LGFA Taituarā Local Government Excellence Awards



SUBMISSION CATEGORY **Excellence in Collaborating for Results.**

WAIKATO Lidar Collaboration Project





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WAIKATO LIDAR COLLABORATION PROJECT





Project Summary

Waikato Regional Council (WRC), using their shared services CCO, Co-Lab, led a successful collaboration with nine other Waikato councils to create the first-ever regional LiDAR (Light Detection and Ranging) dataset.



This collaboration was made possible through Toitū Te Whenua LINZ's National Elevation Programme to procure and make available a nationally consistent baseline elevation data set. In the Waikato, LINZ joined with 16 partner organisations, including the ten councils and five co-funding agencies.

Completed in August 2024 at a cost of \$2.8M, the project utilised advanced LiDAR technology to capture over 23,966 square kilometres of high-resolution 3D terrain data from aircraft with specialised sensors.

The dataset provides open access to detailed, accurate 3D elevation data for the entire Waikato, supporting applications like infrastructure planning, flood risk management, landslide monitoring, and earthquake preparedness. Beyond councils, environmental agencies, forestry companies, agriculture, and utility firms use LiDAR data for mapping, inventory, and planning. It is also used in construction, transportation, research, and insurance companies for risk assessments.

This collaboration marks a major step forward in environmental and disaster resilience, empowering local authorities, researchers, and industries with critical spatial information.

The project sets a precedent for regional data sharing and use of technology.

Strategic Context



The Waikato LiDAR Project was a collaboration facilitated by Co-Lab with technical leadership from Waikato Regional Council (WRC) partnering with nine other Waikato councils to create a regional LiDAR dataset. With \$1.4M from the Provincial Growth Fund, support from the National Elevation Programme, and a facilitation vehicle through Co-Lab, the project became viable.

Councils worked together to define mutual goals, plan, set product specifications, and allocate budgets and roles. WRC secured five additional funding partners through its network (WEL Networks, Environmental Research Institute, The Earthquake Commission, Mercury NZ Ltd, Waikato River Cleanup Trust).

This collaborative effort addressed a key data gap, enabling better infrastructure planning, environmental risk management, and sustainable growth for the region.

Level of Need & Evidence Base:

LiDAR has become an essential dataset to aid decisions involving the physical world, in turn driving economic growth and wise investment.

Before 2024, only 29% of Waikato had LiDAR coverage, hindering planning for at-risk land areas (23% of New Zealand's buildings below 0.5m elevation are in the Waikato), infrastructure, and land use productivity. Without accurate data, planning inefficiencies persisted, restricting savings in design costs and environmental management.

Waikato councils recognised the need for comprehensive LiDAR data to ensure more informed decisions.

Anticipated Outcomes & Linkage to Project:

The project aimed to provide access to a region-wide LiDAR dataset for councils, communities, and industries. The accurate 3D terrain data aids planning, land use decisions, and emergency preparedness.

Expected outcomes include faster design schedules, infrastructure savings, and better hazard management. Analysis of LiDAR benefits found that with infrastructure projects, precise elevation data can reduce design time by 20% and deliver 1% saving in total cost. Similarly, farm mapping with accurate elevation data can reduce fertiliser costs by as much as 25% on steep land.

Making data publicly available promotes data-driven decisions, ensuring sustainability and resilience.

Relationship to Council's Strategic Direction:

This collaboration supports sustainable development, economic growth, resource management, and climate resilience. LiDAR data enhances planning, stewardship, and risk management while fostering regional collaboration, helping councils tackle shared challenges and make smarter investments.

Risks & Mitigation:

Key risks were the potential failure of the supplier to deliver quality data, affecting user confidence. Mitigating this, WRC, LINZ, and councils from around the country developed a national technical specification. This was included in the supplier's contract. The project team also undertook rigorous data quality checks to ensure standards were met at each stage.





Project Management

The project was managed using a strategic partnering approach, involving key stakeholders, and the supplier.

Governance was provided by a Project Steering Group, accountable to the Co-Lab Board for the project's success (or failure). The Steering Group consisted of:

- Project Sponsor: Co-Lab CE with overall decision-making authority
- Senior Supplier: Senior representative from the LiDAR vendor, accountable for the quality of deliverables
- Senior User: Senior representative from a participating council, responsible for ensuring the solution met operational needs

The Project Team managed the time, scope, cost, and quality of the project, focusing on delivering the outputs and outcomes. Key roles included:

- Project Manager: Overall responsibility for project success (Co-Lab staff)
- Contractor Project Manager: Operational representative from the LiDAR vendor
- Technical Reference Group Lead: Ensured quality standards of LiDAR products (representative from WRC)
- Contractor Technical Manager: Technical representative from the LiDAR vendor

The project team met monthly for the four-year duration, increasing to weekly meetings during busy periods.



The project scope was geographically defined, covering approximately 25,000 square kilometres, and technically governed by the NZ National Aerial LiDAR Base Specification.

Developed by LINZ in collaboration with WRC and other regions, these specifications guided the project and were key to ensuring the supplier delivered quality data.

The data supply quality control process was highly collaborative, with LINZ, WRC and the vendor working closely through extensive testing processes. Regular group meetings with the supplier were held, followed by debrief sessions after each data delivery. This process ensured that data met the



required standards, though it resulted in delays. The original completion date of October 2022 was extended to early 2024 as the US-based subcontractor moved data processing between multiple locations.

Despite these timing setbacks, the team's dedication to meeting specifications meant that only high-quality and accurate data was accepted.

Relationship Management

Effective communication and relationship management were key to the collaboration's success. Several tools were used to engage stakeholders, and the community:

Communication Tools:

- Emails & Newsletters: Regular updates kept stakeholders informed of milestones.
- Video Updates: Engaging visual updates tracked project progress.
- **Progress Reports:** Detailed reports from LINZ and the project manager were shared with the Steering Group.
- **Presentation Updates:** Updates were provided regularly to working groups, such as the Geospatial Forum.
- **Co-Lab Reporting:** Status updates were provided to Council Chief Executives.

Stakeholder Audiences:

Key Stakeholders: Nine councils and the five co-funders preferred to be kept informed (rather than directly involved), so regular communication through the above mentioned channels was maintained.

Wider Community: The project reached the broader public through:

- **Story Map:** A visual tool to explain the project's impact. <u>VIEW HERE.</u>
- Website: For ongoing updates.
- Media Releases & Social Media: Articles, press releases, and LinkedIn posts.
- Showcase Events: In-person demonstrations highlighted LiDAR applications, with professionals sharing insights on its value across sectors. Feedback was overwhelmingly positive, with many finding it engaging and inspirational.

Engaging Hard-to-Reach Groups: The project used transparent communication to keep less-involved groups informed and provide feedback opportunities. Showcase events engaged a wider audience, including those typically less connected to such projects.

Other Regions: Collaboration extended nationally, with the technical lead participating in a guidance group with LINZ and regional representatives, ensuring shared resources and knowledge.



Posts

Waikato

BETTER TOGETHEF

Project Success

Before & After

Before the Waikato LiDAR project, the region had significant gaps (just 29%) in LiDAR data available to Councils and community. This limited their ability to make informed decisions on infrastructure planning, environmental management, land use, and hazard mitigation.

Now, LiDAR data covers the entire region, providing reliable, detailed datasets supporting activities like flood management, infrastructure development, land use planning, and compliance with statutory obligations.



LiDAR Coverage: before project (left) and after project (right) completion.

Criteria for Success

The project aimed to deliver improved outcomes in five areas.

- 1. Improved planning for 'At-Risk' Land Areas: LiDAR data is instrumental in overland flow path modelling, significantly enhancing region-wide flood management planning. Example, it supported Taupō District Council's ongoing work on overland flow path modelling for the Taupō/Mangakino area.
- **2. Enhanced infrastructure planning and investment:** LiDAR data collected in 2021 enabled the creation of detailed 3D models, providing engineering firm Beca, and others with an accurate ground profile of SH25A before the slip.



SH25A Taparahi Re-build

State Highway 25A Taparahi between Kōpū and Hikuai suffered significant damage with the road collapsing after the North Island's major storm event in late January 2023.

AR imagery - before slip LiDAR imagery - after slip > According to Renee

"Without the new LiDAR coverage, we wouldn't have had a reliable reference of the ground surface pre-slip."



∧ Bridge complete

Geoff Gover, National Harvest Planning & Engineering Manager, Manulife Investment Management New Zealand, said : "We used LiDAR data in our review to improve sight distance on an intersection design. LiDAR data enabled us to replace our intended solution, that had a potential cost of \$380K, with a solution that was less than \$10K. This is a great result for us, and validation of the business case for the LiDAR project".

Criteria for Success Continued

3. Improved land use and productivity: LiDAR data facilitated ongoing development of a hydrologically corrected Digital Elevation Model (DEM), essential for modelling surface water flow paths. Promoting more efficient use of existing infrastructure and enhancing protection of private and productive land.



- **4. More accurate landscape change and land use suitability:** Large areas of the Hauraki Plains and Lower Waikato catchment consist of cultivated peat land, which naturally shrinks over time. LiDAR provides precise elevation measurements of these lands and stop banks, crucial for effectively managing associated risks.
- **5. Improved Compliance in statutory responsibilities:** LiDAR data supports Council in fulfilling its statutory resource management duties, supporting compliance with the NPS-FM and NPS-UDC, including enabling components of Te Ture Whaimana o Te Awa o Waikato under the Waikato River Authority, and enhancing implementation of the Waikato Regional Land Transport Plan across the community.

Barriers Traversed

A key challenge in the project was the lengthy data processing phase, where initial deliveries failed to meet the required quality specifications. The project team tackled this by implementing rigorous quality control (QC) processes:

- Setting the national data specification up front for clear reference.
- Supplying testing scripts and processes to the supplier.
- Holding regular collaborative meetings with the supplier and LINZ to review and resolve issues.
- Drawing on the experiences of other regions, particularly Hawkes Bay, to inform the Waikato project.
- Joining the wider collaborative group of LINZ plus other regions to influence suppliers.
- After two years of persistence, the data met the required standards in 2023 and 2024, allowing the project to progress successfully.

Lessons Learned

With input from governance, project management, the technical team, supplier management, and technical experts, a thorough review of lessons learned was conducted. Key areas covered:

- Acquisition and contracting
- Working collaboratively with multiple councils
- Developing the business case and co-funding strategies
- Collaboration with LINZ
- Project structure and effectiveness
- Quality control processes
- Data supply and LINZ specifications

Key lessons emerged from this review, guiding future initiatives:

- Clarifying expectations with suppliers and councils from the beginning.
- The importance of a structured governance model with welldefined roles and responsibilities.
- The value of a collaborative and transparent approach to quality control, including interactive review sessions involving all parties.
- The necessity for developing detailed business cases and aligning financial responsibilities across participating councils.

To ensure continuous improvement in future projects, the lessons learned, business cases and use cases have already been shared. The current regional aerial photography project has benefited significantly from this transfer of knowledge.



Project Success Continued

Integration into Business-As-Usual

LiDAR data is now seamlessly integrated into the Waikato region's daily operations and planning activities, providing lasting value to councils and stakeholders.

Its open accessibility to stakeholders and the community has made it an essential tool for informed decision-making, resource optimisation, and enhanced planning outcomes. The data is freely available via LINZ Data Service <u>HERE & HERE</u>, and OpenTopography Portal <u>HERE</u>

By embedding the data into regular workflows, councils are enhancing operations and laying foundation for future development. Its use is driving improvements in efficiency, risk management, and sustainable growth.

As more councils adopt and refine its application, the integration of LiDAR data will continue to evolve and contribute to more effective region-wide planning.

Transferability to Other Local Authorities

The collective success and lessons are highly transferable to other local authorities, particularly those considering largescale data acquisition projects.

Key lessons that can be applied elsewhere:

- Establishing clear specifications and expectations with vendors before project commencement.
- Using shared service models to manage joint projects efficiently across councils.
- Implementing collaborative quality control processes with regular engagement from all stakeholders.
- Ensuring clear financial and project management frameworks, with clearly defined roles and responsibilities.

By applying these lessons, other local authorities can replicate the success of the Waikato LiDAR project, achieving better outcomes in infrastructure planning, environmental management, and statutory compliance.

These lessons learned are most easily transferable in two ways:

1. Future LiDAR Projects:

- Establishing clear LiDAR specifications for future acquisitions.
- Setting precedents for cost-sharing amongst Waikato councils.
- Utilising WRC's revised quality control plan, ensuring clear understanding of the process between the client, vendor, and LINZ.
- Prioritising setup before project commencement to establish expectations, relationships, deliverables, and payment schedules.

2. Other Multi-Council Data Acquisition Projects:

- The use of a shared service CCO proved efficient in managing and administering joint projects, reducing the burden on individual councils.
- Applying established contract templates and seeking efficiencies by aligning with nearby regions.
- Introducing financial milestones for better tracking and reporting.
- Scheduling key meetings early. Particularly before data collection and at the start of quality control, ensuring all parties understand the specifications and expectations.
- Schedule key meetings into the contract. These should be early in the project, before data collection, then again at start of QC, will all key parties to ensure full understanding of spec, and expectations.

In Summary

The Waikato LiDAR collaboration has been a success. We've brought users, with a common vision and need together to create a region-wide resource that transforms our area's ability to plan, manage risks, and invest in infrastructure.

By addressing a critical data gap and fostering partnerships across multiple councils, the team has delivered tangible benefits in flood management, land use, and infrastructure development.

The lessons learned and the integration of LiDAR data into business-as-usual processes ensure that the project's impact will be felt long into the future, providing a scalable model for other regions to adopt and refine.

This initiative not only enhances the region's operational capacity but also sets a benchmark for collaborative data-driven decision making across local authorities.



