

Original research or treatment paper

Painting Hinemihi by numbers: Peoples-based conservation and the paint analysis of Hinemihi's carvings

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This study describes the analysis of paint samples from carvings belonging to Hinemihi, the Maori meeting house, Clandon Park, Surrey, UK. The assessment of physical evidence contained within Hinemihi's built fabric (along with historiographic research of archival sources and oral histories) has formed a key part of the information gathering process during the current conservation project. The production of such data provides an opportunity for a dialogue that is essential for effective decision-making within participatory conservation projects. From this, it is evident that the use of paint analysis, in deciding the eventual painted scheme for a restored Hinemihi, is settled within a broader dialogue about the conception, use, and management of Hinemihi as a Maori cultural centre, as built heritage, and as an object of conservation. Therefore, the value of material analysis is considered in relation to the potential that this information has to engage a community of users in designing an effective conservation response that seeks to balance the opportunities and constraints of the cultural and physical landscapes that surround Hinemihi and Clandon Park.

Keywords: Materials analysis, Paint analysis, Values-based conservation, Peoples-based conservation, Maori meeting house, Building conservation, Public engagement, Object biography

Introduction

An examination of Hinemihi's painted surfaces was conducted as part of the information gathering process of the current conservation project managed by the National Trust Hinemihi Project Steering Group (National Trust, 2010). The materials analysis of heritage objects represents a powerful technique for revealing information of past events. Physical evidence retained in the traces of past interactions, left behind by people in making the world around them, can be revealed through the detailed examination of the physical fabric of heritage materials, supported by analytical techniques (Pollard *et al.*, 2007). As part of investigative conservation, materials analysis has an established role in revealing specific aspects of an object's biography (Caple, 2000; Pye, 2001; Appelbaum, 2007). This information is routinely used to develop a statement of significance that contributes to the design of a suitable conservation response, reflecting the methods of the Burra Charter Process (Australia ICOMOS, 1988; Kerr,

1996; Russell & Winkworth, 2010). This process is evident in the creation of a 'statement of significance' and a 'vision statement' produced by the Hinemihi Project Steering Group, which led to the production of a Conservation Statement in 2010 (National Trust, 2006, 2008, 2010). A statement about Hinemihi's past painted decoration formed an important contribution to the debate about Hinemihi's future conservation and will form the focus for this paper.

In addition to describing the technical and cultural process of analytical investigation, this article will consider the mechanisms for embedding this type of materials analysis into participatory decision-making. A key part of this project was the communication of the results of investigative conservation through a dialogue with the participant community, in this case 'Hinemihi's People'.

'Hinemihi's People' includes:

- The descendants of the originating community in New Zealand, *Ngati Hinemihi hapu* (the Hinemihi sub-tribe), and associated *iwi* (peoples) including *Te Arawa*, *Ngati Tuhourangi*, and *Kereopa whanau* (Descendants of Tene Waitere);

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- The British Public; National Trust staff, volunteers, members and visitors, academic staff and students, the Onslow family, artists, weavers, carvers, and local residents living in and around Clandon;
- The British New Zealand, Maori and Polynesian community; *Ngati Ranana* (London Maori Club), *Te Kohanga Reo o Ranana* (The London Maori language school), *Maramara Totara* (London Maori weaponry school), *Matariki, Kiwa & Manaia* (Maori Cultural Groups), Beats of Polynesia (Polynesian Cultural Group), New Zealand High Commission, New Zealand Society, Pacific Islands Society, The New Zealand Business Women's Network, New Zealand Women's Association, Kea – New Zealand's Global Talent Community, The Link Foundation, New Zealand Studies Network, New Zealand Universities Graduates Association, etc.

The process involved will be described and the implications for different frameworks of conservation (materials-based, values-based, and peoples-based conservation) assessed in relation to the realities of this heritage conservation project. The care of Hinemihi provides an opportunity to examine the potential of peoples-based conservation, both as a theoretical approach and as a practical tool, to build relationships with the people affected by cultural heritage. In this process, we are able to reconsider the nature of current relationships, power, authority, and control over the cultural heritage of other peoples and their pasts. The nature of participation defines the relationships of people to cultural heritage and with each other, as an artefact of the heritage conservation project (Sully, 2013).

Peoples-based conservation

In considering the future conservation of Hinemihi, the results of paint analysis provide a scientific justification for the selection of a certain historic painted scheme to be used. It is, however, evident that the selection of the eventual restored decorative scheme for Hinemihi will reflect a dialogue between Hinemihi's People. Decisions about the eventual appearance of a conserved Hinemihi will be taken as part of a broader discussion about the use, function, and purpose of the conserved building in relation to the needs of the participants in the conservation project.

The right of heritage specialists to make decisions about the conservation of other peoples' heritage has been challenged by social and cultural groups that are affected by the conservation process. (Kreps, 2003: 149). As a result, the assumed certainties of a conservation discipline, based on a technical understanding of the material world, have been increasingly questioned (Ashley-Smith, 1999; Caple, 2000; Pye, 2001; Clavir, 2002; Muñoz Viñas, 2005; Appelbaum, 2007; Richmond & Bracker, 2009). Contemporary

conservation decisions are premised on developing an understanding of cultural significance through historiographic research and community consultation (Kerr, 1996). This process of information gathering is required to evaluate an object's cultural values, so that these can be retained or enhanced in the conserved object. A values-based conservation framework seeks to include a broad range of opinions within the decision-making process, supported through engagement with multiple stakeholders (Avrami *et al.*, 2000; Clavir, 2002, 2009; de La Torre, 2002; Muñoz Viñas, 2005). The production of a statement of significance provides a focal point for discussions about the priorities of conservation treatment. Conservators operating within a values-based conservation process are, therefore, unable to simply focus on the physical materials of the heritage places, spaces, and objects in their care. In this process, materials analysis is seen to be a starting point for a dialogue with a community of 'stakeholders', rather than the answer to questions at the conclusion of a discussion (Kerr, 1996; Russell & Winkworth, 2010).

A materials-based approach to conservation research sits comfortably within a values-based process, as one category of data among multiple sources of available information (such as a condition assessment of physical fabric, considered alongside an assessment of cultural value and management context). This can form the basis for consultation to provide a mechanism for the views of a community of users to be reflected in the conservation response. The advantage of this devolved decision-making process is in helping to connect communities with the care of heritage, and in broadening the focus of the heritage professionals managing the process. However, the top-down, expert-led consultation that tends to underpin values-based conservation has been criticized as an internally generated process that satisfies the requirements of the heritage professionals, but may not relate to the reality of peoples' lived experience of their heritage (Smith, 2006, p. 12; Sully, 2007, p. 226; 2013).

Claims about the role of heritage within political campaigns for social inclusion and diversity have encouraged heritage professionals to look for the benefits of the heritage process beyond the stability and accessibility of the heritage material (Jones & Holden, 2008). This has helped to turn the focus of heritage professionals from the material authenticity of cultural heritage, to the provision of social benefit to participant communities in the heritage process. How heritage professionals are able to support the aspirations of a community in this process, and how the aspirations of the specialist can be matched with those of a community, is a complex question (Brown, 2009, p. 155). A response to this is a shift towards a

peoples-based approach that utilizes a participatory process to enhance the connection between a community and its heritage in ways that are appropriate to those people. It seeks to empower communities to make their own decisions about the care of their heritage (Stovel *et al.*, 2005; Wharton, 2005). Within a peoples-based approach, the desire to consult with a user community goes beyond evaluating a response to a predetermined expert driven solution, rather it seeks to develop an appropriate conservation response that reflects the aspirations of the community of users. This is aligned to, but different from the aims of a values-based conservation approach. A values-based approach seeks to maintain the cultural significance of the object to be conserved, in ways that place the welfare of the material heritage as the primary concern that is balanced within contemporary needs of the community of stakeholders. A peoples-based approach differs in that it prioritizes the welfare of the contemporary community over material heritage. 'It is a part of sitting down and talking with the people and seeing what they want in the first place' (Schuster, 2010), in doing so, the response is likely to be different from what you might expect. This reflects a difference between a people-up-approach to community participation and the top-down process more commonly associated with consultation within the authorized heritage discourse (Smith, 2006, p. 37).

Table 1 compares elements of a 'materials-', 'values-', and 'peoples-based' approach to conservation, by identifying the foundational charters and conventions associated with each approach, and highlighting the different focus provided by each framework of understanding. The shift in focus from 'materials-', to 'values-', and then to 'peoples-based' conservation could be seen as an evolutionary sequence, but more

usefully, it represents a broadening of the framework of theory and practice in heritage conservation in which these approaches are utilized to differing degrees, depending on the requirements of a particular heritage project. The reframing of conservation in this way encourages greater diversity in working practice and provides the intellectual justification for challenging established norms of practice that limit the adaptation of conservation practice to the particular needs of the conservation project. It enables a continuity of established conservation practice, associated with a materials focus, where this is considered to be the most appropriate approach. Furthermore, it sanctions the incorporation of a community's cultural values into conservation decision making, where relevant. Significantly, however, it authorizes the conservation processes to reflect the diverse ways that people care for, and use their own cultural materials.

Hinemihi, the conservation object

Hinemihi was constructed as a *whareniui* (meeting house) of the *Ngati Hinemihi hapu* (Hinemihi's source community in New Zealand) in Te Wairoa, *Aotearoa* (New Zealand) in 1881; she was transported to her present location at Clandon Park, Surrey, UK in 1892, and is currently cared for by the National Trust. As well as Hinemihi's geographical, contextual, and cultural transition, she has gone through many physical transformations in the past 133 years and apart from the 23 carvings that exist from her time in New Zealand, the majority of her current structure appears to date from restorations carried out by the National Trust in 1960 and 1980 (Sully & Gallop, 2007). Maori meeting houses embody the living ancestors of their *iwi*, Hinemihi as a female is therefore referred to as 'she'.

Table 1 Categorization of material-, value-, and peoples-based conservation approaches (after Braille, 2009, p. 33)

Materials-based conservation	Values-based conservation	Peoples-based conservation
Universal values	Stakeholder values	Community values
Athens Charter of 1931, Venice Charter 1964, World Heritage Convention 1972	Burra charter 1979, Nara Document on Authenticity 1994	The Convention for the Safeguarding of the Intangible Cultural Heritage 2003
Heritage has 'intrinsic value' decoded by experts	Heritage values are ascribed by experts in consultation with stakeholders	Heritage values are context specific, defined by contemporary communities
Cultural significance based on expert values	Cultural significance guided by expert values that includes stakeholder values	Cultural significance is determined by community values
Expert-led, top-down, linear decision-making	Expert-led, top-down decision-making that seeks stakeholder participation, consultation and dialogue	Community-led, people-up decision-making that seeks locally appropriate solutions
The welfare of the material heritage takes precedence over contemporary needs of people	The welfare of the material heritage is balanced with contemporary needs of stakeholders, but material heritage is the primary concern	The welfare of contemporary communities takes precedence over material heritage.
Conservation action is guided by a condition assessment	Conservation action is guided by a statement of significance (this includes a condition assessment, a values assessment, and an assessment of management context)	Conservation action is guided by a locally appropriate reference (e.g. in the Hinemihi Project this is a 'Vision statement')

Since the 1980s, Hinemihī has experienced increased contact with Maori. This led to the donation of new carvings from *Ngati Hinemihī* that were installed and dedicated at a ceremony in 1995 (Gallop, 1998; Hooper-Greenhill, 1998, 2000). This Maori re-appropriation has created a new profile for Hinemihī in both the UK and New Zealand, through which Hinemihī has been re-imbued with a Maori spiritual presence. Hinemihī, as the adopted meeting house of *Ngati Ranana* (London Maori Club), has been used as a functioning *marae* (a ceremonial meeting place) since 1995. She has been the focus of regular Maori cultural activities, such as ‘*Te Kohanga Reo o Ranana* (London Maori Language School) Annual *Hangi*’, ‘Maori and Pacific Day of Dance’, as well as, *powhiri* (formal welcoming ceremony), *karakia* (blessing ceremony) as part of communal and individual Maori cultural practice (see *Te Maru o Hinemihī* website: *hinemihī.co.uk*; Sully *et al.*, 2013).

Since 2004, a collaborative heritage conservation project (the ‘Hinemihī Project’) between the National Trust and Maori has been underway to develop Hinemihī; to meet the needs of her people as a centre for Maori & Polynesian culture in the UK (National Trust, 2010). This has shifted the conservation approach to Hinemihī from understanding her as built heritage, to her as an object centred network of social relationships (Latour, 2007). The preferred option for the conservation of Hinemihī has been developed as part of the formal consultation process since 2004, through the creation of a ‘statement of significance’ and a ‘vision statement’ produced by the Hinemihī Project Steering Group (National Trust, 2006, 2008). This is consistent with the views presented by the source community, *Ngati Hinemihī*, and has received the support of the British-based Maori diaspora represented in the National Trust stakeholder group. The proposal includes the provision of support services that will enable Hinemihī to be used all year-round as a *marae*. To achieve this, a new floor, heating, lighting, insulation, and a new roof will be provided for the *whareniui* (meeting-house). In addition, a *whare manaaki* (service building, with showers, toilet, and kitchen) named Hinewai (after Hinemihī’s daughter) and *wharau* (performance and dining shelter) named Rangipare (after Hinemihī’s sister) are proposed to support the functions of the Hinemihī *marae*. A key element of this proposal is to conserve Hinemihī’s historic built structure, including her decorative scheme, to reflect her form when first constructed in Te Wairoa in 1881 (National Trust, 2010).

Gathering understanding

Detailed physical examination, oral, archival, and documentary research has revealed information

about Hinemihī’s changes of location, ownership, use, and interpretation. This creates a chronology for understanding of Hinemihī’s biographic story as a continuity of change from her time in Te Wairoa as a *tapuna whare* (ancestral meeting house), to a conservation object subject to the management of the National Trust at Clandon Park (see Fig. 1A–H for a list of key events in the developments in Hinemihī’s built structure over time). This provides a general chronology from which to understand Hinemihī’s paint sequence.

Paint analysis

The investigation of Hinemihī’s decorative surfaces aimed to identify material evidence of these chronological changes within the cross sections of paint samples removed from Hinemihī’s surface (Mairinger & Schreiner, 1986; Schoute & Verougstraete-Marcq, 1986; Hackney *et al.*, 1999). The sampling of an object is controversial – a non-reversible and invasive act – so a strong rationale is needed (Eastaugh, 1989). The importance of integrating paint analysis within a broader interdisciplinary study is critical in order to focus research questions and ensure that there is a reasonable degree of certainty of obtaining answers. Information from the broader research project helped identify appropriate sample locations, and helped to reduce the number of samples needed to address the research questions.

The key research questions of this study were: is it possible to find evidence of the first colours, materials, and design used on Hinemihī’s carvings? Is it possible to describe the changes in the painted decoration over time? Is it possible to relate the different decorative schemes to what is known of the history of Hinemihī?

The number of samples taken was a compromise between the desire to obtain reliable results, capable of answering the research questions, and the aim of minimal intervention (Eastaugh, 1989). Samples taken for cross sections were as small as possible and targeted existing areas of damage in the decorated surface, limiting the adverse implications for surface appearance.

In addition to the ethical issues of the conservation profession resulting from the physical removal of samples from the object, there are specific issues that relate to the significance of Hinemihī for Maori (Schuster, 2007). Hinemihī is a living being who embodies ancestral knowledge, character, and a range of cultural values. She bears the *wairua* (spirit) and *mana* (customary authority or prestige) of the ancestor Hinemihī. To maintain the *mana* of Hinemihī, the presence of *tapu* (prohibition, sacredness) and *korero* (narrative) is required (Durie, 1998; Hakiwai, 2007:48). Therefore, the inclusion of Maori protocol associated with meeting houses *tikanga* (protocol), *kawa* (customary practice), and *kaupapa* (underlying Maori

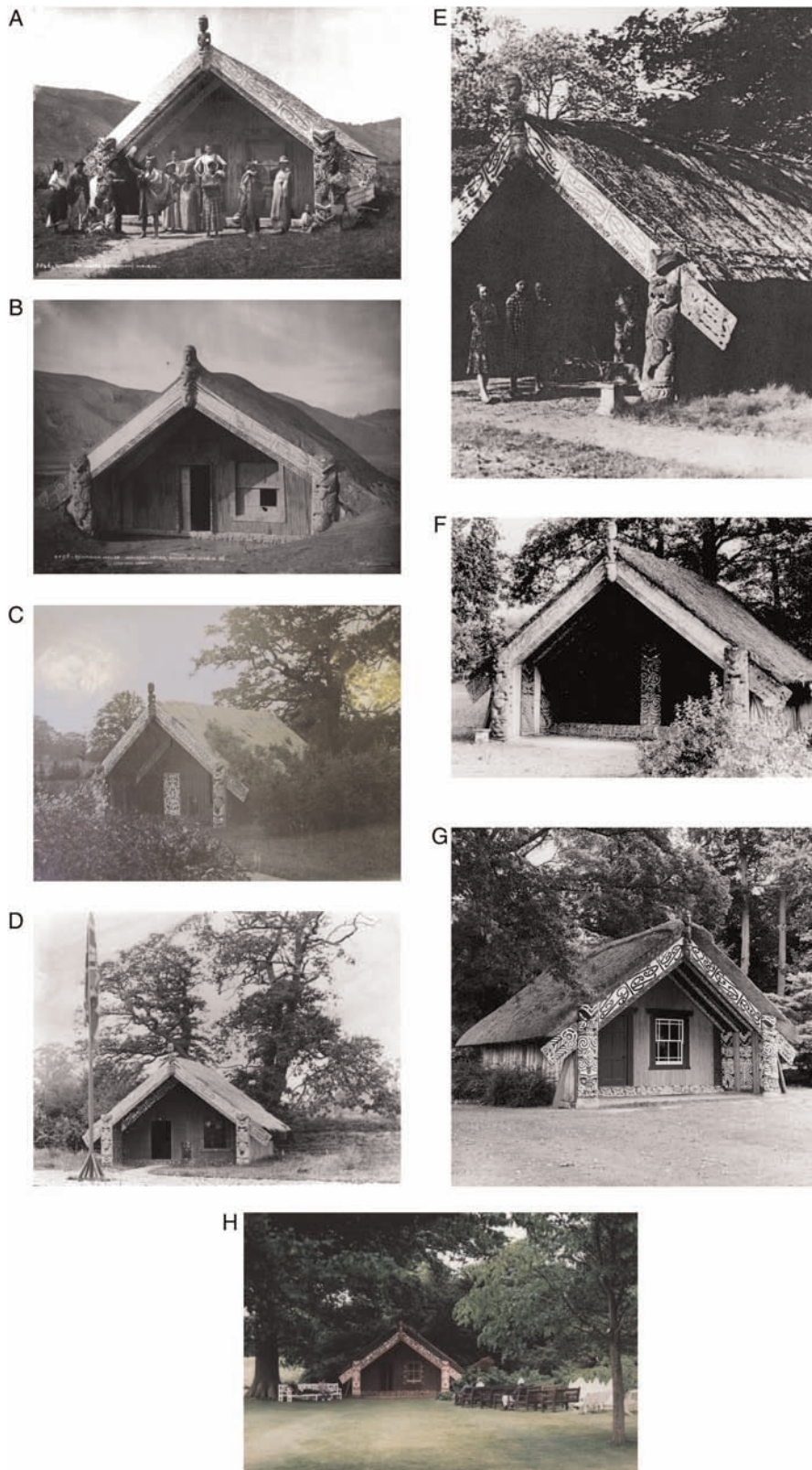


Figure 1 (A) Hinemihī c. 1881, constructed in Te Wairoa, New Zealand for Ngāti Hinemihī (The Alexander Turnbull Library, Wellington). (B) Hinemihī 1886, covered in volcanic ejecta, having survived the Mount Tarawera volcanic eruption, Te Wairoa, New Zealand (the Museum of New Zealand Te Papa Tongarewa). (C) Hinemihī c. 1897 purchased by fourth Earl of Onslow and relocated to Clandon Park, as a focal point within ornamental lakes and gardens (the Surrey History Centre). (D) Hinemihī c. 1917, restored by recuperating First World War soldiers, including Maori National Expeditionary soldiers (Maori Pioneer Battalion) (Alan Gallop). (E) Hinemihī post 1934, repaired and relocated to her current position within Clandon Park, during which her front wall, door and window carvings were removed (National Trust Photographic Library). (F) Hinemihī c. 1960, restored by National Trust and provided with a new roof (National Trust Photographic Library). (G) Hinemihī 1980, restored by National Trust and provided with a front wall for the first time since c. 1934 (National Trust Photographic Library). (H) Hinemihī 1995, during the dedication ceremony for Hinemihī's newly installed carvings (James Schuster).

principles) was an essential part of the analytical project (for further details, see Sully & Cardoso, 2007, pp. 199–219).

Sample preparation and analysis

A staged approach to addressing the research questions was implemented, with two stages of sampling and analysis. The first stage focused on addressing general questions about the overall painted surface. The second stage, focused on clarifying the sequence by targeting specific areas of surface decoration and specific layers in the paint sequence for further investigation (Gilmore, 1998; Sully & Cardoso, 2007, p. 207).

The potential value of the sampled material was assessed with microscopic examination; as a result, specific samples were selected for cross-sectional analysis. Sample fragments were embedded in epoxy resin (Epo-tek[®] 301 (Conservation Resources (U.K.), Ltd., Cowley, England), Billerica, MA) and polished until the edge-on layer structure was revealed using Micro-Mesh abrasive sheets as the polisher (grade 4000, 6000, 8000, and 12 000). The polishing process used no lubricant, in order to avoid interaction and to avoid washing out material from the sample. These prepared samples were examined to determine their potential to answer the research questions.

The choice of optical microscopy (OM), μ -Raman spectroscopy, and scanning electron microscopy with energy dispersive spectrometry (SEM-EDX) as the analytical techniques for the characterization of these cross sections was related to their combined ability to provide information about elemental and molecular components of the paint materials. The techniques are non-destructive for the samples, and readily available to researchers at University College London (UCL). Photomicrographs (visible and UV light) were recorded for each cross section, followed by the application of the most relevant analytical technique.

Optical microscopy

The microscopic examination of the cross sections took place at *Pigmentum* laboratory (<http://pigmentum.org/>) using a Leica DMRX microscope with a x10 ocular lens and x10 and x40 objective lens, with reflected light (both ordinary light and ultraviolet light). This indicated the number, colour, condition, thickness, and sequence of layers, and the distribution of UV fluorescent materials within the layers. The equivalent layers in different samples were mapped and linked into an overlapping continuous sequence (see Cardoso & Sully, 2011, Appendix 2a for sample location, and photomicrographs in reflected light and UV light).

μ -Raman spectroscopy

Raman spectroscopy provides compositional information about the paint layers by producing spectra

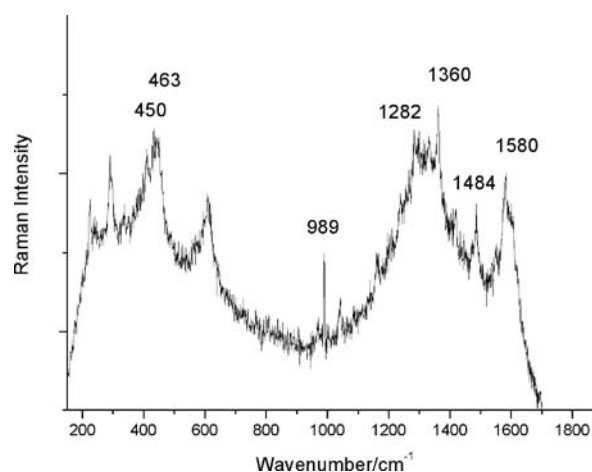


Figure 2 Raman spectrum for layer R2/R3, 1 scan, 1% power; Pigment Red 112, identified with the specific bands occurring at 450, 463, 989, 1282, 1360, 1484, 1580, and 1607 cm^{-1} . Unlabelled bands relate to the presence of iron oxide (Burgio & Clark, 2001).

characteristic of the materials present that can be compared with known references (Bell *et al.*, 1997; Burgio *et al.*, 1997, p. 2). The Raman instrument used at the Christopher Ingold Laboratories, UCL, was a Renishaw InVia Raman microscope, Diode laser operating at 785 nm, x50 objective, and the spatial resolution down to c. 1 μm , calibrated using silicon. The μ -Raman spectroscopy analysis of Hinemihī's cross sections provided the most powerful technique for identifying pigments used in Hinemihī's paints (Burgio *et al.*, 1997; Smith *et al.*, 1999; Ernst, 2010). A key factor in establishing a chronology for the paint sequence was the identification of Pigment Red 112 (see Fig. 2), a commercial paint, which gave an indication of age, since this synthetic pigment was first produced in 1939 (Burgio & Clark, 2001, p. 1504).

Scanning electron microscopy with energy dispersive spectrometer

The use of energy dispersive X-rays provided semi-quantitative analysis of the elements present in the paint cross sections and the prepared soil samples (Goldstein *et al.*, 2003). Back scatter electron imaging (an image based on the different distribution of the elements within the cross section) was used to examine the existence of layers that were not conclusively visible with OM. SEM-EDX was used to analyse specific layers within some samples that were not possible to identify with Raman spectroscopy. This proved very efficient in detecting and analysing a particular important layer, the volcanic ash/mud layer (Rotomahana Mud) (Reed, 1996).

The cross sections, prior to analysis, were carbon coated to avoid sample charging. These were imaged and analysed using a SEM Hitachi S-570 (Maidenhead, Berkshire), SEM Hitachi S-3400N, and

a Philips XL 30 ESEM (SEM Hitachi, Hitachi High-Technologies Europe GmbH, UK) (with an Oxford Instruments EDS) in the Wolfson Archaeological Science Laboratories at UCL, Institute of Archaeology.

Results from analysis of the sample cross sections

The results from each cross section are recorded in Cardoso and Sully (2011), Appendices 1, 2, and 3 (available at <http://www.hinemihi.co.uk/page.php?id=20&page=107&subpage=109>) and will only be summarized here.

Stage 1

The results from the examination and analysis of the first sample set revealed that the cross sections comprised anything from only two up to 11 layers (see Fig. 3). The variable preservation of paint layers confirmed the difficulty of revealing the full story of the paint sequence. The practice of stripping old paint layers before each repainting event has significantly reduced the extent of remaining paint layers. An initial interpretation of the general colour sequence was identified in the cross sections: orange/reddish layers in earlier paint layers that changed to reddish/

pinkish in later interventions, white, blue (which is one of the main colours in the first four interventions and reduced in later interventions), and black.

Stage 2

The comparison of the results from the examination of the cross sections, combined with the information from archival research, oral history, and physical fabric survey, allowed the identification of two main areas of Hinemihi's historic carvings with the potential to reveal additional information. The carvings around the *waewae* (window) and the carved area of the *maihi* (bargeboards) were considered relevant for different reasons. The carved area on the bargeboards revealed the largest number of layers within areas of deeply carved relief, suggesting that they could contain the complete paint sequence: c.1881 to 1995. The window carvings had been removed from Hinemihi for a significant period (removed by 1934 and replaced in 1995) representing a gap in the paint sequence, revealed by a direct comparison of the cross sections from these areas. This suggested a sequence of 11 layers, eight before the window's removal (by 1934), and three afterwards (interventions in 1960, 1980, and 1995). The gap in the sequence appears to represent two painting interventions that correspond to the 1960 and 1980 interventions.

Analysis of the volcanic layer

The location of evidence of 1886 Mount Tarawera volcanic eruption within the cross section provides an important boundary, below which the paint applied at Te Wairoa, New Zealand, should be present. Above, is likely to be the paint sequence applied at Clandon Park, following Hinemihi's relocation in 1892 (Sully & Gallop, 2007). The identification of this layer therefore provides a datum from which to recreate an impression of the earliest palette used with Hinemihi. This is closely aligned to the conservation aspiration to restore Hinemihi's built structure to a form that reflects her condition in c. 1881. The remains of a dark, thin layer appear in the lower layers of several of the sample cross sections. The presence of silicon was identified as a key component of this layer by SEM-EDX analysis. The presence of silica is known in the compositional analysis of Rotomahana ejecta from the 1886 Tarawera Eruption that covered Hinemihi (see Fig. 1B) and still buries the landscape at Te Wairoa today (Lowe, 2006, p. 53).

SEM-EDX and thin-section petrography identified the presence of isotropic volcanic glass contained within soil samples collected from the original site of Hinemihi at Te Wairoa. This was corroborated by examining the physical properties of the volcanic glass (such as shape, size, surface morphology, and

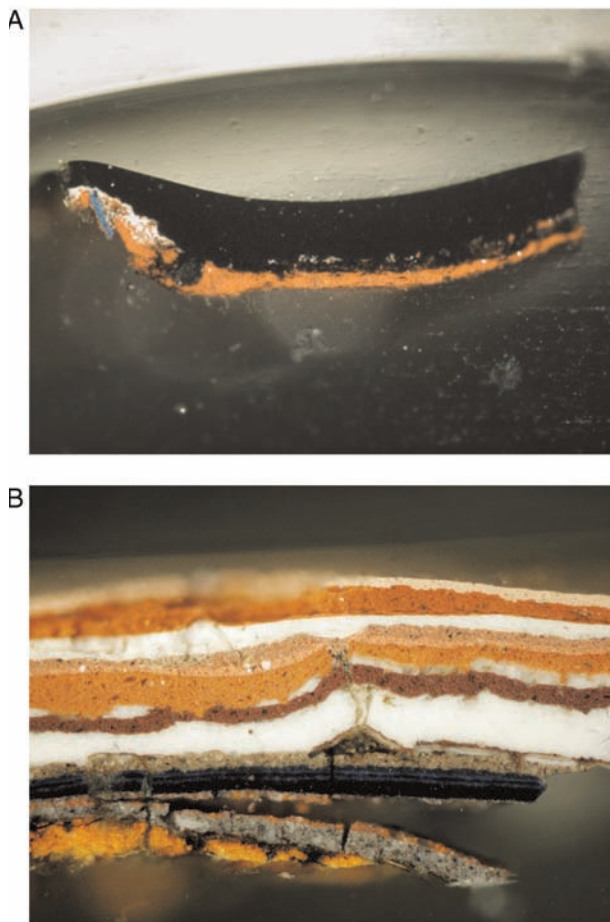


Figure 3 (A) Cross section of sample F showing few paint layers. (B) Cross section of sample 2 showing many paint layers.

Table 2 Chronological paint sequences: the proposed seven different phases of decoration c. 1881–1995

Phases of polychrome decoration	Pigment composition of paint				Date
	Blue	Red	White	Black	
Phase 1	Prussian blue	Red lead	?	Carbon black	c. 1881
<i>Volcanic eruption; silica (volcanic glass)</i>	–	–	–	–	1886
Phase 2	Ultramarine, calcite, carbon black	Iron oxide, red lead, barium sulphate	Lead white, calcite	?	c. 1897
Phase 3	Prussian blue, carbon black, lead white	Iron oxide, carbon black	Lead white, lead sulphate	?	c. 1917
Phase 4	Ultramarine, barium sulphate	Iron oxide, barium sulphate	Lead white	?	c. 1934
Phase 5	–	Pigment red 112, iron oxide	Titanium dioxide (rutile), calcite	?	1960
Phase 6	Phthalocyanine blue	Iron oxide, calcite	Titanium dioxide (rutile), barium sulphate	?	1980
Phase 7	–	iron oxide, calcite	titanium dioxide (rutile), calcite	Carbon black	1995

colour) compared with images published in Nairn (1979) and Heiken and Wohletz (1985) (Thorarinsson, 1981, p. 3; Reedy, 1994, 2008; Enache & Cumming, 2006, p. 664). This revealed the presence of significant amounts of silica (with similar SEM-EDX spectra) present in a specific layer within the cross sections (the 'V' layer in samples T, 2, 5, 6, 7a, 8, 12, and 14), and generally within the soil samples (Black, 2011, p. 27).

Discussion of paint analysis results

The information gathered from the analysis allowed the formulation of a hypothesis for the paint sequence of Hinemihi (see Table 2). The pigments identified represent synthetic pigments commonly used in commercial paints, which are consistent with established chronologies for pigment use (Johnson *et al.*, 1984; Burgio & Clark, 2001; Eastaugh *et al.*, 2004). In all, it is estimated that 11 different layers are present in the cross sections, which may represent seven different phases of painted design. Historical records indicate that Hinemihi was painted in 1881, 1960, 1980, and finally in 1995. Additional interventions are likely to be associated with key events in c. 1897 (construction of Hinemihi at Clandon Park), c. 1917 (possible restoration carried out by Maori Pioneer Battalion soldiers) and c. 1934 (relocation of Hinemihi to current position within Clandon Park).

Red design c.1881–1995

The red design is seen to change from orange to red to pinkish coloured layers over time. The first layers (phase 1) used a vivid reddish/orange made of red lead in its orange form, the lead (II, IV) oxide (c. 1881). There are three interventions (phases 2–4) where the red design was made of iron oxide as the main pigment, mixed with red lead, carbon black, or

barium sulfate (c.1897 to c. 1934). In phase 5, 'Pigment Red 112' was used with iron oxide (1960). The two final interventions (phases 6 and 7) consisted in iron oxide mixed with calcite (1980 and 1995).

Blue design 1881–1995

The blue design consists of Prussian blue in early layers (phases 1 and 3, c.1881 and c. 1917) being replaced by ultramarine in phases 2 and 4 (c. 1897 and c. 1934), and the last blue layer (1980) consisted of phthalocyanine blue. In two samples (T and 11) Prussian blue is found in the fifth intervention and in one sample (G2) in the sixth intervention; the small number of samples where it is found seem to indicate that it was used for details; however, this needs further study. No blue was used in 1995. The presence of the blue as one of the main colours seems to be reduced after phase 4, to blue detailing in a pinkish red-and-white colour scheme.

White design 1881–1995

The white design was initially painted with lead white (phases 2–4), substituted after 1960 (phases 5–7) with titanium white (rutile form) and calcite (1960 and 1995) and with titanium white and barium sulphate (1980).

Black design 1881–1995

The black design is consistently carbon black.

Summary of Results

To return to the original research questions for this project, it has been possible to identify the colour palettes for the c.1881, 1960, 1980, and 1995 interventions within the cross sections. However, there is less certain information about the period from c. 1897 to 1960 and further work is required to identify the detailed chronology for this period. Although the individual paint

layers have been identified for the complete sequence c.1881 to 1995, it is difficult to relate these directly to the decorative schemes at different times in the past. Access to larger sized sample areas, which will be revealed during the stripping of historic carvings in the proposed conservation project, will help to understand how the paint layers relate to one another and to the overall painted design.

The key question to answer relates to Hinemihī's proposed conservation to reflect her appearance c.1881. The first interventions (the first colour scheme present in the samples) used bright colours, a vivid reddish/orange (red lead (II, IV) oxide) contrasting with a strong blue (Prussian blue), and black (carbon black). There is currently no information about the contemporary white layer, as this was not found in the cross sections, but appears in historic photographs.

Communicating results

Mechanisms for engaging user communities with heritage projects are widely discussed and diverse models are proposed that are appropriate for use with heritage projects (Avrami *et al.*, 2000). The identification, activation, or construction of a community is a key part of participatory practice (de La Torre, 2002). The search for a community as the focus of Hinemihī's peoples, has evolved out of participation in community building events at Hinemihī, such as '*Kaitiakitanga: Maintenance of Hinemihī Days*', '*whareNOW*' ('Being with Hinemihī', 'Sharing with Hinemihī' and '*Tukutuku Weaving wananga*' workshop series) (Sully *et al.*, 2013). This has questioned the central role of Maori in the long-term care of Hinemihī. As a result, the formation of 'Hinemihī's People' is an attempt to develop a sustainable conservation community for Hinemihī at Clandon Park that reflects a spatially and temporally grounded reality, based on lived experiences. The paint analysis project has provided repeated opportunity to stimulate interaction between Hinemihī's Peoples and the evolving conservation process.

Kaitiakitanga: Maintenance of Hinemihī Days

The development of the annual '*Kaitiakitanga: Maintenance of Hinemihī Days*' represents an early response to views expressed in the conservation consultation process for the Hinemihī project. These events were implemented to ensure that Hinemihī was in a presentable condition for summer activities, including the annual *hangi* celebrations each year (Sully & Cardoso, 2007, p. 214). The maintenance days have become a fixture in Hinemihī's calendar since 2004, with volunteers from Hinemihī's People arranging to clean and care for Hinemihī (Sully, 2011). This has provided a forum for informal discussion about the use and care of Hinemihī and in developing a continuing connection between the Hinemihī project and



Figure 4 Picture of Hinemihī painted by Alaina from *Kohanga reo*, June 2005 (Dean Sully).

Hinemihī's People, particularly members of the UK based Maori community (*Te Kohanga Reo o Ranana*, 2007). Painting and drawing activities have been an important way for people, especially children, to engage in the broader conservation project. Information about the paint analysis has allowed participants to imagine how Hinemihī's appearance has changed through time. Using photocopied images of Hinemihī and her carved designs as the focus of artistic practice, school children (including *Kohanga reo* children) have been able to record their view of Hinemihī, to speculate on how she may have looked at specific points in the past, and imagine how she may look in the future (see Fig. 4).

Digital reconstructions and website

A dialogue about the results of the paint analysis was formalized through community consultation carried out by Emilia Ralston in 2008. This aimed to understand the types of information that Hinemihī's Peoples expected, and the best ways to present the information to ensure they could participate fully in future conservation decisions. The initial stage of the consultation involved interviewing Hinemihī's People during the annual Hinemihī maintenance days in June 2008 (Ralston, 2008). The Maori community had been involved in discussions about the sampling process from the start of the paint analysis project and therefore it was not unsurprising to hear that they requested access to all the information concerning the pigment analysis (from how the samples were taken, how the samples were analysed, identification of pigments, how the conservators decided on the paint chronology, and any archival information used in conjunction with the paint analysis). The provision of information on a web site would enable people to access the information where and when they wished, and to select what types of information they wished to access, or to choose not to look at some at all (Bishop, 2005; Ralston, 2008). While the creation of



Figure 5 Digital reconstruction of c. 1881 painted design, showing segments of the key architectural features (Ralston, 2008).

a website is a necessary step in disseminating information about the conservation of Hinemihī, digital reconstructed images of Hinemihī formed the starting point for a dialogue with Hinemihī's people about the paint analysis (Bohnet & Smith, 2007).

Digital reconstruction of Hinemihī's c.1881 painted decoration

Given the focus of the conservation project to recreate Hinemihī's c.1881 form and the Maori community's interest in Hinemihī's earliest painted design, it was decided to produce a digital reconstructed image of the first decorative scheme of Hinemihī. Prussian blue bargeboards (maihi) similar to nineteenth-century Ringatu faith meeting houses (Brown, 2009, p. 58), an orangey red on the ancestral carvings (a similar colour has been revealed on Hotunui, a 1870s meeting house currently housed at Auckland Museum (Barton, 1985; Barton & Reynolds, 1985) and black (carbon black).

The specialist nature of the scientific analysis poses a potential problem when communicating conservation research to non-specialist groups. A visual representation of the historic colour scheme was therefore produced with the polychrome design superimposed onto a historic image of Hinemihī from 1881, using Adobe® Photoshop (see Fig. 5) (Ralston, 2008).

Given the lack of homogeneity of colour within each of the paint layers in the sample cross sections, it was necessary to reflect the level of uncertainty in the results of the paint analysis when translated to a representation of the actual colour scheme of c. 1881. A short animation of the potential range of colours for the various architectural features can be seen at the *Te Maru o Hinemihī* digital marae (website) (hinemihī.co.uk). This is presented alongside the Painting Paint Analysis Research Report 2011 and associated appendices, which provides an open access archive of



Figure 6 Picture of Hinemihī painted by Kohanga reo, June 2009 showing blue bargeboards and bright red carvings (Dean Sully).

all information about the paint analysis project available to Hinemihī's People.

Painted stories, a dialogue with the past

The use of information about Hinemihī's past colour schemes was further developed through 'whareNOW', a series of community-building activities that took place between 2009 and 2012, such as 'Being with Hinemihī' (Sully *et al.*, 2009, 2013). This was a series of five *wananga* (workshops) that took place between January and July 2009. These were designed in consultation with parents and teachers from *Te Kohanga Reo o Ranana*. The activities included storytelling, spoken word, song, music, physical activity, and visual art, to articulate feelings of what Hinemihī means to her people. The 'Colour Me In' workshop held at Clandon Park (2 February 2009) presented painting and drawing activities that allowed a nuanced discussion of the information revealed by paint analysis adapted to the priorities of the *wananga* participants (see Fig. 6). This approach has since been used in a variety of events, such as Origins Festival: Maori Heritage Project, in 2011 and more recently as an art completion with Clandon School children in December 2012 (Origins, 2012).

'Sharing with Hinemihī', the next phase of *whareNOW*, was a series of six workshops at UCL and Hinemihī that took place on weekends between May and September 2010, and culminated in 'Staying with Hinemihī', a *noho marae* (sleep over) (Gravesen, 2012; Sully *et al.*, 2013). The ability to hold residential events that span several days is a key element of functioning *marae* in New Zealand (Schuster & Whiting, 2007).

Painting Hinemihī by numbers

Staying with Hinemihī involved learning, hospitality, songs, dance, and a group artwork project 'Painting



Figure 7 The painting by numbers canvas, computer-generated image (WHAT_architecture).

Hinemihi by Numbers', which was a central focus during the *noho marae*. Information was distributed about the paint analysis during the workshops ('Painting with Hinemihi', see hinemihi.co.uk). The painting by numbers design was developed by WHAT_architecture, based on the results of the paint analysis project. An image of Hinemihi was composed that represented her *c.* 1881 colour palette within an imaginary volcanic landscape that reflected her surroundings in Te Wairoa and the Mount Tarawera eruption of 1886 (see Fig. 7). This polychrome image was printed as a large (1700 mm × 1200 mm) canvas and a second version was prepared as a monochrome line image, constructed as 'painting by numbers' picture, seen in Fig. 8.

Each of the numbered sections was linked to a numbered paint colour and the painting was completed by Hinemihi's People at the *noho marae*, seen in Fig. 9. The communal act of completing this painting generated considerable discussion about the scientific basis of the colours used. It was also powerful in considering how Hinemihi appeared in *c.* 1881 Te Wairoa and the



Figure 8 The painting by numbers canvas, computer-generated monochrome line image prepared for painting by numbers (WHAT_architecture).



Figure 9 Painting by numbers canvas, communal artwork painted by Hinemihi's People at the *noho marae* August 2010 (WHAT_architecture).

implications for how she might appear in the future at Clandon Park.

The Painting Hinemihi by numbers group artwork can be seen as a visual analogy of the outcomes of different ways of working, represented by different approaches to conservation practice (i.e. values-based and peoples-based conservation).

Fig. 7 represents the successful conclusion to a well-managed and tightly executed expert-led heritage project that matches its pre-identified aims clearly and accurately. This is based on a well-structured process, formulated on evidence-based investigation, with specific guidelines of action outlined in the unpainted canvas in Fig. 8.

Fig. 9, however, represents something of the reality of the outcomes of a community-led project. It is evident that it has been more difficult to stay between the lines, and the selected colours and design are not necessarily those anticipated in the original design. Fig. 9 may be different from the expected result seen in Fig. 7, but is no less beautiful. It is important for heritage professionals to accept that the outcome of community-led conservation projects will be different from the expected outcomes of expert-led projects.

Conclusion

The results of the analysis of paint sample cross sections provided insight into the previous decorative schemes used on Hinemihi's carvings between *c.* 1881 and 1995. This has helped in understanding the different phases of Hinemihi's life, the frequency of repainting, the materials used in the repainting, and the colour schemes selected by those who painted her. Such materials analysis is not an end in itself, but is a necessary stage in the decision-making process that seeks to gather an understanding of an object in relation to an assessment of community values.

This research process provided repeated opportunity to develop conversations between Hinemihī's People and the ongoing conservation project which have been sustained through formal consultation and less formal participation and engagement. This has resulted in a broad acceptance of the vivid c. 1881 colour scheme as the preferred appearance for Hinemihī's surface in the proposed conservation project. The conservation of Hinemihī can be seen to be embedded within a complex negotiation between Hinemihī's people in which past relationships are reinterpreted in light of present experience and future hopes. Hinemihī's impact on her people has become the inspiration behind current proposals to redevelop Hinemihī (National Trust, 2010). The recreation of Hinemihī's c. 1881 appearance is integrated within a series of proposed changes that seek to develop Hinemihī as a living functioning *marae* in which Maori and Polynesian culture in Britain can be lived through performance, practice, ritual, and learning (National Trust, 2008). In encountering Hinemihī's *marae*, people in Britain have the potential for active intercultural exchange that can challenge rigid concepts of mono cultural identity in a multicultural Britain. Such engagement brings the possibility to reflect on Britain's colonial and post-colonial relationships that have implications in the present.

As a case study, the Hinemihī project provides an opportunity to reconsider the aims of the conservation process in terms of the 'effect' on people, rather than in terms of preserving the physical 'authenticity' of the material past. The product of the conservation process becomes the relationships developed in the conservation process rather than the conserved object itself. The details of adopting such an approach reveal the difficulties of engaging in participatory processes, while utilizing conventional heritage conservation procedures. Therefore, we should be wary of the imperative imposed by routine application of current concepts of best practice, premised on internally driven professional priorities that interfere with the potential that people have to engage with objects.

Community led conservation presents a range of challenges for the conservation specialist (Garton-Smith, 1997/8; Wharton, 2012). However, such a collaborative approach has the potential to create a new set of theories and practices for an ethically informed study and management of the past (Theophile & Ranjitkar, 2003, p. 58). A broadening of the framework of theory in heritage conservation to incorporate peoples-based conservation encourages greater diversity in working practice and provides the intellectual justification for challenging established norms of practice that limit the adaptation of conservation practice to the particular needs of the conservation project. In so doing, it validates conservation responses that seek to

incorporate the multiple ways that people care for, and use, their own cultural heritage. The Living Heritage Approach, developed by ICCROM, has engaged with these issues and is currently being developed as a 'people-centred approach', which places the living dimension of heritage at the centre of conservation decision-making (Wijesuriya, 2007; ICCROM, 2012).

Community-led projects may not offer easy solutions, but rather the prospect of different and possibly better ways of working. The benefits of this work needs to be assessed in terms of the effect on people though general concepts of social benefit and human happiness. It may also be seen to provide a new set of questions about the role of conservation in developing a more humane heritage (Butler, 2006).

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