Drury Quarry Extension

Economic Impact Assessment

20 February 2025 – Final

m.e consulting

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Report author(s): Kieran McLean, Greg Akehurst

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1 Introduction

The New Zealand economy is reliant on the availability of natural mineral resources such as aggregate. The extraction and use of these resources enables urban development and construction, supporting the economy and providing homes, infrastructure and amenities for people. Key amongst these resources is aggregate. Aggregate is used in a range of applications within the Auckland economy, it is used throughout the urban environment to meet the needs of residential, business, infrastructure and road construction requirements. Given the importance of aggregate for Auckland's economy, Auckland's built future is effectively reliant upon maintaining sustainable sources of aggregate. Aggregate extracted from the Sutton Block expansion at the Drury Quarry is a key component of Auckland's sustainable future supply.

1.1 Background

The existing Drury Quarry has a finite lifespan and to provide security of aggregate[1] supply going forward, it is proposed to extend extraction into the Sutton Block. This is an area that is currently farmed and is in paddocks, directly north-east of the current pit. Stevenson Aggregates Limited (SAL) has commissioned Market Economics to assess the economic effects of the proposed project as part of the overall assessment of effects required to support the application for consent to extend the quarry into the Sutton Block. Drury Quarry is located on the eastern side of State Highway 1 (SH1), south of Papakura and Drury. The Ramarama interchange provides access to the motorway in a north and south direction.

The site, as shown in Figure 1.1, is predominantly surrounded by rural residential lifestyle blocks. The exception is the Drury South development to the west (between the quarry and SH1), comprising industrial and urban residential activities. The Sutton Block is located directly north-east of the current pit. It is currently in pasture utilised for grazing. Kaarearea pa, a wāhi tapu historic pa site, is located between the current pit and the Sutton Block, and no works are proposed in this location[2].

The Drury Quarry currently produces around 3.5 million tonnes of aggregate per year, although the current resource is expected to run out in the short term future. The Sutton Block extension is expected to significantly prolong the life of the Quarry with a total aggregate resource of approximately 240 million tonnes. The extension is expected to be utilised over a 50 year life span, with the potential to provide up to around 5 million tonnes of aggregate per year. This would maintain the Quarry's current annual supply of 3.5 million tonnes plus an increase of 1.3 million tonnes per year.

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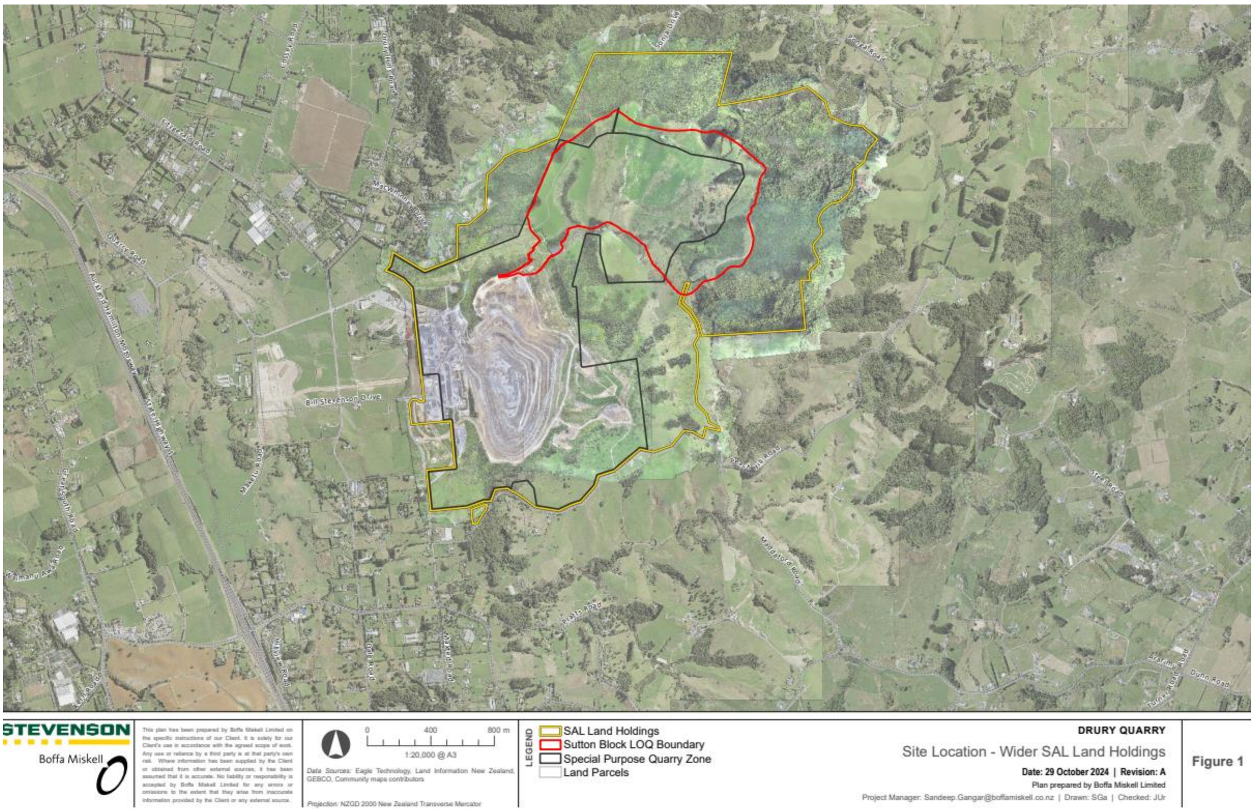
[1] In this document, aggregate supply/demand refers to supply/demand of construction aggregate, not the macroeconomic term (unless stated otherwise).

[2] As defined by the Auckland Unitary Plan.

Figure 1.1: Drury Quarry with Sutton Block Expansion



Source: Stevenson Ltd

1.2 Approach

The following assessment evaluates the impacts of the quarry extension to assess the degree to which the proposal generates economic benefits for people and communities affected. In order to estimate the role SAL aggregate extraction plays in Auckland's economy, it is necessary to identify the role aggregate plays within the regional economy overall. The historic and future aggregate demand trends will be examined under both a business-as-usual and a high-growth future to provide a range of scenarios. This will enable the effects of the Sutton Block expansion consents at Drury to be contextualised effectively.

If the Sutton Block expansion is not able to be progressed, demand for aggregate will not be impacted, rather the market will supply the aggregate from sources further afield, given supply constraints across the rest of Auckland's quarries (given Auckland Region is a net importer of aggregate). The combined costs of additional transport are therefore a key measure of benefit that accrues to the upper North Island economy as a result of approving extraction to the Sutton Block expansion of SAL Drury quarry.

In summary this report presents and assesses;

- A summary of Auckland's potential growth future. This draws from recent publications relating to historic growth and predictions, including the Auckland Growth Monitor. This information forms the basis for estimates of aggregate likely to be required to sustain growth.

- The role aggregate plays in Auckland's growth. These effects are not driven by aggregate but are certainly facilitated by the availability, cost and quality of aggregate.
- The role the extension of SAL Quarry can potentially play in meeting a share of the total Auckland market demand.
- An overview of the principal alternatives to the extraction activities at Drury. This identifies additional costs and benefits from sourcing the aggregate from outside the region. This is based on avoided transportation and environmental costs.
- The benefits of using the Sutton Block aggregate over other resources from a technical and environmental perspective.

2 Context

Auckland is New Zealand's largest and fastest growing region; it is also where much of the future economic growth will be centred. Building and construction are key parts of the Auckland's growth story. The city's economy is diverse and expanding, leading NZ's economic performance. The city is also a key population centre that needs investment in response to existing and emerging growth pressures.

This section provides a context showing Auckland's growth performance in terms of population and the economy. Aggregate is a key input into many everyday uses. As the city grows and expands, so too does the demand for aggregate. Examples of current and anticipated growth projects are included to illustrate the link between growth and demand for aggregate. Literature highlights the key relationships between aggregate demand, population growth and economic growth[3]. These are the key dimensions used in this section. The section starts by putting Auckland in a NZ-wide context. It describes the population and economic growth performance.

2.1 Auckland's Population

As mentioned, Auckland is NZ's largest population centre. The City hosts approximately 1.8m people – a third of NZ's total population. Historically, the city has seen an uptick in the share of NZ's population that lives in Auckland, but Covid has seen a brief reverse in the increase. Regardless, more than 33% of NZ population is in Auckland. Table 2.1 provides demographic data, highlighting the changes in Auckland and NZ. The table provides backward and forward-looking data and is based on StatsNZ estimates (of historic data) and projections (forward-looking).

Over the past decade or so (2014 to 2024), Auckland's population grew by 18%, while the national population also increased by 18%. During this time frame, Auckland accounted for 34% of the national population change. Looking ahead, the projected five-year change (2025-2030) under a medium scenario shows a 6% increase in the population of Auckland and a 3% increase for New Zealand as a whole. The projected change for the years beyond that (2030-2048) shows an expected 19% change for Auckland but only 12% for New Zealand under a medium growth scenario. Under each of the growth scenarios, Auckland's future growth is forecast to exceed that of New Zealand as a whole, further enhancing its role as a hub of people and activity. **Auckland's role as a key destination for population growth and economic activity means that it will continue to act as NZ's premier population and investment destination.**

[3] 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).

Table 2.1: Estimated and Projected Population Change

	Estimated Change 2014-2024	Projected Change 2025-2030	Projected Change 2030-2048	Estimated Change 2014-2024 (%)	Projected Change 2025-2030 (%)	Projected Change 2030-2048 (%)
Auckland						
Low	277,900	17,300	185,400	18%	1%	9%
Medium	277,900	109,300	477,100	18%	6%	19%
High	277,900	204,100	781,100	18%	11%	28%
New Zealand						
Low	822,000	- 143,600	22,700	18%	-3%	3%
Medium	822,000	165,200	834,100	18%	3%	12%
High	822,000	481,500	1,692,800	18%	9%	20%
Share of National Population change (%)						
Low	34%	-12%	817%			
Medium	34%	66%	57%			
High	34%	42%	46%			

Spatially, the growth is expected to be distributed around Auckland. Using Stats NZ's population projections[4] and aggregating the Local Boards to five broad areas shows that spatially, the growth will be concentrated around the northern/western parts as well as the on the isthmus-southwards. The specific share of growth in the main locations are:

a. North 28%
b. West 13%
c. Central 16%
d. East 17%
e. South 25%

These spatial patterns are relevant because it influences where aggregate will be (indirectly) required. This relates to where concrete plants are located around Auckland (the link between Drury Quarry aggregate and concrete plants is discussed later in the report). Given Drury Quarry's location in Auckland's South-East, it is ideally located to provide aggregate to South, Central and Eastern Auckland – areas that will see large shares of the population growth looking forward (58% of the total).

2.2 Economic Performance

Like NZ's population, Auckland generates a disproportionate share of NZ's GDP. Over the past ten years, Auckland has experienced strong growth[5], and GDP is estimated at $133.7bn (in 2022). Compared to the NZ economy with a GDP of $357.7bn, Auckland contributes 37% of the national economic value.

Between 2001 and 2011, Auckland grew marginally faster than the national economy (2.8% p.a. compared to 2.5% p.a.). However, over the last decade, Auckland's growth rate has surpassed that of New Zealand

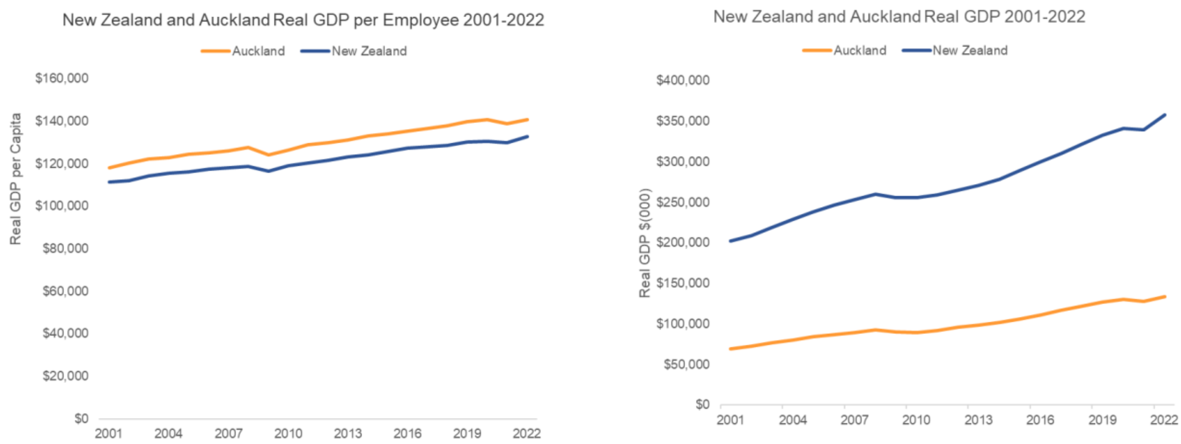
[4] StatsNZ. Subnational population projections, consistent with medium scenario of National population projections. Released 5 February 2024.

[5] Sourced from Infometrics.

as a whole, with a 3.4% real terms annual increase, compared to the 3.0% national rate – These figures are high and are influenced by the exceptionally strong post-Covid period. Figure 2-1 displays the growth of national and regional GDP since 2000.

From 2001 to 2022, Auckland contributed to 41% of New Zealand's overall GDP growth. In the first decade of this period (2001-2011), this percentage was 40%. However, more recently (2011-2021), Auckland's contribution increased to 41%. Despite the pandemic's impact, Auckland remained responsible for 27% of the country's growth between 2019 and 2021. The comparatively faster growth underlines Auckland's role as economic hub in NZ.

Figure 2-1: GDP – Trends (Total GDP and per capita GDP)



In terms of GDP per employee, Auckland is outperforming the rest of NZ. This reflects the city's economic structure and composition. The share of knowledge economy, and manufacturing activities lift the per employee productivity compared to the rest of NZ (which is influenced by rural NZ's economic structure that includes lower productivity sectors, like forestry, and some agricultural activities). Auckland's GDP per employee is around 6% higher than the national average. Over the past decade (2012 and 2022), Auckland's GDP per capita grew broadly in line with the rest of the economy. **This underlines Auckland's role in the national economy, as well as a direct requirement to ensure that the infrastructure and investment activities support the city growth. Infrastructure spending is critical, including investment in new assets together with ensuring that existing assets are maintained.**

2.3 Infrastructure investment

New Zealand has a significant infrastructure challenge that is going to require an unprecedented period of investment. Auckland is in a similar position and the January 2023 flooding events only highlighted infrastructure deficiencies. The population and economic growth will require ongoing investment. This investment is needed to accommodate growth. Additional investment will be needed to address historic backlogs and infrastructure shortfalls. A Waka Kotahi NZTA report noted, there has been a deficit in infrastructure re-investment for the medium term which, when coupled with strong population growth, means that much public infrastructure is coming to the end of its useful and/or economic life[6]. Combining the historic shortfalls with growth means that demands on infrastructure investment are likely to become even more acute over the short- to medium terms. Acknowledgement of these pressures can be seen in central government policy statements, for example the Government Policy Statement on Land Transport (GPS-LT) that proposes to increase a 30% funding (revenue) increase for the National Land Transport Fund. While the GPS-LT mostly relates to NZ-wide new build projects, the scale of need is clear it also highlights a lift in demand for aggregate arising from road maintenance[7]. While changes in central government present some uncertainty around the investment pathway, Government has signalled a move from a 3-year programme to a 10-year National Land Transport Programme (NLTP) to provide more certainty to local authorities and to outline investment to cater for short term, medium- and long-term pressures.

In Auckland specifically, several large-scale infrastructure projects will generate considerable demand for concrete. The National Construction Pipeline report (MBIE, 2023) shows, infrastructure construction activity in Auckland is forecast to be relatively consistent through to 2028, even as residential and non-resident building construction are projected to decline. Much infrastructure spending is dependent on aggregate. While roading takes up a large share of total aggregate (65%), its uses span an array of sectors, such as improving and maintaining water systems or park infrastructure. According to the Infrastructure Commission, there are several large projects planned across Auckland. Examples of funded (or funding sources confirmed) include:

- Kāinga Ora projects:
    - Mt Roskill Precinct Project Bundles 1- 3, stormwater and utilities,
    - Mangere Precinct Projects and rail station upgrades.
    - Tamaki Precinct Projects Bundles 1 and 2, and stormwater and water supply projects.
- Watercare
    - Central Interceptor.
    - Queen Street wastewater diversion and piping.
- Ministry of Education
    - 24 projects ranging from new schools and expansion work in response to roll growth.
- Auckland Transport
    - Several projects, including the Carrington Road projects.
- Eke Panuku projects
    - Including Osterley and Amersham Way Streetscape works.

These projects' budgets sum to $1.8bn and is over the next 4-5 years. Projects beyond this time horizon are not funded (so not included in this list). Other high-profile projects that are in the pipeline include:

- Auckland Airport: The airport is a crucial component of New Zealand's domestic and international economy. Pre-covid, 62% of domestic passengers and 75% of international arrivals passed through it. Numerous projects are planned to improve the facilities, amounting to a $3.9bn construction

[6] https://www.nzta.govt.nz/assets/resources/research/reports/693/693-aggregate-supply-and-demand-in-new-zealand.pdf
[7] The newly established State Highway Pothole Prevention and Local Road Pothole Prevention activity classes.

programme over the next 6 years. Some of the announced projects were put on hold due to the uncertainty introduced by Covid-19, but these are now starting up again (including Domestic Terminal construction works and Airfield expansion).

- Penlink corridor: this project is underway and is a 7km transport connection between the Whangaparāoa Peninsula and SH1 at Redvale, which will include new local road connections and a bridge crossing the Wēiti River. These works are estimated to be completed in late 2026 and will cost around $830 million.
- Central Rail Link: construction is still underway on this project. When completed it will consist of 2 3.45km tunnels under ground (up to 42m deep), 2 underground stations, a redeveloped Britomart station, Maungawhau Station redeveloped and wider network upgrades.
- Eastern Busway: work continues through to 2027 including; construction of busway from Pakuranga to Botany, new intersections and lanes on Ti Rakau Drive, new road connections and bridges and overpasses.

In addition to the very large items listed above, Waka Kotahi NZTA, Auckland Transport have a number of large projects including;

- Waihoehoe Road (Drury Upgrade): Upgrade as part of the Roads of National Significance project to provide access to new housing areas in Drury and the Drury Rail station. Project has been brought forward to ensure access ahead of need.
- State Highway 1 (Papakura to Drury): A $655m project as part of the New Zealand Upgrade Programme. The project will deliver 4.5km of new motorway lanes in each direction, 4km of pathways for walking and cycling, interchange improvements at Pakuranga (new Southbound) and Drury.

These are particularly important with respect to Stevensons' Drury quarry as it is the closest source of aggregate for these significant works. In addition, the local addition of 26,000 new dwellings in the Drury area each requiring (on average 250 tonnes of aggregate)[8] along with local roads and other infrastructure means demand for aggregate Auckland-wide will grow strongly and demand for aggregate locally will also grow strongly.

2.4 Auckland's aggregate market

Aggregate supply struggles to increase in response to spikes in demand. Auckland has a well published local shortfall (local supply cannot match demand) so aggregate is imported from other regions. This increases the costs of imported material. According to the New Zealand Infrastructure Commission, Te Waihanga (2021), since 2014 there have been no new quarries established within Auckland; meanwhile only three expansions have been undertaken[9]. This further exacerbates the shortages in the region. The

[8] The Aggregate & Quarry Association of NZ, Fact Files | Aggregate & Quarry Association.

[9] https://tewaihanga.govt.nz/our-work/research-insights/infrastructure-resources-study

report estimated Auckland's aggregate shortfall to be around 4.5m tonnes[10], which must be imported at a higher cost (both to purchasers and society). The estimates of aggregate supply match the adjusted supply levels derived from our modelling, placing the level at around 10m tonnes.

An online survey of aggregate supply and demand by NZTA[11] – conducted in 2020 and featuring 89 participants nationally, of whom 13 were from Auckland[12] – sought to understand the views of key and representative groups within the industry. Nearly all Auckland respondents agreed that there were issues with aggregate supply, with more than half describing these as major issues. Although not disaggregated at a regional level, the main reported issues across the country aligned with the regularly cited anecdotal evidence. These included issues obtaining the correct sort of aggregate from close to the areas of demand; the consenting process being difficult; a lack of forward planning; and competition for produced aggregate. These responses reinforce the need for additional supply, especially of the sort which can be located close to areas of demand.

Expanding aggregate supply faces numerous additional challenges in the existing policy landscape. Some key issues are listed below.

- There is a large lead in time to procure the necessary equipment, either to replace machines or obtain new ones. For some equipment, this time can be between 12 and 24 months.
- The tight labour market and lack of workers with the requisite skills make finding new or replacement staff difficult.
- Energy grids are under strain and raising energy can be unfeasible in some scenarios.

These issues all add complexity to production. Moreover, they make it harder to respond to changes in demand, entrenching the supply shortfall in Auckland.

The changing policy landscape, with a significant shift towards environmental protection, is seen as a significant barrier to growth and long-term security of supply. For example, the National Policy Statement for Indigenous Biodiversity adds considerable uncertainty around the ability to expand some existing quarries (where significant natural areas are impacted).

2.5 Conclusion

Aggregate supply has a central role in infrastructure delivery. Infrastructure investment in response to housing growth, high impact weather events, and economic growth requirements need secure access to quality and appropriately located aggregate. The price effects of supply can influence project viability.

Auckland's future growth trajectory is expected to reflect the established geography and functioning of its centres and business areas. With housing intensification around the established centers, most of Auckland's population growth, and the increase in economic activity, will require appropriate infrastructure to support

[10] This is higher than the M.E estimates that are described later in the report.

[11] https://www.nzta.govt.nz/assets/resources/research/reports/693/693-aggregate-supply-and-demand-in-new-zealand.pdf

[12] There was also one respondent from Northland, whose answers were grouped with the Auckland region.

the efficient functioning of Auckland. Therefore, the Sutton Block extension will contribute towards facilitating Auckland's growth while reducing its dependence on imported aggregate.

3 Aggregate Use

Rock aggregate is a foundation and building product and a fundamental component of concrete. Concrete is used in every aspect of economic activity in New Zealand and without a ready supply of appropriately located aggregate, the production of concrete and the development of buildings, roading and infrastructure would halt – or would cost considerably more. Aggregate is also used as a base material under foundations, roads and railroads alongside wider uses such as in landscaping and in industrial processes. In this section of the report historic production and consumption of aggregate across New Zealand is examined and likely future consumption is explored under two growth scenarios.

3.1 Historic New Zealand Aggregate Production

New Zealand Petroleum and Minerals (NZP&M), a division within MBIE, oversees the administration of the Crown Minerals Act. This division compiles and releases data on a range of aggregate production classifications. The NZP&M dataset spans from 1993 to 2022 and is categorised by usage and region, enabling a spatial overview of relevant mineral commodities. For this report, we focus on aggregate as encompassing:

a. rock for reclamation and protection;
b. rock, sand and gravel for building, and
c. rock, sand and gravel for roading.

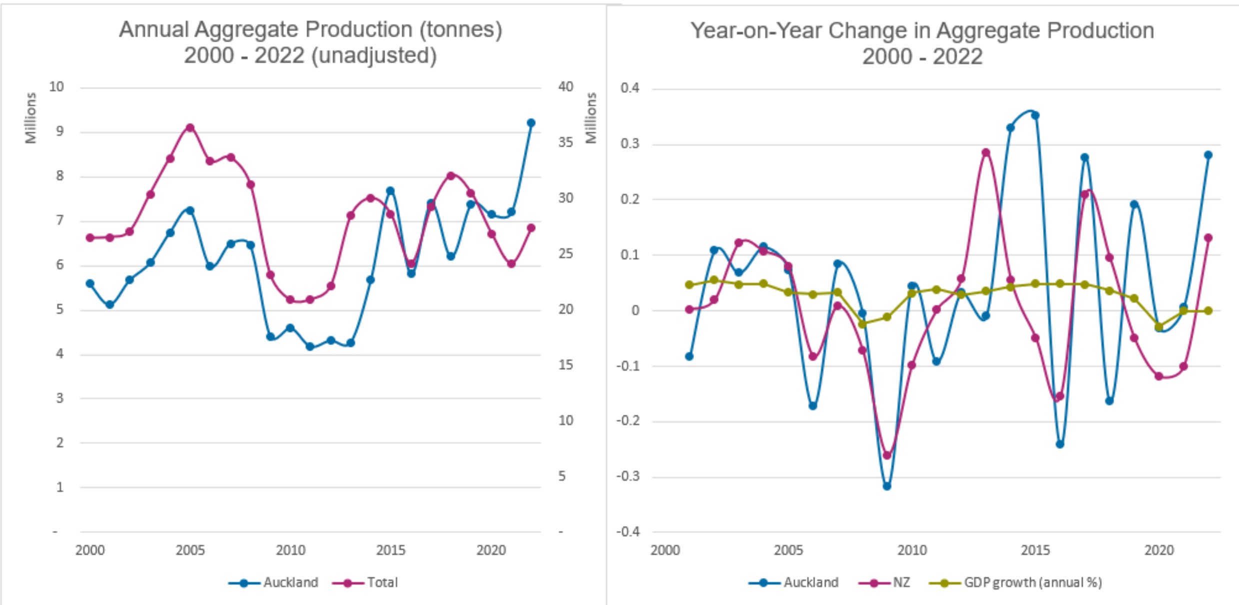
These categories are established at a 'purpose' level and are not reported in a more finely disaggregated manner, such as at the commodity level. Nonetheless, the data generally aligns well with the aggregate products of Drury Quarry. Certain categories have been omitted from our analysis due to their limited compatibility with Drury Quarry's aggregate utilisation.

The production figures are sourced from a voluntary survey, which means that the accuracy of the results depends on the responses received by NZP&M. This also implies that the results are subject to how well these responses represent the entire industry. In 2022, the response rate for the complete survey was 54%, which was also at 54% in 2021, however responses have been down from an average of about 76% between 2012 and 2020. While this requires a cautious approach to the data, an examination of detailed data within our areas of interest shows relatively little variation across recent years when analysed by region. This suggests that the 2022 data includes critical data points and is sufficiently robust to inform this assessment, especially when considering distribution.

However, other industry sources suggest that the NZP&M survey may be underestimating total production. For example, comprehensive data collected by Fulton Hogan on Auckland's aggregate market in 2019 implies that aggregate production could be understated by as much as 28%. A review of the NZP&M data revealed that non-responders appear to be evenly distributed between regions. Consequently, we can apply the adjustment index for Auckland to the other regions to scale the data accordingly. Despite the unusually significant drop in the response rate in 2021, it's worth noting that nearly all regions experienced volume fluctuations that remained within historical year-on-year trends.

In Figure 3.1, the aggregate production trends across New Zealand and Auckland for the past two decades based on the NZP&M are shown. It's important to note that the Auckland data in the figure represents survey production volumes, not the volumes used locally. This means that any imports from other regions are not reflected in the figure.

Figure 3.1: Aggregate Production since 2000



During the early 2000s, aggregate production in New Zealand experienced a noteworthy period of expansion. Production volumes surged by 37%, escalating from 26 million tonnes in 2000 to a peak of 36 million tonnes in 2005, as per the unadjusted NZP&M data. Subsequently, production levels started to decline, reaching a low point of 21 million tonnes in 2010, closely aligned with the economic recession stemming from the Global Financial Crisis.

In the years immediately following, there was a robust rebound in aggregate production. This period coincided with a flourishing economy, growing at an approximate annual rate of 4%. Key initiatives, such as the Christchurch rebuild in the aftermath of earthquakes and substantial infrastructure projects like Transmission Gully, Puhoi to Warkworth and the CRL significantly contributed to this growth.

However, both 2020 and 2021 witnessed declines in aggregate production, primarily attributed to the impact of COVID-19 restrictions and the virtual shutdown of certain industries. At the highest alert level, mining activities were curtailed, leading to reduced production. Even at lower alert levels, projects involving aggregates may have been delayed, further contributing to decreased production volumes. While production has increased in 2022, it is uncertain as to whether a trend will emerge.

In general, the aggregate production trends in Auckland closely mirror the production profile observed across New Zealand as a whole. However, it's important to note that Auckland typically contributes an average of 22% to the nationwide aggregate production figures from 2000 to 2022. Therefore, Auckland's patterns have a noticeable influence on the national data. Nevertheless, the impacts of COVID-19 on production levels and the various lockdown levels have caused some divergence in the growth trends between Auckland and the rest of New Zealand. It is anticipated that these trends will gradually converge in the short term as the effects of the pandemic become more consistent across regions.

Despite being NZ's largest population hub, with most of the growth occurring in Auckland, the city only produces around one quarter of New Zealand's aggregate. Auckland was reported to have produced 8.0m tonnes of aggregate in 2023. The Waikato region, by comparison, has at times produced more aggregate than Auckland, as recently as 2013 and 2018. Industry sources suggest that Auckland has a deficit of aggregate, and the region imports a portion of its total requirements from neighbouring regions. The table shows the total aggregate production across the upper North Island regions.

As shown in Table 3.1, reported national aggregate production in 2023 was 33m tonnes[13]. In terms of regional production, Auckland has remained in the top three producers in the country over the last ten years. With 8.0m tonnes produced in 2023, Auckland is the largest regional producer of aggregate rock. Auckland's position is consistent with it being the most populated region in the country, the most employment and the highest GDP leading to elevated demand for aggregate.

Table 3.1: New Zealand Aggregate Production (million tonnes) 2013-2023

Region	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Northland	2.0	1.8	1.7	0.7	1.4	0.9	0.8	1.1	1.0	0.8	1.4
Auckland	5.2	7.1	8.7	6.7	8.4	7.2	7.4	7.3	7.2	9.2	8.0
Waikato	6.3	5.4	6.3	4.3	7.0	9.2	5.6	6.5	6.3	6.0	7.2
Bay of Plenty	1.9	1.8	0.7	0.6	1.4	1.1	1.3	1.2	0.1	0.6	1.2
Total New Zealand	**31.5**	**34.1**	**32.4**	**26.7**	**34.4**	**35.5**	**32.9**	**28.2**	**24.6**	**28.0**	**33.0**

As the reported production volumes of the NZP&M survey mean that the production volumes shown in Table 3.1 understate the true level of aggregate production. To account for this, these figures have been adjusted to better reflect actual production and inform future projections. The adjustments are based on a full and comprehensive survey carried out by Fulton Hogan on Auckland's aggregate production volumes. The FH numbers have subsequently been cross checked by other significant industry operators and their accuracy confirmed. The adjusted production estimates are shown in Table 3.2

[13] Note that supplying production information to MBIE (NZ Petroleum and Minerals) by quarries is voluntary. This means there is an amount of under reporting and fluctuations in the production numbers.

Table 3.2: Adjusted New Zealand Aggregate Production (million tonnes) 2013-2023

Region	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Northland	2.7	2.5	2.4	1.0	2.0	1.2	1.1	1.5	1.3	1.1	2.0
Auckland	7.3	9.9	12.1	9.4	11.8	10.0	10.3	10.2	10.1	12.9	11.2
Waikato	8.9	7.5	8.7	6.1	9.8	12.9	7.8	9.1	8.7	8.4	10.1
Bay of Plenty	2.7	2.5	1.0	0.9	2.0	1.6	1.8	1.7	0.2	0.8	1.7
Total New Zealand	**44.0**	**46.1**	**45.0**	**36.8**	**47.6**	**48.7**	**44.7**	**38.1**	**31.4**	**37.3**	**44.9**

The adjusted production volumes show Auckland output go from 8.0m tonnes to a more accurate 11.2m tonnes in 2023. The degree of inaccuracy in the Auckland market has been applied to the reported estimates from the other regions to produce figures closer to the real volumes.

The future supply of aggregate in Auckland is assumed to remain constant at current levels observed during the past five years (2019-2023). This is because production in Auckland is relatively constant. New consents tend to balance out existing sources drying up. The average production over the past 5 years is 10.9m tonnes. Over the past 10 years it is also 10.9m tonnes annually.

Crucially, aggregate production is dependent on the consents and consent conditions, and these can expire. The gap between the consented volumes, current production levels and expiry dates are unknown. Therefore, the existing production levels are used illustrate the quantum of the shift, relative to current volumes.

3.2 Historic Per Capita Aggregate Production and Demand

StatsNZ produce population estimates at a Territorial Authority level. Drawing on the population data and combining it with the production estimates enable a derivation of a per-capita use ratio. Such a ratio provides an ability to design a scenario that reflects future demand levels. The per-capita ratios can also be used (together with other sources) to estimate the degree to which a region is self-sufficient in aggregate production.

Table 3.3 summarises the population estimates for the upper North Island regions, as well as NZ over the past ten years.

Table 3.3: Annual Population Estimates, 2013-2023

Region	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Northland	164,700	168,200	172,100	176,400	181,200	185,800	189,100	194,600	198,900	201,500	202,200
Auckland	1,493,200	1,520,400	1,552,800	1,589,800	1,625,100	1,654,800	1,681,300	1,714,200	1,704,100	1,695,200	1,753,700
Waikato	424,600	432,400	442,100	452,800	465,000	475,600	485,700	500,100	508,400	513,800	524,800
Bay of Plenty	279,700	286,100	293,200	301,500	311,500	320,800	328,200	339,200	344,000	347,700	349,700
Total New Zealand	**4,442,100**	**4,516,500**	**4,609,400**	**4,714,100**	**4,813,600**	**4,900,600**	**4,979,200**	**5,090,200**	**5,111,400**	**5,124,100**	**5,245,000**

The data reveals that Auckland in the 2023 year, reversed the COVID-19 slump of 2021 and 2022 that saw its population decline and its population grew by 3.5% - far higher than other regions and the rest of New Zealand as a whole (1.8%). It's worth noting that the 2022/23 figures for Auckland are boosted by record net migration figures that have subsequently slowed. However, whether this elevated growth will persist in the medium term remains uncertain. Various factors, including future migration patterns and economic conditions, will influence the trajectory of population growth in Auckland beyond the short term.

The population data is combined with the adjusted aggregate production to estimate aggregate per-capita ratio. Table 3.4 shows the average aggregate production levels per capita for regions near Auckland between 2013 and 2023. The production per capita in Auckland has exhibited fluctuations, ranging from a low period in 2013 with 4.9 tonnes to per capita to 7.8 tonnes per capital in 2015 and a peak of 7.6 tonnes per capita in 2022. It's important to note that these figures may not necessarily align with the national average because regional infrastructure projects and significant events, (the Christchurch rebuild following the earthquake, for example), can exert a substantial influence on how production adjusts to meet demand. Therefore, when applying the per-capita ratio for forward-looking assessments, it's advisable not to rely solely on data from a single year but rather consider a longer timeframe. In recent years, the average tonnes per capita are likely to be unrepresentative of uninterrupted production due to the impact of COVID-19 lockdowns, coupled with the robust recovery in the post-COVID environment. While Auckland's production per capita has increased in 2022, significant increases in the last ten years, such as in 2015 and 2017, were followed by equivalent decreases. This underscores the importance of considering the broader context and historical trends when evaluating production per capita and its implications.

Table 3.4: Average Aggregate Production per capita, 2013-2023

Region	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Northland	16.6	14.7	13.8	5.7	11.0	6.6	6.0	7.9	6.7	5.7	9.7
Auckland	4.9	6.5	7.8	5.9	7.3	6.1	6.1	6.0	5.9	7.6	6.4
Waikato	20.9	17.3	19.8	13.4	21.1	27.1	16.0	18.2	17.2	16.3	19.2
Bay of Plenty	9.6	8.8	3.5	2.9	6.3	4.9	5.5	4.9	0.5	2.3	5.0
Total New Zealand	**9.9**	**10.2**	**9.8**	**7.8**	**9.9**	**9.9**	**9.0**	**7.5**	**6.1**	**7.3**	**8.6**

Over the past 10 years Auckland has consistently produced a lower amount of aggregate on a per-capita basis relative to the other regions. The Waikato, meanwhile, has constantly produced more aggregate than it requires on a per-capita basis, meaning it has ability to export material to proximate regions which are under-supplied internally – especially Auckland and Bay of Plenty.

For Auckland, the annual per capita ratio has varied between 4.9 tonne/capita and 7.6 tonnes/capita between 2013 and 2023. During this period, the median and average ratios were:

- Auckland:
    - Median 6.1 tonnes/capita
    - Average 6.4 tonnes/capita
- Waikato:
    - Median 18.2 tonnes/capita
    - Average 18.8 tonnes/capita
- NZ:
    - Median 9.0 tonnes/capita
    - Average 8.7 tonnes/capita

These ratios suggest that Auckland imports a portion of its aggregates to supplement locally produced aggregates. Given that aggregate is a high volume, low value[14] product which is expensive to transport, it should be accessed as close as possible to where it is used.

3.3 Future Aggregate Demand

To understand the potential future role that an expansion of the Drury Quarry will play, it is important to understand the range within which future aggregate demand will sit. Market Economics have developed two scenarios for future aggregate demand. These include a standard population driven scenario and a high growth scenario reflecting high population growth with economic growth.

Several other scenarios were modelled and appraised to understand the wider spread. The core drivers of the scenarios are:

- The medium growth scenario
  - Medium population growth without an additional allowance for higher growth.
- A high growth scenario
  - High population growth plus an additional factor to reflect shifts like higher (additional) demand associated with climate change and related responses (e.g., building in resilience and rebuilding activities). Also, accounts for higher investment in roading projects than previously.

Population projections are sourced from the StatsNZ medium and high growth scenarios. The link between population and economic growth is acknowledged. For the high scenario an additional growth factor is included and is informed by NZ Treasury medium-term economic forecasts, the population shifts and the potential responses. The high scenario runs off the median aggregate demand ratio, whereas the medium scenario uses the average per capita ratio.

3.3.1 Aggregate Demand Estimates

Table 3.5 shows the total aggregate demand estimates for the regions presented. Scenario 1 reflects the medium population growth and no allowance for employment based economic growth. Scenario 2 uses the higher population projections and an additional factor representing a higher economic growth pathway (1.75%).

[14] Aggregate is low value relative to its weight.

Table 3.5: Auckland Aggregate Demand Forecasts by scenario (million tonnes)

Scenario	2025	2028	2033	2038	2043	2048	% Change 2025-2048
Medium Growth	15.4	15.1	15.9	16.7	17.4	18.1	17.4%
High Growth	15.8	17.0	20.0	23.4	27.2	31.5	99.8%

The overall change in aggregate demand is projected to grow to 18.1m tonnes by 2048 under Scenario 1, equal to a 17.4% increase, or a 0.7% compound growth rate. For scenario 2, the higher growth assumptions mean that the future demand is estimated to almost double over 23 years. The percentage change is 99.8% and the compound growth rate is estimated at 3.1%. These two scenarios present the anticipated demand bounds over the long term. While there could be short periods where growth is below these estimates it would be inappropriate to base medium- or long-term decision making on such short-term movements. Therefore, the above range is seen as realistic and appropriate for the purpose of this assessment.

The demand projections are sensitive to the input assumptions, including the per-capita ratio employed. Increasing the ratio by 10%, leads to a 10% increase in total demand – that is a linear relationship between this ratio and the estimated demand.

3.4 Differences between Aggregate Supply and Demand

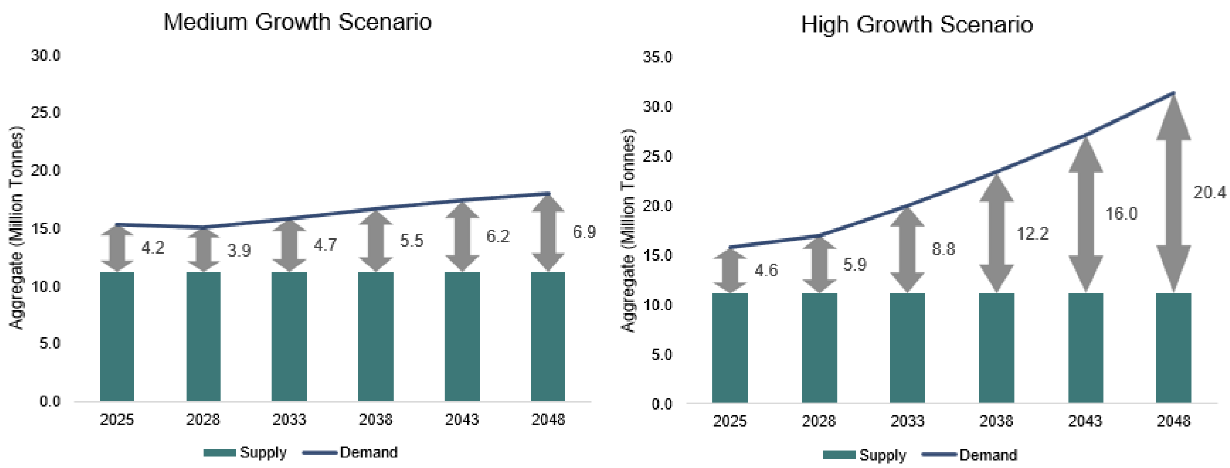
The differences between supply and demand are represented by the output gaps showing the wedge between demand and supply. Table 3.6 displays the growth projections relative to the local (Auckland) supply of aggregate. This is shown visually in Figure 3.2, illustrating the shifts relative to the existing supply (including the imported values). The supply level is set at the most recent aggregate level in 2022 of 12.9m tonne per year. However, as 2022 saw a significant increase to aggregate production, the comparison to the projection's assumes that this as a baseline level when it is uncertain if this level could potentially be an outlier.

The total supply in Auckland is subtracted from the total demand to identify the output gap. A negative number therefore represents more demand than supply in the region. This gap shows the net position (surplus or deficit) over time. Auckland already imports a portion of its aggregate, and these sources are located at some distance from their destination, meaning that an increase in aggregate sourced from other regions will increase other costs.

Table 3.6: Auckland standard and high growth aggregate demand scenarios (million tonnes), 2023-2048.

Scenario	2025	2028	2033	2038	2043	2048
Projected Demand (million tonnes)						
Medium Growth	15.4	15.1	15.9	16.7	17.4	18.1
High Growth	15.8	17.0	20.0	23.4	27.2	31.5
Difference between 2023 supply of 11.2million tonnes and demand.						
Medium Growth	- 4.2	- 3.9	- 4.7	- 5.5	- 6.2	- 6.9
High Growth	- 4.6	- 5.9	- 8.8	- 12.2	- 16.0	- 20.4

Figure 3.2: Projected Aggregate Output Gap in Auckland



As the market grows and demand lifts, additional product will need to be imported to satisfy business and infrastructure needs, assuming that no additional local capacity is added.

The scenarios show demand exceeding (Auckland-based) supply, with the current situation ranging from 4.26m to 4.6m tonnes in 2025. Over time, this shortfall grows to between 6.9m tonnes and 20.4 tonnes by 2048. The difference highlights the sensitivity to high growth rates, and the need to ensure that there are sufficient, readily accessible raw materials that can be used to satisfy the growth requirements. This will assist in minimising the wider economic costs associated with the aggregate market.

However, it must be noted that these demand projections are compared with the most recent level of aggregate production in 2022 which has been almost the highest level seen in the last 10 years. While it may be a temporary surge, newly consented capacity (Brookby and potentially Hunua and Flattop which are listed under the Fast Track Approvals Act) may see production rise in Auckland. However, by my estimation, this may only add between 3.5 and 5m tonnes. This could be sufficient for the short term (under a no economic growth future), but insufficient for the medium to long term.

The average level of aggregate production for the last five years has been 10.4 million tonnes, 2.4 million tonnes lower than the 12.9 million tonnes produced in 2022, and 0.8 m tonnes lower than the 11.2m tonnes produced in 2023. This peak production level could regress toward the historical average in the short term, depending on the Fast-track Approvals process.

Because of the nature of aggregate as a low-value, high-weight product, it doesn't travel well, with the cost to the consumer heavily influenced by the distance each truck load travels. This means that for aggregate extraction to be economical, it should be located proximate to the areas it is required. Therefore, regardless of additions to production in the northern part of Auckland, growth in and around Drury including the significant; infrastructure, housing, Metropolitan Centre and community service developments, mean that providing for additional aggregate capacity at the Drury Quarry is vitally important to ensure efficient growth path and a sustainable economy.

Over the long term, the analysis suggests that without a combination of maintaining the existing level of demand and further development of Waikato resources, there is likely to be a shortfall in Auckland under high growth assumptions. The Waikato is a net exporter of aggregate and is used in regions like Auckland to satisfy total demand (because local supply is sufficient).

3.5 Conclusion

Aggregates play a huge role in the economic development of a region. Increased demand can be considered a consequence of economic development while also creating significant employment opportunities. Retention of existing aggregate extraction resources is paramount to ensuring that there is sufficient supply to meet or facilitate regional growth. If supply does not grow in accordance with demand, aggregate will need to be sourced from neighbouring regions, imported from overseas or from recycled materials. Without the capacity to accommodate increases in production, a growing number of projects requiring aggregates is likely to drive prices upward.

The present level of aggregate production in Auckland has nearly reached parity with demand according to the most recent year with available production data. However, this relied on a potential one-off increase in production, where Auckland supply rose by 28% in one year, being maintained into the future. The medium growth scenario indicates that the future output gap in 2048 would require an increase of around 62% on the 2023 level of supply to meet demand. Increased aggregate demand in periods of significant large scale infrastructure investment may lead to peaks that are better captured in the high growth scenario where the sufficiency gaps are significantly higher.

The alternative options come with higher costs and will have greater environmental impacts as the need for transportation of aggregate increases. The identification and development of new resources within Auckland region is very important, but the best economic and potentially environmental outcomes occur through the extension of existing quarries within the region – such as the Sutton Block expansion to Drury Quarry. In particular, because it is proximate to an area of high investment in infrastructure and housing.

With the existing Drury Quarry reaching the end of its lifespan, the 3.5 million tonnes of aggregate of it produces annually needs to be maintained or replaced in order to maintain the current level of supply in the Auckland market and minimise future output gaps. While the estimated production increase of the Sutton Block would meet 41% of the projected output gap of the medium growth scenario in 2048.

As previously mentioned, when assessing aggregate production from financial, environmental, and social perspectives, it becomes clear that it is both more suitable and efficient for aggregate production to be located in close proximity to its intended destination of use. Moreover, for a market to operate with efficiency, the supply side must be capable of adapting to shifts in demand. The importance of maintaining a stable aggregate price cannot be emphasized enough. It not only ensures the financial viability of ongoing projects by keeping costs in line with initial forecasts but also serves as a catalyst for initiating new projects by exerting control over expenditures. These benefits, along with the reduction of expenses associated with passing on input costs to end users or consumers, underscore the critical significance of achieving aggregate sufficiency.

The next section explains the potential cost savings associated with the Sutton Block expansion.

4 Sutton Block Costs and Benefits

Having established the scope and scale of the Auckland market for aggregate and its potential future growth and change, it is necessary to understand the potential role of the Sutton Block expansion of the existing Drury site in helping Auckland's economy meet its present and future aggregate needs. In addition, it is necessary to understand the role SAL operation will play in contributing to the wellbeing of Auckland and Auckland's economy.

The economic costs and benefits are associated with both direct effects, such as price increases, and indirect effects, including factors like emissions and social costs. These effects are predominantly influenced by changes in transportation related to the location of aggregate production. In this section, the savings achieved in transportation costs and the resulting impacts is assessed. The subsequent section will delve into the longer-term advantages of improving supply through new development.

When evaluating the costs and benefits of sourcing aggregate through SAL Drury Quarry, we compare the potential changes enabled by this option against alternative sources. The alternatives under consideration include resource sites in Waikato and Northland. It's unlikely that other quarries within Auckland could quickly meet the market's demands due to limitations in capacity, expansion constraints, or variations in the materials they produce. Therefore, the alternatives in Waikato and Northland are used for comparison. The proximity to Auckland is a significant advantage, which helps reduce the economic costs of this option relative to others. The approval of the Drury quarry extension consent will not only extend the quarry's useful life but also increase the quantity of product that can be delivered to the market.

Without the consent, Auckland would need to source large quantities of aggregate to replace the gap created if the Drury Quarry is no longer contributing to production. It's annual aggregate production of 3.5 million tonnes would need to be sourced from quarries likely to be further away, unless new local quarries are established. The additional costs associated with setting up a new quarry site and commencing production would probably be reflected in the price of the extracted aggregate. Approving the consent application would enable Auckland to mitigate the effects of a growing aggregate deficit and avoid incurring these additional costs. In this assessment, these avoided costs are treated as benefits. It's worth noting that we do not quantify equilibrium effects, such as how the market price of aggregate might be affected or how other quarries might respond to changes in competition. However, it's generally agreed that price increases due to material shortages represent a suboptimal outcome.

4.1 Costs and Benefits – Assumptions

This section delves into the costs and benefits associated with the expansion of Drury quarry. These are assessed by comparing the situation with the expansion against the alternatives without it. Much like all transport activities, the transportation of aggregate incurs costs related to the actual act of transportation, alongside environmental and social costs that follow as consequences.

In our analysis, we rely on the existing destinations to which Drury Quarry's outputs are delivered to determine the spatial distribution of increased delivery quantities. These patterns are, to a large extent, established because a significant portion of the quarry's outputs are supplied to concrete plants and construction projects located around the Auckland region. Penrose is used as a reference point as a key location of industrial activity, particularly given the location of concrete plants. The estimated weighted average return distance from Drury quarry stands at around 31 kilometres.

In presenting the cost comparison, we have taken Smythes Quarry in Waikato and Maungaturoto in Northland as alternative source locations. Both of these quarries produce Greywacke, much like SAL Drury quarry, although it's important to note that it's unrealistic to assume that, in the absence of a Drury quarry consent, these quarries would be able to individually or collectively increase production as a replacement. Instead, we use Smythes and Maungaturoto as illustrative examples. Without the Drury quarry, it is likely that aggregate sourcing would need to extend even further. These locations, located in northern Waikato and southern Northland, provide a sense of the potential distances aggregates might have to travel if sourced from neighbouring regions. Of the approximately 60 quarries in Northland, only one is closer to Auckland than Maungaturoto, but it may not be a suitable option. Similarly, among the 84 quarries in Waikato, only six are closer to Auckland than Smythes, but these include sources like the Tuakua and Pukekawa resources, which are primarily sand quarries. Greywacke sources in Mangatani and Pokeno were considered, but they are already integrated into the existing market, serving Auckland's aggregate needs. Therefore, the additional costs illustrate the "at least" position, which reflects the extended distances aggregate would need to be transported from these alternative quarries.

Public information was reviewed as part of identifying the potential alternative sources. The review found that there are many quarries throughout the Waikato (including Coromandel) and Northland. However, many of these quarries lack the necessary scale that would support Auckland's respond to growth. Only a select few quarries have sufficient scale. In the Waikato, this includes Smythes and the Huntly quarries. Smythes is marginally closer and using this quarry as the alternative means that the estimated costs form the 'at least' values. If aggregate is sourced from other sources, then the transport costs (and other costs) will be greater. A similar situation is observed in Northland were there are many smaller quarries.

In addition to considering existing quarries, another potential option could be to establish a new, greenfield quarry. However, expanding an existing quarry typically offers several advantages over developing a completely new one. These included economic and environmental[15] considerations, including:

- Reduced environmental impact,
- Existing environmental monitoring baseline data and planning provisions (zoning),
- Faster start-Up with reduced permitting time,
- Lower infrastructure costs,
- Maximising historic investments, and
- Efficient resource utilization.

[15] These are included here for completeness even though the environmental matters are normally addressed by the relevant experts. The environmental matters are not included in the assessment of costs and benefits.

Using Smythes and Maungaturoto as the potential alternatives, the additional distance travelled by trucks transporting aggregate based on the reference point of Penrose is estimated. Table 4.1 shows the distribution of journeys from Drury quarry.

Table 4.1: Base Values for Transport Distance

Return Journey	Destination (km)	
	Penrose	Difference
Distance from Drury (km)	62	0
Distance from Smythes (km)	144	82
Distance from Maungaturoto (km)	244	182

The distances presented in the table encompass a round trip to each destination. It's assumed that the trucks deliver their loads and return to the quarry empty. This setup has implications for both the transportation costs and the quantity of emissions generated on each leg of the journey. The distance information is then combined with the number of truck movements to estimate the total travel distance. Subsequently, this data is used to calculate various costs, including transport costs, social costs related to injuries, and emissions costs. Table 4.2 summarises the core assumptions around the vehicle movements.

Table 4.2: Core Transport Assumptions

	Core Input
Truck Size (t)	23
Volume assessed (t)	1,000,000
Truck loads	43,478

The truck size in this analysis is associated with the weight of aggregate carried in each load, the quantity provided by SAL is 23 tonnes. The volume assessed was set at 1,000,000 tonnes, the analysis therefore considers the impacts from the Drury quarry extension on a per million tonnes basis. Based on these core assumptions, it is estimated that the expansion would result in around 43,500 loaded journeys per million tonnes of aggregate produced. The costs related to transport, social, and environmental factors are calculated based on the delivery of these loads to the specified reference point location of Penrose.

The transport cost assumptions are informed by cost estimates from SAL. However, these are reflected in the cost of aggregate to the end consumer. These are at rates of $12.50 per tonne and $5 per tonne. Therefore, the average cost of a full truck load of aggregate from SAL Drury quarry to Penrose is around $443 per truck load of 23 tonnes. These rates have also been applied to the alternatives.

The transport function is translated into transport, environmental and social costs. The approach followed in each of these aspects is summarised below.

4.1.1 Emissions Costs

The environmental costs are calculated as the price of the emissions arising from the transport activity. Emissions costs are calculated using Waka Kotahi New Zealand Transport Agency's Vehicle Emissions Prediction Model (VEPM v6.3). The factors are for 2023 and we apply these static values to the fleet in all future years.

The cost (per tonne) of emissions are based on the Monetised Benefits and Costs Manual (V1.6.1, June 2023) and using update figures to express the values in current prices. The Manual provides a range of values, differentiating between costs incurred in urban and rural areas. The analysis considers the relative distances travelled in these different areas as well as the load difference (loaded vs unloaded). Table 4.3 shows the base values used to estimate the emissions costs. The applied values then differ for the different quarries based on location.

Table 4.3: Environmental Costs - Values

	CO	NOx	PM2.5	VOC	CO2-e
Cost/tonne (Rural)	$0.23	$28,843	$58,880	$73	$94
Cost/tonne (Urban)	$5.84	$1,038,788	$1,024,422	$47,193	$94
Emissions factors 2023 (g/tonne) Diesel Articulated >50 t	2.06	5.60	0.20	0.14	1092.93
Emissions factors 2023 (g/tonne) Diesel Articulated 20-28 t	1.36	4.58	0.17	0.13	675.78

4.1.2 Transport Costs

Transporting any high-volume commodity is expensive. The transport costs for aggregate on a per tonne basis varies depending on the volume-weight relationship and the total travel distance. Moving a tonne of commodity for one kilometre typically ranges between $0.38 – $0.60. For distances above 40kms, the average price is $0.38. For shorter distances this is higher. However, as the data underpinning this analysis is in the form of end user aggregate prices per tonne and per distance, the analysis combines the transport costs with distance and weight to estimate the total costs. The difference between transport costs associated with Drury Quarry compared against Smythes or Maungaturoto shows the additional costs the customer absorbs associated with not having access to the local resource.

The potential price increases compared to Drury Quarry will depend on the fraction of the transport costs absorbed by the supplier and intermediaries. Where demand greatly exceeds supply and is relatively inelastic, it is likely that a larger proportion of costs will be passed on to consumers. In a market with existing shortages, the proportion of cost pass-through is likely to be high.

4.1.3 Social Costs

In addition to the direct transportation and environmental costs, there are social costs linked to injuries and fatalities due to changes in distance travelled. With every additional kilometre travelled by trucks, the likelihood of an injury, serious injury, or death marginally increases. The Ministry of Transport's Social Cost of Road Crashes and Industry report, in conjunction with data on vehicle travel distances and other data published by the Ministry of Transport, are used to derive a social costs per 100m kilometres driven by trucks. The social costs are expressed in 2023 prices. Coupling these estimates with the distances driven if the aggregate is delivered from SAL Drury quarry, compared with the alternative sources, provides an ability to estimate the additional (change in) social costs.

Table 4.4: Social Costs Values

	Deaths	Serious Injury	Minor Injury
Social cost ($ per instance, 2023 prices)	$5.2	$0.5	$0.03
Cost per 100 million km	$13.2	$2.9	$0.7

4.2 Findings

4.2.1 Per Million Tonnes

The values and calculations mentioned above are applied to the aggregate movements. Table 4.5 presents the annual values associated with various quarries and demonstrates the additional costs that would be incurred if the aggregate were supplied from alternative quarries. When assessing the costs and benefits, it's important to note that avoided costs are treated as benefits in this analysis. In this context, the benefits are entirely linked to the avoidance of costs. This approach helps in quantifying the positive financial and economic impact of the Drury quarry extension by emphasizing the cost savings and efficiency gains it brings compared to alternative supply sources.

Table 4.5: Cost of Alternatives per million tonnes

	Total driving distance (million km)	Transport costs	Social costs	Emissions costs	Total costs
Stevensons Drury Quarry	2.7	$19.2m	$0.5m	$15.0m	$34.7m
Smythes	6.3	$28.2m	$1.1m	$34.9m	$64.1m
Maungaturoto	10.6	$39.0m	$1.8m	$59.1m	$99.9m
Additional from Smythes	3.6	$8.9m	$0.6m	$19.9m	$29.4m
Additional from Maungaturoto	7.9	$19.8m	$1.3m	$44.1m	$65.2m

Delivering the aggregate from Drury quarry results in total costs of $34.7 million per million tonnes. However, if the same quantity of aggregate were delivered from the more distant sources, the costs would be significantly higher due to the additional distance. The additional costs for these two options are as follows:

- Smythes: $64.1 million
- Maungaturoto: $99.9 million

Therefore, enabling the quarry extension to deliver aggregate to the market and avoiding these additional transport costs will yield a cost-saving (benefit). **On a per million tonne basis, the total net cost reduction of Drury quarry ranges from $29.4 million to $65.2 million compared to the Waikato and Northland alternatives.**

The most substantial component of the cost equation is the transport costs, which are primarily borne by aggregate producers and users, rather than being a direct cost to society. However, it is highly likely that these costs will be reflected in the final price of the aggregate, impacting the costs of consumption for various stakeholders, including local councils, home buyers, businesses, and others. The result is that intermediate or end users face increased costs for the same product, underscoring the inefficiencies in the system.

The environmental costs specifically pertain to emissions and are based on the Vehicle Emission Prediction Model (VEPM) and the New Zealand Transport Agency (NZTA) calculation manual. The underlying methodology suggests that the values encompass the health effects of emissions as well as the abatement costs to mitigate emissions, with the latter based on CO2-equivalents. It's important to note that these avoided costs do not reflect the environmental damage arising from climate change.

The emissions costs are estimated at $15.0 million for Drury quarry compared to $34.9 million and $59.1m for Smythes and Maungaturoto, respectively. **Enabling the extension to the quarry will avoid emissions costs ranging from $19.9 million to $44.1 million per year**.

Social costs have a broader impact on the entire community, even if only a small minority of people are directly involved in accidents. The estimated social costs are $0.5 million for Drury quarry, but they increase for the Smythes and Maungaturoto options to $1.1 million and $1.8 million, respectively. The net change compared to Drury Quarry is therefore approximately $0.6 million for Smythes, with the upper estimate at $1.3 million based on the Northland option. These figures represent the social cost savings delivered by allowing the Sutton Block to be quarried.

4.2.2 Sutton Block Lifecycle

The Sutton Block is estimated to provide a total aggregate resource of around 240 million tonnes. Assuming a 50-year lifecycle for the extraction of the total resource, this equates to production of around 4.8 million tonnes per year. By applying the cost per million tonnes from Table 4.5 at a discount rate of 5% p.a. and assuming operation could begin in 2026, Table 4.6 presents the values associated with various quarries and demonstrates the additional costs that would be incurred if the aggregate were supplied from alternative quarries over the course of the Sutton Block's lifecycle.

Table 4.6: Cost of Alternatives over Sutton Block Lifecycle

	Total driving distance (million km)	Transport costs	Social costs	Emissions costs	Total costs
Stevensons Drury Quarry	647	$1606m	$38m	$1253m	$2897m
Smythes	1,503	$2349m	$88m	$2911m	$5349m
Maungaturoto	2,546	$3257m	$149m	$4933m	$8338m
Additional from Smythes	856	$744m	$50m	$1658m	$2452m
Additional from Maungaturoto	1,899	$1651m	$111m	$3679m	$5442m

While the cost savings per million tonnes of aggregate are significant, when the total aggregate provided by the extension of 240m tonnes is considered over a 50-year extraction period, this underlines the magnitude of the potential cost savings into the future. Delivering the aggregate from Drury quarry sourced from the extension results in total costs of $2.9 billion per over its lifecycle. However, if the same quantity of aggregate were delivered from the more distant sources, the costs would be significantly higher due to the additional distance. The additional costs for these two options are as follows:

- Smythes: $2.45 billion
- Maungaturoto: $5.4 billion

Therefore, enabling the quarry extension to deliver aggregate to the market and avoiding these additional transport costs will yield a significant cost-saving (benefit) over the long term.

4.3 Summary of Costs and benefits

Based on the above transport, environmental and social costs, extraction from the Sutton Block would save around $29.4 million to $65.2 million per million tonnes of aggregate produced. This is based on the costs required to transport the aggregate consented at Drury from the nearest alternatives outside of Auckland to meet the region's demand. This represents the economic benefit (in the form of avoided costs) that accrue to Auckland's economy - and ultimately households – if the consent is approved.

This is likely to be a conservative estimate, as it assumes that the existing out of region quarries used are able to meet the shortfall caused by Auckland's shortage of locally sourced aggregate. In all likelihood, the transport costs will be significantly higher when the proportion of Auckland's locally supplied aggregate continues to decline (relative to demand), and aggregate is needing to be sourced from further and further afield. However, these are most likely to be from the Waikato region as opposed to Northland.

It is important to note that the transport, environmental and social impacts described above relate to current market demand and supply and meeting any changes in supply patterns in comparison with today's distribution of demand and growth patterns. As cities grow and development locations shift, the impacts will differ. The provision of new greenfield supply sites to meet future growth patterns will generate different transportation profiles and therefore impacts. It is important that any new sites are evaluated in the market conditions that are present at the time.

5 Conclusion

New Zealand is reliant on the availability of natural mineral resources such as aggregate. As aggregate is used in a range of applications within the Auckland economy, its use enables urban development and construction, supporting the economy and providing homes and amenities for people, together with infrastructure and buildings for businesses and industries. Given the importance of aggregate for Auckland's economy, Auckland's built future is effectively reliant upon maintaining sustainable sources of aggregate. Aggregate extracted from the Sutton Block expansion will form a key component of Auckland's sustainable supply.

The Sutton Block will allow Stevenson to provide a significant amount of high-quality aggregate for the Auckland market at sustainable prices. The volume enabled by the consent would be able to accommodate a significant proportion of Auckland's demand, providing aggregate across the long term for use in the construction of housing, roads, infrastructure, high rise buildings and factories and warehouses. The presence of the aggregate and the ability to utilise it sustainably contributes significantly to the economic wellbeing of Aucklanders.

Auckland is a growing city with significant population growth projected. In order to accommodate this, large amounts of construction will occur. Efficient and sustainable access to aggregate will be an important factor in both facilitating Auckland's economic growth aspirations and providing infrastructure such as roading, buildings, and other infrastructure to support Auckland's rapidly growing population and economy.

Aggregate is a part of construction and as demand for buildings, roads and other infrastructure increases, so will the demand for aggregate. Auckland currently produces a large amount aggregate, with 11.2 million tonnes produced in 2023, which was the most in New Zealand and saw a large increase on previous years. However, local production has not yet reached the level of supply to meet the needs of New Zealand's largest city and commercial hub and this has yet to emerge as a consistent level of production. Our medium growth projections show that Auckland aggregate demand is projected to exceed supply by around 6.9 million tonnes in 2048. Under our higher growth scenario, this shortfall is around 20.4 million tonnes in 2048. Furthermore, this shortfall will need to be sourced from neighbouring regions such as Northland or Waikato unless more aggregate production is enabled locally, generating economic, social and environmental costs.

The Sutton Block located on the site of SAL existing Drury Quarry, 31 km south of the Auckland CBD. It is estimated to provide around 240 million tonnes of aggregate over its life span. The economic benefits of the Sutton Block aggregate are represented by significant cost savings derived from the lower transport requirements of sourcing aggregate from a quarry closer to Auckland. These are projected to be cost savings of $8.9 million in transport costs, $19.9 million in environmental costs, and $0.6 million in social costs, per million tonnes of aggregate produced, when compared to the nearest alternative source in the Waikato region. This means that the economic benefits of the Sutton Block total to $29.4 million for every million tonnes of aggregate that it will provide.

The impact of aggregate extends significantly further than just the construction sector - economic growth is in part related to urban development and expansion, meaning that the ability to grow the economy is linked to the sustained availability of aggregate. Ensuring local aggregate companies can provide aggregate to market at a cost-effective price, helps ensure housing remains affordable, that businesses seek to expand within Auckland rather than relocate, and that large infrastructure projects are able to be delivered on time and to budget.

Therefore, based on the above analysis, the Sutton Block extension of the Drury Quarry will generate significant economic benefits for Auckland Region and New Zealand.

Gregory Michael Akehurst

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