

# WELLINGTON CITY COUNCIL

## **Proposed Plan Change 83**

Kiwi Point Quarry

### **s42A Report – Appendix 5**

Landscape and visual effects

#### **Report Date**

19 November 2018

#### **Hearing Date**

10 December 2018

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## Attachments

- Attachment 1: Regenerating vegetation on road batters at the Newlands interchange
- Attachment 2: Kiwi Point Quarry Open Space Assessment, Boffa Miskell Ltd, February 2001
- Attachment 3: Project Description and Landscape and Visual Assessment for Kiwi Point Quarry, Boffa Miskell Ltd, September 2003
- Attachment 4: ZTV maps and additional viewpoint photographs

## INTERPRETATION

This report utilises a number of abbreviations for brevity's sake as set out in the glossary below:

Abbreviation	Means...
"the Act"	Resource Management Act 1991
"the Council"	Wellington City Council
"LVEA"	Landscape and Visual Effects Assessment
"the Operative Plan"	Operative Wellington District Plan 2001
"PC83"	Proposed Plan Change 83
"the plan change"	Proposed Plan Change 83
DEM	Digital Elevation Model
"QMP"	Quarry Management Plan
"RMA"	Resource Management Act 1991
"RPS"	Regional Policy Statement for the Wellington Region (2013)
ZTV	Zone of theoretical visibility (viewshed)

# 1.0 REPORT INTRODUCTION AND SUMMARY

## Report Author

- 1.1. My name is Boyden Henry Evans. I am a NZILA Registered Landscape Architect and a Partner at Boffa Miskell Limited ("**Boffa Miskell**"), a New Zealand-owned consulting company of environmental planners and designers.
- 1.2. I have a Bachelor of Science in botany and pedology from Victoria University of Wellington and a post graduate Diploma in Landscape Architecture from Lincoln University. I am a Fellow of the New Zealand Landscape Architects (NZILA).
- 1.3. I have been a landscape consultant with Boffa Miskell since 1986 and have worked on a range of projects for corporate and private clients and for territorial authorities and government agencies in various parts of New Zealand. This work includes district and regional landscape assessments and resource studies, landscape and visual effects assessments, including preparation of visual simulations, for many types of development projects. These include infrastructure projects, such as quarries, new highways, wind farms, transmission lines, and rural lifestyle and residential subdivisions. I have also been involved in many site rehabilitation and revegetation projects and have prepared master plans and management plans for reserves and other areas.
- 1.4. I have prepared landscape and visual effects assessments for several quarry projects that involve extensions to existing quarries or relate to overburden disposal areas associated with quarries. Several of these projects have entailed preparation of landscape mitigation proposals and rehabilitation strategies and plans and overseeing the implementation of these.
- 1.5. I have been asked by the Council to prepare this addendum to the s42A report on Proposed Plan Change 83.
- 1.6. Along with contextual information and other matters of fact, this report includes my personal views and recommendations on the proposal. These views and recommendations are my own, except where I indicate otherwise.

- 1.7. Though not a requirement of Council plan change hearings, I have read and agree to abide by the Code of Conduct for Expert Witnesses and have prepared this report in accordance with it. The report content is within my area of expertise except where stated otherwise. I have not omitted to consider the material facts known to me that might alter or detract from the opinion expressed in this report.
- 1.8. In some instances, I have relied on the evidence of Mr Stephen Fuller (Ecology).

### **Report Scope and Structure**

- 1.9. This report addresses landscape and visual effects issues relevant to the plan change.
- 1.10. More specifically, my report covers the following:
- a. **Section 2** briefly identifies the submissions that have raised landscape and visual effects matters;
  - b. **Section 3** includes a summary of the submitted application documents related to landscape and visual matters, having regard to relevant strategic direction from the RMA and other higher order planning documents.
  - c. **Section 4** contains recommendations for additional information to be supplied in relation to landscape and visual matters raised.
  - d. **Section 5** contains recommendations for changes to the Plan Change wording to address some of the issues raised.
- 1.11. The application contains several documents which relate to landscape and visual issues (Isthmus Group Urban Design and Landscape Report, November 2016; visual representations produced by Isthmus Group, July 2017; Ormiston Associates Report, July 2015; Ormiston Associates Rehabilitated Quarry Plan, September 2016; Wildlands' Revised Draft of Mitigation Options for the Potential Loss of Indigenous Vegetation and Habitat at the Proposed Kiwi Point Quarry, Wellington). I have reviewed these reports. I have also referenced two earlier reports prepared by Boffa Miskell on the Kiwi Point Quarry site: an open space assessment carried out in 2001, and a subsequent landscape and visual effects assessment dated September 2003.

- 1.12. I have also considered the evidence of Mr. Fuller (Ecology) on the basis that an integrated rehabilitation approach is most likely to deliver overall benefits.
- 1.13. My discussion also includes matters covered at the Landscape Expert Conferencing (B Evans and G Lister 12<sup>th</sup> July 2018).
- 1.14. I have also reviewed the Plan Change documentation (S.32), the current Quarry Management Plan (2014) and the Progressive Rehabilitation Plan (2005).
- 1.15. Attached to the report are the following:
- a. **Attachment 1** contains comparative views of regenerating vegetation on road batters at the Newlands interchange in 1998, 2003 and 2018;
  - b. **Attachment 2** contains the Kiwi Point Quarry Open Space Assessment, Prepared by Boffa Miskell Ltd for Wellington City Council, February 2001;
  - c. **Attachment 3** contains the Project Description and Landscape and Visual Assessment for Kiwi Point Quarry Prepared by Boffa Miskell Ltd for Wellington City Council September 2003; and
  - d. **Attachment 4** contains ZTV maps of the permitted development and the proposed plan change, and additional photographs from viewpoints to the northeast and south of the proposal.

### **Summary of key findings and recommendations**

- 1.16. The site is identified by the plan change s32 report and submitters as an important part of the 'gateway experience' into Wellington City, with high visibility from SH1 and distinct special qualities which contribute to the City and its sense of place. The landscape and visual value of the Ngauranga Gorge is clearly outlined in the plan change, but no discussion is provided on the landscape and visual effects of the proposal on this area. The submitted plan change information in the s32 report identifies there are views towards the site from the surrounding area, including from residential properties, though quarrying forms a part of the existing setting of these properties and the Ngauranga Gorge.

- 1.17. The site is not identified as an outstanding natural feature, an outstanding natural landscape, or a special amenity landscape under the RPS. Both the preliminary urban design and landscape report by Isthmus and the Section 32 report identify that the Plan Change has the potential for “moderate to significant adverse ecology and landscape effects”. However, the supporting ecological and landscape reports both identify “significant” ecological and landscape effects.
- 1.18. Defining the potential viewing audience and the level of visual effects needs further attention. While a series of visual simulations were included there are gaps, which could have been avoided. The scale of the changes from some residential locations have not been fully addressed and several submissions highlighted that more information and details are required. Submissions also identified shortcomings in the landscape and visual mitigation measures and site rehabilitation.
- 1.19. I am unconvinced by some of the mitigation and site rehabilitation measures set out in Wildlands report (November 2018, Revised Draft), which expanded on earlier drafts of this report.
- 1.20. I have identified the need for further information to address the issues raised in submissions, including:
- a. A landscape and visual effects assessment (LVEA) which considers the effects on the landscape as a resource in its own right, and visual effects; that is effects on specific views and the general visual amenity experienced by people. The LVEA should consider methods to avoid, remedy or mitigate potential adverse effects during the operational quarry period and during/following rehabilitation.
  - b. The LVEA should include a series of figures, including:
    - i. A plan illustrating extent of permitted and proposed footprints;
    - ii. A computer-generated Zone of Theoretical Visibility (ZTV), comparing the visual footprint of the permitted development compared to the proposed;
    - iii. The five representative views updated to compare the existing situation with what might be achieved under the current District

- Plan permitted activity provisions ('Option 2' in the s32 Report) and the proposed Plan Change ('Option 4'), together with:
- iv. An additional photo simulation from a viewpoint travelling north up the Ngauranga Gorge which compares the existing situation, current District Plan permitted activity scenario, and proposed plan change scenario; and
  - v. At least two additional photo simulations; one from the Broadmeadows residential area (above and to the west of Burma Road), and another from the Mandalay Terrace residential area (south of the proposed site), which compares the same three scenarios as (iv) above.
- c. The plan change's proposed mitigation measures require further specific information and details for this particular site. A mitigation and rehabilitation plan should include:
- i. A phasing plan to illustrate order of works and potential greatest extent of cut faces and timeframes.
  - ii. A specific rehabilitation programme with target dates, budgets and monitoring. This could include reference to the examples of the rehabilitation already occurring on the north face of the quarry.
  - iii. A scaled cross section diagram to illustrate the scale of the proposed bank adjacent to SH1 (bund for mitigation of quarry activities on the quarry floor). Vegetation planted on this bund would further enhance this bank as a mitigating feature.
  - iv. A demonstration of the adequacy of provisions and policies relating to rehabilitation and an explanation of what happens if rehabilitation is not achieved as stated.
  - v. reference to current open space policy for the area, and how the future rehabilitation of the site under the Business 2 Zone will enhance the open space corridor of the Ngauranga Gorge as a recognised gateway to Wellington City.

- d. The proposed plan methods, rules and objectives should be updated in accordance with the amendments outlined in Attachment 2 of Mr Jones' evidence.

## 2.0 SUBMISSIONS

- 2.1. Fourteen submissions raised concerns about landscape, and/or visual effects. These submissions oppose the plan change.
- 2.2. In summary, the issues raised in submissions can generally be grouped into the following categories:
  - a. the plan change (generally) will result in adverse visual effects<sup>1</sup>;
  - b. the plan change will adversely affect the landscape value of the area as a gateway to the City<sup>2</sup>;
  - c. visual representations provided are misleading regarding timeframes illustrated for the rehabilitation process<sup>3</sup>;
  - d. the proposed mitigation is ineffective<sup>4</sup>; and
  - e. further detail is required in relation to mitigation and rehabilitation, including time limits<sup>5</sup>.
- 2.3. These matters are addressed in the evaluation under section 3 below.

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<sup>1</sup> Submissions 2, 4, 8, 10, 22, 23, 26, 36

<sup>2</sup> Submissions 2, 7, 13, 18, 20, 22, 23, 26, 29, 36

<sup>3</sup> Submission 18

<sup>4</sup> Submissions 18, 22

<sup>5</sup> Submission 7

## 3.0 EVALUATION OF THE APPLICATION

### Evaluation approach and outline

- 3.1. For this section of my report, I provide my view in relation to the landscape and visual effects of the proposal, including within the scope of those points raised by submitters.
- 3.2. The discussion below includes recommendations on measures to avoid, remedy or mitigate adverse effects, should the Commissioners be minded recommending approval for the plan change.
- 3.3. I have organised my discussion in this section to address the following matters:
  - a. Relevant policy direction from:
    - i. the RMA;
    - ii. the RPS;
    - iii. the Operative District Plan; and
    - iv. the Quarry Management Plan.
  - b. A summary of the plan change documents related to Landscape and Visual Matters.
- 3.4. Specific consideration has also been given to the proposed mitigation (during operation) and rehabilitation measures (post-quarrying) supplied in the application package. Two earlier documents relating to the current quarry zoning, an open space assessment and landscape and visual assessment prepared for the quarry by Boffa Miskell in 2001 and 2003 respectively, have also been referred to.

### Relevant policy direction

Resource Management Act 1991

- 3.5. The purpose of the Resource Management Act 1991 as set out in Section 5 of the Act is to promote the sustainable management of natural and physical resources. Section 6 of the Act relates to the to managing the use, development, and protection of natural and physical resources and identifies matters of national importance, including the requirement to protect

outstanding natural features and landscape from inappropriate subdivision, use and development.

- 3.6. No Section 6 matters are relevant to the assessment of this project in relation to landscape and visual effects. The Site is not an outstanding natural feature or landscape and there are no outstanding natural features or outstanding natural landscapes in the vicinity.
- 3.7. However, the RMA contains other provisions relevant to landscape and visual effects of relevance to the Site which include the need to have particular regard to:
- a. Section 7(c) – the maintenance and enhancement of amenity values; and
  - b. Section 7(f) – the maintenance and enhancement of the quality of the environment

#### Regional Policy Statement 2013

- 3.8. The Wellington Regional Policy Statement (RPS) became operative on the 24th April 2013 and provides the current framework for the sustainable management of the Region's natural resources.
- 3.9. Within the RPS, Objective 17 is relevant to the Region's outstanding natural features and landscapes. Under this objective, Policies, 26 and 50 require the identification, protection and management of outstanding natural features and landscapes.
- 3.10. Objective 18 refers to the Region's special amenity landscapes with policies 27 and 28 referring to their identification and management. As discussed above, the Site does not lie within an outstanding natural feature or landscape, nor a special amenity landscape.

#### Operative District Plan

- 3.11. The current zoning of the area proposed to be rezoned by Plan Change 83 is Open Space B. In Section 16 of the District Plan, the introductory discussion on Open Space B (Natural Environment), the rationale underlying the zone is described as follows:

*Open Space B land is valued for its natural character and informal open spaces. It involves areas that are used for types of*

*recreation that, in the broadest sense, do not involve buildings or structures. The intention is to keep such areas in an unbuilt or natural state. This type of open space encompasses both formal and informal open space elements. It includes walkways, scenic areas and open grassed areas where buildings are inappropriate. Its characteristics are minimal structures, largely undeveloped areas and open expanses of land. Most Open Space B areas are vegetated and often have ecological values or may buffer Conservation Sites.*

- 3.12. An open space objective and associated policy of relevance to the potential plan change is:

*Objective 16.5.1 To maintain, protect and enhance the open spaces of Wellington City.*

*Policy 16.5.1.1 Identify a range of open spaces and maintain their character, purpose and function, while enhancing their accessibility and usability.*

- 3.13. The area to be rezoned by the plan change has open space value (together with ecological values) as land forming a part of the Ngauranga Gorge corridor at the entrance to Wellington City. The potential for recreation use is limited due to the steep topography of the area and the distance from existing connections.

- 3.14. Other policies and objectives of relevance include:

*16.5.2 To maintain and enhance natural features (including landscapes and ecosystems) that contribute to Wellington's natural environment.*

*16.5.2.1 Identify and protect from development and visual obstruction landforms and landscape elements that are significant in the context of the Wellington landscape, and in particular significant escarpments and coastal cliffs.*

*16.5.2.2 Restrict the construction of [buildings,] structures and earthworks on [identified ridgelines and hilltops.]*

*16.5.2.3 Encourage retention of existing native vegetation and where appropriate re-introduce native cover.*

- 3.15. The area of the proposed plan change contains a prominent knoll, which is visible within local area. In the Wellington Ridgetops and Hilltops Study, the ridgelines and hilltops on the western side of the Ngauranga Gorge were not identified as important at a district-wide level and are therefore not subject to protection for their visual values.
- 3.16. Within the vicinity of the Ngauranga Gorge, the ridgeline to the east of the Site, on the opposite side of the gorge, is however identified as the Upper Ngauranga Area, whose key characteristics the District Plan identifies as the distinctive flat-topped hill, landmark in views across Wellington Harbour. The hilltop is visually accentuated by pasture above the vegetated steep flanks.
- 3.17. The landform of the Plan Change site forms a part of the Ngauranga Gorge landscape at a local level and is significant in its scale and location on a major bend in the motorway, which reveals a view of the city beyond.

Proposed amendments to District Plan objectives and policies

- 3.18. The Plan Change proposes a change from Open Space B to Business Area 2 of the Operative District Plan, bringing the proposed extension under the specific objectives and policies relating to Kiwi Point Quarry, which are also proposed to be updated as a part of the Plan Change. The quarry is subject to specific policies and rules recognising its economic importance to the City and wider region as well as to other relevant rules applying elsewhere in Business Areas to mitigate adverse effects. A new objective is proposed in the plan change under 33.2.14
- 3.19. Policy 33.2.27, an existing policy in the operative Plan, provides for site rehabilitation. The explanation to Policy 33.2.2.7 also sets out the requirements for the development and site rehabilitation of the Kiwi Point Quarry. The explanation outlines the requirement for the preparation of the quarry management plan, which is to include, amongst other requirements: any specific provisions relating to onsite management of noise, dust, vibration, visual impact, water quality, objectives and principles for the rehabilitation of the site, and management of buffer areas.

- 3.20. A vegetated buffer area is included within the area as part of the development of the southern part of the quarry. At the northern end, the necessary buffer area is within the Open Space B Area.
- 3.21. Proposed new text under the explanation describe the area where ecological mitigation is to be undertaken, on Lots 4 and Lots 6 which lie to the northwest and southeast of the central southern quarrying area (Lot 5 DP72996). It is unclear what form the mitigation within this central area (Lot 5) will take. This central area would remain open and exposed to the Ngauranga Gorge following quarrying operations. The Quarry Management Plan outlines the process for hydroseeding areas that are unable to be planted.
- 3.22. A vegetated buffer is required as part of the quarrying operations as described in the revised policy explanation. In the permitted area, this buffer is 20 metres between the working edge of the quarry and the open space area or nearby properties in the northern area. The proposed vegetated buffer area for the extended southern part of the quarry *“shall be a minimum of 70 metres from the edge of the quarrying area to the nearest Residential Area Boundary.”*
- 3.23. Currently the separation boundary between the permitted southern working area and adjacent residential properties in Gurkha Crescent is approximately 170 metres.
- 3.24. The policy in relation to walkways within the site is also proposed for revision, with reference to the future site forming a part of the green belt proposed to be removed under the explanation for policy 33.2.2.7.
- 3.25. The policy for a Green Belt through the Ngauranga Gorge was originally outlined in the Council’s 1998 open space strategy, *Capital Spaces*. The revised version of *Capital Spaces*, published in 2013, identifies the need for improved recreation connections in the Ngauranga Gorge area, but the aim to form an inner green belt connecting the Outer Green Belt with the coast via land in the Ngauranga Gorge has been removed.
- 3.26. The current QMP (published 2014 and discussed in further detail in the following section) still references the site rehabilitation forming part of the inner green belt, despite being published following the later version of *Capital Spaces*.

- 3.27. Now that the policy for the site to form a part of the inner green belt has been removed from *Capital Spaces*, there is no detail provided on the future strategy for the site post-quarrying. The new *Capital Spaces* does not specify the role of the site as part of the ‘gateway’ to Wellington City, however the area is recognised as part of the gateway and referred to as such throughout the plan change documents. Recognition of the site as part of the gateway to the city is also evidenced by six submitters (submitters 2, 13, 20, 22, 29 and 36) who raise concerns at the landscape and visual impact of quarrying activities on the site and the perception of this at the ‘gateway’ to the city.
- 3.28. Traffic data supports the view that the site forms part of the landscape gateway to the city, with the site visible from 22,610 vehicles traveling southbound on the Ngauranga Gorge each day, and 22,293 traveling north bound.<sup>6</sup>

#### Changes to Business 2 rules and methods

- 3.29. Rezoning of the site to Business 2 has further potential impacts on the ‘gateway’ experience. Business 2 areas are described by the District Plan as:

*“Traditional business areas where a range of industrial activities including warehousing, manufacturing and commercial services can occur. Because of the industrial nature of the activities in such areas, lower levels of amenity are acceptable compared with other areas in the City. Residential and some retail activities are restricted in Business 2 Areas”*

- 3.30. The plan goes on to state that it “seeks to ensure that all new development within the Business Areas is provided for in a manner that will maintain existing character and respect the amenity of that particular area”. The proposed finished quarry levels illustrated in Appendix 2 of the submission (Proposed Map Amendments to Chapter 34, Appendix 2) potentially allows for the development of larger scale industrial and commercial buildings allowed under a Business 2 zoning.

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<sup>6</sup> Source: NZTA, 1 August 2018

- 3.31. Proposed amendments to the Controlled Activity Rule are outlined under objective 34.2.3.
- 3.32. While the revised policies outline the process for ensuring effective mitigation and rehabilitation, the controls over how to ensure mitigation and rehabilitation is carried out effectively and within a required timeframe are to be determined via consent conditions rather than defined within the policy. A lack of policy to define mitigation and rehabilitation measures was an issue raised by one submitter (submitter 7) who requested that *“a mitigation management plan is put in place that details dates, areas to be worked on and when mitigation will be started and completed for each section.”* The current policy wording to begin rehabilitation *“as early as is practicable”* does not provide a measure of when rehabilitation should begin or what happens if it does not occur.
- 3.33. The creation of a specific rehabilitation programme with target dates, budgets and monitoring, which could reference the examples of the rehabilitation already occurring on the north face of the quarry would address this matter.
- 3.34. The programme should also demonstrate the adequacy of provisions and policies relating to rehabilitation and mitigation and an explanation of what happens if rehabilitation does not occur as stated.

### **Kiwi Point Quarry Management Plan**

- 3.35. The Kiwi Point QMP (June 2014) is a requirement of the operation of the quarry under policy 33.2.2.7 of the District Plan. Preparation of a QMP was a requirement of Plan Change 25 (December 2004), which allowed extension of the quarry into a formerly-worked area in Ngauranga Gorge to the south of the present quarry. A further update to the management plan took place in 2009 to reflect the amended provisions of the District Plan Change 64 process.
- 3.36. Proposed Plan Change 83 retains the current 2014 version of the Management Plan but adds regulatory force in that the QMP will become a matter of control under the new rule, and will therefore be subject to conditions, future monitoring and enforcement. The purpose of the QMP is to provide an overall framework that outlines how the Council will operate, manage and develop all the land area at Kiwi Point.

- 3.37. An important aspect of the QMP is rehabilitation of the final quarry form. Section 7.1 states that:

*“The overall objective of the proposed rehabilitation is to establish native vegetation cover that contributes to the Council’s vision of Ngauranga Gorge as part of the City’s inner green belt network. Rehabilitation will focus on bringing all areas where quarry operations have ceased to a state where native vegetation will re-establish.”*

- 3.38. Section 7.3 Rehabilitation principles and Objectives of the QMP identifies the following five general rehabilitation principles:

- 1. To promote Wellington’s indigenous biodiversity and rehabilitate natural processes within the site.*
- 2. To conduct rehabilitation concurrently with quarry operations, coordinating progressive completion with rehabilitation.*
- 3. To finish the quarry faces to resemble the steep bluff landforms that would have occurred naturally in the Ngauranga Gorge.*
- 4. To conduct rehabilitation in a manner that encourages rapid vegetation of the slopes, reducing the duration of adverse visual impacts.*
- 5. To revegetate the quarry in a way that supports the vision of the City’s Inner Green Belts.*

- 3.39. Section 7.7 of the QMP, the Rehabilitation Summary states that the principles for rehabilitation of the Kiwi Point Quarry include all of the following steps:

- 1. Preparation of an annual implementation plan, including coordinated staging of works closure to achieve best ecological outcomes.*
- 2. Programme for clearance of vegetation, mulching and composting and stockpiling.*

3. *Methods for limiting disruption to streams and freshwater habitat.*
4. *Vegetative screening of work areas.*
5. *At the completion of the quarry operation – the quarry landform shall be re-contoured to reflect the former landforms/ topography of the area. Achieving a combination of revegetated benches and more natural unvegetated landforms including large rock outcrops, bluffs, screes and gullies to reflect the surrounding topography is the desired outcome.*
6. *Creation of new soil substrate in all planting areas (benches, screes etc), to encourage rapid vegetation of the slopes, reducing the duration of visual impacts.*
7. *Trialling of a range of onsite revegetation methods for ensuring rapid vegetation cover, and maintenance of revegetated areas.*
8. *Preparation of pest plant, pest animal and fire control programme.*

3.40. Section 7.4 of the QMP discusses Ngauranga Gorge Values. These values are identified in relation to the 1998 *Capital Spaces* document, which identifies open spaces values of the proposed areas of green belt under the headings of ecological, recreation, landscape and heritage values. The QMP discusses Ngauranga Gorge values under the same set of headings as follows:

- *Ecological values: Coastal forest is under-represented in Wellington. There is potential for native forest to be gradually restored on the steep hillsides of the gorge increasing this uncommon forest type and providing an almost continuous green corridor between the Wellington fault escarpment (Hutt Road Scarp), Ngauranga Gorge bush, Tyers Bush and the lowland reserves in Khandallah and Johnsonville, and the regenerating native forest of Mt Kaukau and the outer green belt.*

- *Recreational values: Recreational values in the Ngauranga Gorge are currently limited by the steep open space terrain; SH1, which is a major cross-gorge barrier for pedestrian and cycle movement; and the dominance of industry on the valley floor. However, the Council has long term plans to develop more recreation routes along the western hills of the harbour, and opportunities to develop more recreational access through the gorge are likely to be explored further.*
- *Landscape Values: The gorge is an important threshold in and out of Wellington Harbour, experienced by thousands of people every day, and the regenerating native vegetation is noted in the strategy as providing the basis for a “striking gateway to the harbour in the future”.*

3.41. As discussed above, the requirement for the rehabilitated quarry site to form a part of the City's inner green belt is outlined in the now superseded *Capital Spaces*. The 1998 version of *Capital Spaces* set out a clear vision for the creation of a Ngauranga Gorge Green Belt linking the coast and the Outer Green Belt. The 2014 QMP responds to these policies with a rehabilitation scheme which aimed to revegetate the quarry site in line with this higher-level objective. Now that this policy from *Capital Spaces 1998* no longer stands, it needs to be considered how the site can be rehabilitated in the context of its location at the gateway to Wellington City.

3.42. It is recommended that in addition to the rehabilitation principles in the management plan are updated to accurately reflect the current version of *Capital Spaces*, and address how the future rehabilitation of the site under the Business 2 zone will enhance the open space corridor of the Ngauranga Gorge as a recognised gateway to Wellington City.

### **Summary of plan change supporting documents related to Landscape and Visual Matters**

#### Urban Design and Landscape Report

3.43. The plan change documentation does not include a landscape and visual effects assessment. A high level 'Urban Design and Landscape Report' is covered in a memo titled 'Kiwi Point Quarry Expansion – Alternatives' prepared by isthmus Group in November 2016. Appendix D in the plan change documentation outlines several potential landscape and visual issues

in relation to the possible development options proposed. Of Option 4 described in the memo, (maximum expansion), the report concludes that landscape and visual amenity effects are significant.<sup>7</sup>

- 3.44. The Isthmus report also considers that there will be cumulative effects due to the proximity of the existing quarrying activity and built development/modification to the Ngauranga Gorge natural landforms.
- 3.45. The memo also identifies that there is potential to create beneficial effects and enhance the gateway qualities of the site, for example through improvements to open space and assisted revegetation. The memo identifies that Option 3 and 4 potentially provide greater opportunities for development than Option 2.
- 3.46. The site's importance as part of gateway experience to Wellington is highlighted. Landscape values include the "Distinct spatial qualities, sense of enclosure, steep descent and dramatic emergence out to the harbour and city; contributing to the cities sense of place". The report also recognises the landform of the area, with the spur extending from Rangoon Heights identified as forming part of the western skyline to the Ngauranga Gorge. Adverse landscape effects can be reduced by implementing natural landform boundaries to the quarry works.
- 3.47. A long list of options contained within the Isthmus memo discusses "landscape effects" of the different options. Option 3 is described as having a "more logical relationship to the existing contours" with "the cut faces are turned away from the suburb of Khandallah (but will be visible from a limited number of future properties in Newlands)". Option 4 (maximum expansion) is described as having an "additional impact on both ridgeline and existing regenerating vegetation (compared to Option 3)". The report concludes that Option 2b would provide a better fit with the existing landforms and reduced visual amenity and natural character effects compared to the other options.
- 3.48. I agree that all options (apart from Option 1 - do nothing) would have adverse landscape effects. Options 3 and 4 are similar in terms of effects, with both options having greater adverse effects than Option 2. As a

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<sup>7</sup> Refer Short List Option scoring table

landscape and visual effects assessment has not been provided, it is difficult to comment in further detail on the issues outlined above.

#### Section 32 report

- 3.49. The Section 32 Report contains several sections on landscape. It outlines the landscape and visual issues with reference to the Urban Design and Landscape report by Isthmus and the series of visual simulations, also prepared by Isthmus.
- 3.50. The report identifies that the site is located within the Ngauranga Gorge, which is a highly visible yet highly modified environment but retains special characteristics and qualities<sup>8</sup>.
- 3.51. Section 5.7 of the report discusses landscape, referring to the series of visual simulations from five nominated viewpoints, discussed in greater detail in the following section. These illustrate proposed views of the unmitigated maximum cut face extent, the cut face one year after commencement of site rehabilitation and 20 years following the cessation of quarrying for Option 3 and for Option 4. No discussion is provided on these viewpoints, nor are any other policies of relevance to landscape and visual matters referred to.
- 3.52. Section 6.2 of the s32 report discusses the assessment of alternative options for the quarry site and refers to the existing landscape characteristics of the site.
- 3.53. Section 7.4 of the report provides an assessment against the options of Objective 4: Landscape. Option 1, Do Nothing, receives the lowest raw score of zero, with the permitted development (Option 2) receiving a score of -2.0 and Option 3 and 4 both scoring -3.0. When assessed against the other objectives of Extraction, Rehabilitation and Effects in Section 7.5, Option 4 is ranked 1, with Option 1 ranked 3. The report summary in Section 7 concludes that:

*“The key impacts of the expansion options (Options 2, 3 and 4) relate to landscape, visual amenity and ecology effects, with key*

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<sup>8</sup> Section 1.1, page 2.

*features being the gorge landscape and regenerating vegetation. None of the key features are identified as outstanding or significant within the current plan framework (i.e., outstanding natural features and landscapes or as areas of significant indigenous vegetation and significant habitats of indigenous fauna in accordance with section 6 matters of national importance). None of the expansion options were fatally flawed under specialist assessments. The effects of the expansion options are not considered to be detrimental to the point that they should not be considered further. Option 1 Do Nothing is not the only viable option under the RMA framework."*

- 3.54. Option 4 is identified as the preferred option to take forward for public consultation and is identified as having "moderate to significant adverse ecology and landscape effects". This statement conflates two separate aspects. The Wildlands Assessment of Ecological Effects (July 2017), concludes that ecological effects would be "significant, and if quarry development cannot avoid these effects, it will require substantive mitigation and/or remediation." The landscape and visual amenity effects are considered by the Urban Design and Landscape Report memo (Isthmus Group, November 2016) to be "significant, with additional ridgeline, vegetation and residential proximity effects compared to Option 3." No moderate effects are identified for Option 4 within either the landscape and visual memo or terrestrial ecology report.
- 3.55. Section 8 of the report discusses site specific resource management issues. The site's importance as part of the Wellington gateway experience is identified.
- 3.56. Section 8.2 of the report considers residential amenity, highlighting that there will be effects on the closest residential properties in Gurkha Crescent.
- 3.57. Landscape and visual effects on local residents are raised by several submitters but have not been considered in mitigation proposals beyond the construction of a boundary fence. 6
- 3.58. Submitter 36 raises issues in relation to the effects of the proposal on neighbouring properties to the south. Submitter 36, who lives on Homebush Road, currently experiences "views across the valley to the green vegetation and ridgeline of the proposed Plan Change site." The submitter attaches a

model view (prepared by Isthmus) from 146 Mandalay Terrace, which illustrates the change in landform that would be visible from these dwellings. The submitter states that the “proposed quarrying activities would not only irreversibly modify the ridgeline but open up our views into the existing quarrying operations which in turn brings further adverse effects of dust, noise and wind.” The nearest submitted visual simulation to provide a view is from Shastri Terrace (Viewpoint 4).

- 3.59. The view from Shastri Terrace is representative of the view a from the nearest residential properties to the site but has a different aspect to the properties on Homebush Road and Mandalay Terrace, who look directly towards the spur to be removed by the proposal, rather than out and over the proposed extension site. This would mean views are obscured by landform in the foreground as illustrated in Viewpoint 4.
- 3.60. Other properties to the western end of Shastri Terrace and Imran Terrace experience more exposed views, which look towards the spur on its northern side. These properties will experience more of a change in view than that illustrated in Viewpoint 4. A view from the end of Shastri Terrace illustrating the view of the spur is shown in Photo A, and Imran Terrace in Photo B in Attachment 4.
- 3.61. To assist with understanding the change in view, two ZTV maps have been prepared, based upon the digital 3D model provided by Isthmus Group.<sup>9</sup> These maps illustrate the potential viewshed of the permitted development (Option 3) compared with the proposed Plan Change (Option 4).
- 3.62. A series of observable points were located within the working area of both options, and the ZTV analysis based upon these points. It should be noted that the ZTV indicates areas from where the observable points on the proposed quarry cut faces may be visible within the wider area. It cannot and does not indicate the nature or magnitude of visual effects. Instead, the ZTV provides a starting point and framework of the potential visual catchment and where field work should be directed.
- 3.63. The accuracy of the ZTV analysis is limited by the level of detail, or cell size of the underlying digital elevation model (“DEM”). The cell size on the DEM

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<sup>9</sup> Ormiston Associates provided Isthmus with the digital files to produce the visualisations.

of the ZTV is 1.0m. The ZTV analysis is based upon lines of sight generated using a “hybrid ground” digital elevation model, taking into account the screening effect of intervening structures.

- 3.64. The currently permitted development is based upon 10 observable points located on the face of the working area. The proposed plan change ZTV is based upon the same 10 observable location points, relative to the proposed working levels at their maximum extent, together with six additional points representing the proposed extension of the working area. These points give an indication of location from which the working area of both options is likely to be able to be seen. Site visits were also carried out to verify the findings of the ZTV. These confirmed that extended views of the proposed development will be potentially available from many residential properties.
- 3.65. The ZTV showing the permitted development illustrates that the development will be visible from Johnsonville to the north, including properties on the newly developed extension to Spenmoor Street<sup>10</sup> to the northeast, Broadmeadows to the northwest and the northern part of Khandallah to the west.
- 3.66. The ZTV illustrating the Plan Change proposal illustrates that the viewshed of the proposal is extended to the south, with the removal of the spur to the west of Ghurka Crescent opening up views into the quarry and out towards the harbour. This additional area of visibility covers at least 18 properties to the south of the site, on Homebush Road, Mandalay Terrace and Narbada Terrace in Khandallah, in the location of Submitter 36.
- 3.67. A photograph (Photo C) representing the current view experienced by these properties is provided in Attachment 4. The view is representative of properties to the south on Mandalay Terrace and Homebush Road. The view is towards the vegetated ridgeline above Tyers Stream Reserve. The loss of this vegetated spur between these properties and the site completely changes the character of the view experienced from these properties. The model view provided by Submitter 36 gives an indication of the view of the proposed extension. Residents in this location will experience open views of

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<sup>10</sup> Dwellings in the c. 115-lot Point 360 residential subdivision on the Spenmoor Street extension is currently under construction. Parts of this development have open, unobstructed views to the proposed Kiwi Point Quarry development.

the quarry works and the spur receding as the material is quarried and removed. The resulting removal of the spur will result in views into the processing area of the quarry operations and beyond.

- 3.68. The removal of this spur also means the working area is now visible to a number of additional properties to the north in Johnsonville. Around 15 properties on Dominion Park Rd in Johnsonville will have oblique views down the valley towards the open upper faces of the quarry excavations. Photo D representing this view is provided in Attachment 4.
- 3.69. The ZTV and photographs illustrate that the proposed plan change will be visible from a wider residential audience than the permitted development. The removal of the spur above Tyers Stream will open up views into the working area of the quarry from areas to the south, and views of the upper face of the quarry for viewers to the northeast. While the visual simulations provided in the application are well executed in terms of depicting the proposed extent of the quarry benches in Option 4, they underplay the level of landscape and visual effects in relation to the broader landscape context. That is, the extent of the viewshed and the size of the potential viewing audience is not sufficiently described, analysed and depicted as I have described above and illustrated in Attachment 4.
- 3.70. Section 10 of the report assesses the efficiency and effectiveness of the methods chosen against key objectives for the plan change. For landscape, the objective is “To minimise landscape impacts as far as practicable, recognising landscape values in the context of the gateway experience.”
- 3.71. The assessment in relation to this objective state that:

*Landscape effects of quarrying an extended southern face will be significant as it introduces cut faces upon an area of natural landform. The area is not an outstanding landscape and there has been a long history of quarrying in the Ngauranga Gorge. Mitigation is provided for through effective quarry rehabilitation once cut faces are worked and by ecological restoration of Council owned land in close proximity. With these measures in place it is considered that landscape effects can be managed to an acceptable degree.*

- 3.72. I disagree with this statement. Mitigation needs to be considered as an integral part of the development of the quarry during its lifetime, not just at the rehabilitation stage, to address the maintenance and enhancement of amenity values and the maintenance and enhancement of the quality of the environment under Section 7(c) and (f) of the RMA respectively.
- 3.73. The reference to *effective* quarry rehabilitation is also of concern given that nothing has been provided to demonstrate how this will be achieved nor reference to examples where it has already been successfully implemented. For example, in the rehabilitation of the northern faces where rehabilitation stated in the Quarry Management Plan should have been underway for many years.
- 3.74. The report identifies that there is potential for significant landscape and visual effects. The Plan Change proposal as it stands does not adequately address the potential for mitigation during the operation life of the quarry, and rehabilitation measures lack sufficient detail to assess their potential effectiveness. Mitigation needs to be considered during and following quarrying, with more information provided to give confidence in the ability to rehabilitate the site, particularly given the lack of any meaningful rehabilitation that has been achieved on the north face. Consent conditions should detail a step by step rehabilitation process to achieve the desired outcome described in the management plan, together with details on monitoring and an annual review process. The plan change provisions need to provide certain direction for the future consent process in this respect.

#### Visual representations

- 3.75. A series of visual simulations, prepared by Isthmus, were used to support the public consultation. These illustrate proposed views of the maximum cut face extent for both Options 3 and 4 from five representative viewpoints. Following the witness conferencing discussions, further simulations have been provided which also illustrate views of the permitted development at its maximum extent and during rehabilitation. The viewpoints selected are generally representative of some of views towards the site within 1km. The visual simulations are high quality images but are not accompanied by any text or analysis that would assist the viewer.
- 3.76. The views do not include a view for the nearest residents to the proposed extension on Gurkha Crescent and Shastri Terrace, northbound views along

the Ngauranga Gorge, nor any more distant views to illustrate potential views of the proposed development in the wider landscape, such as from the residential area to the south of the site. There is no description or analysis of the viewing audience or a ZTV map, therefore it is difficult to understand the reasons for the limited viewpoint selection. An analysis of the potential viewing audience – its size, extent, and composition would provide an explanation of the approach adopted.

The two ZTV maps in my Attachment 4 illustrate the potential viewing audience of the permitted development and the proposed development and the annotated photographs in Attachment 4 help explain the level of visibility from parts of the visual catchment. Visualisations showing permitted quarrying

- 3.77. Viewpoint 1 illustrates the maximum unmitigated extent permitted development (Option 2, pages 6-7) from the intersection of Gruman Lane and Spenmoor Street. The five levels of quarry benching cover the end of the ridgeline in the centre of the view. In the proposed plan change (Option 4, pages 18-19), the exposed cut face is increased to around double in size, with seven levels of benching and a greater area of the ridgeline cut into towards the right of the view. There is a substantial increase in cut face visible in this view. The cut face of the permitted development shows ochre coloured rock, while the proposed plan change has been illustrated in a more recessive grey colour.
- 3.78. Viewpoint 2 illustrating the maximum unmitigated extent of the permitted development (Option 2, pages 26-27) from 25 Kitchener Terrace shows six levels of benching cut into the hillside, leaving a triangular shaped cut face which extends to the ridgeline in the view. The view of the proposed plan change (Option 4, pages 38-39), shows eight levels of cut benching, with the cut face extending along to remove the ridgeline in the right of the view. Again, the area of cut face has almost doubled. The width of the cut face has increased at the bottom of the face and substantially increased at the upper level. The cut face of the permitted development shows ochre coloured rock, while the proposed plan change has been illustrated in a more recessive grey colour.
- 3.79. Viewpoint 3 illustrating the maximum unmitigated extent of the development (Option 2, pages 46-47) looking south east from Fraser Ave below Westmount School shows the cut face with six benches visible ascending the toe of the ridgeline in the right of the view. The benched form

narrows the higher up the slope to join the ridgeline, forming a new curved spur from this angle. In the plan change view (Option 4, pages 58-59), seven levels of benching are visible, with the visible cut area increasing by around a third. The removal of the ridgeline back towards Gurkha Crescent has exposed a view of properties along Mandalay Terrace and Homebush Road in Khandallah.

- 3.80. Viewpoint 4 illustrating the maximum unmitigated extent of the permitted development (Option 2, pages 66-67) looks north from the reserve below Shastri Terrace across the Ngauranga Gorge towards residential properties on Spennor Street and Paparangi beyond. The permitted development is not visible. The harbour is screened from view by the prominent knoll in the right of the view. In the plan change view (Option 4, pages 74-75), the entirety of the knoll landform in the right of the view is removed, exposing a large area of bare ground and a view towards the eastern side of the Ngauranga Gorge and the harbour.
- 3.81. Viewpoint 5 illustrating the maximum unmitigated extent of the permitted development (Option 2, pages 74-75) looking south from SH1 shows the cut face with six benches visible. The area of cut face reduces moving higher up the ridgeline. Residential properties on Mandalay Terrace and Homebush Road are visible on the more distant ridgeline in the view. In the plan change view (Option 4, pages 86-87), eight levels of cut benching are visible, with the visible cut area increasing by around a third in the right of the view. The removal of most of the ridgeline back towards residential properties on Gurkha Crescent has exposed further houses along Mandalay Terrace, Homebush Road and Narbata Crescent which previously would not have had a view of the quarry, and potentially not had a view of SH1. This is evidenced further by the model view from Mandalay Terrace provided by submitter 36.
- 3.82. The November 2016 Isthmus urban design and landscape memo identifies that “there will be cumulative effects due to the proximity of the existing quarrying activity and built development/modification to the Ngauranga Gorge natural landforms.” There are no viewpoints which illustrate views of the northern and southern extents of the quarry together. Views of the northern and southern quarry areas are possible to the east from Imran Terrace and to the west from the newly formed subdivision at Spennor

Street to the south of Newlands. This area is higher than the quarry and has a view over the top of the quarry.

- 3.83. The timeframes stated with the depiction of the proposed rehabilitation in the visualisations is questioned by two submitters (submitter 18 and submitter 24), who provide current pictures of the rehabilitation on the northern site from Nagpur Terrace, Broadmeadows, which shows greater areas of exposed rock than the provided visual simulations.
- 3.84. The rehabilitation timeframes depicted in the visual simulations illustrate the extended time frame that it will take to achieve meaningful revegetation on the slopes. The site is north-facing and exposed and windy; consequently, it will be hot and dry, and the environmental conditions will not be conducive to natural regeneration of vegetation or to revegetation. By contrast, the quarry faces currently being worked are south-facing and hence cool and shady, which are far better for the establishment of vegetation.
- 3.85. The 2004 *Kiwi Point Quarry Rehabilitation Plan*<sup>11</sup> gives target time frames for rehabilitation. On the north facing aspects, only grass cover is expected within 1-2 years, with 10% woody cover expected after 10+ years, and up to 50% woody cover after 20+ years.
- 3.86. This is supported by Attachment 1 which illustrates a plan view of the Newlands Interchange from 2002 and a view of regenerating road batters in the area taken in 2003. The batters have around 10% vegetation cover. A photograph from a similar location (on the overbridge in the left of the 2003 view) taken on 28<sup>th</sup> July 2018 shows there is around 80% vegetation cover on the batters 15 years later. This vegetation is primarily exotic scrub species and rank grass.
- 3.87. The difficulty of establishing planting on exposed north facing slopes is further supported by the restoration planting examples carried out within the quarry in the Wildlands Mitigation Options Report, referred to in Mr

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<sup>11</sup> *Kiwi Point Quarry Rehabilitation Plan*, prepared by Boffa Miskell for Wellington City Council, March 2004, Revised May 2004

Fuller's evidence, where planting on exposed north facing slopes has completely failed.<sup>12</sup>

#### Mitigation proposals

- 3.88. I accept that the ability to provide mitigation during the life of the quarry is limited due to the scale and nature of the proposals. Users of the Ngauranga Gorge and residents in nearby properties will experience views of the extended quarry. However, adverse effects from quarrying are not new to the area as it has been operating as a quarry for many years.
- 3.89. The proposed mitigation measure that will have the greatest effect to the proposal is the vegetated bank between the quarry and SH1, which is an important aspect in mitigating the adverse effects of the activities on quarry floor and yard from the highway. It would not however mitigate the visual effects of the quarry faces and benches above, a point which is raised by submitter 18. A cross section diagram of the bank that will be retained would be useful to understand the scale of the proposed mitigation and accurately judge its effectiveness as a screen to users on SH1.
- 3.90. The only other form of mitigation proposed is a 1.2m high fence, which will be erected along the top of the face of the quarry, with a security fence setback from this. This will assist with separation of the quarry from the nearest residents. As a landscape and visual effects assessment has not been carried out, it is not known whether other options for mitigation or screening for residents were identified and considered. A LVEA prepared for the Plan Change should consider this.
- 3.91. During consultation, additional decorative fencing was proposed at site level.<sup>13</sup> This fencing is mentioned by one submitter (submitter 22) who states that *"the proposed plans to build a small fence and paint that will do nothing to prevent everyone from seeing what's really going on behind it"*.

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<sup>12</sup> Mitigation Options for the Potential Loss of Indigenous Vegetation and Habitat at the Proposed Kiwi Point Quarry, Wellington. Appendix 1: Email from Anita Benbrook to Astrid van Meeuwen-Dijkgraaf, 26 July 2018.

<sup>13</sup> 'Have your say on Kiwi Point Quarry' summary brochure, published on the Council's website.

I agree with the submitters that this fencing is an ineffective form of mitigation in relation to the scale and nature of the works.

- 3.92. As discussed above, the Plan Change proposal as it stands does not adequately address the potential for mitigation during the operational life of the quarry, and rehabilitation measures lack sufficient detail to assess their potential effectiveness. Further details on mitigation measures are required. Opportunities for potential mitigation during the operational quarry period should be identified in a supporting landscape and visual effects assessment, and details of their implementation detailed within an amended version of the QMP.

#### Rehabilitation proposals

- 3.93. The plan produced by Ormiston Associates (Appendix C in the Plan Change documentation) labelled 'Rehabilitated quarry plan' depicts the finished form of the quarry for proposed Option 3. No plan has been included in the plan change documentation which illustrates the potential rehabilitation of Option 4. The plan provided is insufficient for describing in detail the mitigation measures to rehabilitate the quarry. Section 7 of the Kiwi Point Quarry Management Plan, June 2014, which sets out the rehabilitation objectives and principles, together with a range of rehabilitation measures and practices (e.g. rock face shaping, soil preparation, hydroseeding, revegetation, planting trials, maintenance and monitoring). The same principles and methods could be utilised for the expanded quarry. The rehabilitation summary states that:

*"At the completion of the quarry operation – the quarry landform shall be re-contoured to reflect the former landforms/ topography of the area. Achieving a combination of revegetated benches and more natural unvegetated landforms including large rock outcrops, bluffs, screes and gullies to reflect the surrounding topography is the desired outcome."*

- 3.94. It is not apparent from the information supplied in the Plan Change documentation how these objectives will be achieved. Proposed recontouring to *"reflect the former landforms/topography of the area"* as described above is not apparent in the simulations, which appear to be depicting natural regeneration with possibly some revegetation on the benches. The QMP will form part of the consent conditions and contain

objectives and principles for mitigation and rehabilitation, together with details as to how rehabilitation will be monitored and approved/certified.

- 3.95. The Wildlands Revised Draft (2018) describes a combination of rehabilitation methods that are proposed as part of the mitigation measures (i.e. stockpiling topsoil for later use, secure fencing of the hold-over stock grazing area, planting, controlling pest plants, direct transfer of indigenous vegetation). It is proposed that approximately 0.66 ha. of direct transfer of indigenous vegetation would form part of the 7.47 ha. of indigenous vegetation to mitigate the loss of 4.67 ha. existing indigenous vegetation.
- 3.96. I am unconvinced by some of the rehabilitation measures described in the Wildlands report. In section 3.2.1 it acknowledges the difficulties in terms of planting (dry, exposed to strong winds, thin topsoil) and then goes on to describe planting methodologies to improve success that “could be considered”. These methodologies are labour intensive, require large amounts of topsoil (up to 500mm depth) and expensive. I also question the feasibility and practicalities on such ‘hard’, difficult and disturbed sites.
- 3.97. Mr Fuller discusses the rock face shaping proposed as part of rehabilitation of the site (para 4.55). The northern face of the quarry has been significantly over steepened, which does not allow room for rolled back batters and fill at the toe of the slope to produce a more natural landform and conditions suitable for revegetation. Section 7.5.4 of the management plan defines that batters should not exceed 55 degrees from the horizontal and that “*variety and visual interest shall be provided for by varying the batter angle and heights*”. Mr Fuller refers to the Boffa Miskell rehabilitation design prepared for the quarry in 2005 (his Attachment 2) which provides methods for “naturalising” cut faces and the quarry floor to provide for indigenous revegetation, and which would create a softer landform. There is potential with this method to facilitate a staged rehabilitation where soil placement and planting to the benches where quarrying has been completed is carried out as each stage is achieved, reducing the potential duration of adverse landscape and visual effects. I agree with Mr Fuller that a single integrated plan for rehabilitation should be developed collaboratively between an ecologist, landscape architect, planting contractor and the site engineer.
- 3.98. There is no comment in the application on the success or otherwise of the rehabilitation carried out in the quarry to date. Appendix 7 of the Quarry

Management Plan contains a 10-year list of actions and budget (2008/09 to 108/2019). It would be helpful in considering the effectiveness of mitigation and rehabilitation for the plan change area to understand what has been achieved in terms of rehabilitation over the past decade at the existing north face.

- 3.99. The rehabilitation of the quarry face subject to the plan change will need to rely on natural processes/colonisation. The north facing area to be quarried will take time to rehabilitate because it will be exposed, windy and dry. Appropriate interventions to mitigate landscape and visual effects and assist with the natural processes include scarifying the quarry face, hydromulching, topsoiling and replanting the benches, and replanting the perimeter of the face. Such interventions would help the natural processes but would not fundamentally change the need to rely on natural colonisation over a long time frame. As has occurred elsewhere on cut faces in the Ngauranga Gorge, gorse, exotic grasses and scrub will be the first to establish and will persist and dominate for many years. Native species will gradually establish but it will be 35-40 years before they have any real presence. Given the prevailing environmental factors, the rehabilitation process will be slow and could potentially happen over a longer time frame than that depicted in the simulations.
- 3.100. The direct transfer of indigenous vegetation on to the quarry benches as proposed in the Wildlands report (2018) would, in my opinion, have limited if any success. As a technique it has merit but given that the material will be placed on the raw, exposed, dry quarry benches, it is very unlikely that much of the vegetation would survive. The time and effort to implement the direct transfer needs to be considered in relation to the likelihood of success of this method.
- 3.101. The Wildlands report (2018) questions the development of a bird corridor close to SH 1 and lists three reasons of why it is not favoured (i.e. increased likelihood of bird strike, timing of its construction, and the nature of the activities as a result of rezoning). In my opinion, some of these reasons do not withstand scrutiny. For example, the bird strike issue is largely dependent on the species used (i.e. flax planted close to a busy highway or road is a potential issue, but the aim would be to plant local indigenous species that minimise this occurring).

## Previous Landscape and Visual Effects Assessment and Open Space Assessments

- 3.102. In February 2001 Boffa Miskell Ltd prepared a draft open space assessment of a proposed extension to Kiwi Point quarry (Attachment 2). The footprint of this proposed extension was very similar to the current proposal, with an extended cut face up to the prominent knoll at 190masl.
- 3.103. The assessment was a scoping study to consider the proposed extension in terms of the open space values in the area and relevant Council policies and reports, to review the nature and extent of the proposed extension and to consider appropriate remedial or rehabilitation measures that could be taken. The open space assessment concluded that the landscape effects of the proposed quarry would be “highly visible from adjacent residential areas, State Highway 1 and some harbour locations...” The report also highlighted that the “form and appearance of the proposed quarry is not sensitive to its landscape setting nor does it relate, visually or physically, to the adjacent landforms.”
- 3.104. Because of this work, a modified proposal was formulated, to minimise adverse effects that were identified. Boffa Miskell carried out a landscape and visual assessment for this proposal, dated September 2003 (Attachment 3). This modified proposal was “planned to visually contain the quarrying activity as much as possible, to minimise the extent of disturbed land and to create final landform of relatively natural appearance.” This modified proposal forms the permitted southern extension.

## 4.0 CONCLUSION

- 4.1. I endorse the changes to the plan provision Mr Jones has noted in his Attachment 2. These capture the key recommendations of this report, including measures to provide greater certainty, greater focus on remediation particularly around processes to be followed and monitoring, and recognising the importance of the quarry’s location as part of the gateway to Wellington City. Preparation of a LVEA will assist in identifying landscape and visual issues and establish appropriate mitigation and rehabilitation measures which can be carried through into the revised quarry management plan for the site.

- 4.2. However, I concur with the comments made in the Isthmus memo that the proposed development will have significant landscape and visual effects in relation to users on SH1 and from adjacent residential areas. I also have serious reservations about the effectiveness of the mitigation measures and some of the rehabilitation methods that are proposed.

*Boyden Evans*

*Registered NZILA Landscape Architect*

*Boffa Miskell Limited*

*19 November 2018*

## 5.0 REFERENCES USED IN EVIDENCE

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Wildlands (2017) *Assessment of Ecological Effects for Proposed Expansion of the Kiwi Point Quarry, Ngauranga Gorge, Wellington*, Contract Report No. 4378, July 2017.

Wildlands (2018) *Mitigation Options for the Potential Loss of Indigenous Vegetation and Habitat at the Proposed Kiwi Point Quarry, Wellington Revised Draft, November 2018, Revised Draft*.

## **Attachment 1: Regenerating vegetation on road batters at the Newlands interchange**

**Attachment 1**



*Above: Aerial View of Newlands Interchange, 2003, showing approximate location of photographs 1-3*



*Photo 1: Newlands Interchange with road batters visible in left of view at completion, 1998*



*Photo 2: View towards recent road batters at Newlands Interchange, 2003*



*Photo 3: View towards road batters at Newlands Interchange, July 2018*

- **Attachment 2: Kiwi Point Quarry Open Space Assessment, Boffa Miskell Ltd, February 2001**

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OPEN SPACE ASSESSMENT  
**Kiwi Point Quarry**  
Prepared for Wellington City Council  
February 2001



**BOFFA**

**MISKELL**

*planning design ecology*

# Kiwi Point Quarry – Ngauranga Gorge Draft Open Space Assessment

prepared for  
**Wellington City Council**

by  
**Boffa Miskell Ltd**  
**February 2001**

BM Wellington  
NO456  
9.523  
KW

## 1 BACKGROUND

- 1.1 In January 1999 Boffa Miskell Ltd prepared a Zone Change Scoping Study for Kiwi Point Quarry in Ngauranga Gorge. The purpose of this study was to examine whether quarry extension to the south of the present operation would be feasible in the context of Wellington City Council's district planning provisions, the Resource Management Act and to advise on an appropriate planning strategy. The scoping study was essentially a desktop exercise, which included preliminary investigations on the likely environmental effects of a southern extension to the existing quarry.
- 1.2 The Boffa Miskell report concluded that the environmental effects of a southern quarry extension would be significant, particularly in terms of the site's high visibility, Council's Open Space Strategy and the site's location within what has been identified as the northern gateway to the city. The report also noted that gaining consent for the quarry extension was likely to be difficult and would only have a reasonable chance of success if alternative aggregate sources of similar quality were so far removed from the market, or so difficult to access, that their utilisation imposed a significant cost to the community.
- 1.3 This assessment, for a southern extension to the Kiwi Point Quarry, is based on the premise that feasible and economic alternative aggregate sources are not readily available and that a proposal for some form of quarry activity at Kiwi Point should be investigated further and in more detail.
- 1.4 The scope of this open space assessment covers the following:
- The consideration of the open space values of the area.
  - The consideration of all relevant Council Policies and reports.
  - The consideration of the Kiwi Point Quarry extension proposal.
  - The review of existing visual simulations and the preparation of further graphic simulations to illustrate the nature and extent of any quarry extension.
  - The consideration of appropriate remedial or rehabilitation measures for the quarry extension.
- 1.5 The proposed southern extension to the quarry, as depicted on Roding Design Unit Plan 40/2517/1, shows the extent of the proposed earthworks. The quarrying of the hillside landform would result in a relatively flat platform adjacent to the State Highway some 400 metres by 200 metres in extent. Above this 8 hectare platform there would be a 2 hectare stepped cut batter rising at its highest point to the 180 metre contour, which is the highpoint of the affected landform. The maximum height of the cut batter would be approximately 120 metres above the State Highway.

## 2 LANDSCAPE CONTEXT

- 2.1 Ngauranga Gorge has undergone significant landform and vegetation modifications over the past 150 years with the most significant and widespread changes having occurred in the last 75 years, primarily as a result of quarry activities and the upgrading of the State Highway. Quarry operations have taken place in the gorge since the 1920s and continue today with the present operation at Kiwi Point predicted to exhaust its available resource by 2004. Major roading realignment and associated earthworks occurred in the late 1930s and again around 1975. The construction of the Newlands Interchange in 1997/98 resulted in significant earthworks to the upper portion of the gorge between Kiwi Point quarry and the Johnsonville exit from the State Highway. In recent years Council has identified Ngauranga Gorge as being one of the inner green belt areas and an important gateway to the city.
- 2.2 While extensive landform modifications have resulted in widespread vegetation removal, land clearance for grazing has also occurred within the gorge. Prior to the 1800s, the gorge probably supported a significant and dense cover of coastal forest. The vegetation that is present today appears as a patchwork of vegetation at various stages in the regeneration process. Woody and invasive weed species along with areas of grassland, rock outcrops and rock faces are also a characteristic feature of the land cover in the gorge landscape. Other than the extensive planting that was carried out during the construction of the Newlands Interchange, very little active revegetation, other than grass hydroseeding, appears to have been carried out in the gorge. On flat land, generally created as a result of landform modification, industrial developments have been established in clusters throughout the area.
- 2.3 In landscape terms, the gorge appears as a dynamic, diverse and highly modified landscape dominated throughout by the State Highway. Prior to recent residential development above the central section of the gorge, the landscape appeared to “contain” development within the floor of the gorge and accordingly the landforms, albeit highly modified, were a characteristic and distinctive feature of the gorge landscape. The skylined housing now appears to intrude into the gorge landscape and has to some degree compromised the “natural” character of the central gorge landforms.
- 2.4 While the developed nature of the gorge landscape is essentially industrial in character and appearance, the gorge experience as a gateway is largely created by the dramatic and steep canyon effect one experiences when approaching the city. The visual contrast in the gateway sequence from Johnsonville to the harbour is quite dramatic, different and spectacular. The gateway effect is, therefore, not necessarily reliant on any intrinsic values the gorge may or may not have, but rather the contrast in character, its containment, its ruggedness, along with the sense of surprise one is greeted with by the expansive views out over the harbour to the city. The drama of

the gateway experience has as much, if not more, to do with its geographic location and spatial form as its appearance and landscape character.

- 2.5 The gorge is a highly modified landscape with an industrial character and, as such, is a “working gateway” displaying commercial and industrial activity that is not incompatible with the gateway experience. The potential for the inner green belt concept, which is an integral component of Council’s Open Space Strategy, can also be realised as revegetation within the gorge will be an ongoing and long term objective.

### 3 OPEN SPACE VALUES

- 3.1 Open space values identified in Council’s Open Space Strategy (Capital Spaces November 1998) are:

- Ecological values with respect to those areas where there is extensive regeneration of native species and/ or significant vegetation that weaves “natural corridors” through the city fabric.
- Recreational values where there is potential for formal and informal recreational activities.
- Landscape values are identified as being significant in all four of the inner green belt corridors. The regenerating native vegetation in the Ngauranga Gorge is noted as providing the basis for a “striking gateway to the harbour in the future”.
- Heritage values, both Maori and European, are identified as being high in all four of the inner green belts.

- 3.2 Within Ngauranga Gorge, recreational values are limited and are not likely to be an issue with respect to any extension of the Kiwi Point Quarry. Likewise heritage values, while noted as being high generally within the identified inner green belt areas, are also unlikely to be a major issue in the Gorge.

- 3.3 With respect to Ngauranga Gorge the most significant and relevant open space issues are landscape, primarily visual, and ecological, particularly in terms of vegetation and natural regeneration values. Of particular ecological significance is the relationship between the Ngauranga Gorge Bush on the northern side of the gorge and Tyers Gully Reserve bush on the southern side of the gorge. The effects of quarry activity on the south face would further separate the ecological connectivity between the two areas and the would interrupt green belt pattern and character that is naturally evolving and becoming visually evident in the lower gorge area.

#### 3.4 Landscape Values

- 3.4.1 The most significant effect on landscape values will be the physical impact on the gorge landforms and the visual

effect of these modifications both during the life of the quarry and for some years after the activity has ceased. The proposed southern extension of Kiwi Point Quarry takes in the entire landform separating the Taylor Preston Abattoir and the Tyers Road industrial area. While previous quarry activities have occurred on parts of this landform, the visual effects are largely masked by the adjacent landforms, the modified area's orientation in relation to readily accessible viewpoints and 25 years plus of natural revegetation.

- 3.4.2 The visual effects of the proposed quarry, while relatively well contained within the gorge landscape, will be visible to residents in close proximity to the site. Residential areas located on the ridges, particularly to the north and west of the proposed quarry extension will have clear views to the proposed quarry activity. The quarry will be visible from some residential locations in the Cashmere, Rangoon Heights, Broadmeadows, Raroa and Newlands areas. Based on a preliminary assessment, the areas likely to be most affected are the Broadmeadows area, northern locations in Cashmere and Rangoon Heights, and the southern area of Raroa. From the Broadmeadows area a considerable number of properties would have clear and quite expansive views of the quarry.
- 3.4.3 From the harbour, Somes Island and the eastern bays area in Hutt City, much of the lower part of the quarry extension would be screened by the intervening landform at the base of the gorge. However, the upper slopes of the quarry extension are likely to be visible from the harbour, Somes Island and eastern bay locations. Given the height of the proposed quarry cut face relative to the foreground spur, it is likely that distant views of the upper quarry face would be visible from parts of Roseneath and Point Halswell as well as from the harbour itself.
- 3.4.4 The proposed quarry extension will be highly visible from State Highway 1 when approaching the city from the north. With traffic volumes of 60,000 vehicles per day and the gorge being the main entry to the city, the quarry will be a prominent and dominant activity in the gorge landscape. While the quarry site will be highly visible when approaching the city, travellers will only see the site for some 15-20 seconds. For north bound travellers, the period of visibility is likely to be less. While the cut batter face will be visible when approaching the city the harbour view will not be prematurely revealed due to an intervening spur which effectively maintains the visual containment of the gorge.

- 3.4.5 With respect to wider environmental effects of the proposed quarry extension namely, dust, noise, vibration, stormwater runoff, and traffic these effects, while potentially significant, can be managed based on the performance of current mitigation measures being employed by quarry management.

### 3.5 Ecological Values

- 3.5.1 The dynamics of the Ngauranga Gorge vegetation is primarily influenced by the following:
- o Aspect, particularly where soil moisture remains fairly constant all year round (i.e. on south facing slopes and in gullies).
  - o Soils, slope and substrate particularly where these have not been previously disturbed.
  - o Seed source availability, particularly where this is in close proximity to native bush remnants.
- 3.5.2 The native bush areas on the proposed Kiwi Point Quarry extension area are in good condition other than the 15-25 metre edge which is largely dominated by vines, both native and exotic, as well as invasive woody weed species. Generally species enrichment is occurring within the bush and will succeed in time to a multi-tier forest.
- 3.5.3 In landscape terms the main ecological value of the site's vegetation lies in its relationship and connectivity with adjacent bush areas, particularly to the north (Ngauranga Gorge Bush), and the scarcity of high quality north aspect bush in the immediate area. While there is little indigenous ecological value at present in the area of the old quarry workings and the adjacent pasture areas, these areas do support the early stages of a regeneration process that has taken some 20-30 years to reach the point it is currently at. Had planned revegetation measures been put in place following the quarry activity that occurred between 1950 and 1975, it is likely the revegetation process would have been more advanced and more visually apparent.
- 3.5.4 The return of a closed canopy forest to the Ngauranga Gorge hillsides will enhance and realise Council's vision for green belt in the Ngauranga Gorge. It will also be a positive factor in creating plant and animal habitat, soil protection and enhancing indigenous biodiversity. Within the Ngauranga Gorge landscape the most significant habitats are those that are extensive (rather than small and fragmented), and contain a range of physical environments and biotic communities. In ecological terms, bulk and connectivity of second growth forest warrants a

greater significance rating than a small, albeit mature, bush fragments.

3.5.5 In ecological terms the second growth forest on the proposed quarry site is significant in several respects:

- o Early plant successional phases have been dominated by indigenous species (i.e. tauhinu, followed by manuka, karamu, mahoe and rangiora on the south aspects; kanuka, karamu, mahoe and mapou on the north aspects), so integrity of indigenous cover is high (compared with, say, the bush below Khandallah housing nearby which contains acacias, sycamores, pines and has developed through a pioneering stage of gorse and broom).
- o Two vegetation communities are represented, and are aspect-influenced. The south aspect bush is typical of succession on most slopes of native bush in the vicinity of the Gorge, Tyers Reserve, Newlands and the coastal escarpments. However, since there is little north aspect bush in the vicinity, the two fragments of mahoe-mapou bush overlooking SH1 assume a scarcity value. There is one other small area of similar composition and integrity further up the gorge near the interchange, and an area in Khandallah which is at a more mature stage of succession. The two fragments appear to be recovering from stock grazing which has, until recently, prevented much seedling growth.
- o The north aspect fragments are also particularly significant in creating one of only two close links of native bush across the gorge, thereby extending the continuum of forest from Khandallah through to Newlands. Only 150m separates these communities from Ngauranga Gorge Bush. Further up the gorge (just below the interchange) there is another small area where 150m separates native bush on both sides; elsewhere the distances are more like 350-380m. The influence connectivity has on bird habitat and succession is clearly seen in the proposed quarry bush areas where seedlings of species that have come in from elsewhere are evident.

## 4 RELEVANT COUNCIL POLICIES

4.1 In considering the open space implications of a southern extension to Kiwi Point Quarry the following City Council policy documents were reviewed:

- Wellington City District Plan
- Capital Spaces (Open Space Strategy for Wellington)
- Wellington City District Ridgetop and Hilltop Study
- Ngauranga Gorge Gateway Strategy

### 4.2 Wellington City District Plan (November 2000)

4.2.1 The zoning of the Kiwi Point Quarry “southern face” is Open Space B. In Section 16 of the District Plan the introductory discussion on Open Space B (Natural Environment), the philosophy underlying the zone is expressed as follows:

*Open Space B land is valued for its natural character and informal open spaces. It involves areas that are used for types of recreation that, in the broadest sense, do not involve buildings or structures. The intention is to keep such areas in an unbuilt or natural state. This type of open space encompasses both formal and informal open space elements. It includes walkways, scenic areas and open grassed areas where buildings are inappropriate. Its characteristics are minimal structures, largely undeveloped areas and open expanses of land. Most Open Space B areas are vegetated and often have ecological values or may buffer Conservation Sites.*

4.2.2 Section 16 then proceeds to express a series of open space objectives and policies. In the context of a potential quarry extension to the southern face, the following are relevant:

*Objective 16.5.1: To maintain, protect and enhance the open spaces of Wellington City.*

*Policy 16.5.1.1: Identify a range of open spaces and maintain their character, purpose and function while enhancing their accessibility and usability.*

4.2.3 In terms of its landscape setting and in the context of the Open Space B zoning, the site’s values are primarily visual and ecological. The enhancement of access and recreational use is limited, but the area in its present or modified state (as a consequence of possible future quarry activity) must be planned and managed in an integrated and sensitive manner so as to enhance its appearance and

ecological values. Past cut faces, as a result of roading in 1938/39 and quarry activity between 1950 to 1976, are still quite evident within areas of the site. While policies 16.5.1.2 to 16.5.1.5 refer specifically to the original Town Belt and the proposed Outer Town Belt, the Kiwi Point site is not within either of these policy areas.

4.2.4 Other relevant Objectives and Policies include:

*Objective 16.5.2: To maintain and enhance natural features (including landscapes and ecosystems) that contribute to Wellington's natural environment.*

*Policy 16.5.2.1: Identify and protect from development and visual obstruction landforms and landscape elements that are significant in the context of the Wellington landscape, and in particular significant escarpments and coastal cliffs.*

*Policy 16.5.2.2: Restrict the construction of structures and earthworks on skylines, hilltops and ridges that make an important contribution to the landscape of Wellington.*

*Policy 16.5.2.3: Encourage retention of existing native vegetation and where appropriate re-introduce native cover.*

4.2.5 In policies 16.5.2.1 and 16.5.2.2 the emphasis appears to be on significant features in the context of the wider Wellington landscape. While the southern face of the Kiwi Point landform is not highly visible beyond its local setting, it is important in the Ngauranga Gorge landscape, due primarily to its strategic location as a focal point at a major bend in the gorge and its relative size.

4.2.6 In the Wellington City District Ridgetop and Hilltop Study, which is presently being carried out, the ridgetops and hilltops in and around the Ngauranga Gorge were not identified in the provisional 1999 report as outstanding at a district wide level. However, while the more detailed assessment is incomplete, it seems likely that the landform affected by the proposed quarry extension will be identified as a locally important hilltop.

4.2.7 While the Ridgetop and Hilltop Study focuses on significant landforms within the Wellington district, it is likely that the visual effect of the quarry, particularly the upper 80 metres, may be visible from parts of the harbour and the eastern bays area in Hutt City.

4.2.8 Approximately one third of the proposed quarry extension area is covered in woody vegetation, most of which is in an advanced state of regeneration. While the area of

vegetation may not be significant at a district level or in overall terms, its strategic location, age and condition makes it significant in the Ngauranga Gorge landscape.

4.2.9 Although the District Plan zones the hillside land on the south side of Ngauranga Gorge Open Space B, the land on the northern side, which appears to have higher landscape and ecological values than much of the land to the south, is zoned rural. Other than for perhaps land ownership considerations there appears to be no logic to the present zoning pattern. It is also interesting to note that the Suburban Centre zone extends some 20-30 metres into the south face along the gorge road frontage. This area is a steep rock face so the zoning strip appears for no other reason than perhaps linking the two larger and flatter areas of Suburban Centre zone land on either side of the proposed quarry site.

4.2.10 Summary

- o Open space is acknowledged as an important component of Wellington's natural character.
- o Council, through the District Plan, is committed to the protection and enhancement of open space areas.
- o Undeveloped and unmodified skylines, hilltops and ridges are important and make a positive contribution to Wellington's landscape.
- o Council seeks to ensure earthworks do not create scars on the landscape or detract from an area's amenities.
- o Council seeks to retain existing native vegetation.

4.2.11 An extension to the south of the Kiwi Point Quarry on Open Space B zoned land appears to be contrary to the objectives and policies of the District Plan.

#### 4.3 Capital Spaces (November 1998)

4.3.1 Capital Spaces is a statement of Council's vision for the open spaces of Wellington in the future. This strategy document does not have any status under the Resource Management Act, however, it is broadly consistent with the District Plan.

4.3.2 While the Open Space Strategy is relatively general in its focus, it does specifically refer to the Ngauranga Gorge as being one of the four proposed inner green belts. Specifically the Ngauranga Gorge Green Belt is seen as linking the harbour with the Outer Green Belt. The Outer Green Belt identified in Capital Spaces is essentially the same area as that identified as the Outer Town Belt in the District Plan.

- 4.3.3 The Inner Green Belts are described as:
- “A series of green belts or corridors, rich in ecological, recreational and heritage values, which weave green open space through the city, containing and identifying the suburbs and connecting other open spaces”.*
- 4.3.4 The Inner Green Belt open space values identified in Council’s Open Space Strategy are:
- o Ecological values with respect to those areas where there is extensive regeneration of native species and/or significant vegetation that weaves “natural corridors” through the city fabric.
  - o Recreational values where there is potential for formal and informal recreational activities.
  - o Landscape values are identified as being significant in all four of the inner green belt corridors. The regenerating native vegetation in the Ngauranga Gorge is noted as providing the basis for a “striking gateway to the harbour in the future”.
  - o Heritage values, both Maori and European, are identified as being high in all four of the inner green belts.
- 4.3.5 Relative to the south face of Kiwi Point Quarry, recreational and heritage values are limited and are not likely to be an issue. The most significant and relevant open space issues will be landscape and ecological.
- 4.3.6 One of the threats and issues identified in the Open Space Strategy states:
- “Industrial, quarry and motorway land uses in the Ngauranga Gorge may conflict with open space values”.*
- 4.3.7 This statement clearly acknowledges the existing land use situation and implies that these activities are an integral component of the gorge landscape and that they are likely to remain and/ or continue to be developed. The industrial nature of the gorge and its domination by the State Highway need not be seen as compromising the “greening” of Ngauranga Gorge as it is the extensive hill slopes that have the potential for revegetation within the framework land use activity, including quarrying, can, if necessary, be integrated as an evolving component of the working, gorge landscape. The proposed quarry extension would set back the “greening” process in the affected area, however, its rehabilitation could be managed as an integral part of a more comprehensive and long term gorge revegetation strategy.

4.3.8 With regard to opportunities, Ngauranga Gorge is seen as being a future gateway to Wellington City. The Strategy specifically makes mention of the need to:

*“Plan and implement a revegetation programme for Ngauranga Gorge to create a future gateway to Wellington”.*

4.3.9 While the Open Space Strategy envisages a strengthening of the green gateway concept in the Ngauranga Gorge, the revegetation programme needs to be viewed in the wider context of the landscape rehabilitation of the gorge landscape overall. The acknowledgement that present and future commercial activities in the Ngauranga Gorge may conflict with open space values needs to be addressed in a comprehensive and integrated manner, particularly in terms of existing and potential landscape rehabilitation, landscape enhancement and revegetation.

4.3.10 The Ngauranga Gorge was identified as a potential green belt because of its amount of open space linking, almost continuously, the harbour and escarpment, to the regenerating forest of Mt Kaukau and the Outer Green Belt. It is relevant, however, that apart from the vegetation on the bluffs on the gorge sides of Upper Ngauranga and at Tyers Bush, much of this open space is considerably modified by vegetation clearance, grazing, earthworks and industrial activity. It has, therefore, been noted as a long-term opportunity for restoration. This green link also coincides with a major focal point – the entrance to Wellington City and the harbour, experienced by thousands of commuters and travellers everyday. Enhancing the gorge as a green corridor is also seen as an opportunity to enhance this gateway and provide a more memorable and attractive setting to the industrial/commercial activities in the bottom of the gorge itself.

4.3.11 Given the character of the present landscape, the nature and outcome of a quarry extension and the need for a comprehensive long term programme of revegetation and landscape enhancement of the gorge, a well planned and operated quarry activity may not be in conflict with Council's long term strategy for the Ngauranga Gorge becoming an Inner Green Belt.

4.3.12 Summary

- o Ngauranga Gorge is identified as being one of the inner green belts that will link the harbour with the Outer Town Belt.

- o Landscape (visual) and ecological (vegetation and fauna) values are the significant open space values in the Ngauranga landscape.
- o Council acknowledges that industrial, quarry and motorway uses may conflict with open space values, and identifies the need to plan and implement a Ngauranga Gorge gateway revegetation programme.
- o A quarry activity, planned in conjunction with an overall rehabilitation and landscape enhancement programme for the entire gorge landscape, may not be in conflict or compromise the long term achievement of Council's Inner Green Belt Strategy for Ngauranga Gorge.

#### 4.4 Wellington City District Ridgetop and Hilltop Study (1999- ongoing)

- 4.4.1 This study was commissioned to assist the Council to clarify provisions in the Wellington City District Plan with regard to the protection of ridgetops and hilltops. The original objective was to identify the ridgetops and hilltops that could be classified as 'outstanding' within the context of the district, and 'significant' at a more local level. A 'Phase 1' report was produced in 1999, with provisional 'outstanding' assessment results, which were to be reviewed and refined during Phase 2, when the assessment would be continued at a more detailed, local community level.
- 4.4.2 Subsequently, the objectives of the study were revised. Instead of ranking the ridgetops and hilltops, the Phase 2 assessment was required to identify their natural and amenity values, and then determine how these could be sustainably managed. It is worth noting here that the provisions in the District Plan and the commissioning of this study arise from a community desire to protect undeveloped ridge and hill tops from development. 'Natural' skylines and backdrops are valued as an important part of the Wellington landscape. The scope of the study is, therefore, quite specific in its focus – the 'undeveloped' ridgetops and hilltops within the district.
- 4.4.3 The redefined project is underway but is unlikely to be completed until later in 2001, after a public consultation exercise has been carried out. The earlier 1999 report will be reviewed and incorporated into the new study as appropriate.
- 4.4.4 The ridgetops and hilltops in and around the Ngauranga Gorge were not identified as outstanding at a district-wide level in the provisional 1999 report. Although the more detailed assessment is still incomplete, it seems likely that

- the spur affected by the proposed southern quarry extension would be identified as a locally important hilltop, on the basis of its visual prominence from the State Highway 1.
- 4.4.5 The revised assessment considers four main values associated with *undeveloped* ridgetops and hilltops. These are: natural values, visual values, heritage values and recreation values. In terms of natural values, the upper part of the landform appears to be relatively unmodified with the pasture cover and areas of regenerating vegetation presenting increasingly significant ecological values. It is unlikely that recreation and heritage values will be identified for the landform spur, given the industrial and motorway activity in the gorge and the apparent absence of historic sites<sup>1</sup>.
- 4.4.6 Visual and ecological values are the most important with regard to ridgetop and hilltop values. Within the gorge itself, the spur is a prominent visual feature for south-bound traffic. Its undeveloped flanks and skyline provide a relatively 'natural' setting, which complements the increasingly vegetated bluffs on the north side of the gorge.
- 4.4.7 In the wider landscape context, the Ngauranga hilltops are seen most clearly from across the harbour: from ferry routes on the harbour, from the central city, from such vantage points as Roseneath and Point Halswell. From these perspectives, the Ngauranga hills form part of the west harbour edge, but the spur affected by the proposed extension is not a highly distinctive feature of this. However, given the height of the proposed quarry cut face relative to the foreground spur, it is likely that distant views of the upper quarry face would be visible from parts of Roseneath and Point Halswell as well as from the harbour itself.
- 4.4.8 The ridgetop study is confined to the Wellington City district. Therefore, views of Wellington ridges and hills from places such as Eastbourne and Petone are not considered in the study. However, these locations should be considered in terms of effects of the proposed quarry extension because the Ngauranga hilltops are part of the harbour landscape seen from these locations.
- 4.4.9 The west harbour edge is strongly defined by the steep vegetated Wellington Fault escarpment. Above the escarpment a rolling plateau rises to around 260 metres elevation. It is this higher elevation that is seen as the

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<sup>1</sup> The scope of the heritage component in the ridgetop study is confined to listed sites in the District Plan, or otherwise well-known sites.

skyline from across the harbour. Upper Ngauranga is a distinctive undeveloped landform on this skyline, seen as a stand-alone, pasture-covered hilltop. The two spurs which flank the entrance to the Ngauranga gorge are less prominent in these distant views, as they are not seen on the skyline. However, they frame the gorge with relatively undeveloped landforms that complement both the vegetated fault escarpment and the increasingly vegetated sides of the gorge that are visible from out on the harbour and when entering the gorge itself.

4.4.10 Much of the lower part of the proposed extension would be screened from harbour locations by the two gorge entrance spurs, in particular the southern (Home Bush) spur. Nevertheless, part of the lower extension may be visible from Somes Island and parts of Eastbourne.

4.4.11 The upper part of the extension spur would be visible from the harbour, however. The Home Bush spur, at 100m elevation, is some 80m lower than the top level of the proposed excavation. This means that the upper cut face would be seen from viewpoints on and across the harbour. Currently, this upper part of the extension spur does not stand out as a distinctive feature because it is vegetated and seen against other landforms of similar cover behind. However, once excavated, the cut faces would attract notice because the paler-coloured bare rock would show up in contrast to the adjacent hill slopes.

4.4.12 The effects of this would be similar to that of the Horokiwi Quarry, where the higher cut faces are visible from Eastbourne above the harbour edge buffer strip.

#### 4.5 Ngauranga Gorge Gateway Strategy

4.5.1 In recent years Council has been considering a gateway strategy for Wellington. Evidence of this is seen in the Open Space Strategy, the Urban Design Strategy and more recently a review of gateways that has been carried out by the City Development and Businesses Committee of Council.

4.5.2 The Urban Design Strategy does not cover in any detail the Ngauranga Gorge area other than to make passing reference to it with respect to its regional transportation linkage function. In this regard the Urban Design Strategy states on page 8:

*“...the vehicular entry down the Ngauranga Gorge, or via the Tawa rail tunnel is marked by a grand opening of the hills to the harbour”*

4.5.3 The Urban Design Strategy does acknowledge the significance of the city entry from Kaiwharawhara (page

66). However, other than a brief reference to the northern entry as being one of the major entry sequences into the city, the strategy focuses on the motorway/ harbour edge sequence with little reference to the gorge itself.

- 4.5.4 In October 2000 the City Development and Businesses Committee reviewed a range of possible initiatives that might be considered in order to develop attractive gateways into Wellington City, and to suggest options for the implementation of the initiatives.

State Highway 1 was identified as a key lineal gateway. The Ngauranga gateway was seen as being made up of two component parts namely, Ngauranga Gorge and secondly the stretch of road between the Ngauranga interchange and the Aotea off ramp. With reference to Ngauranga Gorge, the main issue that was identified was the appearance of the commercial/ industrial centres and the effects of any development in this area.

The Committee agreed that a Gateways Improvement Plan be included as an option in the Strategic Review package for the Built Environment Key Achievement Area as a 2001/02 project.

- 4.5.5 Summary

- o Council is furthering its commitment and support for the Ngauranga Gorge gateway and the integrated enhancement of this area.
- o The emphasis of the gateway concept appears to be on the impacts as one approaches the city with little reference to the effects when one departs the city. For example, the existing Kiwi Point Quarry is not generally visible when approaching the city, whereas the southern extension would be highly visible and a prominent feature in the city approach.

## 5 PROPOSED QUARRY EXTENSIONS

- 5.1 The Stage Two Development of Kiwi Point Quarry involves an extension to the south which will effectively remove the hill landform that separates the existing industrial area south of the existing quarry and the abattoir with the Tyers Road industrial area further to the south. The indicative quarry excavation is illustrated on Plans 1-7 (No. 40/2517) prepared by the Roading Design Unit, Wellington City Council.
- 5.2 The quarry plans show an excavation which parallels State Highway 1 extending back 200 metres to the cut batter face. This face then extends up to and removes the high point of the hill at the 180 metre contour. The highest point of the cut face is approximately 120 metres

above the flat platform at the base of the excavation. The cut batter will be stepped with 15 metre high and 5 metre wide terraces. The overall slope will be approximately 0.5:1.0 in steepness.

- 5.3 In an attempt to reduce the visual impact of the quarry, staging plans that show an excavation of the hillside from the south to the north have been developed. These are shown on Plans 2-7 and are more fully illustrated in visual simulations prepared from two northern viewpoints. While the access road across the lower face of the hillside to the first stage platform above Tyers Road will be visible from the State Highway, quarry activity during the initial phases of the activity will largely be screened from residential locations to the north and west.
- 5.4 However, as the quarry progresses it will appear as a severe and environmentally insensitive cut across the grain of the landscape and the face of the major hill landform that separates the two lower gorge industrial areas. The height of the cut batter will also result in the quarry being visible from the harbour, from the eastern bays in Hutt City and potentially from the Roseneath and Point Halswell areas of Wellington City.
- 5.5 Overall the indicative quarry proposal appears as a functional or engineering response to the challenge of extending and lengthening the life of the present quarry operation. The proposal appears to have been driven by the desire to establish a 200 metre wide flat platform parallel with the State Highway. There appears to have been no attempt to relate the quarry form and excavation to the surrounding landscape and, more particularly, to achieving an end landform that at least will in time appear to be more “natural” in its general appearance.
- 5.6 While a stepped terraced cut face is shown on the drawings and the visual simulations, these could in fact be “rounded off” so as to create a more ragged and informal appearance to the cut face. This would not only make the cut batter appear less formal and engineered, it would also assist with revegetation by providing better micro-environments for plant establishment. Visually, however, the effects of the excavation will be significant even though the process of revegetation may be enhanced and achieved in a shorter period of time.
- 5.7 The landscape effects of the proposed quarry will be as follows:
- The quarry activity and the resultant landform will be highly visible from adjacent residential areas, State Highway 1 and some harbour locations.
  - The upper cut batter faces of the quarry are likely to be visible from Somes Island and potentially from Roseneath, Point Halswell and from east harbour locations in Hutt City.
  - The quarry will dramatically change the character and appearance of the central gorge landscape.

- The form and appearance of the proposed quarry is not sensitive to its landscape setting nor does it relate, visually or physically, to the adjacent landforms.
- The distinctive form of the hill landform that is to be quarried will largely be lost.

5.8 The ecological effects of the proposed quarry will be as follows:

- The loss of approximately 3-4 hectares of healthy and advanced regenerating bush.
- The loss of approximately 8 hectares of early stage regeneration including approximately 5 hectares where there appears to have been no previous soil disturbance.
- The loss of connectivity between Ngauranga Gorge bush on the north side of the gorge and Tyers Bush on the south side.
- Loss of terrestrial habitat and biodiversity.
- Potential edge impacts on adjoining bush to the south of the proposed earthworked area, particularly in terms of wind exposure, weed infestation and hydrological effects.

5.9 Gaining consent for the proposed quarry will be an extremely difficult task given Council's current policies, the location of the site and the likely environmental effects. If it can be clearly shown that other quarry resource alternatives are not economically feasible, or indeed available, a case could be made for the extension of the Kiwi Point quarry.

5.10 Alternative sites in the Makara area and Carey's Gully (north of the Owhiro Bay quarry) should be thoroughly investigated as alternative sites given the nature and extent of the likely environmental effects and public reaction to a quarry extension at Kiwi Point.

## 6 ALTERNATIVE QUARRY PROPOSAL

6.1 On the basis of the form and character of the existing hillside, the open space values of the area and the extent of previous quarry activity, an alternative quarry layout has been investigated. This proposal seeks to achieve the following:

- To visually contain the overall extent of the quarry and its cut batters.
- To create a modified quarry form that is more sensitive to the area and the site's open space values.
- To retain the high point of the hill landform in the context of its upper slopes.
- To reduce the visibility of the upper terrace cut faces particularly from harbour viewpoints.

- To minimize the disturbance and loss of soil cover particularly on those areas not previously disturbed.
  - To minimize the loss of or disturbance to significant areas of regenerating bush and forest.
  - To maximize resource recovery by excavating below the 60 metre quarry floor in order to compensate for retaining a greater area of the hillside landform.
  - To backfill the quarry hole with clean fill so as to create a suitable platform for an appropriate land use activity.
  - To eliminate all terraced batters so as to achieve a more informal and natural scree slope appearance.
  - To create an end landform and micro-environment that facilitates and enhances opportunities for revegetation.
- 6.2 In addition the modified quarry proposal better meets the following relevant Council District Plan policies:
- Policy 16.5.2.5 Restricts the construction of structures and earthworks on skylines, hilltops and ridges that make an important contribution to the landscape of Wellington.*
- Policy 16.5.2.3 Encourage retention of existing native vegetation and where appropriate re-introduce native cover.*
- 6.3 The modified quarry proposal also better conforms to the spirit and intent of the Ridgetop and Hilltop Study by the protection of the bulk of the hillside spur which is likely to be identified as a locally important hilltop.
- 6.4 While the modified quarry proposal minimises potential environmental effects, the overall effects will still be significant. Any further quarry activity at Kiwi Point will need to be justified on the basis that other alternative locations are not available or economically viable.
- 6.5 The alternate quarry layout is shown on Figure XX and indicatively illustrated as a visual simulation on Figure XX.
- 6.6 A further gorge quarry option which could be investigated is to consider extending the present operation in a hole below the existing ground level. While this would necessitate the relocation of the processing plant this large area could provide considerable quarry resource material with the hole eventually being available for backfilling and eventual commercial and/ or industrial development.

## 7 REVEGETATION ISSUES

- 7.1 Past quarry and roading earthworks in Ngauranga Gorge have created two plant environments, namely, vertical rock faces and bluffs, and consolidated rock benches. When left to regenerate naturally, it appears that on south aspects it takes up to 25 years for the first woody seedlings to establish in crevices in the rock face and walls. These colonising species include *Hebe stricta*, gorse and broom. Over longer periods these faces support other species such as tree hebe, broadleaf, manuka and coastal flax. On northern aspects initial vegetation establishment can take considerably longer.
- 7.2 On benches with a southerly aspect it takes between 15-20 years for the grass sward/ gorse/ fennel pioneering phase to collect enough soil material to enable small shrubs and ground ferns to establish. On northern aspects vegetation establishment takes longer. Exotic weed species that establish themselves as early colonising plants include buddleia, Darwins barberry, pampas, blackberry and *Clematis vitalba*. Native species which are early colonisers include manuka, *Coprosma robusta*, tauhinu, *Hebe stricta* and the ferns *Asplenium oblongifolium* and *Polystichum richardii*.
- 7.3 In practical terms it will be particularly difficult and very long term to recreate successional forest similar to what occurs in Tyers Reserve or the Ngauranga Gorge bush area further to the north. This will be due to the loss of soil, steepened slopes and the fact that the cut faces will have a northerly aspect.
- 7.4 Observations of previous earthworks in Ngauranga Gorge and in other similar localities confirms that revegetation will be a difficult and slow process at Kiwi Point. While revegetation techniques can assist in speeding up the natural processes, the time periods required for revegetation and effective landscape mitigation will be in excess of 50 years.
- 7.5 The following table provides an indicative guide to the likely time frames that would be required for the successful revegetation of sites both undisturbed and earthworked in the Ngauranga Gorge. Unmodified sites are those sites that have lost their vegetation cover but have not previously been earthworked. The unrehabilitated modified sites are those that have been earthworked and left as either stepped terraced landforms or steep cut batters. The rehabilitated modified sites are those which are left in an informal and less engineered form where scree slopes and a range of micro-environments are provided for.

**Ngauranga Gorge Revegetation**  
(Time Periods in Years)

Land Cover	Unmodified Sites		Unrehabilitated Modified Sites		Rehabilitated Modified Sites	
	North aspect	South aspect	North aspect	South aspect	North aspect	South aspect
Grass Cover	1-2	1	5	3	1-2	1-2
10% woody cover	10+	5+	30+	20+	20+	10+
50% woody cover	20+	15+	60+	40+	30+	20+
Optimal vegetation cover <sup>1</sup>	40+	30+	80+	60+	50+	40+
Optimal second growth forest <sup>2</sup>	80+	60+	150+	120+	100+	80+

<sup>1</sup>Optimal Vegetation Cover: mosaic of dense woody growth, grass/ scrub; or rock faces depending on substrate.

<sup>2</sup>Optimal second growth forest: mosaic of closed canopy bush, scrub/ grass or rock faces depending on substrate.

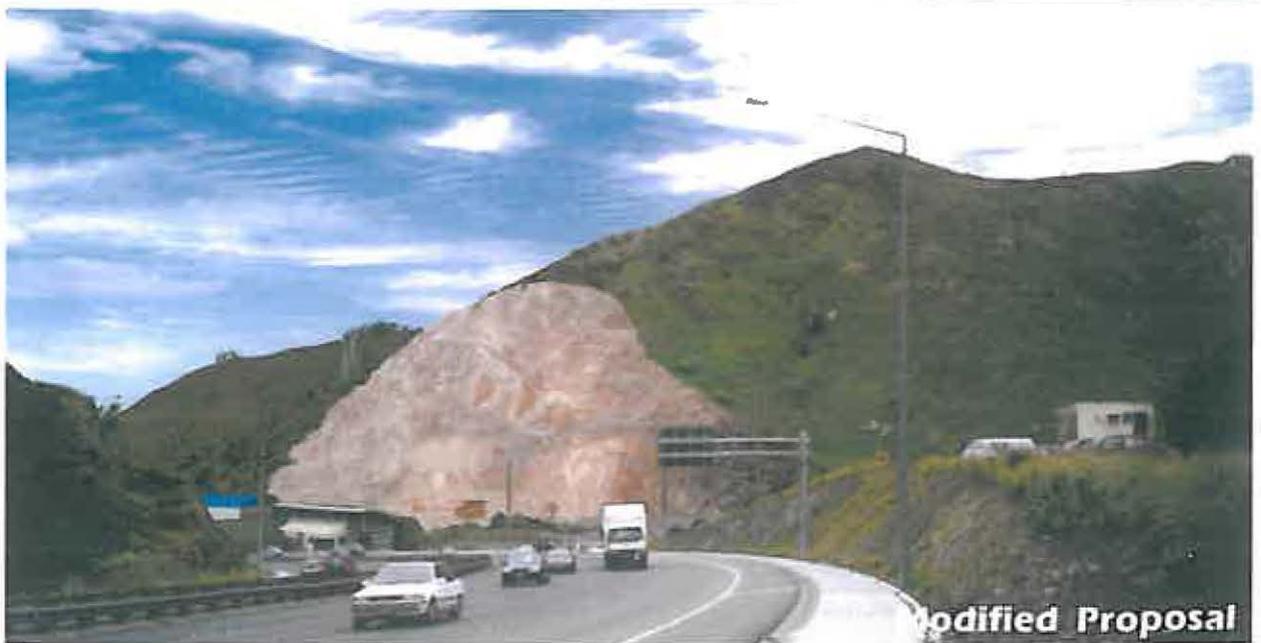
7.6 The indicative time frames required to achieve a reasonable woody native vegetation cover can be speeded up by utilising revegetation techniques such as:

- Creating and/ or adding soil forming materials and/ or organic soils.
- Providing a diversity of micro-environments.
- Planting appropriate rock-habitat adventive species and "nursery" plants.
- Ripping and blasting to create scree and/ or suitable plant establishment areas, and not oversteepening slopes.

7.7 In order to illustrate the likely effects of revegetation on both the quarry cut faces and the undisturbed adjacent hillside areas, simulations depicting the indicative nature and pattern of revegetation cover is shown on Figures XX. The simulations show the effects of revegetation on the proposed quarry and modified quarry. The time periods depicted are:

- at the completion of quarry operations.
- 20-years after quarry operations have ceased.
- 50-years after quarry operations have ceased.

The simulations have been prepared on the assumption that active and progressive site rehabilitation and revegetation would occur for both quarry options and on the adjacent undisturbed land during and following the quarry activity.



**KIWI POINT QUARRY**  
Southern Extension



**Existing Situation**

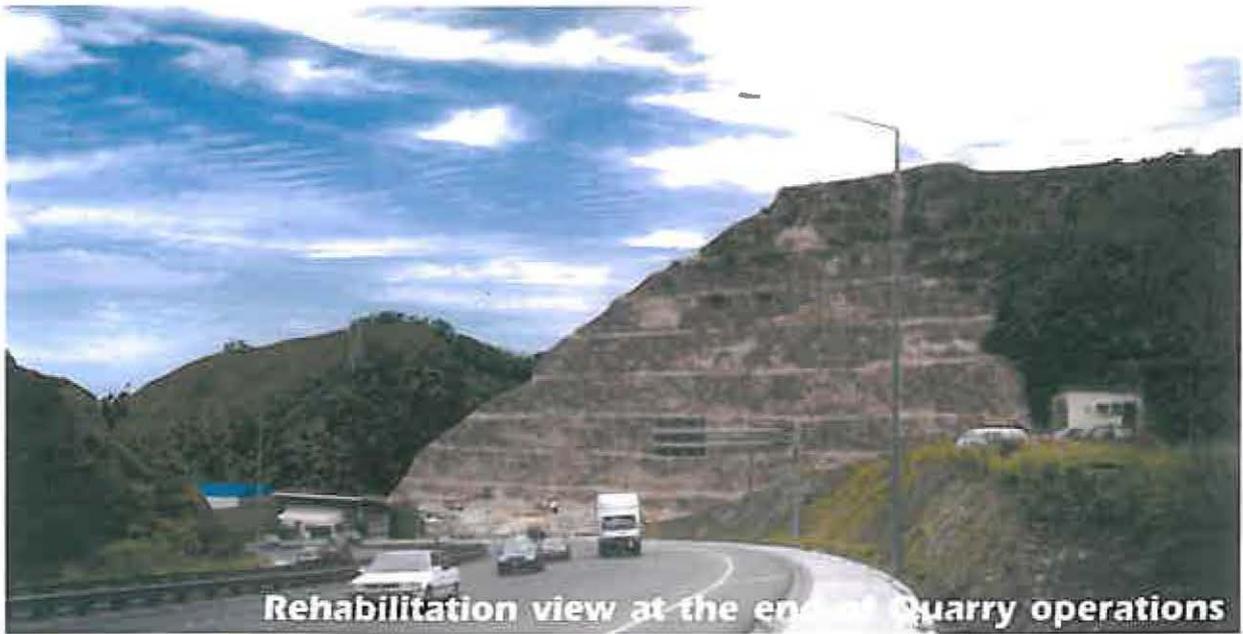


**Current Proposal**



**Modified Proposal**

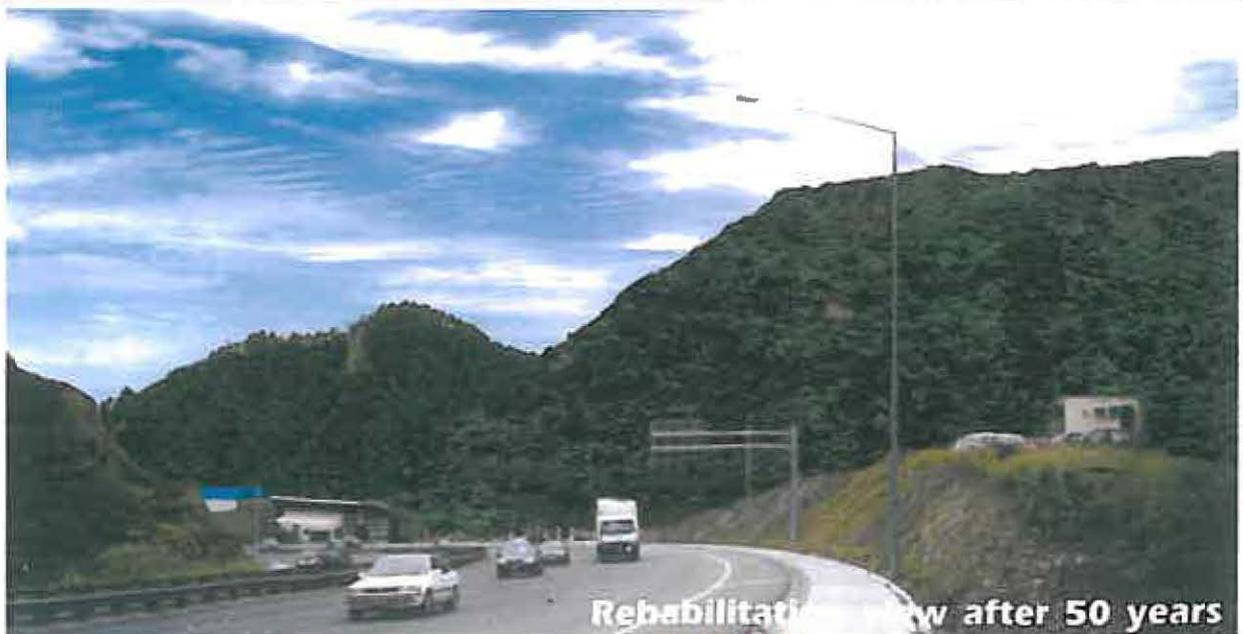
**KIWI POINT QUARRY**  
**Southern Extension**



Rehabilitation view at the end of Quarry operations



Rehabilitation view after 20 years



Rehabilitation view after 50 years

**KIWI POINT QUARRY**  
Rehabilitation of Current Proposal



**Rehabilitation view at the end of Quarry operations**



**Rehabilitation view after 20 years**



**Rehabilitation view after 50 years**

**KIWI POINT QUARRY**  
**Rehabilitation of Current Proposal**



**Rehabilitation view at the end of Quarry operations**

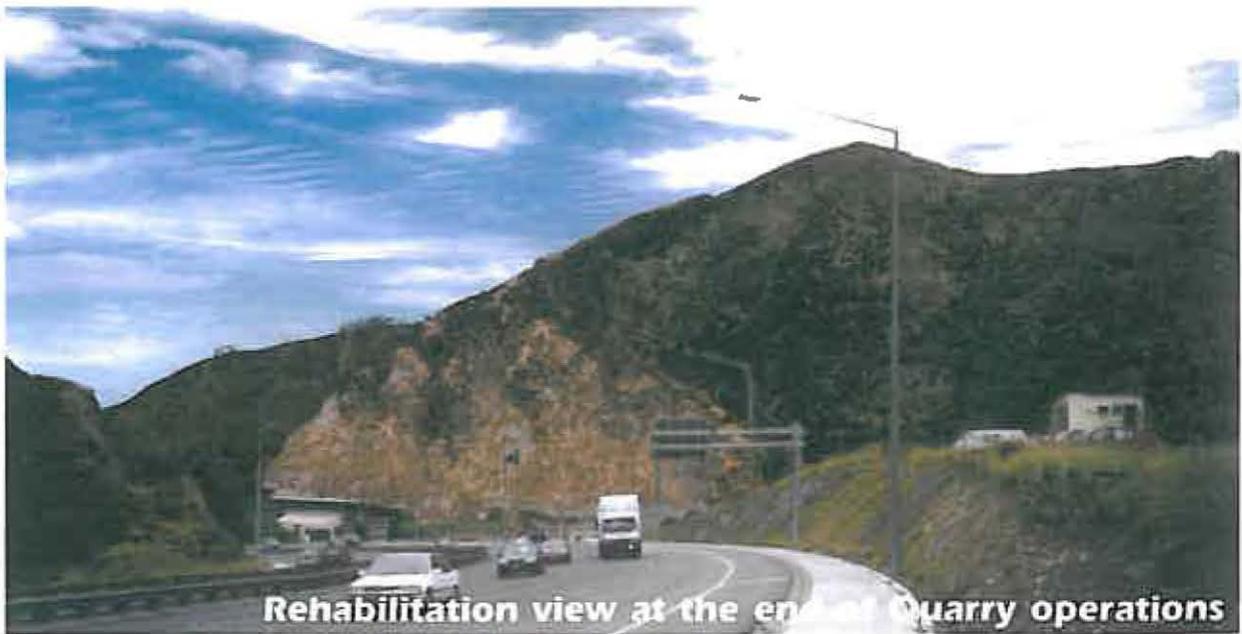


**Rehabilitation view after 20 years**

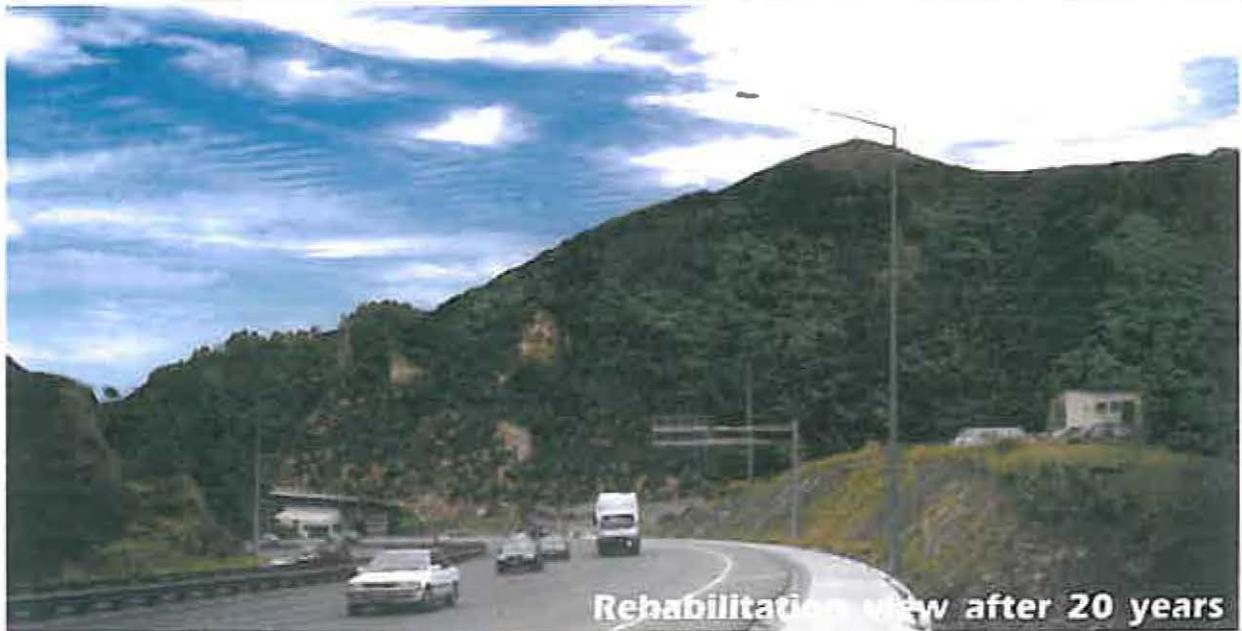


**Rehabilitation view after 50 years**

**KIWI POINT QUARRY**  
**Rehabilitation of Modified Proposal**



Rehabilitation view at the end of Quarry operations



Rehabilitation view after 20 years



Rehabilitation view after 50 years

**KIWI POINT QUARRY**  
Rehabilitation of Modified Proposal

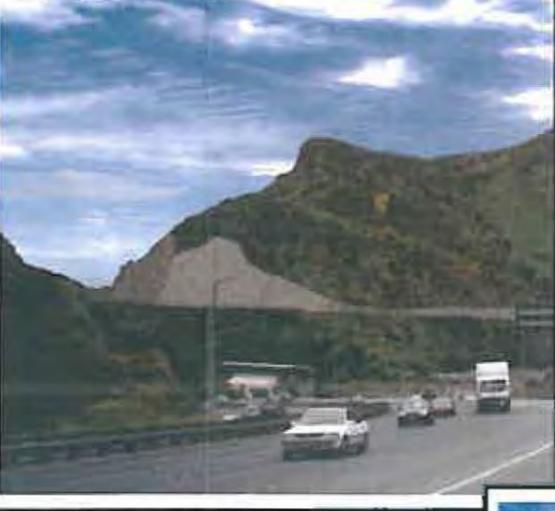
STAGE 2: ORIGINAL



STAGE 2: ACCESS ROAD



STAGE 2: 500k Cut



STAGE 2: 1000k Cut



STAGE 2: 2000k Cut



STAGE 2: FINAL



STAGE 2: 3000k Cut



FIELDWORK	TERRALINK	4/98
DESIGN	T. JAEGER	10/99
DRAWN	S. DEL FAVERO	10/99
GRAPHIC RENDERING	P. O'BRIEN	10/99
DESIGN SOFTWARE	AUTODESK CIVIL/SURVEY V8	
DRAUGHTING SOFTWARE	AUTOCAD R14	
RENDERING SOFTWARE	3D STUDIO VIZ	



**KIWI POINT QUARRY**  
 STAGE 2 DEVELOPMENT  
 VIEW FROM STATE HIGHWAY

The Revegetation previously shown by Graphic Dimensions (October 1999) has been modified by Boffa Miskell in February 2001 to more accurately depict the nature and character of the revegetation process.



ROADING DESIGN UNIT  
 PLAN No. 40/2517/1  
 SHEET 1 OF 1 SHEETS  
**M. BARNETT**  
 ROADING DESIGN MANAGER

STAGE 2: ORIGINAL



STAGE 2: ACCESS ROAD



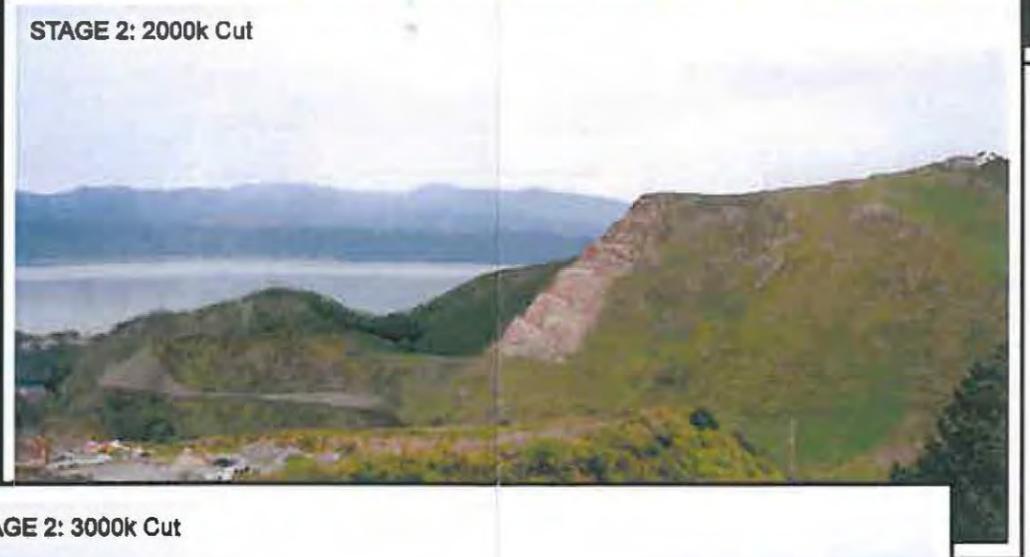
STAGE 2: 500k Cut



STAGE 2: 1000k Cut



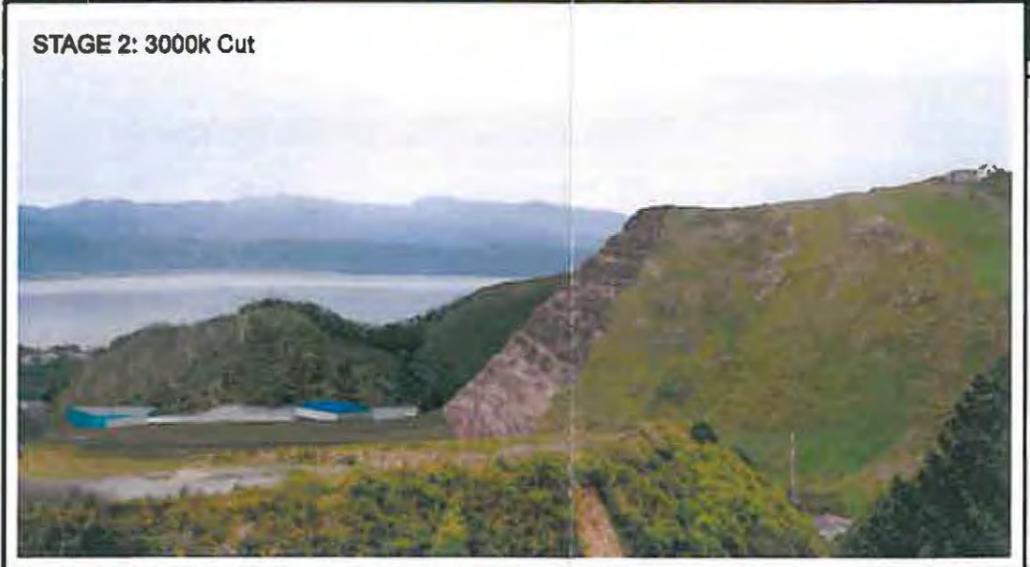
STAGE 2: 2000k Cut



STAGE 2: FINAL



STAGE 2: 3000k Cut



FIELDWORK	TERRALINK	4/95
DESIGN	T. JAEGER	10/99
DRAWN	S. DEL RIVERO	10/99
GRAPHIC RENDERING	P. O'BRIEN	10/99
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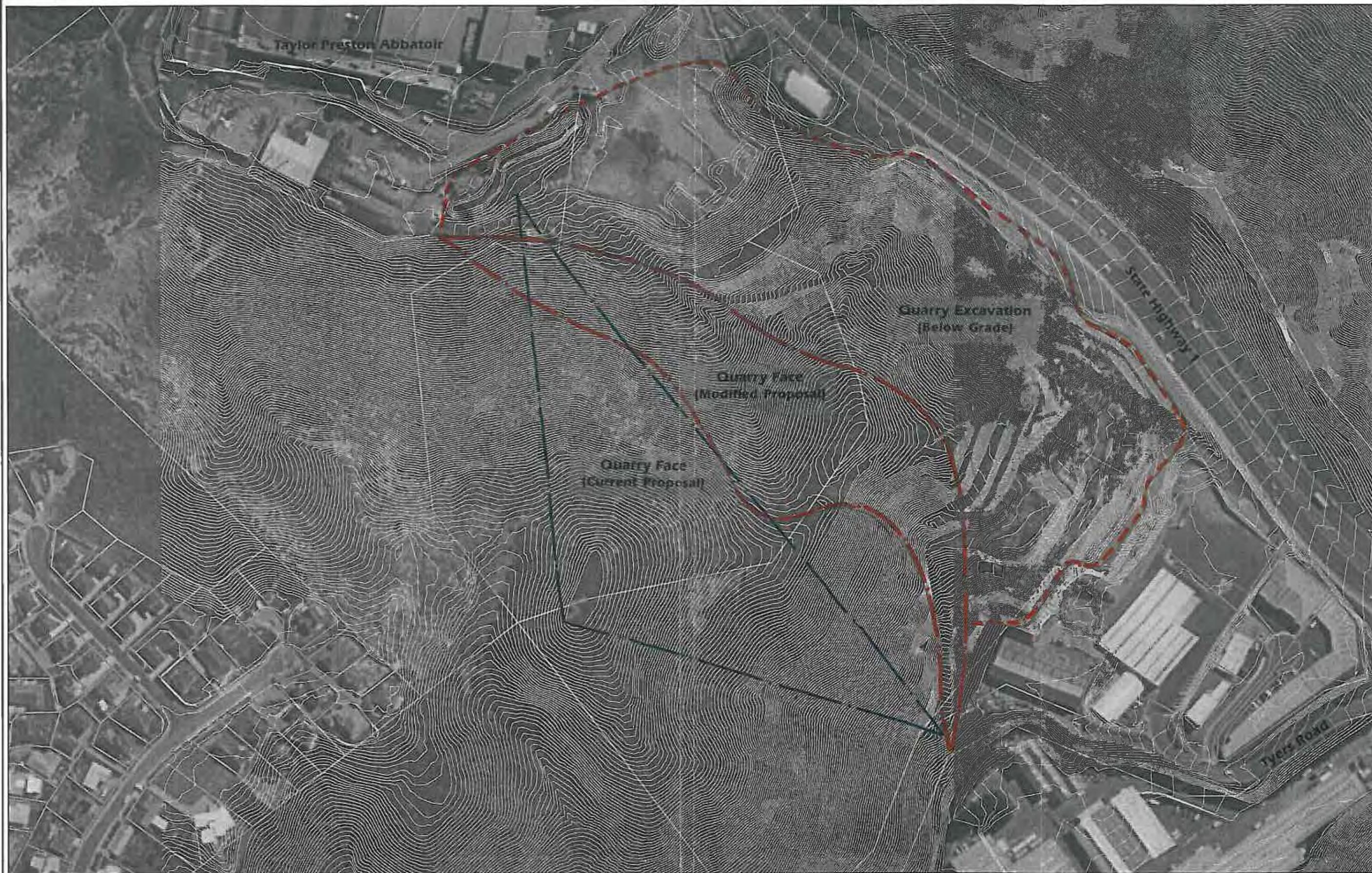


**KIWI POINT QUARRY**  
 STAGE 2 DEVELOPMENT  
 VIEW FROM FRASER AVENUE

The Revegetation previously shown by Graphic Dimensions (October 1999) has been modified by Boffa Miskell in February 2001 to more accurately depict the nature and character of the revegetation process.



ROADING DESIGN UNIT  
 PLAN No. 40/2517/2  
 SHEET 1 OF 1 SHEETS  
**M. BARNETT**  
 ROADING DESIGN MANAGER



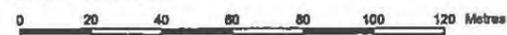
**DATA STATEMENT**

Property boundaries  
 Land Information NZ  
 Licence WN083547/2  
 Crown Copyright reserved  
 Accuracy in urban areas: +/- 3m  
 Accuracy in rural areas: +/- 20m

Topographic data:  
 Wellington City Council  
 WCC copyright reserved  
 Accuracy: +/- 30cm

Other data has been  
 compiled from a  
 variety of sources and  
 its accuracy will vary.

Scale 1:2000



**KIWI POINT QUARRY**  
 Southern Extension  
**Modified Development Proposal**  
 Boffa Miskell Limited  
 February 2001

**ABSOLUTELY  
 POSITIVELY  
 WELLINGTON**  
 Tūmaka Pōneke  
 Wellington City Council

- **Attachment 3: Project Description and Landscape and Visual Assessment for Kiwi Point Quarry, Boffa Miskell Ltd, September 2003**



PROJECT DESCRIPTION AND LANDSCAPE AND VISUAL ASSESSMENT

# Kiwi Point Quarry Extension

Prepared for WELLINGTON CITY COUNCIL  
September 2003



**BOFFA  
MISKELL**  
*planning design ecology*

**Kiwi Point Quarry Extension**  
**Project Description**  
**And**  
**Landscape And Visual Assessment**

prepared for  
**Wellington City Council**

by  
**Boffa Miskell Ltd**

September 2003

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## 1.0 EXECUTIVE SUMMARY

### Project description

- The Wellington City Council is seeking a Plan Change to rezone land for a proposed extension to Kiwi Point Quarry in the Ngauranga Gorge, from Open Space B to Suburban Centres.
- The proposed extension will involve gradually removing the lower part of a spur in the central Ngauranga Gorge to form a platform adjacent to SH1 in the bottom of the gorge and then excavating a pit in the platform. The pit will be backfilled with clean fill to form a sloping platform just above the level of SH1.
- The proposed extension will be carried out in 6 stages:
  - *Stage 1*: set up, involving the construction of an access road around the lower part of the spur;
  - *Stages 2 & 3*: quarrying the south face of the spur;
  - *Stage 4*: quarrying to remove the remainder of the spur;
  - *Stages 5 and 6*: quarrying and backfilling the quarry pit.
- A 25 metre buffer strip contained by a 2m security fence will be set aside around the steep sides and top of the quarry face where existing vegetation will continue to regenerate.
- Bunds (or mounds) around the outer edge of the access road and working platform will screen some activity from view and provide a noise, dust and safety barrier.
- The operational area of the existing quarry, including the processing plant, office, temporary stockpiling and customer service area will be maintained, so no buildings or fixed machinery will be located at the proposed quarry extension.
- The quarry is expected to be operational for 30 – 40 years. On completion, the finished quarry face will be revegetated and managed as part of the Council’s long-term plan for a Ngauranga Gorge green belt. The end use of the final platform will be decided at a future time.

### Landscape Context

- The Ngauranga Gorge is a spatially enclosed ravine, within which steep, rugged hill slopes enclose a densely developed valley floor where transport, industrial and commercial uses dominate. It is a highly modified landscape resulting from clearance of the original native forest cover and a long history of major landform modification. Substantial open space areas on the hillsides are in a degraded condition due to loss of vegetation cover, loss of topsoil and lack of action to rehabilitate disturbed land.
- The gorge is a recognised ‘working’ city gateway containing the major transport corridor of State Highway 1 and associated industrial / commercial uses and made memorable by a dramatic threshold to Wellington Harbour.
- The gorge is also recognised as a future green belt because of the potential to revegetate the open space on the hillsides and create an ecological link between the harbour and Outer Green Belt. A long-term, comprehensive enhancement and revegetation programme for the entire gorge landscape is needed to which a well-planned programme of rehabilitation for the proposed quarry would contribute.

### Landscape Effects

- During the life of the quarry, ongoing disturbance of areas of the site will result in substantial areas of exposed rock, removal of vegetation cover and obvious quarrying activity in the gorge. However, quarrying is already an established activity in the gorge that is not out of place amongst the industrial ‘working’ land uses concentrated in the bottom of the gorge.
- The proposed staging has also been planned to minimise the area being actively worked at each stage and to progressively rehabilitate areas as they are finished. The main quarry face will be finished by the end of stage 4 – approximately two thirds of the quarry’s life - so that its rehabilitation will be progressing during stages 5 and 6.
- In the longer term, the proposed removal of a substantial part of the spur landform will widen the central gorge and reduce the sense of enclosure to some extent. Revegetation of the site will be set back by some

35 – 45 years. However, this is in the context of a landscape that has been substantially modified in both its landforms and vegetation cover over the last 150 years.

- The gorge will still function as a gateway in and out of Wellington Harbour with its a dramatic ravine-descent and harbour threshold unaffected. The quarry face will be rehabilitated to re-establish vegetation cover and will contribute to the long-term Ngauranga Gorge green belt concept.

### Visual effects

- The proposed quarry will be of a scale and nature that it will result in some significant visual effects during its operation.
- SH1 travellers will see the quarry, although fleetingly, as a substantial area of disturbed land in their foreground view.
- The quarry will also be noticeable as an area of exposed rock in the middle distance of views from parts of nearby hill suburbs. However, the full extent of the quarry face will be visible from a relatively small number of houses and the quarry will be seen as a relatively small part of extensive hilltop and harbour views from most residential viewpoints.
- The quarry development has been planned to minimise adverse visual effects. The top height of the quarry face has been lowered to a level where its visual impact in the wider harbour landscape will be minimal and the quarry pit in the bottom of the gorge will be screened from SH1 travellers as well as most locations in the wider landscape.
- The south-to-north direction of quarrying has been planned so that the north face of the quarry spur will screen much of the quarry activity from north and west locations for the first 3 stages of the quarry development.
- The quarry face, which will be the most noticeable area of disturbance, will be progressively rehabilitated as it is completed, from approximately halfway through the life of the quarry. In the long term, the quarry face will revegetate and it will become one part of the vegetated hillsides in the gorge that will eventually form the Ngauranga Gorge green belt.
- Longer views up and down within the gorge and enlarged views in and out of the gorge in the direction of Broadmeadows, resulting from widening the gorge, will somewhat reduce the sense of enclosure and separation from the residential areas in the gorge.
- However, the gorge's essential visual character will remain much the same – a highly developed utilitarian corridor in the gorge bottom, flanked by steep, dramatic, revegetating slopes.

### Mitigation

- An original proposal, which involved removing a much larger proportion of the spur landform was amended to reduce the degree of adverse landscape and visual effects, in particular, reducing the quarry's visibility in the wider landscape, reducing the area of land and vegetation disturbance, and achieving a final landform of more natural appearance.
- Various measures are planned to mitigate adverse visual effects while the quarry is operational, including protection of two small, but visually and ecologically valuable, stands of karaka trees; planting to extend the karaka grove and screen the quarry pit from view on SH1; hydroseeding the access road batters; and maintaining bunds around the outer edge of the access road and working platforms for visual screening and safety.
- A long-term rehabilitation programme will be implemented to revegetate the finished quarry face. The rehabilitation will aim to speed up the natural rate of regeneration and improve the quality of vegetation cover through ground finishing to encourage plant establishment and planting in selected areas.
- The adjacent grazing land and decommissioned existing Kiwi Point quarry will be actively rehabilitated while the quarry extension is operational. This will substantially contribute to the Ngauranga Gorge green belt concept by extending the vegetation corridor and visibly 'greening' a large area of the gorge landscape.

## 2.0 INTRODUCTION

### 2.1 Purpose

This report is an assessment of the landscape and visual effects that would result from the proposed south extension of the Kiwi Point Quarry in Ngauranga Gorge, Wellington. The report has been prepared as part of the supporting information for a Plan Change by Wellington City Council, which seeks to rezone part of the land affected by the proposal from Open Space B to Suburban Centres. The report describes:

- the proposed quarry extension,
- the existing landscape,
- the landscape and visual changes that are likely to occur as a result of the proposed extension,
- the effects that these changes would have on landscape and visual values, and
- proposed mitigation to reduce or remedy potential adverse effects.

### 2.2 Background

In February 2001 Boffa Miskell Ltd prepared a draft open space assessment of a proposed extension to the quarry, which was followed by a further assessment in August 2001, which incorporated additional ecological information. These assessments were essentially scoping studies to consider the proposed extension in terms of the open space values in the area and relevant Council policies and reports, to review the nature and extent of the proposed extension and to consider appropriate remedial or rehabilitation measures that could be taken. As a consequence of this work, a modified proposal was formulated, to minimise adverse effects that were identified. The original and modified proposals are compared in 8.1.

District Plan provisions are addressed separately in the Plan Change documentation. However, the following City Council strategic policy documents are relevant to the assessment of landscape and visual effects and are discussed in relevant sections of the report:

- *Capital Spaces, Open Space Strategy for Wellington, 1998*
- *Wellington's Ridgetops and Hilltops, The Natural and Amenity Values, 2001*
- *Gateways to Wellington City, 2003.*

## 3.0 THE SITE

The site is located on the south side of State Highway 1 (SH1) in the central part of Ngauranga Gorge, as shown in Figure 1.

It comprises the lower part of a spur, which slopes steeply down into the gorge from Rangoon Heights, a ridgetop housing area. The spur slopes down from a high point at 190m asl (above sea level), adjacent to the housing area, to approximately 60 - 40m asl adjacent to SH1. The highest part of the quarry will be 158 m asl. The site also includes a flat area on the north side of the spur, which is currently used as a stockpile area by the current Kiwi Point quarry operation. A Council-owned house is located at the base of the hill behind the stockpile area at the edge of the land that will be affected by the proposed quarry. The house will be removed during stage 4, at least 15 years after closure of the existing quarry. Noticeable areas of the lower south and east slopes have been cut back by past quarrying and road cutting activities, and this is particularly noticeable on the south face where benching and exposed rock is apparent.

To the north and east, the site is bounded by State Highway 1. A Wellington Regional Council pumping station is located between SH1 and the site, immediately adjacent to the north corner. The Taylor Preston abattoir is adjacent to the northwest, with the existing Kiwi Point Quarry beyond that. To the southeast, the site is bounded by industry in the Tyers Stream gully and, to the south and west, is bounded by open space, where Tyers Bush is notable for its relatively advanced secondary native vegetation within the wider gorge environs.

The site is mainly covered in rank grass with patches of regenerating exotic and native vegetation, much of which comprises tawhini, gorse, blackberry and other weed species. There are several stands of taller trees, including two small stands of karaka next to the WRC pumping station and a mixed stand of native trees on the mid-slope to the south of the station (see ecology report for more detail).

## 4.0 THE PROPOSED QUARRY EXTENSION

### 4.1 Concept

The concept for the proposed quarry extension has been developed after a major revision of an earlier proposal (see 8.1). The revision was driven primarily by landscape considerations and set out to minimise adverse landscape and visual effects. Specifically, the revised concept aims to visually contain the quarrying activity as much as possible, minimise the area that will be disturbed and create a final landform of comparatively natural appearance, finished to facilitate revegetation, while also maximising quarried rock volumes.

### 4.2 Rock Extraction

The proposed southern extension to Kiwi Point Quarry will involve quarrying the lower part of the spur that separates the abattoir from the industrial area on Tyers Road. This would eventually see the lower end of the spur entirely removed from 158m asl down to the bottom of the gorge where a platform resulting from the quarrying would be formed approximately 10 – 15 metres above the level of SH1. Further quarrying would then excavate down into the platform to a lowest level of 30m asl, and the pit would then be backfilled with clean fill. The final finished ground level would form a platform sloping north-south from 64 – 44m asl, which would vary between 0 and 10 metres above the level of SH1.

Quarrying would start on the south side of the spur and work progressively north. The following six representative stages are illustrated in Figures 2(a) and 2(b) to show how the landform will progressively change during the quarry's life span. The figures show the large-scale landform modification and staging and show regular benching required for overall slope stability and working access during the quarry's operation. However, as the quarry face is completed the final finishing will be designed in detail and progressively implemented, as part of site rehabilitation, to stagger the benching, vary gradients and vary ground conditions to achieve a more natural appearance and to aid plant establishment.

- Stage 1:* Set-up stage: construction of an access road to a working platform at 94m asl with screening bunds around the outer edge, screen planting adjacent to the WRC Pumping station.
- Stage 2:* Quarrying of the south face from 154m asl to an enlarged working platform at 94m asl (i.e. level of the preliminary working platform).
- Stage 3:* Quarrying of the south face from 94m asl down to the quarry pit platform by progressively excavating and lowering the level of the working platform.
- Stage 4:* Quarrying to remove the remainder of the spur landform within the site from 158m asl to the quarry pit platform, working from south to north, and final contouring of the finished face.
- Stage 5:* Quarrying of the quarry pit to 30m asl into the quarry pit platform.
- Stage 6:* Backfilling of the quarry pit to the level of the finished platform sloping north-south from 64 - 44m asl.

### 4.3 Associated Features

A number of site features will also occur as a consequence of the rock extraction operation (see Figure 3).

- A 25 metre safety and visual *buffer strip* will be set aside around the steep sides and top of the area to be excavated, which will be left for the existing vegetation cover to continue regenerating.

- *Fencing* will be constructed around the outer edge of the buffer strip to exclude members of the public. This will be a 2 metre-high steel pole and wire mesh construction.
- An *access road* will be constructed around the lower part of the spur to enable machinery to reach the south face (which will be quarried first) and transport the rock material back to the existing quarry facilities for washing and stockpiling. This road will eventually be removed as the quarrying excavates below its level.
- *Bunds* on the outer edge of the access road and the main working platform will provide a visual screen, noise and dust buffer, and safety barrier during quarrying of the spur. The bunds will be a minimum of 2m height and will be created by excavating the road and working platform to a level 2m or more below the outer edge, which will be left in situ to form a 'rim'. As the working platform comes down in height, the bund will be adjusted to maintain the minimum height above the working area.
- *Screen planting* of native trees will be planted on the south side of the WRC pumping station to screen views into the quarry pit platform during stages 5 and 6 and avoid possible distraction for south-bound SH1 drivers of seeing quarry machinery ahead.
- *Machine access tracks* to the working face of the quarry will be progressively constructed, removed and reconstructed as the landform is excavated.
- *Temporary stock piling* of quarry material for short periods prior to trucking to the processing area at the existing quarry.

The operational area at the existing quarry, including the processing plant, office, temporary stockpiling and customer service area will be maintained. Consequently, no buildings or fixed machinery will be located at the proposed quarry extension.

#### 4.4 Duration

The quarry's life span will depend upon demand for rock resources in the region but it is expected to be 30 - 40 years. The assessment of effects and proposals for mitigation in this report have been based on this timeframe.

## 5.0 LANDSCAPE CONTEXT

In this section the historic and existing landscape features and character of the Ngauranga Gorge are described, as this is the context within which the effects of the proposed quarry extension need to be considered.

### 5.1 Topography

The Ngauranga Gorge is a deep cleft in the land that forms the western edge of Wellington Harbour. This land rises steeply along the Wellington Fault line from sea level to elevations up to 297 metres<sup>1</sup>. The fault escarpment is an important feature in the harbour landscape; a steep vegetated face with narrow openings at Kaiwharawhara Gorge, Ngauranga Gorge and Korokoro Stream.

The landforms of Ngauranga Gorge have been considerably modified by human action over the past 150 years<sup>2</sup>. Historic records indicate that the gorge was very narrow, winding and deeply incised before European settlement. Landform modification began as early as the 1850s with the construction of access tracks and roads up the gorge but these were comparatively minor, comprising little more than narrow benches cut above the stream (see Photograph 1). Landform changes of far greater magnitude have occurred over the last eighty years.

Quarries have operated in the gorge since the 1920s and continue today with the present operation at Kiwi Point. Several areas of previously non-existent flat land in the gorge have resulted from quarrying

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<sup>1</sup> Westridge trig is the highest point on the hills immediately above the harbour at 297m.

<sup>2</sup> Montgomery Watson, *Kiwi Point Quarry, Study of the Ngauranga Gorge – Landforms and Modifications*, prepared for Kiwi Point Quarry, December 2000.

activities, including the abattoir site where an entire hill was removed. The areas affected by quarrying up until 2000 are shown in Figure 4.

The road originally followed a circuitous route around the hill that was removed by quarrying, as shown in Figure 4 and Photograph 2. The road was realigned to its present route and widened to four lanes in the late 1930s, resulting in significant areas of cut and fill. It was widened further to 6 lanes in the 1960s, with extended areas of cut and fill. Construction of the motorway overbridge and interchange at the bottom of the gorge in the 1970s resulted in major landform modification and the 1997/98 Newlands Interchange resulted in significant earthworks to the upper portion of the gorge between Kiwi Point Quarry and the Johnsonville motorway exit (see Photographs 3 and 4).

Today, the gorge topography is characterised, as it always was, by steep-sided hill slopes and bluffs with rock outcrops and rock faces a feature. However, there are numerous areas where landform modification is evident in the exposed rock of obviously artificially cut faces, and the benching of former quarry faces and larger road cuttings (see Photographs 5 - 7.) The gorge is still a deep cleft set well below the enclosing hills but is substantially wider than it originally was with significantly greater areas of flat land in the valley bottom than originally.

## 5.2 Drainage

The Waitohi Stream<sup>3</sup>, which once dominated the narrow bottom of the gorge, has also been substantially modified to the extent that much of it is piped underground and those vestiges still above ground are largely hidden behind industrial development. The stream is piped underground near the abattoir and taken across SH1, north of the site.

## 5.3 Vegetation

Prior to the 1800s, the gorge probably supported a dense cover of tall coastal forest, which was cleared following settlement.

Today, most vegetation occurs on the hillsides of the gorge and comprises a patchwork of exotic and native vegetation, including rank pasture, large areas of shrubby re-growth with noticeable presence of invasive weed species, a pine plantation, and native vegetation at various stages of regeneration. Areas of more advanced secondary native bush occur in the Tyers Stream Reserve and parts of the bluffs above SH1 east of the Kiwi Point quarry, where the south-facing aspect favours regeneration. The sparse, weed-prone vegetation on many of the hillside areas is indicative of past landform modification, which has resulted in vegetation clearance and loss of topsoil with little remedial action. Besides the Newlands Interchange roadside planting and pine planting on the ridge to the southwest of the gorge entrance, very little active revegetation appears to have been carried out in the gorge, other than grass hydroseeding.

There is little vegetation in the valley bottom, except for some amenity planting around industrial and commercial sites and extensive roadside planting associated with the Newlands Interchange.

## 5.4 Land uses

Historically, the gorge has been, and continues to be, a major transport route in the region. Consequently, the bottomland of the gorge is dominated by SH1 and most of the remaining flat land is occupied by industrial and commercial activities. The main hillside activities have historically been grazing and quarrying. Kiwi Point is now the only remaining quarry and much of the former grazing land appears to have been retired, with pasture giving way to regenerating vegetation.

Residential housing, once clustered at the lower end of the gorge but replaced by industry, was for many years confined to a small group of houses on Malvern Road and Fort Street on the eastern spur above the SH1 / SH2 interchange. In recent years, housing has appeared in the central gorge landscape - on the skyline of the ridge west of the central gorge in the Rangoon Heights area. Before this, the gorge appeared to “contain” development within the floor of the gorge. Accordingly the unbuilt nature of the enclosing (albeit highly modified) landforms was a characteristic feature of the gorge landscape. The skyline housing now appears to intrude into this landscape and has to some degree compromised the “natural” character of the central gorge landforms.

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<sup>3</sup> Adkin, Leslie G., *The Great Harbour of Tara, Traditional Maori Place-names and Sites of Wellington Harbour and Environs*, Whitcombe and Tombs Ltd, 1959

## 5.5 Landscape values

### 5.5.1 City Gateway

Ngauranga Gorge is recognised as an important gateway in and out of the city. Its value as a gateway is largely due to the drama of descending south down a steep, enclosed ravine, which then opens out unexpectedly to expansive views of the harbour and city. The contrasting sequence of character from relatively elevated, suburban Johnsonville, through the rugged and spatially contained gorge to the wider harbour panorama is quite spectacular. Travelling north, the experience is less dramatic but, nevertheless, the gorge provides a recognisable threshold of departure from the city.

In recent years the Council has been considering a gateway strategy for Wellington and the Ngauranga Gorge is recognised as a gateway in several documents:

- The Urban Design Strategy 1994 makes passing reference to the gorge in the context of its regional transportation linkage function: - “...the vehicular entry down the Ngauranga Gorge, or via the Tawa rail tunnel is marked by a grand opening of the hills to the harbour”- but otherwise does not cover the gorge in any detail. While the strategy does acknowledge the northern entry as being one of the major entry sequences into the city, it focuses on the harbour edge and Kaiwharawhara sequence with little reference to the Ngauranga Gorge.
- The Open Space Strategy, 1998, sees the opportunity to “create a future gateway to Wellington” by revegetating the gorge<sup>4</sup>.
- In October 2000 the City Development and Businesses Committee reviewed a range of possible initiatives to develop attractive gateways into Wellington City and options for implementing the initiatives. State Highway 1 was identified as a key lineal gateway. The Ngauranga gateway was seen as being made up of two component parts – the Ngauranga Gorge and the stretch of road between the Ngauranga interchange and the Aotea off ramp. With reference to Ngauranga Gorge, the main issue identified was the appearance of the commercial/ industrial centres and the effects of any development in this area.
- Following on from the Committee’s recommendations, the *Gateways to Wellington City* project was completed in 2003. This considered the journey in and out of the city from the northern city boundary to the airport in the south, and recommended design concepts for enhancing the immediate road corridor along this journey. Ngauranga Gorge was identified as a major threshold and a recognised landscape feature. Visual and erosion issues associated with the existing and future quarry activities were identified and the development of ‘living screens’ (or fenced planting) recommended to enhance the road edge and screen quarry activities.

### 5.5.2 Inner Green Belt

The Council’s open space strategy, *Capital Spaces*<sup>5</sup>, refers to the Ngauranga Gorge as one of four proposed inner green belts. The strategy sets out the Council’s broad vision for the open spaces of the Wellington City district in the future. It does not have any status under the Resource Management Act but is broadly consistent with the District Plan. The Inner Green Belts are described as:

*“A series of green belts or corridors, rich in ecological, recreational, and heritage values, which weave green open space through the city, containing and identifying the suburbs and connecting other open spaces”.*

The Ngauranga Gorge Inner Green Belt is envisaged as an open space corridor linking the harbour with the Outer Green Belt<sup>6</sup>. The inner green belt open space values identified in the strategy, and their contribution to the Ngauranga Gorge, are summarised in the table below.

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<sup>4</sup> *Capital Spaces*, 1998 page 36

<sup>5</sup> *Capital Spaces, Open Space Strategy for Wellington City*, November 1998

<sup>6</sup> The Outer Green Belt identified in *Capital Spaces* is essentially the same area as that identified as the Outer Town Belt in the District Plan.

City-wide Inner Green Belt Open Space Values	Ngauranga Gorge Open Space Values
<b>Ecological values:</b> in those areas where there is extensive regeneration of native species and/or significant vegetation that weaves “natural corridors” through the city fabric.	There is potential for native forest to be gradually restored on the steep hillsides of the gorge to provide an almost continuous green corridor between the Wellington fault escarpment and the regenerating native forest of Mt Kaukau and the Outer Green Belt.
<b>Recreational values:</b> where there is potential for formal and informal recreational activities.	Recreational values in the Ngauranga Gorge are currently limited by the steep, open space terrain; SH1, which is a major cross-gorge barrier for pedestrian and cycle movement; and the dominance of industry on the valley floor. However, the Council has opened up, as a recreation route, the old road up the eastern branch of the gorge that connects the lower gorge with Newlands. The Council also has long-term plans to develop more recreation routes along the western hills of the harbour and opportunities to develop recreational access through the gorge are likely to be explored further.
<b>Landscape values:</b> identified as being significant in all four of the city’s proposed inner green belt corridors.	The gorge is an important threshold in and out of Wellington Harbour, experienced by thousands of people every day, and the regenerating native vegetation is noted in the strategy as providing the basis for a “striking gateway to the harbour in the future”.
<b>Heritage values:</b> both Maori and European, are identified as being high in all four of the inner green belts.	The entire gorge landscape is of historic interest, dating back to Maori settlement at the mouth of the gorge and then the history of the transport corridor and associated land uses, which have involved major modifications to the gorge landscape and the supply of quarry materials to the city and region for over 100 years. Cultural values are addressed in a separate report.

In terms of this report, the key values are landscape and ecological. Although the ecological effects of the proposed quarry extension are assessed in a separate report, ecological values are nevertheless relevant here because vegetation cover is an important component of landscape and visual values.

The Ngauranga Gorge was identified as a *potential* green belt because it provides a corridor of open space between the harbour and Outer Green Belt. However, apart from the secondary native vegetation on the bluffs of Upper Ngauranga and at Tyers Stream Reserve, much of this open space is in a degraded condition; considerably modified by vegetation clearance, grazing and earthworks with sparse, weed-prone vegetation cover. It has, therefore, been noted as a long-term opportunity for restoration and an opportunity to enhance the ‘working gateway’ character of the gorge. A green corridor would provide an attractive setting to the industrial / commercial activities in the bottom of the gorge itself.

Given the character of the present landscape and the need for a comprehensive long-term programme of revegetation and landscape enhancement of the gorge landscape overall, a well-planned and operated quarry, with site rehabilitation incorporated into its management, need not be in conflict with the Council’s long-term strategy for Ngauranga Gorge becoming an inner green belt.

### 5.5.3 Ridgetop and Hilltop Values

The Council commissioned a study of Wellington’s ridgetops and hilltops to assist in clarifying relevant provisions about their protection in the Wellington City District Plan. *Wellington’s Ridgetops and Hilltops, The Natural and Amenity Values* (2001) identified the natural and amenity values associated with undeveloped ridgetops and hilltops in the district and recommended how these could be sustainably managed.

In the vicinity of Ngauranga Gorge the ridgetops and hilltops identified as important were Upper Ngauranga (the flat-topped hill separating Glover Street and SH1) and the small ridges that form the threshold between the gorge and harbour. As shown in Figure 1, neither of these features are directly associated with the proposed quarry extension.

## 5.6 Summary of Landscape Context

The Ngauranga Gorge is a highly modified landscape resulting from clearance of the original native forest cover and a long history of major landform modification. It is a spatially enclosed landscape, characterised by steep, rugged hill slopes that contain a densely developed valley floor where transport, industrial and commercial uses dominate. Substantial open space areas on the hillsides are in a degraded condition due to loss of vegetation cover, loss of topsoil and lack of action to rehabilitate disturbed land.

The gorge is a recognised ‘working’ city gateway containing the major transport corridor of State Highway 1 and associated industrial / commercial uses and made memorable by a dramatic threshold to Wellington Harbour. It is recognised as a future green belt because of the potential to revegetate the open space on the hillsides and create an ecological link between the harbour and Outer Green Belt. The revegetated hillsides would also enhance the setting for the ‘working gateway’ land uses on the valley floor. A long-term, comprehensive enhancement and revegetation programme for the entire gorge landscape is needed to which a well-planned programme of rehabilitation for the proposed quarry would contribute.

## 6.0 LANDSCAPE EFFECTS

‘Landscape effects’ relate to physical changes in the landscape and can include such things as modified landform, altered vegetation cover and patterns, and differences in land use and activities. These physical changes can affect landscape character – the particular combination of landform, land cover and land use that characterises a particular area. These physical changes also manifest themselves visually as ‘visual effects’, and this has more to do with people’s perception of landscape change, being a response to what is seen.

It should also be noted that effects can be:

- positive (beneficial) contributing to the character and quality of the landscape;
- negative (adverse), detracting from the character and quality of the landscape; or
- neutral (benign), having essentially no effect on the character and quality of the landscape.

In this section, the physical changes brought about by the proposed quarry extension (landscape effects) are examined and the likely effects of these changes on landscape character and values are assessed. These changes are considered in terms of:

Temporary changes that will occur during the quarry operation; and  
Long term change that will remain after the quarry closes.

Visual effects are assessed in 7.0.

## 6.1 Landform Modification

### 6.1.1 Temporary effects

During the period that the quarry is operational (30 - 40 years) much of the quarry area will be subject to excavation and progressive landform change. For much of this operational period the site will be subject to ‘work in progress’ with the land being shaped into temporary cuttings and platforms for operational access and safety needs.

### 6.1.2 Long-term effects

The final contouring and surface finishing will be designed to achieve a more ‘natural’ final form compared to many of the modified faces in the gorge. However, the entire removal of the lower end of the spur will gradually bring about a change in the spatial character of the central gorge. The bottom of the gorge, where the quarry will be located, will be approximately twice as wide as it is now (see Figure 5) and this will somewhat reduce the gorge’s ‘ravine-like’ spatial character and enlarge the existing man-made

basin currently occupied by the abattoir and quarry. The western side of the gorge at this point will also be steepened as a result of excavating the spur back from SH1.

Nevertheless, the essential landscape character of the gorge will be retained:

The gorge will remain a gorge – deeply cut into the land;

The finished face of the quarry extension will be in keeping with the gorge's characteristic steep slopes and bluffs.

The landforms in the gorge have already been greatly modified by human action, including the site of the quarry extension itself where benching from former quarrying is noticeable. Benching and unnaturally straight cut faces are visible evidence of these earlier changes throughout the gorge. While the quarry extension will result in an increased area of cut rock face, the final finished landform will be contoured to a relatively 'natural' appearance. That is, a somewhat rounded overall profile instead of a straight 'slice' carved off the end of the spur; and an irregular pattern of rock faces, outcrops and benched areas instead of a regular pattern of alternate steep faces and straight horizontal benches. (It should be noted that the contour modelling illustrated in Figures 2(a) and (b) has been carried out to determine the large-scale shape of the final landform and shows the standard, regular benching needed for slope stability and working access. Progressive site rehabilitation will include detailed design to vary the benching and surface treatment as areas of the quarry face are completed.)

## 6.2 Drainage

### 6.2.1 Temporary effects

The quarry operation will not affect the existing piped Waitohi Stream. Throughout the operation, surface water from working areas will be collected and pumped back up to the existing quarry treatment plant prior to discharge into the stream. During stages 5 and 6, when excavation goes below SH1 level, this will also include ground water drainage into the working area. Pumps and temporary piping will be temporary, surface features, and part of the working quarry activity.

### 6.2.2 Long-term effects

Once stage 6 is completed the temporary drainage systems will be removed or replaced with concealed systems.

## 6.3 Vegetation

### 6.3.1 Temporary effects

Over the life of the quarry all the existing vegetation on the site will be removed, except for the vegetation on the buffer strip around the upper edge of the site, which will be left to continue regenerating naturally, and two small stands of karaka trees close to the WRC pumping station. Most of the vegetation to be removed comprises rank grass, weeds and scrub. An earlier proposal was amended to limit the removal of more advanced regenerating native vegetation closer to Tyers Stream Reserve (see 8.1).

The southern face of the spur will be quarried first, during Stages 1 – 3, an area where only sparse vegetation has regenerated after earlier quarrying. The northern face will be left untouched during these stages except for the formation of the access road near the base of the slope. The road batters will be hydroseeded to establish temporary vegetation cover. During Stage 4, the north face will be progressively cleared and excavated but part of the face at the south end (near to Tyers Stream Reserve) will be finished early in this stage and rehabilitation will begin in this area. During Stages 5 and 6, when excavation goes below the level of SH1, the quarry face will be progressively rehabilitated.

Within the broader context of the gorge landscape, the removal of vegetation from the quarry area will be offset by the revegetation of the adjacent land, which will advance the Ngauranga Gorge green belt concept by extending the vegetation corridor north from Tyers Stream Reserve towards Broadmeadows. This revegetation will be carried out as part of the rehabilitation programme for the existing Kiwi Point Quarry; a programme that will be implemented while the proposed quarry extension is operational (see 8.8).

### **6.3.2 Long-term effects**

Overall, the natural or unassisted revegetation process on the quarry face would take some 35 – 45 years, depending on the part of the site. (That is, the period taken for vegetation to regenerate without assistance to the same stage it had reached when it was cleared.) However, a rehabilitation programme is planned, which is likely to result in more rapid revegetation with a more diverse and ‘desirable’ mix of plant species than has occurred in many other areas of the gorge, where disturbed sites have been left to revegetate with no assistance. This will ultimately contribute to the Council’s long-term Ngauranga Gorge green belt vision.

(Note: vegetation management for the flat area adjacent to SH1, created at the end of the quarry and subsequent clean fill operation, will depend upon future land use decisions for that area.)

## **6.4 Land use**

### **6.4.1 Temporary effects**

The proposed extension will be a continuation in the gorge’s long and continuing history of quarrying, industrial and transport land uses. While the open space strategy states that “industrial, quarry and motorway land uses in the Ngauranga Gorge may conflict with open space values”, nevertheless, the statement clearly acknowledges the existing land use situation and implies that these activities are an integral component of the gorge landscape.

In essence, these are large-scale, ‘working’ activities contained within a clearly defined, rugged landscape setting.

### **6.4.2 Long-term effects**

After the quarry closes, the quarry face will be revegetated and, together with the buffer strip, will be managed as part of the proposed Ngauranga Gorge green belt. Future uses of the flat land adjacent to SH1 have not yet been determined and will be subject to a later, separate decision-making process.

## **6.5 Gateway experience**

### **6.5.1 Temporary effects**

The main changes that will affect the gateway experience will be the evident site disturbance brought about by vegetation clearance and quarrying activities, and the gradual widening of the gorge as the spur is excavated. These effects will be reduced by working initially on the less visible south face, with progressive cutting back of the northern face only during stage 4. While these changes will be obvious, the gorge is a “working gateway” to the city; a highly modified landscape characterised by a corridor of utilitarian transport, industrial and commercial land uses. Within this context, the quarry extension will not be out of place.

### **6.5.2 Long-term effects**

The value of the gateway experience in Ngauranga Gorge is primarily due to its geographic location and spatial form – the deeply incised gorge that forms a threshold in and out of Wellington Harbour. As noted in 6.1 the widening of the gorge as a result of the quarry extension will somewhat reduce the sense of being in a narrow, confined space but, even so, the essential elements of the gateway experience will remain; the sense of travelling through a deeply incised landscape and, most importantly, the element of surprise at the threshold to the harbour. The proposed landform removal will not reveal views of the harbour any sooner than now because the landforms that form the threshold into the harbour are unaffected by the proposal.

## **6.6 Green corridor**

### **6.6.1 Temporary effects**

During the life of the quarry, all of the site vegetation except for the buffer strip and the karaka stands will be cleared of vegetation. However, this will not prevent the green corridor concept from being advanced, as vegetation on the buffer strip will be left to regenerate and as rehabilitation of the existing Kiwi Point quarry area will be implemented during this time. The rehabilitation will substantially extend the green corridor inland from Tyers Stream Reserve and will include the existing Kiwi Point quarry face and the slopes above the abattoir.

### 6.6.2 Long-term effects

The Ngauranga Gorge has been identified as a potential green belt because of its amount of open space linking, almost continuously, the harbour and escarpment, to the regenerating forest of Mt Kaukau and the Outer Green Belt. It is relevant, however, that apart from the vegetation on the bluffs of Upper Ngauranga and at Tyers Bush, much of this open space is considerably modified by vegetation clearance, grazing, and major earthworks including quarrying. It has, therefore, been noted as a long-term opportunity for restoration.

The quarry extension would set back the “greening” process in the affected area but this is a relatively small area in the context of the overall proposed green corridor. Its rehabilitation could be managed as an integral part of a more comprehensive and long-term gorge revegetation strategy in which the quarry is one part of the evolving ‘working’ gorge landscape. A well-planned and managed quarry activity, as proposed, would not be in conflict with the Council’s long-term strategy for the Ngauranga Gorge as an Inner Green Belt.

## 6.7 Summary of Landscape Effects

During the life of the quarry, the main effects will be ongoing disturbance of areas of the site, resulting in substantial areas of exposed rock, removal of vegetation cover and obvious quarrying activity in the gorge. However, quarrying is already an established activity in the gorge that is not out of place amongst the industrial ‘working’ land uses concentrated in the bottom of the gorge. The proposed staging has also been planned to minimise the area being actively worked at each stage and to progressively rehabilitate areas, as they are finished. In particular, the main quarry face will be finished by the end of stage 4 – approximately two thirds of the quarry’s life - so that its rehabilitation will be progressing during stages 5 and 6.

In the longer term, the proposed removal of a substantial part of the spur landform will reduce the sense of enclosure in the central gorge to some extent, by widening the bottom of the gorge and revegetation will be set back by some 35 – 45 years. However, this is in the context of a landscape that has been substantially modified in both its landforms and vegetation cover over the last 150 years. The gorge will still function as a gateway in and out of Wellington Harbour with its dramatic ravine-descent and harbour threshold unaffected. The quarry face will be rehabilitated to re-establish vegetation cover and will contribute to the long-term Ngauranga Gorge green belt concept.

## 7.0 VISUAL EFFECTS

In this section, the visual effects of the physical changes brought about by the proposed quarry extension are outlined and the impact of these effects assessed. Visual effects resulting from landscape change are influenced by a number of factors including:

- The viewing distance
- The degree of contrast or integration with existing landscape character
- The angle of view
- The viewing time (i.e. transitory or static views)
- The time (in years) when the physical change will be evident
- The scale of visible change within a given view
- The importance or sensitivity of the view
- The typical number of viewers.

As already mentioned in section 5, the Ngauranga Gorge is a visually contained landscape but the site is visible from within the gorge and from certain locations outside the gorge. To assess visual effects it is necessary to consider:

- What the site looks like now;
- Who sees the site;
- The context in which viewers see the site; and

- How key views will change as a result of the proposed quarry extension.

## 7.1 View Analysis

The main viewer groups and key representative views were identified as follows:

1. Two computer-generated intervisibility maps were prepared, using LINZ 20m topographical contour data, to map the areas from which the highest (and probably most visible) point of the proposed quarry site can be seen and the areas from which the lower part of the site would be seen (indicative level of 120m asl). The maps are shown in Figures 6 and 7.
2. A field survey was carried out to visit the identified areas, to assess typical views of the proposed quarry site from these areas, and to determine representative photograph viewpoints.

From the intervisibility mapping and field survey, four main types of viewers were identified, and photographs were taken from publicly accessible representative viewpoints. The photographs were taken with a 35mm camera, using a 50mm standard lens, as this is the closest equivalent to what is seen by the unaided human eye. The viewpoint locations are listed below and shown on Figure 8 and the views are contained in the illustrations section at the end of the report.

- **SH1 Travellers**
  - View A: SH1, view south
  - View B: SH1, view south
  - View C: SH1, view south
  - View D: SH1, view north
- **Ngauranga Gorge Industry - workers and visitors**
  - View E: Tyers Road
  - View F: Glover Street
- **Residents**
  - View G: Cashmere – Homebush Road
  - View H: Rangoon Heights - Imran Place
  - View I: Upper Broadmeadows – Jaunpur Crescent
  - View J: Upper Broadmeadows – Hindipur Terrace
  - View K: Lower Broadmeadows - Fraser Avenue
  - View L: Hampton Gate – Meadowcroft Grove
  - View M: Raroa – Kitchener Terrace
  - View N: Ngauranga – Malvern Road
- **Wellington Harbour viewers**
  - View O: Days Bay
  - View P: Eastbourne Muritai yacht club

Recreational users in the Ngauranga Gorge were also identified as a potential viewer group. However, there are currently no recreational routes within the central part of the gorge and walking routes in the area largely coincide with streets or side valleys not visible to the future quarry area, so this group is represented under residents.

The visible changes that the proposed quarry activity will bring about in the following representative views and the visual effects of these changes are described below. Note: the potential post-quarry effects of activities on the platform adjacent to SH1 created by the proposed quarry and clean fill are not covered because the end use of the land is to be decided at a future time.

▪ **Views A, B and C: State Highway 1, View South**

*Existing view*

Southbound travellers, who currently average nearly 34,500 per day,<sup>7</sup> see the north face of the site as they approach the main bend in the gorge after descending from the Newlands Interchange. The site is first seen as part of the grazed or revegetating hillsides, topped by housing at Rangoon Heights, that enclose the central part of the gorge (View A). Coming closer (View B) the site is more prominent in the line of vision with the WRC pumping station and stands of karaka trees seen in the foreground at the base of the site.

Views A and B were taken from the footpath adjacent to the southbound lanes, where the view is partly obscured by trees and landform at left in the photographs. View C has been taken from the footpath of the northbound lanes to better approximate the view seen by vehicles in the fast southbound lanes.

The site is visible for approximately 650 metres, travelling in this direction, (i.e. from the point where it first comes into view to the point where travellers have passed the site), a distance that takes approximately 52 seconds to travel at 80km / hour. Beyond the viewpoints illustrated, the road comes closer to the site but bends to the left, so the site is more peripheral in the field of view. This means that the site is seen ahead in the sightline for only approximately 25 seconds.

*Visibility*

During stages 1, 2 and 3, the north face of the spur will screen most of the south face quarrying activity from view but some of the rock batters of the new access road on the lower part of the spur behind and south of the pumping station will be seen. Quarrying activity will gradually become visible during stage 4, gradually increasing in size as the north face of the spur is removed until, by the end of stage 4, most of the finished face will be visible. As the spur is excavated, the ridge on the other side of Tyers Stream gully will gradually become visible. The greatest extent of visible change will have occurred by the end of stage 4, and this is illustrated in Simulation, View C.

During stages 5 and 6, the excavation and backfilling of the quarry pit will be largely screened from view by the existing road cuttings because SH1 will slope down below the quarry pit platform. Views in to the site at the north end, where the platform will be level with SH1, will be screened by the existing pumping station and karaka trees, and the earth bund and the proposed screen planting south of the pumping station.

*Visual effects*

During stages 1-3, the north face will be unaffected and the north end of the access road will be partly screened by the pumping station and adjacent karaka trees. The road batters on the east face beyond the pumping station will be a noticeable feature, although plant cover from hydroseeding will camouflage the exposed rock to some extent. During stage 4 the quarry face will be increasingly prominent, seen as a substantial area of exposed rock in the near-distance view. The gorge widening will allow longer views down the gorge but the harbour threshold will be unaffected, as the Tyers Stream ridge will screen the harbour from view. The ridge will provide a natural skyline and vegetated hill backdrop, consistent with the long-term green belt concept. During stages 5 and 6 the finished quarry face will gradually become less noticeable and visually integrate with the adjacent hillside areas as the rock weathers and vegetation cover is established through rehabilitation.

▪ **View D: State Highway 1, view north**

*Existing view*

North-bound travellers, who currently average nearly 35,500 per day<sup>8</sup>, can see the site for 800 metres (i.e. from the point where it first comes into view to the point where travellers have passed it), a distance that takes approximately 64 seconds to travel at 80km / hour. When the site first comes into view, where SH1 crosses the Waitohi Stream, it is partially obscured by the overbridge but is seen to its fullest extent from just north of the overbridge (View D) and remains prominently in view as far as the Tyers Road

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<sup>7</sup> *State Highway Traffic Volumes, 2002* prepared by Traffic Design Group Ltd for Transit New Zealand, August 2003

<sup>8</sup> *State Highway Traffic Volumes, 2002* prepared by Traffic Design Group Ltd for Transit New Zealand, August 2003

intersection. The road then comes close in below industrial buildings and the spur, so travellers have to look steeply up and sideways to see the site above the buildings and road cuttings. This means that the site is clearly in view in the line of sight for only approximately 15 seconds. Seen from Viewpoint D, the site is central in the view, sparsely vegetated, with obvious benching from former quarrying, and seen prominently as part of the skyline landform.

#### ***Visibility***

During stage 1 the exposed rock of the access road batters and the road cut on the skyline will be visible, however, these features will occupy a relatively small area of the overall scene. During stages 2 – 4 much of the quarry's working face will be visible although the bund, which will be maintained around the outer edge of the working platform, will conceal the quarry trucks and some of the quarry face. During stage 4, the visible area of working quarry face will reduce as the end of the spur is excavated and the face recedes away from the road. The hillsides of Broadmeadows will come into view and will form a lower skyline in the distance. During stages 5 and 6, the excavation and backfilling of the quarry pit will be screened from view by the existing roadside cuttings above SH1, which will be left in place.

#### ***Visual effects***

The south-to-north direction of quarrying means that the quarry will be prominent in northbound views during stages 2 – 4. It will be seen as a substantial area of exposed rock, central in the near-distance. While the visible area of the quarry face will decrease during stage 4 as the spur is excavated back from SH1, the view will also substantially change as the gorge widens and opens up to the northwest. This will reduce the impression of immediate enclosure in the gorge and increase the amount of visible housing development, although the housing will be seen in the distance, beyond the gorge itself. The wider view will be a permanent effect but, in the long term, the finished face will gradually revegetate and visually integrate with the other revegetating hillsides in the gorge. Much of the finished face visible from this viewpoint will have a cool, moist south – southeast aspect which, together with the nearby seed sources in Tyers Stream Reserve, will aid the revegetation process. Simulation, View D shows the likely appearance of View D at the end of stage 4, when the greatest visible change will have occurred.

#### **▪ Views E and F: Industry in the gorge**

##### ***Existing View***

The south / southeast faces of the site are seen at close proximity immediately above the industry in the Tyers Stream gully (View E) and is seen in the middle distance from industry in the lower gorge near the bottom end of Glover Street (View F). The benching and sparse vegetation on site is clearly evident in contrast with the vegetation of the adjacent hillsides.

##### ***Visibility***

From the Tyers Road area (View E), the viewing distance is so close that foreshortening reduces the visible area of the site. During stage 1 the bund around the outside edge of the working platform will conceal most activity from view but the quarry face will be visible during stages 2 and 3 when the south face will be quarried down to the quarry pit platform immediately above SH1 and the Tyers Road industry. As the quarrying extends north in stage 4, the foreground features will screen much of the activity and quarry face from view. During stages 5 and 6, the 6-metre step up in level between the existing industry and the proposed finished level of the quarry pit will screen the quarrying and backfilling activity from view.

From the Glover Street area (View F) the south face will be seen centrally in the middle-distance. The extent of visible exposed rock will be greatest during stages 2 and 3 when the quarry face will be seen front-on. During stage 4, when the spur is gradually cut back, however, the quarry face will recede in the view and be increasingly seen in profile. (Photograph 7 illustrates how a profile view of the existing Kiwi Point quarry reduces the visible area of bare rock.) As the spur is removed, the gorge will widen and the more distant skyline of Broadmeadows will gradually replace the spur skyline. During stages 5 and 6, most of the quarry pit will be screened from view by the existing roadside rock faces.

##### ***Visual effects***

From the Tyers Road area, the quarry in the early stages will be an obvious area of exposed rock face relatively close above and, in the longer term, cutting back the spur will increase the amount of sky in the view and reduce the sense of enclosure. This is likely to be beneficial, as more afternoon sun and light will reach the Tyers Road industry.

From Glover Street, the quarry will be seen as a prominent area of exposed rock, central in the middle-distance view. The south-to-north direction of quarrying means that it will be particularly noticeable up to and including stage 4, although it will occupy a reducing proportion of the view during stage 4, as the spur is cut back from SH1. Distant housing will be a new, though comparatively minor element in the longer views that will be opened up through to Broadmeadows.

In the long term, rehabilitation of the finished face will see vegetation cover gradually re-established and contributing to the green belt concept in the gorge. Much of the visible finished face seen from these viewpoints will have a cool, moist south – southeast aspect which, together with the nearby seed sources in Tyers Stream Reserve, will aid revegetation.

▪ **View G: Cashmere – Homebush Road**

*Existing view*

Locations in the Cashmere area look down Tyers Stream gully towards the south face of the site, which is visible in the middle distance. It is seen as a sparsely vegetated, benched area above industrial buildings in Tyers Road gully between the vegetated slopes of Tyers Road Reserve in the foreground and Upper Ngauranga in the background.

*Visibility*

Quarrying of the spur will be most visible during stages 2 and 3, when the south face will be excavated. The extent of exposed rock visible will gradually decrease as the spur is excavated back and as the quarrying activity moves out of sight round to the north face. By the end of stage 3, only a comparatively thin profile of the finished quarry face will be visible and rehabilitation of the south end of the quarry face will begin during stage 4.

During stages 5 and 6, the continued excavation and backfilling activity of the quarry pit will be partly visible beyond the Tyers Road industry but this will occupy a relatively small part of the overall scene.

*Visual effects*

In the earlier phases of the quarry operation, the quarry will be a noticeable feature because it will be central in the view and will contrast with the vegetated slopes adjacent. However, the south face is currently in a degraded condition from previous quarrying, with obvious benching and sparse vegetation cover. In the long term, the profile of the finished face will occupy a lesser proportion of the view than the currently seen benched area and cutting back the south face will reveal more of the bush-covered slopes of Upper Ngauranga on the other side of the gorge. While more of the developed valley bottom will also be seen it will be a comparatively small proportion of the view, seen low down in association with the existing industry.

▪ **View H: Rangoon Heights – Imran Place**

*Existing view*

Some of the houses on the Rangoon Heights ridgetop look steeply down into the gorge where the north face of the site is partially visible as a scrub-covered hillside dropping steeply to the bottom of the gorge beyond foreground grazing land. The WRC pumping station is visible at the base of the site in some of these views, as shown in View H.

*Visibility*

During stages 1 - 3, construction of the new access road will be barely seen at the base of the slope and during stage 4, the north edge of the quarry face will become visible but this will be a relatively narrow profile. As the spur is removed, more of the vegetated lower slope of Upper Ngauranga on the opposite side of the gorge and a small additional section of SH1 will become visible. During stages 5 and 6, a small area at the north end of the quarry pit will be visible but will be a very small part of the overall view, seen at a steep angle.

### *Visual effects*

The quarry and associated activity will be barely noticeable during all but stage 4 as any visible changes will occupy a very small part of the view, seen below at a steep angle, in the context of more extensive hilltop and harbour views. Even during stage 4, the oblique viewing angle and south-to-north direction of quarrying means the visible area of exposed rock will not be prominent and, by this time, the rehabilitation planting on the foreground grazing land is likely to screen some of the site from view.

#### ▪ **Views I: Upper Broadmeadows – Jaunpur Crescent**

##### *Existing view*

The north face of the site is visible in the lower middle distance within the context of panoramic views over the western harbour hills, Wellington Harbour and the Orongorongos beyond. The site is a relatively small area in the total view, on the lower slopes of the steep hillsides enclosing the Ngauranga Gorge.

##### *Visibility*

During stages 1, 2 and 3, there will be no visible change, as the access road near the base of the slope will be screened from view by intervening landform. During Stage 4 the north face will be gradually removed, but the area of visible quarry face will be seen in profile as a relatively narrow strip of exposed rock. More of the spur on the other side of Tyers Stream gully, which is partially visible now, will be revealed as the quarry spur is removed. During stages 5 and 6, the quarry pit activity in the gorge bottom will be screened from view by intervening landform.

##### *Visual effects*

The south-north direction of quarrying will mean that quarrying activity will be visible only during stage 4 and, during that time, the visible area of the quarry face will be minimised because the spur will be excavated from the other side. As the finished face will be seen in profile it will occupy a comparatively small part of the overall view and will be visually associated more with the foreground housing than the panoramic harbour vistas beyond. The view down the gorge will be opened up but as this will reveal similar vegetated hillsides behind, this will not be a particularly noticeable change in the view at this distance.

#### ▪ **Views J & K: Lower Broadmeadows – Hindipur Terrace and Fraser Avenue**

##### *Existing view*

These views look down the Ngauranga Gorge in the middle distance, where the hills frame distant views across Wellington Harbour to the Eastbourne hills and Orongorongos beyond. The north face of the site is visible, seen as the lower part of the spur that extends into the gorge from Rangoon Heights. The upper part of the site is more noticeable than the lower part because it is outlined against the harbour and distant hills whereas the lower part is seen against a hill backdrop. Transport and industrial uses in the bottom of the gorge are also visible at the base of the site.

##### *Visibility*

During stages 1, 2 and 3 the north end of the access road will be seen above the WRC pumping station. During stage 4, quarrying activity will become visible. The lower end of the spur will gradually recede with cut faces gradually appearing in profile at the receding edge. As the spur is removed, the ridge behind, on the other side of Tyers Stream gully, and a little more of the harbour will be revealed, as will more of SH1 and some of the industry in the lower gorge and Tyers Road. During stages 5 and 6, the quarry pit will be visible beyond the abattoir in the bottom of the gorge.

##### *Visual effects*

During stages 1-3 the visible part of the access road will be a relatively small feature in the view and the rest of the north face will be unaffected. During stage 4, when the lower end of the spur is gradually removed, the south-to-north direction of quarrying will minimise the amount of exposed rock seen from this direction; the north face will gradually reduce in size and the quarry face will gradually come into view as a steepened profile of bare rock. The finished face will be a noticeable area of exposed rock but this will gradually integrate with the adjacent hillsides as it is rehabilitated and the vegetation cover established. In the long term, the pattern of vegetated hillsides above development in the gorge bottom will be retained and the wider view down the gorge will frame a little more of the harbour.

▪ **View L: Hampton Gate – Meadowcroft Grove**

*Existing view*

The north face of the site is visible from some locations in the Hampton Gate area, in the context of expansive views of the Johnsonville basin (foreground), the western harbour hills (middle ground), and Wellington Harbour and the Orongorongos in the distance beyond. The site is seen over housing in the Johnsonville Basin as a relatively small hillside area in the overall scene.

*Visibility*

During stages 1, 2 and 3, there will be no visible change, as the access road will be screened by intervening landform and quarrying will occur on the south face. During stage 4, however, the north face will be gradually removed and the exposed rock of the quarry face will be seen in profile. During stages 5 and 6, the quarry pit in the gorge bottom will be screened from view by intervening landform

*Visual effects*

At this distance, the visible area of exposed rock on the quarry face will be a small feature in the overall scene, which, in the long term, will gradually merge in with the adjacent hills as it revegetates. The removal of the quarry spur will reveal more of the Tyers Stream ridge and a little more of the harbour, which at this distance, will be a relatively minor and beneficial alteration to the view.

▪ **Views M: Raroa - Kitchener Terrace**

*Existing view*

Visibility of the proposed quarry site varies in the small Kitchener Terrace neighbourhood. It is clearly visible from some locations, as illustrated in View M, but is partly or totally screened by vegetation or intervening landform in other views. From Viewpoint M, the site is seen as part of the wider pasture and scrub covered hillsides in the gorge in the middle ground of expansive views towards Wellington Harbour and the city.

*Visibility*

There will be little visible change during stage 1 when a small area of the access road will be seen low down in the view near the WRC pumping station. During stages 2 and 3 some excavation on the south side of the spur will be visible and the southern profile of the spur will gradually steepen as the quarry face cuts back into the landform. The greatest degree of visible change will occur during stage 4 when the north face is removed and the angle of view is such that the face will be seen front-on. During stages 5 and 6 a small area of the quarry pit will be visible but will be partially screened by the existing pumping station and karaka trees, and proposed planting.

*Visual effects*

The direction of view is such that the quarrying activity will be evident during most of stages 2 and 3, and very noticeable during stage 4 because both the north and part of the south sides of the spur are visible. Most of the finished quarry face will be visible from this viewpoint and although it will be set down below the skyline and below the distant harbour / city views, it will be a noticeable area of exposed rock in the middle distance view until vegetation cover is re-established. In the long term, however, the overall pattern of vegetated open space hillsides in the middle distance will be maintained and enhanced as plant cover establishes and develops on the quarry site itself and the adjacent grazing land (see Mitigation, 8.8).

▪ **View N: Ngauranga – Malvern Road**

*Existing view*

From this small housing enclave above the entrance to the gorge, the sparsely vegetated and benched south and southeast faces of the site are visible. Although vegetated slopes frame views from here, the highly modified nature of the gorge is also very evident with the motorway dominant in the gorge and the exposed rock faces of the existing quarry operation evident in the background.

*Visibility*

The quarry operation will be most visible during stages 1, 2 and 3 when the south face will be quarried. During stage 4, when the spur is gradually removed, the quarrying will still be seen but the quarry face

will gradually recede back from SH1 and be seen more in profile. Quarrying and backfilling of the quarry pit during Stages 5 and 6 will also be visible beyond the existing Tyers Road industry.

### *Visual effects*

The south-to-north direction of quarrying means that the quarry will be a comparatively prominent activity in the middle distance of this view, being most noticeable during stages 2 and 3 when most of the currently visible south face will be worked. The area of visible rock face will gradually decrease as the spur is cut back and the quarry face steepened during stage 4 but will remain a noticeable feature until vegetation cover is restored in the long term. More of the Broadmeadows housing area in the distance and more of the industrial area in the gorge bottom will be revealed when the spur is cut back, however, these are existing elements in the view. The increased amount of visible built development will be offset by the revegetation of the existing bare quarry land seen beyond SH1 in View N after the existing quarry closes.

It should be noted that most of the 9 houses in this area are orientated towards Wellington Harbour so that, while the quarry will be visible, it will not necessarily be seen in the most important views from most of these houses.

#### ▪ **Views O and P: Days Bay and the Muritai Yacht Club, Eastbourne**

### *Existing view*

The spur on which the quarry will be located is visible in these views as a very small part of the western harbour hills, located well below the skyline below the housing of Broadmeadows and Rangoon Heights. The viewing distance is such that it is difficult to pick out the spur among the adjacent undeveloped hillsides. However, a paler area immediately behind the pine plantation immediately south of the gorge entrance can be recognised as the existing benched area on the south face where vegetation cover is sparser. The lower part of the site is screened from view by the ridges that form the harbour threshold to the gorge.

The exposed rock of the existing Kiwi Point Quarry can be seen in View P (from Eastbourne) but not in View O. This is because View O looks obliquely towards the gorge so that much of the gorge is screened from view by the adjacent landforms, whereas View P looks directly across to the gorge entrance, with a sightline up the gorge.

### *Visibility*

The lower part of the quarry will not be visible but the upper part of the quarry will be. Therefore, the quarry will be most noticeable during stages 2 – 4, when the upper part of the quarry is being worked. The quarry pit activity in the bottom of the gorge during stages 5 and 6 will not be visible.

### *Visual effects*

These two views are representative of the areas across the harbour from which at least part of the quarry site can be seen, as shown in Figure 6. They represent the ‘worst case’ scenarios with the most direct sightlines up the gorge. Viewpoints further east and west will see less of the site, because the ridges at the gorge entrance will screen more of the site from view. Where the quarry is visible from across the harbour, it will be seen as an area of paler colour in contrast with the vegetated hillsides adjacent. In the context of these panoramic harbour views, this will be less noticeable than the areas of housing on the slopes above and will be a small feature in the overall scene. It will certainly be less obtrusive than Horokiwi Quarry (pictured at right of View O), as the visible area will be smaller and will be visually associated the housing above, whereas the Horokiwi Quarry is larger and stands out in contrast to the surrounding vegetated escarpment.

## **7.1.1 Summary of Visual Effects**

The levels of visual effect of the quarry and/or associated activity for the main viewer groups, as illustrated in the representative views discussed in 7.1, are summarised in Table 1 below. The levels of effect are defined as follows:

Nil:	No part will be seen.
Negligible:	Will barely be noticeable because only a small part will be seen and/or because it is absorbed within a distant view.
Minor:	Involves only a minor element of the wider view, so that a passing viewer might easily overlook it.
Moderate:	Involves a visible new element in the wider view that would be easily noticed by a casual viewer.
Substantial:	Involves a major new element in the existing view that would affect landscape character.
Major:	The quarry would be a dominant element in the view that changes the perception of landscape character in the scene.

**Table 1: Summary of Potential Visual Effects of the proposed Kiwi Point Quarry Extension** (this relates to the changes that will occur as a result of the quarrying activities at each stage and does not include the mitigating effects of site rehabilitation).

	QUARRY OPERATION					
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Approximate proportion of estimated quarry life span <sup>9</sup>	1/3			1/3	1/3	
SH1 travellers, south-bound (Views A, B, C)	Minor	Negligible	Negligible	Major	Negligible	Negligible
SH1 travellers, north-bound (View D)	Minor	Substantial	Major	Major	Negligible	Negligible
Industry in the gorge (Views E, F)	Minor	Moderate	Substantial	Substantial	Negligible	Negligible
Cashmere residents (View G)	Minor	Moderate	Substantial	Minor	Moderate	Moderate
Rangoon Heights residents (View H)	Negligible	Negligible	Negligible	Minor	Negligible	Negligible
Upper Broad-meadows residents (View I)	Nil	Nil	Nil	Minor	Nil	Nil
Lower Broad-meadows residents (Views J, K)	Negligible	Negligible	Negligible	Substantial	Minor	Minor
Hampton Gate residents (View L)	Nil	Nil	Nil	Minor	Nil	Nil
Raroa residents (View M)	Negligible	Moderate	Substantial	Substantial	Negligible	Negligible
Ngauranga residents (View N)	Minor	Substantial	Substantial	Substantial	Minor	Minor
Across-harbour viewers (Views O, P)	Nil	Minor	Minor	Negligible	Nil	Nil

<sup>9</sup> Based upon estimated volumes of rock and cleanfill – see Appendix 1.

## 7.2 Visual Impact

In 7.1 the potential visual effects of the proposed quarry extension were described and evaluated in terms of representative viewpoints and the proposed staging of the quarry operation. In this section the overall significance of these effects – or visual impact – is considered.

### 7.2.1 Impact of Temporary Effects during Quarry Operation

#### *Quarry Activity*

Quarrying, by its very nature, is a large-scale activity. It involves obvious land disturbance, which is often perceived negatively. The paler, orange-brown colour of newly exposed rock just below the surface attracts attention, especially in contrast to any nearby vegetated land. At the proposed quarry, most of this surface rock was removed during earlier quarrying so excavation will rapidly reach the less noticeable darker, blue-grey base rock. Nevertheless, the proposed quarry will be an unmistakable feature in the gorge landscape but the direction of excavation and the proposed rehabilitation has been planned to minimise the extent and visibility of disturbed land at each stage. Moreover, quarrying is an established activity in the gorge and is not out of character with the long-established history of landform modification, the evidence of which can be seen throughout the gorge.

#### *Visibility*

The location of the quarry within Ngauranga Gorge confines its visibility in the wider landscape. Comparison of the intervisibility maps, Figures 6 and 7, shows that the lower part of the quarry will be greatly less visible than the upper part, and the view analysis in 7.1, indicates that only the upper part of the quarry face will be seen, as a small and barely noticeable element, in more distant views. In all but the closer views, the quarry is well below the skyline. The original proposal, which involved quarrying up to a height of 190m asl, was amended to the currently proposed height of 158m to reduce the quarry's visibility, especially in the context of harbour views.

#### *Viewer groups*

The greatest level of visual impact falls with SH1 travellers due to the close viewing distance (which means the quarry occupies a larger proportion of the view) and the comparatively large viewer numbers. However, this is offset to some extent by the fact that SH1 views are transitory (less than a minute) and travellers' attention on this busy stretch of road will be divided between the traffic and the passing landscape. Moreover, the south-to-north direction of quarrying means that the major visual impact is confined to northbound traffic for stages 2 and 3, and will be greatest during stage 4 when it becomes visible to southbound traffic also.

The quarry will also be a noticeable feature for workers and visitors at the gorge industries that have a clear sightline to the quarry, including parts of the Tyers Road industrial area, the abattoir and some Glover Street businesses, due to the relatively close viewing distance. These views will be less transitory than for SH1 travellers but, nevertheless, are likely to be of generally short duration as people come and go from inside and close to the buildings. These people are engaged in the activities associated with the 'working gateway' nature of the gorge and so, while the quarry will be an obvious feature seen in the close or middle distance it will not be out of place in the immediate context of the industrial / transport corridor.

Most of the residential areas from which the quarry will be visible are located on hilltops or hill slopes above the gorge and have extensive or panoramic views of the Wellington Harbour landscape. For the majority of residents (i.e. Broadmeadows, Rangoon Heights and the more distant Hampton Gate area) the quarry will be seen low down in the Ngauranga hills, well below the skyline, in views where the eye is attracted beyond these hills to the harbour and distant mountain skylines. A relatively small number of residents in the Raroa and Ngauranga neighbourhoods will be more adversely affected because of their closer viewing distance and 'front-on' angle of view, which will mean that the quarry face will occupy a larger part of the view.

The visual impact for across-harbour viewers will be negligible due to the long viewing distance and the visibility of only the upper part of the site.

### ***Cumulative effect***

In the early stages of the proposed quarry extension, there is likely to be a degree of cumulative effect, because the existing quarry, although closed, will still be relatively bare. This will mainly affect northbound SH1 travellers and Ngauranga residents, who will see the south face of the proposed quarry against the finished face of the old quarry. However, as rehabilitation of the old quarry progresses this effect will reduce.

### ***Visual screening***

The steep nature of the site and the space constraints in the gorge preclude using planting or large-scale mounding to screen the quarry from view, as can sometimes be done in rural locations. This means that the quarry will unavoidably be an obvious, large-scale feature in the gorge. However, the excavation has been planned so that the landform itself will provide as much visual screening as possible and reduce the amount of quarry face seen at progressive stages of the quarry development.

The north-to-south direction of quarrying means that the north face of the spur will remain unaltered and screen the quarry from viewers to the north and west during stages 1 –3 (approximately 1/3 of the quarry's lifespan.) Lowering the height of the quarry from the original proposal means that not only will there be less area of finished quarry face but that the quarrying and backfilling activity during stages 5 and 6 (approximately 1/3 of the quarry's lifespan) will be largely screened from view by the surrounding landform. The quarry pit will be set down in the gorge bottom where it will be confined within the enclosed gorge landscape. The quarry pit will also be largely screened from the adjacent SH1 traffic and industry because it will be excavated from a platform above SH1 level and the edge of the platform will be left in place to act as 'rim' enclosing the pit and screening it from view.

### ***The Quarry Face***

The quarry operation is planned in two broad phases, which will have quite different levels of visual impact:

- excavation of the spur, and
- excavation of the quarry pit.

Excavation of the spur will have the most visual impact because it will be in an elevated location on the hillside and visible to far more viewers than the quarry pit, which will be below ground level and visible to far fewer viewers. The quarry operation has been planned so that the quarry face will be finished by approximately 2/3 of the way through the quarry's lifespan (at the end of stage 4). Rehabilitation of the quarry face will start progressively from the south end during stage 4 as areas of the quarry face are completed and will continue during stages 5 and 6 while the quarry pit is excavated and backfilled. By the time stage 6 is complete and the final platform is ready for the (as yet undecided) end-use, some 10 – 15 years' of revegetation will be in place on the quarry face. The likely progression of revegetation is illustrated in Figure 11.

## **7.2.2 Impact of Long-term Effects after the Quarry Closes**

The most significant long-term change to the gorge landscape will be the widening of the gorge resulting from removal of the quarry spur, and the steepening of the side of the gorge at the quarry face. This will have the following visual effects:

- Lengthening views within the gorge;
- Revealing more of the surrounding hillside housing areas to view within the gorge;
- Revealing more of the developed gorge bottom to some surrounding housing areas;
- Slightly increasing the amount of harbour seen from some residential areas, such as lower Broadmeadows.

While the central gorge will appear less of a narrow chasm as a result of the widening, the overall character of the gorge will remain much the same in the long term. The gorge will still be experienced as a highly developed transport/industrial/commercial corridor contained within steep, noticeably modified hillsides managed as a green belt.

The increased visibility of some housing from within the gorge and some of the utility corridor from some areas above will be offset by the rehabilitation of the existing quarry and steep grazing land, which will substantially advance the green belt concept in the gorge (see 8.8). By the time stage 6 of the quarry is complete, the rehabilitation and visual integration of the quarry face with the adjacent hillsides will be well on the way.

### 7.3 Summary of Visual Effects

The proposed quarry will be of a scale and nature that it will result in some significant visual effects during its operation. In particular, SH1 travellers will see the quarry, although fleetingly, as a substantial area of disturbed land in their foreground view. The quarry will also be noticeable as an area of exposed rock in the middle distance of views from parts of nearby hill suburbs. However, the full extent of the quarry face will be visible from a relatively small number of houses and the quarry will be seen as a relatively small part of extensive hilltop and harbour views from most residential viewpoints.

The quarry development has been planned to minimise adverse visual effects. The top height of the quarry face has been lowered to a level where its visual impact in the wider harbour landscape will be minimal and the quarry pit in the bottom of the gorge will be screened from SH1 travellers as well as most locations in the wider landscape. The south-to-north direction of quarrying has been planned so that the north face of the quarry spur will screen much of the quarry activity from north and west locations for the first 3 stages of the quarry development. Rehabilitation of the quarry face, which will be the most noticeable area of disturbance, will be progressively implemented as areas of the face are completed, from approximately halfway through the life of the quarry.

In the long term, the quarry face will revegetate and it will become one part of the vegetated hillsides in the gorge that will eventually form the Ngauranga Gorge green belt. The permanent widening of the central gorge that will result from the quarry, will allow longer views up and down within the gorge and enlarged views in and out of the gorge in the direction of Broadmeadows. This will somewhat reduce the sense of enclosure and separation from the residential areas in the gorge but the gorge's essential visual character will remain much the same – a highly developed utilitarian corridor in the gorge bottom, flanked by steep, dramatic, revegetating slopes.

## 8.0 MITIGATION

### 8.1 Alternatives

#### 8.1.1 Original Proposal

In 2001<sup>10</sup> Boffa Miskell was asked to consider the effects of a preliminary quarry extension proposal in terms of open space values. The proposal is illustrated in Figures 9 and 10. It involved quarrying the spur an additional 32 metres vertically and 100 metres horizontally, resulting in a final battered face up to 190m asl (compared to 158m asl in the current proposal.)

Boffa Miskell considered the adverse effects on landscape, ecological and visual values were greater than they needed to be to extract the amount of rock, in particular:

- the extent of the final cut face;
- the extent of land where soil and vegetation cover would be lost or disturbed in an area earmarked as a future green belt;
- the visibility of the higher cut face from the harbour;

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<sup>10</sup> *Open Space Assessment, Kiwi Point Quarry*, prepared for Wellington City Council by Boffa Miskell Limited, February 2001,

- the unnaturally straight profile of the landform – as if the spur had been ‘sliced off’;
- the unnatural appearance of the stepped, horizontal benching on the final face;
- the loss of the high point on the spur, which is important to the natural character of the skyline and, to an extent, in screening the lower spur area from houses above in Rangoon Heights.

An alternative proposal was put forward, designed to reduce the overall extent of the quarry and landform modification, reduce the visibility of the quarry workings as much as possible, and achieve a more natural appearance in the final landform. A significant component of the alternative proposal was quarrying down, below the valley floor, to compensate for the reduced volume of rock that would be extracted from the spur landform. The resulting quarry pit would affect only land already changed by quarrying the spur and would be the least visible part of the site. The alternative proposal was adopted as the basis for the current proposal described in this report due to the significant reduction in adverse effects that it achieved.

## **8.2 South – north direction of work**

The quarry is planned to progressively excavate the spur from the south side, as illustrated in Figures 2(a) and 2(b). This reduces the time period when the quarry will be visible in key views (south-bound motorway traffic and residents in the Raroa / Broadmeadows area) because the existing north face will be left intact for as long as possible and will screen the quarry from northern viewpoints through stages 1, 2 and 3.

## **8.3 Existing adjacent features**

The WRC pumping station adjacent to the site at the north end is a noticeable feature in the foreground of views for southbound SH1 travellers. Together with the nearby existing karaka trees and proposed screen planting, it will provide a constant feature in the changing view and, during stages 5 and 6, will partially screen the quarry pit area from south-bound SH1 travellers.

## **8.4 Temporary Hydroseeding**

As the access road is likely to be in place for at least 10 years, and the batters will be noticeable to southbound SH1 travellers, the batters will be hydroseeded to reduce the degree of contrast with the adjacent hillside.

## **8.5 Bunds**

The earth bunds formed on the outer edge of the access road and main working platform will reduce the visible extent of the working area and screen truck movement from viewpoints below – namely SH1 and industry in the gorge. As described in 4.2 the bunds will be formed by leaving the outer edge of the road and working platform in place as a ‘rim’ and will be gradually lowered as the level of quarrying descends. Forming them in this way not only reduces the risk of rock fall from road and platform construction but also minimises the amount of ground disturbance on the slope below the working area.

## **8.6 Screen planting**

Screen planting will be put in place south of the pumping station during stage 1 so that the planting will be tall enough to block views into the quarry pit area from south-bound SH1 traffic by the end of stage 4, when the platform is brought down to be level with SH1 at this point. The planting will consist of fast-growing native trees, common to the area, and will include karakas. This planting will complement the two existing karaka stands beside the pumping station that are to be retained and will enhance the pumping station and associated vegetation as a foreground feature and landmark along SH1.

## **8.7 Rehabilitation**

A site rehabilitation plan will be prepared for the finished quarry face with the objectives of:

- achieving relatively natural patterns in the finished ground surfaces and vegetation cover to ameliorate adverse landscape effects;

- revegetating the face with plant cover that will contribute to the future green belt concept for the gorge.

(The end use of the platform adjacent to SH1 is to be decided at a future time, so it will not be included in the rehabilitation plan.)

### **8.7.1 Finished Landform**

The overall shape of the finished face has been modelled to achieve a more ‘natural’, rounded profile than the straight, ‘sliced’ face originally proposed. This modelling has been carried out on the basis of standard, regular benching required for overall slope stability and working access. However, the rehabilitation plan will include more detailed design of the ground finishing, aimed at staggering benched areas and varying finished gradients on final completion to provide a more natural, varied combination of ground surfaces. These measures will also assist plant establishment as described in 8.7.2 below.

### **8.7.2 Rehabilitation Measures**

The following rehabilitation measures will be incorporated into the rehabilitation plan to speed up the process of establishing a reasonable cover of woody native vegetation cover:

- Reducing the gradient of cut faces where possible to be more favourable for plant establishment;
- Ripping and minor localized blasting to create a range of slopes, aspects and ground conditions at the micro-environment level, including outcrops, crevices and benches;
- Creating and/ or adding soil forming materials (such as rock screeds) and/ or organic soils where possible;
- Planting appropriate rock-habitat adventive species and ‘nursery’ plants in accessible areas, to act as a seed source for natural regeneration and to visually break up the appearance of the finished face.

The aim would be to create a variety of conditions on the face so as to achieve a diverse pattern of vegetation cover, including patches of more sparsely vegetated rock outcrops and areas of taller growth, as illustrated in Photographs 9 and 10. It should be noted here, that apart from the recent roadside planting at the Newlands Interchange, very little, if any, active rehabilitation has occurred within the gorge before. Even at the interchange, the finishing of the roadside batters has not been conducive to plant establishment, as illustrated in Photograph 8. A long-term restoration programme for the wider gorge landscape would be instrumental in improving past performance and furthering the Council’s future green belt concept.

### **8.7.3 Site conditions in the Ngauranga Gorge**

Observation of the trends in the site conditions and regeneration of plant cover elsewhere in the Ngauranga Gorge has provided useful information from which to develop rehabilitation measures for the proposed quarry extension and predict likely outcomes.

Past quarry and roading earthworks in the gorge have created two plant environments, namely, vertical or near-vertical rock faces, and consolidated benches.

On the rock faces, it appears that on south aspects it takes up to 25 years for the first woody seedlings to establish in crevices in the rock face and walls when left to regenerate naturally. These colonising species include *Hebe stricta*, gorse and broom. Over longer periods these faces support other species such as tree hebe, broadleaf, manuka and coastal flax. On northern aspects initial vegetation establishment can take considerably longer.

On the benches, those with a southerly aspect take between 15-20 years for enough soil material to collect during the first pioneering phase (grass / gorse/ fennel) to enable small shrubs and ground ferns to establish. On northern aspects vegetation establishment takes longer.

Early colonising plants include a range of exotic weed species as well as a number of native species.

Observations of previous earthworks in Ngauranga Gorge and, in other similar localities, confirms that revegetation will be a slow process at Kiwi Point. While revegetation techniques can assist in speeding up the natural processes, the time periods required for revegetation and effective landscape mitigation will be in excess of 50 years.

The following table provides an indicative guide to the likely time frames that will be required for the successful revegetation of both undisturbed and earthworked sites in the Ngauranga Gorge. Unmodified sites are those sites that have lost their original vegetation cover but have not been earthworked. The unrehabilitated modified sites are those that have been earthworked and left as either stepped terraced landforms or steep cut batters. The rehabilitated modified sites are those that have been left in an informal and less engineered form where scree slopes and a range of micro-environments occur. The latter is the rehabilitated condition that would be sought.

### Ngauranga Gorge Revegetation

(Time Periods in Years)

Land Cover	Unmodified Sites		Unrehabilitated Modified Sites		Rehabilitated Modified Sites	
	North aspect	South aspect	North aspect	South aspect	North aspect	South aspect
Grass Cover	1-2	1	5	3	1-2	1-2
10% woody cover	10+	5+	30+	20+	20+	10+
50% woody cover	20+	15+	60+	40+	30+	20+
Optimal revegetation cover <sup>1</sup>	40+	30+	80+	60+	50+	40+
Optimal second growth forest <sup>2</sup>	80+	60+	150+	120+	100+	80+

<sup>1</sup> Optimal Revegetation Cover: mosaic of dense woody growth, grass/ scrub; or rock faces depending on substrate.

<sup>2</sup> Optimal second growth forest: mosaic of closed canopy bush, scrub/ grass or rock faces depending on substrate.

#### 8.7.4 Rehabilitation Time frame

Simulations depicting the indicative nature and pattern of revegetation of the rehabilitated quarry extension are shown in Figure 11 to illustrate the likely effects of revegetation on both the quarry cut faces and the undisturbed adjacent hillside areas: The time periods depicted are:

- At the completion of quarry operations.
- 20-years after quarry operations have ceased.
- 50-years after quarry operations have ceased.

The simulations have been prepared on the assumption that active and progressive site rehabilitation and revegetation would occur during and subsequent to the quarry operation, on the excavated quarry faces as they are completed and on the adjacent undisturbed land.

### 8.8 Rehabilitation of Adjacent Land

A long-term rehabilitation programme is planned for the existing Kiwi Point quarry after it closes, and for the grazing land on the hillsides adjacent to the proposed quarry extension behind the abattoir, which are pictured to right of View A. The rehabilitation programme will aim to:

- Plan the final landform and finishing of the ground surface for implementation during the final stages of the existing quarry to achieve a relatively natural overall form, and site conditions that will be conducive to revegetation;
- Revegetate the finished quarry face and the grazing land through on-going rehabilitation measures and monitoring;

- Assist the Council in furthering its green belt objectives by actively ‘greening’ a substantial part of the gorge landscape and developing a vegetation corridor north from Tyers Stream Reserve towards the open space areas of Fraser Avenue / lower Broadmeadows.

Rehabilitation is often a process of experimentation and learning by experience, regardless of prior experience, because every site is different and climatic conditions can vary from year to year. The existing quarry is largely south-facing, which is likely to aid revegetation but the grazing land is likely to prove more challenging due to its drier, more exposed north-facing aspect. The aim will be to speed up the rate of revegetation that would occur if the site were left alone and to improve the quality of plant cover compared to the weed-prone modified areas elsewhere in the gorge. The rehabilitation programme will include regular monitoring and record keeping and this will provide a useful source of on-the-ground experience and highly relevant information for the rehabilitation of the proposed quarry extension.

## 8.9 Summary of Mitigation Measures

The quarry extension proposal has evolved from an original proposal, which involved removing a much larger proportion of the spur landform. The original proposal was amended to reduce the degree of adverse landscape and visual effects, in particular, reducing the quarry’s visibility in the wider landscape, reducing the area of land and vegetation disturbance, and achieving a final landform of more natural appearance.

Various measures are planned to mitigate adverse visual effects while the quarry is operational, including protection of two small, but visually and ecologically valuable, stands of karaka trees beside the WRC pumping station; extending this vegetation with screen planting; hydroseeding the access road batters; and maintaining bunds around the outer edge of the access road and working platforms for visual screening and safety.

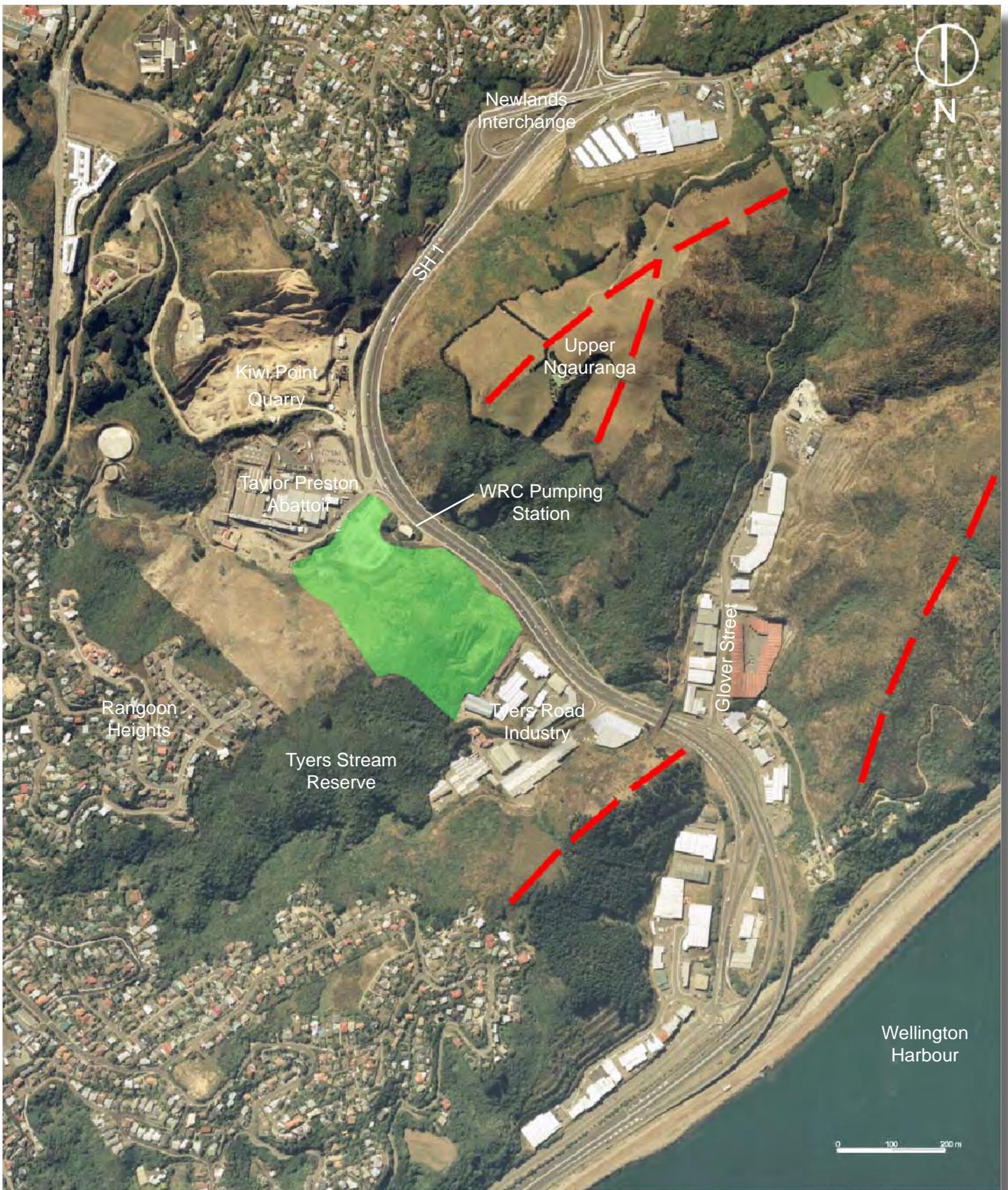
A long-term rehabilitation programme will be implemented to revegetate the finished quarry face. The rehabilitation will aim to speed up the natural rate of regeneration and improve the quality of vegetation cover through ground finishing to encourage plant establishment and planting in selected areas. While the quarry extension is operational, the adjacent grazing land and decommissioned existing Kiwi Point quarry will be actively rehabilitated. This will substantially contribute to the Ngauranga Gorge green belt concept by extending the vegetation corridor and visibly ‘greening’ a large area of the gorge landscape.

## 9.0 CONCLUSION

The proposed quarry has been planned to visually contain the quarrying activity as much as possible, to minimise the extent of disturbed land and to create a final landform of relatively natural appearance. The quarry’s location within the gorge minimises its visibility in the wider Wellington Harbour landscape and, in most wider landscape views, it will be barely noticeable or a relatively minor component. While the quarry will be a large-scale, noticeable activity within the Ngauranga Gorge, and will have a substantial to major visual impact for the thousands of people who use the gorge, this is in the context of a highly modified landscape where quarrying is already an established activity and where most viewers are travelling at speed and will see the quarry fleetingly. Moreover, the direction of quarrying and progressive rehabilitation will limit the temporary adverse visual effects as much as possible during each stage.

In the long term, the central gorge will be wider as a result of the quarry and this will reduce the sense of enclosure, but the overall landscape character will remain much the same – a corridor of utilitarian land uses contained by steep, revegetating slopes within a deep, gorge landscape. A well-planned rehabilitation programme for the quarry would see the finished quarry face contributing to the Council’s long-term vision for a Ngauranga Gorge green belt.

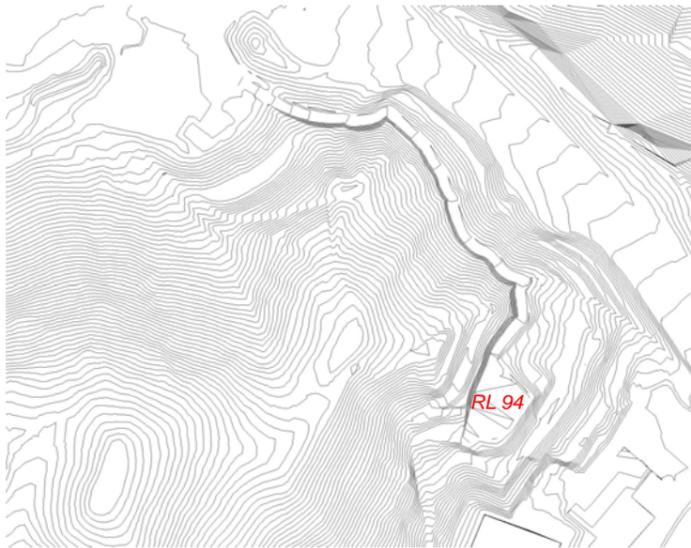
## FIGURES



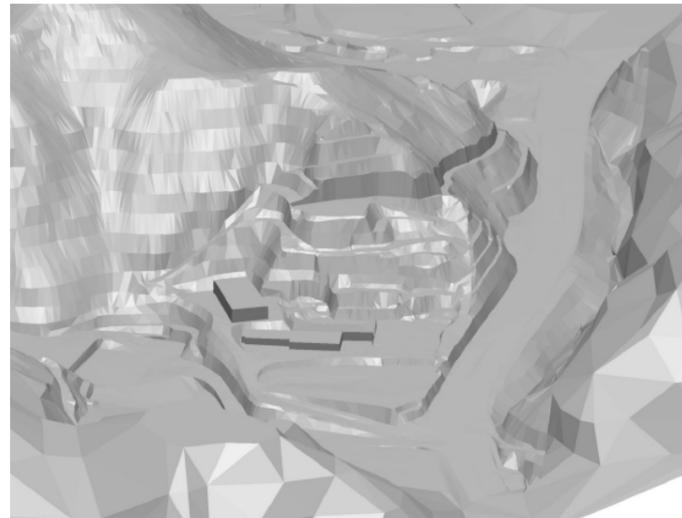
Proposed Quarry Extension



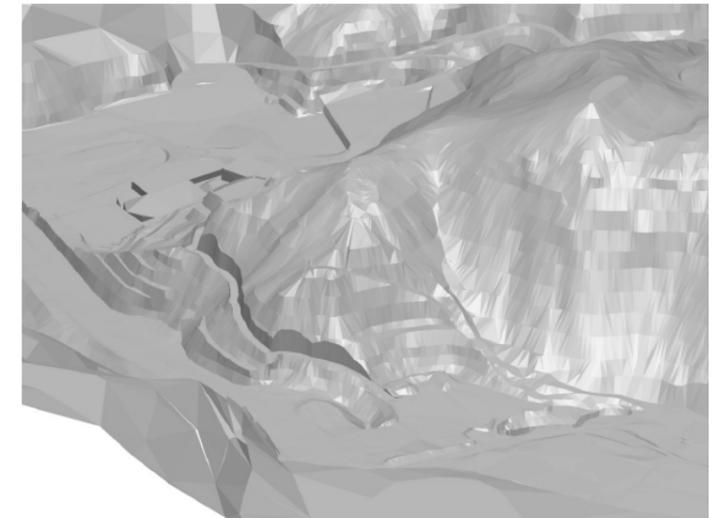
Important Undeveloped Ridgetops and Hilltops  
 (Ref: *Wellington's Ridgetops and Hilltops, The Natural and Amenity Values*)



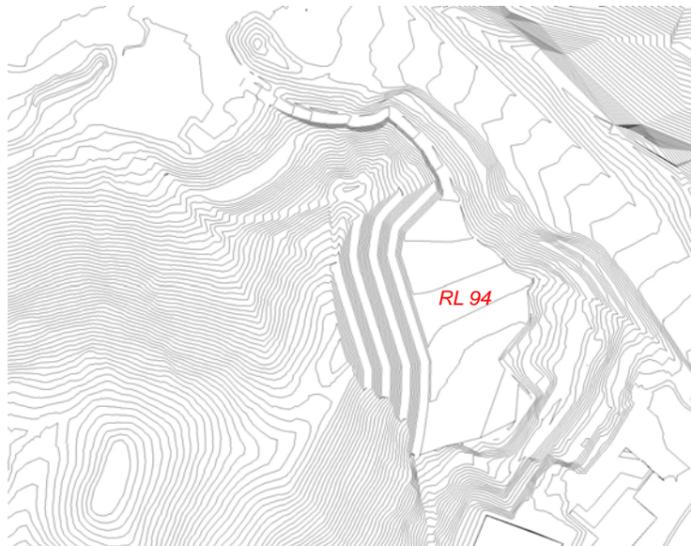
Stage 1 - Initial Road Access to South Face (Volume=21,500m<sup>3</sup>)



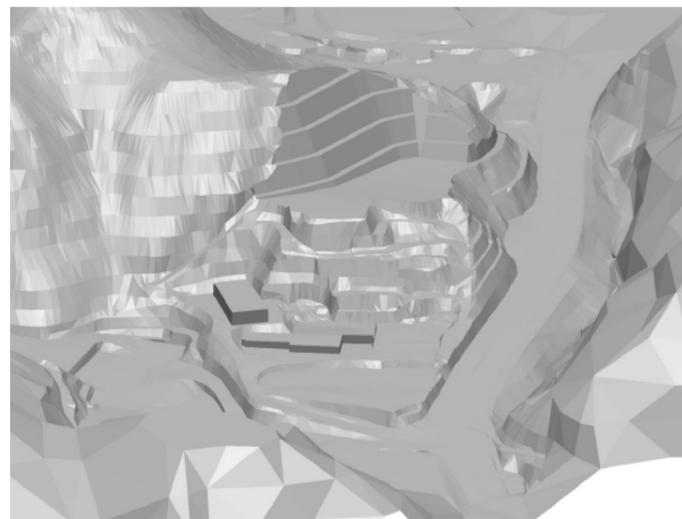
End of Stage 1 - View looking towards South Face



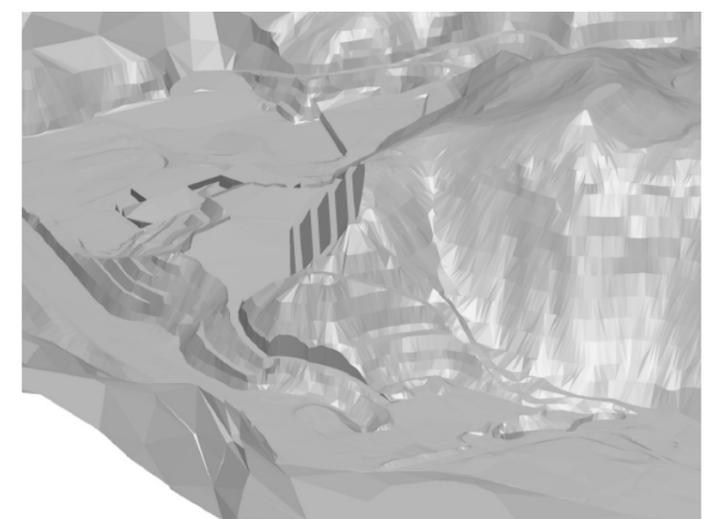
End of Stage 1 - View looking towards North Face



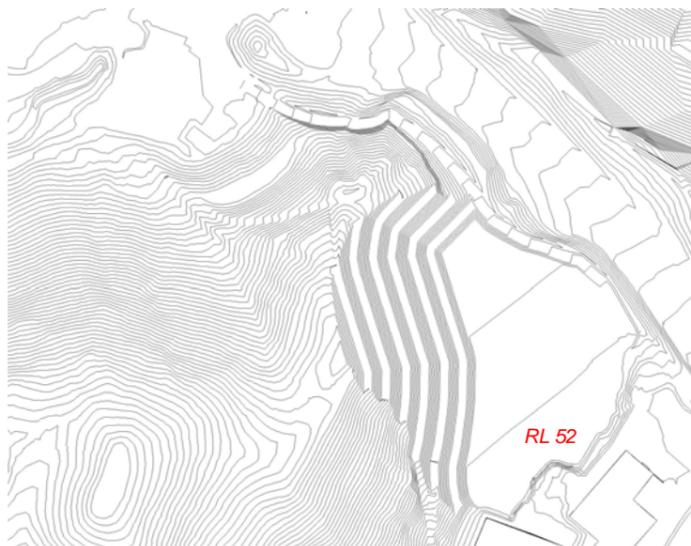
Stage 2 - Excavation of South Face to RL94 (Volume=305,400m<sup>3</sup>)



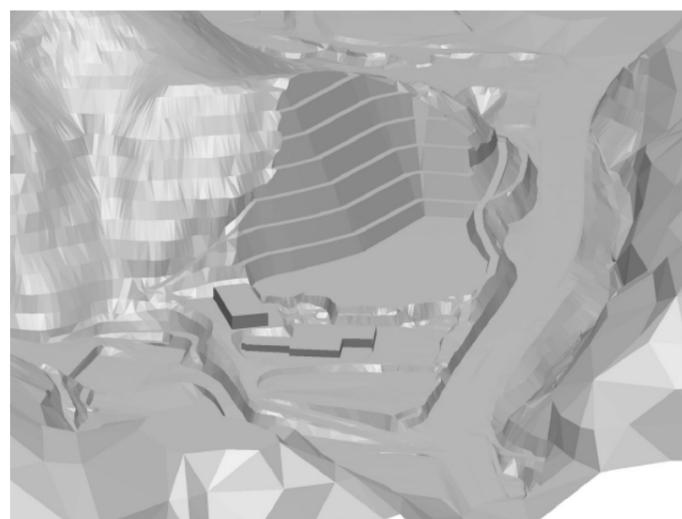
End of Stage 2 - View looking towards South Face



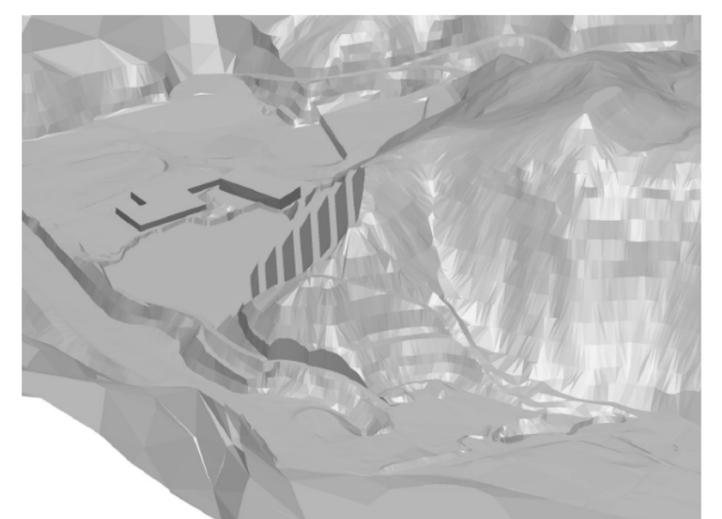
End of Stage 2 - View looking towards North Face



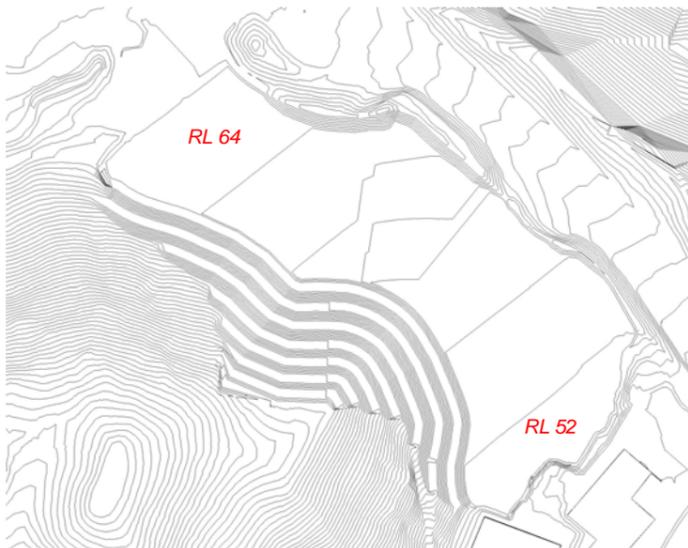
Stage 3 - Excavation of South Face to RL52 (Volume=1,035,500m<sup>3</sup>)



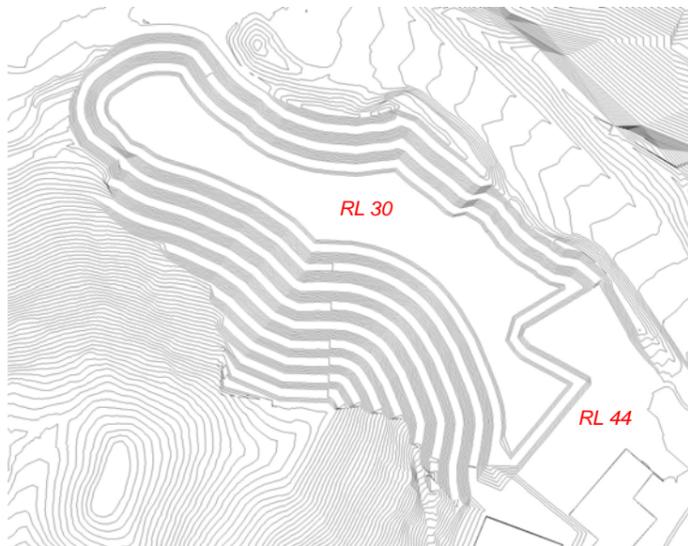
End of Stage 3 - View looking towards South Face



End of Stage 3 - View looking towards North Face



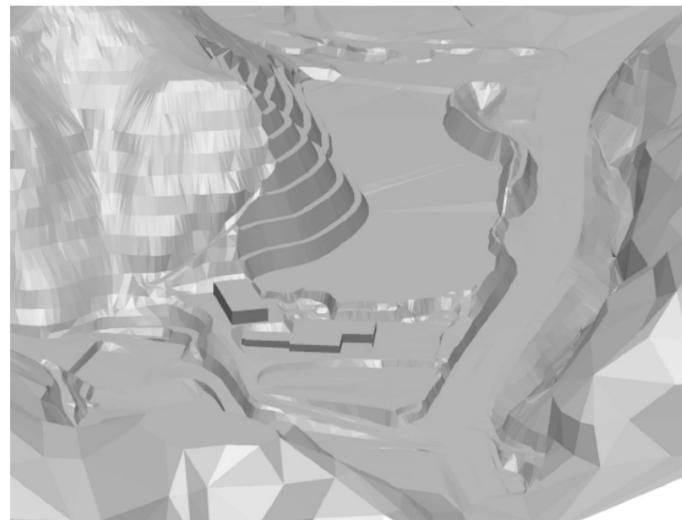
Stage 4 - Excavation to RL52 (Volume=1,078,800m<sup>3</sup>)



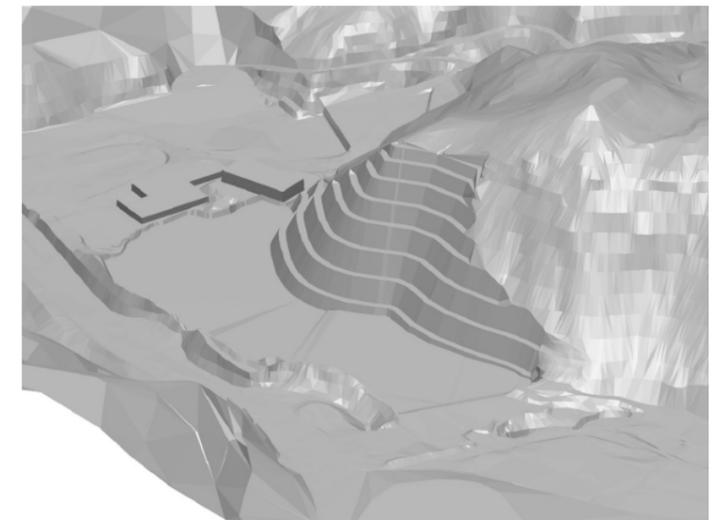
Stage 5 - Excavation to RL30 (Volume=800,500m<sup>3</sup>)



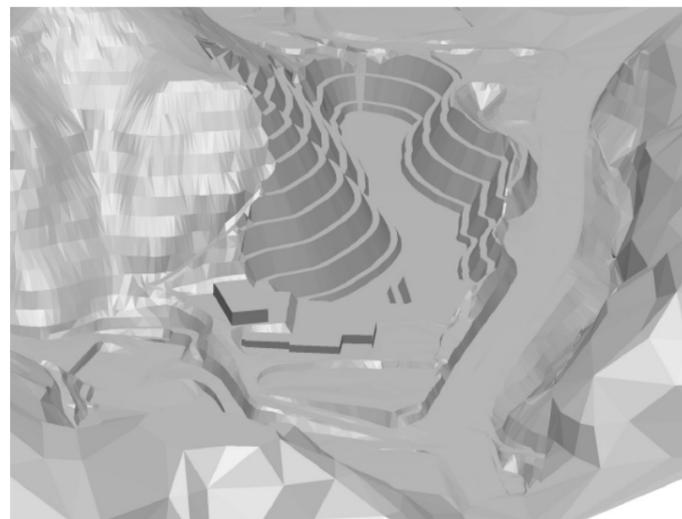
Stage 6 - Backfill to Final Platform sloping from RL64 to RL44 (Volume=670,000m<sup>3</sup>)



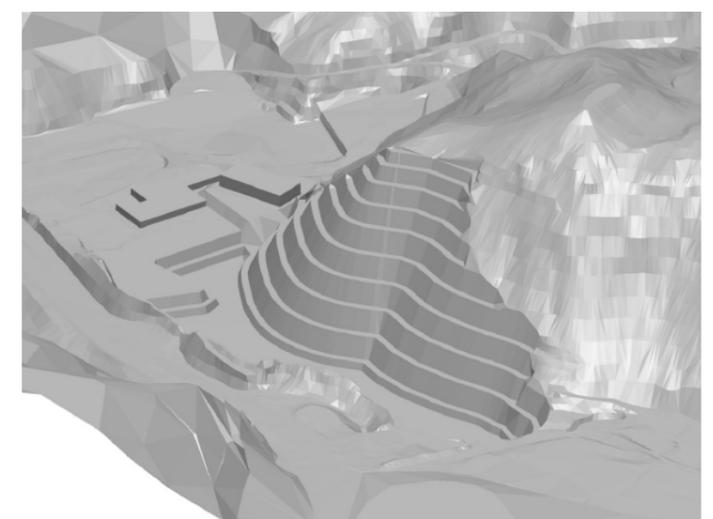
End of Stage 4 - View looking towards South Face



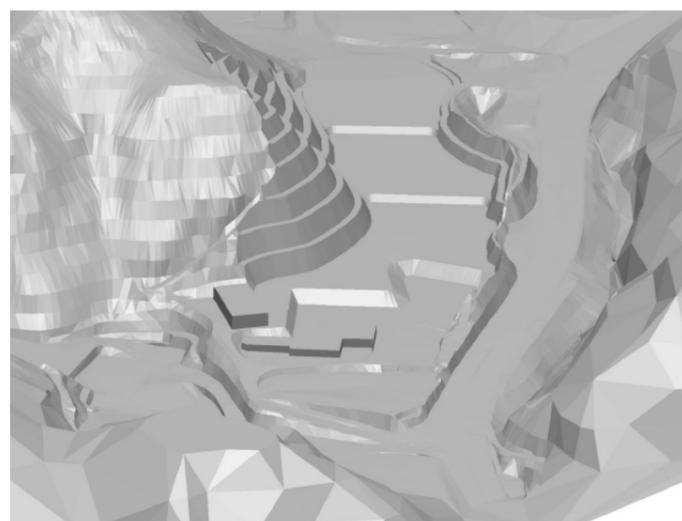
End of Stage 4 - View looking towards North Face



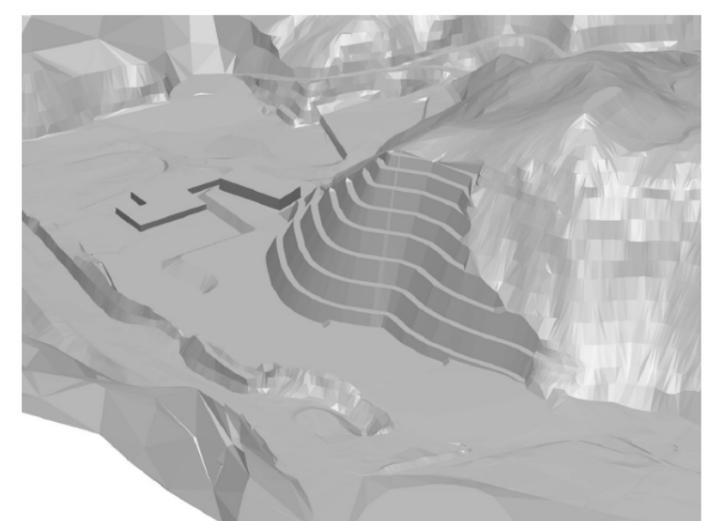
End of Stage 5 - View looking towards South Face



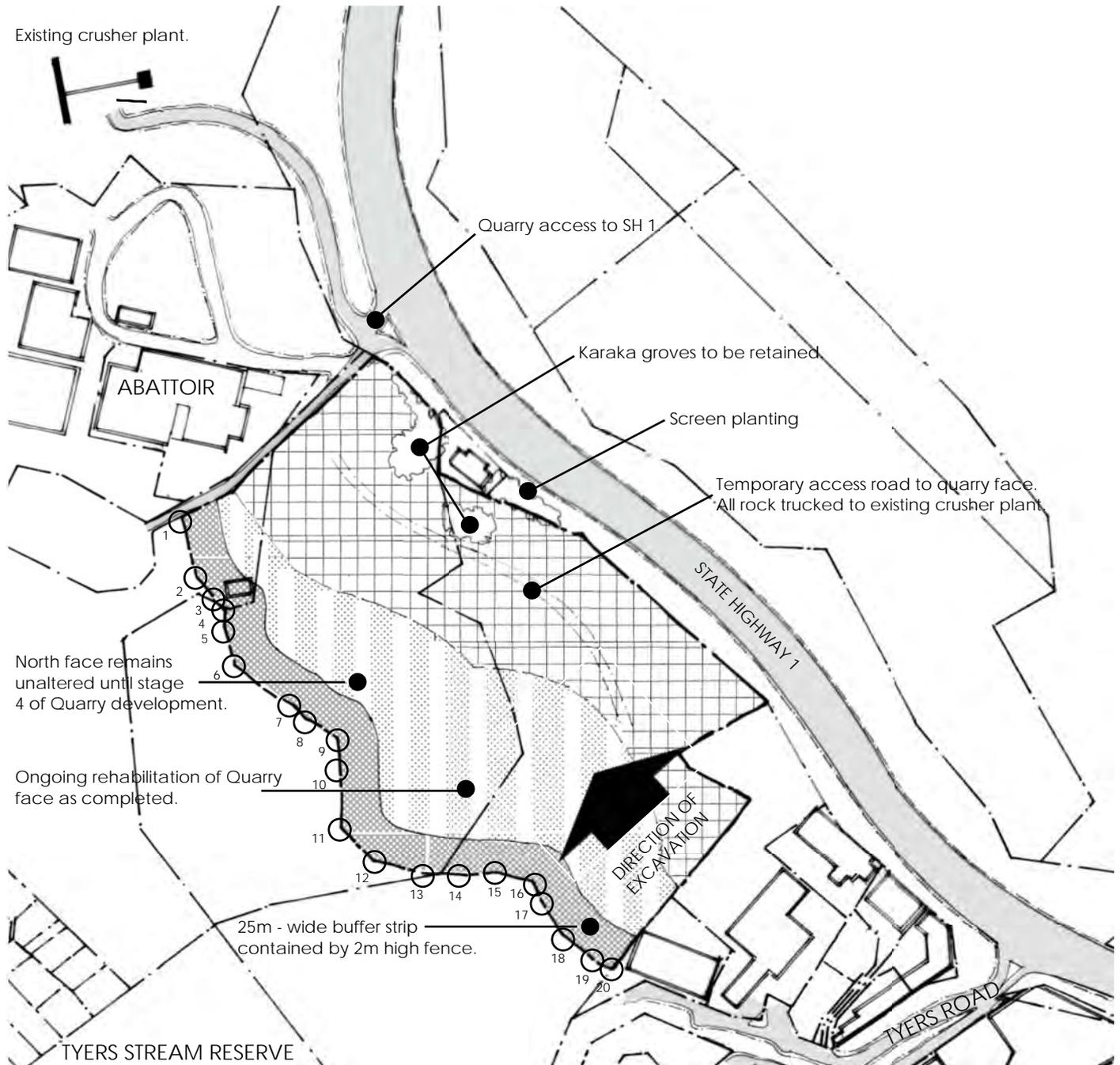
End of Stage 5 - View looking towards North Face



End of Stage 6 - View looking towards South Face



End of Stage 6 - View looking towards North Face

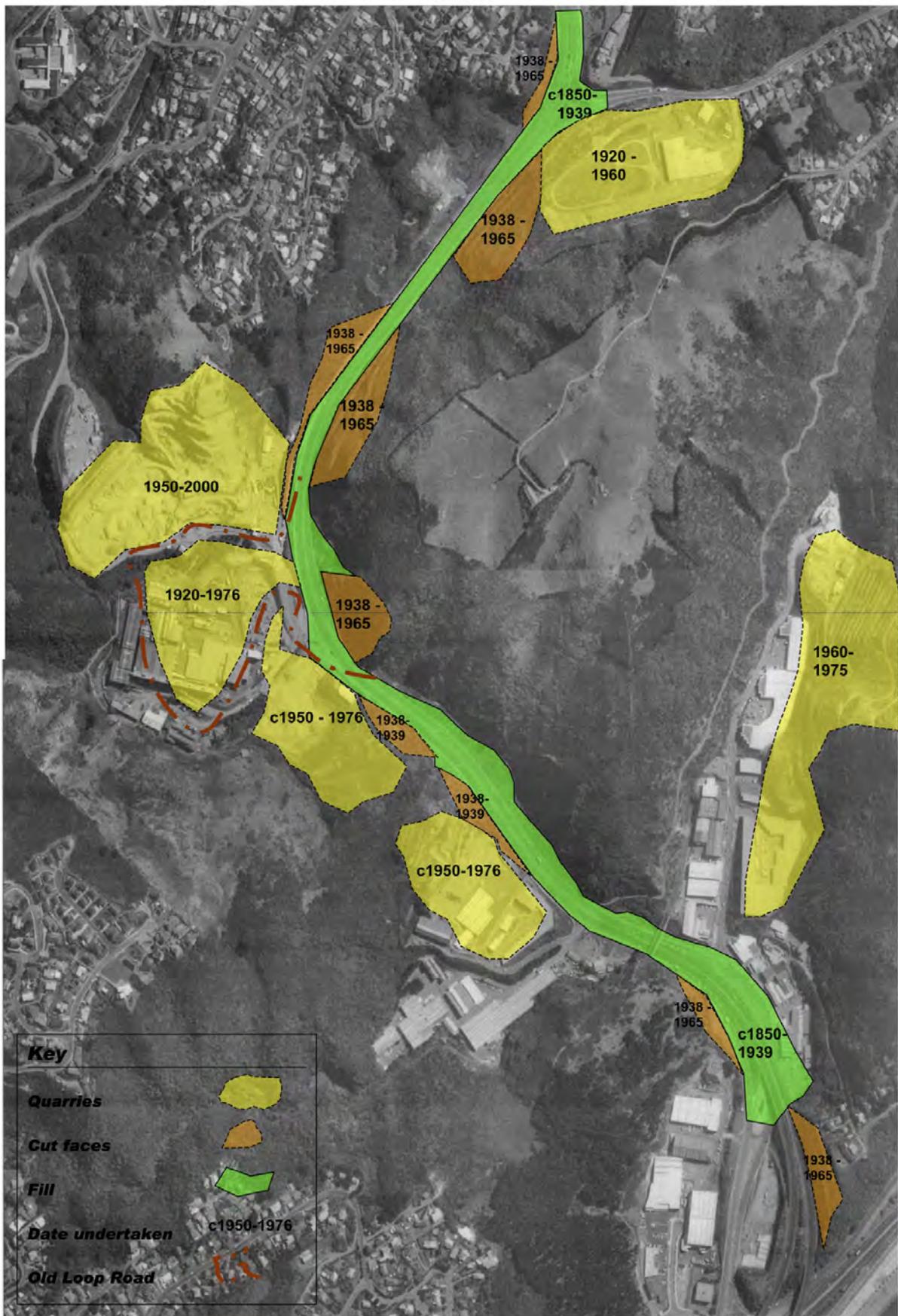


SCALE 1 : 4000 @ A4

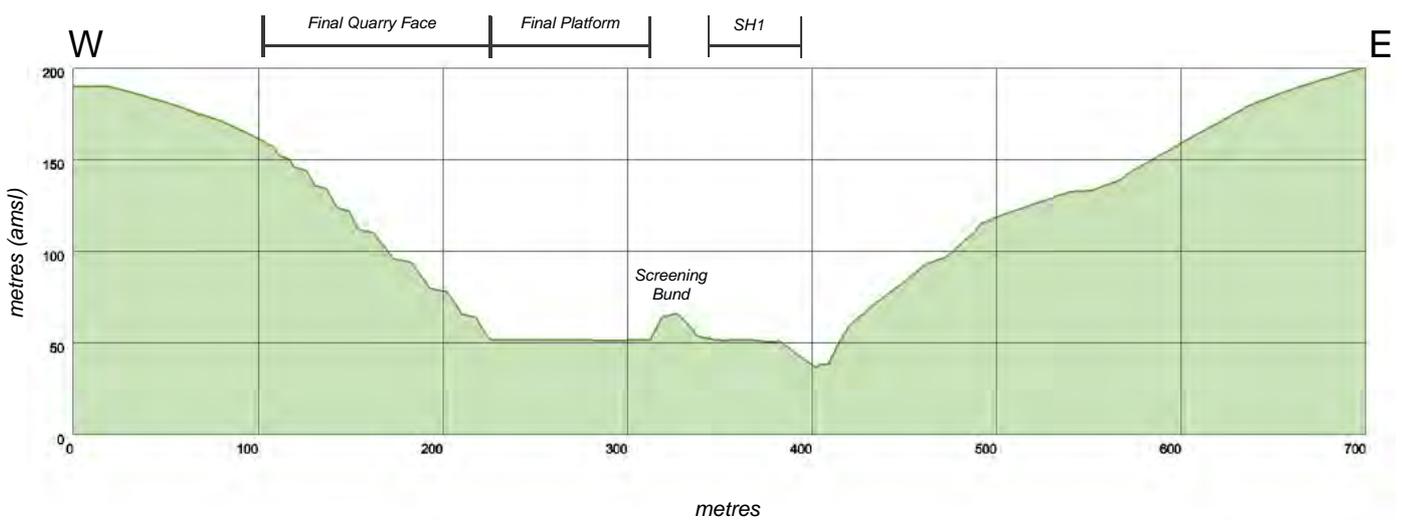
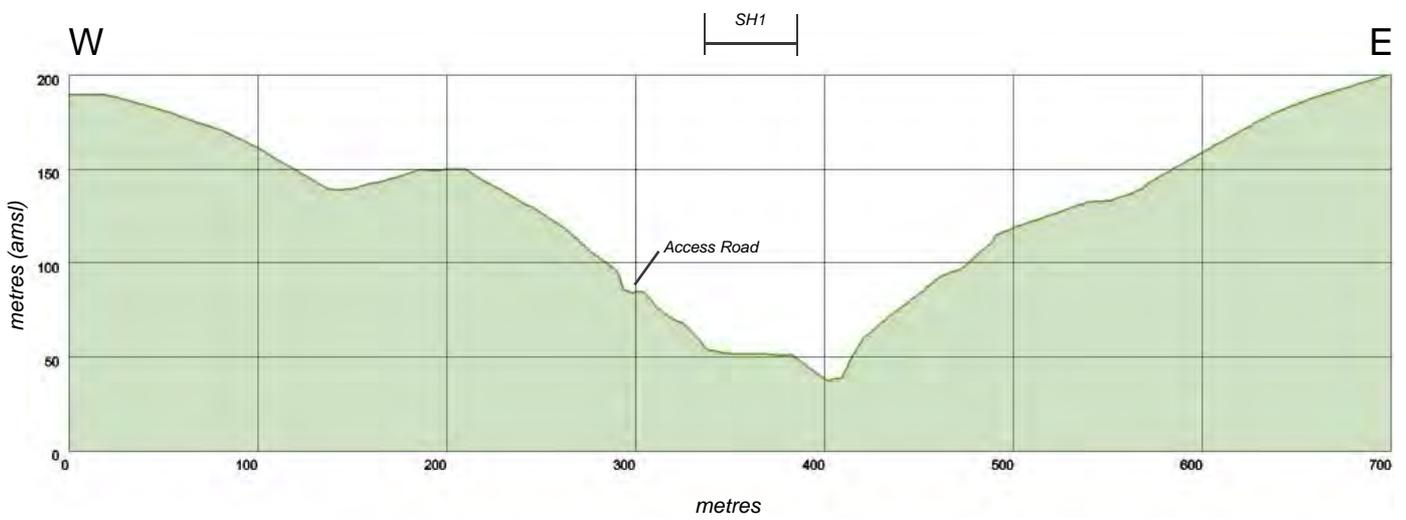
Boundary co - ordinates

- KEY**
-  Cadastral Boundaries
  -  Existing Buildings
  -  Existing Roads
  -  Quarry Boundary
  -  Cut face at completion from 158m asl to meet with platform
  -  Excavation to maximum of 30m asl, cleanfilled to a final platform sloping from 64 - 50m asl (north - south)

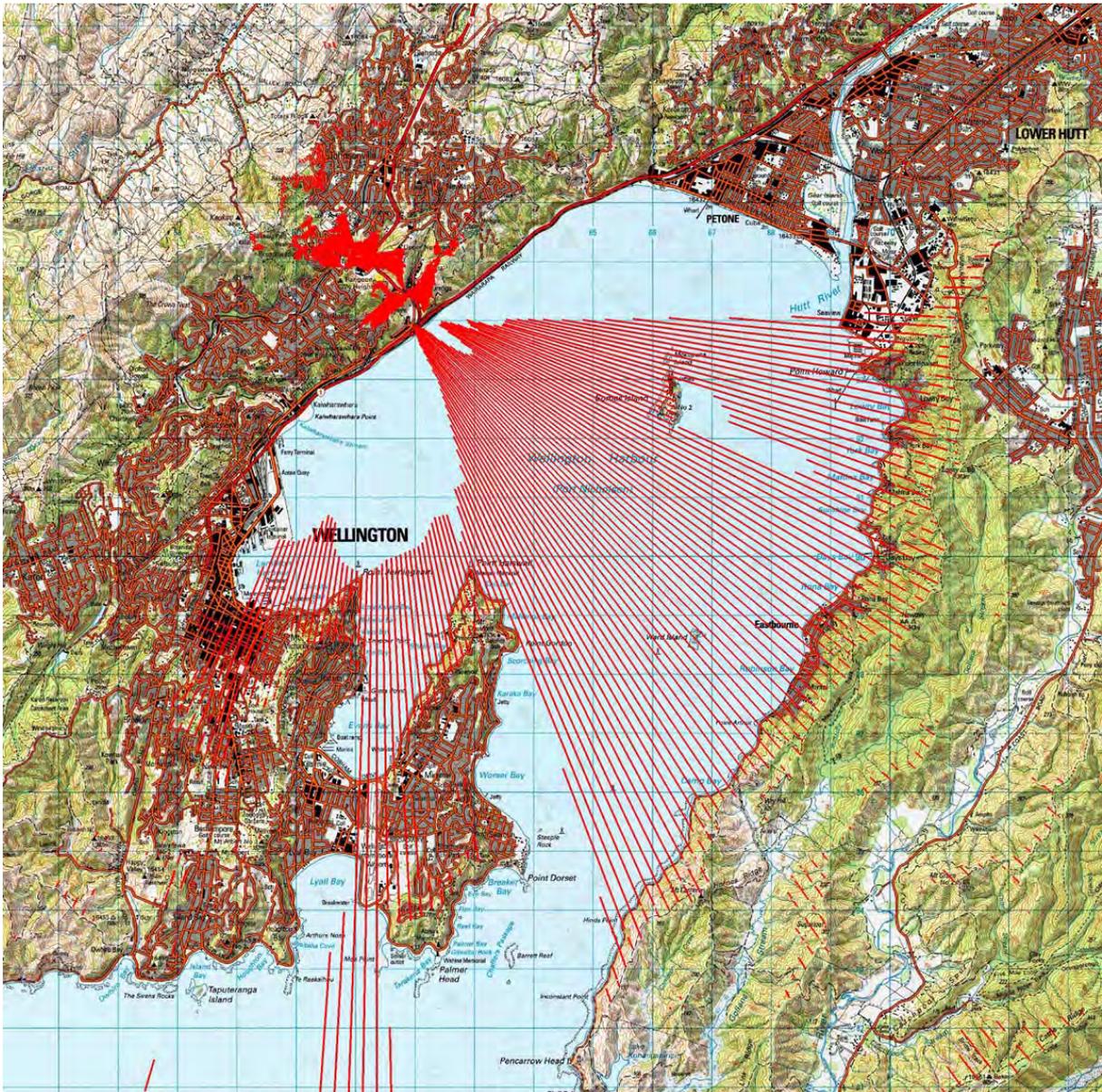
1	2661184.26	5994790.43
2	2661193.50	5994753.45
3	2661207.65	5994733.55
4	2661214.15	5994729.40
5	2661213.10	5994716.60
6	2661219.80	5994693.30
7	2661258.35	5994666.75
8	2661269.95	5994655.38
9	2661285.53	5994647.85
10	2661290.16	5994632.62
11	2661291.20	5994582.25
12	2661310.47	5994562.98
13	2661338.60	5994554.55
14	2661369.30	5994553.55
15	2661389.57	5994554.93
16	2661415.60	5994551.27
17	2661420.80	5994537.93
18	2661436.90	5994514.40
19	2661458.27	5994495.60
20	2661470.13	5994490.74



Aerial Photo (1997) showing location and types of major modifications to the Ngauranga Gorge landforms  
 Source : *Kiwi Point Quarry - Study of Ngauranga Gorge Landforms and Modifications*, Montgomery Watson New Zealand Ltd, 2000



Cross Section at end of Stage 6 of Quarry Development



SCALE 1 : 100 000 @ A4

The intervisibility map has been produced by modelling LINZ 20m topographical contour data and radiating 1 degree view lines out in all directions from a specified viewpoint. Each radial viewline is drawn where the viewpoint is visible.

NOTE : The intervisibility map is modelled solely on 20m contour information. Therefore, surface obstructions to viewlines such as trees and buildings are not taken into account.



LOCATION OF VIEWPOINTS



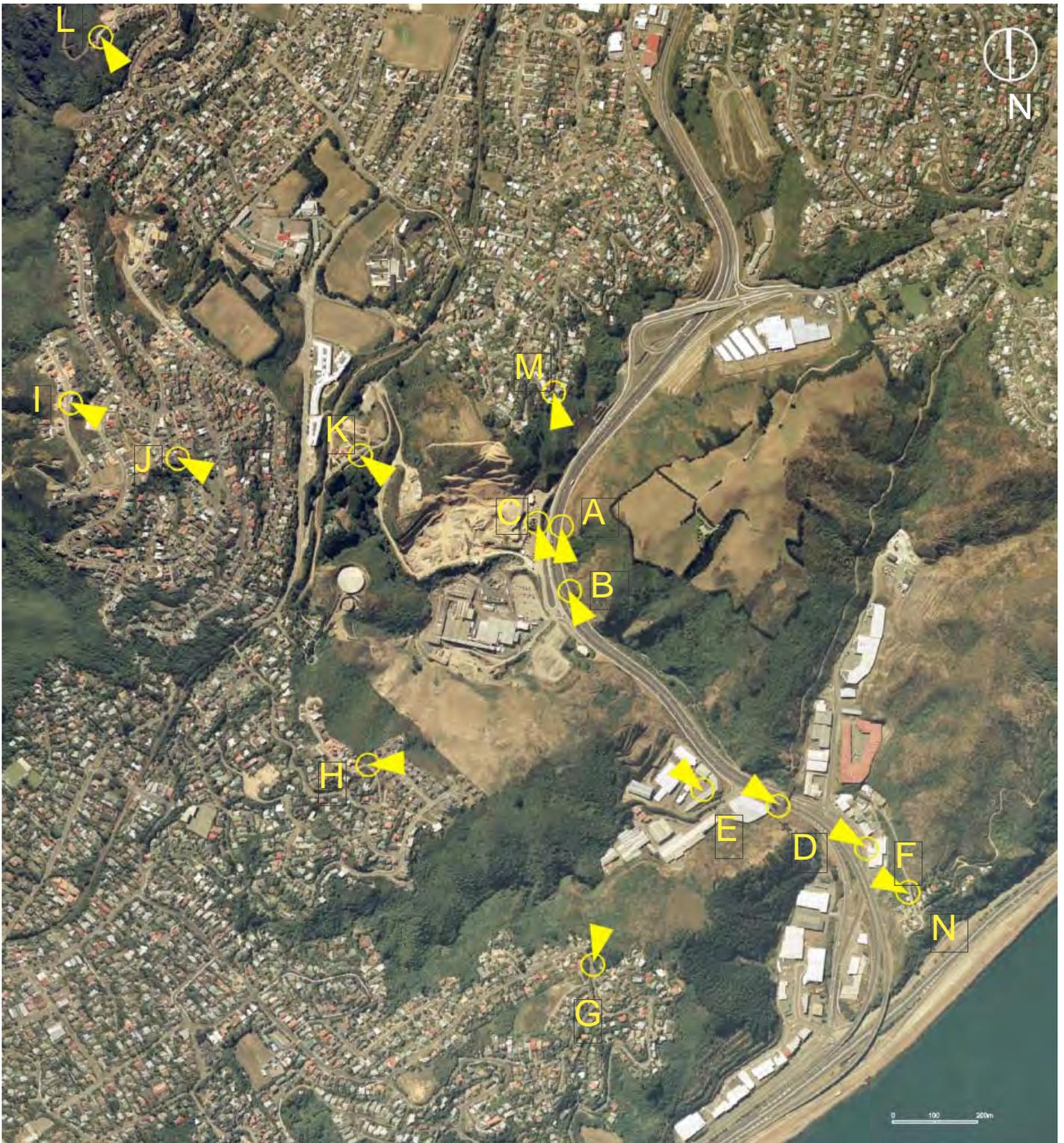
SCALE 1 : 100 000 @ A4

The intervisibility map has been produced by modelling LINZ 20m topographical contour data and radiating 1 degree view lines out in all directions from a specified viewpoint. Each radial viewline is drawn where the viewpoint is visible.

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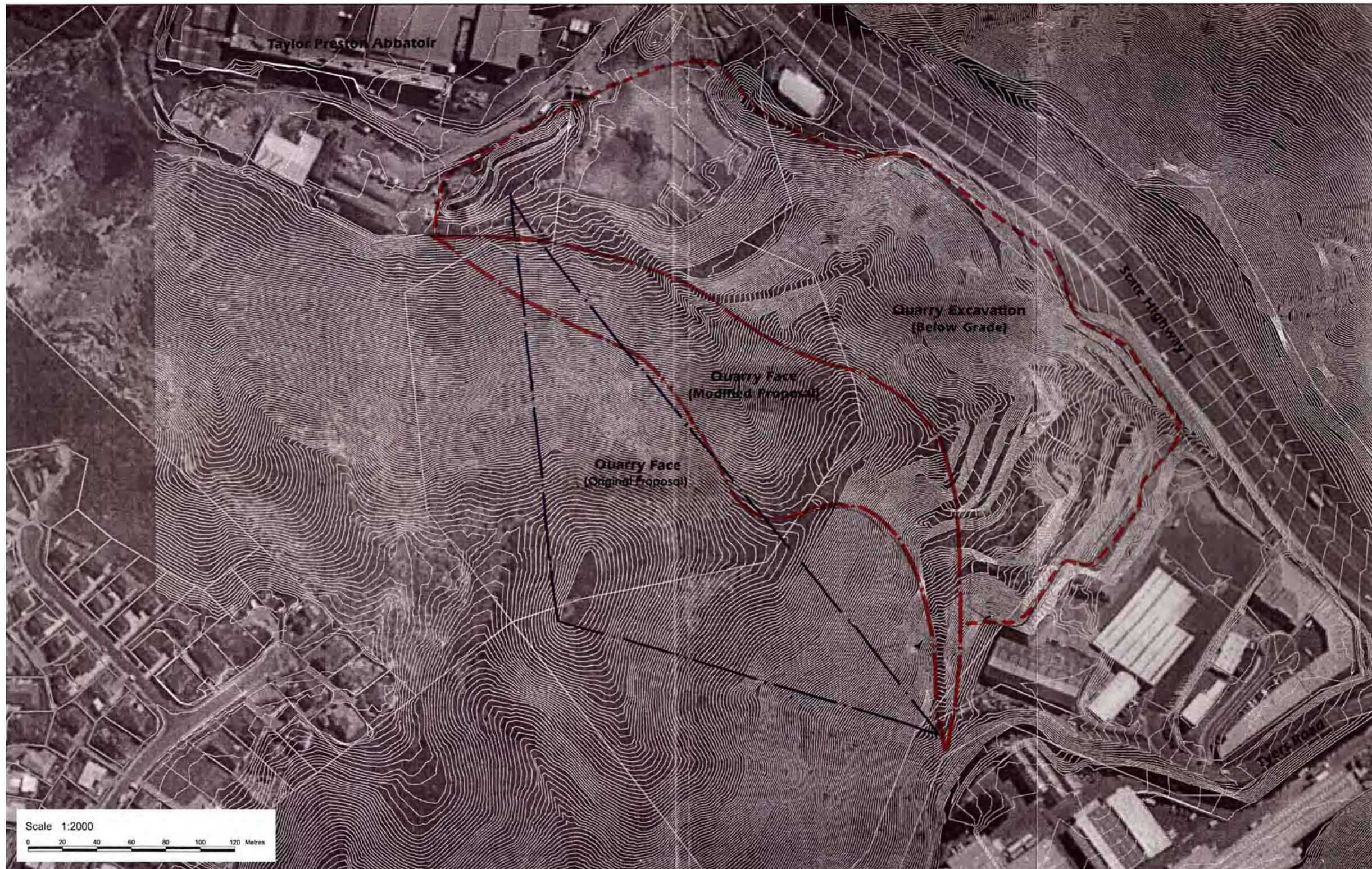


LOCATION OF VIEWPOINTS



VIEW A : SH1 - View south from southbound lane  
 VIEW B : SH1 - View south from southbound lane  
 VIEW C : SH1 - View south from northbound lane  
 VIEW D : SH1 - View north from northbound lane  
 VIEW E : from Ngauranga - Tyers Road  
 VIEW F : from Ngauranga - Glover Street  
 VIEW G : from Cashmere - Homebush Road  
 VIEW H : from Rangoon Heights - Imran Place

VIEW I : from Upper Broadmeadows - Jaunpur Crescent  
 VIEW J : from Upper Broadmeadows - Hindipur Terrace  
 VIEW K : from Lower Broadmeadows - Fraser Avenue  
 VIEW L : from Hampton Gate - Meadowcroft Grove  
 VIEW M : from Raroa - Kitchener Terrace  
 VIEW N : from Ngauranga - Malvern Road  
 VIEW O : from Days Bay wharf (location not shown)  
 VIEW P : from Eastbourne beach (location not shown)



The original proposal would have resulted in a triangular finished face with a straight profile up to 190m asl (black line). The modified (current) proposal will result in a lower finished face up to 158m asl with a more rounded profile (red line). Source : *Open Space Assessment, Kiwi Point Quarry*, Boffa Miskell Limited, February 2001.



View from Fraser Avenue. The original proposal would have removed the high point on the spur and resulted in a higher, straight cut face.  
Source : *Open Space Assessment, Kiwi Point Quarry*, Boffa Miskell Limited, February 2001.



REHABILITATION AT END OF QUARRY OPERATIONS



REHABILITATION AFTER 20 YEARS



REHABILITATION AFTER 50 YEARS

Rehabilitation will include finishing the final face to appear more natural and to aid plant establishment by varying benching, gradients and ground conditions. The simulations were prepared for an earlier report (*Open Space Assessment, Kiwi Point Quarry*, Boffa Miskell Ltd, February 2001) and there may be minor variations when compared with View C, which was taken in 2003.

## PHOTOGRAPHS

1. WELLINGTON. NGAURANGA GORGE

687491½



Photograph 1 :  
1860s view of Ngauranga Gorge stream and track.  
Source : Alexander Turnbull Library



Photograph 2 :  
Ngauranga Gorge stream and track and adjacent quarry, 1920.  
Source : Alexander Turnbull Library



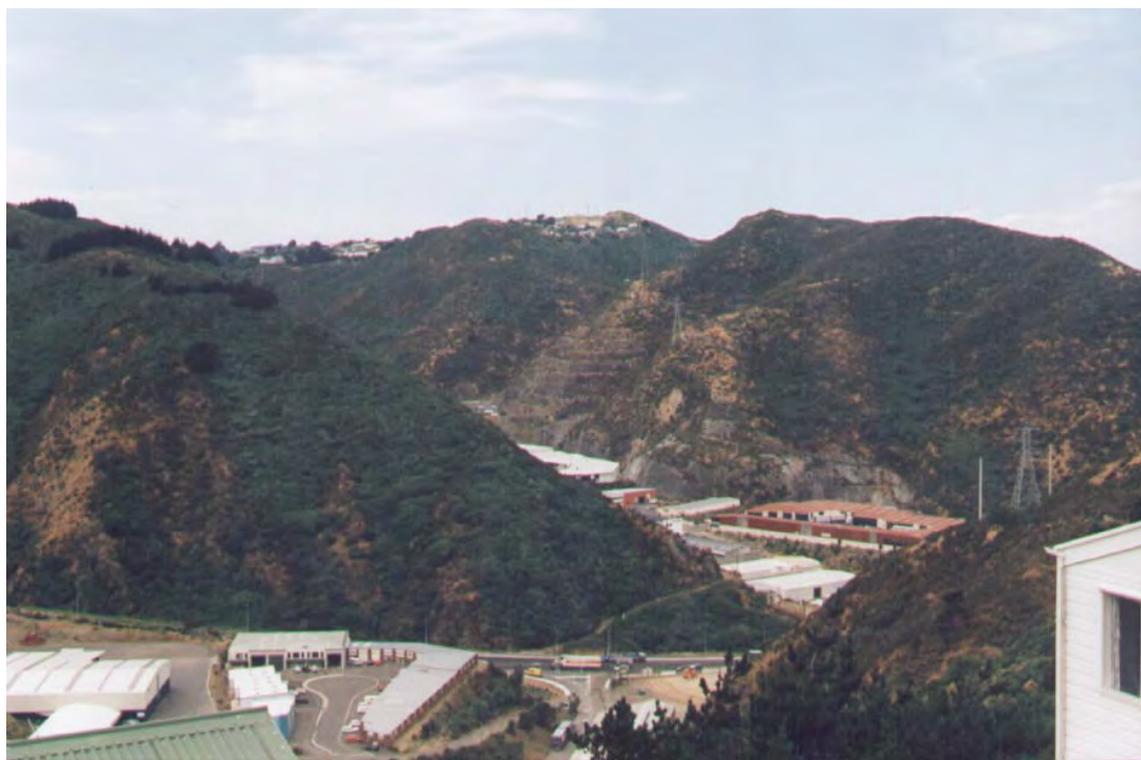
Photograph 3 :  
Southbound view from approximately adjacent of the Kiwi Point Quarry, 1939.  
Source : Alexander Turnbull Library



Photograph 4 :  
Southbound view from approximately adjacent of the Kiwi Point Quarry, 2000.  
Source : Alexander Turnbull Library



Photograph 5 :  
Newlands Interchange on SH1, 2003, showing recent road batters (centre) and older cut faces behind industry (centre left).



Photograph 6 :  
View of Ngauranga Gorge from Homebush Road, 2001. Benched and sparsely vegetated faces from former quarrying, behind industry in Glover Street can be seen (centre).



Photograph 7 :  
View into Ngauranga Gorge from lower Braodmeadows. Large cut faces formed during SH1 widening in the 1930-1960s are visible (centre and center right). The existing Kiwi Point Quarry can be seen in profile as a strip of recently exposed rock (left centre).



Photograph 8 :  
Benched road batters at Newlands Interchange. The vertical faces have been hydroseeded but plant establishment has not been aided by vertical surface scrapping.



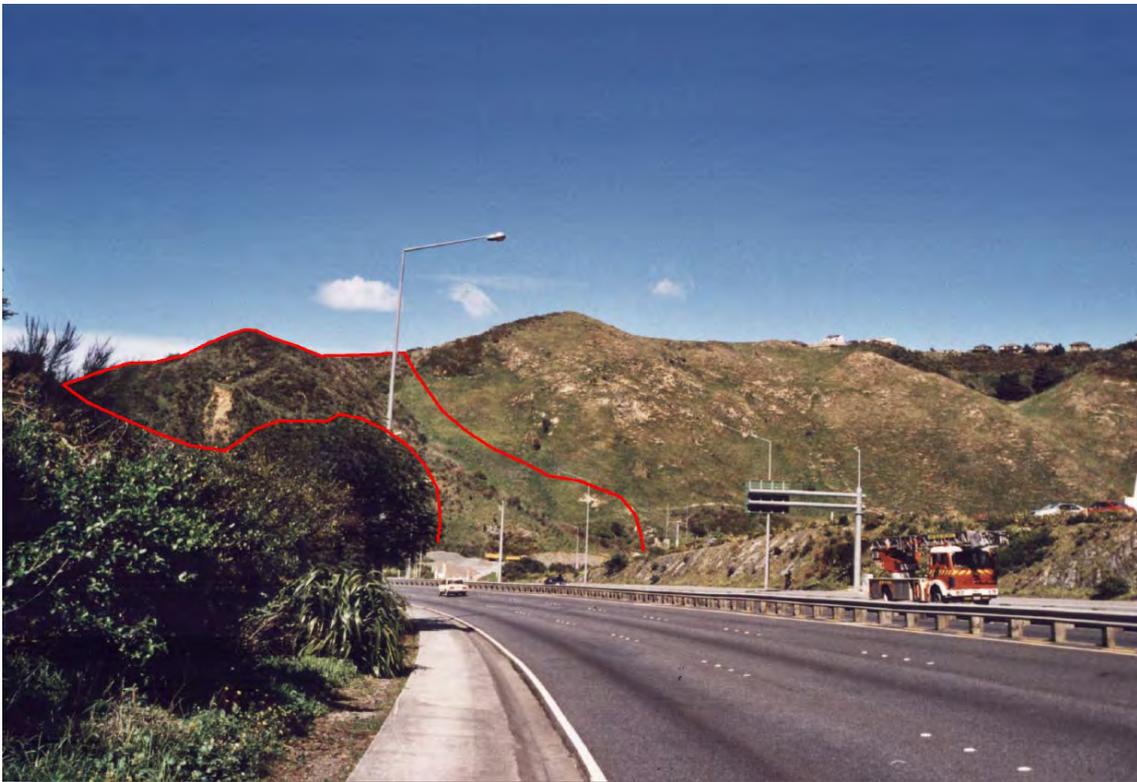
Photograph 9 :  
Regenerating vegetation on old cut faces (lower slopes) and steep unmodified land (upper slopes) opposite Kiwi Point Quarry, on the east side of the gorge.



Photograph 10 :  
Patterns of regenerating vegetation, showing variation in plant cover reflecting micro-sites such as rock outcrops.

## VIEW ANALYSIS VIEWS

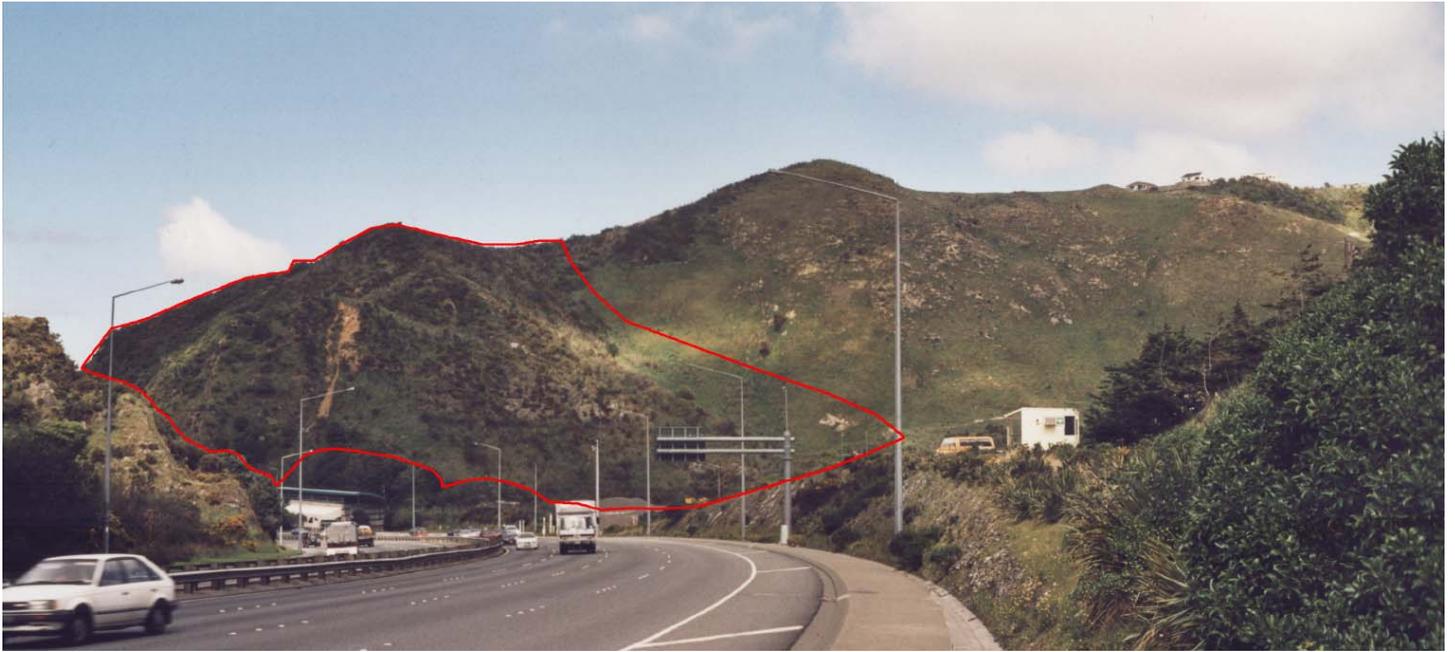
**NOTE:** The red lines marked on the following views indicate the approximate area that will be affected by the proposed quarrying activity. This does not mean that the entire landform within the red line will be removed by quarrying as the areas shown will include the final finished face (see simulations of Views C, D and K).



View A : SH1 - View south from southbound lane



View B : SH1 - View south from southbound lane

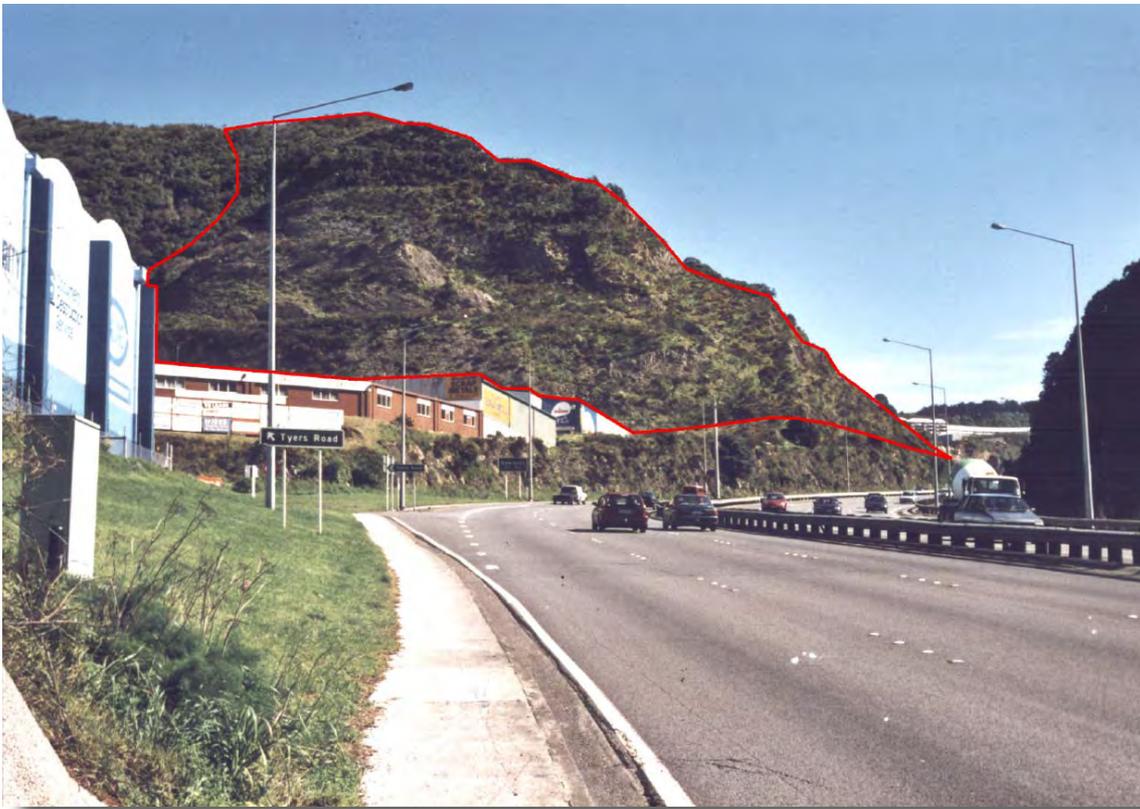


View C : SH1 - View south from northbound lane



Simulation - View C :

SH1 - View south from northbound lane at the end of Stage 4. The simulated quarry face is based on the staging models in Figures 2(a) and (b). The final face will be finished with varied benching, gradients and ground conditions to appear more natural and aid plant establishment, as illustrated in Figure 11.



View D : SH1 - View north from northbound lane



Simulation - View D :  
View north from northbound lane at the end of Stage 4. The simulated quarry face is based on the staging models in Figures 2(a) and (b). The final face will be finished with varied benching, gradients and ground conditions to appear more natural and aid plant establishment, as illustrated in Figure 11. The revealed landform of Broadmeadows is indicative, modelled from LINZ 20m topographical contour data.



View E : from Ngauranga - Tyers Road



View F : from Ngauranga - Glover Street



View G : from Cashmere - Homebush Road



View H : from Rangoon Heights - Imran Place



View I : from Upper Broadmeadows - Jaunpur Crescent



View J : from Upper Broadmeadows - Hindipur Terrace



View K : from Lower Broadmeadows - Fraser Avenue



Simulation - View K : from Lower Broadmeadows - Fraser Avenue at the end of Stage 4. The simulated quarry face is based on the staging models in Figures 2(a) and (b). The final face will be finished with varied benching, gradients and ground conditions to appear more natural and aid plant establishment, as illustrated in Figure 11.



View L : from Hampton Gate - Meadowcroft Grove



View M : from Raroa - Kitchener Terrace



View N : from Ngauranga - Malvern Road



View O : from the Days Bay wharf (landward end)



View P : from Eastbourne beach, adjacent to Muritai Yacht Club

## References

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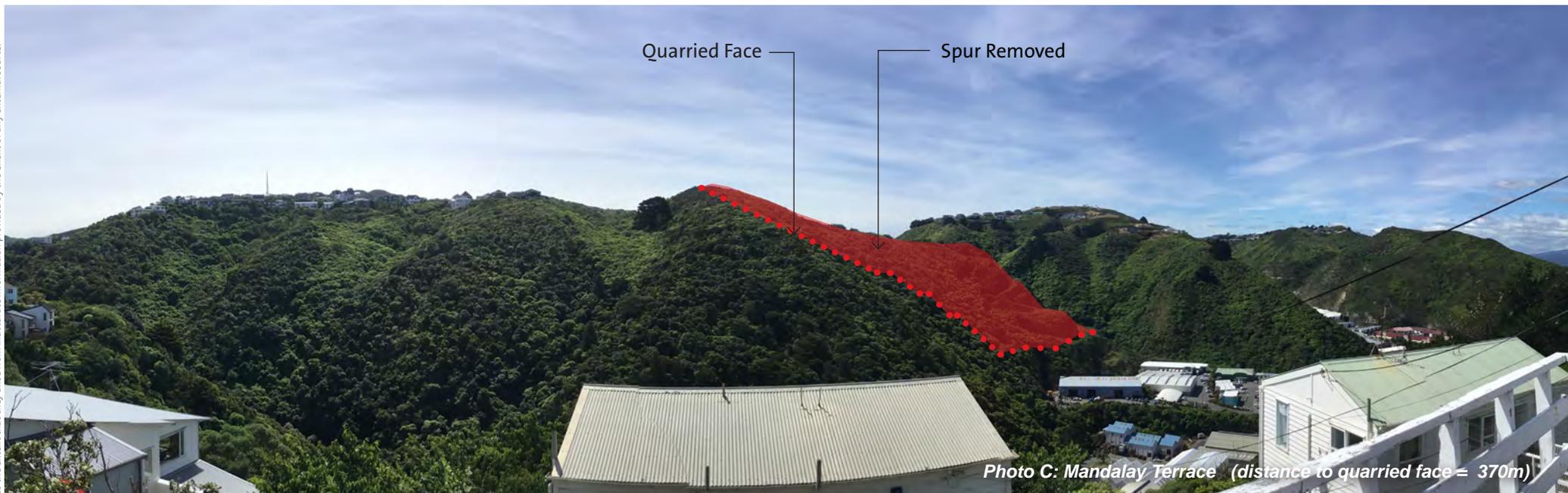
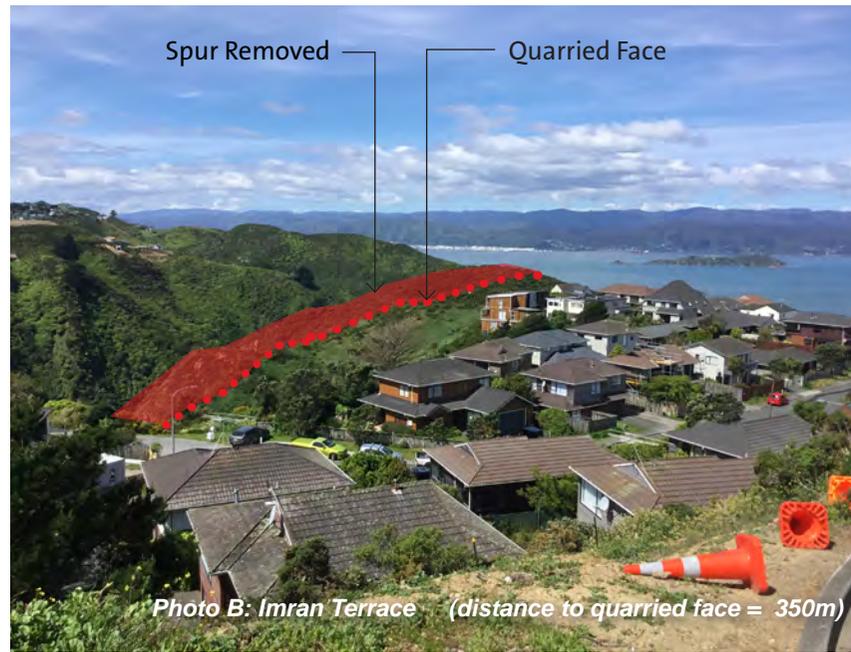
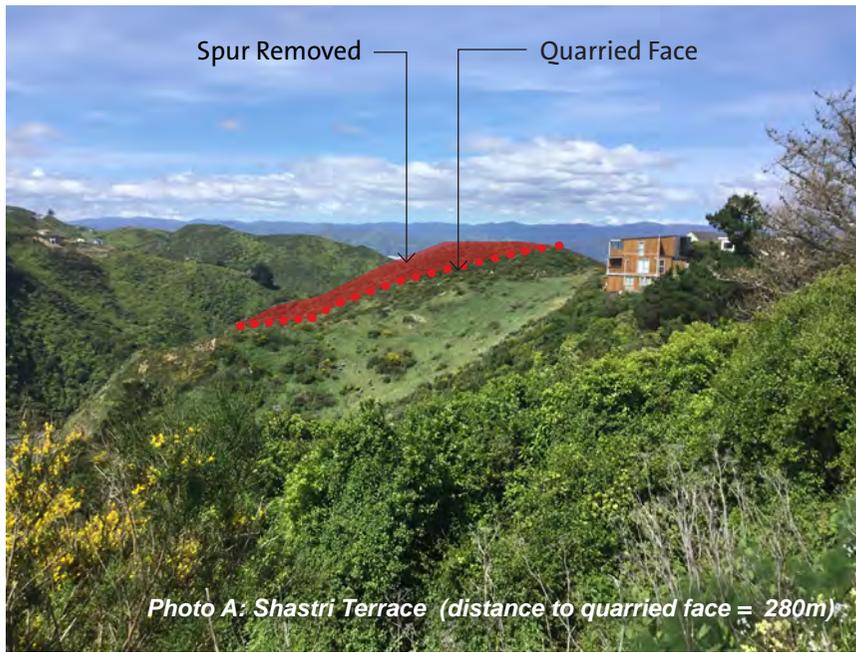
## APPENDIX 1:

### Estimates of Volumes for the Proposed Kiwi Point Quarry Southern Extension

Stage of Quarry Development	Rock Volume in m <sup>3</sup>	Proportion of total volume
Stage 1 – excavated rock	21,500	35%
Stage 2 – excavated rock	305,400	
Stage 3 – excavated rock	1,035,500	
Stage 4 – excavated rock	1,078,800	28%
Stage 5 – excavated rock	800,500	37%
Stage 6 – clean fill	670,000	
<b>Total</b>	<b>3,911,700</b>	

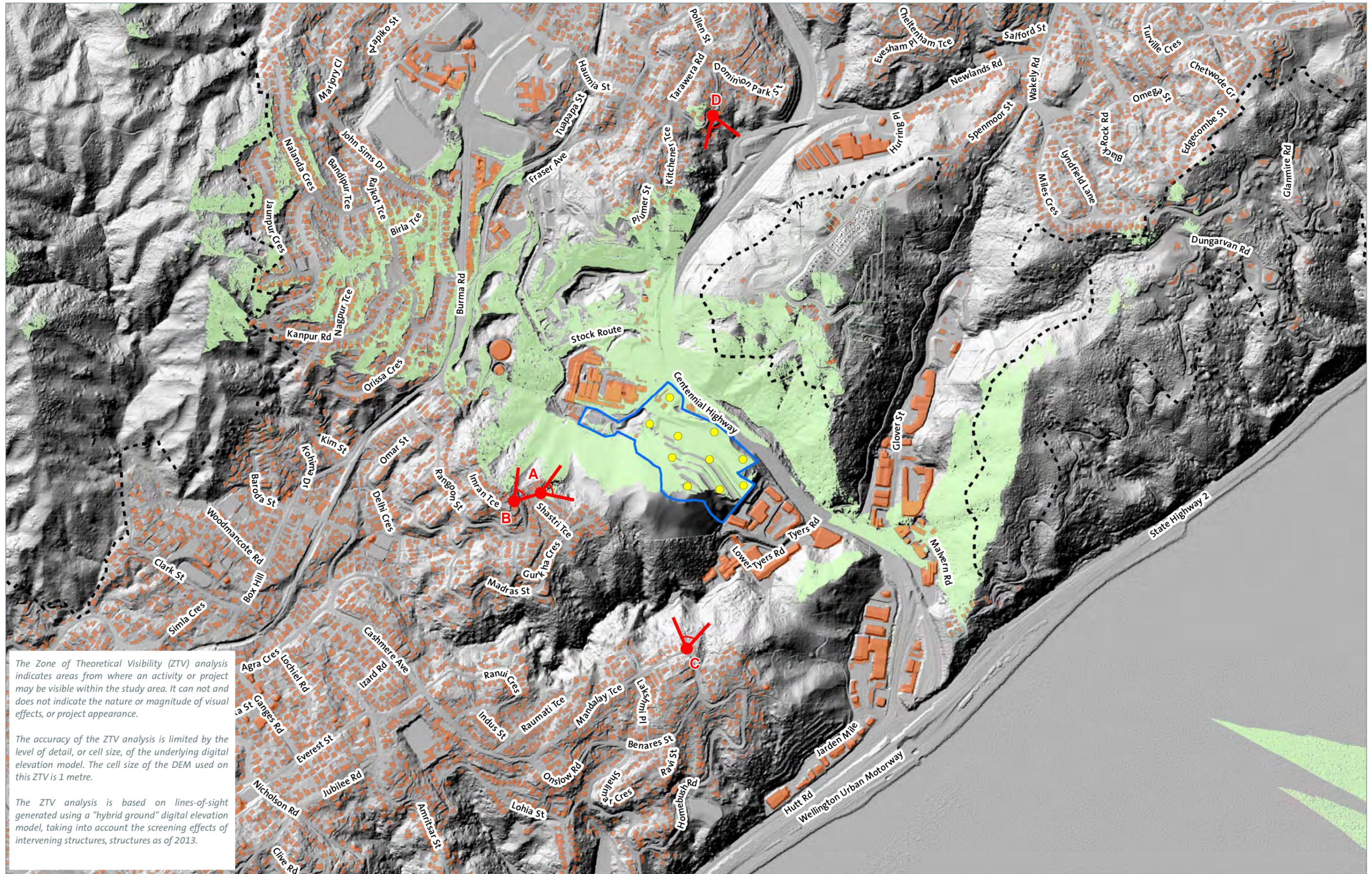
## **Attachment 4: ZTV maps and additional viewpoint photographs**

This plan has been prepared by Boffa Miskell Limited on the specific instructions of our Client. It is solely for our Client's use in accordance with the agreed scope of work. Any use or reliance by a third party is at that party's own risk. Where information has been supplied by the Client or obtained from other external sources, it has been assumed that it is accurate. No liability or responsibility is accepted by Boffa Miskell Limited for any errors or omissions to the extent that they arise from inaccurate information provided by the Client or any external source.



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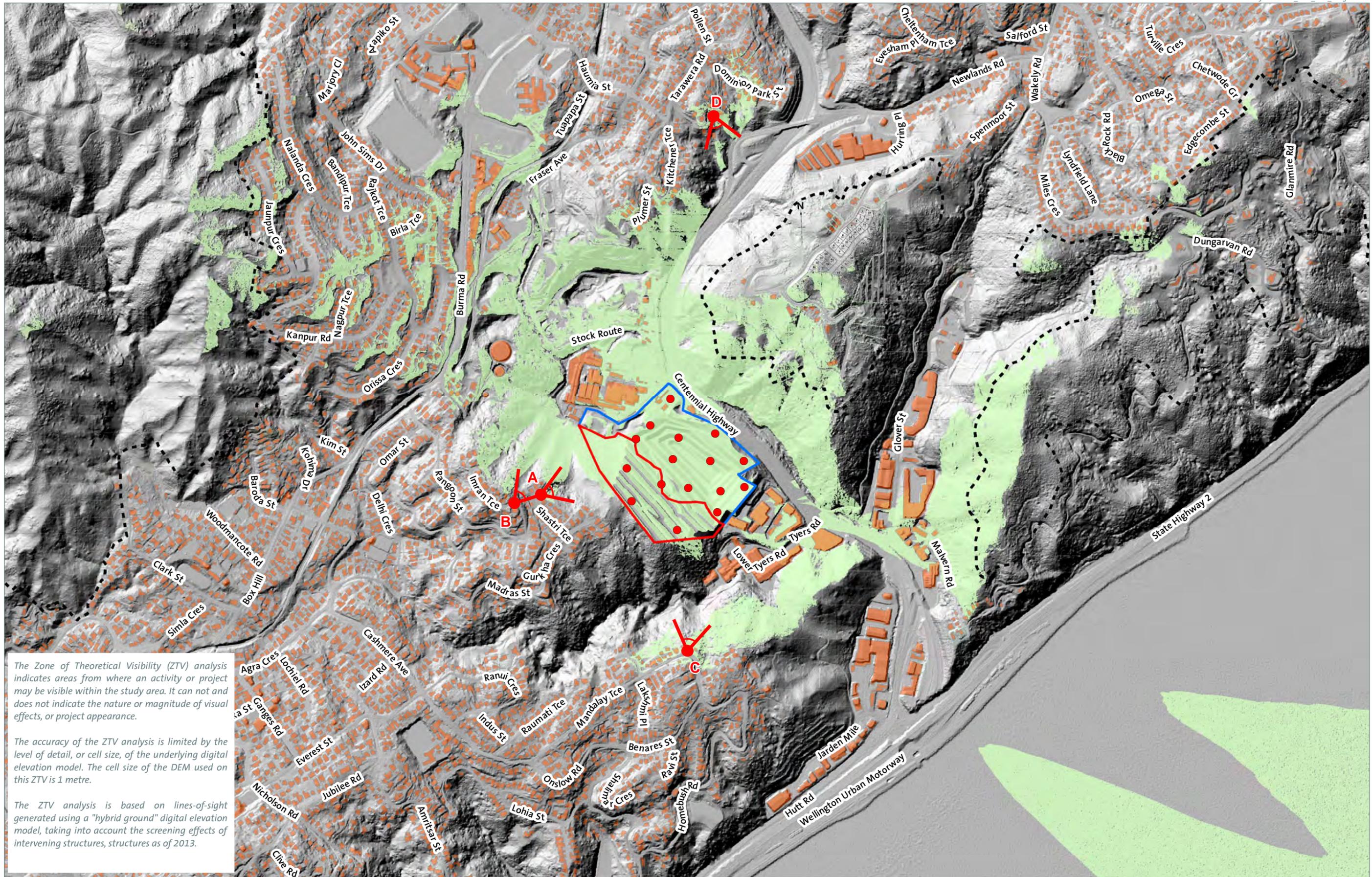




The Zone of Theoretical Visibility (ZTV) analysis indicates areas from where an activity or project may be visible within the study area. It can not and does not indicate the nature or magnitude of visual effects, or project appearance.

The accuracy of the ZTV analysis is limited by the level of detail, or cell size, of the underlying digital elevation model. The cell size of the DEM used on this ZTV is 1 metre.

The ZTV analysis is based on lines-of-sight generated using a "hybrid ground" digital elevation model, taking into account the screening effects of intervening structures, structures as of 2013.



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