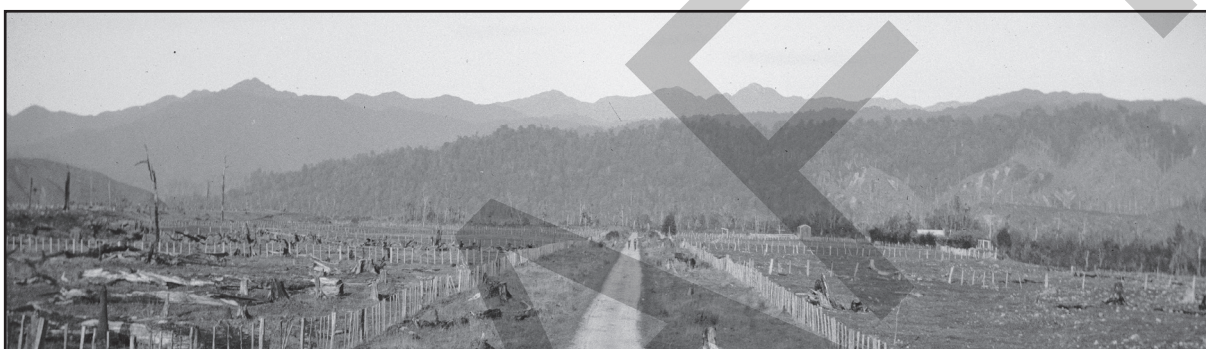




**An Analysis of Archaeological Potential Relating to Alignments,
Interchanges and Local Roads Within the S6 and N4 Route
Options for the North of Ōtaki to North of Levin Expressway**



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INTRODUCTION

Since 2013 inSite Archaeology has been part of a team of technical experts providing research and advice to Waka Kotahi in regards to options for a new expressway between Taylor’s Road and north of Levin: part of the Ōtaki to North of Levin (O2NL) Project. Research into the archaeological risks associated with the emerging preferred alignments was undertaken in four stages related to proposed changes to the Project scope between 2013 and 2017, as outlined below in the order of progression:

Daniel Parker (2013), *An Assessment of the Archaeological Risks Associated with Proposed Upgrades to the Connection of SH1 and SH57: Manakau to Levin*, research report prepared for MWH New Zealand Limited

Daniel Parker (2015), *An Assessment of the Archaeological Risks Associated with Proposed Upgrades to the Connection of SH1 and SH57: Otaki to Levin*, research report prepared for Waka Kotahi

Daniel Parker (2016), *A Brief Overview of the Archaeological Risks Identified Within the Levin Northern Connection Options Area*, research note prepared for Waka Kotahi

Daniel Parker (2017), *An Overview of Archaeological Risks Identified Within the Combined Routes, North of Otaki to North of Levin, Options Area*, research report prepared for Waka Kotahi

Daniel Parker (2017), *An Analysis of the Archaeological Risks for Route Options Within the North of Otaki to North of Levin Options Area*, research report prepared for Waka Kotahi

Having evaluated the accumulated research products and public feedback, in late 2018 Waka Kotahi (Peet, Povall, Ranatunga, and Allan, 2018) presented an indicative business case (IBC) for the Project that identified a preferred route option (Figure 1). The IBC also outlined the next steps to progress the Project to a detailed business case (DBC) and it is further archaeological research in support of the DBC that is presented here; specifically, for the purpose of a multi-criteria analysis (MCA) process to identify an expressway alignment within the approved 300 m wide route option, interchange locations and form, and local road connections. The report assesses the potential adverse effects of alternative expressway alignments on archaeological sites and their values within each of the 10 zones defined along the preferred route option (Figure 1).

Waka Kotahi recognises that historic heritage, which includes archaeological sites, is a non-renewable resource that, “constitute[s] a unique and invaluable record which contributes to our understanding of the history and cultures of New Zealand” and that the “Avoidance of development impacts on, and preservation in situ of, historic heritage places are always the preferred options” (NZTA, 2015). This report evaluates the potential adverse effects and

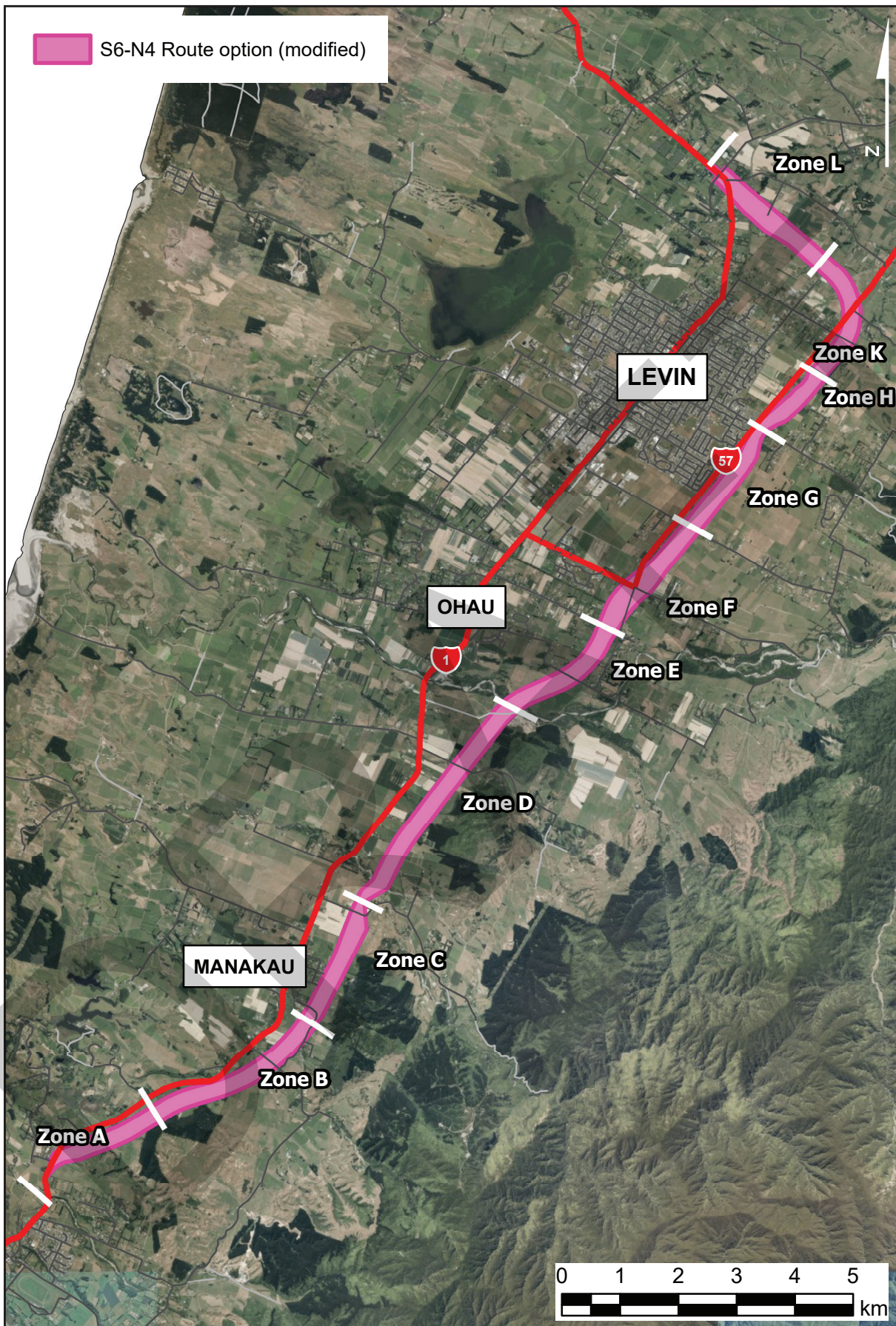


Figure 1: Existing State Highway network and the proposed new route, options S6-N4 combined, for SH 1 recommended by the IBC. The route is subdivided into 10 zones and each alignment option within the zones is assessed and scored separately for their potential adverse effects on archaeological sites.

benefits of the emerging preferred alignments, interchange and local road options prepared by Stantec NZ as it relates to archaeology and heritage along the S6 and N4 route options recommended in the IBC. This information was presented to Waka Kotahi and the Project team at two MCA workshops on the 25th of May and 3rd of June 2020.

This report is not a full assessment of environmental effects (AEE) for the purposes of a Resource Management Act (RMA) or Heritage New Zealand Pouhere Taonga Act (HNZPTA) proceeding, more detailed documentation suitable for these purposes will be prepared as the Project progresses. Please also note that while some built heritage is evaluated in this report from an archaeological values perspective, a second built heritage report has also been prepared that evaluates built heritage from an architectural values perspective. Finally, this report also evaluates places of both archaeological and cultural value to iwi and though there are some cross-over interests this report does not speak for these iwi values. Separate cultural values assessments have been prepared by iwi that explicitly address these matters.

RESEARCH METHODOLOGY

Prior route options had been evaluated and scored on the basis of potential effects to registered Historic Places, recorded archaeological sites, known archaeological sites and unknown archaeological sites¹. Depending on the number of route options to be assessed and their geographic spread the evaluation and scoring at each stage of the Project was conducted on a site-by-site (fewer options, tighter spread) or probabilistic (greater options, broader spread) basis. In particular, the most recent research in support of the IBC took a probabilistic approach to the assessment of archaeological potential for the 18 route options that were distributed across the Horowhenua and upper Kapiti districts. However, now that a recommended route has been selected and the alignment, interchange and local road options that are assessed in this report are constrained to a much tighter area, it is appropriate to return to a site-by-site analysis.

The methodology applied in this report is divided into four stages: data definition, data collection, values/effects assessment, and scoring.

¹ Registered Historic Places, predominantly historic buildings but also including archaeological sites, are “significant and valued historical and cultural heritage places” recognised and listed by Heritage New Zealand. The New Zealand Archaeological Association maintains an online database of archaeological sites that includes basic site details and location information. While the Association database contains a substantial number of sites, it is not a complete record and there are many known sites that are not included. For this reason, sites listed in the Association database are referred to as being ‘recorded sites’, while sites not included in the database, but identified through other sources, are ‘known sites’. Where there is no direct evidence for archaeological sites, but their presence is strongly inferred – on the basis of patterns in the distribution of known and recorded sites – reference may be made to potential ‘unknown’ sites.

Data definition

Within the definitions of the RMA, historic heritage includes:

- i. Historic sites, structures, places, and areas; and
- ii. Archaeological sites; and
- iii. Sites of significance to Māori, including wāhi tapu;
- iv. Surroundings associated with the natural and physical resources

Although there is a heritage component to all of the above, a number of these elements of heritage are more directly addressed by other technical experts for the Project: i.e., natural and physical resources, Adam Forbes; structures, Ian Bowman; and sites of significance to Māori, by local iwi. Of the remaining elements the focus for this report is on the identification and evaluation of archaeological sites, though the definition of an archaeological site that is used here is sufficiently broad that it includes some cross-over into a number of the other elements of heritage that will be addressed by other technical experts. Where there is some cross-over, it is important to remember that this report is approaching these aspects from an explicitly archaeological perspective and does not speak for the values and interests that may be held by other parties.

The HNZPTA defines an archaeological site as being:

- a) Any place in New Zealand, including any building or structure (or part of a building or structure), that –
 - i. Was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and
 - ii. Provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and
- b) Includes a site for which a declaration is made under section 43(1)

While relatively simple and straightforward, for planning and management at this stage of the Project this definition requires a level of knowledge of and about sites that is beyond our current capacity. In particular, there are number of places or areas associated with historic occupation – predominantly by Māori – that have the potential to be archaeological sites that should also be considered as part of this MCA process. Therefore, for the purposes of this MCA exercise, the threshold for establishing an ‘association with human activity’ is lowered to include any place with a historic Māori-name association and any unnamed features of the natural environment that are generally regarded as having been focal points for past human activity. In doing so, the potential range of site types is expanded to include natural landscape features such as dunes, hills, lagoons, lakes, mountains, rivers and streams. There are a range of sources, for both the

Horowhenua and wider New Zealand, which indicate that many of these places have, or are likely to have, an archaeological component that is as yet unrecognised due to issues of surface visibility or a limited history of landscape study.

Data collection

Applying the expanded definition above, the majority of the data collection was completed during earlier phases of the Project and includes a comprehensive coverage of historic survey plans, close reading of selected Māori Land Court minute books, historic newspapers, published books and pamphlets, and a more limited series of site visits, land owner interviews and iwi consultation. Further research at this time has expanded the coverage of historic survey plans to almost 100% and greatly extended the research into written sources. A comprehensive historic aerial photographic coverage from 1939 and 1942 was also acquired for the entire study area.

Historic survey plans were georeferenced into the national coordinate system (NZTM) and the relevant data such as historic settlements, named places, and buildings were digitised. Where suitable, cadastral or topographic data from the Land Information Data Service was used to improve the accuracy of the captured data, particularly in regards to the historic cadastral parcel network that was also digitised. Aerial photographs were processed into a georeferenced orthophotograph and relevant features digitised. The primary benefit of the aerial photography was the identification of known or potential historic buildings that were standing in 1939/42 that were no longer present in the most recent aerial photography coverages. In terms of data quality, there is greater certainty about the relevant age of data captured from the historic plans than for the historic aerial photography, but there is a much higher degree of spatial accuracy and precision for the aerial photography than there is for the historic plans.

Selected readings from Māori Land Court minute books for cases pertaining to the Horowhenua, Manawatu-Kukutauaki 4 and 7D, Muhunua, Ohau, Paruauku and Pukehou blocks were undertaken and possible archaeological sites were mapped as accurately as the text and available spatial data allowed: the same strategy applied to the study of published books and pamphlets regarding local histories, school and church centenaries etc. A range of personal and place names identified from historic maps and written sources were also used as keywords to search the National Library's database of digitised historic papers: more than 5,000 articles, briefs and advertisements regarding subjects such as Manakau, Kuku, Ohau, Muhunua, Arapaepae and Heatherlea, amongst others, have been reviewed just for this report alone and many more were reviewed during earlier phases.

A small number of site visits to houses with historic values were undertaken at the request of land owners in connection with the 2017 MCA process and further information was received from land owners and the general public during the public consultation phase leading up to the release of the IBC. Preliminary conversations with iwi representatives for Muaūpoko and Ngāti Raukawa occurred during earlier phases but comprehensive discussions regarding shared aspects of cultural and archaeological value have not been completed at this time.

A sample of the collated site data is presented in Table 1 and the full data set is included as

Table 1: Sample of site information and alignment data. A full copy of this data table is included as Appendix 1.

Site #	Site Name	Site Type	Parcel	SITE DATA			A	B	C			
				Description	Map Source	Photo Source				Text Source	Pres. Comm	
14	Pukehou	Geology and fauna			A prominent hill that is a general location marker for many events and sites that are only tentatively located. The hill itself was an important site for bird snaring/hunting, but burials and pa sites are also associated with this location.	ML 367, SO 11039				X	X	
15	[house]	Buildings and structures	Part Lot 28 DP 415	Possible pre-1900 house tentatively identified on the basis of the building footprint, established trees and visual appearance (Google Streetview). The stream of the paper-mulberry (<i>Broussonetia papyrifera</i>), the paper-mulberry (laua) was cultivated for the fabric that was derived from its bark.		SN 181		X				X
16	Maiaite stream	Geology and fauna	Part Lot 28 DP 415, Lot 1 DP 54757 Lot 3 DP 369031, Lot 1 DP 394488, Lot 2 DP 369031, Lot 1 DP 54757, Lot 2 DP 394488, Lot 3 DP 394488, Lot 20 DP 394488, Lot 21 DP 394488, Lot 19 DP 394488	The name of this stream is derived from the name said to have been applied by Te Rauaparaha to the general area. Possible pre-1900 house tentatively identified on the basis of the building footprint and established gardens.	SO 11900, S 11574, SO 12698			X				X
17	Manakau stream	Geology and fauna				SO 11900, SO 12698		X				X
18	[house]	Buildings and structures	Lot 1 DP 369031			SN 181		X				X
19	South Manakau Road	Railways, roads and tracks				SO 12698, SO 12699, SO 13760		X				X
20	Puketawhiki/Te Tahawhakarungamangahua hill	Geology and fauna	Lot 2 DP 349423, Lot 1 DP 54937, Lot 4 DP 408558, Lot 3 DP 72857, Lot 2 DP 398440, Lot 1 DP 22763, Lot 1 DP 405870	The 'kohūhu (<i>Protoporum tenuifolium</i>) hill' or 'the hill above the Huiā stream'.	SO 11038			X				X
21	Puna (springs)	Geology and fauna	Lot 1 DP 69689, Lot 2 DP 396584 Part Lot 3 DP 415, Lot 2 DP 415, Lot 2 DP 469288, Lot 2 DP 396584, Lot 3 DP 472237, Lot 3 DP 409803, Lot 1 DP 69689, Lot 4 DP 472237, Lot 1 DP 396584, Lot 1 DP 53561, Lot 1 DP 405870	There are a small number of springs located between Puketawhiki/Te Tahawhakarungamangahua and the Harawera Ridge that are of cultural significance and may also be of archaeological significance.	ML 888, Wellington 2013			X				X
22	Mangahua stream	Geology and fauna	405870	A stream where the huiā bird was plentiful.				X				X
23	R. Whitley house and 1st Manakau School	Buildings and structures	Lot 1 DP 61323	In 1867 Robert Whitley built this house for his family and volunteered its temporary use as the first school at Manakau.		SN 181		X				X
24	North Manakau Road	Railways, roads and tracks				SO 12698		X				X

Appendix 1. Each site record includes:

- i. A site number that is referenced in the labels for all sites shown in the location plans included in Appendix 1.
- ii. A site name, where a site does not have a proper name a generic name is given in square brackets [].
- iii. All sites are grouped into one of five broad class-types: buildings and structures, geology and fauna, native reserves, occupied clearings, and railways, roads and tracks.
- iv. General site locations are indicated in plans included in Appendix 1 with details regarding specific land parcels included in the tabulated data. Reference to a given land parcel does NOT in all cases indicate that an archaeological site (within the strict legal definition of the HNZPTA) is present within its bounds or that the entire parcel is of archaeological interest. In some instances the list of parcels is merely an indicator of land that is considered to have a non-negligible archaeological potential (i.e., see above discussion of named landscape features).
- v. A brief description for most sites is provided.
- vi. The sources of information are listed as either map, photo, text or personal communication sources.
- vii. A checkmark is placed against each alignment zone the site appears in.

Information provided in the site descriptions is not meant to provide a comprehensive discussion of the site and its background history, but is intended to provide a brief overview of the most pertinent site-history information.

Due to restrictions associated with the COVID-19 lock-down there are a small number of key data sources that have not been reviewed at this time. In particular, two early cadastral survey plans, 19th century voter registration rolls and some local historical publications are not currently accessible. These documents will be reviewed as social distancing restrictions are lifted and their respective holding institutions make them available. Additionally, at present, land access for field surveys and geophysical investigation have not been arranged and these are important methods for the identification of archaeological sites. The identification of new sites and improved spatial information about existing sites is expected as land access is negotiated by Waka Kotahi and support for field investigation becomes available.

Values and effects assessments - Alignments

Due to the more specific design information available, route alignments were assessed differently to interchanges and local roads. In order to arrive at an overall score for the route alignments

a sub-assessment was developed that evaluated the indicative archaeological values of the identified sites, as well as the archaeological potential for adverse effects and the expected degree of effect for each of the alignments.

The RMA is the primary legislative mechanism for the recognition and protection of historic heritage which it defines as “those natural and physical resources that contribute to an understanding and appreciation of New Zealand’s history and cultures derived from any of the following qualities: archaeological, architectural, cultural, historic, scientific, and technological” (RMA, 1991). The HNZPTA similarly promotes “the identification, protection, preservation and conservation of historical and cultural heritage” but also provides a legislative mechanism, via an authority process, for the management of the modification or destruction of archaeological sites. Under the authority process Heritage New Zealand (HNZ) requires applicants to address effects to six archaeological values: condition, rarity or uniqueness, contextual value, information potential, amenity value, and cultural associations. HNZ also recognises the qualities identified in the RMA, but these may be optionally addressed as additional values. Given that the dominant heritage effects of the Project are likely to be associated with the destruction, damage or modification of archaeological sites, HNZ’s archaeological values were selected as the most appropriate framework for assessing the heritage values of the sites in question. An overview of HNZ’s guidance regarding the assessment of archaeological values is provided in Appendix 2.

While the assessment of archaeological values that is presented here is only a preliminary indicative review, not all of the values recognised by HNZ can be addressed at the present time. In particular, it is not possible to fairly evaluate condition across all sites, therefore condition is not included in the assessment. Additional architectural, cultural (i.e., iwi) and historic values are also relevant to sites that may be affected by the Project, but only the historic values are incorporated here: the architectural and cultural values will be addressed by other experts within the Project team.

For each site the six associated values – rarity or uniqueness, contextual value, information potential, amenity value, cultural association, and historic – were assessed as being of either low, medium or high value and scored on a 1 to 3 scale (Table 2, Appendix 3). The sum of these values is recognised as the total heritage value; adverse effects to sites with higher total heritage values are likely to have more significant consequences and effort should be made to avoid or minimise effects to these sites. Where avoidance is not possible a higher degree of mitigation is likely to be required for higher value sites as opposed to lower value sites.

The archaeological potential for adverse effects is evaluated as a combined measure of the quality of a site’s spatial information and the possibility that the aforementioned archaeological values will be affected. Archaeological potential increases as function of the quality of the spatial information available and the certainty that archaeological values, as defined in the HNZPTA, will be affected and is scored according the decision matrix shown in Table 3. The following examples are provided to illustrate this decision-making process:

- The Mangahuia stream is a named place that indicates an association with the huia bird that was prized by Māori (and later on by Europeans)

Table 2: Sample of indicative site values data following the values assessment scheme outlined in HNZ's guidelines for assessment. A full copy of this data table is included as Appendix 3. An overview of HNZ's guidance regarding the assessment of archaeological values is provided in Appendix 3.

Indicative Archaeological Values (Heritage NZ)										
Site #	Site Name	Rarity/Uniqueness	Information potential	Contextual value	Amenity value	Cultural associations	Historic	TOTAL VALUE	Zone	
14	Pukehou	2	2	3	3	3	2	15	A/B	
15	[house]	1	1	1	2	1	0	6	B	
16	Waiaute stream	1	2	2	2	2	1	10	B	
17	Manakau stream	1	1	2	2	2	0	8	B	
18	[house]	1	1	1	2	1	0	6	B	
19	South Manakau Road	1	1	1	1	1	0	5	B	
20	Puketawhiwhi/Te Tahawhakarungamangahua hill	1	1	2	2	2	0	8	B/C	
21	Puna (springs)	1	1	2	2	2	1	9	C	
22	Mangahua stream	1	1	2	2	2	0	8	C	
23	R. Whiley house and 1st Manakau School	2	1	2	3	3	2	13	C	
24	North Manakau Road	1	1	1	1	1	0	5	C/D	

Table 3: Decision matrix for determining the archaeological potential of sites. Archaeological potential is a combined measure of spatial quality and the potential for archaeological values to be affected.

ARCHAEOLOGICAL POTENTIAL			
Spatial Quality	Will Archaeological Values be Affected?		
	Possibly	High Probability	Known
Nil / Estimate	1	2	3
Location	2	3	4
Location + Extent	3	4	5

for its fine tail-feathers and other qualities. Archaeological sites have been documented on the banks of or in close proximity to rivers and streams passing through the lowland forests and given the streams name-association it is possible that archaeological sites could be found in its vicinity. The location of the stream is known but the location and extent of any archaeological features that may be present are unknown; the archaeological potential along this stream is a 2.

- A house on the North Manakau Road is visible in recent and historic aerial photography and is also partially visible on Google Streetview. The footprint and frontage of the house indicate there is a high probability that the house was built before 1900. The location and extent of the house are accurately documented from aerial photography; the archaeological potential is a 4.
- The house of Robert Whiley was built in 1887 and was also volunteered for use as the first school building at Manakau in the same year. The location and extent of this house on North Manakau Road is known from aerial photography and its archaeological qualities are known; the archaeological potential is a 5.

The potential effects of an alignment on any given site is scored on a 5-point scale from 1 to 5 and represents an assessment of negligible, minor, low, moderate or significant adverse effect, respectively. The level of predicted adverse effect depends on the archaeological values of the site and the nature and extent of the adverse effect. The scoring of effects does not include an allowance for specific mitigation actions on a site-by-site basis, as there are a number of sites for which further information would be needed in order to do so in a fair an even-handed manner. However, a broad consideration of the ability to mitigate effects is incorporated into the MCA discussion and will be developed in further detail at later stages of the Project.

Returning to the three examples above, examples of the assessment of predicted effect are:

- Potential archaeological features along the Mangahuia stream are likely to be associated with inland hunting trips or short seasonal occupation

and are likely to include evidence for small fires, midden and temporary shelters: these are relatively common types of site features and are of generally low archaeological value. As there is only a possibility that low value archaeological features will be damaged or destroyed by an alignment, the overall adverse effect is expected to be no more than minor (2).

- A potential historic house on North Manakau Road will not experience direct physical effects from any of the alignments, but amenity values are likely to be affected by the increased noise and changes to viewsheds. The increase is not expected to make on-going occupation of the house untenable, so the overall adverse effect is expected to be no more than low (3).
- Robert Whiley's house on North Manakau Road is a known archaeological site with high archaeological values and cultural links to the wider community. The alignment option passing over the current house location would have a significant (5) adverse effect, while alignments adjacent to the house are likely to be sufficiently close that the disruption to the amenity value will be of at least moderate adverse effect (4).

Archaeological potential and the predicted effect are only scored for sites that are expected to be affected by an option (Table 4, Appendix 3). Within each zone an alignment may not affect all of the identified archaeological sites and only the sites that will be adversely affected are scored for potential and effect. For some sites there may be a beneficial effect gained by the selection of a particular option – an alignment that would result in the highway being located further away from a heritage building, for example – but beneficial outcomes are not accounted for in the effects scoring due to the difficulty of determining the point at which any gained benefit becomes irrelevant. The alignment sub-assessment is completed by compiling the sum of the archaeological value, archaeological potential and predicted effect for the affected sites into an alignment total (Table 5). The overall sub-assessment total does not directly translate to a specific MCA score, but helps to guide the value and spread of the final MCA scores within each zone.

MCA scoring

The MCA scoring for each alignment is guided by a 5-point scoring system with one or more qualitative conditions attached to each possible score (Table 6). For each alignment zone or interchange and local road option the following aspects are discussed, though only the first two are included in the final score:

1. Overall archaeological values, potential and adverse effects.
2. Ease of navigation through statutory processes.
3. Technical challenge of achieving appropriate mitigation.

Table 4: Sample of indicative site values, archaeological potential and predicted effect data. Archaeological potential and the predicted effect are only scored for sites that are expected to be affected by an option.

Site #	Site Name	Indicative Archaeological Values (Heritage NZ)										TOTAL VALUE	Zone	Green			White		Cyan	
		Rarity/Uniqueness	Information potential	Contextual value	Armenity value	Cultural associations	Historic	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect			Archaeological potential	Predicted effect					
14	Pukehou	2	2	3	3	3	2	2	15	A/B	4	4	3	4	3	4	3			
15	[house]	1	1	1	2	1	0	1	6	B	4	2	2	4	2	4	2			
16	Waiaite stream	1	2	2	2	2	1	1	10	B	2	2	2	2	2	2	2			
17	Manakau stream	1	1	2	2	2	0	0	8	B	2	2	2	2	2	2	2			
18	[house]	1	1	1	2	1	0	0	6	B	4	2	4	3	4	2	2			
19	South Manakau Road	1	1	1	1	1	0	0	5	B	5	1	5	1	5	1	1			
20	Puketawihiri/Te Tahawakaurungamangahua hill	1	1	2	2	2	0	0	8	B/C										
21	Puna (springs)	1	1	2	2	2	1	1	9	C	2	2	2	2	2	2	2			
22	Mangahua stream	1	1	2	2	2	0	0	8	C	2	2	2	2	2	2	2			
23	R. Whiley/ house and 1st Manakau School	2	1	2	3	3	2	2	13	C	5	4	4	5	5	5	5			
24	North Manakau Road	1	1	1	1	1	0	0	5	C/D	5	1	1	5	1					

Table 5: Sample of sub-assessment totals for site values, archaeological potential and predicted effect data that guides the MCA scores assigned to each zone option.

Zone	Option	Site Count	Archaeological Values (total)	Archaeological potential (total)	Potential adverse effect (total)	ALIGNMENT TOTAL
A	Green	12	100	40	25	165
	White	12	100	40	25	165
B	Cyan	7	58	23	14	95
	Green	7	58	23	14	95
	White	7	58	23	15	96
C	Green	5	41	18	12	71
	Purple	5	41	18	12	71
	White	5	41	18	13	72

Table 6: Scores and guidance for the the assignment of scores for alignments and interchanges.

SCORES	DESCRIPTION
1	The option presents few difficulties on the basis of the criterion being evaluated and may provide significant benefits in terms of the attribute.
2	The option presents only minor aspects of difficulty on the basis of the criterion being evaluated, and may provide some benefits in terms of the criterion.
3	The option presents some aspects of reasonable difficulty in terms of the criterion being evaluated and problems cannot be completely avoided. There are few apparent benefits in terms of the criterion.
4	The option includes clear aspects of difficulty in terms of the criterion being evaluated, and very limited perceived benefits.
5	The option includes significant difficulties or problems in terms of the criterion being evaluated and no apparent benefits.

The first of these expands on the matters that were addressed above to consider if there are reasons to preference specific alignments for the sake of avoiding disproportionate adverse effects to a high value site, or sites, or are the values and effects relatively even across the options. The second anticipates the strength of argument that may be required to justify the selection of a given alignment: alignments with disproportionate adverse effects to high value sites are likely to receive greater scrutiny. Finally, the third aspect broadly discusses the technical challenges that are likely to be faced in order to achieve the expected level of mitigation, such as archaeological excavations or the removal and reinstatement of buildings, for example. Further site-specific research is required to be able to evaluate the potential mitigation of effects in a more quantitative manner and the brief discussion that is included only serves as a pointer to where future improvements may lie. Allowance for reductions to the level of adverse effect resulting from mitigation is not included in the MCA score.

The design information provided for the assessment of the interchange options was not as detailed as that provided for the assessment of the alignments. Sample designs were provided at

each potential interchange location, but not for each of the alignment options at those locations. As a result, a detailed values, potential and adverse effect sub-assessment was not able to be undertaken for each option. Instead, the options were directly scored according to the 5-point MCA scale based on a broad understanding of the two aspects addressed above as they related to the identified sites located in the general vicinity of the proposed interchange connection.

Design information for the potential local road changes was provided in a simplified schematic format and these options were similarly scored directly with reference to the broader site data. Due to the lower level of detail regarding the potential changes, local roading options were scored on a coarser 3-point scale with simplified conditional prerequisites.

SCORING - ROUTE ALIGNMENTS

Table 7 presents a summary of the counts, values, potential and effects totals and the overall MCA for the affected sites in each of the zone/option combinations, as listed in full in Appendix 3. In 7 of the 10 zones there is no variation in the overall MCA score between the options within an individual zone and this can generally be explained by one or more of the following:

- i. The affected sites are long, linear features or extensive area features that are equally or nearly equally affected by all of the available options: i.e., historic roads, named streams or swamps that cut through the entire 300 m wide recommended route option.
- ii. There is insufficient information about the location and extent of a site to be able to differentiate the options by potential and effects: i.e., there is a forced assumption that all options have equal potential and effect.
- iii. The location and extent of sites are well known but each option results in relatively equal effects to the same sites (but differently weighted to each of the individual sites) or a similar number of different sites.

Though there is a relatively wide range of variation between the zone/option sub-assessment totals, the MCA scores do not necessarily reflect the same degree of variation as the scoring is directed by the qualitative language of the score descriptions; particularly with regards to the degree of difficulty. Two or more options may have very different sub-assessment totals but the overall degree of difficulty – across the three aspects previously listed – may be substantially the same: e.g., an option with potentially substantial effects to a larger number of low value sites (with a high sub-assessment total) may be scored the same as an option with moderate effects to fewer sites of high value (with a low sub-assessment total). Alternatively, an option with relatively high effects to a small number of high value sites should be expected to score higher than an option with similar effects to a greater number of low value sites. For reference, it

Table 7: Sub-assessment totals for site values, archaeological potential and predicted effect for each zone option and overall MCA score.

Zone	Option	Site Count	Archaeological values (total)	Archaeological potential (total)	Potential adverse effect (total)	ALIGNMENT TOTAL	MCA SCORE
A	Green	12	100	40	25	165	3
	White	12	100	40	25	165	3
B	Cyan	7	58	23	14	95	2
	Green	7	58	23	14	95	2
	White	7	58	23	15	96	2
C	Green	5	41	18	12	71	4
	Purple	5	41	18	12	71	4
	White	5	41	18	13	72	5
D	Cyan	9	69	26	18	113	2
	Dark Blue	10	74	30	22	126	3
E	Cyan	8	52	26	16	94	2
	Green	8	52	26	16	94	2
F	Orange	10	64	40	23	127	3
	Purple	10	64	40	23	127	3
	White	10	64	40	24	128	3
G	Cyan	3	25	12	6	43	3
	Purple	3	25	12	6	43	2
	White	3	25	12	6	43	3
H	Cyan	3	15	11	7	33	1
	Purple	4	20	15	11	46	1
K	Cyan	11	68	37	26	131	3
	Dark Blue	10	63	33	25	121	3
	Yellow	10	63	33	24	120	3
L	Black	8	50	29	16	95	3
	Green	8	50	29	15	94	3
	Orange	9	56	31	16	103	3
	Purple	8	48	29	16	93	3

should be noted that the options with the highest MCA scores (zone C) also have the sites with the highest mean values, second highest mean potential, and highest mean effect. The options with the lowest MCA scores (zone H) have the lowest mean values.

As previously mentioned, the potential for mitigation is included in the discussion of alignment options but is not a factor that has been considered in regards to the MCA scores. Rather, the discussion of potential mitigation options highlights where there may be scope for effects scoring to be improved at later stages of the Project. Further research is required to ensure that site-specific mitigations can be assessed fairly and consistently across all potentially affected sites. Only the archaeological values, potential, effects and the ease of statutory process are assessed in the scores below. This also applies to the scoring for the interchange and local road options that follow.

The following tables summarise the key aspects, listed above, as they relate to the MCA scores for each of the zone options.

Table 8: Summary of key issues for alignment options in Zone A and their MCA scores.

ZONE A				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
GREEN	Little to no difference between options with predominantly moderate potential and low-level effects to structures and natural landscapes with archaeological potential. Parauaku and Waerengapoka clearings are potentially of higher value but further research and fieldwork would be required to confirm this. Pukehou is a significant landscape feature where Māori Land Court records indicate there is the potential to encounter multiple high value sites and further research and field investigation is required at this location.	Little to no difference between options at this time, but there is the potential for further research regarding Parauaku, Waerengapoka and Pukehou to identify new difficulties that may preference a particular route. Māori Land Court minutes indicate there is an urupa of Muaūpoko in the general vicinity of Pukehou. Any effects on urupa would likely face significant challenges to gaining statutory approval but at present there is insufficient information about this sites location to raise immediate concerns. The former Native Reserve at Pukehou is no longer Māori Title land. An archaeological authority is likely to be required.	Little to no difference between options at this time. Low-level mitigation may be required for some historic houses. Where archaeological features are encountered in former forest clearings or alongside waterways and swamps, archaeological investigations will be the required, at minimum. There is likely to be scope for signage and complementary landscape design to be included in the mitigation package.	3
WHITE				3

Table 9: Summary of key issues for alignment options in Zone B and their MCA scores.

ZONE B				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
CYAN	Little to no difference between options with predominantly moderate potential and low-level effects to historic houses and natural landscapes with archaeological potential.	Little to no difference between options at this time, but there is the potential for further research regarding Pukehou to identify new difficulties that may preference a particular route. Māori Land Court minutes indicate there have been an urupa of Muaūpoko in the general vicinity of Pukehou. Any effects on urupa would likely face significant challenges to gaining statutory approval but at present there is insufficient information about this sites location to raise immediate concerns. An archaeological authority is likely to be required.	Little to no difference between options at this time. Low-level mitigation for noise effects may be required for some historic houses. Where archaeological features are encountered in former forest clearings or alongside waterways and swamps, archaeological investigations will be the required, at minimum. There is likely to be scope for signage and complementary landscape design to be included in the mitigation package.	2
GREEN	WHITE option may result in slightly higher level of effect to one additional historic house. Pukehou is a significant landscape feature where Māori Land Court records indicate there is the potential to encounter multiple high value sites and further research and field investigation is required at this location.			2
WHITE				2

Table 10: Summary of key issues for alignment options in Zone C and their MCA scores.

ZONE C				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
GREEN	Little to no difference between options with moderate to significant effects to historic houses and archaeological sites. All options would affect Robert Whiley's house (built in 1887) on North Manakau Road, that served as the first Manakau School. The WHITE option, that is aligned through Robert Whiley's former home, is the option of greatest effect, though the GREEN and PURPLE options will have such a substantial adverse effect to amenity that the overall difference is minimal.	While there is little difference in overall effect between the options, there are some statutory differences. For all options, removal and relocation of the Whiley house is likely to be required and this can be achieved without the need for an archaeological authority (HNZPTA 2014, s 42(3)). However, an archaeological authority would be required for the WHITE option due to potential, most likely near certainty, that subsurface archaeological features would be uncovered. The former Native Reserve land at Manakau is no longer Māori Title land	A high level of mitigation is likely to be required for all options in this zone, particularly with regards to sites in the vicinity of North Manakau Road. Historic houses will likely require mitigation for noise effects to maintain amenity value or otherwise relocation. As the first school at Manakau, the Whiley house has heritage values that are likely to be appreciated by a wide section of the local community and these values and a high standard of mitigation will be expected. There is likely to be scope for signage and complementary landscape design to be included in the mitigation package.	4
PURPLE				4
WHITE				5

Table 11: Summary of key issues for alignment options in Zone D and their MCA scores.

ZONE D				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
CYAN	Little to no difference between options with predominantly low or moderate potential and low-level effects to houses and natural landscapes with archaeological potential. DARK BLUE option will have a slightly higher adverse effect to one additional house site. There are no known sites on the bank of the Ohau River in at this location but further investigation is warranted given the substantial number of known sites at other locations on the river.	Little to no difference between options in this zone and no notable barriers are foreseen at this time. A battle site alongside the Kuku stream with the potential for human remains will need to be treated with sensitivity but this can be addressed with appropriate mitigation measures. An archaeological authority is likely to be required.	Little to no difference between options at this time. Low-level mitigation may be required for some historic houses. Where archaeological features are encountered in former forest clearings or alongside waterways and swamps, archaeological investigations will be the required, at minimum. There is likely to be scope for signage and complementary landscape design to be included in the mitigation package.	2
DARK BLUE				3

Table 12: Summary of key issues for alignment options in Zone E and their MCA scores.

ZONE E				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
CYAN	Little to no difference between options with predominantly low or moderate potential and low-level effects to houses and natural landscapes with archaeological potential. There are no known sites on the bank of the Ohau River in at this location but further investigation is warranted given the substantial number of known sites at other locations on the river.	Little to no difference between options in this zone and no notable barriers are foreseen at this time. The former Native Reserve on Muhunoa East Road is no longer Māori Title land. An archaeological authority may be required.	Little to no difference between options at this time. Low-level mitigation may be required for some historic houses. Where archaeological features are encountered in former forest clearings or alongside waterways and swamps, archaeological investigations will be the required, at minimum. There may be scope for signage and complementary landscape design to be included in the mitigation package.	2
GREEN				2

Table 13: Summary of key issues for alignment options in Zone F and their MCA scores.

ZONE F				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
ORANGE	On current information there is little to no difference between the available options. Clarification of the age and values of some houses and further investigation into potential adverse effects within the former Kohitere clearing may help to separate the options. Māori Land Court minute books indicate there were areas of intensive occupation within the Kohitere clearing, but the exact location of these sites is unknown at this time.	Little to no difference between options in this zone and no notable barriers are foreseen at this time. An archaeological authority will be required.	Little to no difference between options at this time. Low-level mitigation may be required for some historic houses. Māori Land Court minute books indicate there is the potential for intensive archaeological investigation to be required in the former Kohitere clearing. There is scope for signage and complementary landscape design to be included in the mitigation package.	3
PURPLE				3
WHITE				3

Table 14: Summary of key issues for alignment options in Zone G and their MCA scores.

ZONE G				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
CYAN	Scoring for this option is driven by potential adverse effects to the amenity values of the Prouse homestead, James Prouse being one of two brothers who were recognised for their notable contributions during the early years of Levin's development as a town. There are relatively negligible differences between the options but the PURPLE option is credited for keeping the greatest separation between the Prouse homestead and the expressway.	Little to no difference between options in this zone. A high standard of mitigation will be expected for the potentially substantial effects to the amenity values of the Prouse homestead. An archaeological authority will be required.	Little to no difference between options and archaeological excavation is not expected to be required. High-level noise mitigation for the Prouse home is likely to be required, at minimum. There may also be opportunities for Waka Kotahi to contribute to the restoration/maintenance of the historic buildings on the Prouse property. There is scope for signage and complementary landscape design to be included in the mitigation package.	3
PURPLE				2
WHITE				3

Table 15: Summary of key issues for alignment options in Zone H and their MCA scores.

ZONE H				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
CYAN	There is little to no difference between the available options with few sites affected. The PURPLE option effects an additional house site that may pre-date 1900.	Little to no difference between options in this zone and no notable barriers are foreseen at this time. An archaeological authority may be required.	Little to no difference between options at this time and a generally low level of mitigation is expected. Archaeological investigation will be required if house sites are confirmed to pre-date 1900.	1
PURPLE				1

Table 16: Summary of key issues for alignment options in Zone K and their MCA scores.

ZONE K				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
CYAN	There are notable differences in the focus of adverse effects for each option, but the overall effects are relatively similar. The affected sites are predominantly houses and house sites that are or may be of pre-1900 origin that will experience varying levels of adverse effect. Confirmation of the age of these houses will potentially affect the overall scores.	There is little to no difference between options in this zone though care should be taken to avoid unnecessary effects, where possible. No notable barriers are foreseen at this time. An archaeological authority may be required.	There is little to no difference between options at this time and all options will need to mitigate physical and amenity effects to various degrees. Relocation of some historic houses may be appropriate and archaeological investigation will be required for in situ historic houses and sites that may be encountered adjacent to waterways. There may be scope for signage and complementary landscape design to be included in the mitigation package.	3
DARK BLUE				3
YELLOW				3

Table 17: Summary of key issues for alignment options in Zone L and their MCA scores.

ZONE L				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
BLACK	There is little to no difference between options in this zone and a majority of the expected effects relate to a single pre-1900 house and a bird snaring site at the northern end at the re-connection to SH1. There is the potential for settlements and work sites associated with the 19th century construction of the Wellington-Manawatu Railway (present-day North Island Main Trunk railway). Field investigation would be required to further explore this potential.	There is little to no difference between options in this zone and no notable barriers are foreseen at this time. The former Native Reserve at Heatherlea is no longer Māori Title land. An archaeological authority will be required.	There is little to no difference between options at this time and all options will need to the substantial adverse effects on the pre-1900 house at 96 Avenue Road North. Archaeological investigation and relocation of the house and any in-ground features is likely to required. Further investigation may be required for the Waituhi snaring site and other potential sites adjacent to waterways, swamps and NIMTR. There is scope for signage and complementary landscape design to be included in the mitigation package.	3
GREEN				3
ORANGE				3
PURPLE				3

SCORING – INTERCHANGES

Table 18 lists the interchange options and overall MCA scores. Like the alignment zones, at many of the potential interchange locations there is no variation in the overall MCA score. The reasons for this are the same those for the congruence of the zone alignment scores and the absence of detailed designs for each alignment-interchange combination also a contributing factor.

Table 18: Interchange options grouped by zone and their MCA scores.

Zone	Option	MCA SCORE
B	Manakau - Roundabout at South	2
	Manakau - Grade Separation at South	2
D	Manakau - Roundabout at North	2
	Manakau - Grade Separation at North	2
-	Manakau - No Connection	1
F	K/T - Roundabout at Kimberley	2
	K/T - Grade Separation at Kimberley	3
F / G	K/T - Roundabout at Tararua	1
	K/T - Grade Separation at Tararua	1
K	Split - Bifurcation	3
	Split - Roundabout	2
	Split - Grade Separation	3
L	North Levin - Roundabout	1
	North Levin - Grade Separation	1

The following tables summarise the key aspects that are discussed above, with respect to the zone-alignment options, as they relate to the MCA scores for each of the interchange options.

Table 19: Summary of key issues for interchange options south of Manakau and their MCA scores.

ZONE B - SOUTH OF MANAKAU				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
ROUND-ABOUT	There is little to no difference between the options with most of the effects centred on potential sites at named waterways and the historic road. GRADE SEPARATION has a larger footprint and would increase the potential for archaeological discoveries but there is insufficient information to separate scores at this time.	There is little to no difference between options though care should be taken to avoid unnecessary effects, where possible. No notable barriers are foreseen at this time. An archaeological authority may be required.	There is little to no difference between options. Archaeo-palynological investigations along the Waiaute stream would be appropriate at this time and other archaeological investigations may be required. GRADE SEPARATED options may increase effects to historic houses in the vicinity. There is scope for signage and complementary landscape design to be included in the mitigation package.	2
GRADE SEPARATION				2

Table 20: Summary of key issues for interchange options south of Kuku and their MCA scores.

ZONE D - SOUTH OF KUKU				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
ROUND-ABOUT	There is little to no difference between the options with most of the effects centred on a named waterway and a forest track. There is limited archaeological potential at this location due to it remaining relatively heavily forested until the late 19th or early 20th century. GRADE SEPARATION has a larger footprint and would increase the potential for archaeological discoveries but there is insufficient information to separate scores at this time.	There is little to no difference between options though care should be taken to avoid unnecessary effects, where possible. No notable barriers are foreseen at this time. An archaeological authority may not be required.	There is little to no difference between options. Archaeological investigations may be required in the vicinity of named waterways and inland forest tracks. There may be scope for signage and complementary landscape design to be included in the mitigation package.	2
GRADE SEPARATION				2

Table 21: Summary of key issues if no interchange is provided at Manakau and its MCA score.

NO CONNECTION AT MANAKAU				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
No CONNECTION	This option would reduce the cumulative potential for adverse effects in and around Manakau. As many of the affected sites are only sites of archaeological potential the actual benefit of this option, in terms of reduced effect, is unclear and may be negligible.	While an archaeological authority would not be required the management of adverse effects on heritage and receipt of appropriate authorities as mandated by statute will still be required for the eventual route alignment. Any benefit to be gained in this regard is likely to be negligible.	No additional mitigation will be required.	1

Table 22: Summary of key issues for interchange options at Kimberley Road and their MCA scores.

ZONE F - KIMBERLEY ROAD				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
ROUND-ABOUT	Without further information about occupation within the Kohitere clearing it is difficult to adequately assess these two options, though both have greater archaeological potential than the connections at Tararua Road. The ROUNDABOUT is scored slightly lower due to the reduced footprint and GRADE SEPARATION is more likely to affect a small number of potentially historic houses, but scores for both options are relatively speculative at this stage. Field investigation will be required to more accurately assess these options.	Without additional information to differentiate potential adverse effects there is little to no difference between the options. No notable barriers are foreseen at this time. An archaeological authority will be required.	There is little to no difference between options though the extended footprint of GRADE SEPARATION increases the likelihood that archaeological investigations will be required within the former Kohitere clearing. GRADE SEPARATION will also increase the likelihood of archaeological investigations and other mitigation measure being required for potential historic houses. There is scope for signage and complementary landscape design to be included in the mitigation package.	2
GRADE SEPARATION				3

Table 23: Summary of key issues for interchange options at Tararua Road and their MCA scores.

ZONE F/G - TARARUA ROAD				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
ROUND-ABOUT	There is little to no difference between the options with few adverse effects expected. There is limited archaeological potential at this location due to its remaining relatively heavily forested until the late 19th or early 20th century. The single known site in this vicinity has an uncertain location.	Without additional information to differentiate potential adverse effects there is little to no difference between the options. No notable barriers are foreseen at this time. An archaeological authority is unlikely to be required.	There is little to no difference between the options and the likelihood that archaeological investigations will be required is limited.	1
GRADE SEPARATION	GRADE SEPARATION has a larger footprint and would increase the potential for archaeological discoveries but there is insufficient information to separate scores at this time.			1

Table 24: Summary of key issues for split at SH1/SH57 and their MCA scores.

ZONE K - SH1/57 SPLIT				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
BIFURCATION	Little to no difference between options as the general area has a small concentration of historic or potentially historic houses and other potential archaeological sites. A ROUNDABOUT would have the smallest footprint and limit potential for additional adverse effects above and beyond the primary alignment, hence it scores slightly lower.	There is little difference between the options though a ROUNDABOUT could reasonably be expected to result in an overall lower level of adverse effect. However, given the likely widespread effects of any alignment that is eventually selected, the actual benefit to be gained from a ROUNDABOUT may be negligible. No notable barriers are foreseen at this time. An archaeological authority is likely to be required.	There is little to no difference between options though the extended footprint of the BIFURCATION and GRADE SEPARATED options increases the likelihood that mitigation for physical and amenity effects will be required for a number of house sites. BIFURCATION OR GRADE SEPARATION will increase the likelihood of archaeological investigations and other mitigation measures, such as house relocation, being required. There may be scope for signage and complementary landscape design to be included in the mitigation package.	3
ROUND-ABOUT				2
GRADE SEPARATION				3

Table 25: Summary of key issues for interchange options north of Levin and their MCA scores.

ZONE L - NORTH OF LEVIN				
OPTION	VALUES, POTENTIAL AND EFFECTS	STATUTORY PROCESS	MITIGATION	MCA SCORE
ROUND-ABOUT	Little to no difference between options with the expected effects largely focused on the historic house at 96 Avenue Road North. The extended footprint of GRADE SEPARATED option increases the potential for adverse effects to other archaeological sites and passes through a former Native Reserve but there is insufficient information to separate scores at this time.	There is little to no difference between the options and no notable barriers are foreseen at this time. The former Native Reserve at Heatherlea is no longer Māori Title land. An archaeological authority will be required.	Both options will require a high degree of mitigation for effects to the historic house at 96 Avenue Road North and may include archaeological investigations and house relocation: this mitigation would also be required for any of the alignment options without an interchange at this location. The GRADE SEPARATED option increases the likelihood that archaeological investigations will be required at other places. There may be scope for signage and complementary landscape design to be included in the mitigation package.	1
GRADE SEPARATION	Both options score low as the cumulative effect, in addition to the new expressway alignment, is expected to be negligible.			1

SCORING – LOCAL ROADS

As briefly discussed above, local roading options were scored directly using a coarse three point scale as below:

1. Option is likely to have only minor impacts or issues.
2. Option is likely to have moderate impacts or issues.
3. Option is likely to have serious or significant negative impacts or issues.

As shown in Table 26, all local road options are scored at the lowest end of the scale. A more detailed presentation of the local road options can be found in the Local Access Roads Long List Options Report (Weale, 2020), but in general the local roading options were scored favourably for the following reasons:

- Options that require earthworks or minor modifications within the existing road reserve that has been incrementally modified and maintained over many decades (if not over a century) are expected to have a negligible or minimal adverse effect.
- Options closing access along existing roads are expected to have a

Table 26: MCA scores and general comments for local roading options.

OPTION	SCORE	GENERAL COMMENTS
A1 - Taylors Road / PP20 Tie-in - Connect current SH1 via Waitohu stream bridge / Taylors Road	1	Little difference between these options in terms of likely effects: possible 19th C house on corner of Taylor's Road-SH1 and Waitohu stream areas of greatest possible effect. A2 and A3 may have greater archaeological potential due to the need for more extensive structures in the vicinity of the Waerengapoka and Paruauku clearings but the location and full extent of these clearings is poorly defined at present.
A2 - Taylors Road / PP20 Tie-in - Connect via a new underpass (Taylors Road realignment abandoned)	1	
A3 - Taylors Road / PP20 Tie-in - Connect via a new underpass (Taylors Road via Waitohu Stream bridge)	1	
B1 - South Manakau Road - Reconnect South Manakau Road via an underpass (expressway over)	1	Little difference between these options. B3 would require the least additional earthworks in the vicinity of Manakau stream, but the archaeological potential in this area is poor defined at present and any 'benefits' to be gained by avoiding the stream areas are uncertain.
B2 - South Manakau Road - Reconnect South Manakau Road via an overbridge (expressway under)	1	
B3 - South Manakau Road - Sever South Manakau Road and provide access via Honi Taipua Street	1	
C1 - Honi Taipua Street - Sever Honi Taipua Street and access via Manakau Heights Drive	1	No difference between options with no known archaeological sites in the immediate vicinity. Options that would require greenfield earthworks in close proximity to Puketawhiwi/Tahawhakarungamangahua hill may have higher archaeological potential.
C2 - Honi Taipua Street - Reconnect Honi Taipua Street via an overbridge (expressway under)	1	
C3 - Honi Taipua Street - Reconnect Honi Taipua Street via a footbridge only (expressway under), vehicle access via Manakau Heights Drive	1	
C4 - Honi Taipua Street - Sever Honi Taipua Street and create a Mokena Kohere Street footbridge	1	
D1 - North Manakau Road - Reconnect North Manakau Road via an overbridge (expressway under)	1	No difference between options as any effect to archaeological sites will only be minor additions to the already substantial impact of the earthworks required for the expressway alignment at this same location.
D2 - North Manakau Road - Reconnect North Manakau Road via an underpass (expressway over)	1	
E1 - Kuku East Road - Reconnect Kuku East Road via an overbridge (expressway under)	1	Little difference between options, though E2 may be slightly lower risk due to possible 19th C house site on north side of Kuku East Road, 50 m beyond 300 m route corridor.
E2 - Kuku East Road - Reconnect Kuku East Road via an underpass (expressway over)	1	
EQ - Quarry Access - Provide access under the Ohau River Bridge (expressway over)	1	One possible 19th C building at quarry entrance and the Otararere and Pukeatua hills have cultural significance, but no other known sites in this area.
F1 - Muhunua East Road - Reconnect Muhunua East Road via an overbridge (expressway under)	1	
F2 - Muhunua East Road - Reconnect Muhunua East Road via an underpass (expressway over)	1	No difference between options with no known archaeological sites in the immediate vicinity.
F3 - Muhunua East Road - Sever Muhunua East Road and provide access via Arapaepae Road or Mcleavey Road	1	
G1 - Mcleavey Road - Reconnect Muhunua East Road via an overbridge (expressway under)	1	
G2 - Mcleavey Road - Reconnect Muhunua East Road via an underpass (expressway over)	1	Little to no difference between options. Unknown archaeological potential in the vicinity of Te Waiaruhe creek and probable 19th C house on McLeavey Road, though the effects of any local road adjustments are likely to be only a minor addition relative to the effect of the expressway.
G3 - Mcleavey Road - Sever Muhunua East Road and provide access via Muhunua East Road or Arapaepae Road	1	
H1 - Arapaepae Road south of Kimberley Road - Sever Arapaepae Road and provide access via Muhunua East Road	1	Relatively little difference between options. Any additional earthworks in this area would have the potential to effect sites in the former Kohitere clearing but the occupation history of this site is not well known. H1 would have the least effect, but any additional effects of any of the three options are likely to be low or negligible in comparison to the expressway itself.
H2 - Arapaepae Road south of Kimberley Road - Sever Arapaepae Road and provide access via Mcleavey Road	1	
H3 - Arapaepae Road south of Kimberley Road - Sever Arapaepae Road and provide access via Kimberley Road / new link	1	
I1 - Muhunua East - Muhunua East, Mcleavey and Kimberley severed, new connecting road built	1	Mostly minor effect as new roads predominantly in areas heavily forested until the late 19th or early 20th C, but potential to encounter archaeological sites in former Kohitere clearing near Kimberley-Arapaepae Road intersection.
J1 - Kimberley Road - Reconnect Kimberley Road via an overbridge (expressway under)	1	Little overall difference between options. J4 may be slightly better with new roading through areas heavily forested until the late 19th or early 20th C. J1-3 would have result in further effects to sites in Kohitere clearing but occupation history of this site is not well known and actual effect may be very low or negligible.
J2 - Kimberley Road - Reconnect Kimberley Road via an underpass (expressway over)	1	
J3 - Kimberley Road - Sever Kimberley Road and provide access via Arapaepae South and a new link	1	
J4 - Kimberley Road - Sever Kimberley Road and provide access via Tararua Road and a new link	1	
K1 - Queen Street - Reconnect Queen Street via an underpass (expressway over)	1	No apparent difference between options, but would have a preference for the option that reduces noise effects to the amenity of the Prouse homestead.
K2 - Queen Street - Reconnect Queen Street via an overbridge (expressway below ground level)	1	
L1 - Waihou Road - Reconnect Waihou Road via a new link to McDonald Road	1	No apparent difference between options. Archaeological potential limited to a possible 19th C house site on Waihou Road, the Koputaroa/Te Awa a te Tau stream and puna (springs) sites located on farmland. This area was heavily forested until the late 19th or early 20th C.
L2 - Waihou Road - Reconnect Waihou Road via a new link to Wakefield Street	1	
N1 - Sorenson Road - Reconnect Sorenson Road via an underpass (expressway over)	1	Little to no difference between options. Four buildings off Sorenson Road are possible 19th C buildings, but the potential for adverse effects to these sites resulting from local roading changes are likely to be low.
N2 - Sorenson Road - Reconnect Sorenson Road via an overbridge (expressway under)	1	
N3 - Sorenson Road - Retain Sorenson Road status quo based on alignment selection	1	
P1 - Heatherlea East Road and Koputaroa Road - Reconnect Heatherlea East Road and Koputaroa Road via an intersection to a new roundabout on SH1	1	Little to no difference between options with no affected sites identified that would not already be affected by the expressway.
P2 - Heatherlea East Road and Koputaroa Road - Reconnect Heatherlea East Road and Koputaroa Road via an interchange on SH1	1	
Q1 - Avenue North Road - Convert to cul de sac, active mode access to SH1 only	1	Little to no difference between options with no affected sites identified that would not already be affected by the expressway.

negligible or nil adverse effect.

- Relative to the expressway and interchanges, any greenfield local road development is expected to have a relatively negligible or minor additional adverse effect and most greenfield options are located in areas that remained heavily forest until the late 19th or into the early 20th century.
- Changes to the local road network are expected to require earthworks of a more limited extent, relative to the expressway alignment and interchanges, and there is generally insufficient detail about the location and extent of archaeological sites to assess any potential adverse effect beyond a low level of confidence. The scale of the earthworks required for the expressway alignment and interchanges increases the likelihood that there will be adverse effects and enable effects to be assessed with greater confidence.

CONCLUSIONS

In general, the overall adverse effect of the Project on heritage values, and archaeological sites in particular, is expected to be at the lower end of the effects scale. Archaeological sites or places that have the potential to be archaeological sites are located in all of the assessment zones, though these sites are sufficiently widely dispersed that route alignments and interchanges can be developed without the need for the widespread destruction or modification of archaeological sites. Furthermore, the assessment is broadly neutral in regards to preferencing alignment, interchange and local road options, though this is largely a function of the limitations in the data that is available at present.

Accurate information is available for some buildings that are visible in aerial photographic records, but most survey plan or text sources are insufficiently detailed, with regards to site locations and extents, to enable competing options to be separated by potential adverse effects to these sites. Some of the location issues are addressed by the inclusion of potential archaeological sites such as named hills, rivers, streams and swamps, but these tend to be long linear or extensive area features that are equally affected by all options. Further research into the background history and significance of these places may help to establish greater distinction in terms of heritage values but further work to improve the understanding of archaeological potential and predicted effect would be more beneficial. To achieve this, land access and extensive field investigation, with an emphasis on geophysical survey, is required. This would be particularly beneficial for the following locations:

- Zone A and B; Waerengapoka and Paruauku clearings, Waiwaro and Otepua/Otipua swamp, Pukehou and the Waiaute stream.

- Zone E; late 19th century houses off Muhunoa East Road.
- Zone F; internal organisation of sites within the Kohitere clearing.
- Zone L; potential for 19th century railway works camps adjacent to the NIMTR.

Though these limitations need to be acknowledged and addressed within the Project's future timeline, it is important to also acknowledge that the most important decision regarding heritage effects has already been made. The recommendation of an eastern route (options S6 and N4) coming out of the IBC has had substantial beneficial effects for the preservation of the region's archaeological sites and cultural heritage (Figure 2). Archaeological reporting for earlier phases of investigation has emphasised the divergence in the intensity of long-term historic occupation between the more open land of the coastal dune belt with its patch work of lakes and lagoons, swamps and bush stands while the dense podocarp forest located further inland and dotted with occasional clearings, cross-cutting trackways, hunting encampments and cultivation grounds alongside rivers and streams, was less intensively occupied. The general disposition of occupation over the past 800 or more years is succinctly illustrated by Keepa Rangihwinui (Major Kemp), a chief of Muaūpoko, who when asked where on the Horowhenua Block Muaūpoko had historically lived, replied:

alongside the [west of] lake [Horowhenua], from their ancestors down to the present day... They have permanent whares there; there are fortified pas [sic] there too. You could see the heaps of shells handed down from past generations; *the other portion [i.e., the forest east of Lake Horowhenua] the birds and the rats occupied.*" [emphasis added]

It is only in the last 130 years, since the completion of the Wellington-Manawatu Railway in 1886, that the overall balance of settlement and occupation by both Māori and Pakeha has shifted further inland to its current points of focus. Much of the land within the recommended route remained heavily forested until relatively late into the 19th or early 20th century and there are relative few archaeological sites in contrast to the more western options considered in the IBC. Most of the potential effects to archaeological sites are concentrated in a few key areas – Pukehou, North Manakau Road, Kimberley Road and Heatherlea – and it is to these areas that the bulk of future research will be directed in order to continue to reduce the extent of any adverse effects the Project may have on the regions heritage.

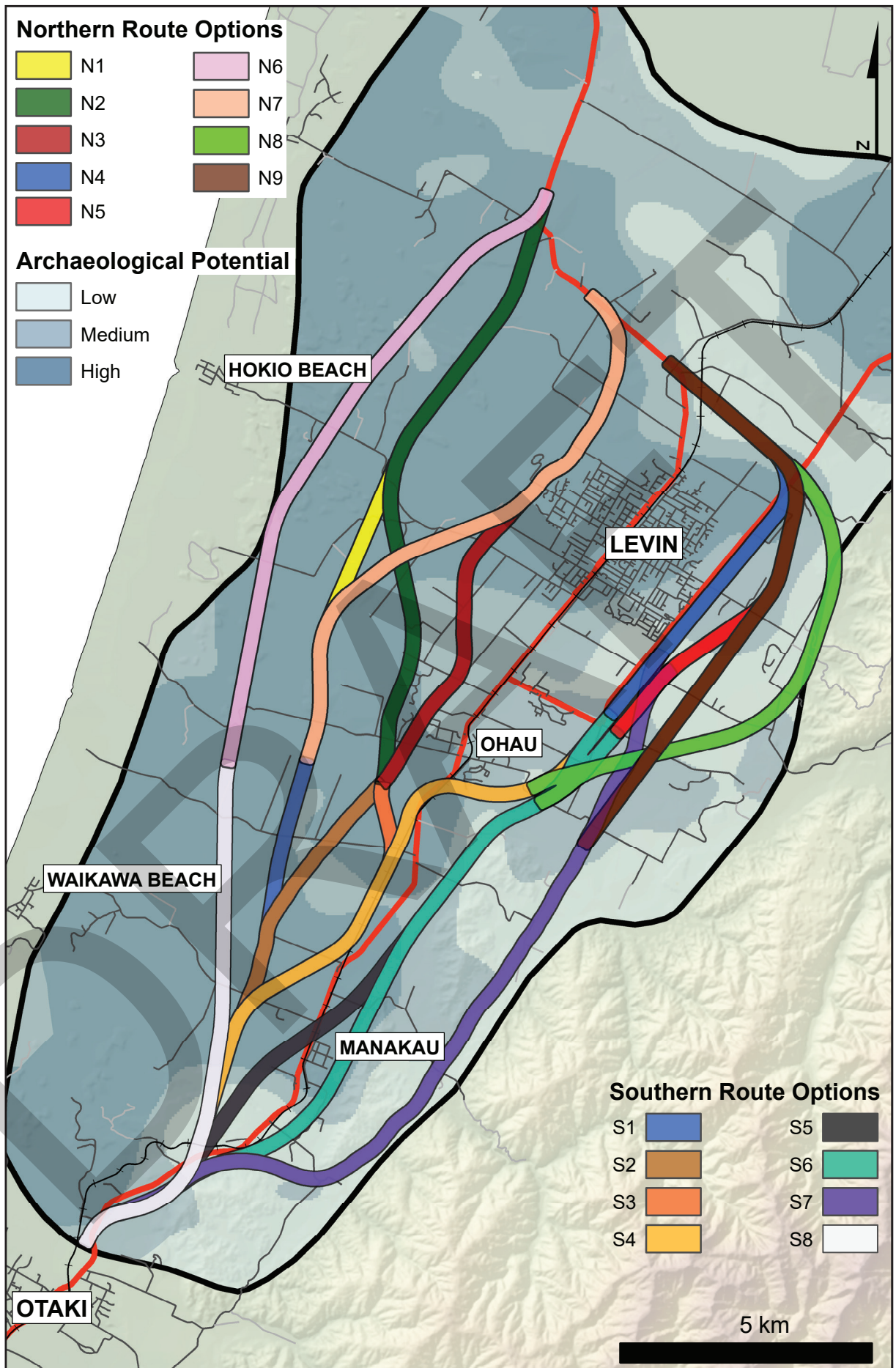


Figure 2: Relationship between archaeological potential and the route options evaluated in the IBC, showing the number and density of archaeological sites decreasing to the east.

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APPENDIX 1:

SITE DESCRIPTIONS AND PLANS

The following pages present the full list of archaeological sites identified within or in close proximity to the recommended route option corridor, as at 15th of June 2020. Each site record includes:

- i. Site numbers referenced in the following table are matched to markers in the location plans.
- ii. A site name, where a site does not have a proper name a generic name is given in square brackets [].
- iii. All sites are grouped into one of five broad class-types: buildings and structures, geology and fauna, native reserves, occupied clearings, and railways, roads and tracks.
- iv. General site locations indicated in the attached plans and details regarding specific land parcels included in the tabulated data are of varying accuracy. Reference to a given land parcel does NOT in all cases indicate that an archaeological site (within the strict legal definition of the HNZPTA) is present within its bounds or that the entire parcel is of archaeological interest. In some instances the list of parcels is merely an indicator of land that is considered to have a non-negligible archaeological potential (i.e., see above discussion of named landscape features).
- v. A brief description for most sites is provided.
- vi. The sources of information are listed as either map, photo, text or personal communication sources.
- vii. A checkmark is placed against each alignment zone the site appears in.

Information provided in the site descriptions is not meant to provide a comprehensive discussion of the site and its background history, but is intended to provide a brief overview of the most pertinent site-history information. The included plans do not provide a full coverage of the S6-N4 route option, but only covers those areas that have or may have archaeological sites.

DRAFT

SITE DATA								ALIGNMENT ZONES											
Site #	Site Name	Site Type	Parcel	Description	Map Source	Photo Source	Text Source	Pers. Comm	A	B	C	D	E	F	G	H	K	L	
1 [track]		Railways, roads and tracks	Part Pukehou 5L2A Block	Represented as location without extent or direction on Public Works plan.	PWD 8555				X										
2 Waitohu stream		Geology and fauna	Part Pukehou 5L2A Block	According to Eldson Best the Waitohu stream was named after a sign or marker (i.e. tohu) left by Haunui-a-Nanaia, an early occupant of the area.	SO 11574		Eldson, B. (1927). HAU AND WAIRAKA. The Adventures of Kupe and His Relatives. The Journal of the Polynesian Society, 36(3)		X										
3 [county road]		Railways, roads and tracks		The current SH follows the alignment of former county road linking Otaki, Manakau, Ohau and Levin.	SO 13155, SO 13154				X										
4 [abandoned county road]		Railways, roads and tracks	Part Section 1 SO 17751, Pukehou 5L1A1 Block SO 489585, Lot 7 DP 87750, Lot 10 DP 87750, Lot 8 DP 87750, Lot 1 DP 54714, Lot 9 DP 87750	A former alignment of the county road that was replaced by a deviation along the line of the existing SH 1.	ML 1031, SO 13155				X										
5 [house]		Buildings and structures	Lot 1 DP 27434	Possible pre-1900 house tentatively identified on the basis of the building footprint and established gardens.		SN 181			X										
6 [house]		Buildings and structures	Lot 1 DP 6025	Late 19th C house identified by land owner during 2017.		SN 181			X										
7 [WWII American military camp shed]		Buildings and structures	Lot 1 DP 6025	A large shed transported from the American military camp at Queen Elizabeth Park, Paekakariki.				Land owner	X										
8 Waerengapoka clearing		Occupied clearing	Lot 1 DP 371211, Lot 1 DP 31303, Lot 2 DP 371211	A cultivated clearing of Ngati Kauwhata and/or Ngati Pare.	SO 11039		MLC 12-05-1873		X										
9 Waitaro swamp		Geology and fauna	Lot 1 DP 371211, Lot 1 DP 31303, Lot 2 DP 371211	A deep, watery swamp where hinaki were set for the taking of eels.	Wellington 2013 DEM		Horowhenua (Adkin, 1948)		X										
10 [track]		Railways, roads and tracks	Lot 1 DP 31303, Lot 10 DP 87750, Lot 8 DP 87750, Lot 9 DP 87750, Lot 2 DP 81659	Approximate location of an early inland walking trail on a roughly north-south orientation.	SO 11234				X										
11 Pukehou Block No. 4A1		Native Reserves	Lot 7 DP 87750, Lot 10 DP 87750, Lot 8 DP 87750, Lot 9 DP 87750		ML 367, SO 12699				X										
12 Parauku clearing		Occupied clearing	Lot 1 DP 31303, Lot 10 DP 87750, Lot 2 DP 81659	A large cultivated clearing extending to the lower slopes of Pukehou, the ownership of which was strongly contested by multiple parties in the mid-19th C.	SO 11234, SO 11574		Horowhenua (Adkin, 1948)		X										
13 Otepuia/Otipua swamp		Geology and fauna	Lot 7 DP 87750, Lot 6 DP 87749, Lot 5 DP 87749, Lot 2 DP 320898	The 'place of the edible seeds', a large swamp with a large clearing(s) on the banks that were cultivated. Ownership of the land around this swamp was strongly contested by multiple parties in the mid-19th C.	ML 367, ML 1228, Wellington 2013 DEM		Horowhenua (Adkin, 1948)		X	X									
14 Pukehou		Geology and fauna		A prominent hill that is a general location marker for many events and sites that are only tentatively located. The hill itself was an important site for bird snaring/hunting, but burials and pa sites are also associated with this location.	ML 367, SO 11039		Horowhenua (Adkin, 1948)		X	X									
15 [house]		Buildings and structures	Part Lot 28 DP 415	Possible pre-1900 house tentatively identified on the basis of the building footprint, established trees and visual appearance (Google Streetview).		SN 181				X									
16 Waiatea stream		Geology and fauna	Part Lot 28 DP 415, Lot 1 DP 54757	The 'stream of the paper-mulberry (<i>Broussonetia papyrifera</i>), the paper-mulberry (aute) was cultivated for the fabric that was derived from its bark.	SO 11900, S 11574, SO 12698		Horowhenua (Adkin, 1948)			X									
17 Manakau stream		Geology and fauna	Lot 3 DP 369031, Lot 1 DP 394488, Lot 2 DP 369031, Lot 1 DP 54757, Lot 2 DP 394488, Lot 3 DP 394488, Lot 20 DP 394488, Lot 21 DP 394488, Lot 19 DP 394488	The name of this stream is derived from the name said to have been applied by Te Rauparaha to the general area.	SO 11900, SO 12698		Horowhenua (Adkin, 1948)			X									
18 [house]		Buildings and structures	Lot 1 DP 369031	Possible pre-1900 house tentatively identified on the basis of the building footprint and established gardens.		SN 181				X									
19 South Manakau Road		Railways, roads and tracks			SO 12698, SO 12699, SO 13760					X									
20 Puketawhiwhi/Te Tahawahakarungamangahua hill		Geology and fauna	Lot 2 DP 349423, Lot 1 DP 54937, Lot 4 DP 408558, Lot 3 DP 72857, Lot 2 DP 398440, Lot 1 DP 22763, Lot 1 DP 405870	The 'kōhūhū (<i>Pittosporum tenuifolium</i>) hill' or 'the hill above the Huiā stream'.	SO 11038		Horowhenua (Adkin, 1948)			X	X								
21 Puna (springs)		Geology and fauna	Lot 1 DP 69689, Lot 2 DP 396584	There are a small number of springs located between Puketawhiwhi/Te Tahawahakarungamangahua and the Hanawera Ridge that are of cultural significance and may also be of archaeological significance.				Iwi			X								
22 Mangahua stream		Geology and fauna	Part Lot 3 DP 415, Lot 2 DP 415, Lot 2 DP 469288, Lot 2 DP 396584, Lot 3 DP 472237, Lot 3 DP 409803, Lot 1 DP 69689, Lot 4 DP 472237, Lot 1 DP 396584, Lot 1 DP 535861, Lot 1 DP 405870	A stream where the huiā bird was plentiful.	ML 888, Wellington 2013 DEM		Horowhenua (Adkin, 1948)				X								
23 R. Whiley house and 1st Manakau School		Buildings and structures	Lot 1 DP 61323	In 1887 Robert Whiley built this house for his family and volunteered its temporarily use as the first school at Manakau.		SN 181	Manakau School Centenary				X								
24 North Manakau Road		Railways, roads and tracks			SO 12698						X	X							



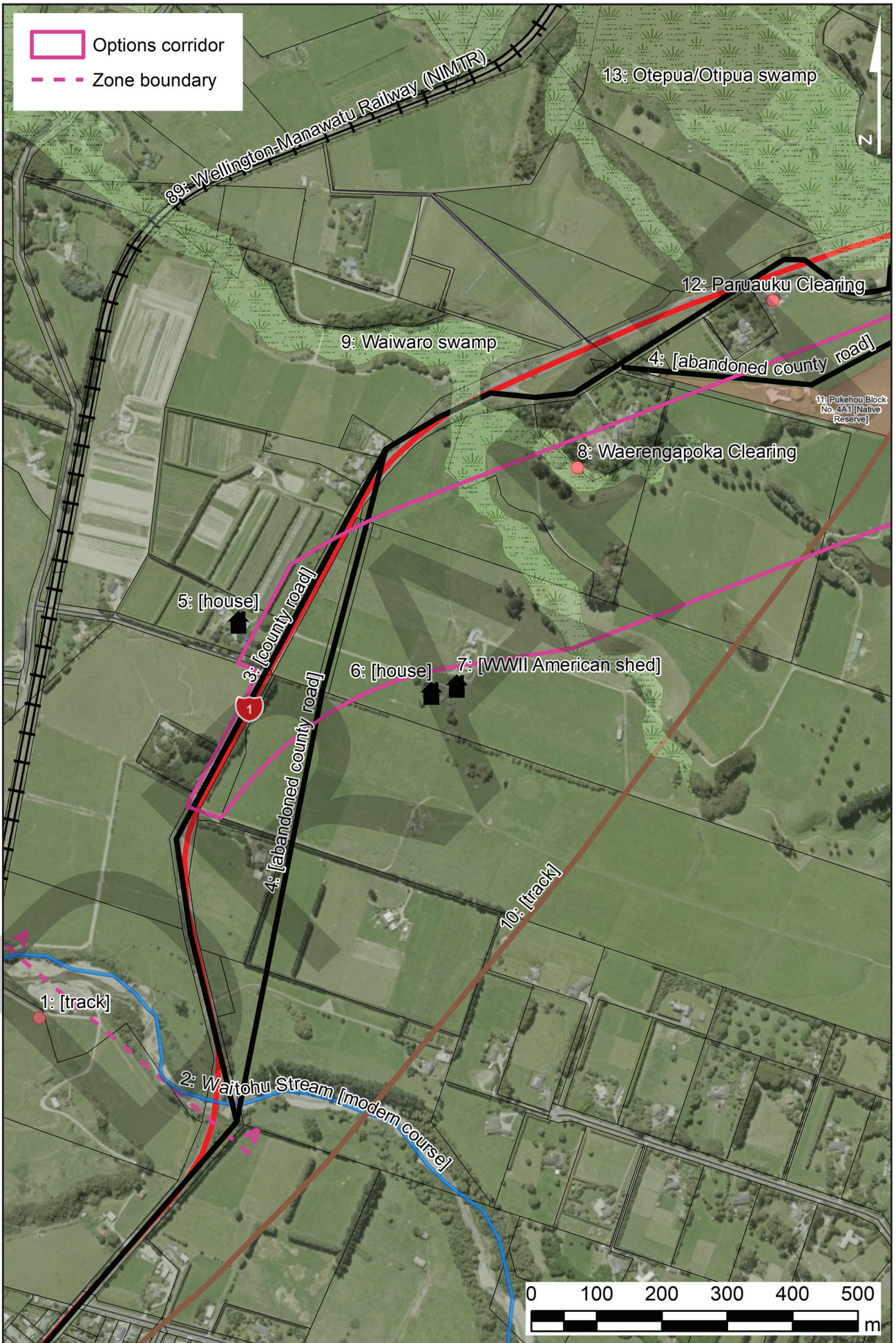
SITE DATA								ALIGNMENT ZONES											
Site #	Site Name	Site Type	Parcel	Description	Map Source	Photo Source	Text Source	Pers. Comm	A	B	C	D	E	F	G	H	K	L	
25	[village - Thomas Bevan Jnr.]	Buildings and structures	[North Manakau Road]	"Mr Thomas Bevin Jnr. ... in the early 1900s maintained a small village in his property, on the corner of North Manakau Road, employing 40 to 50 men. Roding, haulage, land clearing, a flax mill and carriage building were all under his hand, and a blacksmith and carpenter shop kept all the gear in order."			Manakau School Centenary												
26	[house]	Buildings and structures	Lot 2 DP 435730	Possible pre-1900 house tentatively identified on the basis of the building footprint.		SN 181					X								
27	[house - Sidey/Burnell]	Buildings and structures	Lot 1 DP 50378	Heavily modified villa (formerly two-storey) built by the Sidey family and later occupied by the Burnells. There is a forge and workshop on the property but its presence at this location post-dates 1940.		SN 181		Land owner				X							
28	Climie's track	Railways, roads and tracks	Lot 2 DP 454344, Lot 3 DP 454344, Lot 1 DP 454344, Section 1 SO 442512, Part Manawatu-Kukutauaki 4E3,2B Block	A track cut/used by the early survey J. D. Climie.	SO 11900							X							
29	Parikawau	Geology and fauna	Lot 3 DP 454344, Lot 1 DP 362812	A hunting ground for the shag on the south bank of the Waikawa River	SO 11038		Horowhenua (Adkin, 1948)												
30	Waikawa River	Geology and fauna	Part Manawatu-Kukutauaki 4E3,2A2 Block, Part Manawatu-Kukutauaki 4E3,2B Block, Lot 3 DP 454344, Lot 1 DP 56388	Meaning 'bitter water', the lower reaches of this river were intensively settled.	SO 11456, SO 11574, SO 12698							X							
31	Martins Road	Railways, roads and tracks			SO 12698							X							
32	Waikawa Native Reserve	Native Reserves	Part Manawatu-Kukutauaki 4E3,2A2 Block, Section 1 SO 442512, Part Manawatu-Kukutauaki 4E3,2A2 Block		ML 193							X							
33	Waikokopu stream	Geology and fauna	Lot 2 DP 384664, Ohau 3,4B2B Block, Ohau 3 Sbdn 15 and 16 No 2B Block, Part Ohau 3,1 Block, Part Ohau 3,4A Block, Ohau 3 Sbdn 15 and 16 No 1 Block	The 'stream of the kokopu', kokopu being a relatively generic term used to describe a number of small freshwater fish species.			Horowhenua (Adkin, 1948)					X							
34	Kuku East Road	Railways, roads and tracks			SO 13496							X							
35	[house]	Buildings and structures	Lot 1 DP 56764	Possible pre-1900 house site tentatively identified on the basis of the building footprint.		SN 181						X							
36	Kuku stream	Geology and fauna	Lot 1 DP 420651, Lot 2 DP 339388	The 'wood-pigeon stream', a running battle occurred on the south bank of this stream with the victims of this battle left where they fell.	ML 1034, ML 915, SO 11574			Iwi				X							
37	[house]	Buildings and structures	Ohau 3,11D Block	Possible pre-1900 house site tentatively identified on the basis of the building footprint and established trees.		SN 181						X							
38	Ohau River	Geology and fauna	Ohau 3,11D Block, Lot 1 DP 75720	Taking its name from ancient ancestor Haunui-a-Nanaia (as for the Waitohu), there were many cultivation grounds located on the banks of the Ohau River.	ML 1136, SO 11456, SO 11574							X	X						
39	[track]	Railways, roads and tracks	Lot 1 DP 75720	An track leading from the coast to paths crossing the Tararua Range was located on the north bank of the Ohau River.	ML 595								X						
40	[house and outbuildings]	Buildings and structures	Part Section 35 Block V Waiopehu SD	Possible pre-1900 house tentatively identified on the basis of the building footprint and established gardens and outbuildings.		SN 181							X						
41	Muhunua East Road	Railways, roads and tracks			SO 12978								X						
42	Muhunua Block No. 4	Native Reserves	Lot 1 DP 60994, Lot 2 DP 60994, Lot 3 DP 90212, Lot 4 DP 90212, Lot 5 DP 90212, Lot 2 DP 90212		DP 439								X						
43	[horse track]	Railways, roads and tracks	Lot 1 DP 60994, Lot 2 DP 60994, Lot 2 DP 464458, Lot 5 DP 90212, Lot 1 DP 69565, Lot 3 DP 464458,		ML 364, SO 11456								X						
44	[house]	Buildings and structures	Lot 1 DP 78980	Possible pre-1900 house site tentatively identified on the basis of the building footprint.		SN 181							X						
45	Te Waiaruhe creek	Geology and fauna	Part Lot 14 DP 2463	The 'bracken fern stream', the bracken fern had an edible rhizome and was a staple food in pre-European times.	ML 364, Horizons 2005 DEM								X						
46	[house]	Buildings and structures	Lot 1 DP 82697	Pre-1900 house tentatively identified on the basis of the building footprint.		SN 181							X						
47	[house]	Buildings and structures	Lot 1 DP 65350	Possible pre-1900 house tentatively identified on the basis of the building footprint.		SN 181								X					
48	[house]	Buildings and structures	Lot 1 DP 55800	Possible pre-1900 house tentatively identified on the basis of the building footprint.		SN 181								X					
49	Kohitere clearing	Occupied clearing	Lot 1 DP 29076, Part Section 67 Horowhenua East SETT, Lot 2 DP 427531, Part Lot 3 DP 25093, Lot 1 DP 69127, Lot 2 DP 86751, Part Section 68 Horowhenua East SETT, Lot 2 DP 69127, Lot 1 DP 25093, Lot 5 DP 25093, Lot 1 DP 427531, Lot 4 DP 40890, Section 86 Block V Waiopehu SD, Lot 2 DP 25093, Lot 4 DP 25093, Lot 1 DP 55800	A large occupied forest clearing used by Maaupoko for cultivation and catching pigs. A butchery was located in this clearing.	ML 4903, SO 14541		MLC 25-03-1873, MLC 28-3-1873							X					



SITE DATA								ALIGNMENT ZONES											
Site #	Site Name	Site Type	Parcel	Description	Map Source	Photo Source	Text Source	Pers. Comm	A	B	C	D	E	F	G	H	K	L	
50	[tramway - forestry]	Railways, roads and tracks	Lot 1 DP 29076, Lot 1 DP 69127, Part Section 68 Horowhenua East SETT, Lot 1 DP 23429, Section 66A Horowhenua East SETT, Lot 2 DP 23429	Multiple tramways leading to Bartholomew's mill at Florida Road crossed the Kohitere clearing	SO 14541										X				
51	Arapaepae Road	Railways, roads and tracks			DP 439, SO 14541, SO 12913, ML 1099										X			X	
52	Arapaepae Post Office	Buildings and structures	Part Section 68 Horowhenua East SETT	Former post office was established on this property c. 1911	SO 17683														
53	Arapaepae Creamery	Buildings and structures	Part Section 68 Horowhenua East SETT	Former creamery was established on this property c. 1911.	SO 17683														
54	Kimberley Road	Railways, roads and tracks			SO 14541										X				
55	[house]	Buildings and structures	Part Section 67 Horowhenua East SETT	Possible pre-1900 house tentatively identified on the basis of the building footprint.		SN 181									X				
56	[house]	Buildings and structures	Lot 2 DP 318500	Possible pre-1900 house tentatively identified on the basis of the building footprint.		SN 181									X				
57	[house]	Buildings and structures	Lot 1 DP 15592	Possible pre-1900 house tentatively identified on the basis of the building footprint.		SN 181									X				
58	Waiore	Geology and fauna		Unknown, possibly an old well.	ML 4903										X				
59	[track]	Railways, roads and tracks	Part Lot 3 DP 6490, Lot 1 DP 63980, Lot 1 DP 24471	A track connecting the Weraroa clearing to birding camps on the Arapaepae Ridge.	ML 4903											X			
60	James Prouse's house, 'Ashleigh'	Buildings and structures	Lot 2 DP 86925	Two storey villa in near original condition and with multiple out-buildings in various states of repair/disrepair. James Prouse was one of two brothers, the other being Richard Prouse, recognised for their contribution to the early life and success of Levin.			Horowhenua County Rate Books	Land owner									X		
61	Queen Street East	Railways, roads and tracks			SO 12913											X	X		
62	Waimarie stream	Geology and fauna	Part Lot 2 DP 1941, Part Lot 4 DP 1941, Lot 1 DP 514857, Lot 2 DP 422327	A temporary stream that flowed during periods of inundation, the dry bed serving as a walking track leading to clearings the Arapaepae Ridge at other times of the year.			Horowhenua (Adkin, 1948)										X		
63	[house]	Buildings and structures	Part Lot 4 DP 1941	Possible pre-1900 house site, but may also be a shed. Other outbuildings/sheds on same property amongst mature trees. Tentatively identified on the basis of the building footprint.		SN 181											X		
64	[house]	Buildings and structures	Lot 2 DP 82330	Possible pre-1900 house with some outbuildings or sheds and a few mature trees and hedges. Tentatively identified on the basis of the building footprint.		SN 181											X		
65	Waitaiki stream	Geology and fauna	Lot 1 DP 323615, Lot 2 DP 323615, Lot 1 DP 69491, Section 51 Block II Waiopehu SD, Lot 2 DP 396758, Part Lot 1 DP 29766	[taiki = wicker basket, c.f. hinaki?]	Horizons 2005 DEM		Horowhenua (Adkin, 1948)												X
66	[house]	Buildings and structures	Lot 2 DP 408577	Possible pre-1900 house tentatively identified on the basis of the building footprint and visual appearance (Google Streetview).															X
67	[house]	Buildings and structures	Lot 22 DP 2291	Possible pre-1900 house tentatively identified on the basis of the building footprint and mature trees.		SN 181													X
68	[house]	Buildings and structures	Lot 6 DP 2291	Possible pre-1900 house tentatively identified on the basis of the building footprint and visual appearance (Google Streetview).		SN 181													X
69	[house]	Buildings and structures	Part Lot 7 DP 2291	Possible pre-1900 house tentatively identified on the basis of the building footprint and mature trees.		SN 181													X
70	[house]	Buildings and structures	Lot 2 DP 69491	Possible pre-1900 house tentatively identified on the basis of the building footprint and mature trees.		SN 181													X
71	[house]	Buildings and structures	Lot 2 DP 27455	Possible pre-1900 house or building tentatively identified on the basis of the building footprint and mature trees.		SN 181													X
72	Te Aratoaka track	Railways, roads and tracks	Lot 2 DP 323615, Lot 25 DP 2291, Lot 1 DP 69491	A track connecting Kawiwi clearing, on the north shore of Lake Horowhenua, to the Arapaepae Ridge.	ML 4903														X
73	Waihou Road	Railways, roads and tracks			ML 1099														X
74	[house]	Buildings and structures	Lot 1 DP 514399	Possible pre-1900 house tentatively identified on the basis of the building footprint.		SN 181													X
75	Punaoho (spring)	Geology and fauna	Lot 2 DP 72257	The 'bountiful spring', Punaoho was a spring used by parties of bird-spearmen and food-foragers operating in the dense forest and was considered to have excellent drinking water.			Horowhenua (Adkin, 1948)												X
76	[whare]	Buildings and structures	Lot 1 DP 72257	Small whare shown on survey plan, probably located in small cleared space surrounded by established trees.	SO 16683	SN 181													X

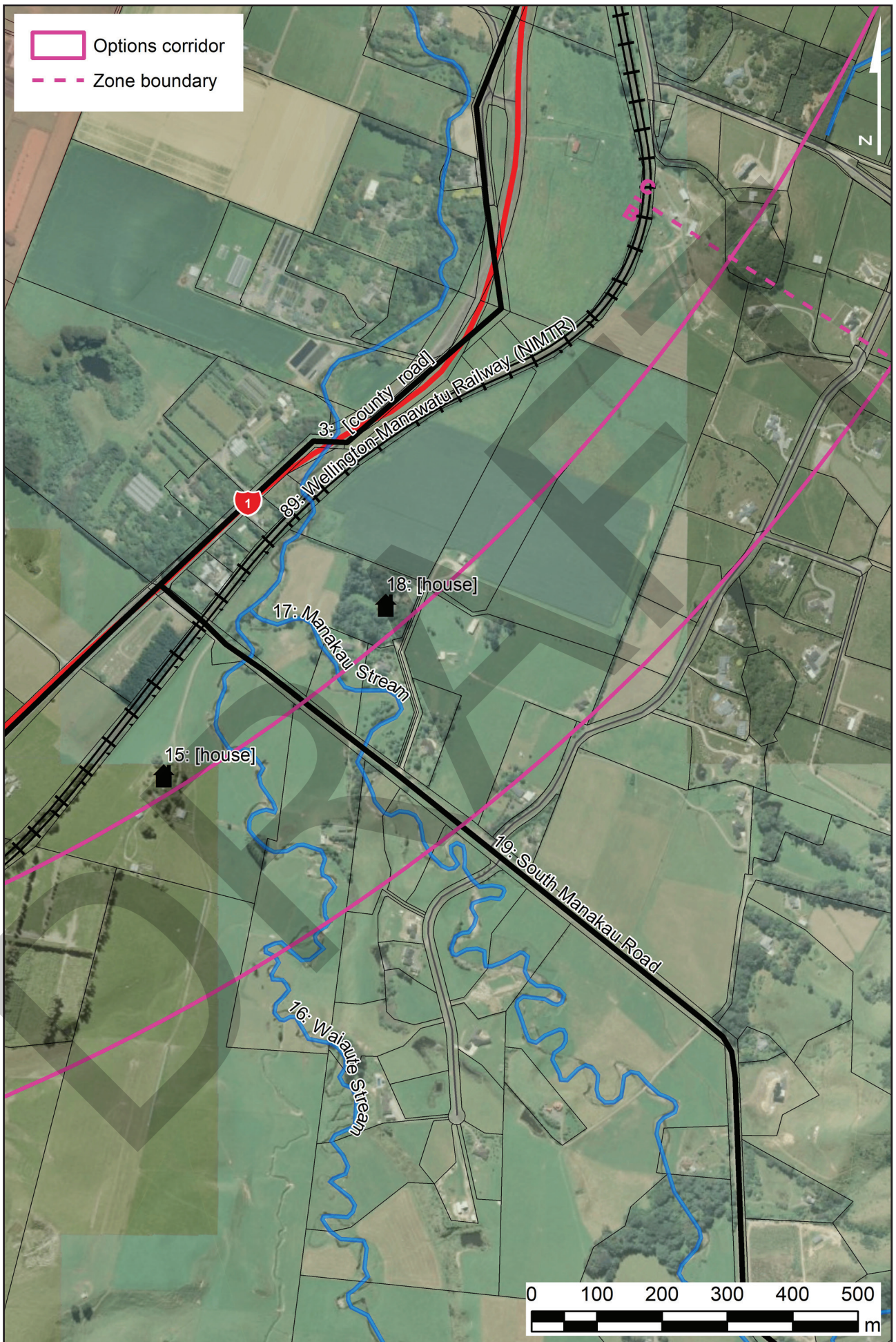


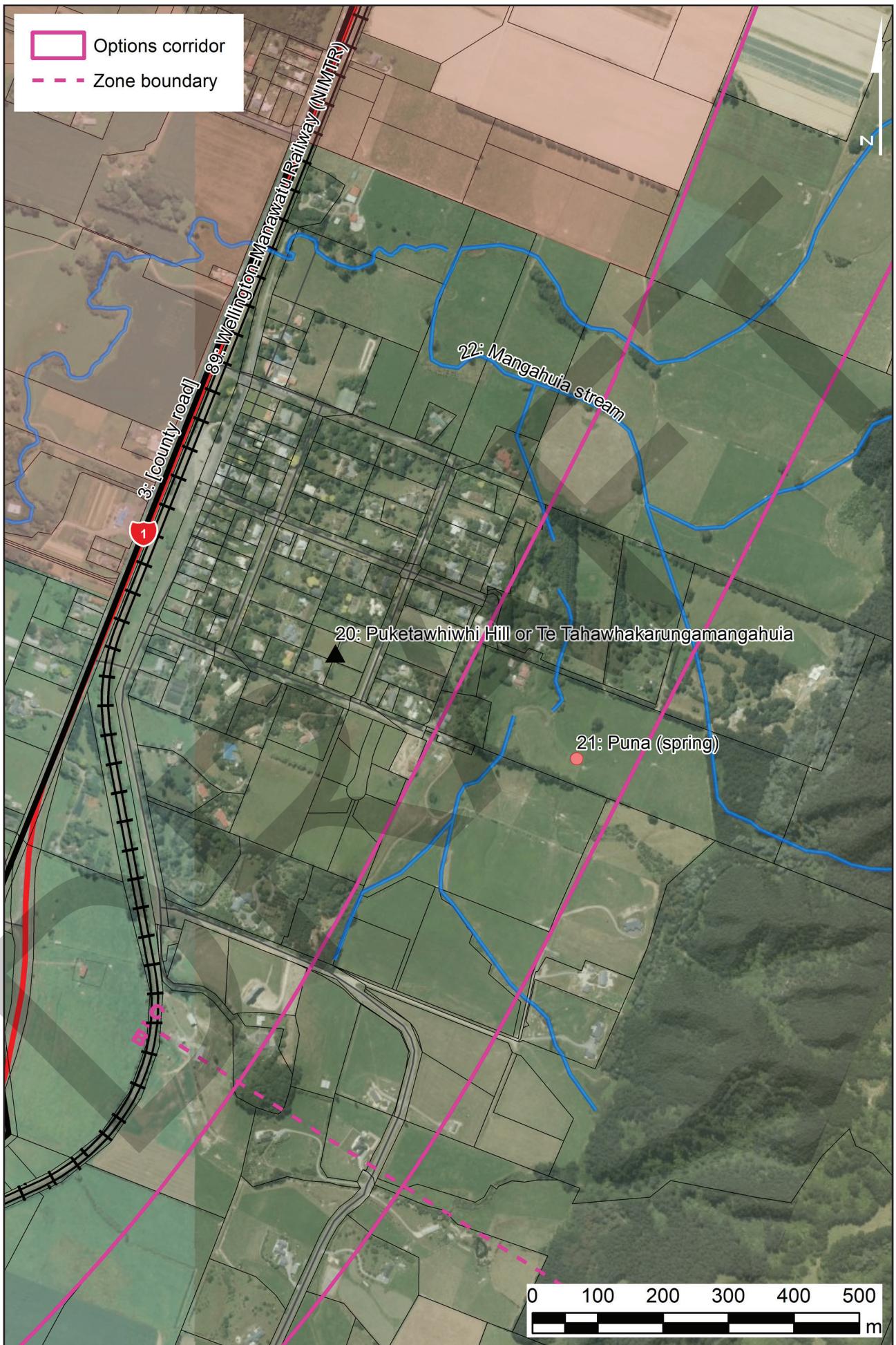
SITE DATA								ALIGNMENT ZONES												
Site #	Site Name	Site Type	Parcel	Description	Map Source	Photo Source	Text Source	Pers. Comm	A	B	C	D	E	F	G	H	K	L		
77	Te Awa a te Tau/Koputaroa stream	Geology and fauna	Part Lot 9 DP 417, Section 1 SO 405188, Part Lot 1 DP 65805, Part Lot 3 DP 447	The upper reaches of the Koputaroa stream also go by the name Te Awa-a-Te Tau, 'the stream of Te Tau', and contain tuna (eel), koeke (fresh-water crayfish), kakahi (fresh-water mussel). Adkin states that the banks of this stream are of high archaeological interest, with "very numerous remains of umu or hangi... occur along the course of the stream or in its immediate vicinity."			Horowhenua (Adkin, 1948)											X		
78	[house]	Buildings and structures	Lot 1 DP 89255	Possible pre-1900 house tentatively identified on the basis of the building footprint. This building has been relocated to this site so the archaeological issues are restricted to the building itself.		SN 181, LINZ												X		
79	[house]	Buildings and structures	Lot 2 DP 89255	Possible pre-1900 house tentatively identified on the basis of the building footprint. This building has been relocated to this site so the archaeological issues are restricted to the building itself.		SN 181, LINZ												X		
80	[house]	Buildings and structures	Lot 1 DP 52953	Possible pre-1900 house tentatively identified on the basis of the building footprint.		SN 181												X		
81	[house]	Buildings and structures	Lot 1 DP 396758	Possible pre-1900 house tentatively identified on the basis of the building footprint.		SN 181												X		
82	[house]	Buildings and structures	Section 51 Block II Wailopehu SD	Possible pre-1900 house tentatively identified on the basis of the building footprint. Unclear if still standing or demolished and rebuild on top.		SN 181												X		
83	Waikarito stream	Geology and fauna	Lot 1 DP 73153	The 'raupo (karito) stream', raupo was used in a number of ways by Maori including as a thatching material and as a fibre for clothing.			Horowhenua (Adkin, 1948)											X	X	
84	[track to Kaihinau]	Railways, roads and tracks	Lot 2 DP 428802, Lot 2 DP 73153, Lot 1 DP 73153	Approximate location of an early inland walking trail on a roughly northeast-southwest orientation.	ML 4903													X	X	
85	[house]	Buildings and structures	Lot 6 DP 57100	Possible pre-1900 house tentatively identified on the basis of the building footprint and established garden.		SN 181													X	
86	[building]	Buildings and structures	Lot 6 DP 57100	Possible pre-1900 building/whare/house site tentatively identified on the basis of the building footprint.		SN 181													X	
87	[building]	Buildings and structures	Lot 1 DP 87383	Possible pre-1900 building/whare/house site tentatively identified on the basis of the building footprint.		SN 181													X	
88	[house]	Buildings and structures	Lot 1 DP 70766	Possible pre-1900 house site tentatively identified on the basis of the building footprint and mature trees.		SN 181													X	
89	Wellington-Manawatu Railway (NIMTR)	Railways, roads and tracks																	X	
90	[house]	Buildings and structures	Lot 1 DP 396990	Possible pre-1900 house site tentatively identified on the basis of the building footprint and mature trees.		SN 181													X	
91	[house]	Buildings and structures	Part Lot 5 DP 872 Lot 1 DP 319993, Lot 1 DP 19771, Lot 2 DP 410379, Lot 1 DP 410379, Lot 3 DP 410379, Lot 4 DP 19771, Lot 3 DP 19771, Part Lot 8 DP 4291, Lot 1 DP 305662, Lot 1 DP 40660, Lot 2 DP 40660, Part Lot 6 DP 4291, Lot 1 DP 22733, Part Lot 5 DP 4291, Lot 1 DP 14380, Lot 2 DP 14380, Lot 3 DP 14380, Lot 4 DP 14380, Part Lot 5 DP 14380, Part Lot 5 DP 14380, Lot 6 DP 14380	Possible pre-1900 house tentatively identified on the basis of the building footprint and mature trees.		SN 181														X
92	Heatherlea' Native Reserve	Native Reserves		Land retained as a native reserve following breakup of the Manawatu Kukuatuaiki 7D Block. Although forested until relatively, approximately half of the land to the south of Heatherlea East Road was cleared prior to 1900.	DP 391														X	
93	Heatherlea East Road	Railways, roads and tracks			DP 872														X	
94	Avenue North Road	Railways, roads and tracks			SO 13005														X	
95	Koputaroa Road	Railways, roads and tracks			SO 13005														X	
96	[house]	Buildings and structures	Section 4 SO 436187	Late 19th C house identified by land owner during 2017.		SN 181													X	
97	[house]	Buildings and structures	Lot 1 DP 18535	Possible pre-1900 house site tentatively identified on the basis of the building footprint.		SN 181													X	
98	Waituhi snaring tree	Geology and fauna	Lot 1 DP 18535, Lot 1 DP 89441	A bird snaring location on a small knoll or rise on the west side of and close to the Heatherlea-Koputaroa intersection.			Horowhenua (Adkin, 1948)												X	



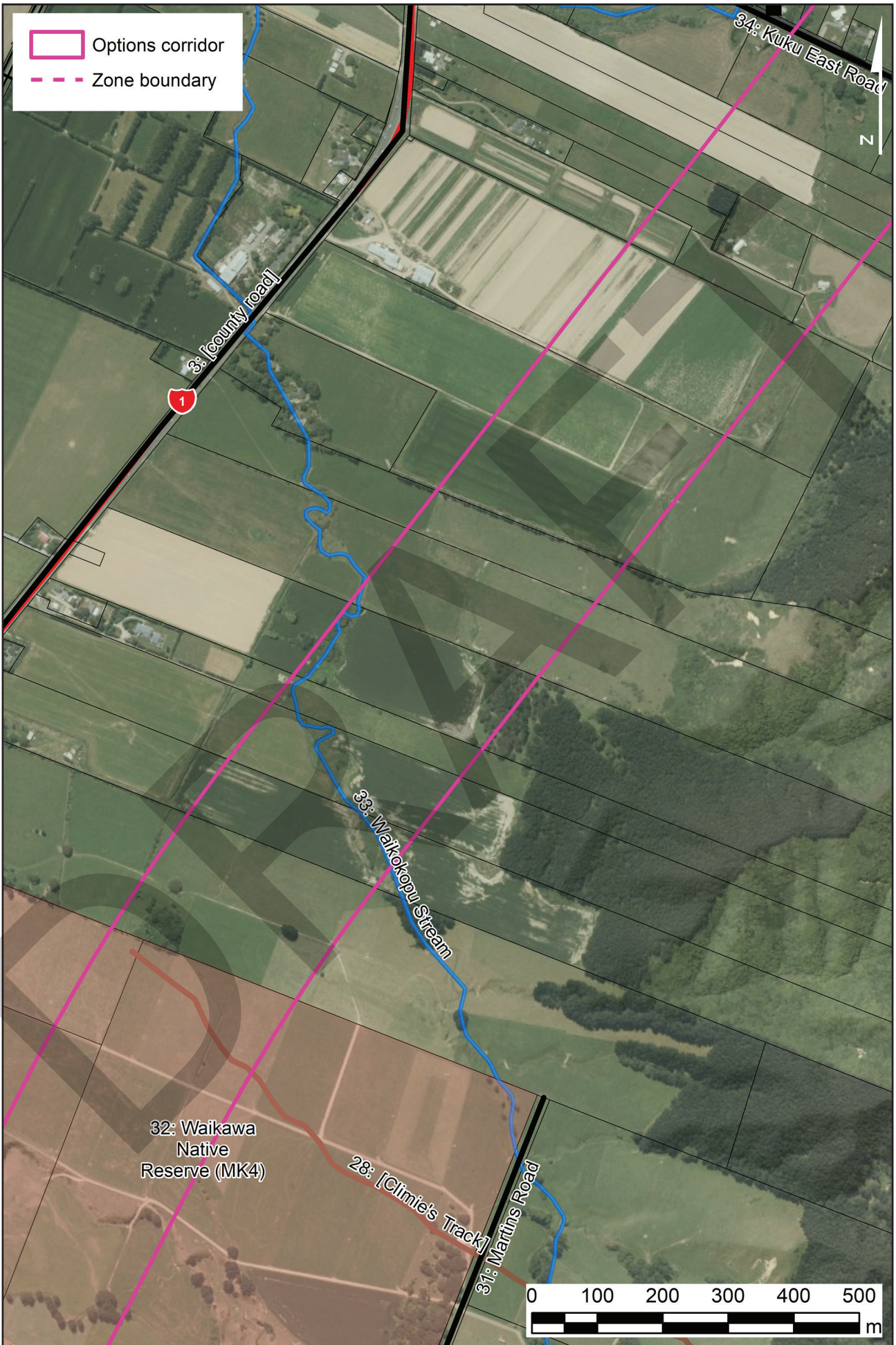


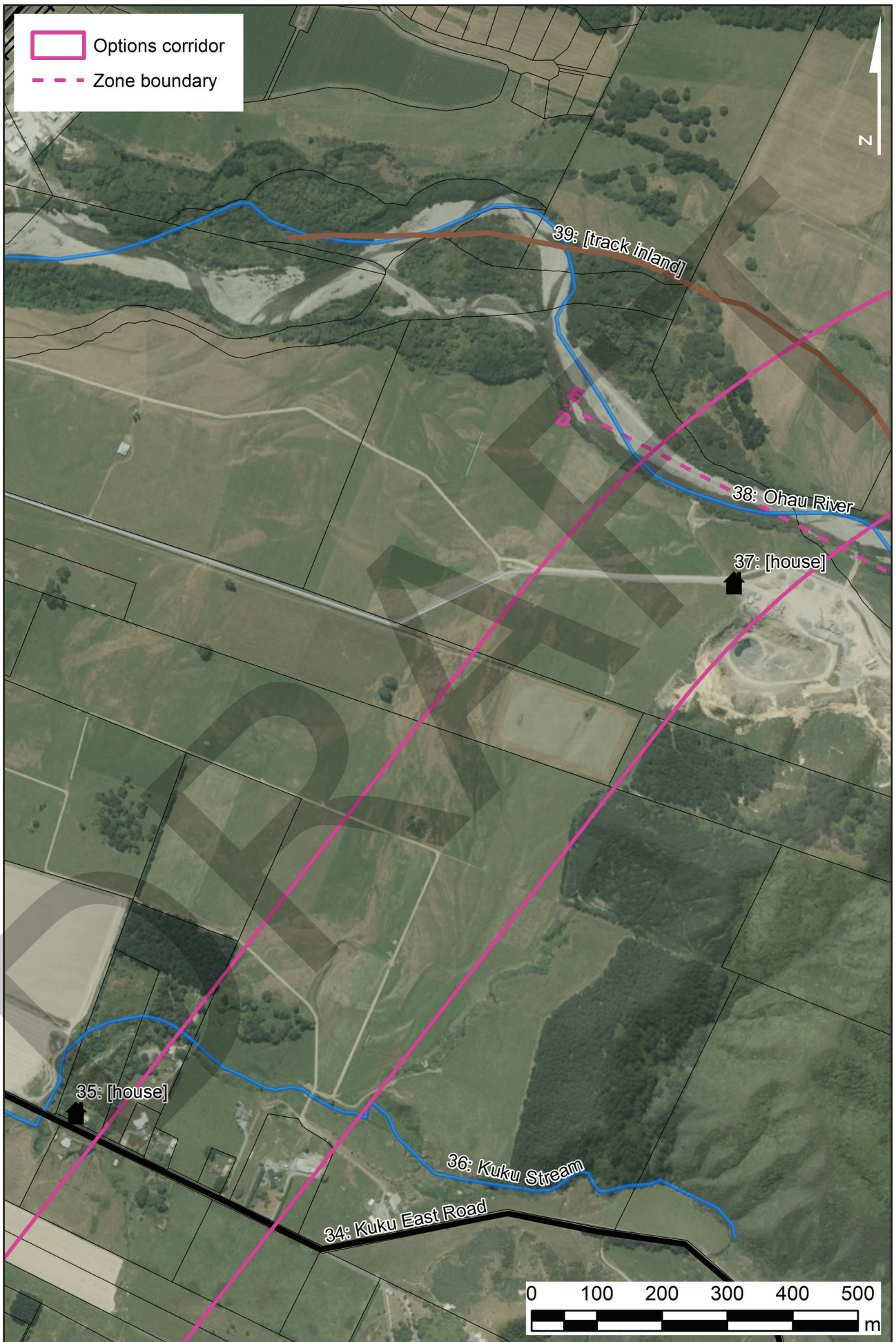


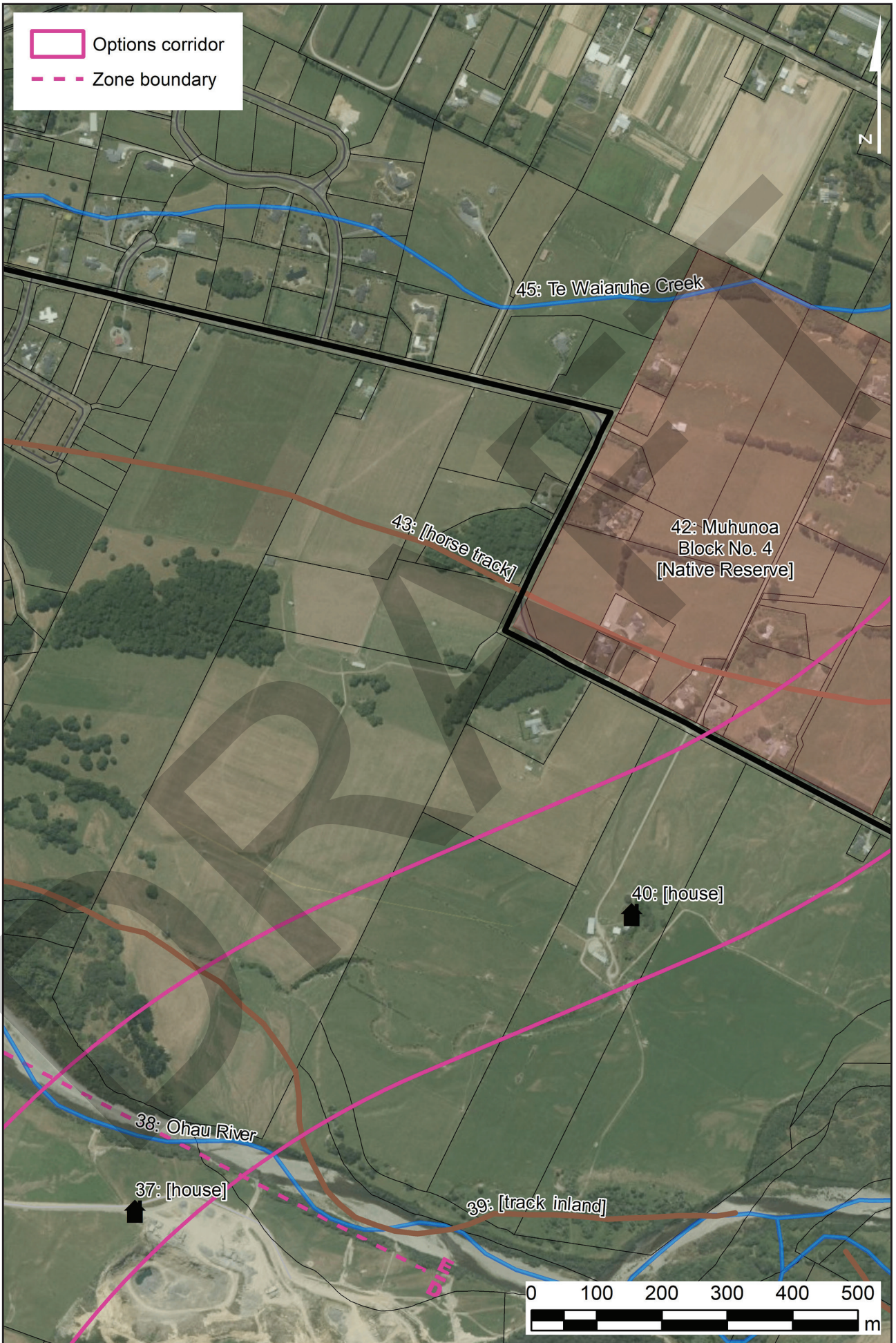


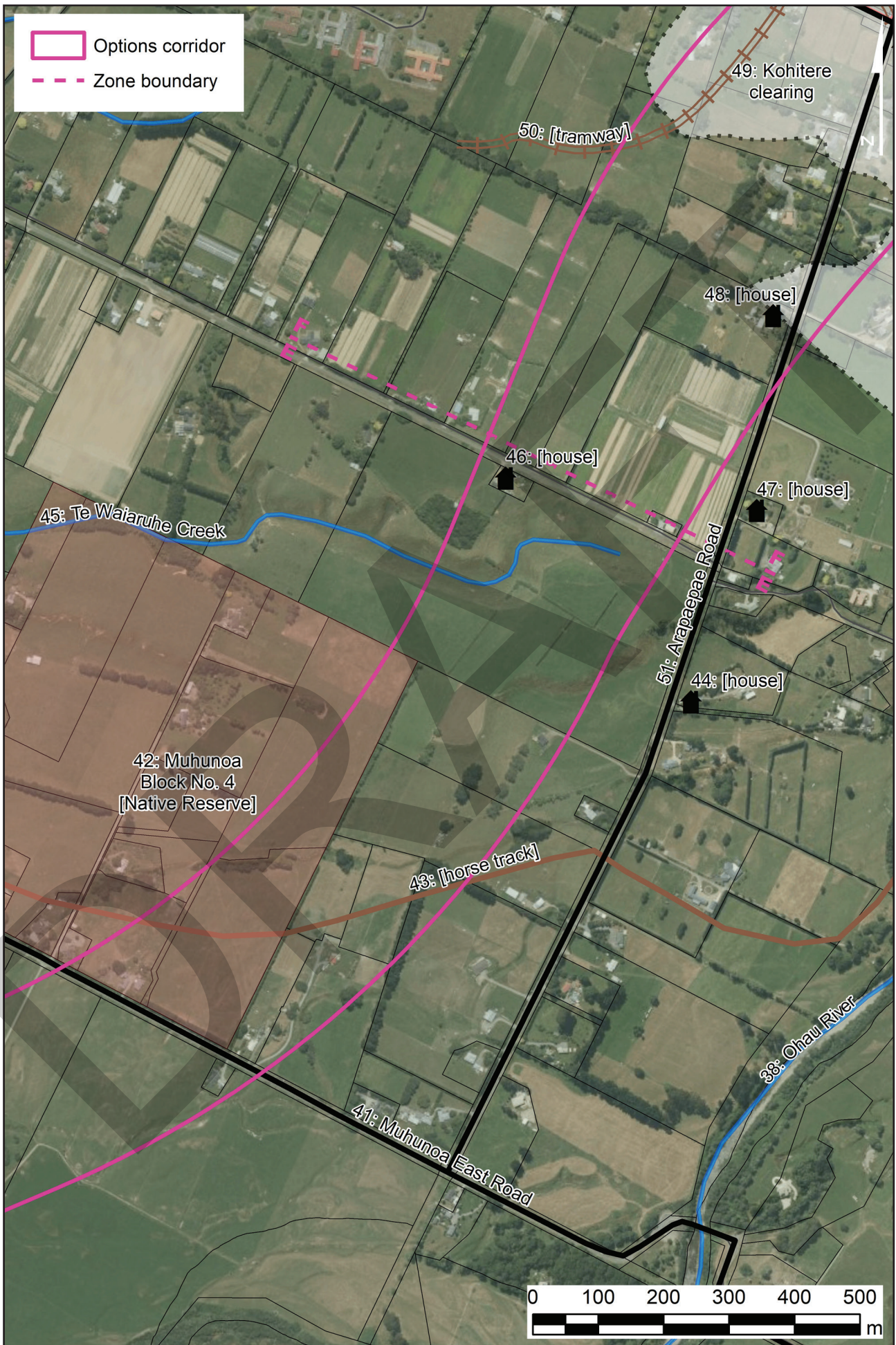


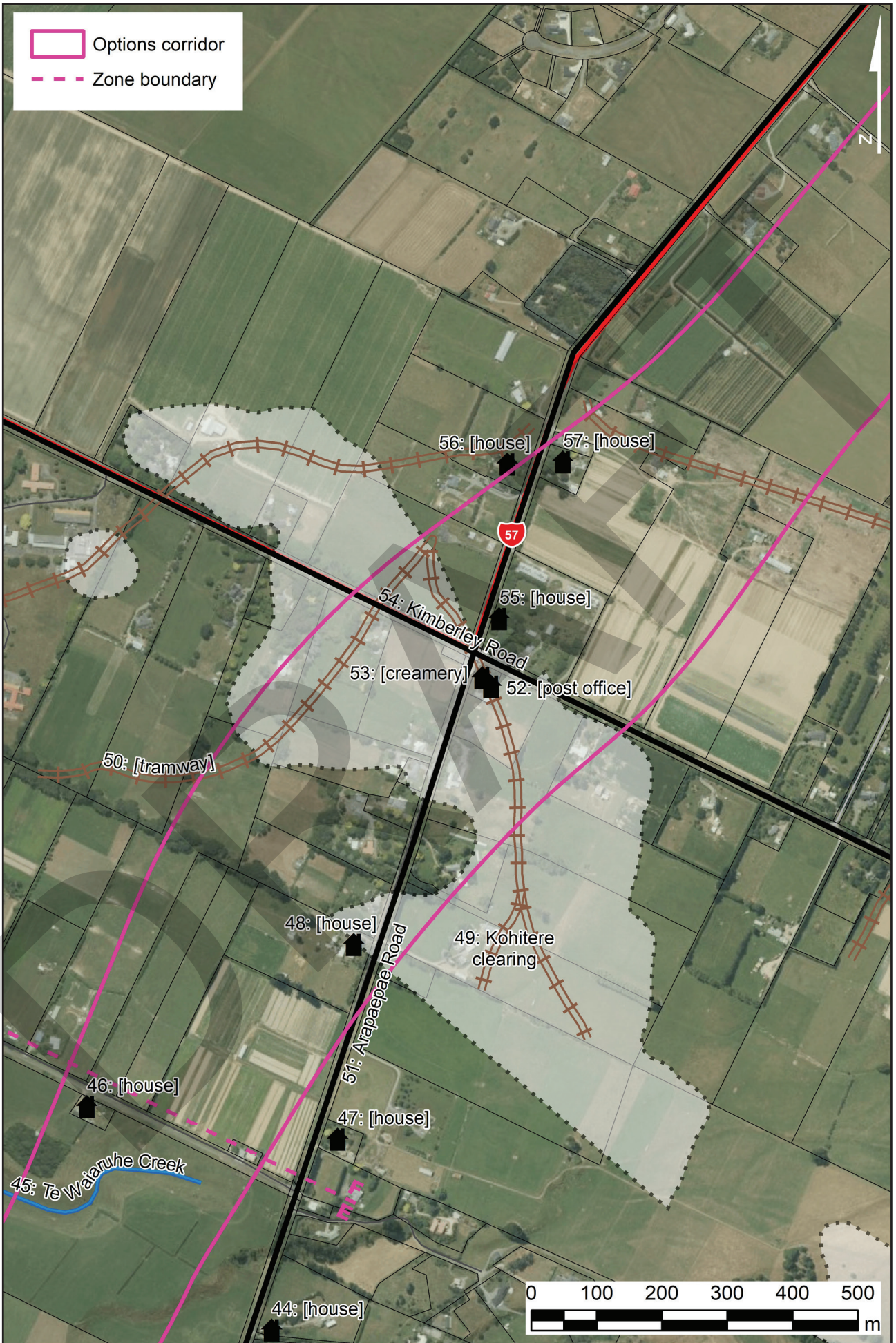




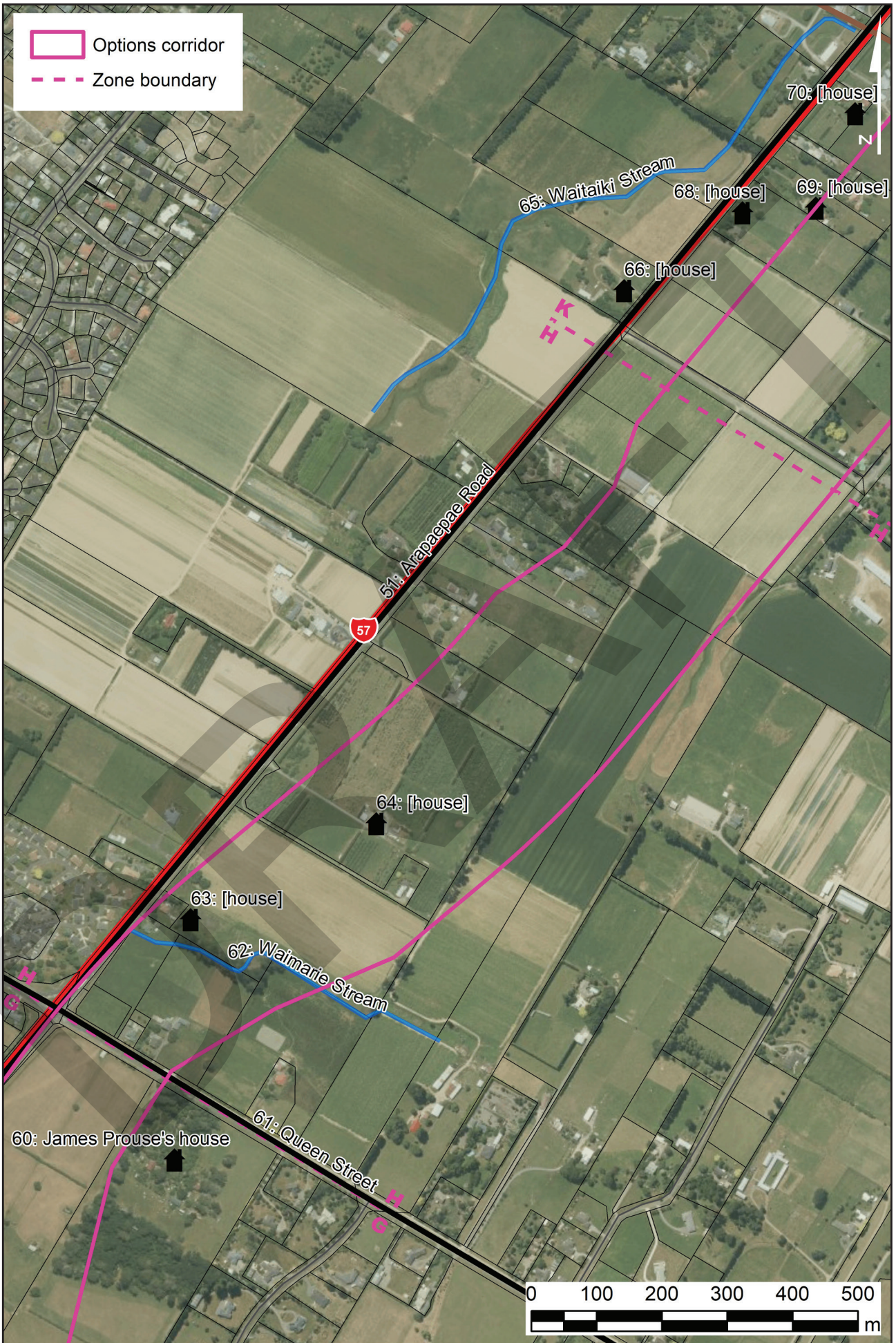


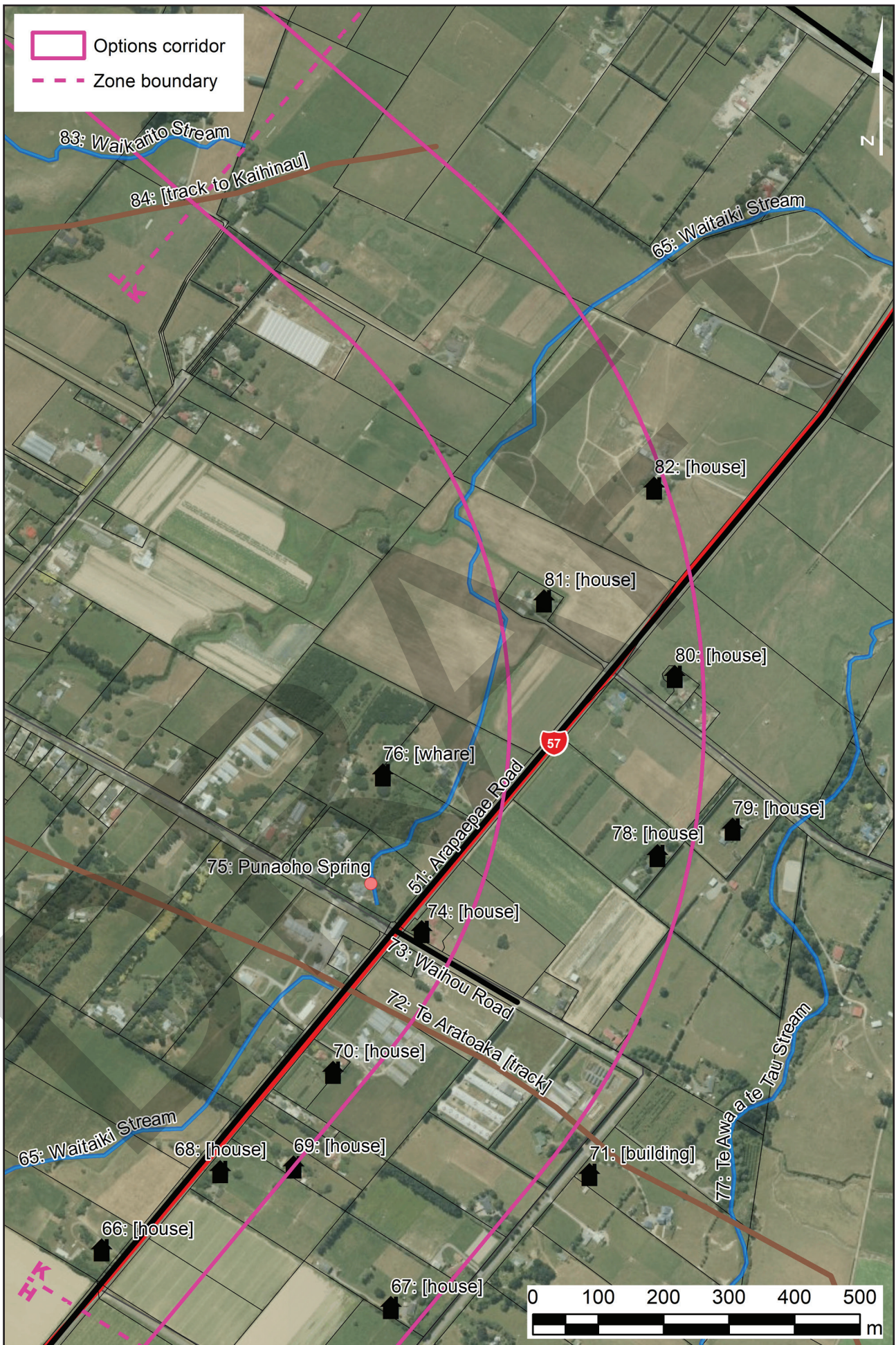
















APPENDIX 2:

ARCHAEOLOGICAL VALUES ASSESSMENT CRITERIA

The following describes the criteria used to assess the archaeological values presented in this report. This assessment follows guidelines set down by Heritage New Zealand, formerly the New Zealand Historic Places Trust (NZHPT), which have been specifically formulated for the evaluation of values relating to archaeological sites.

Assessment Criteria

“Archaeological values relate to the potential of a place to provide evidence of the history of New Zealand. This potential is framed within the existing body of archaeological knowledge, and current research questions and hypotheses about New Zealand’s past. An understanding of the overall archaeological resource is therefore required.” NZHPT 2006

Following Gumbley (1995) and Walton (2002), archaeological values can be divided into two contextual categories. The first looks at the intra-site context and evaluates a site as a distinct and discrete entity.

- Condition:

How complete is the site? Have parts of the site been damaged or destroyed? A complete and undamaged site has a high value, a partially destroyed or damaged site has a moderate value and a site which has suffered significant damage or destruction will have a low value.

- Rarity/Uniqueness:

Rarity is classified into local, regional and national contexts. Sites that are rare at a local level only are afforded a low significance, those that are rare at a regional level are given a moderate value, and sites that are rare nationwide are held to have a high significance. Sites that are not rare at any of these spatial levels have no significance in this category.

- Information Potential:

Does the site have the potential to contribute to the expansion of human knowledge about our past? For sites where the expected feature set is predicted to support questions of a purely local interest the information potential is low. Where the archaeology may contribute to the resolution of questions of a national interest level the potential is considered to be moderate. The highest level of information potential is reserved for those sites that may be able to contribute information to research themes that are of a global interest.

The second set of archaeological values relate to the inter-site contexts that evaluate individually distinct and discrete sites as subsets of a great whole.

- Archaeological Landscape/Contextual Value:

What is the context of the site within the surrounding archaeological landscape? Does the site derive all or part of its meaning from, or impart meaning to, other sites within the wider landscape? If a site is one of many amongst other sites of a similar nature the contextual value is low. Where a site imparts additional meaning to, or derives additional meaning from, one or more other sites by virtual or landscape, structural, historic, cultural or other relationships the contextual value of those sites is collectively

high.

- Amenity Value:

Amenity value is a synthesis of the above criteria framed as a measure of a sites potential to reach beyond a purely scientific audience and communicate its multiplicity of values to a wider public audience. This measure particularly favours dominant sites that define the context of the wider landscape, and those with visible surface features in a good condition of preservation, with high values. Sites that derive their value through their relationship to more dominant sites, and those with little or no visible surface features, will have a low amenity value.

- Cultural Association:

How are the past and the present connected through the relationship of the historic site to the people of the present, be they tangata whenua, other descendant groups or the general public? The highest values are afforded to sites that are the nexus of a direct relationship between important historic events and the social memory of the descendants who played out those events. Moderate values more generally apply to sites where one part of this relationship, important historic events or social memory, is retained. Where neither aspect of to this relationship are found a low value is applied.

Other values can also include ((NZHPT), 2004):

1. Architectural
2. Historic
3. Scientific
4. Technological
5. Aesthetic/Visual impact
6. Cultural

APPENDIX 3:

PRELIMINARY SITE VALUES, ARCHAEOLOGICAL POTENTIAL AND POTENTIAL EFFECTS ASSESSMENT

The following pages present the full list of archaeological sites and the preliminary assessment of their heritage values, archaeological potential (per alignment) and potential effects (per alignment). These values have been assessed on the basis of a predominantly desktop assessment and high-level design information, they may reasonably be expected to change as further information comes to hand and more detailed plans are developed.

Site #	Site Name	Indicative Archaeological Values (Heritage NZ)								Green		White		Cyan		Purple		Dark Blue		Orange		Yellow		Black	
		Rarity/Uniqueness	Information potential	Contextual value	Aesthetic value	Cultural associations	Historic	TOTAL VALUE	Zone	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect
1	[track]	2	1	2	1	1	0	7	A																
2	Waitohu stream	1	1	2	2	2	0	8	A																
3	[county road]	1	1	1	1	1	0	5	A	5	1	5	1												
4	[old county road]	1	1	1	1	1	0	5	A	5	1	5	1												
5	[house]	1	1	1	2	1	0	6	A	4	2	4	3												
6	[house]	1	1	1	2	1	0	6	A	4	2	4	2												
7	[WWII American military camp shed]	3	1	2	2	1	2	11	A	3	1	3	1												
8	Waerengapoka clearing	2	2	2	1	2	0	9	A	3	4	3	4												
9	Waiwaro swamp	1	1	2	2	2	0	8	A	2	2	2	2												
10	[track]	2	1	2	1	1	0	7	A	2	1	2	1												
11	Pukehou Block No. 4A1	2	1	1	1	2	0	7	A	3	3	3	3												
12	Parauku clearing	2	2	3	1	3	2	13	A	3	3	3	2												
13	Otepu/Otipua swamp	1	1	2	2	2	0	8	A/B	2	2	2	2	2	2										
14	Pukehou	2	2	3	3	3	2	15	A/B	4	3	4	3	4	3	4	3								
15	[house]	1	1	1	2	1	0	6	B	4	2	4	2	4	2	4	2								
16	Waiate stream	1	2	2	2	2	1	10	B	2	2	2	2	2	2	2	2								
17	Manakau stream	1	1	2	2	2	0	8	B	2	2	2	2	2	2	2	2								
18	[house]	1	1	1	2	1	0	6	B	4	2	4	3	4	2	4	2								
19	South Manakau Road	1	1	1	1	1	0	5	B	5	1	5	1	5	1	5	1								
20	Puketawhiwi/Te Tahawhakarungamangahua hill	1	1	2	2	2	0	8	B/C																
21	Puna (springs)	1	1	2	2	2	1	9	C	2	2	2	2												
22	Mangahua stream	1	1	2	2	2	0	8	C	2	2	2	2												
23	R. Whitley house and 1st Manakau School	2	1	2	3	3	2	13	C	5	4	5	5	5	4	5	4								
24	North Manakau Road	1	1	1	1	1	0	5	C/D	5	1	5	1												
25	[village - Thomas Bevan Jnr.]	3	2	3	1	2	1	12	C					5	1										
26	[house]	1	1	1	2	1	0	6	C	4	3	4	3												
27	[house - Sidey/Burnell]	2	1	1	2	2	1	9	D					5	3										
28	Climie's track	2	1	1	1	1	1	7	D					2	1										
29	Parikawau	2	1	1	2	2	0	8	D					2	2										
30	Waikawa River	1	1	2	2	2	0	8	D					2	2										
31	Martins Road	1	1	1	1	1	0	5	D																
32	Waikawa Native Reserve	2	1	1	1	2	0	7	D					3	2										
33	Waikokopu stream	1	1	2	2	2	0	8	D					2	2										
34	Kuku East Road	1	1	1	1	1	0	5	D					5	1										
35	[house]	1	1	1	1	1	0	5	D																
36	Kuku stream	1	1	2	2	2	1	9	D					2	3										
37	[house]	1	1	1	1	1	0	5	D																
38	Ohou River	1	1	2	2	2	0	8	D/E	3	2	3	2												
39	[track]	2	1	2	1	1	0	7	E					2	1										
40	[house and outbuildings]	2	1	2	1	1	1	8	E																
41	Muhunoa East Road	1	1	1	1	1	0	5	E	5	1			5	1										
42	Muhunoa Block No. 4	2	1	1	1	2	0	7	E	3	2			3	2										
43	[horse track]	2	1	1	1	1	0	6	E	2	1			2	1										
44	[house]	1	1	1	1	1	0	5	E	4	3			4	3										
45	Te Waiaruhe creek	1	1	2	2	2	0	8	E	2	2			2	2										
46	[house]	1	1	1	2	1	0	6	E	5	4			5	4										
47	[house]	1	1	1	2	1	0	6	F					4	3										
48	[house]	1	1	1	2	1	0	6	F	4	5			4	5										
49	Kohitere clearing	2	2	2	2	2	1	11	F	4	3			4	3										
50	[tramway - forestry]	2	1	2	1	1	1	8	F	4	2			4	2										
51	Arapaepae Road	1	1	1	1	1	0	5	F/K					5	1										
52	Arapaepae Post Office	1	1	2	1	2	1	8	F																
53	Arapaepae Creamery	1	1	2	1	2	1	8	F																
54	Kimberley Road	1	1	1	1	1	0	5	F	5	1			5	1										
55	[house]	1	1	1	2	1	0	6	F					4	2										
56	[house]	1	1	1	2	1	0	6	F	4	2			4	2										
57	[house]	1	1	1	2	1	0	6	F	4	2			4	2										
58	Waiore	1	1	1	1	1	0	5	F					2	3										
59	[track]	2	1	1	1	1	0	6	G	2	1			2	1										
60	James Prouse's house, 'Ashleigh'	2	2	2	3	3	2	14	G	5	4			5	4										
61	Queen Street East	1	1	1	1	1	0	5	G/H	5	1			5	1										
62	Waimarie stream	1	1	1	1	1	0	5	H					2	2										
63	[house]	1	1	1	1	1	0	5	H					4	4										
64	[house]	1	1	1	1	1	0	5	H					4	4										
65	Waitaiki stream	1	1	2	2	2	0	8	K	2	2			4	4										
66	[house]	1	1	1	2	1	0	6	K																
67	[house]	1	1	1	1	1	0	5	K					4	4										
68	[house]	1	1	1	2	1	0	6	K																
69	[house]	1	1	1	2	1	0	6	K																
70	[house]	1	1	1	1	1	0	5	K																
71	[house]	1	1	1	1	1	0	5	K																
72	Te Aratoaka track	2	1	2	1	2	0	8	K					2	1										
73	Waihou Road	1	1	1	1	1	0	5	K					5	1										
74	[house]	1	1	1	1	1	0	5	K																

Site #	Site Name	Indicative Archaeological Values (Heritage NZ)							Green		White		Cyan		Purple		Dark Blue		Orange		Yellow		Black	
		Rarity/Uniqueness	Information potential	Contextual value	Aesthetic value	Cultural associations	Historic	TOTAL VALUE	Zone	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect	Archaeological potential	Predicted effect	Archaeological potential
75	Punaoho (spring)	1	1	1	2	2	0	7	K															
76	[whare]	1	1	1	1	1	0	5	K															
77	Te Awa a te Tau/Koputaroa stream	1	2	2	2	2	0	9	K															
78	[house]	1	1	1	2	1	0	6	K					4	4			4	4			4	3	
79	[house]	1	1	1	2	1	0	6	K					4	3			4	3			4	3	
80	[house]	1	1	1	2	1	0	6	K					4	5			4	4			4	2	
81	[house]	1	1	1	1	1	0	5	K					4	1			4	3			4	5	
82	[house]	1	1	1	1	1	0	5	K					4	2									
83	Waikarito stream	1	1	2	2	2	0	8	K/L	2	2			2	2	2	2	2	2	2	2	2	2	2
84	[track to Kaihinau]	2	1	1	1	1	0	6	K/L					2	1			2	1	2	1	2	1	
85	[house]	1	1	1	1	1	0	5	L															
86	[building]	1	1	1	1	1	0	5	L															
87	[building]	1	1	1	1	1	0	5	L							3	2							
88	[house]	1	1	1	1	1	0	5	L															
89	Wellington-Manawatu Railway (NIMTR)	1	2	2	1	1	1	8	L	2	2							2	2				2	2
90	[house]	1	1	1	1	1	0	5	L															
91	[house]	1	1	1	2	1	0	6	L															
92	Heatherlea Native Reserve	2	1	1	1	2	0	7	L	3	1									3	1		3	2
93	Heatherlea East Road	1	1	1	1	1	0	5	L	5	1				5	1			5	1		5	1	
94	Avenue North Road	1	1	1	1	1	0	5	L	5	1				5	1			5	1		5	1	
95	Koputaroa Road	1	1	1	1	1	0	5	L	5	1				5	1			5	1		5	1	
96	[house]	1	1	1	2	1	0	6	L	5	5								5	5		5	5	
97	[house]	1	1	1	1	1	0	5	L															
98	Waituhi snaring tree	2	1	1	1	1	0	6	L	2	2					2	2			2	2		2	2

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