

WAIRAKEI-WHAKAMARU TRANSMISSION LINE
(Replacement of existing single-circuit B-line with a new double-
circuit C-line)
SOCIAL IMPACT ASSESSMENT

Prepared by Taylor Baines & Associates
for Boffa Miskell Ltd

on behalf of Transpower New Zealand Ltd

October 2010

TABLE OF CONTENTS

EXECUTIVE SUMMARY -i-

1 INTRODUCTION -1-

1.1 Purpose of this document -1-

1.2 Objective of the Social Impact Assessment (SIA) -1-

1.3 Statutory framework for the SIA -1-

1.4 Contract brief and roles -2-

1.5 SIA scope and approach -6-

1.6 SIA activities and stages -6-

1.7 Transpower communications with stakeholders -9-

1.8 Structure of this report -9-

2 PROJECT DESCRIPTION -10-

2.1 Project overview -10-

2.2 Changes in infrastructure -10-

2.3 Change in route and centre line -10-

2.4 Construction time frame and activities -13-

2.5 Standard easement obligations -13-

3 THE EXISTING SOCIAL ENVIRONMENT -14-

3.1 Introduction to the Area of Study -14-

3.2 Population trends and settlement patterns -19-

3.3 Land-use patterns and trends -20-

3.4 Particular communities -25-

3.5 Rural infrastructure and community facilities -27-

3.6 Demographic features -28-

3.7 Expressed values -29-

4 THE POTENTIAL SCOPE OF SOCIAL EFFECTS AND RELATED ISSUES ... -30-

4.1 Overview of social effects from transmission infrastructure -30-

4.2 Scope of effects assessed in this SIA -31-

4.3 Primary responsibilities for assessment of effects -32-

5 ASSESSMENT OF LIKELY SOCIAL EFFECTS AND RELATED ISSUES -34-

5.1 Basis for assessment -34-

5.2 The existing base-line for comparison -34-

5.3 Influence of Transpower's route selection process on level of effects ... -35-

5.4 Spatial analysis of the proposed C Line - separation distances -35-

5.5 Potential social effects related to operation and maintenance -37-

5.6 Potential social effects related to the construction and removal -44-

6 MITIGATION -48-

6.1 The influence of the route selection process -48-

6.2 The role of easement agreements in mitigation -48-

6.3 Transpower responsibilities for mitigation of social effects -48-

6.4 Contractor protocols -49-

7 CONCLUSIONS -51-

APPENDICES -52-

EXECUTIVE SUMMARY

Purpose of this document

1. The purpose of this document is to report on the findings of the Social Impact Assessment (SIA) carried out by Taylor Baines and Associates on Transpower New Zealand Limited's (Transpower's) proposed new Wairakei to Whakamaru transmission line (WRK-WKM C-line).

Objective and Scope

2. The objective of the SIA is to assess the nature and significance of positive and adverse social effects likely to be experienced by various communities that have an interest in the proposal.
3. The principal geographic focus of the SIA has been on the people and communities living in and between Wairakei and Whakamaru. This reflects the fact that the SIA was not required to assess the extent of need for the electricity that will be carried by the new transmission infrastructure. Rather, the SIA has been part of assessing an optimal new transmission line alignment between two fixed points and the social effects of this new line.

Statutory framework and conceptual framework

4. The Resource Management Act 1991 (RMA) sets out a statutory framework which aims to direct the assessment of whether the proposed project would promote the sustainable management of resources in a way or at a rate that enables people and communities to provide for their social, cultural and economic well being as provided for in section 5 of the Act.
5. Carrying out a social impact assessment within this statutory framework requires attention to a conceptual framework for thinking about social well being, and the factors which might contribute to people's experience of social well being.

Transpower's route selection process

6. Transpower has developed a generic methodology for identifying new or replacement transmission line routes. This methodology is described as the ACRE process - an acronym for Area-Corridor-Route-Easement investigations, with decisions being made at each stage using appropriate decision techniques and taking into account the information relevant to that stage. For this project, a modified ACRE process was used which eliminated the Corridor stage, due to the confined size and shape of the Area of Study.

Preliminary SIA by Beca Consultants

7. A Preliminary SIA was carried out by Beca Consultants and reported in October 2008. The Preliminary SIA compiled selected background information aimed at defining the scope of social issues and the communities of interest for the Project. The first objective of this Preliminary SIA was to inform the Grid Investment Test (GIT) application to the Electricity Commission.

The brief for Taylor Baines

8. Taylor Baines & Associates (TBA) were engaged to carry out the SIA work for the remainder of the route selection process in July 2009. By this time the Project Team had progressed onto the stage of Route Options Selection.

Peer Review

9. At the same time as Taylor Baines & Associates were engaged, Dianne Buchan of Corydon Consultants was engaged in the specific role of peer reviewer for the SIA work.

SIA Activities and Stages

10. The assessment of potential social impacts has contributed to the route selection process at each stage -
 - transmission options selection;
 - route options selection;
 - preferred route; and
 - centre line and tower locations.
11. SIA activities have included at various times -
 - reviewing background documentation and data sources;
 - field visits for direct observation and interviews;
 - attendance at Open Days;
 - attendance at marae meetings;
 - review of feedback from consultation activities;
 - assessment team workshops and discussions with other experts;
 - analysis of maps, aerial photographs and separation distances.

Project overview

12. The project involves the construction, operation and maintenance of a new 220 kV double circuit overhead transmission line between the Wairakei and Whakamaru substations (called the "WRK-WKM C Line").
13. The existing WRK-WKM B-Line is a 220kV single-circuit transmission line comprising 110 single-circuit, flat-top towers, typically 25 metres tall. The proposed WRK-WKM C-Line comprises 106 double-circuit, steel lattice towers, with an average height of 42 metres, between the two sub-stations.

Construction time frame

14. The construction sequence is expected to take approximately 18 months, assuming that construction activities will be allowed seven days per week between the hours of 7 am and 6 pm. The duration of construction activities on any single property will depend on the number of towers located on a property. However, property-specific duration is expected to be of the order of 4-9 months

15. In addition to the construction sequence, the removal of the existing B-Line is expected to take a further 12 months in total.

Purchase of easements

16. Transpower intends to purchase easements from landowners whose land the proposed line will cross. Such easements would be at least 50 m wide and come with certain obligations on the landowner and on Transpower.

The Area of Study

17. The Area of Study is defined by the Wairakei and Whakamaru substations at the end points. The most substantial areas of intensive residential settlement are also located at these end points. The Waikato River generally forms the northern and eastern boundaries to avoid crossing this feature, which is valued for a number of environmental, recreational and social reasons. A notional western boundary is formed by the twin Bunnythorpe to Whakamaru A and B transmission lines. The southern boundary was defined by an off-set from the straight line between the two substations, with a buffer to Lake Taupo.
18. While being predominantly rural in character, the Area of Study encompasses the settlements of Wairakei, Mokai and Whakamaru.
19. In combination with Kaahu Road, Poihipi Road forms essentially a central east-west route through the Area of Study between Taupo and Whakamaru, with various other roads branching off either to the north or south. The development of transmission infrastructure has itself been instrumental in improving access for all rural residents to their main urban centre.

The existing social environment

20. The existing social environment is described with reference to population trends and settlement patterns, land-use patterns and trends, particular communities such as Wairakei, Mokai and Whakamaru, rural infrastructure and community facilities, distinguishing demographic characteristics, and values expressed by local residents.

The information basis for this assessment

21. The assessments of likely effects draws upon the following sources of information -
 - direct observation of the Area of study during several visits, with observations made from public roads and from walkovers of several properties;
 - a detailed property-by-property comparative analysis of the existing B-Line and the proposed C-Line, in terms of properties intersected and separation distances to existing dwellings;
 - discussions with Transpower's two property managers responsible for liaison with landowners and for property negotiations where easements will be required;
 - other technical assessments and discussions with some of these consultants.

The influence of the route selection process on level of effects

22. For identifying the route options and then for identifying a preferred route, proximity to existing dwellings and community facilities was the critical factor influencing planning decisions when considering potential social effects, particularly the minimisation of adverse social effects. For finalising the proposed centre line, face-to-face discussions involving the landowners and the engineering and environmental consultants enabled finer-grained consideration to be given to aspects of land use and visual outlook.
23. The analysis indicates that the route selection process has delivered an outcome which will result in a distinct improvement to the residential amenity of a substantial number of households in the Area of Study.

The potential social effects

24. Potential social effects likely to be experienced are analysed in relation to operation and maintenance of the proposed line and in relation to construction and line-removal activities.
25. For this assessment, the Social Assessment activities have been complemented by separate assessment of landscape and visual effects, effects on farming activities, effects on traffic, noise effects, health effects, and effects on recreation and tourism activities.

Mitigation

26. The route selection process has given priority to avoidance over mitigation in the first instance. Nevertheless, mitigation is still appropriate under certain circumstances in order to address effects which are specific to particular properties, to address uncertainty either in the assessment of effects or in the experience of contractors and landowners, or to address issues that are not property specific but may affect the rural community more widely, such as employment opportunities or traffic management in the local road network.
27. Several of the technical assessments recommend specific mitigation actions for Transpower.
28. In addition to these, it would be prudent for Transpower to maintain effective on-going liaison with landowners and communities along the new alignment during the two-year construction period. Transpower proposes to appoint a Landowner and Community Liaison Manager for this project. To complement this initiative, it is recommended - as a condition of consent - that Transpower invites local representatives to participate in a Landowner/Community Liaison Group, with several specific functions -
 - to provide landowner support during the construction period (i.e. not dealing with landowners just on an individual basis);
 - to oversee a complaints procedure;
 - to provide a monitoring and evaluation function in relation to all aspects of mitigation, including the periodic review of the Construction Management Plan, the Site Works plans and the contractor protocols..

29. Other on-going communications initiatives are also recommended for Transpower's actioning.

Conclusions

30. Transpower's approach to route selection has put avoidance of adverse social effects ahead of mitigation. It has delivered an outcome which will result in a distinct improvement to the residential and rural amenity of a substantial number of households in the Area of Study, while potentially significant adverse social effects are limited to a very few properties - possibly no more than 3-4 in total, all of which are subject to direct negotiation with Transpower in terms of purchasing an easement (including the amount of compensation).
31. Perceptions of the risk of adverse health effects and the risk of noise nuisances should be significantly improved for all landowners as a result of the increased separation distances between dwellings and the transmission line which have been achieved.
32. Some residents in the hydro village of Whakamaru will experience a significant improvement to their sense of wellbeing, with the removal of the B-line from directly over their properties. This change in circumstances can be expected to improve the amenity values of a substantial number of properties in the village, reinforcing the recent gradual trend towards new arrivals.
33. Although it is proposed that the C-Line will pass approximately 350 m behind the settlement at Mokai, the siting of towers and the screen planting proposed in mitigation of visual effects will protect existing amenity values for residential properties and the marae, and ensure that current expectations for future growth in the settlement are not compromised.
34. For future trends in rural-residential development and sub-division throughout the Area of Study, the implications of the proposed C-Line alignment are probably less influential than either the current over-supply of sub-divided sections or the Taupo District's expressed intentions to direct such development more to the south of the Area of Study. Consequently, this proposal is not expected to have any significant effect on trends in rural-residential development in the future.
35. Construction-related social effects, particularly for farmers and road users are the ones that will require most careful management, since most landowners will not have prior experience of this kind of activity. Appropriate mitigation has been recommended, including a mechanism to enable Transpower to be responsive to any further issues that may not have been anticipated.
36. In light of these conclusions, this proposal can be said to enable the people and communities of the Area of Study to provide for their social, economic, environmental and cultural wellbeing and for their health and safety, consistent with the purpose of the Resource Management Act.

1 INTRODUCTION

1.1 Purpose of this document

The purpose of this document is to report on the findings of the Social Impact Assessment (SIA) carried out by Taylor Baines and Associates on Transpower New Zealand Limited's (Transpower's) proposed new Wairakei to Whakamaru transmission line (WRK-WKM C-line). The SIA was carried out under sub-contract to Boffa Miskell Limited.

1.2 Objective of the Social Impact Assessment (SIA)

The objective of the SIA is to assess the nature and significance of positive and adverse social effects likely to be experienced by various communities that have an interest in the proposal.

The principal geographic focus of the SIA has been on the people and communities living in and between Wairakei and Whakamaru. This reflects the fact that the SIA was not required to assess the extent of need for the electricity that will be carried by the new transmission infrastructure. Rather, the SIA has been part of assessing an optimal new transmission line alignment between two fixed points and the social effects of this new line.

1.3 Statutory framework for the SIA

The Resource Management Act 1991 (RMA) sets out a statutory framework which aims to direct the assessment of whether the proposed project would promote the sustainable management of resources in a way or at a rate that enables people and communities to provide for their social, cultural and economic well being as provided for in section 5 of the Act. The requirement in the Act is to consider the potential effects on people and communities. Thus a social impact assessment is not focussed just at the community level. Generally, SIA is defined¹ as considering effects on individuals, households, groups, sectors of society as well as communities.

Carrying out a social impact assessment within this statutory framework requires attention to a conceptual framework for thinking about social well being, and the factors which might contribute to people's experience of social well being. Such a conceptual framework, which has been adopted in a range of other SIAs² and social research contexts in New Zealand in recent years comes from social indicators work in the OECD³ and closely parallels the framework adopted by the Ministry of Social Development⁴. The OECD study identified key areas of social life which shape well being:

¹ Burdge, R.J. 2004.

² e.g. Assessment of the effects of project Aqua on local communities and development of community mitigation proposals, for Kurow Aqua Liaison Committee, 2003; SIAs carried out on several wind farm proposals between 2005 and 2007 and on the Wairau Valley HEPS in 2005; social analyses carried out for assessing the social implications of commercial retail strategy development in Christchurch City between 2003 and 2005, social assessment carried out on a Structure Plan proposal in North Shore City in 2007.

³ OECD, 1998.

⁴ e.g. Ministry of Social Development, 2003.

- the state of physical and mental health;
- the quality of housing, shelter, neighbourhood and living place;
- opportunities for formal education and lifelong learning;
- opportunities for income, employment and the quality of working life;
- opportunities for leisure and recreation, time to enjoy them, and access to quality outdoors/open space;
- access to public facilities, transport, communications, and access to goods and services;
- the quality of the physical environment, a clean environment with aesthetic appeal;
- influences on family life, social attachment, social contact, interaction and support;
- influences on participation in community and society, including participation in organised groups and social activities; and
- influences on personal safety, public safety, autonomy or freedom from too much risk.

By way of examples, transmission infrastructure could have the potential to affect the state of individuals' physical or mental health⁵; the presence of transmission infrastructure (pylons within private property or lines passing directly overhead private property) could affect the quality of neighbourhood and living place; hosting transmission infrastructure could impose costs or loss of income on those involved with commercial production such as farming and forestry; the presence of high voltage transmission lines could interfere with access to television and radio services; the presence of transmission infrastructure could affect people's appreciation of the aesthetic qualities of the local landscape⁶. This paragraph is intended to be illustrative rather than exhaustive.

In conducting this SIA, consideration was given to whether or not the proposed project is likely to have consequential effects on any of these areas of social life, and for which communities of interest this is most likely to be the case.

1.4 Contract brief and roles

To be clear about the contract brief for Taylor Baines & Associates in this project, it is necessary to understand Transpower's planning process and the prior engagement of another firm of consultants who initiated an SIA process.

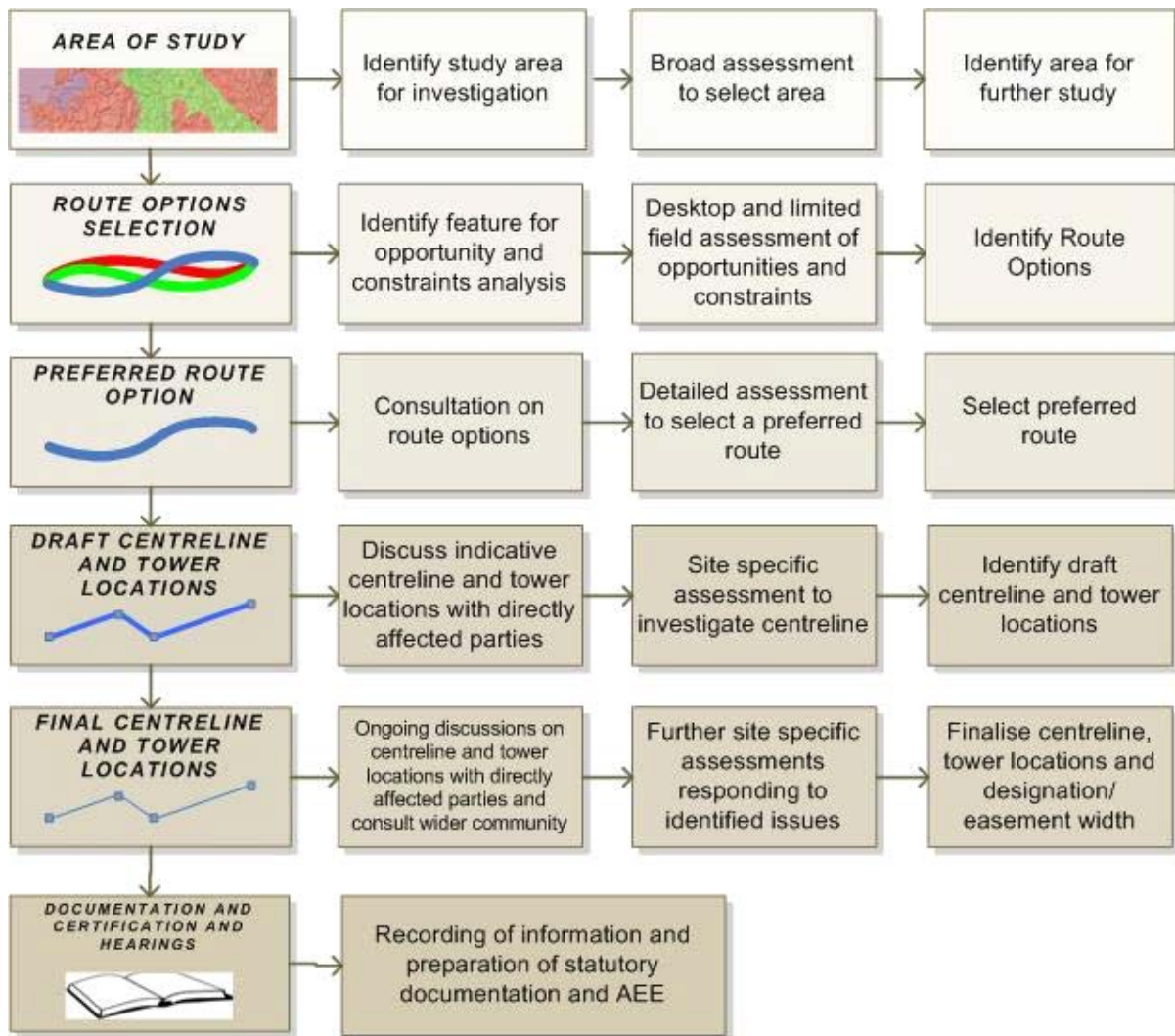
Transpower's route selection process:

Transpower has developed a generic methodology for identifying new or replacement transmission line routes. This methodology is described as the ACRE process - an acronym for Area-Corridor-Route-Easement investigations, with decisions being made at each stage using appropriate decision techniques and taking into account the information relevant to that stage. For this project, a modified ACRE process was used which eliminated the Corridor stage, due to the confined size and shape of the Area of Study. The modified ACRE process is shown graphically in Figure 1.

⁵ As explained in Section 1.5, for this Transpower project, assessment of such potential health effects are the primary responsibility of Dr Black.

⁶ As explained in Section 1.5, for this Transpower project, assessment of such potential landscape and visual effects are the primary responsibility of Dr Boffa.

Figure 1: Modified ACRE process

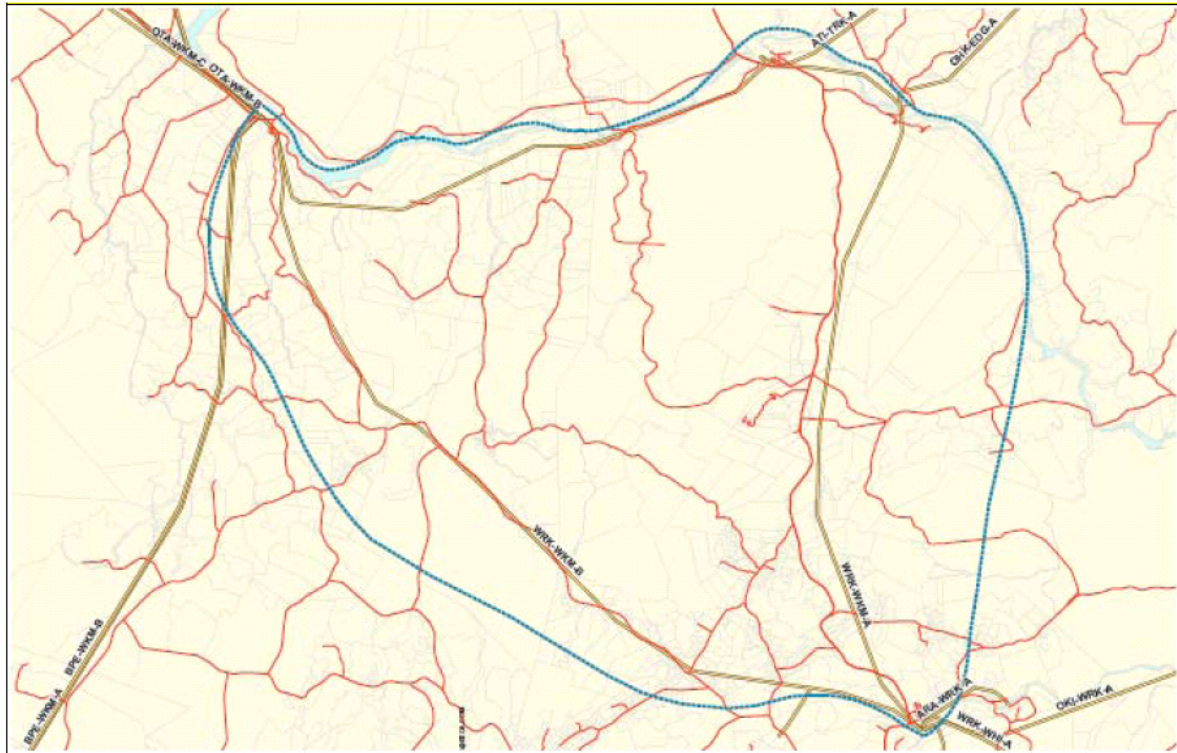


SIA activities have been chosen according to each of the stages in the modified ACRE process (left-hand column of Figure 1). These activities are summarised in Section 1.6 below.

Preliminary SIA by Beca Carter Hollings and Ferner (Beca):

A Preliminary SIA was carried out by Beca and reported in October 2008. The Preliminary SIA compiled selected background information aimed at defining the scope of social issues and the communities of interest for the Project. The first objective of this Preliminary SIA was to inform the Grid Investment Test (GIT) application to the Electricity Commission. In doing so it incorporated submissions received by Transpower from industry stakeholders in the first stage of consultation (May 2008) and from community engagement involving letters sent out and feedback received from occupants of the Area of Study (September and October 2008). The Area of Study was initially set as shown in Figure 2.

Figure 2: Area of Study at time of Preliminary SIA



The Preliminary SIA compiled a community profile based on census area unit data⁷ for the census of 2001 and 2006, including total population, ethnicity, age distribution, occupied dwellings, household types and personal income. The report summarised information on three primary schools and one playcentre, as well as other community infrastructure, tourist sites and communities of interest within the Area of Study.

This stage of assessment enquired into preferences between four transmission upgrade options: (i) re-conductoring existing lines (i.e. using the existing lines on their existing routes and expanding the capacity of the conductors), (ii) duplexing existing lines, (iii) new flat top lines and (iv) new double circuit lines. Options (i) and (ii) are restricted to existing routes (WRK-WKM A and B Line), whereas options (iii) and (iv) open the way to considering alternative routes.

The Preliminary SIA Report indicates that “generally the preference expressed was to upgrade the existing lines (Options 1 and 2) rather than to construct new lines in new routes.”⁸ However, the report also highlighted “another crucial message to ‘future proof’ the line - to ‘do it right, do it once, and do it properly’.” and the fact that dominant preferences differed for different communities⁹.

⁷ Covering three CAUs, namely Oruanui, Wairakei-Aratiatia and Marotiri.

⁸ Beca, 2008. p.32 It should be noted that the Report refers to both stakeholder feedback and residents’ feedback, and states that a large number of residents’ responses did not state an explicit preference.

⁹ Beca, 2008. p.32 A greater proportion of Wairakei respondents preferred options 1 and 2 (upgrade existing) while a slightly higher proportion of Whakamaru preferred option 4 (re-route around the village)

The Preliminary SIA summarised the following as key social issues/impacts -

- Impacts on sites of significance;
- Visual impact of lines/structures;
- Proximity of upgrades / new lines to housing (unspecified negative impact for property owners);
- Concern over constructing new routes / new pylons;
- Perception of health risks from proximity to transmission lines (including perceived storm/accident risk);
- Perceived impact on property values;
- Concern over electromagnetism / voltage; and
- Possible disruption to business operations / construction impact on residents.

Finally, the Preliminary SIA recommended setting up working groups in particular communities to discuss preferred options and assist in identifying mitigation for particular areas¹⁰. Transpower project staff have explained that meetings were held during this period with two groups at the settlement of Whakamaru. Transpower also initiated a series of meetings with individual landowners and a series of Open Days.

Engagement of Taylor Baines & Associates to carry out the SIA:

As noted above, the Preliminary SIA by Beca was completed in October 2008. Taylor Baines & Associates (TBA) were engaged¹¹ to carry out the SIA work for the remainder of the route selection process in July 2009. By this time the Project Team¹² had progressed onto the stage of Route Options Selection.

Internal peer review

At the same time as Taylor Baines & Associates were engaged, Dianne Buchan of Corydon Consultants was engaged in the specific role of peer reviewer for the SIA work. This timing allowed for the SIA leader to seek critical review from the peer reviewer over the planning of SIA activities at various stages, as well as providing critical comment on this report. It should also be noted that Ms Buchan substituted in the role of SIA expert for James Baines¹³ at the July 2009 workshop on route options

¹⁰ Beca, 2008. p.55.

¹¹ Letter of engagement, 9 July 2009.

¹² Transpower, Boffa Miskell and associated sub-consultants.

¹³ James Baines had to attend a Board of Inquiry hearing to give evidence and was therefore unavailable to participate in the workshop which had been planned some time previously. Nevertheless, James Baines and Ms Buchan had prior discussions about her input to the workshop.

1.5 SIA scope and approach

Taylor Baines' SIA scope:

The principal geographic focus of the SIA has been on the people and communities living in and between Wairakei and Whakamaru. This reflects the fact that, by the time Taylor Baines & Associates was engaged, the case for the upgrade proposal had already been accepted by the Electricity Commission, acknowledging the need for the electricity that will be carried by the upgraded transmission infrastructure. Rather, this phase of the SIA work has been part of assessing an optimal new transmission line alignment between two fixed points, and the social effects of this new line.

In terms of substantive scope, and with reference to the conceptual framework of social wellbeing elements articulated in section 1.3, it should be noted that the assessment of landscape and visual effects (Dr Boffa), the assessment of recreation and tourism effects (Mr Bamford), the assessment of effects on farming (Mr Horton), and the assessment of health effects (Dr Black) have been assigned to other experts who have primary responsibility for reporting their technical assessments. Nevertheless, a summary of their findings will be incorporated into this SIA Report so that an overview of all social effects is collated and presented in a single document. Similarly, cultural effects and consultation with the Maori community and trusts in the vicinity of Mokai are the responsibility of Mr Olsen.

SIA - staged and issues focussed:

The approach to the SIA work for this Transpower project has been staged, reflecting both the stages of the route selection process and also the contemporary practice of SIA which is staged and iterative in character. This will be elaborated in section 1.6.

An issues-focussed approach was adopted, in which the assessment focussed particularly on those actual and potential effects and issues which are most critical from the perspective of the stakeholders¹⁴ involved, rather than being encyclopaedic and descriptive in nature.

1.6 SIA activities and stages

The assessment of potential social impacts has contributed to the route selection process at each stage. In doing so, it is informed by an understanding of the potential social impacts/issues which evolves progressively in detail at each stage, as planning becomes increasingly location-specific and as new information is incorporated.

The social impacts/issues identified in the Preliminary SIA provided a starting point. This range of issues/impacts reflect the fact that, once operational, it is the presence of such immobile infrastructure in the environment and particularly its proximity to where people live, work and play for much of the time that are primary concerns. Proximity of transmission lines has the potential to influence perceptions of health and safety risks, concerns over disturbances and interruptions caused by electromagnetic effects, possible disruption to business operations¹⁵,

¹⁴ As used in this report, the term 'stakeholders' is more inclusive than the narrow set of statutory organisations sometimes referred to. In this report, any individual, household, landowner or business potentially affected by the proposal is considered to be a stakeholder.

¹⁵ e.g. restrictions on land uses beneath transmission infrastructure; constraints on use of rural airstrips.

and reduction in residential amenity. The mere presence of transmission lines in the neighbourhood is a source of potential visual impact. In addition to these operational-phase effects, there are also more transitory effects associated with the construction of new lines and removal of existing lines. Taken together, all these effects have the potential to influence landowners' perceptions of property values and their perceptions of how potential buyers for their property might respond to the presence of transmission lines on or near a property. As such, potential property value effects are a consequence of these other health, safety, nuisance, amenity and financial effects.

It is evident from this discussion that spatial relationships - proximity of transmission lines to properties and dwellings - is a critical element in the assessment. However, it must also be remembered that the assessment of these social impacts/issues is part of a combined assessment effort which incorporates other dimensions - potential impacts on ecological values, tangata whenua values, landscape values and visual amenity, historic heritage values, geo-technical considerations, other infrastructure (roads and tele-communications), and hazards. For the Route Options selection and the Preferred Route selection stages, these various assessments were 'integrated' via workshop processes with dedicated reporting outputs. For the finally proposed centre line in the Notice of Requirement, separate assessment reports have been produced, of which this SIA Report is one.

Route Options selection:

The methodology is described in detail in the Route Options Report, September 2009, involving an opportunities and constraints analysis for the Area of Study (section 2.6 and section 3). 'Community' interests were expressed in terms of the location of urban residential areas, rural dwellings, and community facilities such as marae, schools, and churches (section 3.7). Also taken into account were rural settlement patterns and areas of higher density.

Proximity is the critical factor, and the assessment at this stage attempted to minimise proximity, or optimise overall proximity across alternative route options. The combined assessment results were summarised in section 8 of the Route Options Report.

Preferred Route:

The methodology is described in detail in the Preferred Route Report, February 2010 (section 2), involving a comparative ranking analysis for individual segments of route options ('sectors') leading to overall route evaluations. Social dimensions relate to numbers of dwellings and other buildings encountered in each route segment, as well as the location of community facilities. Sources of information employed for the social analysis at this stage included interviews with a small sample of 16 landowners living in various parts of the Area of Study¹⁶, written submissions and written feedback from the Open Days (74), direct observations from driving extensively around the Area of Study (24 and 25 Sept 2009; 4 and 5 Nov 2009) and walking over several farming properties and other elevated areas in the company of the landscape expert and a transmission line expert¹⁷, and discussions with other consultants and Transpower personnel.

¹⁶ A cluster of 13 landowners (mix of active farmers and lifestyle block owners) in the vicinity of Poihipi Road and Tuhingamata Road, plus several landowners near Tirohanga and Marotiri.

¹⁷ In order to gain insights into route feasibility.

As before, proximity is the critical factor, and the assessment at this stage involved choosing a route which minimised overall proximity to dwellings and other community facilities. The combined assessment results were summarised in section 5 of the Preferred Route Report.

Draft Centre Line and Tower Locations:

This stage of the SIA began with a review of existing research on the social impacts of transmission line infrastructure, which presented a qualitative assessment and description of social impacts/issues based on the actual experience of landowners living close to existing transmission lines in various parts of New Zealand (see section 4.1 and Appendix 5 of this report).

Once the draft centre line was identified¹⁸, a detailed analysis of separation distances between dwellings and centre lines, involving a comparison of the existing B-Line and the proposed C-Line was carried out (see section 4.3 of this report). This assessment will be supplemented with other sources of information, including information collated from discussions between Transpower's two property managers and affected landowners. An overview of the SIA activities associated with each stage, indicating how proximity considerations have been incorporated at each stage is provided in Table 1.

Table 1: SIA activities by stage

Route selection Stage	Timing	SIA-relevant activities	Basis of SIA input to decisions
Area of Study	January-June 2009	- Preliminary desk-based SIA prepared by Beca	Consideration of community of interest
Route Options selection	July-September 2009	- Review of secondary data - Team workshop ¹⁹	Consideration of locations of urban residential areas; rural dwellings identifying more densely settled areas; locations of community facilities.
Preferred Route Option	October 2009-February 2010	- Written submissions/Open Days - Field visit with scoping interviews ²⁰ - Discussions with other experts - Analysis based on aerial photos and dwelling/building counts - Team workshop	Consideration of numbers of dwellings and community facilities, and likely proximity for each route.
Centre line definition and associated assessment of effects	March-September 2010	- Review background research on social effects typically experienced with transmission infrastructure - Field visit with centre-line team - Meetings at Mokai marae - Open Days/written submissions - Spatial (separation) analysis based on aerial photos and centre line map	Qualitative assessment of actual experience of transmission lines; Consideration of proximity to dwellings; Systematic observations of Transpower property managers' landowner discussion; and direct observation.

¹⁸ The procedure involved a property-by-property assessment by landscape (landform) and technical experts, informed also by the knowledge that proximity is a critical factor, and informed by initial discussions with each landowner concerned.

¹⁹ As previously footnoted, Dianne Buchan substituted for James Baines at this workshop.

²⁰ See Appendix 1 for details of Scoping Interviewees

Range of information sources for the SIA:

At various stages of the SIA work reported here, the following sources of information have been drawn upon -

- interviews with landowners and community representatives (16 scoping interviews in November 2009 involving 10 properties in the Area of Study; 3 in-depth interviews in September 2010, including a local historian with detailed experience of the maori and pakeha history of the Area of Study;
- interviews with Taupo District Council staff (planner and community development);
- written submissions and written feedback forms (39 at the route options stage and 74 at the preferred route stage);
- 24 written submissions on Contact Energy's Te Mihi power station consent application;
- attendance at two community meetings in Mokai (12 May 2010 and 2 September 2010);
- Taupo District Policy and Planning documents²¹;
- previous New Zealand research on host experience of electricity transmission lines;
- Statistics NZ census data 1996-2006
- Ministry of Education roll data for schools and pre-schools in the Area of Study;
- land title data for rural sub-divisions and land purchases in the Area of Study;
- discussions with Transpower property managers;
- discussions with Transpower project staff;
- discussions with other technical consultants engaged by Transpower;
- attendance at Transpower route options workshop (10 November 2009).

1.7 Transpower communications with stakeholders

Transpower has employed a variety of methods for communicating with and engaging with stakeholders during the course of this planning and assessment period. These include letters to stakeholders, Project Newsletters, Open Days, visits by consultants and visits by Transpower's Property Managers.

The sequence of Transpowers' communication events is shown in Appendix 2.

1.8 Structure of this report

The remainder of this report addresses the following -

- project description (Section 2)
- the existing social environment (Section 3)
- the potential (conceptual) scope of social effects and related issues (Section 4)
- assessment of social effects and related issues for this proposal (Section 5)
- mitigation and monitoring of effects (Section 6)
- conclusions (Section 7).

²¹ e.g. Taupo 2050; Taupo District Plan Change 19 Decision.

2 PROJECT DESCRIPTION

2.1 Project overview

The project involves the construction, operation and maintenance of a new 220 kV double circuit overhead transmission line between the Wairakei and Whakamaru substations (called the “WRK-WKM C Line”), both located within the boundaries of Taupo District. The new line has a length of approximately 40 kilometres. The works include -

- construction of the support structures (towers);
- installation of the insulators, conductors and earth wires and other ancillary fixtures and fittings; and
- extension/alteration to the existing Wairakei substation, and connections to the Whakamaru Substation (including the new Whakamaru North switchyard proposed as part of the North Island Grid Upgrade Project (NIGUP)).

The new WRK-WKM C Line will replace the existing Wairakei–Whakamaru B Line (“WRK-WKM B Line”), which was commissioned in 1961²². Consequently, this project includes the decommissioning of the WRK-WKM B Line, including its dismantling and removal.

2.2 Changes in infrastructure

The existing WRK-WKM B-Line is a 220 kV single-circuit transmission line comprising 110 single-circuit, flat-top towers, typically 25 metres tall. The proposed WRK-WKM C-Line is a 220 kV double-circuit transmission line comprising 106 steel lattice towers, with an average height of 42 metres, between the two sub-stations. Thus the new towers will have a substantially higher profile²³ than the existing towers, but there will be slightly fewer towers overall.

The existing B-Line is a single-circuit line which carries three conductors (lines) of 2.9 cm diameter, while the proposed C-Line is a double-circuit, duplex line which will carry twelve conductors of 3.4 cm diameter.

2.3 Change in route and centre line

The first point to note in any discussion of transmission line upgrading is that “upgrading an existing line” or “re-using an existing route” does not imply literally building a new transmission line along the same centre line and replacing existing towers with new towers. The transmission services of the existing line have to be maintained while the new line is constructed. Therefore, to avoid significant safety risks for construction workers, a new line would typically be located at least 50 m away from an existing ‘live’ line, except where tower siting is particularly constrained, where temporary bypass lines can be used. This requirement creates the opportunity for some fine-tuning in centre line location, if assessed as desirable.

²² The WRK-WKM A-Line, via Atiamuri, had been commissioned three years previously in 1958.

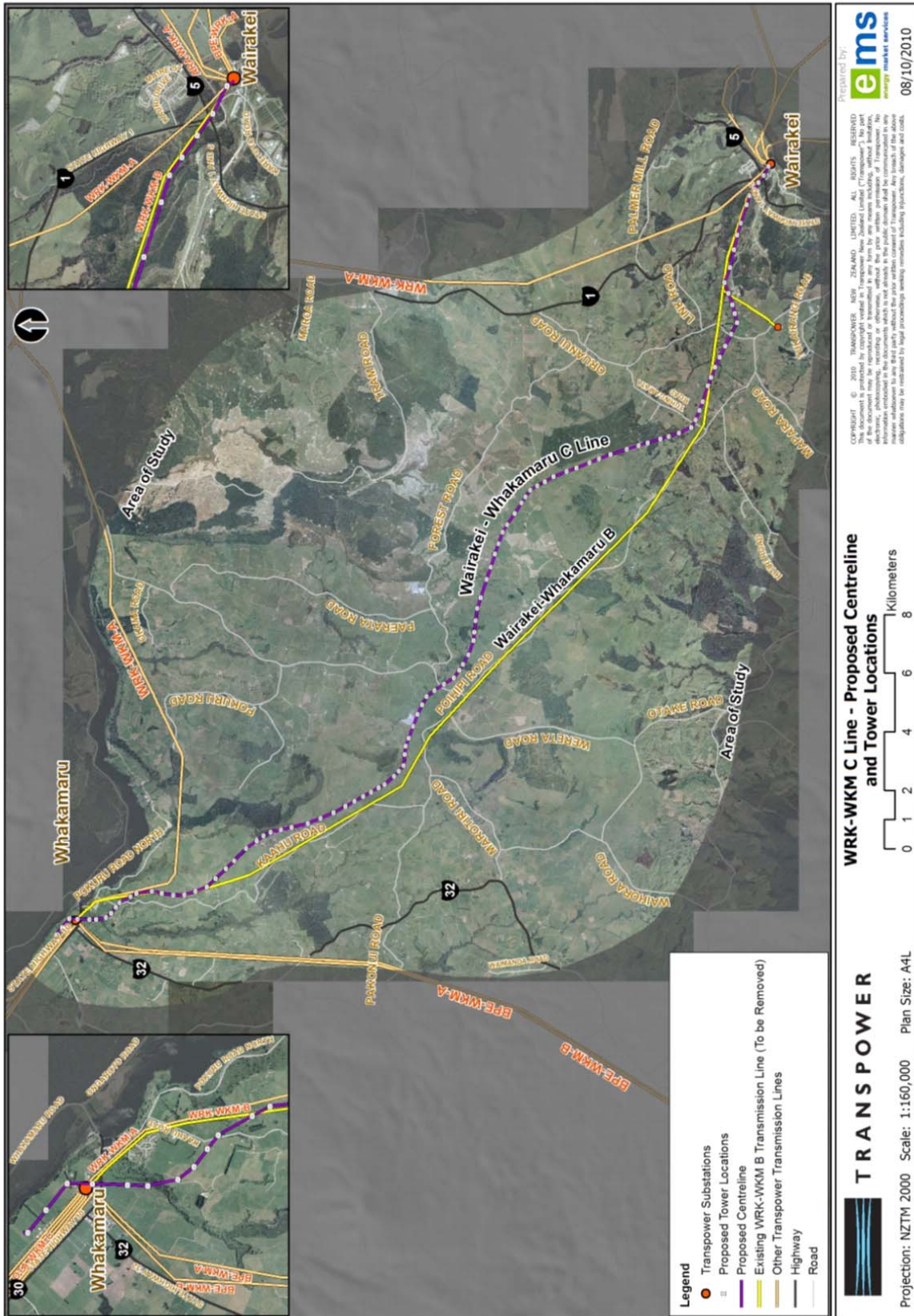
²³ Although this increase in height can sometimes be reduced by judicious tower siting

The strategic-level preferences expressed by residents and stakeholders in early consultation have been interpreted as follows -

- upgrade the existing line, where people have become accustomed to seeing and working with transmission infrastructure in their environment and neighbourhood;
- keep lines away from dwellings, indeed use the opportunity afforded by the need to shift the centre line to increase separation distances to dwellings, as much as possible where this can be done within environmental and technical considerations and without significantly adversely affecting other properties;
- select infrastructure to provide for long-term capacity growth in transmission load, and select a route which is likely to have minimal effect on long-term land-use patterns.

The outcome proposed involves a C-Line route similar to the existing WRK-WKM B-Line route over approximately two-thirds of its length, as shown graphically in Figure 3. More details of the proposed WRK-WKM C-Line will be discussed in Section 4 of this report.

Figure 3: Proposed C-Line centre line and existing B-Line centre line



2.4 Construction time frame and activities

Based on estimates provided by Transpower, the whole construction sequence is expected to take approximately 18 months, assuming that construction activities will be allowed seven days per week between the hours of 7 am and 6 pm. The duration of construction activities on any single property will depend on the number of towers located on a property. However, property-specific duration is expected to be of the order of 4-9 months²⁴. In addition to the construction sequence, the removal of the existing B-Line is expected to take a further 12 months in total.

2.5 Standard easement obligations

Transpower intends to purchase easements from landowners whose land the proposed line will cross. Such easements would be at least 50 m wide and come with certain obligations on the landowner and on Transpower. Standard Easement Obligations on either party include the following general principles -

The Landowner will:

- not alter the land contour in the easement (except for normal farming operations);
- not build any new structures within the easement;
- not plant trees that will grow into the lines;
- maintain minimum clearance (4 metres) from the lines when operating machinery;
- not knowingly flood or light fires in the easement area;
- not subdivide land in the easement (except with Transpower's approval); and
- not do anything to damage the line or supporting towers.

Transpower will:

- give notice prior to coming to the property (except in emergency situations);
- cause as little disruption as possible; and
- pay compensation for temporary disturbance (in addition to payment for the purchase of the easement).

²⁴ A property hosting a single tower could expect ~3 weeks of preparatory work leading up to pouring the foundations; a gap of 1-2 months before work commences on erecting the tower; followed by ~1 month of additional activity. For a property hosting 5 towers, the corresponding periods could be ~3 months, 1-2 month's gap and 5 months.

3 THE EXISTING SOCIAL ENVIRONMENT

3.1 Introduction to the Area of Study

The Area of Study is defined by the Wairakei and Whakamaru substations at the end points. The most substantial areas of intensive residential settlement are also located at these end points. The Waikato River generally forms the northern and eastern boundaries to avoid crossing this feature, which is valued for a number of environmental, recreational and social reasons. A notional western boundary is formed by the twin Bunnythorpe to Whakamaru A and B transmission lines. The southern boundary was defined by an off-set from the straight line between the two substations, with a buffer to Lake Taupo. This apparently arbitrary boundary does not artificially fragment any well-defined community of interest. The Area of Study is shown in Figure 4 and the Route Options that were considered are shown in Figure 5.

Figure 4: Study Area

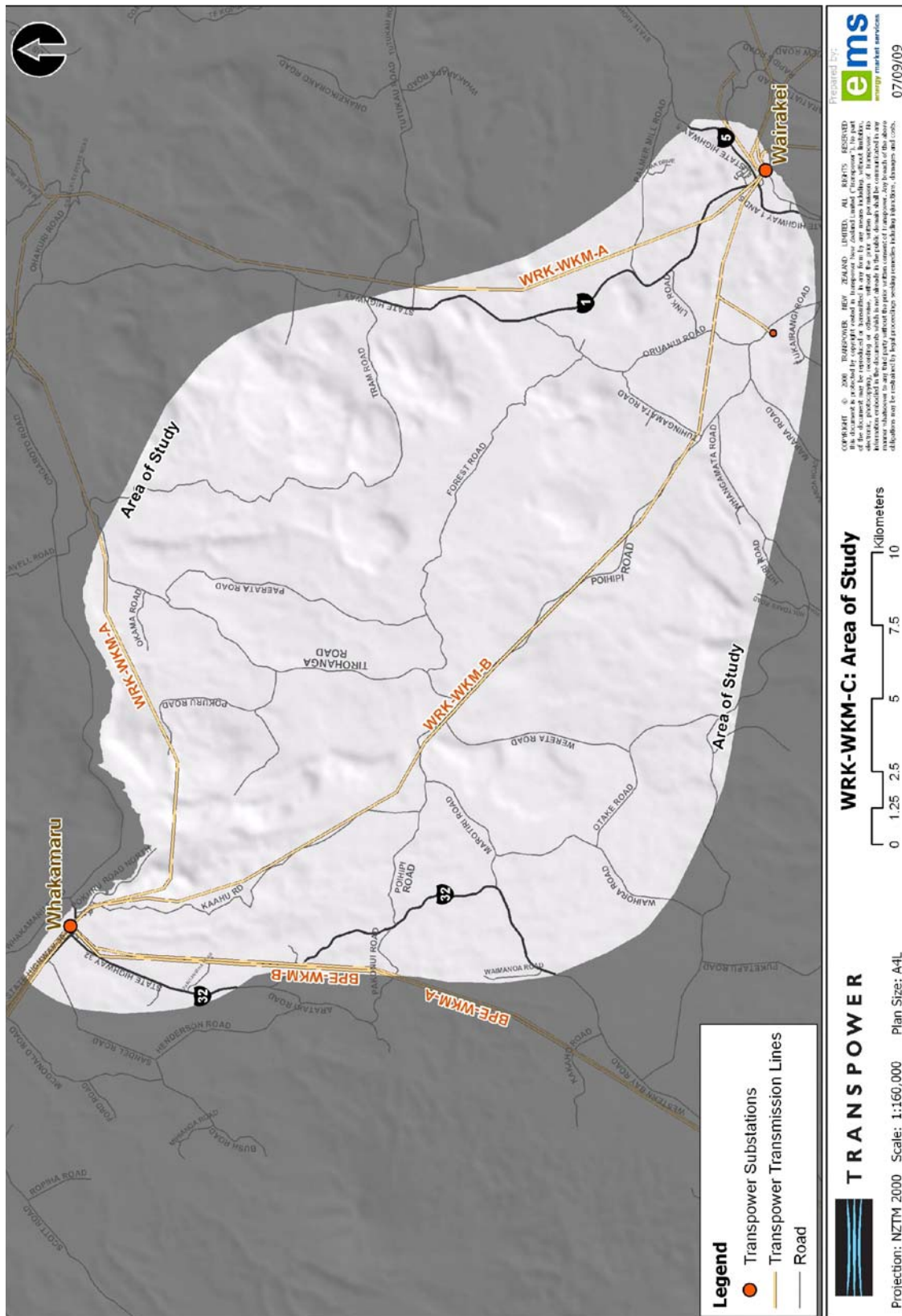
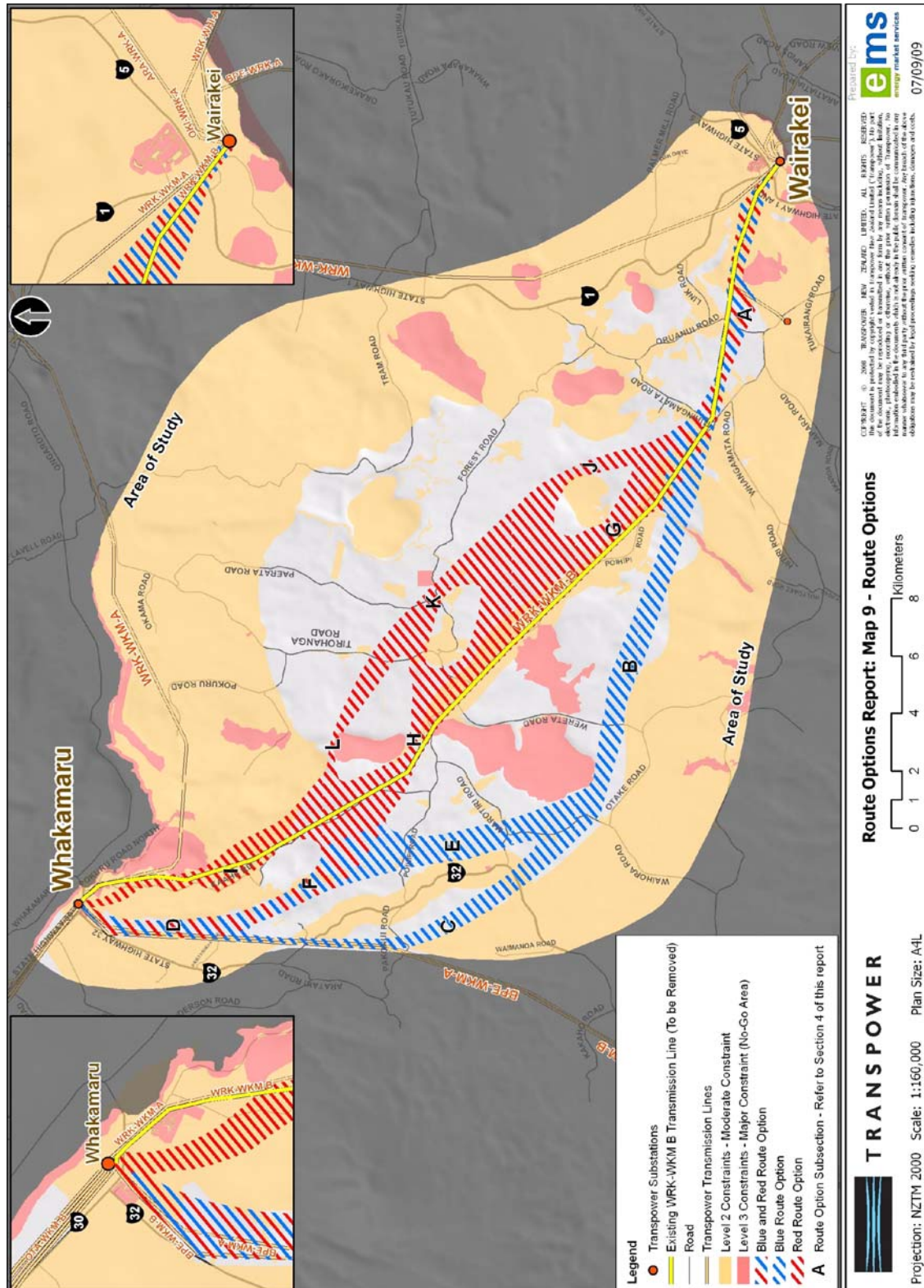


Figure 5: Route Options



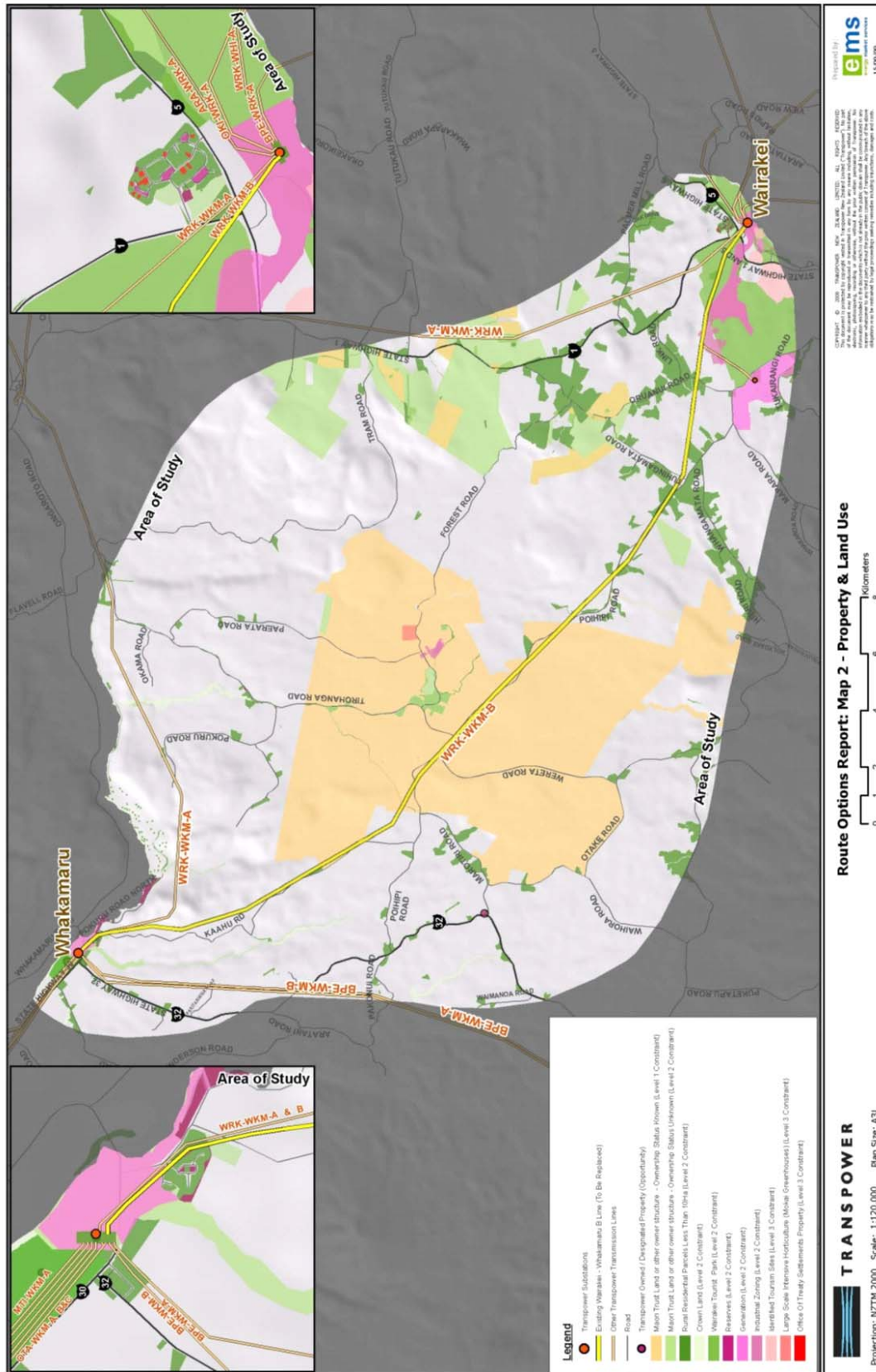
While being predominantly rural in character, the Area of Study encompasses the settlements of Wairakei, Mokai, Atiamuri and Whakamaru. Atiamuri will not be studied in further detail, since the preferred route is at least 14 km distant at its nearest point.

The Area of Study is traversed by a network of mostly tar-sealed roads. Poihipi Road provides a direct link from Taupo beyond the south east corner of the Area of Study to SH32 on the western edge of the Area of Study. In combination with Kaahu Road, Poihipi Road forms essentially a central east-west route through the Area of Study between Taupo and Whakamaru, with various other roads branching off either to the north or south. Mapara Road and Whangamata Road connect to the lake-side development areas to the south, while Oruanui Road, Forest Road, Tirohanga Road and Paerata Road provide connections towards the north.

Compared with today's pattern of development in the Area of Study, it is relevant to point out that until the B-Line was constructed and commissioned in 1961, there was no public road for most of what is now Poihipi Road²⁵. Since that time, the road has been extended and sealed, so that rural lifestyle residents living near Marotiri are no more than 20 minutes drive from the edge of Taupo. Thus, the development of transmission infrastructure has itself been instrumental in improving access for all rural residents to their main urban centre, and has played its part in facilitating the growth of rural lifestyle development along what is now the Poihipi Road axis. This pattern of settlement is evident from the map in Figure 6 which shows the current status of residential development in the Area of Study.

²⁵ The origins of Poihipi Road were linked with the need to provide road access for establishing the B-Line.

Figure 6: Property and residential land use



3.2 Population trends and settlement patterns

Land-use patterns and trends differ markedly across the Area of Study, as have growth rates in resident population over recent years (see Table 2). The population of Wairakei Village has been virtually constant for more than a decade, while the population of Whakamaru declined by 33% between 1996 and 2006. In contrast, the population of the rural areas throughout the Area of Study increased by 45% over that period. Rural residential development has clearly been a primary driver of population growth in the Area of Study for more than the last decade, while the resurgence in pastoral farming and the trend towards more labour-intensive dairy farming has contributed as well.

Table 2: Recent population trends in Area of Study communities

	<i>UR Pop. 1996</i>	<i>UR Pop. 2001</i>	<i>UR Pop. 2006</i>	<i>Pop.Ch. '96-'06</i>	<i>% Pop.Ch. '96-'06</i>
Wairakei	462	480	465	3	1%
Atiamuri	120	117	72	-48	-40%
Mokai	159	141	180	21	13%
Whakamaru	129	99	87	-42	-33%
Rural areas	1590	1848	2301	711	45%
Whole Area of Study	2301	2544	2925	624	27%

The western part of the Area of Study - from Mokai westwards to SH32 - has remained predominantly in pastoral farming activity, with several sizeable areas of indigenous vegetation just west of Wereta Road. This area has sporadic rural settlement and generally shows little sign of rural-residential clusters, with the exception of Marotiri Road. The northwestern quarter of the Area of Study - along Kaahu Road experienced negligible population growth during 1996-2006, whilst the southwestern quarter, along Waihora Road and SH32 experienced modest population growth (22%) compared with 45% for all rural areas combined.

The central-eastern part of the Area of Study - the Forest Road/Oruanui Road loop - has seen considerable plantation forestry clearance and replacement by pasture for dairy farming. Rural re-population in this quarter was marked during the 1996-2006 period (68%), and appears to have continued subsequently with an increasing number of dairy farm workers, as well as some rural-lifestyle development.

The southeastern part of the Area of Study - Oruanui Road, Tuhingamata Road, Link Road and the eastern end of Poihipi Road - is characterised by the obvious conversion of pastoral land uses into rural-residential, lifestyle use, with the occasional rural commercial enterprise. This transition appears to have moved progressively in a westerly direction (i.e. increasing distance from town), evidenced by the relative rates of population growth which were minimal around Link Road and highest west of the intersection of Poihipi Road and Whangamata Road²⁶. This trend aligns with the Council's preference²⁷ for concentrating further rural-residential sub-division south of the Area of Study, closer to the Lake and the main Taupo urban area. Data for these trends are summarised in Table 3 below. It is noted that consent has been granted for another 87-lot Farm Park development between Poihipi and Whangamata Roads. At the time of this

²⁶ Some of this may reflect new rural-residential development southward along Whangamata Road.

²⁷ Refer to Taupo District Plan Change 19 and Taupo 2050 Growth Strategy

assessment, this consent had not been implemented. However, most new rural residential development in recent months is occurring outside the Area of Study, in locations such as the Mapara Structure Plan area, Kinloch, and Wairakei International Golf Course expansion into residential development. Rural-residential development in the Area of Study appears to have slowed, with the remaining capacity far exceeding demand at present, and many 'For Sale' signs evident.

Overall, settlement densities are greatest in the southeast, near the eastern end of Poihipi Road²⁸ with other small pockets of lifestyle development further west (refer to Figure 6). All the lifestyle development in the Area of Study has occurred in the presence of the existing B-Line. Much of the area is not a 'rural arcadia'; farming activity is increasing, and there are several geothermal power stations in existence already.

Table 3: Population growth trends distinguished by rural-residential location

	<i>UR Pop. 1996</i>	<i>UR Pop. 2001</i>	<i>UR Pop. 2006</i>	<i>Pop.Ch. '96-'06</i>	<i>% Pop.Ch. '96-'06</i>
Northwestern quarter: Kaahu Rd/Poihipi Rd Pastoral	99	105	102	3	3%
Southwestern quarter: Wereta Rd/Marotiri Rd/SH32 Pastoral	339	366	414	75	22%
Central-eastern area: Forest Rd/Oruanui Rd Dairying/forestry/life-st.	159	198	267	108	68%
Link Rd/Oruanui Rd: Rural life-style	123	132	129	6	5%
Oruanui Rd/ Tuhingamata Rd/ Poihipi Rd: Pastoral/lifestyle	102	135	156	54	53%
Poihipi Rd/Whangamata Rd: Pastoral/lifestyle	105	165	261	156	149%

Much of the land in the Area of Study has rolling and fractured topography. Along with forestry blocks and areas of native bush, much of the rural land also has significant levels of established trees so that, overall, many rural dwellings have quite limited longer-distance views in certain directions.

3.3 Land-use patterns and trends

Over the past several decades the main features of land use and land-use change in the Area of Study have involved extensive pastoral farming, extensive forestry and the advent of rural-residential life-style blocks.

A large centre part of the Area of Study (see Figure 6) is owned by two Maori trusts - the Tuaropaki Trust and the Waipapa Trust. Most of this land is now farmed. Other notable land uses include Tuaropaki geothermal power station near Mokai²⁹, which exports to the grid via a privately-owned line into Whakamaru, and a substantial nearby horticultural enterprise utilising

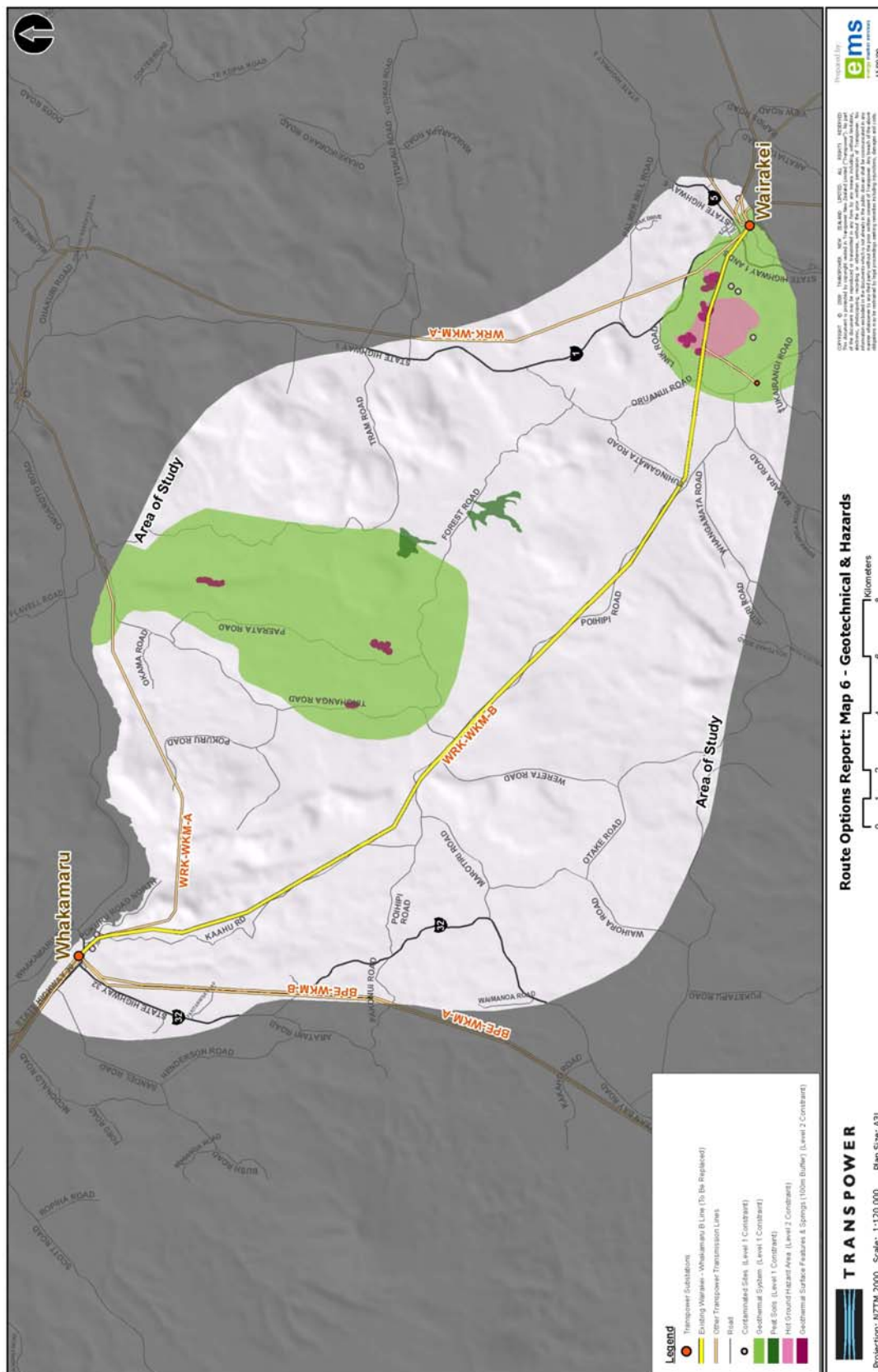
²⁸ Also along Link Road, Oruanui Road, Tuhingamata Road and Whangamata Road

²⁹ In partnership with Mighty River Power.

geothermal waste heat. Extensive glass houses are used to grow crops such as tomatoes and capsicums for export. These two enterprises are significant local employers. Just south of the junction of Poihipi and Tirohanga Roads is the Cadet Training Unit operated by the Waipapa Charitable Trust.

A second existing geothermal power station between Poihipi Road and Tukairangi Road in the south east corner of the Area of Study - Poihipi power station - is owned and operated by Contact Energy, while the proposed Te Mihi power station, about one kilometre north of the Poihipi power station, has been consented but not yet built. Figure 7 shows the location of active geothermal systems and surface features within the Area of Study.

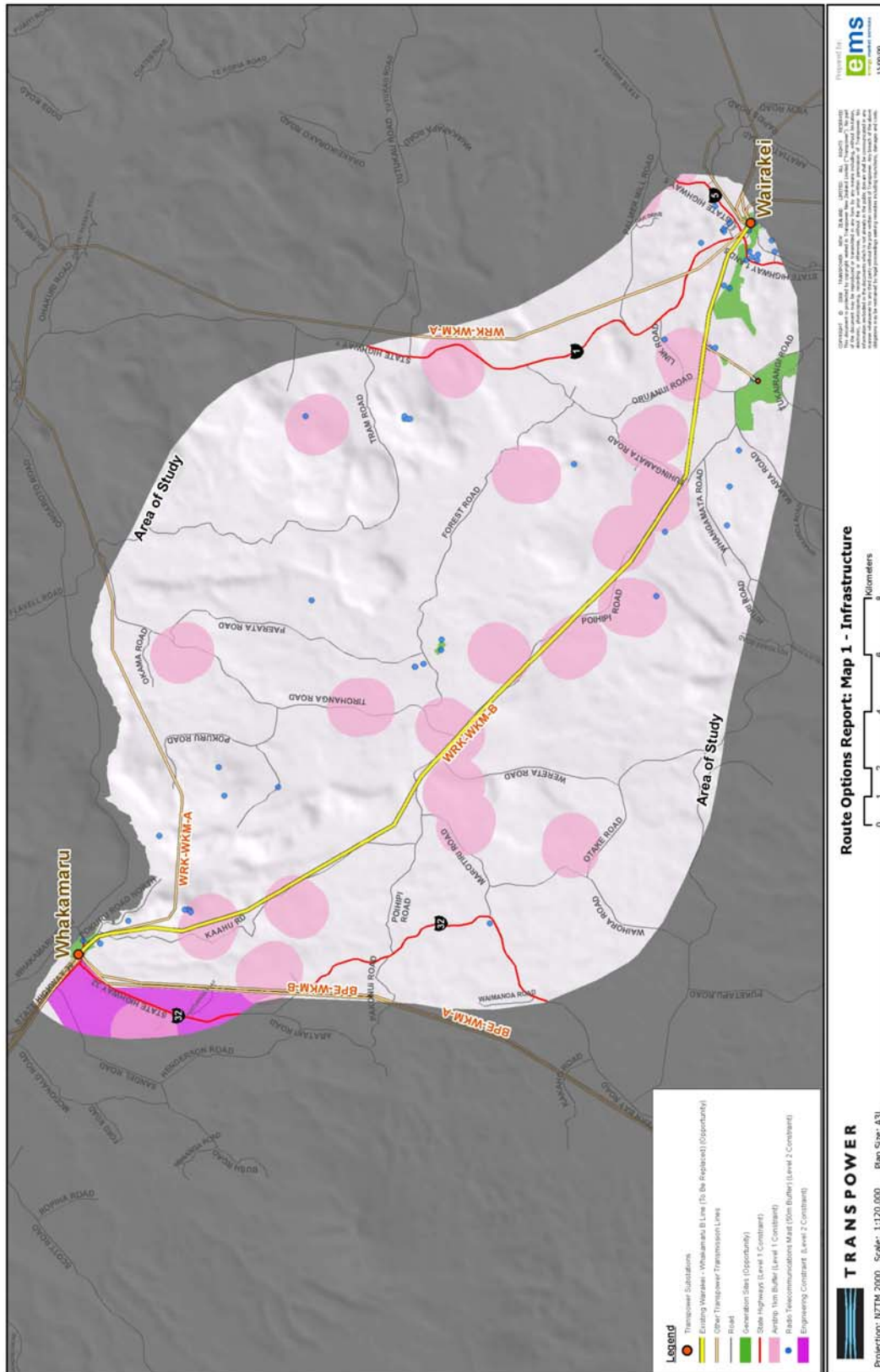
Figure 7: Geothermal systems and surface features



With the exception of the relative concentration of rural residential development in the southeast of the Area of Study, remaining exotic forest along the eastern fringes of the Area of Study (see Figure 6) and several sizeable Significant Natural Areas further west, in the vicinity of Wereta Road and Pokuru Road, most of the Area of Study is actively farmed. There is evidence of significant recent dairy conversions from exotic forest, particularly in the northeast and northwest. Farms are relatively large everywhere and there has also been some shift between sheep and beef properties and dairying in recent years.

The widespread extent of pastoral farming is evident from the distribution of farm airstrips throughout the Area of Study, shown in Figure 8. Most of these are notable for their proximity to public roads, facilitating cartage of materials for aerial spreading. Interviews for this assessment indicate that some airstrips now experience little use, while others are still in active use. In some cases, for example in the west near SH32, an airstrip provides something of a farming community facility, its use being shared by a group of farmers in the neighbourhood.

Figure 8: Farm airstrips and radio-telecommunications masts



3.4 Particular communities

Wairakei:

Wairakei is a well-established ex-NZED power station village. Displaying an ordered and compact urban area, Wairakei is well provided with local community facilities including a primary school, tennis courts, playground and The Lodge Bar and Café. For all shops and other services, residents of Wairakei turn to Taupo, some ten minutes drive along SH1.

The village is more than 200 m from the existing WRK-WKM B-line, and is totally screened visually by established trees along the southern perimeter of the village. Also the village is largely on much higher ground and 'faces' northeast rather than south.

Nearby Wairakei Thermal Valley hosts a camp ground and Café³⁰ close to the existing B-line; the B-line passes directly over the spill-over camping area but not over camp buildings. The nearest tower on the ridge (up Lone Pine Rd) is largely masked from view by pine trees, but several towers nearer to the Wairakei power station are visible from the camp ground.

Mokai:

The settlement of Mokai is located at the centre of the Area of Study. In terms of the present settlement, long-established facilities include the Mokai marae, at the junction of Forest and Tirohanga Roads, along with the much newer papakainga housing and recently opened playcentre, housed in what was previously the Mokai primary school.

However, Mokai is a settlement which has a history³¹ far longer than any other settlement in the Area of Study; a history which attaches considerable significance to this locality.

As an over-night settlement or permanent community, Mokai has its origins in the 1890s. Prior to this, Mokai was only a camping area, with actual settlements several kilometres away at the forest edges. The milling of the native forests in the area brought about permanent settlement; the milling companies, both government and private, being responsible for bringing physical and social infrastructure to Mokai. The railhead from Putaruru came right into Mokai. The site for the marae and meeting house was selected and built in the 1890s.

Much of the forested land around Oruanui marae had been vested in the crown and sold off to private interests. However, Maori at Mokai were associated with the kingi movement which resulted in different ownership outcomes. As a result, this land has never been alienated from Maori ownership, and remains to this day in the Trusteeship of the two Trusts.

At its peak, Mokai was said to have a resident population of up to 5000 people. The settlement had a broad range of social amenities - halls, community gymnasiums, schools - grounds for rugby, cricket, a golf course, hot pools, sports days, medical services funded by the community, and so on. At this time, Taupo was just a few homes and baches on the edge of the Lake. Mokai's heyday as a permanent settlement came to an end in the early 1940s when the mill at

³⁰ More discussion of the circumstances of this business enterprise can be found in the Recreation & Tourism Assessment Report prepared by Mr Bamford.

³¹ Taylor Baines acknowledges the input to this section provided by Perry Fletcher and the people of Mokai.

Maroa was set up. All the labourers went en masse to Maroa, a town which lasted until 1963, when pressure went on the government of the day to ease up on the milling of native forests.

More recently, the Maori landowners at Mokai have not relied just on one resource as before; geothermal development has been complemented by farming, once it was discovered in the 1950s that aerial top-dressing could address cobalt deficiency and allow more intensive pastoral development, including dairying. Other commercial developments such as the glass houses have been noted already in section 3.3. While the highly-automated power station involves just six staff, the glass-house operation has created about 100 jobs. A dairy factory promising 60 jobs is under construction nearby, and a native nursery involves another six workers.

Most residents and landowners in Mokai are shareholders in both Trusts, resulting in a strong relationship between the Trusts and the community at Mokai.

Looking to the future, Mokai residents at several meetings have expressed the fact that many people have strong sentimental attachments to this place³², and the hope that some of the many absentee landowners could return. Some of the younger generation have already returned, with the re-vitalisation reflected in the new business initiatives and facilitated through initiatives such as education grants.

Whakamaru:

The settlement of Whakamaru was established in 1956 as an NZED hydro village when the Whakamaru dam was built. In the pre-computer era, Whakamaru was the location of an important electricity control centre along the Waikato River. ECNZ³³ withdrew from Whakamaru in the early 1990s, ceding the village infrastructure and land to the Taupo District Council and putting the approximately 60 residential properties up for sale. At the present time, about two-thirds of these houses are occupied permanently, with the remainder being used as holiday homes. The latter have been increasing in numbers in recent years as the settlement has become a recognised destination and local hub for recreational activities on the River, including water sports and fishing. This explains the significant reduction in permanently resident population reported in section 3.2 (Table 2) above. The present residential community comprises a mix of retired people³⁴, people living on various benefits, and people who work³⁵ on farms or nearby settlements such as Tokoroa and Mangakino.

Whakamaru now has two distinct settlements slightly less than one kilometre apart, located on the banks of the Waikato River near the Whakamaru hydro dam. The eastern-most settlement, described in the previous paragraph, with the primary school nearby. As shown in the Preliminary SIA Report³⁶, the existing A- and B-Lines pass over houses³⁷ on the northern fringe

³² For example, the lands administered by the Tuaropaki Trust in 2010 have more than 2,000 individual owners.

³³ The SoE equivalent of NZED

³⁴ See Table A4.5 in Appendix 4.

³⁵ See also Table A4.4 in Appendix 4.

³⁶ Figures 13 and 14 on pp.41-42.

³⁷ When the lines were first erected in the 1950s, this row of houses did not exist; they were built subsequently in the mid-1970s.

of the settlement as well as a corner of the school's playing fields. Indeed, all the dwellings in this settlement are within 250 m of these two lines. A separate and newer area of settlement, comprising commercial premises³⁸ as well as residential sections, is located further west, at the junction of SH32 and the road to Mangakino. The Whakamaru Playcentre is situated several kilometres south of this settlement, on its own on Arataki Rd. This western-most part of Whakamaru is approximately 200 m away from the Whakamaru switchyard, which is a major installation in the context of the North Island's national grid network, with no fewer than nine transmission lines converging at this point. All dwellings in this part of the settlement are within 200 m of the two transmission lines which approach from Bunnythorpe in the south (near Palmerston North).

With no spare land left in the old hydro village, any new development has to occur in the newer western part of Whakamaru.

3.5 Rural infrastructure and community facilities

Community infrastructure in the rural areas is focused around Maori communities and farming communities. Already mentioned is the settlement of Mokai. Another marae exists at Oruanui, just north of the junction of Oruanui and Tuhingamata Roads, with St Matthews Church located nearby.

Schools and pre-schools are frequently important community focal points and social meeting points in dispersed farming communities. Tirohanga and Marotiri Schools are examples of this, and both also have community halls nearby and well established community networks and patterns of social behaviour. Tirohanga has strong community-focused social activity, with regular Friday evening gatherings and other social activities organised. The Tirohanga Kindergarten closed in May 2009, despite strong support in terms of the number of children attending. People from the Tirohanga area are now turning to the Mokai playcentre which has opened in what used to be the Mokai school building. It is likely that this facility will attract children from the Forest Rd area as well. The Whakamaru Playcentre operates in a building at the junction of Tihoi and Arataki Rds, midway between Marotiri and Whakamaru.

Farming airstrips, including some which serve local groups of farmers, have been mentioned already. The other notable local rural infrastructure is the stock yards near the junction of Poihipi and Oruanui Roads. Several rural stock and station firms operate from these premises.

The life-style areas exhibit various clusters of life-style lots, particularly small 'valley clusters' along Link Rd, lower Oruanui Rd, Tuhingamata Rd, upper Marotiri Rd, and several sections of Poihipi Rd. None of these clusters have any community infrastructure in the way of halls, reserves, or other buildings. Nor is there any local social organisation evident. Interviews for this assessment indicate that these rural residents tend to orient towards Taupo for their social and recreational activities, as well as their services.

³⁸ Including two veterinary practices, squash courts, garage, bar and restaurant, café, dairy and tea rooms.

3.6 Demographic features

Demographic statistics to accompany the foregoing description are tabulated in Appendix 4. These include data on the age distribution of the resident population, the distribution of ethnicity, and aspects of household income and employment status.

Comparisons are made between the population resident in the Area of Study and the population of Taupo District. Differentiation is also possible between sub-areas³⁹ of the Area of Study and also the specific communities of Whakamaru, Wairakei and Mokai⁴⁰.

In terms of age distribution in the resident population⁴¹, the principal difference between the Area of Study and Taupo District as a whole reflects the propensity for older people to migrate towards towns and cities when they retire. The District in 2006 had 14% of its usually resident population aged 65 years and above, whereas the Area of Study had only 5% in this age bracket. The rural lifestyle sub-area exhibited a slightly higher proportion (8%) while the actively farmed areas were correspondingly lower (3%). The retirement component of the Whakamaru Village population is also evident in these data (7%).

In terms of ethnicity⁴², the Area of Study and the District were aligned in their proportions of European residents (65%) but markedly different in their proportions of Maori residents - 27% for the District and 20% for the Area of Study. However, certain sub-areas had markedly different proportions - 8% in the rural lifestyle sub-area, and 28% in the Mokai/pastoral sub-area. The two settlements of Wairakei (60%) and Whakamaru (38%) had the highest concentrations of residents acknowledging Maori ethnicity. The latter case probably reflects younger Maori wage workers associated in some cases with nearby Trust enterprises.

In terms of length of residence⁴³, when compared with Taupo District and even national patterns, the Area of Study is typically over-represented in new arrivals (36% arrived between 1 and 4 years ago compared with 31% for the District) and under-represented in long-term residents (6% arrived between 15 and 29 years ago compared with 9% for the District). This reflects the recent trends in both rural-residential developments and in the revival of agriculture linked to dairying. The steady recruitment of new residents into Whakamaru since ECNZ withdrew in the early 1990s is also evident in these data.

In terms of household income⁴⁴, households within the Area of Study generally enjoyed higher income levels than the District as a whole. Households with income greater than \$100,000 in 2006 were almost as likely in the Area of Study (10%) as they were in the District (11%). On the other hand, households with income less than \$20,000 in 2006 were far less likely in the Area

³⁹ Distinguished as (a) the sub-area of rural lifestyle development in the south-eastern part of the Area of Study, and (b) the sub-area of pastoral/forestry which spans most of the remainder of the Area of Study.

⁴⁰ In Appendix 4 the term "Mokai/Trusts" refers to the statistical meshblocks which incorporate the settlement of Mokai as well as the people resident in the surrounding areas owned by the Tuaropaki and Waipapa Trusts.

⁴¹ See Table A4.1 in Appendix 4.

⁴² See Table A4.2 in Appendix 4.

⁴³ See Table A4.3 in Appendix 4.

⁴⁴ See Table A4.4 in Appendix 4.

of Study (6%) than in the District (13%). Rural sub-areas within the Area of Study were represented more at the upper end of the income bracket (10%-15% greater than \$100,000) and less at the lower end (3%-6% less than \$20,000).

While the District unemployment rate⁴⁵ in 2006 (3%) was lower than the national rate (5%), the Area of Study reported no unemployment at all, and other forms of benefits (sickness - 2%; DPB - 2%) were well below District rates (4% and 6%) respectively.

3.7 Expressed values

Important local values can be inferred from a variety of information sources, including written responses to Transpower's consultation letters and materials, discussions with landowners and at hui, public responses at Open Days, and written submissions on other recent proposals in the Area of Study such as the Te Mihi power station resource consent application.

Taken together, these sources of expressed values point to the following as important values amongst the residents of the Area of Study -

- a sense of fairness and equity of treatment by Transpower;
- a sense of place and people's sentimental attachment to place;
- the quality of the rural landscape, the rural character and visual amenity;
- the importance of the home property in terms of retirement security;
- the avoidance of risks to human health;
- the avoidance of disruption to farming and other business operations;
- the avoidance of disturbances to rural residential amenity from intrusive noise;
- human safety and the avoidance of physical hazards from proximity to the transmission infrastructure;
- the possibility that there might be some economic benefits to the local community, by way of employment opportunities or future geothermal development;
- the consideration of social issues as well as technical and environmental issues.

⁴⁵ See Table A4.6 in Appendix 4.

4 THE POTENTIAL SCOPE OF SOCIAL EFFECTS AND RELATED ISSUES

4.1 Overview of social effects from transmission infrastructure

In broad terms, the social effects associated with the construction and operation of high voltage transmission lines fall into the following categories:

A) Electricity producer and consumer benefits⁴⁶ including -

- i) operational returns to electricity generators located in or near the Area of Study;
- ii) user benefits for residential electricity consumers in major load centres remote from the Area of Study⁴⁷;
- iii) user benefits for commercial and industrial consumers in major load centres remote from the Area of Study;
- iv) enhanced security of supply for all these electricity consumers.

B) Property-related effects on landowners living in the area through which the transmission line passes including -

- i) construction-related effects associated with building the proposed C-Line - transitory nuisances, disturbances and disruptions to households and businesses⁴⁸ in the vicinity of the easement (e.g. from noise, dust, vehicle movements, etc.);
- ii) demolition-related effects associated with removing the existing B-Line - similar transitory nuisances, disturbances and disruptions to households and businesses in the immediate vicinity of the existing WRK-WKM B Line;
- iii) operation and maintenance-related effects associated with the proposed C-Line - permanent and sometimes continuous nuisances associated with the presence of the line and periodic disturbances (e.g. from transmission line contractors accessing towers and lines) associated with the maintenance of the line;
- iv) financial compensation to those properties directly intersected by the line or required to host towers.

C) Other non property-specific social effects including

- i) employment opportunities during construction of the C-Line and removal of the B-Line;
- ii) employment opportunities in on-going maintenance of the lines;
- iii) disruption to traffic and other road users as a result of construction-related traffic using local roads, particularly slow-moving heavy vehicles with over-dimension loads; and
- iv) new locations for restricted flying zones for aircraft operating in the agricultural sector.

⁴⁶ Note that all these categories of producer or consumer benefit can be considered to yield direct and indirect social benefits. By way of examples (1) operational returns to generators support the on-going employment of personnel in those organisations and the potential future growth of services to increasing numbers of consumers; (2) heating homes provides a comfortable living environment in cooler seasons, supports improved health status of the dwelling's occupants, and maintains their ability to keep attending school or work.

⁴⁷ Such as Hamilton, Tauranga and Auckland.

⁴⁸ Generally farming businesses, but not necessarily exclusively so. For example, constraints on the use of farm airstrips could shift the balance between aerial spreading and ground spreading of fertiliser.

For the national and regional communities of interest, the potential social effects of this proposal are likely to be universally positive. Most electricity generators, even those with local power stations, are national organisations and operate as part of national networks. Electricity consumer benefits supported by increased levels of electricity supply and enhanced longer-term security of supply accrue nationally and regionally. This is by virtue of the fact that the national transmission grid, of which this proposal is a part, is specifically a high-voltage network for long-distance transmission. Furthermore, many of the specialist skills required for line construction and line maintenance may be sourced from beyond the immediate community.

It should be noted that these national and regional-level social effects have not been formally assessed and quantified in this SIA.

For the local community of interest, and particularly for those communities within the Area of Study, most of the potential on-going social effects associated with having a transmission line pass through a neighbourhood are strongly related to proximity. The closer the line, the greater the potential risk that some kind of effect may be experienced. Conversely, the further away that the transmission line can be located, the less the likelihood that some kind of effect may be experienced. Hence the need for a detailed property-level analysis within the Area of Study.

4.2 Scope of effects assessed in this SIA

As pointed out in section 1.5, the principal geographic focus of this SIA has been on the people and communities living in and between Wairakei and Whakamaru. The SIA has been part of assessing an optimal new transmission line alignment between Wairakei and Whakamaru, and the social effects of the proposed transmission line.

In simple terms, this means that the primary focus of this assessment of social effects is on categories B and C. Category A social effects have not been assessed. Furthermore, recall that the potential effects on landscape and visual amenity, on recreational activities and tourism operators, on farming operations, on local traffic, and the potential effects on human health or telecommunications are addressed in separate assessments carried out by other experts (see Table 4 below). However, in the interests of providing a coherent overview of potential social effects, the findings of these other assessments will be drawn together in this SIA Report.

In the course of this assessment, information from previous studies of the generic types of social effects experienced by rural and peri-urban landowners living close to existing transmission lines has been reviewed and is summarised in this report⁴⁹. These include effects on visual amenity, perceptions of health risks, aerodynamic noise, EMF effects and potential interference with radio/TV reception, hazards from structural failure of transmission infrastructure, constraints on farming operations, and nuisances experienced with periodic maintenance activities involving contractor visits.

A range of potential construction-phase effects can also be deduced. These are all transitory in nature, and likely to be spread over a period from 4 to 9 months, depending on the length of line and number of towers to be erected on each property.

More detail on the nature of these potential property-specific social effects is provided in Appendix 5, where the links to various elements of social wellbeing are also indicated.

⁴⁹

A brief overview is provided in this section, with further detail in Appendix 5.

Direct effects on landowners whose properties are intersected by a transmission line or who host one or more towers are explicitly the subject of financial compensation, which has a bearing on their acceptability (net effect). Financial compensation is not payable to property owners if the land is not directly intersected by a transmission line. It is likely that the potential effects alluded to above will be experienced mostly by landowners on whose properties the transmission towers are being erected or removed. In which case, financial compensation applies. Some of the nuisance effects could be experienced by near neighbours as well, such as noise, dust and vibration. Conditions of consent to mitigate such risks should cover these properties as well.

Other potential social effects may apply more broadly through the Area of Study during the construction period. These include the potential benefits of employment opportunities for people living locally or the opportunity to provide rental accommodation to members of a temporary workforce. There may also be the potential for traffic effects on rural roads associated with construction-related traffic, particularly the slow movement of over-sized loads associated with tower components and conductors. Once constructed, the new C-Line will represent a shift in the location of restricted flying zones for aircraft working in the agricultural sector.

It should be noted that the identification of potential generic social effects in this section of the SIA Report should not be taken to imply that such effects will eventuate or will be problematic in the current case, or that they cannot be adequately mitigated. The purpose of providing this summary is merely to identify the overall scope and nature of the potential effects and to demonstrate how they are associated with aspects of the social wellbeing framework articulated in section 1.3 of this report.

4.3 Primary responsibilities for assessment of effects

Table 4 summarises those areas of social life which shape social wellbeing which are likely to be relevant in this case, noting where other technical assessments either cover or contribute to the assessment of effects.

Table 4: Areas of social life which shape social wellbeing

Areas of social life	Related assessment disciplines
A) The state of physical and mental health	Assessment of health effects (HIA, Dr Black)
B) The quality of housing, shelter, neighbourhood and living place	SIA.
C) Opportunities for income, employment and the quality of working life	SIA. Assessment of recreational and tourism effects as it relates to recreational and tourism businesses in the Area of Study (Mr Bamford). Assessment of effects on farming business activities (Mr Horton).
D) Opportunities for leisure and recreation, time to enjoy them, and access to quality outdoors/open space	SIA, as it relates to individual property owners within the Area of Study. Assessment of recreational and tourism effects as it relates to recreational visitors to the Area of Study (Mr Bamford).
E) Access to transport, communications and services	SIA. Assessment of effects on the use of farm airstrips (Mr Horton). Assessment of effects on traffic (Mr Kelly) Assessment of electromagnetic fields and radio interference effects (Mr Mitton)
F) The quality of the physical environment, a clean environment with aesthetic appeal.	SIA. Assessment of landscape and visual effects (Dr Boffa). Assessment of noise effects (Mr Wassilieff)
G) Influences on personal safety, public safety, autonomy or freedom from too much risk.	SIA Assessment of risks to aerial spreading contractors - fixed wing or helicopter (Mr Horton) Assessment of risks to other road users (Mr Kelly) Assessment of electromagnetic fields and radio interference effects (Mr Mitton)

5 ASSESSMENT OF LIKELY SOCIAL EFFECTS AND RELATED ISSUES

5.1 Basis for assessment

The assessments of likely effects presented in this section draws upon the following sources of information -

- direct observation of the Area of study during several visits, with observations made from public roads and from walkovers of several properties;
- review of feedback from consultation activities;
- a detailed property-by-property comparative analysis of the existing B-Line and the proposed C-Line, in terms of properties intersected and separation distances to existing dwellings (details reported in Appendix 6);
- discussions with Transpower's two property managers responsible for liaison with landowners and for property negotiations where easements will be required⁵⁰;
- other technical assessments, as noted in Table 4 of the previous section.

The remainder of this section of the SIA Report discusses the likely extent of social effects expected from the proposal under the following sub-headings -

- the existing baseline (B-Line) for comparison;
- the influence of the route selection process on the overall level of social effects;
- Spatial analysis of the proposed C-Line - change in the number of properties intersected by easements and change in separation distances to occupied dwellings;
- potential social effects related to the operation and maintenance of the proposed C-Line; and
- potential social effects related to the construction of the proposed C-Line and the removal of the existing B-Line.

5.2 The existing base-line for comparison

The existing WRK-WKM B Line was commissioned in 1961. At that time, Poihipi Road did not exist as a sealed public road. At least part of Poihipi Road began as an unsealed access track which was used during construction of the B-Line. As a result, many of the dwellings which currently have the B-Line close to them were built and occupied with the B-Line in place. With few exceptions⁵¹, all current dwelling owners have bought in the knowledge that the B-Line was present, thereby accepting its actual impacts on their enjoyment and use of their land as not being significantly adverse.

At the present time, there are 16 occupied dwellings within 100 m of the existing B Line and 36 dwellings within 200 m. The smallest separation distance - between the B Line and a current dwelling is approximately 10 m.

⁵⁰ The two property managers have been responsible for liaising with the 25 private landowners along the proposed C-Line easement (i.e. eligible for direct compensation), as well as other private landowners who were within the 'preferred route' but now not actually intersected by the proposed C-Line easement.

⁵¹ Farm dwellings which existed when the B Line was constructed.

5.3 Influence of Transpower's route selection process on level of effects

Section 1.6 of this SIA Report described the various stages of Transpower's route selection process. For identifying the route options and then for identifying a preferred route, proximity to existing dwellings and community facilities was the critical factor influencing planning decisions when considering potential social effects, particularly the minimisation of adverse social effects. For finalising the proposed centre line, face-to-face discussions involving the landowners and the engineering and environmental consultants enabled finer-grained consideration to be given to aspects of land use and visual outlook.

The final outcome of these cumulative planning decisions is analysed and quantified in the following section.

5.4 Spatial analysis of the proposed C Line - separation distances

This analysis of property intersection and separation distances (proximity) was carried out on a sectional or neighbourhood basis, moving progressively from east to west along the alignment of the proposed C-line, as follows -

- Section 1: from Wairakei power station to Poihipi power station tee-line
- Section 2: from Poihipi power station tee-line to the junction of Poihipi Road and Tuhingamata Road
- Section 3: from Tuhingamata Road along Poihipi Road as far as the Kiwitahi Land Co. Ltd property
- Section 4: from the Cahersiveen Farm Ltd property to Mokai village
- Section 5: from Tirohanga Road to Whakamaru
- Section 6: Whakamaru Village

The analysis involved estimating separation distances⁵² between occupied dwellings and the existing and proposed centre lines, and noting whether or not the existing or proposed centre line passes directly over a land parcel. The principal focus of the quantitative analysis has been on properties intersected by the 'preferred route'⁵³, dwellings within 1,200 m either side of the existing B-line⁵⁴, and the Mokai settlement⁵⁵.

Tables 5, 6 and 7 summarise the results of this analysis, indicating on a sector-by-sector basis the expected change in circumstances for individual properties and dwellings associated with replacing the existing B-Line with the proposed C-Line.

⁵² Estimated from aerial photograph maps provided and the Google Earth ruler.

⁵³ Transpower Ltd, 2010. Preferred Route Report Wairakei-Whakamaru C Line.

⁵⁴ Based on direct observations in the field from several visits to the Area of Study, 1,200m adequately covers any dwellings along the existing B-Line route which might be expected to experience a change in the level of effects.

⁵⁵ Where dwellings are between 1,200 m and 1,750 m north of the existing B-line but will be closer to the proposed B-line.

Table 5: Sector-by-sector summary of changes in separation distances and property intersection

<i>Section</i>	<i>Total properties assessed</i>	<i>Total dwellings assessed⁵⁶</i>	<i>Dwellings closer⁵⁷</i>	<i>Dwellings further away</i>	<i>Properties become new hosts⁵⁸ to C-line</i>	<i>Properties no longer host B-line</i>
Section 1	3	1	-	1	-	-
Section 2	28	28	6	21	-	6
Section 3	40	43	6	37	6	16
Section 4	25	29	18	11	3	2
Section 5	11	23	4	17	-	3
Section 6	86	86	-	56	-	7
Total	193	209	33	143	9	34

Table 5 shows that 9 properties which hitherto have not had the B-Line across their land will in future have the C-Line easement across their land. Seven of these are larger farming or forestry properties between Tuhingamata Road and Mokai village, while two are small rural-residential properties accessed off Tuhingamata Road. These are all properties where Transpower will have to negotiate a property right with the landowners.

Table 5 also shows that the different alignment between the existing B-Line and the proposed C-Line means that 34 properties which currently host the B-Line will in future no longer have a transmission line crossing them. Of these, 24 are rural residential properties⁵⁹, 7 are residential properties in Whakamaru hydro village and 3 are farming properties.

Table 6 compares the numbers of properties intersected by the existing B-Line and the proposed C-Line. The results in Table 6 indicate that the route selection process has delivered an outcome which will result in a distinct improvement to the residential amenity of a substantial number of households in the Area of Study.

Table 6: Comparison of properties intersected by the existing B-Line and proposed C-Line

	Total properties	Residential/R-R properties	Farming/forestry/energy
B-Line	48	33	15
C-Line	23	4	19

⁵⁶ Some farming properties have more than one dwelling.

⁵⁷ Closer to the proposed C-Line than they were to the existing B-Line.

⁵⁸ The term 'host' implies that the easement will pass across a property.

⁵⁹ 6 in the vicinity of Oruanui Road, and 24 along the central stretch of Poihipi Road between Tuhingamata and Tirohanga Roads.

Table 7: Comparison of separation distances between dwellings and the existing B-Line and proposed C-Line.

	<i>Existing B-line</i>	<i>Proposed C-line</i>
Smallest separation distance between an occupied dwelling and the transmission line	0 m ⁶⁰	150 m
# occupied dwellings within 100 m of the transmission line	23	-
# occupied dwellings within 200 m of the transmission line (includes within 100 m)	44	5
# occupied dwellings within 300 m of the transmission line (includes within 200 m)	60	19

Table 5 shows that not all rural residents have benefitted from increasing separation distance from the proposed new centre line. For 33 dwellings along the route from Wairakei to Whakamaru, the separation distance will be reduced, but for a substantially larger number of dwellings, the separation distance will increase. However, Table 7 makes it clear that where the proposed C-Line will be moving closer to existing dwellings, it will never be as close as the B-Line has been for the past few decades, and by a considerable margin. The proposed C-Line minimises the likelihood of proximity-dependent adverse social effects for all but a very few residents. This conclusion relates to visual effects, anxiety over perceived health risks, EMF-related effects and interference with radio/TV reception, noise effects, and perceived hazards associated with the risk of structural failure or the risk to over-flying aircraft.

5.5 Potential social effects related to operation and maintenance

5.5.1 Overall social benefits resulting from the route selection approach

The results in the previous section underline the beneficial outcome delivered by the route selection process. The number of properties which will in future no longer have a transmission line passing over them (34) or where dwellings will be further away from the transmission lines (143) will experience distinct improvements to various elements of their owners' social wellbeing, including -

- improvements to the quality of their living space and the quality of the physical environment by reducing or eliminating altogether the potential noise nuisance (corona discharge) and induced currents from transmission lines, and by reducing the potential visual effects through increased separation distances;
- improvements to the quality of their living space by reducing or eliminating altogether any perception of potential health risk through increased separation distance;
- improvements to the quality of their living space by avoiding the nuisances and risk of property damage associated with periodic maintenance activities by contractors;
- reduced risk of interference with their access to radio/TV services with greater separation distances;
- improvements in their sense of personal safety by eliminating the risks from structural failure of towers and lines at greater separation distances.

⁶⁰ In Whakamaru village, 7 dwellings have the B-Line passing directly overhead. The nearest dwelling elsewhere along the B-Line has a separation distance of 10 m.

The proposed B-Line has been removed from an alignment directly over properties and dwellings in Whakamaru Village. This change in alignment results in benefits not just to the 7 residential properties directly under the B-Line but also to some 50 other residential properties in the eastern part of Whakamaru Village and also to the Whakamaru School. In the case of the school, the existing B-Line passes over the corner of the playing field and Towers 105 and 106 are visually prominent from the school, frequently eliciting comments from visitors and parents. While the existing A-Line will remain, it is further away from the school and the residential properties than the B-Line.

The results in the previous section also show that some properties (9) will have the proposed C-Line passing over them, and some dwellings (33⁶¹) will be closer to the C-Line than they were to the B-Line. Of the 9 new hosts, two are rural-residential properties accessed off Tuhingamata Road and the remaining 7 are either farms or forestry blocks. In every case, irrespective of the nature of the outcome of negotiations, financial compensation will be forthcoming, although any associated property-specific social effects are not amenable to explicit assessment in this SIA Report.

For the two rural-residential properties which will become new hosts of a transmission line, the previously unanticipated prospect of the proposed C-Line puts their owners in a state of uncertainty. For the 33 dwellings that will be closer to the C-Line than they are to the B-Line, all will be considerably further from the C-Line than many dwellings are currently from the B-Line⁶². Given the demonstrable acceptability of the current situation, it is unlikely that the owners or occupiers of many of these 33 dwellings will experience significantly adverse effects on their social wellbeing.

Particular cases will be discussed in the following sections of this SIA Report, which draw together the various information sources listed in section 5.1. In particular, these following sections review the assessments made by a number of technical experts engaged by Transpower whose findings are relevant to a consideration of social effects, and assesses the nature and likelihood of consequential social effects, and whether mitigation is recommended.

5.5.2 Impacts on farming or forestry properties

The C-Line proposal will cross 19 farms or forestry blocks.

Mr Horton (of Agricultural Developments Ltd) has assessed the potential effects of the proposal on agricultural activities covering aerial topdressing, ground fertiliser spreading and spraying, access and tracks, loss of productive land, farm buildings, removal of trees and vegetation, on-farm infrastructure, and on-going maintenance activities. In doing so, he confirms the range of sources of impact that a transmission line may potentially have on farming and forestry operations that was identified in the summary of existing research findings.

Transpower property managers have also reported from their discussions with the owners of farms or forestry blocks, a number of concerns including -

⁶¹ Within 1,200m.

⁶² The nearest dwelling to the proposed C-Line will be at a distance of 150 m. There are currently 25 dwellings closer to the B-Line than 150 m and practically all of these have been built or purchased in full knowledge of the presence of the B-Line..

- constraints on future sub-division potential;
- the need to avoid particular areas on farms such as areas for cropping silage, farm infrastructure such as dairy sheds, stock races, critical stock movement channels;
- the cumulative impacts of other service infrastructure on farming operations

The related elements of social wellbeing include the effects on the quality of the working environment for farmers through improved farm access or difficulties with stock movement, effects on personal safety through risks of accidents with equipment, effects on their autonomy of decision making over parts of their land, reduced opportunity for income from land taken out of production by towers, overhead lines and new access tracks, and changes required in mode of fertiliser application.

Mr Horton's report makes the following observations -

- regarding fertiliser top-dressing and weed spraying: one farm⁶³ will have its airstrip use significantly restricted for fixed-wing use. Most other airstrips have been inactive for some time and are unlikely to be restored to future use for financial reasons or due to changes in farming systems. Some other farms may experience minor impacts on fixed-wing operations, such as a requirement for different flight paths or flying higher over transmission lines. There has in any case been a shift towards ground spreading of fertiliser in this area. The only limitation on ground spreading and spraying would be around tower locations. Aerial weed spraying has been predominantly by helicopter. The transmission line will not impact on aerial weed spraying, except in the immediate vicinity of the line.

- regarding access tracks: the creation of access tracks for constructing and maintaining the transmission line will provide good all-weather access for the farmers concerned. If new tracks require alteration to fence lines, this will be at Transpower's cost. Overall, access tracks will be beneficial.

- regarding loss of productive land: the extent of such loss is expected to be small - limited to tower locations and access tracks. This loss is covered by compensation arrangements.

- regarding farm buildings: the proposed alignment generally avoids being close to operational farm buildings and houses. It is well north of the A&P Showgrounds facility at the junction of Poihipi and Oruanui Roads.

- regarding the removal of trees and vegetation: on forestry blocks, removal of trees for transmission lines attracts financial compensation. Vegetation may also require clearance around tower locations and along access tracks. To avoid damage to soil structure and the risk of erosion, such clearance work should be carried out in summer or autumn, to minimise the risk to disturbed soil from adverse weather events. Pasture restoration may be necessary in some situations.

- regarding on-farm infrastructure: farmers will need to exercise care when operating large farm machinery around lines and towers - e.g. spreading of effluent on dairy farms with a travelling irrigator. Some fence lines may require re-alignment if they run parallel

⁶³ Owned by the Tuaropaki Trust

to the new transmission line - due to electro-magnetic conductive effects - this would be negotiated on a case-by-case basis.

- regarding on-going maintenance activities: direct liaison between Transpower or its sub-contractors and landowners is required for access arrangements for tower inspections and maintenance. Sensitive times to avoid include when farmers are lambing, calving or fawning.

Mr Horton recommends the following mitigation -

- replacement of the affected airstrip;
- inform the Civil Aviation Authority of the new alignment and tower locations, as these affect zones of flying restriction and the notified location of hazards to flying;
- negotiate with landowners over track locations, tree and vegetation removal and replacement (e.g. livestock shelter), and timing of maintenance activities;
- financial compensation for loss of productive land.

He concludes that overall the effects on farming activities along the proposed C-Line are likely to be minor and manageable with effective landowner liaison, noting that landowner feedback was incorporated into the preferred route selection and final alignment and tower siting decisions. Nevertheless, he acknowledges that several property-specific effects are more significant and will require case-by-case mitigation.

Mr Horton's assessment draws attention to the potential scope of effects on farmers, noting the likelihood of both positive and adverse effects on their operating environment. While the adverse effects are likely to be amenable to mitigation via a range of initiatives discussed above, good practice in mitigation suggests that on-going monitoring of farmer experience will be appropriate (see further discussion in section 6). Furthermore, since not all properties have been visited individually by Mr Horton, some liaison mechanism will need to be put in place to respond to other possible farm management and operating issues should they come to light.

5.5.3 Landscape and visual effects on landowners

Dr Boffa (of Boffa Miskell Ltd) has assessed the landscape and visual effects of the proposed C-Line. These effects derive from the presence of towers and transmission lines in the local landscape and their effects on views from dwellings, properties and public places. In social wellbeing terms, the effect is on amenity values and relates to the quality of the physical environment and the quality of neighbourhoods and living spaces. For several landowners⁶⁴ who have either already sub-divided their property or have the prospect of doing so in future, the effect is also on future opportunity for income, sometimes in relation to retirement provision.

Dr Boffa observes that because landscape and visual considerations have been a major driver of planning decisions throughout the route selection process for this proposal, he concludes that landscape and visual effects are *"minor and where appropriate or necessary can be adequately and effectively mitigated."* (para.10.3)

⁶⁴ Identified by a Transpower property manager.

He further points out that -

“the selection of the centreline alignment and tower positions has also sought to minimise potential visual and landscape effects, particularly from dwellings and both on properties which towers are located and adjacent properties.” (para,11.1)

“Through the route selection process, discussions have been held with some landowners adjacent to the proposed alignment. Some of the properties have been identified as areas where mitigation planting may be appropriate and/or required, in order to minimise potential adverse visual effects. Transpower will continue to engage with adjacent landowners in these locations and implement ‘off site’ plantings to mitigate visual effects from directly affected adjacent properties.” (para.11.2)

The assessment identifies “possible areas that are likely to benefit from specific and targeted landscape mitigation in the form of planting are –

From the dwelling area on the property with towers 17 and 18.

From dwellings adjacent to and the south west of towers 20, 21 and 22.

From the properties adjacent to and to the south of towers 25 and 26.

From the dwellings on properties that the line traverses between towers 25 and 26.

From the Mokai settlement area with respect to towers 57 to 59. As previously noted, preliminary discussions and proposals for mitigation plantings with representatives of the Mokai community to the south of the settlement area are currently being developed and discussed.” (para11.5)

Notably, excluding Mokai settlement these identified properties are, with one exception, all rural-residential small blocks. Two of them have the proposed C-Line passing over the property; three of them have the existing B-line passing south of their dwellings and will have this removed but will also have the C-Line visible to the north of their property. The exception is the farming property adjacent to the southern end of Oruanui Road on the western side.

The Mokai settlement has been the focus of several meetings⁶⁵ with community members. Discussion at the first meeting raised a number of social concerns⁶⁶ in addition to the potential visual effects. At the meeting on 2 September, discussion focussed on the importance of proximity versus visibility, with particular reference being made to future building sites and the expectations held by members of the Mokai community that others with connections to this land should not be deterred from returning to settle here by the presence of transmission infrastructure too close. A subsequent meeting on 18 September involving Dr Boffa, Mr Murray and Mr Watson (Transpower) and about 20-25 interested Mokai residents assessed views from various properties in the village and the location of several towers - specifically proposed T57 and T58. It was agreed that T57 should remain at its proposed location while T58 should be moved some 50 m in order to strike a better balance between proximity and visibility. The draft

⁶⁵ In May, August and September 2010 (2).

⁶⁶ Concerns about potential noise nuisance, health effects (cancer risk) and interference with aerial top-dressing operations, as well as questions about employment opportunities and the ability of the proposed line to cater for increasing generation capacity at local geothermal power stations.

landscape mitigation plan was reviewed with the community members on site, with a revised plan to be developed.

Dr Boffa concludes that the proposed C-Line is the most appropriate alignment; that the visual effects have been minimised for the new line and improved for others with the removal of the B-line; and that the landscape effects have been minimised with regard to the siting of towers - the C-line *“fits and flows’ comfortably and sensitively with both the landscape and the rural character of the area.”* (para 12.5). He comments *“Where dwellings on directly affected properties or adjacent properties are likely to be adversely affected by the appearance of towers or conductors, appropriate planting mitigation can and will be carried out in consultation with the affected landowner.”* (para12.6)

5.5.4 Noise effects on landowners

Mr Wassilieff (of Marshall Day Acoustics) has assessed the noise effects of the proposed C-Line, including wind-induced noise and electrically-induced (corona discharge) noise. These concern a nuisance or amenity effect in terms of the quality of the physical environment.

Mr Wassilieff points out that *“Turbulent noise from towers cannot be controlled but has a broadband sound similar to that created by trees. It is rarely a noise problem, even in residential areas.”* (p.4) and *“The other type of aerodynamic noise is “wind-in-wires” (aeolian tones) and sometimes strongly tonal sounds from insulators. If these tonal sounds were to cause noise problems, engineering methods exist by which they can be controlled or eliminated. These include “spoilers” or “strakes” to break up the symmetry of air vortices around conductors and hence convert tonal sounds into more acceptable turbulent noise”*(p.4)

He explains that *“Corona (and the associated audible noise) is due to ionisation of the air surrounding the conductor, and occurs along the length of the conductor.”* (p.4), observing that conductors arranged in a bundle (i.e. duplex or triplex) provides a practical means of reducing this source of noise.

Mr Wassilieff refers to *“One of the noise conditions imposed on the North Island Grid Upgrade Project (NIGUP) was that noise from the operation of the transmission line shall not exceed a limit of LAeq 40dB under wet conductor conditions as defined in Chapter 6 of the EPRI Transmission Line Reference Book beyond the boundaries of the transmission line designation.”* (p.5) and recommends that a similar condition apply in this case.

He concludes that at 25 m from the centre line, corona noise is likely to be 12dB(A), so that no one should experience any corona noise at all at their dwelling. Overall operational noise will be negligible and much less than is generated from the existing B-Line.

5.5.5 Health effects on landowners

Dr Black (of ITMedical) has assessed the potential health effects from electric or magnetic fields generated by high voltage transmission lines. These relate to social wellbeing in terms effects on personal safety and the quality of the living space.

Dr Black discusses the nature of electric fields and magnetic fields and their distinction from the phenomenon of much higher frequency radiation. He states that there is no biologically significant radiation from a transmission line.

For electric and magnetic fields, Dr Black points out that two factors influence field strength attenuation: (a) the use of reverse phasing to cancel fields, and (b) distance from the conductor, which is the main influence. He notes that within a few metres they are well within safety guidelines. He makes it explicit that the potential for EMF-induced biological/health effects is negligible directly under the lines themselves, and explains that residents will be exposed to higher levels of electric and magnetic fields in their own homes from domestic appliances.

Dr Black concludes that the proposed C-Line is designed and positioned so that electric and magnetic fields are well below the general public threshold specified in the International Commission for Non Ionising Radiation Protection (ICNIRP) Guideline. In turn, these guidelines are conservatively set to eliminate any direct biological or health effects.

5.5.6 Effects on road users

Tim Kelly (of Tim Kelly Transportation Planning Ltd) has assessed the likely traffic effects of the proposed C-Line. The social wellbeing elements relevant to a traffic assessment include issues of personal safety and access to public roads.

Because the proposed C-Line has a similar number of towers as the existing B-Line, there is not expected to be any change in the level of vehicular activity associated with line maintenance. Therefore the potential effects from on-going maintenance are assessed as nil, i.e. same as now.

Note that the principal traffic-related effects from this proposal are associated with line construction - see section 5.6.3 below.

5.5.7 Effects on recreation and tourism

Mr Bamford (of Tourism Resource Consultants, TRC) has assessed the potential effects on recreation and tourism activities, noting the limited extent of tourism and recreational activity in the area between Wairakei and Whakamaru. They have compiled an inventory of such activities both 'near'⁶⁷ and 'in the vicinity of'⁶⁸ the proposed C-Line.

A Transpower property manager also identified two recreational activities on rural-residential properties near the proposed C-Line - a horse-riding/dressage facility and the use of a micro-light aircraft. The dressage arena is associated with an established small business enterprise, and the owners have expressed concern at possible client perceptions about the proximity of the line and particularly of Tower 15, which has been moved in response to this concern. The micro-light flying appears recreational in nature, but the proposed C-Line would render take-off and landing on the property infeasible. The property manager has initiated discussions with Contact Energy - the neighbouring landowner - about possible use of an alternative airstrip.

⁶⁷ 'Near' meaning within 100 m of the line.

⁶⁸ "In the vicinity of" meaning between 100 m and 1,000 m from the line.

The TRC assessment concludes that there will be no effects on tourism and recreational activities once the new line is operational, observing that generally the C-Line is further away from areas of tourism operation and recreational activity, and where it is closer (e.g. Oruanui Pony Club) it remains far enough away to not affect adversely the operations or recreational enjoyment.

The other potential effects reported above appear amenable to mitigation. However, the responsibility for confirming satisfactory outcomes remains with Transpower. Furthermore, since not all properties have been visited individually, some liaison mechanism will need to be put in place to respond to other possible recreation-related issues should they come to light.

5.5.8 Employment effects

Because the proposed C-Line has almost the same number of towers as the existing B-Line, there is not expected to be any change in the level of maintenance activity over the long term. In the short term, and once commissioning is complete, the newer line may indeed require less maintenance work than the B-Line requires at present.

Hence potential employment effects during operation are assessed as nil.

5.6 Potential social effects related to the construction and removal

As stated in section 2.4 of this SIA Report, the whole construction sequence is expected to take 18 months, assuming that construction activities will be allowed seven days per week between the hours of 7 am and 6 pm. The duration of construction activities on any single property will depend on the number of towers located on a property. However, property-specific duration is expected to be of the order of 4-9 months. In addition to the construction sequence, the removal of the existing B-Line is expected to take a further 12 months in total.

The following sections draw together the various information sources listed in section 5.1, including the assessments made by a number of technical experts engaged by Transpower whose findings are relevant to a consideration of social effects, and assesses the nature and likelihood of consequential social effects, and whether mitigation is recommended.

5.6.1 Impacts on farming properties

Mr Horton has assessed that some disruption to normal farming operations can be expected during construction. These include temporary constraints on stock movements and crop harvesting in certain parts of farms. He recommends that it will be important to avoid lambing/calving/fawning times. He also observes that construction of access tracks will require careful consideration of landowner needs and preferences as to locality and placement of tracks and gates, along with fence repair, and that this should involve direct liaison between Transpower, its construction contractors and the individual landowners.

Transpower's property managers confirm that these sorts of issues have been raised by a number of farmers during their discussions to date - for example, concerns about construction traffic close to a dairy shed, interference with stock movement around the property or disruptions to paddock operations.

In practically all cases, these farmers will have had no prior experience of transmission line construction activities on their properties, although some will have experienced line maintenance activities on the B-Line. However the scale and intensity of disruption to farm operations from new construction activity is likely to be much greater than from maintenance activities. The construction phase may be described as temporary, but farming is a 24/7 activity and construction activities spread over 4-9 months have the potential to cause significant disruptions and require considerable adjustments by each individual farmer and new demands on their skills and time.

Notwithstanding the fact that directly impacted farmers will receive financial compensation from Transpower, the management of construction activity impacts on farming operations (to the satisfaction of all parties) will require both careful planning as well as close and sustained liaison between construction contractors and individual farmers. Mr Horton's assessment rightly points to this need. Furthermore, Transpower will need to take overall responsibility for monitoring the effectiveness of these management and mitigation arrangements for the duration of the construction period.

Mitigation is discussed further in section 6.

5.6.2 Noise effects on landowners

In assessing the potential noise effects, Mr Wassilieff has identified the main noise-producing activities as auger drilling for the foundations, ground-based equipment for pouring concrete, helicopters for pulling pilot wires and potentially for pouring concrete as well, and diesel winching equipment for stringing the new lines. He notes that while the overall construction period will extend over approximately 18 months, each site is likely to experience construction noise for less than one month over three specific working periods - foundations, tower erection, and stringing.

He expresses the expectation that *"There will be limited hours of work (i.e. generally not at night), and a community liaison plan will be a required part of the construction management plan. Land owners will be fully aware of the programming of the construction as it affects their land."* (p.8). He also points out that the New Zealand Standard NZS 6803:1999 Acoustics-Construction Noise will apply.

The extent of reduction in residential amenity will depend on the distance between these tower construction activities and dwellings. Given the transitory pattern of potentially disruptive noisy activities, it is likely that nearby residents would prefer that the construction activities be carried out in as time-concentrated a manner as possible. Even so, the restrictions on working hours means that there is no risk of sleep disturbance.

5.6.3 Effects on road users

In assessing the potential effects on users of the road network, Mr Kelly observes that impacts on public transport, cycling and walking are considered negligible.

In his assessment, Mr Kelly identifies the nature of the existing road network throughout the Area of Study, the existing traffic volumes and the accident history and pattern. While the existing B-Line crosses public roads at 14 locations, the proposed C-Line will cross public roads at 6 locations. However, he points out that some traffic logistics remain uncertain until property access agreements are finalised.

Construction of the C-Line is likely to involve the establishment of depots for storing materials such as tower steel and conductors - at Wairakei, Whakamaru and possibly a midway location as well. It is likely that concrete and quarry stone would be delivered directly to each individual tower site. Construction crews are likely to be transported by minibus. Although their accommodation base has not been determined, it is likely to be in the Taupo/Kinloch area.

The C-Line is unlikely to be constructed sequentially; the timing of individual towers being reliant upon appropriate site access, materials availability and ground conditions.

Assessment of traffic effects includes consideration of vehicle movements involved in -

- delivery of materials to depots;
- formation of access tracks and vegetation clearance;
- installing tower foundations;
- erecting towers;
- stringing the conductors;
- commissioning the C-Line; and
- removal of B-Line materials.

Traffic effects are assessed in terms of -

- additional vehicular activity: estimating an average level of additional traffic but noting that traffic activity associated with construction will be characterised by short periods of more intense activity at specific locations - not a sustained increase in traffic movements throughout (convenience issue);
- access locations: particularly road safety effects where site-distances are restricted in the vicinity of property access points (personal safety issue); and
- temporary road closures; required whenever conductors are strung or removed across public roads; closures generally of no more than 15 minutes duration - but no alternative routes are feasible which take less than 15 minutes (convenience issue).

Mr Kelly concludes that the potential convenience effects from additional traffic will be negligible (involving the occasional nuisance of delay); the potential safety effects from rural road accesses onto farm properties will be negligible, although still requiring temporary traffic management provisions; and the potential safety and convenience effects from road closures will be minor.

Mr Kelly does not identify any locations or households for whom a potential delay of 15 minutes in normal travel times might be potentially problematic⁶⁹.

He recommends mitigation in the form of a Construction Management Plan (CMP) dealing with the days and times at which road closures can take place, the control of traffic movements during such closures, and requirements for warning signage, temporary speed limits and other controls for the protection of road users and site personnel.

⁶⁹ For example, individuals with medical conditions who may require emergency travel to hospital; a school bus service.

From a social assessment perspective, a critical issue requiring attention is the effective and proactive communication of this CMP information to people living in the Area of Study and to regular users of this road network.

5.6.4 Effects on recreation and tourism

The TRC assessment notes the potential for some disruption to tourism operations during construction, citing in particular the Wairakei Natural Thermal Valley Café and Campground and Kiwi Outback Adventures on Poihipi Road.

As pointed out in section 5.5.7 of this SIA Report, a Transpower property manager also identified two recreational activities on rural-residential properties near the proposed C-Line - a horse-riding/dressage facility and the use of a micro-light aircraft. In addition to the mitigation recommended for effects related to the operation of the proposed C-Line, situations such as these highlight the importance of on-going community and landowner liaison prior to and during the construction period (see section 6).

5.6.5 Employment effects

Transpower estimates that up to 90 people may be required for construction works, with possibly 20 management or supervisory personnel, some technical specialist transmission line personnel and the remainder being labourers. There will clearly be some level of demand for the labouring jobs. The extent to which this will create opportunities for local residents to gain employment is unclear. The actual timing of construction will have some influence on this. It is not uncommon for major construction projects to attract semi-skilled labour from the rural workforce, particularly if relative pay rates are favourable. Also, it is not uncommon for major projects to attract workers from a catchment area equivalent to one hour's driving time.

There is a high level of construction activity either currently in progress or anticipated in the District including: the East Taupo Arterial road and the proposed Te Mihi power station. Furthermore, the Area of Study had negligible unemployment at the last census in 2006.

It is concluded that, while the demand will exist, whether or not this demand is supplied from the local labour market, the District labour market or the wider regional market cannot be assessed with certainty at this time.

6 MITIGATION

6.1 The influence of the route selection process

In the RMA hierarchy of “avoid, remedy, mitigate”, the route selection process has given priority to avoidance. The effectiveness of this approach in delivering positive outcomes for a very high proportion of landowners in the vicinity of the proposed C-Line has been discussed in sections 5.3 and 5.4 of this SIA Report.

Mitigation is still appropriate under certain circumstances in order to -

- address effects which are specific to particular properties, whether the property has the designation over it or not;
- address uncertainty either in the assessment of effects or in the experience of contractors and landowners; or
- address issues that are not property specific but may affect the rural community more widely, such as employment opportunities or traffic management in the local road network.

6.2 The role of easement agreements in mitigation

Transpower intends to negotiate an easement agreement with every landowner over whose land the proposed C-Line will pass. These agreements will be negotiated once the Notice of Requirement has been confirmed. Therefore, there may potentially be some social effects at an individual property level that are yet to be determined.

On the assumption that both parties to the agreement negotiate in good faith and reach agreement willingly, such agreements will be an indication and acknowledgement that property-specific issues have been resolved between Transpower and the landowner concerned.

6.3 Transpower responsibilities for mitigation of social effects

Some of the technical assessments have recommended mitigation initiatives.

Mr Horton recommended that Transpower replaces the affected airstrip on Tuaropaki Trust land, and inform the Civil Aviation Authority of the new alignment and tower locations, so that the maps which pilots rely can be updated with this new information. He also emphasised the importance of construction contractors negotiating with landowners over such matters as access track locations, tree and vegetation removal and replacement (e.g. livestock shelter), and timing of construction/maintenance activities

Tourism Resource Consultants recommended that Transpower notify nearby tourism operators of forthcoming construction activities.

Mr Kelly recommended that Transpower prepare a Construction Management Plan to address specific traffic-related issues.

Dr Boffa recommended that screen planting be provided for 11 individual properties as well as in the vicinity of the Mokai settlement.

As noted previously (see Section 5.5.7), Transpower's property managers have identified a number of possible adverse effects in their discussions with individual landowners whose properties are adjacent to the proposed easement. So far these include concerns about impacts on client perceptions for a rural riding/dressage school and interference with micro-light flying. While these potential effects appear amenable to mitigation, they have yet to be fully resolved and the responsibility for confirming satisfactory outcomes remains with Transpower.

It should be noted that, if Transpower wishes to encourage the uptake of local labour during the the construction period, this is likely to be best served by taking some specific initiatives, such as providing advance notice to DSW offices responsible for Workbridge programmes.

6.4 Contractor protocols

Dealings between Transpower's line maintenance contractors and landowners are guided by certain established protocols. Transpower advise that such protocols are agreed as part of each contract and may vary from project to project, incorporating project- or property-specific issues.

As part of the Construction Management Plan, the responsibilities and obligations of contractors will be set out. Further detail is provided in the individual Sites Works Plans agreed between Transpower and the landowner prior to construction.

It is nevertheless essential that provision be made to review the effectiveness of these protocols and Site Works Plans from time to time, in light of evolving experience. Such a recommendation does not imply inherent inadequacies in measures such as contractor protocols or Site Works Plans. Rather, the recommendation is in line with a pro-active approach to managing and resolving unanticipated issues, should they arise.

Details for such review are discussed further in the following section.

6.5 On-going landowner and community liaison

For practically everyone living in the Area of Study, the most novel aspect of the upgrade project will be the actual construction of the C-Line and the removal of the B-Line. Very few people will have experienced this before. There are several other reasons why it would be prudent for Transpower to maintain effective on-going liaison with landowners and communities along the new alignment during the two-year construction period.

Firstly, not all properties have been visited by all consultants making these assessments. It is therefore possible that some potential issue, specific to a particular property, has not been revealed so far. Secondly, Landowners may be familiar with Transpower maintenance contractors' protocols for dealing with landowners. However, no information has been provided to this assessment to indicate whether or not these protocols are working effectively, from a landowner perspective. Once initial negotiations between Transpower staff and landowners is completed, primary responsibility for on-going liaison with landowners will generally be via contractors and sub-contractors. These lines of delegated responsibility can be problematic for landowners if contractors do not adhere to agreed protocols.

To address the need for on-going liaison with landowners and communities along the alignment, Transpower proposes to appoint a Landowner and Community Liaison Manager for this project, reflecting Transpower's ultimate responsibility for landowner and community liaison. To complement this initiative, it is recommended - as a condition of consent - that Transpower

invites local representatives⁷⁰ to participate in a Landowner/Community Liaison Group, with several specific functions -

- to provide landowner support during the construction period (i.e. not dealing with landowners just on an individual basis);
- to oversee a complaints procedure;
- to provide a monitoring and evaluation function in relation to all aspects of mitigation, including the periodic review of the Construction Management Plan, the Site Works Plans and the contractor protocols.

Transpower cannot require local residents to become involved; it can issue the invitation and make the offer. Positive experience of such a mechanism elsewhere suggests that local residents would welcome the opportunity and that all parties would find it beneficial⁷¹. It is likely that the Group would convene before the construction programme begins, and convene thereafter at 2-3 monthly intervals, or at a frequency which the Group itself deems necessary.

Transpower should consider logistical support for the Landowner/Community Liaison Group. This could involve providing a facilitator and secretariat function, or alternatively paying someone local to provide these functions.

Such a Liaison Group can be a mechanism for sustaining community trust. With positive experience, Transpower may wish to consider retaining this mechanism after construction is over.

Some information needs to go out more broadly than just to directly affected landowners. Such information includes -

- project contact numbers - a project 0800 number or, better still, contact details for the Landowner and Community Liaison Manager;
- a complaints procedure, to ensure speedy responses to issues that may arise for any landowner or member of the public;
- notification of the timing and location of more intense traffic movements and also timing of slow-vehicle movements and road closures - this will help rural commuters avoid delays;
- notification of unusual activities such as periods of intense helicopter activity in a particular locality;
- progress reports on the construction and removal work.

Periodic project newsletters like those used during the planning and assessment activities should be considered during the construction period.

All these details should be incorporated into the Construction Management Plan, and be subject to periodic effectiveness review.

⁷⁰ Typically, the Liaison Group might include about four farming landowners, two rural-residential property owners and representatives from Mokai and Whakamaru communities.

⁷¹ Three specific examples bear out this observation - the Community Liaison Groups operated by the landfill operator at the Auckland Regional Landfill, and by TrustPower Ltd at its T3 wind farm expansion project in Manawatu and during its Wairau Valley project consenting work in Marlborough.

7 CONCLUSIONS

The route selection process has put avoidance of adverse social effects ahead of mitigation. It has delivered an outcome which will result in a distinct improvement to the residential and rural amenity of a substantial number of households in the Area of Study, while potentially significant adverse social effects are limited to a very few properties - possibly no more than 3-4 in total; two lifestyle properties and one or two farming/forestry properties. All the latter cases are subject to direct negotiation with Transpower over mitigation.

Perceptions of the risk of adverse health effects and the risk of noise nuisances should be significantly improved for all landowners as a result of the increased separation distances which have been achieved.

Some residents in the hydro village of Whakamaru will experience a significant improvement to their sense of wellbeing, with the removal of the B-line from directly over their properties. This change in circumstances can be expected to improve the amenity values of a substantial number of properties in the village, reinforcing the recent gradual trend towards new arrivals.

Although it is proposed that the C-Line will pass some 200 m behind the settlement at Mokai, the siting of towers and the screen planting proposed in mitigation of visual effects will protect existing amenity values for residential properties and the marae, and ensure that current expectations for future growth in the settlement are not compromised.

For future trends in rural-residential development and sub-division throughout the Area of Study, the implications of the proposed C-Line alignment are probably less influential than either the current over-supply of sub-divided sections or the Taupo District's expressed intentions to direct such development more to the south of the Area of Study. Consequently, this proposal is not expected to have any significant effect on trends in rural-residential development in the future.

Construction-related social effects, particularly for farmers and road users are the ones that will require most careful management, since most landowners will not have prior experience of this kind of activity. Appropriate mitigation has been recommended, including a mechanism to enable Transpower to be responsive to any further issues that may not have been anticipated.

In light of these conclusions, this proposal can be said to enable the people and communities of the Area of Study to provide for their social, economic, environmental and cultural wellbeing and for their health and safety, consistent with the purpose of the Resource Management Act.

APPENDICES

Appendix 1: SIA scoping interviewees and scope of direct observation

Appendix 2: Transpower sequence of communication events

Appendix 3: School roll data

Appendix 4: Demographic data for the Area of Study

Appendix 5: Summary of existing research findings on social impacts experienced by landowners from transmission infrastructure

Appendix 6: Details of proximity analysis of dwellings in relation to the proposed centre line

Appendix 1: SIA Scoping interviews and scope of direct observation

Scope of direct observations:

The field visit on 24 and 25 September 2009 involved direct observations of the following locations -

- Wairakei Village
- Wairakei Thermal Valley
- Link Road
- Oruanui Rd - north of Link Rd intersection
- Oruanui - south of Link Rd intersection
- Mapara Rd
- Poihipi Rd - west of Mapara Rd
- Whangamata Rd
- Tuhingamata Rd
- Poihipi Rd - west of Tuhingamata Road
- Poihipi Rd - west to Wereta Rd
- Wereta Rd/Otake Rd
- Waihora Rd to Marotiri Rd
- Marotiri Rd - north of Waihora Rd
- Marotiri Rd to SH32
- SH32 - west to Whakamaru
- Kaahu Rd to Poihipi Rd
- Poihipi Rd, from Kaahu Rd intersection towards SH32
- Tirohanga Rd
- Forest Rd

Scoping interviews:

On 4 and 5 November 2009, interviewed 16 individuals on 10 properties, including

13 individuals on farming or rural lifestyle properties along Poihipi Road, between Tuhingamata Road and Wereta Road;

2 individuals (rural lifestyle property) in the vicinity of Marotiri;

1 individual (farming property) towards the northern end of Tirohanga Road.

Appendix 2: Communication Events

Date	Event
May/June 2008	Consultation with key stakeholders on the various assumptions, methodologies and models for the Wairakei Ring. Included workshops with generators to receive feedback on nationwide generation plans which could impact on transmission investment.
August 2008	Began discussing upgrade options and the process for progressing the investigation with community stakeholders in the Wairakei Ring area. Transpower sent out a full information pack to all potentially affected community members and landowners in the Wairakei Ring area (see Preliminary SIA for more details).
July 2009	Area of Study Report publicly released. Project Newsletter released and letters sent to all potentially affected community members and landowners in the WRK-WKM C Line "Area of Study". In addition, letters (including Newsletter) sent to range of interested parties/stakeholders.
September 2009	Route Options Report publicly released. Project Newsletter released and letters sent to all landowners within route options. Also, letters to all other landowners in 'Area of Study' advising they were outside route options. In addition, letters (including Newsletter) sent to range of interested parties/stakeholders. Open Days Held: Mangakino - Taupo District Council Offices 14 October (12pm–8pm) 15 October (9am–12pm) Taupo - Taupo Library 15 October (2pm–8pm) 16 October (9am–2pm)
October – November 2009	Site visits to a selected number of properties by Dave Watson (transmission line contractor), Frank Boffa (landscape architect) and Toby Mann (Transpower property advisor) to better understand areas which could not be viewed from public vantage points.
February 2010	Preferred Route Report publicly released. Project Newsletter released and letters sent to all landowners within preferred route. Also, letters to all other landowners in 'Area of Study' advising they were outside route options. In addition, letters (including Newsletter) sent to range of interested parties/stakeholders. Open Days Held: Taupo - Taupo Library 8 – 9 April Mokai Marae 12 May

Date	Event
February – May 2010	Toby Mann and Stephen Cribb (both Transpower property advisors) make first contact with landowners in preferred route and arrange meetings. Gavin Murray contact for Tuaropaki and Waipapa Trusts. Subsequent meetings/site visits accompanied by Dave Watson and/or Frank Boffa.
June – July 2010	Toby Mann and Stephen Cribb continue dialogue with landowners. Subsequent meetings/site visits accompanied by Mark Jacob (Beca Transmission Line Engineer) and other technical specialists visit specific sites of interest (Alexy Simmons – Archaeologist and Matiu Park, Ecologist).
August 2010	Draft Centreline and Tower Location public released. Project Newsletter released and letters sent to all landowners within preferred route. Also, letters to all other landowners in 'Area of Study' advising they were outside route options. In addition, letters (including Newsletter) sent to range of interested parties/stakeholders. Open Days Held: Taupo - Taupo Library 2 – 3 September Mokai Marae 2 September
August – September 2010	Toby Mann and Stephen Cribb continue dialogue with landowners along centreline. Further site visits/meetings.

Appendix 3: School roll data

Table A3 July roll data from Ministry of Education for four primary schools in the Area of Study

School	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Tirohanga School	39	26	17	17	21	31	28	28	32	28
Wairakei School	199	220	210	200	211	227	237	247	241	260
Whakamaru School	186	166	139	167	154	144	118	124	119	84
Marotiri School	122	137	116	115	91	78	68	77	88	78

Appendix 4: Demographic statistics associated with the Area of Study

Data for a range of demographic variables are provided, with comparative data for the whole country and for Taupo District.

Table A4.1 Age distribution of the resident population

Area	0-19year-olds %	20-49year-olds %	50-64year-olds %	Over 65year-olds %
Area of Study	31%	40%	15%	5%
- rural lifestyle	30%	41%	21%	8%
- rural pastoral/forestry	34%	41%	14%	3%
- Mokai/Trusts	38%	38%	16%	3%
- Wairakei	39%	38%	11%	3%
- Whakamaru	28%	55%	7%	7%
Taupo District	29%	40%	18%	14%
New Zealand	29%	42%	17%	12%

Source: Statistics NZ. Census of Population and Dwellings.

Note: Some respondents did not provide details of age.

Table A4.2 Ethnicity

Area	% Maori	% European	% Pacific Islander	% Asian
Area of Study	20%	65%	2%	1%
- rural lifestyle	8%	77%	0%	1%
- rural pastoral/forestry	20%	65%	2%	0%
- Mokai/Trusts	28%	66%	1%	0%
- Wairakei	60%	49%	5%	2%
- Whakamaru	38%	62%	3%	0%
Taupo District	27%	65%	3%	2%
New Zealand	14%	65%	7%	9%

Source: Statistics NZ. Census of Population and Dwellings.

Note: Respondents were allowed to nominate more than one ethnicity; some respondents did not provide details of ethnicity.

Table A4.3 Length of residence

Area	< 1 year %	1-4 years %	5-9 years %	10-14 years %	15-29 years %	30+ years %
Area of Study	23%	36%	17%	9%	6%	2%
- rural lifestyle	21%	39%	17%	11%	7%	2%
- rural pastoral/forestry	25%	33%	16%	10%	8%	1%
- Mokai/Trusts	23%	35%	14%	12%	5%	1%
- Wairakei	23%	41%	19%	5%	5%	1%
- Whakamaru	21%	38%	21%	14%	7%	0%
Taupo District	25%	31%	16%	9%	9%	3%
New Zealand	23%	31%	16%	9%	10%	4%

Source: Statistics NZ. Census of Population and Dwellings.

Table A4.4 Household annual income - proportions at the margins

Area	Less than \$20,000 \$	Greater than \$100,000 \$
Area of Study	6%	10%
- rural lifestyle	6%	15%
- rural pastoral/forestry	4%	10%
- Mokai/Trusts	3%	11%
- Wairakei	13%	4%
- Whakamaru	17%	8%
Taupo District	13%	11%
New Zealand	14%	16%

Source: Statistics NZ. Census of Population and Dwellings.

Table A4.5 Sources of private household income

Area	Wages %	Self-employed or own business %	Other private income %	Private super. or pension %
Area of Study	44%	27%	19%	1%
- rural lifestyle	68%	53%	34%	2%
- rural pastoral/forestry	46%	24%	18%	1%
- Mokai/Trusts	68%	35%	30%	0%
- Wairakei	-	-	-	-
- Whakamaru	-	-	-	-
Taupo District	63%	25%	29%	5%
New Zealand	66%	24%	32%	5%

Source: Statistics NZ. Census of Population and Dwellings.

Note 1: 'Other private income' includes interest earnings, dividends and rental income.

Note 2: Data disaggregation rules did not permit income data for Wairakei and Whakamaru.

Table A4.6 Sources of public benefit income

Area	NZ Super %	Unemployment benefit %	Sickness benefit %	Domestic Purposes benefit %
Area of Study	7%	0%	2%	2%
- rural lifestyle	14%	0%	3%	4%
- rural pastoral/forestry	4%	0%	2%	0%
- Mokai/Trusts	5%	0%	3%	0%
- Wairakei	-	-	-	-
- Whakamaru	-	-	-	-
Taupo District	21%	3%	4%	6%
New Zealand	20%	5%	4%	6%

Source: Statistics NZ. Census of Population and Dwellings.

Note: Data disaggregation rules did not permit income data for Wairakei and Whakamaru.

Appendix 5: Summary of existing research findings on social impacts experienced by landowners from transmission infrastructure

Table A5.1 summarises information from previous studies of the generic types of social effects experienced by rural and peri-urban landowners living close to existing transmission lines, (column 1) and links them to the areas of social life listed in Table 4 of this report (column 2). Column 3 indicates whether or not the effect is likely to be experienced by property owners whose land is not directly intersected by a transmission line or who do not host one or more towers on their land. It is noted that the sometimes steep and generally undulating terrain, combined with the area’s climate, means that mobile irrigation technology for pasture, or broadscale cultivation for crops are unlikely to be encountered in the Area of Study farming systems. Nor is there any outdoor horticulture requiring frost protection or protection from birds and pests.

Table A5.1: Possible social effects associated with the operation of transmission lines

Possible social effect for properties intersected by a transmission line or hosting one or more towers	Related area of social life	Likelihood of social effects if property NOT intersected
OPERATIONAL-PHASE EFFECTS		
1) Effects on aesthetics and visual amenity: reduced amenity value; impact on image of residential neighbourhood	F) Quality of physical environment B) Quality of neighbourhood and living space	Potential effect.
2) Effects on property saleability and value, often linked to aesthetic and perceived health effects: properties less attractive, to fewer potential buyers, and may take longer to sell; impact on subsequent choice of dwelling type or farming activity;	C) Opportunity for income	Potential effect, if related to visual amenity effect; depends on proximity.
3) Effects on property management and farming practice from presence of towers: loss of productive area to towers and access tracks; loss of irrigation opportunity; added costs of mechanical cultivation; additional costs due to restrictions on aerial spraying, top-dressing, frost fighting;	C) Opportunity for income	Generally not possible; exceptions may arise as a result of proximity to a neighbours farm airstrip.
4) Adverse effects on property management and farming practice from presence of towers: stock becoming ‘trapped’; level of manual work to operate irrigation technology;	C) Quality of working life	Not possible
5) Adverse effects on property management and farming practice from presence of towers: risk of collisions/accidents with farming equipment	G) Influence on personal safety	Not possible
6) Adverse effects on property management and farming practice from presence of towers: restrictions on activities below - tree planting, burn-offs, use of bird netting, etc.	G) Influence on autonomy	Not possible
7) Positive effects on property management and farming practice: improved access to certain areas of the property via new access tracks	C) Quality of working life	Not possible
8) Electro-magnetic effects: loss of service due to interference with radio/TV reception	E) Access to services	Generally less likely; depends on proximity and direction of radio/TV signal

Possible social effect for properties intersected by a transmission line or hosting one or more towers	Related area of social life	Likelihood of social effects if property NOT intersected
9) Noise: nuisance from electrical buzzing; aerodynamic noise of wind through lines;	F) Quality of physical environment	Generally less likely; depends on proximity
10) Hazards due to presence of infrastructure: risk of structural failure to transmission line or towers due to extreme weather, lightning, earthquake with potential for damage to property, local reticulation lines, or injury to people	G) Influence on personal safety E) Access to services	Generally less likely for personal safety; depends on proximity; Possible disruption to services
11) Hazards due to presence of lines: risk of accident and injury for low-flying aircraft	G) Influence on personal safety	Depends on proximity
12) Inadequate security around towers: unauthorised people climbing towers	G) Influence on personal and public safety	Not possible
13) Adverse effects from the activities of line maintenance contractors: the nuisance of litter or the risk of damage to property during tower cleaning (e.g. sand blasting, painting)	F) Quality of physical environment	Generally less likely; depends on proximity
14) Adverse effects from the activities of line maintenance contractors: arriving without notice leading to inconvenience during lambing/calving; nuisance of gates left open leading to extra stock work	C) Quality of working life	Not possible; assumes access is not required across a neighbouring property
15) Adverse effects from the activities of line maintenance contractors: vehicle damage to pasture; poor level of weed control around tower bases and introduction of weed sources on contractor vehicles leading to additional farm costs and lost production	C) Opportunity for income	Pasture damage not possible; assumes access is not required across a neighbouring property; weed spread is possible, depending on proximity.
16) Benefits of line removal for landowners who currently host towers	All of the above	Neighbours may also benefit in some instances

Table A5.2 summarises generically the potential construction-phase social effects, applying the same format as in Table A7.1.

Table A5.2: Possible social effects associated with the construction or removal of transmission lines

Possible social effect for properties intersected by a transmission line or hosting one or more towers	Related area of social life	Likelihood of social effects if property NOT intersected
CONSTRUCTION-PHASE EFFECTS		
1) Effects on property management and farming practice from construction activities: loss of productive area to tower footprint, construction lay-down area and access tracks;	C) Opportunity for income	Not possible; assumes access is not required across a neighbouring property
2) Adverse effects on property management and farming practice from construction activities: disruption to stock at sensitive periods such as lambing/calving requiring adjustments to stock management	C) Quality of working life	Not possible
3) Noise and dust: nuisances from construction activities such as creation of access tracks, excavation of foundations, concrete pouring, over-flying helicopters during line installation, etc.	F) Quality of physical environment	Generally less likely; depends on proximity
4) Hazards due to construction activities: risk of accident or injury associated with construction site or construction-related vehicle movements	G) Influence on personal safety	Not possible; assumes access is not required across a neighbouring property

Appendix 6: Details of proximity analysis of dwellings in relation to the proposed centre line

Overall comments:

This summary is provided on a sectional or neighbourhood basis, moving progressively from east to west along the route of the proposed C-line, as follows -

- Section 1: from Wairakei power station to Poihipi power station tee-line
- Section 2: from Poihipi power station tee-line to the junction of Poihipi Road and Tuhingamata Road
- Section 3: from Tuhingamata Road along Poihipi Road as far as Kiwitahi Land Co.Ltd
- Section 4: from Cahersiveen Farm Ltd to Mokai village
- Section 5: from Tirohanga Road to Whakamaru
- Section 6: Whakamaru Village

The analysis of proximity to the transmission line has involved estimating separation distances⁷² between occupied dwellings and the existing and proposed centre lines, and noting whether or not the existing or proposed centre line passes directly over a land parcel.

The principal focus of the quantitative analysis has been on properties intersected by the 'preferred route'⁷³, dwellings within 1,200 m either side of the existing B-line, and the Mokai settlement⁷⁴. Dwellings and centre-line locations were taken from aerial photos.

Section 1: from Wairakei power station to Poihipi power station

One tourism venture is located on a parcel of Crown land administered by the Ministry of Tourism. Buildings include one cafe/dwelling and several buildings associated with a camp ground operation. The remainder of the land in this section is owned by Contact Energy Ltd.

The existing B-line passes 120 m to the south of the cafe/dwelling and slightly closer to the camp ground facilities, although partially screened by trees.

The centre-line of the proposed replacement C-line is some 50 m further south of the present alignment

⁷² Estimated from aerial photograph maps provided and the Google Earth ruler.

⁷³ Transpower Ltd, 2010. Preferred Route Report Wairakei-Whakamaru C Line.

⁷⁴ Where dwellings are between 1,200 m and 1,750 m north of the existing B-line but will be closer to the proposed C-line.

Section 2: from Poihipi power station to junction of Poihipi Road and Tuhingamata Road

This area has two concentrations of rural life-style development: a cluster of some 25 dwellings accessed off Oruanui Road at its southern end⁷⁵, and a cluster further west of some 15 dwellings situated on the northern side of Poihipi Road but south of the existing B-line and proposed C-Line alignments. These two clusters of rural residential properties are separated by one more substantial farming property. There are also two farming properties lying to the north of Poihipi Road cluster, through which the existing B-line passes.

The existing B-line traverses this area in almost an East-West direction, while the proposed C-line detours in a southerly direction near the proposed Te Mihi power station before traversing the area along an alignment that is somewhat more SE to NW, intersecting the existing B-line at a point in the adjacent farming property.

The Oruanui Road cluster includes 10 lifestyle properties within the 'preferred route', of which 6 are currently intersected by the existing B-line. Table A6.1 summarises proximity assessments for the Oruanui Road cluster.

Table A6.1: Proximity assessments - Oruanui Road rural-residential cluster

<i>Sub-group (No. of dwellings)</i>	<i>Proximity to existing B-line</i>	<i>Proximity to indicative centre line</i>	<i>Change in separation (m)</i>	<i>Change in intersection status</i>	<i>Comment</i>
Properties intersected by existing B-line (N=6)	Range = 40-160 m	Range = 200-660 m	Range = 70-590 m	5 out of 6 no longer intersected	New centre line lies to the south of all these dwellings
Additional properties within 'preferred route' (N=4)	Range = 40-420 m	Range = 130-610 m	Range = -290 m to +570 m	No change All 4 still not intersected	New centre line lies to the south of all these dwellings
Other properties further north along Oruanui Road (N=15+)	Range = 200-1,200 m	Range = 650-1,600 m	Range = 400-450 m	No change None intersected by either alignment	New centre line lies to the south of all these dwellings

In summary, the rural residential properties in the vicinity of the southern end of Oruanui Road can be expected, with one possible exception, to experience noticeable reductions in visual exposure to the proposed new C-line. Thus, of the 10 properties identified within the 'preferred route', 9 can expect reduced visual exposure while one has the potential for increased visual exposure. In all cases, the proposed B-line will lie to the south. The residential dwellings generally face a northerly aspect, albeit with variations from NE to NW. Furthermore, while the existing B-line in this section passes directly over (intersects) Contact Energy Ltd's land, three farming properties and 6 lifestyle properties, the proposed C-line will intersect the corner of only one lifestyle property.

The one central farming property in this section has the existing B-line passing directly over it (approximately 1,100 m). However, the proposed centre line is more than 400 m closer to the

⁷⁵

Between 1 km and 3 km from the junction with Poihipi Road. Note that more rural residential dwellings occur further north along Oruanui Road; however, these were not specifically identified on the aerial photographs used for this assessment.

farm dwelling at its closest point (down from 770 m), and the length of transmission line somewhat longer (estimated at 1,800 m).

The Poihipi Road cluster includes 9 lifestyle properties within the 'preferred route', of which two are currently intersected by the existing B-line. Table A6.2 summarises proximity assessments for the Poihipi Road cluster. Note that no properties south of Poihipi Road are included in this section.

Table A6.2: Proximity assessments - Poihipi Road rural-residential cluster

Sub-group (No. of dwellings)	Proximity to existing B-line	Proximity to indicative centre line	Change in separation (m)	Change in intersection status	Comment
Properties intersected by existing B-line (N=2)	Range = 70-170 m	Range = 230-420 m	Range = 160-250 m	1 out of 2 no longer intersected	Separation distance is more than doubled for both properties
Additional properties within 'preferred route' (N=7)	Range = 150-970 m	Range = 250-970 m	Range = -30 m to +160 m	No change All 7 still not intersected	Separation distance reduces only for one dwelling at 770 m
Additional properties between Poihipi Road and existing B-line (N=6)	Range = 190-1,150 m	Range = 360-1,110 m	Range = -40 m to +170 m	No change None intersected by either alignment	Separation distance reduces only for one dwelling at 1,150 m

In summary, while the existing and proposed centre lines lie to the north of all these properties, the undulating topography and intervening trees would suggest they are unlikely to experience a significant increase in visual exposure.

The two farming properties north of the Poihipi Road rural residential cluster both have the existing B-line passing directly over them (approximately 120 m and 950 m respectively in length) at distances of 610 m and 110 m respectively from the associated farm dwellings. The proposed centre line is closer to one farm dwelling (310 m) and further from the other (160 m) while traversing somewhat longer distances (approximately 300 m and 1,150 m respectively).

Section 3: from Tuhingamata Road along Poihipi Road as far as Kiwitahi Land Co. Ltd

This area has two concentrations of rural life-style development: a cluster of some 15 dwellings accessed off Tuhingamata Road, as far north as Tangye Road, and a ribbon of rural-residential development stretching westwards on either side of Poihipi Road, interspersed with farming properties of various scales. There are also two forestry blocks separating the Tuhingamata Road area from the farms further west.

At Tuhingamata Road, the existing B-line bends to the north, adopting a generally north-westerly route. In contrast, the proposed new C-line bends even more sharply to the north following a NNW direction across a mix of forest and farm land.

The Tuhingamata Road cluster includes 4 lifestyle properties (5 dwellings) within the 'preferred route', none of which are currently intersected by the existing B-line. Table A6.3 summarises proximity assessments for the Tuhingamata Road cluster.

Table A6.3: Proximity assessments - Tuhingamata Road rural-residential cluster

<i>Sub-group (No. of dwellings)</i>	<i>Proximity to existing B-line</i>	<i>Proximity to indicative centre line</i>	<i>Change in separation (m)</i>	<i>Change in intersection status</i>	<i>Comment</i>
Properties within 'preferred route' (N=5 dwellings)	Range = 430-590 m	Range = 150-310 m	Range = -220 m to -330 m	2 out of 4 properties intersected by proposed centre line	Screening by topography and/or trees may hide the proposed B-line from 3 out of 5 dwellings

In summary, while the proposed C-line lies to the south or west of all these properties, and closer than the existing B-line, the undulating topography would suggest that relatively few of these properties are likely to experience a significant increase in visual exposure. In some cases, intervening trees/forestry also provide considerable screening. Furthermore, dwellings tend to be oriented towards the north so that main views are not in the direction of the transmission infrastructure.

Travelling along Poihipi Road west of the junction with Tuhingamata Road, there are 4 lifestyle properties on the northern side of Poihipi Road and three farming properties (with a total of 12 dwellings). These 7 properties overlap the 'preferred route'. Further west are 3 more lifestyle properties and another farming property surrounded on their northern boundaries by a large farming property. On the southern side of Poihipi Road, spanning a similar distance westward from the junction with Tuhingamata Road, are some 22 rural-residential dwellings in relatively close proximity to the existing B-line - in two clusters of 14 and 8. Table A6.4 summarises proximity assessments for all the properties and dwellings accessed off Poihipi Road west of the junction with Tuhingamata Road.

It should be noted that just west of the junction between Tuhingamata and Poihipi Roads, the existing B-line and the proposed C-line diverge markedly. Because of this, many of the properties which have been traversed by the existing B-line will no longer have a transmission line passing over them once the existing B-line is removed.

Table A6.4: Proximity assessments - Poihipi Road west of Tuhingamata Road

Sub-group (No. of dwellings)	Proximity to existing B-line	Proximity to indicative centre line	Change in separation (m)	Change in intersection status	Comment
Properties <u>north</u> of Poihipi Road intersected by existing B-line (N=3)	Range = 30-380 m	Range = 290-450 m	Range = -80 to +420 m	All 3 no longer intersected	In each case, the centre line will move from being on the south side to being on the north side of the property and dwelling
Additional properties (4) <u>north</u> of Poihipi Road within 'preferred route' (N=9 dwellings)	Range = 90-660 m	Range = 490-1,380 m	Range = 190-1,010 m	One farming property is currently intersected; two farming properties will be intersected	In each case, the centre line will move from being on the south side to being on the north side of the property and dwelling
Other properties <u>north</u> of Poihipi Road and further west (N=4)	Range = 300-500 m	Range = 1,740-2,330 m	Range = 1,240-2,030 m	One property intersected by existing B-line will not be intersected by proposed B-line	In each case, the centre line will move from being on the south side to being on the north side of the property and dwelling
Properties <u>south</u> of Poihipi Road - <u>first</u> cluster (N=14)	Range = 10-400 m	Range = 500-1,160 m	Range = 320-940 m Note: change in separation increases in a westerly direction	6 properties currently intersected by the B-line will no longer be intersected	In each case, the proposed C-line moves considerably further to the north
Properties <u>south</u> of Poihipi Road - <u>second</u> cluster (N=8)	Range = 80-890 m	Not estimated; all in excess of 2,000 m		6 properties currently intersected by the B-line will no longer be intersected	In each case, the proposed C-line moves considerably further to the north

In summary, 18 dwellings currently lie north of the existing B-line while the remaining 20 dwellings lie to the south of the existing B-line. The proposed C-line moves the transmission infrastructure to the north of every dwelling in this area and, with the exception of one dwelling, provides increased separation distances which reduce the overall visual exposure for residents.

Section 4: from Cahersiveen Farm Ltd to Mokai village

This area comprises extensive farmland involving three farming properties until it approaches the rural settlement of Mokai, at the southern end of Tirohanga Road. The settlement of Mokai comprises some 13 dwellings, a marae complex and a pre-school building. A small cluster of 8 rural-residential and farm dwellings exist close to Poihipi Road, with 3 more farm dwellings further west towards the junction with Tirohanga Road.

In this area, the existing B-line continues its northwesterly straight-line route across high ground while the proposed new C-line curves around from its previous NNW direction to follow a more westerly approach across low-lying farm land towards the Mokai settlement, rising to higher ground in order to pass to the south of the settlement.

Table A6.5 summarises proximity assessments for all the properties.

Table A6.5: Proximity assessments - Poihipi Road, farming and Mokai Village

Sub-group (No. of dwellings)	Proximity to existing B-line	Proximity to indicative centre line	Change in separation (m)	Change in intersection status	Comment
3 farm properties intersected by proposed B-line (N=5 dwellings)	Range = 2,100-3,100 m	Range = 210-750 m	Range = -1,350 m to -2,790 m	All 3 farm properties intersected compared with one farm property for the existing B-line	Recently-erected farm dwellings (re-location possible?)
3 farm properties + 8 rural-residential dwellings accessed off Poihipi Road (N=11 dwellings)	Range = 50-780 m	Range = 1,110-3,500 m	Range = 720-2,740 m	2 farm properties no longer intersected	Topography is critical to avoiding views of the proposed C-line
Mokai Village (N=13 dwellings + marae)	Range = 1,100-1,730 m	Range = 250-850 m	Range = -770 m to -910 m	No individual land titles intersected	Some dwellings will have no direct line of sight ⁷⁶ .

In summary, there are three distinct groupings: (1) properties in the vicinity of Poihipi Road and the existing B-line which will experience the removal of the existing B-line; (2) two farm properties, including new farm worker dwellings, which will experience the introduction of the proposed C-line; and (3) the Tuaropaki Trust and the associated settlement of Mokai, which will experience the introduction of the proposed C-line. Note that residents of Mokai also have beneficial interests in the Tuaropaki Trust and its associated developments in the area.

Section 5: from Tirohanga Road to Whakamaru

This area, incorporating the remainder of Poihipi Road as far as the junction with Kaahu Road and then the length of Kaahu Road to Whakamaru Village, comprises extensive farmland involving some 9 farming properties as well as a small number of sub-divided lifestyle blocks. Particularly along the northern portion of Kaahu Road, the topography is amongst the most undulating and fractured of the whole route.

The existing B-line and the proposed C-line travel on progressively converging alignments, being almost 1,000 m apart in some places but converging on one of the farming properties, before finally adopting diverging approaches to Whakamaru. Table A6.6 summarises proximity assessments for all the properties.

⁷⁶

Concerns were expressed at several meetings on the Mokai marae that the proposed C-Line centre line might discourage some absentee landowners from returning to build and live in Mokai. One potential building site indicated as being at the back of an existing section closest to the farm land would have a separation distance of 180-200m from the proposed C-Line.

Table A6.6: Proximity assessments - Tirohanga Road to Whakamaru

Sub-group (No. of dwellings)	Proximity to existing B-line	Proximity to indicative centre line	Change in separation (m)	Change in intersection status	Comment
3 farm properties - Tirohanga Rd to Kaahu Rd (N=3 dwellings)	Range = 500-950 m	Range = 290-950 m	Range = -660 m to +370 m (1 reduction; 2 increases)	All 3 farm properties already intersected	
9 properties accessed off Kaahu Road (N=20 dwellings)	Range = 30-980 m	Range = 180-1,390 m	Range = -450 m to +720 m (3 reductions; 17 increases)	4 properties no longer intersected; 4 remain intersected	

In summary, four out of 22 dwellings have reduced separation and two more dwellings have negligible change in separation distance (but all still in excess of 200 m straight-line distance). The remaining 17 dwellings will have increased separation from the proposed line in excess of 350 m. Many dwellings are likely to have no direct views of the proposed C-line, such is the character of the topography. Overall visual exposure is therefore substantially reduced.

Section 6: Whakamaru Village

The settlement of Whakamaru is split into two distinct parts - the larger hydro-village (with some 56 dwellings) and another area of settlement some 700 m to the west (with some 30 dwellings).

The existing B-line passes directly over the corner of the Whakamaru Primary School playing field and 7 residential properties in the hydro-village before connecting into the Whakamaru sub-station. The existing A-line - from Atiamuri - passes over the northern boundaries of the same 7 properties. The proposed C-line will pass to the south of the hydro-village before curving onto a northward approach to the control centre. Table A6.7 summarises proximity and preliminary exposure assessments for properties in Whakamaru Village.

Table A6.7: Proximity assessments - Whakamaru Village

Sub-group (No. of dwellings)	Proximity to existing B-line	Proximity to indicative centre line	Change in separation (m)	Change in intersection status	Change in assessed visual exposure	Comment
Properties in hydro-village intersected by existing B-line (N=7)	Overhead	Range = 450-600 m	Range = 450-600 m	School and 7 residential properties no longer intersected	Substantial reduction	The 7 residential properties will still have the A-line to the north
Remaining properties in hydro-village (N=49)	Range = 20-220 m	Range = 280-570 m	Range = 100-520 m	No change None intersected by either alignment	Substantial reduction	Centre line moves from north to south side; A-line remains to the north
Properties in western part of Whakamaru (N=30)	Range = 250-500 m	Range = 250-500 m	Little change	No change None intersected by either alignment	Some increase	From the west, the proposed C-line from Wairakei will be seen through two existing transmission lines from Bunnythorpe

In summary, the hydro-village properties benefit to some extent at the expense of the properties in the western part of Whakamaru. Both parts of the Village will ultimately experience similar degrees of proximity to the proposed C-line which will be much more visible from the western part of the village than from the hydro-village. However, the proposed C-line will no longer pass directly over any residential properties nor over the primary school playing field.