Parliamentary Commissioner for the Environment (PCE) comments on Testing our thinking: Developing an enduring National Infrastructure Plan

Thank you for the opportunity to submit on your recent report *Testing our thinking: Developing an enduring National Infrastructure Plan*.[1] Te Waihanga New Zealand Infrastructure Commission has engaged thoughtfully and thoroughly over the past couple of years and as a result, the vast majority of this document – indeed most of the work the Infrastructure Commission does – is of a high quality.

This submission draws on insights from a roundtable presentation and discussion that Te Waihanga participated in with PCE and expert stakeholders. This roundtable took place on 5 December 2024 and due to the short timeframe, this submission is brief, highlighting the key areas that would benefit from more thinking about ecological infrastructure.

This submission focuses on two issues (which overlap to some degree) that appear to be missing from the current approach:

1. The **opportunities that nature-based solutions and green infrastructure (henceforth collectively termed "ecological infrastructure") can provide** in the National Infrastructure Plan.
2. In addition to thinking about the impacts of a changing climate on infrastructure, there is a need to think about **an increased role for some infrastructure in dealing with the impacts of climate change** on other property (and infrastructure). In particular, stormwater regulation will become more important. Ecological infrastructure again plays an important role here, including green roofs, swales and topsoil in cities, and forests and wetlands in rural areas.

This submission answers your questions with these two issues in mind.

Section one: Why we need a National Infrastructure Plan

1. What are the most critical infrastructure challenges that the National Infrastructure Plan needs to address over the next 30 years?

Many of these challenges – such as decarbonisation and adapting to a warming climate – are picked up in the proposed approach.

There are important environmental outcomes *beyond* climate change that we need to urgently address as a nation. This is an important omission in your approach. For example, improving biodiversity and water quality are regularly cited government goals but are not considered in your report.

[1] See https://tewaihanga.govt.nz/national-infrastructure-plan/discussion-document.

Over the past ten years, successive governments have set increasingly ambitious limits and targets for freshwater quality (through successive national policy statements). Achieving these goals will require both considerable new infrastructure investment to remove pollution, and a more integrated approach to infrastructure design and delivery. This latter point is especially the case in cities where the waterways and receiving environments are the most degraded and infrastructure design is a major contributor to the problem.

However, national policy statements on fresh water and biodiversity have proved to be very difficult to operationalise at a regional level. There are several reasons why this is so:

- A reluctance by regional leaders to implement ambitious limits and targets.
- Ambiguity with limits and targets that are not always easily incorporated into infrastructure design metrics.
- Frequently shifting goalposts around limits and targets that have led to uncertainty for councils and land and water users. This is driven by changing policies from central government (which are once again under review).
- The expense of achieving these limits and targets. Central government has devolved responsibility for their implementation without the necessary funding or capacity to deliver them.

PCE has covered some of these issues from a rural land use perspective in our recent report *Going with the grain*.[2] The future delivery of infrastructure, at all scales, provides an opportunity to support continuous improvement in terms of environmental, social and cultural outcomes.

2. How can te ao Māori perspectives and principles be used to strengthen the National Infrastructure Plan's approach to long-term infrastructure planning?

Roundtable participants noted that ecological infrastructure and taking a more integrated approach across policy domains is very much in line with te ao Māori principles. These types of solutions often deliver multiple values, including cultural values, and offer many opportunities for codesign with mana whenua. Furthermore, the inclusion of te ao Māori perspectives and principles into the National Infrastructure Plan and infrastructure planning and delivery will:

- require infrastructure planners to give consideration and effect to intergenerational outcomes
- drive innovation that is specific to Aotearoa, regions and locations
- enable central, regional, and territorial authorities to give effect to their obligations under Te Tiriti o Waitangi, and Treaty Settlements.

Greater thought needs to be given on how to capture te ao Māori principles (as well as other non-market values) in the Better Business Case process. Mātauranga utilised to develop and guide codesigned infrastructure projects will not always be tangible or quantifiable and therefore does not easily fit into this structure.

[2] See https://pce.parliament.nz/publications/going-with-the-grain-changing-land-uses-to-fit-a-changing-landscape.

Section two: Long-term expectations

3. What are the main sources of uncertainty in infrastructure planning, and how could they be addressed when considering new capital investments?

Note the response to question one above which outlines how rapidly shifting targets for water quality and biodiversity can introduce uncertainty.

Even more than grey infrastructure, ecological infrastructure in urban areas is much more affordable if the land it requires is proactively acquired in advance. This requires careful long-term planning to ensure keystone parks and green spaces are strategically positioned to support the multiple benefits desired (for example water regulation). This in turn requires long-term direction on urban form, which is not obviously addressed by the eight drivers identified in the document.

Section three: Existing investment intentions

4. How can the National Infrastructure Pipeline be used to better support infrastructure planning and delivery across New Zealand?

Participants in our roundtable noted their frustration with the existing Better Business Cases approach. Given the dearth of uncontested, quantitative evidence on the positive impact of ecological infrastructure in New Zealand, people naturally tend to draw on evidence from overseas studies. However, participants told us that overseas studies tend to be disregarded in business case processes particularly where benefits (or costs) are less easily directly translated into financial metrics.

Greater investment in understanding the benefits of ecological infrastructure is needed in the New Zealand context. This relates to the need to improve New Zealand's accounting or natural capital – something PCE has raised frequently in discussions with the Treasury and Stats NZ.[3] In the meantime, those assessing business cases must be open to international evidence where it is based on applied research and has effectively supported successful implementation of ecological infrastructure. During our roundtable, Te Waihanga stated that they planned to take a more open-minded approach to international evidence during the Infrastructure Priorities Programme process.

Roundtable participants also noted that sometimes ecological infrastructure is distributed and therefore each component is smaller. As a result, larger 'end of pipe' solutions tend to attract more attention than some more distributed ecological infrastructure that can cumulatively deliver more effective and efficient outcomes. Participants identified this as a problem with a funding focus on supporting large projects, whereas the aggregated cost of many smaller projects to deliver the same outcome can also be significant.

[3] See https://pce.parliament.nz/publications/going-with-the-grain-changing-land-uses-to-fit-a-changing-landscape/ and https://pce.parliament.nz/publications/submission-on-the-lsf-dashboard/.

Similarly, the benefits of incorporating ecological elements into 'traditional' infrastructure is also played down, despite substantial evidence that design approaches such as incorporating water sensitive design into urban areas shows health and wellbeing benefits. As noted previously, while these measures tend to be difficult to quantify, a substantial body of evidence suggests that the qualitative benefits they deliver can often translate into subsequent financial benefits. That evidence needs to be considered.

Section four: Changing the approach

5. Are we focusing on the right problems, and are there others we should consider?

As noted above, environment outcomes are far broader than climate emissions. The Government's goals on biodiversity and water quality are directly relevant to infrastructure, given the scale and spatial footprint of many typical infrastructure projects. While the Government's goals for these issues are not always clear it is well documented that biodiversity and water quality are highly degraded in many parts of the country and improving them is likely to remain an enduring priority across governments. Addressing water and biodiversity concerns is every bit as important as climate change and should be internalised in the way infrastructure is planned for.

Theme one: Capability to plan and build

Investment management: Stability, consistency and future focus

6. What changes would enable better infrastructure investment decisions by central and local government?

Better infrastructure investments will result from ecological infrastructure being on a level playing field with grey infrastructure. This requires three main changes:

a. Long-term clarity over the outcomes that infrastructure can influence (especially environmental outcomes).

b. Better accounting for environmental and social co-benefits.

c. Rebalancing legislative and administrative requirements that treat traditional and ecological infrastructure differently. The Local Government Act 2002 does this, as does the National Policy Statement on Urban Development (NPS UD).

7. How should we think about balancing competing investment needs when there is not enough money to build everything?

The roundtable participants accepted that there needs to be a process that allows for transparent trade-offs. For ecological infrastructure to be on a level playing field, there needs to be investment in understanding (and, where appropriate, monetising) the benefits of these approaches.

Ecological infrastructure can also offer significant cost savings when considered early in the planning phase. For example, upstream wetland and land use controls to reduce flooding is usually more cost effective (and resilient) than downstream stopbanks. Similarly, the

development of urban blue green networks can support pedestrian and cycling connections as well as flood resilience, reduced insurance costs, improved post flood recovery (with direct economic benefits) and increased public confidence. These benefits are in addition to the ecological, community and public health and wellbeing benefits.

Workforce and project leadership: Building capability is essential

8. How can we improve leadership in public infrastructure projects to make sure they're well planned and delivered? What's stopping us from doing this?

Capacity needs to be built within grey infrastructure providers and their agents to recognise the benefits that can arise from integrating well designed ecological infrastructure into their projects.

Procurement processes also need to reward these environmental benefits appropriately.

Decision makers need to be better educated about the co-benefits and resilience often delivered by ecological infrastructure. There is a tendency to regress to 'what we have done before' rather than adopt innovative approaches to deliver the same outcome. For example, piping a watercourse may be seen as 'safe', whereas naturalising the watercourse can offer significant ecological, cultural and community benefits without the need for a future renewal.

However, the need to better integrate these benefits into current cost-benefit analysis such as the Better Business Case is paramount, as they inherently drive the scope and nature of public infrastructure projects.

Ecological infrastructure needs to be viewed as an asset just like physical infrastructure. It requires a mindset change that considers nature from the outset i.e. within pre/feasibility stages of infrastructure planning where the cost-benefit analysis process is initiated.

9. How can we build a more capable and diverse infrastructure workforce that draws on all of New Zealand's talent?

Roundtable participants believe that working on ecological infrastructure is attractive to the generation coming into the workforce. A more diverse range of infrastructure solutions means that the programme will appeal to a wider range of talent. Jobs for Nature and other programmes have built some capacity in this space and ecological infrastructure offers an opportunity for a continuing career path for those who were trained through that.

As migration increasingly drives our labour force it will also be important to ensure that an New Zealand's unique ecological context is understood by future infrastructure providers. Our indigenous biodiversity is particularly vulnerable to poor infrastructure planning/delivery due to our high levels of endemism. Ongoing loss of diversity is a threat to our international reputation.

Project costs: Escalation means less infrastructure services

10. What approaches could be used to get better value from our infrastructure dollar? What's stopping us from doing this?

Ecological infrastructure will often generate benefits across multiple domains.[4] When considered holistically this can be better value for money than grey infrastructure. The challenge is in thinking and funding across silos to make this happen.

Theme 2: Taking care of what we've got

Asset management: Managing what we already have is the biggest task

11. What strategies would encourage a better long-term view of asset management and how could asset management planning be improved? What's stopping us from doing this?

The recent changes to public sector discount rates are positive and appropriate to note here.

Roundtable participants found that a mandatory requirement to take a whole-of-life approach to designing and costing new assets would be useful, particularly in the local government sector. The expense of ongoing maintenance/opex is often given lip-service in the race to deliver the lowest capital cost solution. The current approach generates a legacy of costly maintenance requirements in an environment where maintenance funding is stretched, so assets are sweated to the point of failure.

The benefits of 'repurposing' existing infrastructure rather than the usual assumption that brand new is required, should also be on the table. Roads provide an example. Analysis published recently by PCE suggests that these account for 20% of the urban area of New Zealand cities.[5] Increased transport efficiency might be gained through repurposing lanes to higher carrying-capacity vehicles or dynamic lanes that change with demand to reduce the need for more vehicle lanes. This would also increase available public space for ecological infrastructure and integrated urban ecology.

Resilience: Preparing for greater disruption

12. How can we improve the way we understand and manage risks to infrastructure? What's stopping us from doing this?

New Zealand needs better information on the risks to infrastructure and how they are likely to change over coming decades as the climate changes. Currently this is done by individual agencies, which is expensive and leads to people reinventing the wheel. There should be one publicly available source of information on hazard risk. This is a public good investment. It seems that Te Waihanga has this point covered.

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[4] See https://ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Strategies/NaturalAssetManagementStrategy2.pdf.
[5] See https://pce.parliament.nz/publications/are-we-building-harder-hotter-cities-the-vital-importance-of-urban-green-spaces/.

However, there is another important element here; the potential for infrastructure to reduce the impact of future hazards. This will be difficult to do without a coherent national approach to climate adaptation, but it needs to be considered. As a nation we seem prepared to spend a lot of money on clean up and recovery post events, but there is not little or no budget available to prevent the event having as great an impact. Responsibility for prevention is often distributed across several agencies with no cohesive leadership or on-the-ground targets and solutions. Roundtable participants felt that a more preventative and proactive approach would save money as well as reduce the social disruption and stress from these increasingly frequent acute events.

Some infrastructure – such as piped stormwater and stop banks – exists purely to manage the risk of hazards to people and their property. Private ecological infrastructure – such as protected soils, trees, wetlands or green roofs in urban areas, and forests and wetlands in rural areas – can play a large role here also but is often overlooked because it is on private land.

Construction of stormwater infrastructure needs to consider both the changing climate and changing built environment – as existing green spaces are built over this will increase the pressure on stormwater systems and likely contribute to reduced resilience in downstream public and private properties. Research published recently by PCE highlights that post-2016 residential development retains about 25% of the development area as green space.[6] The equivalent figure for areas and suburbs developed during earlier decades was in excess of 50%.

Conversely, if existing ecological infrastructure is protected or enhanced, the impact of acute and chronic climatic events would be reduced. The potential for initiatives like Recloaking Papatuanuku (which would reforest 2 million hectares over 30 years at a cost of $12 billion) to reduce the impact of future storms is large; the North Island Weather Events of 2023 were estimated to cost between $9–14.5 billion.[7]

Similarly, trees in cities help provide shade, which will become increasingly important in a warming climate with more extreme heat events. A recent global review estimated that a 10% increase in green space reduced neighbourhood average air temperatures by 0.3 °C.[8] The immediate cooling effect available in the shade of a tree is likely to be much greater.

The removal of tree canopy and landscaping within cities risks increasing heat effects within urban areas. This has well-documented impacts on community health and increased public health costs in addition to worsening impacts on freshwater biodiversity that has evolved to our traditionally cooler climate. Resilient urban trees need a sufficient depth of topsoil and uncompacted subsoil to develop – something that is missing in many new developments. PCE has discussed stormwater, shade and soil in our work on urban green spaces and the follow up note on urban soils.[9]

Australia's experience in recent summers shows that a good urban tree canopy can reduce heat sickness (urban heat stress) as well as the need for air conditioning systems, smoothing the

[6] See https://pce.parliament.nz/publications/are-we-building-harder-hotter-cities-the-vital-importance-of-urban-green-spaces/, figure 2.17.
[7] See https://www.treasury.govt.nz/information-and-services/nz-economy/climate-change/north-island-weather-events-response-and-recovery-funding.
[8] See https://iopscience.iop.org/article/10.1088/1748-9326/abdcf1.
[9] See https://pce.parliament.nz/publications/urban-ground-truths/.

demand for electricity. Most Australian cities now have tree canopy targets of 30–40% to provide shade and urban cooling. This has the added benefit of increasing the life of roading assets.

It is also worth noting than the benefits of well-planned urban tree strategies will take decades (30–50 years) to start to be adequately realised meaning that New Zealand has needs to take decisive steps now that are proactive and future focussed.

Theme 3: Getting the settings right

Decarbonisation: A different kind of challenge

13. How can we lower carbon emissions from providing and using infrastructure? What's stopping us from doing this?

Generally speaking, grey infrastructure is very carbon intensive during construction and operation. Conversely ecological infrastructure can often be carbon negative, although it can take time for these benefits to appear.

Institutions: Setting the rules of the game

14. Are any changes needed to our infrastructure institutions and systems and, if so, what would make the biggest difference?

To improve environmental outcomes now and into the future, we need a sustainable way to assess the financial benefits of and sourcing the funding for ecosystem services. These need to draw on the extensive experience with innovative financial mechanisms implemented internationally and the successes these have had in influencing infrastructure planning and delivery.[10]

Network pricing: How we price infrastructure services impacts what we think we need

15. How can best practice network pricing be used to provide better infrastructure outcomes?

Non-built solutions are powerful and PCE supports congestion charging.

A similar case could be made for encouraging private landowners to provide ecological infrastructure that can regulate water flows such as green space, green roofs and topsoil. Incentives for this could implemented in a variety of ways. Modulating development contributions or stormwater rates according to the amount of permeable surface that is to be paved or sealed over is one such option. Providing rates relief to properties where green space – in whatever form – has been given legal protection is another.

[10] See https://www.nature.org/en-us/what-we-do/our-insights/perspectives/accelerating-adaptation-nature-based-solutions/; https://insurancecouncil.com.au/wp-content/uploads/2024/10/ICA_Nature-Insurance-Report.pdf; https://water.phila.gov/green-city/; https://www.adaptationclearinghouse.org/resources/city-of-chicago-tax-increment-financing-and-green-roof-improvement-fund.html; and https://www.seattle.gov/utilities/your-services/accounts-and-payments/rates/drainage.

Instead, the increasing trend is for landowners to remove topsoil and cover their properties in impermeable surfaces. This trend increases the load on the stormwater system at the same time that climate change is adding pressure. The implementation of private ecological infrastructure outcomes is readily supported through well considered financial mechanisms to incentivise and reward good design outcomes.

Where the value of ecological infrastructure has been appropriately established, pricing can ensure its effective management which is often lower than hard infrastructure and which avoids replacement costs.

Regulation: Charting a more enabling path

16. What regulatory settings need to change to enable better infrastructure outcomes?

The provision and protection of ecological infrastructure often straddles multiple pieces of legislation – including the Resource Management Act (RMA), Local Government Act, Reserves Act, Public Works Act and Building Act.

As mentioned earlier in this submission, several of these statutes (or the regulatory instruments that flow from them) treat ecological infrastructure as a discretionary 'nice to have' relative to traditional forms of grey infrastructure. The NPS UD is a good example. It distinguishes between "development infrastructure" – the three waters and roading infrastructure required to serve new developments – and "additional infrastructure" – things like open space and community facilities. Councils must be "satisfied" that the latter "is likely to be available" but are required to provide the former. In a recently published report on urban green space, PCE recommended that this – and other similar regulations – be addressed.[11]

Additionally, the siloed nature of the implementation of the RMA by local authorities appears not to be geared towards supporting ecological infrastructure. Participants in our roundtable told us that using ecological infrastructure – which often has multiple cross-benefits – can lead to perverse outcomes. For example, building an artificial wetland can be a useful piece of ecological infrastructure to help with flood protection, water quality improvements or stormwater relief. However, planting this with native vegetation could trigger consent requirements under biodiversity regulations that increase the costs of future changes or maintenance. While native vegetation could have biodiversity co-benefits, some councils have opted for exotic vegetation so not to trigger the consent requirement. Another example is that planting any vegetation – even native vegetation – can be challenging in overallocated catchments as they are viewed as another draw on freshwater.

Further it is noted that implementing the RMA in relation to urban stormwater is often difficult due to the highly variable nature of contaminant loads, concentrations and composition depending on land use, climate and development typology. As such, the 'effects based' foundation of the RMA has resulted in a very contentious and often litigious approach to consent planning. Other international jurisdictions have recognised the complexity with urban stormwater and intentionally focused on more standardised rules and practice to support outcomes rather than arguments between 'experts'.

[11] PCE (2023)

Section five: What happens next?

17. **Do you have any additional comments or suggestions that you would like us to consider as we develop the National Infrastructure Plan?**

Nothing in addition to what has been mentioned above.