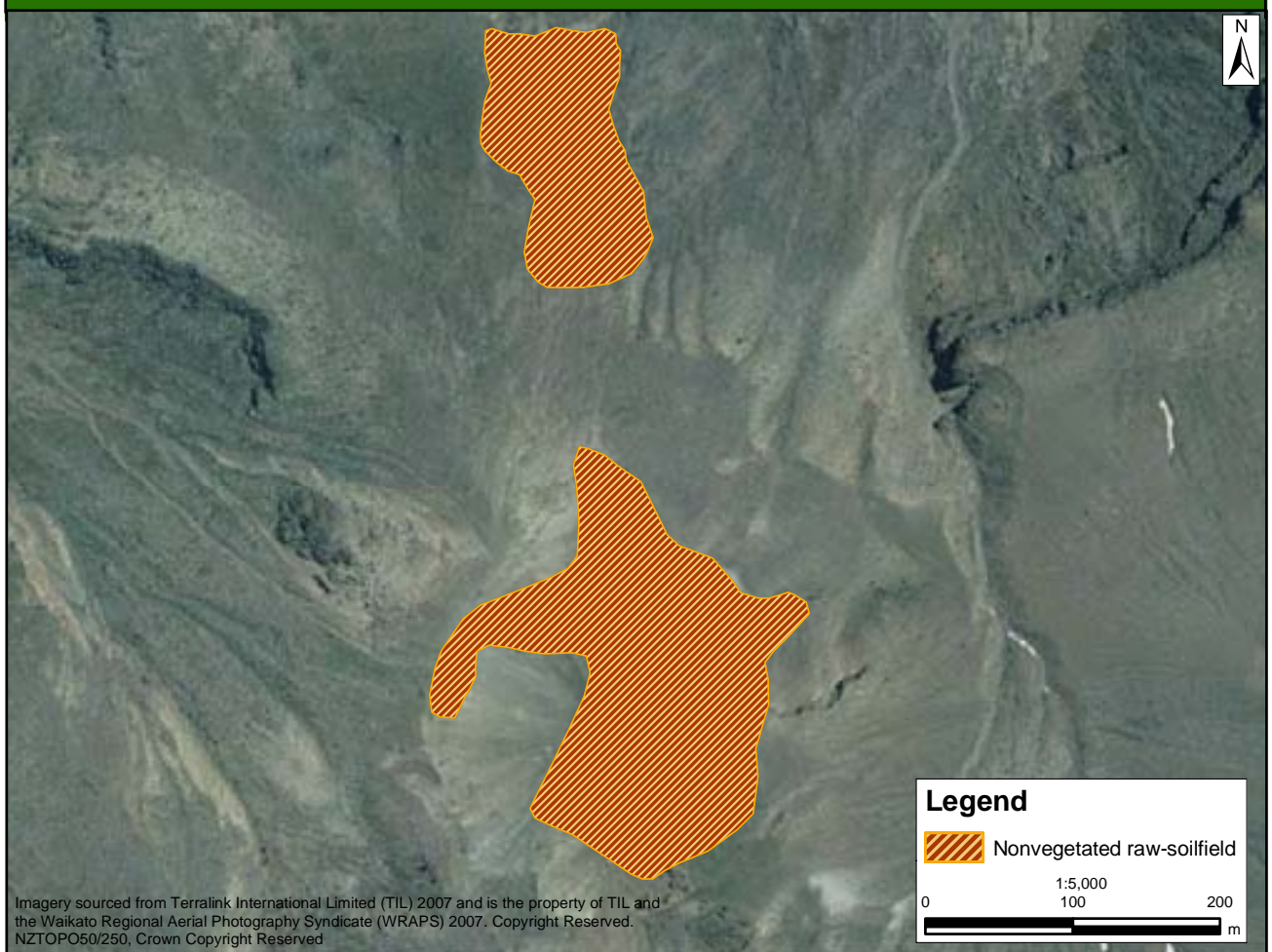
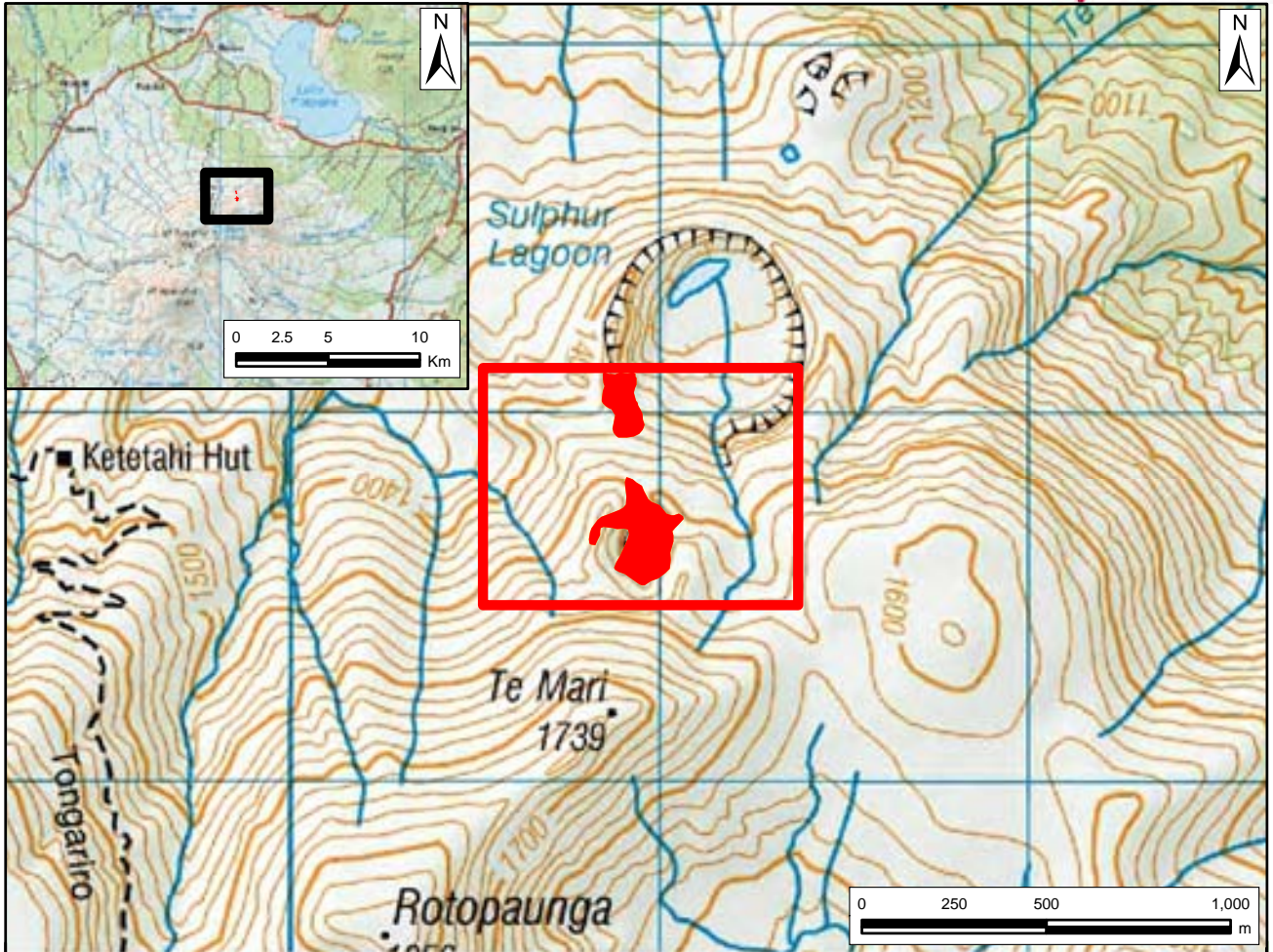


1.15 TONGARIRO GEOTHERMAL FIELD

List of Geothermal Sites

TGV01	Te Maari Craters
TGV02	Ketetahi
TGV03	Emerald Lakes
TGV04	Red Crater



TE MAARI CRATERS

Site Number: TGV01¹
Grid Reference: NZTopo50 BH35 310 683
GPS Reference: NZTM E1831000 N5668300
Local Authority: Taupo
Ecological District: Tongariro
Geothermal Field: Tongariro
Bioclimatic Zone: Subalpine
Tenure: Protected (Tongariro National Park)
Altitude: c.1,525 m
Extent of Geothermal Habitat: c.4.9 ha
Extent of Geothermal Vegetation: c.4.9 ha
Date of Field Survey: 14 June 2011

Code	Type	Landform	Extent
07.07	Lycopodiella-dominant fernland (not mapped)	Crater face	<0.1 ha
07.07.01	Lycopodiella cernua fernland Several small vents on the edge of Te Maari Crater (facing north, NZTM E1830927 N5667972) are surrounded by <i>Lycopodiella cernua</i> , low stature manuka, <i>Gleichenia dicarpa</i> , <i>Dracophyllum recurvum</i> , <i>Epacris alpina</i> and <i>Gaultheria colensoi</i> .		
28.01	Nonvegetated raw-soilfield	Crater rim, crater face	c.4.9 ha
28.01.01	Nonvegetated raw-soilfield There are scattered plants of <i>Rytidosperma setifolium</i> , <i>Celmisia spectabilis</i> subsp. <i>spectabilis</i> , <i>Gaultheria colensoi</i> , and <i>Racomitrium</i> on the scree slopes.		

Indigenous Flora: *Lycopodiella cernua* surrounds small north facing vents. In inland areas in the central North Island, this species only occurs in geothermal sites.

Fauna: New Zealand pipit were recorded during the survey. New Zealand falcon were recorded near the site by one of the authors in 2008.

Current Condition (2011 Assessment): The Te Maari Craters are in the remote experience zone of Tongariro National Park.

Threats/Modification/Vulnerability:

Invasive pest plants (2011 Assessment): None known

Human impacts (2011 Assessment): This site is c.1.5 km to the east of an internationally recognised walking track (Tongariro Alpine Crossing). It is in a remote experience zone, and is only occasionally visited by tramping parties.

¹ Previously identified as T19/20 in Wildland Consultants (2007).

Grazing (2011 Assessment): Site in National Park, not farmed. Hares present near site and may visit occasionally.

Adjoining land use (2011 Assessment): Tongariro National Park (Remote Experience Zone). Occasionally visited by trampers.

Site Change:

Recent change: Unknown. Not previously assessed.

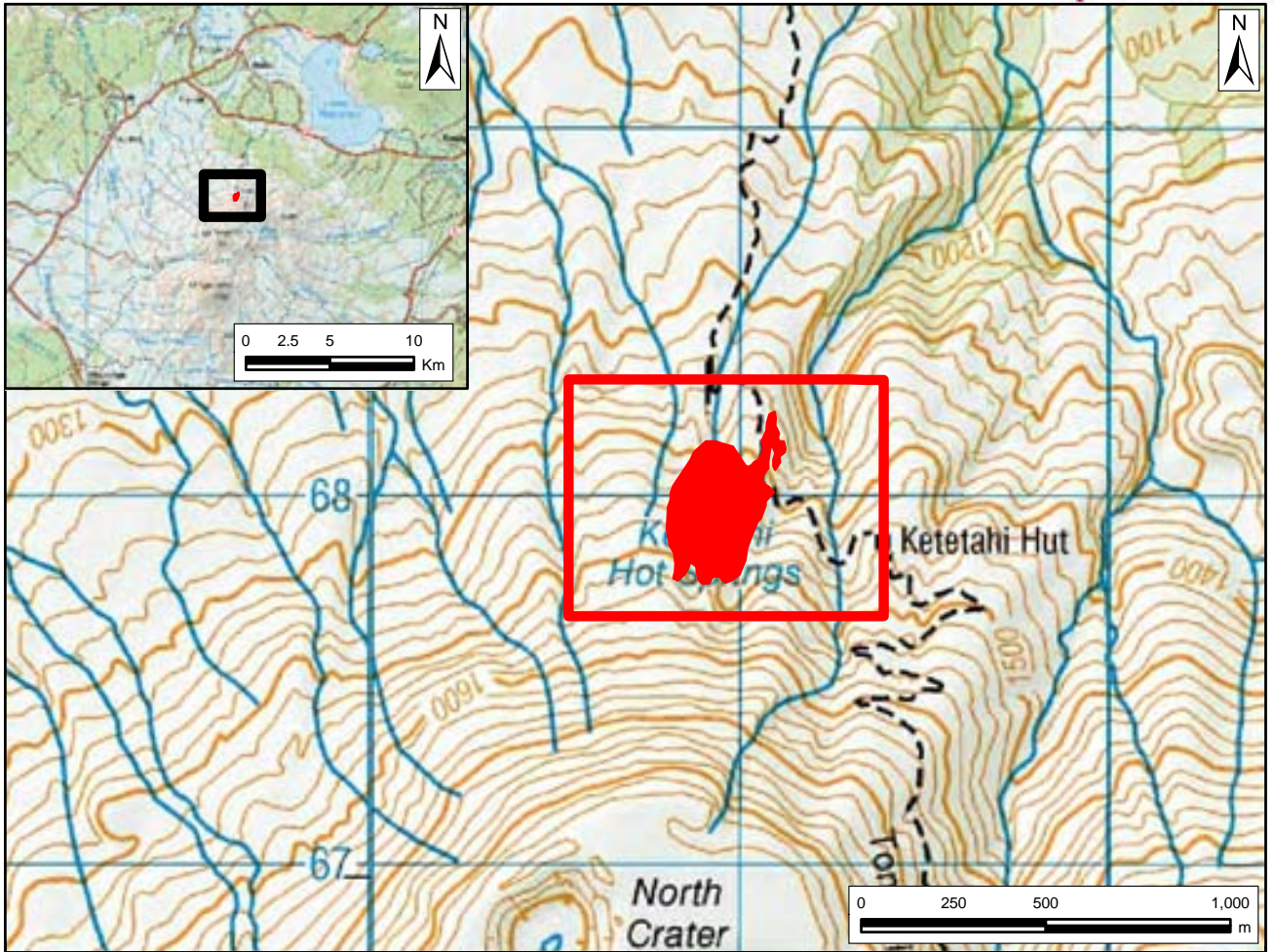
Historical: Site change is not easily identified from historical photos (Historical photos: SN 1035 Run 2569 Photos 3-6, 1957; SN 1035 Run 2570 Photos 2-4, 1957).

Management Requirements:

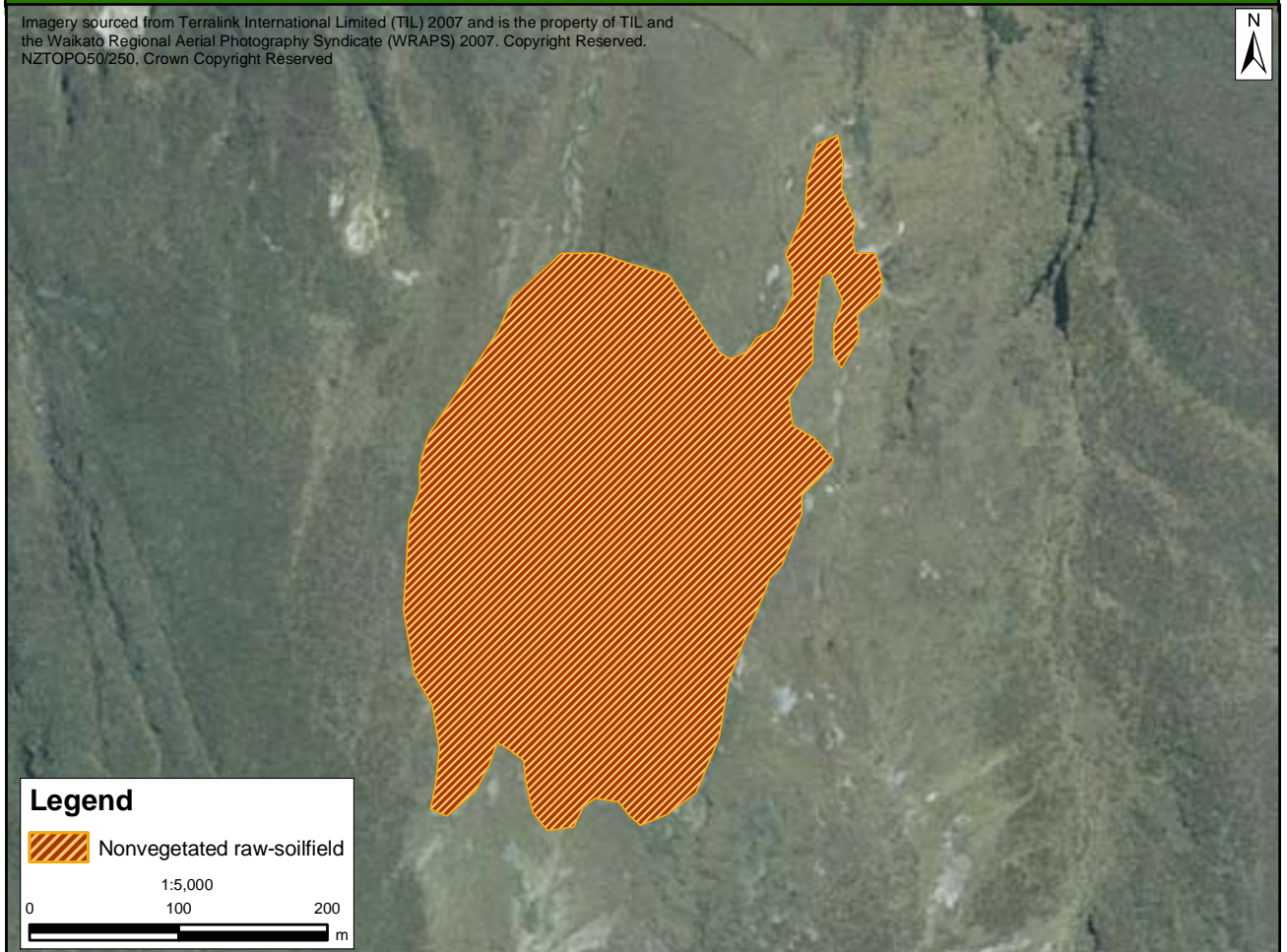
Significance Level: International (Table 1 - Criteria 1, 5, 10; Table 2 - Factor 2)

Significance Justification: Te Maari Crater is an internationally significant site because it is located within Tongariro National Park, which is a World Heritage Site. The vegetation is of relatively low diversity but it is habitat of exceptional quality, with no recorded pest plant species and few human-induced impacts.

References: Wildland Consultants 2007



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KETETAHI

Site Number: TGV02¹
Grid Reference: NZTopo50 BH35 289 680
GPS Reference: NZTM E1828935 N5667965
Local Authority: Taupo
Ecological District: Tongariro
Geothermal Field: Tongariro
Bioclimatic Zone: Subalpine
Tenure: Unprotected private land
Altitude: c. 1460 m
Extent of Geothermal Habitat: c. 8.2 ha
Extent of Geothermal Vegetation: c. 8.2 ha
Date of Field Survey: No field survey undertaken. Mapping is based on aerial photograph and descriptions in Given (1995 & 1996). There are likely to be additional thermal sites nearby.

Code	Type	Landform	Extent
28.01	Nonvegetated raw-soilfield	Hillslope	c. 8.2 ha
28.01.01	Nonvegetated raw-soilfield Silica crusts and fumaroles.		

Indigenous Flora: Unknown. Not assessed in this survey.

Fauna: Unknown. No survey undertaken.

Current Condition (2007 Assessment): Exceptional quality, few human impacts.

**Threats/Modification/
Vulnerability:**

Invasive pest plants: No significant pest plants known.

Human impacts: About twenty years ago a walking track passed through this site and it was a popular bathing spot. Public access is now restricted, the walking track has been relocated, and the site is now rarely visited by people. As a consequence, it is likely that there are few human impacts.

Grazing: Not grazed. Surrounded by Tongariro National Park. Hares and deer are likely to be present on margins on occasion.

Adjoining land use (2011 Assessment): Tongariro National Park.

¹ Previously identified as T19/15 in Wildland Consultants (2007).

Site Change:

Recent change: Unknown. Probably no significant change as the site is rarely visited. Natural changes to surface geothermal manifestations are likely.

Historical: Apart from fluctuations in surface geothermal activity, little change to this site is likely. Site change is not easily identified from historical photos (Historical; photos: SN 1035 Run 2569 Photos 3-6, 1957; SN 1035 Run 2570 Photos 2-4, 1957).

Management Requirements: Unknown.

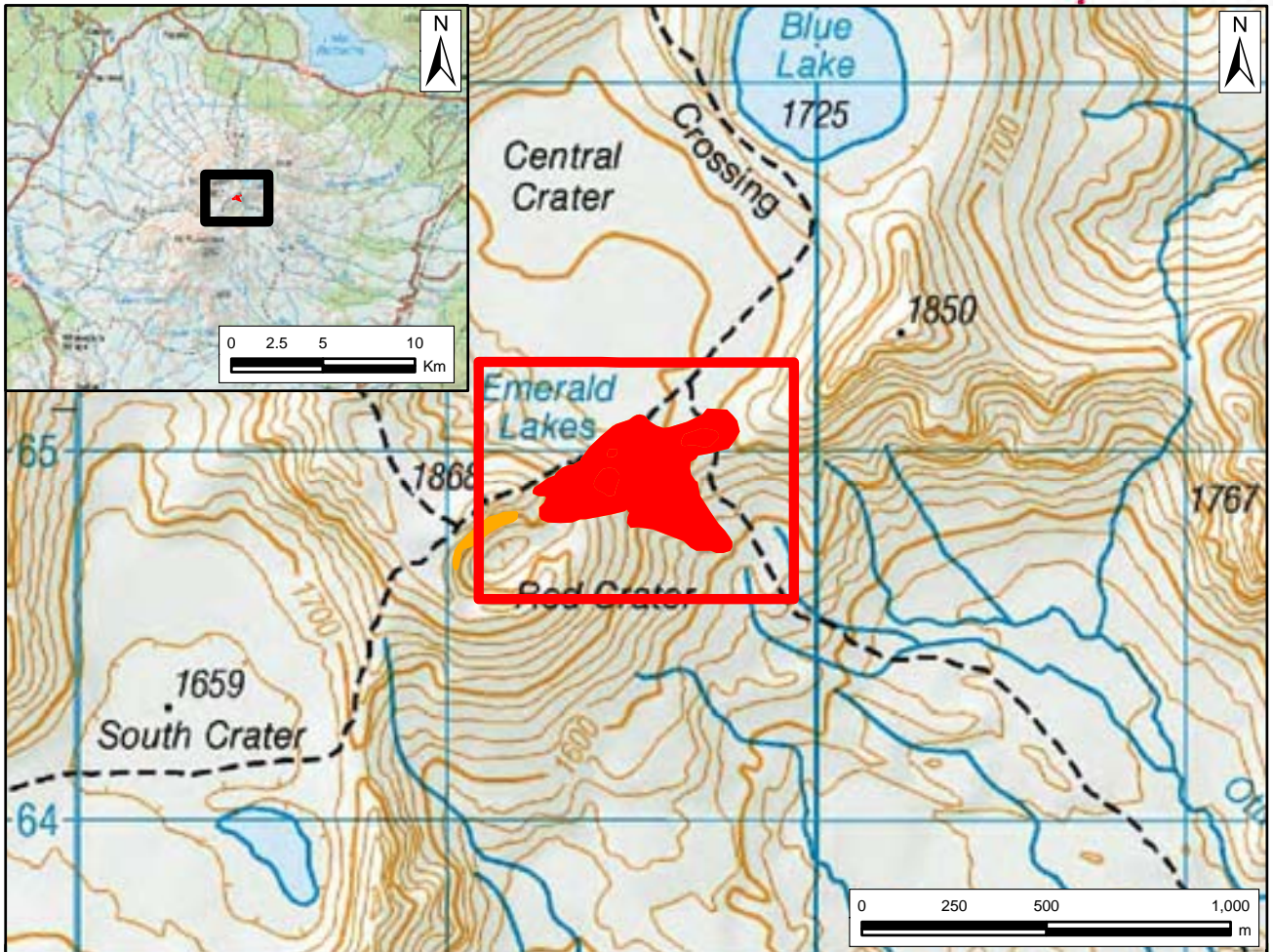
Significance Level: National (Table 1 - Criteria 5, 9, 10; Table 2 - Factor 8)

Significance Justification: Ketetahi Hot Springs is known to be a very good quality example of a nationally uncommon habitat type.

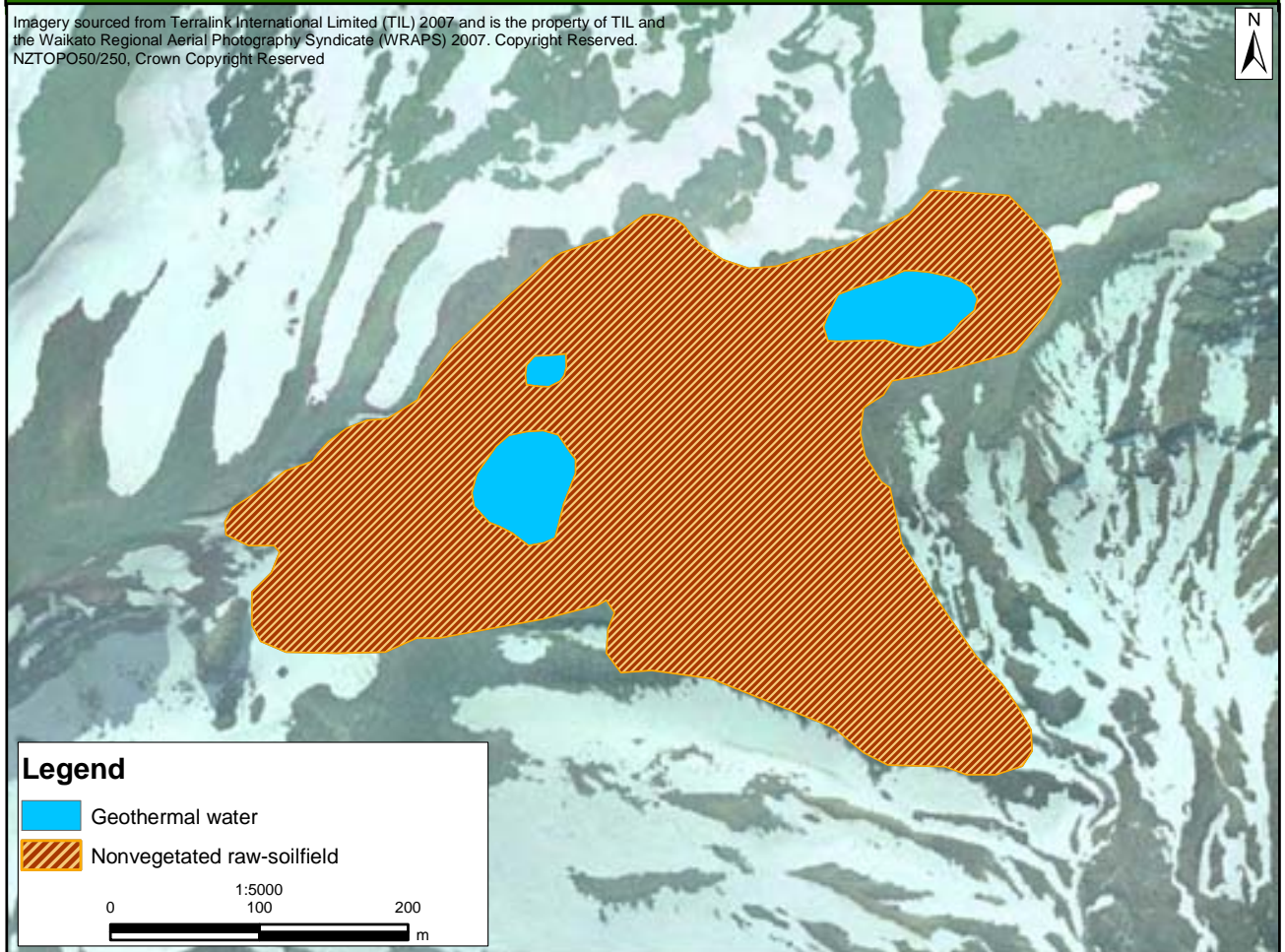
Notes: This site was described by Given 1995 as being highly unusual in having no vegetation on the hot ground area, except for algal crusts on siliceous sites near fumaroles. Given (1995) states that it is an unusual site not replicated elsewhere in the region, and highly unusual even in a botanical sense on account of its lack of any flowering plants, mosses or lichens.

Given (1996) gave this site a botanical ranking of 'A' - the highest possible ranking.

References: Given 1995 & 1996.



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EMERALD LAKES

Site Number: TGV03¹
Grid Reference: NZTopo50 BH35 297 651
GPS Reference: NZTM E1829672 N5665082
Local Authority: Taupo
Ecological District: Tongariro
Geothermal Field: Tongariro
Bioclimatic Zone: Subalpine
Tenure: Protected (Tongariro National Park)
Altitude: c.1700 m
Extent of Geothermal Habitat: c.12.1 ha
Extent of Geothermal Vegetation: c.11.3 ha
Date of Field Survey: 14 June 2011

Code	Type	Landform	Extent
22.01	Geothermal water	Crater lakes	c.0.8 ha
22.01.01	Geothermal water Three geothermally influenced lakelets are included in this site. <i>Juncus bolbosus</i> is present in the shallow margins. While the water temperature is cold, there is a strong geothermal influence surrounding the lakes. The lakes are up to 4.5 m deep and have a pH of 3-5; their colour is caused by minerals, mainly fumarolic sulphur, entering the water forming polysulphide ions (Williams 2001).		
28.01	Nonvegetated raw-soilfield	Crater walls	c.11.3 ha
28.01.01	Nonvegetated raw-soilfield Occasional patches of <i>Rytidosperma setifolium</i> occur amongst otherwise unvegetated screefield.		

Indigenous Flora: No 'Threatened' or 'At Risk' plant species are known to occur at this site.

Fauna: No 'Threatened' or 'At Risk' fauna species are known to use this site.

Current Condition (2011 Assessment): While not botanically diverse, the lakes and surrounding geothermal habitat is of exceptional ecological quality, of high scientific value and high ecological interest.

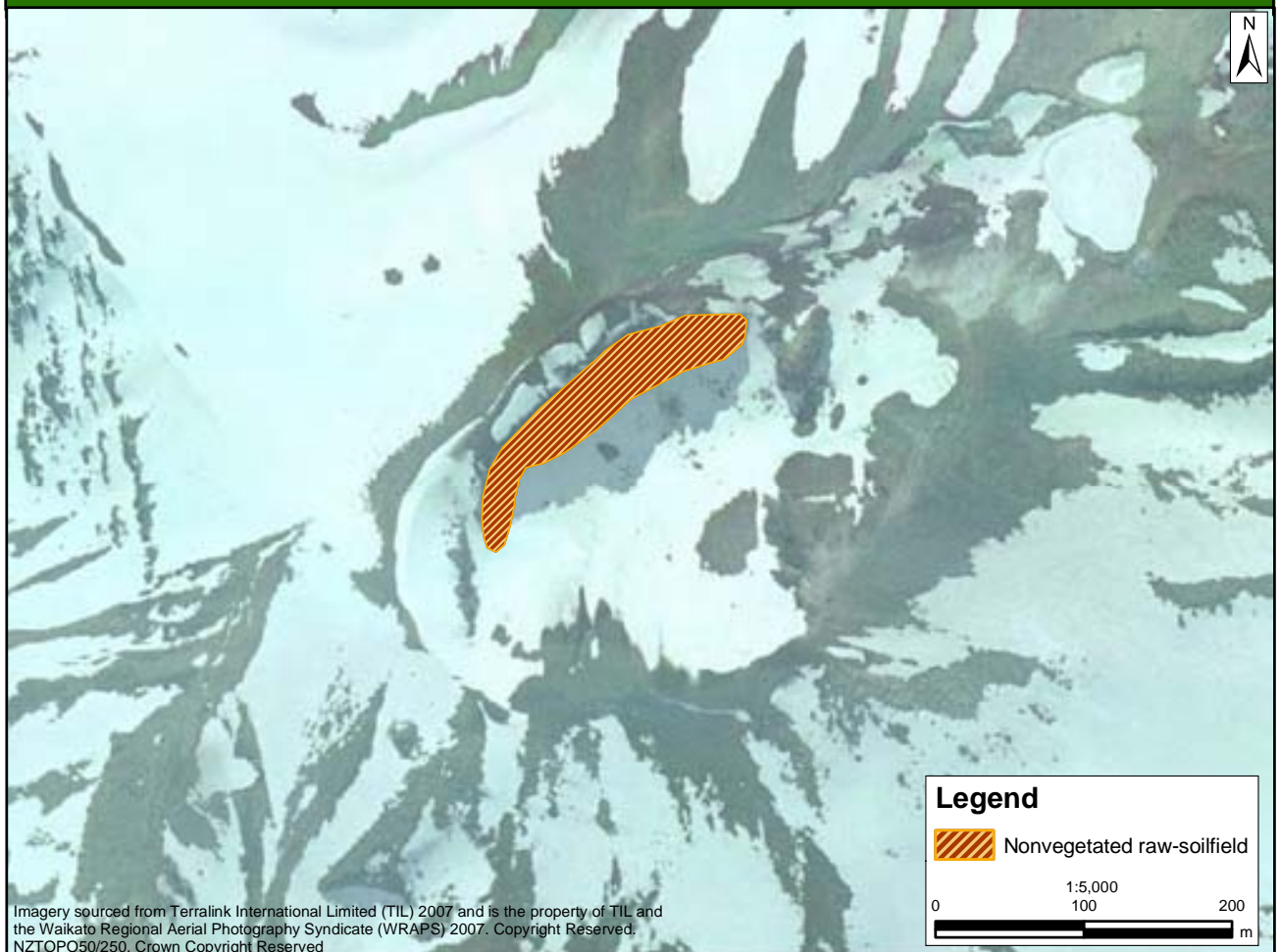
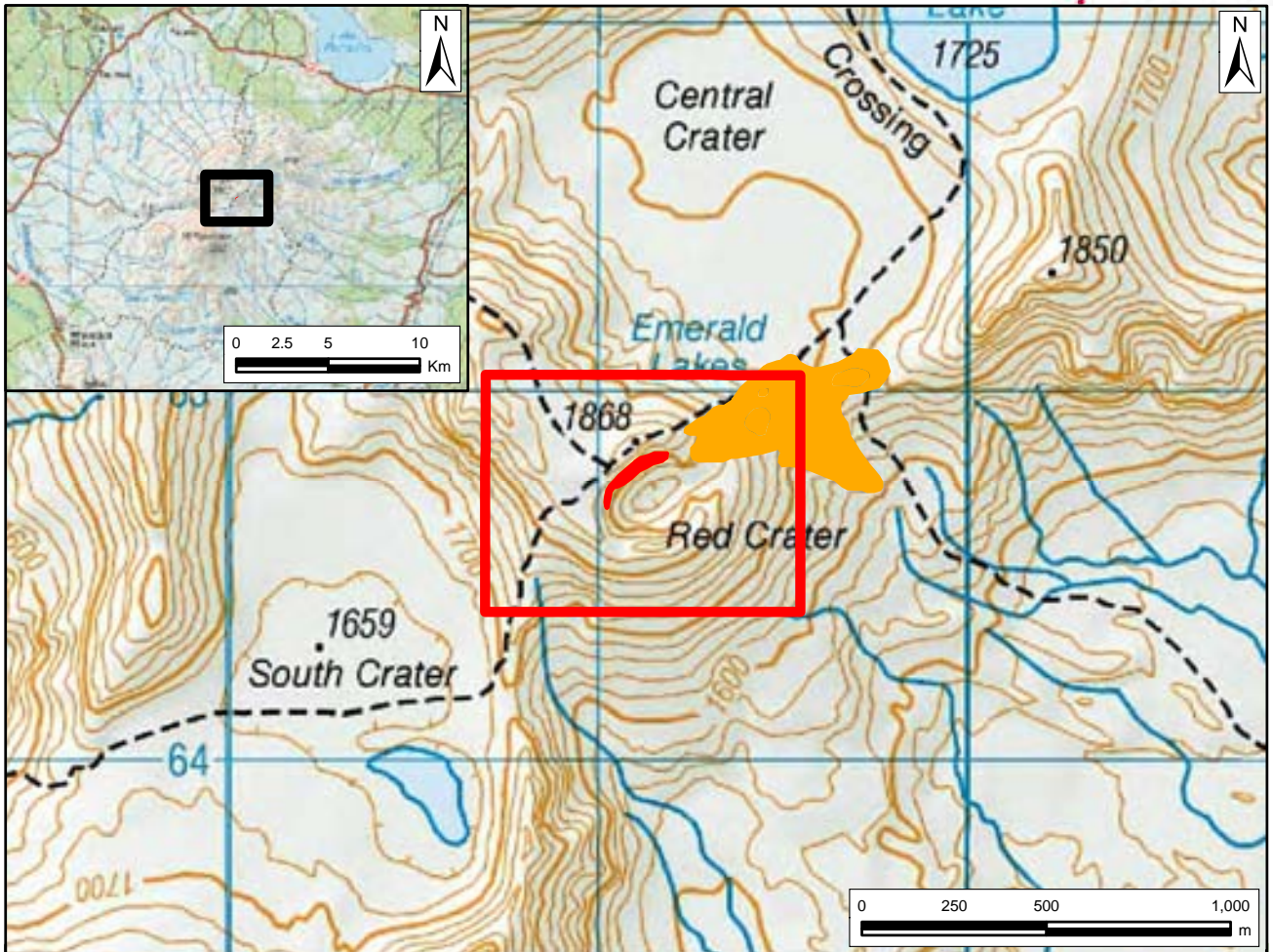
**Threats/Modification/
Vulnerability:**

Invasive pest plants (2011 Assessment): The exotic rush *Juncus bolbosus* is present in at least the lower Emerald Lake.

Human impacts (2011 Assessment): An internationally renowned walking track (Tongariro Alpine Crossing) passes within close proximity to the Emerald Lakes, and track users have access to the site. Occasional trampling of features and vegetation are the main human impacts.

¹ Previously identified as T19/18 in Wildland Consultants (2007).

<i>Grazing (2011 Assessment):</i>	Grazing of domestic stock is not an issue at the Emerald Lakes (National Park and the site is not farmed). Introduced mammal impacts on this site are likely to be minor.
<i>Adjoining land use (2011 Assessment):</i>	Tongariro National Park.
Site Change:	
<i>Recent change:</i>	No known significant ecological change is known to have occurred at this site in the last ten years.
<i>Historical:</i>	Site change is not easily identified from historical photos (Historical photos: SN 1035 Run 2569 Photos 3-6, 1957; SN 1035 Run 2570 Photos 2-4, 1957). The site is under snow in these historical photographs. The authors know of no major change at this site in the last 50 years.
Management Requirements:	None noted.
Significance Level:	International (Table 1 - Criteria 1, 5, 10; Table 2 - Factor 2)
Significance Justification:	Emerald Lakes is an internationally significant site because it is located within Tongariro National Park, which is a World Heritage Site.
Notes:	These lakes occur downslope of Red Crater. They comprise three explosion pits that have formed in the last 1,800 years (Williams 2001).
References:	Wildland Consultants 2007a; Williams 2001.



RED CRATER

Site Number: TGV04¹
Grid Reference: NZTopo50 BH35 292 648
GPS Reference: NZTM E1829200 N5664800
Local Authority: Taupo
Ecological District: Tongariro
Geothermal Field: Tongariro
Bioclimatic Zone: Subalpine - Alpine
Tenure: Protected (Tongariro National Park)
Altitude: c. 1860 m
Extent of Geothermal Habitat: c.0.7 ha
Extent of Geothermal Vegetation: c.0.7 ha
Date of Field Survey: 14 June 2011

Code	Type	Landform	Extent
28.01	Nonvegetated raw-soilfield	Crater and crater walls	c.0.7 ha
28.01.01	Nonvegetated raw-soilfield Bare heated scoria and soils. Fumarole present. Site viewed from the distance.		

Indigenous Flora: No „Threatened’ or „At Risk’ plant species are present.

Fauna: No „Threatened’ or „At Risk’ fauna species are present.

Current Condition (2011 Assessment): The active Red Crater is located on the slopes of Mount Tongariro.

**Threats/Modification/
Vulnerability:**

Invasive pest plants (2011 Assessment): None known.

Human impacts (2011 Assessment): Although near the Tongariro Alpine Crossing, the site is rarely visited and human impacts are negligible.

Grazing (2011 Assessment): Grazing is not an issue in the Crater, Tongariro National Park.

Adjoining land use (2011 Assessment): Tongariro National Park.

¹ Previously identified as T19/18 in Wildland Consultants (2007).

Site Change:

Recent change: Unknown. Probably little change (see historical change below). The site appears to have changed little in the last 20 years (Chris Bycroft pers. comm. 2011).

Historical: Site change is not easily identified from historical photos (Historical photos: SN 1035 Run 2569 Photos 3-6, 1957; SN 1035 Run 2570 Photos 2-4, 1957). Geothermal activity is likely to change through natural variation over time, but human impacts are likely to be negligible.

Management Requirements: None noted.

Significance Level: International (Table 1 - Criteria 1, 5, 10; Table 2 - Factor 2)

Significance Justification: Red Crater is an internationally significant site because it is located within Tongariro National Park, which is a World Heritage Site.