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KIWI POINT QUARRY – ASSESSING AND MITIGATING THE LANDSCAPE EFFECTS

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KIWI POINT QUARRY – ASSESSING AND MITIGATING THE LANDSCAPE EFFECTS

By

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Introduction

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This is Kiwi Point Quarry in Wellington - ideally situated beside a main transport corridor in an area of good, accessible rock but unfortunately due to reach the limit of its designated area by 2006. There is potential to expand but the new site is viewed at close quarters by some 70,000 motorists every day and is overlooked by the residents of several nearby suburbs. What will the landscape and visual effects be and what can be done to mitigate adverse effects?

Boffa Miskell was commissioned to answer that question and, as a consequence, the original concept was significantly altered. Today we will outline how that came about and show examples of the various graphic communication and 3D modelling techniques we used as assessment and communication tools. Graphic communication is a key factor in landscape and visual assessment, of course, as it enables decision-makers and interested parties to visualise proposals.

Setting the Scene

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First of all, it will be useful to set the scene. The existing Kiwi Point Quarry and proposed quarry extension site are located in the Ngauranga Gorge on State Highway 1, 6 kilometres from Wellington's CBD.

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The Gorge is a natural transport corridor leading inland from Wellington Harbour. Originally narrow and winding, it has been considerably widened by road building and quarrying activity over the last 150 years.

Today, the gorge is occupied by a 6-lane motorway and various industrial and commercial activities. On the steep hillsides above, numerous areas of cut faces and benching reveal the extent of modification that has occurred.

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The dense native forest that originally covered this area was cleared and today most of the hillsides are covered in rank pasture and scrub with a few areas of pine plantations and regenerating native bush. The poor quality of vegetation cover is partly due to the lack of effort in the past to rehabilitate the old quarries and cuttings.

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The gorge is recognised as an important gateway in and out of the city with a particularly dramatic threshold opening out onto Wellington Harbour. It is regarded as a 'working' gateway because of the transport, industrial and commercial activities concentrated in the valley bottom but the City Council proposes in the long term to improve the gorge's visual amenity by gradually restoring native forest to the hillsides – making it into a green belt.

The chance of gaining approval for more quarrying within a proposed green belt sounds like a long shot. However, given the degraded condition of the gorge overall, we considered that a quarry need not be in conflict with the long-term objective, provided it was well-planned and operated, with rehabilitation incorporated into its management.

The Original Proposal

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When Brian first approached Boffa Miskell in 2001, he had already identified the best area for extending the quarry on the next spur down the gorge from the existing quarry. A preliminary concept proposal had been drawn up. This involved removing a large proportion of the spur and ending up with a straight, 'sliced-off' face approximately 140m high.

We considered the adverse landscape, ecological and visual effects of this concept to be greater than they needed to be, in particular:

- The visibility of the higher cut face from the harbour,
- The extent and unnatural form of the final cut face,
- The removal of the high-point knob which was important to the natural character of the skyline and helped to screen the lower part of the spur from nearby housing.

The Revised Proposal

We suggested an alternative proposal, designed to reduce the area that would be physically affected by the quarry, reduce its visibility as much as possible, and achieve a more natural finished appearance – while still enabling a similar amount of rock to be quarried.

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The revised proposal lowers the height of the finished face by 32 metres, reduces the horizontal cut by 100 metres and excavates a pit down into the valley floor to compensate for the reduced volume to be taken out of the spur.

Visibility

In terms of visibility, a key factor was elevation. The higher parts of the spur are visible from a wide area, in particular, within the highly scenic Wellington Harbour landscape where visible scarring from quarry activity would be least acceptable. The lower parts of the spur are, however, visually contained within the gorge and, therefore, much less widely visible. We used intervisiblity mapping as a tool to identify the areas that would see the quarry.

[Slides 9 & 10]

The first map shows the areas that would 'see' the high point of the revised proposal (at 158 m asl) and the next map shows a representative point lower down the quarry face and fully contained within the gorge (at 120 m asl.) By concentrating most of the quarrying activity lower down within the gorge, its wider visibility (and therefore potential visual impact) has been considerably reduced.

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We tested this by visiting selected viewpoints and found that, while parts of the quarry will be seen from areas across the harbour it will, in fact, appear as a very small feature in the landscape due to its enclosure in the gorge and the long viewing distance.

Staging and Using the Landform for Interim Screening

We also considered how best to stage the quarrying activity to minimise the visual impact within the gorge itself and from the overlooking housing areas on the hills immediately around the gorge. The answer was to use the spur destined to be quarried as a visual screen for as long as possible.

[Slides 12 & 13]

The south side of the spur, which you can see has already been partially quarried in the past, is more visually contained in a narrow side gully than the north side which is more open and overlooked by the greatest number of houses. Taking this into account, we proposed that the quarry be progressively

excavated from the south to the north, 'scooping' into the south side of the spur, so that the north side remains untouched for as long as possible and screens the quarrying activity from the main area of overlooking housing.

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Indicative staging plans were prepared by CH2M Becas, starting with the preliminary construction of an access road to the pre-existing platform. The south face will then be progressively quarried from the top down to a middle level and then down to the proposed quarry pit platform - meanwhile keeping the north face intact. After that, the north face will be gradually cut back until the quarry pit platform is complete. The quarry pit will be excavated down a further 30 or so metres before being backfilled to a final finished platform.

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We used Geopac 3D modelling software to generate a series of aerial oblique views from the contour staging plans – a very useful means of visualising the three-dimensional changes to the landform from any chosen viewpoint. This series of views shows the progression through the modelled stages from a convenient aerial oblique viewpoint. It should be noted that the regular benching shown is indicative of the temporary benching likely to be used while each stage is operational and not the final finishing.

Assessing Visual Effects

[slide 16]

The aerial oblique viewpoints we've just seen do not represent actual on-the-ground views, though. To assess the potential visual effects of the quarry we took photographs from representative public viewpoints in the areas we knew could 'see' the site. Using the GPS locational data for each of these viewpoints we were able to plot an outline of the proposed quarry site onto the photos and simulate the landform change that would occur.

Essentially we needed to consider:

- What the site looks like now
- Who sees it
- The context in which the viewers see it, and
- How the views will change as a result of the proposed quarry extension.

There are a number of factors that need to be taken into account such as the viewing distance, the angle of view, the degree of contrast or 'fit' with the landscape, the scale of visible change, the viewing time, the

time in years that the physical change will be seen, the typical number of viewers and the importance or sensitivity of the view.

In this view of the north side of the site the working face will be out of sight on the other side of the spur through stages 1, 2 and 3 and only the access road to it will be seen. The greatest period of visual effect will be stage 4 when the lower end of the spur will gradually recede and the visible area of exposed rock increase to the extent shown in the simulation. At the same time, the ridge behind will gradually come into view and a little more of the harbour will be revealed. Finally, the quarry pit will be a relatively small feature in the view not out of place with the adjacent transport and industry in the gorge.

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In this view, looking up the gorge from the motorway, the south side of the site is seen prominently in the foreground view. The working face will be clearly visible as a major feature during Stages 2 – 4 although it will gradually recede back. As this occurs the gorge will widen and the hillsides of Broadmeadows behind will gradually come into view as shown in the simulation (these are indicated by wireframe modelling taken from contour information as we didn't have the photographic data to attempt a realistic impression of those hills.)

Yes, there will be a major visual impact on this view seen daily by 35,000 motorists. However, the site is only directly in the line of sight for approximately 15 seconds at the average travelling speed, has already been visibly modified and is seen in the context of existing transport and industrial development. Furthermore, excavation of the quarry pit during the last third of the quarry's life will be screened from view by the roadside bund that will be left in situ as shown in the simulation.

Rehabilitation

The modelling you've seen so far has been essentially diagrammatic and has not shown how the finished quarry might look after final finishing and rehabilitation. Rehabilitation is, however, a critical component of the entire proposal, including a number of measures to mitigate adverse visual effects during both the operational life of the quarry and its afterlife. A rehabilitation fund levied from customer charges has already been established and will enable the implementation to begin in the coming year. This fund will be maintained for the life of the quarry as part of the overall quarry management.

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The Rehabilitation Plan extends well beyond the proposed quarry extension, and covers three main areas:

1. the existing quarry, which will be completed within 3 – 4 years;
2. the proposed quarry extension, and , in addition

3. the adjacent Council-owned grazing land that connects the two quarry areas and reserve land north of the existing quarry.

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The long-term rehabilitation objective is to re-establish native vegetation cover. This will contribute significantly to advancing the City Council's green belt concept – improving ecological values and visual amenity. The idea is to speed up natural regeneration and improve the quality of vegetation cover by improving site conditions on the finished quarry. Nevertheless, as shown in these visual simulations, it will be a slow process, taking at least 50 years to achieve good vegetation cover over most of the area.

In terms of rehabilitating the quarry faces, we plan to create a variety of micro-sites so that – as in nature – there will be a range of site conditions and eventually a corresponding range of plants. Finishing techniques (within the requirements of slope stability) include:

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- easing back the gradient of cut faces in places - as illustrated this also has safety benefits, as the top of the face will be less abrupt, with more chance of plant establishment to provide a buffer;
- establishing 'islands' of vegetation on accessible benches;

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- ripping benches to allow root penetration;
- ripping rock faces to create screes and crevices where cliff plants can establish;
- bringing in growing medium to accessible benches;
- varying the widths and alignment of benches so as to give a more irregular, natural appearance.

Plant cover will be established by various means including hydroseeding, laying slash, planting accessible sites and, of course, natural regeneration.

There will, inevitably, be a component of trial and error as we find out about the local conditions. With this in mind, and also knowing how susceptible rehabilitation is to climatic variation, the rehabilitation areas will be inspected every year and an implementation plan prepared for the following year.

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In preparing the visual simulations we have been very careful not to overstate the rate or quality of plant establishment. In this series of simulations, we have shown predicted plant establishment based on careful observation of similar sites in the gorge and shown what we conservatively think the site will look like

part way through the quarry operation and at completion. Vegetation cover will develop first at the south end where the early stages will be completed first. In the background, the gradual regeneration of the retired grazing land is also depicted. As you can see, we're not predicting miracles but we are predicting a better result than would occur with no rehabilitation.

Conclusion

In conclusion, the 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, rehabilitated landform of relatively natural appearance that will help create a green belt in the gorge in the long term. It will be a large-scale, noticeable activity within the gorge itself and will have a major visual impact for motorway travellers and a few local residents. However, it will be seen in the context of a highly modified landscape where quarrying is already an established activity and where most viewers, travelling at speed, will see it only fleetingly.

It would seem that this conclusion reflects the views of many as only three submitters registered concerns about the landscape and visual effects when the proposed Plan Change was notified.