Submission on the Draft National Infrastructure Plan

To: The New Zealand Infrastructure Commission **Date:** august 2025

1. Introduction

We support the Draft Plan's strategic direction and its accurate diagnosis of the challenges facing our nation. The purpose of this submission is to provide constructive, actionable recommendations on how the strategic adoption of digital technologies, particularly through a **National Digital Twin Programme**, can be the primary enabler for achieving the Plan's objectives.

2. Executive Summary

The Draft Plan correctly identifies that New Zealand "spend[s] a lot but doesn't always get value" and that our infrastructure quality "lags, relative to what we spend on it" (Chapter 1). We contend that the most effective way to reverse this trend is through a concerted, national effort to embrace data-driven decision-making and artificial intelligence.

Our recommendations are centred on one core, transformative initiative: the establishment of a **Federated National Digital Twin (FNDT) Programme**, modelled on the UK's successful federated approach. This programme is not about creating a single, monolithic government database, but rather a "system of systems" built on open standards for data sharing. This approach respects data sovereignty and allows organisations to progress at their own pace, while unlocking immense collective value.

Our key recommendations are:

1. **Mandate a Federated National Digital Twin Programme:** The government should champion and facilitate a FNDT programme that focuses on creating common standards for data sharing across infrastructure asset owners. This directly addresses the Draft Plan's call for "cost-effective coordination tools" (Chapter 4) and is the foundational step to unlocking the benefits of AI.

2. **Transform Asset Management with Data:** The Draft Plan highlights New Zealand's systemic failures in asset management, noting that most capital-intensive agencies fail to

meet basic requirements (Chapter 5). A federated NDT programme, requiring the implementation of monitoring systems, would create the data streams necessary for AI-powered predictive maintenance, shifting the sector from a reactive to a proactive and efficient model.

3. **Boost Resilience Through Simulation:** The Plan notes New Zealand's high exposure to natural hazards and the need to manage intensifying risks (Chapter 5). A federated NDT allows for the simulation of systemic shocks—including natural hazards, earthquakes, cyber-attacks, or physical sabotage—across interconnected networks. This enables a coordinated, data-informed response that secures our nation and minimises disruption.

4. **Address the Workforce Challenge with Technology:** The Draft Plan correctly identifies the demographic challenge of a shrinking workforce-to-retiree ratio, which will fall to 2:1 (Chapter 1). We cannot expect a smaller workforce to physically manage a growing and aging asset base. Digital twins and AI are essential productivity levers, enabling a smaller, higher-skilled workforce to manage the network more effectively.

3. Specific Recommendations

This section details our core recommendation for a National Digital Twin Programme, linking it directly to the problems identified in the Draft Plan.

Core Recommendation: Establish a Federated National Digital Twin (NDT) Programme

We strongly recommend that the final Plan includes a central recommendation for the government to initiate and facilitate a **Federated National Digital Twin Programme**. Critically, this should be a federated "system of systems" approach, focusing on developing open standards and a common data-sharing framework, rather than a single, centralised platform. This approach is better suited to New Zealand's decentralised infrastructure ownership and varied digital maturity levels.

Justification and Links to the Draft Plan:

● **Lifting the Bar on Project Appraisal (Chapter 5):** The Draft Plan reveals a critical weakness in our investment process: "half of the Budget bids reviewed... for the 2023 and 2024 Budgets had missing or incomplete business cases". A FNDT provides the high-quality, real-world data needed to build robust business cases. Furthermore, AI tools,

powered by this data, can be used to generate and test multiple design and delivery options, ensuring we select projects that offer the best whole-of-life value, not just the lowest upfront cost. This directly addresses the need to "lift the bar for project appraisal, selection and delivery".

- **Solving the Asset Management Deficit (Chapter 5):** The Draft Plan is unambiguous about our poor asset management, noting that in June 2024, "six out of eight capital-intensive agencies self-reported that they do not currently have asset registers that meet these requirements". An NDT programme would necessitate the creation of these registers as a first step. However, a digital twin is only as powerful as the data that feeds it. **It is therefore critical that the NDT programme mandates the deployment of monitoring equipment—such as IoT sensors, SCADA systems, and remote sensing technologies—on all new and refurbished critical infrastructure.** This action is not for tomorrow; it must begin now. The data streams we start capturing today are the essential fuel required to train the AI models of the future. Without this foundational data, the potential for predictive analytics and intelligent simulation will remain unrealised.

- **Building National Resilience (Chapter 4 & 5):** The Plan highlights that "risks are intensifying" and that "costs from extreme weather events and flooding will increase due to climate change" (Chapter 5). Compounding this is a global environment of increasing geopolitical instability, which elevates the risk of human-made threats, including cyber-attacks and physical sabotage. Our national security depends on the resilience of our critical infrastructure. As Chapter 4 notes, our networks are deeply interdependent. A federated NDT is the only effective way to model and understand these cascading failure points. It allows us to simulate diverse threats, identify systemic vulnerabilities, and make evidence-based investments in security and redundancy where they will have the greatest impact on securing our nation.

- **Future-Proofing the Workforce (Chapter 3):** The Draft Plan's projection of a 2:1 worker-to-retiree ratio by 2075 is a stark warning. The current model of manual inspection and reactive maintenance is unsustainable. An NDT programme, fed by real-time monitoring data, enables a fundamental shift in the nature of work. It empowers a smaller workforce with data-driven tools, moving their efforts from low-value investigation to high-value maintenance, upgrades, and system optimisation. This directly supports the need outlined in Chapter 3 to "establish broader pathways into the workforce

that draw upon the talents of all New Zealanders" by creating new, high-skilled digital roles.

The AI-Powered Maturity Pathway

A National Digital Twin is not a static model; it is an evolving capability. The true value is unlocked when AI is applied to the data it generates. We see a clear maturity pathway:

1. **Informative Twin:** The initial state, providing a descriptive view of "what we have and where it is." This alone would solve the utility strike problem and provide the asset registers we currently lack.
2. **Predictive Twin:** As historical and real-time data from monitoring equipment accumulates, AI models can be trained to forecast asset failure, demand patterns, and environmental impacts. This enables proactive maintenance and better operational planning.
3. **Comprehensive Twin:** With a rich dataset and validated models, the NDT becomes a powerful simulation tool. We can train AI to recommend optimal responses to complex scenarios, experiment with new operating models, and provide a high-fidelity evidence base for future investment decisions, fulfilling the Plan's goal to "lift the bar for project appraisal" (Chapter 5).

4. Conclusion

The Draft National Infrastructure Plan provides a strong foundation for the future. However, to truly transform our infrastructure performance and overcome the profound challenges of a shrinking workforce and increasing security risks, we must embed digital technology at the core of our national strategy.

A federated National Digital Twin Programme is the single most impactful investment New Zealand can make to address the systemic issues of poor value, inadequate asset management, and a lack of resilience identified in the Draft Plan. It provides the data-driven backbone required to unleash the power of AI, enabling us to do more with less and build a truly smart, resilient, and secure nation.