

LANDSCAPE REVIEW



VOLUME 22(2)

AN OCEANIA JOURNAL OF LANDSCAPE
ARCHITECTURE

LANDSCAPE REVIEW
An Oceania Journal of Landscape Architecture

CHIEF EDITOR

Honorary Associate Professor Gill Lawson,
School of Landscape Architecture,
Faculty of Environment, Society and Design,
PO Box 85084, Lincoln University, Christchurch 7647,
Canterbury, Aotearoa New Zealand
Telephone: +64-3-423-0466
Email: Gillian.Lawson@lincoln.ac.nz

ASSISTANT EDITORS

Ms Wendy Davies (Lat Studios)
Dr Hannah Hopewell (Louisiana State University)

BOARD

Associate Professor Matthew Bradbury (Unitec
Institute of Technology)
Ms Meg Back (WSP)
Mr Brad Coombs (Isthmus)
Dr Sara Padgett Kjaersgaard (University of NSW)
Ms Rachel de Lambert (Boffa Miskell)
Emeritus Professor Simon Swaffield (Lincoln University)
Dr Ata Tara (Redland Shire Council)

CONTRIBUTIONS

The editor welcomes contributions, and an author's
template can be found under the Submissions link on
the [website](#).

The aim of *Landscape Review* is to showcase the
relationship between research and professional practice
in the field of landscape architecture. It offers a forum for
scholarly writing and critique on a wide range of topics
that particularly impact Oceania and, more broadly, the
rest of the world.

We encourage articles that further develop research
ideas and findings from previously published peer-
reviewed sources, critiques or reflections, to analyse
and synthesise them for impact within professional
practice and/or academic research.

For further information on the types of submission,
please go to <https://journals.lincoln.ac.nz/index.php/lr/about/submissions>.

CONTENTS

Foreword

Chief Editor – Gill Lawson 1–2

Research

Landscape architects love to talk about representation
Jillian Walliss 3–6

The convergence of digital and print in landscape
architecture

Hamish Clarke 7–11

Virtual pūrākau: co-designing adaptive cinematic virtual
reality for culturally responsive landscape interpretation
at Te Rau Aroha

Kris Tong 12–20

Evolving tools, enduring principles: maintaining
accuracy, transparency and trust in visual representation
Rhys Girvan and Corey Murray 21–30

Production *Tanya Tremewan, Christchurch and Dee Warring, Kāpiti*

Cover image *Ōtākaro Avon River, Ōtautahi Christchurch,
Aotearoa New Zealand*

ISSN 2253-1440

Published October 2026

© Edition: School of Landscape Architecture,
Lincoln University.

© Text and illustrations: individual contributors,
unless otherwise noted.





Foreword

GILL LAWSON

Technological change! We have witnessed its broad-scale impacts before. The first industrial revolution of the late 1700s and early 1800s overturned working conditions and the global environment; the second industrial revolution of the late 1800s and early 1900s set up global transport, telecommunications and trade; the third industrial revolution of the mid 1900s saw computational electronics creating knowledge-based global economies; and most recently the fourth industrial revolution of the late 1900s and early 2000s used cyber systems, robotics and artificial intelligence (AI) to transform global production and distribution processes. Will human–AI collaborations be next?

This issue of *Landscape Review* looks at some of the current debates over impacts and challenges in the field of *visual representation* that landscape architecture professional practitioners, graduates, students and academics are currently experiencing at a more local level. In 2026, the New Zealand Institute of Landscape Architects (NZILA) commissioned two landscape architecture companies, Isthmus and Boffa Miskell, to update its *Best Practice Guide: Visual Simulations BPG 10.2* (BPG 10.2) (NZILA Education Foundation, 2010). These guidelines were the foundational standard for producing accurate, transparent and replicable visual simulations that are photomontage-based.

Technological tools and processes have moved on dramatically in the last 25 years. We thought this transformation presented a good opportunity to invite speakers from Australia and Aotearoa New Zealand to join a discussion, face-to-face or online, about the use of AI in landscape architecture, on-site construction tech tools, digital twins, digital cultural narratives and digital evidence for court proceedings. That idea led to a symposium at Lincoln University on 4 September 2026 that drew 40 attendees with expertise in both landscape architecture and information technology from Aotearoa New Zealand, Australia, China, the Philippines, Switzerland and the UK. We asked our speakers to write a paper to complement their presentations and we present four of those papers in this issue.

Jillian Walliss, Associate Professor from the School of Design, University of Melbourne, starts by stating that landscape architects love to talk about visual representation. And she is right, of course! She argues that we are experiencing a second digital turn in our profession, where technology is altering our ways of thinking, particularly through our use of AI. That means we must now focus on processes of formation, which requires a high level of critical thinking and curation. Creativity and imagination have become more important than ever.

Hamish Clarke is a technical support representative at Trimble Inc. in Christchurch, Aotearoa New Zealand. He explores the benefits of digital tools for landscape architects, their clients and construction teams. Hamish focuses on the transition to the integration of digital designs with cloud-based collaboration platforms and high-accuracy, augmented reality applications. Interestingly, while he extols the virtues of on-site visualisation and digital workflows to increase productivity and enhance coordination and collaboration during the design and build process, he also recognises that print-based design and plans will remain the staple, legal and tactile backbone of the industry for some time yet. But how to hybridise the best of both?

Lingwei (Kris) Tong is a postdoctoral research fellow with the Human Interface Technology Laboratory New Zealand (HIT Lab NZ) at the University of Canterbury in Christchurch. His paper provides a detailed explanation of a cultural narrative project

Gill Lawson is an Honorary Associate Professor of Landscape Architecture, School of Landscape Architecture, Faculty of Environment, Society and Design, PO Box 85084, Lincoln University, Christchurch 7647, Canterbury, Aotearoa New Zealand.

Email:

gillian.lawson@lincoln.ac.nz

KEY WORDS

landscape architecture publication;
landscape architecture discourse;
landscape architecture divide;
landscape architecture knowledge

focused on bespoke spatial storytelling using cinematic virtual reality, which he developed respectfully with kaikōrero (Māori storytellers) at Te Rau Aroha marae in Motupōhue Bluff, Aotearoa New Zealand. This project is a valuable example of how co-designing digital stories with kaikōrero revealed unexpected technological requirements that challenged rigid, conventional, digital storytelling to produce a more authentic give-and-take of face-to-face spatial storytelling for visitors to the marae.

Finally, from Boffa Miskell in Christchurch, Rhys Girvan, an associate partner and technical lead for landscape planning, and Corey Murray, a visualisation specialist, provide a critical overview of what BPG 10.2 got right, what has changed since 2010 and how clients' expectations have dramatically increased. They critically explain the implications of developments in high-resolution spatial data, everyday digital devices, screen-based viewing, realistic rendering, augmented and virtual reality immersion, and generative AI. Finally, they recommend eight guiding principles to provide a trust framework across a broad range of digital outputs that will keep evolving. We look forward to the launch of the updated NZILA's best practice guidelines on visual simulation later in 2026.

We hope that the papers in this issue will provoke other authors to have their say!

REFERENCE

NZILA Education Foundation (2010) *Best Practice Guide: Visual Simulations BPG 10.2*, New Zealand Institute of Landscape Architects.



Drawing by Alison Page, Creative Shape Shifter Exhibition, Melbourne School of Design
(with permission from Alison Page, May 2026).



Landscape architects love to talk about representation

JILLIAN WALLISS

Take a look at the Routledge *Representing Landscapes* series published from 2012 to 2024: *Digital*, *Hybrid*, *Analogue* and *Visualizing Climate Action* (Amoroso, 2015, 2016, 2019, 2025) are just a few of the subtitles. Landscape architects love to talk about representation.

It was through the lens of representation that landscape architects first considered the impact of digital technology, leading to extensive debate over a projected loss of creativity. In contrast, architecture, inspired by the work of Deleuze and Guattari, explored the potentials of parametric tools emerging from the car and aviation industries to speculate on novel ideas of smooth space and continuous variation. But landscape architecture's comfort zone is not speculation. It is representation.

Introduction

Landscape architecture's obsession with representation inspired the writing of *Landscape Architecture and Digital Technologies: Reconceptualising Design and Making*, which I co-authored with Heike Rahmann (Walliss and Rahmann, 2016). Through this book, we aimed to shift understandings of the digital away from a limited focus on representation to instead explore the broader value of the digital in shaping contemporary design practice. Working across academia and practice, *Landscape Architecture and Digital Technologies* examined parametric modelling, scripting, real-time data, simulation, prototyping, fabrication, and Building Information Modelling for their potentials in the design and construction of contemporary landscapes.

Published in 2016, our book formed part of a cluster of works exploring digital design possibilities that emerged contemporaneously. Related publications included *Responsive Landscapes* (Cantrell and Holzman, 2016), *Codify: Parametric and Computational Design in Landscape Architecture* (Cantrell and Mekies, 2018) and *Dynamic Patterns* (M'Closkey and VanDerSys, 2017). That moment could be considered landscape architecture's first digital turn.

A decade on, the question is no longer about understanding how technology changes practice but instead how design practice is now positioned in an increasingly technological age. As Mario Carpo (2017) highlights, while the first digital turn focused on making, this second digital turn concerns how technology has altered our ways of thinking. Nowhere is this more clearly demonstrated than in the rapid evolution of artificial intelligence (AI), which, at its most extreme, represents a complete outsourcing of thinking.

An image is not a design

In researching *Landscape Architecture and Digital Technologies*, it became clear to us that digital technologies encourage a very different design logic. This was not simply drawing through digital means. Digital techniques move from the privileging of the visual and compositional to a focus on processes of formation. These processes break the binary between the physical and the digital and are driven by explicit rather than implied knowledge. As such, a digital practice requires a high level of critical thinking and curation on the part of the designer. It is not a linear process.

The introduction of AI offers enormous potential for designers to extend their capabilities. However, an emerging concern is the assumption that design can be

Jillian Walliss is an Associate Professor in Landscape Architecture at the University of Melbourne, Melbourne, Victoria 3010, Australia.
Email: jwalliss@unimelb.edu.au

KEY WORDS

digital; design; creativity; representation

Citation: Walliss, J. (2026)

Landscape architects love to talk about representation. *Landscape Review*, 22(2), pp 3–6.

Received: 20 May 2026

Published: 1 October 2026

outsourced to AI. For clients, this leads to expectations of lower design fees and faster outputs. A 2025 discussion with an AI specialist architect from the internationally renowned firm Snøhetta highlighted a troubling trend of clients coming to meetings with images generated by AI, followed by a request for the firm to produce a replica. Here we see how the production of a realistic image is conflated as a design. Snøhetta soon realised the importance of communicating to clients that they are paying for a bespoke design process and not a product. Given landscape architecture is a process-driven practice, this shouldn't be too hard, right?

The problem of known solutions

Landscape Architecture and Digital Technologies was driven by the new possibilities and novel design outcome afforded by digital design. Yet this explicit emphasis on design and making has diminished over the past decade as those in the profession of landscape architecture have increasingly positioned themselves as problem solvers. The unfolding implications of climate change have no doubt inspired this instrumental turn towards ecology, landscape planning and science.

In his article 'The problem with solutions', Rob Holmes (2020) clearly lays out the pitfalls of a problem-solving approach. Adopting Evgeny Morozov's term 'solutionism', Holmes highlights how this approach encourages the adoption of known solutions and often ignores aspects that are not considered problems. In its simplest form, solutionism can be understood through the saying, 'when all you have is a hammer, everything looks like a nail'. It is not a stretch to see how the intersection of AI with a problem-solving approach could easily replicate many work flows of the landscape architect. Repeatable methodologies (think McHargian overlay) easily translate into a fast AI procedure. Landscape visualisations can be developed in minutes. If, as Holmes warns, solutionism encourages the replication of ideas and concepts from other places, what is the role of the designer, given AI excels in the domain of what has already been done?

Universities are currently at the front line of this evolution. As Zhai, Wibowo and Li (2024, p 31) warn in their literature review on the effects of AI on students' cognitive abilities, 'students in research and education might depend too heavily on AI generated content, neglecting the development of their ideas and original thought process'. Even for the most conscientious student, it is hard to go past an AI summary of a book or to resist outsourcing renders and images. Programs can take a simple photo of a building and reproduce it as a full set of plans, sections and elevation. Why spend time reading a book or speculating through an open-ended design process when you can outsource in minutes? Academics are now having to include 'proof of learning' in their classes: assessing assignments is no longer enough; they must have evidence that the student has acquired knowledge. Our experience is practice's future.

Representing landscape architecture

Over 25 years ago, James Corner (1999) wrote the essay 'The agency of mapping: speculation, critique and invention'. In his critique, he implored landscape architects to see mapping as a creative design practice, stating that 'Its agency lies in neither reproduction nor imposition but rather in uncovering realities previously unseen or unimagined, even across seemingly exhausted grounds' (p 213).

In many ways, history is now repeating itself. With the influence of AI unfolding rapidly, landscape architects in practice and academia must once again be reminded of the value of creativity and imagination. As Richard Weller (2023) warns, landscape architecture has dropped the ball on design:

Landscape architects must take responsibility for a general lack of design experimentation in both the academy and the profession. This lack of commitment to design novelty, material exploration, and technological innovation is replaced,

I think, by an emphasis on illustrating an orthodoxy of righteousness bundled under the rubrics of sustainability, resilience and equity. (p 12)

Landscape architecture's biggest representational challenge therefore lies not in how we work with representation but instead in whether landscape architecture can convincingly shift itself back into the domain of design. Otherwise, our own future might become a problem.

About the author



Associate Professor Jillian Walliss is interested in the relationship between theory, culture and contemporary design practice. She works across multiple platforms including digital media, exhibition and festival curation, is a guest editor for books and journals, and writes for a wide range of academic and professional journals. Her research is characterised by strong links to design practice.

REFERENCES

- Amoroso, N. (Ed.) (2015) *Representing Landscapes: Digital*, New York, NY: Routledge.
- Amoroso, N. (Ed.) (2016) *Representing Landscapes: Hybrid*, New York, NY: Routledge.
- Amoroso, N. (Ed.) (2019) *Representing Landscapes: Analogue*, New York, NY: Routledge.
- Amoroso, N. (Ed.) (2025) *Representing Landscapes: Visualizing Climate Action*, New York, NY: Routledge.
- Cantrell, B.; Holzman, J. (2016) *Responsive Landscapes*, New York, NY: Routledge.
- Cantrell, B.; Mekies, A. (2018) *Codify: Parametric and Computational Design in Landscape Architecture*, New York, NY: Routledge.
- Carmo, M. (2017) *The Second Digital Turn: Design Beyond Intelligence*, Cambridge, MA: MIT Press.
- Corner, J. (1999) The agency of mapping: speculation, critique and invention. In *Mappings*, D. Cosgrove (Ed.); London: Reaktion Books, pp 213–252.
- Holmes, R. (2020) The problem with solutions. *Places Journal*, July. DOI: [10.22269/200714](https://doi.org/10.22269/200714).
- M'Closkey, K.; VanDerSys, K. (2017) *Dynamic Patterns: Visualizing Landscapes in a Digital Age*, London: Taylor & Francis.
- Walliss, J.; Rahmann, H. (2016) *Landscape Architecture and Digital Technologies: Re-conceptualising Design and Making*, New York, NY: Routledge.
- Weller, R. (2023) Introduction. In *The Landscape Project*, R. Weller, T. Hands, Eds.; Novato, CA: Oro Editions, pp 9–17.
- Zhai, C.; Wibowo, S.; Li, L.D. (2024) The effects of over-reliance on AI dialogue systems on students' cognitive abilities: a systematic review. *Smart Learning Environments*, 11(1), art 28.



SiteVision on-site viewing proposed services (with permission from Trimble Inc., June 2023).



The convergence of digital and print in landscape architecture

HAMISH CLARKE

This paper explores the benefits that digital tools can provide for landscape architects, their clients and the construction team, by transforming the traditional 2D printed sets to a powerful hybrid workflow. At the core of this transition is the integration of digital designs with cloud-based collaboration platforms and high-accuracy augmented reality applications. The combination of these workflows increases productivity, coordination and collaboration during the design and build process through on-site visualisation.

Hamish Clarke is a technical support representative at Trimble Inc., 11–15 Birmingham Drive, Christchurch, Aotearoa New Zealand
Email: hamish_clarke@trimble.com

Introduction

Landscape architecture and construction have historically relied on 2D print sets to convey spatial intent. However, with the transition to digital design software packages like Sketchup, AutoCAD and Vectorworks Landmark, design files can now be viewed in high-accuracy augmented reality workflows. By integrating collaboration tools such as Trimble Connect™ with augmented reality applications like Trimble SiteVision®, designers can overlay 3D designs, building information modelling (BIM), utility data and grading plans on to the physical job site in real time.

Benefits to designers and landscape architects: precision and validation

For the landscape architect, the digital workflow acts as a bridge between the studio and the soil.

- **Single source of truth:** Trimble Connect™ is a cloud-based data environment designed for architects, engineers, contractors and owners to store, share, view and coordinate project data in real time.
- **Real-time contextualisation:** Trimble SiteVision® allows designers to visualise designs, plant maturity, shadows and sightlines at a 1:1 scale before the construction has started.
- **Conflict detection:** By viewing the underground utility layers digitally, designers can adjust the placement of infrastructure or deep-rooted trees to avoid costly subsurface clashes.
- **Iterative freedom:** The workflow allows for design tweaks. If a stone wall doesn't feel right in the digital overlay, the designer or client can add notes to the element within the application, make adjustments to the model and re-sync, saving hours of drafting.
- **BCF Topics (BIM collaboration format):** Rather than taking static screenshots, teams can use BCF files to click on a topic in one program (like Trimble Connect™ or Tekla structures) and instantly jump to the exact location of the issue in another.

KEY WORDS

landscape architecture;
augmented reality; hybrid workflow;
BIM collaboration

Citation: Clarke, H. (2026) The convergence of digital and print in landscape architecture. *Landscape Review*, 22(2), pp 7–11.
Received: 2 June 2026
Published: 1 October 2026

Benefits to the client: vision and transparency

The biggest hurdle for the client is often spatial literacy: the ability to understand how a 2D drawing will feel in 3D space.

- **The ‘wow’ factor:** Walking a client through their future garden or outdoor entertaining area using an augmented reality (AR) headset or handheld device provides an emotional connection that a flat plan cannot match.
- **Stakeholder buy-in:** When a client can see exactly where a pergola or deck will sit in relation to their existing structure or landscape, and how it will frame a view, decision-making becomes faster and more confident – see, for example, figure 1.
- **Transparency:** Trimble SiteVision® provides a clear ‘before and after’ comparison. Because clients can see exactly what they are paying for, trust is fostered throughout the construction lifecycle.



Figure 1. Timber framing for designed boardwalk at Lake Wanaka (with permission from Blakely Construction, February 2021).

Benefits to construction workers: clarity and efficiency

The construction phase is where the design is turned into reality. Trimble Connect™ and Trimble SiteVision® replace the ambiguity of 2D stakes with the absolute clarity of 3D visualisation.

- **Eliminate the guesswork:** Before the construction starts, contractors can view the designs in 3D in the office and plan their schedule. Out on site, Trimble SiteVision® allows the construction team to visualise the end product and uncover potential clashes with pre-existing structures.
- **Increased safety:** By visualising ‘invisible’ hazards, such as buried pipes or electrical lines, crews can excavate with significantly higher confidence and lower risk.
- **As-built verification:** During the build, crews can compare the physical progress against the digital model to ensure the project stays within tolerance, reducing the need for expensive re-works. For example, compare the AR design in figure 1 with the photo of the boardwalk’s progress in figure 2.



Figure 2. Boardwalk under construction at Lake Wanaka (with permission from Blakely Construction, June 2021).

The hybrid workflow: Why print still matters

While tools like Trimble Connect™ and Trimble SiteVision® provide an augmented visualisation of the design, and facilitate additional data collection, the printed design and plans will remain a staple in the industry.

Design remains the legal and tactile backbone of the industry. Digital (Trimble SiteVision®) is:

- dynamic: real-time updates and 3D depth
- interactive: great for client meetings and layout
- precise: CM-level accuracy via GNSS.

Print (construction plans) is:

- static: the legal ‘record set’ and contract
- reliable: no require power
- tactile: essential for quick on-site annotation.

Conclusions

The future of landscape architecture isn’t about replacing paper with screens; it’s about interoperability. By utilising tools like Trimble Connect™ and Trimble SiteVision®, the designer validates their vision, the contractor builds with precision, and the clients see their investment come to life. This integrated workflow reduces errors, saves time and ultimately results in a more faithfully executed landscape.

Acknowledgements

Thanks to the Trimble Inc. SiteVision® development team based in Christchurch, Aotearoa New Zealand.

Declaration of the use of generative AI

During the preparation of this paper, the author used Google Gemini to assist with grammar checks and structural layout. After using this tool, the author reviewed and edited the content as needed and he takes full responsibility for the content of the publication.

About the author



Hamish Clarke is a geospatial technical support representative at Trimble Inc. He is a qualified carpenter, has worked as a survey technician, with experience in topographical data collection, set out, and scanning workflows.



From top to bottom: a bird's-eye view of Te Rau Aroha marae in Motupōhue Bluff, Aotearoa New Zealand; a front view of its wharehau (ancestral meeting house); and a behind-the-scenes view when capturing 360-degree videos inside the wharehau (images by author, June 2022).



Virtual pūrākau: co-designing adaptive cinematic virtual reality for culturally responsive landscape interpretation at Te Rau Aroha

KRIS TONG

Landscapes hold cultural narratives, but conventional static interpretation struggles to communicate them. This research explored adaptive cinematic virtual reality (CVR) as a spatial storytelling tool, developed with *kaikōrero* (Māori storytellers) at Te Rau Aroha marae in Motupōhue Bluff, Aotearoa New Zealand. The results show that immersive storytelling must move beyond a one-size-fits-all model. By identifying viewer personas and adapting the narrative to them, CVR can support culturally responsive interpretation that respects place-based Indigenous knowledge. Immersive media should therefore be treated not as a technical tool but as a platform for communicating landscape narratives. For landscape architecture, adaptive digital storytelling offers a complementary and non-extractive method of interpretation. It also opens new options for community consultation, site interpretation and stakeholder engagement in the public realm.

Kris Tong is a postdoctoral researcher, Human Interface Technology Laboratory New Zealand (HIT Lab NZ), University of Canterbury, 20 Kirkwood Ave, Christchurch 8041, Aotearoa New Zealand.
Email: kris.tong@canterbury.ac.nz

Introduction

Landscapes are more than physical environments. They also hold cultural narratives, memory and Indigenous knowledge. In Aotearoa New Zealand, these narratives are often expressed through *pūrākau* (oral traditions), which are active, spatial practices connecting *mana whenua* (people holding customary authority over the land) to their environment. Communicating such place-based stories to the public is difficult for designers and heritage planners. Conventional interpretive infrastructure, such as signage or plaques, cannot adapt to the different backgrounds and prior knowledge of visitors. It can also clutter sensitive heritage sites, and it freezes living, relational narratives in fixed text.

Immersive media, and cinematic virtual reality (CVR) in particular, have emerged as a way around these limits. CVR lets practitioners turn a physical landscape into narrative without building anything on site, and it keeps the sense of being in a space. Immersive environments are effective at building empathy and contextual understanding of complex environments (Young, O'Dwyer and Smolic, 2022). CVR in the public realm has its own constraints, however. Conventional digital storytelling treats visitors as a single uniform audience. It therefore misses the reciprocal quality of Indigenous storytelling, in which a storyteller reads the audience and adapts the account to keep it culturally safe and relevant. Narrative flow has to be guided carefully; otherwise, the storyteller's intent is lost (Winters and Zhu, 2014; Zagalo, Torres and Branco, 2005).

This paper asks how digital media, and CVR specifically, can be designed to adapt to diverse visitor backgrounds and prior knowledge, and to reveal place-based Indigenous narratives respectfully within cultural landscapes. To explore that question, it reflects on a collaborative project with *kaikōrero* (Māori storytellers) at Te Rau Aroha marae (communal meeting grounds) in Motupōhue Bluff, Aotearoa New Zealand (Tong et al, 2024) (figure 1). The project was grounded in Indigenous research principles (Walker, Eketone and Gibbs, 2006). It involved co-designing a CVR system that adapts what it tells based on the particular 'persona' of the viewer. I argue that adaptive digital storytelling gives landscape practice a culturally responsive tool for site interpretation, community consultation and stakeholder engagement.

KEY WORDS

cinematic virtual reality; CVR; landscape interpretation; cultural landscapes; digital storytelling; Māori heritage; co-design

Citation: Tong, K. (2026) Virtual pūrākau: co-designing adaptive cinematic virtual reality for culturally responsive landscape interpretation at Te Rau Aroha. *Landscape Review*, 22(2), pp 12–20.
Received: 20 May 2026
Published: 1 October 2026

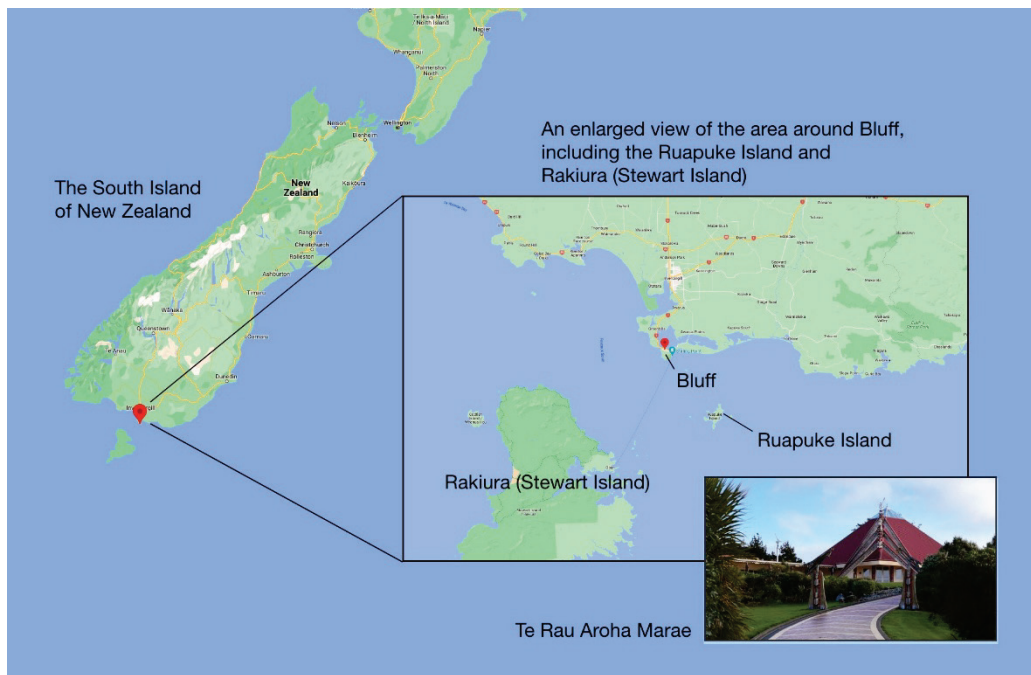


Figure 1. The location of the township of Motupōhue Bluff in the south of Te Waipounamu South Island, Aotearoa New Zealand, along with its immediate surroundings, including the islands off its coast. Te Rau Aroha marae is inset (map data: © 2026 Google; inset photo by author, October 2023).

Approach – part 1: Collaborative and interpretive co-design

To investigate how immersive media can communicate place-based narratives respectfully, this research used a participatory design approach. In that tradition, the people who will live with a system hold authority over its design, rather than being consulted about it (Simonsen and Robertson, 2012). In Aotearoa New Zealand, the tradition is increasingly practised inside Indigenous frameworks rather than alongside them (Harding et al, 2020; Harvey and McEntee, 2026). Specifically, kaupapa Māori principles governed this research (Walker et al, 2006). These principles hold research accountable to the community it concerns, and reject the practice of gathering knowledge from a community and then interpreting it elsewhere (Smith, 2021). Mana whenua kept authority over how their narratives were turned into digital form. The University of Canterbury’s Human Research Ethics Committee approved the research.

For a project like this, the decisive question is not which technology to use. Rather, the key questions are where the camera stands and who it is speaking to. Barclay (2003) drew a distinction between the camera on a ship’s deck, which records Indigenous people for an outside audience, and the ‘camera ashore’, held by the people for whom ‘ashore’ is home. What separates the two approaches is not who operates the equipment but whose conventions decide framing, sequence and disclosure, and who the audience of the work is assumed to be (Hokowhitu, 2013). Putting a 360-degree camera inside a wharenui (ancestral meeting house) makes answering those questions unavoidable. A marae is not a neutral setting, and a recording made there carries the authority of the place whether or not its makers intended it. Treating the system as a camera ashore meant that decisions normally left to a production team – about what is shown, in what order and to whom – stayed with the storytellers.

The collaboration began in 2019, within the wider Ātea programme of Māori-led immersive media research (Regenbrecht et al, 2022). Whanaungatanga (relationships between people) was established long before any recording was proposed, and video capture did not take place until August 2022. Two co-design sessions were held, each with

around eight participants: two kaikōrero from Te Rau Aroha marae, two Māori cultural advisors and the research team.

Both sessions ran as online video conferences under pandemic restrictions. That constraint drew attention to the central problem rather than hiding it, because the reciprocity of face-to-face storytelling is exactly what a video call removes. The first session established what the kaikōrero themselves consider when they tell a story. The second session reviewed and corrected the interaction prototype and persona framework developed from the first session. Only then was the recording made on site, inside the wharenui.

The first session identified the rigidity of conventional digital storytelling as the central obstacle. When guiding visitors through the marae, a kaikōrero reads the audience and adjusts the way they tell the story accordingly. The kaikōrero described this not as personalisation but as knowledge access control. To address this issue in the recording, the research team designed ‘personas’ for the range of different visitors to the marae. The kaikōrero then corrected our original design substantially.

Our categories proved culturally wrong in ways we had not foreseen. A ‘first-time visitor’ does not stand, because anyone hearing a story has already been welcomed through pōwhiri (the ceremony of formal welcome). ‘No whakapapa’ was rejected outright, because everyone has whakapapa (genealogy), and to deny it breaches manaakitanga (hospitality and care for others). The replacement categories became waewae tapu (newcomer) and, for genealogy, mana whenua and Ngā Hau e Whā (the four winds, everyone from afar). The corrected personas drove the adaptive playback control (APC) mechanism described in the next section.

Approach – part 2: Structuring the adaptive narrative and evaluating APC

Following the co-design sessions, building the CVR system meant turning continuous oral tradition into a flexible digital structure. A conventional 360-degree video runs on a fixed timeline, which rules out the adaptability that culturally safe storytelling needs. The solution came from the practice of the kaikōrero themselves. They described telling stories through a cascading three-block model (figure 2). Every group receives a **generic** block, the baseline account offered to any visitor. A **detailed** block is added where the group’s access and the time available allow. An in-depth block follows for those entitled to it. Where the audience is known well in advance, such as a wānanga (a forum convened and led by Māori) or a formal delegation, they instead prepare a **special** version beforehand. The recorded pūrākau were therefore structured as a matrix of segments and takes rather than as one continuous file, with each take matching one persona group.

Two kaikōrero recorded stories about the whānau (extended family) wall inside the wharenui, and both accounts were used. Capture used an Insta360 Pro 2 at 8K and 30 fps, mounted on a tripod and kept still, with a separate lapel microphone. The footage was stitched and reduced to 5K in Insta360 Stitcher, before being edited in Adobe Premiere Pro. The camera, the kaikōrero and the wall were positioned so that a visitor can see both the kaikōrero and whatever the kaikōrero is pointing to (figure 3). The camera itself was left running unattended. This is the ‘unmanned camera’ Strickland (2013) identifies in Barclay’s practice, where authorship sits with the people in front of the lens rather than behind it.

This modular repository formed the basis of the system’s underlying mechanism, the APC, built in Unity and delivered on an Oculus Quest 2 headset. The APC works as the digital equivalent of an interpretive guide. Rather than playing a fixed sequence, it checks the visitor’s persona against the available segments, then selects, orders and moves between them. A visitor whose persona shows existing knowledge of te reo Māori (the Māori language) and existing cultural ties receives segments carrying deeper whakapapa knowledge, and skips the introduction that a first-time international visitor would need. For landscape and heritage practitioners, this matrix approach to preparing content offers a sustainable model for digital interpretation. It maintains the digital landscape as a living, editable archive rather than making it a fixed record.

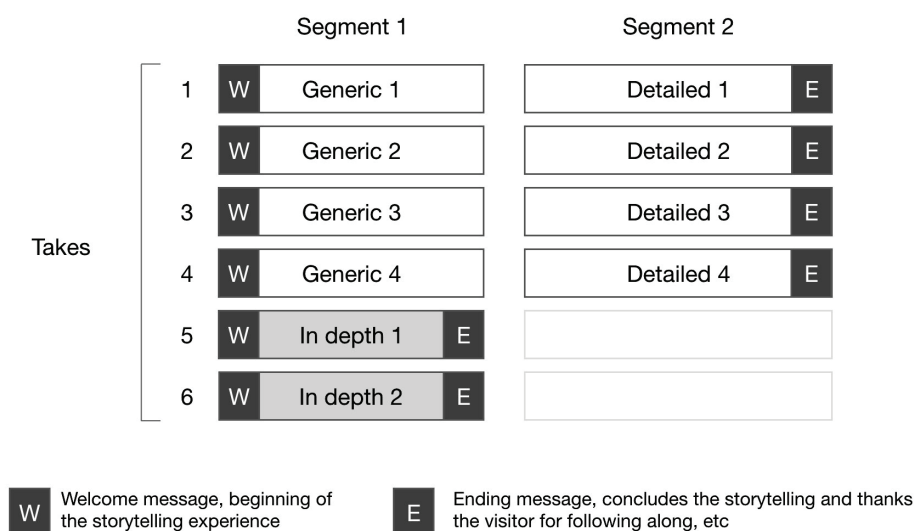


Figure 2. The layout of story bits showing how generic segments, detailed segments and two in-depth special segments were arranged around the six visiting groups. Welcome messages and ending messages were also captured and attached to the main content segments (image by author, January 2024).

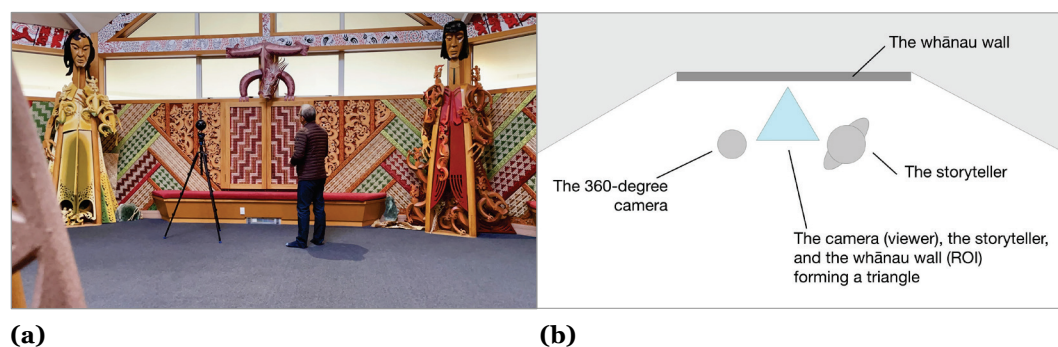


Figure 3. (a) Behind-the-scenes photo showing the capture work at Te Rau Aroha marae. The 360-degree camera and the kaikōrero are both in front of the whānau (extended family) wall. **(b)** Top-down view of the capture site. The camera, the storyteller, and the wall the kaikōrero is talking about are properly arranged so the visitor can later see both the kaikōrero and the wall and follow the gestures of the kaikōrero easily (image by author, January 2024).

After implementation, the adaptive experience was evaluated with the kaikōrero themselves. In landscape practice, post-implementation evaluation is what establishes whether a design meets its intended social function, and the same logic applies here. The session was held kanohi ki te kanohi (face to face) inside the wharehenui. Four kaikōrero each selected two persona groups and worked through the matching narratives. The headset view was

transferred to a monitor so the others could follow and talk while they waited. A semi-structured group discussion followed, covering pacing, cultural safety and spatial representation. This evaluation kept the technology from overshadowing the cultural narrative, so that it worked instead as a clear, culturally endorsed channel for interpretation.

Findings: Culturally responsive digital narratives

Evaluating the adaptive CVR system with *kaikōrero* produced several insights into how immersive media works within a cultural landscape. The main finding is that digital systems must move away from linear, broadcast-style media if they are to communicate *pūrākau* respectfully. They need instead to reproduce the give and take of face-to-face spatial storytelling.

1. Moving beyond a 'one-size-fits-all' interpretation

A core insight from the co-design and evaluation phases was that a single uniform narrative does not work. Applied to a sensitive space like Te Rau Aroha marae, conventional digital interpretation such as a standard 360-degree video treats the audience as one undifferentiated group. The *kaikōrero* pointed out that giving complex, culturally layered knowledge to an audience who do not have the necessary grounding is inappropriate, and contrary to *tikanga* Māori (customary practices).

The APC addressed this. By differentiating visitors based on a range of distinct personas, the system adjusted the visual and spoken narrative as it played (Tong et al, 2024). The qualitative findings showed that the digital media could act with judgement. It gave essential historical context to a first-time international visitor, and skipped that introduction to go straight to delivering deeper *whakapapa* knowledge to a viewer with established cultural ties. The key point is that the APC did not alter the truth of the landscape; instead, it altered how much of the narrative reached the visitor, and the depth of the information it conveyed, so that it was appropriate to each persona group.

2. Cultural safety and reciprocal spatial practice

The evaluation showed the importance of cultural safety in digital landscape representation. The *kaikōrero* said the adaptive framework gave them a sense of security, because sensitive site knowledge was safeguarded and released only to appropriate personas.

This is where the 'camera ashore' question becomes practical rather than theoretical. The recording exists, so what matters is who decides its release. That is a question of data sovereignty as much as of interpretation, and it is answered here by leaving the decision with *mana whenua* rather than with the system's designers (Kukutai and Taylor, 2016).

Through this capability, the CVR system reproduced the presence of a human guide in the physical landscape. On a guided visit, a local expert continually reads the questions, cues and prior understanding of the audience, and adjusts their pace and focus in response. When digital media is built to make that same assessment, it stops being a technical novelty and becomes an extension of Indigenous spatial practice. The immersive environment and the adaptive narrative together produced a strong sense of place. Digital tools can therefore uphold the integrity of oral traditions, provided the underlying framework puts the content owners' protocols first.

Implications

The findings from Te Rau Aroha marae show that culturally responsive digital media moves from being a technological overlay to working as an effective tool for spatial interpretation. This innovation carries at least two major implications for landscape architects, heritage planners and spatial designers.

1. Complementary and non-extractive interpretation

Immersive storytelling offers a complementary method of interpretation for cultural landscapes. As heritage sites face growing pressure from tourism, practitioners have to provide educational experiences without damaging the physical or spiritual integrity of the site. Conventional interpretation often needs physical infrastructure such as pavilions, boardwalks and dense signage, which visually degrades the landscape it explains. Adaptive CVR embeds detailed, multi-sensory narrative into the site experience while leaving the physical environment untouched, so the landscape itself remains as the focus.

It also redefines the role of digital media in communicating place-based narratives. Digital interpretation in the public realm can no longer be a passive broadcast. Persona-driven adaptation of the kind used here requires digital media to take part in the reciprocal relationship between visitor and land. For landscape architecture, this means the digital landscape needs the same cultural consultation, and the same adherence to tikanga Māori, as the physical one.

2. Addressing gaps in professional education and research

Integrating physical and digital environments to form a hybrid approach will require a shift in professional education. Landscape architecture teaching emphasises spatial arrangement, ecology and materials. Using adaptive CVR also demands skill in building digital narrative, identifying visitor personas and designing for audience interaction. That includes structuring branching narratives that carry plural histories respectfully.

There is also a clear research gap. This study evaluated the judgements of the kaikōrero, who are the appropriate authority on cultural fidelity. How diverse public stakeholders – ranging from international visitors to governance bodies – interact with and learn from CVR in the public realm remains thinly evidenced in landscape architecture literature. Building that evidence is necessary to establish best practice for immersive media in statutory planning and public space design.

Conclusions

This paper has argued that immersive storytelling technologies should be seen not as technical novelties but as platforms for communicating landscape narratives and safeguarding cultural knowledge. The case study at Te Rau Aroha marae shows that CVR, coupled with an adaptive framework and co-designed with mana whenua, can address the ‘narrative paradox’ (Winters and Zhu, 2014). Matching what is disclosed to the prior knowledge of specific visitor personas allows the digital experience to respect tikanga Māori, and to preserve the reciprocity that face-to-face pūrākau depends on. For landscape interpretation, this is a shift towards non-extractive, culturally responsive spatial design.

Three limitations bound these claims. First, the analysis of the co-design sessions followed a general inductive approach, but it did not reach the scale of a full thematic analysis, given the time available and the small number of experts who could take part. Second, the evaluation drew on the judgement of the kaikōrero rather than of visiting members of the public. The former are the appropriate authority on cultural fidelity, but they are not a proxy for how a general audience would respond. Finally and most importantly, the persona categories are specific to Te Rau Aroha marae. The kaikōrero emphasised that their reading of whakapapa applies to this marae and would differ at another. What transfers is the method of deriving such categories with mana whenua, not the categories themselves (Harvey and McEntee, 2026).

Looking forward, CVR in landscape architecture should expand beyond heritage tourism into active spatial planning and scenario-based design. Future versions of adaptive CVR should explore both predetermined and real-time viewer interaction, to allow deeper exchange between the digital environment, storyteller and audience (Tong et al, 2024).

Adaptive immersive media also has potential for statutory planning and community engagement. One promising application is CVR in virtual environment court hearings, such as hearings by Resource Management Act 1991 commissioners in Aotearoa New

Zealand. Commissioners could use CVR to ask spatial questions, while proponents and submitters could give their perspectives on a proposed development from within a shared, multi-sensory understanding of the site. CVR also offers new options for community consultation, letting consultants and community members evaluate a site together before any physical work begins.

Finally, adaptive CVR need not be limited to interpretation during a visit. By engaging with users before they arrive or after they leave, practitioners can inform the public, encourage respectful visits, and manage the physical and ecological footprint on sensitive cultural landscapes. As the physical and digital public realms merge, landscape architects should champion adaptive, Indigenous-led digital media frameworks, so that future landscapes remain equitable, dynamic and connected to their cultural foundations.

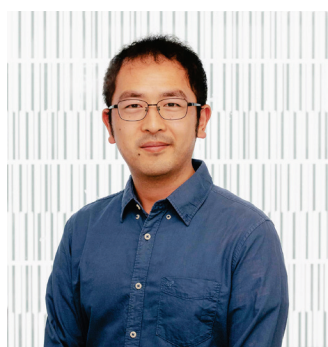
Acknowledgements

The author would like to thank Professor Rob Lindeman and Professor Heide Lukosch for their support, as well as other researchers from HIT Lab NZ, University of Canterbury, Professor Hēmi Whaanga, Dean Whaanga, the late Bubba Thompson and others from Te Rūnanga o Awarua, Te Rau Aroha marae in Motupōhue Bluff, and research members from the New Zealand Science for Technological Innovation National Science Challenge project Ātea. E te hoa, te rangatira Bubba, te uri o Ngāi Tahu me Ngāti Kahungunu. I haoa koe ki te kupenga nui a Taramainuku, i whakairia ake ki te hao o Rua, ā kua whetūrangihia koe. E tangi tonu ana te ngākau, e auē tonu nei te mamae. Nō reira, moe mai rō, oki atu.

Declaration of the use of generative AI

The author acknowledges that during the preparation of this work, he used Google Gemini to improve grammar and syntax, in turn improving the clarity and readability of the manuscript. After using this tool, he reviewed and edited the content as needed and he takes full responsibility for the content of the publication. The AI tool was not used in study planning, data processing and analysis, or the generation of original content and ideas.

About the author and collaborators



Author **Dr Lingwei (Kris) Tong** is a postdoctoral researcher at HIT Lab NZ, University of Canterbury who specialises in immersive storytelling. His research explores how emerging technologies like CVR can respectfully capture and present Indigenous narratives connected to place. Drawing on his experience of co-designing culturally responsive digital media alongside Māori communities in Motupōhue Bluff, Kris is passionate about bridging the gap between human–computer interaction and the built environment to craft socially meaningful, dynamic interpretations of cultural landscapes.

Collaborators

Professor Rob Lindeman is the Director of HIT Lab NZ, University of Canterbury. His research on virtual reality began in 1993, and focuses on immersive, multi-sensory feedback systems and the effective application of 360-degree video for environmental outreach. Rob is deeply passionate about democratising immersive technologies and empowering communities, particularly Māori storytellers, to share their narratives with confidence. His expertise in designing non-fatiguing, user-friendly VR immersion provides a critical technological foundation for the development of culturally responsive, place-based digital storytelling in the public realm.

Professor Hēmi Whaanga (Te Pūtahi-a-Toi) is a leading researcher in Indigenous digital innovation at Massey University. He leads the Ātea project, developing conceptual

frameworks for virtual and augmented realities, artificial intelligence, and Māori data sovereignty. Additionally, he co-leads the international *Abundant Intelligences* programme, advancing culturally grounded digital systems that empower Indigenous communities. His deep expertise in Indigenous data sovereignty and digital repositories is instrumental in ensuring that emerging immersive technologies respectfully safeguard, manage and communicate place-based cultural heritage and pūrākau.

Professor Heide Lukosch is a researcher and designer of applied games at HIT Lab NZ, University of Canterbury. She explores how games and virtual and augmented reality can extend the boundaries of the physical world. Heide is dedicated to using games and immersive media to empower people to understand complex spatial and social challenges. Her work frequently intersects with landscape interpretation, focusing on generative tourism, natural hazard preparedness and community resilience, always balancing technological advancement with a deep connection to natural environments and people.

REFERENCES

- Barclay, B. (2003) Celebrating fourth cinema. *Illusions*, 35, pp 7–11.
- Harding, T.; Oetzel, J.; Foote, J.; Hepi, M. (2020) Perceptions of co-designing health promotion interventions with Indigenous communities in New Zealand. *Health Promotion International*, 36(4), pp 964–975. DOI: [10.1093/heapro/daaa128](https://doi.org/10.1093/heapro/daaa128).
- Harvey, M.; McEntee, M. (2026) Mahitahi me te Taiao: co-designing in Māori, te Tiriti, transdisciplinary and Aotearoa native forest contexts. *AlterNative: An International Journal of Indigenous Peoples*, online first. DOI: [10.1177/11771801251413241](https://doi.org/10.1177/11771801251413241).
- Hokowhitu, B. (2013) Theorizing Indigenous media. In *The Fourth Eye: Māori Media in Aotearoa New Zealand*, B. Hokowhitu, V. Devadas, Eds.; Minneapolis, MN: University of Minnesota Press, pp 101–123. DOI: [10.5749/minnesota/9780816681037.003.0006](https://doi.org/10.5749/minnesota/9780816681037.003.0006).
- Kukutai, T.; Taylor, J., Eds. (2016) *Indigenous Data Sovereignty: Toward an Agenda*, Canberra: ANU Press. DOI: [10.22459/CAEPR38.11.2016](https://doi.org/10.22459/CAEPR38.11.2016).
- Regenbrecht, H.; Park, N.; Duncan, S.; Mills, S.; Lutz, R.; Lloyd-Jones, L.; et al. (2022) Ātea presence – enabling virtual storytelling, presence, and tele-co-presence in an Indigenous setting. *IEEE Technology and Society Magazine*, 41(1), pp 32–42. DOI: [10.1109/MTS.2022.3147525](https://doi.org/10.1109/MTS.2022.3147525).
- Simonsen, J.; Robertson, T. (Eds.) (2012) *Routledge International Handbook of Participatory Design*, New York, NY: Routledge. DOI: [10.4324/9780203108543](https://doi.org/10.4324/9780203108543).
- Smith, L.T. (2021) *Decolonizing Methodologies: Research and Indigenous Peoples*, 3rd ed., London: Zed Books. DOI: [10.5040/9781350225282](https://doi.org/10.5040/9781350225282).
- Strickland, A. (2013) Barry Barclay's *Te Rua*: the unmanned camera and Māori political activism. In *The Fourth Eye: Māori Media in Aotearoa New Zealand*, B. Hokowhitu, V. Devadas, Eds.; Minneapolis, MN: University of Minnesota Press, pp 143–161. DOI: [10.5749/minnesota/9780816681037.003.0008](https://doi.org/10.5749/minnesota/9780816681037.003.0008).
- Tong, L.; Lindeman, R.W.; Lukosch, H.; Clifford, R.; Regenbrecht, H. (2024) Applying cinematic virtual reality with adaptability to Indigenous storytelling. *Journal on Computing and Cultural Heritage*, 17(2), pp 1–25. DOI: [10.1145/3647996](https://doi.org/10.1145/3647996).
- Walker, S.; Eketone, A.; Gibbs, A. (2006) An exploration of kaupapa Maori research, its principles, processes and applications. *International Journal of Social Research Methodology*, 9(4), pp 331–344. DOI: [10.1080/13645570600916049](https://doi.org/10.1080/13645570600916049).
- Winters, G.J.; Zhu, J. (2014) Guiding players through structural composition patterns in 3D adventure games. *Foundations of Digital Games – Conference Proceedings*. Accessed 10 August 2026, http://www.fdg2014.org/papers/fdg2014_paper_35.pdf.
- Young, G.W.; O'Dwyer, N.; Smolic, A. (2022) Exploring virtual reality for quality immersive empathy building experiences. *Behaviour & Information Technology*, 41(16), pp 3415–3431. DOI: [10.1080/0144929X.2021.1993336](https://doi.org/10.1080/0144929X.2021.1993336).
- Zagalo, N.; Torres, A.; Branco, V. (2005) Emotional spectrum developed by virtual storytelling. In *Lecture Notes in Computer Science*, Berlin: Springer, pp 105–114. DOI: [10.1007/11590361_12](https://doi.org/10.1007/11590361_12).



Handmade visual simulation of Macraes Mine (with permission from Boffa Miskell, 1993).



Evolving tools, enduring principles: maintaining accuracy, transparency and trust in visual representation

RHYS GIRVAN AND COREY MURRAY

Visual simulations have long played a role in landscape and visual effects assessment. At their best, they help practitioners, communities, councils, hearing panels and courts understand the visual consequences of landscape change. At their worst, they can create a false sense of certainty, overstate realism, or obscure the assumptions that sit behind an image. The New Zealand Institute of Landscape Architects' 2010 best practice guide provided an important foundation for credible photomontage-based visual simulation practice in Aotearoa New Zealand. Its core emphasis on technical accuracy, representative viewpoints, transparent method and appropriate presentation remains highly relevant. However, the technological context in which visual simulations are prepared, distributed and relied on has changed. Contemporary visual representation practice includes high-resolution elevation data, drone and terrestrial photogrammetry, point clouds, 3D GIS, real-time rendering, screen-based review, animation, augmented and virtual reality, and image production assisted by artificial intelligence. While creating opportunities to improve communication and assessment, these tools also introduce risks around apparent realism, scale, image manipulation, provenance and auditability. This paper argues that the professional challenge is no longer simply to prepare technically accurate photomontages; it extends to how to maintain trust in visual evidence across a wider, more immersive and more editable digital environment.

Introduction

Visual simulations have long been used as one tool within landscape assessment (Gobster, Ribe and Palmer, 2019). They are images, but they are not merely illustrations. In assessment and consenting contexts, they often function as evidence. Visual simulations help people imagine a future condition that does not yet exist. They can influence whether the viewer interprets a proposal as acceptable or intrusive, inevitable or avoidable, and/or temporary or transformative.

These functions give visual simulations power. They also introduce risk.

For many years, professional guidance focused largely on the technical preparation and presentation of photomontage-based visual simulations (Landscape Institute, 2011; NZILA Education Foundation, 2010). This most often entails selecting representative viewpoints and taking high-resolution photographs, before preparing accurate models, matching lens geometry, and presenting images at an appropriate scale and viewing distance. *The Best Practice Guide: Visual Simulations BPG 10.2* (BPG 10.2), which the New Zealand Institute of Landscape Architects (NZILA) published in 2010 (NZILA Education Foundation, 2010), remains a significant foundation for this work. The BPG 10.2's stated purpose is to promote best-practice standards and procedures in the landscape profession's preparation and use of visual simulations. It defines visual simulations as tools that can accurately portray a proposed change or modification in the landscape, while also recognising that they are not 'real-life views'.

That distinction remains critical. A simulation can assist judgement, but it is not the view itself. It is a constructed representation, shaped by method, data, judgement, software, framing and presentation.

The BPG 10.2 is not obsolete in principle, but the representational environment around it has changed. The task now is not simply to modernise a photomontage guide by

Rhys Girvan is technical lead: landscape planning and a registered landscape architect at Boffa Miskell, 141 Cambridge Terrace, Christchurch, Aotearoa New Zealand.

Email:

rhys.girvan@boffamiskell.co.nz

Corey Murray is a visualisation specialist at Boffa Miskell, Aotearoa New Zealand.

Email:

corey.murray@boffamiskell.co.nz

KEY WORDS

visual simulation; landscape assessment; visual representation; photomontage; provenance; artificial intelligence

Citation: Girvan R.; Murray, C. (2026) Evolving tools, enduring principles: maintaining accuracy, transparency and trust in visual representation. *Landscape Review*, 22(2), pp 21–30.

Received: 11 June 2026

Published: 1 October 2026

adding a list of new tools. Instead, it is to carry forward the guide's concern with credible visual evidence into a more complex environment of digital models, screen-based review, immersive media and generative image technologies.

What BPG 10.2 got right

It would be easy, but wrong, to characterise BPG 10.2 as simply 'out of date'. The more accurate view is that its core principles remain sound.

The guide was prepared for photomontage-based visual simulations (figure 1). It expressly emphasises the need for accurate 3D models, accurate representation on photographic images, representative viewpoints, technical photographic knowledge, and documentation of the steps involved, including software used, assumptions and limitations. Those matters remain fundamental today.



Figure 1. From photograph to visual simulation (with permission from Boffa Miskell).

The strength of BPG 10.2 is that it treats visual simulation as an evidential practice, not simply as an image-making exercise. Rather than aiming to produce compelling pictures, its purpose is to assist more informed and transparent judgements about appearance and effects.

That is still the right starting point.

In practice, many disputes about visual simulations are not really disputes about technology. They are disputes about trust. Is the viewpoint representative? Is the proposal located accurately? Is the focal length appropriate? Has the image exaggerated or diminished apparent scale? Is mitigation shown fairly? Are lighting and atmospheric conditions reasonable? Can the method be checked? Has the image been presented in a way that allows the intended viewer to understand it properly?

Those questions remain as relevant to an image assisted by artificial intelligence (AI), real-time model or virtual reality (VR) scene as they do to a printed photomontage.

What has changed since 2010

The world in which BPG 10.2 was prepared was largely print-based, photography-based and photomontage-centred. The current world is much broader, as NZILA's own update process recognises. The 2025 call for expressions of interest in updating the visual simulation guidelines states that advances in technology have opened new and more accessible approaches to preparing and presenting visual representations. It identifies the need to build on and expand BPG 10.2, including through guidance around data gathering and management, preparing digital models and presenting visual representations.

That shift matters. The professional task is no longer limited to how to prepare a verified photomontage. It includes how to select, prepare, disclose and review a wider range of visual representation tools.

In the United Kingdom, the Landscape Institute has already made a comparable move in terminology. Technical Guidance Note 06/19 is titled *Visual Representation of Development Proposals* (Landscape Institute, 2019). The Landscape Institute explains that this guidance replaced earlier photography and photomontage advice, and its purpose

in preparing it was to help landscape professionals, planning officers and others select, produce and present types of visualisation appropriate to the circumstances in which they are used. The guidance itself emphasises clear, open and transparent communication and fitness for purpose.

The use of ‘visual representation’ in the title marks another important difference from BPG 10.2. Broader than ‘visual simulation’, the term ‘visual representation’ acknowledges that assessment and communication may involve different types of image, model and display, each with its own strengths, limitations and level of evidential status.

Better data, higher expectations

One of the most significant changes since 2010 has been the availability of higher-resolution spatial data.

As a result, visibility analysis and digital terrain modelling no longer necessarily rely on coarse contour intervals or simplified bare-earth assumptions. In Aotearoa New Zealand, Toitū Te Whenua Land Information New Zealand (2025) now provides open-source Light Detection and Ranging (LiDAR)-based elevation data for much of the country, including a national 1-metre Digital Elevation Model (DEM) assembled from current LiDAR surveys. This creates obvious benefits for viewshed analysis, landform modelling, model placement and terrain understanding.

But improving data does not remove the need for judgement. If anything, it raises the standard of explanation expected of the practitioner.

A Zone of Theoretical Visibility (ZTV) based on a bare-earth DEM may identify theoretical visibility that is substantially screened by vegetation or buildings. A Digital Surface Model (DSM) may include surface features, but these may be temporary, simplified, out of date or captured at a particular point in time. A point cloud may be highly detailed but still require classification, filtering and interpretation (figure 2). Vegetation may be modelled as present or absent, retained or removed, and/or established or mature. Each assumption can materially affect the apparent visibility of a proposal.

The implication is not that visual representation guidance should require a single, correct dataset. That would be unhelpful and quickly outdated. Rather, guidance needs to require clear disclosure of data source, date of production, resolution, vertical datum, processing assumptions and limitations. Higher-resolution data improve the potential for accuracy, but also increase the need for transparency.

The field device has changed

Another major shift since 2010 has been the collapse of the distinction between specialist capture technology and everyday field devices.

In 2020, Apple introduced LiDAR scanning to the iPad Pro, promoting its depth-sensing capability and potential to support augmented reality (AR) workflows. While useful, the contribution of this technology to a landscape assessment should not be overstated. Its effective range is limited to only a few metres, making it unsuitable for capturing or verifying landscape-scale geometry, landform relationships or distant built elements. Its value is better understood as lying in its convenience as a field tool for close-range spatial recording, rapid site documentation and small-scale 3D capture.

By 2021, research was already testing the iPhone 12 Pro LiDAR sensor for geoscientific fieldwork. This work indicated that phone-based LiDAR could be useful to rapidly scan small- to medium-scale landforms, particularly where speed, portability and ease of use are important. However, it also confirmed important limitations to this technology, including that it has a restricted range and variable accuracy, depends on surface texture and lighting conditions, and is less suitable for landscape representation on a larger scale. Its role is therefore supplementary rather than authoritative: useful for field understanding and close-range recording, but not a substitute for surveyed data,

photogrammetry, terrestrial laser scanning, drone-derived models or other controlled methods where evidential accuracy is required.

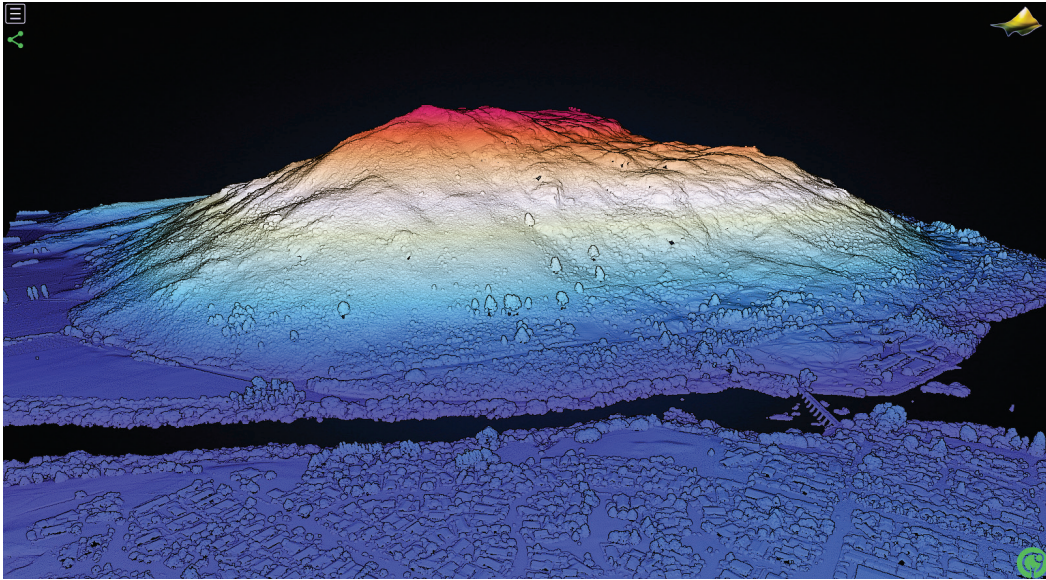


Figure 2. Point cloud image of Peninsula Hill, Queenstown, Aotearoa New Zealand (Land Information New Zealand, 2025).

The point is not that an iPhone or iPad replaces controlled survey, professional photography or verified modelling. It does not. What is the point is that practitioners now routinely carry devices capable of high-resolution photography, GPS-tagged imagery, video, panorama capture and LiDAR-assisted scanning. Progress has also been made in AR overlay, field annotation and cloud transfer.

These advances change practice. They support faster site reconnaissance, better field records, more iterative design review and more accessible communication. But they also blur the line between field note, engagement graphic, design visualisation and assessment-grade simulation.

Updated guidance therefore needs to distinguish between different levels of reliance. A smartphone image may be entirely appropriate for site recording, viewpoint scoping or informal engagement. It may be appropriate for some assessment graphics if location, lens, orientation and scale are sufficiently controlled. But where we rely on a simulation as evidence of likely visual effects, we need stronger controls: known viewpoint position, eye height, lens geometry, model placement, metadata, calibration and retained source files.

The issue is not the device. The issue is evidential status.

From print-first to screen-first review

BPG 10.2 was prepared in a world where printed reports and stated viewing distances were central. That concern remains valid. We can only assess a printed simulation properly if we understand image size and viewing distance.

However, most visual material is now reviewed first, and sometimes only, on screens. Simulations are viewed in PDFs, online portals, presentation slides, hearing-room screens, Teams or Zoom sessions, tablets and laptops. They may be cropped by report formatting, compressed by file systems, enlarged on a projector, or pinch-zoomed on a tablet.

These practices are not a minor issue. Apparent scale changes with screen size, pixel density, brightness, zoom level and viewing distance. A simulation prepared to be geometrically correct at a specified print size can become unreliable when casually zoomed, reduced, projected, or viewed on a small screen.

Future guidance needs to deal with this issue directly. It should not assume that landscape architects will return to print-first practice. Instead, it should provide practical direction for screen-first workflows: prepare images for their intended viewing medium;

include viewing instructions; avoid uncontrolled cropping; provide full-resolution files where appropriate; use calibration bars or scale references where useful; and be clear when an image is for general context rather than scale-sensitive assessment.

This is also an accessibility issue. If visual simulations are prepared to assist decision-makers and communities, then the method of viewing is part of the method of communication. A technically accurate image that its intended audience cannot view properly has not fully achieved its purpose.

The seduction of realism

The most difficult professional issue may not be accuracy. It may be realism.

Since 2010, rendering technology has advanced rapidly. Real-time rendering, physically based materials, real-time ray tracing, atmospheric effects and gaming-engine workflows can produce highly convincing images and immersive environments. Unreal Engine's 2019 discussion of real-time ray tracing in architectural visualisation, for example, described features that produce more accurate and believable architectural visualisation images and experiences (figure 3).



Figure 3. Basemap imagery and elevation (Esri World Imagery, rendered by Rhys Girvan in Unreal Engine 5, 2026).

This is useful. It can improve design testing, stakeholder engagement and communication. But it also introduces a professional trap.

Apparent realism is not the same as evidential reliability.

A highly polished render may be geometrically wrong. A cinematic animation may underplay scale by moving too quickly. A real-time model may omit existing vegetation or simplify landform. A virtual environment may feel convincing because it is immersive, while still being based on uncertain modelling assumptions. Conversely, a simple wireframe or verified model overlay may be less visually seductive but more reliable as evidence.

This distinction needs to sit at the heart of updated guidance. That guidance must recognise that visual simulation for evidential purposes should be judged not by how realistic it appears to be, but by whether it is accurate, representative, transparent, fair and auditable.

The more realistic the image, the greater the risk that viewers will overlook the assumptions it contains.

Immersion and interaction

AR and VR have also shifted from specialist demonstration environments toward more accessible platforms (figure 4). In landscape terms, these platforms most often remain limited to near-field mobile experiences rather than offering precise, auditable landscape-scale simulation – however, technology continues to evolve quickly.



Figure 4. Construction workers using Trimble SiteVision to view digital site information in its real-world context (Trimble SiteVision product page, retrieved 2026).

Immersive technologies can be valuable. They can help people understand spatial relationships, experience scale, test design options and communicate change to non-specialist audiences. Lincoln University’s own 2026 Landscape and Visual Representation Symposium recognises that digital modelling, virtual worlds and generative AI are relevant to how spatial, cultural and environmental change is interpreted.

But immersion can also make the image more persuasive as evidence for the viewer without necessarily increasing its accuracy. AR and VR outputs vary with camera position, eye height, headset optics, frame rate, field of view, model quality, lighting, movement speed and user interaction. Using them only to increase the viewer’s engagement may be acceptable provided appropriate caveats are also made clear. If a landscape architect is relying on them to make an assessment or provide evidence, they need fixed reference points and a clear audit trail.

These differences in approach point to a useful distinction between assessment-grade visual simulations, explanatory visual representations, engagement tools and design development tools. The same technology may be used across all four categories, but the evidential expectations should not be the same.

AI and the provenance problem

The most recent and most disruptive shift has occurred with generative AI.

In 2026, generative image technology has moved beyond early text-to-image systems and become embedded in mainstream creative and production workflows. OpenAI currently identifies GPT Image 2 as its latest image model, supporting both image generation and image editing from text prompts, including modification of existing images either partly or entirely (figure 5). OpenAI also enables the user to develop images through a series of prompts and refine them step by step as part of a wider workflow.

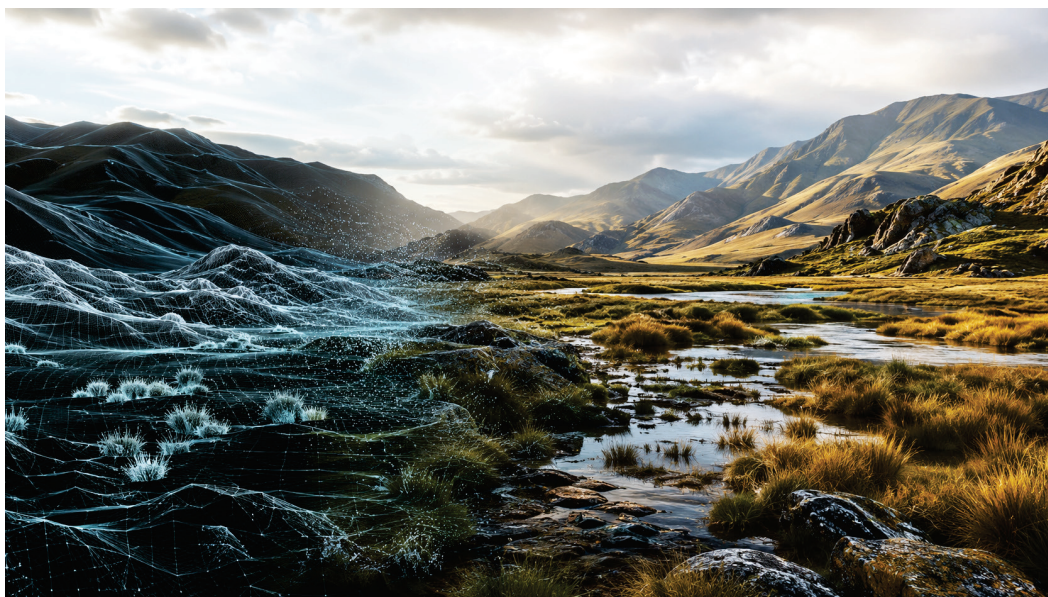


Figure 5. AI-generated conceptual image showing a digital terrain model transitioning into a photorealistic landscape (image generated by Rhys Girvan using ChatGPT (OpenAI), 2026).

Adobe's current positioning of Photoshop similarly reflects the mainstreaming of generative editing. Across desktop, web and mobile, Photoshop is promoted as enabling users to crop and expand images, adjust colour, and add or remove objects. Adobe is also moving towards offering both Firefly and third-party AI models within its creative applications. For certain AI-generated outputs, Adobe attaches Content Credentials recording information such as the application and AI tool used, helping users identify whether content was generated using Firefly or a partner model.

For landscape assessment, the implication is blunt: generative image tools are now sufficiently accessible and convincing that they cannot be treated as peripheral. They may assist with non-evidential communication, masking, layout testing, stakeholder engagement material, or clearly labelled illustrative work. However, landscape architects should not use these tools to alter assessment-relevant geometry, visibility, scale, lighting, landform, vegetation, materiality, weather, atmospheric conditions, or the presence or absence of landscape elements in visual simulations relied on as evidence, unless they explicitly disclose the alteration, justify it and separate it from verified assessment imagery.

This practice aligns with *Landscape Review*'s own guidelines for authors, which state that authors can use generative AI tools to produce content provided they disclose such use. The guidelines also state that authors should cite original sources rather than use generative AI tools as primary sources, and that it is not acceptable to enhance, obscure, move, remove or introduce a specific feature within an image.

The lesson for visual simulation practice is direct. In an environment of AI-assisted images, answering the question, 'How was this image made?' is no longer the only task. Additional questions that now need answers are: 'What has been changed, by whom or what, and can that be verified?'

This is where provenance becomes central. The Coalition for Content Provenance and Authenticity (C2PA) provides an open technical standard intended to establish the origin and edits of digital content. Its technical specification describes provenance information as including assertions about asset creation, edit actions, capture device details and other trust signals.

Such tools will not replace professional judgement. Nor should they become a bureaucratic burden disproportionate to the amount of work involved. But they indicate the direction of travel: as images become easier to manipulate, provenance and auditability become more important.

Toward a trust framework

The future of visual simulation guidance should not be a software manual as software will change too quickly for it to keep up to date. Nor should guidance attempt to rank every emerging tool in advance. That too would likely be obsolete before publication.

A more durable approach is to organise guidance around principles of trust. Eight principles are particularly important.

- **Accuracy:** Is the proposal shown in the right place, at the right scale, from a known viewpoint or spatial reference?
- **Representativeness:** Does the visual material relate to a relevant viewing audience, viewing context and assessment question?
- **Transparency:** Can the viewer understand the method, assumptions and limitations?
- **Auditability:** Can another suitably qualified practitioner check the process?
- **Fairness:** Does the representation avoid exaggerating or minimising likely effects?
- **Proportionality:** Is the method appropriate to the scale, sensitivity and consequence of the decision?
- **Accessibility:** Can the intended audience view and understand the material properly?
- **Provenance:** Is the involvement of source files, edits, model versions, metadata and AI traceable?

These principles are not new in spirit. Many are implicit in BPG 10.2. What has changed is the importance of applying them across a broader range of outputs: photomontage, wireframes, ZTVs, panoramas, drone imagery, 3D GIS, real-time models, animation, AR, VR and AI-assisted material.

The practical implication is that updated guidance should help practitioners classify visual material by purpose and evidential status. Not every image needs to meet the standard of a verified visual simulation. But where practitioners are relying on images to support their conclusions about landscape and visual effects, they should prepare, present and document those outputs to a standard commensurate with that degree of reliance.

Conclusion

BPG 10.2 remains important because it established a professional expectation that visual simulations should be technically accurate, credible and transparent. That foundation should not be lost.

But the context has changed. Visual representation is now more data-rich, more screen-based, more immersive, more interactive and more editable. The tools available to landscape architects have become more powerful. So have the risks.

The central professional challenge is no longer simply how to prepare photomontages. It extends to how to maintain trust in visual evidence. As images become more realistic, guidance about accuracy must become clearer. As visualisation becomes more immersive, guidance about evidential status must become clearer. As AI makes altering images easier, guidance about provenance and disclosure must become clearer.

The future of visual simulation guidance is therefore more than technical; it is ethical and professional as well. It concerns how landscape architects represent change fairly, how they communicate uncertainty honestly, and how they retain the confidence of the public and decision-makers in the visual evidence they prepare.

Declaration of the use of generative AI

The authors used generative AI as an assistive tool to help identify potential source material, organise a technology timeline and test alternative article structures. They have

independently reviewed and verified the sources they relied on. The professional analysis, interpretation, conclusions and final text are the responsibility of the authors.

About the authors



Rhys Girvan is a registered landscape architect, associate partner and technical lead: landscape planning at Boffa Miskell. He has more than 20 years' experience in landscape planning and assessment across Aotearoa New Zealand and the United Kingdom, with particular expertise in landscape character, natural character, visual effects and major infrastructure projects.



Corey Murray is a visualisation specialist at Boffa Miskell with over 20 years' experience. He uses his knowledge of photography, surveying and 3D modelling to create accurate visual simulations. His interests include virtual and augmented reality, and artificial intelligence.

REFERENCES

Gobster, P.H.; Ribe, R.G.; Palmer, J.F. (2019) Themes and trends in visual assessment research: introduction to the *Landscape and Urban Planning* special collection on the visual assessment of landscapes. *Landscape and Urban Planning*, 191, art 103635.

Landscape Institute (2011) *Photography and Photomontage in Landscape and Visual Impact Assessment*, Advice Note 01/11, London: Landscape Institute. Withdrawn and replaced in 2019.

Landscape Institute (2019) *Visual Representation of Development Proposals*, Technical Guidance Note 06/19, London: Landscape Institute.

NZILA Education Foundation (2010) *Best Practice Guide: Visual Simulations BPG 10.2*, New Zealand Institute of Landscape Architects.

Toitū Te Whenua Land Information New Zealand (2025) LiDAR data coverage. Accessed 28 August 2026, www.linz.govt.nz/products-services/data/types-linz-data/elevation-data/lidar-data-coverage.