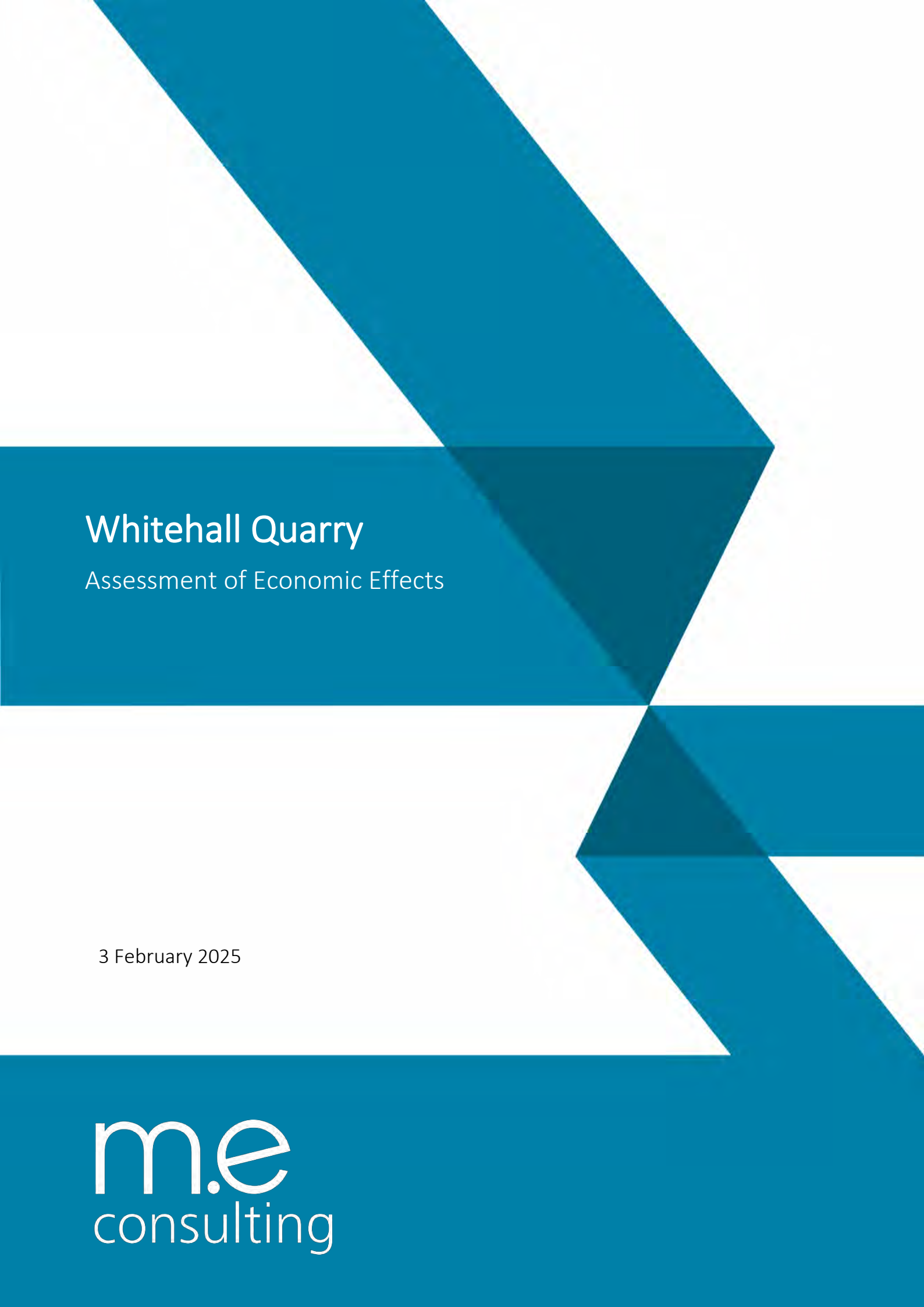


Appendix 8: Economic Assessment



Whitehall Quarry

Assessment of Economic Effects

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Executive Summary

Economic growth and development rely on quality infrastructure, but New Zealand faces challenges with an infrastructure deficit and rising costs for construction and maintenance. In turn, infrastructure requires reliable access to essential inputs, including aggregate.

Whitehall Quarry, owned by Winstone Aggregates, is a key part of the Waikato aggregate supply accounting for 8% -15% of the region's aggregate production¹. Winstone is seeking consent to expand its footprint to enable the quarry to continue operations. We understand that if consent is not granted, then Whitehall will not be able to operate beyond the short term. The proposed expansion will ensure that the quarry will be able to supply aggregate for the medium to long term – at least 35-years (based on current projections) as sought under the consent. Aggregate supply is essential in supporting infrastructure delivery because it is a key input into concrete production and used throughout construction projects. Infrastructure investment is driven by population and economic growth, as well as efforts to addressing infrastructure backlogs. Demand for demand across the Hamilton and Tauranga markets for aggregate is expected to continue in the future. Market Economics has been tasked with assessing the economic effects of this expansion to support its consent application. The assessment draws on supply and demand patterns and the spatial distribution of quarries to quantify the anticipated economic costs and benefits associated with a 'with Whitehall' vs 'without Whitehall' situations. Several growth scenarios are considered and a sensitivity analysis is also included.

Context

Whitehall Quarry, strategically located near Hamilton in New Zealand's golden triangle, is a vital supplier of high-quality aggregate to key projects across the Waikato and Bay of Plenty regions. Its proximity to the Waikato Expressway facilitates efficient distribution to a wide catchment area across Waikato and Bay of Plenty regions. Waikato aggregate is also used to satisfy Auckland's demand for aggregate.

Whitehall supplies aggregate to Hamilton, the Waikato as well as the Tauranga/Bay of Plenty markets. These markets:

- Have seen significant population growth, and are leading New Zealand's growth,
- Form part of the nationally significant golden triangle, accounting for 44% to New Zealand's GDP
- Supports construction, a key sector that delivers vital infrastructure.

As mentioned, Whitehall Quarry is a significant supplier of aggregate in the Waikato and Bay of Plenty regions. The high quality aggregate is used for roading, drainage, bulk fill, and farm maintenance.

Aggregate supply and demand

Data about aggregate production is limited, and have several limitations. We combine different datasets to estimate production volumes and trends. We draw on employment data, the New Zealand Minerals and Petroleum (NZP&M) data, as well as industry publication to form the views. The key points about the aggregate sector are:

- Waikato produced an estimated 8.4 million tonnes of aggregate in 2022, accounting for 24% of New Zealand's total production, while Bay of Plenty produced 810,000 tonnes.²

¹ The share varies depending on which year is used, and the approach followed to estimate regional production totals.

² These figures account for the different data sources and industry information.

- Waikato’s aggregate production per capita is significantly higher than the national average, indicating its role as a key exporter. Over the past five years, Waikato’s per capita production averaged 17.2 tonnes per annum, compared to the national average of 8.0 tonnes. This is because the Waikato aggregate is exported to Auckland and the Bay of Plenty.
- Waikato’s aggregate production has shown a long-term upward trend, closely aligned with national economic activity and demographic patterns.

Demand for aggregate is estimated by using historic relationships between national construction sector employment, national aggregate production rates, population totals, and applying these to local observations. Our analysis suggests that the per capita demand for aggregate in the Waikato and Bay of Plenty aligns with national patterns, sitting between 8.0t to 8.7t per capita. These ratios are applied to Stats NZ’s medium- and high-growth population projections to estimate the future demand for aggregate.

	Waikato		Bay of Plenty	
	Medium	High	Medium	High
Current annual demand (tonnes per capita)	7.6	8.3	7.8	8.6
2023-2033 additional (tonnes per year)	0.6m	0.9m	0.4m	0.7m
2033-2048 additional (tonnes per year)	0.5m	0.9m	0.3m	0.5m

As mentioned, Waikato is a net exporter of aggregate, supplying Auckland and Bay of Plenty. Therefore, caution is needed when considering sufficiency from a Waikato-centric perspective – the region produces more aggregate than it needs. However, any sufficiency assessment must acknowledge the export component. The anticipated growth in demand for aggregate in the wider region (Auckland, and Bay of Plenty) will see a continued reliance on Waikato aggregate. Significant growth is expected in New Zealand’s “golden triangle” of Auckland, Waikato, and Bay of Plenty – a significant part of New Zealand’s economy. To meet the demand and avoid market constraints, sufficient capacity must be ensured through resource development.

Whitehall Quarry produces enough aggregate to supply approximately 20% of Waikato’s aggregate demand. Without its production, a local shortfall equivalent to 8% of total regional production (770,000 tonnes) could emerge. This is because aggregate that is destined for the Auckland market might not be diverted to local (Waikato) demand. Such a situation is likely to see price increases (due to higher demand, greater distance from areas of demand), inefficiencies, and/or, or new quarries³ being established. This loss would exacerbate supply pressures, particularly given Auckland's constrained aggregate supply and its reliance on Waikato sources.

Costs and Benefits

The availability of aggregate and aggregate producers’ capacity to meet demand is critical to ensure that unnecessary economic, social and environmental costs are avoided. If aggregate is sourced for distant sources, then a range of costs are incurred. These include:

- additional (direct) transportation costs
- externalities such as:
 - emissions, and

³ That require additional costs associated with development new quarries.

- o social costs (accidents).

A range of assumptions were used to estimate the magnitude of the avoided costs. The alternative aggregate suppliers are assumed to be existing quarries (located near Whitehall's client base), and those quarries will respond by increasing production by 10% to cover a shortfall. If a deficit remains, then that shortfall is assumed to be supplied from Smythes (another quarry in the Waikato). A 35 year period is used, and the costs are discounted in the current terms using Discounted Cashflow Analysis; several discount rates are used with the recent (October 2024) guidance from NZ Treasury being the preferred option.

Based on the above, transport, environmental and social costs that would be avoided by enabling the Whitehall quarry expansion, is estimated at \$25.0m. The average annual avoided costs are around \$1 million per year (undiscounted), and using discounted totals, implies an annual average of \$715,200/year. In terms of the components, annual averages (undiscounted) are as follows:

- Transport costs \$324,200
- Emissions costs \$289,200
- Social costs \$396,900.

The sensitivity analysis highlights the effect of distance on the total costs. The sensitivity setting shows that even using significantly lower demand level, and satisfying that demand using alternative quarries will result in cost greater than servicing aggregate demand from Whitehall. Using the same volume, but substituting Whitehall aggregate with other quarries will see significant cost increases.

Conclusion

Consenting the expansion of Whitehall Quarry will ensure its continued operation, thereby ensuring that there is reliable access to a high quality resource, avoiding the need to source aggregate from distant locations. Avoiding extra transport means that significant costs are avoided. These avoided costs include, direct transport costs, emissions, and social costs that are estimated at \$25 million over 35 years. As a result, aggregate extraction at Whitehall Quarry provides significant regional public benefit because it avoids substantial costs.

1 Introduction

Economic growth and development depend heavily on access to quality infrastructure. New Zealand's infrastructure deficit and the cost of delivering and maintaining infrastructure is in the spotlight. The economic effects of sub-optimal infrastructure are significant, reducing productivity, constraining growth, and diverting incomes away from other investment opportunities. In addition, extreme weather events are adding to the pressures on infrastructure providers, requiring additional spending on resilience and rebuilding activities.

Reliable access to quality inputs is essential to ensure an efficient and response infrastructure supply chain. These inputs include materials like aggregate and sand and are essential for a high-functioning construction sector.

Aggregate is a high-volume but low-value good. Aggregate prices are highly sensitive to transport costs, making distance between source locations and end-use points a critical part of the decision-making process. The balance between the cost of transporting bulk aggregate and the potential challenges of operating near sensitive areas, like residential neighbourhoods, influences the location of quarries and the delivered price of aggregate. The transportation of aggregate also has broader economic effects, such as:

- congestion,
- externalities (pollution), and
- social costs (accident risks).

Quarry operations can sometimes conflict with surrounding land uses, making efficient access to aggregate supplies essential to mitigate adverse effects related to material shortages and transport costs.

Whitehall Quarry is owned by Winstone Aggregates ("Winstone") an operational division of Fletcher Building. To continue quarrying at 249 & 253 Whitehall Road, Cambridge, and to extract aggregate resource to meet demand, the spatial extent of the quarry needs to be expanded. This expansion will enable continued quarrying at the site thereby providing an essential component to the local construction sector. A staged development process will be followed with Stage 1 planned for 2025-2026 and vegetation clearance for stage two commencing in line with market requirements⁴. The proposed expansion would extend the pit in a westerly direction by approximately 15.5 ha in total (see Appendix 1). The proposed expansion is anticipated to provide a 35-year resource, subject to annual extraction rates and demand levels. We understand the pit expansion to the west will extend marginally beyond the Significant Mineral Extraction Zone and into Rural zoned land.

Whitehall quarry plays a critical role in supplying aggregate to the Waikato market, accounting for circa 8% - 15% of production (depending on which year is used and which alternative sources are included). This is a significant share of the local market, but it understates the quarry's significant because it services the wider region, supplying aggregate to projects well beyond the Waikato, including Tauranga, Bay of Plenty and the East Coast. Over the past decade, the quarry has averaged annual production of 734,000 tonnes (per year), with maximum production 961,800 tonnes. Production levels align with the business cycle and the effects of the Covid-disruptions are evident in production activity.

Aggregate is a non-renewable resource, and some local quarries are nearing the end-of-life status. For example, Winstones' Tamahere quarry is nearing closure. We understand that the rationale for the consent

⁴ Timing is subject to the demand for aggregates and when additional resource is needed.

application is to enable the ongoing operation of the Whitehall Quarry to meet long term demands for aggregate resource. Quarry operations will continue as they currently do, with no adjustments to truck movements, operating hours, or site access due to the proposed expansion.

Market Economics (M.E) has been commissioned to conduct an economic assessment to support the Whitehall Quarry expansion. The quarry primarily supplies greywacke, used in building and roading, and largely serves the local market within the Waikato region, with some distribution in the Bay of Plenty, as well as some minor markets towards the East Cape.

1.1 Project aim and approach

The following project aims guided the assessment:

- To assess the current quarrying activities and the aggregate supply and demand patterns in the local market.
- To utilise a scenario-based approach to illustrate the aggregate demand outlook and to compare the future demand levels against the aggregate supply position.
- To analyse the economic implications (costs and benefits), of the Whitehall consent using an appropriate counterfactual i.e., without a Whitehall quarry.
- To comment on the broader economic effects of the proposed expansion.

This assessment examines the supply and demand patterns and then uses these relationships to highlight the significance of the Whitehall quarry. The analysis is based on bespoke model that draws on official and unofficial data sources to illustrate market relationships. The approach is consistent that that applied for other aggregate and sand quarrying consent applications (including those presented at the Environment Court).

The scenarios reflect different forward looking pathways and are designed to show the anticipated spread of outcomes. In doing so, uncertainty is addressed. A sensitivity analysis is also included to show the effects of changing key input parameters.

Several data sources were consulted and used in undertaking this assessment. The main sources are introduced below:

- **Supply information:** The main sources used to inform the supply situation were the New Zealand Petroleum and Minerals dataset (NZP&M)⁵ as well as industry information as published by the likes of Inside Resources. These sources were supplemented with information collected by M.E as part of other aggregate studies and research for this assessment.
- **Demand information:** Demand patterns are derived using sources such as Stats NZ's population projections and local council data and reports. The relationship between historic population and economic performance with the supply information is established.

The following main data sources were used in the assessment:

- New Zealand Petroleum and Minerals dataset (NZP&M)
- Inside Resources
- Future Proof Partners

⁵ Administered by the Ministry for Business, Innovation and Employment (MBIE).

- SmartGrowth (Tauranga City Council and Western Bay of Plenty)
- Ministry of Transport and New Zealand Transport Agency
- Stats NZ
 - Population projections
 - Census 2023
 - Business Demography Survey
 - National Supply and Use Tables and Input-Output Tables
- Aggregate and Quarry Association
- M.E inhouse datasets and models
- Information received from Winstones.

In terms of the analysis process, the different datasets were analysed and combined. Both the direct and indirect use patterns were considered and different ratios were derived (e.g., tonnes per capita) and the relationships between non-production metrics like GDP and population were calculated. Trends over the past two decades or so underpin the analysis thereby ensuring that the effects of short term variability are removed. Next, the regional growth outlook was prepared using Stats NZ population projections. The anticipated spatial patterns of urban development are based on local strategy documents. The scenario approach is applied to illustrate the net position of aggregate supply position (demand less supply) over the assessment period.

The potential role of the Whitehall quarry is evaluated using the scenarios by estimating the economic costs and benefits of delivering aggregate to key markets under with/without perspective. For the without perspective, the effects associated with delivering aggregate to the market from alternative quarries are assessed. The analysis includes travel distances, changes in transport tasks, associated emissions, and social interactions, expressed in monetary terms for comparability. Importantly, if a cost is avoided, then it is seen as a benefit. Greater transport distances than those associated with Whitehall quarry are expected to result in economic costs and potential price increases. These costs include community impacts such as emissions, slower transport journeys due to congestion, and social costs from accidents. Notable intangible effects and impacts without market valuation studies are also included for completeness, though not monetized.

1.2 Caveats and Limitations

Like most economic modelling and projections, there are caveats and limitations that apply to this assessment. These limitations and caveats must be considered when using the findings. The main limitation related to data availability and the associated flow-on implications. The subsequent list outlines the key limitations and caveats:

- This assessment draws on existing information obtained from official and unofficial sources. No additional surveys or primary research were conducted. However, where possible alternative sources were consulted to validate or triangulate key findings.
- The New Zealand Petroleum & Minerals (NZP&M) dataset is a key source of information for understanding aggregate production at regional and national levels. However, it is based on a voluntary survey and limited response rates means there is variability and uncertainty associated with the data. We did not audit the dataset, but we adjusted the data to better reflect, and improve alignment with other sources. Likewise, data from the Aggregates and Quarries Association (AQA) is utilized, but we did not audit the information and assume it is accurate.

- The Covid-19 pandemic disrupted society and economic activities. This includes construction and its related sectors, which had flow-on impacts for aggregate producers and users. The disruptions are evident in trends with irregular patterns seen during the Covid-period. The analysis looks through the volatility and a conservative posture is applied to reduce the risk of overstating potential demand levels. This could occur if too much weight is placed on the post-Covid rebound period.
- Valuing non-market effects is often controversial and subject to optimism bias. Therefore, instead of assigning monetary values to certain non-market effects, this assessment presents describes them in qualitative terms.
- The assessment includes scenarios that consider local conditions. However, central government policies, such as migration trends, economic performance, and interest rates movement are not explicitly covered.
- Infrastructure investments of all sizes require aggregate. A shift in central government priorities towards roading projects has been signalled with the announcement of Roads of National Significance (RoNS) with some of the projects included as part of the Fast-track Approvals Bill. The exact timing of the projects is uncertain, but they signal a lift in activity. In contrast, New Zealand Transport Authority has indicated that at least six⁶ of the projects are expected to start within the next three years. This implies an increase in road-related projects, which would raise demand beyond baseline levels. This analysis, grounded in historical trends, does not factor in such increases.
- The current aggregate supply from the Bay of Plenty region is constrained, requiring establishment of new quarries to meet demand. Beyond the potential expansions of Katikati and Waitawheta quarries (consent applications have been submitted) we are not aware of any new, large-scale investments that could significantly alter this situation in the short term.
- Data on the gap between quarries' actual production levels and consented maximums is limited. It is assumed that these quarries are operating at or near capacity.

1.3 Report structure

The report is structured as follows:

- Section 2 sets the scene for the analysis by presenting a context covering the local population, recent economic performance and a snapshot of the infrastructure investment pipeline.
- Section 3 discusses the aggregate market. Historic production levels and 'per capita' ratios are presented. The second part of this section outlines the growth scenarios and illustrate the sufficiency situation i.e., how the demand and supply situations compare over time. The section concludes with a sensitivity analysis.
- Section 4 presents the costs and the benefits as assessed for the quarry. The assessment presents the benefits (i.e., avoided costs) if Whitehall is granted consent to expand.

⁶ <https://www.nzta.govt.nz/planning-and-investment/roads-of-national-significance/>

2 Context

Winstone's Whitehall Quarry is located near Cambridge, in the Waipā District. The quarry is strategically located near Hamilton – an important part of New Zealand's golden triangle (Auckland, Hamilton and Tauranga). Whitehall Quarry is recognised as “regionally significant industry” in the Waikato Regional Policy Statement.

The Quarry has good access to major transport routes, including the Waikato Expressway, enabling aggregate to be delivered to markets using the State Highway network and to access development areas. Whitehall Quarry supplies aggregate to projects across the Waikato and Bay of Plenty regions. The quarry produces high quality aggregate, and is the largest supplier of TNZ40⁷ in proximity to Hamilton/Cambridge.

Demographics and economic conditions play a crucial role in driving aggregate demand, because aggregate is a fundamental input into many parts of everyday life, even though use is often indirect. Aggregate is used in essential infrastructure investments like roading, drainage systems, concrete production (which goes into many applications), and components of building materials. It is also used to form foundations.

As regions expand and economies grow, demand for aggregate rises accordingly. The relationship between economic and regional growth, and aggregate demand is well-published. A detailed account of these relationships is presented in a recent report prepared for Waka Kotahi NZ Transport Agency⁸.

Historic supply patterns (from Whitehall Quarry) are used to define the market area associated with this natural resource. It is our understanding most of the aggregate is supplied to the local market covering Waipā and Hamilton, as well as the wider market that includes the rest of the Waikato, Tauranga and the Western Bay of Plenty areas. Other, more distant areas are also serviced but the share of aggregate delivered to these locations is relatively minor. Therefore, this section uses this broad spatial area to provide a context showing the economic and demographic features of the wide catchment. The section starts with an overview of population and then the economy is discussed.

2.1 Population

The quarry is located near Cambridge and services the local and regional aggregate markets, which spans several fast-growing Territorial Authority areas (TAs). Population estimates and projections released by StatsNZ in 2024 highlighted the strong population growth recorded in the Waikato. The region was the third fastest growing region between 2022 and 2023, with Hamilton the fastest growing district (and city) over this time. The high growth is evidence of the area's significance in a national setting.

Table 2-1 summarises the population outlook for the area serviced by this quarry. Hamilton City, Tauranga City, and Waipā District are considered the core market, where most of the aggregate delivered from the quarry will be used. The supporting area includes Waikato District, South Waikato District, Matamata-Piako District, Ōtorohanga District and the Western Bay of Plenty. Only a portion of the secondary area's population

⁷ High quality un-weathered well graded rock, generally used in Pavement on State Highways and Heavily Trafficked roads, complies with TNZ M4-2006 specification.

⁸ Wilson, D., Sharp, B., Sheng, M. S., Sreenivasan, A., Kieu, M., & Ivory, V. (2022). Aggregate supply and demand in New Zealand (Waka Kotahi NZ Transport Agency research report 693).

is used in the analysis (next section), but the full population is reported in this section to provide a benchmark. The table shows the medium and high growth scenarios.

Table 2-1: Projected Population Change

	StatsNZ Scenario	Medium			High		
	Area	2023	2033	2048	2023	2033	2048
Primary (core)	Waipā District	58,690	63,220	67,650	58,690	65,860	74,820
	Hamilton City	174,740	198,330	231,640	174,740	206,490	255,000
	Tauranga City	152,840	172,650	196,530	152,840	180,060	217,180
	Subtotal	386,270	434,200	495,820	386,270	452,410	547,000
Secondary (support)	Waikato District	85,970	102,130	123,360	85,970	105,940	134,290
	Matamata-Piako District	37,100	38,970	40,060	37,100	40,860	45,190
	Ōtorohanga District	10,410	10,890	11,280	10,410	11,400	12,770
	South Waikato District	25,040	26,390	27,540	25,040	27,660	31,120
	Western Bay of Plenty Dist	56,180	62,360	68,070	56,180	64,750	74,760
	Subtotal	214,700	240,740	270,310	214,700	250,610	298,130
Rest of Region	Rest of Waikato Region	106,800	107,100	101,400	106,800	112,500	115,600
	Rest of Bay of Plenty Region	125,100	133,800	141,000	125,100	139,900	157,900
	Subtotal	231,900	240,900	242,400	231,900	252,400	273,500
	Total	832,870	915,840	1,008,530	832,870	955,420	1,118,630
Change (different periods)							
		10y 2023-2033	15y 2033-2048	Total 2023- 2048	10y 2023-2033	15y 2033-2048	Total 2023- 2048
Primary (core)	Waipā District	4,530	4,430	8,960	7,170	8,960	16,130
	Hamilton City	23,590	33,310	56,900	31,750	48,510	80,260
	Tauranga City	19,810	23,880	43,690	27,220	37,120	64,340
	Subtotal	47,930	61,620	109,550	66,140	94,590	160,730
Secondary (support)	Waikato District	16,160	21,230	37,390	19,970	28,350	48,320
	Matamata-Piako District	1,870	1,090	2,960	3,760	4,330	8,090
	Ōtorohanga District	480	390	870	990	1,370	2,360
	South Waikato District	1,350	1,150	2,500	2,620	3,460	6,080
	Western Bay of Plenty Dist	6,180	5,710	11,890	8,570	10,010	18,580
	Subtotal	26,040	29,570	55,610	35,910	47,520	83,430
Rest of Region	Rest of Waikato Region	300	-5,700	-5,400	5,700	3,100	8,800
	Rest of Bay of Plenty Region	8,700	7,200	15,900	14,800	18,000	32,800
	Subtotal	9,000	1,500	10,500	20,500	21,100	41,600
	Total	82,970	92,690	175,660	122,550	163,210	285,760

Source: Calculations based on StatsNZ

According to Census 2023, there are 386,270 people living in the core market. By 2048, this is expected to be between 495,820 and 547,000 depending on the growth scenario. In the supporting market, the population is currently around 214,700. By 2048, the total population in the area is projected to be between 270,310 and 298,130. In the rest of region, the population is slightly greater than in the secondary area, but the population is distributed over a large area.

The population outlook is positive, with strong growth expected in the key areas associated with Whitehall Quarry. Waipā District, Hamilton City and Tauranga City. In these areas, the population is projected to increase by between 47,930 and 66,140 people over the next ten years, and another 61,620 to 94,590 over the subsequent 15 years. This implies population growth over the next 25 years of between 109,550 and 160,730 in the core area. Growth in Hamilton City accounts for more than half (52%) of the total population growth

within the core area, and Tauranga City's growth makes up 40%. Hamilton City is anticipated to grow by between 56,900 individuals to 80,260 individuals and Tauranga City by between 43,690 individuals to 64,340 individuals. This spread underscores the need importance of ensuring that all sectors supporting population growth and infrastructure development are equipped to handle emerging growth pressures. This includes aggregate production. Maintaining secure and reliable access to aggregate is crucial to support ongoing and future infrastructure projects.

Table 2-2 shows the anticipated rate of change (compound growth rate) of the different areas against New Zealand.

Table 2-2: Compound Growth (per annum) - Population

Area	Medium Scenario		High Scenario	
	10y 2023-2033	15y 2033-2048	10y 2023-2033	15y 2033-2048
Hamilton City	1.3%	1.0%	1.7%	1.4%
Rest of Waikato Region	0.7%	0.6%	1.2%	1.3%
Tauranga City	1.2%	0.9%	1.7%	1.3%
Rest of Bay of Plenty Region	0.8%	0.6%	1.2%	1.3%
New Zealand	0.8%	0.6%	1.2%	1.0%
Source Calculations based on StatsNZ				

Annual population growth in the core area is expected to exceed the national rate. This performance is across all timeframes for the 10-year and subsequent 15-year periods, and under both the medium- and high-growth scenarios. This underlines the strategic role of the areas and its contribution to the New Zealand growth story.

Key observations about annual population growth include:

- Under the medium and high scenarios, Hamilton City and Tauranga City will see population growth consistently outpacing New Zealand, and the rest of the Waikato and Bay of Plenty regions over the next 25 years.
- Nationally, population is expected grow at 0.8% to 1.2% per annum (compounded) over the next 10 years, slowing somewhat over the subsequent 15 years, growing at 0.6% to 1.0% per annum. The range reflects different growth assumptions (scenarios). The slowing rate is due to population dynamics (i.e., ageing population).
- In comparison, Hamilton City is projected to see strong growth of between 1.3% and 1.7% per annum over the next decade, and 1.0 to 1.4% between 2033 and 2048.
- Similarly, Tauranga City is anticipated to see growth rates of between 1.2% and 1.7% per annum over the next 10 years, and 0.9% to 1.3% between 2033 and 2048.
- Growth in the rest of Waikato and Bay of Plenty is expected to remain subdued, reaching growth rates between 0.6% and 0.8% under a medium growth scenario and rates of 1.2% to 1.3% under a high growth scenario – this is broadly inline with the New Zealand growth rates.

The core area served by the quarry is projected to outperform national population growth by some margin. This suggests that the area will continue to be an investment destination, attracting population and growing comparatively faster. This growth will lead to increased pressures on infrastructure and the need to accommodate growth. The growth is relevant in the aggregate market because it highlights the ongoing demand for investment, and the need for aggregate resources.

2.2 Economic Performance

The geographic area within the Auckland, Hamilton, Tauranga Golden Triangle is a key economic area within the North Island. The area is projected to see continued population and economic growth, making it one of the most dynamic regions in New Zealand. The triangle's anchors have strong linkages with supporting economic centres within the Waikato and Bay of Plenty region's broader economic and transport framework.

2.2.1 Gross Domestic Product (GDP)

The effects of Covid-19 and the associated lockdowns are evident in economic data, especially GDP. Therefore, some care is needed when analysing historic GDP and employment trends because the Covid-disruptions caused unusual patterns. In 2023, the NZ economy produced GDP to the value \$377.8bn. The Golden Triangle contributes a significant portion of New Zealand's GDP and hosts key industries such as agriculture, logistics, and exports. For 2023, the Golden Triangle cities generated GDP of \$166.9bn, 44% of the NZ economy. At a city level, the breakdown is as follows:

- Auckland \$143.0bn
- Hamilton \$13.7bn, and
- Tauranga \$10.1bn.

The Auckland economy is the main economic centre and is the largest contributor to national GDP. The other two cities combined contribute 6% of national GDP. The triangle's anchor cities do not operate in isolation and are supported by the surrounding rural economies. These surrounding rural economies, particularly around Hamilton and Tauranga, form part of the triangle's economic supply chains. Hamilton is the main urban centre for the Waikato, and the surrounding supporting districts include Waipā and Waikato Districts. Similarly, the Western Bay of Plenty (WBoP) economy is closely associated with Tauranga. These surrounding economies add to the overall size of the Golden Triangle, increasing the GDP by \$10.4bn, or 2% of national GDP. The contribution of the Golden Triangle cities, and the associated supporting role of the rural economies, is nationally significant.

Historically, the economies within the Golden Triangle have experienced growth rates that outpace the national average. In 2000, the three cities accounted for 40% of New Zealand's GDP output. This share increased to 41% in the pre-GFC environment (2008) and reached 43.7% in 2020. The upward trend has continued with a marginal increase to 44.2% (2023).

Figure 2-1 displays the GDP trends⁹ over the past two decades and isolates the key local markets, i.e., those where the aggregate is delivered to including Hamilton City and Waipā District within the Waikato Region, as well as Tauranga City and parts of the rest of Bay of Plenty Region¹⁰.

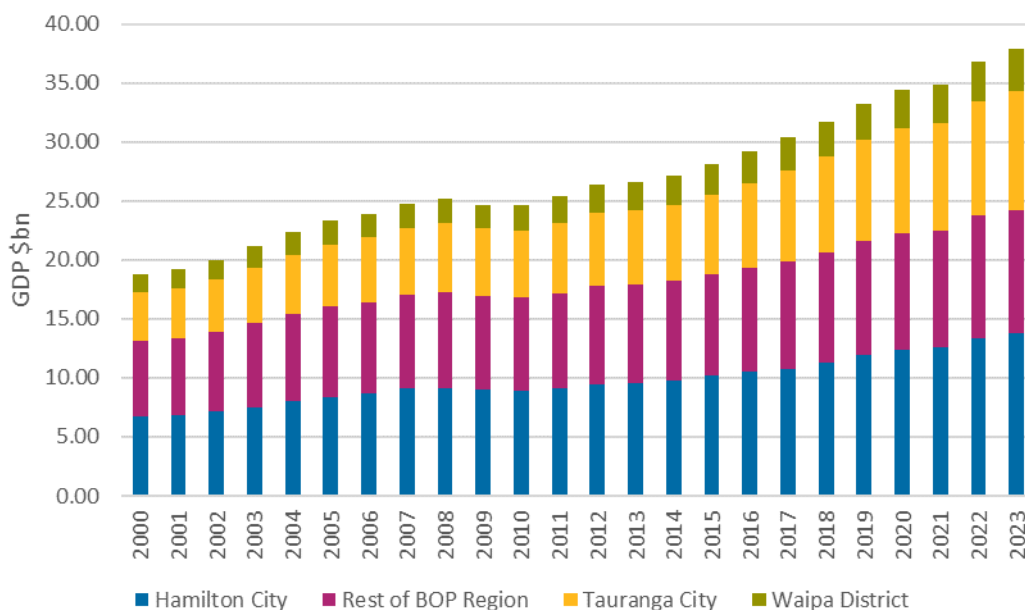
Hamilton City and Tauranga City/Rest of BoP are clearly established as key economic drivers within the Waikato and Bay of Plenty regions. This is important for the quarrying operations because these growing economies require constant investment in new infrastructure to support population growth, as well as changes in business landscape. While smaller than Hamilton, Auckland, or Tauranga, Cambridge/Waipā District plays a supporting role in the regional economy, particularly through its agricultural base, lifestyle appeal, and contribution to

⁹ Sourced from public information and Infometrics.

¹⁰ Including Western Bay of Plenty District, Whakatane District, Kawerau District, Opotiki District.

Waikato's industries. The quarry's location near Cambridge allows it to benefit from the economic dynamism of the Golden Triangle.

Figure 2-1: GDP – Trends (Total GDP)



At a local level, the Waipā District economy (within which Whitehall quarry is located) is experiencing positive economic growth. The long-term compound growth rate (2000-2023) has been 3.6%, and 3.8% for the past 5 years. These rates are above the New Zealand growth rates and similar to those observed for Hamilton City, suggesting that the local area is, despite the current slowdown, experiencing strong economic growth. Other observations include:

- The rest of BoP region has experienced positive economic growth, however, the rates observed are below that of Hamilton, Tauranga and Waipā. This suggests that demand for aggregates from this area may not be as strong as other key markets identified. However, it is part of the Golden Triangle, and supporting its performance is important.
- Retaining quarrying in the local economy is important for supporting jobs locally and other businesses in the economy (through the quarry's inputs).
- Tauranga and Hamilton will continue to demand inputs associated with building and construction to support growth and respond to development pressures. Having access to enough resources to support the construction (growth) and maintenance of existing infrastructure is key to manage costs and avoid infrastructure pressures ballooning – stretching budgets and increasing the likelihood of deficits.
- Supporting and enabling growth in the Waikato and BoP regions enhances the Golden Triangle's economic influence and its overall contribution to the national economy.

2.2.2 Construction Employment

Construction employment has a strong link to regional (and district) economic performance, acting as both an indicator and a driver of economic growth. Employment data is sourced from StatsNZ Business Directory and

filtered to highlight employment related to construction activities¹¹. Employment is measured using a Modified Employee Count¹² (MEC). The historic trends in construction employment for the key local markets of aggregate are analysed focusing on Hamilton City and Waipā District in the Waikato Region, as well as Tauranga City and parts of the rest of BoP Region.

Total construction employment in Waipā District for 2023 is some 1,050 MECs (Figure 2-2). The compound growth rate in construction employment over the last two decades is 3.2%, declining to 1.3% over the past five years, reflecting the initial period of the economic slowdown, and inflationary pressures. For 2023, house construction MECs account for the largest share (69%) of construction employment, followed by non-residential building construction (14%). Since 2003, negative growth has occurred in road and bridge construction declining from 62 jobs in 2003 to 27 jobs in 2023. A contraction in the district's share of road and bridge construction and other heavy and civil engineering construction as a share of total construction employment is evident since 2018. These patterns are associated with a relocation of larger construction companies to Hamilton.

Figure 2-2: Construction Employment Trends, Waipā District and Hamilton City



In comparison, Hamilton City's construction employment is more evenly spread across the categories, except for other residential building construction which accounts for a small share. Growth rates over the last two decades (3.8%) and last five years (3.2%) are higher than those observed for Waipā – this is expected as population growth in Hamilton City is driving construction of houses in new growth areas, transport

¹¹ Construction employment includes 6-Digit ANZSIC levels; House construction, Road and bridge construction, Other heavy and civic engineering construction, Other residential building construction, and Non-residential building construction.

¹² The modified employee count take account of business proprietors and undercounts to provide a more comprehensive picture of employment.

infrastructure and community facilities. Hamilton City's employment growth in house construction over the past five years has been strong – recorded at 7.3% (compound growth rate). Consequently, the relative share of house construction employment has increased from 36% in 2018 to 43% in 2023.

Figure 2-3 presents trends in construction employment for Tauranga City and rest of BoP. In 2023, Tauranga City had a construction workforce of 4,280 MECs, with house construction accounting for the largest share at 44%. This is followed by road and bridge construction (25%), other heavy and civic engineering construction (16%), non-residential building construction (11%) and other residential building (5%). The compound growth rate in construction employment over the last two decades is 4.0%, declining to 2.1% over the past five years. In terms of the overall structure, the share of non-residential building construction has declined overtime, while growth has occurred in other residential building construction.

Figure 2-3: Construction Employment Trends, Tauranga City and Rest of Bay of Plenty Region



Growth rates observed over the past two decades for rest of BoP are comparable to Tauranga City. However, over the last five years, Rest of BoP has experienced higher growth rates (3.4% vs. 2.1%). The share of house construction employment has increased from 52% in 2018 to 58% in 2023 – a compound growth rate of 5.7%. Notable growth in road and bridge construction since 2003 is observed, increasing from 70 MECs to 320 currently (2023). The structure of construction employment has evolved over time to meet the infrastructure demands driven by population growth.

Historic trends in construction employment across key local aggregate markets highlight that these economies are expanding, with infrastructure development being a major focus to support their growing populations. Construction inputs, including aggregate, are needed to support construction activities and delivery.

2.3 Infrastructure investment

The quarry's location near key transport routes, including the Waikato Expressway, enables efficient distribution of aggregate and other materials to support ongoing construction and infrastructure projects. Additionally, proximity to commercial and industrial developments, such as Titanium Park south of Hamilton and Tauriko in Tauranga, enhances its economic importance and drives further economic efficiencies.

The population and economic growth in Hamilton City and Tauranga City, as presented in the preceding sections, are generating additional demand for infrastructure investment. In addition to baseline growth, severe weather, and natural hazards (slips and flooding), are adding to demand pressures. These pressures relate to infrastructure resilience, re-investments, and growth management. Responding to existing and baseline growth pressures is shown in historic use patterns. However, the emerging pressures are not shown in the use patterns. The demand for aggregate relative to historic patterns is expected to increase over time in response to population and economic growth.

To illustrate the current and anticipated demand patterns, the infrastructure pipeline and investment outlook are shown by citing a selection of projects. Basic information about the projects and key challenges are presented. The infrastructure pipeline includes key Roads of National Significance (RoNS) – significant investments in roading infrastructure that will support economic development and lift productivity. The investment in the RoNS is expected to see a significant increase over the short term in response to shifts in central government policies.

2.3.1 Waikato Region

The Waikato is part of the 'golden triangle' connecting Hamilton, Auckland and Tauranga, making it a convenient access point for freight and logistics. The region is a key part of New Zealand's growth engine, however, the region is facing significant growth challenges including:

- An increasing proportion of the region's infrastructure is nearing the end of its functional lifespan, with 15% currently classified as being in poor or very poor condition.
- Responding to and planning for extreme weather events.
- Preparing for future growth, ensuring development occurs in suitable locations, and anticipating infrastructure demands and pressures well in advance.

The challenges detailed in the region's Annual Plan and Long-Term Plan (LTP) highlight the significant demand for aggregate required to address these needs effectively. Infrastructure such as flood protection (stop banks) and land drainage assets are critical for the region to ensure future resilience to natural hazards (climate change). The relative age of the infrastructure means that to address the infrastructure (maintenance) backlog, a lift in renewal investment is needed. The infrastructure backlog issue is not unique to the Waikato and many parts of New Zealand are facing infrastructure pressures.

2.3.2 Hamilton City

Hamilton City Council are experiencing growth challenges that are also seen in other high growth Councils. These are identified in the city's LTP and include:

- Pressure on infrastructure and services because of population growth. Significant investment is required to develop and maintain essential infrastructure to support the city's growing population.
- Environmental challenges – the city must consider environmental impacts, including water use, climate resilience, and reducing carbon emissions. Managing the Waikato River's water resources is a critical aspect of this challenge.
- Rising costs and interest rates mean the city is facing increasing funding challenges to deliver new infrastructure, provide services, and maintain and renew assets. Significant changes to planning, delivery and funded are needed to balance community needs and financial sustainability.

Hamilton City aim to respond to these growth challenges by continuing to deliver essential work for communities, while ensuring financial sustainability, and keeping rates increases as low as possible. Over the next 10 years, \$4.4bn of capital expenditure is planned for Hamilton City. Key areas of expenditure include wastewater, transport and water supply. These infrastructure projects will demand substantial quantities of aggregate and other construction materials. Sourcing these materials locally is critical for minimising transportation costs and reducing the overall project expenses. The cost pressures mean that all inputs (including aggregate) must be sourced from cost effective locations. This generally means that the distance over which aggregate is transported must be minimised.

2.3.3 Tauranga City

Tauranga City is experiencing significant growth pressures driven by its status as one of New Zealand's fastest growing urban centres. The growth pressures facing the city are highlighted in the City Council's Long Term Plan. These include:

- The city's high growth, lack of community facilities and historic underinvestment in community facilities.
- Demand for enhanced community amenities and public spaces to match the cities growth. Investment in the city centre (Civic precincts) is required to lift the area's profile and to catalyse development.
- Planning for natural hazard events, adapting to climate change and strengthening infrastructure resilience.
- The increasing pressure on transport infrastructure, and the need to prioritise transport investments due to funding constraints.
- Rising costs and inflation have impacted delivery of planned projects, requiring careful prioritisation of investments and community consultation to set the right funding levels.

In response to these challenges the city is planning to invest \$4.9bn over the next 10 years. The following examples of capital projects highlight the type of projects that the city is embarking on and the link to aggregate demand:

- Memorial Park Aquatics, Recreational Hub and park enhancements,
- Developing new community facilities and upgrading sports fields,
- Increasing capacity at the Marine Park/Sulphur Point, and
- Civic Precinct development.

Infrastructure investment is needed to support key growth areas as well as maintenance and upgrades of existing services. The LTP includes significant transport investment in the eastern corridor benefiting both the city and growth areas of Pāpāmoa and Wairākei. These investments will also support future growth in Te Tumu.

Investing in growth to the west (Tauriko) is also a key priority to address the city's housing shortage and provide business and industrial infrastructure. Over the next decade, the city plans to invest \$230m to develop new residential and business areas in Tauriko West, the Tauriko Business Estate, and Keenan Road. This investment aims to provide up to 4,000 new homes and additional job opportunities, with a significant portion allocated to community spaces and transport infrastructure.

In addition to the above investments and activities, the Council acknowledges and is responding to increasing natural hazard threats. It is continuing to renew stressed infrastructure in a way that responds to a changing natural environment, e.g., climate change. The focus is on resilience to ensure that assets – particularly pipes and roads – continue to operate during hazard events.

2.3.4 National construction pipeline

The National Infrastructure Pipeline, developed by Te Waihanga, is a comprehensive collection of infrastructure project information gathered from various contributing organisations. The pipeline report offers insights into planned infrastructure projects across New Zealand and can be filtered to focus on specific regions. Projects were filtered to include Waikato and Bay of Plenty and are summarised in Appendix 2. The projects are summarised based on:

- Funding status (fully funded, funding sources confirmed, part funded or funding sources to be confirmed),
- project status (early planning, in planning, in procurement, under construction or on hold), and
- the delivery organisation.

The pipeline report lists projects with a total budget in excess of \$17.9bn¹³ for Waikato and Bay of Plenty. In terms of funding status, around \$8.4bn worth of projects are fully funded with an additional \$2.1bn having confirmed funding sources. Partly funded projects account for \$5.9bn while projects where funding sources are to be confirmed are valued at \$1.6bn. Of the projects that are fully funded or have confirmed funding sources, \$6.8bn are under construction, \$2.4bn of projects in early planning or planning and further \$1.1bn worth of projects are in procurement.

The bulk of the projects being delivered are associated with Waka Kotahi NZ Transport Agency – that is roading projects with a direct requirement for aggregate. The infrastructure pipeline showcases the substantial long-term investment committed to infrastructure development in the Waikato and Bay of Plenty. This includes significant allocations for road and transport projects planned over the next decade. The outlook highlights a growing demand for aggregates, essential for roading projects and other construction needs such as drainage, foundations, and base layers.

2.3.5 Roads of National Significance

The Roads of National Significance (RoNS) programme was reintroduced in March 2024 as part of the Coalition Government's draft Government Policy Statement on Land Transport. The new iteration includes funding for a package of major transport projects that, once completed, will support economic growth and productivity, reduce congestion, improve safety, support housing development, and provide a more resilient roading

¹³ Based on the class mid-values.

network. These projects will prioritise creating four-lane, grade-separated highways to improve connectivity and resilience across regions.

Pending confirmation of funding, construction on the RoNS is expected to begin over the next three years and will determine a 10-year construction pipeline. Key RoNS for Waikato include:

- **Hamilton Southern Links:** The aim of this project is to support Hamilton's planned growth south of the City by developing an effective transport network of state highway and urban arterial routes. The route has been identified, but the project remains in the early stages of development, with no decisions yet made regarding construction timelines. This is a joint project between Waka Kotahi and Hamilton City Council with the construction pipeline valuing the project at over \$1bn.
- **SH1 Cambridge to Piarere:** Waka Kotahi is working to make SH1 between Cambridge and Piarere safer through construction of a 16km four-lane grade separated highway. The first stage is already under construction while the future stages are still in the design phase. The first phase of construction is expected to start in late 2026 and anticipated to take 6-7 years.

For Bay of Plenty RoNS include:

- **SH29 Tauriko West:** This project includes transport upgrades to SH29 and SH29A beginning with the replacement of Ōmanawa bridge, realignment of the connections on SH29 around the bridge and minor safety improvement to Ōmanawa Road intersection.
- **Takitimu North Link Stage 1:** Currently under construction and due for completion in 2028. Stage 1 of the Takitimu North Link will deliver a safer, more efficient and reliable route between Tauranga and Te Puna consisting of a 6.8km four-lane expressway. The project is valued at between \$500m - \$1bn.
- **Takitimu North Link Stage 2:** Stage 2 will extend the four-lane expressway a further 8km between Te Puna and Ōmokoroa. Early indications suggest this project is valued at over \$1bn.

Aggregate is a foundational material used for constructing road bases, sub-bases, asphalt, and concrete. The proposed RoNS programme for the Waikato and Bay of Plenty will generate demand for aggregate. Sourcing aggregate locally will minimise projects costs providing overall benefits to timeline management and completion.

2.4 Conclusion

Overall, there is considerable investment in the local economies, with Councils and central government agencies committed to investing in infrastructure programmes aimed at supporting growth while addressing historic infrastructure deficits. There is also a growing need for Councils to improve infrastructure resilience and address damage associated with extreme weather events and natural hazards.

Aggregate supply is essential in supporting infrastructure delivery with strong population and economic growth in Hamilton and Tauranga putting pressure on infrastructure investment. These fast-growing economies are driving demand for inputs into the construction sector, including demand for aggregate.

At the local level (Waipā District), the economy has been growing and the outlook is positive. However, the rate of change lags the fast-growing economies of Hamilton City and Tauranga/rest of BoP. This implies that Waipā plays a supporting role in the growth of these economies and retaining local businesses and their supply chain links is important.

3 The Aggregate Market

Whitehall Quarry is a major supplier of aggregate for the Waikato and Bay of Plenty regions. The quarry produces materials for roading, drainage, bulk fill, and farm maintenance through its fixed plant operations. The quarry supports regional infrastructure investments and has been used to support large roading projects.

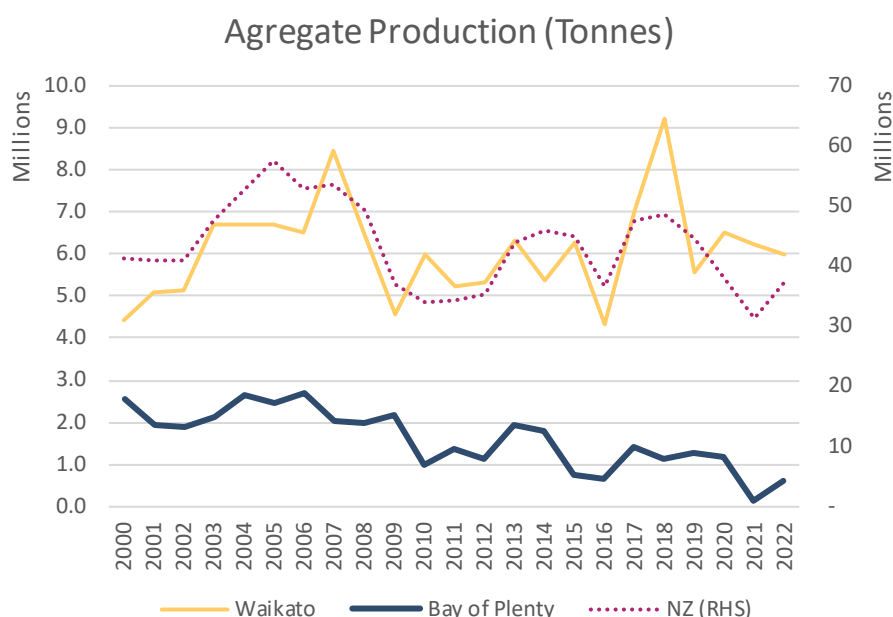
As mentioned earlier, there is limited official information about aggregate production. M.E used industry data to estimate production trends and volumes. These estimates draw on relevant employment data, and New Zealand-wide production data derived from official and industry sources. Data published as part of the New Zealand Minerals and Petroleum data is reported as underreported and we have applied adjustments to align the data with industry feedback. New Zealand-wide data were then refined and scaled to capture regional nuances using sectoral employment estimates.

The section starts with an overview of historic production data and key relationships (e.g., aggregate per capita). The section then illustrates the anticipated future demand levels based on projected growth patterns. Any forward-looking projection has an element of uncertainty. Therefore, the analysis uses a scenario approach to report the anticipated spread of outcomes. A sensitivity analysis is included to further test the results and the robustness of the modelling.

3.1 Historic Aggregate Production

Regionally, aggregate production varies significantly around New Zealand. **Error! Reference source not found.** s shows aggregate production across the Waikato and Bay of Plenty. The data underlying the figure is presented in Appendix 3. New Zealand's overall production is reported and used as a benchmark. Importantly, the data shows production volumes and should not be equated with consumption (i.e., how much is used). Many regions export aggregate to other regions. Auckland consumes more aggregate than it produces, and it supplements local production with imports from the Waikato and Northland.

Figure 3-1: Aggregate Production



Waikato aggregate is also exported to the Bay of Plenty. During 2022 (the most recent production data), the Waikato produced 6m tonnes of aggregate while the Bay of Plenty produced approximately 600,00 tonnes (Figure 3-1). However, these estimates are unadjusted and likely to under-report total production. After allowing for the difference between the different data sources and industry information, the total aggregate production in the Waikato is estimated at 8.4m tonnes, and the Bay of Plenty's production is higher at 810,000 tonnes.

The production profiles for the two regions show:

- A long term, downward trend for the Bay of Plenty. This is due to the spatially concentrated nature of growth i.e., most of the region's growth is concentrated around Tauranga and the Western Bay of Plenty.
- The Waikato is a key location in terms of aggregate production. Aggregate production shows strong alignment with the New Zealand totals. This is because there is alignment between production activities and the New Zealand business cycle and demographic patterns. This alignment is due to close relationship between economic activity and aggregate consumption, as well as the significance of the Waikato as aggregate producers in the New Zealand context. The Waikato produces circa 24% of New Zealand's aggregate¹⁴ – up from circa 17% in the early 2000s.

Looking through the volatility in the production data shows that the production totals in the Waikato are trending up, even if the effects of the Covid-lockdowns are not as pronounced.

The aggregate production data is compared against the historic population data to show the relationship between these elements, as well as aggregate use.

3.1.1 Per capita ratios

The level of aggregate that is produced across regions vary considerably, with larger regions consuming more aggregate than smaller ones. Expressing aggregate production in terms of population size illustrates this difference. Table 3-1 shows the per capita ratios for the Waikato, Bay of Plenty and New Zealand.

Table 3-1: Production ratios – per capita

	Waikato	Bay of Plenty	NZ
	Decade (2012-2022)		
Min	14.5	1.6	6.1
Median	18.0	5.3	8.8
Max	23.8	12.5	14.0
Average	18.0	4.8	8.7
	Five years (2017-2022)		
Min	14.5	1.6	6.1
Median	16.2	4.1	7.5
Max	23.8	5.0	9.9
Average	17.2	3.7	8.0

¹⁴ 5 year average to 2022. The share is reduced due to the Covid disruptions.

The size of Waikato's production, relative to the size of the population is evident. For all the periods considered, the Waikato produces almost double that seen across New Zealand. Over the past five years, production levels have been on average 2.2 times national ratios. This includes the Covid-disruptions as well as the period coming out of the lockdowns that saw a lift in activity as pent-up demand was addressed. During this high activity period, the maximum per capita rate of 23.8t was recorded in the Waikato.

The production rates (per capita over the past decade) are in the order of:

- Waikato
 - Median 18.0t
 - Average 18.0t
- Bay of Plenty
 - Median 5.3t
 - Average 4.8t

These ratios provide an indication of the anticipated production levels that could be expected going forward and are based on a continuation of historic trends.

Importantly, the Waikato produces more aggregate on a per capita basis than New Zealand. This suggests that the region exports aggregate. The difference between Waikato's production and the New Zealand ratio is used to estimate the local demand.

3.2 Demand for aggregate, and outlook

Aggregate is a low value, high volume good. This means that transporting it is expensive and therefore aggregate sources close to end users are preferred over ones that are located further away. To estimate the demand for aggregate in a region, the relationship between construction sector employment, and aggregate production is estimated. Construction employment is location specific and the link between investment and construction employment provides a way to estimate local demand. While construction is cyclical, the long term relationships between investment, construction activity, construction employment and aggregate remain stable.

Our analysis suggests that the per capita demand for aggregate around New Zealand is relatively similar. At a national level, the per capita demand is in the order of 8.0t/capita to 8.7t/capita. The ratios are (the spread shows the 5-year and 10-year averages):

- In the Waikato 7.6t/capita to 8.3t/capita,
- In the Bay of Plenty 7.8t/capita to 8.6t/capita.

These ratios are applied to population growth projects to estimate the demand profile over time. The change in population and economic activity influence the demand levels. The growth outlook for the economy and population is uncertain and the current economic slowdown is adding uncertainty. To deal with the uncertainty, a scenario approach is used. This shows the anticipated spread of demand over the long term. The scenarios combine the per capita ratio as well as different population growth projections. The population projections use the Stats NZ medium- and high-growth pathways. The scenarios show the medium pathway as well as the high growth pathway. These ranges are interpreted as the likely outcomes. Considering the importance of the aggregate in supporting construction and investment, the high scenario is included to ensure that the assessment does not 'undershoot' potential demand levels. The medium scenario uses the

medium growth settings together with lower per capita demand ratios. Conversely, the high scenario combines the higher per capita ratios and the high population projections.

For this assessment, an additional demand shift associated with the potential effects of higher demand levels arising from matters such as a response to climate change and natural hazards, as well as accelerated infrastructure spending is not included here. However, this is presented as part of the sensitivity analysis to illustrate the potential effect. Table 3-2 summarises the demand outlook for selected years, for the Waikato and the Bay of Plenty.

Table 3-2: Demand outlook (m' tonnes)

Scenario	Region	2023	2028	2033	2038	2043	2048
Medium	Waikato	3.8	4.2	4.4	4.5	4.7	4.9
	Bay of Plenty	2.6	2.9	3.0	3.1	3.2	3.2
High	Waikato	4.1	4.8	5.1	5.4	5.7	6.0
	Bay of Plenty	2.9	3.3	3.5	3.7	3.9	4.1

The demand outlook for the Waikato and Bay of Plenty shows that aggregate demand is projected to increase going forward in both areas. This is consistent with the population outlook. The change (additional) in the aggregate demand is set out below.

- Medium scenario
 - Next decade (2023-2033)
 - Waikato 0.6m tonnes
 - Bay of Plenty 0.4m tonnes
 - Next 15 years (2033-2048)
 - Waikato 0.5m tonnes
 - Bay of Plenty 0.3m tonnes
- High scenario
 - Next decade (2023-2033)
 - Waikato 0.9m tonnes
 - Bay of Plenty 0.7m tonnes
 - Next 15 years (2033-2048)
 - Waikato 0.9m tonnes
 - Bay of Plenty 0.5m tonnes.

The difference between the medium and high scenarios is substantial with the change in demand levels for the high scenario 80% greater in the Waikato and 56% greater in the Bay of Plenty. This large variation underlines the need to enable sufficient capacity so that aggregate suppliers can respond to market growth in a timely manner. There is a risk that relying on too conservative demand projection could see market constraints if above trend growth is observed.

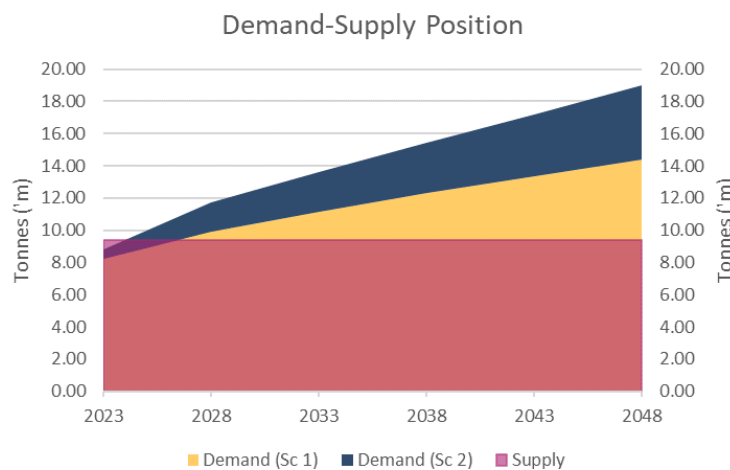
3.2.1 Regional Sufficiency Outlook

An important part of assessing the economic effects of a quarry in the local context is the availability of alternative aggregate sources. As mentioned earlier, Waikato is a net exporter of aggregate, supplying the

Auckland and Bay of Plenty markets. Therefore, caution is needed when considering sufficiency because while the Waikato produces sufficient aggregates to satisfy regional demand, large portions of the aggregate is directed to other markets. Therefore, the regional sufficiency outlook must also consider Auckland's growth situation. Whitehall quarry currently delivers aggregate that is equal to circa 20% of the Waikato's demand. Without Whitehall quarry, there may be a potential local (Waikato) shortfall even if there is sufficient local capacity because the aggregate is directed to the Auckland and Bay of Plenty markets. Therefore, focusing solely on the supply-demand balance in the Waikato, without reflecting the links to Auckland and Bay of Plenty is likely to mask potential pressures.

If demand in a region is greater than the supply, then aggregate must be imported from elsewhere. Figure 3-2 shows the sufficiency situation across the Waikato and Bay of Plenty for the two scenarios. The supply situation is based on the estimated five year average. This average includes the Covid disruptions as well as the post-lockdown periods that saw a bounce back in activity to deal with pent-up demand. A key feature of the Waikato aggregate market is that it supplies the wider region, including Auckland. Auckland's aggregate supply is constrained, even if recently consented volumes are included.

Figure 3-2: Demand, Supply and Output Gaps



The Waikato aggregate sufficiency position shows that a deficit is expected over the short term. This is based on the historically observed patterns with aggregate exports to Auckland and the Bay of Plenty consuming large shares of local aggregate production. Considering the role of Auckland, Waikato and Bay of Plenty (Golden Triangle) in New Zealand's economy, it is argued that the Waikato's aggregate supply is nationally significant.

The analysis shows that based on the medium scenario, a deficit will emerge in the next five years and under scenario 2 (high growth), the supply-demand situation is finely balanced with only a narrow surplus over the next five years. However, this situation is projected to reverse once growth returns.

Exports to Auckland and Bay of Plenty are projected to account for an increasing share of demand. Currently, the Waikato based demand captures 46%-47% of supply. Over time, this share is expected to decrease to around a third (32%-33%) if additional aggregate resource is not added to the supply side in the Bay of Plenty or Auckland. This is despite developments such as Stage 3 of Brookby quarry proceeding (adding 2.7m tonnes of aggregate to the Auckland supply situation). It is acknowledged that other quarries could be developed in

the Bay of Plenty and this would reduce reliance on Waikato aggregate. Regardless, the anticipated growth in demand for aggregate in the wider region (Auckland, and Bay of Plenty) will see a continued reliance on Waikato sources.

Under a without-Whitehall basis, around 770,000 tonnes of aggregate would not be available to the local market. This equates to a substantial loss of potential volume to the local market – a loss of 8% -15% of total production.

4 Costs and benefits

The availability of aggregate and aggregate producers' capacity to meet demand is critical to ensure that economic costs are avoided. In addition, there are other effects to consider. If aggregate is sourced for distant sources, then a range of costs are incurred. These include additional (direct) transportation expenses and externalities such as emissions and social costs (accidents). Avoiding these costs are seen as a benefit. Other potential benefits include effects associated with supply security. The economic effects of quarrying are linked to transportation, which depends on the quarry's location and the aggregate's destination. This section quantifies these different effects.

As discussed in Section **Error! Reference source not found.**, Auckland and Bay of Plenty are net importer regions of aggregate from surrounding areas like Waikato. This indicates that local supply is already constrained in these locations, and operational factors limit local quarries' ability to increase production. Therefore, the role of Whitehall Quarry must be seen on the wider context i.e., while there is sufficient capacity in local quarries to supply the Waikato, a large portion of production leaves the district so losing a large, local resource would see pressures on local availability because aggregate could be diverted to other (non-Waikato) locations. Granting the consent application would help the local construction sector to respond to development pressures in a cost effective way, thereby avoid additional expenses related to sourcing aggregate.

Aggregate is a low value commodity, averaging around \$20-\$30 per tonne¹⁵. However, transportation costs can quickly surpass the cost of the aggregate itself when hauled over distances greater than 30 kilometres¹⁶. The greater the transport distance, the higher the transport costs that is normally recovered as part of the delivered costs (total price). Minimizing transport distances by using local aggregate is critical. If aggregate is sourced from a location that is comparatively further from the market (destination) than an alternative source, then additional costs are introduced – this introduces inefficiencies. While we do not quantify equilibrium effects, such as what might happen to the market price of aggregate or how other quarries might be affected by competitive changes, there is a consensus that price increases due to material shortages are sub-optimal.

4.1 Assumptions

This section outlines the key assumptions that underpins the analysis. These assumptions provide visibility of the metrics used to estimate the costs and benefits of enabling the ongoing operation of Whitehall Quarry. The costs and benefits are viewed as the net change relative to the 'without Whitehall' situation. It is our understanding that if consent for the expansion is not granted, then Whitehall will not be able to operate beyond the short term (we use a 5 year period to reflect a managed closing down process). This suggests that other quarries would need to increase production to address any shortfall arising from the unavailability of the Whitehall resource.

Existing supply patterns and destinations are used to determine the changes in costs associated with delivered aggregate. Over the medium term, these patterns are largely fixed due to the relationship between aggregate locations (quarries) and where growth is anticipated. The destination markets (where aggregate is used) are

¹⁵ According to the Aggregate and Quarries Association (AQA).

¹⁶ https://aqa.org.nz/uploads/files/The_Tyranny_of_Distance.pdf Accessed: 4 December 2024.

based on information provided by Winstones and fall into two main categories, concrete plants and construction location, and are:

- Construction locations:
 - Hamilton¹⁷ 35%
 - Rest of Waikato 25%
 - Tauranga¹⁸ 15%
 - Rest of Bay of Plenty 15%
- Concrete plants
 - Mt Maunganui 5.0%
 - Taupo 2.5%
 - Te Awamutu 0.5%
 - Rotorua 2.0%.

The transport distances are estimated from the Whitehall site to central locations in the destination markets. Public information was then reviewed to identify alternative sources of aggregate, and the distances from those alternatives to the end destinations. Appendix 4 list the quarries that were considered as part of the assessment. Of the 73 quarries across Waikato and Bay of Plenty regions, 13 quarries were identified that could fill a market shortage in the absence of Whitehall Quarry (Table 4-1).

Table 4-1: Alternative Aggregate sources

Comparison Quarries	Company	Primary extract	Estimated Extraction (per year, tonnes)	Region
Waingaro	Fulton Hogan	Greywacke	400,000	Waikato
Taotaoroa	J Swap Contractors	Greywacke	700,000	Waikato
Huntly	Gleeson & Cox	Greywacke	800,000	Waikato
Tauhei	Fulton Hogan	Greywacke	950,000	Waikato
Pukeatua	C N Anderson	Greywacke	50,000-80,000	Waikato
Beach Road	Maranuie Hereford	Andesite	80,000	Bay of Plenty
Bodley	Inframax Construction	Greywacke	30,000	Waikato
Matamata	J Swap Contractors	Greywacke	220,000	Waikato
Osterns	J Swap Contractors	Greywacke	285,000	Waikato
Smythes	Kaipara	Greywacke	800,000-900,000	Waikato
Pukemiro	AP Quarries (AP Group)	Aggregates	28,000	Waikato
Poplar	Fulton Hogan	Andesite	500,000	Bay of Plenty
Tauranga	J Swap Contractors	Dacite	270,000	Bay of Plenty
<i>Source: Inside Resources and own calculations</i>				

There is a degree of uncertainty around the ability of these alternatives to respond to potential gap (without Whitehall situation), specifically the technical ability to lift production, and the degree to which consenting conditions would support a lift in activity. For example, operators may choose to increase production until those consents expire, or a lift in production might not be possible due to consent conditions limiting maximum

¹⁷ More specifically, the greenfield growth areas of Te Rapa North, Peacocke, Rotokauri, Rototuna and Temple View.

¹⁸ More specifically, the priority growth areas of Tauriko West, Rangiuru business park, Omokoroa and Wairakei/Te Tumu

truck movements. Another alternative could be the establishment of an entirely new quarry. The potential cost changes are illustrated by assuming that the key quarries would increase production by 10% and any remaining shortfall will be sourced from Smythes (near Maramarua).

The evaluation considers a 35-year period, and future values (\$) are expressed in current terms using Discounted Cash Flow analysis (DCF). To align with the most recent guidance¹⁹ from the New Zealand Treasury (October 2024), declining discount rates were used as the default setting, with sensitivity testing performed using 8% and 5%. NZTA Waka Kotahi suggests a discount rate between 4% and 6%.

The analysis examines direct transport costs and broader externalities, including emissions and social costs.

4.1.1 Transport costs

The distance aggregate is transported has a direct influence on the delivered price²⁰. Transporting any high-volume and low value commodity is expensive, and the cost per tonne per kilometre depends on the weight-to-volume ratio, as well as the distance travelled. The cost of moving one tonne of aggregate for one-kilometre ranges from \$0.38 to \$0.60. For distances over 40 kilometres, the average cost is \$0.38 per km tonne, while shorter distances tend to have higher costs.

The difference in transport costs between the Whitehall quarry and alternative quarries is determined by the extra distance involved. This is calculated by multiplying the transport cost (per kilometre) by the additional distance and the number of trips required ($\$/\text{km} \times \text{distance} \times \text{trips}$).

The additional distance travelled by trucks based on the current destinations for Whitehall aggregate, is presented in Appendix 5. . The main transport assumptions are:

- Truck size – truck and trailer option with weight averaging 30 tonnes per trip, is used.
- The volume that is assessed is 770,000 tonnes per year. This value is slightly higher than average recorded sales volumes over the past 10 years, but lower than the peaks of the recent past (2021 and 2022). To show the impact of a lower level of production a situation with 600,000 tonnes annual production is also assessed. The lower production totals are used as part of the sensitivity analysis (section 4.3).

The distances travelled are combined with the anticipated tonnages to estimate the freight task, the transport costs, social cost of injury and emissions costs. Based on these assumptions, the truck movements²¹ are estimated to be between 40,190 and 51,420 trips for 600,000 and 770,000 tonnes, respectively. The transport function drives these costs and the approach followed for each component is summarised below.

The potential increase in end prices depends on suppliers' ability to pass any increase on. This ability is a function of well-location alternative sources. If demand is much higher than supply and, and supply is constrained (with limited substitutes), then a greater share of the costs is likely to be passed on to consumers. In a market already experiencing shortages, this cost pass-through is expected to be significant.

¹⁹ <https://www.treasury.govt.nz/publications/circulars/treasury-circular-2024-15-updated-public-sector-discount-rates-cost-benefit-analysis>

²⁰ If the distances decrease, then a cost saving occur (this is integrated into the modelling).

²¹ The estimates are marginally greater than the volume divided by truck size. This is because during the apportionment process, 'partial loads' emerge that are included in the distance and trip calculations.

As mentioned, Waikato region is an exporter of aggregate, supplying Auckland and the Bay of Plenty. It can therefore be assumed that Waikato quarries would be limited in how much they can increase production to supply the market currently served by Whitehall.

4.1.2 Emissions Costs

The role of transport in generating emissions is well documented. Avoiding transport-related emissions that cause health and environmental costs is crucial. In 2022 the Ministry for the Environment (MfE) released its first Emissions Reduction Plan (ERP)²² setting out targets and actions to achieve a 41% reduction in transport emissions by 2035. Likewise, the Ministry of Transport (MoT) work programme is designed to reduce transport emissions. Based on current patterns, enabling Whitehall to continue operating will maintain an efficient transport network, thereby avoiding extra transport distances relative to alternatives.

These emissions are estimated using published conversion ratios. The emissions are then translated into costs (\$) using the methodology and parameters from NZTA Waka Kotahi’s Vehicle Emissions Prediction Model (VEPM v6.3²³). Both the health effects²⁴ and the shadow price of carbon²⁵ of the emissions are reported. Emissions are valued using official, whole-of-government, parameters. Emission costs per tonne are derived from values in NZTA Waka Kotahi’s Monetised Benefits and Costs Manual (V1.7.2, November 2024²⁶) and expressed in current terms using relevant factors.

In terms of health effects, the Manual provides different cost factors for transport routes through urban and rural areas. Most potential transport routes are in rural areas, with only a small portion passing through urban areas like Hamilton or Tauranga. The analysis also considers the impact of loaded and unloaded trips on emissions and transport costs. However, because most of the trips are in rural areas, the associated health values are relatively small.

The current shadow price of carbon (NZ\$₂₀₂₃ per tonne of CO_{2-e}) is between \$70 per tonne and \$140 per tonne with a reported mid-point value of \$105 per tonne (NZTA). Over time, the shadow price increases, with the mid value increasing to \$407 per tonne by 2048. This highlights the critical importance of reducing emissions. Table 4.3 summarizes the factors used to value emissions in the analysis.

Table 4-2: Emissions Costs and Factors

	Emission costs and factors				
	CO	NOx	PM2.5	VOC	CO2-e
Cost/tonne (Rural)	\$0.24	\$29,804	\$60,842	\$76	\$105
Cost/tonne (Urban)	\$6.04	\$1,073,386	\$1,058,542	\$48,765	\$105
Emissions factors 2023 (g/tonne) Diesel	1.37	4.67	0.18	0.13	720.13
Articulated 28-34t					
<i>Source: Monetised Benefits and Costs Manual, NZTA Waka Kotahi</i>					

²² An update of the plan was recently consulted on and is expected to be released in the near future.

²³ Accessed November 2024; an online version of the VEPM was released (VEPM 7.0) but there have been no technical changes between VEPM 6.3 and VEPM 7.0.

²⁴ This represents the economic burden of treating illnesses and managing health conditions caused by poor air quality. This includes costs related to hospitalizations, medical treatments and lost productivity.

²⁵ This captures the cost to society that arises from carbon emissions and is used in calculations to monetise the benefit of reducing carbon emissions, or an equivalent in other emissions.

²⁶ Accessed November 2024; <https://www.nzta.govt.nz/assets/resources/monetised-benefits-and-costs-manual/Monetised-benefits-and-costs-manual-v1.7.2.pdf>

4.1.3 Social Costs

Beyond the direct costs of transport and environmental impacts, there are significant social costs linked to the risks of injuries and fatalities caused by increased truck travel. Every additional kilometre travelled by trucks increases the probability of accidents, including minor injuries, serious injuries, and deaths. These risks are quantified using official valuation methodologies, translating them into measurable social costs for deaths, serious injuries, and minor injuries.

The Social Cost of Road Crashes and Industry report, combined with vehicle travel distance data and other published information from the Ministry of Transport, is used to calculate the social cost per 100 million kilometres driven by trucks. These costs are expressed in 2023 prices. By applying these estimates to the distances that would be driven if the aggregate were sourced from alternative quarries, it becomes possible to estimate the additional changes in social costs. The Ministry of Transport also provides metrics that highlight the economic value of avoiding these additional risks. For example, the Value of a Statistical Life (VoSL) is estimated at \$14.2 million, a serious injury is valued at approximately \$740,000, and a minor injury at \$78,000. **Error! Reference source not found.** summarises the costs and risk factors.

Table 4-3: Social Costs Values

	Death	Serious injury	Minor Injury
Social cost (\$ per instance @2023 prices)	\$14.2m	\$0.74m	\$0.08m
Deaths/Injuries per 100 million km (risk factor)	2.6	8.8	30.9

Reducing the additional distances travelled by trucks, i.e., there is no need to deliver aggregate from alternative sources, directly mitigates these risks, leading to significant savings in social costs (i.e., avoiding a costs). Minimizing transport-related risks is not only a matter of public safety but also an important economic consideration for long-term planning.

Like environmental costs, these social costs are expected to change over time. This is due to upward revisions in the VoSL and related metrics as societal valuations of life and safety.

Enabling the expansion of Whitehall, reduces the distances trucks travel, suggesting decision-makers are proactively addressing these risks. Therefore, helping to create safer communities, reduce pressure on public health systems, and align with broader goals of sustainability and cost efficiency.

4.1.4 Discount rates

Discount rates play an important role in economic assessments, particularly in evaluating the present value of future benefits or costs. The discount rate is used to convert future values into present values. A higher discount rate reduces the present value of future values (costs or benefits), and in effect places greater emphasis on short term effects, and less on long term effects.

Several different discount rates are used across New Zealand with the New Zealand Treasury providing the most recent updates. We do not provide a detailed account of the different discount rates, but we use the most recent guidance (NZ Treasury – October 2024) in this analysis. The sensitivity analysis incorporates the discount rates presented in other guidance (e.g., NZTA). The spread of discount rates across the guidance documents is:

- Treasury
 - 2%, then declining to 1.5% (2% for years 1 to 30 and 1.5% for years 31 to 35)
 - 8% for the sensitivity.
- NZTA (2019)
 - a discount rate of between 4% and 6% (with a midpoint of 5%).

4.2 Results

Aggregate movements associated with the Whitehall quarry is assessed using the above assumptions. When assessing the costs and benefits, avoided costs are treated as benefits. The additional costs associated with transport, emissions, and deaths/injuries (social costs) are reported. Importantly, the focus on the additional costs (net additional) that would be incurred if consent for the Whitehall quarry was declined, and alternative sources of aggregate need to be used to supply the market. The additional costs are based on the change in the transport load that would occur. If the alternative quarries are not able to respond by increasing production, and aggregate is sourced from more distant quarries (e.g., located in Northland or further South), then the costs will be even greater than those reported here. Therefore, these costs are seen as 'at least' values.

The economic effects associated with Whitehall's continued operation will accrue over multiple years. The present value of these future annual effects is expressed in present value terms by discounting them at 2% for years 1 to 30 and 1.5% for years 31 to 35. The non-discounted value is also reported. **Error! Reference source not found.** reports the present value of the benefits (avoided costs).

Table 4-4: Present Value – Avoided Costs (35 years)

770,000 tonnes per year	Discount rate	
	2%, 1.5%	No-discount
Transport costs (\$m)	8.1	11.3
Emissions costs (\$m)	7.0	10.1
- Health costs (\$m)	3.2	4.5
- Shadow price of carbon (\$m)	3.8	5.6
Social costs (\$m)	9.9	13.9
Total costs (\$m)	25.0	35.4

Based on the above, transport, environmental and social costs that would be avoided by enabling the Whitehall quarry expansion, is estimated at \$25.0m.

The average annual avoided costs are around \$1 million per year (undiscounted), and using discounted totals, implies an annual average of \$715,200/year. In terms of the components, annual averages (undiscounted) are as follows:

- Transport costs \$324,200
- Emissions costs \$2889,200
- Social costs \$396,900.

This represents the economic benefit (in the form of avoided costs) that accrue to the region's economies - and ultimately the community. The estimated benefit will be greater if annual production level is higher than used here (or smaller if production level is lower).

4.3 Sensitivity analysis

The analysis includes several forward looking statements and elements. As with any forward-looking assessment, there is some uncertainty. A sensitivity analysis is used to illustrate the change in key results if the core assumptions are changed. The following changes were considered:

- Sensitivity 1: Less aggregate required by the market (600,000 tonnes per annum). Alternative quarries respond by lifting their production by up to 10% and any shortfall is addressed by a corresponding increase in production by Smythes.
- Sensitivity 2: Alternative quarries are constrained and are only able to lift their production by 5%, with the remaining balance sourced from Smythes. The response is to replace 770,000 tonnes that would be unavailable from Whitehall.
- Sensitivity 3: 770,000 tonnes per annum required and alternative quarries lifting their production by up to 10% to address the shortfall left by Whitehall and the remaining balance being sourced from an alternative (hypothetical) location which adds 10% to distances from source to destination.

Table 4-5 shows the results for the different sensitivities. The base position (results presented in the preceding section) is included as a benchmark. The figures have been discounted at the default rate.

Table 4-5: Present value of Avoided costs (2%, 1.5% discount rate) - \$'m

Cost component	Results (770,000t; 10% prod increase)	Sensitivity 1 (600,000t; 10% prod increase)	Sensitivity 2 (770,000t; 5% prod increase)	Sensitivity 3 (770,000t; +10% dist)
Transport costs	8.1	4.3	12.8	8.8
Emissions costs	7.0	3.7	11.1	7.7
- Health costs	3.2	1.7	5.1	3.5
- Shadow price of carbon	3.8	2.0	6.1	4.2
Social costs	9.9	5.3	15.7	10.8
Total costs	25.0	13.3	39.6	27.3

Sensitivity 1 explores a situation where the annual demand for aggregate decreases to 600,000 tonnes. This reduction could result from several factors, including an overestimation of the demand outlook. Under this scenario, the proportion of aggregate supplied from Smythes would become significantly smaller compared to what is required under the base. However, a 20% increase in production at Smythes would still be required. Under these settings, the total costs be \$13.3m i.e., even if the required aggregate is significantly less than the assumed values, enabling Whitehall would avoid significant costs.

Sensitivity 2 reflects a situation where the existing quarries can accommodate a smaller portion of the deficit, instead of expanding by 10% they expand by 5%. This suggests that other quarries located farther away needs

to respond to the demand. Sensitivity 2 shows the increase in total costs of 58%. Under this scenario, Smythes' production needs to increase by around 65% to satisfy the market currently served by Whitehall. Similarly, Sensitivity 3 presents a situation in which an alternative to Smythes (a hypothetical location) is developed to ensure that there is sufficient aggregate supply. This sensitivity lifts total costs by 9% relative to the base.

The sensitivity analysis highlights the effect of distance on the total costs. This observation is consistent with the notion that aggregate is a high volume, low value commodity that is highly sensitive to distance. Retaining access to a local quarry will avoid considerable costs. **The sensitivity setting shows that even using significantly lower demand level, and satisfying that demand using alternative quarries will result in cost greater than servicing aggregate demand from Whitehall. Using the same volume, but substituting Whitehall with other quarries will see significant cost increases.**

4.4 Unmonetized Costs and Benefits

The analysis highlights the additional costs that developers and communities will face if aggregate is sourced from more distant locations. While the study captures quantifiable and monetizable impacts, there are other costs and externalities that cannot easily be quantified or expressed in monetary terms. Although some techniques exist to estimate and value these externalities, they remain contentious, particularly when applying economic tools to assess adverse environmental impacts. Aside from the direct environmental effects of extraction, many of these externalities are likely to be exacerbated by increased travel distances for aggregate delivery. This underscores the importance of sourcing aggregate from as close as possible to end users. Other unmonetized effects include:

- **Noise Pollution:** Truck movements generate significant noise, which can impose (wellbeing) costs on those living near transport routes or delivery destinations. However, as most transport routes assessed in this analysis traverse rural areas, the noise impacts en route are expected to be relatively limited.
- **Congestion:** Additional truck movements contribute to congestion, leading to travel delays and increased costs for other road users. Congestion suppresses productivity, raises transport expenses, and incurs opportunity costs. Many movements occur along key routes in the Bay of Plenty and Waikato regions. While the assessment did not estimate the congestion effect, serving the aggregate market from non-Whitehall quarries will add to the transport load, and therefore add to the adverse effects associated with congestion.
- **Road infrastructure:** Heavy trucks generate road wear and tear, increasing maintenance costs. While some wear is expected, the additional transport distances for aggregate delivery will amplify these costs.
- **Natural environment:** Quarrying and construction activities can impact the natural environment, creating costs that can be mitigated through measures such as rehabilitation, replanting, or offsets. However, this assessment does not attempt to quantify environmental effects or account for losses in natural value. Such considerations are typically addressed by other experts within the context of the Resource Management Act (RMA).
- **Supply chain risks:** Relying on distant sources increases vulnerability to supply chain disruptions, such as road closures, extreme weather events, or fuel shortages, which can delay projects and increase costs. Events such as floods, storms, and landslides can damage transport infrastructure and make it

impassable. These risks are increasing due to climate change. Therefore, minimising the transport distances will mitigate some of these risks.

- **Cost savings for projects:** Shorter transport distances lower delivery costs, which help to contain project budgets for private and public projects (infrastructure and non-infrastructure that rely on aggregate as key input).
- **Increased competition and market efficiency.** Increased competition fosters a transparent pricing structure and prevents monopolistic or oligopolistic practices that could lead to inflated prices. Competition also incentivises more efficient practices that benefit consumers.

Additionally, the environmental effects linked to climate change, driven by emissions from extended transport distances, is not included in this analysis. It is expected storm events will become more frequent and more severe because of climate change. Recent storm events across New Zealand, including in the Coromandel and Hawke's Bay regions highlight the importance of reducing emissions. Re-instating infrastructure after an event requires a responsive delivery supply chain that include the aggregate sector. Enabling Whitehall quarry will ensure that there is sufficient capacity to provide responsiveness in the event of extraordinary, short term demand shocks.

5 Conclusion

Aggregate is fundamental to a wide range infrastructure and development that underpin a wide range of everyday activities. Access to conveniently located aggregate is crucial for supporting infrastructure investments effectively and efficiently because it minimises costs. Aggregate supply is essential to support economic and population growth because it is a crucial input into concrete manufacturing and the wider construction sector (e.g., roading and foundations). The Whitehall Quarry will support infrastructure investment in the Hamilton and Tauranga – supporting infrastructure development in response to growth as well as investment targeting infrastructure backlogs. The growth outlook for Hamilton and the Waikato is positive and long term demand for aggregate is expected to grow.

Whitehall quarry is well-positioned to meet the needs of the local aggregate market around Hamilton and the Waikato, as well as the Tauranga and Bay of Plenty regions. Local councils in these areas recognize the importance of infrastructure, with significant budgets earmarked for infrastructure investment over the short, and medium terms. Aggregate is an essential component of infrastructure spending.

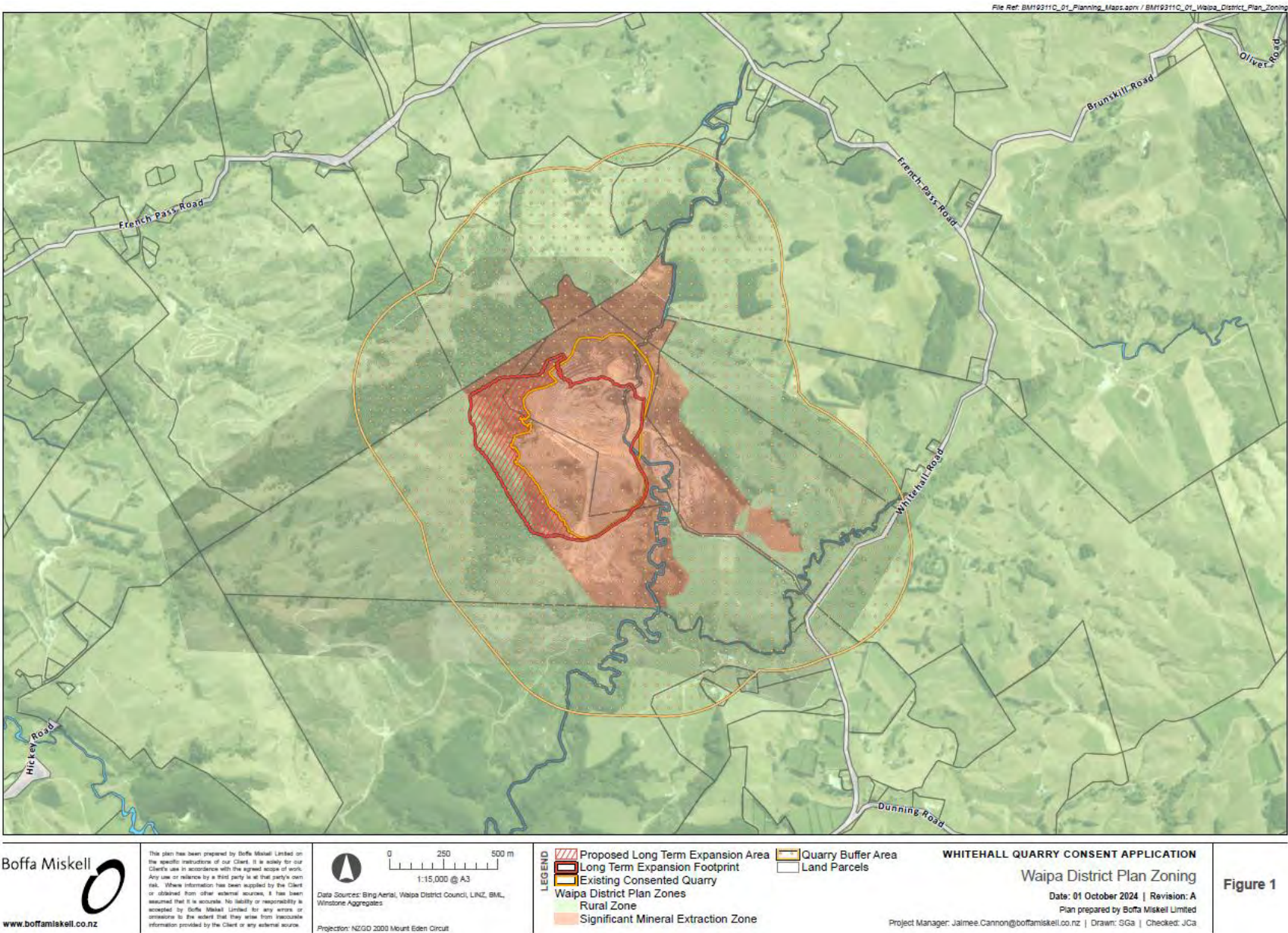
Tauranga and Hamilton, two key parts of New Zealand's Golden Triangle of economic production, is experiencing significant growth pressures. Whitehall quarry can help address these demands by providing aggregate in a cost-effective manner, thereby continuing to support for the region's development. The quarry will help to contain cost pressures associated with construction costs by limiting the transport component of aggregate. Earlier assessments highlighted that Auckland and the Bay of Plenty are net importers of aggregate. The reliance on Waikato's aggregate sources is expected to intensify going forward. While aggregate demand may fluctuate in line with the business/economic and population growth cycles, the overall shortfall is projected to persist. Transporting aggregate over longer distances not only increases costs but also has broader social and environmental impacts.

Whitehall quarry is strategically located to address these challenges by continuing to operate, thereby maintaining overall supply levels. The quarry's proximity to key markets reduces transportation costs and associated emissions while ensuring a reliable and efficient supply of aggregate for infrastructure projects. Without Whitehall's contribution, reliance on distant sources would increase, leading to higher costs and undermining regional growth aspirations. Whitehall quarry is essential to addressing current and future aggregate supply needs, supporting infrastructure investment, and fostering sustainable economic growth. The analysis shows that enabling the ongoing operation of Whitehall quarry to provide ongoing aggregate resource to meet demand will avoid significant costs.

Aggregate extraction at Whitehall Quarry provides significant regional public benefit, that could not otherwise be achieved using resources elsewhere within New Zealand. From an economics perspective there is a functional need for the expansion to occur in the proposed location, with no practicable alternative locations available. This is because resource extraction (aggregate) is location bound to where the resource is.

Appendices

Appendix 1: Proposed expansion of Whitehall Quarry



Appendix 2: Summary of Infrastructure Pipeline

	Fully funded	Fully funded	Fully funded	Fully funded	Fully funded
	Early planning	In planning	In procurement	Under construction	On hold
Delivery Organisation					
Bay of Plenty Regional Council	-	40,000,000	-	39,000,000	-
Department of Corrections	-	-	-	750,000,000	-
Energy Efficiency and Conservation Authority	-	-	-	37,500,000	-
First Gas Limited	-	-	-	-	-
Hamilton City Council	15,000,000	75,000,000	-	634,000,000	-
Health New Zealand	-	30,000,000	-	265,000,000	-
Kāinga Ora—Homes and Communities	-	-	-	315,000,000	-
Kānoa - Ministry of Business, Innovation and Employment	-	30,000,000	-	27,000,000	-
Matamata-Piako District Council	58,500,000	101,000,000	38,000,000	40,000,000	-
Ministry of Education	-	-	-	-	-
Ministry of Justice	-	-	-	175,000,000	-
NZ Transport Agency Waka Kotahi	-	70,500,000	-	1,633,000,000	-
Otorohanga Kiwi House Charitable Trust	-	-	-	15,000,000	-
Powerco Limited	-	-	120,000,000	-	-
Quayside Holdings	-	-	-	-	-
Rock Gas	-	-	-	-	-
South Waikato District Council	329,000,000	25,500,000	3,000,000	4,000,000	-
Taupo District Council	-	-	-	15,000,000	-
Tauranga City Council	190,000,000	165,000,000	647,000,000	2,136,000,000	31,000,000
Te Puni Kōkiri (Ministry of Māori Development)	-	-	-	17,500,000	-
Transpower New Zealand Limited	-	-	-	175,000,000	-
Waikato District Council	-	-	-	-	-
Waikato Regional Council	-	-	-	21,000,000	-
Waipa District Council	-	15,000,000	-	36,000,000	15,000,000
Western Bay of Plenty District Council	-	-	-	37,500,000	-
Total	592,500,000	552,000,000	808,000,000	6,372,500,000	46,000,000
	Funding source confirmed	Funding source confirmed	Funding source confirmed	Funding source confirmed	Funding source confirmed
	Early planning	In planning	In procurement	Under construction	On hold
Delivery Organisation					
Bay of Plenty Regional Council	-	-	-	-	-
Department of Corrections	-	-	-	-	-
Energy Efficiency and Conservation Authority	-	-	-	-	-
First Gas Limited	-	-	-	18,000,000	-
Hamilton City Council	-	150,000,000	-	-	37,500,000
Health New Zealand	-	-	-	-	-
Kāinga Ora—Homes and Communities	-	89,000,000	232,000,000	-	-
Kānoa - Ministry of Business, Innovation and Employment	-	-	-	-	-
Matamata-Piako District Council	-	-	-	-	-
Ministry of Education	-	67,500,000	105,000,000	120,000,000	6,000,000
Ministry of Justice	75,000,000	75,000,000	-	-	-
NZ Transport Agency Waka Kotahi	-	-	-	-	-
Otorohanga Kiwi House Charitable Trust	-	-	-	-	-
Powerco Limited	650,000,000	40,500,000	-	-	-
Quayside Holdings	-	37,500,000	-	175,000,000	-
Rock Gas	-	-	3,000,000	-	-
South Waikato District Council	-	-	-	-	-
Taupo District Council	-	-	-	-	-
Tauranga City Council	-	-	-	-	-
Te Puni Kōkiri (Ministry of Māori Development)	-	-	-	-	-
Transpower New Zealand Limited	-	-	-	-	-
Waikato District Council	-	37,500,000	-	26,500,000	15,000,000
Waikato Regional Council	-	-	-	-	-
Waipa District Council	6,000,000	3,000,000	-	108,000,000	18,000,000
Western Bay of Plenty District Council	-	-	-	-	-
Total	731,000,000	500,000,000	340,000,000	447,500,000	76,500,000

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Pipeline information, continued from previous page

	Part funded	Part funded	Part funded	Part funded	Part funded
	Early planning	In planning	In procurement	Under construction	On hold
Delivery Organisation					
Bay of Plenty Regional Council	-	-	-	-	-
Department of Corrections	-	-	-	-	-
Energy Efficiency and Conservation Authority	-	-	-	-	-
First Gas Limited	-	-	-	-	-
Hamilton City Council	-	-	-	-	-
Health New Zealand	-	-	-	-	-
Kāinga Ora—Homes and Communities	-	-	-	-	-
Kānoa - Ministry of Business, Innovation and Employment	-	-	-	-	-
Matamata-Piako District Council	4,500,000	90,000,000	18,000,000	-	-
Ministry of Education	-	-	-	-	-
Ministry of Justice	-	-	-	-	-
NZ Transport Agency Waka Kotahi	1,500,000,000	4,209,000,000	-	-	-
Otorohanga Kiwi House Charitable Trust	-	-	-	-	-
Powerco Limited	-	-	-	-	-
Quayside Holdings	-	-	-	-	-
Rock Gas	-	-	-	-	-
South Waikato District Council	-	-	-	-	-
Taupo District Council	-	-	-	-	-
Tauranga City Council	-	37,500,000	-	15,000,000	-
Te Puni Kōkiri (Ministry of Māori Development)	-	-	-	-	-
Transpower New Zealand Limited	-	-	-	-	-
Waikato District Council	-	-	-	-	-
Waikato Regional Council	-	-	-	-	-
Waipa District Council	-	-	-	-	-
Western Bay of Plenty District Council	-	-	-	-	-
Total	1,504,500,000	4,336,500,000	18,000,000	15,000,000	-
	Funding source to be confirmed	Funding source to be confirmed	Funding source to be confirmed	Funding source to be confirmed	Funding source to be confirmed
	Early planning	In planning	In procurement	Under construction	On hold
Delivery Organisation					
Bay of Plenty Regional Council	-	-	-	-	-
Department of Corrections	-	-	-	-	-
Energy Efficiency and Conservation Authority	-	-	-	-	-
First Gas Limited	-	3,000,000	-	-	-
Hamilton City Council	-	75,000,000	-	-	-
Health New Zealand	-	-	-	-	-
Kāinga Ora—Homes and Communities	-	-	-	-	-
Kānoa - Ministry of Business, Innovation and Employment	-	-	-	-	-
Matamata-Piako District Council	22,500,000	-	-	-	-
Ministry of Education	-	-	-	-	-
Ministry of Justice	-	-	-	-	-
NZ Transport Agency Waka Kotahi	6,000,000	37,500,000	-	-	18,000,000
Otorohanga Kiwi House Charitable Trust	-	-	-	-	-
Powerco Limited	-	-	-	-	-
Quayside Holdings	-	-	-	-	-
Rock Gas	-	-	-	-	-
South Waikato District Council	-	-	-	-	-
Taupo District Council	-	-	-	-	-
Tauranga City Council	111,000,000	566,500,000	3,000,000	-	49,000,000
Te Puni Kōkiri (Ministry of Māori Development)	-	-	-	-	-
Transpower New Zealand Limited	450,000,000	250,000,000	-	-	-
Waikato District Council	-	-	-	-	-
Waikato Regional Council	-	-	-	-	-
Waipa District Council	-	500,000	6,500,000	-	-
Western Bay of Plenty District Council	-	-	-	-	-
Total	589,500,000	932,500,000	9,500,000	-	67,000,000

Source: Calculations based on “National Infrastructure Pipeline – produced by New Zealand Infrastructure Commission - Te Waihangā.
Accessed: 25 November 2024.

Appendix 3: Estimated Aggregate Production

Million Tonnes Per Year							
Year	Bay of Plenty (NZP&M)	Bay of Plenty Adjusted based on Fulton Hogan Study	Bay of Plenty Adjusted based on Employment and NZ figures	Waikato (NZP&M)	Waikato Adjusted based on Fulton Hogan Study	Waikato Adjusted based on Employment and NZ figures	NZ (NZP&M)
2000	2.6	3.6	-	4.4	6.2	-	41.4
2001	1.9	2.7	1.8	5.1	7.1	7.9	41.0
2002	1.9	2.6	1.9	5.1	7.2	8.6	41.1
2003	2.1	2.9	2.2	6.7	9.3	10.9	47.7
2004	2.7	3.7	3.0	6.7	9.3	12.0	52.7
2005	2.5	3.4	3.0	6.7	9.3	13.2	57.8
2006	2.7	3.8	3.1	6.5	9.1	12.8	52.9
2007	2.0	2.9	4.5	8.5	11.8	12.7	53.7
2008	2.0	2.8	3.1	6.4	9.0	11.4	49.4
2009	2.1	3.0	2.2	4.6	6.4	8.8	36.8
2010	1.0	1.4	1.8	6.0	8.4	7.7	34.0
2011	1.3	1.9	1.8	5.2	7.3	7.1	34.4
2012	1.1	1.6	1.9	5.3	7.4	7.8	35.3
2013	1.9	2.7	2.9	6.3	8.9	9.9	44.0
2014	1.8	2.5	1.7	5.4	7.5	11.7	46.1
2015	0.7	1.0	1.8	6.3	8.7	11.1	45.0
2016	0.6	0.9	1.6	4.3	6.1	9.7	36.8
2017	1.4	2.0	2.2	7.0	9.8	12.2	47.6
2018	1.1	1.6	1.9	9.2	12.9	11.9	48.7
2019	1.3	1.8	1.8	5.6	7.8	11.4	44.7
2020	1.2	1.7	1.3	6.5	9.1	8.7	38.1
2021	-	-	1.3	6.3	8.7	7.1	31.4

Source: Ministry of Business, Innovation and Employment; M.E calculations

Appendix 4: Quarries considered

Quarry	Company	Material
Waikato		
Andersons/Pukeatua Quarry	C N Anderson	Greywacke
Awakino	Fulton Hogan	Greywacke
Bodley	Inframax Construction	Greywacke
Bowe	Brian Bowe	
Brunskill	Maxwell Brunskill	Hard rock
Cambridge	Revital Group	Hard rock, sand
Corbett Road	Corbett Rd Quarry	Aggregate
Coromandel	Coromandel Quarry and Contracting	Roading, draining, aggregate
Desert Road	New Zealand Defence Force	
Huntly (Gleeson)	Gleeson & Cox	Greywacke
Huntly (Wedding)	I H Wedding & Sons	Greywacke
Matamata	J Swap Contractors	Greywacke
Matatoki	HG Leach	Andesite
McFall Enterprises	Ross Weinberg	Hard Rock
Myers	Richard Myers	
Ngakuru (Mangatete Road)	Blue Pacific Minerals	Zeolite, perlite, hard rock
Ngakuru (Twist Road)	Blue Pacific Minerals	Zeolite, Hard rock
Ngaruawahia (Greenhills)	Greenhills Holdings	
Ngutunui	Downer	Hard rock
Osterns	J Swap Contractors	Greywacke
Patetonga	Select Civil	Aggregates
Peacockes	Downer	Aggregates
Pirongia	AT Kelly	Aggregates
Pokeno	McPherson Resources	Greywacke
Pukekawa	Winstone Aggregates	Basalt
Pukemiro (Waingaro Quarries)	AP Quarries (AP Group)	Aggregates
Rainbow Mountain	Rotorua Quarry	Andesite, dacite
Rakanui	J Swap Contractors	Aggregates
Ridge Road	Allan and Patricia Blackmore	Aggregates
River Run	River Run Products	Greywacke
Smythes	Kaipara	Greywacke
Tahuna	HG Leach	Greywacke
Taihape	Byfords	Greywacke
Taotaoroa	J Swap Contractors	Greywacke
Tapuwae	Inframax Construction	Greywacke
Tauhei	Fulton Hogan	Greywacke
Taupo Scoria	Seay Earthmovers	Basalt, Scoria
Te Aroha	Norman's Transport	Aggregates
Te Mata/Jowseys	Tom Jowsey	Basalt
Tirau Sands	Bowers' Brothers Concrete	Aggregates
Totoro Road	White Ridge Contracting	Greywacke
Tuateawa	Coromandel Quarry and Contracting	Andesite
Waingaro (Fulton Hogan)	Fulton Hogan	Greywacke

Waiotaka	Byfords Construction	Greywacke
Waitawheta	HG Leach	Andesite
Wallis	Wallis Quarries	Aggregates
Waotu	J Swap Contractors	Greywacke
Ward	Ward Group	Greywacke
Whangamata	Peninsula Aggregates	Andesite
Whangapoua	Peninsula Aggregates	Andesite
Whitehall	Winstone Aggregates	Greywacke
Whitianga	Peninsula Aggregates	Andesite

Bay of Plenty		
Beach Road Quarry ²⁷	Maranuie Hereford	Andesite
Awahou	Awahou Quarry	Aggregates
Awakeri	J Swap Contractors	Aggregates
Blue Rock	Waiotahi Contractors	Greywacke
Brown's Quarry	Beach Contractors	Andesite
Katikati	J Swap Contractors	Andesite, dacite
Kutarere	Devert Family	Hard rock
Motu River	Maraenui A2 Trust	Aggregates
Opotiki	Waiotahi Contractors	Greywacke
Oropi	Oropi Quarries	Andesite, basalt
Otamarakau	Winstone Aggregates	Greywacke, Pumice
Poplar Lane	Fulton Hogan	Andesite
Pukehou (Crown Forestry)	Crown Forestry and Fortus Forestry	Aggregates
Ratahi	Waiotahi Contractors	Greywacke, Rhyolite, Pumice
Raukokore River	Takatini Group	Gravel
Reid's Road	Waiotahi Contractors	Aggregates
Rototaha Road	TPM Holdings	Aggregates
Stanley	PF Olsen & Co	Aggregates
Tauranga Quarry	J Swap Contractors	Dacite
Te Mahoe	Tiaki Plantations	Greywacke

Source: Inside Resources and M.E literature review

²⁷ Formerly Browns Quarry

Appendix 5 - Additional distances relative to Whitehall associated with potential alternative sources

<i>Destination</i>	Kilometer							
	<i>Hamilton</i>	<i>Rest of Waikato**</i>	<i>Tauranga</i>	<i>Rest of BoP**</i>	<i>Mt Maunganui</i>	<i>Taupo</i>	<i>Te Awamutu</i>	<i>Rotorua</i>
Quarries								
Waingaro	1	15	63	44	63	66	34	67
Taotaoroa	3	3	-6	-20	-6	-4	3	-6
Huntly	-12	11	50	32	50	53	22	54
Tauhei	-9	1	30	15	31	46	22	42
Pukeatua	23	22	12	-9	13	-20	-5	-2
Beach Road	63	53	-17	-23	-15	66	85	35
Bodley	41	55	77	56	77	0	14	65
Matamata	36	13	-26	-34	-25	-1	37	-10
Osterns	11	26	43	22	43	-0	-17	32
Smythes	36	17	53	47	67	64	29	65
Pukemiro	-1	62	67	-47	-62	17	82	-14
Poplar	83	54	-62	-48	-58	20	74	-12
Tauranga	75	32	-57	25	47	74	64	70
<i>*Negative values indicate the alternative source (quarry) is closer to the destination market than Whitehall.</i> <i>**Average distance to several destinations.</i> <i>One way distances</i>								