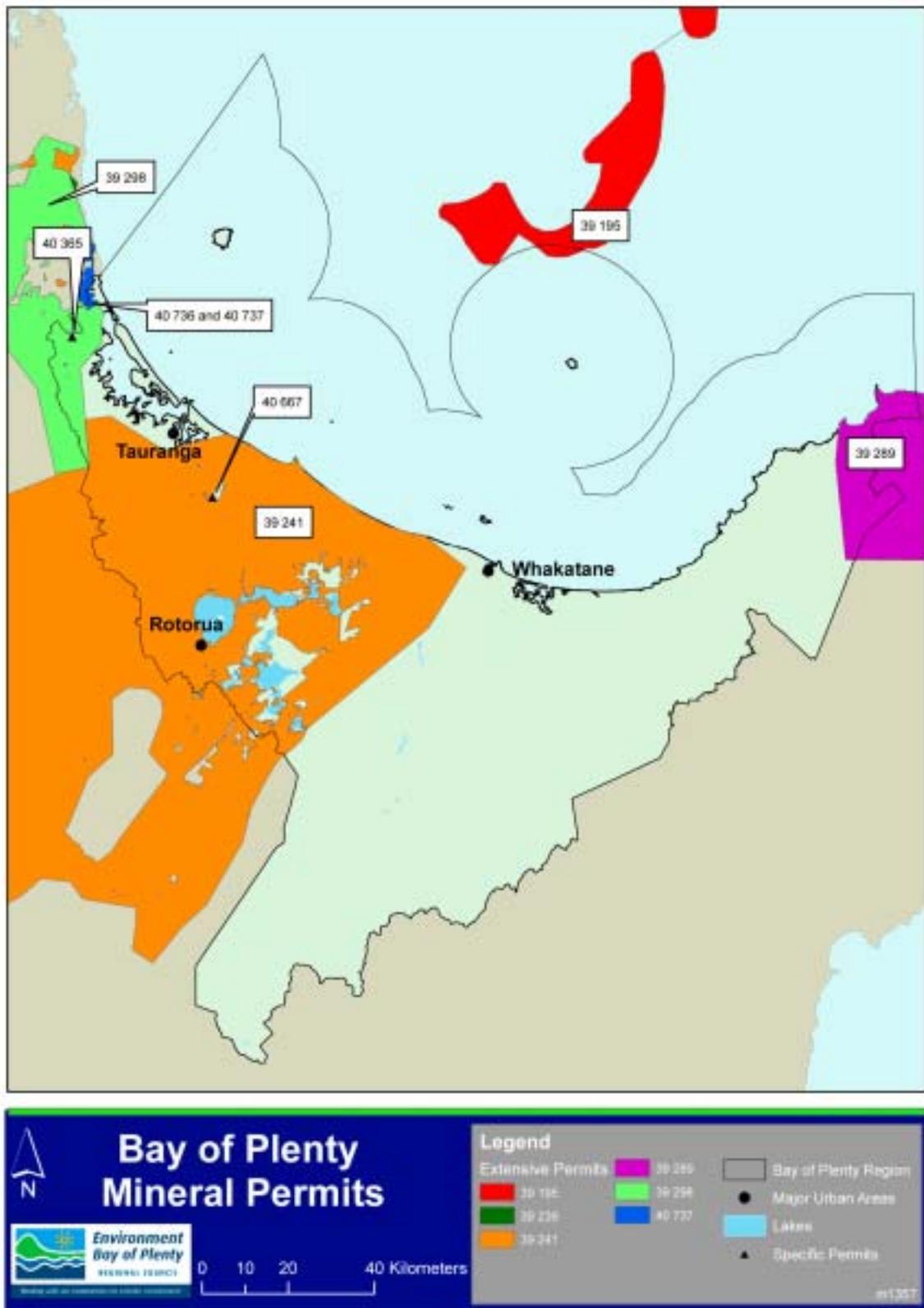
Figure 5 maps the spatial extent of the permits referred to in Table 1. The permit information indicates there is considerable prospecting and exploration interest in potential high value metallic mineral deposits in the region.

Prospecting permit 39 241 held by Glass Earth Ltd is the most extensive, corresponding with large areas of the Taupo Volcanic Zone (TVZ). Glass Earth Ltd is particularly interested in potential epithermal gold deposits in the TVZ, and has developed a comprehensive database to identify target areas for further exploration.

Figure 5 also shows there are prospecting and exploration permits that 'spill' into the northwest corner of the Bay of Plenty from the actively mined Waihi area. Also of note is permit 40 667, centred on Muirs Reefs, an area of historical gold production near Te Puke. Offshore, Neptune Resources (39 195) holds a prospecting permit for potential mineral deposits associated with volcanoes and seamounts of the southern Kermadec Arc and Havre Trough.

A prospecting permit has recently been issued to Mercator Gold (39 289) for an area encompassing the eastern edge of the Bay of Plenty and adjacent parts of the Gisborne District. Mercator Gold is interested in potential epithermal gold mineralisation in the area, which was also explored by another company in the late 1990s.

Figure 5 Bay of Plenty Mineral Permits



Source: Kenex Knowledge Systems Ltd (2005).

### 3.3 Gold and Silver

The prospecting and exploration permits discussed in the previous section indicate that these activities are primarily focused on potential gold deposits in the Bay of Plenty. While there is no current gold production in the region, existing information and the location of the nearby Martha Hill mine at Waihi suggest that this cannot be discounted in the future. Figure 6 maps some areas of potential interest for gold and silver deposits, identified using publicly available information. The map locates these areas in the Western Bay of Plenty and Rotorua districts.

Areas of interest in the Western Bay of Plenty centre on known mineralised areas with historical gold production. Information from Crown Minerals (2004) focuses on two locations in particular and provides the following commentary:

- (i) **Muir's Reefs** in the Te Puke area. Two subparallel, north northeast striking auriferous quartz reefs. Worked intermittently from 1897 to 1928 from several adits and shafts with a production in excess of 1685 kg (54 172 oz) of bullion from 64 482 tonnes of quartz. These reefs and their possible extensions and repetitions have been explored under various mineral licences and permits in more recent times. The area has good prospectivity and is potentially a future extraction site.
- (ii) **The Eliza Mine** on the Waitekohe Stream in the ranges southwest of Katikati yielded only 150g bullion from 12 tonnes quartz earlier last century but remains a potential future extraction site. The known mineralisation is >400m long, several metres wide, and strikes 15° dipping steeply west.

While these remain potential areas of interest, other interpretations should also be taken into account. For example, Houghton and Cuthbertson (1989, p.31) acknowledge the Eliza Mine deposit, but conclude that the history of prospecting and mining in this part of the Kaimai Range has been 'singularly unsuccessful'.

The areas of interest located in the Rotorua District are associated with epithermal gold mineralisation in the TVZ. The TVZ contains volcanic rocks (mainly ignimbrites and rhyolites), hosting a number of active high temperature geothermal fields, each about 10-20km<sup>2</sup> in area. These fields are mainly confined to the active eastern side of the TVZ, and commonly contain ore-grade gold-silver mineralisation (Figure 7).

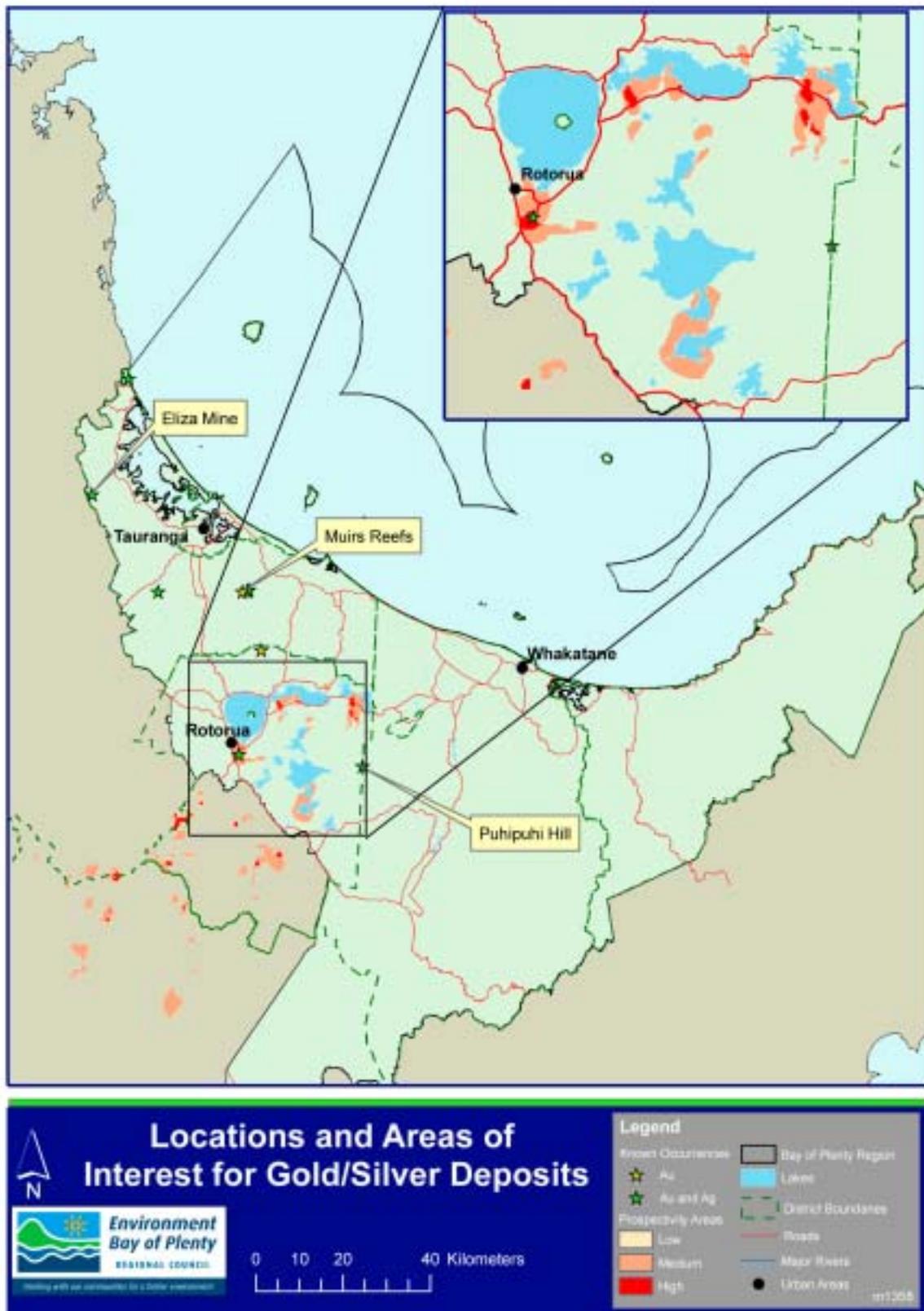
The mineralisation is found in surface siliceous sinters, subsurface quartz veinlets, quartz infilling cavities and silicified hydrothermal breccias, and disseminated in wallrock (Christie and Brathwaite, 2003).



**Figure 7** Deep geothermal fluid emerges from Champagne Pool, Waiotapu to deposit a sinter terrace containing up to 80g/t gold and 175g/t silver.

Source: Christie and Brathwaite (2003) p.25.

Figure 6 Locations and Areas of Interest for Gold/Silver Deposits



Sources: Cody and Christie (1992), Crown Minerals and the Institute of Geological and Nuclear Sciences (2003), Crown Minerals (2004).

The areas of interest in the Rotorua District have no record of significant gold production, but as Figure 6 shows, they do display high prospectivity in places. This prospectivity rating was modelled using spatial recognition techniques in a Geographical Information System. However, the limitations of the model, particularly in terms of data availability, mean that the prospectivity areas identified on the map should be treated as broadly indicative only (Rattenbury and Partington, 2003). In fact, the model is limited by the currency of factors that, if revised in the future, may point to additional zones of gold-silver prospectivity in the Bay of Plenty region (Crown Minerals, 2004).

Crown Minerals (2004) provided the following analysis on prospectivity in the Rotorua district:

The Tikitere and Whakarewarewa areas stand out as prospective (amorphous silica is currently mined at Tikitere). However, because these localities have obvious cultural significance and other intrinsic values, there is little suggestion that they could be areas for potential future extraction. The same would be said for the prospectivity area generally centred on Waimangu. Gold prospectivity is also indicated generally west and south of Lake Rotoma where there is an increased likelihood of an extractable resource, but again contingent on cultural and environmental factors.

In addition to these areas, gold-silver mineralisation was recorded early last century at Puhipuhi Hill (also known as Goldmine Hill), 14km southwest of Kawerau, but more recent reconnaissance exploration in the 1980s and 1990s located only an area of anomalous stream sediment geochemistry.

### 3.4 Other Minerals

The Bay of Plenty region has deposits of many other minerals, particularly those associated with volcanic activity. Figure 8 maps known occurrences and recent extraction sites of these minerals. The map indicates multiple deposits of sulphur, clays, limestone, obsidian, titanium, diatomite and perlite in the region.

Sulphur deposits occur in the volcanic zone stretching from Rotorua to Whakaari/White Island and have been mined at several sites over the years. Sulphur has been mined historically on Whakaari/White Island. However, a volcanic eruption and subsequent lahar in 1914 killed many workers, and highlighted the hazardous nature of extracting minerals in a volcanically active zone.

Clay is present in a number of locations and has been extracted from a site near Whakatane. Obsidian is found at Mayor Island (Tuhua), while there are known occurrences of titanium on Matakana Island and near Waihi Beach. Limestone has in the past been quarried near Ruatoki south of Whakatane, and can also be found southeast of Murupara. In recent times, substantial amounts of amorphous silica have been extracted from a deposit at Tikitere. Limited quantities of dimension stone for building have also been extracted recently.

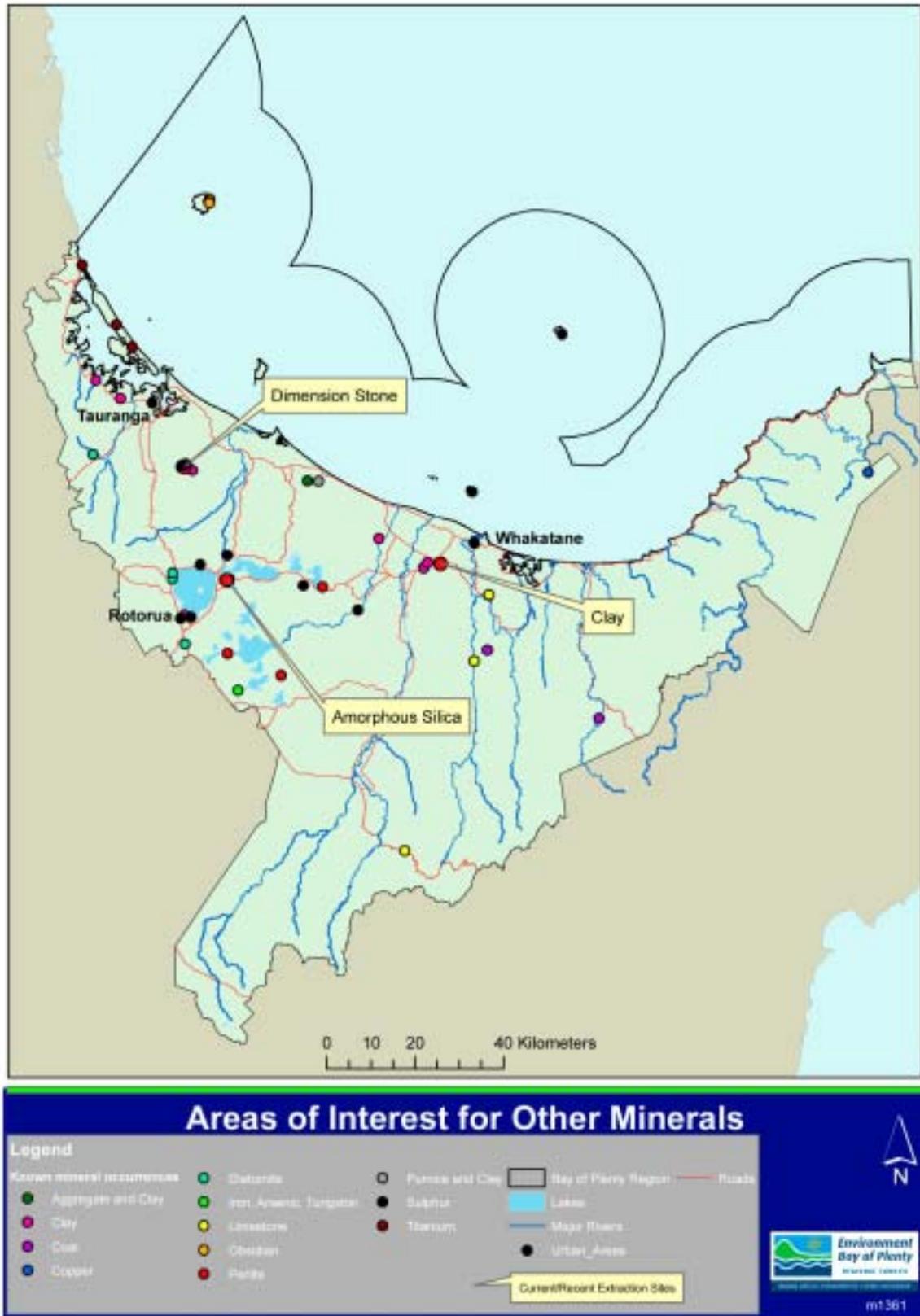
Deposits of perlite and diatomite have been recorded at several sites in the vicinity of Rotorua, and near McLaren Falls to the south of Tauranga. There has also been historical extraction from these deposits in the Bay of Plenty. Substantial quantities of perlite are currently extracted just outside the region at a quarry near Atiamuri to the south of Rotorua. Perlite is used domestically as an inert insulator and filler, and for horticultural/pot plant mixes, while diatomite is quarried for use as a mild abrasive, insulation, filtration and pozzolan material (Ministry for Economic

Development, 2001). The Bay of Plenty would appear to display some potential for the future extraction of both perlite and diatomite.

A report by Cody and Christie (1992) provides more detailed locational information and a historical record of prospecting and extraction activities for the mineral resources referred to above.

It should be noted here that although these recorded occurrences provide some interesting insights into the mineralogy of the Bay of Plenty, detailed ground work would be required to identify and refine areas for potential future extraction of these minerals.

Figure 8 Areas of Interest for Other Minerals



Sources: Cody and Christie (1992), Crown Minerals (2005).

### 3.5 Aggregates, Pumice and Sand

Figure 9 locates current or recent quarry-based extraction sites for aggregate, pumice and sand in the Bay of Plenty using quarry resource consent and mining permit information (additional site-specific information is contained in Table 2). Figure 9 also maps known occurrences of aggregate, pumice, clay and sand. The map indicates a spatial clustering into some general areas of interest:

- (i) There is a zone of activity in the vicinity of the Te Puke, Paengaroa and Pongakawa areas, extending west to the southern limits of Tauranga. Many of these sites are adjacent to the network of major roads and feed the demand generated by Tauranga and its surrounds. Within this zone, there is a general resource-based division, with rock predominantly extracted in the western half, and pumice and sand in the eastern half (Kensington Consulting Group Ltd, 2000).
- (ii) There is a second area of interest surrounding Whakatane, centred in particular on the southeastern part of the Rangitaiki Plain. Again, many of these sites are adjacent to major roads. There are also clusters of known occurrences of aggregate extending inland from the mouths of rivers to the east of Whakatane.
- (iii) A third area of interest is in the Murupara area. Production information suggests the main purpose of many of these quarries is to provide material for forestry roading. Consequently, extraction tends to be undertaken intermittently as required.
- (iv) Finally, there is a limited number of extraction sites adjacent to Rotorua.

Pumice and high quality sand are predominantly extracted from sites near Te Puke and Whakatane. Historically, beach extraction has provided an additional source of high quality sand. For example, the largest sand mining operation in the region extracted approximately 26 000 m<sup>3</sup> from the beach at Otamarakau in 1997 (Lawrie, 1997). However, this operation sparked a debate about the effects of such activities on coastal processes, prompting a report by the Parliamentary Commissioner for the Environment (1998). Beach mining operations have since ceased in the Bay of Plenty, and commercial sand mining from the 'active beach system on the open coast' will soon become a prohibited activity under the Regional Coastal Environment Plan.

In terms of aggregates, the spatial information mapped in Figure 9 tends to support analysis provided by Crown Minerals (2004), which states:

Although there are abundant reserves of low-grade aggregate material (rhyolite) throughout most of the Bay of Plenty region, there are inadequate resources of high-grade material close to Tauranga and Rotorua. High grade andesite is therefore brought in from quarries near Katikati and Te Puke.

Cody and Christie (1992, p.70) agree, noting that good quality roading and concrete aggregate are particularly lacking in abundance, and that 'the eastern greywacke ranges offer good quality aggregate resources but they are far removed from the urban centres of greatest need'.

The Crown Minerals report (2004) adds that:

Andesite is and has been quarried at many localities in the region and so those areas where there is 'fresh' andesite of the southern Coromandel Volcanic Zone (CVZ) will themselves contain areas of potential future aggregate extraction.

This analysis affirms the conclusions of Houghton and Cuthbertson (1989, p.32), who, when referring to the andesite of the Uretara Formation (Kaimai Range), state that 'the material is of excellent quality where not hydrothermally altered, and only thickness of overburden constrains the viability of quarrying'.

Figure 10 maps andesites, basalts and dacites in the western Bay of Plenty. The map also shows the locations of existing extraction sites. Figure 10 indicates that there are a number of sites centred on the hard rock resource to the west of Te Puke. There are also hard rock quarries located on the fringes of the Kaimai Range near Waihi Beach and Katikati. While detailed assessments would be required to determine the viability of quarrying at any particular site, at a more general level this spatial pattern would suggest that future extraction sites are likely to be located within or on the edges of these mapped areas.

Crown Minerals (2004) identified additional areas of Tertiary/Quaternary andesites, dacites and basalts, which may also prove to be suitable sites of high quality material for aggregate. These areas are not marked on Figure 10, but are centred on Putauaki to the immediate south east of Kawerau; and to the north of this area in the vicinity of the mining permit 41 606 (see Figure 9).

The Greywacke ranges in the eastern Bay of Plenty are another key source of aggregate in the region. Greywacke is extracted from quarries near Whakatane (see Figure 9), while river gravels also provide a natural concentration of washed, durable materials for roading and construction purposes.

Figure 11 maps the broad gravel lithologies of the region and locates recent river gravel extraction resource consents. The map shows that river gravel extraction sites are confined to the rivers draining out of the eastern greywacke ranges. This is largely due to the structural characteristics of greywacke, which leads to rivers with rock or shingle beds and carrying significant bedloads of shingle, sand and silt (Environment Bay of Plenty, 2003).

River gravel extraction rates are managed under the Regional River Gravel Management Plan for flood and resource management purposes, and to meet demand for aggregate. The extraction of small volumes is generally a permitted activity, while a resource consent is required for the extraction of large volumes (e.g. for commercial purposes). Figures show that a total of 255 587 m<sup>3</sup> was extracted from consented sites in the 2001-2004 period. Approximately 75% of this total was extracted from the Waimana (58 883 m<sup>3</sup>), Waioeka (55 622 m<sup>3</sup>), Whakatane (49 570 m<sup>3</sup>) and Horomanga (34 833 m<sup>3</sup>) rivers.

Figures also show a downward trend in annual extraction rates over the past ten years. The average for the 1993-1997 period was 200 000 m<sup>3</sup> per year, for the 1997-2001 period it was 98 000 m<sup>3</sup> per year and between 2001-2004 the average was approximately 75 000 m<sup>3</sup> per year (Mooney and Pickles, 2005). While there is a ready supply of river gravel, demand would appear to be governed by factors such as the availability of low cost alternatives and specific requirements for certain uses e.g. roading.

There are also some access issues associated with the extraction of river gravels. These issues tend to be about securing access (e.g. across private property) to

sections of rivers where gravel needs to be extracted for river management purposes rather than placing limitations on the overall supply of the river gravel resource. However, the expectation is that greywacke in its various forms will continue to be a principal source of aggregate in the east of the region in the future.

Aggregates play a key role in functioning of the Bay of Plenty economy. Ensuring that sources of supply are located in proximity to demand (generally the main population centres) is important because transport costs are an important factor in the economics of aggregate production. Guaranteeing the supply of certain types of aggregate is also important. For example, certain qualities are required for sealing chip on major roads, while aggregate of lesser quality can be used as base material for roading. Similarly, specific properties are desirable for aggregates and sand used in the production of concrete and for other industrial uses<sup>2</sup>.

While this report provides a general overview at the regional level, these other factors need to be borne in mind because they influence individual decisions about the location of extraction sites and the type of material that is extracted.

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<sup>2</sup> MacFarlan and Barry (1991) provide a good overview of the qualities required for various uses of aggregate and sand.

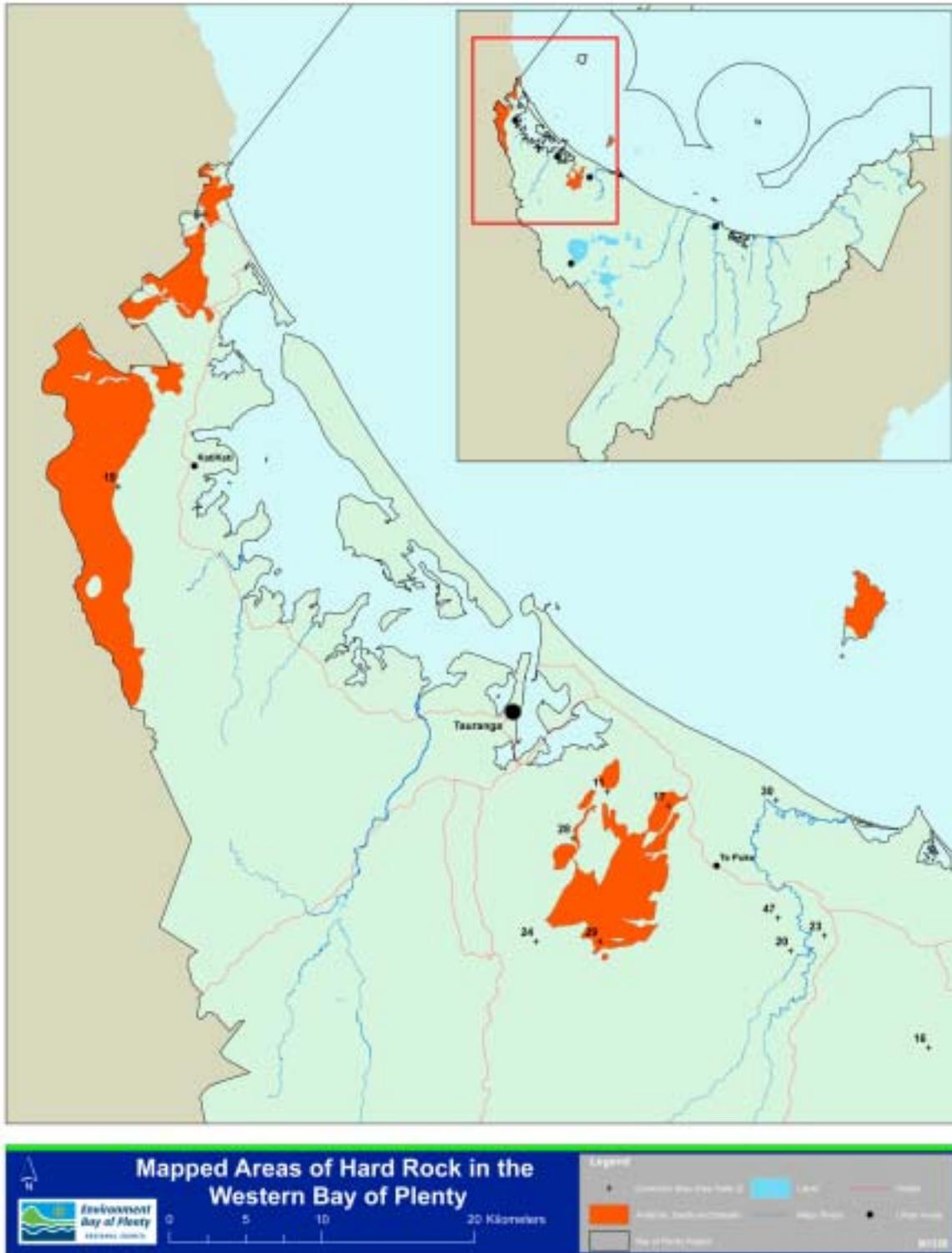


Table 2 Current / Recent Quarry Extraction Sites for Aggregates, Pumice and Sand

Map No.	Mineral Resource	Mining Permit required?	Permit No.	Area	Date of Grant	Expiry Date
1	Rock/sand for roading, building	No				
2	Pumice	No				
3	Rock/sand for roading, building, fill	No				
4	Aggregate	Yes	41 399	8 ha	24/7/1996	23/7/2016
5	Rock/sand for roading, building	Yes	41 116	5.8 ha	24/7/1996	17/7/2017
6	Pumice	No				
7	Pumice/rock/sand for roading	No				
8	Rock for roading (forestry)	No				
9	Rock for roading (forestry)	No				
10	Rock for roading (forestry)	No				
11	Pumice	No				
12	Aggregate, sand and gravel	Yes	41 340	100.5 ha	7/11/1995	6/11/2025
13	No information	No				
14	Rock/sand	No				
15	No information	No				
16	Pumice	No				
17	Rock/sand for roading, building, fill and reclamation	No				
18	Rock (rhyolitic) for roading, fill	No				
19	Rock/sand for roading, building	Yes	32 3132	29.8 ha	9/3/1993	8/3/2014
20	Pumice	No				
21	Pumice	No				
23	Rock/sand for roading, building, fill and industry.	No				
24	Rock/sand for roading, building, fill	Yes	41 054	7.6 ha	16/7/1992	15/7/2013
25	Pumice	No				
26	Rock for roading, fill	No				
27	Rock/sand for roading, building, fill	No				
28	Rock for roading, fill, limited quantities for sealing chip (blue andesite)	Yes	41 362	54 ha	7/11/1995	6/11/2015
29	Aggregate for building	No				
30	Sand	No				
31	Pumice	No				
32	Rock (crushed metal) for roading (forestry)	No				
33	Hard rock quarry (forestry), intermittent use	No				
34	Hard rock quarry (forestry), intermittent use	No				
35	Hard rock quarry (forestry), intermittent use	No				
36	Hard rock quarry (forestry), intermittent use	No				
37	Hard rock quarry (forestry), intermittent use	No				
38	Rock and some pumice	No				
39	Rock for roading purposes	No				
40	Pumice for roading (forestry)	No				
41	Rock roading (forestry)	No				
42	Pumice for forestry maintenance purposes	No				
43	Rock/sand for roading	No				
44	Pumice	No				
45	Rock/sand for roading	No				
46	Sand for roading	Yes	41 733	3.9 ha	24/9/2002	23/9/2009
47	Pumice	No				
48	Rock and pumice for roading and maintenance (farming)	No				
N/A*	Andesite	Yes	41 606	33.5 ha	11/8/1999	11/8/2039

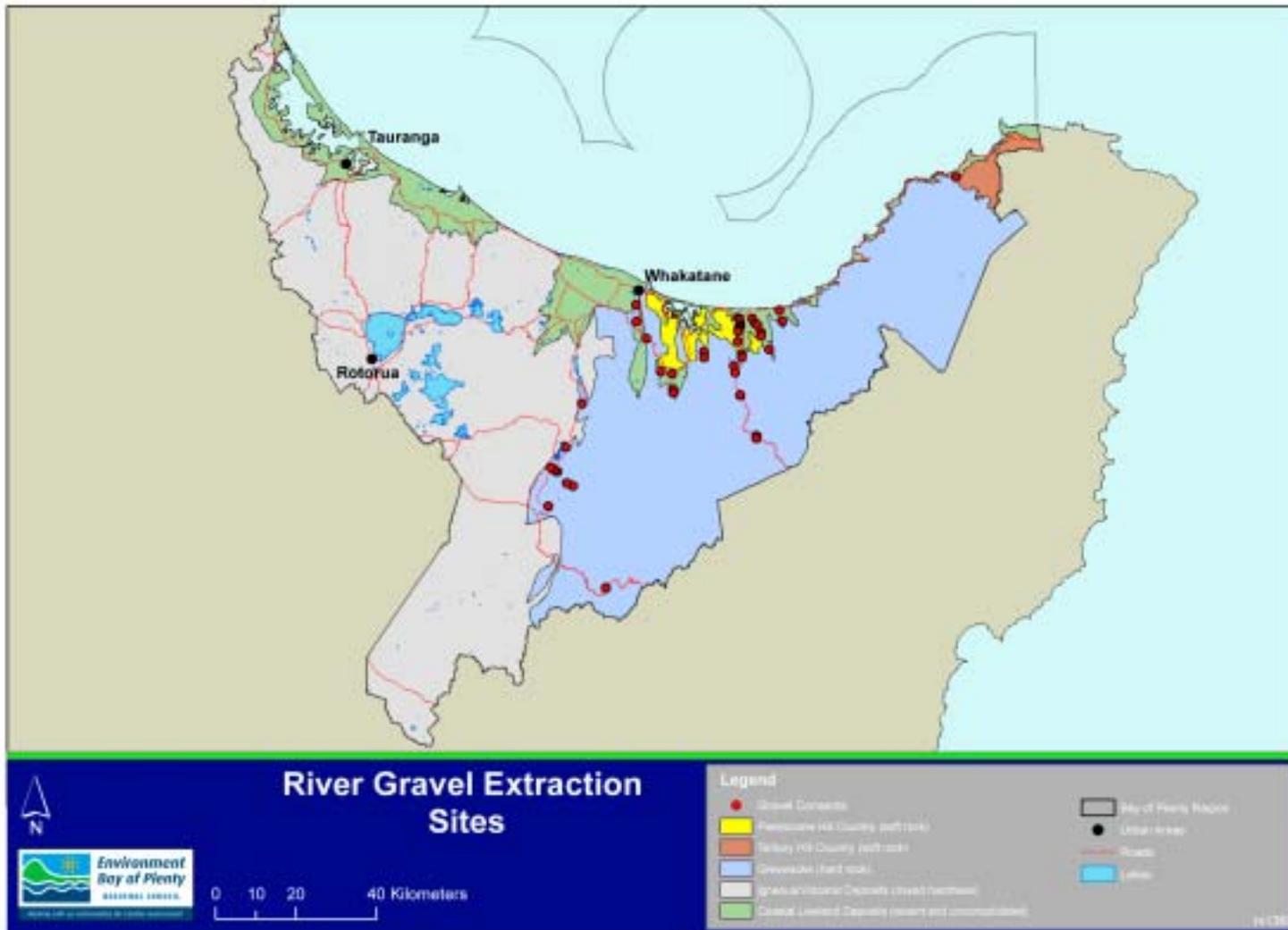
\*Does not have a current consent (e.g. historical extraction site with current mining permit).

Figure 10 Mapped Areas of Hard Rock in the Western Bay of Plenty



Sources: Houghton and Cuthbertson (1989), Brathwaite and Christie (1996), Briggs *et al* (1996), Weiss (2004).

Figure 11 River Gravel Extraction Sites



Sources: Environment Bay of Plenty (2003), Mooney and Pickles (2005).



## Chapter 4: Conclusions

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The Bay of Plenty contains a rich and diverse mineral resource base, comprising both metallic and non-metallic minerals. The diversity of the resource can to some extent be attributed to the underlying geology and the dynamics of the Taupo Volcanic Zone. This results in a mineral distribution that in New Zealand is perhaps only replicated in the neighbouring Waikato region.

Mineral extraction plays an important role in the functioning of the regional economy, particularly in the supply of raw materials for the development and maintenance of infrastructure. Consequently, knowledge of the nature and location of key strategic mineral resources should be factored into land use planning decisions.

The information presented in this report shows that the Bay of Plenty has been, and remains, a region of active prospecting for gold deposits. The current prospecting focus is on epithermal deposits of the Taupo Volcanic Zone, an area of historical gold production near Te Puke, and the northwestern corner of the region adjacent to the Waihi gold production area. Future production from more refined areas within these prospects cannot be discounted.

There is also a history of extraction of minerals primarily associated with volcanic activity in the region, particularly sulphur, diatomite and perlite, while substantial quantities of amorphous silica are extracted currently. Again, there is the potential for future interest in extracting these minerals, particularly from areas within the Rotorua district.

Although the information presented in this report points to some potential areas of interest for 'high value' minerals, it is evident that considerable work is required to identify and refine areas to gain any certainty in terms of future extraction sites. Accurately identifying these sites is the 'commercial edge' that companies seek in their prospecting and exploration activities. Identifying an area with potential is only the beginning of a process that may eventually lead to the extraction of a mineral from a specific site. The uncertainties surrounding this process suggests there is little to be gained from attempting to predict potential extraction sites as a means of protecting access to these minerals.

Industrial minerals such as aggregates, pumice and sand are extracted in significant quantities from many sites in the region. The abundance of these resources and the distribution of existing extraction sites suggests there is greater utility in identifying areas of potential extraction as a first step towards protecting future access to these resources.

The material reviewed in compiling this report raises no apparent issues in terms of the overall supply of pumice and sand in the region. However, high quality sand for building is extracted from a limited number of coastal sites (e.g. Thornton) and, without active intervention, future access to this resource could be constrained by conflicting land use demands. Another factor is that large-scale mining of sand from beaches is no longer considered to be an acceptable option due to the effects of this extraction on coastal processes.

The east of the region is served by a ready supply of aggregate emanating from the eastern greywacke ranges. This aggregate resource is extracted from numerous quarry and river extraction sites.

The lack of adequate supplies of high grade aggregate in the west of the region is a recurring theme in existing mineral resource assessments. The projected population growth of Tauranga and its satellites may exacerbate this situation by generating additional demand, while simultaneously 'locking up' potential extraction sites. From a mineral resource perspective, it would appear that areas of andesite in the western Bay of Plenty (e.g. Kaimai and Papamoa ranges) constitute a key source of quality aggregate. The protection of access to this resource in particular should be a consideration in future resource management decisions.

## Chapter 5: Recommendations

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Method 6.3.1(c) in the Regional Policy Statement encourages the regional council and territorial authorities to recognise known mineral deposits and consider whether the potential for access to those mineral resources could be compromised. This report has considered mineral resources in the regional context as part of a scoping exercise to implement this method. The findings suggest that seeking to protect access to high quality andesite in the western Bay of Plenty subregion should be a priority for future work. This recommendation is based on information that points to the limited availability of this resource and the pace of rural subdivision in the western Bay of Plenty.

Further work is required in two areas:

- 1 A more detailed investigation into the dynamics of supply and demand for high quality aggregates in the western Bay of Plenty subregion and Rotorua. This should focus on factors such as projected demand and the specific requirements of this demand (e.g. how much of each grade of material will be required in the future). There also needs to be further refinement of the areas of potential future extraction of this aggregate.
- 2 Environment Bay of Plenty also needs to initiate discussions with the relevant territorial authorities about what formal protection may be required to protect access to these key sources of aggregate. This may involve proposing new provisions for inclusion in district plans.



## References

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- Brathwaite, R. L. and Christie, A. B. (1996) Geology of the Waihi Area, scale 1:50 000. Institute of Geological & Nuclear Sciences geological map 21. 1 sheet + 64 p., Lower Hutt: Institute of Geological and Nuclear Sciences.
- Briggs, R. M. et al (1996) Geology of the Tauranga Area. Department of Earth Sciences Occasional Report No.22. Hamilton: University of Waikato.
- Christie, A. B. and Brathwaite, R. L. (2003) Epithermal Gold in New Zealand: Mineral Deposits Models, Institute of Geological & Nuclear Sciences science report 2003/11, Lower Hutt: Institute of Geological & Nuclear Sciences.
- Christie, T., Douch, C., Winfield, B. and Thompson, B. (2000) 'Industrial Minerals in New Zealand', *New Zealand Mining*, 27, pp. 14-25.
- Cody, A. D. and Christie, A.B. (1992) Sheet QM302 Whakatane, Geological Resource Map of New Zealand 1:250 000, Institute of Geological & Nuclear Sciences science report 92/17, Lower Hutt: Institute of Geological and Nuclear Sciences.
- Crown Minerals (2004) Mineral Resources in the Bay of Plenty Region. Unpublished report.
- Crown Minerals (2005) online: New Zealand Mineral and Coal Production. <http://crownminerals.med.govt.nz/minerals/facts/index.html> (downloaded 16 March 2005).
- Crown Minerals and the Institute of Geological and Nuclear Sciences (2003) CD-ROM: Epithermal Gold in New Zealand GIS Data Package and Prospectivity Modelling, Wellington: Crown Minerals/Institute of Geological and Nuclear Sciences.
- Environment Bay of Plenty (2003) River Gravel Management Guidelines. Environment Bay of Plenty Guideline No. 2003/02. Whakatane: Environment Bay of Plenty.
- Houghton, B. F. and Cuthbertson, A. B. (1989) Sheet T14BD – Kaimai, Geological Map of New Zealand 1:50 000, Map (1 sheet) with notes, Wellington: Department of Scientific and Industrial Research.
- Kenex Knowledge Systems Ltd (2005) online: TenMap. <http://www.kenex.co.nz> (downloaded 12 April 2005).
- Kensington Consulting Group (2000) Quarry Material Transported on District Roads within the Western Bay of Plenty 2000-2018, Whangarei: Kensington Consulting Group Limited.
- Lawrie, A. (1997) Compliance Report: Sand Mining in the Bay of Plenty. Whakatane: Environment Bay of Plenty.

- MacFarlan, D. A. B. and Barry, J. M. (1991) Mineral Resources of New Zealand. Resource Information Report 11. Wellington: Energy and Resources Division, Ministry of Commerce.
- Ministry of Economic Development (2001) Explore New Zealand Minerals, Wellington: Ministry of Economic Development.
- Mooney, W. and Pickles, S. (2005) River Gravel Extraction Compliance Report. Environmental Publication 2005/07, Whakatane: Environment Bay of Plenty.
- Parliamentary Commissioner for the Environment (1998) Compliance Monitoring of a Coastal Permit for Sand Extraction, Otamarakau Beach, Bay of Plenty, Wellington: Parliamentary Commissioner for the Environment.
- Rattenbury, M. and Partington, G. A. (2003) 'Prospectivity models and GIS data for the exploration of epithermal gold mineralisation in New Zealand', in Epithermal Gold in New Zealand GIS Data Package and Prospectivity Modelling, Wellington: Crown Minerals/Institute of Geological and Nuclear Sciences.
- Weiss, S. (2004) Quarry Compliance Report. Environment Bay of Plenty Environmental Publication 2004/10, Whakatane: Environment Bay of Plenty.

## Appendices

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Appendix A - Bay of Plenty Regional Policy Statement (Operative 1 December 1999)



## Appendix A

### Bay of Plenty Regional Policy Statement (Operative 1 December 1999)

<i>Policies</i>	
6.3.1 (b)(xvi)	To promote the integrated management of mineral resources including aggregates.
13.3.1 (b)(viii)	To discourage uses of land, for example for urban development or settlement growth, which would:
(g)	Result in the loss of access to minerals including aggregate sources.
<i>Methods of Implementation</i>	
Environment Bay of Plenty and District Councils are encouraged to:	
6.3.1(c)	Recognise known mineral deposits and consider whether the potential for access to those mineral resources could be compromised.
Environment Bay of Plenty and District Councils will co-operate in:	
13.3.1(c)(v)	Requiring in any assessment of environmental effects for proposed significant resource developments including infrastructure and utility developments, consideration of the effects of the proposal on finite resources including high quality soils and minerals.

### SmartGrowth Strategy and Implementation Plan

<i>7.2.7 Aggregates and other Mineral Resources</i>	
<b>Actions</b>	
1	Investigate mineral demand and resource potential and prepare maps showing the location of areas of known or potential resources within the region, and develop management strategies that take into account the findings of this investigation.