
Regional Demand Forecasts for Aggregates in Wellington



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1. Background

KPQ is strategically located in Ngauranga Gorge, on State Highway 1 within Wellington City. The quarry is a hard rock quarry extracting greywacke. The KPQ site also hosts:

- An asphalt plant owned and operated by Downer, and
- A concrete plant owned and operated by Allied Concrete in which Holcim has a 50% holding.

There are long term supply agreements in place with these businesses which provide both long term stability and sales, with the advantage of having exposure to both roading and construction based sales. This provides balance if there are short term fluctuations in either market. There is reasonable ability to adjust production between either market.

There are limited sources of aggregate material in the region. The greywacke rock resource reserves along the Wellington Fault have for many decades been the prime source of the hard rock quarried for use in the wider Wellington and Hutt Valley areas. Ngauranga Gorge has been quarried for over 100 years.

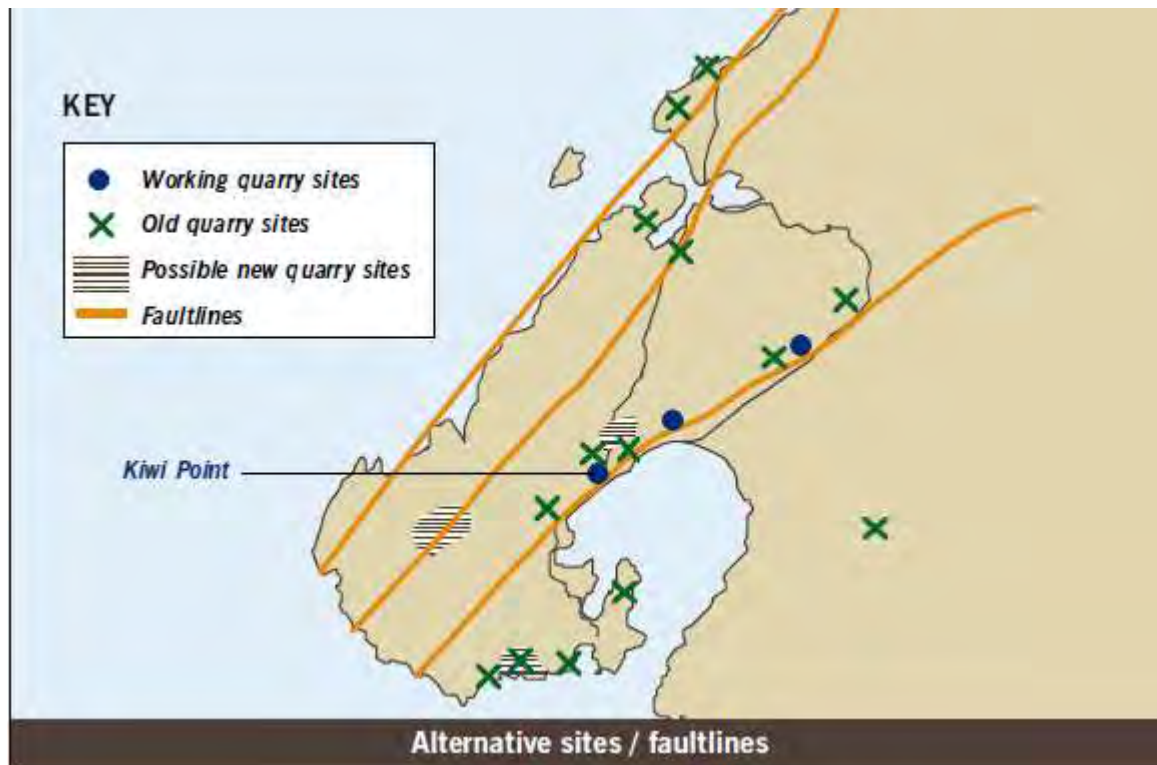


1920 Quarry activity in Ngauranga Gorge:Track & Stream (Alexander Turnbull Library)

2. Regional Rock Resources and Alternatives

Location of rock resources

The three main existing Wellington quarries (Kiwi Point, Belmont and Horokiwi) are all located adjacent to the Wellington Fault. This has lifted greywacke available for extraction. There are many older and abandoned sites.



Generic barriers to quarrying

The Commerce Commission notes the following barriers to entry in the quarry and aggregate industry:¹

- Appropriate Resource. In Wellington, the greywacke resources are located on major fault lines.
- Land. Land needs to be available next to the appropriate resource.
- Equipment/capital. The hard rock quarries in Wellington take a reasonable investment in equipment.
- Resource consent.

New quarry sites would run into considerable difficulty to be established due to these factors. Consenting activities would also need to be considered in relation to the District Plan provisions with potential sites in the Wellington region more likely to be zoned 'rural' or 'open space B' which would likely require a plan change. Transport and trucking of materials would provide a significant impact on infrastructure.

¹ Commerce Commission decision: [file:///C:/Users/Philip/Downloads/Fletcher-Building-Holdings-NZ-Ltd-Higgins-Group-Holdings-Ltd-and-Horokiwi-Quarries-Ltd-clearance-application-16-February-2016%20\(1\).pdf](file:///C:/Users/Philip/Downloads/Fletcher-Building-Holdings-NZ-Ltd-Higgins-Group-Holdings-Ltd-and-Horokiwi-Quarries-Ltd-clearance-application-16-February-2016%20(1).pdf)

Alternative sites for Aggregate extraction

The Wellington region was initially estimated to have around 84 million tonnes of extractable resource². About 32-36 million tonnes are estimated still to be available. The other main potential rock resources in the Wellington region are the Makara area (centered around Quartz Hill), Owhiro Bay Quarry, and the Northern Ngauanga Gorge. There would be considerable difficulties accessing these resources.

- Makara/Quartz Hill. This area is located on a ridgeline running above the Makara Road on a South West orientation. The easterly flanks of this ridge may represent a large area of accessible hard rock resource. However, there would be significant issues accessing this resource:
 - Meridian's wind farm is located along the ridgetop and is a valuable wind resource with a large investment in turbines. The cost of acquiring and accessing this land would be considerable.
 - The ridge including Quartz Hill and White Rock Hill to the southwest was included in the ridgeline and hilltop overlay for protection under the District Plan.
 - Transport and access would present major difficulty as the roads from Karori to Makara and through the Owhariu valley to Johnsonville are currently small and narrow. Widening and straightening them would be challenging, particularly in Makara valley. Karori Road is also heavily used and congested at peak times and the presence of heavy trucking would cause significant impacts. The Owhariu route is much longer with similar challenges.
 - Amenity & landscape values. The Makara Road is a popular scenic route for drivers and cyclists. While most visual impacts could be hidden depending on the location of the quarry operations, trucking and noise would be detrimental to the amenity values. The local community are also sensitive to noise and disruption (as evidenced in their opposition to the Wind Farm construction).
 - Accessing this or other resource in the Makara beach area or from the western side and attempting to transport through the Coastal Area (e.g. by barge) would present significant logistical and environmental challenges. There is some DOC land, a Coastal walkway and limitations on activities in the coastal area (let alone the logistical challenges of operating on an exposed coast and barging back to some other port facility through Cook Strait).

However, in the next 20 years this resource may need further assessment as to its potential. This would be prudent to carry out in during the lifespan of the existing Wellington quarries to test out the resource availability, and whether there were any logistical solutions that could enable extraction.

- Northern Ngauranga Gorge. On the North Side of SH1 across from Kiwi Point Quarry is a potential resource. It likely has similar rock characteristics to the existing KPQ operation. The issues accessing this resource would include:
 - Land access as there is subdivision on the top of the hill for lifestyle blocks.
 - Operational constraints as there is little space separating SH1 and the steep upper slopes. On the eastern side the North Island Main Trunk Line (railway) would constrain access.
 - Landscape and amenity values as the area has been included in the ridgetops and hilltops overlay in the District Plan, and there would be visual impacts from the northern Khandallah area.
 - The northern side of Ngauranga is regenerating forest, assisted by being damper and less disturbed than the southern faces. Disturbance could

– ² Applied Geology Associates, 1978. Planning for Mineral Resources in the Wellington Region.

fragment a developing ecological corridor up the gorge that links to Tyers Stream Reserve to the south.

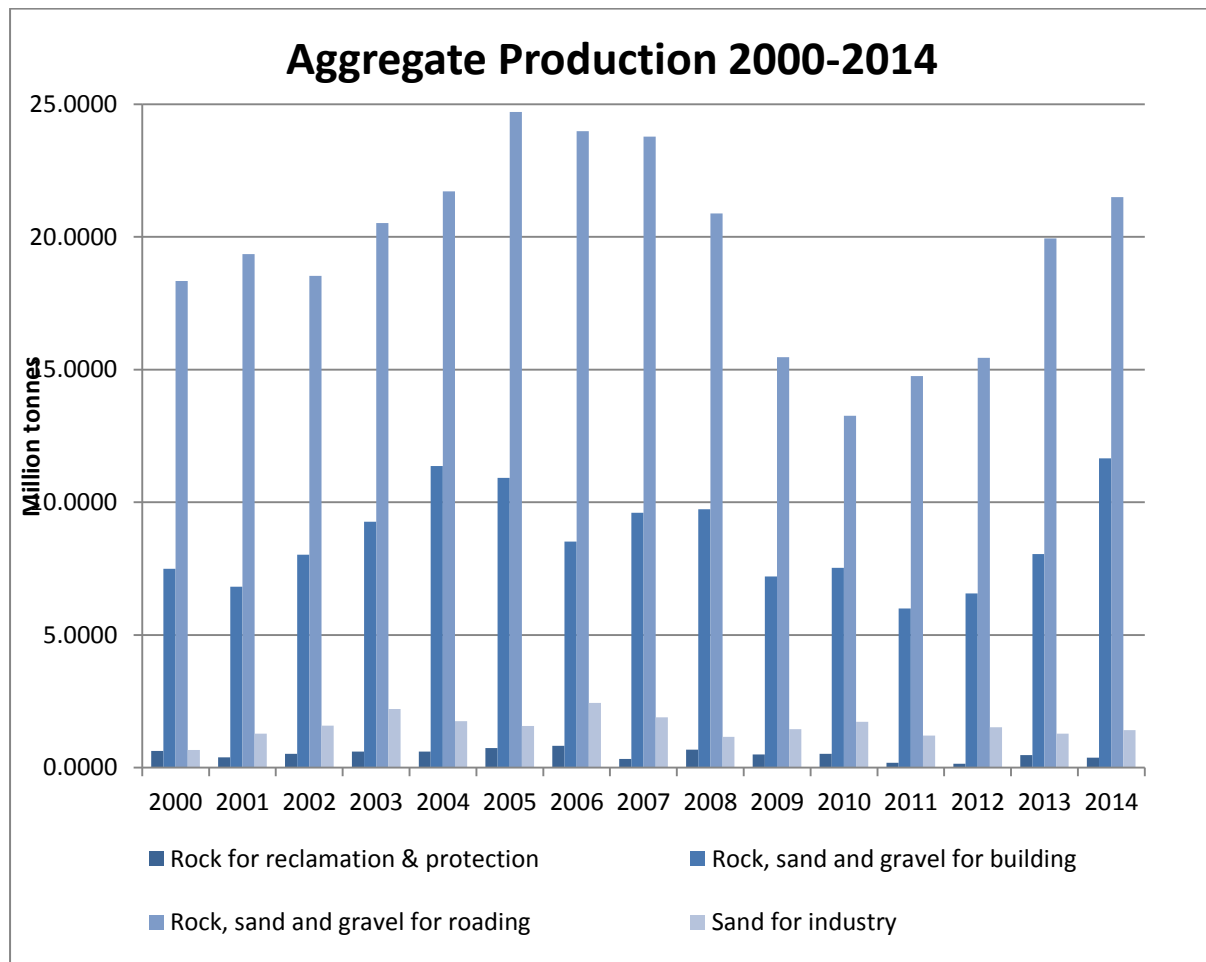
- Owhiro Bay. The former quarry at this site was closed in 1999. It was decommissioned mainly in response to concerns about environmental effects. The obstacles to this site include:
 - Commercial barriers as the terms of the Wellington's City Council purchase means the Council cannot reopen the quarry as of right.
 - Previous works and rehabilitation which means that accessing resource would require significant land modification.
 - Considerable public opposition to activity in the coastal area. This is an important recreation resource for the public accessing the wild south coast including walkers and mountain bikers. The quarry also lies within an area of special value to local iwi with cultural sites for protection. Given a main reason for public pressure closure was environmental effects in the coastal area reopening this quarry or nearby would be highly contentious.
 - Transport up the Happy Valley would add to the landfill trucking impacts.
 - Access from Happy Valley (landfill) side was considered during the quarry closure process and was not considered feasible as access to high quality rock was constrained by intervening overburden and poor rock.

In the wider region there are limited other possibilities. Plimmerton quarry was closed due to the environmental effects of trucking through the village and was a limited resource. The Regional Council holds consents for extraction of aggregate from the Hutt River but that is specifically aimed at river management activities and is not a reliable material for supply.

3. Current Wellington Market

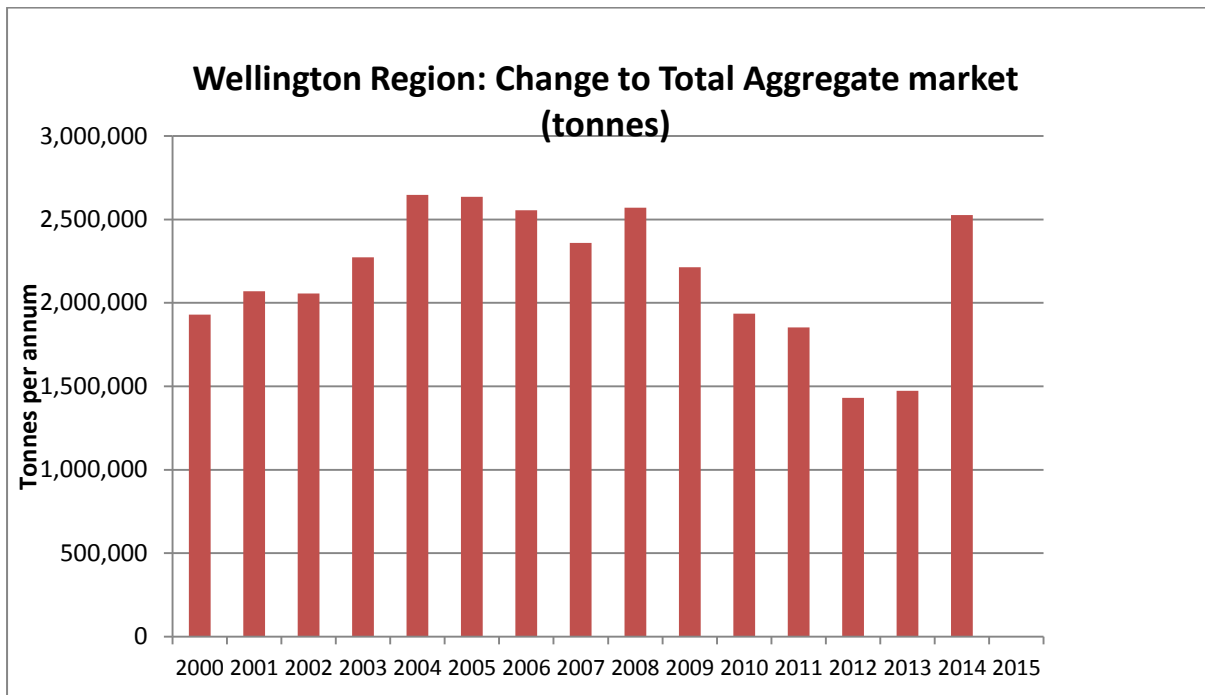
National Production

Nationally, aggregate production has been somewhat cyclical. Following the global financial crisis in 2008 there was a major downturn. From 2013 there has been a significant reinstatement of production levels³:

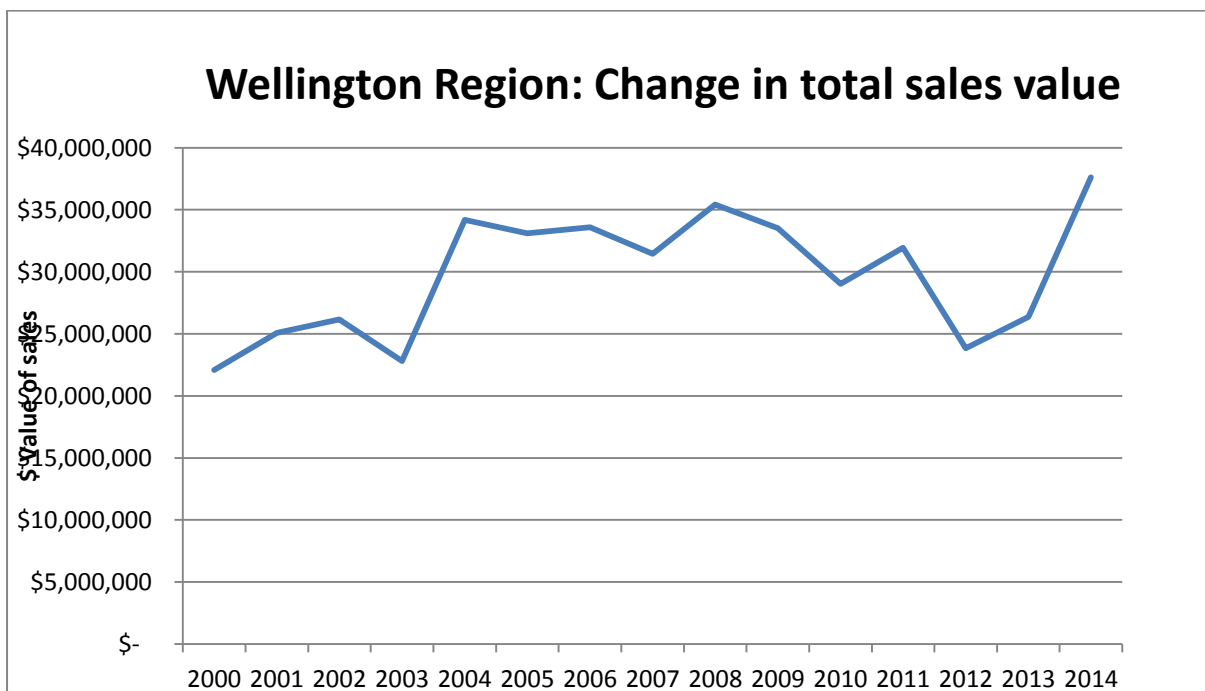


³ Source: <http://www.nzpam.govt.nz/cms/investors/doc-library/minerals-industry-snapshot-files/aggregate-production-1993-2014.xls>

The Wellington market has been less extreme but has also rebuilt in terms of tonnage and value⁴ with a 70% increase from 2013 to 2014.



Sales value has also increased:



⁴ Regional production figures from <http://www.nzpam.govt.nz/cms/investors/doc-library/minerals-industry-snapshot-files/> (downloadable spreadsheets by year).

4. Market Outlook

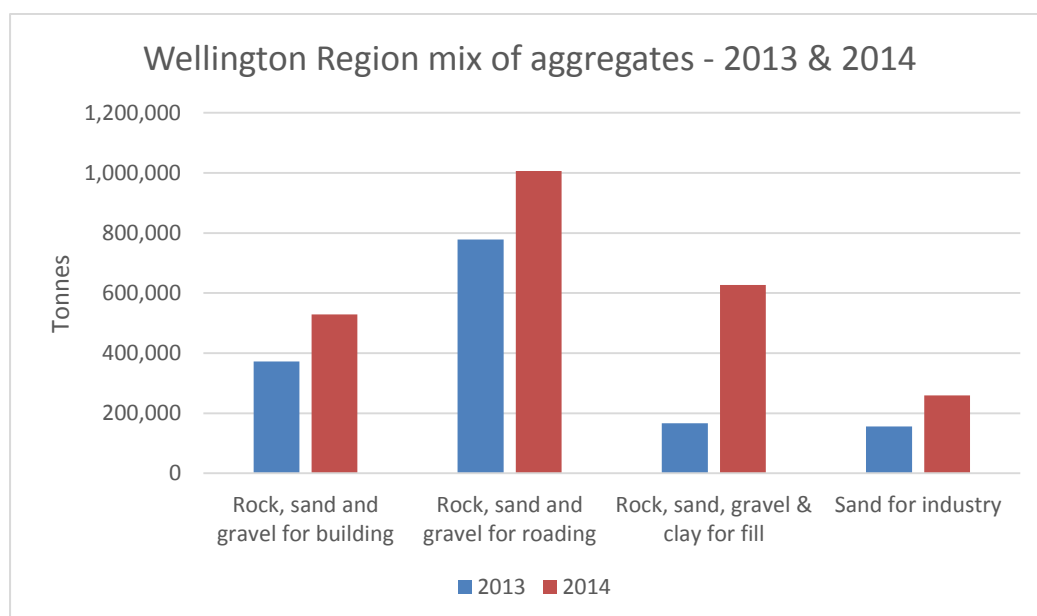
Underlying demand for aggregate

There is an underlying demand for aggregate for a wide range of uses in building, roading and infrastructure. The 'rule of thumb' is that the per capita consumption rate is about 8 tonnes per person per year⁵. Of course that consumption is averaged out. Some examples of drivers of aggregate use are:

- A new house uses approximately 250 tonnes of aggregate including foundations, retaining works, drains, cladding, linings, driveways and landscaping etc.
- 1 km of motorway uses 4,000 tonne of aggregate from basecourse to sealing chip.

In addition, commercial construction, drainage and other uses all require aggregate inputs.

In the Wellington Region, the estimate of usage is about 6.3 tonnes per year for a total of about 2.5 million tonnes. The mix of aggregates is as follows:



Population forecasts and development

The population of Wellington City is expected to rise by about 0.64% per annum between 2013 and 2043, from 203,933 to around 246,692⁶. Slightly lesser increases are forecast for other regional areas.

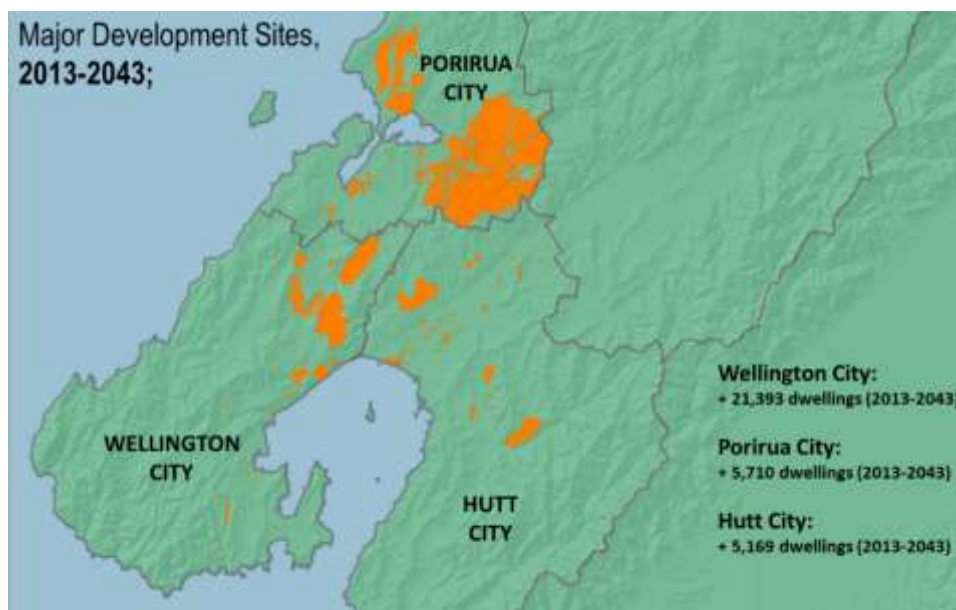
While there are around 800 building consents for new dwellings per annum in Wellington, the Housing Accord aims to increase this from 1000 to 1500 per annum through to 2019. Hutt City and Wellington City Council policies are to increase intensification, particularly around transport hubs and for more multi-storey buildings.

The following is an outline of major development sites for forecast building:⁷

⁵ Source" Aggregate & Quarry Association 2002

⁶ This is the Wellington City Council forecasts: see <http://forecast.idnz.co.nz/wellington>

⁷ <http://blog.id.com.au/2016/population/new-zealand/forecasting-in-new-zealand-building-regional-knowledge-in-the-wellington-region/>



So for example, 21,000 new dwellings would indicate about a resource demand of 5 million tonnes.

Specific projects and infrastructure

Nationally there is a current strong focus on infrastructure development including Roads of National Significance (RoNS) and on improving regional links⁸. There are considerable opportunities for growth in the Wellington market. From the National Construction Pipeline⁹ the following is specific to Wellington for the period up to 2019:

- All building and construction is expected to grow by 38% (better than the national average of 32%);
- Residential building expected to grow by 21%; and
- Non-residential building and construction forecast to grow by 49%.

The peak of construction is in 2017 with \$3 billion of works forecast.

The planned non-residential works in Wellington include:

- Roothing. In total over the next 10 years NZTA projects \$5.4 billion in roading within the Wellington region.
 - RoNS including McKays to Peka Peka (M2PP), Transmission Gully, Waitangirua and Whitby links.
 - Link road development including SH1 development through Wellington (Aotea Quay to Ngauranga, Airport to Mt Vic Tunnel, etc.); and Petone to Grenada links.
- Wellington Airport including \$635 million on the Master Plan for terminal upgrade, hotel development, car park extension and apron development. This does not include the \$300 million runway extension for which resource consent is being planned.
- Retirement villages (Boulcott and Petone) and health infrastructure (e.g. Wakefield Hospital expansion).
- Education Sector developments.
- Other civil works and construction (including water and wastewater projects)

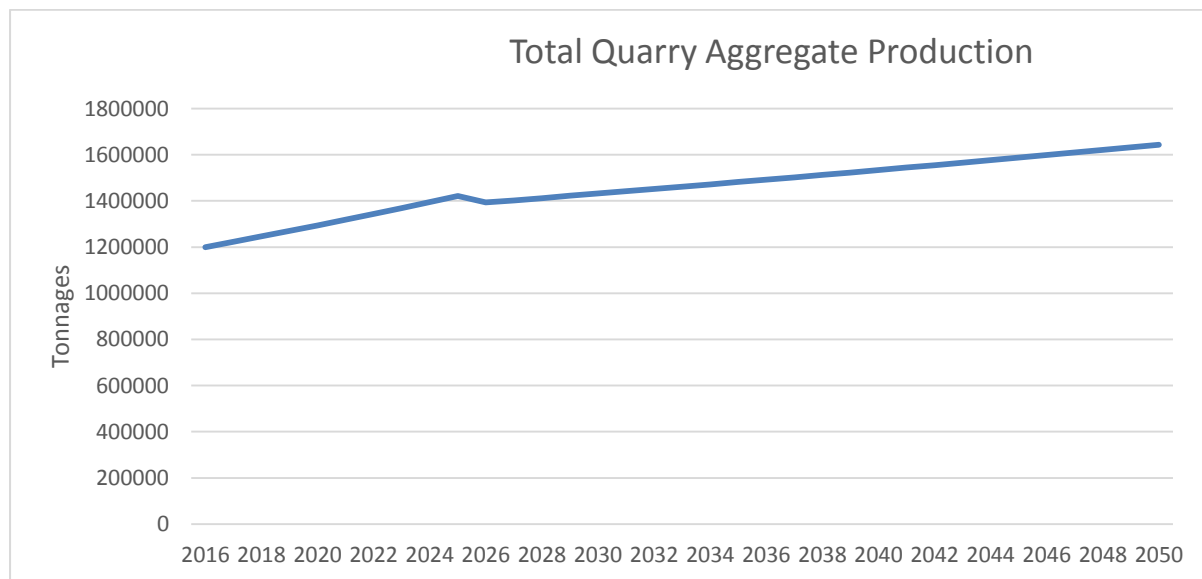
⁸ <http://www.insideresources.co.nz/news-story/19694/govt-confirms-transport-spend-over-next-ten-years>

⁹ "National Construction Pipeline", October 2014 prepared by BRANZ, Pacifecon, and MBIE.

The \$300 million Wellington Airport Runway extensions (if approved and funded) would require a significant amount of rock material. They estimate 150,000 cubic metres of primary armour or akmons and 137,000 cubic metres of secondary armour will be needed, plus concrete to form the rock and dyke wall, with a further 1.5 million cubic metres of fill material like fine gravel or dredged material for the land mass. South Island sources may be looked at, as well as possibly timing in construction with a second tunnel from Mt Vic supplying some rock¹⁰.

Forecast of Wellington Production and Demand

Combining the current known demand and projects (not including the runway extension), and the underlying population and new dwelling forecasts substantiates the following aggregate production¹¹:



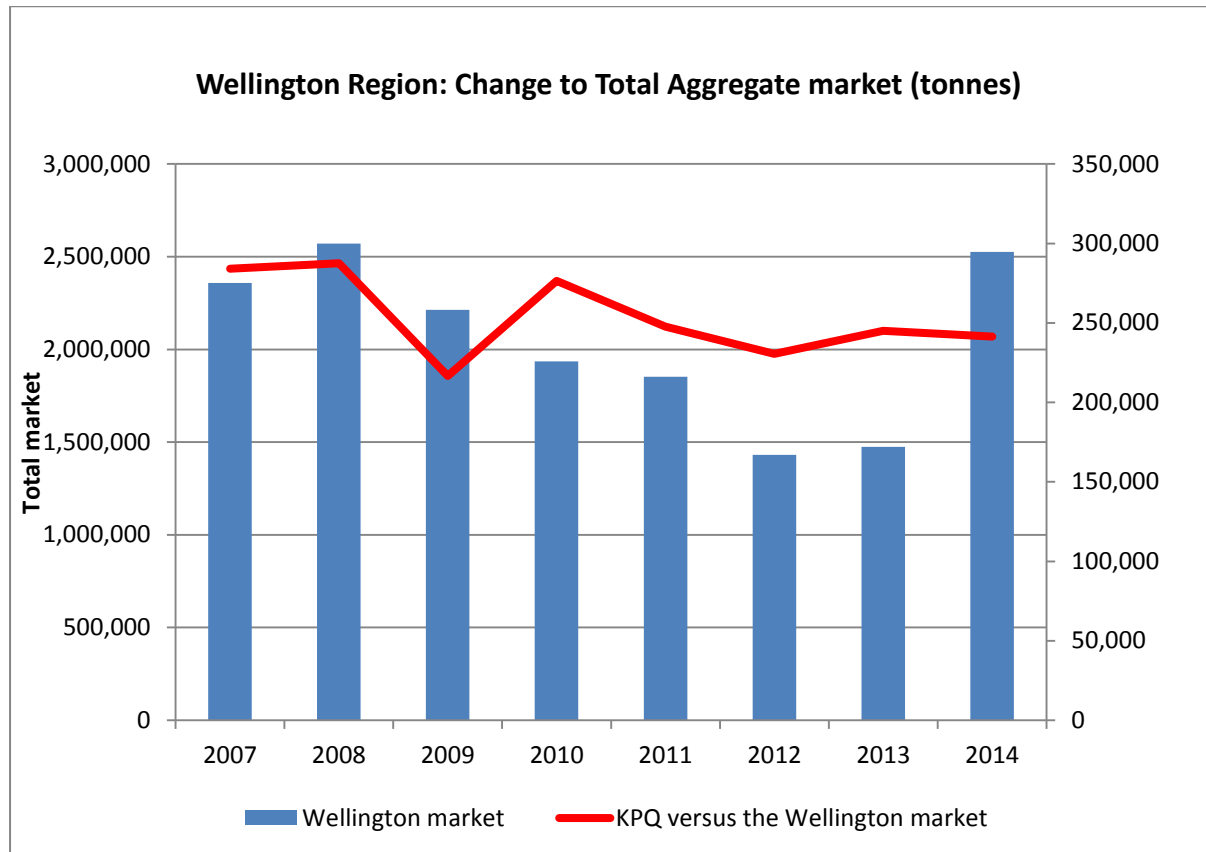
¹⁰ <http://www.insideresources.co.nz/news-story/19720/wellington-airport-extension-may-source-south-island-rock>

¹¹ This is based off the 3 major quarries in the area around their core product sets and does not include overburden etc.

5. Relative market supply

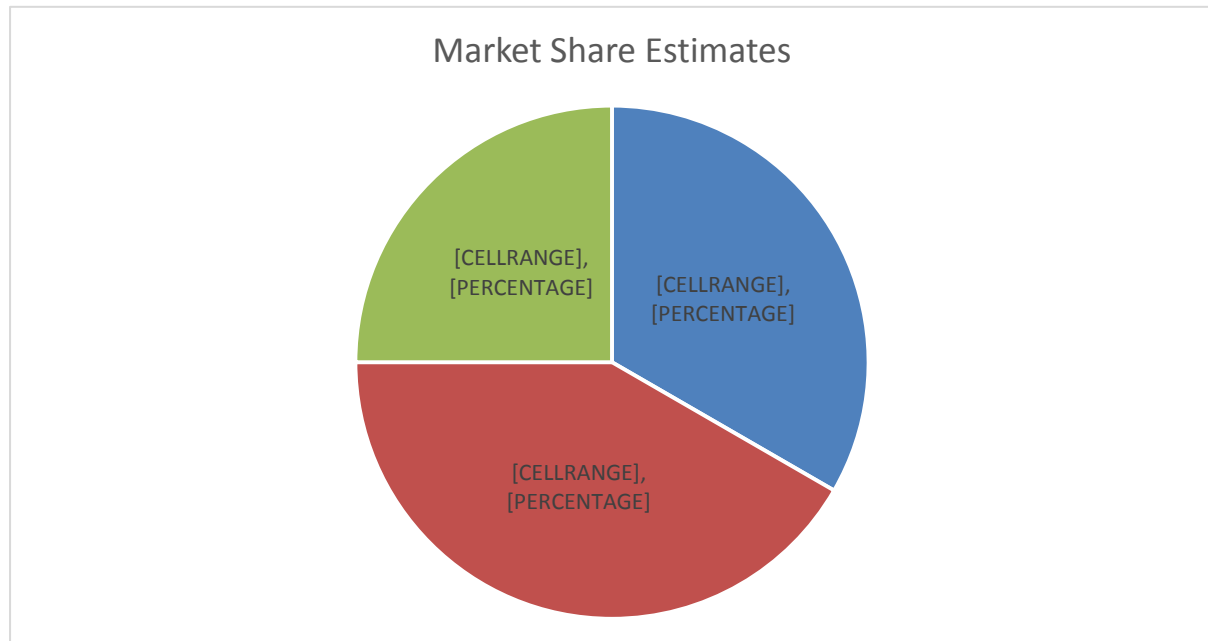
Performance relative to market:

KPQ volumes are fairly consistent against the total market:



The market share estimates for the three regional quarries are as follows:¹²

¹² Based on reported tonnages from Inside Resources. Note that KPQ is listed as 350,000 tonnes in this, there well may be padding of all participant numbers.



Product Mix

All quarries produce a range of material. While Belmont and Kiwi Point Quarry have traditionally had more ability to produce higher grade roading product, there is reasonable ability for any of the quarries individually or together to support the construction or roading markets from all quarries.

Barriers to entry and supply

With road or alternative haulage costs a significant factor in supplying quarry products there are barriers to non-local entry into the market. Local haulage costs are also a significant factor of the cost. The three Wellington based quarries have both the resource and the location for the immediate Wellington market.

Lifespan with KPQ Plan Change

Both Belmont and Horokiwi appear to have sufficient resources in the medium term.

- Horokiwi has a forecast of about 20 years of resource remaining¹³.
- Belmont had a plan change approved in 2014 that gave it access to additional resources of about 10 million cubic metres. This additional resource also improved their access to higher-quality resources. This is thought to extend the current life of the quarry to around 40 years¹⁴.

If KPQ also gets the required Plan Change, then the supply outlook is as follows:

With KPQ Plan Change	2015	2020	2025	2030	2035	2040	2045	2050	
KPQ									
Belmont									
Horokiwi									

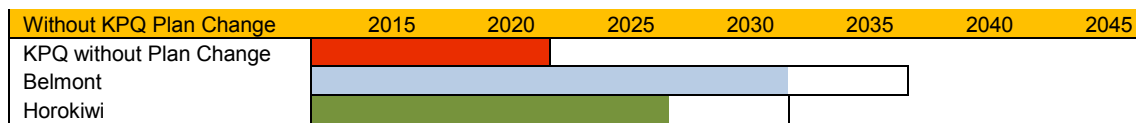
Note that means there is an opportunity around 2030 for reduced competition, higher demand from KPQ and potential increase in pricing.

¹³ <http://www.insideresources.co.nz/news-story/19374/horokiwi-pushes-ahead-quarry-development>

¹⁴ <http://www.insideresources.co.nz/news-story/14999/winstone-prepares-belmont-expansion>

Lifespan without KPQ Plan Change

Without the Plan Change, then there is a more severe supply outlook.



KPQ resources would be exhausted by 2020 and while a limited amount of material could be taken from the Southern area (already consented) that would not be of high quality or be particularly viable. The loss of access to high quality resource would speed up the utilisation of resources from the other two quarries. Belmont is likely to be significantly impacted – it is expected that it would be able to gear up for higher demand – and continue to supply a full range of high quality products. There would be opportunity for increased prices due to lessening competition in this period, as well as additional transport costs for southern and western areas of the Wellington region.

Demand/supply risks

Given the constancy of historical demand for aggregates it is hard to envisage significant downside risks to demand. More likely are potential increasing demands. This may be from higher levels of construction/intensification and infrastructure development or from re-building from one-off events. GNS has estimated the risk of a large (>magnitude 7.5) earthquake on the Wellington Fault as 10% in the next 100 years¹⁵. The experience from Christchurch is that following their earthquakes there was considerable demand for quarry materials to support re-building. However, a lesser earthquake, such as Wellington experience in 2013, can also trigger considerable demand e.g. to strengthen or replace earthquake prone buildings.

¹⁵ www.gns.cri.co.nz