

APPENDIX J

Economic Assessment

**ASSESSMENT OF ECONOMIC EFFECTS OF PROPOSED ROYDON QUARRY
DEVELOPMENT**

Prepared for Fulton Hogan Limited

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INTRODUCTION

Background

1. Fulton Hogan Limited (Fulton Hogan) proposes to develop a new quarry, to be called Roydon Quarry, within a block of land bound by Curraghs Road, Dawsons Road, Maddisons Road, and Jones Road at Templeton. The eastern site boundary is approximately 0.7 kilometres to the west of the Templeton township, is within the Selwyn District and borders the Christchurch City boundary. The site is well located to supply points of aggregate demand within the south-west of Christchurch City and the Selwyn District.
2. The quarry will produce a range of high quality aggregates for use in roading, other infrastructure, drainage, concrete and other building materials. Fulton Hogan estimates that around 15 million cubic metres (equates to around 30 million tonnes) of aggregate is available to be produced from the quarry, with production averaging around 700,000-1,000,000 tonnes per annum over an estimated 30 to 40 year life for the quarry. Annual production is likely to vary from year to year in line with fluctuations in aggregate demand but is anticipated to generally increase over time.
3. Within Greater Christchurch (i.e. Christchurch City and Selwyn and Waimakariri Districts) Fulton Hogan currently operates three fixed aggregate and processing quarries – its Miners Road quarry at Yaldhurst, its Pound Road quarry at Islington and its McLeans Island quarry. Fulton Hogan supplements these sites with aggregate raw material from smaller extraction only sites such as its Roberts Road Quarry at Islington. While Pound Road still operates as a processing site, the site is now exhausted of extractable aggregate resource. The proposed Roydon Quarry will provide a source of supply of aggregate and a processing and storage base for Fulton Hogan to meet demand from customers primarily in the south-west of Christchurch City and the Selwyn District.
4. Fulton Hogan is seeking consents from both the Canterbury Regional Council and the Selwyn District Council for the establishment and operation of the quarry.

Report Purpose

5. The purpose of this report is to assess the economic effects of the proposed Roydon Quarry. The report together with other technical reports assessing other effects of the quarry will form part of the Assessment of Environmental Effects (AEE) accompanying the application for consents.

Report Format

6. In addition to this introductory section, this report is in seven parts covering the following:
 - a. A consideration of the relevance of economic effects under the Resource Management Act (RMA);
 - b. The future demand for, and supply of aggregate, in Greater Christchurch;
 - c. The economic importance of low cost aggregate supplies;
 - d. The economic benefits of maintaining Christchurch's low cost aggregate supplies;
 - e. The economic benefits of the proposed Roydon Quarry;
 - f. Potential economic costs of the proposed Roydon Quarry; and
 - g. The report's conclusions.

ECONOMICS AND THE RMA

Community Economic Wellbeing

7. Economic considerations are intertwined with the concept of the sustainable management of natural and physical resources, which is embodied in the RMA. In particular, Part II section 5(2) refers to enabling "*people and communities to provide for their ... economic ... well being*" as a part of the meaning of "*sustainable management*", the promotion of which is the purpose of the RMA.
8. As well as indicating the relevance of economic effects in considerations under the RMA, this section also refers to "*people and communities*", which highlights that in assessing the impacts of a proposal it is the impacts on the community and not just the applicant or particular individuals or organisations, that must be taken into account. This is underpinned by the definition of "*environment*" which also extends to include people and communities.
9. Fulton Hogan's proposed Roydon Quarry will limit future increases in the costs of aggregate supply in Greater Christchurch and therefore benefit local businesses and residents. This is discussed later in this report.

Economic Efficiency

10. Part II section 7(b) of the RMA notes that in achieving the purpose of the Act, all persons “*shall have particular regard to ... the efficient use and development of natural and physical resources*” which includes the economic concept of efficiency¹.

Economic efficiency can be defined as:

“the effectiveness of resource allocation in the economy as a whole such that outputs of goods and services fully reflect consumer preferences for these goods and services as well as individual goods and services being produced at minimum cost through appropriate mixes of factor inputs”².

11. More generally economic efficiency can be considered in terms of:

- a. Maximising the value of outputs divided by the cost of inputs;
- b. Maximising the value of outputs for a given cost of inputs;
- c. Minimising the cost of inputs for a given value of outputs;
- d. Improving the utilisation of existing assets; and
- e. Minimising waste.

12. The Fulton Hogan Roydon Quarry will limit increases in aggregate transport costs and has a number of other efficiency-related benefits as compared to alternative sites for a new quarry. These efficiency benefits are discussed later in this report.

Viewpoint

13. An essential first step in carrying out an evaluation of the positive and negative economic effects of a development proposal is to define the appropriate viewpoint that is to be adopted. This helps to define which economic effects are relevant to the

¹ See, for example, in *Marlborough Ridge Ltd v Marlborough District Council* [1998] NZRMA 73, the Court noted that all aspects of efficiency are “*economic*” by definition because economics is about the use of resources generally.

² Pass, Christopher and Lowes, Bryan, 1993, *Collins Dictionary of Economics* (2nd edition), Harper Collins, page 148.

analysis. Typically a city (district) or wider regional viewpoint is adopted and sometimes even a nationwide viewpoint might be considered appropriate.

14. For the proposed Roydon Quarry the primary beneficiaries will be the businesses, residents and ratepayers of the Selwyn District and Christchurch City with only limited volumes of aggregate from the new quarry being delivered to points of demand within the Waimakariri District. Therefore a Greater Christchurch viewpoint is appropriate, with the main focus being on the Selwyn District and Christchurch City.³
15. There are also private or financial costs and benefits associated with the proposed new quarry. If consents are granted allowing the quarry to be developed, and Fulton Hogan give effect to these consents, then it can be assumed that the private or financial costs and benefits have been responsibly and properly analysed and that from the viewpoint of Fulton Hogan which has money at risk, the expected financial benefits exceed the expected costs. Accountability for the accuracy of the financial analysis clearly rests with Fulton Hogan and ultimately the net financial benefits it might receive from the proposal are not directly relevant to the assessment of effects under the RMA.
16. Therefore the focus of this report is generally on the wider economic effects on parties other than Fulton Hogan. Economists refer to such effects as “externalities”⁴. However, as is explained later in this report, increases in the costs for Fulton Hogan in supplying aggregate to customers in Greater Christchurch (particularly within the Selwyn District and Christchurch City) will flow through into higher prices for aggregate, increasing infrastructure and other building capital and maintenance costs. This will detrimentally impact on not just Fulton Hogan but also local residents, directly as aggregate customers and indirectly as ratepayers and taxpayers. Also increases in the costs of supplying aggregate are relevant with respect to the *“efficient use and development of natural and physical resources”*.

³Even though the volume of sales from the new Roydon Quarry to the Waimakariri District are likely to be small, quarries in the north of Christchurch City over time are likely to increase sales within the Waimakariri District. This will increase the shortfall of Christchurch City supply and the new Roydon Quarry is well placed to fill this void. Therefore the new quarry also indirectly impacts on aggregate supply to customers within the Waimakariri District.

⁴Defined as the side effects of the production or use of a good or service, which affects third parties, other than just the buyer and seller.

Non-Economic Effects

17. This report addresses the economic effects⁵ of allowing the proposed new Roydon Quarry. Non-economic effects (e.g. air quality, landscape, traffic, and noise effects) are covered in the AEE reports of other technical experts.
18. In economics, 'intangible' costs and benefits are defined as those which cannot be quantified in monetary terms. Sometimes attempts can be made to estimate monetary values for 'intangible' non-economic costs and benefits using techniques such as willingness to pay surveys or inferring values on the basis of differences in property values. Once quantified in monetary terms, these effects can supposedly be considered as part of the assessment of economic wellbeing and efficiency effects.
19. However, such techniques are frequently subject to uncertainty and criticism. It is generally better to not attempt to estimate monetary values for these effects but to leave them to be assessed by appropriately qualified experts and for their assessments to form part of the application of the relevant legal test. This also avoids the danger of 'double-counting' – i.e. including them within a quantified measure of economic wellbeing or efficiency and treating them as a separate consideration.

THE FUTURE DEMAND FOR AND SUPPLY OF AGGREGATE IN GREATER CHRISTCHURCH

20. In evidence presented on behalf of the Christchurch City Council dated 16 October 2015, Mr Richard English set out his forecasts for aggregate supply and demand for Greater Christchurch, the Selwyn and Waimakariri Districts and Christchurch City over the period 2014 to 2041.⁶ For Greater Christchurch, Mr English forecast total aggregate demand of 180 million tonnes and total supply from existing land based quarries and river supply⁷ of 140 million tonnes, leaving a shortfall of 40 million tonnes (i.e. around 29% of existing supply). For Christchurch City there was a forecast shortfall of 45 million tonnes, for the Selwyn District a surplus of 20 million tonnes and for the Waimakariri District a shortfall of 15 million tonnes.

⁵Sometimes economic effects can have a social dimension – e.g. employment and income effects.

⁶ See Statement of Evidence of Mr Richard Spencer English on behalf of Christchurch City Council, 16 October 2015; before the Christchurch Replacement District Plan Independent Hearings Panel; Rural (Part) Proposal (Stage 2). Mr English also used this same analysis in his evidence on behalf the Water Rights Trust and dated 2 June, 2016 before the Canterbury Regional Council Hearing Panel in opposition to the Canterbury Aggregate Producers Group application for land use consents to excavate below the highest recorded groundwater level at ten quarries located at McLeans Island, Miners Road and Selwyn Road.

⁷From the Waimakariri, Selwyn, Rakaia (part), Ashley and Eye Rivers.

21. Although aggregate supply from annual river replenishment is a useful source of additional supply, it is a relatively small contributor to overall aggregate supply in Greater Christchurch. Mr English forecast around 0.5 million tonnes per annum from rivers as compared to average annual demand over the period 2014-41 of 6.7 million tonnes – i.e. only around 7.5% of forecast average annual demand. Mr English's estimate of 0.5 million tonnes per annum from rivers for Greater Christchurch is consistent with Environment Canterbury's current estimate for the net sustainable annual supply rate of 0.25 million cubic metres (0.5 million tonnes) for aggregate that can be taken from the Waimakariri River and its tributaries which include Eyre, Cass, Bealey and Kowai Rivers and Coopers Creek. This compares with an average of 0.59 million cubic metres (1.18 million tonnes) per annum extracted from the river and its tributaries over the past 3 years (September 2015 to October 2018).⁸
22. Mr English forecast in 2015, that the remaining Christchurch rebuild would require approximately 5 million tonnes of aggregate. This is a relatively small amount in the context of total demand for aggregate in Christchurch City (130 million tonnes) and Greater Christchurch (180 million tonnes) over the longer term – i.e. out to 2041, the end of Mr English's forecasting period. Whilst in the short-term the Christchurch earthquakes have led to a significant increase in the demand for aggregate, even without the earthquakes there is an underlying (Business as Usual ("**BAU**")) increase in the annual demand for aggregate. In 2010, prior to the earthquakes annual demand in Greater Christchurch was approximately 3.2 million tonnes per annum and Mr English expected this to grow to 7.7 million tonnes per annum by 2041. For Christchurch City the corresponding figures were 2.8 million tonnes per annum in 2010 and 5.5 million tonnes per annum in 2041 and for the Selwyn District, less than 0.5 million tonnes per annum in 2010 growing to over 1.0 million tonnes per annum in 2041.
23. In his June 2016 evidence opposing the Canterbury Aggregates Producers Group's application for deeper excavation of ten existing quarries, Mr English suggested that new quarries could make up the shortfall in aggregate supply out to 2041. He also states at paragraphs 69 and 70 of his evidence that:

"The potential 'surplus' of resources recorded in the Selwyn District Council area is predominantly due to the large size of the resource held at Road Metal Ltd's quarry at Wards Road, Rolleston. This quarry is considered to be too remote, from a

⁸ Source: Environment Canterbury. Information provided by a memo dated 4 October, 2018.

transportation perspective, to be able to effectively/economically supply other than a relatively small proportion of the study area's (Greater Christchurch's) requirements, which are dominated by demands emanating from the urban areas of Christchurch City.

It is accordingly recommended for planning and transportation cost minimisation purposes that the requirements of each local authority area be satisfied predominantly from within their own boundaries."

24. The Canterbury Aggregate Producers Group's application for deeper excavation of existing quarries was unsuccessful. Since Mr English carried out his supply and demand analysis back in 2015, I am aware of only two new quarries that have been established in the Greater Christchurch sub-region – those of Frews Contracting Limited and SOL Quarries Limited, both of which are in the Conservators Road area. I am informed that neither of the quarries has gravel washing facilities, which are necessary for concrete aggregate supply.⁹
25. Developing new quarries is expensive, time consuming and uncertain due to consenting requirements and constraints. Harewood Gravels Company Limited's application for a new quarry at Conservators Road, Yaldhurst was declined on appeal to the Environment Court.

THE ECONOMIC IMPORTANCE OF LOW COST AGGREGATE SUPPLIES

26. Because of the significance of aggregate in housing, commercial and industrial buildings and community infrastructure (especially roading), enabling the provision of low cost aggregate is important to both people and community's economic wellbeing and the efficient use and development of resources. Aggregate is used in the manufacture of concrete and concrete products (e.g. blocks, pipes and paving stones), the construction and maintenance of roads and railway lines and for drainage and filtration. The construction of an average New Zealand house requires between 180 and 240 tonnes of aggregate for foundations, tiling, plastering, brick or block cladding, gib board wall linings, driveways and other landscaping, drains and soak pits and sewerage and water schemes. A kilometre of water pipe services

⁹ Source: Mr Jonathan Francis, Road Metals Company Limited. (See Evidence of Michael Copeland re An Application for Resource Consents to Christchurch City Council and Canterbury Regional Council by Road Metals Company Limited to extend quarry operations onto adjoining land and operate an aggregate processing activity; 15 March, 2018.)

requires 8,100 tonnes of aggregate and a kilometre of single highway lane requires 39,000 tonnes of aggregate.¹⁰

27. Nationally, around half of the aggregate produced is used on roads and over 20% is used in the construction of commercial and residential buildings. Central and local government work accounts for well over 50% of the quantity of aggregate used each year.¹¹
28. In a competitive market, increases in the costs of quarrying, producing and transporting aggregate will result in increased prices for aggregate used for the construction and maintenance of infrastructure and other building. Fulton Hogan's proposed new Roydon Quarry will delay the need to source aggregate from quarries located further away from points of aggregate demand.
29. Putting downward pressure on aggregate supply costs benefits businesses and residents, both directly and indirectly as ratepayers and taxpayers, since aggregate is a significant cost component of roading and other infrastructure provision and maintenance. Higher prices for inputs reduce the overall competitiveness of a local economy reducing employment, incomes and economic growth.
30. Keeping the cost of aggregate supply as low as possible was especially important in the context of the Christchurch City recovery, which was to address not just the rebuilding, repair and reinstatement of infrastructure and building that existed prior to the earthquake but also to provide for the future economic and social needs of the City. Minimising the cost of aggregate supply and use was important with respect to both of these aspects of recovery. As the City moves into the "regeneration" phase the ongoing needs of the City become increasingly important. As explained earlier in this report, the BAU demand for aggregate is expected to increase in line with future population, household and employment growth requiring additional sources of aggregate supply to be developed, quite independently from increased requirements as a result of the earthquakes.
31. Low cost aggregate supply and use is also relevant to the issue of affordable housing, since it impacts on subdivision development and home building costs.

¹⁰ Aggregate and Quarrying Association of New Zealand Incorporated; Submission on Land Use Consent to place overburden from existing Otaika Quarry onto adjoining land zoned countryside environment and partially within mineral extraction area, as defined in Operative Whangarei District Plan; 4 August, 2017.

¹¹Source: Aggregate and Quarrying Association of New Zealand Incorporated.

THE ECONOMIC BENEFITS OF MAINTAINING GREATER CHRISTCHURCH'S AGGREGATE SUPPLY COST ADVANTAGE

32. Aggregate is a low value, high volume product and its delivered cost is particularly sensitive to transport costs – i.e. the distance between its point of supply and its end use. As an approximate rule of thumb the cost of a truckload of aggregate doubles if it needs to be transported 30 kilometres from its source of supply. Beyond 30 kilometres the delivered cost continues to rise by around 20-30% for the next 30 kilometres and beyond that at a diminishing rate. This is for average priced aggregates. For higher priced aggregates (e.g. sealing chip), the higher price of the aggregate means that transport costs are a lower percentage of the delivered cost. For example, carting sealing chip 30 kilometres would typically increase the ex-quarry price by 35-40%.¹²
33. Greater Christchurch is effectively self-sufficient in aggregates as there is no need to import aggregates into the area. This self-sufficiency is of significant economic advantage to Greater Christchurch, because the cost of transporting aggregates is such a significant proportion of their delivered cost.
34. By way of example, the delivered cost of aggregate in Auckland and Wellington is estimated to be in broad terms double that for Christchurch because of the greater transport distances involved between sources of supply and points of demand and the more expensive quarrying costs from hard rock quarries.¹³ Based on average annual demand for Greater Christchurch of 6.7 million tonnes per annum over the period 2014 to 2041¹⁴, and a weighted average delivered price of \$25 per tonne,¹⁵ this implies Greater Christchurch's comparative advantage from lower cost aggregate is in approximate terms worth on average \$167.5 million per annum over the period 2014 to 2041 (or \$4.5 billion over the entire period).
35. Without the aggregate supply cost comparative advantage Greater Christchurch has compared to other main centres in New Zealand, there would be significant additional costs for local residents, businesses and in particular the Christchurch City Council and the Selwyn District Council and their ratepayers. To the extent that

¹²Source: The Aggregate and Quarry Association of New Zealand newsletter December 2016 – January 2017. (www.aqa.org.nz)

¹³Source: Based on data supplied by Fulton Hogan, Isaac Construction Limited and Mr. Richard English.

¹⁴180 million tonnes for period 2014 to 2041 - see earlier in this report.

¹⁵Source: Mr. Richard English personal communication. The estimate is based on data collected on weighted average prices for aggregate (ex quarry) and transport across a range of different aggregate products, from different quarries and to different points of demand in Christchurch.

central and local government agency budgets are fixed these additional costs may delay or prevent the provision of new infrastructure. This is particularly relevant in the context of the Christchurch regeneration being required to provide public sector infrastructure and facilities to secure additional private sector investment and initiatives, which will underpin Selwyn and Christchurch's future economic growth, economic and social well being, resilience and overall prosperity.

THE ECONOMIC BENEFITS OF THE NEW ROYDON QUARRY

Reduced Aggregate Transport Costs

36. Without consents being granted for the proposed Roydon Quarry, there will be additional aggregate transport costs and in the case of transporting additional unprocessed aggregate material to the Fulton Hogan's existing quarry sites for processing additional handling costs. As discussed earlier in this report since aggregate is a low value high volume product the delivered cost of aggregate is very sensitive to transport costs. For example, Mr Richard English in rebuttal evidence on behalf of the Christchurch City Council before the Christchurch Replacement District Plan Independent Hearings Panel and dated 6 November 2015 stated that if the shortfall in aggregate resources for Christchurch City were to be sourced from new quarries an additional 15 kilometres from the sources of demand (i.e. above current cartage distances), the additional transport costs would be approaching \$200 million. This would equate to a delivered aggregate price increase in the order of 15-20%.
37. The transport costs associated with the movement of aggregate incorporate both the running costs of operating vehicles (such as fuel, oil, tyres, and distance-related vehicle depreciation) as well as the standing (or time) costs associated with owning and operating a vehicle (time-related vehicle depreciation, insurance, driver's wages and required return on capital). Included in vehicle running costs are road user charges, which are a proxy for the cost of maintaining the road, as well as including a contribution towards new capital works for enhanced road capacity and safety. Road user costs are distance related, and since they are a function of the number of heavy vehicles using a section of road, so are road maintenance costs.
38. There are also three important external effects (or "externalities") associated with road transport, and which need to be taken into account. Firstly, there are the environmental benefits associated with reduced road transport including reduced emissions of CO₂ and other pollutants. Secondly, there are reduced road accident

costs, which are not internalised in freight rates. These include reduced costs to other traffic and public health and policing agencies. Thirdly, there are reduced congestion effects of road transport for other road users. Congestion cost reductions in this context relate to lower vehicle running and standing costs and travel time costs for users of the road other than the trucks carting aggregate.

Other Economic Efficiency Benefits of the Roydon Quarry Site

39. The main text of the AEE has set out the factors which led to Fulton Hogan choosing the Roydon Quarry site for development. Some of these relate to Fulton Hogan's assessment of the comparative advantages of this site with respect to alternative sites relating to obtaining consents for the proposed development. However other factors relate to comparative efficiency benefits in developing the site and producing aggregate from it. These factors include:

- a. The quality of the resource enabling Fulton Hogan's to produce a full range of high quality aggregate products;
- b. Proximity to major road network links and the rail network for potential future access;
- c. The amount of the resource available enabling the development to benefit from economies of scale – i.e. the processing equipment and infrastructure required for the development does not need to be duplicated at a number of smaller sites and can be used for its full economic life rather than for only a more limited time period;
- d. The ability to have land rehabilitation of parts of the site soon after aggregate is extracted from it, thereby improving plant logistics and scheduling efficiencies¹⁶; and
- e. The ability to retain much of the site as an operational farm – prior to it being quarried it can continue as pasture and after it is quarried it will quickly be rehabilitated to pasture (or land for forestry development).

40. These economic efficiency benefits accrue in the first instance to Fulton Hogan, but as explained in the next section of this report also lead to benefits to the wider

¹⁶Some of the same equipment used to quarry the aggregate raw material will be used for rehabilitation. Because rehabilitation is done soon after quarrying there is no need to relocate plant between each of quarrying and rehabilitation activities.

Greater Christchurch community, especially those within the Selwyn District and Christchurch City.

41. Fulton Hogan regularly assesses the comparative economics of greater utilisation of recycled materials (including concrete, glass and rubber) for use as aggregate substitutes. At the present time and for the foreseeable future such materials can only be considered economic substitutes to a very limited extent, driven by recyclable material volumes availability and product quality characteristics affecting market uptake.¹⁷

Reduced Aggregate Prices¹⁸

42. Savings in the costs of producing and transporting aggregate (as described above) imply increases in resource use efficiency. However in terms of “community economic wellbeing” positive impacts will occur only if these cost savings are translated into price reductions for customers – or at least aggregate prices are maintained at existing levels for longer before cost increases are reflected in higher prices. If the proposed Roydon Quarry consents are not granted, it is likely Fulton Hogan will be faced with higher aggregate supply costs as a consequence of needing to source aggregate from an alternative location further from the points of demand and/or the need to double handle aggregate raw material. Initially Fulton Hogan may at first need to accept a reduction in the margin achieved from the sale of aggregate. The market price for aggregate supplied to points of demand in Greater Christchurch may still be largely driven by the existing supply points and there would be limited scope for the delivered price of aggregate to immediately increase significantly.
43. However with time we would expect the market to adjust to a new supply regime and with a significant supply volume¹⁹ from further afield, prices will trend upwards. The rate of increase would be largely determined by the pricing behaviour of the quarries closest to the market demand points. Increased costs for aggregate supply would be reflected in the market prices for aggregate because even though other competitors would not face these increased costs, with a tight supply situation generally, the aggregate would be “priced to market” – in other words, prices from all sources tend towards the highest cost source of supply that is required to meet demand.

¹⁷ Source: Fulton Hogan.

¹⁸ Or restraint on future price increases.

¹⁹ Either finished aggregate products or aggregate raw material trucked to Fulton Hogan’s other existing quarries for processing.

44. The new Roydon Quarry will help delay the time when higher cost sources of aggregate must be utilised and therefore help to delay increases in the delivered price of aggregate. Higher prices for aggregate raise the costs for infrastructure projects and other building construction and maintenance. Also to the extent that central and local government budgets for the provision and operation of infrastructure are fixed, higher costs imply delays in the provision of improved infrastructure services, impacting on community economic and social wellbeing. The economic importance of maintaining the lowest possible prices for aggregate within Greater Christchurch has been covered earlier in this report.

Retained Employment, Incomes and Expenditure

45. The new Roydon Quarry is expected to retain 10 to 12 jobs, with annual wages and salaries of around \$0.5 million to \$0.7 million per annum. Expenditure with local businesses is expected to average \$9.5 million per annum.²⁰ Without the new Roydon Quarry it is likely similar jobs, income and expenditure will be created at an alternative site or sites but the jobs and incomes possibly not within this particular part of the Selwyn District.

POTENTIAL ECONOMIC COSTS OF PROPOSED ROYDON QUARRY

Alternative Land Uses

46. The current uses of the site is for pastoral farming, with 4 existing dwellings and pasture, shelterbelts and farming infrastructure on the remainder of the block. The proposed development of the quarry will involve only limited parts of the site being required for quarrying activities at any one time and the land being rehabilitated progressively. However, the temporary loss of land for alternative uses is not an external cost of the proposed Roydon Quarry development. Fulton Hogan, in purchasing the land, has paid a price reflective of future net returns from alternative uses for the land. Such costs are not costs to be borne by the wider community.

47. Also because Fulton Hogan paid the market price for the land, the quarrying of the land and its subsequent rehabilitation is the best use of the site in economic terms, as judged by the market.

²⁰ Source: Fulton Hogan.

Public Infrastructure Costs

48. Externality costs can arise when utilities provided by central or local government (e.g. roads, water supply, storm water and flood control systems and wastewater disposal) are not appropriately priced. In the case of Fulton Hogan's Roydon Quarry no such externality costs will arise. The Quarry will be completely self-sufficient with respect to water supply and wastewater disposal. In addition to road user charges, and roading costs payable as part of the annual rates, Fulton Hogan will meet the costs of the proposed relocation and modification of the Jones Road/Dawson's Road intersection to ensure adequate capacity in the local network and to improve road safety.

Local Road Congestion Costs

49. An analysis of the traffic effects of the proposed Roydon Quarry development has concluded that the proposed access and egress arrangements will accommodate the volumes of vehicles envisaged and that the traffic generated will be safely and efficiently accommodated within the adjacent road network.²¹

CONCLUSIONS

50. Community economic wellbeing and the efficient use and development of resources are relevant concepts under the RMA.

51. For the period 2014 to 2041, Greater Christchurch is forecast to have total aggregate demand of 180 million tonnes, aggregate supply from existing land based quarries and river supply of 140 million tonnes and therefore a shortfall of 40 million tonnes. For Christchurch City, a shortfall of 45 million tonnes is projected.

52. The Canterbury Aggregate Producers Group application for deeper excavation of existing quarries was unsuccessful. Developing new quarries is expensive, time consuming and uncertain due to consenting requirements and constraints as experienced recently in relation to the Harewood Gravels application for a new quarry at Yaldhurst.

53. Aggregate is an important component in the construction and maintenance of housing, commercial and industrial buildings and community infrastructure. Local authorities and central government are significant users of aggregate.

²¹See Fulton Hogan Roydon Quarry Integrated Transport Assessment (Draft); Stantec; October, 2018.

54. Aggregate is a low value, high volume product and its delivered cost is particularly sensitive to its transport costs. Greater Christchurch is effectively self-sufficient in aggregates as there is no need to import aggregates into the area. This self-sufficiency is of significant economic advantage to Greater Christchurch, because the cost of transporting aggregates is such a significant proportion of their delivered cost.
55. Fulton Hogan's proposed new Roydon Quarry will give rise to the following economic benefits:
- a. Lower aggregate transport costs;
 - b. Lower aggregate production costs;
 - c. Lower aggregate supply prices; and
 - d. Retention of employment and incomes in the local economy.
56. The new Roydon Quarry will not result in economic externality costs.
57. The new quarry is consistent with community economic wellbeing and the efficient use and development of resources.