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Future Pathways Submission

WSP response to Te Ara Paerangi Future Pathways Green Paper 2021

1 Introduction

Thank you for the opportunity to respond to Te Ara Paerangi Future Pathways Green Paper 2021.

A review of the Aotearoa's science and research system is timely. WSP welcomes moves to consider what a future-focused science system should look like. We recognise that this is the first step in a substantive and ongoing consultation process. We look forward to being able to engage further as details of the proposed system design are developed and shared. We anticipate as the process progresses that we will have more detailed views to share where designs have implications for our organisation, research capability and the international, national and local infrastructure interests we serve.

2 About WSP

WSP is one of Aotearoa's oldest research organisations. Since 1870 we have had the privilege of shaping the future of Aotearoa through the creation of critical infrastructure and environments for our communities: From the earliest rail, ports, and hydro plants and dams, through to transport modes of the future, we are focused on infrastructure research, design and operations that will connect and support future generations.

WSP's rich history dates back to colonial New Zealand, when the Public Works Department was opening up the country's difficult terrain through the combination of national road and rail networks. Over the years we have worked under several names. In 1988 the Ministry of Works and Development became a state-owned enterprise, Works and Development Services Corporation NZ Limited. In 1996 Works Consultancy Services was sold to Kinta Kellas of Malaysia, and the following year the company rebranded to Opus International Consultants Limited (Opus). The Research Division in the Ministry of Works, Works Consultancy and Opus operated as Central Laboratories. Central laboratories undertook a large part of the research necessary to enable the building of Aotearoa's infrastructure. In 2019 Opus was acquired by WSP. WSP is a globally recognized professional services firm with 49,000 staff in 550 offices in 44 countries.

The WSP Research and Innovation Centre is the only research facility within the WSP global entity. As such, we can not only maximise our research inputs in and for the benefit of Aotearoa, but also to take Aotearoa's infrastructure research (academic and applied) to the globe. This also allows us to attract foreign research spend in Aotearoa. We have a strong focus on delivering actionable research that can be applied by our clients. A key strength is genuine engagement with end-users from inception through to implementation, review and improvement. As an organisation we feel this is a "research to impact" function that WSP excels at.

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3 To illustrate the important role WSP plays in Aotearoa below are some examples to highlight some of the types of critical research we undertake in the infrastructure space. These are examples of contestable research funding (Endeavour, Science Challenges, or other government research funding), implementing research outcomes for the benefit of Aotearoa and working in partnership with mana whenua.

1. WSP Research is a trusted advisor of Waka Kotahi NZ Transport Agency (Waka Kotahi): More than two thirds of pavements and road surfacing research published on Waka Kotahi's website were conducted by WSP Research (under various forms, Central Labs, Opus Research, and WSP Research).
2. Several of our specialists and Technical Principals are on the Independent Professional Advisors panel for Waka Kotahi. We represent the private research organisation in several industry-led industry groups such as National Pavements Technical Group and National Surfacing Technical Group. Many of the Waka Kotahi test methods and specifications are developed and revised by WSP Research.
3. FRST and MBIE Endeavour funded work has directly led to new specifications such as the performance-based bitumen specifications for Waka Kotahi.
4. We have developed epoxy modified open grade porous asphalt (EMOGPA), as part of an international OECD Research project. Our research leadership has led to material changes and specifications for high traffic volume State Highways (particularly roads of national significance). EMOGPA is now a preferred option for the State Highway network where durability and noise reduction are of the highest priorities. This has enabled the quadrupling of the lifespan of conventional surfacing designs leading to significant maintenance savings for the nation.
5. Developing and trialling alternative materials, in Te Urewera in partnership with Ngāi Tūhoe (Tūhoe). Currently the commercialisation of sustainable, natural product is being worked on jointly with Tūhoe, WSP and a staff member seconded part-time from MBIE to Tūhoe . This research initiative facilitates a durable, dust reducing surface that is culturally and environmentally acceptable to the Tūhoe people. This work was the recipient of an ACE NZ Silver Award 2021 and a special ACE Clients Award for Tūhoe from the Association of Consulting Engineers New Zealand. This project was held up as being a model example of mutual sharing and learning with a strong economic, environmental, and social outcome.
6. Commercial activities - 9(2)(i)
7. Much of our research finds its way to local authorities. In the road material space, our research work in sustainable road materials (crumb rubber in roads) is often referenced by local governments.
8. Advancing knowledge of wind effects / wind loading leading to refinements to Australia/NZ wind loading code (AS1170.2) in areas of Aotearoa design wind speeds, identification of wind sensitive structures and topographic wind effects. This work has been picked up and applied internationally. We are also the first organisation in Aotearoa to apply force balance testing to high rise buildings. We are currently undertaking wind research and commercial work internationally including wind tunnel modelling for a significant development in South America.

9. Urban wind design. We have produced/contributed to wind design guides for mitigating undesirable wind effects in urban areas and assisted in the preparation of wind related ordinances for Wellington and Auckland.

10. We have been instrumental in the introduction of skid resistance management of state highways which has resulted in wet road crash rates approaching dry road crash rates. This has significant social, economic and safety advantages.

11. Our noise and vibration research has informed Waka Kotahi's "State highway construction and maintenance noise and vibration guide" leading to a greater awareness of the environmental impact of different road construction practices and materials.

12. We assisted in the introduction of automatic data collection methods for assessing the condition of the State Highway network – previously only roughness, now roughness, rutting, texture, skid resistance and road geometry. This enabled Aotearoa to become a recognized leader in pavement management/pavement deterioration modelling/crash prediction modelling.

13. We pioneered work in the area of road user costs, specifically: rolling resistance, tyre wear and vehicle operating costs. This model was incorporated into the World Banks HDM Economic model. We are also credited as the first organization to use accelerometers to derive and validate VOC relationships. This has now become a recognized method. All these models have been incorporated in Waka Kotahi's Monetised Benefits and Costs manual (MBCM) which is the industry's standard for the economic evaluation of land transport activities in Aotearoa.

14. Our work with local authorities brings robustness to evidence gathering to support infrastructure investment decisions. We use social science methods to help them engage meaningfully with their communities and stakeholders about infrastructure priorities.

15. We have worked with Waka Kotahi to build a roadmap and industry guidelines for more sustainable use of resources in roading. The roadmap was based on in-depth engagement with a range of industry players to understand barriers and opportunities for more sustainable practices.

16. Developing indicators to enable monitoring and measurement of transport infrastructure performance for Waka Kotahi and local authorities. Social scientists worked alongside asset managers, planners, and data specialists in the agency and local authorities to design a suite of measures to support Waka Kotahi's shift to multi-modal transport.

17. We also work closely with private clients nationally and internationally in developing and trialling new products. We are currently engaged in a project to use recycled natural waste material as a cement substitute, increasing strength and saving on carbon.

4 Executive summary

The key points we wish to make in response to the consultation are summarised here. Some of these align to specific questions in the consultation document, others are broader observations that we feel should be considered as work progresses.

- There should be a level playing field for public and private organisations in the system. A key principle should be support and investment focused on the right capability and people. Investment design should be agnostic of organisation type or structure.
- Changes should have a focus on reducing the costs of engaging with the science system. There is well-established national and international research showing the significant cost of unsuccessful research processes such as unsupported proposals and unproductive engagement activities. Any changes to the system should have, as a core design principle, a reduction in the cost of doing business. This will enable a greater proportion of available time and money to be spent on developing and delivering research and outcomes.
- Similarly, any changes to the system should build on recent work that has been undertaken to further incentivise successful outcomes and measurable impact. End user engagement in design and implementation is shown to lead to better outcomes (and need not come at the expense of scientific rigour or researcher independence).
- In order to deliver research into action greater consideration needs to be given within the system to the investment and skills required to translate, implement and evaluate research. If a focus is on delivering improved research outcomes then attention needs to be given as to the role of the science system in providing greater support to implementation. People skilled in implementation, testing and refinement across industries and society are not always the researchers themselves. There will be different skill sets that need to be recognised, funded, and valued for their roles as part of system solutions.
- At the highest level any changes need to go hand in hand with a review of overall investment levels. In short, there is limited value in shuffling existing resources - significant system change should be accompanied with a sustainable refresh and increase in funding levels.
- Engagement with Māori in the design and implementation of the system is critical to its success. WSP works closely with iwi on projects at both the national and local scale. Our experience is that meaningful partnership requires commitment from all parties and a long-term investment beyond specific pieces of work. We welcome MBIE's commitment to strengthening a Treaty partnership approach. In order to translate this down to providers we feel that work should be undertaken with the Māori research community and end-users to identify meaningful opportunities for improvement. Unfortunately, we still hear that engagement can lack depth, be too little, too late and be seen as a "requirement" rather than as a fundamental element of delivering successful outcomes.
- At the heart of any change will remain an exercise to make choices about where to focus limited resources. As such the prioritisation exercise will be critical. Any exercise will face pressure to align efforts to existing organisational priorities and capabilities of larger

institutions. The starting point should be Aotearoa's future pressing priorities and opportunities. Pulling this together should not be a distinct or new exercise or limited to science sector participants. Rather priorities could be drawn from existing prioritisation work already undertaken (for example, the prioritisation work undertaken by the Climate Change Commission).

- Finally, we note that it is essential that organisations operating within the new system are able to access and be funded on a comparable basis. Regardless of how different organisations are funded (for example if a core funding model progresses) an essential component of the new system will need to be that the true, full costs of delivering work are understood. This is important if the system wants to ensure a level playing field in terms of cost comparison and productivity transparency across organisations.

5 Te Ara Paerangi Questions

5.1 What principles could be used to determine the scope and focus of national research Priorities?

As noted in our overall comments above, the scope and focus of national research priorities should (where possible) be tied to work already carried out identifying key challenges across Aotearoa. For example, linking to national priorities set out in sector transformation plans, Climate Change Commission reports and developing and maintaining critical national transport and utility infrastructure.

Research priorities should dovetail with these plans and strategies in order to coordinate effort and focus. Extensive work and consultation has already been undertaken and should not be replicated.

It is also important that the government gives thought to societal buy-in to priorities as much as science sector buy-in. The sharing of national research priorities provides an opportunity to engage with New Zealanders around the role and importance of research, science and evidence in decision making and shaping the country's future. At a time when questioning of experts and science is evident in parts of society, this is a particularly important opportunity.

5.2 How can the process best give effect to Te Tiriti?

See comments in our executive summary.

5.3 How should the strategy for each national research priority be set and how do we operationalise them?

If the research prioritisation exercise is aligned successfully to national priorities and strategies then this should also have a significant influence on how the research could be operationalised. It would enable the work to be initiated with a clear understanding of end users' targets and goals. This would then enable the research design process to be refined from this starting point. It would also provide a natural end-user/stakeholder community with which to engage during the design process and through implementation. End user engagement during the design and

operationalisation phase should be a requirement. This will help ensure that impact is built into the design phase with clear lines for delivery and implementation.

To support this, MBIE needs to consider how it supports the (considerable) time and effort put into designing research. A shift is required away from thinking that sees this as "the cost of doing business". Investment is required up front to support thorough problem identification, refinement and design.

The design process also needs to look beyond traditional stakeholders and participants in the science system. Where system maps are available these should be utilised as they can provide insights around the key actors who need to be engaged for outcomes to be achieved.

To this end there is a need to avoid the usual suspects dominating the design and operationalisation of research activities. As a principle, operationalisation should take a "right team" approach - looking across providers and institutions for the right mix of science expertise and implementation skills and relationships.

It is critical for the nation that we retain institutional knowledge, foster and develop the engineering and research skills to enable sustainable cost-effective infrastructure for future generations.

5.4 What are your thoughts on how to enable and protect mātauranga Māori in the research system?

WSP is fully supportive of a science system that capitalises on the significant strengths and contribution of mātauranga Māori. In order to protect, nurture and enhance this we feel that at the system design level there needs to be a partnership approach between MBIE and Māori. This could then establish some national level guidance, expectations, and resourcing. In turn this could cascade down through the system providing a set of core expectations that supports (not constrains) local variations.

We also note that an improved and genuine partnership approach will require greater efforts to support Māori across the research system as well as look at how engagement can be supported given likely increased demands on Māori participation and contribution.

We demonstrate our commitment to mātauranga Māori through our partnership approaches with mana whenua such as our relationship with Tūhoe and other iwi groups. We focus heavily on capacity building with a view to research outcomes being owned and implemented by mana whenua, with technical support as may be required. The research system needs to foster this outcome.

5.5 What are your thoughts on regionally based Māori knowledge hubs?

We don't have any specific views on this. We would expect that MBIE should pay particular attention to Māori researchers and iwi to identify if regional hubs are a positive move. We are regionally distributed and are well positioned to support

regional research hubs should that be the eventual outcome. Regional hubs, over time, has the potential to build core skills to support regional iwi interests. However, with the desperate shortage of Māori researchers particularly in the engineering sector this may be difficult to achieve in the short-term. For this to work, organisations such as ours through our cadet and other intern programmes are well positioned to foster research skills and developments outside of the main centres but this needs to be actively supported by MBIE.

5.6 How should we decide what constitutes a core function and how do we fund them?

WSP does not have a view about what should constitute a core function or funding at this time. We do however note that it is our view that if nationally important or significant infrastructure or capability is going to be supported, this should take place regardless of the institution type that holds that function.

5.7 Do you think a base grant funding model will improve stability and resilience for research organisations, AND how should we go about designing and implementing such a funding model?

We do not have a view about whether a base grant funding model is desirable or not at this stage. We do support funding that is more stable, consistent and transparent, reduces process costs and provides stability for investment in people and assets. Again, our view is that core funding of priority capability and infrastructure should be agnostic of organisation type. Our concern would be if a core funding model excluded commercial entities like ourselves or other independent research organisations or discriminated on the basis of organisational structure. That approach would result in the loss of critical research skills and institutional knowledge of infrastructure, particularly in the engineering sector.

5.8 How do we design collaborative, adaptive and agile research institutions that will serve current and future needs?

A key element across the consultation and in turn the design of a successful future focused system is to provide clarity about current and future needs. If this process is carried out successfully then it will provide certainty for organisations' governance to plan and respond to.

The broader review does provide an opportunity for the government to consider inter-institutional competition and replication of capability.

In OECD countries, much science funding is allocated via competitive mechanisms. Competitive funding schemes can support scientific excellence in a process that is well understood and controlled by the science community itself. However, that is not the only objective of a system and other matters should be given weighting in the process. We note that a key focus of this review should be to support Aotearoa's publicly funded science system to maximise its investment. The fostering of public institution competition (notably in and amongst CRIs and universities) should be revisited. Aotearoa does not have the people or funding to support unnecessary

duplication of skills and assets. Skills and assets should be recognised and supported irrespective of organisational structure or commercial drivers

Government has an opportunity to provide clarity about the behaviours that it is looking for and can incentivise these through the design process. A useful starting point may be to develop an evidence base to identify any disincentives that have hindered collaboration and cooperation.

5.9 How can institutions be designed to better support capability, skills and workforce development?

Training and human capital needs to be an explicit focus of all science and innovation investment programs. There needs to be consideration given to the attraction/retention of top researchers as part of the design of funding mechanisms. This also needs to be linked into wider education reform and immigration prioritisation and the need for cross-government planning is essential. Certainty of investment and stability of priorities over longer periods will also aid development of the research community.

5.10 How should we make decisions on large property and capital investments under a more coordinated approach?

WSP does not have a view on this at this time. We note a general opportunity for improved procurement processes and better planning and coordination around investment and access to research infrastructure.

5.11 How do we design Tiriti enabled institutions?

WSP is supportive of Tiriti enabled institutions and welcomes the opportunity to engage with this part of the consultation as it develops. We do not have any further comments from those provided earlier at this stage.

5.12 How do we better support knowledge exchange and impact generation? What should be the role of research institutions in transferring knowledge into operational environments and technologies?

As noted, if the end goal is a science system that delivers on prioritised national outcomes then thinking differently about the impact across the system from design through to implementation is required. Investment in the design and implementation stages should be seen as a core part of an end-end approach. This may require research organisations developing new skill sets or establishing partnerships with groups skilled in implementation beyond core research. The accessibility and actionability of research should be given weighting in assessment processes as this will drive behaviour during the design and development of projects. We believe a critical role in implementing research outcomes for the betterment of the nation.

5.13 Developing the research workforce. How should we include workforce considerations in the design of national research Priorities? What impact would a base grant have on the research workforce? How do we design new funding mechanisms that strongly focus on workforce outcomes?

Workforce matters should be part of the system design and WSP welcomes the appreciation of workforce issues in the consultation. As with other matters we have discussed, the starting point in workforce development should be clarity around national priorities and long-term commitments to these priorities. This will provide organisations with certainty and the confidence to develop and invest in their workforces accordingly. WSP generally does not employ contract researchers. Our staff are valuable assets to the organisation and all of our current researchers are permanent employees. Providing employment certainty is critical to develop research capacity. Clarity on priorities, transparent funding and no discrimination based on organisational structure will retain our ability to grow capacity particularly in the infrastructure and engineering sectors.

From a government funding perspective this would also provide the opportunity to improve workforce planning at a national level. For example, a process like a workforce/capability audit could go hand in hand with the prioritisation process. This would enable a considered view of existing and future workforce needs and support action to align the workforce to priorities through planning with professional bodies, academic institutions and through other instruments such as immigration signals.

Regards

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