

A photograph of Earth from space, showing the curvature of the planet and the thin blue atmosphere. The sky is a deep, dark blue, and the Earth's surface is a lighter blue with some white clouds. The horizon line is visible, separating the dark sky from the bright atmosphere and the Earth's surface.

Submission form

New Zealand Space Policy Review Consultation

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How to make a submission

The space policy review consultation is an opportunity to share your interests in space and views on the values and policy objectives that underpin New Zealand's space activities and engagements.

You can make a submission either through this form or the survey linked below.

Submissions close by **31 October 2022**.

Submission form

This submission form can be accessed via the MBIE consultation portal at www.mbie.govt.nz/have-your-say/new-zealand-space-policy-review. To make a submission through this form you will need to:

1. Fill out the **submitter information** page within this document, including your name, email address, phone number and organisation. If you are representing an organisation, please ensure you have the authority to represent its views.
2. Fill out your **responses to the questions** within this document. You can answer any or all of these questions.
3. Please **send this submission form** either:
 - Via email: to spacepolicyreview@mbie.govt.nz; or
 - Via post: to: Space Policy Review, Ministry of Business, Innovation and Employment, PO Box 1473, Wellington 6140.

Submission survey

Alternatively, you can complete a submission on the same questions within this form using the following link: <https://www.research.net/r/spacepolicyreview>

How feedback will be used

Your feedback will be collated into a summary of feedback report. This will assist the New Zealand government to create or amend space policies and to look at:

- *Creating a National Space Policy*: a document which outlines New Zealand's values and objectives on space, including for our international partners.
- *Articulating New Zealand's broad interests on space across multiple activities and engagements*: including at United Nations fora and with international space and security partners.
- *Developing future space strategies, policies and regulatory changes*: including adjusting our policies and regulations to meet advancements in space technology.
- *Future engagement on space policy with the New Zealand public*: including on any key areas of interest identified through the consultation.

Considering whether any legislative changes are required to the Outer Space and High-altitude Activities Act 2017.

MBIE has commissioned PublicVoice to produce a summary of feedback report on the space policy review consultation. PublicVoice will collate all submissions, and other feedback received through the course of the consultation.

All feedback from the space policy review consultation will be collated by PublicVoice for the purposes of producing a summary of feedback report. MBIE will upload the summary of feedback report onto the MBIE website, and may also upload PDF copies of submissions received to MBIE's website in due course.

Private information

The *Privacy Act 2020* establishes certain principles with respect to the collection, use and disclosure of information about individuals by various agencies, including MBIE.

Any personal information you supply to MBIE in the course of making a submission will be used in the collation of feedback on the space policy review consultation, to facilitate the purposes outlined in the "how my feedback will be used" section above.

Release of information

Submissions remain subject to requests under the *Official Information Act 1982* and MBIE will consider you to have consented to the release of your submission in full, unless you clearly specify otherwise.

Release of your submission will include releasing your name in a list of submitters in the report, and as part of uploading submissions in due course to the MBIE website – www.mbie.govt.nz, and in the event of a request under the *Official Information Act 1982*.

If you do not wish for certain information in your submission to be released, please tick the relevant boxes on the next page and outline which parts you consider should be withheld, together with the reasons for withholding the information.

MBIE will take such objections into account and will consult with submitters when responding to requests under the *Official Information Act 1982*.

Submitter information

About you

Name: Paul A. Broady

Email address: paul.broady@canterbury.ac.nz

Are you making this submission on behalf of a business or organisation?

- Yes No

If yes, please tell us the title of your company/organisation.

Would you like to be kept informed of the outcome of the Space Policy Review?

- Yes No

Are you happy for MBIE to contact you if we have questions about your submission?

- Yes No

Release of information

- Please tick this box if you do not wish your name and contact details above to be included in any information about submissions that MBIE may publish.
- Please tick this box if there is other information within your submission that you want to be kept confidential. If you have ticked this box, please state your reasons and grounds under the Official Information Act 1982 below, for consideration by MBIE.

Section 1: New Zealand interests in space

New Zealand's association with space goes back centuries – the first Māori explorers navigated by the stars to Aotearoa New Zealand, and centuries later they were followed by European navigators whose instruments also looked to the stars. Today, our modern navigation systems are still guided from space.

New Zealanders rely on space assets to do everyday tasks, like banking, transporting goods, travelling by air, and talking with each other. As the world becomes more connected and digitised, our reliance on space to support our daily lives is only going to increase.

The New Zealand government pursues a range of cross-cutting interests in space – including economic development, national security, regulation, international relations, and environmental interests. These interests are often articulated in broader government policies, strategies and assessments and inform our approach to space policy interests.

Question 1. What are your interests and relationship to space? (Pick as many as apply below)

General interest in space	Work in the New Zealand space sector	Cultural connections to space	Academic involvement on space issues	Other (please explain in box below)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Please note any other interests and relationship to space below that you would like to share.

I am concerned about the potential environmental impacts in New Zealand of an increased frequency of launches of space vehicles, especially by Rocket Lab from the Mahia Peninsula.

My further comments are limited to Section 2, Question 3 below.

Section 2: New Zealand values in space

New Zealand’s values speak to who we are as a nation and how we act in the world. The following are values that the New Zealand government aims to reflect and promote through space activities, engagements and the use of space technologies. These values are informed by the concept of kaitiakitanga (guardianship) as a guiding framework to ensure that space, and its benefits, remain accessible for all.

- **Innovation** – We value innovation, science, and technology as means of advancing our knowledge about the universe, driving productivity in the economy and improving the wellbeing of New Zealanders. We also want to encourage innovation which is responsible, enables New Zealand to be a good steward of the environment, and enables collaboration with companies and other governments.
- **Responsibility** – Space is a unique domain which is shared by all states. We act responsibly to promote a peaceful, stable, and secure space environment and to inform responsible behaviours on Earth. This includes acting in accordance with the principles in the Outer Space Treaty and other international agreements and arrangements applicable to space, as well as New Zealand’s domestic law and policies. We also seek to influence the development of new international instruments, and develop norms and standards with like-minded countries, where there are gaps.
- **Stewardship** – Space offers a unique perspective that is crucial for understanding our environment, including to fight climate change, and better manage our natural resources. At the same time, we take care to act sustainably in space and on Earth to preserve the benefits of these environments for future generations.
- **Partnership** – We are better when we work together. Participation, Partnership, and Protection are key principles of Te Tiriti o Waitangi and we want to continue to engage with Māori on New Zealand’s space activities and engagements. The government works alongside New Zealanders and the space sector in developing policy and regulations that impact them; collaborates with international partners on economic, security and other interests; and within international institutions to promote New Zealand’s values.

Question 2. To what extent do you agree or disagree that these values should apply to New Zealand’s space activities and engagements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don’t know
Innovation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Responsibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stewardship	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Partnership	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Question 3. Are there any other values, or aspects of kaitiakitanga (guardianship), that you think should apply to New Zealand’s space activities and engagements (for example, cultural values regarding space).

What are the impacts of increased space activity on NZ natural environments, e.g. 1) land, freshwater and marine ecosystems at and around launch sites, 2) the atmosphere through which launch vehicles travel?

On p30 the “Objectives” note that the NZ government intends to better protect the environment on Earth and will, specifically, assess the cumulative impact of space activities on the Earth environment. Expansion on this is very limited elsewhere in the report. P31 notes, 1) that the Kaitōrete Spit environment will be protected and rejuvenated, and 2) that NIWA has assessed the ecological risk to the marine environment from launch debris.

There needs to be a much more detailed description of the full range of potential impacts and especially of those at the current main launch site on Mahia Peninsula. How might increased activity there impact the local and regional environment?

There is no mention of the effects of launches on the atmosphere. As launch frequency could be significantly increased then this aspect needs urgent and detailed attention. What fuels are and might be used in launches? What might be the chemical and physical effects of both the fuels themselves and their combustion products on atmospheric characteristics? At a time of rapidly rising concern about climate change this should be an important focus. Also, despite concern having decreased in recent years, there is still considerable annual ozone depletion in the stratosphere. How might fuels and their combustion products affect ozone chemistry? I am aware that the production of black carbon as a waste product of combustion has been noted to affect the stratosphere (Maloney et al. 2022). To what extent might launches from NZ contribute to this effect?

Maloney CM, Portmann RW, Ross NR, Rosenlof KH. 2022. The climate and ozone impacts of black carbon emissions from global rocket launches. *Journal of Geophysical Research: Atmospheres*, 127, e2021JD036373. <https://doi.org/10.1029/2021JD036373>

Section 3: New Zealand’s space policy objectives

The New Zealand government supports a range of interests in space (economic, environmental, international, national security and regulatory) by pursuing the following key policy objectives:

- Growing an innovative and inclusive space sector
- Modelling sustainable space and Earth environments
- Promoting the responsible uses of space internationally
- Protecting and advancing our national security and economic interests
- Regulating to ensure space activities are safe and secure

Question 4. Are any of these key policy objectives of particular importance to you?

Section 3a: Growing an innovative and inclusive space sector

OBJECTIVES

The New Zealand government supports the growth of an innovative and inclusive space sector. This means:

- Promoting New Zealand’s natural advantage for conducting space activities, and research and development expertise across the space value chain
- Partnering within New Zealand and internationally to increase research and development capabilities
- Identifying opportunities to increase diversity in the space sector
- Using cutting-edge space technology and space sourced data to support New Zealand’s values and interests

Question 5. To what extent do you agree or disagree that these policy objectives will help the New Zealand government to grow an innovative and inclusive space sector?

a. Promoting New Zealand’s natural advantage for conducting space activities, and research and development expertise across the space value chain

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

b. Partnering within New Zealand and internationally to increase research and development capabilities

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

c. Identifying opportunities to increase diversity in the space sector

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

d. Using cutting-edge space technology and space sourced data to support New Zealand's values and interests

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Question 6. Do you have any comments on these policy objectives (e.g. any suggested change to how they are framed)? Is there anything missing?

Question 7. Are there any other policy objectives that you think would help the New Zealand government to grow an innovative and inclusive space sector?

Question 8. Do you have any questions or comments about what these objectives would mean in practice?

Section 3b: Modelling sustainable space and Earth environments

OBJECTIVES

The New Zealand government advocates for the sustainable use of space to ensure its benefits remain available to future generations. At the same time we seek to use space, and space technologies, to gain understanding and better protect our environment on Earth. Specifically this means:

- Encouraging inclusive, sustainable space collaborations within New Zealand
- Assessing the cumulative impact of space activities on the Earth environment
- Assisting with solving sustainability challenges through space data, including to better monitor or understand the Earth's environment
- Investing in New Zealand's capability to retain, grow, access and use sustainable space technologies

Question 9. To what extent do you agree or disagree that these policy objectives will help the New Zealand government to model sustainable space and Earth environments?

a. Encouraging inclusive, sustainable space collaborations within New Zealand

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

b. Assessing the cumulative impact of space activities on the Earth environment

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

c. Assisting with solving sustainability challenges through space data, including to better monitor or understand the Earth's environment

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

d. Investing in New Zealand's capability to retain, grow, access and use sustainable space technologies

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Question 10. Do you have any comments on these policy objectives (e.g. any suggested change to how they are framed)? Is there anything missing?)

Question 11. Are there any other policy objectives that you think would help the New Zealand government to model sustainable space and Earth environments?

Question 12. Do you have any questions or comments about what these objectives would mean in practice?

Section 3c: Promoting the responsible uses of space internationally

OBJECTIVES

The New Zealand government promotes the responsible use of space internationally. This means:

- Advocating for effective international rules, norms and standards in space
- Partnering with like-minded launch states to adopt peaceful, responsible and sustainable space practices
- Collaborating internationally to increase New Zealand's influence and capabilities in the global space sector

Question 13. To what extent do you agree or disagree that these policy objectives will help the New Zealand government to promote the responsible uses of space internationally?

a. Advocating for effective international rules, norms and standards in space

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

b. Partnering with like-minded launch states to adopt peaceful, responsible and sustainable space practices

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

c. Collaborating internationally to increase New Zealand's influence and capabilities in the global space sector

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Question 14. Do you have any comments on these policy objectives (e.g. any suggested change to how they are framed)? Is there anything missing?)

Question 15. Are there any other policy objectives that you think would help the New Zealand government to promote the responsible uses of space internationally?

Question 16. Do you have any questions or comments about what these objectives would mean in practice?

Section 3d: Protecting and advancing our national security and economic interests

OBJECTIVES

To sustainably grow our space sector by having due regard to our national interests we need to:

- Use space assets to protect and advance New Zealand’s national security and economic interests
- Manage the broad range of security risks in space to protect New Zealand’s space industry
- Collaborate with international space and security partners to pursue New Zealand’s national security and economic interests

Question 17. To what extent do you agree or disagree that these policy objectives will help the New Zealand government to protect and advance our national security and economic interests?

a. Use space assets to protect and advance New Zealand’s national security and economic interests

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don’t know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

b. Manage the broad range of security risks in space to protect New Zealand’s space industry

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

c. Collaborate with international space and security partners to pursue New Zealand's national security and economic interests

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Question 18. Do you have any comments on these policy objectives (e.g. any suggested change to how they are framed)? Is there anything missing?)

Question 19. Are there any other policy objectives that you think would help the New Zealand government to protect and advance our national security and economic interests?

Question 20. Do you have any questions or comments about what these objectives would mean in practice?

Section 3e: Regulating to ensure space activities are safe and secure

OBJECTIVES

The New Zealand government regulates to ensure New Zealand space activities are safe and secure. This means:

- Facilitating the safe and secure use of emerging space technologies from New Zealand
- Clarifying what New Zealand space activities are inconsistent with the national interest
- Promoting and protecting New Zealand's interests through permitting space technologies

Question 21. To what extent do you agree or disagree that these policy objectives will help the New Zealand government to ensure space activities are safe and secure through regulation?

a. Facilitating the safe and secure use of emerging space technologies from New Zealand

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

b. Clarifying what New Zealand space activities are inconsistent with the national interest

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

c. Promoting and protecting New Zealand's interests through permitting space technologies

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Don't know
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Question 22. Do you have any comments on these policy objectives (e.g. any suggested change to how they are framed)? Is there anything missing?)

Question 23. Are there any other policy objectives that you think would help the New Zealand government with regulating to ensure space activities are safe and secure?

Question 24. Do you have any questions or comments about what these objectives would mean in practice?

Section 3e(i): Regulating in line with our national interests

Under the Outer Space and High-altitude Activities Act 2017, the Minister for Economic and Regional Development may decline a licence or permit if they are *not satisfied* that it is in the national interest. The Minister may take into account when considering the national interest: economic or other benefits to New Zealand; risks to national security, public safety, international relations or other national interests; risks that cannot be mitigated by conditions of the licence or permit; and any other relevant matters.

As part of policy to inform the language in the Act, Cabinet has agreed to principles that will inform the consideration of national interest for space activities, as well as what is not in New Zealand's national interests. These principles are:

- **Responsibility:** that space activities from New Zealand should be conducted with due care and in such a way as to promote an orbital environment where actors avoid causing harm or interference with the activities of others.
- **Sustainability:** New Zealand should promote sustainable space practices that preserve the benefits of space for future generations.
- **Safety:** space activities from New Zealand should be conducted in a way that does not jeopardise human safety (including the safety of people in space).
- **Aligning with New Zealand's values and interests:** space activity from New Zealand should uphold the policies and values supported by New Zealanders and align with broader policy settings.

The following space activities are *not in New Zealand's interests*; i.e. the Minister will not authorise space activities:

- that contribute to nuclear weapons programmes or capabilities

- with the intended end use of harming, interfering with, or destroying other spacecraft or space systems on Earth
- with the intended end use of enabling or supporting specific defence, security or intelligence operations that are contrary to government policy
- where the intended end use is likely to cause serious or irreversible harm to the environment.

Question 25. Are there any comments you would like to make about these criteria that inform consideration of the national interest?

Question 26. What questions do you have about how the national interest is considered in practice?