



economics

Report to:

Development West Coast

**POTENTIAL CONTRIBUTION
OF MINING TO THE WEST COAST REGION**

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1 Executive Summary

The mining sector is the backbone of the West Coast regional economy and is a key sector in terms of achieving the growth and aspirations of the Region. This report finds that the mining sector, after including indirect and induced effects, employs 4,160 full-time equivalents (FTEs) and contributes \$553 million to GDP in the West Coast region.

Our analysis of the contribution of the mining sector to the West Coast region builds on a report completed by GNS Science in 2010. The GNS Science report is a mineral resource assessment of the West Coast region that identified the potential levels of mining activity that could be present under three scenarios.

- Scenario 1 is a business as usual scenario that sees current levels of coal and mineral production in the Region maintained. It describes current coal and mineral production, and the exploration and extraction required to replace current mined resources with new coal and gold resources.
- Scenario 2 is an historical maximum scenario, which is based on the highest historically recorded levels of annual production in the last decade (except for placer gold, where the 1995 production level is used).
- Scenario 3 is an optimistic growth scenario, where increases are proposed for all areas of activity based on increased exploration defining new resources, and the ability to develop these resources. This scenario involves new mining operations being established on prospective mining commodities.

Our analysis draws on Scenario 1 and Scenario 3. Full-time employment required to produce the identified volume of production by mineral commodity is used to determine the economic contribution of the potential mineral resources on the West Coast region. A survey of key companies and discussion with people in the mining sector in the Region was conducted to identify and confirm the employment and the current level of production and to identify the employment required to achieve the increased output identified in Scenario 3.

Assuming that mining activity was able to increase from the current level of activity to the level identified in Scenario 3, then employment in the mining sector in the West Coast region would increase to 5,960 FTEs, and generate \$1.0 billion in GDP. Further, if this increase in the level of minerals output required major investment, such as a new mining operation, then further economic activity would accrue. For example, a \$300 million investment in a new mining project could result in additional employment of 1,840 FTEs and increase regional GDP by around \$200 million during the construction phase. Ongoing operation of the new mine could contribute a further \$86 million in GDP and employ 570 FTEs per year.

Additional employment of around 1,800 FTEs and activity generated under Scenario 3 (over current activity) would have further impacts on the regional economy. Based on current FTE to population ratios of 0.47, and an average household size in the West Coast region of 2.3 people, an additional

1,800 FTEs implies that mining activity could increase the Region's population by around 3,800 people or 1,660 additional households. This would have a flow-on effect on the demand for population driven infrastructure and services such as health, education and amenities. It would also generate the rates revenue and expenditure required to support economic activity and investment in the Region.

However, if we assume that mining activity increases to the level identified in Scenario 3, our analysis suggests that the mining sector - with existing intentions - will reach production levels under this scenario sooner rather than later. Along the way, there are a number of issues that need to be addressed to allow the mining sector to achieve this growth. These include:

- infrastructure around the ability to export production;
- resources around the ability to employ and retain appropriate and adequate people; and
- access to the resource in terms of perception, consenting and environmental issues.

Achieving Scenario 3 will not provide the scale of activity required to effectively address these issues. For the mining sector on the West Coast to be regionally sustainable it needs to have **higher output targets** than those identified under Scenario 3. In addition to gold and coal, the GNS Science report identified 12 potentially high value minerals that could be mined. The extent of coal resources is well understood in this Region but there is the potential to expand current gold resources; and for a new range of minerals to be extracted. The key to realising this potential is a sustained increase in exploration investment. The Government's proposed airborne geophysical survey of part of the West Coast region could be the first step towards achieving this.

For the sector to grow and support the aspirations of the West Coast community, these issues need to be addressed. BERL suggests that the sector needs to produce around 10 million tonnes of coal and/or double gold production and new minerals to provide the scale that would support a vibrant industry by allowing effective services and infrastructure. Increasing activity to this level would support a regional population of around 50,000, which would provide a more sustainable base from which to achieve community aspirations.

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2 Introduction

Metallic minerals and coal resources have been one of the major drivers of development in New Zealand. Non-metallic minerals (aggregate, limestone and specialised high value minerals) and their processed products such as cement have also contributed significantly to economic growth.

The mining sector is important to the West Coast, historically and currently, but also its future. Mining underpins the Region's economy, and has shaped the Region's social and cultural development. This report looks at the role of mining at the regional and district levels of the West Coast economy. It then looks at the current economic contribution, and the potential future contribution, based on a GNS Science Mineral Resource Assessment (Christie et al. 2010). It further explores the issues that affect the ability of the mining sector to grow on the West Coast.

This report draws on information gathered from the GNS Science analysis, supplemented by the BERL regional database. Further information was gathered from discussions with the industry. The Economic Impact Analysis used input-output tables and multipliers for the West Coast produced by Butcher and Associates.

The production volumes and values used in our current and growth scenario differ from the GNS Science numbers slightly in that current estimates based on discussion with the industry (as opposed to official production numbers from 2009) are used. As well, in an effort to identify current output, we have used higher prices for coal and gold than those used in the GNS Science report.

Format of the report

Chapter 3 provides a synopsis of the West Coast economy, drawing on the BERL Regional Database to present settlement patterns, industry activity, and economic growth indicators. Chapter 4 provides an overview of the mining industry in New Zealand and on the West Coast. Chapter 5 presents the economic impact of mining on the West Coast, both current and under an optimistic growth scenario. Chapter 6 discusses issues that are affecting the ability of the mining sector to grow on the West Coast. The report is summarised in Chapter 7.

Consultation

This report draws heavily on intelligence and information from a number of people/organisations involved in the mining sector on the West Coast. We acknowledge their contribution to the report, and appreciate their time and effort. A list of people consulted is included in the appendix.

3 The West Coast Economy

3.1 Geography and settlements

The West Coast region is the fifth largest region in the country, with a land area of 23,000 square kilometres. However, it has only 32,000 people, accounting for less than one percent of New Zealand's population. This population is spread across three districts: Buller, Grey, and Westland, with the largest settlement in each district being Westport, Greymouth and Hokitika respectively.

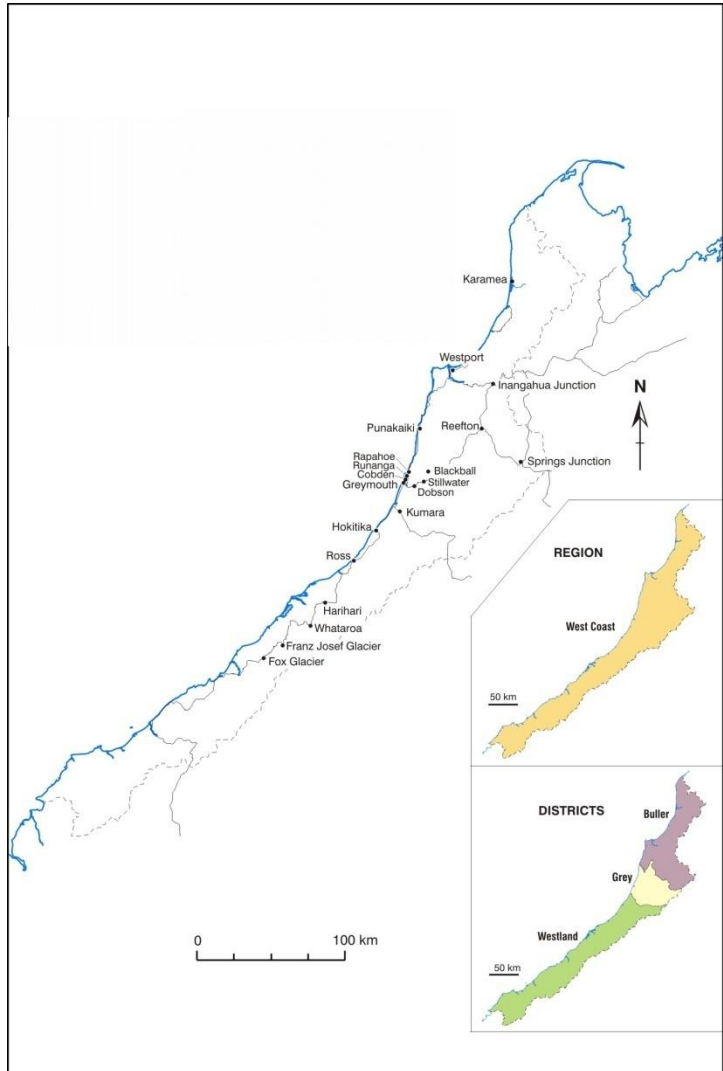
The West Coast has a diverse geography that is endowed with a number of natural resources: ore/minerals, fisheries, pastoral and indigenous forest in a rural setting. As such, the economy is resource-based.

Settlements

There are four major towns in the Region. In the centre of the Region is Greymouth, with an estimated urban population of 10,000. It is the main centre for the Region, providing the majority of business services as well as health and education. To the north, Westport, with an urban population of 3,900 supports the Buller District, which largely focuses on mining and agriculture. Hokitika, which has a population of around 3,100 is in the Westland District and supports tourism and dairy. Reefton, which is inland, supports the mining industry and has a population of around 1,000 people.

Population

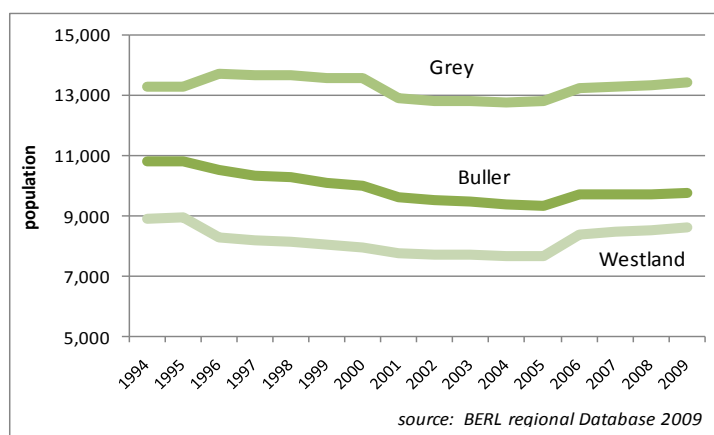
All up, the West Coast region has a population of around 32,000 people, spread over 500 kilometres and three main towns.



The biggest town in the West Coast region is Greymouth, with the Grey District having a population of around 13,500 people. Westport supports the Buller District, which has a population of 9,800. Hokitika is the biggest town in the Westland District, which has a population of 8,600. Ultimately, there is free movement along the Coast with the towns providing basic services for its residents. However, Greymouth is the main retail, recreational, cultural and business service centre for the wider West Coast region.¹

A quick look at the population across the three districts that make up the Region shows that only Grey has grown over the last 10 years. Over the last five years all districts have grown, although this growth has been slowest in Buller and highest in Westland.

Figure 3.1. Population estimates, 1994 to 2009



Growth in recent years has seen the population recover to 1999 levels. Over the same period, the New Zealand population has been growing at 1.0 percent per annum.

Transport

There is movement between all the main centres. State highway six (SH6) connects Westport, Greymouth and Hokitika. It is one and a half hours drive from Westport to Greymouth, and from Hokitika to Greymouth it takes around 30 minutes. SH6 continues on to Nelson, while Greymouth is connected to Christchurch through SH73 over Arthur's Pass.

There are two ports, one in Westport and one in Greymouth. Air services to Christchurch, Wellington and Auckland leave from Hokitika and Westport.

The Midland Line links Greymouth with Christchurch and the Port of Lyttelton. It is used mainly for transporting coal from the West Coast to Lyttelton. It also carries the TranzAlpine Express, a daily passenger service between Christchurch and Greymouth.

¹ Greymouth has the major chain shops as well as fast food franchises such as McDonalds and KFC. The DHB and base hospital is in Greymouth.

The Stillwater-Westport Line and Ngakawau branch lines extend north from east of Greymouth to service the coal mines in the Buller District. The Hokitika branch line extends south from Greymouth to Hokitika to serve Westland Milk Products.

3.2 Industry analysis

The primary economic activities in the Region are mining (largely coal and gold) and dairy (Westland Milk Products). The Region is also a UNESCO World Heritage Site and home to five of New Zealand's 14 national parks. Hence, tourism is the third major industry, and is particularly visible in the Westland District. A report to RTONZ² identified that 2,380 FTEs in the West Coast region were employed in tourism related industries, and contributed \$145 million to regional GDP in 2009.

Primary production and the retail and distribution industries are the major employers on the West Coast. The primary sector is the major contributor to Gross Domestic Product (GDP) and to business units. This is shown in Table 3.1

Table 3.1. Industry analysis

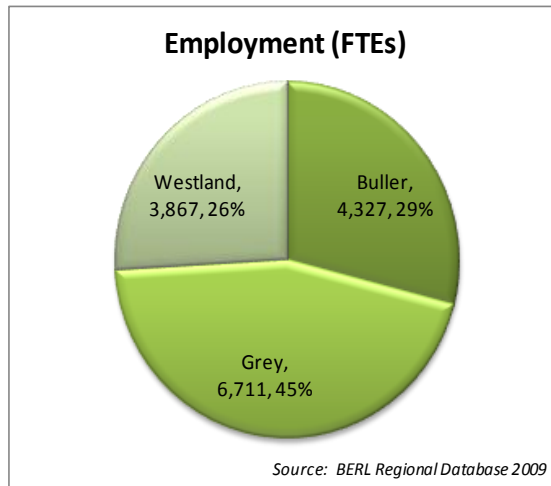
Sectors (2009)	FTEs		GDP (2009\$m)		Business units	
		%		%		%
Primary	3,156	21.2%	351	25.2%	1,136	28.8%
Manufacturing	1,463	9.8%	179	12.9%	185	4.7%
Construction	1,415	9.5%	82	5.9%	0	0.0%
Retail and Distribution	4,462	29.9%	294	21.1%	932	23.7%
Business Services	1,187	8.0%	289	20.7%	791	20.1%
Recreation Services	892	6.0%	43	3.1%	277	7.0%
Social Services	2,330	15.6%	154	11.0%	251	6.4%
Totals	14,904	100.0%	1,392	100.0%	3,940	90.7%

Source: BERL Regional Database, Statistics NZ

Employment is spread across the three districts in the West Coast region in different proportions. Grey has the largest employment base, with Westland and Buller employing a relatively similar number of people.

² (BERL, 2010)

Figure 3.2. Employment by district



Grey accounts for 45 percent of employment in the Region, with Westland and Buller accounting for similar levels of employment (26 percent and 29 percent respectively).

3.2.1 Key Production sectors³

As noted above the key employment sectors in the West Coast are primary, mining and tourism.

Primary sector employment

The employment split in the primary sector is 57 percent agriculture and 35 percent mining. The remaining nine percent is split between two-thirds forestry and one-third fishing, as shown in Figure 3.3.

Figure 3.3. Employment in primary sector by sub-sector

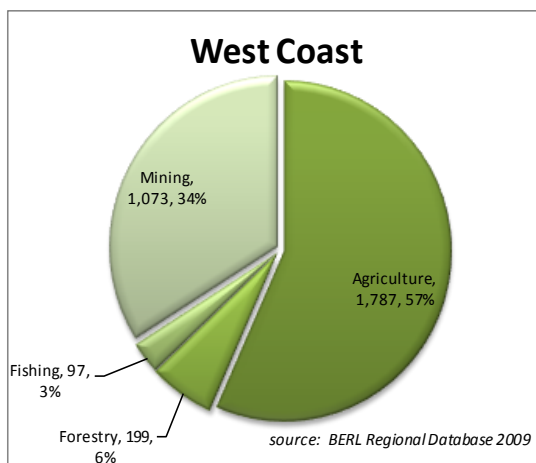
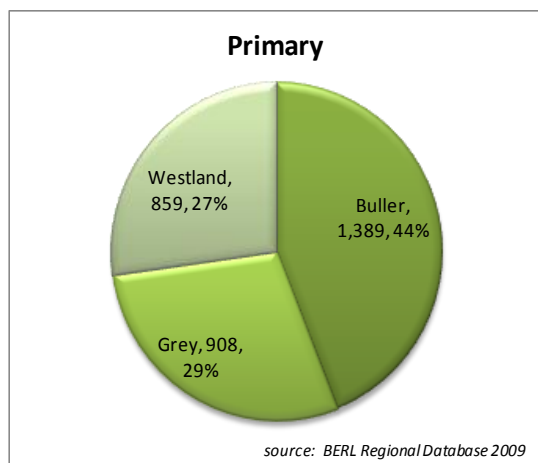


Figure 3.4. Employment in primary sector by district



³ Production sectors are those sectors that generate activity, namely growing or making things rather than support activity such as retail or services.

Buller makes the biggest contribution to employment in the primary sector, accounting for 44 percent (Figure 3.4). Grey and Westland have almost similar sized primary sectors accounting for 29 percent and 27 percent of employment respectively.

Looking at employment by sub-sector, agriculture appears relatively evenly split across the three districts in the West Coast region as shown in Figure 3.5, where Westland accounts for 40 percent of employment, Buller 37 percent, and Grey 23 percent. On the other hand, mining is highly concentrated in the Buller and Grey districts as shown in Figure 3.6.

Figure 3.5. Employment in agriculture by district

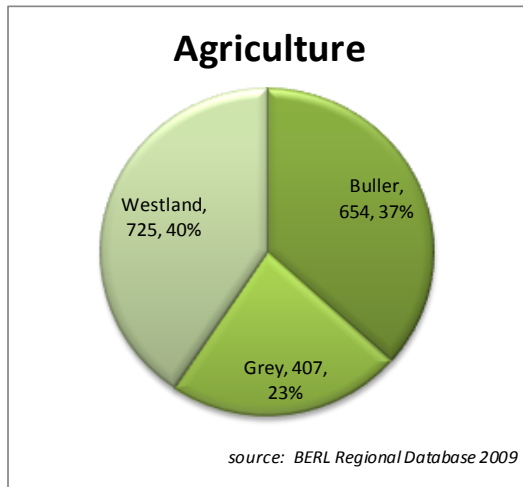
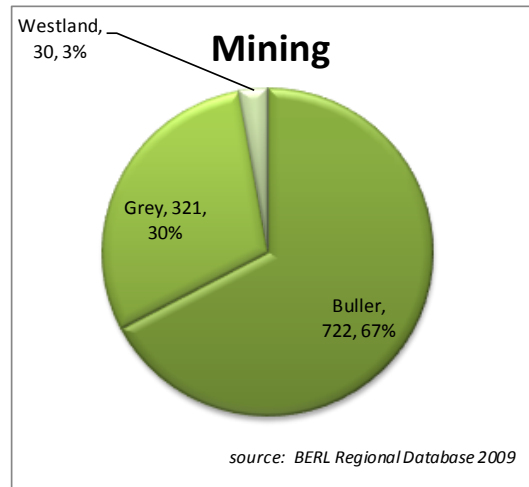


Figure 3.6. Employment in mining by district



Buller accounts for two-thirds of the employment in mining, with Grey accounting for 30 percent. There is little employment in mining in Westland, where it accounts for only three percent of employment. Most of the employment in mining in Westland is in gold mining.

Manufacturing and construction

We have split the manufacturing and construction sector into five sub-sectors – food processing; mineral processing; non-residential construction; metal product, machinery and equipment manufacturing; and other. This allows us to look at employment and economic activity at a more detailed level. This split is shown in Figure 3.7 and Figure 3.8 below.

Figure 3.7. Employment in manufacturing & construction on the West Coast

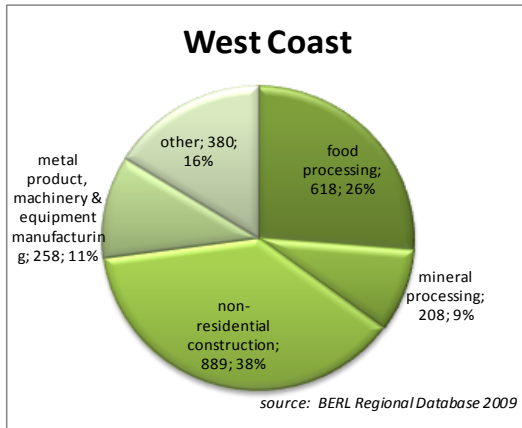
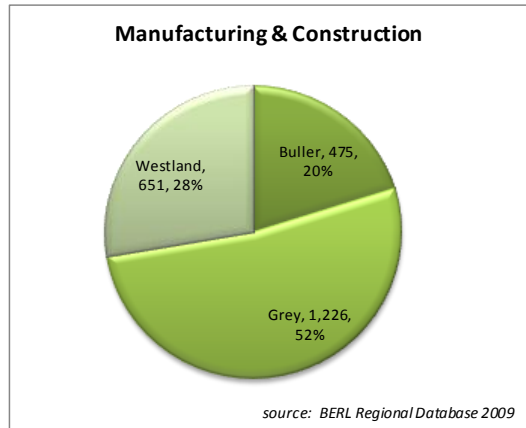


Figure 3.8. Employment in manufacturing & construction



Non-residential construction is the largest sector within manufacturing and construction, accounting for 38 percent of employment, followed by food processing with 26 percent of employment. Mineral processing is a smaller employer and accounts for nine percent of employment in the manufacturing and construction sector.

Looking at where activity in the manufacturing and construction sector occurs, Grey is a significant area of employment, accounting for over 50 percent of employment, with the remaining 48 percent split slightly in Westland’s favour (28 percent against 20 percent for Buller), as shown in Figure 3.8 above.

However, where industries are situated is interesting. Almost half of employment in food processing is in Westland, followed by Grey with 40 percent, and only 12 percent in Buller, as shown in Figure 3.9. This reflects Westland Milk Products processing site being situated in the Westland District, and Grey’s position as the major settlement for economic activity in the West Coast region.

Figure 3.9. Employment in food processing by district

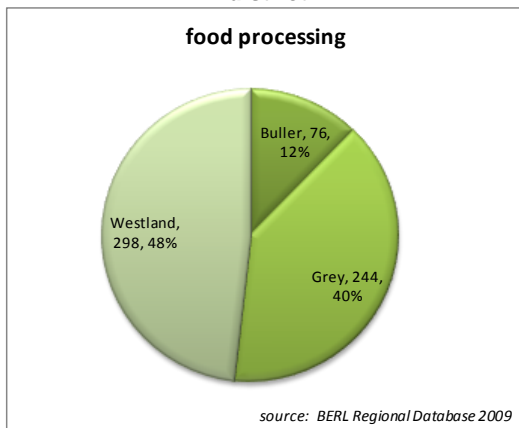
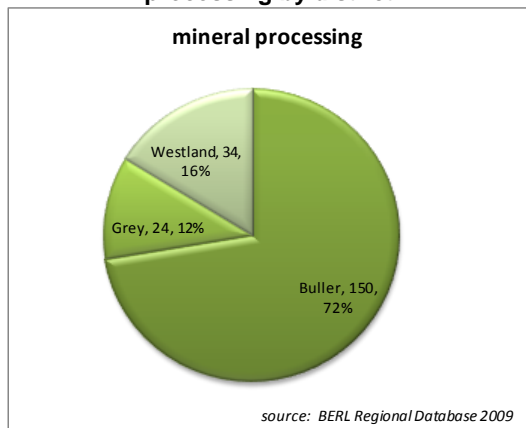


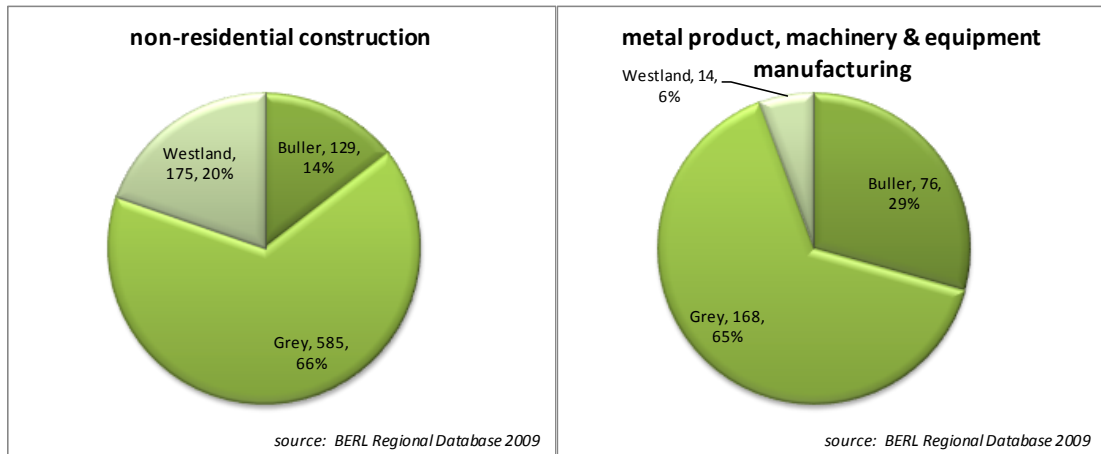
Figure 3.10. Employment in mineral processing by district



In terms of mineral processing⁴, Buller is the major area of activity, accounting for close to three-quarters of total employment. Westland is next with 16 percent, and Grey only accounts for 12 percent of employment. This is shown in Figure 3.10 above.

Where Grey comes into the picture is in non-residential construction and metal product, machinery & equipment manufacturing as shown in Figure 3.11.

Figure 3.11. Employment in non-residential construction; and metal product, machinery & equipment manufacturing by district



These two sub-sectors – non-residential construction and metal product, machinery & equipment manufacturing are largely there to support the mining industry. They also support dairy processing but to a lesser extent as indicated by Westland’s lower level of employment in these sectors. However, this is not conclusive as the Grey District accounts for around two-thirds of employment in each of the sub-sectors, and whether the activity is mining or dairy related is less obvious.⁵

The role of mining in Buller is evident when looking at metal product, machinery & equipment manufacturing. Almost 30 percent of employment in this industry is located in the Buller District.

Tourism

Tourism is the third major productive sector in the Region. Based on recent work undertaken for RTONZ, tourism employs around 2,380 FTEs, accounting for 16 percent of employment in the West Coast. This is significantly higher than the national proportion, where around 5.2 percent of employment is tourism related.

⁴ Mineral processing includes Petroleum, Coal, Chemical & Associated Product Manufacturing (3 FTEs) and Non-Metallic Mineral Product Manufacturing. (147 FTEs). Neither of these are industries are included in the official mining sector numbers of 1,217.

⁵ Although we did have discussions with one engineering firm in Greymouth where a significant proportion of their activity was mining-related.

As shown in Figure 3.12, employment is split fairly evenly between Westland and Grey districts, with 39 percent and 36 percent of tourism employment respectively. Buller accounts for around a quarter of tourism employment.

Figure 3.12. Employment in tourism by district

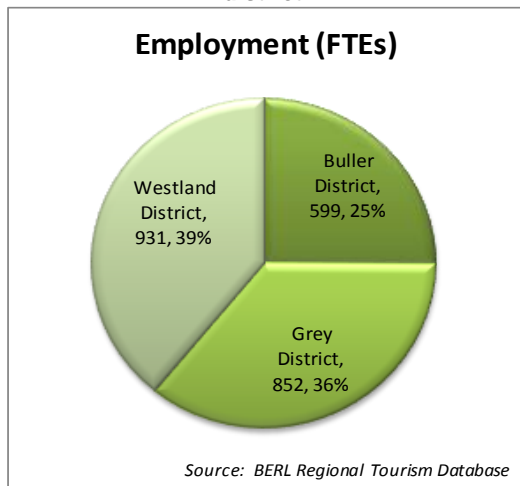


Figure 3.13. Employment in tourism as a % of total employment by district

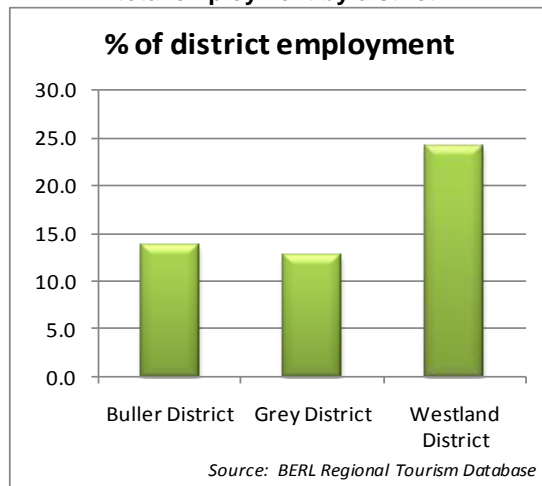


Figure 3.13 shows that tourism employment accounts for around a quarter of total employment in Westland, whereas it accounts for 14 and 13 percent of total employment in the Buller and Grey Districts respectively.

While the major tourist attractions on the West Coast are related to the landscape and national parks, mining and mining history forms an important part of the tourism offering in the Region.

According to the *International Visitor Survey* and the *Domestic Travel Survey*, there were over 33,000 visits to heritage attractions and almost 15,000 visits to museums and galleries in the West Coast in 2009.

Reefton Gold Mine tours combines gold mining history with the current gold mining operations at OceanaGold's Reefton Mine; and Outwest Tours run tours through Solid Energy's Stockton Mine site on the Stockton Plateau taking in a number of mining related attractions such as Waimangaroa, Birchfield, Granity and the ghost town of Stockton.⁶

Shanty Town (10 kilometres south of Greymouth) consists of over 30 historic buildings that recreate a nineteenth century pioneer town, inspired by the West Coast gold rushes of the 1860s.

⁶ Based on an annual survey of domestic and international visitor conducted by Statistics New Zealand for the Ministry of Tourism, there were 94,350 (23%) international visitors and 273,523 (26%) domestic tourists participated in land-sightseeing in West Coast in September 2010 (www.tourismresearch.govt.nz). However, data on actual number of visitors to mine tours in the Region is not currently available.

Friends of the Hill Trust are restoring the Denniston Mine, north of Westport, with the goal of making it a major tourist attraction on the West Coast. When completed (in 2011) visitors will be offered an insight into the daily life of miners as they take a train ride through the original 1880s mine.

There are also a number of other mining related attractions such as the Coaltown and Granity Museums, and Mitchells Gully.

A further relationship between mining and tourism is in the provision of accommodation and the availability of air services. The mining sector allows the Region to provide capacity. During the week, a large number of rooms in the Region are let to mining sector workers and service suppliers. These people generally fly in and out of the Region. Without the demand generated by the mining sector, the accommodation and air transportation sectors would be unlikely to provide either the capacity or the level of service that they currently do. In turn, these sectors provide the infrastructure that supports the tourism sector.

3.3 Economic performance

Looking then at the recent performance of the West Coast region, there has been mixed results compared to New Zealand. Table 3.2 presents five key performance indicators for the region broken down by district.

Table 3.2. Per annum change in key performance indicators (2009)

Key Performance Indicators	%pa for 2009 year				
	Buller District	Grey District	Westland District	West Coast Region	New Zealand
Resident population	0.4	0.7	0.8	0.7	1.1
Value Added (GDP)	4.8	4.6	3.2	4.3	-1.1
GDP per capita	4.4	3.8	2.4	3.6	-2.2
Employment	10.5	8.3	3.7	7.7	0.7
Labour productivity	-5.2	-3.6	-0.6	-3.3	-1.9

Source: BERL Regional Database, Statistics NZ

In 2009 the West Coast across all three districts, performed relatively well. In particular, rates of GDP and employment growth were much better than for New Zealand; and population growth, while on average not as high as for New Zealand, was well above the Region's average performance over the last 10 years as shown in Table 3.2.

Table 3.2. Economic performance (1999 to 2009)

Key Performance Indicators	%pa 1999 to 2009				
	Buller District	Grey District	Westland District	West Coast Region	New Zealand
Resident population	-0.3	-0.1	0.7	0.0	1.2
Value Added (GDP)	2.8	2.5	1.8	2.4	3.1
GDP per capita	3.2	2.6	1.1	2.4	1.8
Employment	3.4	3.1	2.1	2.9	2.4
Labour productivity	-0.4	-0.5	-0.1	-0.3	0.8

Source: BERL Regional Database, Statistics NZ

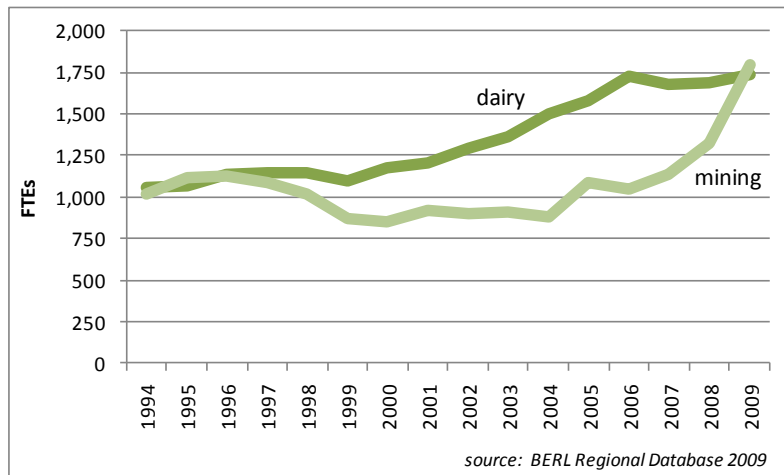
Over the last 10 years, the economic performance of the Region has not been as stellar. The population has not changed, compared to 1.2 percent growth annually in New Zealand. GDP growth has lagged behind New Zealand, growing at around 77 percent of national growth.

On a positive note, employment has been better than nationally over the last decade, averaging 1.2 times the growth of employment in New Zealand. And the non-growth in population has seen GDP per capita grow faster than for New Zealand as a whole.

Mining and Dairy

The growth in the mining and dairy sectors has been the main driver of the positive performance in the West Coast region, especially mining in the latter periods. Employment growth for dairy and mining is shown in Figure 3.14.

Figure 3.14. Employment growth in dairy and mining



Dairy went through a major growth period from 1999 through to 2006 and has since levelled off, whereas mining employment⁷ has increased from 2004 to the present. Looking forward, employment

⁷ Within mining employment we have included 50 percent of employment in the industrial machinery and equipment manufacturing, non-residential building construction, non building construction, road and bridge construction, site preparation services and machinery & equipment wholesaling nec. This number is therefore higher than the 1,217 identified in the official statistics as 'mining' but is closer to the 1,917 identified in this report.

growth in mining is expected to come from the new Bathurst Coal Mine, which is expecting to employ 200 FTEs (and the associated contracting and wholesaling services).

Based on the industries identified as contributing to the dairy and mining sectors, mining now is responsible for employing more people than the dairy sector in the West Coast. Between 2004 and 2009, employment in mining more than doubled, from 880 FTEs to 1,800 FTEs.

3.4 Summary

Our assessment of the West Coast economy is that the Buller District will rise and fall with the mining sector. Westland District will rise and fall with tourism and/or dairy. As the main service centre for the West Coast region, Greymouth District's growth is better spread across industries (with a bias toward mining) but is heavily dependent upon the fortunes of Buller and Westland.

Growth in dairy appears to have eased off, and additional gains are likely to be from productivity or product improvements rather than volume increases. Tourism is a growth industry, although growth will be incremental and there are issues around infrastructure, sustainability and environmental impacts. Mining appears to provide the greatest step-change potential for the Region, with the opportunity to positively affect growth in the regional economy.

4 Mining in New Zealand

Due to increasing global demand and the economic potential of the mining industry in New Zealand, mining has been identified by the current New Zealand government as one means of providing a step change to New Zealand's economic performance, allowing us to catch up to Australia in terms of GDP per capita.

New Zealand has substantial mineral deposits within its land area of 270, 000 km². Mining operations are currently using around 4,000 hectares (0.01 percent) of New Zealand's total land area. This land use has an estimated return of \$38.4 million per square kilometre. The current value of mineral and coal production is \$1.6 billion, less than two percent of the potential value of the resource.

According to the *Crown Minerals Annual Report 09/10*, mining operations contributed over \$12 million in minerals and coal royalties to the Government in the 2009/2010 year. The contribution of the mining industry to GDP has been increasing over the last five years. In 2009, GDP generated by the mining industry was \$475 million, up 11 percent over the previous year. There has been increased activity in mining aggregates and other industrial minerals in recent years due to increasing local demand for buildings and roads. Higher prices resulted in a surge in mineral prospecting and exploration activity in the 1990s, and increased the number of mineral exploration companies active within New Zealand.

Exploration activity and expenditure has declined in recent years. Total expenditure for prospecting and exploration in 2009 was \$25 million, down from \$38 million in 2007. While the current global economic recession contributed significantly to the drop in expenditure in 2009, major producers (i.e. OceanaGold at Macraes, Reefton, Newmont Waihi Gold at Waihi, and Solid Energy at Stockton) are undertaking further exploration and prospecting activities to raise the resource base and extend the life of existing mines.

On the employment side, the mining sector directly employs over 4,500 people. Full-time employment steadily increased between 1999 and 2009. About 458 FTEs were added to the mining sector work force in 2009.

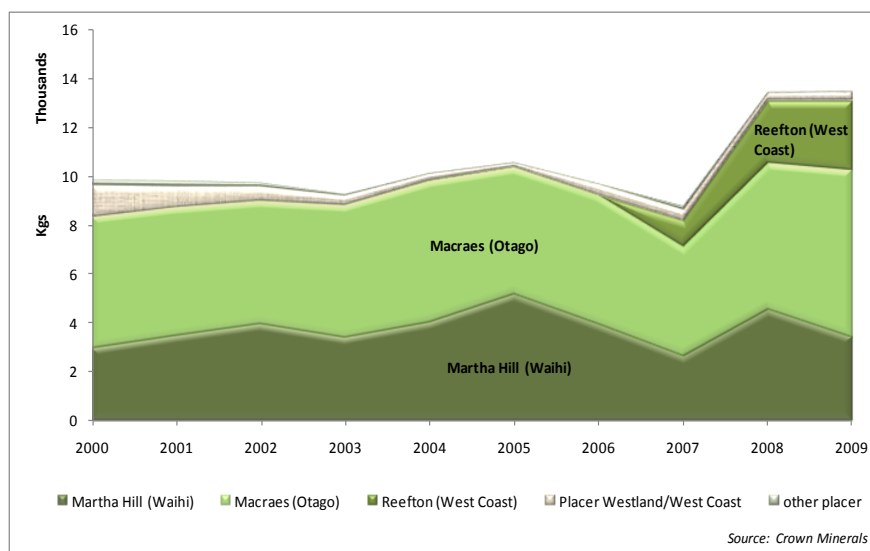
4.1 Mining production

Gold

Around 97 percent of the recorded gold produced in New Zealand in 2009 was from four mines in three centres. Newmont operates Martha and Favona mines in Waihi in the North Island, while OceanaGold operates Macraes in Otago and Reefton on the West Coast. Placer gold accounted for 2.7 percent of recorded total production in 2009, with 90 percent of that coming from the West Coast.

Most of the gold produced in New Zealand is exported. In 2009, 13.44 tonnes of gold was produced with a value of \$662.5 million. This volume of production is almost equal to the previous year but with the increase in gold prices, its value was up \$144 million⁸.

Figure 4.1. New Zealand gold production, 2000-2009



Coal

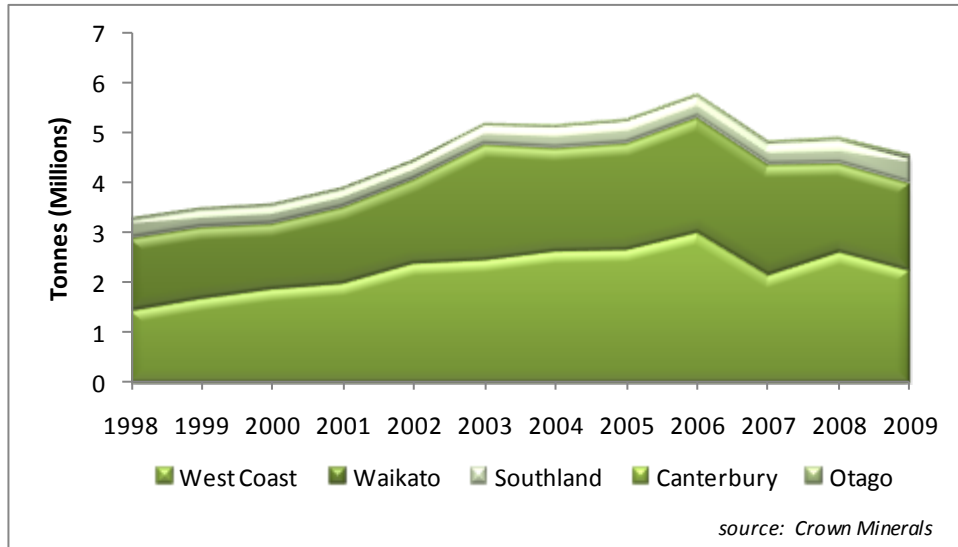
New Zealand's coal production is predominantly bituminous and sub-bituminous coal. Most bituminous coal, sourced entirely from the West Coast is exported, mainly to India and Japan.

There are currently 17 coal producing mines operating in New Zealand. Of these, five are underground and 12 are open cast mines. Total coal production in 2009 was 4.56 million tonnes, with 4.3 million tonnes of bituminous and sub-bituminous coal and over 259,000 tonnes of lignite (Crown Minerals Group, 2010).⁹

⁸ Based on the New Zealand Annual Production Statistics, 13.403 tonnes of gold valued at about \$518 million was mined in 2008.

⁹ Using 2009 prices, \$200/t for bituminous and \$125/t for sub-bituminous coal (as reported in Table 1 of Christie et al. (2010)), the estimated value of production for bituminous and sub-bituminous coal in New Zealand is around \$694 million.

Figure 4.2. New Zealand coal production, 1998-2009



As Figure 4.2 shows, the West Coast is the largest coal producer in New Zealand with 49 percent of the total, followed by the Waikato with 39 percent. Southland accounts for a further 10 percent, with the remainder (2.2 percent) produced in Canterbury and Otago.

Coal output is expected to further increase in the West Coast region. Bathurst Resources Ltd is developing a new mining operation in Buller, and is looking to produce up to one million tonnes a year from 2012. This mine could potentially expand its production to two million tonnes a year.

Aggregates

Aggregates and other industrial material produced in the mining sector are largely consumed in New Zealand. Because of the low value of aggregates and high transportation costs, they tend to be produced close to where they are likely to be used. Hence, aggregates are produced in nearly 600 quarries throughout New Zealand.

An economic impact analysis (NZIER, 2008) suggested that the aggregate and quarrying industry directly employed 1,890 FTEs, generating around \$240 million in GDP. Including indirect and induced effects, employment increased to 9,700 FTEs and GDP to \$720 million.

4.2 Mining on the West Coast¹⁰

The West Coast is New Zealand's major producer of coal and gold. There are 10 coal mines, one hard rock gold mine and several placer gold mines currently operating. The West Coast accounts for close to a quarter of all employment in the mining sector around 50 percent of the country's employment in coal mining; and a third of its employment in services to mining.

The mining sector is a dominant economic force on the West Coast. The Stockton Mine, north of Westport is the largest coal mine in New Zealand, producing around 1.6 million tonnes of export quality coal annually.

Increasing international demand for coal, high global commodity prices, record spending on exploration, and technological advances have all contributed to the sector growing over the last five years.

Mining also provides downstream opportunities for a range of contractors including transport operators, equipment fabricators and other suppliers relying on the extractive industry.

The West Coast region produces bituminous and sub-bituminous coal. Bituminous coal is sought after internationally, particularly by major steel mills, coke makers, power utilities and industrial processors. This coal is highly sought after because it contains the world's lowest ash content for a coking coal. This ensures more energy and less waste is produced in the coke making process. Sub-bituminous coal is used primarily for electric power generation. In 2009, the West Coast region produced 2.2 million tonnes of coal, about 151,000 tonnes of which is sub-bituminous coal (Energy Information and Modelling Group, 2010).

Mining companies operating in the West Coast are a mix of local, national and international companies. This includes coal and gold as well as aggregate production.

4.2.1 Coal

The largest coal operator in New Zealand is Solid Energy, a state-owned enterprise, which produces around 2.3 million tonnes of coal on the West Coast. Stockton, in Buller, is the largest coal mine in New Zealand. Solid Energy also mines Spring Creek in Greymouth.

New Zealand Coal and Carbon operates the Francis and Roa Mines. These mines produce around 200,000 tonnes of coal annually¹¹. There are a number of smaller producers who, between them, produce around 350,000 tonnes of coal annually.

¹⁰ The gross values of mineral and coal production in this section are from Christie et al. (2010) who used 2007 to 2010 commodity prices across 28 types of metallic mineral deposit and 10 non-metallic mineral deposits. Coal production data is from Crown Minerals' 09/10 report. The review of the economic performance of the mining industry in the region is from the 2009 BERL regional database, while the profile of the mining operators in the West Coast from taken from individual company websites and annual reports.

¹¹ Estimate.

Looking ahead, Bathurst Resources Ltd is currently setting up operations in Buller and is looking to produce around one million tonnes and potentially two million tonnes over the next few years.

4.2.2 Gold

Gold mining consists of one large hard rock opencast mine (OceanaGold) and a number of small alluvial (placer) miners.

OceanaGold's Globe Progress open pit mine near Reefton commenced production in 2007. It is the only hard rock operation and is the major gold producer on the West Coast. The company employs 200 people and, in 2009 extracted 87,400 ounces of gold. Existing production is sustainable up to 2015. However, OceanaGold currently has a substantial exploration programme underway and is hopeful of sustaining or even growing production past 2015.

Placer gold mining is made up of a number of comparatively small operations. Bulldozers and excavators strip away the topsoil and stockpile this. The alluvial deposits are mined before the area is recontoured and the topsoil replaced. On the Grey River a gold dredge completes the same operation, leaving behind new productive pasture. On the Region's beaches blacksanders use a variety of methods to extract gold from the black beach sands. These are small, often part-time, one or two-person operations.

GNS estimates that around 10,000 ounces are produced through placer deposits on the West Coast (which is consistent with Crown Minerals assessments). Estimates by Minerals West Coast suggest that placer activity could actually produce up to 32,000 ounces and employ around 130 FTEs.

Off the coast, exploration of gold-bearing sediment washed onto the continental shelf by glacial action and river outwash has started. GNS sees potential to mine around 60,000 ounces of offshore placer gold annually if exploration discovers an economic deposit.

4.2.3 Limestone and aggregates

Limestone

Limestone is used as a base for fertilisers with phosphate and other minerals such as potassium, salt, sulphur and serpentine being added. High quality lime is used in industry and is the base ingredient in cement. It is heated to remove carbon dioxide and water, and then shale or clay is added. Limestone has a wide range of other uses, many of them far removed from its origins.

Holcim (New Zealand) Ltd's Westport cement works began operation in 1958. The plant runs 24 hours a day and is capable of producing approximately 500,000 tonnes of cement annually. It employs around 120 people.

Two bulk cement carriers transport cement from the storage silos at the Port of Westport to marine terminals around New Zealand. Both vessels are able to carry used oil products back to Westport to be used as fuel in the clinker kilns.

In addition, small volumes of cement are transported by rail from Westport to South Island depots on a regular basis.

There are several other, smaller limestone mining companies operating out of the West Coast. These companies are mainly involved in agricultural lime production. It is estimated that these companies employ around 16 FTEs on the West Coast.

Aggregates

The sand, gravel, and rock used for building and road making are called aggregate. Aggregates are the most widely used mineral product in New Zealand. In 2008, production was equivalent to 11 tonnes per person.

Aggregates on the West Coast are mostly extracted from river deposits and alluvial terrace deposits. Natural, large river boulders and large quarried blocks of granite, limestone, and lesser amounts of sandstone and schist, are extracted from quarries and pits. Washouts and high flood levels on West Coast rivers create a continual demand for riprap for river and coastal protection work.

There are a number of businesses involved in the aggregate mining industry, with most of those tying through to road construction or transport businesses. On the West Coast, the Regional Council has currently allocated 40 consents that allow the removal of around 775,000 cubic metres of river gravel for aggregate use. These consents are worked intermittently. Reported aggregate production on the West Coast has been falling since 2006, and in 2009 production hit its lowest point in over 10 years.

Large companies involved in aggregate removal include Avery Brothers Ltd; Ferguson Brothers Ltd; Fulton Hogan; MBD Contracting Ltd; Westroads Ltd; Works Infrastructure Ltd; and West Stone. It is estimated that the aggregate component of these businesses employs around 65 people on the West Coast.

The GNS Science' assessment of the mineral resources on the West Coast Region suggests there is the potential to export 500,000 tonnes of high quality aggregates from the region. However, this depends on the price, cost and ability to transport the aggregate to markets. Generally, to keep cartage costs to a minimum a network of production sites is spaced along the main roads.

Selected aggregates and decorative stone is currently shipped by barge from Greymouth and railed to distribution points in the North Island. The potential exists to increase the production of these materials as they have a greater value than base building aggregate.

4.2.4 Other minerals

There is currently limited activity in mining other minerals. Exploration activity continues for ilmenite, which is used to produce titanium dioxide, a base pigment in paint, paper and plastics. There is also potential across a number of other minerals such as serpentine, and talc. These are discussed in more detail in the GNS Science report.

5 Economic Impact

This section presents an economic assessment of increasing mining activities in the West Coast region. BERL based its analysis on the high growth scenario described in the GNS Science assessment of the value of potential mineral resources in the Region.

5.1 Approach

To determine the economic impact of the mining industry on output and GDP, our analysis used estimates of the value of production to generate GDP. Employment was based on discussions with the industry. Multiplier analysis was then used to determine the indirect and induced impacts.

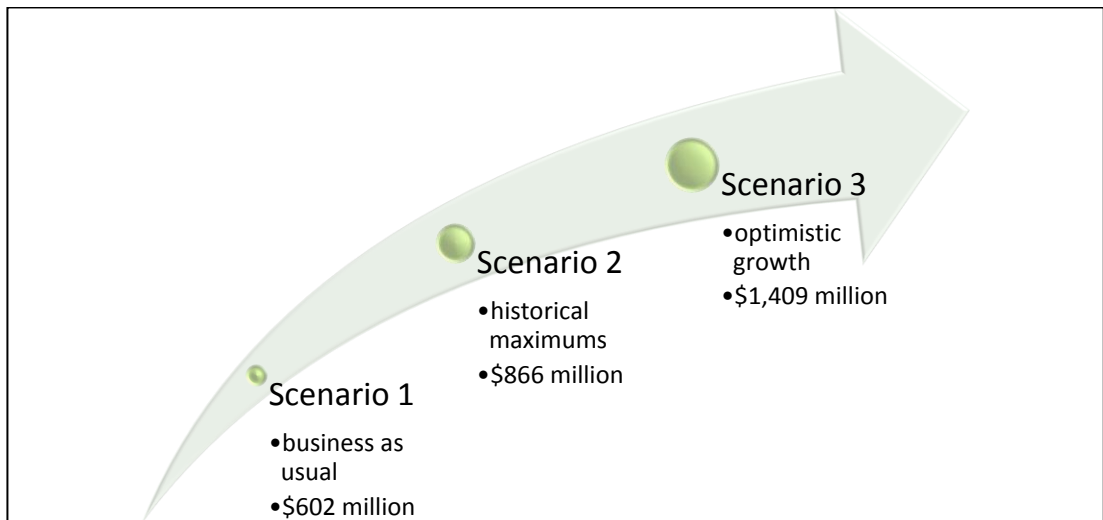
Scenarios were tested with the mining sector to determine the current employment and the employment required to achieve the growth scenario output. A survey of companies in the Region's mining sector was conducted.

5.2 GNS Science production scenarios

While the level of mining activity and the value of mineral production have significantly increased, it represents only a fraction of the potential resource that could be extracted in the West Coast region.

This section summarises three possible scenarios of future annual mineral production on the West Coast that have been derived from the GNS Science report (Christie et al. 2010). These are presented in Figure 5.1.

Figure 5.1. GNS Science Scenarios



Scenario 1 is a **business as usual** scenario that sees current levels of coal and mineral production maintained. Scenario 1 describes the current coal and mineral production in the Region, and the

exploration and production required to replace current mined resources with new coal and gold resources. The potential value of production is estimated at \$602 million. The annual cost of exploration activity to maintain this level of production is estimated at \$6.2 million.

Scenario 2 increases production to the **highest historically recorded levels** of annual production in the last decade (except for placer gold, where the 1995 production level is used). This scenario increases gross value to \$866 million. To achieve this production level, exploration spending needs to ramp up to \$10.2 million per year.

Scenario 3 is an **optimistic growth scenario**, where increases are proposed for all areas of activity based on increased exploration defining new resources, and the ability to develop these resources.¹² Gross value for this production scenario amounts to \$1,409¹³ million. This scenario involves new mining operations being established on prospective mineral commodities, with annual exploration spending of \$14 million within the West Coast region.

Table 5.1 presents a summary of production and the value of that production, broken down into major commodity groups.

Table 5.1. GNS Science Scenarios – production and value

Mineral commodity	Production			value		
	Scenario 1	scenario 2	scenario 3	Scenario 1	scenario 2	scenario 3
Coal (tonnes)	2,236,531	3,014,074	4,651,045	435,977,825	591,486,425	918,880,625
Gold (ounces)	97,160	156,349	240,000	151,569,600	251,463,481	374,400,000
Limestone (tonnes)	926,893	1,005,249	1,005,249	12,328,335	13,995,723	13,995,723
Aggregate (tonnes)	165,283	586,338	1,086,338	1,877,913	7,420,294	14,920,294
Other (tonnes)	13,843	69,740	319,740	311,749	1,982,290	86,482,290
Total				602,065,422	866,348,213	1,408,678,932

Source: GNS

Scenario 1 is the base case, and is an estimate of current production based on 2009 mineral production statistics. The GNS Science scenarios suggest significant increases across all commodities, with Scenario 3 suggesting a 134 percent increase in the total value of commodities extracted. This requires a significant increase in production across the main commodity groups, with

¹² Aggregates- The increase in aggregate production is mainly for export to other regions, and it is increased to 500,000t per year. Price variability is due to increasing demand and supply constraints that affect this scenario.

Coal- The proposed Bathurst operation is expected to boost bituminous coal production from 2.5Mt to 4.5 Mt. Literature suggests that this level of production can be sustained for at least 20 years. The proposed increase in coal production is constrained by transport chain logistics and the geotechnical risks of underground mining.

Gold, hard rock-development and the exploration of mineral resources in the Blackwater mine and other deposits are likely to compensate for the Globe Progress and its extension mines.

Gold, placer- An increase in onshore placer mining to recent maximum levels and the potential mining of offshore resources could result in \$187 million per year in gross value.

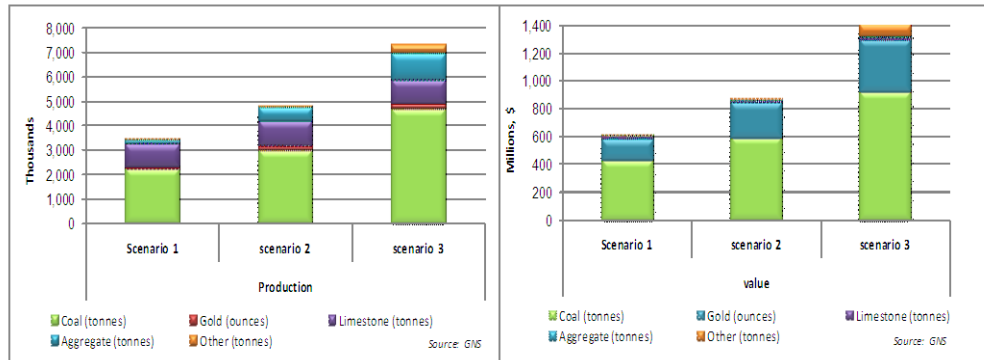
Titanium- Potential contribution from a titanium operation, at a production rate of 250,000 tonnes per year.

Unspecified new-metallic and non-metallic mining operations - Despite low probability of this outcome, annual returns are expected to be low but it can contribute around \$50 million from metallic mineral operations. Annual production value of \$10 million is assigned to new non-metallic operations.

¹³ Rounded from Christie et al. (2010) who estimated the value of production for this scenario as \$1,408,678,932.

coal production increasing by 108 percent, gold production increasing by 147 percent, aggregate production increasing by 557 percent and other minerals production increasing by 2,200 percent. This data is displayed in Figure 5.2 below.

Figure 5.2. GNS Scenarios – production and values



5.3 Identifying mining sector activity – current and future scenario

In order to describe current and projected activity in the mining sector, a range of interviews with key players in the mining industry was conducted¹⁴. The interviews combined with official statistics were used to estimate the actual employment and production. Volumes of production under Scenario 3 were based on the GNS Science assessment of mineral resources in the West Coast region. This resulted in employment and production numbers for the current activity and scenario 3 as shown below in Table 5.2.

Table 5.2. Employment and production

Mineral Commodity	Actual			Scenario 3		
	Employment (FTEs)	Production	Value (\$NZ)	Employment (FTEs)	Production	Value (\$NZ)
Coal (tonnes)	1,345	2,887,000	\$649,575,000	1,540	4,651,045	\$1,046,485,125
Gold (ounces)	332	119,400	\$220,890,000	675	240,000	\$444,000,000
Limestone (tonnes)	166	926,893	\$12,328,335	180	1,005,249	\$13,995,723
Aggregate (tonnes)	65	165,283	\$1,877,913	427	1,086,338	\$14,920,294
Other (tonnes)	9	13,843	\$311,749	74	319,740	\$86,482,290
Mining sector Total	1,917		\$884,982,997	2,896		\$1,605,883,432

Source: BERL, GNS

BERL estimates current mining sector employment in the West Coast region at 1,917 people. This is well above the number in the BERL Regional Database of 1,217 FTEs¹⁵, which has been derived from official statistics.

Current production is again based on discussions with the sector. It is higher than the official production identified in the GNS Science report, particularly for gold and coal. However, the GNS

¹⁴ The survey includes: five coal mines; one gold mine; seven companies engaged in aggregates; and five in limestone production.

¹⁵ The 1,217 FTEs includes Cement and Lime Manufacturing employment of 144 FTEs. Excluding the Cement and Lime Manufacturing employment gives 1,073 FTEs, which is the number used in Figure 3.6.

Science report was for the 2009 period. The analysis uses GNS Science production numbers for limestone, aggregates and other commodities.

The value of the output varies slightly from the GNS Science scenarios. The GNS Science report uses \$200/tonne for coal and \$1,560/oz for gold. However, actual prices increased in 2010 to around \$250/tonne for coal and \$1,860/oz for gold. This provides a better indicator of the current value of activity in the West Coast. Therefore, the BERL multiplier analysis runs off these more recent values for coal and gold of \$225/tonne for coal and \$1,850/oz for gold.¹⁶

The limestone total includes Holcim (New Zealand) Ltd, who employs around 120 people in Westport. In 2011, Holcim will decide on whether to build a new facility in Oamaru (an option favoured by Holcim (New Zealand) Ltd's management). If this does happen, then the facility in Westport is likely to be closed down.

Employment under Scenario 3 is estimated on a straight employment to output ratio, except for coal production, where it is based on industry estimates, and placer gold, where labour economies of scaling up are expected. The analysis suggests that, under GNS Science Scenario 3, the mining sector would employ 2,896 FTEs with the production of seven million tonnes of coal, limestone, aggregates and other minerals, and 240,000 ounces of gold.

The analysis also incorporates the value of exploration, which has been identified by GNS Science under both the current production scenario, and the output required to achieve the optimistic scenario (Scenario 3).

¹⁶These prices for gold and coal are estimates provided by Minerals West Coast. The value of aggregate, limestone and other minerals are calculated based on the GNS Science price per tonne.

5.4 Current activity

Based on the BERL regional database, the mining industry contributes \$191 million to the West Coast economy almost 14 percent of the regional GDP. However, a survey of major players in the industry suggests that actual employment in the sector is higher than the BERL regional database by about 60 percent, where the sector employed 1,917 FTEs.

Table 5.3. Mining sector employment

Mining sector (FTE employment)	BERL Regional Database	Survey
Coal	465	1,345
Gold	82	332
Aggregates	26	65
Limestone	144	166
Other*	500	9
	1,217	1,917

source: BERL

Other refers to other mining services in the regional database, whereas in the survey, other services have been included within each sector. However, there is still significant discrepancy in employment numbers across coal, gold and aggregates.

Table 5.4 shows the direct and total impacts of the West Coast mining sector, broken down into operational and exploration activity. Exploration activity is based on the GNS Science estimates under each scenario.

Table 5.4. Economic impact of current mining activity

Current Mining Operations		
Operation	Direct	Total
Output (\$ m)	885	1,309
GDP (\$ m)	374	549
Employment (FTEs)	1,917	4,126
Exploration		
Output (\$ m)	6.2	9.7
GDP (\$ m)	2.7	4.1
Employment (FTEs)	23.2	38.0
Total		
Output (\$ m)	891	1,319
GDP (\$ m)	377	553
Employment (FTEs)	1,940	4,164

Source: BERL

Table 5.4 shows that the direct impact of current mining and quarrying activities on the West Coast employs 1,940 FTEs and generates \$377 million in regional GDP.

Applying indirect and induced effects increases employment to 4,164 FTEs and contributing \$553 million to regional GDP.

5.5 Optimistic growth (Scenario 3)

The optimistic growth scenario describes the contribution of the mining sector to the Region based on increased production levels across all mineral groups. This analysis uses BERL estimates for coal, gold and limestone, whereas the GNS Science production scenario is used for other commodities.

Exploration expenditure required to achieve this level of activity increases to around \$14 million annually. Results are shown in Table 5.5.

Table 5.5. Economic impact of optimistic growth in mining

Optimistic Growth Scenario		
Operation	Direct	Total
Output (\$ m)	1,606	2,390
GDP (\$ m)	680	1,003
Employment (FTEs)	2,896	5,874
Exploration		
Output (\$ m)	14.0	21.8
GDP (\$ m)	6.0	9.3
Employment (FTEs)	52.4	85.9
Total		
Output (\$ m)	1,620	2,412
GDP (\$ m)	686	1,013
Employment (FTEs)	2,949	5,960

Source: BERL

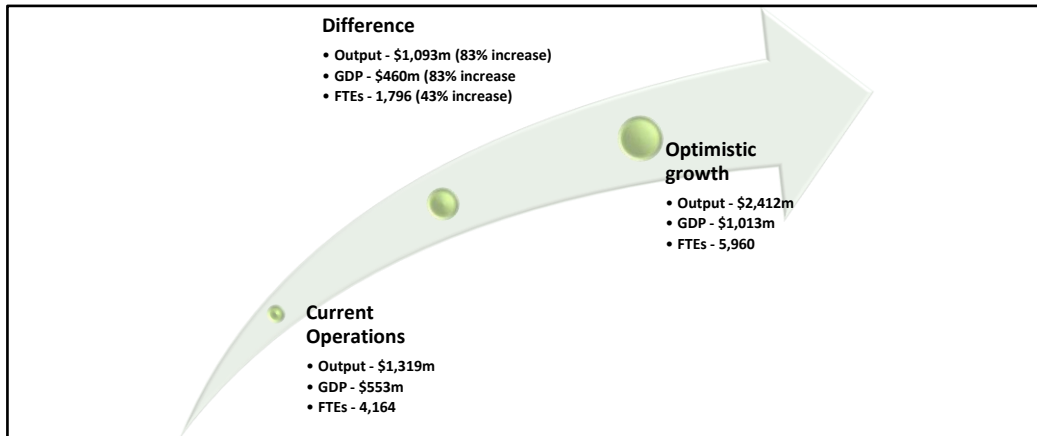
Based on increased production, employment is expected to increase to around 2,950 FTEs. This would generate \$686 million in GDP. Adding indirect and induced effects, employment almost doubles to 5,960, and GDP increases to \$1.0 billion, which is more than two-thirds of the West Coast region's current GDP.

5.6 Summary of current and optimistic scenarios

Figure 5.3 shows the total impacts for the current and optimistic scenarios as well as the additional growth generated.

Achieving the optimistic growth scenario would see an increase in output of \$1,093 million, GDP of \$460 million, and FTE employment of 1,796.

Figure 5.3. Current and optimistic growth impacts



5.6.1 New mining activity

An objective of the Region could be to attract another significant mining operation to the West Coast. Looking at recent operations this could result in a construction phase costing in the vicinity of \$300 million, albeit over several years. A rough estimate, of the impact of a \$300 million mine construction on GDP and employment is presented in Table 5.6.

Table 5.6. Economic impact of the construction phase of a new mine on the West Coast economy

	Direct	Total
Output (\$ m)	300	468
GDP (\$ m)	129	199
Employment (FTEs)	1,122	1,840

Source: BERL

Depending on the type of mine (opencast or underground; gold or coal; diversification to other mineral commodities), the mine could sustain annual employment of between 200 and 500 FTEs over its lifetime, generating ongoing benefits to the region. Assuming an employment level of around 350 FTEs, this could result in the annual economic impact shown in Table 5.7.

Table 5.7. Economic impact of the operation phase of a new mine on the West Coast economy

	Direct	Total
Output (\$ m)	129	201
GDP (\$ m)	56	86
Employment (FTEs)	350	574

Source: BERL

With additional employment opportunities and GDP flows into the Region, the establishment and operation of a new mine on the West Coast is significant. However, as discussed in the following chapter, there are a number of issues such as transport infrastructure and safety that affect the ability of the West Coast to expand mining in the Region.

6 Issues

Our analysis has identified a number of issues related to mining that concern the economic viability of the West Coast region. Our basic premise, as shown in the numbers, is that the mining sector is a key industry in the Region and that the growth of the regional economy is heavily dependent on the growth of the mining sector.¹⁷ However, growth of the mining sector is constrained by scale, infrastructure, labour and access issues. These issues need to be addressed to encourage continued growth of the mining sector in the Region, supporting a healthy and vibrant West Coast economy.

6.1 Scale

The key issue is scale - of the mining industry and of the Region. Our current assessment suggests that the mining sector is too small to achieve economies of scale. The Region is also too small to provide the quality and breadth of services expected by a vibrant community. In particular, the town of Westport appears to be very dependent upon the mining sector, with its fortunes tied to the rise or fall of the industry.¹⁸

While mining is a significant industry that the Region is dependent upon for its viability, the scale of production is tiny when compared internationally. The total output of the coal industry in the West Coast region, even under the high growth scenario (5.85 million tonnes) is less than of an average-sized operator in Australia, which produced around 334 million tonnes of saleable coal and exported around 261 million tonnes in 2008/09.

Our estimates suggest around 1,940 FTEs are directly employed in the mining industry in the West Coast. Adding indirect employment through upstream activity (supply chain) increases that number to around 4,164 FTEs. Official figures suggest that the New Zealand mining sector employs less than 5,000 FTEs, while in Australia over 120,000 people work in the mining industry (excluding oil and gas).

This lack of scale means that the mining sector in the West Coast remains relatively basic. It cannot attract effective infrastructure or the technical services necessary to effectively support growth in the industry.

Mining industry skills are in demand globally. It is very difficult for the West Coast to compete internationally in terms of job security and job opportunities for people involved in the industry let alone nationally. Key technical services are contracted in from offshore rather than being provided locally as there is not enough local demand to support the activity. Industry people do not have a career path in the West Coast because of the small number of mining companies that operate in the Region.

¹⁷ This is more so in the North than in the South of the Region, where dairy and tourism play a more prevalent role.

¹⁸ Over half of primary sector employment in Buller is in mining, while around half of manufacturing activity is mining related. Meanwhile, Hokitika draws on tourism and Westland Milk Products, while Greymouth is the main urban centre for the wider region and so has a more diversified industry base.

A larger mining sector would encourage improved investment in infrastructure and support services, as well as provide incentives for staff attraction and retention. In turn a larger mining sector would generate greater activity and therefore population to the Region, which would enable improved population infrastructure, services and activities.

6.2 Infrastructure

As noted earlier in this report, the West Coast region is relatively isolated in terms of geography but also in terms of accessibility. The West Coast region does not have the infrastructure to support any significant increase in minerals production. Currently, products are moved by rail, sea and road, and each of these is constrained.

6.2.1 Rail

The Midland Line links Greymouth with Christchurch and the Port of Lyttelton. It is used mainly for transporting coal from the West Coast to Lyttelton. It also carries the TranzAlpine Express, a daily passenger service between Christchurch and Greymouth.

The Stillwater-Westport Line and Ngakawau branch lines extend north from east of Greymouth to service the coal mines in the Buller region. The Hokitika branch line extends south from Greymouth to Hokitika to serve Westland Milk Products.

Rail is currently run by KiwiRail, with coal being the key commodity transported. Solid Energy is the sole purchaser of all non-passenger rail throughput. OceanaGold also ships its ore concentrate from Reefton to Palmerston by rail. The issue with rail is its current carrying capacity. Based on the current configuration the rail system has the capacity, with some investment, to transport around 4.0 million tonnes annually. With significant investment¹⁹, the rail system has a maximum carrying capacity somewhere between 5.0 million and 6.0 million tonnes.

Solid Energy currently transports around 2.3 million tonnes through its Spring Creek and Stockton mines. Looking at the growth scenario, coal production alone is expected to increase to around 4.8 million tonnes by 2012, with the potential for a further 2.0 million tonnes out of Bathurst, if they mine their second seam.

¹⁹ Minor improvements are in the tens of millions of dollars. Double tracking and the changeover to electrification of locomotives could be in the hundreds of millions of dollars.

6.2.2 Ports

The second means of transporting large quantities of materials out of the Region is by sea. There are two ports on the West Coast – the Port of Westport and the Port of Greymouth. Currently, both ports are only lightly utilised - apart from fishing (commercial and recreational). In the year ended June 2009, the Port of Westport transported around 470,000 tonnes of goods, while the Port of Greymouth transported around 5,900 tonnes of goods.

The Port of Westport can accommodate vessels up to 131 metres in length. In 2009, cement exports accounted for 97 percent of all volume through the port, with far smaller amounts of used oil and fish imported.²⁰

The Port of Greymouth can accommodate vessels up to 109 metres in length, at draughts of 4.8 to 5.5 metres. In 2009, 82 percent of the tonnage through the port was fish, and the remainder was aggregate exports.

The issues with the ports in the region revolve around capacity and access. Neither port can accommodate Panamax-size vessels (capacity > 40,000 tonnes). This is the necessary size to efficiently transport coal and other deposits to international markets. The alternative option is to barge to another port – New Plymouth or Nelson, where deposits can be transferred to larger vessels for export.

A second issue is around bar conditions. In 2009, bar conditions closed the Port of Westport to shipping for 40 days, and in 2008 it was closed to shipping for 51 days. With uncertainty around delays costing time and money, shipping companies would question the idea of calling in on the coast, even if the product was there to be transported.

If significant increases in mineral extraction are desired, then an effective sea port is a key infrastructure investment. Discussions have been had and some work done on a viable solution to sea access on the West Coast, whether it is an upgrade of one or both ports, or a new deep-sea port that could service the Region. In any respect, a solution needs to be found and implemented.

²⁰ Holcim Cement currently transports around 500,000 tonnes of cement annually. Buller Port Services, which is 100 percent owned by Holcim (NZ) Ltd holds the management contract for the Port of Westport.

6.0.1 Road

This leaves road as the only alternative option once constraints hit rail and ports. This is an expensive option, and would not work for significant, bulky, low value tonnages, particularly those for export production.

6.3 Labour

Attracting and retaining workers to support existing mining operations is always a concern. This occurs at two levels. The first is to attract people to the West Coast from other regions of New Zealand. The second is to compete internationally for technical skills or expertise and for experienced miners.

Businesses in the Region find it difficult to attract workers, especially workers who are skilled and motivated. This is across all industries, from primary and manufacturing, through to business, government, cultural and social services. This is even more difficult in the mining sector where the competition for the workforce is global. Anecdotally there are already issues around health and education in the Region, to go with its isolation and remoteness (although this could also be a positive attribute).

A major reason for this is the small population and the difficulties attracting and retaining more people to the Region. The small size of the population combined with its isolation, geography and spread of settlements makes it difficult to achieve urban scale and the provision of business, population and community services.

6.4 Access

Access to mineral resources is always going to be an issue for the mining sector. Under the current government, the pendulum has swung some way in favour of the mining sector. However, there is always going to be the need to balance economic activity with sustainability and environmental protection.

Mining has been going on in the West Coast for a long time and there has been detailed geological mapping of the Region. An announcement has been made that an airborne geophysical survey of the Region will be undertaken that may lead to the discovery of new mineral deposits. The GNS Science report identified the current production and potential resources across a range of minerals, which suggests that there is the potential to maintain and even increase activity.

The issue with the West Coast is that a significant proportion of the area is national park and other lands of high conservation status. The ability to explore and/or mine these areas is very limited, as the reaction to the schedule 4²¹ stock-take showed. Moreover, lifestyle and other primary activities threaten to make mining more difficult in the Region, particularly in getting resource consents to access and mine the resource; and the cost of concessions to mitigate environmental and business concerns.

²¹ Schedule 4 of the Crown Minerals Act specifically provides for mining in National Parks and such like land, but subjects it to extreme restrictions relating to surface disturbance.

A clear position needs to be conveyed that the Region supports the mining sector as the key industry driving economic growth. Conversely the mining industry needs to continue to operate sustainably and support the community and the environment.

A proactive and positive relationship between the mining sector, wider industry, and the environment needs to be developed. Evidence suggests that mining and environmental sustainability are not mutually exclusive; and that mining can even result in improved environmental sustainability. Mining growth is necessary for the continued growth of the West Coast region. This relationship needs to be communicated to and bought into by the community at large.

6.5 Exploration investment

The GNS Science report has identified 12 potentially high value minerals in the Region, in addition to gold and coal. Exploration investment is required to convert this potential to economic resources. Exploration investment to date in New Zealand has been dominated by the main gold producers (OceanaGold and Newmont) seeking to expand resources in the vicinity of their mining operations at Reefton and Otago (OceanaGold) and the Waihi district (Newmont). The airborne geophysical surveys proposed by the Government for the West Coast region should lead to increased exploration investment in the region. Exploration initiatives and mineral development strategies that identify and target opportunities to facilitate investment in exploration have been widely used in Australia, Canada, Europe and elsewhere. New Zealand and the West Coast could benefit from such development programmes because of their well established, undeveloped mineral potential.

7 Conclusions

This report suggests that the mining sector is a key driver industry in the West Coast region. This is more so in Buller, with Westland drawing on tourism and dairy. Greymouth holds the position as the major settlement in the Region and so will always attract broader activity such as business services, and population-based services.

A closer look at the districts suggests that the Buller and Grey populations have actually declined over the last 10 years.

Economic growth in the Region over the last five years has been driven largely by the mining sector, where commodity prices have supported further development and production. The sector has been buoyed by the entry of new mining activities in the region. Pike River invested over \$300 million and employed around 180 people in the Region. OceanaGold's Reefion mine also started production in 2007, and employs around 200 people. Solid Energy, the major entity in the Region, with over 1,000 employees, continues to explore further opportunities for expansion. Bathurst Resources is looking to enter the industry with projected production of two million tonnes.

Other opportunities exist around aggregate exports and other minerals such as ilmenite.

Our analysis suggests that the mining sector (including exploration) directly employs 1,940 FTEs generating \$377 million in GDP annually. Adding indirect and induced impacts increases employment to 4,164 and GDP to \$553 million (Table 7.1).

Scale of the mining sector

BERL considers that even the optimistic scenario (seven million tonnes) will not be enough to address the issues that limit the potential of the mining sector and the regional economy. The mining sector will continue to struggle with issues around resources and infrastructure, which would affect their incentives to explore and prospect. Similarly, the Region will continue to struggle to attract and retain the population needed for a viable and vibrant economy.

A more sustainable strategy would be to aim for a sector that produces a minimum of 10 million tonnes of coal and around 300,000 ounces of gold. Considering that the industry will be close to the GNS Science scenario if currently planned activity is implemented, then this is achievable. While it seems a lot for the mining sector to be twice its current size, activity would still be less than that generated from a medium sized mine/operation in Australia. A sustained increase in exploration investment is essential for realising the mineral potential of the Region.

Increased output and activity would give the sector the economies of scale needed to address technological and servicing issues, as well as provide workers in the industry with a career path domestically - assisting in the attraction and retention of labour.

Increased output would also provide the case for the Region to invest in infrastructure, namely rail and port.

Improved infrastructure and access to services and resources would encourage investment in other mining activity such as for ilmenite or even aggregate exports.

This level of activity will also provide a much needed boost to the regional economy. If, for example, there is an increase in direct employment in mining of around 3,000 FTEs, you could expect total (indirect and induced) employment to increase to around 5,000 FTEs. This would take total employment in the region to around 20,000 FTEs.

Taking the current employment to population ratio, this suggests an increase in population of 48,000 to 50,000. Assuming that there were 2.3 people per household on the West Coast, this would suggest around 21,000 households, an increase of over 7,000 households.

With extra 7,000 households, the Region would require increased business and population infrastructure and services, such as retail, education, health and amenities.

With an increased rating base the Region would then be better able to provide necessary infrastructure and services such as water, waste, roading and amenities.

Moreover, with an increased population, businesses would have a better customer pool to buy their goods and services as well as their labour requirements.

Table 7.1. Summary of economic impacts

Operation	Current Operations		Optimistic Growth Scenario	
	Direct	Total	Direct	Total
Output (\$ m)	885	1,309	1,606	2,390
GDP (\$ m)	374	549	680	1,003
Employment (FTEs)	1,917	4,126	2,896	5,874
Exploration				
Output (\$ m)	6.2	9.7	14.0	21.8
GDP (\$ m)	2.7	4.1	6.0	9.3
Employment (FTEs)	23.2	38.0	52.4	85.9
Total				
Output (\$ m)	891	1,319	1,620	2,412
GDP (\$ m)	377	553	686	1,013
Employment (FTEs)	1,940	4,164	2,949	5,960

Source: BERL

If we were to look at the optimistic growth scenario (Scenario 3) as identified by GNS Science, this level of output results in direct employment of 2,949 FTEs and GDP of \$686 million. Adding indirect and induced effects increases employment to 5,960 FTEs and GDP to \$1.0 billion.

Table 7.2 shows the difference in economic activity between the current and optimistic growth scenario.

Table 7.2. Comparison of baseline and optimistic scenario

	current	scenario 3	difference	% change
Output (\$ m)	1,319	2,412	1,093	82.9%
GDP (\$ m)	553	1,013	460	83.2%
Employment (FTEs)	4,164	5,960	1,796	43.1%

Source: BERL

This is a difference on current production of around 1,800 FTEs and \$460 million in GDP annually. Employment would increase by 43 percent, whereas GDP would increase by 83 percent. This is significant change and would have a marked effect on the regional economy.

Looking solely at mining activity, a further 1,800 FTEs would suggest a population increase of 3,800.²² Taking the average household size in the West Coast of 2.3, this suggests around 1,660 additional households in the Region. This would have a flow-on effect on the demand for population infrastructure and services such as health, education and amenities; and also generate the rates revenue and investment required to support activity. This increased activity would certainly improve the viability of the West Coast region as a place to live, work and play.

²² Based on the current FTE to population ratios in the latest BERL regional Profile (2010).

As well as the contribution when the activity is occurring, there will be major investment to construct the mine to allow production to flow. Major investment in mining will have a flow on effect to the Region. For example, the \$300 million investment required to construct the mine would contribute around \$200 million to the regional economy and employ 1,800 FTEs. In the context of the current economy, where employment is 14,900 and GDP is \$1.4 billion, this is a major contribution.

8 Appendices

8.1 Economic impact methodology

We determine the economic impact of increasing mining operations in the West Coast region in terms of the following standard measures of growth:

- **Output** - represents the value of production required to sustain activities. At the firm level, this corresponds to the value of mineral and coal production during **business as usual**, and **optimistic growth** scenarios.
- **Value-added (GDP)** - a measure of the industry's contribution to the economy in wages, rents, interest, and profits. It represents the difference between the value of production (i.e. output) and the total value of any intermediate goods or services used.
- **Employment**- estimates are in terms of full-time equivalent jobs.

The economic impact of a particular industry is separated into three different impacts: direct, indirect, and induced. These three impacts together form the total impact associated with a particular activity.

- **Direct** - these are changes in output, value-added and employment that accrues directly to mining activities. Output and value-added are measured in dollars, while employment is measured in terms of full-time equivalents (FTEs). Thus, we measure the mine's earnings, and the salaries and wages of those persons who are employed or contracted to work for the mining sector.
- **Indirect** - these effects are created by the need to support the activities of the mining sector, and to achieve the volume and value of output projected in the optimistic growth scenario as well as the current mining operation. Example of indirect impact includes flow of goods and services from other industries such as general construction, road freight transport, basic metal manufacturing, provision of administrative and health services, etc. Indirect effects continue from business to business until all spending leaks from the particular region. The 'leaks' occur when expenditure leaves the region through purchases made from producers outside of the region or locality. As with direct impact, these are measured in terms of output, value-added and employment.
- **Induced**- these impacts are created by the households expenditure as a result of incomes derived from the mining sector, thus generating further economic activity.

The sum of these effects forms the total economic impact. Economic multipliers associated with expenditure in industries as determined from a 53-industry input-output table are used to estimate the indirect and induced impacts of the mining industry. These multipliers indicate the amount of indirect or induced economic activity in terms of employment and GDP that are generated for each unit of direct

activity in that industry. For example, the employment multiplier of 2.37 for the “coal mining sector” estimates that for every job created in the “coal mining” sector, a further 1.37 FTEs are created through indirect and induced effects.

Similarly, for every dollar of wages, rents, interest and profits, the GDP multiplier suggests that another \$0.44 is generated through indirect and induced effects throughout the economy. The output multiplier of 1.56 for the *other mining and quarrying* sector, for instance, says that if output (or revenues from mining operations, in this analysis) increases by \$1 million, the output of other sectors of the economy would need to increase by \$560,000 in order to support the additional needs of the *other mining and quarrying* sector.

In general, the multiplier describes the inter-industry connectedness; the more that an industry relies on inputs from other sectors, the greater will be its multipliers. Multipliers can be derived from a number of economic indicators; for this analysis, we focus on output, value-added and employment.

8.2 Consultation list

The following individuals were consulted in the process of writing this report.

Eddie Grey	Grey Brothers
Gareth Thomas	OceanaGold
Gerry Cooper	Bathurst Resources Limited
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Nick Horswell	Solid Energy
Peter O’Sullivan	Minerals West Coast
Peter Whittall	Pike River Coal
Richard Barker	Consulting Geologist
Tony Christie	GNS Science

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