

**BOARD OF INQUIRY
TE MIHI GEOTHERMAL POWER STATION PROPOSAL**

In the Matter of the Resource Management Act 1991

And

In the matter of resource consent applications by Contact Energy Limited
in respect of the Te Mihi Geothermal Power Station Proposal

BRIEF OF EVIDENCE IN CHIEF OF BRAD COOMBS

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Introduction

1. My name is Brad Coombs, I am an Associate, Senior Landscape Architect, and the Tauranga Manager of Isthmus Group Ltd.
2. I have the following qualifications and experience relevant to the evidence I shall give:
 - Bachelor of Landscape Architecture (Hons);
 - Bachelor of Horticulture;
 - I am an Associate member of the New Zealand Institute of Landscape Architects (NZILA), and a Registered NZILA Landscape Architect;
 - I am a member of the elected National Executive of the NZILA for the 2005-2007 and 2007-2009 terms, and am responsible for the Associateship (professional examinations) and Environment and Legislation portfolios;
 - I have over 10 years experience working as a Landscape Architect in New Zealand and overseas on a range of design, project management, and landscape planning projects;
 - I have prepared landscape and visual assessments for a number of electricity generation and transmission projects in the Central North Island, Bay of Plenty and the Coromandel Peninsula. This experience includes the assessment of 33kV, 66kV, 110kV, and 220kv transmission lines through rural and indigenous vegetation dominated environments;
 - I prepared a landscape and visual assessment and proposed conditions of consent for the recently consented Rotokawa II Geothermal Power Station, and continue to advise Mighty River Power with regards to the landscape management of the Power Station site during and post construction; and
 - I am also providing advice to Contact Energy Ltd (“Contact” or “the Applicant”) regarding the appropriate siting, design, and landscape and visual assessment of an additional geothermal Power Station in the Taupo District.
3. I confirm that I have read the ‘Code of Conduct for Expert Witnesses’ contained in the Environment Court Consolidated Practice Note 2006. My

evidence has been prepared in compliance with that Code. In particular, unless I state otherwise, this evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

4. I completed an assessment of the landscape and visual effects for Contact of the proposed Te Mihi Geothermal Power Station that was included in the Assessment of Environmental Effects in support of the applications.

Scope of Evidence

5. My evidence will cover the following matters:
 - a description of the key components of the proposed Te Mihi Geothermal Power Station (“Power Station”) which will be visible or have a potential landscape or visual effect on the landscape values of the area;
 - a description of the existing landscape and visual values of the site and the Te Mihi area;
 - a description of the key landscape policies and objectives of the relevant statutory planning documents;
 - a description of the rural character of the area;
 - a description of the visual catchment of the site, and the proposed Power Station and associated structures;
 - a description of the potential visual effects of the plume from the cooling tower;
 - a description of the potential landscape and visual effects of the proposed Power Station, and associated structures;
 - an assessment of, and response to submissions to the applications;
 - recommended conditions of consent; and
 - conclusions.

Summary of Conclusions

6. I make the following key conclusions:
 - the Te Mihi site is at the western end of a string of geothermal Power Stations in the region, including Poihipi, Wairakei, Rotokawa and

Ohaaki, which together provide a strong electricity generation and transmission character to the Wairakei/Tahorakuri area north of Taupo;

- the Power Station contains significant physical components which are of relevance to this assessment;
- the incorporation of a Power Station of considerable capacity into an area where existing electricity generation and transmission structures exist has merit in landscape and visual terms, as a minimum of additional infrastructure is required to service the new power plant;
- consolidation of existing landscape character through the addition of the Power Station to this location has benefits over the introduction of a Power Station to an alternative location with no existing pattern or history of electricity generation;
- the main landscape effect on the surrounding environment of the Power Station will be on the visual and rural character;
- the largest components of the Power Station can be coloured to avoid strong contrast with the existing pastoral and wood lot landcover of the immediate area;
- planting on the north and west sides of the Power Station will help to reduce its visual bulk, when viewed from surrounding public and private land based locations;
- the design and location of the Power Station is appropriate to the site and the surrounding receiving environment; and
- when considered and assessed in the context of the existing landscape character, the established pattern of electricity generation and transmission infrastructure in the wider area, the sensitivity of the receiving environment, and the proposed landscape mitigation recommendations, the landscape and visual effects of the Power Station are appropriate.

Assessments Undertaken

7. The following methodology has been used to carry out the assessment which this evidence is based upon:

- background research into the relevant statutory provisions, and the intent of the existing zoning within the Taupo District Plan;
- review of previous geothermal power station consent applications;

- site visits to review the existing site character in relation to its potential for, and the effects of the proposed development;
 - site visits to surrounding roads and private properties to assess the site character and visibility;
 - assessment of the landscape character of the site and surrounding locations;
 - assessment of the visibility of the site, and the potential visibility of the proposed development within the site;
 - assessment of the geothermal Power Station development; and
 - recommend design changes, and landscape mitigation measures for the proposal.
8. My landscape assessment is based on numerous site visits undertaken in May, June, July and October 2007, and April and May 2008, the project description provided by Contact Energy, project and Power Station photographs and simulations, drawings, diagrams, site photographs and topographic maps (NZMS260 Series U17 and U18).
9. In response to Taupo District Council's Section 92 Request for Further Information dated 5 September 2007, and site visits to the Te Mihi Site with Mr Frank Boffa, Taupo District Council's consultant landscape assessment peer reviewer, I provided further information that has been updated and included in my evidence.
10. All assessments and graphic material considered and referred to in this assessment have been updated according to the format of the further information provided. In my photomontage work I have conservatively used a height of 28m for the turbine hall (which equates to a final roof ridge-line elevation of 544m asl (above sea level) above a indicative platform elevation of 516m asl. In the AEE attached to the resource consent application an approximate height (as detailed design has not yet occurred) for the turbine hall was given as 24m (which equates to a building elevation of 540m asl above an indicative platform elevation of 516m asl). In response to a further information request, the Applicant undertook further investigation and has now set the maximum elevation of the turbine hall at 542.4m asl. Therefore, the height of the turbine hall roof is over-stated in my photo-simulations by 1.6 metres. In my opinion this makes no discernable difference to the photo-simulations.

11. For the cooling towers my simulations are based on towers of 16m set on an indicative platform elevation of 516m asl. This gives an elevation of 532m asl. Whilst the tower height will not change, I understand that detailed design may require an increase the elevation of the cooling tower platform from 516m asl to 518m asl. This would give a maximum elevation for the cooling towers of 534m asl, 2 metres above my assessed and simulated cooling tower elevation of 532m asl. In my opinion this potential difference of up to 2m would make no discernable difference to the photo-simulations and to any visual effects of the cooling towers from any public view point.

Proposal

12. The Power Station will operate as one of a number of geothermal power stations operating in the area (including the existing Wairakei Power Station (until it is phased out), the Wairakei Binary Plant (located close to the Wairakei Power Station), and the Poihipi Power Station. However, they will utilise the same steam field infrastructure to service the plants. The Power Station will utilise the existing geothermal fluid take resource consents for the Wairakei Steamfield area. The Power Station will be linked to the borefield along with the Poihipi and Wairakei plants through a network of steam pipes. The main physical components of the proposed Power Station include:
- the turbine hall, which would comprise three steam turbine bays (consent for the binary plant option is no longer being pursued), and a loading bay (approximate dimensions are 130m long, 22m wide (plus an 8m electrical annexe), with a maximum elevation of 542.4m asl);
 - three mechanical draft-cooling towers, approximately 60m x 40m x 16m tall, each comprising 6 cells. Detailed design may result in alternative arrangements for the cells, such as a 4x2 pattern (70m x 35m);
 - the cooling towers will produce a dynamic plume which will be intermittently visible as assessed below;
 - a 220kV switchyard (approximately 170m by 110m) connecting the Poihipi generators and the new generators at Te Mihi to the Wairakei-Whakamaru 220kV line, about 1km away will, be constructed on the north side of the turbine hall;
 - a pipeline network between well pads and the new station;

- an undulating site that will require an earthwork cut of 3-4 metres from the highest points, and filling of the central depression to allow the formation of a flat platform on which the Power Station, switchyard and associated infrastructure are to be located;
 - an access road to be built from Oruanui Road, and new road and pipe networks to service the site. (the access road will be retained for long term use).
13. Two-stage development of the Power Station, with completion and commissioning in 2011 and 2016 is the most likely scenario. However, it is possible that the power station may be built as a single stage 3 unit development to be commissioned in 2011.

EXISTING LANDSCAPE

14. Under the Resource Management Act 1991, 'landscape' is a term that relates to a number of matters contained in Part II, including natural character, outstanding landscapes and natural features, and amenity values. As a term, however, landscape has no definition within the RMA. A body of case law has developed over time that has provided increasing clarification on the matters that are relevant to an assessment of landscape.
15. The fullest consideration of matters pertaining to the assessment of landscape was given in *Wakatipu Environmental Society Inc v Queenstown Lakes District Council* (ENV C - C180/99) and the resultant factors became known as the amended *Pigeon Bay* Criteria:
- (a) the natural science factors – the geological, topographical and dynamic aspects of the landscape;
 - (b) its aesthetic values including memorability and naturalness;
 - (c) its expressiveness – how obviously the landscape demonstrates the formative processes leading to it;
 - (d) transient values – occasional presence of wildlife; or its values at certain times of the day or of the year;
 - (e) whether the values are shared or recognised;
 - (f) its value to Tangata Whenua; and
 - (g) its historical associations.

16. These factors were considered relevant in the case cited, and are applicable on a wider basis, reflecting the view that landscape is a broad, holistic, and integrating concept. The list of criteria is provided as a qualified and non-exhaustive list, which may be added to or subtracted from, depending on the context. There is overlap between the criteria listed, and some are worthy of specialist consideration beyond the depth of a landscape assessment where they have particular significance to a location or a proposal. For example, matters covered by criterion a) may require detailed ecological assessment, and those relating to criterion f) may require an archaeological or cultural assessment.
17. The Power Station site ("Site") is assessed against the amended '*Pigeon Bay Criteria*' in the landscape assessment below.

Site

18. The Site is within a farm owned by Contact to the west and at the top end of the Wairakei Steam field. It is surrounded by Poihipi, Oruanui and Link Roads. See **Exhibits BC1** and **BC2**.
19. The underlying Site geology is rhyolite associated with pumiceous pyroclastics¹. The rolling landscape is formed by a series of rhyolite domes. The resultant pumice soils are light, free draining, and prone to drought during the summer. The Site is largely managed in pasture with plantation forestry to the east and south of the site. Slopes within the Site are currently showing signs of small-scale local erosion due to the unstable surface layers of soils, which are typical of the area.
20. Access to the Site is currently gained via the access road through the Wairakei steamfield to a recently formed platform to the east of the site. The Site contains a network of deer post and wire fences, and formed races, which are used to manage the stock within the farm. The approximate location of the southwest corner of the mechanical draft cooling towers is marked by a tall pine tree. See extreme left of Site Photograph 6a, **Exhibit BC14**. The top of the pine tree (544m asl), is a similar height to the ridge of the roofline of the turbine hall, and will further be described and noted on the photo-simulations and site photographs as the 'marker tree'.
21. Existing steam field pipes cross the northern side of the Site to well pads 222 and 242. Existing pipes pass the southern side of the Site to the Te

Mihi bore field and the Poihipi Power Station (see **Exhibit BC15**, Site Photograph 7). This well pad is known as WK253. The existing Poihipi transmission line passes the east side of the Site and joins the Wairakei – Whakamaru Line approximately 1km northeast of the Site. There is nothing to distinguish the Site from the surrounding pasture, which is similarly managed with deer fences and races.

Wider Landscape Character

22. The Site is approximately 5km west of the existing Wairakei Geothermal Power Station, with the Wairakei steam field, including the Western bore field and Te Mihi bore field connecting the Site to the existing Wairakei Power Station site. Approximately 1.5km to the southwest of the Site is the existing Poihipi Geothermal Power Station. See **Exhibit BC1**. The Poihipi pipeline is visible from within the Site, however the Poihipi Power Station is not. See **Exhibit BC15**, Site Photograph 7.
23. The Site is currently managed in pasture and is contiguous with the surrounding rural landscape, albeit that it is on the west edge of the Wairakei steam field. Flash plant 12 is illuminated at night. Existing well pads, steam pipes, access roads, and other geothermal power generation infrastructure surround the site to the south, east and north (see **Exhibits BC20 and BC21**). The area is characterised by a network of geothermal electricity generation and transmission infrastructure located within a patch-worked pastoral rural and forested environment.
24. The Taupo stock sale yards are on Oruanui Road, 1km to the west of the site (see Site Photograph 8 in **Exhibit BC15**).
25. A shelterbelt of eucalypts (*Eucalyptus* sp.) is planted on the northern boundary of the site. See **Exhibits BC4, BC5, BC8, BC12 and BC14**. A patchwork of evergreen and deciduous rural plantings is scattered through the wider landscape to the west of the site. See **Exhibit BC14**. To the north, the east, and the south the dominant land cover is pasture and plantation forest (mainly *Pinus radiata*).
26. The upper Waikato River corridor passes the Site approximately 5km to the southeast, and winds to the west at Waimahana approximately 13km to the north of the Site at Orakei Korako, as it enters Lake Ohakuri. The recessed nature of the Waikato River corridor ensures that it is not a key landscape feature when viewed from adjacent land based locations. The Waikato

¹ NZ Geological Survey, DSIR 1972

River is, however a key landscape feature in terms of the function and drainage of the broader landscape to the north of Lake Taupo.

27. To the east, the Tahorakuri and Kaingaroa Forests dominate the elevated land, while the Kinleith Forest dominates the landscape and the SH1 corridor the north of the Site. The variable topography in the vicinity of the Site limits visibility of the broader landscape context.
28. Other significant natural landscape features in the vicinity of the Site include Mt Tauhara (10km to the southeast - site Photograph 15 in **Exhibit BC19**) and Lake Taupo (8km south). Lake Taupo is not visible from the Site.
29. Within the existing consented environment, however not yet developed, is the Geotherm Geothermal Power Station Site, south of the proposed Te Mihi site on Poihipi Road. See **Exhibit BC1**.

PLANNING CONTEXT

30. At a regional level the Site is under the jurisdiction of Environment Waikato and the provisions of the Waikato Regional Policy Statement and the Waikato Regional Plan. The scope of these documents covers the use of the region's land, air, water and geothermal resources in general but have little association with the landscape-related facets of the proposed development.
31. The Site is located in the Taupo District and its use and future development (in a land use sense) is under the jurisdiction of the Taupo District Council and the provisions of the Taupo District Plan (a summary of the relevant plan provisions is attached in **Appendix 1**). The proposed development straddles an existing Rural/Industrial Environment boundary.
32. The plan provisions provide an indication of the balance that Taupo District Council is trying to achieve between utilisation of the geothermal resource and industrial development and the identification of existing levels of amenity and character throughout the landscape. The avoidance, remedying or mitigation of potential effects on the District's various environments are key in retaining existing levels of amenity and character and the overall quality of the district's landscapes. In terms of the proposed development and the surrounding environment it is clear that the emphasis is on providing for geothermal energy production whilst attempting to minimise the effects that this type of development can have on the surrounding, largely Rural Environment land. Given the existing presence

of geothermal activity in the area and extensive infrastructure surrounding the utilisation of this resource, the proposed development cannot be considered inappropriate.

33. The boundary between the rural and the industrial zone follows the southern boundary of the proposed site, cuts through the cooling towers, turbine hall, and switchyard, across open pasture. The boundary between the rural and industrial zone is essentially arbitrary in its location, with no change in topography or landcover to mark its location. The principle of locating industrial, and in this case geothermal electricity generation activities in the same location is sound, and in my view will not be compromised by small changes in the location of the effective boundary between the industrial and rural land use.
34. Appropriate mitigation measures (e.g. planting, earthworks and building location) can be introduced to minimise any potential effects in a manner that is consistent with the character of the surrounding landscape. The Site is set down within rolling site topography, with land rising from the bowled location to the south, the north, and the west.

RURAL CHARACTER

35. Rural character is generally associated with large separation distances between residences, open spaces of pasture, cropping, forestry, or other woody vegetation, rural buildings, low-key roads without heavy formation (multi-lanes or kerb and channel), low traffic counts, a lack of urban or industrial form, and a dominance of rural activities. The Objectives and Policies which relate to the Rural Environment as outlined in **Appendix 1** do not specifically refer to what makes an environment rural, however do promote the rural character and production potential of the rural environment.
36. The rural character of the site and the surrounding locations are an important consideration in the assessment of the landscape effects of the proposal, as the Site is essentially surrounded by rural land. The existing rural character of the Te Mihi/Poihipi area is dominated by open rolling pasture, interspersed with shelterbelt and small woodlot plantings. This area is also a working natural and electricity generation geothermal environment. Further from the Site (2-10km) plantation forestry occupies much of the elevated and/or heavily sloping land. Existing buildings within the landscape are rural and residential in character, and are well spaced.

The Taupo Sale Yards on Oruanui Road contribute to the rural character evident in the Te Mihi area.

37. From the Site, three buildings are visible to the west in the wider landscape. Those buildings are the Taupo Pony Club building, a residential building (the Birdsall and Koster Farm Managers' residence) and a barn. See **Exhibits BC14 and BC15**. There is a collection of residential buildings around the intersection of Oruanui and Link Roads, however, these are screened from view from the Site by vegetation and landform. The pattern of residential development within the Te Mihi/Poihipi area is of widely spaced residential and rural buildings. Small clusters of residential, rural service or light industrial buildings can be typical in the rural environment.
38. Public roads surrounding the Site are mainly sealed, with some low key, unsealed roads servicing forest areas.
39. The Poihipi/Oruanui road corridor, while rural in character, is affected by the presence of the Poihipi Power Station and the pipeline linking the Poihipi Station with the Te Mihi bore field. The road edge adjacent to the pipeline is heavily planted, essentially screening most of the pipeline from view. This planting represents a significant effort in mitigating the potential effects of the pipeline on rural and visual character of the Poihipi Road corridor, however provides a non-rural planting regime close to the road corridor. The Wairakei steamfield also interrupts the rural character of this area. From a number of locations on Oruanui and Poihipi Roads, venting steam from the steam field is visible (See **Exhibits BC6 and BC10**). Steam venting from within the steam field has been concentrated in places as a result of geothermal development, however would still be present if the Wairakei Geothermal Valley had not been developed for geothermal electricity generation.
40. The intersections and the section of road between Link Road, Poihipi Road, and Mapara Road represent a concentration of residential and rural service development. This area is busier than surrounding rural locations due to the confluence of a number of rural feeder roads (to Mapara Valley and Kinloch). See **Exhibit BC1**. The presence and number of vehicles, in particular large trucks, has the potential to affect on the rural character of a location. The presence of the Poihipi Power Station, Taupo Sale Yards, the surrounding forestry land use, and the feeder roads to Mapara Valley and Kinloch produce a concentration of rural service vehicles in the area. The temporary landscape effects of heavy traffic will be pronounced during the

construction period however will have a negligible effect throughout the ongoing operation of the Power Station.

VISUAL ASSESSMENT

41. The visual effect of development on the existing character of the land can be assessed by identifying the Zone of Visual Influence (ZVI), or visual catchment, and the visual audience of the location or proposal. The visual effect can be further assessed by analyzing the sensitivity of the visual receptors or viewers. The ZVI of the Te Mihi Geothermal Power Station site is limited due to the rolling topography, and in particular the surrounding plantation forestry. The ZVI is limited to areas within the pastoral areas of the higher Waikato River Plain, within 4km of the Site, and is generally covered by the photographs presented in **Exhibits BC4 to BC19**.
42. The main viewing locations of the Site, and of the Power Station include the pastoral areas west of the Site between Oruanui, Poihipi, Mapara and Whangamata Roads. See **Exhibit BC1**. The Site, and the Power Station, will be visible from very limited public viewing locations, which are restricted to short sections of Oruanui and Poihipi Roads, represented in **Exhibits BC6 to BC11**.
43. A key design feature of the Site is its elevated position, approximately 150m above the existing Wairakei Station. This provides particular benefits in transferring steam, but potentially makes the Power Station more visible within the broader landscape due to the elevation of the Site. However, locally variable rhyolite domes break the landscape up into a number of small visual catchments, with only the tops of the landforms visible from greater distances (5km+). The local topography therefore limits the effect of the elevation of the Site on the surrounding visual catchment.
44. The scale of the Power Station is relatively small in relation to surrounding landforms. The main components of the Power Station are up to a height of 542.4m asl, with local topographical variation generally being at a coarser scale. For example, the local trig at Te Mihi is at 558m asl, some 15.6m above maximum height of the turbine hall. Local high points to the southwest, west, and north of the Site climb above 600m asl within 3 to 4 km of the Site. Transmission pylons are taller than the other components within the proposal, however are generally replacements for the re-aligned sections of the Poihipi transmission corridor.

45. The Site is not visible from SH1, Oruanui Road, north of Link Road, or Poihipi Road south of Tukairangi Road. A number of site photographs have been taken to illustrate the existing Site character and level of visibility from surrounding locations. In addition to the public viewing locations represented by **Exhibits BC6 to BC11**, the Site and the Power Station will also be visible from locations within pastoral farms to the west and southwest, and from a limited number of residences and rural buildings.
46. The Taupo District Council prepared an application seeking to designate a corridor for the West Kinloch Arterial Route (WeKA) linking the west side of Taupo with Kinloch. The Notice of Requirement (NoR), currently undergoing a public submission process, confirms the roading corridor and route. Information available from the NoR process suggests that construction of the WeKA could take 10 to 20 years to complete. The proposed alignment of the WeKA has been mapped in relation to the Site. See **Exhibit BC22**.
47. The section of the WeKA from Poihipi Road to Tukairangi Road (closest to the Site) is generally located on land of similar elevation, and separated from the Site by a series of intermediate ridges and landforms which ensure that there is no direct line of sight between the WeKA corridor in this location and the Site. The distances between the WeKA corridor and the Site are upwards of 5km. The Site is also perpendicular to the directions of travel on this part of the corridor.
48. The section of the WeKA corridor between Tukairangi Road, Mapara Road and Whangamata Road climbs to elevated locations, and parts of the corridor are more closely aligned with a 'natural' line of sight to the Site. Glimpses of the proposal may be available from a number of these elevated locations. Viewing distances will be between 5 and 8km from this part of the corridor. Any views of the proposal beyond 4-5km will be inconsequential to the character of the landscape experience, given the relatively discrete nature of the development, the intervening topography and vegetation, the existing geothermal electricity generation and transmission infrastructure associated with the upper Wairakei steam field, the existing Poihipi Power Station, the existing pattern of natural and engineered steam plumes, and the ultimate nature of the WeKA landscape and travel experience.
49. I have not traversed the whole WeKA corridor in order to assess the levels of visibility of the Site or the potential visibility of the proposal, however, for

the reasons outlined above, the effect of the Power Station on the WeKA corridor is unlikely to be discernible.

50. Lighting will be introduced to the Site and to access and service areas associated with the Site. A street light will be added to the Oruanui Road intersection with the new access road. While street lighting is generally associated with the domestication of road corridors, it is common for busy rural road intersections to have such lighting. While lighting will be added to a previously unlit area, back light protectors can be added to ensure a minimum of light spill into the surrounding environment. No permanent road lighting will be required along the access road to the site.
51. During construction some limited operations may need to occur at night (see the evidence of Mr Pummer). Lighting will be required for this work. However, such activities will be limited and all lighting will be shielded and directed to ensure that light spill is minimised. In my opinion the limited amount of night lighting required, given the anticipated scope of night time works and the mitigation proposed, will ensure that off-site effects of lighting during the construction period will be minor.
52. Lighting will also be provided on the buildings and structures and at the security gate during operation of the station. This lighting will be at low levels. Occasionally, to allow for maintenance, night lighting of plant will be required. While this lighting will be of a greater intensity it will occur only occasionally. All lighting will be directed and shielded to ensure that light spill from the site is minimised. Further, apart from building lighting and the security gate lighting, all other lighting will be controlled by motion detectors. In my opinion these mitigation measures will ensure that off-site visual effects arising from the lighting associated with the Power Station will be minor.
53. The proposed construction of the Power Station includes the realignment of a section of the Poihipi transmission line, and the effects of that realignment are assessed below and simulated in the photo-simulations in **Exhibits BC4 to BC13**. The realignment includes the relocation of electricity pylons within the Site, and in my opinion will not result in landscape or visual effects that are greater than the existing effects created by the presence of the existing pylons and lines. The relocation of the pylons surrounding the Power Station will not affect the landscape and visual affects created by the presence of the existing Poihipi and Wairakei-Whakamaru transmission alignment.

Cooling Tower Plume

54. Evaporative cooling towers emit elevated, visible steam plumes, the lengths of which depend on the weather conditions. The plume from the cooling towers will be a mixture of water (present as vapour) and air, producing a relatively dispersed plume. Plumes within the area associated with existing geothermal plants and the Wairakei steamfield are generally of three types:
- Cooling tower plumes, which are a mixture of water (vapour) and air. Such plumes are not under pressure, generally leading to a dispersed plume, covering a greater horizontal distance, with comparatively little vertical scale (due to the lack of pressure), and dispersed nature of the discharge. The cooling tower plume is visible only during particular weather conditions. Cooling tower plumes are visible at the Ohaaki, Wairakei and Poihipi stations.
 - Borehead plumes formed by pressurised steam are very dense by comparison with cooling tower plumes. The borehead plume has greater vertical scale, due to the pressure of the discharge, is generally visible during all weather conditions, and is similar to the Flash Plant 12 silencer plume marked on site photographs.
 - Natural vents: natural steam vents are variable in size and density, and are generally associated with natural surface fissures in the surface of the steam field. More spectacular natural vent plumes come in the form of geysers that are pressurised and highly visible, although variable in scale.
55. The horizontal scale of the plume generated by the cooling towers has been modelled by Air and Environmental Sciences Ltd (AES)². Modelling within the AES report concludes that the maximum predicted visible length of the plume is 386m. Visible plumes longer than 100m are predicted to occur infrequently (4.4% of daylight hours and 3.8% of all hours), and plumes greater than 200m rarely (0.5% of daylight hours and 0.3% of all hours). Plumes above the cooling towers will be visible quite frequently to observers with a line of sight to or somewhat above the cooling towers. The distance to the nearest residential dwelling is 554m (House 20 (owned by L and A Price) in Exhibit MH1 in the evidence of Mr M Hunt) exceeding the maximum predicted visible length of 386m. The plume will therefore never be overhead of this house (especially as the predominant wind blows the plume away from the house).

² See the evidence of Mr Stevenson.

56. Specific factors affecting the visibility of the plume from the cooling towers are limited primarily to daylight and meteorological conditions. Cooling tower plumes will be most visible during cold weather, with high humidity and light or no wind. During warm weather, and low humidity, the cooling tower plume will be close to invisible, having dispersed within a few metres of the top of the cooling tower. Due to the relatively elevated site, the height of the cooling towers, and the lack of surrounding elevated viewing locations, the plume will be viewed predominantly against a backdrop of sky – which may be either blue or cloudy. Under cool, high humidity conditions, when vapour/air plumes are at their most visible, the sky backdrop is likely to be cloud or natural fog. Under these conditions, the plume will have a low level of contrast with the backdrop sky colour. The plume will be most prominent when viewed against a clear blue sky, under cool conditions. These conditions are likely to occur in early morning in the winter and the spring.
57. Existing sources of plumes within the immediate area include the Poihipi Plant (cooling towers), borefield venting plumes (pressured steam) associated with the steam field, and natural geothermal surface vents. **Exhibit BC23** is an aerial photograph of the Te Mihi and Poihipi areas indicating the location of the Power Station, the existing Poihipi Plant and the existing Flash Plant 12 silencer plume at the top of the Wairakei steamfield. The Flash Plant 12 silencer plume, as described above, is a pressurized stem vent, of considerably higher density and scale than the Poihipi plant cooling tower plume. The plume from the Flash Plant 12 silencer is visible in **Exhibits BC4 to BC6**. The plume from the Poihipi cooling towers is barely visible under the conditions as shown in the aerial photograph, whereas under the same conditions, the plume from the Flash Plant 12 silencer is prominent.
58. The potential cooling tower plume should not be confused with the existing Flash Plant 12 silencer plume, to the east of the site, as the extent and visibility of the respective plumes are very different. The purpose of presenting this image in **Exhibit BC23** is to illustrate the difference between the density, extent and shadowing created by the Flash Plant 12 silencer plume and the Poihipi cooling tower plume under the same meteorological conditions.
59. The plume from the cooling towers of the Power Station will be comparable to that which is generated by the Poihipi Power Station. As discussed

above the Power Station site is located within an existing group of geothermal electricity generation sites from Poihipi to Ohaaki. All of the existing, and consented geothermal electricity stations, and associated steam fields within the area have cooling towers or vents which expel low density vapour/air plumes, or high density steam plumes. The most visible of the cooling tower structures and plumes in the area is the tower and plume at the Ohaaki Power Station due to its elevation. Plumes and vented steam are an established part of the geothermal electricity generation landscape within the area. Local plumes are visible from SH 5 (Taupo-Rotorua Road), SH 1, Poihipi Road and Oruanui Road, which essentially surround the Site.

60. The cooling tower plume will create a shadow which will intermittently affect the land surrounding the tower. The heavy shadow created by the Flash Plant 12 silencer plume is visible in the aerial photograph attached as **Exhibit BC23** and can be compared with the shadow created by the Poihipi cooling tower plume under the same meteorological conditions. Also, in the far right of the aerial photograph small plumes are visible from natural vents in the adjacent natural steam field. Natural steam vent plumes are common around Wairakei, Te Mihi, and the recreational area known as the Craters of the Moon.
61. The scale and density of the proposed cooling tower plume, and the distance from the site boundaries and adjacent residential buildings, ensure that shading from the cooling tower plume will not affect surrounding residential neighbours. Visible plumes are not expected to occur above any of the surrounding roads or buildings. The simulated cooling towers plumes in **Exhibits BC7** and **BC12** represent a worse case scenario of cool weather conditions, with high humidity. The backdrop of cloud provides limited contrast with the plume, which will be more prominent when viewed against a blue-sky backdrop.

Visual Assessment Photographs

62. Site Photographs 1, and 6 to 8 are taken from within the Site and Site Photographs 2 to 4 are taken from public road based locations outside of the Site. Photo-simulations have been generated using Site Photograph numbers 1 to 5. The photo-simulation generated using Site Photograph 1 represents views that are available only from within the Site. The photo-simulations generated using Site Photographs 2 to 4 represent views of the Site from public locations. The photo-simulation generated using Site

Photograph 5 is from private land at 43 Oruanui Road (the Birdsall and Koster property). Each Site Photograph and the level of landscape change anticipated are described below:

Site Photograph 1 (Exhibit BC4)

63. Site Photograph 1 is taken from the water tanks at the junction of the fence lines, looking to the west of the Site, the eastern extent of the Wairakei Steamfield, and the Poihipi transmission line. This elevated view is not available to the public and is looking outwards from the Site. The fence in the far right of the photograph marks the southern boundary of the Site and the cooling towers. Existing well pads and steam from the steamfield are clearly visible from this elevated viewing location, including the Flash Plant 12 silencer plume, discussed above and noted on the photograph. This is the most elevated viewing location within the Site, and provides the clearest view across the surrounding landscape (in conjunction with site photograph 8).
64. The Power Station presented as photo-simulation 1A, indicates that the two rhyolite domes in the centre of the view will be lowered by 3-4 metres, and the depression between them will be filled to create a level development platform. This platform will be contiguous with the well pad east of the site and the pattern of earthworks and development associated with steamfield development including pipelines and well pads. It is important to note that this view is not available to the public and presented as it is the clearest view from which the main components of the Power Station development will be visible within the site.
65. The Power Station development will dominate this view, with the cooling towers on the right, and the turbine hall in the centre of the view. The cooling tower plume, when visible, will be a significant dynamic element within this view.

Site Photograph 2 (Exhibit BC6)

66. Site Photograph 2 is taken from Poihipi Road, west of the Site. This viewing location is approximately 1km from the edge of the Site. This is the western most location on Poihipi Road from which the proposed Power Station is likely to be visible. The water tank to the right of the foreground power pole is the location from which Site Photograph 1 was taken, and is elevated above the Site. Site Photograph 1 indicates the elevation of the water tanks above the Site. The group of mixed tree plantings adjacent to

the Taupo Sales Yards (visible in Site Photograph 8 in **Exhibit BC15**) are in the centre of the photograph. The Flash Plant 12 silencer steam plume from the Wairakei steamfield is visible beyond the foreground ridge. Views towards the Site from the Oruanui and Poihipi Road corridors are available intermittently from approximately 1km. These views currently include steam plumes, pipelines, and geothermal energy infrastructure associated with the existing Wairakei steam field. This viewing location is potentially the most affected public viewing location, due to the alignment of the view with the road corridor.

67. As presented in photo-simulation 2A (**Exhibit BC6**), the existing Poihipi transmission pylon will be re-aligned, and will remain within view. The tallest component of the Power Station the turbine hall, is visible above the ridge and plantings behind the sales yards. The simulated plume from the cooling towers is visible above the plantings behind the sales yards. The introduction of the geothermal Power Station infrastructure to this view will be noticeable, and will be in keeping with intermittent views of similar infrastructure associated with the Poihipi Power Station and transmission lines on Poihipi Road. The Power Station will consolidate the existing character of the Oruanui and Poihipi Road corridor, which is rural in character, with occasional views of the Power Station, pipeline and steam field development.
68. The mitigated photo-simulation 2B (**Exhibit BC7**) clearly indicates the effect that sympathetic colouring and mitigation planting will have on the integration of the Power Station into the Site.

Site Photograph 3 (Exhibit BC8)

69. Site Photograph 3 is taken from Oruanui Road, looking perpendicular to the alignment of the road, across the foreground ridge towards the Site. The elevated water tank and Poihipi line pylon south of the Site are visible on the skyline. No other features of the Site are visible from this location, due to the screening provided by the foreground topography. The foreground ridge is relied upon to provide topography and vegetation (to be planted) to screen the Power Station from locations on Poihipi and Oruanui Roads.
70. As indicated in photo-simulations 3A and 3B (**Exhibits BC8 and BC9**), the tallest components of the Power Station and the cooling tower plume will be visible from this location above the foreground ridge. Pylons from the Poihipi transmission line are visible above the foreground ridge, and will be

re-aligned to service the new Power Station. The only electricity generation and transmission infrastructure visible from this location is the existing Poihipi line, however the introduction of further geothermal electricity generation infrastructure will be in keeping with views which are available from various locations on Oruanui and Poihipi Roads.

Site Photograph 4 (Exhibit BC10)

71. Site Photograph 4 is a view from Oruanui Road, adjacent to the Taupo Sale Yards. The foreground of the view comprises deer fencing, pasture and planting, with the Site being obscured by landform. The eucalypts in the left of the view are on the north side of the Site. The plantings in the right of the view are adjacent to the Taupo Sales Yards. The Flash Plant 12 silencer steam plume from the Wairakei steamfield is visible rising behind the ridge (left).
72. The turbine hall is visible in photograph simulations 4A and 4B (**Exhibits BC10 and BC11**) to the right of the red barn, just above the foreground ridge. The upper sections of the turbine hall and the transmission pylons are the only elements of the proposal that will be visible. The cooling tower plume is visible to the right of the turbine hall roof, in the context of the existing steam rising above the ridge from the adjacent Flash Plant 12 silencer plume.

Site Photograph 5 (Exhibit BC12)

73. Site Photograph 5 is taken from the upper paddocks of 43 Oruanui Road (the Birdsall and Koster property), to the west and above the existing house sites. At the request of the submitters this site photograph and photo-simulation were produced to assist in understanding the potential visual effects of the proposed Power Station from the upper parts of the property. This land slopes to the east and gains views towards the Site and the upper Wairakei steam field.
74. The site photograph indicates that the foreground of this view are paddocks within the submitters' block, with Oruanui Road clearly visible. The proposed Power Station site is behind a low ridge which will provide screening of the lower parts of the turbine hall, cooling towers, and the switch yard. The transmission pylons, which generally occupy higher parts of the Site will be visible. Colouring of the turbine hall and the cooling towers, and planting on the ridge between the submitters and the Site

indicate the level of integration which can be achieved (Photograph simulation 5C in **Exhibit BC13**).

LANDSCAPE ASSESSMENT

75. As discussed above, the key landscape effects of the proposed Power Station will be effects on the visual and rural character of the Site and the surrounding area. The visual effects of the proposal have been described above.
76. The effects on the existing rural character of the location will include the introduction of additional geothermal electricity generation infrastructure to the Site, which will be visible from the public locations outlined in the visual assessment. The existing rural character of the Te Mihi area is already compromised to some degree by the presence of the existing Poihipi Power Station, the pipelines servicing that station, and the Te Mihi and Western borefields. The Poihipi Power Station is dominating in its location, as it is located close to the south side of Poihipi Road, perched above the road. The Poihipi Station is visible to traffic travelling both north and south on Poihipi Road.
77. In contrast the Power Station is set back from Oruanui and Poihipi Roads approximately 1km, in a partially screened position. The distance from public viewing locations, and the intervening rolling topography limits the dominating effects of the Power Station components, which are larger than typical rural development.
78. The access from Oruanui Road will introduce an increase in traffic to the Oruanui/Poihipi Roads corridor during construction. This road corridor is currently used by commuter traffic to and from Mapara Valley and Kinloch, and service traffic to the Poihipi Power Station. Additional construction traffic will abate once the station is built, and while general operation and service traffic may use the new access road intermittently, most Power Station traffic will use internal roads to the Power Station via the Wairakei steam field.
79. Given the existing presence of the Poihipi Power Station, the Poihipi pipe and transmission lines, the Wairakei steam field and pipe network, and the Wairakei Power Station, the introduction of the Power Station will consolidate the existing rural/geothermal/electricity generation character of the surrounding area, rather than change the existing rural character to any degree.

80. In addition to the visual and rural character assessments above, the landscape values of the site are assessed below against the amended *Pigeon Bay* Criteria introduced at paragraph 15:
- a) The natural science factors - the geological, topographical and dynamic aspects of the landscape;*
81. The underlying Site geology is rhyolite associated with pumiceous pyroclastics. The rolling landscape is formed by a series of rhyolite domes. The resultant pumice solids are light, free draining, and prone to drought during the summer. The Site is on rolling topography, at the western end of the Wairakei Steam field, a natural steam field which has been developed for geothermal electricity production since the 1950s.
82. The development of the steam field, including well pads and access roads has interrupted the natural geology and topography in localised areas through the Wairakei steam field area, and more recently at the west end of the field in proximity to the Site, and the Poihipi Power Station. The development of the Power Station will require additional localised earthworks to create access roads, and the development platform for the Power Station. These interruptions to the topography of the site are not uncommon in the rural environment and are considered to have a similar level of effect as earthworks associated with normal farm access and drainage works, and small quarrying activities.
83. The dynamic aspects of the local landscape include the seasonal presence of colours and features on the landscape. In relation to the pastoral landscape of the Te Mihi area this includes the late summer browning of pastures as they are grazed off and the drought prone soils create the typical light brown paddocks associated with the pumice pastures around the Taupo area. This particular aspect is important in selecting appropriate colour schemes for the turbine hall and cooling towers.
- b) Its aesthetic values including memorability and naturalness;*
84. The aesthetic values of the Te Mihi area are related mainly to its rural character. The Site and its surrounds are contiguous with the local landscape character, and are not particularly memorable or set apart from the pastoral rolling hills and valleys between the Waikato River corridor and the Kinleith Forest. The Site does not contain high levels of naturalness as it has historically had any original or remnant vegetation removed, is subjected to regular localised earthworks for farming and steam field

management practices, and it does not provide any permanent or high values habitat. The development of the Power Station will not alter the memorability of the local landscape to any degree, other than consolidating the character of the electricity generation corridor from Poihipi to Ohaaki.

c) Its expressiveness – how obviously the landscape demonstrates the formative processes leading to it;

85. The underlying land building processes, such as the rhyolitic volcanic processes are evident through the rolling topography of the Site. Some of the subtleties of these small-scale landforms are masked by forestry and shelter plantings which are laid out according to land boundaries rather than topography. The proposed development will alter two small rhyolite domes and fill the shallow valley in between, masking small scale localised landforms. This level of change is consistent with normal farming practices (including site specific quarrying).

d) Transient values – occasional presence of wildlife; or its values at certain times of the day or of the year;

86. The Site is not known to have any wildlife habitat values beyond occasional visiting avifauna, which are more likely to be associated with the edges of surrounding forests. This factor has some overlap with the dynamic processes outlined in a) above, and therefore any late summer or early autumn change of colour in the local pasture is also relevant.

87. One transient landscape effect which will be created by the Power Station will be the addition of another occasional steam plume to the area, which is outlined under the visual effects of steam plumes above. The Power Station will not have any appreciable effect on the transient values of the Site.

e) Whether the values are shared or recognised;

88. The Site is not recognised as having outstanding natural feature or landscape values associated with Section 6b) of the RMA, nor is it considered to have amenity landscape values associated with Section 7c) in the District Plan. The applications have not drawn any submissions regarding the protection of landscape values beyond immediate neighbours. Therefore, while the Site and its surrounding area have a pleasant rural character, the Site does not contain any landscape values which are of particular importance at a District or Regional level.

f) Its value to Tangata Whenua;

89. The Site itself is not known to have any landscape values which are of particular importance to Tangata Whenua, although it is recognised that the wider area certainly has cultural and historical value for the local hapu. There are no archaeological features recorded within the Site.
90. This assessment does not pretend to represent the views of Tangata Whenua. Submissions in relation to the applications have been received from Tainui, Tauhara North 3B Trust, Te Kapa-o-Te Rangiita ki Oruanui Marae, and the Tuwharetoa Maori Trust Board. No particular landscape values of the specific Site relating to Tangata Whenua issues were identified in those written submissions.

g) Its historical associations

91. As indicated above there are no archaeological features recorded within the Site. There are no known historical associations with the site or its immediate surrounds.

Cumulative Effects

92. The cumulative landscape and visual effects of the construction and operation of the Power Station have been evaluated in the context of the existing geothermal electricity generation and transmission landscape. As described in the sections regarding existing landscape and rural character, the wider area contains geothermal electricity infrastructure including the Poihipi, Wairakei, Rotokawa I, and Ohaaki power stations, the Wairakei and Te Mihi borefields, and the steam field and electricity transmission networks which link the power stations together. The consented, but as yet un-built Rotokawa II and Geotherm power stations are also part of the future wider landscape. Each of these power stations and transmission components contribute to the wider landscape character of the area, however are not visible together from any land based location.
93. Each of the power stations and associated steam field components has a reasonably discrete visual catchment, due to the small scale and broken landscape units of the upper Waikato River corridor. This visually segmented landscape can accommodate the location of discrete, yet connected power stations, as the landscape and visual effects are broken up into smaller components in a similar way to the way that the visual catchments are also segmented. From a small area at the top of the Birdsall and Koster property (see Site Photograph 15 in **Exhibit BC19** and

photo-simulations 5a, b, and c (in **Exhibits BC 12 and BC13**) both the Poihipi Power Station and the Power Station could be visible. However, from public viewing locations both power stations would not be visible together.

94. The characterisation of the local area as a geothermal electricity and natural landscape relates to the travel experience through the landscape, rather than to any single viewing location. Further afield, the Wairakei Power Station will be gradually phased out as the Power Station begins generation. Therefore the effects of the Wairakei station will be reduced within the wider landscape, as the Power Station becomes operative.
95. Due to the discrete locations and nature of the Power Station locations, the reduction in the landscape effects of the Wairakei power station, and the minimal steam field and transmission development associated with the commissioning of the Power Station, I do not consider that the Power Station will create cumulative landscape and visual effects.

RESPONSE TO SUBMISSIONS

96. Submissions relating to the landscape and visual effects of the applications were received from a number of parties. Submissions raising landscape effects were received from:
- Mr and Mrs Ellery;
 - L and A Price;
 - Mr Birdsall and Mrs Koster;
 - Mr Ray Houghton;
 - Mr and Mrs Vanner; and
 - Taupo District Council.
97. As part of the consultation with immediate neighbours, I have visited the Birdsall and Koster, Price, Ellery, and Houghton properties and assessed the content of their submissions in relation to the site visits. Some of the submissions received are similar in nature in that they relate to landscape and visual effects as they are experienced from local areas. Each submission however highlights specific concerns and is relevant to a specific location, and therefore the content of each submission is assessed and responded to in turn.

The Ellerys and the Prices

98. The Ellerys and the Prices both cite landscape and visual issues associated with the proposal. The Ellerys request screen planting, and the Prices' submission contends that the proposed Power Station would be clearly visible from their property.
99. The Ellerys and the Prices are immediate neighbours to the north of the Site. The two properties are directly adjacent to each other, occupy similar land, the residences are in similar physical situations, and there are similarities between the submissions. Therefore, I respond to these two submissions together. The Ellery and Price submissions contend that the Power Station will be both visible from, and will have a significant visual impact on, their properties.
100. I visited the Ellery and Price properties during the application process, and more recently on 8 May 2008 after receiving their submissions, with a view towards producing photo-simulations of the Power Station and associated components, as it would be seen from these properties to help the residents to understand the potential visual effects of the proposal. Considerable landform exists between the Ellery and Price residences and the Site to the south. Significant shelter plantings of Eucalypts, Tasmanian Blackwood, and Pine also exist between the residences and the Site, however this planting is not relied upon to provide screening. The effect of the rising landform between the residences and the Site is to screen the site of the Power Station from view from the residences.
101. Having visited the properties, and in particular areas around the residences and between the residences and the southern (Contact property) boundaries, I am confident that the Power Station (and in particular the turbine hall, switchyard, and the cooling towers) will not be visible from areas close to the residences or in the open pastoral areas of the Ellery and Price properties.
102. **Exhibit BC17** (Site Photographs 11 and 12) are photographs from the highest part of the Ellery property, adjacent to the site boundary, and the east side of the Ellery house curtilage. These photographs indicate the heavily planted boundary between the Ellery property and the Site and the rising topography of the Contact side of the boundary.
103. **Exhibit BC18** (Site Photographs 13 and 14) represent the same southern boundary and house curtilage views from the Price property. These

photographs also indicate the heavily planted boundaries and the rising land on the Contact side of the boundary.

104. It will not be possible to gain views of the Power Station from the boundary between the Ellery and Price, and Contact properties, beneath the existing shelter planting on the boundaries. The Contact boundary generally follows a small ridge between the properties and is a location where potential future residential development is unlikely to take place.
105. The key reason for drawing my conclusion regarding the visibility of the Power Station is that the marker tree identified in the site photographs and the photo-simulations is not visible from within or on the boundary of either property. I have also walked the land between the southern boundaries of the Ellery and Prices properties and the Site and I am further convinced that landform will screen the Power Station from view from these properties.
106. The transmission towers associated with the Power Station however are likely to be visible from locations within the properties. The existing Poihipi line is to be re-directed to the Te Mihi switchyard and will result in changes in the location of existing towers through the Contact land. Existing towers are partially visible from the Ellery and Price properties, and the relocated towers will also be visible from similar elevated locations at the south end of the properties. Views to existing and potential towers are through thickly planted shelter plantings on the boundaries.
107. The Ellery and Price properties generally slope to the northwest, away from the proposed Site. The existing residences have been located, oriented and designed to take advantage of the north-facing aspect and views. Therefore, I do not consider that the transmission line will have an adverse effect on these properties.

Birdsall and Koster

108. The Birdsall and Koster submission cites visual impacts of the Power Station for their objection to the applications and requests that all structures should be screened by either banks and/or trees.
109. The Birdsall and Koster property is to the west of the Site on the opposite side of Oruanui Road. The Birdsall and Koster property occupies land which climbs above, and has views across the Contact land and the Site.
110. I have visited the Birdsall and Koster property and have produced a photo-simulation of the Power Station and associated components as it would be

seen from the top paddocks of this property. The site photograph and photo-simulation are discussed above, and are presented as **Exhibits BC12** and **BC13**. The farm managers' residence and surrounding land in the Birdsall and Koster property is clearly visible in Site Photographs 6A in **Exhibit BC14** and 8 in **Exhibit BC15**.

111. When I visited the Birdsall and Koster property, the submitters were mainly concerned with views from the upper paddocks above the residence (open paddocks to the right above the residence in Site Photographs 6A and 8). From these open paddock locations the Contact land, the Site, and the upper Wairakei Steamfield, including existing steamfield development are clearly visible. The Poihipi Power Station is also visible from the upper paddocks.
112. The upper part of the Birdsall and Koster property occupies land that is higher than the Site, and slopes to the east towards the Site. Due to the elevated viewing locations within the upper paddocks it will be impossible to screen all components of the Power Station from these locations.
113. Since receiving and reviewing the submissions I have re-visited the Birdsall and Koster property to assess the views from the paddocks above the residences and also to view the Site from the farm manager's residence. The site photographs taken from the paddock and from the drive way adjacent to the farm manager's house are presented as **Exhibit BC19** (Site Photographs 15 and 16) respectively.
114. The view from the manager's residence over the Site is at a much flatter angle with more of the foreground landform and vegetation providing screening of the Site and the Power Station. The upper parts of the turbine hall and the cooling towers will be visible from this location in the context of the existing Flash Plant 12 silencer plume and the flash plant associated with existing stream field development.
115. The photographs and photo-simulations (**Exhibits BC12** and **BC13**) prepared from the upper paddocks of the Birdsall and Koster property indicate the open aspect and views over the site and the upper Wairakei steam field. Simulated colour mitigation and planting on the ridge between the Birdsall and Koster property and the Site indicates the degree to which the proposal can be integrated into the Site (Photograph Simulation 5C in **Exhibit BC13**).

116. The Power Station will be viewed from this location in the context of steam field development in the upper Wairakei steam field and the Poihipi Power Station which occupies a much more prominent and elevated location to the south of the Birdsall and Koster property.
117. With regards to the suggestion that the Power Station should be screened from this location using banks and/or planting: this would be impossible to achieve given the scale and nature of Power Station and transmission development, and the undulating nature of surrounding topography. Existing geothermal electricity infrastructure in the area is not completely screened from view. **Exhibit BC19** (Site Photograph 15) representing the panoramic view from the upper paddock at the Birdsall and Koster property indicates the broad landscape context for the Te Mihi site, including views of the upper Wairakei steamfield, the existing Flash Plant 12 silencer plume, steam field infrastructure, and the Poihipi Power Station.
118. The Te Mihi area and the wider Te Mihi – Ohaaki corridor has an established character of geothermal and hydro electricity development and transmission. This infrastructure is visible with the broad rural landscape, and has been for some 50 years. There is no justification for making such development invisible within the broad landscape on the upper Waikato River valley.

Mr Ray Houghton

119. The Houghton property is to the north of the Site on the north side of Link Road. The Houghton submission is concerned at the effect of the discharge permit in creating an additional plume, which will visually detract from the landscape values of the area.
120. Since receiving the submissions I have visited the Houghton property, and viewed the Site from an elevated proposed house site on the Houghton property. This view is represented in **Exhibit BC16** (Site Photograph 9). The house site is a flat earth worked site, which is both oriented and gains views to the north (away from the Site which is to the south-east). There is currently no development within this flat platform, and I understand that there are currently no building consent applications lodged to build a dwelling in this location.
121. The Site, and more importantly, the Power Station itself would be partially visible between existing planting on the northern boundary of the Contact

property in the context of existing steam field development, and electricity pylons.

122. Existing plumes are intermittent features within this landscape and are clearly visible in Site Photographs 1 (**Exhibit BC4**), 2 (**Exhibit BC6**), 4 (**Exhibit BC10**), 15 and 16 (**Exhibit BC19**). Existing Flash Plant 12 silencer and venting plumes, cooling tower, and natural venting plumes are typical in the Poihipi and Te Mihi rural environment. The visual effects of the plume have been assessed above, and they will be consistent with the visual effects of the plume from the existing Poihipi Power Station. The plume from the cooling towers of the Poihipi Power Station is currently visible from the Houghton Driveway. (See Site Photograph 10 in **Exhibit BC16**).
123. Having visited the Houghton property and considered the potential effects of the plume from the property, I do not believe that the plume from the cooling towers will visually detract from the landscape values of the area.

Mr and Mrs Vanner

124. The Vanners' submission, while not opposed to the application, requests that careful consideration be given to the construction of structures that will be visible from local properties. Placement, design, colour, earthworks, and planting have all been considered and are being utilised as appropriate mitigation tools for the project. In particular, views from the Birdsall and Koster, Ellery, Price, and Houghton properties have been considered and assessed. Public viewing locations, in particular roads, have also been carefully considered.

Taupo District Council

125. During pre-application consultation and the early period of assessment of the applications, Taupo District Council commissioned Mr Frank Boffa to peer review the landscape and visual assessment presented with the applications. I visited the Site on two separate occasions with Mr Boffa.
126. Mr Boffa provided advice to Taupo District Council which resulted in a request for further information relating to indicative plans showing the site levels in relation to the development platform and surrounding land, plans indicating mitigation planting locations, and amended photo-simulations including the updated colour and planting mitigation suggestions. This further information was provided, and included the provision of additional

information as opposed to any physical changes being made to the Power Station proposal.

127. The Taupo District Council submission, having the benefit of Mr Boffas' peer review and the further information provided, concludes that mitigation can be achieved through appropriate conditions such as the provision of a detailed landscape management plan specifically tailored to the finalised design of the plant. Taupo District Council further suggests that the landscape management plan should include, as a minimum:
- building colour schemes and reflectivity to provide minimal contrast with the surrounding land cover;
 - plans identifying locations and extent (eg, height, etc) of bunding screen planting, plant species, densities, minimum heights at time of planting and minimum maintained heights;
 - maintenance of this vegetation; and
 - certification by Council.
128. The peer review completed by Mr Boffa was a valuable exercise and provided guidance in helping to present the landscape and visual assessment. The suggestions of Mr Boffa have been incorporated into this evidence and the attached graphic material. I have also prepared a Landscape Mitigation Plan which is attached as **Exhibit BC24**. This plan is also attached to the proposed conditions that are presented in the evidence of Mr Daysh.
129. The approach I adopt in the Landscape Mitigation Plan is to use groups of plantings along elevated land to the west of the Site. My intention is to replicate local patterns of woodlot plantings within the wider landscape. I understand that at the pre-hearing meeting resident submitters commented that they would prefer a solid screen of planting along this elevated land. Aside from the physical constraints of achieving this to allow for the access road and well pad Wk 254 (as shown in **Exhibit BC24**), and potential practical constraints of ensuring adequate wind flow for the cooling towers, I am willing to consider a more solid screen if that is what resident submitters would prefer. I also understand that at the pre-hearing conference some resident submitters commented on the growth rates of Douglas fir. In the Landscape Mitigation Plan (**Exhibit BC24**) I propose plantings of *Pinus radiata* and Douglas fir. Again, my intention is to reflect the diversity of the

wider landscape. However, if resident submitters would prefer faster growing species than Douglas fir then that can be accommodated.

LANDSCAPE MITIGATION RECOMMENDATIONS AND PROPOSED CONDITIONS OF CONSENT

130. The primary landscape and visual effect of the Power Station is the introduction of additional electricity generation structures, buildings, pipelines and cooling tower plume into the existing rural landscape, where an established pattern of similar structures and plumes is already evident. To assist the Power Station to integrate into the existing landscape character of the area, I have made landscape mitigation recommendations (including the Landscape Mitigation Plan) which are contained in the conditions attached to the evidence of Mr Daysh.

CONCLUSIONS

131. Contact Energy proposes to develop the Power Station at Te Mihi, approximately 5km west of the existing Wairakei Geothermal Power Station.
132. The Power Station consists of three two-pressure condensing steam turbines, with steam condensers, closed circuit evaporative cooling towers, and other ancillary plant and services.
133. The Site is at the western end of a string of geothermal power stations in the region, including Poihipi, Wairakei, Rotokawa and Ohaaki, which, together, provide a strong electricity generation and transmission character to the Wairakei/Tahorakuri area north of Taupo.
134. The Power Station contains significant physical components.
135. The incorporation of a Power Station of considerable capacity into an area where existing electricity generation and transmission structures exist has merit in landscape and visual terms, as a minimum of additional infrastructure is required to service the new Power Station.
136. Consolidation of existing landscape character through the addition of a Power Station to this location has benefits over the introduction of a power station to an alternative location with no existing pattern or history of electricity generation.
137. The main landscape effect on the surrounding environment of the plant will be on the visual and rural character.

138. The largest components of the proposed Power Station can be coloured to avoid strong contrast with the existing pastoral landcover of the immediate area.
139. Planting on the north and west sides of the Power Station will help to reduce its visual bulk, when viewed from surrounding public and private land based locations.
140. The design and location of the proposed Power Station is appropriate to the site and the surrounding receiving environment.
141. When considered and assessed in the context of the existing landscape character, the established pattern of electricity generation and transmission infrastructure in the wider area, the sensitivity of the receiving environment, and the proposed landscape mitigation conditions, the landscape and visual effects of the integration of the Power Station are appropriate.

B Coombs
Isthmus
21 May 2008

APPENDIX 1:

Statutory Planning Provisions

There are a number of objectives and policies that relate to geothermal activity and natural values as well as significant resource management issues that need to be considered and are outlined below:

Significant Resource Management Issues

ISSUE 1 – AMENITY AND CHARACTER

The Taupo District Plan acknowledges that distinct environments have been created across the Taupo District and that each of these environments is largely determined by the nature of existing land use and associated activities. With these activities are varying levels of amenity and landscape character with a core function of Council being to define, develop and maintain these existing standards of amenity and character to a level that is acceptable and in keeping with the values of the community. To do this the district wide environments have been categorised as being either residential, rural, town centre or industrial. Provisions are then provided under the Plan that allow for the management and development of these environments via objectives and policies, assessment criteria and performance standards.

ISSUE 4 – THE NATURAL ENVIRONMENT

The protection of the district's outstanding natural areas, features and significant landscapes is recognised as an important issue in the local, national and international contexts. Of particular relevance is the special importance of water bodies and the treatment of their edges and nature of the use of these bodies – particularly Lake Taupo. The Council has undertaken to identify and actively protect those areas, features and landscapes that are of significance to the district. In this case there is no record of the site or immediately surrounding area as having any of these qualities as established under the Plan.

Objectives and Policies

Rural Environment

OBJECTIVE 1

3b.2.1 The protection of the Rural Environment to maintain and enhance the rural amenity and character.

POLICIES

- i. Maintain and enhance the amenity and character of the Rural Environment by providing land use performance standards and subdivision rules to manage the scale and density of development.
- iii. Maintain the dispersed building character by setting minimum lot sizes.
- vi. Avoid, remedy or mitigate adverse effects of subdivision, use and development of land on areas or features of cultural, historical, landscape or ecological value.

OBJECTIVE 4

3b.2.4 The efficient and effective functioning of the Rural Environment by enabling the use and development of natural and physical resources, while ensuring appropriate environmental outcomes are achieved.

POLICIES

- v. To recognise the important role of resource use and development in the Rural Environment, by providing for the continued operation and associated development of existing electricity generation facilities and network utilities by allowing their use, maintenance and minor upgrading where all significant adverse effects are avoided, remedied or mitigated.

OBJECTIVE 5

3b.2.5 The protection of adjoining Environments from the adverse effects of activities within the Rural Environment.

POLICIES

- i. Manage the potential for adverse effects of activities in the Rural Environment at the interface of this and other more sensitive Environments.

Industrial Environment

OBJECTIVE 1

3d.2.1 The maintenance of the environmental qualities and functioning of the Industrial Environment.

POLICIES

- i. Maintain the qualities of the Industrial Environment through controlling the bulk, location and nature of activities, to ensure an appropriate scale and intensity of buildings and activities that are consistent with an industrial scale of development; i.e. an appropriate density of activity and level of environmental effects, while allowing the functioning of the area to be maintained.

OBJECTIVE 2

3d.2.2 The protection of adjoining Environments from the adverse effects of activities within the Industrial Environment.

POLICIES

- i. Control the effects of activities within the Industrial Environment so the scale of development and level of environmental effects does not adversely affect the amenity of other Environments of the District.

Natural Values

OBJECTIVE 1

3i.2.1 Protection of the integrity of areas of natural value.

POLICIES

- i. Maintain the integrity of areas of natural value and protect them from inappropriate activities and development.
- ii. Allow for activities which are compatible with the qualities of areas of natural value and avoid, remedy or mitigate adverse effects on the natural values.
- iii. Consider the scale, intensity, location and design of activities within areas of natural value to avoid adverse effects on the natural values.

Geothermal Activity

OBJECTIVE 1

30.2.1 Enable and manage the effects of land use activities associated with geothermal resource use and development.

POLICIES

- i. To provide for the continued operation, maintenance and minor upgrading of existing developments utilizing geothermal resources.
- ii. To enable land uses associated with the use of geothermal resources in a manner which avoids, remedies or mitigates adverse effects on the environment.
- iii. To control the land use effects associated with the use of geothermal resources by way of environmental performance standards in rules and conditions on resource consents.

Assessment Criteria

Given the location of the proposed development and its relation to both Rural and Industrial Environments as established under the Plan, the Council may have regard to the following assessment criteria in assessing the proposal and its potential effects on the amenity, character and overall physical appearance of the existing landscape.

Rural Environment

GENERAL CRITERIA

- ii. Potential for conflict between the development or subdivision and other existing activities within the Rural Environment.
- iii. Any cumulative effects of the development or subdivision (including precedent effects).
- vi. Any actual or potential cumulative effects of the development or subdivision on the amenity or character of the Rural Environment, and the methods by which such effects can be avoided, remedied or mitigated. Attributes that may contribute to a higher level of amenity and rural character include (but are not limited to):
 - A sense of place
 - Aesthetic coherence
 - Feelings of remoteness
 - Open space, including existing recreational opportunities
 - A relatively high standard of privacy
 - Open vistas of vegetation and topographical features

- A lower incidence of buildings and structural clutter
- ix. The location general assessment criteria and scope of earthworks, including its movement to, from and on the site.
- x. The clearance or planting of vegetation, including its location, species and maintenance.

BUILDING HEIGHT

- i. The extent to which the extra height will:
 - Adversely affect the character and visual amenity of the area and the surrounding Rural Environment, particularly in terms of the dominance of open space over built form.
 - Reduce the privacy or outlook of adjoining allotments.
- ii. Proposed methods for the avoidance, remedying or mitigation of potential adverse effects, and the degree to which they would be successful including:
 - The extent to which topography, alternative design, planting or setbacks can mitigate the adverse effects of the extra height.

COVERAGE

- i. The extent to which the increased coverage will:
 - Adversely affect the character and visual amenity of the area and the area with regard to the visual dominance of open spaces versus built form.
 - Reduce the privacy or outlook of adjoining allotments.
- ii. Proposed methods for the avoidance, remedying or mitigation of potential adverse effects, and the degree to which they would be successful including:
 - The ability to mitigate adverse effects such as through the imposition of conditions such as landscaping; and
 - Provision for the protection or enhancement of significant vegetation.

EARTHWORKS

- i. Detraction from the amenity of adjoining allotments in terms of such matters as noise and dust occurring as a result of the earthworks, and the resulting impact on the use of these allotments.

- iv. Proposed methods for the avoidance, remedying or mitigation of potential adverse effects, and the degree to which they would be successful including:
 - Planned rehabilitation, recontouring and re-vegetation or the retention of existing vegetation.

5.1.1 Industrial Environment

The assessment criteria established under the Section 4d – Industrial Environment of the Plan are largely the same as those criteria outlined above and specifically those relating to building height, coverage and earthworks. There are some additional general criteria and others relating to development that are relevant to the proposed development. These are outlined below:

GENERAL CRITERIA

- i. Impact of the activity on the functioning and utility of the Industrial Environment and effect on surrounding allotments and other Environments.
- ii. Potential conflict between the activity and other existing activities within the Industrial Environment.

DEVELOPMENT

- i. Whether the desired environmental outcome, with a consistent and appropriate standard of infrastructure, is achieved such as through compliance with the Council's Development Guidelines and Structure Plan.