ARCHAEOLOGICAL ASSESSMENT OF THE TRANSPOWER WAIRAKEI TO WHAKAMARU C-LINE

INTRODUCTION

The archaeological assessment of the Wairakei-Whakamaru C Line involved several phases of research and identification of archaeological sites. The work phases relate to the refinement of the corridor from a general area to a single alignment with tower locations. During the initial phase a desk top study was carried out to identify the location of recorded sites in a large study area between Wairakei and Whakamaru. The result of this work was the selection of two proposed routes (Blue and Red Routes). Additional information was collected about potential sites in the Blue and Red Routes to assist in the final selection.

A preferred route was selected that avoided archaeological sites recorded in the New Zealand Archaeological (NZAA) site files, Taupo District Council Schedules, the New Zealand Historic Places Trust Register, and information gained from consultation with the local NZAA File Keeper. A more detailed literature search and additional consultation was carried out following selection of the preferred route. The project phases are discussed in the methodology section that follows.

ASSESSMENT METHODOLOGY

For the purposes of the assessment an archaeological site was defined per the Historic Places Act (1993) as:

> "any place in New Zealand that either (i) was associated with human activity that occurred before 1900; or (ii) is the site of a wreck of any vessel where that wreck occurred before 1900; and (b) is or may be able through investigation by archaeological methods to provide evidence relating to the history of New Zealand."

Under the Act both recorded and unrecorded pre-1900 archaeological sites are protected. This definition includes pre-1900 standing structures. The Historic Places Act regulates affects to archaeological sites. It is unlawful to destroy, damage, or modify an archaeological site without an authority from New Zealand Historic Places Trust (NZHPT).

The archaeological assessment initially involved a search of the NZ Archaeological Association site files (NZAA), NZ Historic Places Trust Register (NZHPT), Taupo District Council Schedule of heritage items, consultation with Perry Fletcher (NZAA Taupo District File Keeper for local information), Gayle Leaf (on behalf of Nga Hapu

of the Wairakei and Oruanui Block), identification and review of early Maori land plans (Land Information New Zealand), a review of archaeological and heritage reports, local history, and documents held in the Simmons & Associates Archives. The archaeological assessment was limited to archaeology. Maori cultural sites and areas of interest are included in other project documents.

An archaeological survey of the project area was undertaken following the literature and record review. This work and the results of the literature search are discussed in the text that follows. The information compiled through the record and literature search, and the archaeological survey provided the basis for a professional opinion as to evidence of, and the potential for: archaeological deposits or features in the project area, the effects of earth work and other land disturbance activities (such as pile driving) on actual or potential archaeological deposits or features, and the necessity for an archaeological authority from NZHPT.

ARCHAEOLOGY AND HISTORIC RESEARCH

BACKGROUND INFORMATION & RECORDED ARCHAEOLOGICAL SITES

The following section contains excerpts from documents relating to the information that informed the selection of the transmission corridor beginning in August 2009.

PHASE I
PRELIMINARY REVIEW AND ADVICE ON ARCHAEOLOGICAL ISSUES AUGUST 23, 2009 AND ROUTE OPTIONS IDENTIFICATION - 28 AUGUST 2009

The initial archaeological advice provided was based on limited detailed information about the project area and recorded sites, and did not include a full literature search or any physical assessment of the project area. (It was requested that the project archaeologist defer conducting a detailed literature search and data compilation until after the project corridor was selected).

HISTORIC HERITAGE SITES (Historic Buildings & Engineering Structures)
The New Zealand Historic Places Register and the Taupo District Plan do not identify any areas or sites of historic heritage value in the Area of Study. Therefore, it was noted that recorded historic heritage sites present no constraint for the project.

ARCHAEOLOGICAL SITES
A number of archaeological sites (pre-1900 sites) were recorded by the New Zealand Historic Places Trust (NZHPT) and the New Zealand Archaeological Association (NZAA) within the Area of Study. These sites range from pre-historic Maori sites to historic period sites. The site types include Maori pa, terraces, rock shelters, forestry sawmills and camps. Many of the recorded sites are clustered because they were identified and documented as part of an archaeological survey associated with a specific land use activity such as geothermal development. Information about the recorded sites was not verified through field work at this stage. It was noted that the quality of the data available varied greatly, and the identified

locations may not always be accurate. It was recommended that a 100 metre radius buffer be applied around the recorded sites due to the uncertainty of their location, as well as the potential for other archaeological sites to be located nearby.

Project management personnel were advised that the activity most likely to have an adverse effect on a site (i.e. result in site destruction/ modification) would be land disturbance activities associated with construction of the foundations for towers and access roads. Given the small physical area encompassed by most archaeological sites in the Area of Study it was considered possible to avoid recorded sites. It was also noted that once the route alignment had been confirmed, an archaeological assessment would be required to verify the location and nature of any previously recorded sites along this alignment, and to identify any unrecorded sites.

This phase resulted in the selection of two route options, the Blue and Red Routes (Phase II).

PHASE II
WAIRAKEI-WHAKAMARU C LINE OPTIONS HISTORIC HERITAGE SITES - October 2009

HISTORIC HERITAGE SITES (Historic Buildings & Engineering Structures)
Neither the Blue or the Red Routes contained any historic areas or historic structures registered by NZHPT or scheduled by Taupo District Council.

ARCHAEOLOGICAL SITES
The Blue and Red routes avoid the majority of the archaeological sites recorded by the New Zealand Archaeological Association (NZAA) (Table 1). Three recorded archaeological sites are located in the Blue Route. The sites are: two obsidian quarries and a rock art site. Four recorded archaeological sites are located in the Red Route. The sites are: two rock art sites, an obsidian quarry, and an obsidian flaking area. It is likely that other unrecorded archaeological sites may be located in both routes, based on these recorded sites.

Consultation was carried out with Perry Fletcher, NZAA Taupo Archaeological Site File Keeper to identify the extent of archaeological survey in the Blue and Red Routes and the potential for unrecorded sites. The request for information from Mr Fletcher confirmed what was evident from the NZAA site files, that is, the archaeological survey work in the Blue and Red Routes was fragmentary. Very little archaeological survey work has been carried out in or near the Blue Route. Some archaeological work has been carried out in or near the Red Route. Mr Fletcher noted the existing Wairakei-Whakamaru B line was not surveyed for archaeological sites when it was constructed.

Not all the archaeological sites known to be located in the Area of Study have been recorded. Over the years Mr Fletcher noted he had found sites in the Area of Study but had not prepared records for the NZAA site file. He noted there was a pa site and storage pit site north-east of the existing Wairakei-Whakamaru B line near the Red Route Section 'H' area. He also reported he had found historic Maori homesteads and small settlements that date to the 1870 or later on the edge of the old forestry blocks, but could not provide the exact location of these places. Mr

Fletcher noted some of the recorded rock art sites he had previously recorded could be natural. (To determine if the rock art sites are natural would require reassessment of each site). He also noted that the obsidian quarries are part of a geological exposure following a recent survey by Mr Fletcher and Dr Phil Moore. Mr Fletcher indicated that some of the obsidian quarry sites south of the Red Route Section 'G' were not used. Mr Fletcher's comments suggest the possibility that three of the sites located in the Blue Route Option and three of the sites located in the Red Route Option may not be archaeological sites. This uncertainty also casts some doubt on the obsidian flaking area in the Red Route.

It was also confirmed that no archaeological survey work had been carried out in the Blue and Red Route Options sections 'D'-'F' and the Red Route Option section 'I' near the Waikato River. Sections of the routes near rivers, creeks and streams have a higher potential for containing archaeological sites because of the natural resources available for use by Maori in these areas.

The archaeological constraints of the Blue Route and Red Route Options were considered moderate based on the small number of recorded archaeological sites located in the routes and the potential that some or all of the recorded sites may be natural. The Blue Route Option contains three sites. The Red Route Option contains four archaeological sites. Neither route has been specifically surveyed for archaeological sites. There is no indication, based on past archaeological work in the study area, that either the Blue or Red Routes has more or less potential for containing unrecorded archaeological sites. On this basis, the Blue and Red Route options were relatively neutral from an archaeological perspective.

TABLE 1 ARCHAEOLOGICAL SITES IN THE BLUE AND RED ROUTE OPTIONS OF THE AREA OF STUDY

NZAA Site Number	Description	Route Area
U17/17	Rock art – incised rock	Blue and Red
T17/2	Obsidian quarry (archaeological site or not?)	Red
T17/10	Obsidian flaking area (archaeological site or not?)	Red
T17/7	Rock art – incised rocks	Red
T17/4	Obsidian quarry (archaeological site or not?)	Blue
T17/3	Obsidian quarry(archaeological site or not?)	Blue
T17/8	Flaking area, obsidian source, shelter, trenches	None
T17/11	Stone source - obsidian	None
T17/14	Obsidian flaking area	None
U17/21	Rock art – incised rock	None
U17/16	Rock art – incised rock	None
U17/18	Otuhounga Pa	None
U17/20	Rock art & grinding stone	None
U17/19	Pit and terrace	None
U17/10	Trenches – source	None

	unknown	
U17/11	Rock quarry – broken rocks	None
U17/13	Rock art – incised rock & ochre & stone quarried	None
U17/12	Rectangular quarry and rock art	None
U17/14	Unspecified pits	None
U17/15	Pa	None
T17/112	Maori campsite	None
T17/12	T.T.T. Timber mill	None
T17/113	Pa (Pukemoremore?)	None
T17/114	Midden	None
T17/115	Terraces	None
T17/116	Pa and ditch	None
T17/117	Terrace	None
U17/34	Timber mill (1948 – 1962)	None

It was noted in the Route Options Report that once the route alignment had been confirmed an archaeological study will be required to identify and assess sites in areas potentially affected by construction and recommend methods for avoiding or mitigating affects on archaeological sites.

PHASE III ARCHAEOLOGICAL WORK FROM 8 APRIL 2010

A programme of work was developed to define the steps taken to survey areas affected by construction and the actions that would be taken to ensure sites were not effected.

PROPOSED WORK PROGRAMME APRIL 8, 2010

1. Indicative tower locations and centre line identified by Transpower and other members of the project team.

2. Archaeological review to determine whether the indicative tower locations and centre line are located in the vicinity of any recorded archaeological sites along entire line length (from NZ Archaeological Association database, other records (LINZ & regional reports), and Perry Fletcher report for Tuaropaki and Waipapa Trust lands[1]. In addition, undertake field work to check for any evidence (or potential evidence) of the presence of recorded/unrecorded archaeological sites/areas in the vicinity of the indicative tower/line location along the entire line length. Report on the location of any archaeological sites and recommendations on changes to preliminary tower locations/centre line. (Added to this was Gayle Leaf's participation in the

[1] Perry Fletcher's report on cultural and archaeological sites on the Waipapa and Tuaropaki land blocks arrived too late to inform the predictive model developed for the archaeological field survey that commenced on 28 June 2010, but the report was read during the field work.

survey and preparation of a report on cultural values and sites of significance to Nga Hapu of the Wairakei and Oruanui Block.)

3. Refine tower locations and centre line based on findings from Step 2 above (repeat Steps 2-3 above as necessary to confirm specific tower locations).

4. Confirmation of tower locations and centre line by Transpower and project team.

5. Archaeological assessment of any sites in the vicinity of transmission line/towers, including damage/disturbance to any sites that cannot be avoided, protocols for accidental discovery, and monitoring requirements during construction.

LITERATURE REVIEW AND CONSULTATION

A detailed literature and record search was began on 11 June 2010 following receipt of the aerial maps that showed the location of the transmission towers. The literature and record search inform the predictive model developed to identify the probability for archaeological sites in tower locations. Also informing this process was knowledge about recent land use and earthworks, such as removal of stumps and scraping off debris and contouring the land (i.e. mass earthworks).

The archaeology and history of Maori land use in this area are discussed in the following section. A number of figures have been included to assist in reading the text and identifying the location of the places named particularly in the references drawn from the Native Land Court records derived from the work of Evelyn Stokes (2000). Due to the time constraints on the research no original research was carried out in Maori Land Court records to identify the importance and type of sites associated with various Maori place names. Information provided in The Legacy of Ngatoroirangi by Evelyn Stokes (2000) was relied on. Several reports became available during the archaeological survey in June through July. These included a report prepared by Perry Fletcher describing the Waipapa and Tuaropaki Trust lands and his survey of the preferred route across this area (Fletcher 29 June 2010) and a Cultural Values report prepared by Gayle Leaf (2010) on the Wairakei/ Oruanui Section of Replacement Transmission Lines.

Consultation included a meeting with Perry Fletcher in Phase II of the project, as previously noted. Gayle Leaf was consulted prior to the archaeological survey. Mrs Leaf also participated in one day of the survey work in the Wairakei area.

ARCHAEOLOGY AND MAORI LAND USE

The archaeological and historical literature of the Taupo region is sparse, making it difficult to develop a reliable picture of landuse over time in this region. In 2003 Anne Williams and Tony Walton prepared a model “Early Landuse Patterns in the Lake Taupo Area” that is the primary document used to inform large scale archaeological surveys in the Taupo Area. While the Area of Study is part of the Tongariro/Taupo

Conservancy south of the Transpower project area, the information discussed in the paper is applicable to the land north of Lake Taupo and discusses this area in the review of known data about the region. Figure 1 shows recorded Maori settlement sites in the Taupo area, but is only an indication of where archaeological surveys have been carried out or major sites such as pa that are easily recognisable by farmers and foresters.

Archaeological field work since 2003 has not added substantially to the model developed by Williams and Walton because the archaeological work has primarily focused on resource rich areas such as the geothermal fields or areas adjacent to the lake where subdivision development has taken place. The Eastern Taupo Arterial Road was one of the few linear surveys across an area away from the lake (Mellows 2007). Chris Mellows identified one archaeological site, U17/64[2] in the road corridor which was determined to be a result of recent activities. A garden site was identified during earthworks for bridge construction adjacent to the south bank of the Waikato River.

Other archaeological work in or near the proposed transmission line has included a historic and archaeological assessment for the Mokai Power Station by Simmons (2006), archaeological investigation for the Te Mihi Geothermal Project (Farley and Clough 2007), and the Wairakei-Whakamaru Replacement Transmission Line Project Cultural Site Survey-Waipapa and Tuaropaki Blocks (Fletcher 2010, which was previously noted). Perry Fletcher was also interviewed in 2009 (as noted in the summary on Phase II and provided some information that corrected existing NZAA records, but no archaeological reports for the area).

The 2006 Simmons assessment identified a number of sites in or near the Mokai project area. No field assessment work was commissioned as part of the report. Te Mihi Geothermal project (Farley and Clough 2007) included a site survey which resulted in the identification of no archaeological sites in that area. It was noted two sites were located nearby U17/17 a rock art site and an unrecorded site near the Te Mihi project area which was an old fortification site that was recorded as U17/65.

The 2010 Fletcher survey of the preferred route on the Waipapa and Tuaropaki blocks resulted in the identification of a number of archaeological features within the preferred route. These features are listed on Table 2. Figure 2 show the location of Fletchers survey points and/ or identified site locations. Fletcher's (2010) work was to inform the indicative location of transmission towers. Many of the potential archaeological features and sites identified by Fletcher were not verified. He has marked these items with a question (?) mark.

[2] The pits, U17/64, identified adjacent to the Waikato River (Mellows 2007) were reassessed. Based on historical information about land use at U17/64 and the location of the pits on a flood plain, it was determined the pits were created by DSIR and not Maori. This is a common problem the new modifications reading as old.

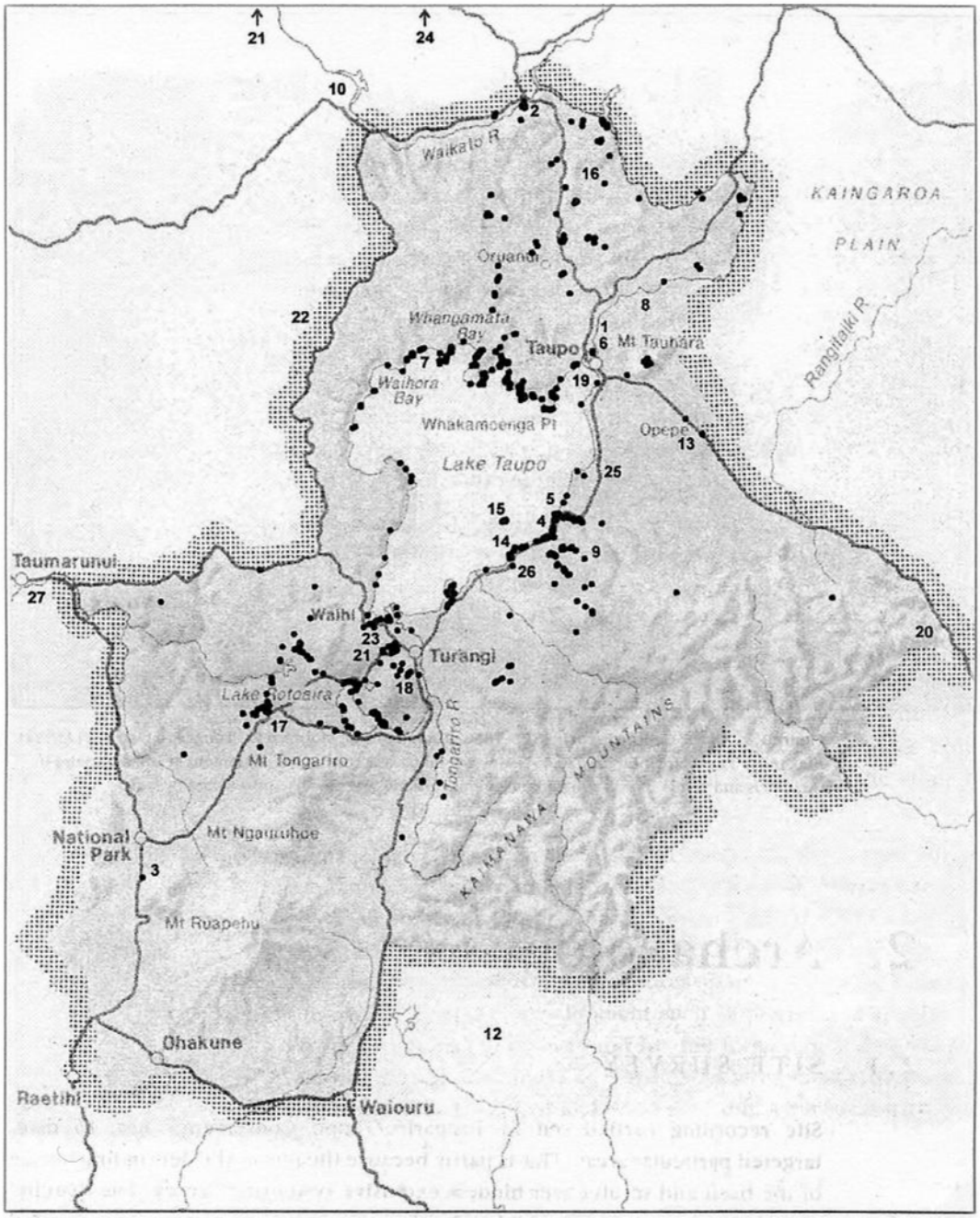


Figure 2. Prehistoric/Maori archaeological sites recorded in Tongariro/Taupo Conservancy. Numbers refer to names mentioned in the text: 1. Aratiatia Rapids, 2. Atiamuri, 3. Erua Swamp, 4. Hallets Bay, 5. Hinemaiaia Stream, 6. Huka Falls, 7. Kawakawa Bay, 8. Lake Rotokawa, 9. Lake Taupo State Forest, 10. Mangakino, 11. Maungatautari, 12. Moawhango Ecological District, 13. Motukino, 14. Motutere Point, 15. Motutaiko I., 16. Orakeikorako, 17. Papakai, 18. Pihanga Range, 19. Tapuaeharuru Bay, 20. Tarawera, 21. Te Ponanga Saddle, 22. Tihoi, 23. Tokaanu, 24. Tokoroa, 25. Waimihia State Forest, 26. Waipehi Bog/Waipehi Stream, 27. Wanganui River.

FIGURE 1 RECORDED PREHISTORIC /MAORI SITES IN THE TAUPO AREA (Williams and Walton 2003:8)

TABLE 2 COPY OF PERRY FLETCHERS SURVEY DATA (Fletcher 2010:29-30) (See figure 2 for reference locations)

GPS position points taken during the inspection of the corridor area in the Tuaropaki and Waipapa Blocks.

Amended list.

Field book pageRef.	GPS Easting	NZTopo50 1:50,000 Northing	Feature.
B11	1852511	5731271	By copse. Miscellaneous logging relics and tracks.
B12	1853184	5730568	Old posts.
B13	1853326	5730590	Back gully south side.
B14	1853403	5730710	Defensive aspect.
B15	1853447	5730818	Old bottle.
B16	1853209	5730752	Stump showing old adze cuts.
B17	1853777	5730626	Old house site.
B18	1853924	5730600	Urupa (fenced)
B19	1853885	5730655	Milking shed site?
B20	1854006	5730638	Drum and post in gully.
B21a	1850754	5731625	Open pit?
B21b	1850762	5731647	Terrace?
B24	1849872	5733642	Bush edge and fence.
B25	1849896	5734012	Boulder and old cabbage tree.
B26a	1850025	5734575	Trig.
B26b	1849936	5734443	6x6 metres depression
B28a	1850000	5732789	Terrace, track ends, old kainga? 15x20 metres.
B28b	1849981	5732849	Pit (tree stump depression?)
B29a	1849950	5732778	Creek source south side.
B29b	1850486	5732374	Hilltop east.
B30a	1850589	5732436	Depression, exposed rocks.
B30b	1850509	5732323	Off gully, ideal as a track. By block boundary.
B31a	1851460	5732314	Line of stumps of old native trees? (in old cadastral)
B31b	2851786	5732178	Old pa site?
B31c	1851928	5732373	Present source of stream. Swift current.
B33a	489	380	Marae Manuka Dairy Farm.
B33b	1849194	5733928	Above source of a creek.
B33c	1849237	5734010	Cultivation, terraced area.
B34a	1849464	5734048	Porphyry obsidian.

Table 2 continues on the next page-

TABLE 2 PERRY FLETCHERS SURVEY DATA (2010) (continued)

Ref #	GPS Grid Reference		Feature
B34b	1849513	5734120	Main area of exposed porphyry obsidian.
B35a	1849513	5734235	2nd creek crossing.
B35b	1848310	5735269	High area start.
B36	1848004	5735391	Open pit? 3x2 metres. West side stream.
B37	1848310	5734916	East side of stream. Old totara fence posts.
B38	1847660	5737201	Area obsidian exposed rocks indicated on map.
B40	1847797	5736372	Tomo area.
B42	1847825	5736314	Crossing.
B43	1851887	5731987	Metal waratah stake on side of a knoll used as a marker?
B44a	1852111	5731686	Small depression at grove.
B44b	1851857	5732123	Pa? North of bush.
B45	513	335	Old large urupa in present use. West of the site of the Wairangi meeting house
B53	1852311	5732223	Pa site. Pa o Te Ata.

The sites for any early archaeological interest are:

B16	1853209	5730752	Stump showing old adze cuts.
B31b	2851786	5732178	Old pa site?
B36	1848004	5735391	Open pit? 3x2 metres. West side stream.
B44b	1851857	5732123	Pa? North of bush.

Outside corridor

B21a	1850754	5731625	Open pit?
B21b	1850762	5731647	Terrace?
B26a	1850025	5734575	Trig.
B26b	1849936	5734443	6x6 metres depression
B28a	1850000	5732789	Terrace, track ends, old kainga? 15x20 metres.
B28b	1849981	5732849	Pit (tree stump depression?)
B33c	1849237	5734010	Cultivation, terraced area.
B53	1852311	5732223	Pa site. Pa o Te Ata. (Just outside corridor)

The area of the settlement called Hapotea has been modified through logging and farm development may still expose material remains when work commences across this section.

[Hapotea is discussed in the following section on Early Maori Population, Settlement Patterns, and Land Use.]

FIGURE 2 WRK-WKM C LINE WITH SURVEY POINTS NOTED BY PERRY FLETCHER 2010. (See Table 2 for descriptions of items noted). (Source: Transpower August 2010).

EARLY MAORI POPULATION, SETTLEMENT PATTERNS, AND LAND USE

INFORMATION SOURCES

The most comprehensive material identified on land use in the location of the proposed WRK-WKM C Line was prepared by geographer Evelyn Stokes (2000). I will discuss her material along with the work of Ward (1956), Walton (1986 and 2003), Williams (1988 and 2003), and others to provide a general overview of land use in the area crossed by the proposed WRK-WKM C Line.

Knowledge about Maori settlement on the plateau is drawn from the journals of early explorers and missionaries that visited the area in the early through mid-1800's and Native Land Court records. I have included maps sourced from Evelyn Stokes report that show the locations of many of the places noted in the Native Land Court records. (Not all the places noted in the testimony she presented are shown on the maps and it is assumed the location of some of these places was not recorded on land plans).

POPULATION

The population of the Taupo region in the 1840s and 1850s has been estimated as being from 1100 to 1600 (Walton 1986 in Williams and Walton 2003:12). Walton based his estimates on historical records and various attempts at applying multipliers to the number of warriors reported. For example; Ernest Dieffenback visited the district in 1841 and suggested 800 warriors lived in the district (Williams and Walton 2003) and John Carne Bidwill visited the district in March and April 1839 and noted:

> "I should not think the population of the pass on the lake could not be less than 5000. The country around I do not think can be populous; it is too mountainous and bare of wood, and the Mowries (sic) only grow potatoes in land which is just cleared, and after about three crops abandon it, and clear another portion of forest" (Bidwell 1974:40)

Early missionary reports provide additional information about distribution of the population because of their interest in drawing the inhabitants to church services. The Reverend Thomas Skinner carried out a census in 1849 and reported he was hindered by the dispersal of people to fish, snare birds, and visit other settlements.

The size of the Maori population in the region was dictated by the resources available, i.e. fern root, cultivated kumara, koura, kokopu, and birds. Pigs were also raised, but the size of the pig population is not known. The shallow top soil on the plateau and climate limited the amount of food that could be obtained from cultivation.

SETTLEMENT PATTERNS

Gerald Ward (1956) prepared a composite map of 65 kainga occupied at various times from 1830 through 1880 in the Taupo region (figure 3). Ward's research was the first notable attempt at understanding settlement on the plateau. In 2000 Evelyn Stokes compiled the evidence given to the Native Land Court during the investigation of the Pouakani Block (Stokes 2000:79) figure 4). The evidence

presented indicated the seasonal round of resource exploitation and agriculture resulted in the occupation of temporary habitations. The occupation sites might be at cultivation sites, camps associated with birding expeditions or obsidian quarrying, etc. Long breaks between occupations of these sites were not unusual. Werohia Te Hiko stated:

> "I lived at Waimahana first before Kaiwha, the former a kainga mahinga kumara [a settlement for kumara cultivation]. My father and all Ngati Wairangi planted at the latter before Te Ariki [1851 to 52]. After that fight all moved to Hapotea and Horaaruhe and Tahataharoa. Kaiwha was deserted for a time, till after Hinana [1856] when Te Mete, Rangitoheriri to Kawao and Paora went back there. There were two houses there then, a wharepuni [a substantial building for sleeping in, principal house] and a kauta [cooking shelter or shed], the property of Te Mete and Te Kirimate.
>
> I lived at Tahataharoa and Hopotea and Horaaruhe after Potatau was made king [1858]. I was at Orohina at the time of Orakau [1864] and after the fall of that pa returned to Hapotea etc. and was living there when Te Kooti came from Taupo, but was at Kaiwha when the fight took place at Tapapa [1870].
>
> One wharepuni one kauta and one wharau [temporary shelter made of branches] were the only buildings at Kaiwha when Potatau was made king; these were the only houses till N' Apakura came [after Orakau, 1864]" (Waikato MB 27/24-25 in Stokes 2000:78-81).

Te Waiti Hohaia commented: "we had so many kaingas we travelled from place to place" (Waikato MB 27/8 in Stokes 2000:79).

CULTIVATIONS

The shallow, poor soils were noted in the missionary journals and military reports. Cultivations and settlements were centred near water resources, streams, springs, the Waikato River, and Lake Taupo. The larger settlements were near Lake Taupo. Many of the small interior settlements were at the bush edge. Parts of the forest were cleared for gardens near settlements when necessary. The Rev Thomas Skinner noted: "Other communities established gardens and 'outsettlements' some distance from their main settlements" (Williams and Walton 2003:14).

Gerald Ward (1956) describes the subsistence difficulties of the district.

> "With long cold winters and the risk of unseasonable frosts the kumara was an uncertain crop in this district and potatoes were apparently introduced from the coast before the first Europeans visited the area. The new crop quickly took the place of fern root as a staple food. Pumpkins, maize and melons,

FIGURE 3 REVISED MAP OF MAORI SETTLEMENTS PREPARED BY STOKES 2000:51 based on Ward (1956). (Note: location of Waipapa is circled)

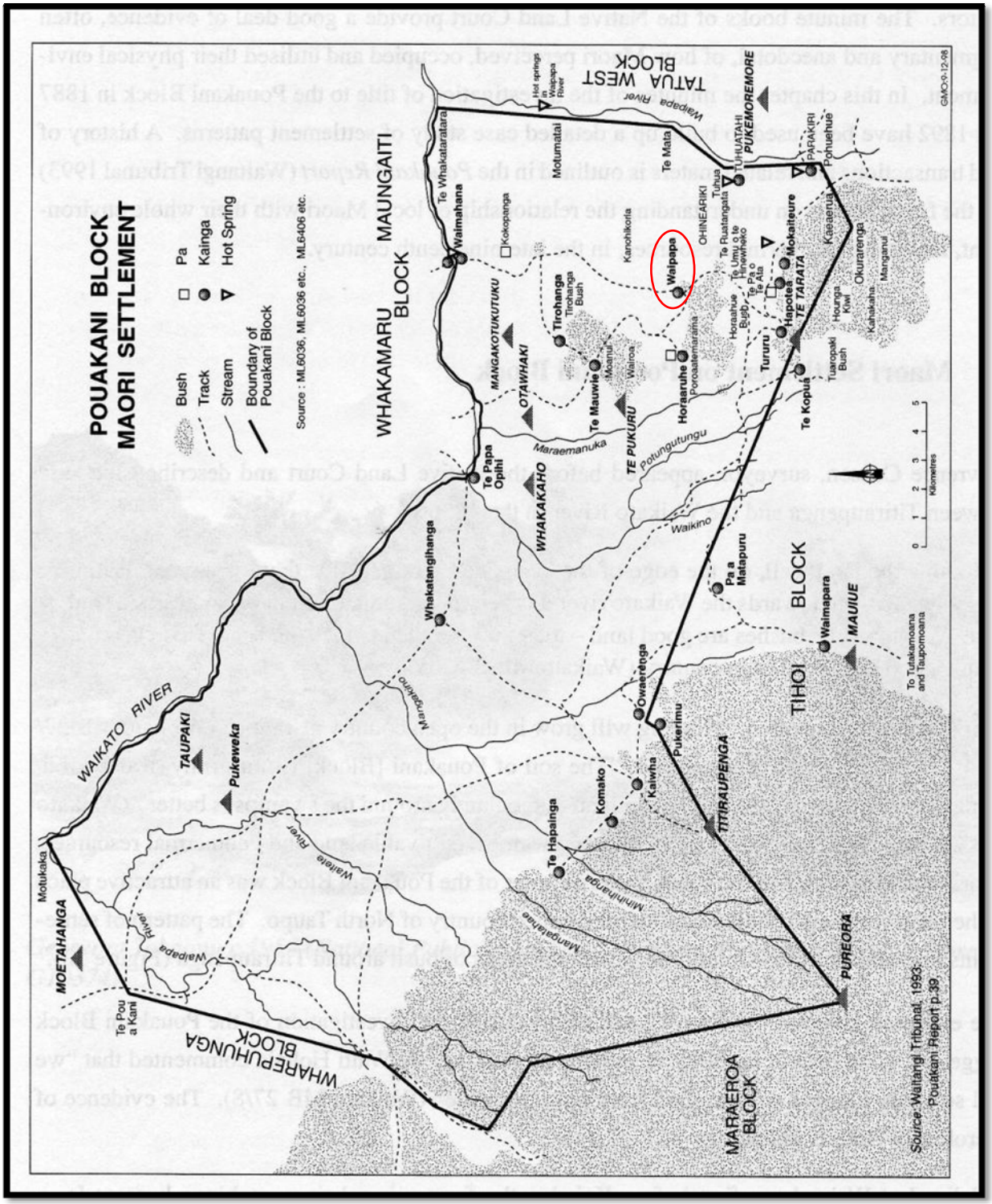


FIGURE 4 MAORI SETTLEMENTS IN THE POUAKANI BLOCK (STOKES 2000:80) (Note: Location of Waipapa is circled)

> together with fruit trees were also introduced at an early date and were widely cultivated. . . The introduction of the potato, however, was not an unmixed blessing, for Bidwill, Dieffenbach and others commented that fires started in connection with the cultivations destroyed the bush in many parts of the region and it seems that repeated burning prevented regeneration. In order to get early corps of potatoes the tubers were sometimes planted in the midst of the scrub which was then felled. Later, this scrub was burnt and although the fire destroyed the haulms of the plants, new growth came away and the set back was not as great as if the crop had been exposed to frost. This method of cultivating potatoes was called whakaota in the Taupo Country. After two or three crops had been taken the land was abandoned and new areas cleared.
>
> Rather similar techniques were employed when gardens were established in the open fern country. Temporary huts were erected but these plantations were rarely used for more than one season" (Ward 1956:42).

The cultivation of kumara, a staple food for many Maori tribes, was only grown on the plateau in places where there was sufficient warmth. The hot springs at Te Waimahana, which was flooded by hydro Lake Whakamaru, was a place where kumara were grown. Werohia Te Hiko denied claims that kumara were grown at other places. He noted potatoes were grown at Ophai and Mareamanuka (Stokes 2000:81)

USE OF NATIVE FOREST

The forest edges were significant zones that provided a concentration of resource opportunities both for foraging, hunting, and cultivation. The kainga on the edge of bush were used as cultivation areas. The forest edges provided sheltered slopes with sunny aspects. The effects of frost on crops would have been reduced by planting crops among trees and shrubs or at the bush line. The forest contained many plant species that were used by Maori for food and medicine. The forest edges were also a focus for bird snaring.

Forest and Forest Edge Plants

The forests provided plant species that Maori rendered edible by processing. Maori had an existing knowledge of food processing that included the use of extended cooking periods and detoxification. Helen Leach has asserted that Polynesian thinking about food included the perspective: that every plant is potentially edible if you can work out how to process it" (Leach 2008:10). For example two species of tree ferns could be rendered palatable after a long period of cooking, i.e.*mamaku* the black tree fern (*Cyathea medullaris*) and *katote (Cyathea smithii)* (Leach 2008:9). Maori relied on forest plant foods like karaka kernels for their carbohydrates. Karaka (*Coryncarpus laevigatus*) kernels are bitter in taste and poisonous. Maori detoxified the karaka kernel through a process of steps that included prolonged cooking followed by weeks of soaking in water to dissolve and wash the toxin out of the kernels. The washing process involved placing baskets of cooked kernels in a pool formed by damming a running stream (Leach 2008:10). Small groves of karaka trees are frequently associated with Maori settlement sites and it has been asserted by Leach and Stowe that Maori had began the process of domesticating this forest species (Leach and Stowe 2005 in Leach 2008:10). Other tree fruits included tawa

kernels and hinau berrys. The stone in the hinau berry was removed and the oily flesh could be turned in to a storable meal (Leach 2008).

Bracken fern rhizome (*aruhe*) was a staple carbohydrate on the plateau until it was replaced by the potato. “The bracken transfers starch into its root system as the days shorten and the foliage dies down” (Leach 2008:10). The roots were dried prior to consumption and were stored for later use. Fern root digging areas were noted in the testimony at the Native Land Court. Tukorehu noted he dug fern root at Karapiti (Taupo MB 2/244 in Stokes 2000:136).

Fructose, a high energy food was provided by cooking the stems and taproot of the cabbage tree *(Cordyline australis).* Nectar was also obtained by sucking flax flowers, consuming fuchsia, bush lawyer or various *Coprosma* berries, although these were never a mainstay (Leach 2008:9).

Forest Birds

Birds were an important resource, particularly kereru (wood pigeons) and kakas (parrots). They were preserved and used at ceremonial feasts including tangihanga [funeral gatherings]. In 1870 Meade, a missionary, noted he consumed fresh wood pigeons while at Oruanui Pa. The Taupo region was once richly populated with forest birds.

Bird snaring trees were given their own name and the rights associated with use of that tree were owned and passed through families. The Tuaropaki Bush contained many named and owned bird snaring areas and trees. Pigeon troughs [bird drinking troughs] were used in some places to attract birds and snare them. Testimony present at the Native Land Court during the investigation of the Pouakani Block documents the importance of bird trees. This information is presented in the following section on the Mokai area.

OTHER IMPORTANT RESOURCES ON THE PLATEAU

Kokowai, Obsidian and Pumice

Other resources that were of interest in the WRK-WKM C Line area were obsidian and kokowai (ochre). Kokowai would have been collected from geothermal springs in the vicinity of the line alignment. Kokowai was used for trade purposes as well as for personal use. A description of kokowai processing and use was included in Bidwill’s 1841 book, “Rambles in New Zealand”:

> “The natives are very fond of daubing their heads with a sort of red paint which they call ‘cocoi’. I saw a large manufactory of it on the banks of the Waikato; a double circle of mat work was formed round a large spring of rusty water, and the curdy carbonate of iron was by this means strained off. After this preparation, it is burnt and mixed with oil, and plastered on their heads and bodies” (Bidwill in Fletcher 2001:8).

The ochre was traded with the Hawkes Bay people and others. The Hawkes Bay people provided greenstone. Hare Reweti Te Kume explained the importance of kokowai, it was used in ceremonial exchange of goods and cemented tribal relationships (Stokes 2000:134).

> "Ngatiterangiita gave red ochre to Ngatiteau and the latter gave a feast in return. The ochre was burnt on this land, the feast was given at Hiruharama" (Taupo MB 2/229-230, 232 in Stokes 2000:134).

The Native Land Court records name some of the places that kokowai was obtained from Pouakani Block; Makuini Te Whakarehu stated that kokowai was obtained from a hot spring at Tuhuatahi, but Te Rangikaripiripia clamed that Tuhunatahi was not the source of kokowai. "Matakatau and Parakauwae are the places where red ochre is obtainable" (Waikato MB 26/162 in Stokes 2000:93)[3].

> "Ngaraka Ngamanu stated: One of the industries in which my parents and elders were engaged in was procuring red ochre (Waikato MB 27/44). Unfortunately, no specific locations where this occurred were given" (Stokes 2000:93)

Kokowai was identified by Stokes (2000) as one of the most valuable commodities found on the Wairakei block. The health related qualities of thermal springs at Matarakutia and Kiriohinekai were also valued.

Obsidian as well as pumice was utilised to provide the tools of daily living. Pumice was used as net floats, bowls, and patu. Obsidian was important as a source of blades for cutting; it was the razor blade/ scissor edge of the Maori and had value as a trade item. There were obsidian sources recorded in the Pouakani Block near the project area (see NZAA site files referenced in Table 1). As was noted previously some of these obsidian quarry areas may not be archaeological, i.e. haven't been modified by humans.

SIGNIFICANT SETTLEMENT AREAS

The Study Area includes several areas where Maori populations were centred, probably because of the concentration of resource opportunities.

Mokai Area

At Mokai Village the forests sheltered the settlement from the cold southerly winds. The nearby swamps provided flax, raupo, and water fowl. The main settlement from the early 1840s was Hopotea (Stokes 2000:82). Stokes also notes other kainga in this area: Mokaiteure, Tuhuatahi, Tururu, Tahataharoa, Waitutu, Matatu and Te Pa O Te Ata [a large pa that was periodically occupied] (Stokes 2000: 82-84).

Stokes (2000)[4] noted that Dieffenbach's accounts of the Mokai area are more detailed than other early accounts of this area. Dieffenback described a kainga near Mokai on the 6th of April 1841:

[3] These places could not be located on the maps provided in Stokes report.
[4] Excerpts taken from Stokes (2000) duplicated the format in her text. Brackets were used by Stokes to provide notes about the translation of a word, the date an event occurred or to provide additional information.

> "we walked until about five when we reached a frontier Pah called Oraruh [Horaaruhe], here we were welcomed by shots and the Iremai [Haere mai]. . . April 8 We passed through a beautiful wood principally Totara and Kikatea [Kahikatea] and in this were potato grounds which produced the fine potatoes I have mentioned. . . three miles walk brought us to the Pah which was even more strongly situated than that we had left. It was on top of a very steep high conical hill defended on two sides by a very deep ravine. It was in a state of repair contained very few people and was very clean. . . but they would not let us have a pig and our whole store of food now consisted of some damaged rice and mouldy biscuits. . . April 10 About five we reached Tutuku Moana [Tutakamoana Pa] the strongest position I had yet seen" (in Stokes 2000:42-43).

Settlements near the bush at Mokai were noted by Eru Te Rangietu who described Ahirara[5]:

> "A kainga [village] and mahinga [cultivation], crops of potatoes, corn and tobacco were here planted. I think the fences are still standing. Bird snaring localities are here. At Poroatemarama which is near Ahirara are the tutus [bird snaring trees] Te Kohi and Te Rimu belonging to Natana and Te Poutumoa respectively" (Waikato MB 26/90 in Stokes 2000:81).

Evidence of ownership rights and the use of various kainga for the acquisition or cultivation of specific resources are described in Hitiri Te Paerata's testimony. Hitiri Te Paerata noted:

> "Te Waimahana. . . is situatied on both banks of the Waikato River. I lived there and my father before me. The houses of this settlement were not wharepunis but wharetoetoe [i.e. not substantial buildings but thatched huts], it was merely a kainga for cultivation purposes . . . the cemetery of this kainga is on the Whakamaru Block. . . at this settlement crops of potatoes were planted and birds were snared. . .
>
> Horaaruhe was a kainga and a pa. . . At this kainga were two large wahrepuni one of which was called Wairangi. . . Te Muna was the name of the second house. . .In connection with this settlement were extensive plantations. . . The bird snaring places of this kainga were at Waipapa. Ngawhkawhitiwhiti, a matai tree, was owned by Te Paerata Kaiawha. Ngamataiturua, two matai trees, belonged to my father. Te Waipopotea belonged to Paora Ngamotu. Since the Hinana feast [1856] no game has been snared at these places. . . There are two burial grounds in connection with this settlement [Waipapa] one at Kanohikorio and the other at the settlement itself. At this Kainga was one large house, Kaingaroa, it is my house. There are extensive cultivations. Mine is the only large house of this settlement" (Waikato MB 26/44-45 in Stokes 2000:81-82).

[5] Perry Fletcher provided a fax to Transpower advising that Ahirara might be located on the land containing towers 69, 70, and 71, but provided no plan or grid reference for the actual site location. No site records was found in the NZAA site files on this site. Perry Fletcher's report arrived as field work commenced. The report noted that Ahirara was an old pa visited by Dieffenback and Best.

Wairakei Area

The names of places in the Wairakei Block were compiled by Evelyn Stokes (2000), figures 5 and 6. Stokes (2000:132) noted that the title to the Wairakei Block was not investigated until 1881, but that Hare Reweti Te Kume gave evidence about the Wairakei-Aratiatia area during the Native Land Court investigation into the title of the Oruanui Block in April 1868:

> "I claim the whole block through ancestry. Rongomaitutaiaka is the ancestory we claim through...Rongomai defeated the Ngatihotu and took the land. Kurapoto his father defeated them…his decendants have ever since occupied the land. I myself have occupied it form childhood and have cultivated potatoes there. I have also a weir in one of the streams at Te Kirihinekai. We had a plantation at Te Apunga and other places. I had a house near the same place but it is now rotten. It is about four years since I planted there. I then went to live at Oruanui and at Kiorehae nearby" (Taupo MB2/225-226 in Stokes 2000:134).

Hare Reweti Te Kume noted his father cultivated land at Kiorehae, Matarakutia near Te Kiri o Moehau and that he had crops there (Stokes 2000:132) (figure 6). He also noted:

> "At te Iringaamanu where there was a pa and cultivations I have turnips growing now. At Koru Mamaku I have a potato plantation. There are not cultivations further west as the land is not good. At Wairakei I have houses where I used to stay when getting red ochre" (Stokes 2000:132).

Evidence was also provided by many other hapu members that claimed interests in the Wairakei block. Gayle Leaf noted in her report on the Wairakei/ Oruanui section of the preferred route for the WRK-WKM C Line, that a number of places near the proposed transmission line are significant to tangata whenua (figures 7 and 8). These places are summarised in Table 3.

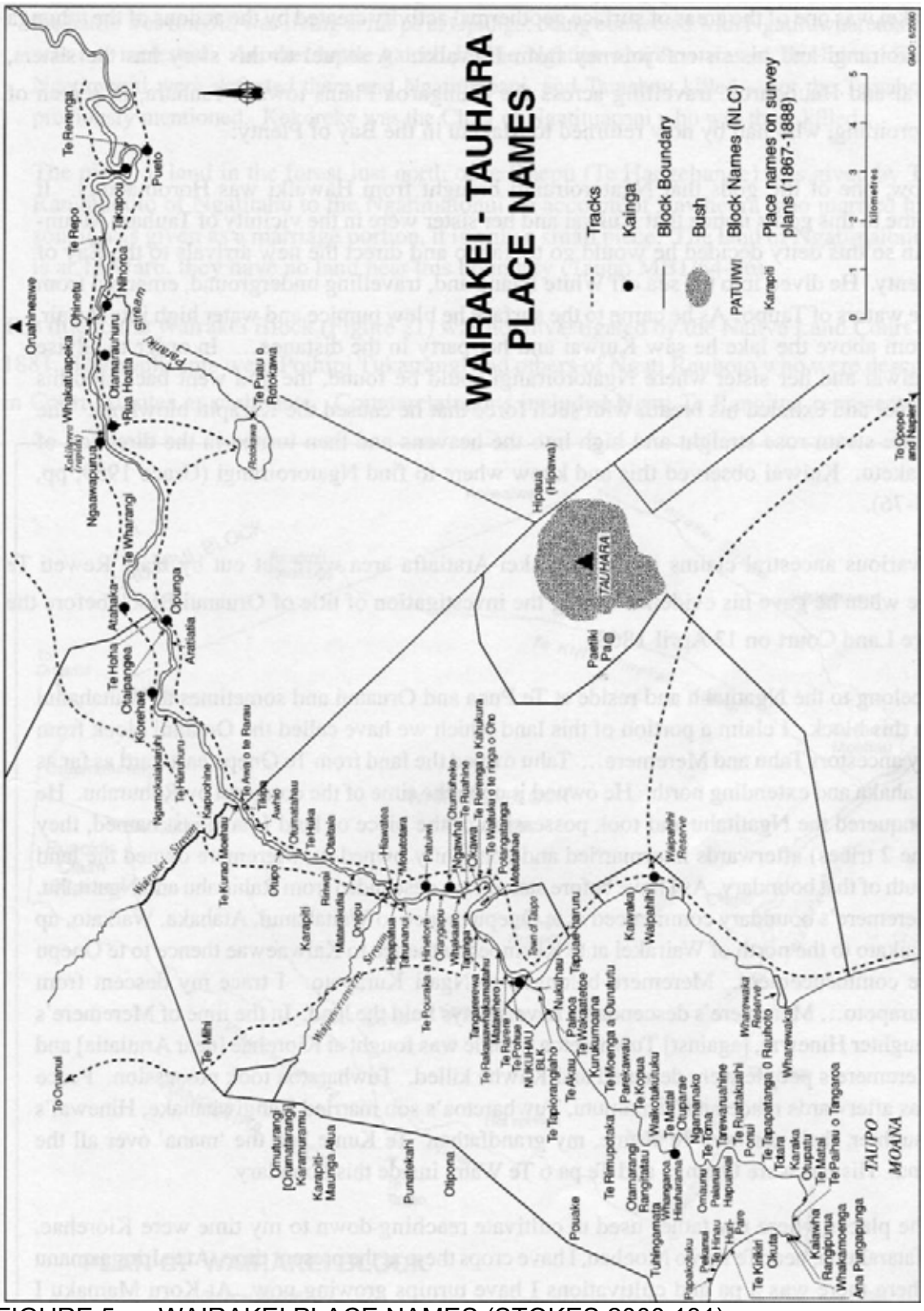


FIGURE 5 WAIRAKEI PLACE NAMES (STOKES 2000:131).

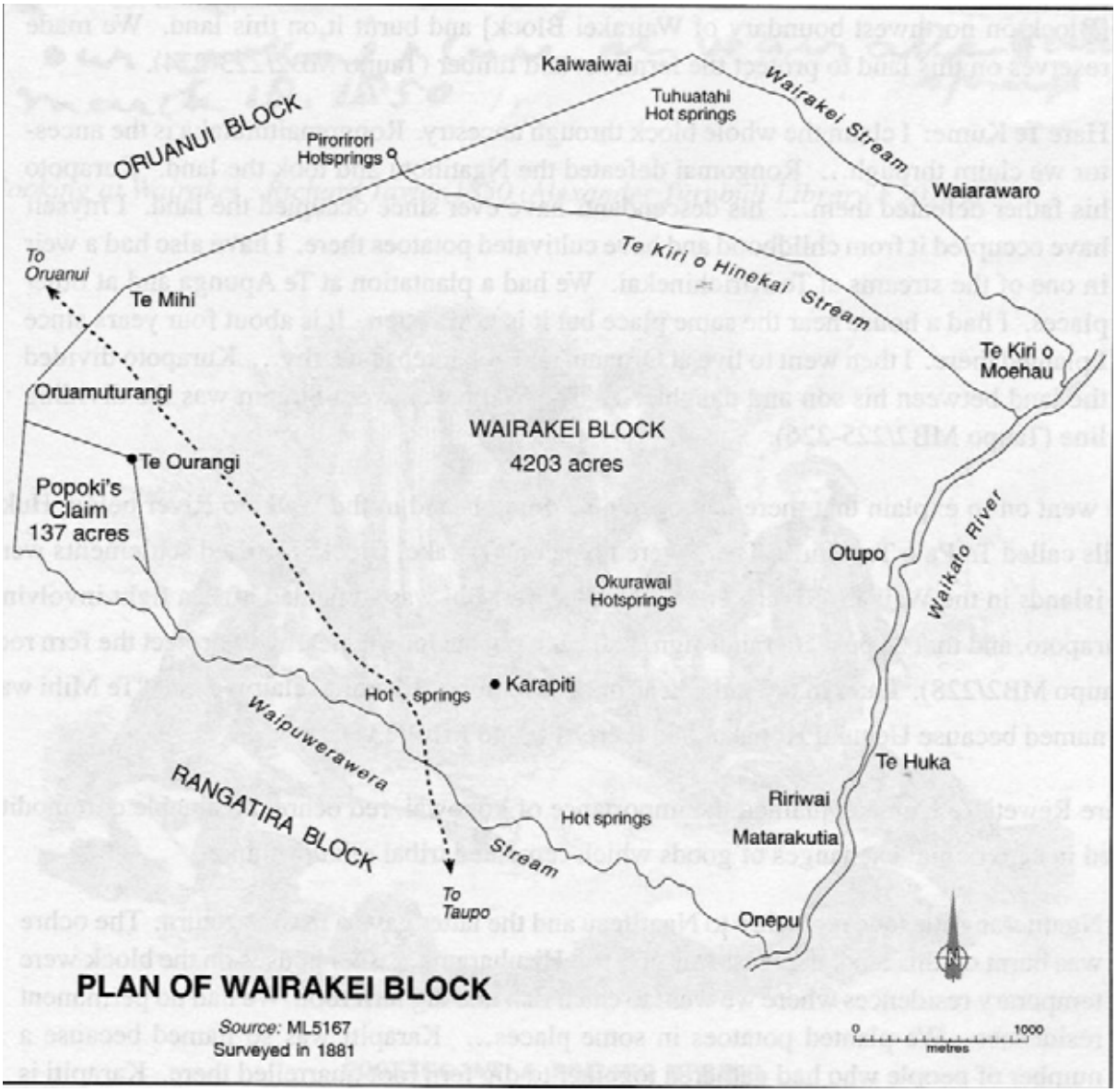


FIGURE 6 WAIRAKEI BLOCK (STOKES 2000:133).

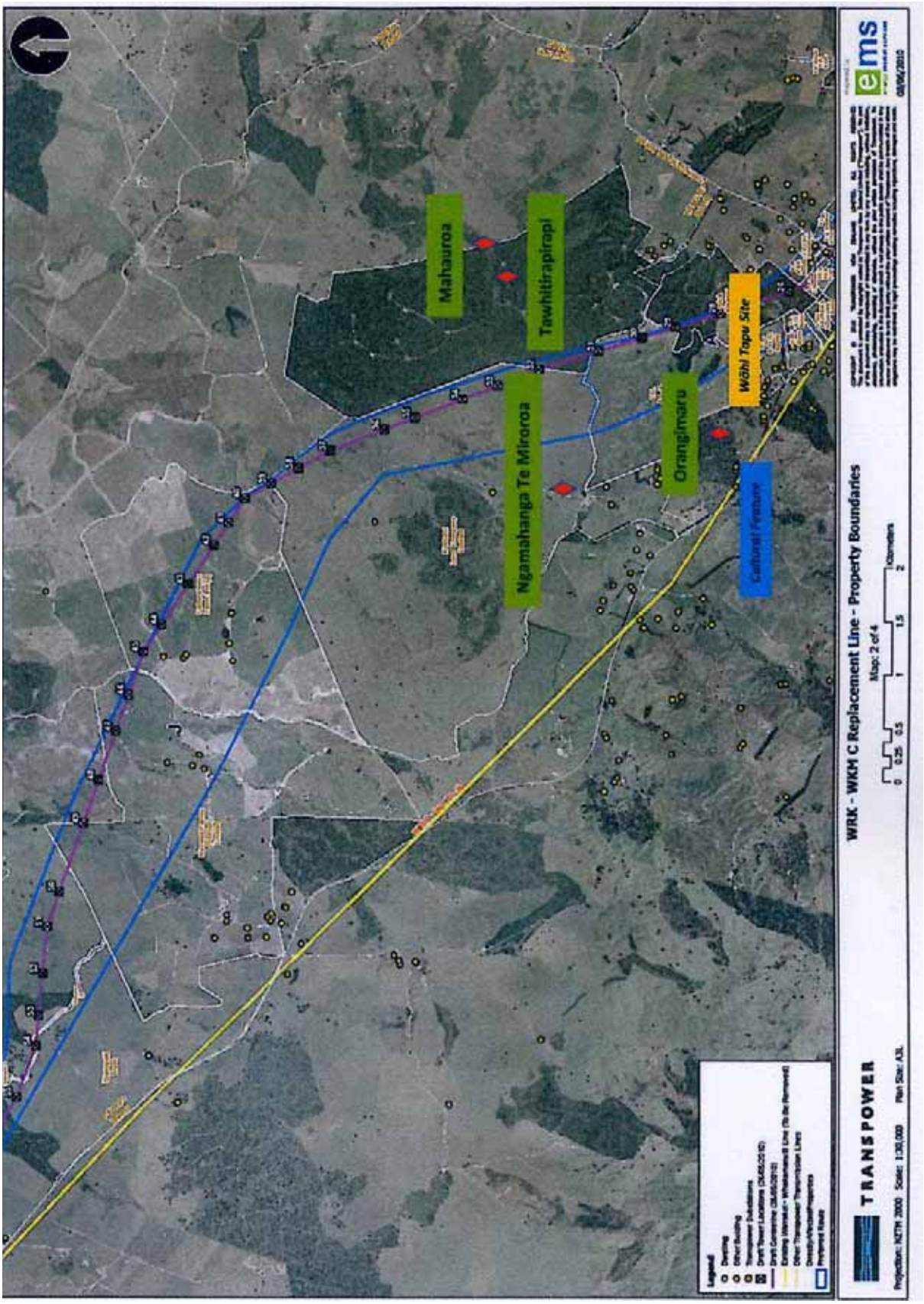


FIGURE 7 WAIRAKEI / ORUANUI SECTION OF TRANSMISSION LINE ROUTE; SITES (LEAF 2010)

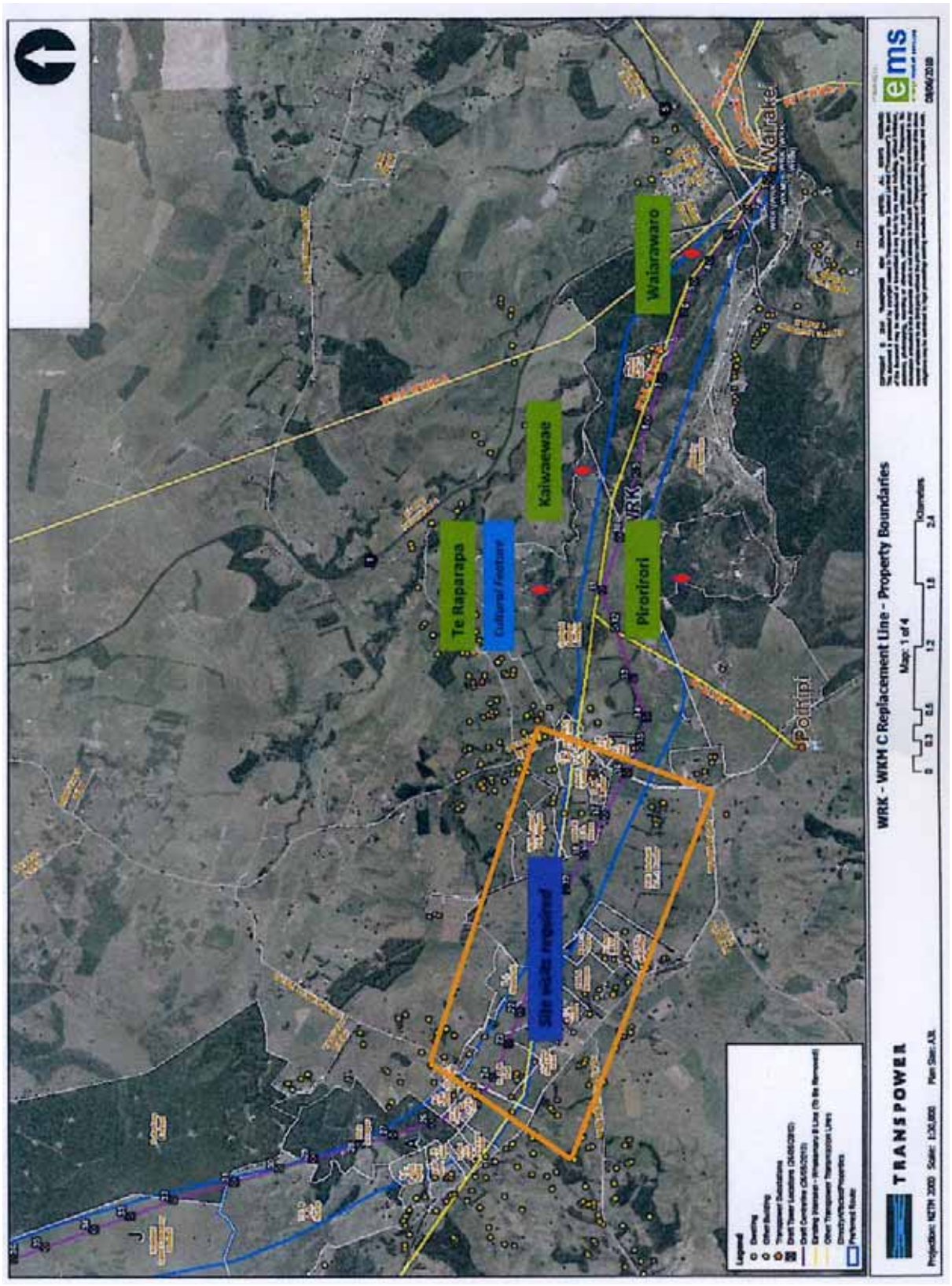


FIGURE 8 WAIRAKEI / ORUANUI SECTION OF TRANSMISSION LINE ROUTE; SITES AND AREAS REQUIRING SURVEY (LEAF 2010)

TABLE 3 SITES OF SIGNIFICANCE TO TANGATA WHENUA (Source Leaf 2010:5-9) (Refer to figures 7 and 8)

Place Name	History, Use, and/ or Site Type	Present Landscape Notes
Waiarawaro	Boundary	Flat rolling country to steep cliffs dropping to Wairakei Stream. Land modified by forestry.
Pirorirori	Aruhe [fern root], kokowai [ochre], occupation, ownership	Geothermal. Land and sites modified by geothermal power development.
Kaiwaewae	Aruhe [fern root], kokowai [ochre], kainaga [settlement], death and burial, kokowai [ochre], historic ridge line separating Wairakei block, pou, ownership	Site is on a raising knoll with a level top. "There appears to be site features linking the name Raparapa and Kaiwaewae." The rock art feature is approximately 400m from Raparapa. A kokowai digging place is approximately 400m from Kaiwaewae. There are many features left that surround this site. The kokowai digging area is described as in the Hawthorn trees. Another feature was a hot boiling spring.
Te Raparapa	Kokowai (ochre), Mere/ Pounamu	Rock markings in good condition inside an overhang surrounded by a wall of blackberry and bracken fern. The overhang contains two spiral carvings. It is a significant area between thermal stream and marsh land.
Mahauroa	Canoe, boundary	Ridge end. Stand of native forest and historic Maori Track. Current land uses are farm land and pine plantation forest.
Tawhitirapirapi	Boundary	Inside Pukerimu Forest. A totara tree identified as a cultural and natural value site. The only remaining totara tree in this area.
Orangimaru Kainga	Birding, dispute, kainga	Physical cultural features remain. Some modification form farming. Orangimaru kainga urupa. Historic dray track.
Ngamahanga Te Miroroa	Rohe	Farm development. Once dense native forest. Forest milled and developed into farm land.

SUMMARY OF MAORI LAND USE

Small hunting and gathering parties would have also traversed across the land included in the Area of Study (between Lake Taupo and the Waikato River). In many areas specific trail systems or routes developed. European surveyors recorded some of the trails on early plans for the colonial government. Stokes (2000) compiled a general map showing these trails (figure 9). The early survey maps also include the names of Maori settlements and places names associated with specific areas. Figures 10 through 12 are excerpts from historic maps of the project area. The example shown is ML 6036/3 (produced in 1886).

The early survey maps were examined at Land Information New Zealand (LINZ) and place names compiled onto the project maps to identify early settlements and use areas in the Study Area. The types of uses associated with many of these areas are noted in the evidence provided by Maori at the Native Land Court sessions. For example the area between Maraemanuka and Waipapa stream on the Waikato River (figure 4) was described by Werohia Te Hiko:

> "Along the river bank were "koura [fresh water crayfish] fisheries and duck snares. . . The kainga mahinga manu [bird snaring camps] . . . belonged to our matuas and tupunas [parents and ancestors] down to ourselves. No cultivations there along the river bank, the plantations were all near the bush away from the river" (Waikato MB 27/152 in Stokes 2000:81).

What is evident from the information available in Native Land Court records, missionary and explorers journals is that Tangata Whenua living on the plateau knew the land and utilised the microclimates to obtain and grow resources they required. The excerpts from the Native Land Court give an indication of the resources utilised and the mobile settlement pattern that facilitated resource use. Land use changed overtime. Gerald Ward noted:

> "by 1880 many of the more remote settlements had been deserted while the population became grouped in modern villages close to Lake Taupo and along the routes used by Europeans" (Ward 1956:41).

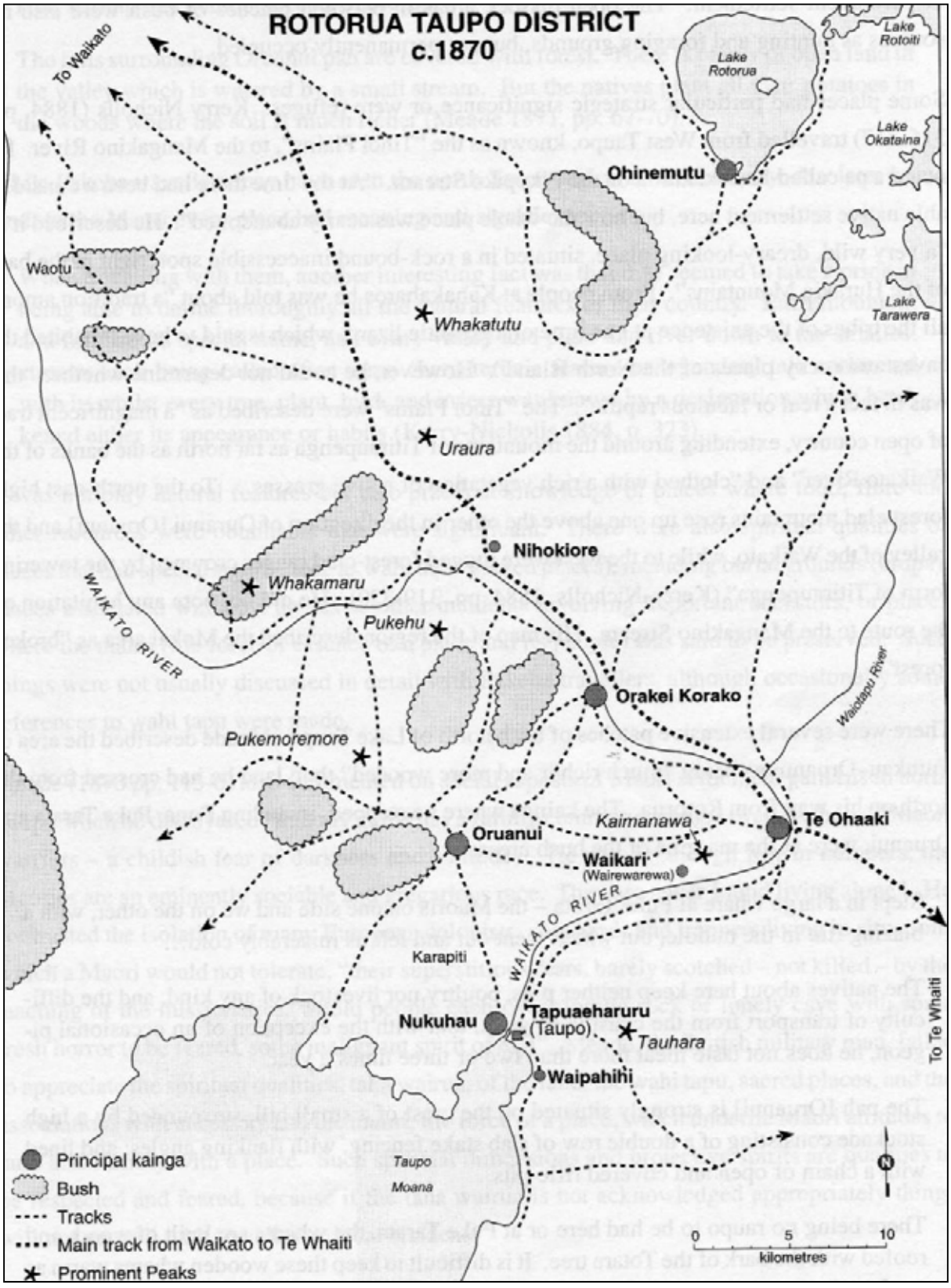


FIGURE 9 TRACKS FROM THE WAIKATO TO TAUPO, ETC IN CIRCA 1870 (STOKES 2000:45)

FIGURE 10 ML 6036/3; WAIKATO RIVER (WHAKAMARU SECTION) SOUTH (plan date 1886) (Note: location of Waipapa is circled).

FIGURE 11 EXCERPT FROM ML 6036/3; WAIKATO RIVER (WHAKAMARU SECTION) SOUTH (plan date 1886)

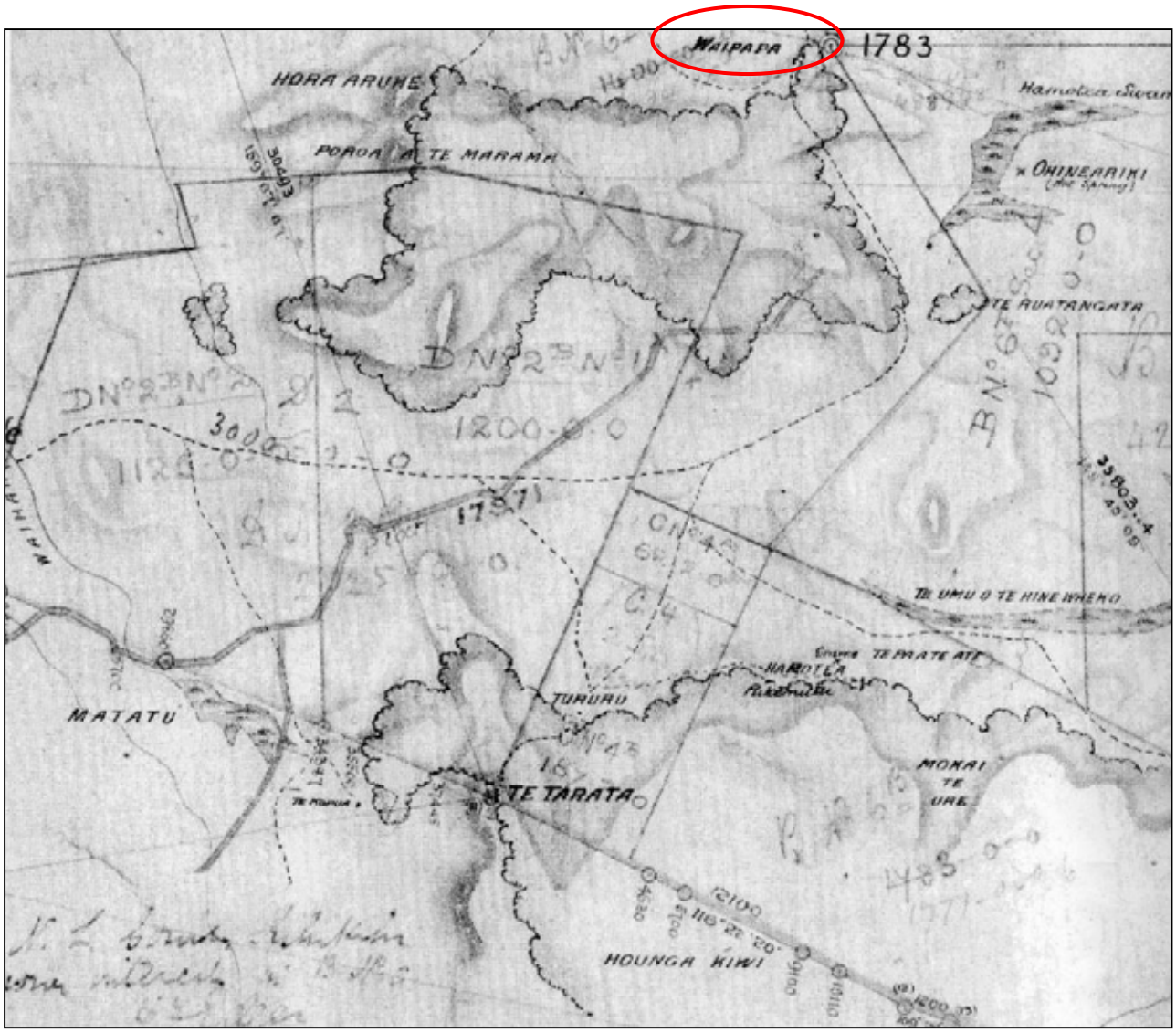


FIGURE 12 EXCERPT FROM ML 6036/3; WAIPAPA SECTION SOUTH (plan date 1886) (Note: location of Waipapa is circled)

HISTORIC PERIOD LAND USE—Post 1900

HISTORIC WAIRAKEI

Tourism

The Wairakei geothermal area attracted tourist attention in the late 1800s. The Wairakei Block was gifted to Robert Graham by Poihipi, a Taupo Chief, in 1879 (Fletcher 1980). He purchased the rest of the block from the Maori owners in 1881. His intention was to develop a tourist and health resort. In 1885 Robert Graham died but Mrs Graham continued to operate the hotel. Graham's Geyser House hotel (figures 13 and 14) was described in the 1890s in Willis' Guide Book.

> "Near the Geyser Valley is a capital hotel kept by Mrs Robert Graham. This is situated close to the banks of Kiriohinekai, a hot stream which flows from

> Pirorirori (the blue lake) to the Waikato River. . .The hotel stands in a pretty garden surrounded by well laid out lawns and shrubberies. . .There is a fine swimming bath, within a few yards of the hotel" (in Stokes 2000:142)

The health properties were also reported in the Willis Guide Book which noted the water was beneficial for eczema and some of the pools in the Geyser Valley (figure 13) were recommended for obesity and other ailments (Stokes 2000:142).

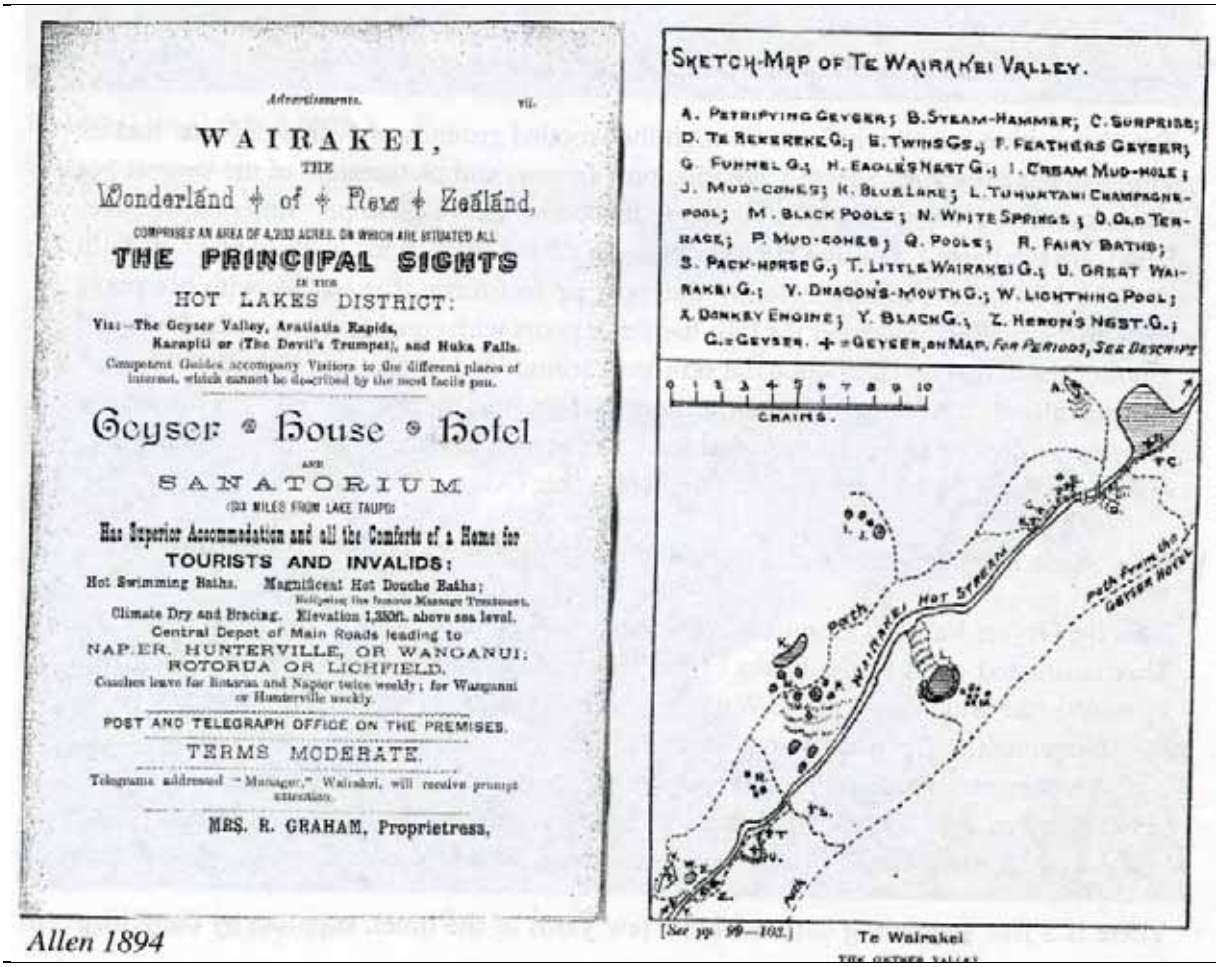


FIGURE 13 GRAHAM'S GEYSER HOTEL AT WAIRAKEI AND THE WAIRAKEI GEOTHERMAL VALLEY (in Stokes 2000:142)

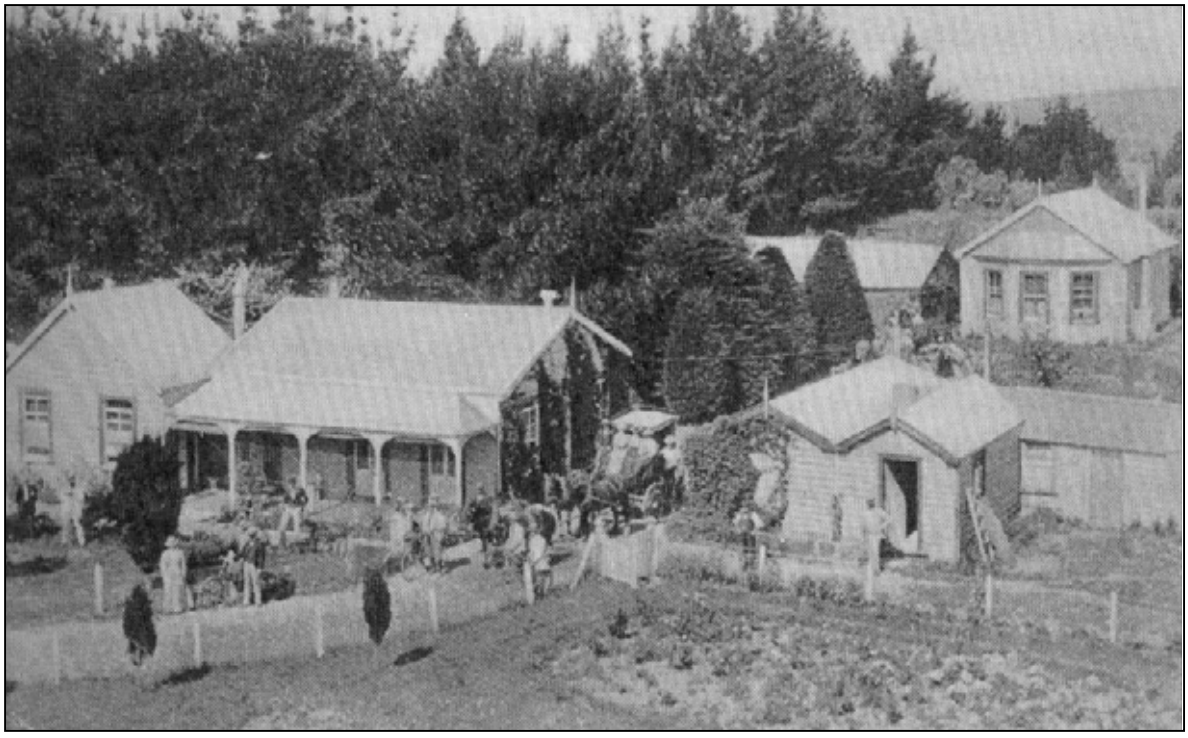


FIGURE 14 WAIRAKEI HOTEL AND FACILITIES ABOUT 1900 (Fletcher 1980:45)

Mrs Graham ran the hotel with assistance from her three sons, Arthur, Roto, and Russell (Fletcher 1980). In 1897 the original building was enlarged to accommodate more guests. It could then cater for up to fifty guests. The hotel operated until 1942 when it was used temporarily as a mental hospital for several years (Stokes 2000). It was reopened as a hotel in 1949 following refurbishment by the tourist department.

Geothermal Development

In March 1950 drilling began at Wairakei using light drilling rigs that were able to reach depths of 750 to 1,500 feet (Martin 1991:257). At Taupo a camp was set up for 50 men who worked on the rigs. In the later part of 1950 rigs that could drill to several thousand feet were brought in to assist in proofing the geothermal potential of the field. Deeper drilling equipment was added in 1952 that could go down to 3,000 to 4,000 feet (Martin 1991). Superheated water of up to 480 degrees Celsius was found. Construction of a geothermal power station began in 1956 and a camp for 100 men was set up on the site. The Wairakei station was brought into production following extensive testing of the stage 1 units beginning in November 1958 and early plant failures (Martin 1991:262). In his history of electric power generation John Martin noted:

> "By March 1960 all the Stage 1 units were producing power and the station was generating 50 MW at peak. . . The remaining units ere commissioned at regular intervals, with the last 30 MW Stage 2 unit producing power in October 1963." (Martin 1991:262)

In the late 1980s along with the sale of other Tourist Department hotels nationally the Wairakei hotel was sold. "By this time the construction and operation of Wairakei geothermal power station since 1960 had destroyed most of the geysers and hot pools that had been a tourist attraction" (Stokes 2000:142). Evelyn Stokes comment

and the aerial photographs of the WRK-WKM C-Line alignment suggest little if anything is left to physical provide evidence of the pre-1900 tourist activities in the Wairakei area.

HISTORIC MOKAI[6]

Mokai also had geothermal resources but these resources were not developed along tourism lines as they were at Wairakei. In the late 1800s and early 1900s, many Maori families lived at Mokai united under Hitiri Te Paerata. Timber harvest and the growth of Mokai was the result of Hitiri Te Paerata management. To the west of the township a Maori settlement was laid out. A central meeting house, wharenui, 'Pakaketaiari' was constructed. Hitiri entered into an agreement with Tudor Atkinson for the sale of the stands of native timber that surrounded Mokai. He also represented the Maori owners in their negotiations with the Taupo Totara Timber company (TTT) and kept records of the royalties paid.

Timber Harvest

A mill and railway from Mokai to Putaruru were started in 1898 with the mill opening in 1903 (Taupo Museum 1987:4). The rail line is illustrated on figure 15. The Tuaropaki bush was inspected in 1901 and found to contain many large totara. The forest was described as the finest in the Colony both in quantity and quality (Davies and Forshaw 1990). A tent village sprang up at Mokai to house workmen who were building two mills. The first log was cut on 26 April 1903 (Davies and Forshaw 1990:15). Figure 16 shows the mill in operation, workers huts and the growing town of Mokai.

In 1906 the no. 1 mill employed 230 men. This brought families to the region and resulted in the establishment of a school and a store. The timber market fluctuated over the early years and the mill ran at a loss for several years. In 1915 the two companies operating at Mokai amalgamated under the banner of the Taupo Totara Timber Company and began to make a profit. The mill at Waipapa was transferred to Mokai in about 1919 and the village prospered. Milling in the Mokai bush resulted in the establishment of many mills on the plateau over the years (figure 17).

Mokai grew rapidly in the late 1920's. In 1930 the town had a population of about 1500 people. The economic depression effected Mokai like most of New Zealand. The town recovered in the mid 1930's and again prospered. The cost of cutting and processing timber increased overtime as the quantity of marketable timber in the adjacent bush was exhausted and marketable timber became available further away from the Mokai mills. Taupo Totara Timber Company withdrew from the area in 1948 leaving only Haughey's Mill, which closed in 1952 (Davies and Forshaw 1990).

[6] This history of Mokai and the harvest of the native timber stands includes many excerpts and figures from Simmons 2007. Much of the original information was drawn from Davies and Forshaw (1990) History of Mokai.

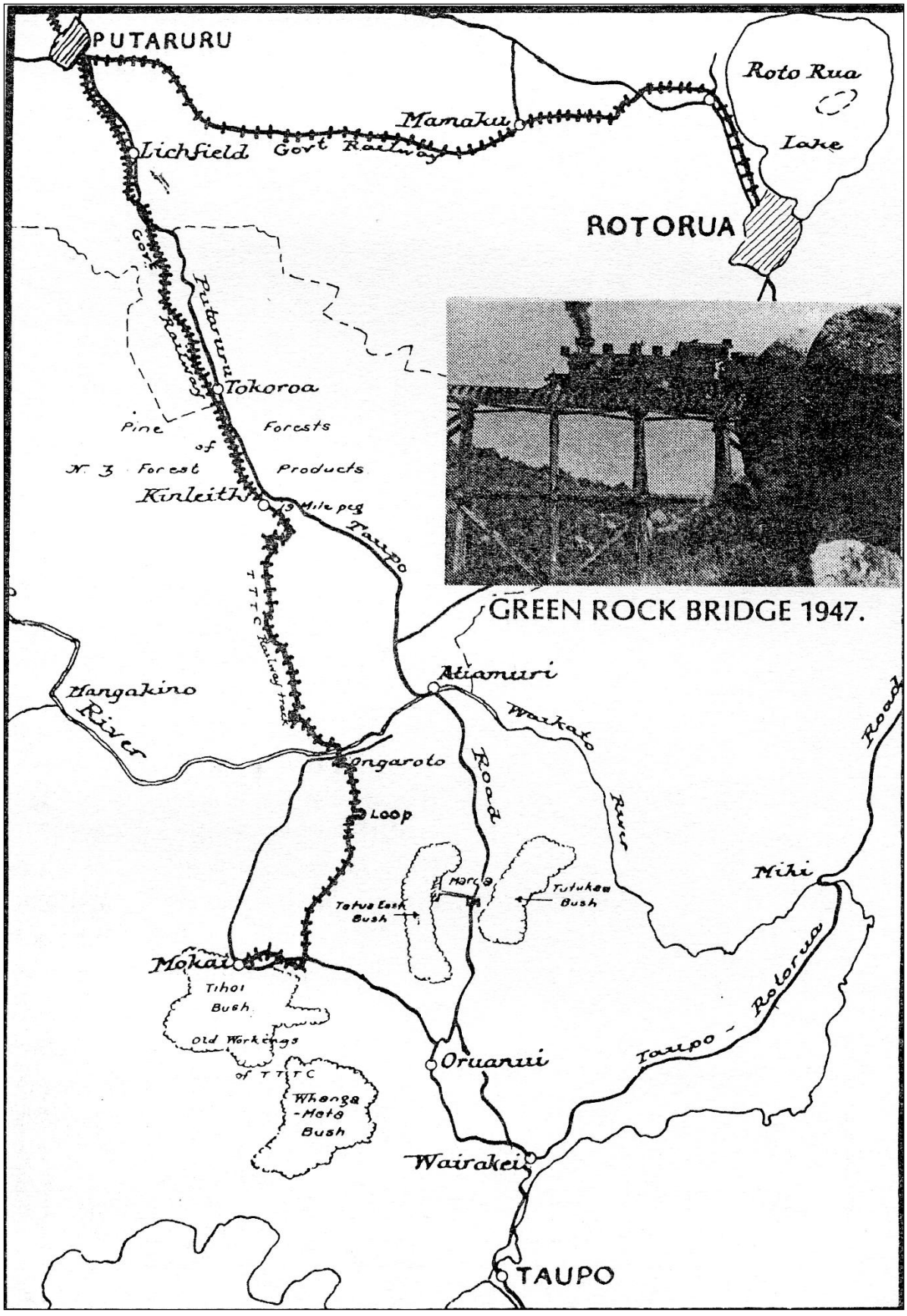


FIGURE 15 PLAN OF RAIL LINE FROM MOKAI TO TOKOROA (Taupo Regional Museum 1987:4)

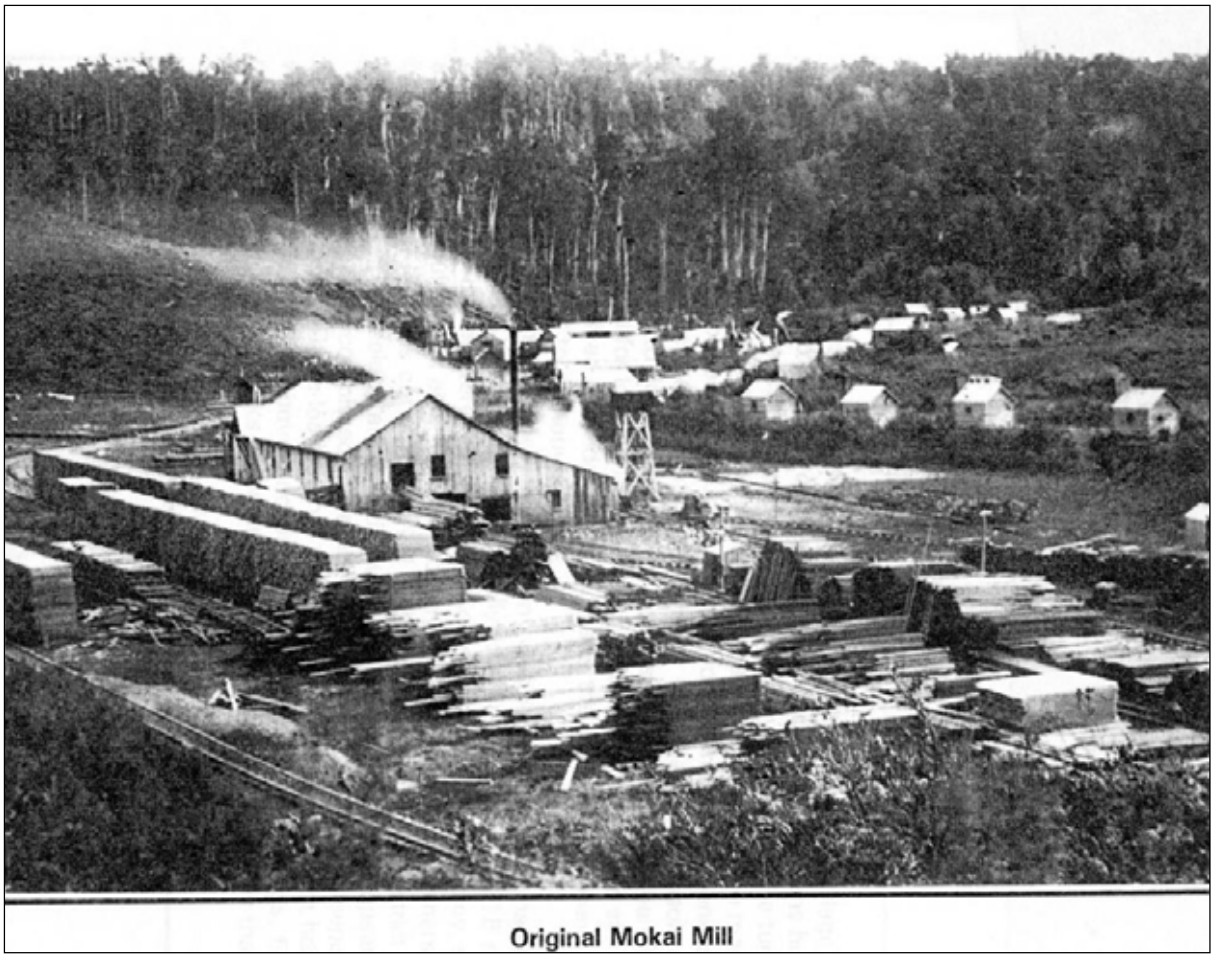


FIGURE 16 MOKAI'S FIRST MILL, SINGLE MEN'S HUTS AND THE GROWING TOWN (Davies and Forshaw 1990:14)

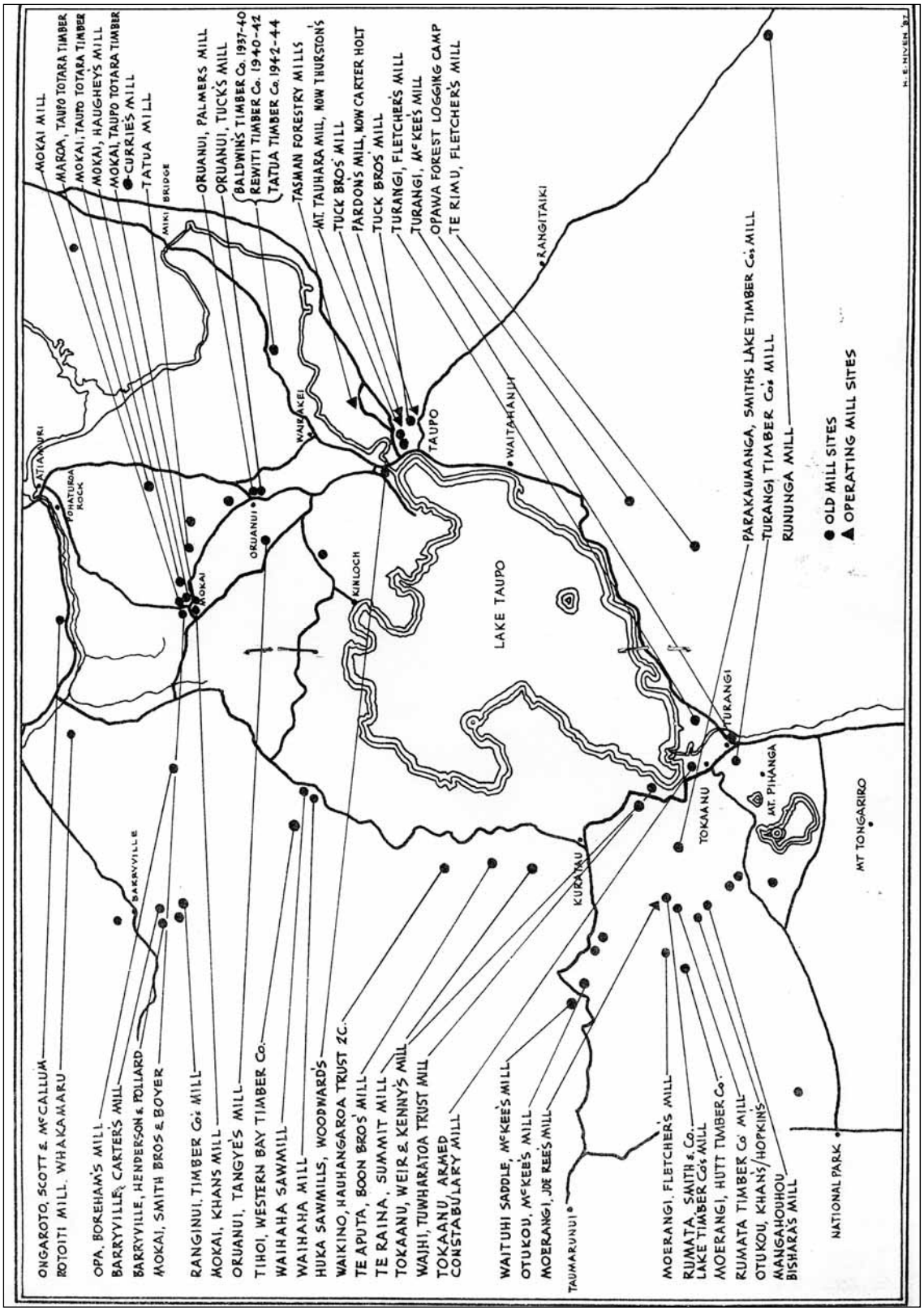


FIGURE 17 SAWMILLS IN THE MOKAI AREA AND SURROUNDING REGION
(Taupo Regional Museum 1987:15)

A local logging company was formed by Sam Andrews and Maori elders sought help for development of leaseholds into farms. Today the farms are managed by Boards of Trustees. The farm lands near Mokai were developed along with other farms on the pumice lands in the 1940s and 50s (Department of Lands and Survey 1975 and Coates 1993).

Geothermal Development
In 1974 the Ministry of Energy began testing in the area of Mokai to assess its geothermal potential. The 1984 report found the Mokai field to be the most economically attractive of the three fields investigated (Ministry of Works 1984).

FARM AND FORESTRY DEVELOPMENT ON PLATEAU

In the 1920s state forestry was set up as a separate government department and a programme started to create the central North Island forests. State forests were established near Wairakei and NZ Forest Products forests between Oruanui and Mokai (figure 18).

Farm development was also seen as an option for the pumice lands as I noted in the summary of Mokai's history. Sir Apirana Ngata was a driving force in Maoridom for the use of huge areas of ill-used or unused land in the North Island. A commission was set up in the early 1930s to regulate and administer efforts at developing land in the central North Island into viable farms.

> "In the late 1940s large scale mechanical operations replaced the earlier hand and horse operations. Agricultural contractors with their crawlers, multi-furrow ploughs and giant discs transformed thousands of acres of scrub, fern and tussock. Notable development efforts were Poukani at Mangakino, Tumunui and Kapenga blocks south of Rotorua and Tuaropaki at Mokai totally nearly 12,000 hectares" (Department of Lands and Survey 1975:18).

In 1949 returned men from World War II were being settled under the Rehabilitation Farm Settlement Scheme in the Whakamaru area. Stan Torkington noted the district started with 5 dairy farms and rapidly grew to 70 farms (Torkington in Whakamuru Primary School Committee 1984:17). He noted the farms were invaded by grass grub about 1966-1970 that caused the collapse of the dairy industry. Doreen Buckley noted the Rehabilitation Farm Settlement dairy farms proved unsuccessful and were sold back to or taken back by Lands and Survey in the 1960s and converted into sheep farms (Buckley in Whakamuru Primary School Committee 1984:7).

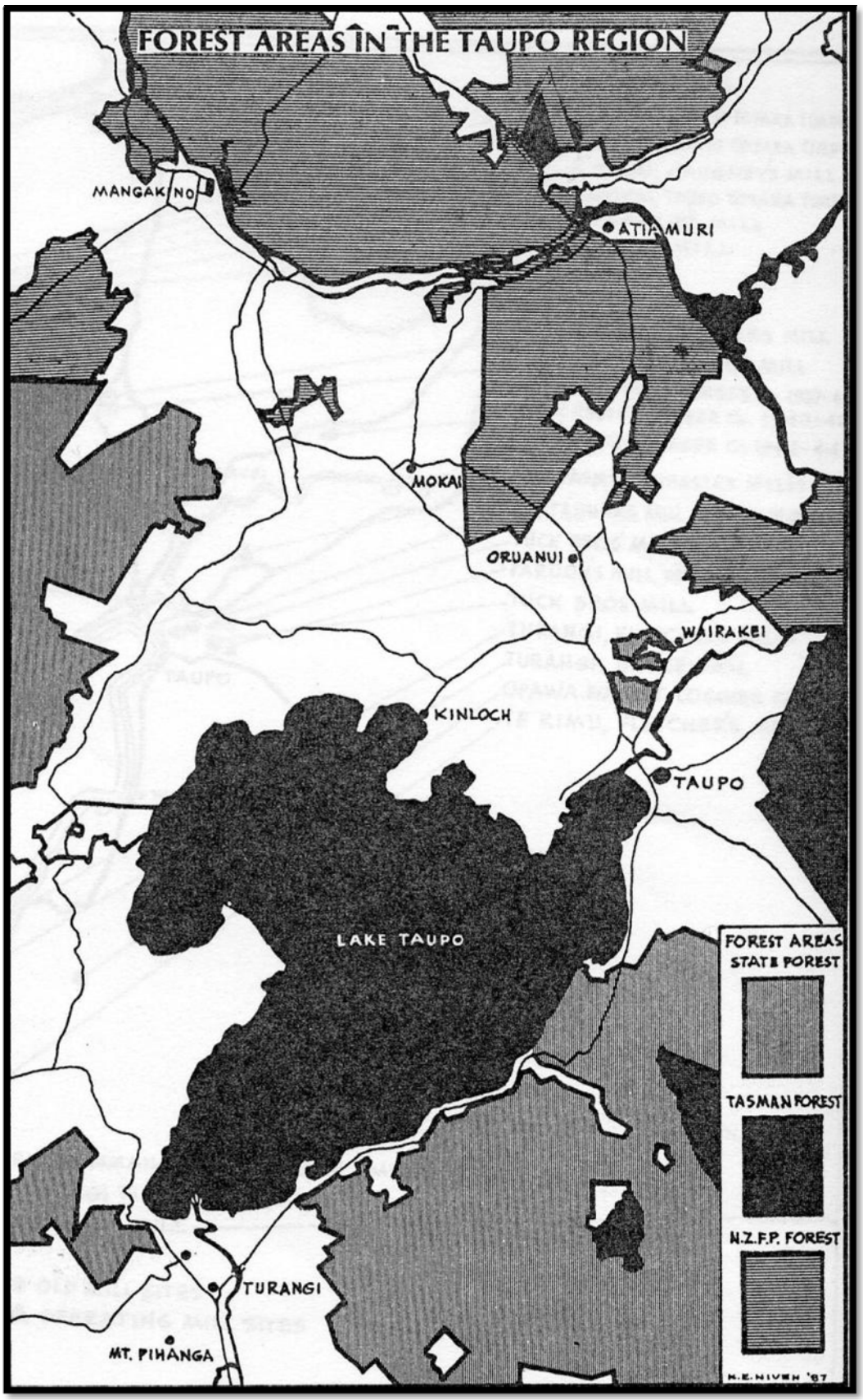


FIGURE 18 TAUPO FORESTS 1987 (TAUPO REGIONAL MUSEUM 1987:15)

WHAKAMARU HYDROELECTRIC DEVELOPMENT

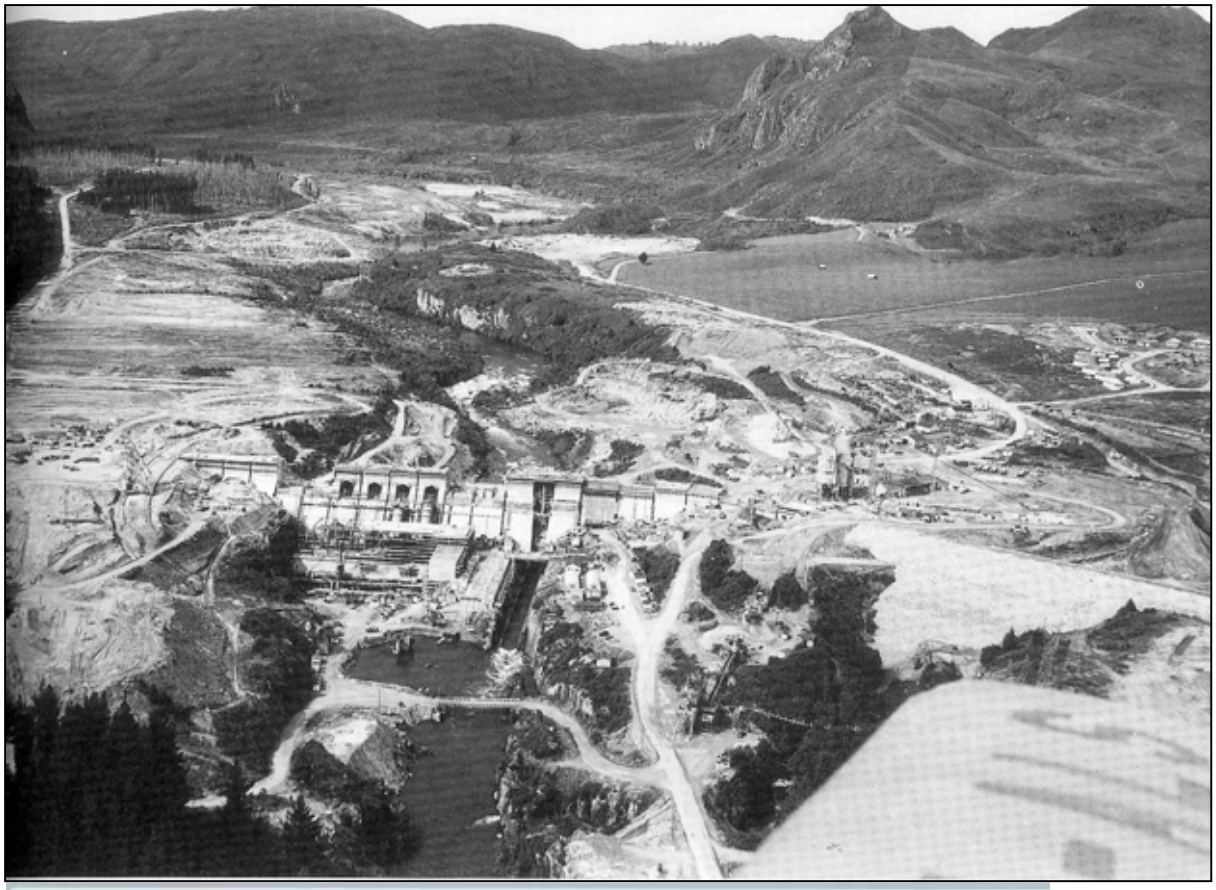
The economy of the Whakamaru area was stimulated by the construction of the dam in 1949. It was the fourth dam in the Waikato hydro system and employed many experienced construction workers from the previous projects. The construction work resulted in substantial modification of the land surrounding the hydro project (figure 19). In May 1956 the first generator was commissioned (Mighty River Power 2002). The other three generators were brought on line in July through December of the same year. Based on the historical information reviewed Lake Whakamaru flooded a number of traditional Maori use areas along this stretch of the Waikato. The WRK-WKM C line runs to the switchyard near the Waikato River at Whakamaru (figure 19).

SUMMARY OF LITERATURE REVIEW

The brief summary of the history of land use in the WRK-WKM C Line alignment provides an indication of the settlement pattern of people, the resources available, and the amount of land modification that has taken place over time. Previous archaeological work in or near the Study Area indicated the potential for archaeological sites (NZ Archaeological Association Site files, Simmons 2006, Farley and Clough 2007, and Fletcher 2010). Based on the historical literature many of the sites used by Maori were ephemeral, and frequently only occupied temporarily and intermittently. Native Land Court Records and early survey maps, indicate that the places that had the most intense historic land use were centred at Mokai and Wairakei. Gayle Leaf (2010) identified several areas of interest and sensitivity in her report on the Wairakei / Oruanui. Field work by Fletcher in May and June 2010 confirmed several sites and potential sites were located in the Mokai area.

Land modification in the Study Area has involved Maori land modification associated with gardening and burning followed by harvest of the native forests in the late 1800s through 1940s. The native forests were replaced by plantation forests and farm development beginning in the 1920s and 30s. Land modifications in recent years include the return of plantation forest to farm land. On several blocks of land this has involved pulling the tree stumps, scraping the surface for debris and scrub, contouring and cultivating to establish pasture. Less extensive economic development has been associated with tourism at Wairakei beginning in the 1880s and geothermal and hydro development at Wairekei and near Mokai in more recent times.

Harvest of the native forest blocks, development of farm land, and the creation and harvest of the plantation forests has resulted in substantial land modification over the last one hundred and twenty years. The magnitude of the affects has probably resulted in the destruction and modification of many of the sites associated with historic Maori land use.



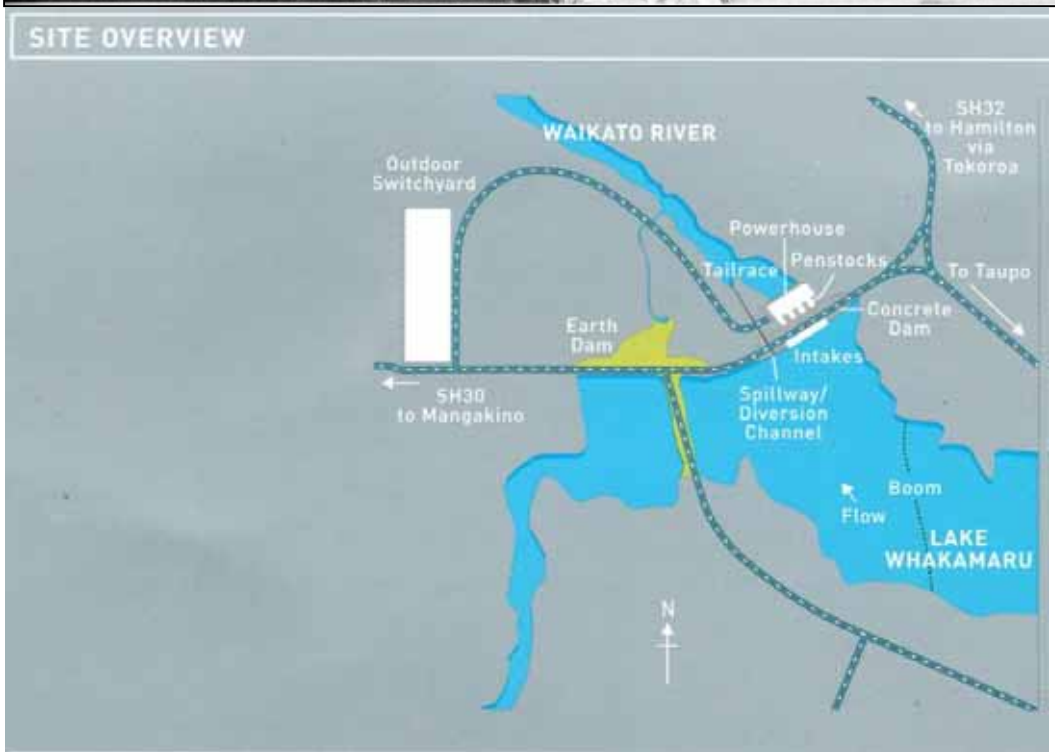


FIGURE 19 WHAKAMARU HYDRO-GENERATION SITE PLAN (Top Martin 1991:161 and Bottom Mighty River Power 2002:2)

PREDICTING ARCHAEOLOGICAL SITE LOCATIONS FOR THE WRK-WKM C-LINE; WAIRAKEI TO WHAKAMARU

To provide an indication of which areas of the corridor might have greater or lesser potential for containing archaeological sites, a predictive model was constructed prior to the survey of the indicative tower locations in late June through early July. In developing the predictive model it was acknowledged that the preferred route was located to avoid known archaeological sites, albeit that very little archaeological survey work had taken place to inform this selection.

The purpose for constructing a predictive model is to determine the probability that a particular piece of land may have been used by people prior to European settlement. Predictive modelling is, based on the resources the land contained in the past (i.e. water, food sources, raw materials for producing the tools and material goods associated with daily life, good locations for house sites, known Maori sites or use areas, etc), but also includes acknowledgement of changes to the land overtime. Predictive models are based on the simple assumption that patterns or common sense choices are made when people select locations for their camps or settlements and that their activities are linked to natural resources in a given area, including places suited to cultivate crops and collecting resources associated with subsistence and daily life. Predictive models also suggest the kind of sites that might be expected in a particular area.

PREDICTIVE MODELLING FOR WRK-WKM C- LINE

The WRK-WKM C-Line alignment crosses areas that were once native forest or belts of bush. The importance of the bush edge as place for settlement, cultivation, and birding was discussed in the previous section on Maori land use. The predictive model was constructed based on the available records and literature discussed in the previous sections of this report.[7]

As was previously noted the early survey plans for the project area were examined and place names compiled on the transmission line alignment maps as part of the preparation for archaeological survey work. This task assisted with the construction of a predictive model for determining which tower locations had the greatest probability for containing archaeological sites. The model was prepared within a tight time frame following the availability of plans showing the indicative tower locations.Table 4 provides a summary of the types of sites anticipated and the potential location of these sites.

[7] The literature search and building a predictive model was designed to follow preparation of a report by Perry Fletcher. However, Mr Fletchers report was not available at this time, therefore the work preceded with out the benefit of his survey data.

TABLE 4 POTENTIAL TYPES OF ARCHAEOLOGICAL SITES & ASSOCIATED FEATURES (June 2010)

TYPE OF RESOURCE	PROJECT AREA/ PHYSICAL FEATURE THAT COULD BE ASSOCIATED WITH THE SITE TYPE
Cultivations	Stream margins, old forest edge
Fern root	Throughout corridor area; forest clearing/ burning resulted in fern growth
Bush bird	Bush/ old forest edge; stream margins
Water fowl	Waikato River and streams
Fibre resources raupo, flax, etc	Wet land areas, old forest margin
Obsidian	Exposures/flows
Pumice	Outcrops/exposures
Kokowai	Geothermal areas

The next stage of modelling was determining the probability for finding sites. The probability for finding sites is based on the probability that if a site was located in an area it would have survived the affects of land modification.The aerial photographs on which the indicative tower locations were plotted were examined to identify the current land use and land form. The images were increased to the maximum scale that rendered the images legible on a 21 inch computer monitor. Based on the records/literature search, land forms, historic plans and current land use the probability for sites was assessed for each indicative tower location. The probability for archaeological sites in any particular area was summarised in terms of high, medium, or low probability. Areas that were significantly modified by earth working, i.e. timber harvest landings, and land that had been recently de-stumped by ground scraping, were listed as low probability and excluded from survey based on the level of ground disturbance. The probability results were rechecked by repeating the process a day later. The data derived on both days had a 95% match and the towers where a different probability level was assigned were rechecked.

Probability levels were general and only regarded as indicative and a mechanism for prioritising which tower sites that were visited first, since the amount of time allocated (two weeks was limited). Table 5 lists the probability levels and other relevant information by tower number.

TABLE 5 ARCHAEOLOGICAL ASSESSMENT PROBABILITY MODEL TO DIRECT FIELD CHECK OF TOWERS

Tower Designation Numbers	Probability that the location might contain archaeological deposits	Descriptive Notes and References (from ML plans, project aerials, and other sources)
1 and 2	low	Plantation forest; disturbed; adjacent to Wairakei Stream (rechannelling?); area of Maori settlement; near Waikato River
3, 4, 5, 6	medium	Adjacent to Wairakei Stream; (see above) appears less disturbed than 1 & 2
7, 8, 9	low	Forestry, logging affects evident
10, 11, 12	medium	Field , developed/ cleared pasture land ?; near Wairakei Stream
13, 14, 15, 16	low	Pasture; developed
17, 18, 19,	medium	Old forest / bush edge
20, 21, 22	high	Hills and gully system; Mangaraupo stream ; Terau o te Kwia (poor legibility)
23, 24, 25	medium	Pasture, Old forest / bush edge
26, 27, 28, 29	low	Timber plantation (disturbed?); old forest bush edge
30, 31	high	Land form suggest potential for obsidian quarries (obsidian flake and quarry sites to the west T 17/10, T17/2, T17/11,& T17/14)
32, 33, 34	medium	Pasture, rock art site T17/7 near by
35, 36, 37, 38, 39	high	Ravines, rock exposures; rock art site T17/7 near by
40, 41, 42, 43, 44, 45	low	Land stripped of tree stumps, contoured for pasture; very disturbed
46, 47	high	Old track on ML plan, near Mokai; 47 may be distrubed
48, 49	low	Logged; disturbed
50 through 68	Excluded – Fletcher survey	Transpower contracted Perry Fletcher to survey; potential for sites medium to high based on old tracks and place names
69, 70, 71	high	Near Poroa Ate Marama, Hora Aruhe, pre 1900 trail; Mareamanu Stream; unrecorded site Ahirara Pa reported by Perry Fletcher (Taupo File Keeper NZAA) as being in the corridor
72 through 77	Excluded – Fletcher survey	Transpower contracted Perry Fletcher to survey; potential for sites low to high based on old tracks and place names; steams/ drainage systems; disturbance on some parts
78, 79	medium	Logged area (condition?); adjacent to Maraemanuka Stream; Pukukuru
80, 81, 82	low	Very disturbed timber landings used for tower locations
83	low	Ridge road; logging effects
84	medium	Old trail; Maraemanuku Stream and ; located between drainage systems
85, 86, 87, 88, 89	high	Between Mareamanukua and Mangakowhiriwhiri streams; Wakakaho
90, 91, 92	high	Adjacent Mangakowhiriwhiri stream; Wakaahu
94, 95, 96, 97, 98, 99	high	Adjacent Mangakowhiriwhiri stream and Waikato River; Whakakahoiti
100,101	high	Adjacent Mangakowhiriwhiri stream; near the Waikato River
102, 103	low	Developed area / Whakamaru

FIELD SURVEY JUNE – JULY 2010

The field work was carried out on the indicative tower locations. Two weeks were allocated for the work involving two field archaeologists (28 June to 9 July). The survey work was to focus on the indicative tower locations and as possible include the general area of the potential access road route to the tower sites. The survey focus was on proposed ground disturbance activities associated with construction of the WRK-WKM C-line. These works included tower construction, construction staging and access road construction or upgrading, (the construction zones are referred to collectively as tower locations). Transpower was advised that additional survey work may be required to assess other construction zones or construction features not identified at the time of the June through July 2010 field work.

The field work brief was initially to visit the high probability areas first, followed by, the medium probability areas. Added to this was the request that the high and medium probability areas with angle/strain towers be given priority.

FIELD WORK PROCESS AND METHODOLOGY

METHODOLOGY

The indicative tower locations were identified on aerial maps and by GPS references (figures 17 through 20). Figure 17 through 20 show the indicative tower locations at the time of the survey and the changes made in the alignment on 23 July 2010. Figure 19 shows the location of the features identified by Perry Fletcher and presented in Table 2.

The indicative tower site visits were carried out in the company of a Transpower representative or land manager or owner. The archaeological field work began on the morning of 28 June. The initial two days of field work involved field archaeologists Alexy Simmons, James Robinson and Anne Ford. The bulk of the field work over the days that followed was carried out by James Robinson and Anne Ford.[8] Gayle Leaf accompanied the Robinson and Ford on 6 July when part of the Wairakei block was being surveyed (towers 1, 2, 10,11,12,13, 14, 15, and 16).

The tower site visits involved a walk into the site, confirming the location based on GPS references and aerial photographs, walking over of the tower location/ construction zone, observation about the condition of the location, and in most cases the excavation of shovel test pits. (The walk in to some of the tower sites followed the general alignment that would probably be used for construction access).

[8] James Robinson and Anne Ford are PhD candidates at the University of Otago. They both hold MAs in Archaeology and have extensive field experience in New Zealand and overseas.

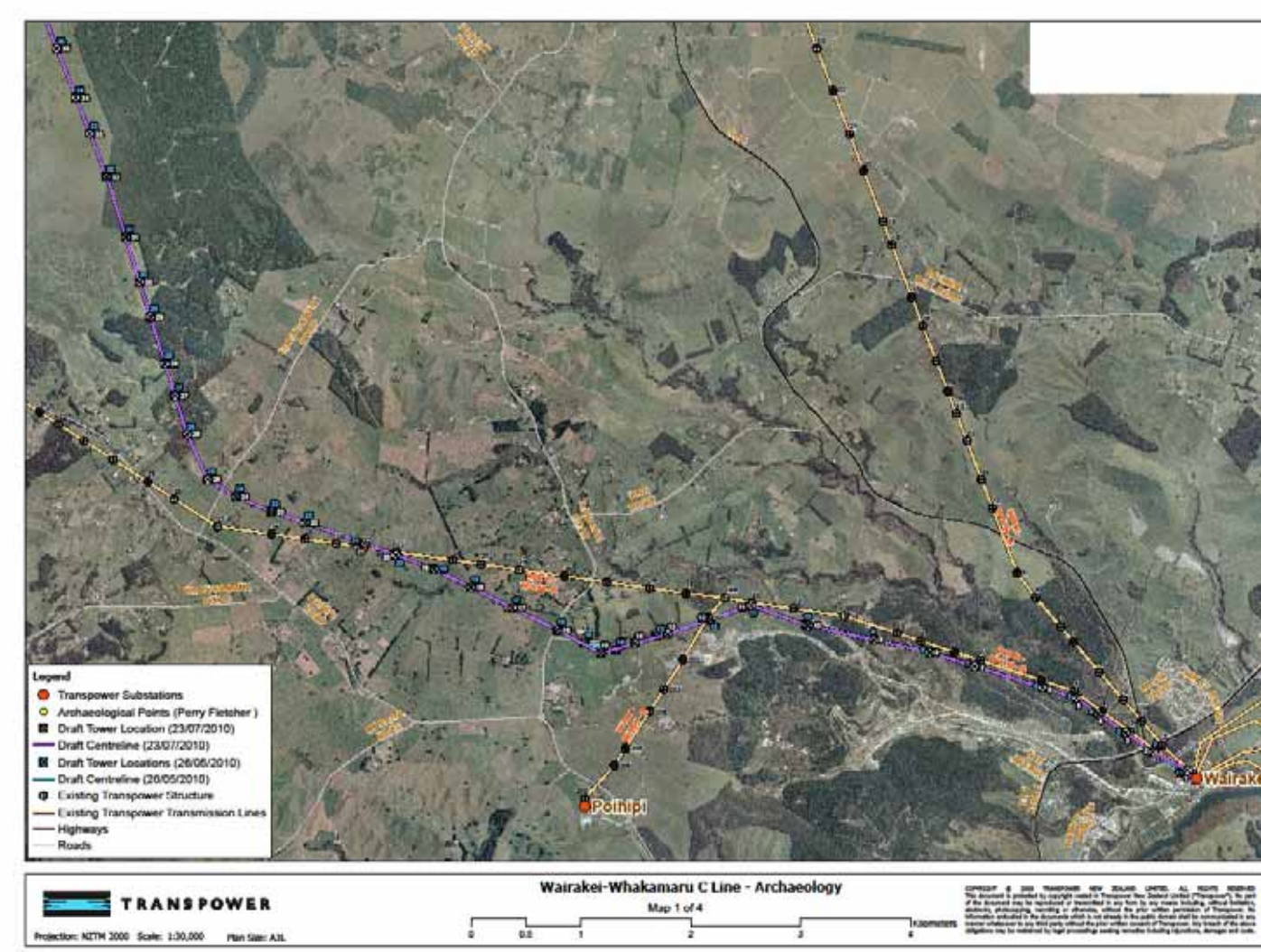


FIGURE 17 INDICATIVE TOWER LOCATIONS PLAN 1 OF 4

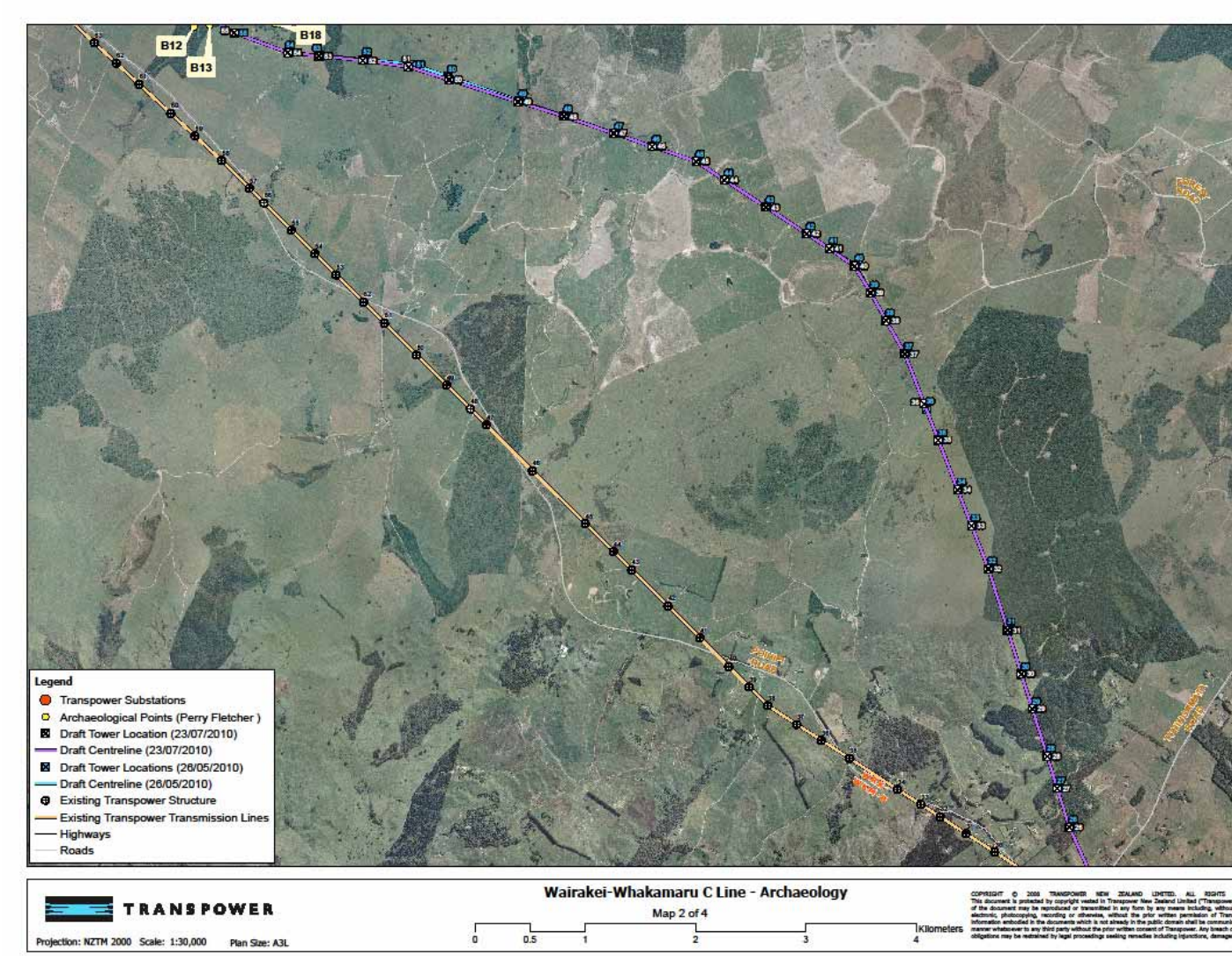


FIGURE 18 INDICATIVE TOWER LOCATIONS PLAN 2 OF 4

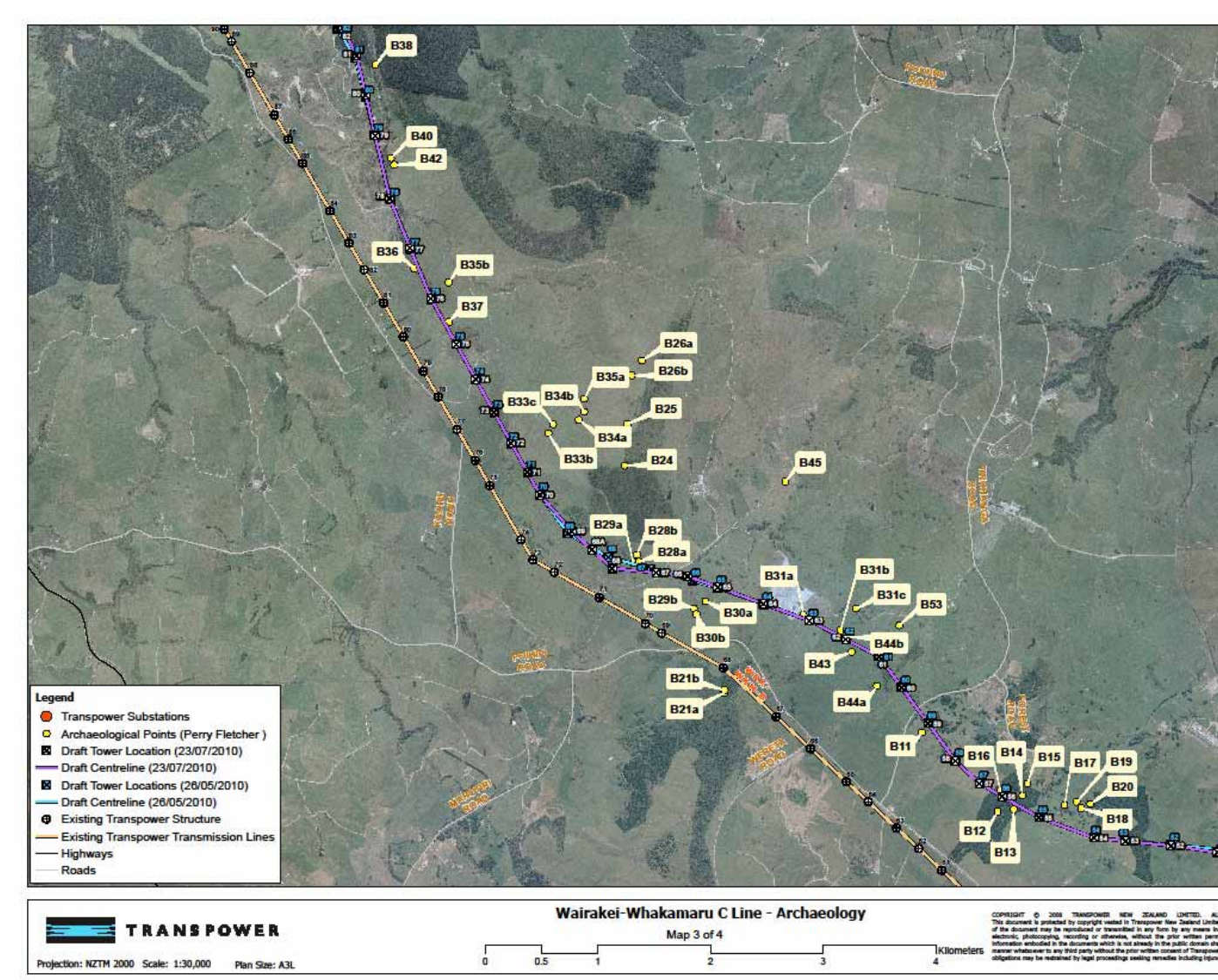


FIGURE 19 INDICATIVE TOWER LOCATION PLAN 3 OF 4 ; SHOWING SURVEY DATA TABLE 2

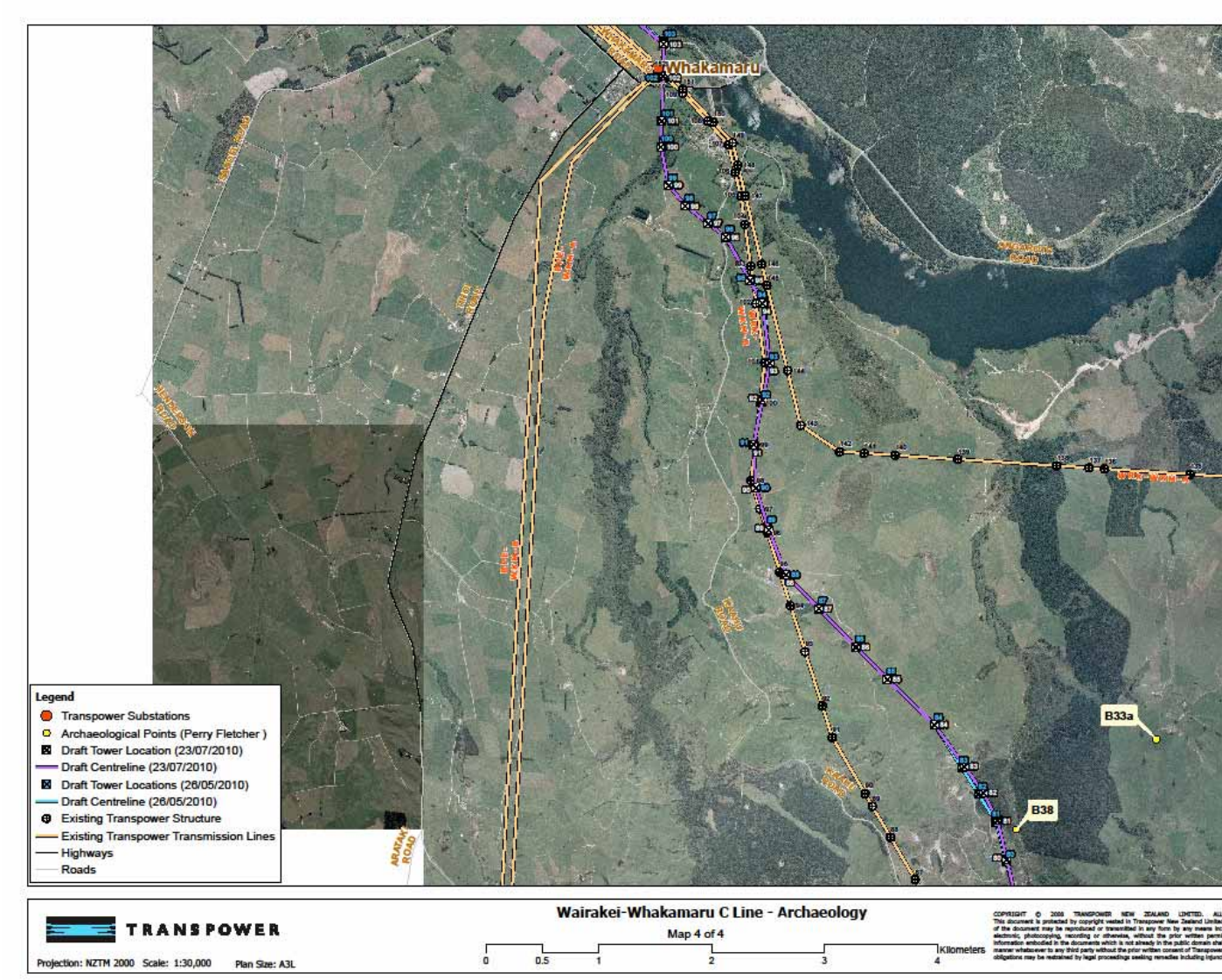


FIGURE 20 INDICATIVE TOWER LOCATION PLAN 4 OF 4

Field Notes

Record keeping was a critical component of the survey. James Robinson was responsible for locating the sites with GPS, maintaining the GPS data, and field records. Anne Ford photographed and maintained the photographs of tower locations and test pits. A spreadsheet was compiled by Robinson with input from Anne Ford at the end of each field day to summarise the field work. The spread sheet included tower numbers and location, notes on the visual inspection, notes on any shovel test pits dug, statement of findings, the survey team, any actions taken, and other relevant information. The spreadsheet was forwarded to Hamish Wesney at Boffa Miskell daily to assist in any changes that might need to be made in the indicative tower locations in response to the findings. Table 7 contains the summary spread sheets for the field work.

Constraints

Survey of all the indicative tower locations was constrained by land access. The towers are located on private property and some of the indicative tower locations

could not be visited because access was not available. On days when land access could not be arranged, Robinson and Ford carried out additional research at local archives, libraries, reviewed 1993 aerial photographs of the indicative tower locations, or viewed indicative tower locations that were visible from adjacent land (i.e. for some towers where permission was not obtained to the tower site). Some of the information gleaned; particularly from the 1993 aerial photographs explained why sites were not found in areas predicted as having a high probability for archaeological sites. This information was included in field notes and some of it is noted on the Table 6 spread sheet of field work.

TABLE 6 FIELD SURVEY DATA SHEET (1 OF 5); Compiled by James Robinson 2010; reformatted by Tanaka (Simmons & Assoc. Ltd)

Indicative tower number	Date inspected	Condition	Features	Artifacts	Test pit	Archaeological findings at tower locations	NZTM Easting	NZTM Northing	Garmin 60CSx error +-	Photos	Team	Comment
1	6/07/10	Area highly modified by power station construction in the 1950s.	none	none	no	No evidence of archaeological features or artefacts.	1870205	5720223	4.0m	yes	James, Anne, Gayle Leaf, Dominic Bowden	Situated within the grounds of the Wairakei Thermal Power Station. No test pit was made partially because the area had been extensively landscaped and highly modified by infrastructure development in the 1950s. Another reason not to test pit was that any excavation within the power station grounds would have required an additional permit from Transpower that we did not have.
2	6/07/10	Area under impenetrable gorse and 3m high blackberry. No assessment possible	none	none	no	No evidence of archaeological features or artefacts.	1869917	5720406	10.0m	yes	James, Anne, Gayle Leaf, Dominic Bowden	Situated adjacent to large scale roading redesign. Suggest that tower site is inspected after shrubs are removed.
3	7/07/10	Area under young pines. Has been bulldozed and is highly modified	none	none	yes	No evidence of archaeological features or artefacts.	1869677	5720588	3.5m	yes	James, Anne, Matiu, Heta	Found in an experimental forest on edge of existing transmission corridor. The shovel test profile shows an unmodified profile.
4	7/07/10	Area under young pines. Appears to be unmodified	none	none	yes	No evidence of archaeological features or artefacts.	1869422	5720772	3.0m	yes	James, Anne, Matiu, Heta	Found in an experimental forest on edge of existing transmission corridor. The shovel test profile lacks any fine ash deposits that are found in most unmodified profiles which suggests that the area has been extensively scrapped and modified presumably when the first transmission line was built.
5	7/07/10	Area under thick blackberry in the transmission corridor. Probably modified	none	none	yes	No evidence of archaeological features or artefacts.	1869221	5720943	3.0m	yes	James, Anne, Matiu, Heta	Could not get closer than 20m to the tower location due to blackberry. We cleaned down an exposed section in an existing digger hole to get our profile which therefore is much deeper than usual. They deep deposit of airborne ash (30-70cm) and the charcoal suggests that this might relate to the Taupo eruption. Actual site of the tower should be reinspected when the area is cleared for construction.
6	7/07/10	Area under thick blackberry in the transmission corridor. Condition unknown however the test pit dug 30m away hinted that some surface scrapping had occurred.	none	none	yes	No evidence of archaeological features or artefacts.	1868898	5721051	3.2m	yes	James, Anne, Matiu, Heta	Only got within 30m of the tower due to impenetrable blackberry. However the tower lies within the leveled transmission corridor and so is likely to have been modified to an unknown extent by bulldozing. Actual site of the tower should be reinspected when the area is cleared for construction.
7	7/07/10	Area in mature pines. Under 1m thick pine duff and branches. Presumably modified during planting.	none	none	no	No evidence of archaeological features or artefacts.	1868313	5721183	6.2m	yes	James, Anne, Matiu, Heta	Could not excavate at the actual location due to over a meter of pine debris present. Instead we cleaned down a profile in the road cutting 10m to the east. Here we found over 1.5m showing multiple deposits of volcanic ash and pumice. This was not drawn but was photographed. Similar to the drawing near tower 5 in that it also contained charcoal at 80cm deep. Actual site of the tower should be reinspected when the area is cleared for construction.
8	7/07/10	Area under impenetrable gorse and blackberry so could not be assessed.	none	none	no	No evidence of archaeological features or artefacts.	1867885	5721349	6.0m	yes	James, Anne, Matiu, Heta	No test pit dug as we could not get closer than 30m to the tower site due to very thick blackberry and gorse. The fact that the tower will be located on a small ridge top suggests that although under a few pines it should be reinspected when the area is cleared for construction.
9	7/07/10	Area in young pines. Appears to have been modified during forestry	none	none	yes	.	1867378	5721432	3.4m	yes	James, Anne, Matiu, Heta	The thin topsoil in the test pit hints that some ground modification has occurred here.
10	6/07/10	Rolling hill side that has been harrowed, swedes harvested. Landscape mostly intact.	none	none	yes	No evidence of archaeological features or artefacts.	1866753	5721570	3.9m	yes	James, Anne, Gayle Leaf, Dominic Bowden	Moving from cropping to pasture regime on top of a ridge. Long term stock use.

TABLE 6 FIELD SURVEY DATA SHEET (2 OF 5); Compiled by James Robinson 2010; reformatted by Tanaka (Simmons & Assoc. Ltd)

Indicative tower number	Date inspected	Condition	Features	Artifacts	Test pit	Archaeological findings at tower locations	NZTM Easting	NZTM Northing	Garmin 60CSx error +-	Photos	Team	Comment
11	6/07/10	Gently rolling hill side. In pasture grass. Area appears to be unmodified.	none	none	yes	No evidence of archaeological features or artefacts.	1866243	5721739	3.0m	yes	James, Anne, Gayle Leaf, Dominic Bowden	Pasture grass on a gently rolling slopes. Long term stock use.
12	6/07/10	Rolling hill side that has been harrowed and heavily stock trampled.	none	none	yes	No evidence of archaeological features or artefacts.	1865864	5721620	3.0m	yes	James, Anne, Gayle Leaf, Dominic Bowden	Pasture grass on a gently rolling slopes. Long term stock use.
13	6/07/10	Gently rolling hill side. Area appears to be unmodified.	none	none	yes	No evidence of archaeological features or artefacts.	1865394	5721458	3.0m	yes	James, Anne, Gayle Leaf, Dominic Bowden	Pasture grass on a gently rolling slopes. Long term stock use.
14	6/07/10	Gently rolling hill side. Some minor modification probably due to root action.	none	none	yes	No evidence of archaeological features or artefacts.	1865032	5721338	3.0m	yes	James, Anne, Gayle Leaf, Dominic Bowden	Pasture grass on a gently rolling slopes. Long term stock use.
15	6/07/10	Sloping hill side. Some minor modification in the subsoil probably due to root action.	none	none	yes	No evidence of archaeological features or artefacts.	1864737	5721396	3.0m	yes	James, Anne, Gayle Leaf, Dominic Bowden	Pasture grass on a gently rolling slopes. Long term stock use.
16	6/07/10	Moderate hill slope. Some minor modification in the subsoil probably due to root action.	none	none	yes	No evidence of archaeological features or artefacts.	1864491	5721517	3.0m	yes	James, Anne, Gayle Leaf, Dominic Bowden	Pasture grass on a gently rolling slopes. Long term stock use.
22	29/06/10	Pasture grass, no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1862193	5722494	3.0m	yes	Alexy, Anne, James and Toby	In rolling grass lands. Long term stock use.
23 Test Pit A	29/06/10	Pasture grass, no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1861889	5722598	3.0m	yes	Alexy, Anne, James and Toby	In rolling grass lands. Long term stock use.
23 Test Pit B	30/06/10	Pasture grass, no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1861909	5722586	3.0m	yes	Alexy, Anne, James and Toby	In rolling grass lands. Long term stock use.
24	29/06/10	Pasture grass, no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1861563	5722733	3.0m	yes	Alexy, Anne, James and Toby	In rolling grass lands. Long term stock use.
25	29/06/10	Pasture grass no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1861306	5722890	3.0m	yes	Alexy, Anne, James and Toby	In rolling grass lands. Long term stock use.
26	28/06/10	Minor modification by 1st rotation pine forest.	none	none	no	No evidence of archaeological features or artefacts.	1861129	5723298	5.6m	yes	Alexy, Anne, James and Steve	In flat land pine plantation.
27	28/06/10	Major modification by 2nd rotation pine forest.	none	none	yes	No evidence of archaeological features or artefacts.	1861009	5723948	5.6m	yes	Alexy, Anne, James and Steve	In flat land pine plantation.

TABLE 6 FIELD SURVEY DATA SHEET (3 OF 5); Compiled by James Robinson 2010; reformatted by Tanaka (Simmons & Assoc. Ltd)

Indicative tower number	Date inspected	Condition	Features	Artifacts	Test pit	Archaeological findings at tower locations	NZTM Easting	NZTM Northing	Garmin (60CSx error +-	Photos	Team	Comment
28	28/06/10	Pasture grass, no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1860924	5723948	3.0m	yes	Alexy, Anne, James and Steve	In rolling grass lands. Long term stock use.
29	28/06/10	Minor modification by 1st rotation pine forest.	none	none	no	No evidence of archaeological features or artefacts.	1860786	5724375	5.0m	yes	Alexy, Anne, James and Steve	On small knoll in pine forest.
30	28/06/10	Pasture grass, no obvious modifications.	none	none	no	No evidence of archaeological features or artefacts.	1860688	5724888	5.0m	yes	Alexy, Anne, James and Steve	On side of medium sized grassy hill.
31	28/06/10	Pasture grass, no obvious modifications.	none	none	no	No evidence of archaeological features or artefacts.	1860560	5725095	3.0m	yes	Alexy, Anne, James and Steve	On gently sloping grass 40m from pine forest.
69	28/06/10	Pasture grass, no obvious modifications.	none	none	no	No evidence of archaeological features or artefacts.	1849371	5733044	4.0m	yes	Alexy, Anne, James and Steve	On side of small grassy knoll.
70	28/06/10	Pasture grass, with unusual depressions.	none	none	Yes	Possible pit features investigated and shown to be natural slumping.	1849116	5733388	5.0m	yes	Alexy, Anne, James and Steve	On broad grassy ridge top. Depressions appear from test pits A, B and C to have natural profiles suggesting they are slump features. The extent of the depression area was marked with GPS points 70-1 to 70-6.
71	28/06/10	Pasture grass, no obvious modification.s	none	none	yes	No evidence of archaeological features or artefacts.	1849007	5733583	5.0m	yes	Alexy, Anne, James and Steve	On narrow grassy ridge top.
78	1/07/10	Pasture grass on European modified river terrace.	none	none	yes	No evidence of archaeological features or artefacts.	1847783	5736022	3.0m	yes	James, Anne, Steve	Newly planted grass on flat river terrace that has been highly modified by forestry activities - probably to form a skidder site.
79	1/07/10	Pasture grass and some recent modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1847656	5736573	4.0m	yes	James, Anne, Steve	On a narrow ridge top high above and overlooking the river. The area has been cleared of pines in the last few years and has been recently grassed. The test pit hints that bulldozing may have modified this ridge top at some time during the forestry phase.
80	1/07/10	Pasture grass on forestry skidder site.	none	none	yes	No evidence of archaeological features or artefacts.	1847576	5736912	4.0m	yes	James, Anne, Steve	This tower site is to be located on a moderate slope immediately above a leveled skidder area. Both the flat below and this slope are likely to have been highly modified by forestry activities before the area was returned to pasture in recent years.
81	1/07/10	Pasture grass on forestry skidder site.	none	none	yes	No evidence of archaeological features or artefacts.	1847492	5737282	4.0m	yes	James, Anne, Steve	This tower site is to be located on the edge of a leveled logging skidder site. This area has been highly modified by forestry activities before the area was returned to pasture in recent years.
82	1/07/10	Forestry area with 2nd rotation modification.s	none	none	yes	No evidence of archaeological features or artefacts.	1847376	5737532	6.4m	yes	James, Anne, Steve	On a moderately steep hill side above the river and covered in mature pines now in 2nd rotation. This location is a recent change from the old skidder site 50m upslope and to the west and was a result of consultation between Transpower and the local land owner.
83	1/07/10	Pasture grass on farm track.	none	none	yes	No evidence of archaeological features or artefacts.	1847187	5737736	3.0m	yes	James, Anne, Steve	This tower site was found to be under an existing transmission line that was not due for removal. At Steve's suggestion we moved the investigating test pit back up slope for 33m to the farm track (this is the grid reference given). Subsequently it was discovered that a change in position of tower 82 to the north required tower 83 to be positioned under the old transmission line and that the old transmission line is to be removed. Although we were not able to test pit this location our surface inspection did include it and suggested that there was no cultural activity there.

TABLE 6 FIELD SURVEY DATA SHEET (4 OF 5); Compiled by James Robinson 2010; reformatted by Tanaka (Simmons & Assoc. Ltd)

Indicative tower number	Date inspected	Condition	Features	Artefacts	Test pit	Archaeological findings at tower locations	NZTM Easting	NZTM Northing	Gamin (GCS± error +-	Photos	Team	Comment
85	1/07/10	Pasture grass, no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1846515	5738536	3.0m	yes	James, Anne, Steve	In rolling grass lands. Long term stock use.
86	1/07/10	Pasture grass, no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1846238	5738822	3.0m	yes	James, Anne, Steve	In rolling grass lands. Long term stock use.
87	1/07/10	Pasture grass previously modified by forestry.	none	none	yes	No evidence of archaeological features or artefacts.	1845908	5739165	3.0m	yes	James, Anne, Steve	In rolling grass lands. Previously used as a pine forest
88	1/07/10	Pasture grass, no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1845618	5739465	3.0m	yes	James, Anne, Steve	In rolling grass lands. Moderately steep.
89	1/07/10	Pasture grass no obvious modifications	none	none	yes	No evidence of archaeological features or artefacts.	1845455	5739884	3.0m	yes	James, Anne, Steve	Pasture grass on a steep slopes. Long term stock use.
90	1/07/10	Pasture grass, no obvious modifications.	none	none	no	No evidence of archaeological features or artefacts.	1845348	5740252	10.0m	yes	James, Anne, Steve	In rolling grass lands with long term stock use. Tower to be located on edge of a gently sloping ridge. Note that we could only view the site from 25m away since property access was not available.
91	1/07/10	Pasture grass. Site has been modified by power tower still present.	none	none	yes	.	1845331	5740252	10.0m	yes	James, Anne, Steve	Moderately steep rolling grass lands. Tower to be located on the site of an existing tower that is part of a transmission line that is to be removed later.
92	1/07/10	Pasture grass, no obvious modifications.	none	none	no	No evidence of archaeological features or artefacts.	1845408	5741020	10.0m	yes	James, Anne, Steve	On gently rolling grass lands. Note that we could only view the site from 18m away since property access was not available.
93	1/07/10	Pasture grass no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1845472	5741346	3.0m	yes	James, Anne, Steve	Rolling to hill landscape in pasture grass. This tower to be located 80m east of existing tower. These older towers are part of a transmission line that will eventually be removed.
94	1/07/10	Pasture grass, no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1845409	5741877	3.3m	yes	James, Anne, Steve	In rolling grass lands. Long term stock use.
95	1/07/10	Pasture grass, no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1845297	5742080	3.0m	yes	James, Anne, Steve	Rolling to hill landscape in pasture grass.
96	1/07/10	Pasture grass, no obvious modifications.	none	none	yes	No evidence of archaeological features or artefacts.	1845083	5742467	3.0m	yes	James, Anne, Steve	Pasture grass on gently rolling land adjacent to the main road.
97	7/07/10	Located in rolling pasture. Appears to not have been modified.	none	none	yes	No evidence of archaeological features or artefacts.	1844942	5742576	3.0m	yes	James, Anne, Matiu, Heta	Classic pasture profile with enhanced topsoil depth probably from applied fertilizer.
98	7/07/10	Located in moderate rolling to hilly pasture lands. Some plough modification is indicated.	none	none	yes	No evidence of archaeological features or artefacts.	1844726	5742743	3.0m	yes	James, Anne, Matiu, Heta	The mixing in layer two may indicate that this land has been ploughed at some time.

TABLE 6 FIELD SURVEY DATA SHEET (5 OF 5); Compiled by James Robinson 2010; reformatted by Tanaka (Simmons & Assoc. Ltd)

Indicative tower number	Date inspected	Condition	Features	Artifacts	Test pit	Archaeological findings at tower locations	NZTM Easting	NZTM Northing	Garmin 60CSx error +	Photos	Team	Comment
99	7/07/10	Located in rolling pasture. Appears to not have been modified.	none	none	yes	No evidence of archaeological features or artefacts.	1844578	5742927	3.8m	yes	James, Anne, Matiu, Heta	This appears to be a standard pasture profile. I assume that more compact ash subsoils will be present at depth
100	7/07/10	Located in rolling pasture. Appears to not have been modified.	none	none	yes	No evidence of archaeological features or artefacts.	1844508	5743267	3.5m	yes	James, Anne, Matiu, Heta	The test pit shows not evidence of ploughing however the deep topsoil layer suggests that long term pasture management and enhancement has built this up over a long period of time.
101	7/07/10	Located in flat pasture. Appears to have been modified probably by ploughing.	none	none	yes	No evidence of archaeological features or artefacts.	1844516	5743497	3.0m	yes	James, Anne, Matiu, Heta	Test pit shows both mixing and buried horizons suggesting that extensive and long term ploughing has occurred here.
102	2/07/10	Situated under sealed carpark. Area highly modified by infrastructure development.	none	none	no	No evidence of archaeological features or artefacts.	1844528	5743897	4.0m	yes	James, Anne,	Within the carpark of Mighty River Power. Whole area likely to have been extensively modified during the construction of the hydro-electric project at Whakamaru.
103	2/07/10	In flat pasture. Subsurface highly modified presumably by hydro infrastructure development.	none	none	yes	No evidence of archaeological features or artefacts.	1844534	5744204	2.8m	yes	James, Anne,	In flat pasture. Likely that the area has been extensively scrapped and leveled during construction of the hydro infrastructure. The grey compact subsoil ash just below the turf today would originally have been deeply buried.
104	2/07/10	In flat pasture. Condition unknown since property access was not available.	none	none	no	Viewed from 300m to the south there does not appear to be any cultural features present.	1844490	5744246	20.0m	yes	James, Anne,	Probably no archaeological features here. Note that the GPS reading is taken from the nearest point we could get to the tower site - namely 320m to the south.

SURVEY RESULTS

No archaeological features were identified on the indicative tower sites surveyed or on the access routes taken to the tower sites. The forty-four towers surveyed are listed in Table 7 along with notes relating to these towers. The indicative tower locations that were not surveyed during June through July, the reason, and other relevant information are noted in Table 8. Towers 46-68 and 72-77 were surveyed by Perry Fletcher (2010). This work is described in his report and summarised previously in this report. Following survey of the preferred alignment Fletcher noted:

> "Having inspected the preferred Pylon route, it is my opinion much of the land where it is intended the proposed transmission line to cross will not effect archaeological or historic remains" (Fletcher 2010:28).

Eighteen tower sites (17-21, 32-39, 46-47, 84, and 104-105) were not surveyed during June-July because access was not available. Five towers (40-45) were excluded from the survey based on recent mass earthworks associated with turning a forest block into pasture.

TABLE 7 WRK-WKM C-LINE TOWER LOCATIONS SURVEYED JUNE THROUGH JULY 2010

TOWER LOCATION #'s	FINDINGS	OBSERVATIONS NOTES:
1-16	No archaeological sites or deposits identified.	
26-29	No archaeological sites or deposits identified.	Currently in forest; Not forested in 1993
30-31	No archaeological sites or deposits identified.	
69-71	No archaeological sites or deposits identified.	
78-83	No archaeological sites or deposits identified.	1993 Aerials show land in forest. When visited in 2010 it was converted to farm land.
85-89	No archaeological sites or deposits identified.	
90-92	No archaeological sites or deposits identified.	Not walked over but observed from 30m away.
93-96	No archaeological sites or deposits identified.	
97-103	No archaeological sites or deposits identified.	102 under a car park. 103 in pasture sub-surface probably modified by hydro infra- structure development. 104 viewed from adjacent public land in pasture.

TABLE 8 WRK-WKM C-LINE TOWER LOCATIONS THAT WERE NOT SURVEYED DURING JUNE THROUGH JULY 2010

TOWER LOCATION #'s	REASON NOT SURVEYED	NOTES:
17-21	No access available	Has not been logged; Gayle Leaf is also interested in this area.
32-39	No access available	Appears to have never been logged. 35-39 ranked as a high probability for sites. Rock art site T17/7 is nearby. Gayle Leaf is also interested in this area.
40-45	Stripped of tree stumps, scraped/ contoured. Very unlikely that any archaeological sites or deposits would have survived the earthworks.	1993 aerial photographs show numerous skidder sites.
46-47	No access available	Near Mokai is considered a high probability for sites. 1993 aerial photographs show the area has been logged in previous years prior to current pasture development; lowering the potential for sites.
48-68	Visited by Perry Fletcher. Excluded from the tower locations to be surveyed.	1993 aerials show the land around tower 48 was logged.
72-77	Visited by Perry Fletcher. Excluded from the tower locations to be surveyed.	
84	No access available	
104-105	No access available	

FIELD INSPECTION OF INDICATIVE TOWER 62 AND ADJACENT FEATURES IDENTIFIED SEPTEMBER 2010

A field inspection was made in the area affected by indicative tower 62 on 2 September 2010 with Gavin Murray, Transpower and Perry Fletcher. Tower 62 is approximately 33 meters from Perry Fletcher's survey point B44b which was recorded as a possible "Pa? North of bush" (Fletcher 2010: 30) and also in close proximity to point B31b which was recorded as a possible "Old pa site?" (Fletcher 2010:29 and 30). (Neither of the survey points was confirmed as being a site). The tower is located in a paddock. That landscape is composed of low hills mixed with stretches of flat or gently rolling grass land. The land is managed as pasture. The field inspection was constrained by wind and heavy rain showers. The location of the tower and the features recorded by Mr Fletcher were verified. No surface features were identified in the actual tower foundation area or the area that might be affected by tower construction. It was determined that survey point B31b will not be affected by construction or insertion of tower 62.

Five shovel test pits were excavated in the tower foundation area. Features B44b and B31b were not sampled to determine if they were natural or archaeological. Each of the shovel test pits contained different information about the soil matrix. A very small (approximately 1cm) chunk of obsidian was found in one of the test holes, but whether the isolated find was natural or cultural was not determined based on the paucity of information and the farm context.

It is recommended that additional subsurface testing be carried out to provide an understanding of the soil stratigraphy in the area of tower 62 and that survey point B44b be sampled to determine if it is natural or archaeological.

RESIDUAL FIELD WORK REQUIRED BASED ON THE JUNE-JULY 2020 SURVEY AND FIELD INSPECTION OF TO TOWER 62 IN SEPTEMBER 2010

Additional field work will be required prior to construction to survey the locations of the eighteen towers that are noted in Table 9 (in the survey results section). (Access to the land these towers are located on was not available during the June- July survey). Subsurface testing is recommended at tower 62 (as noted in the previous section).

TOWER LOCATION CHANGES IN LATE JULY AND SEPTEMBER 2010

In response to other investigations on the indicative tower locations, some changes were made in the location of a number of towers in late July following the field work. Additional changes were made in September 2010 to towers 58 and 59. The affects of these changes and required actions are discussed in Table 9. The tower location changes are shown on figures 17 to 20. It is recommended an archaeological survey is undertaken for seven of the relocated towers (13, 14, 15, 36, 67, 68, and 69) prior to construction on these sites. Table 9 discusses the reason these tower need to be assessed and the reasons that other relocated towers do not need to be

assessed. The desk top assessment of these changes was carried out on a tower by tower bases utilising information gained through the June – July field work.

TABLE 9 WRK-WKM C-LINE TOWER LOCATIONS CHANGES IN LATE JULY 2010 FOLLOWING THE JUNE-JULY SURVEY

TOWER #	CHANGES	NOTES	ACTIONS & REASON
1	Minor change	Tower is at Wairakei; developed and disturbed area	None -in very close proximity to previous #1 tower and in a disturbed zone
10	Minor change	Old #10 location rolling hill side that had been harrowed; sweedes harvested but landscape intact.	None - in very close proximity to previous 10 tower and has probably been walked over
13	Major change	Gentle rolling area; appears to be unmodified	**Survey required** - medium probability area possibly higher
14	Major change	Gentle rolling area; appears to be unmodified	**Survey required** - medium probability area possibly higher
15	Major change	Gentle rolling area; appears to be unmodified	**Survey required** - medium probability area possibly higher
36	Not relevant	Towers in this area not surveyed in June-July due to access not available. Gayle Leaf interested in this area.	**Survey required** - Appears to have never been logged. 35-39 ranked as a high probability for sites. Rock art site T17/7 is nearby.
50, 51, 66	Minor change	No sites noted within approximately 250m	None - Fletcher surveyed; no features or sites within 250 meters
58	Major change	No sites noted in the proximity	None -Fletcher survey; no features record within 500+ meters
59	Minor change		None -Fletcher survey; no sites at tower 59 or relocated tower 59; B11 is identified as misc. logging relics and tracks (see figure 19 and table 2)
67	Minor change	"terrace track end, old Kainga? 15x20m"	**Survey required** - high probability for archaeological deposits or features
68, 69	Minor change	Maori sites located in this area on ML plans and old track	**Survey required** - high probability for archaeological deposits or features
77	Minor change		None - Fletcher surveyed; nothing identified
78	Minor change	Previous tower 78 on modified River terrace; Fletcher points show as tomo area (seems to have surveyed parallel to this block of land)	None - pasture developed after forestry development/ logging area, very disturbed, close to previous 78 tower and has probably been walked over.
80, 81, 82, 83	Minor changes		None -pasture developed after forestry development / logging area, very disturbed, close to previous 80, 81, 82 & 83 tower and has probably been walked over.
89	Minor changes		None -Pasture, close to previous 89 tower and has probably be walked over
92	Minor changes		None -Pasture, observed near previous 92, very low probability for archaeological features or deposits
94,95	Minor changes		None -Pasture, close to previous 89 tower and has probably be walked over
103	Minor changes		None -Highly modified zone from Hydro development, very disturbed.

Changes Defined: Minor changes -changes that show the tower is still located in the general foot print and construction zone of the previous tower and has been walked over by an archaeologist; Major changes -new tower location is away from the original foot print by approximately 50+ meters; Not relevant- Tower location changes when the tower was not surveyed in June and July.

SUMMARY OF ADDITIONAL SURVEY WORK RECOMMENDED

Additional survey work is recommended for 25 tower locations. This work would be to confirm there are no identifiable effects to archaeological sites in tower locations that could not be accessed, or because of potential effects to an adjacent archaeological site from tower construction, or because a tower has been relocated. Table 10 lists the 25 towers that need to be surveyed and the reason for the survey work. In addition, it is recommended the access tracks be surveyed once the alignments to be used are finalised. (During the field work in June-July the access track alignments were not available).

TABLE 10 WRK-WKM C-LINE; SUMMARY OF ADDITIONAL SURVEY WORK RECOMMENDED WITH REASONS FOR SURVEY OF TWENTY-FOUR TOWERS AND SUBSURFACE TESTING AT ONE TOWER

TOWER # or #s	ACTION RECOMMENDED	REASON FOR SURVEY OR SUBSURFACE TESTING
13-15	Archaeological Survey	Gentle rolling area, appears to be unmodified. Medium probability area possibly higher.
17-21	Archaeological Survey	No access available. Has not been logged.
32-39	Archaeological Survey	No access available. Appears to have never been logged. 35-39 ranked as a high probability for sites. Rock art site T17/7 is nearby.
46-47	Archaeological Survey	No access available. Near Mokai and considered a high probability for sites. 1993 aerial photographs show the area has been logged in previous years prior to current pasture development; lowering the potential for sites.
62	Subsurface Testing	62 is approximately 33 meters from Perry Fletcher's survey point B44b "Pa? North of bush" (Fletcher 2010: 30) and also in close proximity to point B31b "Old pa site?" (Fletcher 2010:29 and 30). The area was visited, but the features identified as possible sites could not be verified. Subsurface testing is recommended to determine if feature B44b and the adjacent land affected by tower 62 is natural or archaeological. (See Field Inspection of Indicative Tower 62 in September 2010).
67	Archaeological Survey	High probability for archaeological deposits or features, i.e. "terrace track end, old Kainga? 15x20m"
68, 69	Archaeological Survey	High probability for archaeological deposits or features; Maori sites located in this area on ML plans and old track
84	Archaeological Survey	No access available.
104-105	Archaeological Survey	No access available.

ASSESSMENT OF EFFECTS ON ARCHAEOLOGICAL AND HISTORIC SITES

The following assessment of effects section has been written to address the potential effects of ground disturbing activities based on two potential scenarios:

a) no effect based on **no** archaeological sites in the project area and

b) an effect to an archaeological site that can not be avoided (discovered during the design stage or during construction).

Ground disturbance activities, such as those associated with constructing access tracks and foundation installation, may have a potential effect on unrecorded or buried archaeological sites. The effects may range from nil to significant effects. The effect would be nil if all archaeological sites were avoided. The effect might range in magnitude from minor to significant depending on the site type, significance or value, condition, and whether the site was damaged, modified or destroyed.
If no archaeological sites are located in areas where ground is disturbed, there would be nil effect. Based on current knowledge of archaeological sites, all recorded sites are being avoided.

MEASURES TO AVOID, REMEDY OR MITIGATE ADVERSE EFFECTS ON ARCHAEOLOGICAL AND HISTORIC SITES

Archaeological survey will be used to identify unrecorded archaeological sites in locations where ground disturbance is proposed during the detailed design stage. This stage would build on the existing survey already completed. Identification of unrecorded sites would provide the opportunity to avoid effects by relocating the ground disturbance activity causing the effect.

If effects to archaeological sites cannot be avoided, an application will need to be made to New Zealand Historic Places Trust (NZHPT) for an authority under the Historic Places Act 1993 for site modification, damage or destruction. The application will require a site assessment, and site management plan. The site management plan will include a strategy for archaeological data recovery that addresses NZHPT requirements and best archaeological practices for mitigating effects to archaeological sites.

There is also a potential that unrecorded (and buried) archaeological sites may be discovered during construction, albeit the potential will be very low. To mitigate effects to sites discovered during construction an accidental discovery protocol is recommended to be included in the Construction Management Plan.

CONCLUSIONS

The alignment crosses land that was used by Maori for many generations. The size of the population was limited historically by the carrying capacity of the land. Historically Maori land use focused on foraging, hunting, and fish. Evidence provided at the Native Land Court indicates the streams, riparian zones and forests in the alignment were resource rich zones that were exploited in a cyclic round that could

extend over several years. The brief occupation of temporary settlements to facilitate resource acquisition was documented by early missionaries who found the mobility of the people a hindrance to their goals.

Fern root and other native plant species were collected and stored as winter food. Cultivation was practiced, but probably did not provide the main carbohydrates for the population, although this may have changed after the potato was introduced. The introduction of the potato may have also resulted in an increased focus on cultivation. Potato, unlike kumara was less cold sensitive, and better adapted for the climate of the plateau. Resources like kokowai, obsidian and pumice also played a role in daily life in the Study Area.

Harvest of the native forests, the development of plantation forests and farmland created major changes in the way of life of people in the Study Area. The creation of new land use opportunities has had an effect on the archaeological sites that mark pre-1900 land use. The archaeological sites associated with many historic land use activities were ephemeral and often small in scale. Larger sites such as pa where land modifications such as excavations for house sites, storage pits, cooking areas, and in some places gardens took place do remain. Perry Fletcher has suggested that even many of the larger settlements may have also been destroyed, e.g. Hapotea.

The desk top study identified recorded archaeological sites so they could be avoided. When the indicative tower locations were identified archaeological work was carried out to identify archaeological sites that might be located in tower locations. The survey work indicates that much of the Study Area is modified and that the land has been developed several times over the last 100 years.

While the alignment crosses a large study area the places where the WRK-WKM C-Line affects the land are few, thus decreasing the potential for affecting sites. The alignment only affects specific points on the land where earthworks are required for tower installation.

RECOMMENDATIONS

Additional survey and subsurface testing is recommended to avoid affects to previously unrecorded archaeological sites. The survey work would be focused on areas that were not previously surveyed and that have a likelihood of containing archaeological sites as noted in Table 10. Subsurface testing has also been recommended at tower 62 to determine if feature B44b and the adjacent land is natural or archaeological. Identification of archaeological sites prior to construction follows best practice procedures for eliminating identifiable affects so they can be avoided or mitigated.

It is recommended that an application be made to New Zealand Historic Places Trust for a blanket authority for ground disturbing activities in the WRK-WKM C Line. Application for an authority is recommended even if no archaeological sites are identified when the additional work noted in the Summary of Additional Survey Work Recommended is conducted. Obtaining an archaeological authority ensures that if in

the unlikely event that buried archaeological deposits or features are exposed during earth works this information can be recorded in compliance with the requirements of the Historic Places Act 1993. An NZHPT authority would require that if archaeological evidence is encountered during the exercise of the authority that the evidence be investigated, recorded and analysed in accordance with accepted archaeological practices.

ACCIDENTAL DISCOVERY

While the potential for discovering archaeological features and sites during construction is believed to be low based on the literature, record search and archaeological surveys (that have been carried out and the additional work recommended) there is still a potential that buried (pre-1900) archaeological features or deposits could be exposed during construction[9]. Such exposure would be due to past land modifications that have resulted in the burial of archaeological deposits or features. These features/ deposits might include Maori artefacts or pre-1900 manufactured artifacts, like bottles or other items associated with Maori or Europeans.

PROCEDURE TO FOLLOW IF ARCHAEOLOGICAL DEPOSITS ARE DISCOVERED DURING CONSTRUCTION

If the construction contractor and other personnel carrying out ground disturbance activities discover probable or suspected archaeological deposits during construction:

- Construction should cease in the area of the archaeological deposit.
- The project archaeologist should be contacted so the deposits can be assessed to determine if they are archaeological and date to pre-1900.
- If the deposit is archaeological NZ Historic Places Trust should be contacted; and if required an archaeological authority obtained if one has not already been obtained for the WRK-WKM C-LINE.
- If the deposits include human remains or cultural material an Iwi representative should be contacted and/or any agreed cultural protocols and procedures followed.

[9] pre-1900 archaeological sites area protected under the Historic Places Act 1993. An archaeological site is defined as: any place in New Zealand that was associated with human activity that occurred before 1900; or is the site of the wreck of any vessel where that wreck occurred before 1900; and may be able through investigation by archaeological methods t provide evidence relating to the history of New Zealand.

SELECTED REFERENCES

Bidwill, John Carne
1974 Rambles in New Zealand. Reprint published by Capper Press, Christchurch.

Coates, Albert A
1993 The Pumice Land Story. Times Commercial Printers, Hamilton.

Cooper, Barbara
1989 The Remote Interior. Moana Press, Tauranga.

Davies, Ida and Forshaw Ruth
1990 Mokai. Hamilton Public Library.

Dieffenbach, Ernst
1974 Travels in New Zealand Vol 1. Reprint published by Capper Press, Christchurch.

Department of Lands and Survey
1975 Prosperity From The Pumice Land. Department of Lands and Survey, Wellington.

Electric Corporation of New Zealand
1994 Memorandum of Agreement between Electric Corporation of New Zealand and The Trustees of the Tuaropaki Trust.

Farley, Glen and Rod Clough
2007 Te Mihi Geothermal Project, Wairakei: Archaeological Assessment. Copy on file Simmons & Assoc Ltd, Hamilton.

Fletcher, HM
1980 Tales of Early Taupo. Times Commercial Printers, Hamilton.

Fletcher, Perry
2010 Fax to Gavin Murray, Transpower New Zealand Ltd on 28 May 2010; Transpower cultural/ historic assessment progress summary phase 1 & 2; Tuaropaki and Waipapa Maori Land Blocks. On file Simmons & Assoc Ltd, Hamilton.

2010 Wairakei-Whakamaru Placement Transmission Line Project Cultural Site Survey-Waipapa and Tuaropaki Blocks Phase One and Phase Two Archaeological Assessment of the Preferred Transpower Pylon Route over the Tuaropaki and Waipapa Blocks. Copy on file Simmons & Assoc Ltd, Hamilton.

Grace, John Te H
1992 Tuwharetoa. (reprint) Reed, Auckland.

Greenfield, John
1998 From Dust to Ashes. Hamilton Public Library.

Guffy, R

1857 Manuscript- Short Biography and Map. On file Taupo Museum.

Fletcher, Perry
2005 Correspondence NZAA sites in the Mokai Geothermal field and Transmission Corridors.

Leach, Helen
2008 From Kai to Kiwi Kitchen—tracing the development of New Zealand's culinary traditions. Macmillan Brown Lecture Series 2008.

Leaf, Gayle
2010 Wairakei/ Oruanui Section of Replacement Transmission Line Cultural Vales to Tangata Whenua. Copy on file Simmons & Assoc Ltd, Hamilton.

Martin, John E. (ed)
1991 People, Politics & Power Stations. Bridget Williams Books, Wellington.

Mighty River Power Ltd
2002 Whakamaru 05 in Mighty River Power; Renewable Energy for Today and the Future. On file at Hamilton Public Library.

Ministry of Works and Development
1984 Report on Small Geothermal Power Development in New Zealand; Ngawha, Mokai, Tauhara. Ministry of Energy, Wellington.

Robinson, James and Anne Ford
2010 Taupo Transmission Line and Test Pit Summary June-July 2010; field notebooks; and photographic record of tower sites and test pit stratigraphy. Original documents on file Simmons & Assoc Ltd., Hamilton.

Simmons, Alexy
2006 Mokai Geothermal Resource Development Historic and Archaeological Assessment for a Resource Consent; Technical Report. Copy on file Simmons & Assoc Ltd, Hamilton.

Stokes, Evelyn
2000 The Legacy of Ngatoroirangi; Maori Customary Use of Geothermal Resources. Department of Geography University of Waikato.

Taupo Regional Museum
1987 Development of the Timber Industry in the Taupo Region. Taupo Times, Taupo.

Taylor, Nancy (ed)
1966 Journal of Ensign Best. Turnbull Library Monograph. Government Printer, Wellington.

Ward, R.G
1956 Maori Settlement in the Taupo Country 1830-1860. Journal of Polynesian Society 65. http//www.jps.auckland.ac.nz/document/Volume_65_1956.

Whakamaru Primary School
1984 Whakamaru Primary School 25th Jubilee 5 May 1984. Published by Dalgety Crown, Tokoroa. On file Hamilton Public Library.

Williams, Anne
1988 Land and Lake; Taupo Maori Economy to 1860. Unpublished MA Thesis, Department of Anthropology, University of Auckland.

Williams, Anne and Tony Walton
2003 Early Landuse Patterns in the Lake Taupo Area. Science for Conservation 222. Department of Conservation, Wellington.

MAPS

Sketch Map 1869 Tatua Claim
ML 994/1 & 994/2
ML 994 A, B,C
ML 1363, 1363/1, 1363/2
ML 5167
ML 5508
ML 6036/3
ML 6891-6905
ML 7422 / 7423
ML 11778
ML 12898
DP 13114

FIELD BOOKS

FB 502
FB 1345