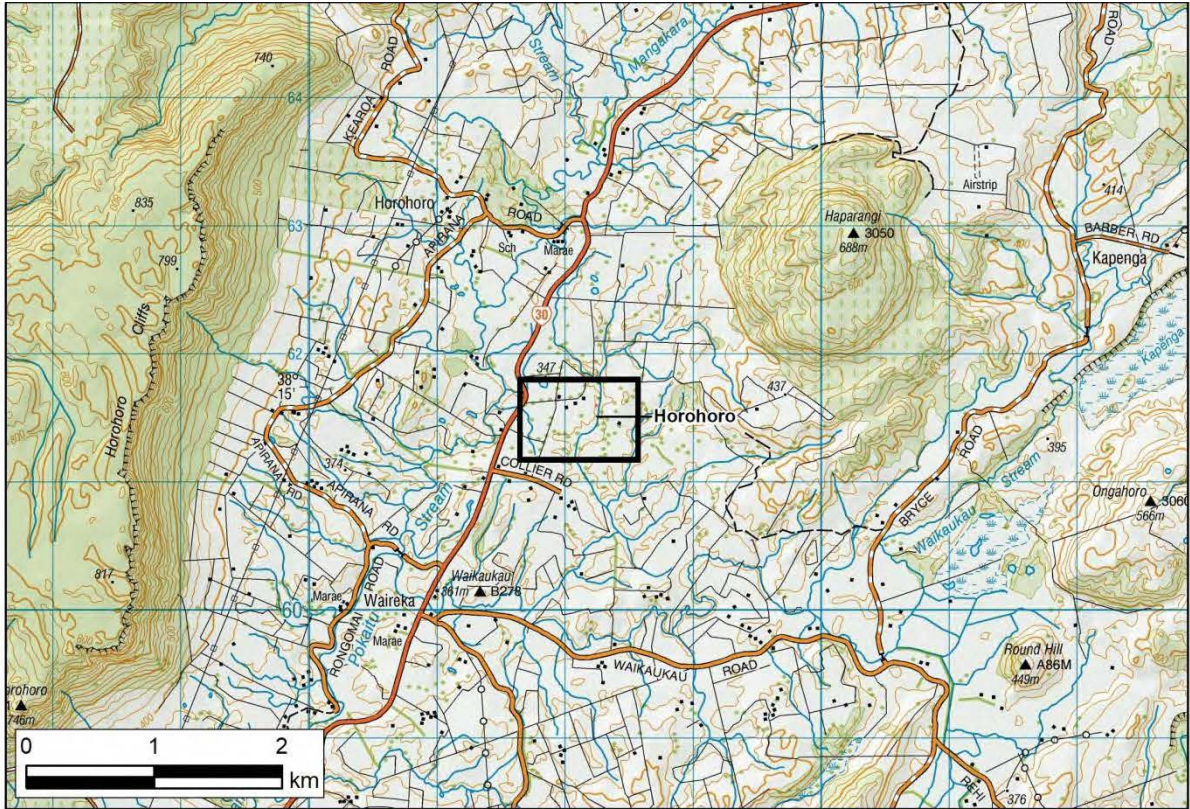


SITE SUMMARIES



- Legend**
- Vegetation and habitat types
 - 1. Mixed exotic grassland
 - 2. Geothermal water



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Report: 4363
 Client: WRC
 Ref: 01 1769
 Path: E:\gis\EW_Geothermal_Sites_2003\2017\mxd\June2017
 File: Horohoro.mxd

Horohoro

Wildlands
 www.wildlands.co.nz, 0508 WILDNZ

Scale: 1:5,000
 Date: 19/06/2017
 Cartographer: JO
 Format: A4

HOROHOHO

| | |
|----------------------------|---|
| Area: | Geothermal Habitat: <0.1 ha Geothermal Vegetation: <0.1 ha |
| Geothermal Field: | Horooho |
| Site Description: | Horooho has at least two small examples of geothermal habitat on unprotected private land near SH30, c.13 km south of Rotorua. There is one moderate-sized geothermal pool (10 × 10 metres), and one smaller pool and associated seepages present. Both pools are surrounded by exotic plant species and are unfenced. The main geothermal pool has a modified outlet trench and a bath has been placed nearby the outlet that takes some of the overflow for bathing. The vegetation is highly modified, mostly due to vegetation clearance and farming, with only occasional indigenous species present. Most of the site is dominated by mixed exotic grassland, and exotic shrubs (e.g. blackberry) with the exception of a few very small patches of <i>Gleichenia microphylla</i> fernland, a very small area with wetland habitat that includes a few <i>Eleocharis acuta</i> and exotic rushes, and other scattered indigenous species typical of geothermal habitats. |
| Ecosystem Services: | <p>This site is a very small geothermal site on private land. It has been highly modified as a result of vegetation clearance and pastoral farming, and it is dominated by exotic plant species. As a result many ecosystem services are impaired and not being provided to the level a more intact geothermal system might provide. Provisioning services were either not present or not able to be quantified with the data available. The site may provide a small level of regulation and maintenance services, including bioremediation in wetland habitat and riparian vegetation (unknown value). The vegetation is likely to provide mass stabilisation and control of erosion rates and flood protection, and sequestration of carbon and potentially other climate change gases, but these were not able to be quantified and can be considered minor due to the small size of the site.</p> <p>The cultural services provided at the site are limited to the small number of people utilising it for bathing, and as a landscape feature on the farm. It is not accessible to the general public. Publications (178) were found when searching on Google Scholar but these may not all be concerned with geothermal aspects of the site.</p> |



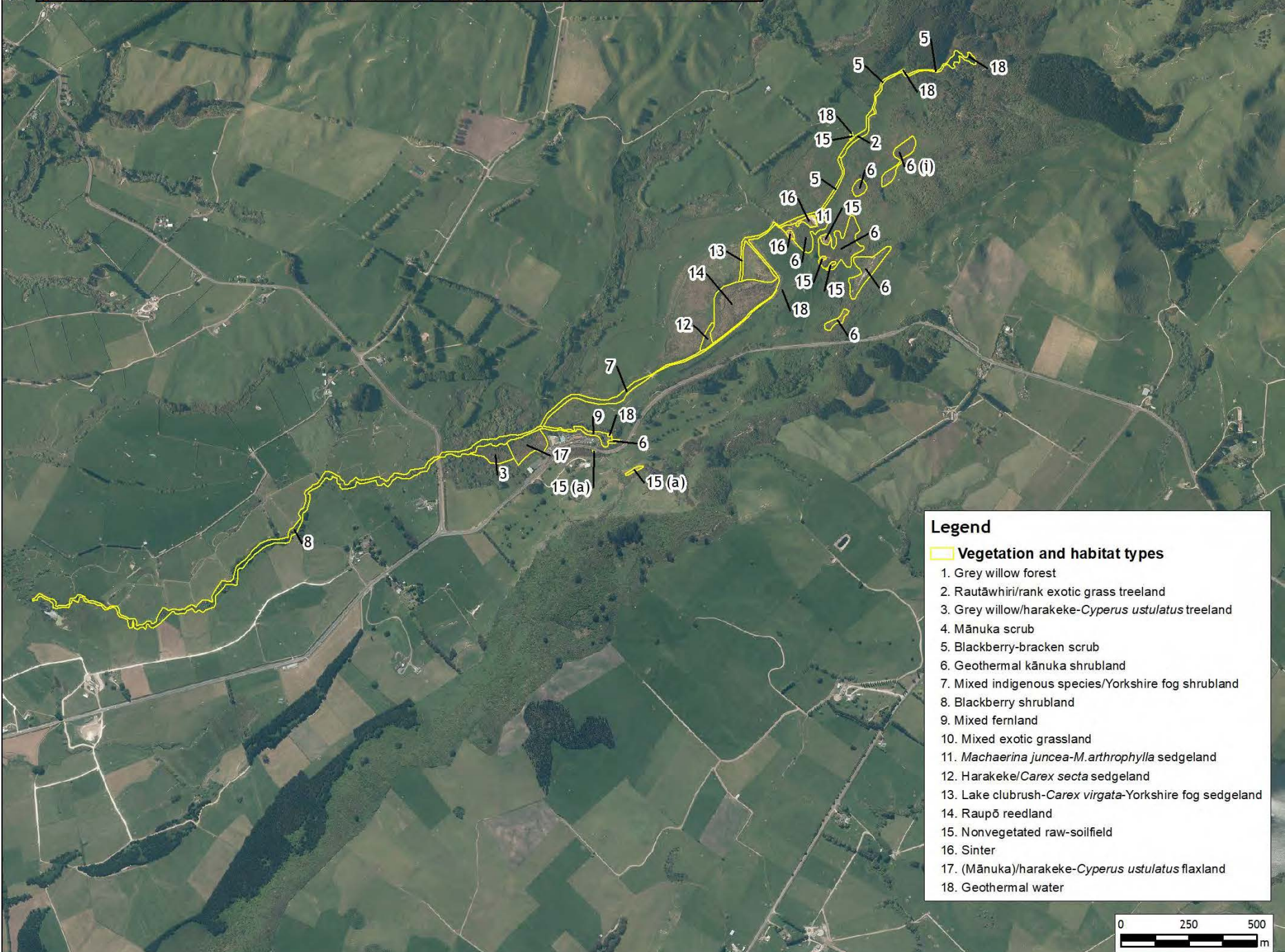
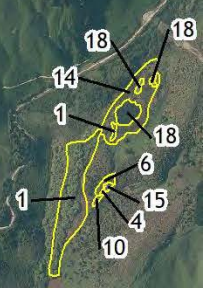
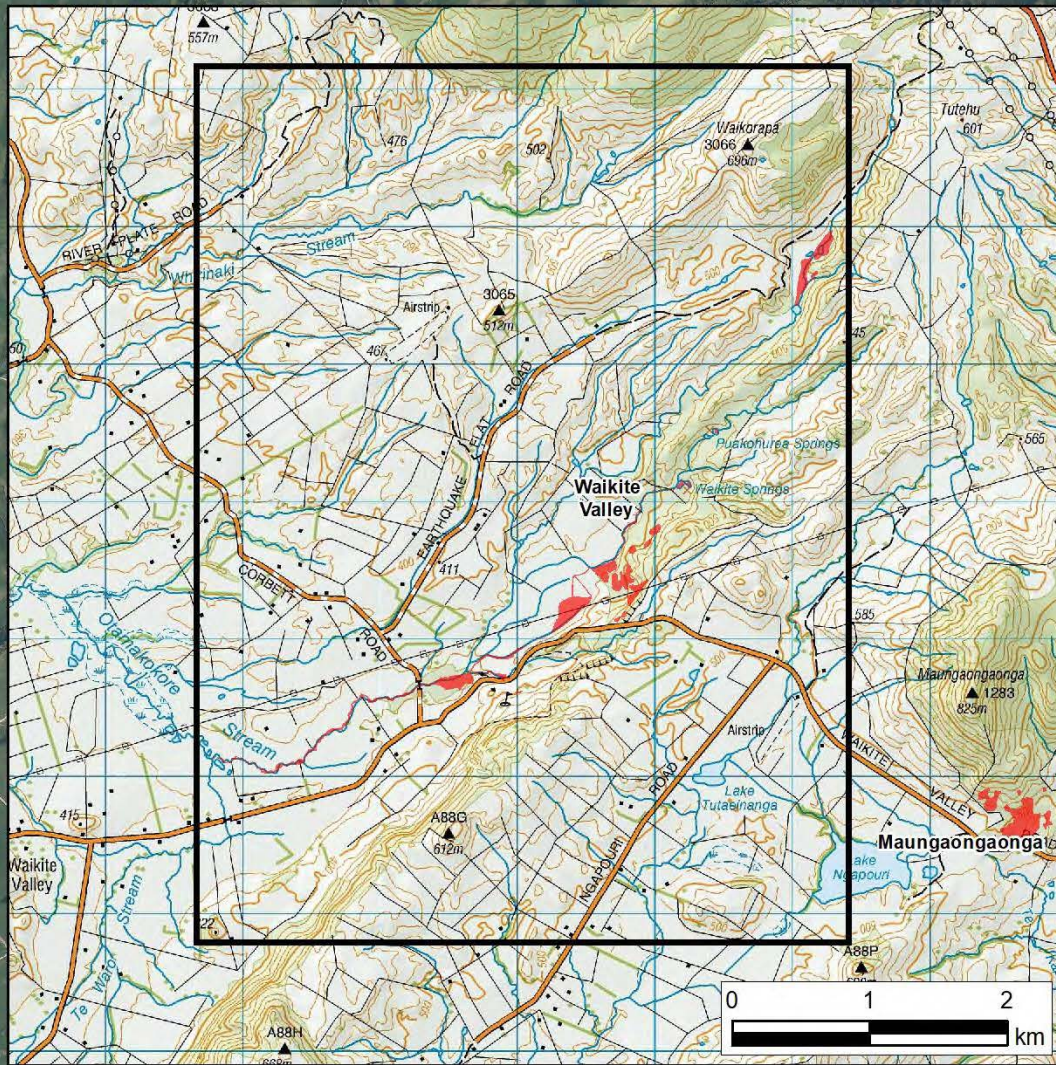
The larger geothermal pool at Horohoro. Note the changing room near the outlet of the pool. (February 2014)



The smaller geothermal pool at Horohoro is surrounded by a few tree ferns and mixed blackberry and fern shrubland. (February 2014)



Horohoro geothermal site is clearly used for bathing. (February 2014)



Legend

Vegetation and habitat types

1. Grey willow forest
2. Rautāwhiri/rank exotic grass treeland
3. Grey willow/harakeke-*Cyperus ustulatus* treeland
4. Mānuka scrub
5. Blackberry-bracken scrub
6. Geothermal kānuka shrubland
7. Mixed indigenous species/Yorkshire fog shrubland
8. Blackberry shrubland
9. Mixed fernland
10. Mixed exotic grassland
11. *Machaerina juncea*-*M. arthropophylla* sedgeland
12. Harakeke/*Carex secta* sedgeland
13. Lake clubrush-*Carex virgata*-Yorkshire fog sedgeland
14. Raupō reedland
15. Nonvegetated raw-soilfield
16. Sinter
17. (Mānuka)/harakeke-*Cyperus ustulatus* flaxland
18. Geothermal water

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 Report: 4363
 Client: WRC
 Ref: 01 1769
 Path: E:\GIS\EW_Geothermal_Sites_2003\2017\mxd\June2017\
 File: Waikite_Valley.mxd

Waikite Valley

Wildlands
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 Scale: 1:17,500
 Date: 28/02/2018
 Cartographer: JO
 Format: A3

WAIKITE VALLEY

| | |
|----------------------------|---|
| Area: | Geothermal Habitat: 20.7 ha Geothermal Vegetation: 19.9 ha |
| Geothermal Field: | Waikite |
| Site Description: | <p>The Waikite Valley site is located c.8 km west of Waiotapu near Rotorua. About three-quarters (76.4%, 15.7 ha) of the site is legally protected; the rest is unprotected private land. The adjoining land use includes farmland, a golf course, riparian margin, protected conservation land, and public thermal baths. It contains good quality, highly diverse and representative examples of geothermal habitat types that are nationally uncommon, including all types listed in Holdaway <i>et al.</i> (2012). Twelve Threatened and At Risk species have been recorded at the site: Geothermal kānuka (At Risk-Naturally Uncommon), <i>Nephrolepis flexuosa</i> (At Risk-Naturally Uncommon), <i>Christella</i> aff. <i>dentata</i> (“thermal”) (At Risk-Naturally Uncommon), <i>Hypolepis dicksonioides</i> (At Risk-Naturally Uncommon), <i>Thelypteris confluens</i> (At Risk-Naturally Uncommon), <i>Dicranopteris linearis</i> (At Risk-Naturally Uncommon), <i>Cyclosorus interruptus</i> (At Risk-Declining), grey duck (Threatened-Nationally Critical), spotless crane (At Risk-Declining), NZ dabchick (At Risk-Recovering), North Island fernbird (At Risk-Declining), whitehead (At Risk-Declining). It also contains habitat for a diverse range of species typical of geothermal habitat. Most of the geothermal areas within this site are fenced to exclude stock. The value of the site has been enhanced by recent restoration works including re-establishment of natural water tables in a geothermal wetland, fencing and planting of stream margins, and pest plant control. The plantings have resulted in indigenous species starting to re-establish and become dominant. Invasive exotic plants are common within parts of the site. The value of the wetlands has been recently enhanced by reinstatement of the geothermal stream to closer to its location prior to human modification, and restoring geothermal wetlands to areas that had been drained. In terms of biodiversity, a relatively large number of the vascular plant species typical of geothermal habitats are present, with 12 species (plants and birds) classified as Threatened or At Risk. The site provides habitat for a rich diversity of the flora of geothermal sites in the Waikato Region, and all key geothermal habitats assessed in the region are found here. Cody (2007) lists 21 features and geothermal characteristics present at Waikite, with three features listed as being of at least national significance.</p> |
| Ecosystem Services: | <p>Provisioning services present include nutrition, potential materials and energy. Nutrition services are provided through limited honey production, conservatively valued at \$40 annually; this is based on the area of mānuka (<i>Leptospermum scoparium</i>) only and other species present are also likely to contribute to honey production. The area may also provide nutritional services from duck shooting, but no data is currently available on use. An area of raupō (<i>Typha orientalis</i>) has potential for fibre (materials) production.</p> <p>The site provides regulation and maintenance services of bioremediation in wetland habitat and riparian vegetation (unknown value). The vegetation provides mass stabilisation and control of erosion rates, flood protection, and sequestration of carbon (3,379 tC annually) and potentially other climate change gases.</p> <p>The site provides a number of cultural services, although the extent of</p> |

many of these is not well known. The local community constructed a hot pool complex at this site in the 1970s, making direct use of the hot stream water. The hot pools are now a significant tourist destination, with public paying an entry fee to access the pools and the Te Manaroa Hot Spring (nature walk). There is also a golf course, cafe and camping ground associated with the site. These commercial operations provide employment. The site provides some educational services with signs explaining the geology and vegetation present, including information on the vascular plant species present. Warning signs for public safety are present, and tracks have been constructed to protect people from hazardous areas, and to protect the features at parts of the site. Many of the geothermal features and steam from the site are visible from the Waikite Valley Road. The site is of considerable scientific interest with 262 scientific publications found (Google Scholar Search).



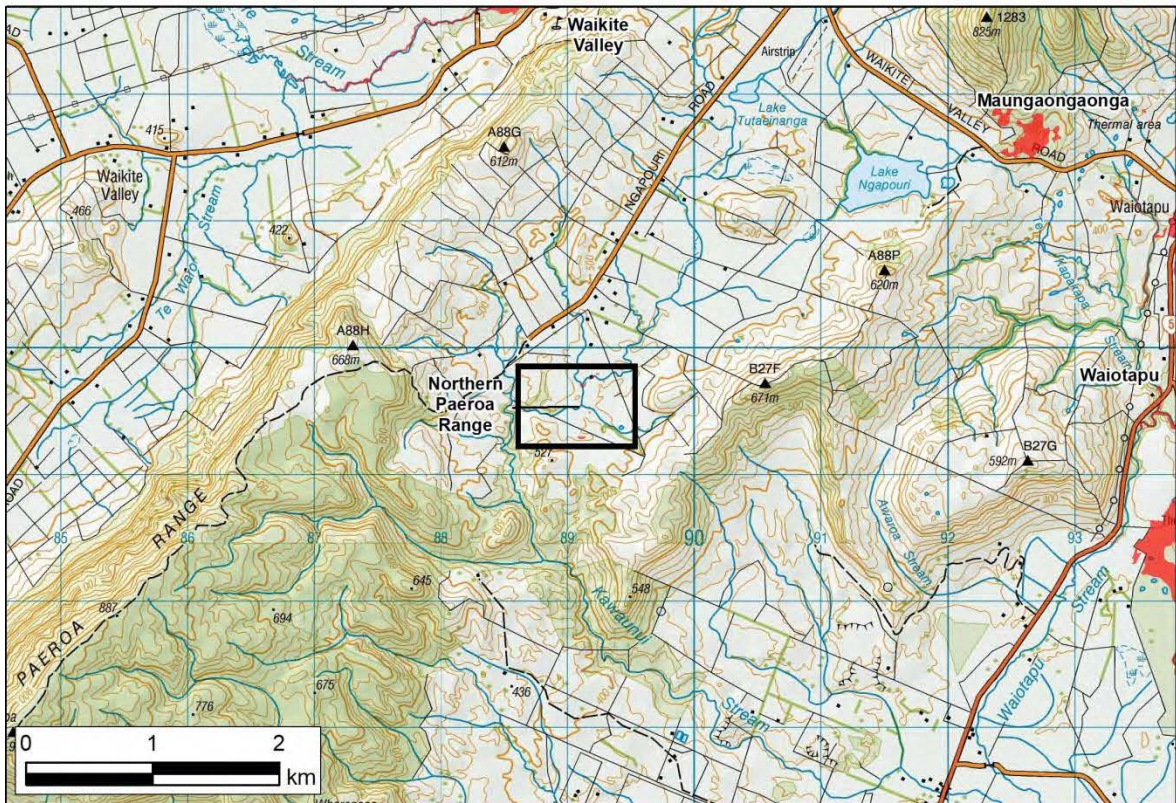
The northern part of the Waikite Valley site has local patches of geothermal kākūka scrub, geothermal wetland and geothermally influenced bare ground. The wetland in the background contains populations of *Thelypteris confluens* and *Cyclosorus interruptus*. Much of this area has been farmed in the past. (July 2014)



A relatively high diversity of geothermal vegetation types and features are present at Waikite. This includes hot springs and geothermal wetlands, and features on the Paeroa Scarp in the background of the photograph. Note the drains that have been dug through the edge of some features. (July 2014)



Indigenous planting alongside some geothermal stream margins at Waikite. (July 2014)



Legend

- Vegetation and habitat types
- 1. Mixed indigenous shrubs/mixed fern species shrubland

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Report: 4363
 Client: WRC
 Ref: 011769
 Path: E:\gis\EW_Geothermal_Sites_2003\2017\mxd\June2017\
 File: Northern_Paeroa_Range.mxd

Northern Paeroa Range

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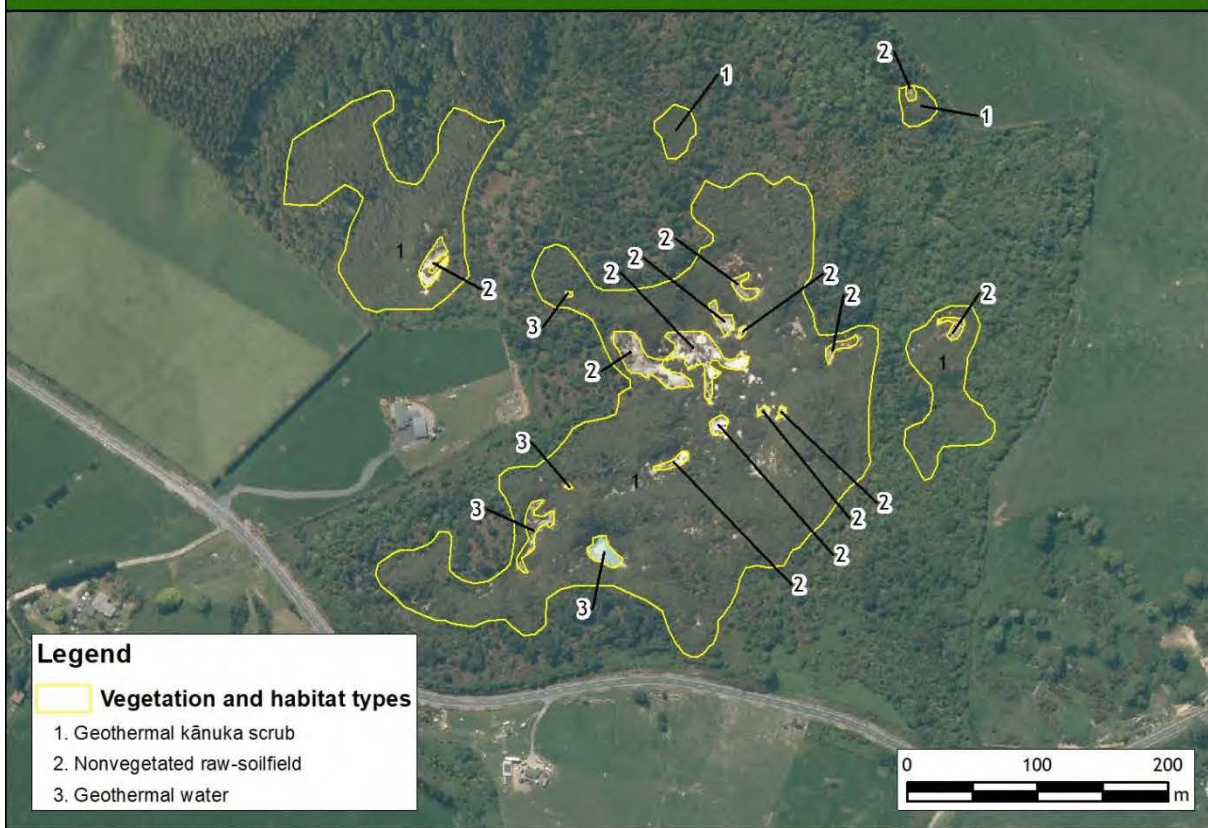
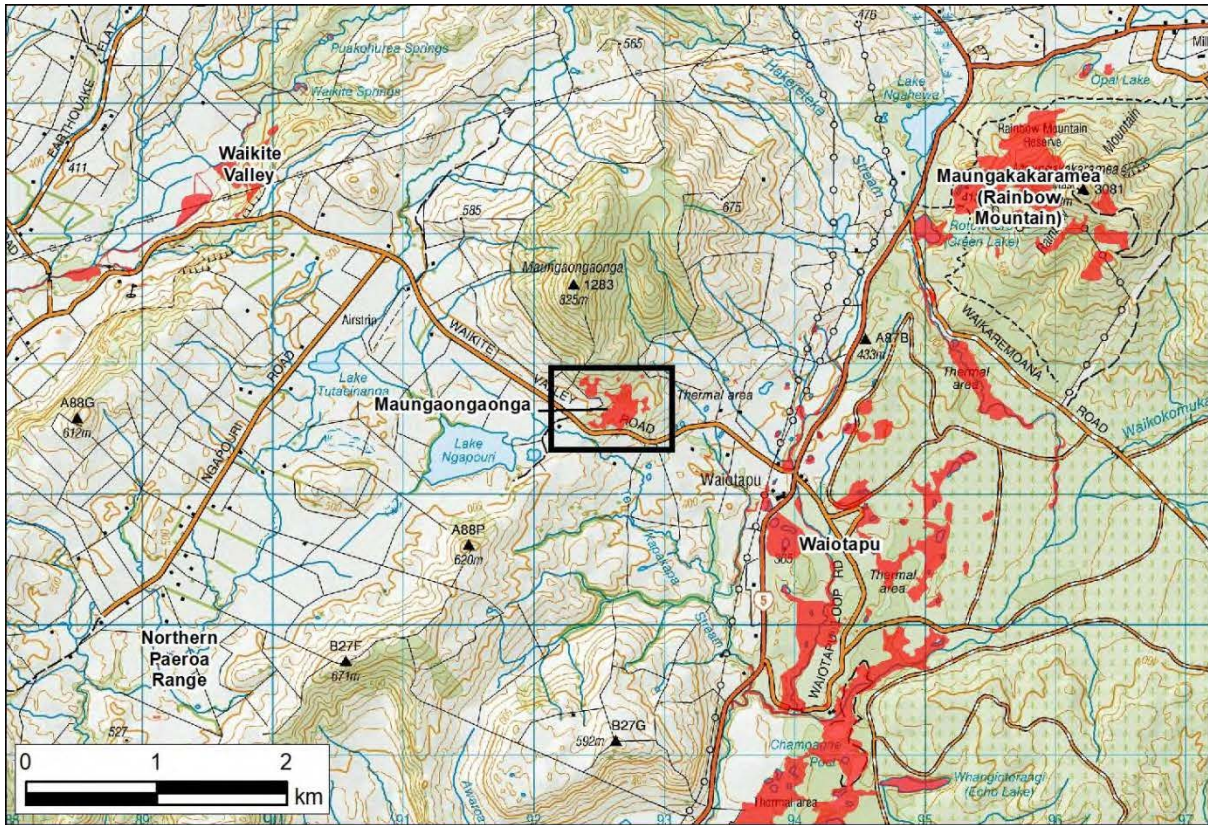
Scale: 1:5,000
 Date: 19/06/2017
 Cartographer: JO
 Format: A4

NORTHERN PAEROA RANGE

| | |
|----------------------------|---|
| Area: | Geothermal Habitat: 0.3 ha Geothermal Vegetation: 0.3 ha |
| Geothermal Field: | Waikite |
| Site Description: | The Northern Paeroa Range site is located on unprotected private land and comprises seven small areas of geothermally altered soil, mostly bare ground, but some geothermal species are present. It is located within gullies and nearby landforms in a catchment of a tributary of the Kauwaunui Stream south of the Waikite Valley. The surrounding land use is exotic plantation forest and farming. Occasional scattered geothermal kānuka (At Risk-Naturally Uncommon) is present along with a few other species typical of geothermal habitats. Only a small diversity of plant species typical of geothermal habitats are present, Most of the features have been adversely impacted by stock and a concrete pipe has been constructed (probably for cooking food) within one of the geothermal areas. |
| Ecosystem Services: | Provisioning services are minor due to its small size compared with other geothermal sites in the Waikato Region. The geothermal springs may occasionally be used for cooking (a concrete pipe was present in one feature in 2010). Some nutritional services may be provided, but due to the site's small size these are difficult to assess. The site provides regulation and maintenance services of bioremediation in wetland habitat and riparian vegetation (unknown value), but these will be limited due to its small size. The vegetation provides mass stabilisation and control of erosion rates, flood protection, and sequestration of carbon and potentially other climate change gases. The site provides a low level of cultural services. It is rarely visited by people, being on private land. |



Some moderately sized areas of geothermally influenced bare ground and springs are present at the Northern Paeroa Range site, but there is a lack of indigenous vegetation cover. Geothermal kānuka (At Risk-Naturally Uncommon) is present. (June 2010)



Legend

Vegetation and habitat types

1. Geothermal kānuka scrub
2. Nonvegetated raw-soilfield
3. Geothermal water

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Report: 4363
 Client: WRC
 Ref: 01 1769
 Path: E:\gis\EW_Geothermal_Sites_2003\2017\mxd\June 2017\
 File: Maungaongaonga.mxd

Maungaongaonga

Wildlands
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Scale: 1:5,000
 Date: 28/02/2018
 Cartographer: JO
 Format: A4

MAUNGAONGAONGA

| | |
|----------------------------|---|
| Area: | Geothermal Habitat: 8.7 ha Geothermal Vegetation: 8.7 ha |
| Geothermal Field: | Waiotapu |
| Site Description: | The Maungaongaonga site is located on protected land (Maungaongaonga Scenic Reserve) to the west of Maungakakamea (Rainbow Mountain), c.20 km south of Rotorua. It comprises high quality geothermal habitat and features, with low pest plant densities. Four At Risk species were recorded at this site: geothermal kānuka (At Risk-Naturally Uncommon), <i>Dicranopteris linearis</i> (At Risk-Naturally Uncommon), <i>Nephrolepis flexuosa</i> (At Risk-Declining), and <i>Korthalsella salicornioides</i> (At Risk-Naturally Uncommon). A moderate number of the vascular plant species typical of geothermal habitats are present, The adjoining land use is farmland and indigenous forest and scrub. The site is seldom visited by the public as it is generally considered unsafe and public access is not encouraged. The lack of public access has enabled the vegetation to be retained in a very high ecological condition. No formal tracks have been established here. |
| Ecosystem Services: | <p>A low level of provisioning services are considered to be present at the site. No mānuka-dominated vegetation is present but the extensive area of geothermal kānuka is likely to of use to bee keepers, particularly the Arataki Honey business nearby.</p> <p>The vegetation provides mass stabilisation and control of erosion rates, flood protection, and sequestration of carbon (1,951 tC annually) and potentially other climate change gases.</p> <p>The site provides a number of cultural services. The steam from the site is a prominent landmark seen from State Highway 5 between Rotorua and Taupō. This area has an intrinsic value in providing habitat for the unique sequence of geothermal vegetation present and these values have been recognised in formal protection as the Department of Conservation administered Maungaongaonga Scenic Reserve. Visitor numbers to this site are very low due to safety concerns and public access is not encouraged. There are no formal walking tracks and the signage at this site is limited to warning signs pertaining to the dangers present. The site is also of some scientific interest with 50 scientific publications found on the site (Google Scholar search).</p> |



An extensive area of geothermal kākūka scrub and shrubland occurs within Maungaongaonga, and is protected in Maungaongaonga Scenic Reserve. It is a prominent scenic landmark and is seen from State Highway 5 and Waikite Valley Road. The vegetation present adjoins indigenous forest. (May 2014)



Some deep geothermal craters are present at Maungaongaonga. The site is rarely visited because it is not considered to be safe and this protects its geothermal features and habitats. (May 2014)



Some of the geothermal vegetation at Maungaongaonga adjoins mixed broadleaved indigenous forest. (May 2014)

Legend

Vegetation and habitat types

- 1. Geothermal kānuka scrub
- 2. (Whauwhaupaku)/geothermal kānuka-mānuka/ blackberry scrub
- 3. Exotic pine/geothermal kānuka-mingimīngi-mānuka scrub
- 4. Geothermal kānuka-mingimīngi-mānuka scrub
- 5. Mānuka scrub
- 6. Exotic pine/mānuka-mingimīngi scrub
- 7. Mānuka-mingimīngi-blackberry-bracken scrub
- 8. Mānuka-geothermal kānuka-mingimīngi/water fern-bracken scrub
- 9. Whauwhaupaku-kāmahi-kōhūhū scrub
- 10. Geothermal kānuka shrubland
- 11. Geothermal kānuka-mingimīngi-mānuka shrubland
- 11. Geothermal kānuka-kāmahi-whauwhaupaku/blackberry shrubland
- 12. Blackberry-bracken shrubland
- 13. Blackberry-broom-water fern-bracken shrubland
- 14. Kōhūhū-mānuka/bracken fernland
- 15. *Hypolepis ambigua*-water fern fernland
- 16. Raupō-harakeke reedland <-> *Carex secta-Machaerina rubiginosa-M. juncea* sedgeland
- 17. Nonvegetated raw-soilfield
- 18. Sinter
- 19. Geothermal water
- 20. Mud pools

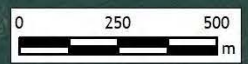
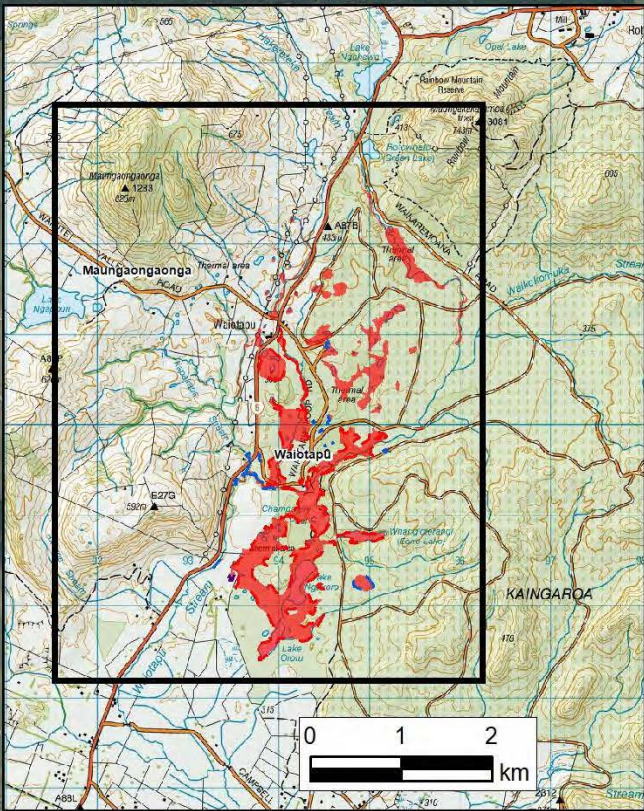
Vegetation and habitat types

○ See text: Significance level

International

Regional

Local



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 Report: 4363
 Client: EW
 Ref: 01 1769
 Path: E:\gis\EW_Geothermal_Sites_2003\2017\mxd\June2017\
 File: Waiotapu.mxd

Waiotapu

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 Scale: 1:17,433
 Date: 28/02/2018
 Cartographer: JO
 Format: A3

WAIOTAPU

| | |
|----------------------------|---|
| Area: | Geothermal Habitat: 186 ha Geothermal Vegetation: 160.8 ha |
| Geothermal Field: | Waiotapu |
| Site Description: | <p>The Waiotapu site includes three sites as mapped in Wildland Consultants (2014a): Ngapouri, Waiotapu North and Waiotapu South. It is the largest area of surface geothermal manifestations in New Zealand. It adjoins two other sites, Maungakakamea/Rainbow Mountain and Maungaongaonga.</p> <p>Waiotapu has several impressive geothermal features and is a major New Zealand tourist attraction. The site has a diverse range of landscape features, including a valley, sinter deposits, lakes, springs, mudpools and rivers. One of the largest geothermal wetlands in New Zealand occurs at the Waiotapu site, and the ecosystem values of the wetland habitat have been assessed by Kessels (2015). Just under half of the site is legally protected (41.5%, 77.1 ha) (Waiotapu Scenic Reserve and Waiotapu Stewardship Area), with the remainder being unprotected private land. The site is highly significant ecologically and geologically and provides habitat for eight At Risk species: Geothermal kānuka (At Risk-Naturally Uncommon), <i>Dicranopteris linearis</i> (At Risk-Naturally Uncommon), <i>Cyclosorus interruptus</i> (At Risk-Declining), spotless crane (At Risk-declining), NZ dabchick (At Risk-Recovering), North Island robin (At Risk-Declining), North Island fernbird (At Risk-Declining), whitehead (At Risk-Declining). The site also contains all eight geothermal habitat types assessed as part of this project and a relatively large number of the vascular plant species typical of geothermal habitats are present. Many of the geothermal features are listed as being of national and international significance (Cody 2007). Parts of the site have been enhanced by recent restoration works (e.g. pest plant control, particularly wilding pines). The surrounding land uses are mostly plantation forest, farmland, and exotic and indigenous scrub and fernland.</p> <p>In the wider Waiotapu Area (probably including Maungakakamea/Rainbow Mountain and Maungaongaonga), Cody (2007) lists 14 features and geothermal characteristics as being present, with four features listed as being of national or international significance (Cody 2007).</p> |
| Ecosystem Services: | <p>Waiotapu provides a range of ecosystem services at a local to an international scale, being the largest, and one of the highest quality geothermal sites in New Zealand. Provisioning services present include honey production, the value of which is likely to be significantly underestimated due to the lack of information on honey producing species present other than mānuka; a minimum value was calculated to be \$9,600 per annum based on the area dominated by mānuka. The value of the large honey, honey products and queen bee-exporting business located at Waiotapu (Arataki Honey), which uses geothermal fluid for heating and processing, can be expected to be substantial. However, it was not included in this calculation because the fluid is not extracted from the surface geothermal features but from the deep resource. An area of raupō has potential for fibre production. Wilding pines have been removed or killed on site, although it is unknown if any economic value has been gained from the extracted trees.</p> <p>The site provides regulation and maintenance services of bioremediation in</p> |

wetland habitat and riparian vegetation (unknown value). The vegetation provides mass stabilisation and control of erosion rates, flood protection, and sequestration of carbon (36,723 tC annually) and potentially other climate change gases.

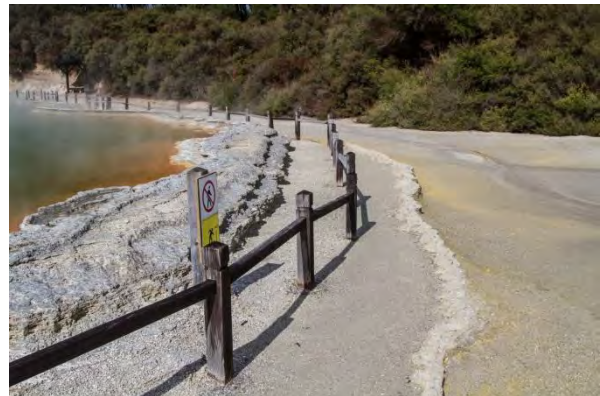
The site provides a number of cultural services, although the extent of many of these is not well known. The service of most economic significance is tourism, with a high volume of paying visitors coming specifically to view geothermal features at the “Wai-O-Tapu Thermal Wonderland” or bathe (for free) in hot streams on the side of the road. Approximately 160,000 paying visitors come to Wai-O-tapu Thermal Wonderland each year, which equates to around \$3.9 million in gross income (Kessels 2015), making this site an important part of the local economy. There is also a café and tourist shop on site. The site has a diverse range of landscape features, including sinter terraces, geothermal lakes and pools, springs, small geysers, mudpools, and geothermal streams and rivers. Many of the significant geothermal features and habitats are well outside the main area that tourists visit at the site. The streams outside of the tourist complex are very popular bathing spots with steps and handrails constructed for safe access. However, signage warning of broken bottles, syringes, sanitary items, condoms and sharp objects in the stream suggests that the high use of these areas may be having negative impacts. There are many warning signs, walkways and fencing present. Some interpretation signs are present, although there is scope for these to be improved to increase the educational value of the site. The site is well studied scientifically with 1,971 published research articles found.



Warning sign at bathing areas and garden memorial at Wai-o-tapu Thermal Wonderland - spiritual values. (August 2017)



Signs at Wai-O-Tapu Thermal Wonderland with guidelines for public health and safety, and environment protection, supporting the cultural service of geothermal areas. (August 2017)



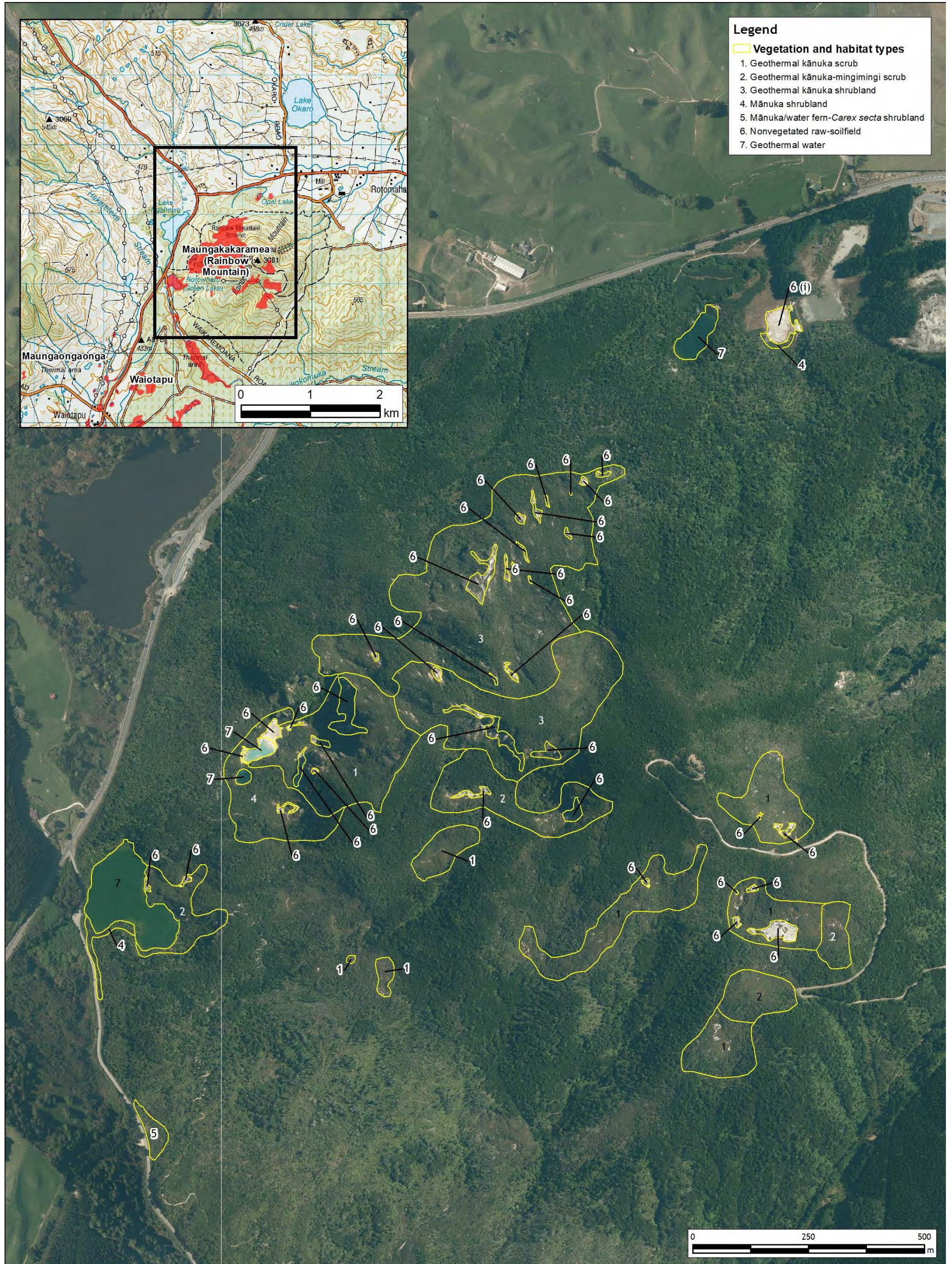
The iconic champagne pool is a major tourist feature of the site, and is fenced to protect both people and the geothermal feature. (August 2017)



This part of Waiotapu is described as Ngapouri in Wildland Consultants (2014a). It has scattered geothermal activity amongst farmland, a honey producing business, accommodation, and tourist activities. (May 2014)



One of the largest geothermal wetlands in New Zealand occurs at the southern end of the Waiotapu site. (July 2011)



- Legend**
- Vegetation and habitat types**
1. Geothermal kākūka scrub
 2. Geothermal kākūka-mingimīngi scrub
 3. Geothermal kākūka shrubland
 4. Mānuka shrubland
 5. Mānuka/water fern-*Carex secta* shrubland
 6. Nonvegetated raw-soilfield
 7. Geothermal water

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 Report: 4363
 Client: WRC
 Ref: 01 1769
 Path: E:\gis\EW_Geothermal_Sites_2003\2017\mxd\June2017\
 File: Maungakakaramaea.mxd

Maungakakaramaea (Rainbow Mountain)

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 Scale: 1:7,500
 Date: 28/02/2018
 Cartographer: JO
 Format: A3

MAUNGAKAKARAMEA (RAINBOW MOUNTAIN)

| | |
|----------------------------|---|
| Area: | Geothermal Habitat: c.55.1 ha Geothermal Vegetation: c.51.6 ha |
| Geothermal Field: | Waiotapu |
| Site Description: | <p>Maungakakaramea (Rainbow Mountain) is a relatively large example of geothermal vegetation and includes nationally uncommon habitat types. This site is of national significance for its ecological values (Wildland Consultants 2014a). It also contains a good quality example of an ecological sequence grading from geothermal vegetation to tall forest over an elevation gradient of 380 m to 743 m. The site has high values for domestic and international tourism providing walking tracks and viewing points over its geothermal features and the surrounding landscape. It is located c.20 km south of Rotorua and the land tenure is protected (Rainbow Mountain Scenic Reserve). It is a prominent landform on State Highway 5, the main road between Rotorua and Taupō. The site is ecologically and geologically significant and provides habitat for eleven At Risk species: Geothermal kānuka (At Risk-Naturally Uncommon), <i>Dicranopteris linearis</i> (At Risk-Naturally Uncommon), <i>Schizaea dichotoma</i> (At Risk-Naturally Uncommon), <i>Nephrolepis flexuosa</i> (At Risk-Declining), <i>Calochilus paledosus</i> (At Risk - Naturally Uncommon), <i>Calochilus robertsonii</i> (At Risk-Naturally Uncommon), <i>Caladenia alata</i> (At Risk-Naturally Uncommon), <i>Caladenia atradenia</i> (At Risk-Naturally Uncommon), NZ dabchick (At Risk-Recovering), North Island robin (At Risk-Declining), whitehead (At Risk-Declining). A relatively large number (at least 27 out of the 44 species) of the vascular plant species typical of geothermal habitats are present and the site provides habitat for a range of plant species and vegetation associations typical of geothermal habitats. Considerable enhancement and maintenance of ecological values have been undertaken through pest plant control at this site. The geothermal features are considered with others in Waiotapu in Cody (2007) and include features of national interest.</p> |
| Ecosystem Services: | <p>Provisioning services present at Maungakakaramea include honey production, valued conservatively at \$1,400 per year based on the area of mānuka present. The area may also provide nutritional services from hunting, but no data is present on use. A small area (0.4 ha) of raupō has potential for fibre production. Wilding pines have been removed or killed on site, although it is unknown if any economic value has been gained from the extracted trees. Historically, it is thought that the coloured soils from this site were sold in bottles as tourist souvenirs, but this no longer occurs.</p> <p>The site provides regulation and maintenance services of bioremediation in wetland habitat and riparian vegetation (unknown value). The vegetation provides mass stabilisation and control of erosion rates, flood protection, and sequestration of carbon and potentially other climate change gases.</p> <p>The site provides a number of cultural services, although the extent of many of these is not well known. The site is regularly used by visitors for both walking and mountain biking, with high use tracks present to the summit and on the sides of Maungakakaramea. The site is also a prominent feature on State Highway 5 between Rotorua and Taupō and is seen from the geothermal area at Waiotapu to the south. Some health and safety signs are present at this site, including some educational</p> |

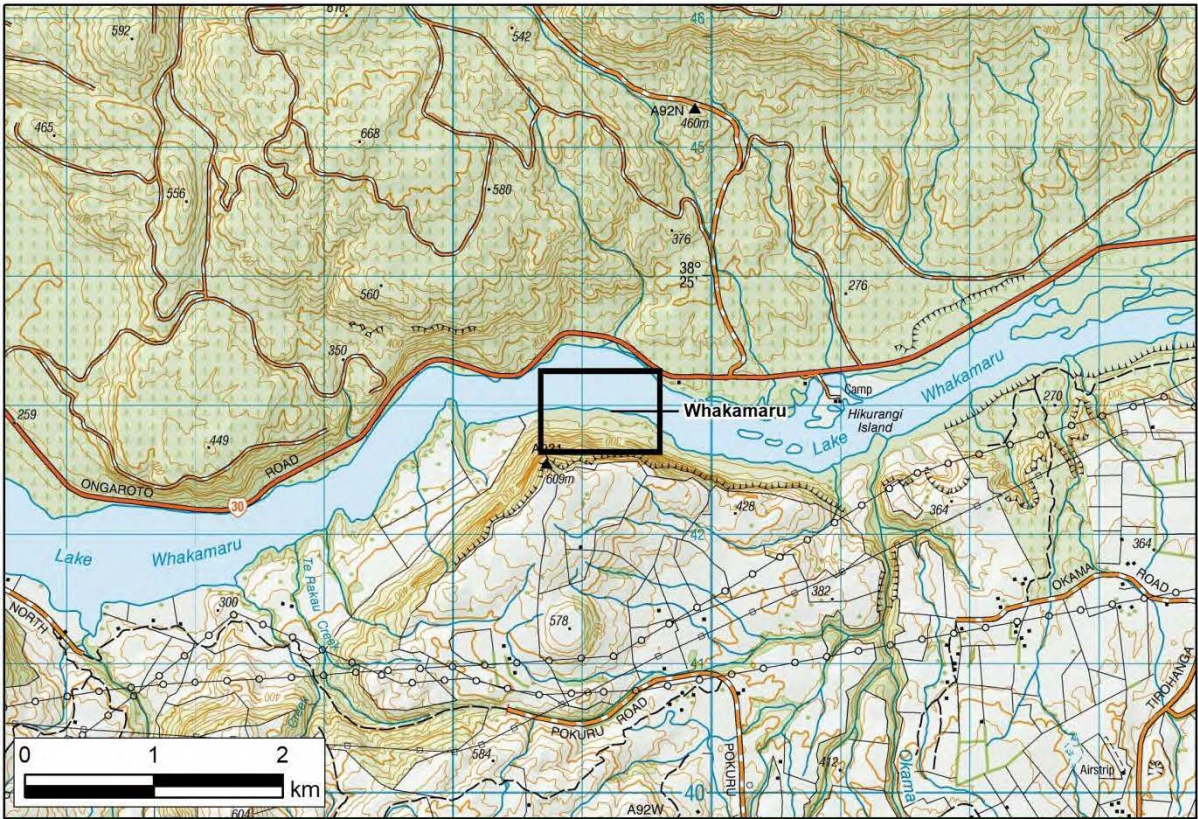
interpretation panels on geothermal processes and Māori culture. Limited bathing is undertaken at the warm Lake Rotowhero, despite being marginally safe to do so. Warning signs for public safety are present, and tracks and barriers have been constructed to protect people from hazardous areas, and to protect the features. The site is of considerable scientific interest, with 72 scientific publications found (Google Scholar search), and is known to be visited by university and other educational groups. The value of the site has been recognised with almost the entire area of geothermal activity being protected within Rainbow Mountain Scenic Reserve administered by the Department of Conservation.



Maungakakamea.
(May 2011)

Geothermal vegetation is found across a wide altitudinal and landform range on and surrounding the dacite cone of Maungakakamea (Rainbow Mountain), including geothermal lakes and extensive areas of geothermal kānuka scrub and shrubland.
(July 2010)

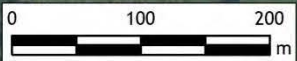




Legend

Vegetation and habitat types

1. Geothermal sand



Data Acknowledgment
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 Service (WRAPS) 2012

Report: 4363
 Client: WRC
 Ref: 01 1769
 Path: E:\gis\EW_Geothermal_Sites_2003\2017\mxd\June2017\
 File: Whakamaru.mxd

Whakamaru

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Scale: 1:5,000
 Date: 19/06/2017
 Cartographer: JO
 Format: A4

WHAKAMARU

| | |
|----------------------------|--|
| Area: | Geothermal Habitat: <0.1 ha Geothermal Vegetation: <0.1 ha |
| Geothermal Field: | Whakamaru |
| Site Description: | The Whakamaru site comprises two or more hot springs in lake shore sands on the margin of Lake Whakamaru and contains a very small area of geothermal vegetation and habitat. At the site, holes are dug in the sand to create small hot pools for bathing by people who access the site by boat. No Threatened or At Risk species are known of at this site, although a few species typical of geothermal habitats are present. The site is of local significance (Wildland Consultants 2014a) as it contains a small example of a nationally uncommon habitat type - geothermal. |
| Ecosystem Services: | This site is very small and therefore provides limited ecosystem services. There are only very small areas of geothermal vegetation and habitats at the site, thus provisioning and regulating services are minor. The lake itself has moderately high recreational use, and some lake users are aware of the hot pools in the sand here and visit them for the purposes of recreation. The site has an intrinsic value associated with being a natural geothermal site, in spite of its limited size and lack of geothermal vegetation. |



At least two geothermal springs are present on the edge of Lake Whakamaru. (February 2008)